CICM

Citywide Intersection Crash Mitigation

CITY OF LAS VEGAS NEVADA

Technical Memorandum #2 - Las Vegas, Nevada

Final Report

January 2021

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BUILDING RELATIONSHIPS ONE PROJECT AT A TIME

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CITYWIDE INTERSECTION CRASH MITIGATION PROGRAM
TECHNICAL MEMORANDUM #2 – FINAL REPORT

CICM

Citywide Intersection Crash Mitigation

PREPARED BY:

WOOD RODGERS

ON BEHALF OF:

CITY OF LAS VEGAS NEVADA

JANUARY 2021

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TABLE OF CONTENTS

TABLES

FIGURES

CHARTS

APPENDICES

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ACRONYMS AND ABBREVIATIONS

AAA	American Automobile Association
AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway Transportation Officials
ADA	Americans with Disabilities Act
BCR	Benefit-Cost Ratio
CAA	Clean Air Act
CICMP	*Citywide Intersection Crash Mitigation Program*
City	City of Las Vegas
CMAQ	Congestion Mitigation and Air Quality Improvement Program
CMF	Crash Modification Factor
DAC	Driver Authorization Card
EB	Eastbound
FAST	Freeway and Arterial System of Transportation
FHWA	Federal Highway Administration
FRI	Fuel Revenue Index
FYA	Flashing Yellow Arrow
GHSA	Governors Highway Safety Association
GIS	Geographic Information System
GISMO	Geographic Information Systems and Mapping Operations
HCM	*Highway Capacity Manual, 6th Edition*
HSIP	Highway Safety Improvement Program
HSM	*Highway Safety Manual*
ID	Identification
ITE	Institute of Transportation Engineers (ITE)
LED	Light-Emitting Diode
LOS	Level-of-Service
LPI	Leading Pedestrian Interval
MPH	Miles-per-Hour
MUTCD	Manual on Uniform Traffic Control Devices
NACTO	National Association of City Transportation Officials
NB	Northbound
NDOT	Nevada Department of Transportation
NHTSA	National Highway Traffic Safety Administration
PDO	Property Damage Only
PROWAG	Public Rights-Of-Way Accessibility Guidelines
RTC	Regional Transportation Commission of Southern Nevada
RTP	*Regional Transportation Plan*
SB	Southbound
SHSP	Strategic Highway Safety Plan
SMP	Safety Management Plan
SNS	Southern Nevada Strong
SPF	Safety Performance Function
STBG	Surface Transportation Block Grant Program
Systemic Tool	Systemic Safety Project Selection Tool
TA	Transportation Alternatives
TAC	Technical Advisory Committee
TRB	Transportation Research Board
v/c	Volume/Capacity
WB	Westbound

EXECUTIVE SUMMARY

The City of Las Vegas' *Citywide Intersection Crash Mitigation Program* (CICMP) is a transportation engineering effort focused on traffic safety for all users, incorporating intersection roadway conditions, crash analysis, traffic and roadway engineering, and the application of the American Association of State Highway Transportation Officials (AASHTO) and the Federal Highway Administration (FHWA) methods to mitigate and reduce roadway crashes.

The CICMP was developed to identify the City of Las Vegas (City) intersections with the highest number of crashes and highest crash rates, with a particular focus on the most vulnerable users, including vehicle-pedestrian and vehicle-bicycle involved crashes. The CICMP utilized the FHWA's *Systemic Approach* to develop countermeasures with future intersection improvements and traffic operations improvements to prevent future crashes and reach the goal of *Vision Zero* – no fatalities or serious injuries involving road traffic. The resulting analysis is being utilized by the City to apply for federal funding for safety projects.

The recommended CICMP safety improvements followed the FHWA's *Systemic Approach* along the Countermeasure Roadmap, illustrated in Figure ES-1. Additionally, the recommendations were broken down into Minor Traffic Signal Improvements, Roadway Improvements, and Pedestrian Realm Improvements, with each having the following cost and associated Benefit-Cost Ratio (BCR):

1. *Durango Drive and Charleston Boulevard* (Total Cost = $3,687,000)
   - Minor Traffic Signal Improvements = $262,000 / BCR = 67.0
   - Roadway Improvements = $3,340,000 / BCR = 8.4
   - Pedestrian Realm Improvements = $85,000 / BCR = 2.4
2. *Eastern Avenue and Stewart Avenue* (Total Cost = $4,132,000)
   - Minor Traffic Signal Improvements = $256,000 / BCR = 50.8
   - Roadway Improvements = $3,796,000 / BCR = 5.5
   - Pedestrian Realm Improvements = $80,000 / BCR = 7.9
3. *Fort Apache Road and Sahara Avenue* (Total Cost = $1,144,000)
   - Minor Traffic Signal Improvements = $262,000 / BCR = 36.6
   - Roadway Improvements = $797,000 / BCR = 17.1
   - Pedestrian Realm Improvements = $85,000 / BCR = 2.7
4. *Martin Luther King Boulevard and Bonanza Road* (Total Cost = $1,349,000)
   - Minor Traffic Signal Improvements = $256,000 / BCR = 58.1
   - Roadway Improvements = $1,013,000 / BCR = 20.8
   - Pedestrian Realm Improvements = $80,000 / BCR = 15.0
5. *Rainbow Boulevard and Lake Mead Boulevard* (Total Cost = $526,000)
   - Minor Traffic Signal Improvements = $256,000 / BCR = 34.5
   - Roadway Improvements = $190,000 / BCR = 66.1
   - Pedestrian Realm Improvements = $80,000 / BCR = 12.5
6. *Rainbow Boulevard and Charleston Boulevard* (Total Cost = $3,322,000)
   - Minor Traffic Signal Improvements = $279,000 / BCR = 37.2
   - Roadway Improvements = $2,945,000 / BCR = 5.6
   - Pedestrian Realm Improvements = $98,000 / BCR = 20.5
7. *Valley View Boulevard and Sahara Avenue* (Total Cost = $801,000)
   - Minor Traffic Signal Improvements = $259,000 / BCR = 35.5
   - Roadway Improvements = $459,000 / BCR = 28.5
   - Pedestrian Realm Improvements = $83,000 / BCR = 24.2

8. *Eastern Avenue and St. Louis Avenue* (Total Cost = $1,524,000)
    - Minor Traffic Signal Improvements = $239,000 / BCR = 12.6
    - Roadway Improvements = $1,218,000 / BCR = 3.5
    - Pedestrian Realm Improvements = $67,000 / BCR = 27.0
9. *Rainbow Boulevard and Cheyenne Avenue* (Total Cost = $2,595,000)
    - Minor Traffic Signal Improvements = $256,000 / BCR = 26.4
    - Roadway Improvements = $2,260,000 / BCR = 4.8
    - Pedestrian Realm Improvements = $79,000 / BCR = 18.2
10. *Decatur Boulevard and Washington Avenue* (Total Cost = 2,332,000)
    - Minor Traffic Signal Improvements = $251,000 / BCR = 33.6
    - Roadway Improvements = $2,006,000 / BCR = 6.0
    - Pedestrian Realm Improvements = $75,000 / BCR = 21.4

Detailed analysis results and recommendations are found throughout this technical memorandum, where specific costs for each individual recommended improvement can be found in Appendix E.

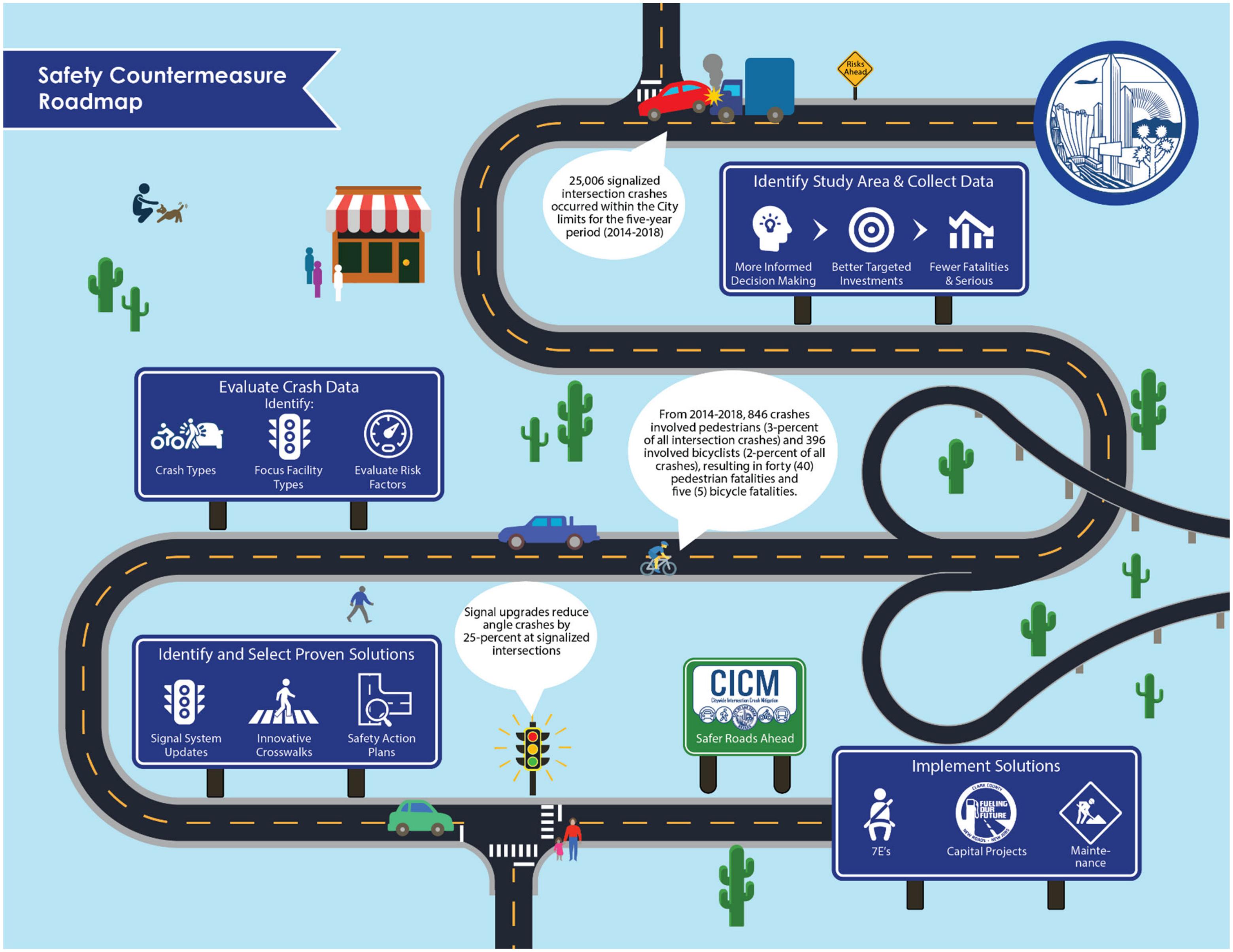

Figure ES-1: Countermeasure Roadmap

1.

INTRODUCTION

1. INTRODUCTION

The City of Las Vegas' *Citywide Intersection Crash Mitigation Program* (CICMP) is a transportation engineering effort focused on traffic safety for all users, incorporating intersection roadway conditions, crash analysis, traffic and roadway engineering, and the application of the American Association of State Highway Transportation Officials (AASHTO) and the Federal Highway Administration (FHWA) methods to mitigate and reduce roadway crashes.

The CICMP was developed to identify the City of Las Vegas (City) intersections with the highest number of crashes and highest crash rates, with a particular focus on the most vulnerable users, including vehicle-pedestrian and vehicle-bicycle involved crashes. The CICMP utilized the FHWA's *Systemic Approach* to develop countermeasures with future intersection improvements and traffic operations improvements to prevent future crashes and reach the goal of *Vision Zero* – no fatalities or serious injuries involving road traffic. The benefits of the *Systemic Approach* are it identifies a problem based on a system-wide analysis of the data, it looks for roadway characteristics that are frequently present in severe crashes, it focuses on one or more low-cost countermeasures that can be deployed widely across the system, and it identifies and prioritizes locations across the network for implementation. Whereas, the challenges of the *Systemic Approach* include the data availability dictates the level of detail in the analysis, resource availability determines the extent of the improvements, an agency's established priorities may dictate the direction of the analysis, and the relationship between the State and local agencies may impact the funding available.

1.1. Systemic CICMP Network Approach

The FHWA's *Systemic Approach*, illustrated in **Figure 1**, was utilized for the CICMP and consists of three basic elements, including:

Element 1 incorporates identifying focus crash types and risk factors, screening and prioritizing candidate locations, selecting countermeasures, and prioritizing projects.

- The CICMP went through this step-by-step process to select, recommend, and prioritize intersection countermeasures.

Element 2 consists of identifying funding for the systemic program and implementation. It provides a framework for balancing systemic and traditional safety investments to set funding goals between systemic and site analysis programs.

- The CICMP set out to achieve the correct balance between systemic and traditional safety investments with the evaluation of low-cost near-term projects and forward-looking long-term infrastructure improvements.

Element 3 is performing the systemic program evaluation by providing high-level direction for evaluating the effectiveness of systemic safety program(s).

- The CICMP concludes by providing a baseline evaluation of the effectiveness of the systemic approach and the effect it can have on future conditions.

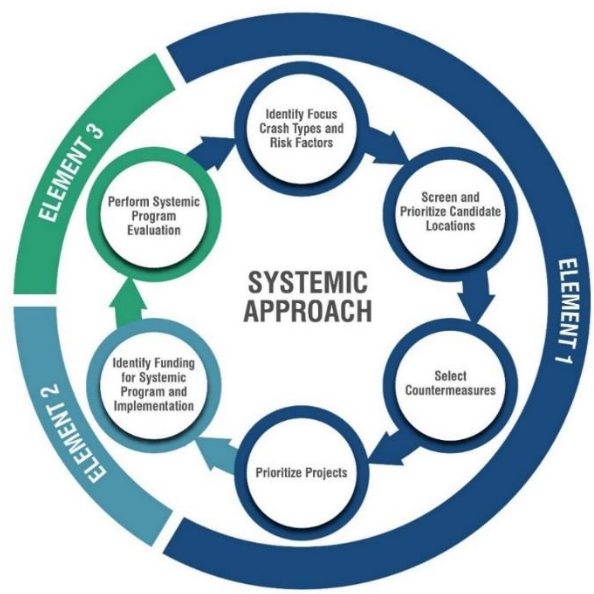

Figure 1. FHWA's Systemic Approach and Elements
Source: https://safety.fhwa.dot.gov/systemic/

1.2. Study Area and Intersections

The CICMP study area is the entire City jurisdictional limits, with a particular focus on intersections with the highest number of crashes (total crashes, pedestrian crashes, bicycle crashes) and crash rates. The City of Las Vegas Transportation Engineering Division selected ten (10) study intersections to evaluate future safety improvement opportunities, including five (5) intersections based on the overall highest crash locations for all transportation modes, and the other five (5) intersections based on crash locations with the highest pedestrian and bicycle involved crashes. The ten (10) intersections selected for further analysis include:

- *Crashes Involving All Transportation Modes*
  1. Durango Drive and Charleston Boulevard
  2. Eastern Avenue and Stewart Avenue
  3. Fort Apache Road and Sahara Avenue
  4. Martin Luther King Boulevard and Bonanza Road
  5. Rainbow Boulevard and Lake Mead Boulevard

- *Crashes Involving Pedestrians and Bicyclists*
  6. Rainbow Boulevard and Charleston Boulevard
  7. Valley View Boulevard and Sahara Avenue
  8. Eastern Avenue and St. Louis Avenue
  9. Rainbow Boulevard and Cheyenne Avenue
  10. Decatur Boulevard and Washington Avenue

A map identifying the City jurisdictional limits, its six (6) Wards, and the ten (10) selected intersections is illustrated in **Figure 2**. The crashes involving all transportation modes are represented by a magenta pink circle and the crashes involving pedestrians and bicyclists are represented by a cyan blue circle. Additionally, the total number of crashes are identified for each intersection. *Technical Memorandum #1*, located in **Appendix A**, provides further information on the intersection selection process, existing conditions collected data, and documented analysis as part of the CICMP.

1.3. Study Purpose

The CICMP has many purposes, including evaluating a selected number of intersections within the City, recommending improvements to address safety deficiencies, prioritizing the implementation of intersection improvement opportunities, determining the cost benefits of the recommended improvements, and helping the City apply for federal funding for safety projects.

Funding for the CICMP was provided by the Clark County approved measure that would allow a fuel tax to fund regional and local transportation projects throughout the Las Vegas Valley. The Fuel Revenue Index (FRI) ordinance was approved in September 2013 and helped fund transportation projects throughout Clark County, of which the City distributed a portion of their allocated money (based off of population and taxes) on the CICMP. The investment and allocation of these funds helped in the creation of jobs for people that built, maintained, and enhanced transportation infrastructure; improved overall commute times; diversified the economy; and helped in ensuring the region's ability to compete in transportation. The 3-year initial program, from 2014 to 2016, was extended for 10-years through 2026, as part of the November 2016 election. According to the Regional Transportation Commission of Southern Nevada (RTC), as of December 31, 2019, FRI is estimated to have created approximately 10,237 direct, indirect, and induced jobs, and generated $954 million in awarded FRI funding.

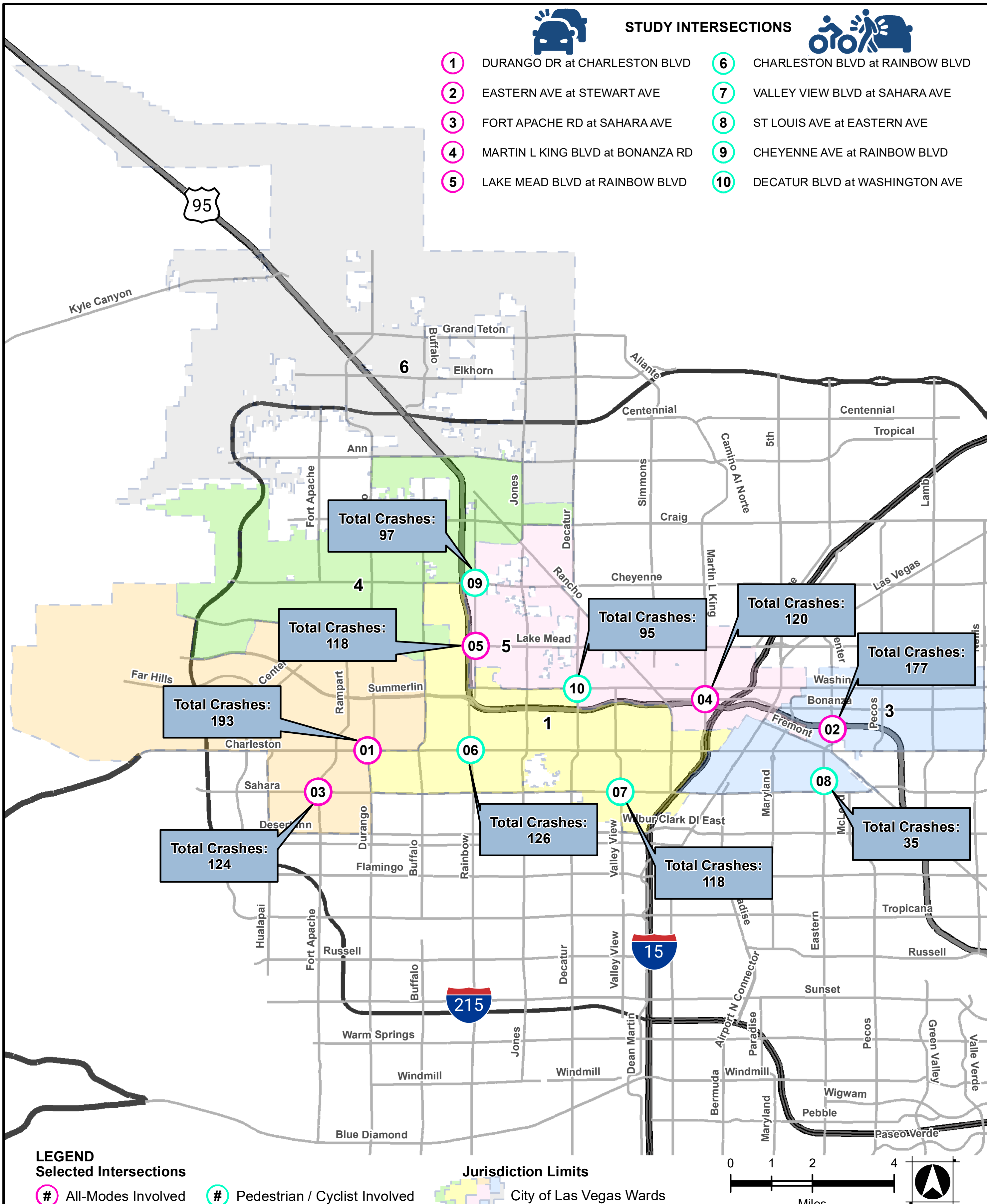

Figure 2. Study Intersections

Las Vegas Citywide Intersection Crash Mitigation Program

January 2021

NOTE:
Crash Data: NDOT 5-year 2014 to 2018

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Citywide Intersection Crash Mitigation

1.4. Report Organization

The remainder of this report is divided into the following chapters:

Chapter 2: Crash Risks and Factors Reduction Strategy

Summarizes the applied procedures outlined in the FHWA's *Systemic Safety Project Selection Tool*, AASHTO's *Highway Safety Manual* (HSM), and FHWA's *Crash Modification Factors Clearinghouse* (*CMF Clearinghouse*).

Chapter 3: Existing Conditions

Includes descriptions of the crash data evaluation, the key findings, and the local plans, studies, and planned projects. Chapter 3 focuses on the first steps of Element 1 of the *Systemic Approach* by providing background information, summarizing the crash data collection and network analysis, identifying and prioritizing the selected intersections, and determining if the recommendations can coincide with future City planned projects. *Note: A comprehensive summary of the City's network and selected intersections is provided in Technical Memorandum #1, located in* ***Appendix A***.

Chapter 4: Identification of Countermeasures and Cost Analysis

Focuses on the recommendations of systemic safety countermeasures, descriptions of identified potential network and intersection safety improvements, and their related costs (including a benefit-cost ratio). Chapter 4 focuses on the middle steps of Element 1 of the *Systemic Approach* by providing a list of countermeasure opportunities and their effectiveness.

Chapter 5: Recommendations

Summarizes the network countermeasure recommendations, funding, and an implementation plan based on low-cost and effective improvements. Chapter 5 covers all three Elements of the *Systemic Approach* by prioritizing projects for implementation, identifying funding, and providing a guideline for CICMP evaluation.

2.

CRASH RISKS & FACTORS REDUCTION STRATEGY

2. CRASH RISKS AND FACTORS REDUCTION STRATEGY

The crash risks and factors reduction strategy focused on the application of AASHTO and FHWA methods to mitigate and reduce roadway crashes.

2.1. Background

Traditional crash and roadway analysis methods historically rely on subjective or limited quantitative measures of safety performance. This requirement makes it challenging to calculate safety impacts when planning projects. Therefore, according to the FHWA, a data-driven safety analysis employs newer, evidence-based models that provide state and local agencies with the means to quantify safety impacts similar to the way they do other impacts such as environmental effects, traffic operations, and pavement condition. This approach provides reliable estimates of an existing or proposed roadway's current and future safety performance. In addition, it helps agencies make more informed decisions, better targeted investments, and ultimately reduces potential crashes occurring on the roadways, as shown in Figure 3.

Figure 3. Roadway Safety Data Program, FHWA Office of Safety
Source: FHWA, Incorporating Data-Driven Safety Analysis in Traffic Impact Analyses: A How-To Guide

2.2. Systemic Safety Analysis Tools Used

Intersection safety is evaluated as a national, state, and local priority. Organizations such as the FHWA, AASHTO, the National Highway Traffic Safety Administration (NHTSA), the Institute of Transportation Engineers (ITE), and other private and public organizations continue to develop and deploy resources designed to help make intersections operate safer.

The FHWA has developed safety implementation documentation and tools, including the *Systemic Safety Project Selection Tool* and the *CMF Clearinghouse*. As outlined on FHWA's website, there are a variety of readily available tools and data to conduct high-level safety analyses. These tools greatly advance state and local agencies' ability to incorporate clear, quantitative consideration of safety into the planning and project development decision process and implementation. The documents and tools used as part of the CICMP are summarized and presented in the following chapters, along with recommended countermeasure treatments at the selected CICMP intersections.

2.2.1. *Systemic Safety Project Selection Tool, FHWA*

The *Systemic Safety Project Selection Tool* (*Systemic Tool*) presents a process for incorporating systemic safety planning into traditional safety management processes. The *Systemic Tool* provides a step-by-step process for conducting systemic safety analysis, considerations for determining a reasonable distribution between the implementation of spot safety improvements and systemic safety improvements, and a mechanism for quantifying the benefits of safety improvements implemented through a systemic approach. The tool is intended for the use to plan, implement, and evaluate systemic safety improvement programs and projects that best meet the capabilities and needs of state, county, and local government agencies.

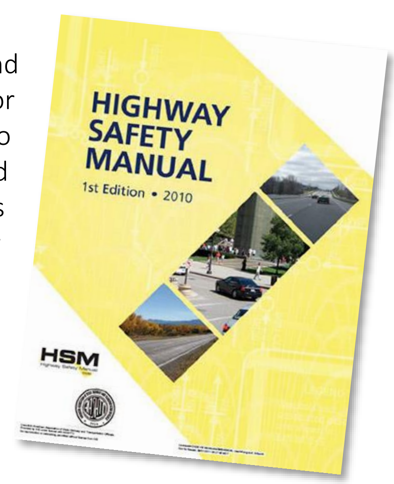
As part of the CICMP, and outlined in the *Systemic Tool*, the systemic safety analysis evaluation process includes three elements. The first element, an interim evaluation, requires a verification of current and upcoming projects. This first evaluation is important in the structure of new systemic safety programs because modifications to the project identification and selection process might be required, and the program can be more successful if these modifications are made sooner rather than later. Tracking long-term performance at the program level is the second element of analysis. Data about systemic countermeasure performance are especially useful for communicating results to stakeholders, executive management, and other interested parties. The third element, evaluating specific countermeasures, allows program managers to understand how individual elements are performing, identify where changes are needed, and adjust future funding to maximize return on investment. Identifying data needs in advance ensures that all relevant data are gathered at the appropriate time after projects are implemented.

Advantages of the *Systemic Tool* include:

- A step-by-step process for conducting systemic safety planning
- A balance between spot and systemic safety improvements
- Analytical techniques for quantifying the benefits of a systemic safety program

2.2.2. *HSM, AASHTO*

The *HSM*, published by AASHTO, is the recognized source of information and methods for quantitatively evaluating traffic safety performance on existing or proposed roadways. The *HSM* provides a science-based, technical approach to facilitate consideration of safety in roadway planning, design, operations, and maintenance decisions that aides state and local agencies in the safety analysis process. This allows safety to be quantitatively evaluated alongside other transportation performance measures such as traffic operations, environmental impacts, pavement durability, and construction costs.



The HSM is organized into the following four parts:

A

Part A provides the fundamentals of safety and includes a discussion of the interaction of human, roadway, and vehicle factors that may contribute to vehicle crashes and hence, roadway safety. Its purpose is to provide a review of the background information required to apply the predictive method, CMFs, and evaluation methods provided in Parts B, C, and D.

B

Part B covers the basic elements of the road safety management process and the role that analysis plays within that framework. The basic elements covered are:

- *Network Screening* – Identifying and ranking locations based on the potential to reduce crash frequencies
- *Diagnosis* – Identifying safety problems through evaluation of crash data and site conditions
- *Countermeasure Selection* – Identifying alternatives to implement which show potential for improvement of safety performance
- *Economic Analysis and Prioritization* – Evaluating the benefits associated with proposed countermeasures and prioritizing implementation strategies accordingly
- *Safety Effectiveness Evaluation* – Using analysis techniques to evaluate the effectiveness and impact of implemented countermeasures

C

Part C presents the predictive method for evaluating crash expectancy on roadway segments, at intersections, or along corridors and networks comprised of segments and intersections. This method is typically used in the Network Screening process described in Part B, or at isolated locations to evaluate the crash history at a particular location. Specific equations are provided for evaluating two-lane rural highways, rural multilane and urban and suburban arterial facilities, freeways, and ramps. For urban arterials, only facilities up to four lanes (two lanes in each direction) are currently included in the analysis tools. *HSM* safety prediction relies on safety performance functions (SPFs) that express the predicted crash frequency for a basic segment or intersection defined by the type of facility under a specific set of base conditions. A unique SPF equation has been developed for each roadway and intersection type, and adjustments to the equations are made to account for differences between the specific site condition(s) being evaluated and the assumed base condition the equations were developed for using adjustment factors. Part C provides detailed instruction on how to use and adjust the SPF equations.

D

Part D covers the impact of countermeasures on safety performance, and how countermeasures can be evaluated using CMFs. CMFs are typically used to estimate the change in the predicted number of crashes at a site when one or more specific safety countermeasures are implemented. CMFs are presented in either decimal form or as an equation, and CMFs for specific countermeasure treatments are included for roadway segments, intersections, interchanges, special facilities, and road networks.

Although, the *HSM* does not use a systemic approach, some of the procedures developed in the document are closely related to this methodology. The *HSM* outlines a six-step roadway safety management process that includes network screening, diagnosis, countermeasure selection, economic appraisal, project prioritization, and safety effectiveness evaluation.

Advantages of the HSM include:

- Safety Improvements
  - ✓ Improve the decision-making process and effectiveness of countermeasures to reduce the number and severity of crashes.
- Cost Savings
  - ✓ Decisions can be made based on quantitative evaluations that predict crash reduction associated with improvements, instilling confidence that safety funds are being applied most effectively.
  - ✓ Time spent justifying a safety decision will be reduced by conducting a definitive, science-based analysis.
  - ✓ Integrate safety elements in the most cost-effective manner in the project development process.

2.2.3. CMF Clearinghouse, FHWA

The FHWA established the *CMF Clearinghouse* in an effort to maintain all documented CMFs in a central location. CMFs quantify the expected change in average crash frequency as a result of geometric or operational modifications to a site that differs from set base conditions.

The *CMF Clearinghouse* currently houses over 3,500 CMFs, offers a searchable database of CMFs along with guidance and resources on using CMFs in road safety practice, and provides:

A. A regularly updated, online repository of CMFs
B. A mechanism for sharing newly developed CMFs
C. Educational information on the proper application of CMFs

The *CMF Clearinghouse* summarizes published information on each CMF, including how it was developed (study design, sample size, source of data) and what its statistical properties are (standard error).

3.

EXISTING CONDITIONS

3. EXISTING CONDITIONS

An important consideration in determining appropriate safety alternatives is identifying locations with a history of crashes. Crash history can help focus an analysis to "hot-spot" locations with the greatest potential for crash reduction. As part of the *Systemic Approach*, the evaluation of crashes within the City's jurisdiction was performed.

A variety of data collection was required to build and analyze the crash network within the City limits and includes:

- Aerial Imagery – Provided by Clark County Geographic Information Systems and Mapping Operations (GISMO)
- Geometry of the Street Network – Provided by City Open Portal
- Signal Timing Data – Provided by RTC's Freeway and Arterial System of Transportation (FAST)
- Field Visit – Conducted by Wood Rodgers on March 26, 2020
- Turning Movement Volumes – Proved by the City
- Crash Data – Provided by the Nevada Department of Transportation (NDOT) for the five-year period from January 1, 2014 to January 1, 2019

The first section of this chapter (*Crash Data Evaluation*) evaluates Element 1 of the *Systemic Tool* by summarizing the steps taken to identify focus crash types and risk factors, and screening and prioritizing candidate locations as performed in *Technical Memorandum #1* (Appendix A) of the CICMP. The second section of this chapter (*Key Findings [Crash Intersection Patterns]*) identifies the key findings of the crash data analysis and candidate location site visits. The third section of this chapter (*Local Plans, Studies, and Planned Projects*) identifies planned projects surrounding the candidate locations.

Technical Memorandum #1 (Appendix A) also contains existing conditions of the following:

- 5-yr summary of crashes and trends at City intersections with network and selected intersection findings
- Vehicle-pedestrian crash results (detailed geographic information system (GIS) maps and tables)
- List of highest crash locations and highest crash rates at existing intersections
- GIS crash summary maps, traffic control device maps, existing and proposed land use maps, community facilities map, and bicycle and pedestrian network map

3.1. Crash Data Evaluation

The crash data evaluation included identifying target crash types, identifying focus facility types, identifying and evaluating risk roadway factors, and screening and prioritizing candidate locations.

3.1.1. *Identify Target Crash Types [Element 1]*

Systemic problem identification involves the identification of target crash types and the commonly associated location characteristics experienced across the system. For the CICMP, systemic problem identification was based on a City network system-wide review of crash data and the documentation of crash characteristics.

Identification of preventable crashes that represent the greatest opportunities for crash reduction are typically characterized by the greatest number of crashes across the system. As such, intersection related crashes were considered the target crash type and vulnerable special users, such as pedestrians and bicyclists, were categorized as variables in identifying target crash types.

The key to the *Systemic Approach* is evaluating an entire system using a defined set of criteria, which results in a contingent prioritization that indicates some elements of the system are better candidates for safety investment compared to others. In turn, the outlined criteria for the CICMP included the following two initial criteria parameters:

- High signalized intersection crash locations involving <u>ALL</u> crashes
- High signalized intersection crash locations involving pedestrians and bicyclists

The two initial criteria parameters were narrowed down by removing locations where the intersections were currently being analyzed through another project. The resulting intersection crash locations were used to help the City's Transportation Engineering Division select ten (10) signalized intersections to evaluate further, of which five (5) were based off of <u>ALL</u> crashes, and five (5) were based off of vehicle-pedestrian and vehicle-bicycle crashes.

3.1.2. Identify Focus Facility Types [Element 1]

Determining where and on which facilities the crashes were occurring was based on identifying and defining the target facilities. For example, intersection related crashes were defined as all crash locations where the reporting officer designated the crash within a 200-foot radius of an intersection roadway junction node, which included both signalized and unsignalized intersections. However, crashes located on NDOT facilities within City limits, such as freeway ramp intersections, were eliminated from further analysis. Thus, the facility types identified in the *Systemic Approach* as part of the CICMP were refined and prioritized based on the following parameters:

- High crash intersections within City limits
- Intersections not classified as highway/freeway facilities, including freeway segments and ramps
- Intersections with recorded turning movement traffic volumes

3.1.3. Identify and Evaluate Risk Roadway Factors & Screen and Prioritize Candidate Locations [Element 1]

Documentation and evaluation of the most common characteristics and risk factors for the identified crash types and facilities was performed. As part of the process, identified risk factors outlined by the *Systemic Approach* were evaluated for the selected intersections. Roadway factors represent the roadway and traffic characteristics present at locations experiencing higher than expected frequencies of the target crash type on the focus facility type. Once the City's Transportation Engineering Division selected the CICMP intersections, the roadway characteristics associated with particular crash types were identified. The following is a list of risk factors, which is an expansion of the *Systemic Approach* potential risk factors, at the selected CICMP intersections:

Roadway and Intersection Features
▶ Number of through lanes
▶ Presence, number, and length of left-turn and right-turn lanes
▶ Allowance of right-turn-on-red
▶ Allowance and signing of U-turns
▶ Intersection control device
▶ Left-turn phasing
▶ Number of signal heads versus number of lanes
▶ Presence of retroreflective backplates
▶ Through lane alignment
▶ Overhead versus pedestal mounted signal heads
▶ Presence and type of median

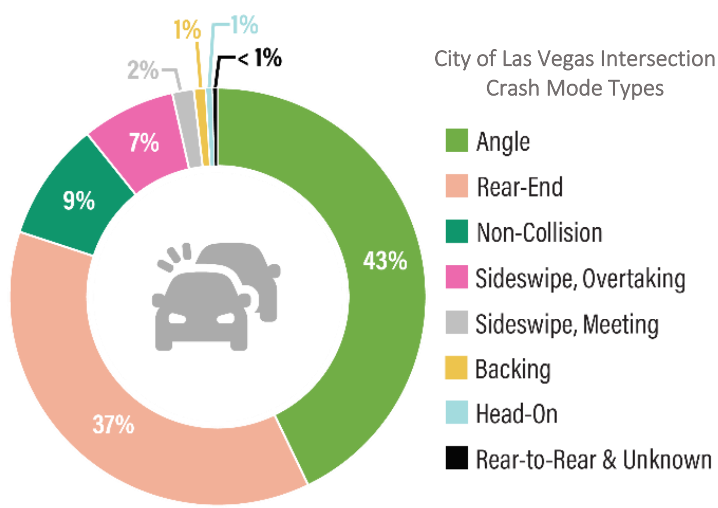
Roadway and Intersection Features - Continued
▶ Pedestrian crosswalk presence, crossing distance, and signal head type
▶ Presence of bicycle facilities
▶ Presence of on-street parking
▶ Location and presence of bus stops including bus turnouts
▶ Presence of lighting
▶ Driveway density and distances from intersection
▶ Presence of advanced warning signs
▶ Freeway access
Traffic Volume
▶ Annual average daily traffic (AADT) volumes
▶ Intersection turning movement volumes
Other Features
▶ Posted speed limit or operating speed
▶ Presence of nearby railroad crossing
▶ Presence of automated enforcement
▶ Adjacent land use, such as schools, commercial, or alcohol-sales establishments
▶ Location and presence of bus stops facilities

Each of the listed risk factors was documented through a field review at all ten (10) selected intersections to identify existing safety concerns and is summarized in **Table 1**. The accompanying detailed field review results can be viewed in *Technical Memorandum #1* (**Appendix A**).

Crash Type, Severity, and Factors

In addition to the potential risk factors, 5-year crash history data was broken down by crash type, crash severity, and crash factors for all ten (10) selected intersections. **Chart 1** summarizes the total number of crashes for all ten (10) selected intersections based on crash type, whereas **Table 2** summarizes the crash factors and resulting injury severity for each of the selected intersections. Similar to the potential risk factors, the accompanying detailed crash type, crash severity, and crash factors are illustrated in *Technical Memorandum #1* (**Appendix A**). Moreover, **Appendix B** provides detailed intersection crash factor data for the selected CICMP intersections.

Chart 1: Selected Intersections Crash Type Summary



Source: Wood Rodgers, September 2020

Table 1: Intersection Potential Risk Factors

ID	Intersection	Traffic Conditions				Pedestrian Realm			Bicycle and Transit Realm	
		Posted Speed Limit	Signal Head Alignment[1]	Retroreflective Backplate	Signalized Left-Turn	Crosswalk	ADA Compliant Curb and Sidewalk	Lighting Conditions[2]	Bicycle Facility Amenities	Transit Facility Amenities
1	Durango Dr at Charleston Blvd	**> 35 MPH**	**Non-Compliant**	**No**	**Green Ball - Permitted**	Yes	**Non-Compliant**	**1-Luminaire**	**No**	**Shelters**
2	Eastern Ave at Stewart Ave	≤ 35 MPH	**Non-Compliant**	**No**	FYA[3] - **Permitted**	Yes - **Faded**	**Non-Compliant**	**1-Luminaire**	**No**	**NB: N/A**
3	Fort Apache Rd at Sahara Ave	**> 35 MPH**	**Non-Compliant**	**No**	Protected	Yes - **Faded**	**Non-Compliant**	**1-Luminaire**	Shared with BRT	**Shelters**
4	Martin L King Blvd at Bonanza Rd	≤ 35 MPH	**Non-Compliant**	**No**	Protected	Yes - **Faded**	**Non-Compliant**	**1-Luminaire**	**No - Striped not Signed**	**NB/SB: No Amenities**
5	Lake Mead Blvd at Rainbow Blvd	**> 35 MPH**	**Non-Compliant**	**No**	Protected	**No**	**Non-Compliant**	**1-Luminaire**	**No**	**WB: N/A**
6	Charleston Blvd at Rainbow Blvd	**> 35 MPH**	**Non-Compliant**	**No**	Protected	Yes - **Faded**	Compliant	**1-Luminaire**	**No - Wide Shoulder**	**Shelters**
7	Valley View Blvd at Sahara Ave	**> 35 MPH**	**Non-Compliant**	**No**	Protected	Yes - **Faded**	**Non-Compliant**	**0 Luminaires for West Crosswalk, 1-Luminarie for Other Crosswalks**	Shared with BRT	**Shelters**
8	St Louis Ave at Eastern Ave	≤ 35 MPH	**Non-Compliant**	**No**	**Green Ball - Permitted**	Yes - **Faded**	**Non-Compliant**	**1-Luminaire**	Yes	**EB/WB: N/A**
9	Cheyenne Ave at Rainbow Blvd	**> 35 MPH**	**Non-Compliant**	**No**	Protected	Yes - **Faded**	**Non-Compliant**	**1-Luminaire**	**No**	**Shelters**
10	Decatur Blvd at Washington Ave	**> 35 MPH**	**Non-Compliant**	**No**	FYA - **Permitted**	Yes - **Faded**	**Non-Compliant**	**1-Luminaire**	**Yes -Disjointed**	**Shelters**

Notes:
Characteristics represent all four-intersection approach legs with at least one countermeasure opportunity presented at one of the four approaches
Full roadway geometric and surrounding characteristics are presented in Appendix A
***Bold** highlights areas where countermeasure opportunities were identified*
[1] According to the 2009 Manual on Uniform Traffic Control Devices (MUTCD), "one overhead signal face should be located approximately over the center of each through lane" – Non-Compliant Signal Head Alignment refers to the alignment of the signal heads (signal head not located over the center of the lane) as well as the number of signal heads (number of signal heads is less than the number of lanes)
[2] Refer to CCAUSD 300.S3 for required luminance and 301.S2/302.S2 for streetlight locations
[3] FYA = Flashing Yellow Arrow

Source: Wood Rodgers, Inc. site visit field collection data gathered March 26th, 2020

Table 2: Selected Intersections Contributing Factors and Resulting Injury Severity

ID	Intersection	Most Common Factors							Injury Severity			Total Crashes	Total Pedestrian & Cyclist Crashes
		Hour / Day / Month	Lighting	Driver Factor	Crash Type	Most Harmful Event	Weather	Vehicle Factor / [Hit-and-Run ranking]	PDO[1]	Injury	Fatal		
1	Durango Dr at Charleston Blvd	7 PM / Thursday / June	Daylight	Normal	**Angle**	Unknown	Clear	Failed to Yield Right-of-Way / [Hit & Run – 3rd]	86	107 Bicycle: 1	0	193	**1**
2	Eastern Ave at Stewart Ave	2 PM / Friday / January - February (tie)	Daylight	Normal	**Angle**	Unknown	Clear	Unknown / [Hit & Run: - 5th]	104 Pedestrian: 1	73 Pedestrian: 1	0	177	**4**
3	Fort Apache Rd at Sahara Ave	11 AM / Sunday / August	Daylight	Normal	**Rear-End**	Unknown	Clear	Unknown / [Hit & Run: - 2nd]	69 Pedestrian: 1	55 Bicycle: 1	0	124	**2**
4	Martin L King Blvd at Bonanza Rd	3 PM / Thursday / March	Daylight	Normal	**Rear-End**	Unknown	Clear	Unknown / [Hit & Run: - 4th]	74	45 Pedestrian: 5 Bicycle: 1	1*	120	**6**
5	Lake Mead Blvd at Rainbow Blvd	1 - 2 PM (tie) / Monday / December	Daylight	Normal	**Angle**	Unknown	Clear	Unknown / [Hit & Run – 3rd]	68	50 Pedestrian: 4 Bicycle: 1	0	118	**5**
6	Charleston Blvd at Rainbow Blvd	10 AM - 12 PM - 6 PM (tie) / Tuesday / January	Daylight	Normal	**Rear-End**	Unknown	Clear	Unknown / [Hit & Run: - 2nd]	65	61 Pedestrian: 7 Bicycle: 3	0	126	**10**
7	Valley View Blvd at Sahara Ave	4 PM / Thursday / July	Daylight	Normal	**Rear-End**	Unknown	Clear	Unknown / [Hit & Run – 3rd]	65	53 Pedestrian: 6 Bicycle: 4	0	118	**10**
8	St Louis Ave at Eastern Ave	3 PM / Saturday / November	Daylight	Normal	**Angle**	Unknown	Clear	Unknown / [Hit & Run: - 6th]	17	18 Pedestrian: 7 Bicycle: 2	0	35	**9**
9	Cheyenne Ave at Rainbow Blvd	12 PM / Friday / June – November (tie)	Daylight	Normal	**Angle – Rear-End (tie)**	Unknown	Clear	Unknown / [Hit & Run: - 2nd]	60 Pedestrian: 1	37 Pedestrian: 5 Bicycle: 2	0	97	**8**
10	Decatur Blvd at Washington Ave	1 PM - 7 PM (tie) / Tuesday / February - June – August (tie)	Daylight	Normal	**Angle**	Unknown	Clear	Unknown / [Hit & Run – 3rd]	44	51 Pedestrian: 5 Bicycle: 3	0	95	**8**

Notes:
Age is not listed as a Common Factor as the most frequent factor was documented as "Unknown"
[1] PDO = Property Damage Only
** The fatal crash at Martin Luther King Blvd and Bonanza Rd involved a northbound vehicle and a motorcycle in the number 2 lane as a result of an angle crash. The motorcyclist was reported to had been drinking at the time of the incident*
***Bold** highlights areas where countermeasure opportunities were identified*

Source: NDOT 5-year 2014 to 2018 crash database

HSM and CMF Clearinghouse

In addition to the roadway risk factors and the crash contributing factors, the HSM was utilized to identify additional roadway characteristics and factors. The HSM, and its subsidiary CMF Clearinghouse, are references used to estimate the degree to which each roadway factor contributes to increases in target crash frequencies within a facility type. The use of CMF values comparing the predicted number of crashes between the base condition and the recommended condition for each of the selected intersections is presented in Chapter 4.

Prioritize Candidate Locations

The next step in the *Systemic Approach* is to develop a prioritized list of locations on the roadway system that could benefit from systemic safety improvement projects. This prioritized list was created earlier in the *Systemic Approach* where the City's network intersections were screened and prioritized based on the targeted crash types and facilities. The City's Transportation Engineering Division selected five (5) signalized intersections based off of high intersection crash locations involving ALL crashes and five (5) signalized intersections based off of high intersection crash locations involving pedestrians and bicyclists. Figure 2 illustrates the location of the ten (10) selected intersections to be evaluated further, where countermeasure recommendations are provided later in this report.

3.2. Key Initial Findings

Key initial findings from analyzing the crash data patterns to analyzing intersection site conditions patterns were performed at each of the ten (10) selected intersections. These key initial findings were utilized to help recommend the countermeasures discussed in Chapter 4.

Intersection Crash Data Patterns

For the five-year crash history period, presented in *Technical Memorandum #1* (Appendix A), there were a total of 1,203 crashes, resulting in 550 injuries, at the ten selected intersections. The injuries included 45 crashes involving pedestrians and 18 crashes involving bicyclists, with one reported fatality involving a motorcycle/moped. Some common themes, with the exclusion of "Unknown" parameters, were angle crashes, rear-end crashes, and hit-and-run crashes.

Angle and rear-end crashes were extremely common at all ten selected intersections, in fact, angle crashes and/or rear-end crashes were always the most common crash type. Intersections that include permissive left-turns (permitted green ball or flashing yellow arrow (FYA)) all have angle crashes as their most common crash type. In addition, hit-and-run crashes occurred frequently at each of the ten intersections and resulted in a total of 142 crashes, which accounted for 11.8-percent of all vehicle crash factors.

1,203

10 Selected Intersections

From 2014 to 2018, a total of 1,203 intersection crashes occurred at the CICMP selected intersections

Incapacitating injuries

27 out of 1,203 crashes (2.2%) resulted in incapacitating injuries

2.2%

11.8%

Hit-and-Run Crashes

142 out of 1,203 crashes (11.8%) were the result of a hit-and-run

Pedestrian & Bicyclist Crashes

63 out of 1,203 (5.2%) crashes involved a pedestrian or bicyclist

5.2%

Left-Turn Crashes

17.5%

210 out of 1,203 crashes (17.5%) were the result of a vehicle making a left-turn

54.9%

106 out of 193 crashes (54.9%) at the intersection of Durango Drive and Charleston Boulevard were the result of a vehicle making a left-turn

Intersection Site Condition Patterns

As mentioned earlier, part of the *Systemic Approach* includes identifying associated risk factors that led to the high number of crashes at the selected intersections. In turn, the intersection site condition patterns offered a glimpse of the common concerns that exist at all ten of the selected intersections, each of which is described as follows:

Signal Heads do not Equal the Number of Approaching Lanes

Signal heads should be centered over each approaching lane, including left-turn and right-turn lanes. If turn signals are located above a through lane, drivers in the through lane sense that it is the through lane that is green.

All 10 intersections have approaches where the signal heads do not equal the number of lanes.

Signal Heads do not have Retroreflective Backplates

Retroreflective backplates should be installed onto each signal head. According to the FHWA, *"Transportation agencies should consider backplates with retroreflective borders as part of their efforts to systemically improve safety performance at signalized intersections. Adding a retroreflective border to an existing signal backplate is a very low-cost safety treatment."*

All 10 intersections have approaches where signal heads do not have retroreflective backplates.

Intersection Street Lights do not have Dual Luminaires

Each analyzed intersection should have a street light with dual luminaires in each corner of the intersection, where the luminaires point toward the two different approaching crosswalk directions. The dual luminaires create additional lighting at the intersection and makes pedestrians more visible and feel safer crossing the intersection.

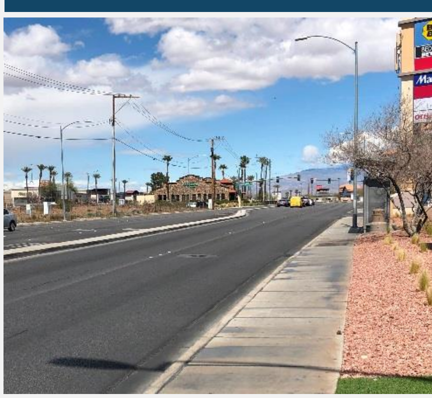
All 10 intersections have either one (1) or zero (0) luminaires in each corner of their respective intersection.

Driveway Distances are too Close to the Intersection

According to the *Clark County Area Access Management Guidelines*, for a 45 miles-per-hour (MPH) major arterial intersecting with another 45 MPH major arterial, the minimum upstream distance of a driveway from the intersection is 600-feet, similarly, the minimum downstream distance of a driveway from the intersection is 450-feet. Additionally, driveways closer than 50-feet from the intersection result in over a 33% increase in crashes.

All 10 intersections have driveway distances less than the Clark County minimum standard.

Transit Stops are not Located in a Bus Turnout or “BUS ONLY” Lane



Ideally, all transit stops would have a bus turnout on the far-side of the intersection, or be located on the far-side of a “BUS ONLY” lane. The bus turnout prevents buses from stopping in the through travel lane, which requires vehicles within that lane to merge over a lane or wait for transit passengers to board and alight. In turn, the bus turnout helps reduce rear-end and sideswipe crashes.

9 out of 10 intersections have buses that stop within the through travel lane due to a lack of a bus turnout and/or “BUS ONLY” lane.

Intersection Approach does not have a Dedicated Right-Turn Pocket

Right-turn pockets can help reduce rear-end collisions and improve the overall traffic operation of an intersection as it keeps the outside through travel lane from slowing and/or stopping when a vehicle makes a right-turn. According to the FHWA, adding a right-turn lane on a multilane approach results in a 40% reduction in fatal and injury crashes and a 10% reduction in property damage only (PDO) crashes.

9 out of 10 intersections have intersection approaches that do not have dedicated right-turn pockets.

Intersection Approach Through Lanes do not Line Up with Their Corresponding Receiving Lane

Approaching through lanes should line up straight with its corresponding receiving lane on the opposite side of the intersection to help prevent sideswipe crashes from occurring within the intersection. If this is not physically possible, an alternative is to place "cat tracks" through the middle of the intersection to help safely guide vehicular drivers through the intersection.

9 out of 10 intersections have approaching through lanes that do not line up with their corresponding receiving lane.

Sidewalks and Curb Ramps are not Americans with Disabilities Act (ADA) Compliant

All sidewalks and curb ramps should either abide by Public Rights-Of-Way Accessibility Guidelines (PROWAG) standards or ADA standards. If pedestrians, people needing wheelchairs, and people needing scooters do not have proper ADA clearance, the user will either have to utilize the landscape or the roadway to traverse around poles, electrical boxes, and ramps not to code. Creating extra sidewalk space can help the users stay within the sidewalk realm and help prevent vehicle-pedestrian crashes.

9 out of 10 intersections have sidewalks and/or curb ramps that are not ADA-compliant.

Crosswalks are Faded or not to Current Standards and Need to be Restriped

Crosswalks should be restriped and updated to current standards because well-defined crosswalks help pedestrians stay within the pedestrian crossing area and alert motorists of a pedestrian crossing location.

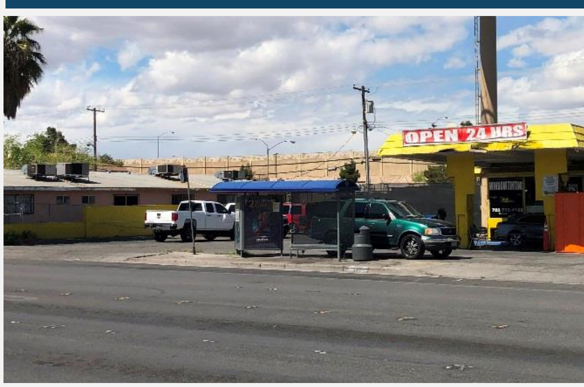
9 out of 10 intersections have crosswalks that need to be restriped and/or updated to current standards.

Approaching Speed Limit is Posted at 45 MPH

Reducing all arterial speed limits from 45 MPH to 35 MPH would greatly reduce the severity of all crashes and help lead the City towards its goal of Vision Zero. According to America Walks' *Speed: A National Pedestrian Safety Issue*, *"If a pedestrian is hit by a vehicle that is traveling 20 MPH, the pedestrian survival rate is 95-percent. This drops to 60-percent at 30 MPH, and just 20-percent at 40 MPH."*

7 out of 10 intersections have approaches with posted speed limits of 45 MPH.

Transit Stop Shelters and Benches are Located within the Sidewalk Realm



All transit stop shelters and benches should be located behind the sidewalk, preferably 6-feet from the curb face, and away from blocked walls. This will increase the safety of the transit riders and pedestrians within the sidewalk realm (see *Sidewalks and Curb Ramps are not ADA-Compliant*). According to the *AASHTO Roadside Design Guide*, *"In an urban environment, approximately 80-percent of roadside crashes involved an object with a lateral offset from the curb face equal to or less than 4-feet and more than 90-percent of urban roadside crashes have a lateral offset less than or equal to 6-feet".* Thus, moving all transit stop shelters and benches 6-feet from the curb face would reduce crashes at these locations by more than 90-percent.

7 out of 10 intersections have transit stop shelters and/or benches that are located within the sidewalk realm.

U-Turns are not Signified

Intersections should signify if U-Turns are allowed as U-Turns can cause crashes due to right-turn-on-red vehicles not anticipating the U-Turn movement. U-Turns should not be allowed if there is not enough roadway width to perform the movement safely. Where U-Turns are allowed, a red right-turn arrow should be carefully considered, however there is a potential trade-off with traffic operations by eliminating the right-turn-on-red movement.

5 out of 10 intersections have left-turn approaches that do not signify if a U-turn is allowed.

Intersection Left-Turn Approach is Permitted

Permitted (green ball) left-turns and protected/permissive (FYA) left-turns result in a higher number of angle crashes and an increase in the severity of crashes compared to protected (green arrow) left-turns. In fact, all of the selected intersections for the CICMP that currently allow permitted left-turns have angle collisions as the most frequent crash type. *It should be noted that FYA left-turns are safer than the permitted only left-turns, but protected left-turns are the safest of the three left-turn options.*

4 out of 10 intersections have left-turn approaches that allow permitted left-turns.

Intersection is Located Near a Freeway Access Intersection

Vehicular drivers exiting the freeway typically travel at higher speeds than posted on the arterials, thus the proximity of the intersection to the freeway is a concern. In addition, some freeway signalized intersections are too close (less than ½-mile apart) to the adjacent selected intersection, which creates safety issues due to weaving, lack of queuing, and lack of platooning.

4 out of 10 intersections are within close proximity of freeway access.

Lack of Median Island

Median islands are easy to identify and prevent turning vehicles from crossing into the opposite travel lane. They add access management by preventing left-turns close to the intersection, they add a level of comfort to drivers and pedestrians, and they help prevent head-on crashes.

3 out of 10 intersections have approaches that do not have a median island.

Lack of Sight Distance

Proper sight distance is needed when vehicles are approaching the intersection, as well as when vehicles are exiting driveways near the intersection. According to the FHWA, "Poor sight distance can lead to rear-end crashes on the approaches and to angle crashes within the intersection because motorists may be unable to see and react to traffic control devices or approaching vehicles."

3 out of 10 intersections have approaches where poor sight distance exists.

Detailed figures identifying the intersection site condition patterns for all ten selected intersections are provided in *Technical Memorandum #1* (Appendix A).

3.3. Local Plans, Studies, and Planned Projects

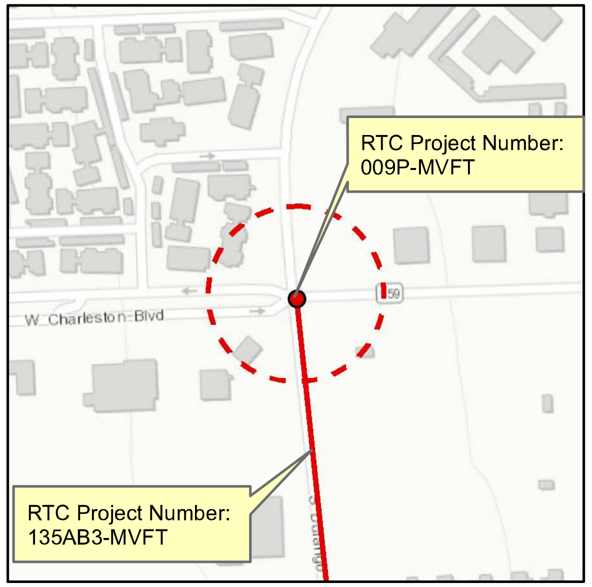
Local plans, studies, and planned projects that are relevant to the selected intersections were identified by the CICMP Technical Advisory Committee (TAC). The TAC utilized the following sources to help identify upcoming projects:

- *RTC 2017-2040 Regional Transportation Plan (RTP)*
- *RTC 2017 Regional Bicycle and Pedestrian Plan for Southern Nevada*
- *Draft City Mobility Master Plan*
- *Regional Project Coordination Committee GIS Website*
- City Staff

Projects located within ¼-mile of the selected CICMP intersections are presented in Figure 4A and Figure 4B, and detailed descriptions of the future identified projects are provided in Appendix C. The planned projects can be used to help incorporate the recommended CICMP intersection countermeasures.

Note: During the course of the CICMP, the intersection of Durango Drive and Charleston Boulevard went under construction, where elements of the design were taken into consideration for the recommended CICMP intersection countermeasures (construction plans located in **Appendix C***). Additionally, the intersection of Valley View Boulevard and Sahara Avenue is currently under design and the CICMP intersection countermeasures were taken into consideration during the redesign of the intersection.*

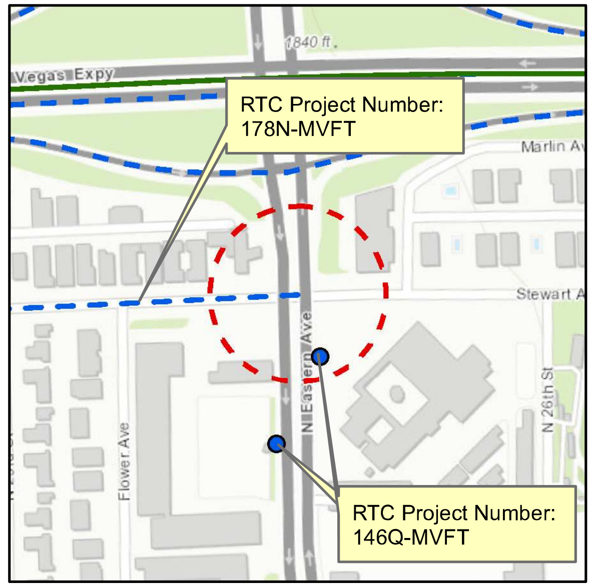
1. Durango Drive & Charleston Boulevard



Intersection
Project Details:
NAME: Charleston @ Durango/Rancho Intersection Improvements (AKA Traffic Package 6B)
FUNDING: NDOT, RTC
FUNDED AMOUNT: $3,304,000
DESCRIPTION: Modify intersections to provide dual left turn lanes, exclusive right turn lanes, and other geometric improvements to improve traffic safety. Project ID# 25814
Program: 405000 - TRAFFIC IMPROVEMENTS
Department: Public Works

Roadway
Project Details:
NAME: Pavement Overlay - Durango, Sahara to Charleston
PHASE: DESIGN
CATEGORY: ROADWAY
DESCRIPTION: Pavement Overlay - Durango, Sahara to Charleston
AGENCY: Las Vegas

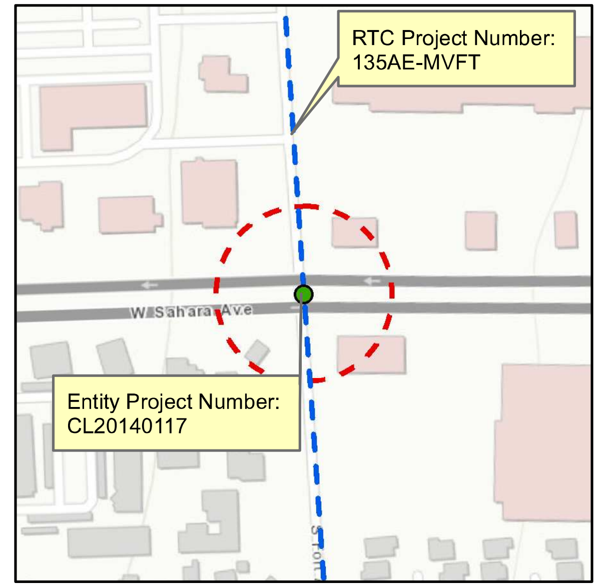
2. Eastern Avenue & Stewart Avenue



Intersection
Project Details: 12 Bus turnouts along Eastern and Nellis between Owens Avenue and Charleston Boulevard.
Eastern and Nellis Bus Turnouts
Project Status: DESIGN
Project Type: Roadway Improvements
Owner: Las Vegas
Entity Project Number: CL20100195
Participant: NDOT

Roadway
Project Details: Pedestrian Safety Upgrades FY 2019
Pedestrian Safety Upgrades FY 2019
Project Status: DESIGN
Project Type: Bicycle/Pedestrian Safety Improvements
Owner: Las Vegas

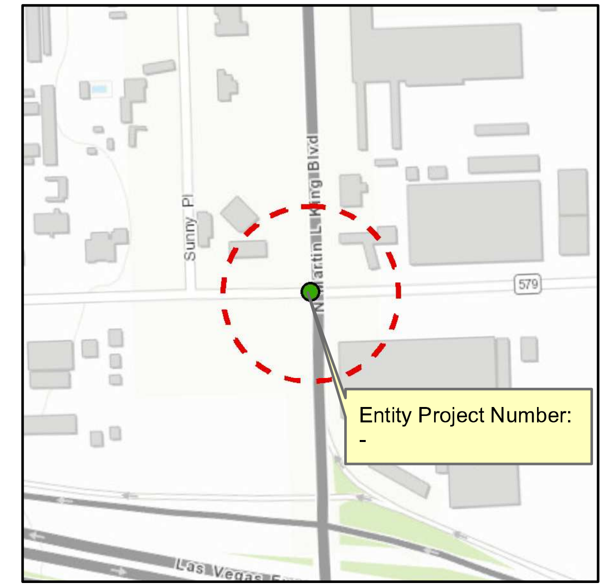
3. Fort Apache Road & Sahara Avenue



Intersection
Project Details: Widen and overlay Rampart Blvd in consisted areas to provide for bicycle lanes that will complete a gap in the bicycle lane network.
Project Status: PLANNED
Project Type: Bicycle/Pedestrian Safety Improvements
Owner: Las Vegas
Participant: NDOT

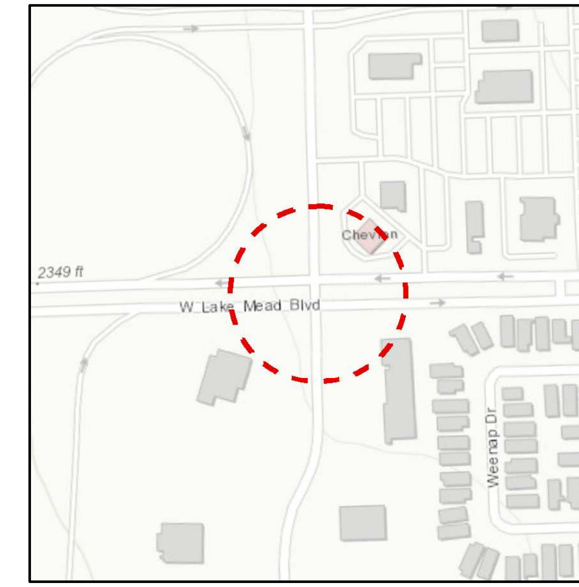
Roadway
Project Details: Fort Apache Road, Desert Inn Road to Charleston Boulevard
Arterial Reconstruction Program FY 2020
Project Status: DESIGN
Project Type: Roadway Improvements
Owner: Las Vegas

4. MLK Boulevard & Bonanza Road



Intersection
Project Details: Bonanza and MLK
Project Status: PLANNED
Project Type: Bicycle/Pedestrian Safety Improvements
Owner: Las Vegas

5. Rainbow Boulevard & Lake Mead Boulevard



No Projects Planned or Identified

LEGEND

Project Status

- ON HOLD
- PLANNED FUNDED
- DESIGN
- SOON TO ADVERTISE
- ADVERTISING
- CONSTRUCTION
- ON HOLD
- PLANNED FUNDED
- DESIGN
- SOON TO ADVERTISE
- ADVERTISING
- CONSTRUCTION

Entitlement Projects

- PLANNED FUNDED

Intersection

- 200-FT BUFFER

Source(s):
RTC - Online GIS Database
City of Las Vegas Capital Improvement Projects

0 125 250
FEET

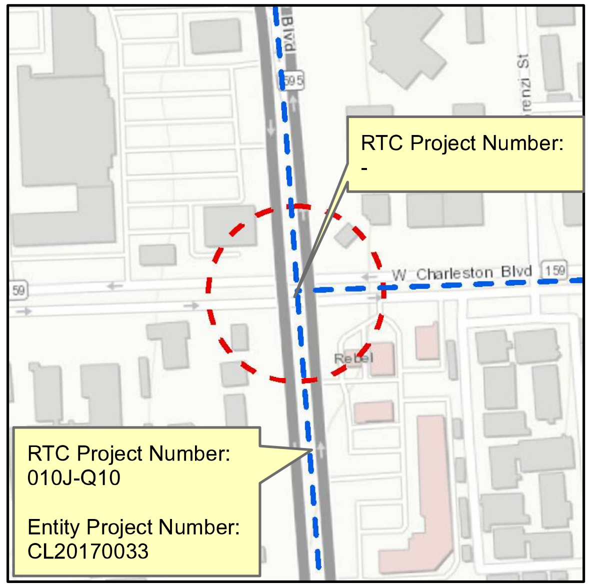
Figure 4A. Future Projects

City of Las Vegas Selected Intersections (1 to 5)
January 2021

WOOD RODGERS

CICM
Citywide Intersection Crash Mitigation

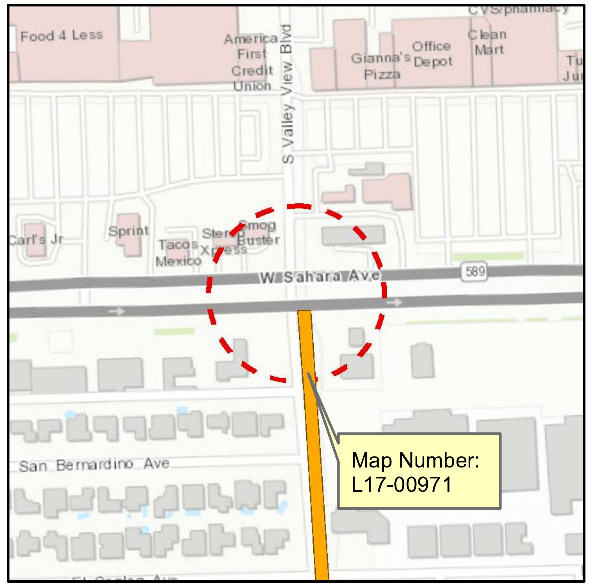
6. Rainbow Boulevard & Charleston Boulevard



Roadway
Project Details: Transportation corridor improvements on Rainbow Boulevard from Westcliff Drive to Sahara Avenue. The improvements include widening sidewalks, landscaping, dedicated bus/bike lane and median improvements
Rainbow Boulevard Improvements - Westcliff to Sahara
Project Status: DESIGN
Project Type: Roadway Improvements
Owner: Las Vegas
Entity Project Number: CL20170033
Participant: NDOT

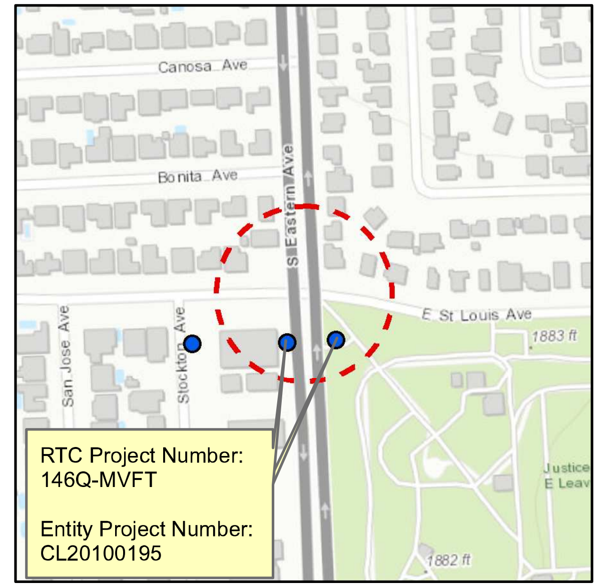
Project Details: Pavement overlay – Charleston Boulevard from Rainbow to Jones
Charleston Boulevard Pavement Overlay
Rainbow to Jones
Project Status: DESIGN
Project Type: Roadway Improvements
Owner: Las Vegas

7. Valley View Boulevard & Sahara Avenue



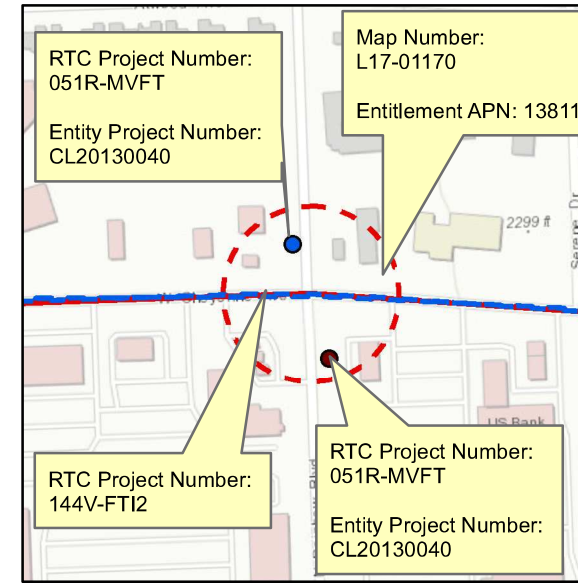
Entitlement APN: 16208199007

8. Eastern Avenue & St. Louis Avenue



Intersection
Project Details: 12 Bus turnouts along Eastern and Nellis between Owens Avenue and Charleston Boulevard.
Eastern and Nellis Bus Turnouts
Project Status: DESIGN
Project Type: Roadway Improvements
Owner: Las Vegas
Entity Project Number: CL20100195
Participant: NDOT

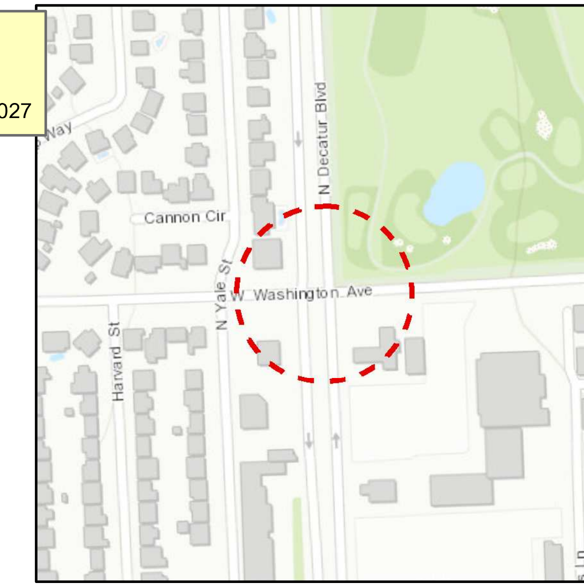
9. Rainbow Boulevard & Cheyenne Avenue



Intersection
Project Details: Design for dedicated right turn lane improvements at six intersections. Right Turn Intersection Improvements
Project Status: DESIGN
Project Type: Roadway Improvements
Owner: Las Vegas
Entity Project Number: CL20130040
Participant: NDOT

Roadway
Project Details: 2018 FAST Arterial and 215 Beltway ITS
Project Status: DESIGN
Project Type: ITS/System Efficiency
Owner: RTC FAST

10. Decatur Boulevard & Washington Avenue



No Projects Planned or Identified

LEGEND

Project Status

ON HOLD
PLANNED FUNDED
DESIGN
SOON TO ADVERTISE
ADVERTISING
CONSTRUCTION
ON HOLD
PLANNED FUNDED
DESIGN
SOON TO ADVERTISE
ADVERTISING
CONSTRUCTION

Entitlement Projects
PLANNED FUNDED

Intersection
200-FT BUFFER

Source(s):
RTC - Online GIS Database
City of Las Vegas Capital Improvement Projects

0 125 250
Feet

Figure 4B. Future Projects
City of Las Vegas Selected Intersections (6 to 10)
January 2021

WOOD RODGERS

CICM
Citywide Intersection Crash Mitigation

4.

IDENTIFICATION OF COUNTERMEASURES & COST ANALYSIS

4. IDENTIFICATION OF COUNTERMEASURES AND COST ANALYSIS

The *HSM* was utilized to identify countermeasures and analyze their associated costs for each of the ten selected intersections. Part C of the *HSM* (Volume 2, Page C-19), lists four methods that can be applied to estimate the safety effectiveness of a proposed project. Of the four methods, Method 2 was selected and outlines applying Part C methods to estimate crashes for existing conditions, then applying appropriate project CMFs from Part D and/or the CMF Clearinghouse to estimate the safety performance of the recommended countermeasures.

Therefore, Chapter 4 is broken up into two separate sections. The first section provides the steps taken to identify applicable countermeasure methods and evaluates Element 1 of the *Systemic Tool* by selecting countermeasures based on their system network applicability. The second section summarizes the effects of the evaluated and screened countermeasures on the candidate locations and calculates their economic value through planning-level cost estimates and a benefit-cost analysis.

4.1. Proposed Countermeasure Evaluation

According to the FHWA's *Toolbox of Countermeasures and Their Potential Effectiveness*:

> *"A CMF should be regarded as a generic estimate of the effectiveness of a countermeasure. The estimate is a useful guide, but it remains necessary to apply engineering judgment and to consider site-specific environmental, traffic volume, traffic mix, geometric, and operational conditions which will affect the safety impact of a countermeasure. Actual effectiveness will vary from site to site. The user must ensure that a countermeasure applies to the particular conditions being considered."*

Furthermore, FHWA's *Systemic Safety Project Selection Tool* indicates the following:

> *"Not enough information is available at this time to determine how appropriate these CMFs might be for predicting the success of a systemic safety program. Specifically, it is unknown whether the countermeasure will be as effective at reducing crashes in a systemic safety program as it was for a specific location identified through the site analysis approach. Until systemic safety programs mature and are evaluated, understand that some CMFs may not accurately reflect expected outcomes of a countermeasure implementation on a systemic basis."*

For the CICMP, the multiplicative method was used to calculate the combination of multiple CMFs. The multiplicative method is discussed in the FHWA's *Introduction to Crash Modification Factors*, provided in Appendix D, which states the following:

> *"Methods have been proposed for combining the CMFs developed from individual countermeasures to approximate the effect of multiple countermeasures, but there has been little research to support any specific method. The current practice for many agencies is to assume that CMFs are multiplicative; this is the current method presented in the HSM and posted on the CMF Clearinghouse."*

Moreover, the *HSM* and *CMF Clearinghouse* provide direction on how to calculate the combined effects of applying multiple safety improvements. CMFs are typically multiplied to estimate the combined effect of independent countermeasures such as adding pedestrian signals and left-turn lanes at a signalized intersection. However, the *HSM* recommends practitioners multiply no more than three (3) CMFs to estimate the combined effect of multiple safety improvements.

Application of CMFs

CMFs are numerical values assigned to a specific countermeasure to estimate the number of expected crashes following changes to transportation infrastructure implementation, are used to compare the effects of alternative designs, and are used alongside other factors such as operational performance and environmental impacts. A CMF for a given countermeasure may signify an expected reduction in crashes, indicated by a CMF less than 1.0, or an expected increase in crashes, indicated by a CMF greater than 1.0. The application of CMFs is implemented through the following equation:

Crashes With Countermeasure = (Crashes Without Countermeasures) x (CMF)

When more than one CMF is used, the equation is adjusted to the following:

Crashes With Countermeasure = (Crashes Without Countermeasures) x (CMF_1) x (CMF_2) x (CMF_n)

The steps taken in the CICMP to determine the appropriate CMF at each of the selected intersections include:

1) Defined the Base Condition (*Chapter 3*)	a. Selected and evaluated the target facility type, which was intersections i. Cataloged items such as area type, traffic control, number of approaches, number of lanes b. Calculated number of crashes for the existing base conditions i. Calculated the safety performance of the existing base conditions through crash rates
2) Applied the CMF to Estimate the Safety Performance for the Condition with the Countermeasure of Interest	a. Selected an appropriate CMF utilizing the FHWA's CMF Clearinghouse, shown in Figure 5 i. To improve the confidence in safety analyses performed using CMFs, the CMF Clearinghouse provides a quality rating for each CMF to help analysts select the CMFs that have been developed through the most thorough analyses – for the CICMP, a minimum required CMF quality level of 3-stars was used b. Calculated the crashes with the countermeasure by multiplying the existing base conditions crashes by the selected CMF
2) Calculated Combined Countermeasure Effects, When Applicable	a. Defined the scenario of interest i. Identified ALL crashes as target crash types for the countermeasures of interest b. Determined the potential for overlapping effects among countermeasures i. Potential overlap is defined with respect to the target crashes and represents the likelihood that the individual countermeasure would address the same crash types c. Categorized the magnitude of individual countermeasure effects and selected the combined countermeasure method to estimate the combined effect of two or more countermeasures, when applicable i. The maximum effect of any countermeasure or combination of counter-measures is a crash reduction of 100-percent, or a CMF of zero (0.0)

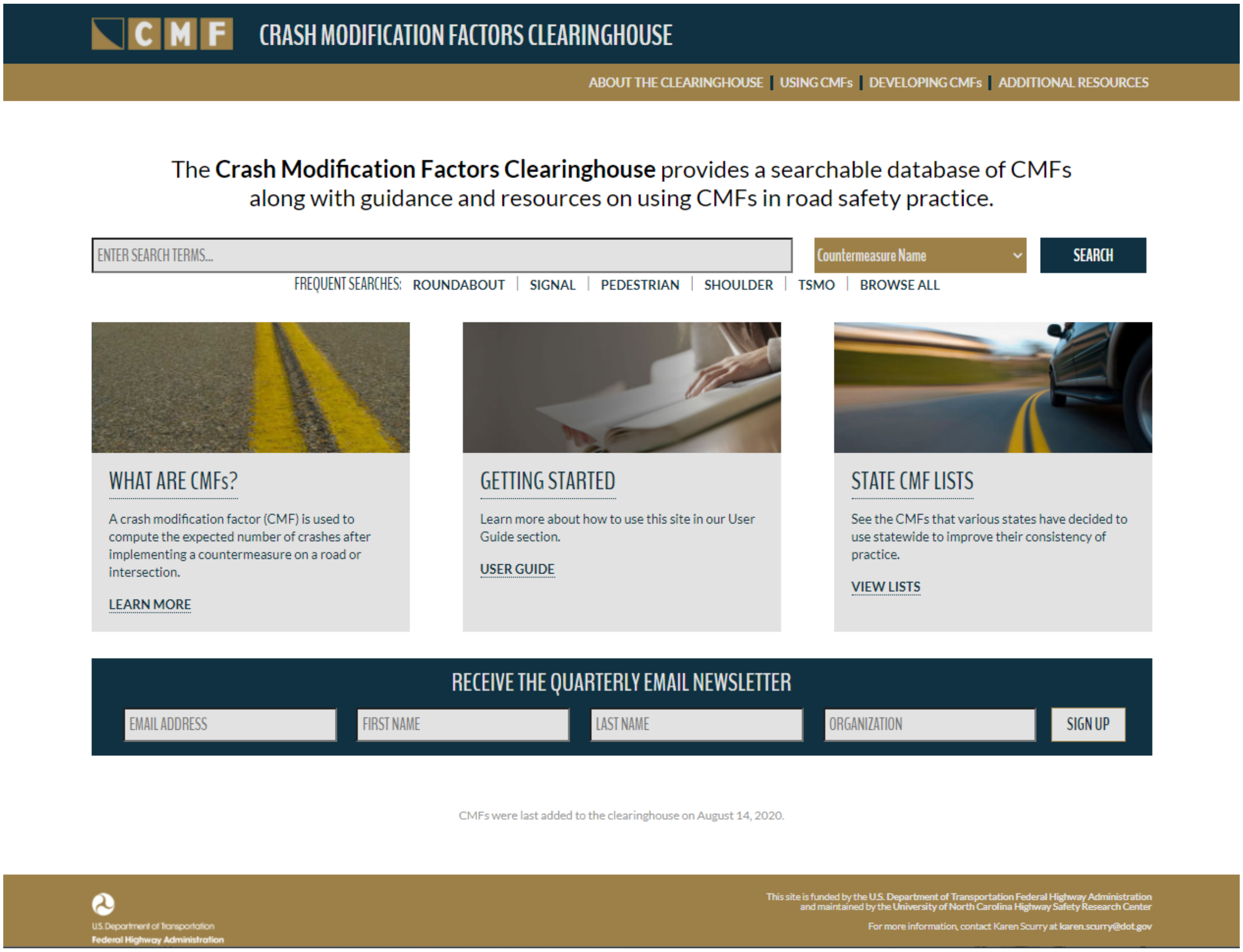


Figure 5: *CMF Clearinghouse* Website

4.1.1. Select Countermeasures [Element 1]

Selecting countermeasures at CICMP intersections involved choosing a small number of low-cost to medium-cost, highly effective recommended countermeasures to be considered for implementation. The selection process involved assembling a comprehensive list and then screening the selected countermeasures.

The comprehensive list consists of safety countermeasures associated with each of the targeted crash types and their identified risk factors. The evaluation and screening of the initial comprehensive list of countermeasures was based on the documented effectiveness of reducing target crash types, implementation and maintenance costs, and consistency with the City's policies, practices, and experiences. **Table 3** provides a list of identified and screened countermeasures including a description of the countermeasure, CMF, CMF identification (ID), star quality rating, cost estimate, crash type, crash severity, and the categorized facility improvement treatment. The list highlights effective countermeasures focused on reducing the number and severity of intersection related crashes, including crashes involving the most vulnerable, such as pedestrians and bicyclists.

Table 3: Selected Countermeasures

Countermeasure	Additional Description (if provided)	CMF	CMF ID	Star Quality Rating	Relative Cost	Crash Type*	Crash Severity**	Proposed Improvement Treatment
Install pedestrian countdown timer		0.912	8790	★★★★	Low	All	All	Signal System Pedestrian Realm
Modify signal phasing (implement a leading pedestrian interval)		0.87	9916	★★★★★	Low	All	All	Signal System Pedestrian Realm
Implement systemic signing and visibility improvements at signalized intersections	Description: Replace all signal heads. Replace pedestrian signal heads, pushbuttons, and signs. Install backplates with retroreflective borders on all signal heads. Restripe stop lines. Restripe crosswalks. Install advance warning signs. Install overhead signs. Install curb ramps.	0.949	8927	★★★	Low to Moderate	All	All	Signal System Pedestrian Realm
Replace incandescent traffic signal bulbs with light emitting diodes (LEDs)	At urban signalized intersections, incandescent traffic signal bulbs are replaced by LEDs to improve signal visibility	0.982	4898	★★★	Low	All	All	Signal System
Resurface pavement		0.787	10280	★★★★	High	All	K, A, B, C	Roadway Improvement
Provide a left-turn lane on one major-road approach		0.76	263	★★★★★	High	All	All	Roadway Improvement

** Crash Type: Type of crashes which will be affected by the implementation of the particular countermeasure*
*** Crash Severity: Severity of crashes which will be affected by the implementation of the particular countermeasure*

Source: Federal Highway Administration, "CMF Clearinghouse." Available online at: www.cmfclearinghouse.org

In addition to the *CMF Clearinghouse* CMFs provided in **Table 3**, FHWA's *Proven Safety Countermeasures* were utilized and are highlighted in **Figure 6**. The FHWA's *Proven Safety Countermeasures* generally provide low-cost countermeasures appropriate for systemic implementation and are designed to enhance safety in their respective focus areas.

The next step in the CMF selection process was to use the multiplicative method to combine CMFs into composite CMFs. **Table 4** summarizes the composite CMFs used for the CICMP and includes a description of the evaluated and screened countermeasure improvements.

Figure 6: FHWA's *Proven Safety Countermeasures*

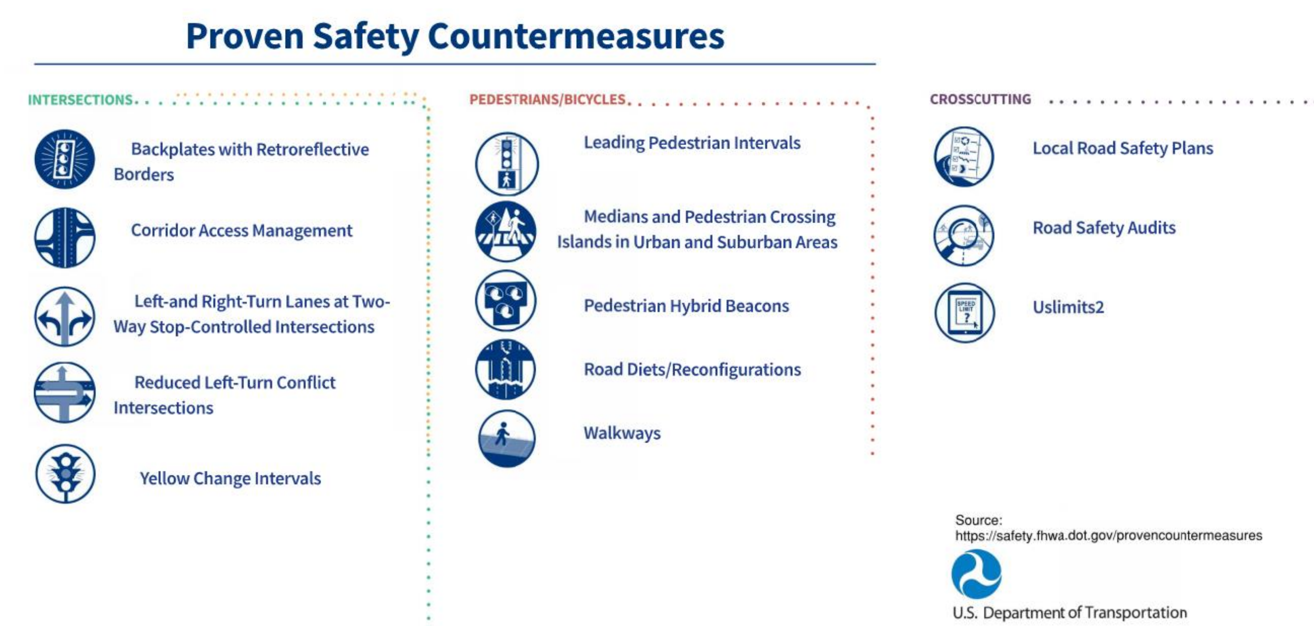


Table 4: Composite CMFs

Focus Crash Type	Category	Countermeasure	Crash Modification
Signalized, Urban Crashes		**Description of Improvements and Associated CMFs**	**$CMF_{composite}$**
Intersection	*Minor Traffic Signal Improvements*	• Twelve-inch LED lenses on all signal heads • Retroreflective backplates on all signal heads • A minimum of one traffic signal head per approach lane • Traffic signal phase timing in accordance with the ITE timing standards • Install pedestrian countdown timer • Restripe crosswalks, and stop lines • Install curb ramps *Includes Clearinghouse CMF combinations of: CMF ID's 8927; 4898; and 8790*	0.85[1]
	Roadway Improvements	• Construct left-turn pockets (where needed) • Through lane alignment • A minimum of one traffic signal head per approach lane (where needed) • Construct median islands (where needed) • Construct transit turnout (where needed) *Includes Clearinghouse CMF of: CMF ID 10280, when rehabilitation of the study intersection is recommended (long-term)* *Includes Clearinghouse CMF of: CMF ID 263, when additional left-turn lane pocket for the study intersection is recommended (long-term)*	**0.79**, when intersection rehabilitation is proposed **or** **0.76**, when left-turn lane pocket is proposed
Pedestrian	*Pedestrian Improvements*	• Restripe a high visibility crosswalk • Modify signal phasing (implement a Leading Pedestrian Interval) • Install pedestrian countdown timer • Install curb ramps *Includes Clearinghouse CMF combinations of: CMF ID's 8790 and 9916* *Note: Installation of a high-visibility crosswalk (CMF ID 4123) was not included in the combined CMFs, as the Clearinghouse documented location of the reference study was in New York, a heavily pedestrian trafficked city. Additionally, the Star Quality Rating of 2 eliminated it from being evaluated for this study. However, restriping of the study intersection is recommended at locations where fading is present.*	0.79[1]

Note(s):
[1] Composite CMF was calculated by multiplying crash modification factors

Crash Modification Example Calculation: If there are currently 100 intersection crashes over a 5-year period, implementing the Minor Traffic Signal Improvements at the intersection will potentially reduce the crashes to 85 over the next 5-year period (100 Crashes x 0.85 = 85 Crashes), thus eliminating 15 crashes

Source: Federal Highway Administration, "CMF Clearinghouse."

4.2. Economic Appraisal

The benefits of the recommended safety improvements were compared to the costs of implementing the recommended safety improvements in order to calculate a Benefit-Cost Ratio (BCR).

4.2.1. Cost Estimates

To calculate the BCR, the benefits and costs were translated into a monetary value and were broken down into Crash Costs and Capital Costs.

Crash Costs

Crash costs were developed utilizing NDOT's *Crash Cost Per Definition*, illustrated in **Table 5**, which was derived using the HSM's *Crash Cost Estimates*. The crash costs per event, based off of crash severity, were converted and rounded into 2018 dollars using the Bureau of Labor Statistics Consumer Price Index data and then converted to costs per crash to correspond with the data on crash reduction. The detailed crash costs for each CICMP intersection are provided in **Appendix E**.

Table 5: NDOT Crash Cost Assumption (2018 USD)

Crash Severity	Crash Cost per Crash
Fatal (K)	$9,400,000
Suspected Serious (A) Suspected Minor (B) Possibly/Claimed (C)	$206,500*
Property Damage Only (PDO)	$32,800

**Represents cost per injury crash*
Source: NDOT 2019 Performance Management Report, Table E-5. Available online at: https://www.nevadadot.com/home/showdocument?id=17220

Capital Costs

In addition to crash costs, planning-level capital cost estimates in 2020 dollars were calculated for each CICMP intersection and broken down into the following three categories:

- ***Minor Traffic Signal Improvements*** – Includes Poles, Mast Arms, Signal Heads, Retroreflective Backplates, Pedestrian Push Buttons, U-Turn Signs, and Luminaires
- ***Roadway Improvements*** – Includes Left-Turn Pockets (Plus Right-of-Way), Right-Turn Pockets (Plus Right-of-Way), Transit Turnouts, and Speed Limit Signs
- ***Pedestrian Realm Improvements*** – Includes Pedestrian Ramps and Crosswalks

Each of the planning-level capital cost estimates included the construction cost, a 10-percent design services cost, a 10-percent construction management cost, and a 30-percent contingency cost. The 30-percent contingency cost was included to cover items not calculated into the final costs, such as median islands, loops, mill and overlay, striping/raised markers, sidewalk improvements (including moving existing poles), and driveway consolidations. If needed, right-of-way costs were added to the cost estimate totals. A breakdown of the three categories for each intersection is provided on the following page, and detailed analysis is provided in **Appendix E**.

1. *Durango Drive and Charleston Boulevard*
   - Minor Traffic Signal = $262,000
   - Roadway = $3,340,000
   - Pedestrian Realm = $85,000
   - TOTAL IMPROVEMENTS = $3,687,000

2. *Eastern Avenue and Stewart Avenue*
   - Minor Traffic Signal = $256,000
   - Roadway = $3,796,000
   - Pedestrian Realm = $80,000
   - TOTAL IMPROVEMENTS = $4,132,000

3. *Fort Apache Road and Sahara Avenue*
   - Minor Traffic Signal = $262,000
   - Roadway = $797,000
   - Pedestrian Realm = $85,000
   - TOTAL IMPROVEMENTS = $1,144,000

4. *Martin L. King Boulevard and Bonanza Road*
   - Minor Traffic Signal = $256,000
   - Roadway = $1,013,000
   - Pedestrian Realm = $80,000
   - TOTAL IMPROVEMENTS = $1,349,000

5. *Rainbow Boulevard and Lake Mead Boulevard*
   - Minor Traffic Signal = $256,000
   - Roadway = $190,000
   - Pedestrian Realm = $80,000
   - TOTAL IMPROVEMENTS = $526,000

6. *Rainbow Boulevard and Charleston Boulevard*
   - Minor Traffic Signal = $279,000
   - Roadway = $2,945,000
   - Pedestrian Realm = $98,000
   - TOTAL IMPROVEMENTS = $3,322,000

7. *Valley View Boulevard and Sahara Avenue*
   - Minor Traffic Signal = $259,000
   - Roadway = $459,000
   - Pedestrian Realm = $83,000
   - TOTAL IMPROVEMENTS = $801,000

8. *Eastern Avenue and St. Louis Avenue*
   - Minor Traffic Signal = $239,000
   - Roadway = $1,218,000
   - Pedestrian Realm = $67,000
   - TOTAL IMPROVEMENTS = $1,524,000

9. *Rainbow Boulevard and Cheyenne Avenue*
   - Minor Traffic Signal = $256,000
   - Roadway = $2,260,000
   - Pedestrian Realm = $79,000
   - TOTAL IMPROVEMENTS = $2,595,000

10. *Decatur Boulevard and Washington Avenue*
    - Minor Traffic Signal = $251,000
    - Roadway = $2,006,000
    - Pedestrian Realm = $75,000
    - TOTAL IMPROVEMENTS = $2,332,000

4.2.2. Benefit-Cost Ratio

As mentioned earlier, the benefits of the recommended safety improvements were compared to the costs of implementing the recommended safety improvements in order to calculate a BCR. BCRs were calculated for all ten intersections and broken down into Minor Traffic Signal Improvements, Roadway Improvements, and Pedestrian Realm Improvements. The BCR calculations were based on recommended infrastructure improvements with a life-cycle of 20-years, and estimated crashes were based on the average growth rate of 1.5-percent per year for the 20-year time period. Additionally, the BCRs are represented as year 2020 "present values", where life-cycle maintenance and service costs are not included. The BCRs for each CICMP intersection are summarized in **Figure 7A** through **Figure 7J** and the detailed calculations are provided as part of **Appendix E**.

The calculated BCRs can be used to aide in prioritizing projects as they reflect the project's present value versus project cost. Hence, a project with a BCR higher than one would indicate the identified project is viable, and the higher the BCR, the better the return on the investment.

Roadway Data

Roadway Data
Facilty Type: Control Type
Intersection: Signalized
Number of Approaches
4
Urban / Rural
Urban
Agency
City of Las Vegas
District - Ward
Ward 1 and Ward 2
Daily Entering Traffic
68,663
Existing LOS: AM / (PM)
LOS D / (LOS E)
Mitigated LOS: AM / (PM)
LOS D / (LOS D)

1 Charleston Boulevard and Durango Drive

Crash Data (2014 - 2018)

Total Crashes (PDO / Injury A/B/C / Fatal)	
193	(86) / (6/32/69) / (0)

Total Pedestrain & Bicyclist Crashes (PDO / Injury A/B/C / Fatal)	
0 & 1	(0) / (1/0/0) / (0)

Countermeasures Considered and Benefit Cost Evaluation

Improvements:	Minor Traffic Signal	Roadway [1]	Pedestrian Realm
Capital Cost	$262,000	$3,340,000	$85,000
Service Life	20 Years	20 Years	20 Years
Crash Savings	$17,555,000	$28,071,000	$201,000
CMF $_{composite}$	0.85	0.76	0.79
Crash Costs*	$116,960,000	$116,960,000	$970,000
BCR	67.0	8.4	2.4

[1] ROW cost included for Roadway Improvements

Figure 7A:
Charleston Boulevard and Durango Drive BCRs

NOTE(S):
*NDOT 2018 Crash Cost
Property Damage Only (PDO): $32,800
Injury (A), (B), and (C): $206,500
Fatal (K): $9,400,000

Annual 1.5% increase in ADT prediction

DISCLAIMER(S):
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January 2021

WOOD RODGERS

CICM
Citywide Intersection Crash Mitigation

Roadway Data

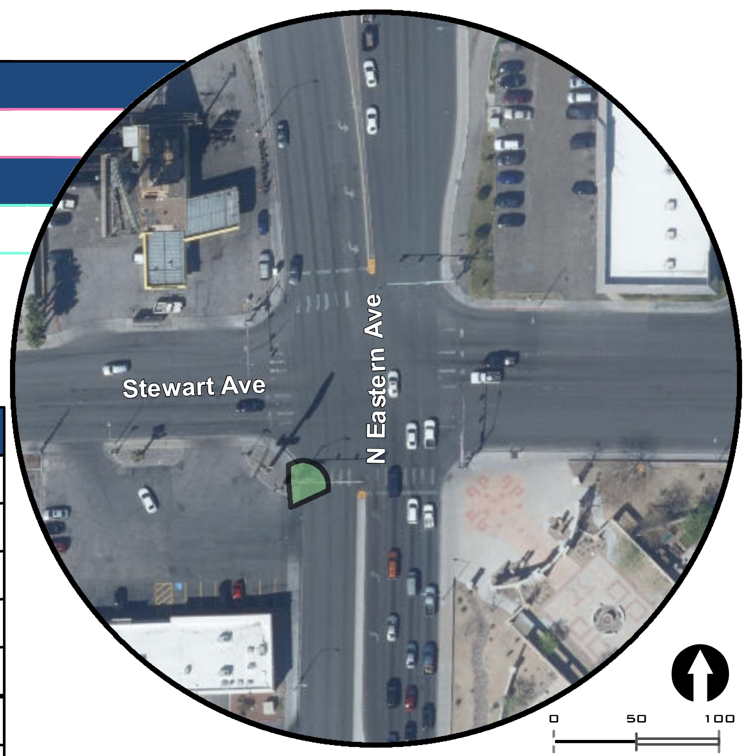
Roadway Data
Facilty Type: Control Type
Intersection: Signalized
Number of Approaches
4
Urban / Rural
Urban
Agency
City of Las Vegas
District - Ward
Ward 3
Daily Entering Traffic
53,025
Existing LOS: AM / (PM)
LOS D / (LOS E)
Mitigated LOS: AM / (PM)
LOS D / (LOS D)

2 Stewart Avenue and Eastern Avenue

Crash Data (2014 - 2018)

Total Crashes (PDO / Injury A/B/C / Fatal)	
177	(104) / (2/12/59) / (0)

Total Pedestrain & Bicyclist Crashes (PDO / Injury A/B/C / Fatal)	
4 & 0	(1) / (0/1/2) / (0)



Countermeasures Considered and Benefit Cost Evaluation

Improvements:	Minor Traffic Signal	Roadway [1]	Pedestrian Realm
Capital Cost	$256,000	$3,796,000	$80,000
Service Life	20 Years	20 Years	20 Years
Crash Savings	$13,017,000	$20,826,000	$634,000
CMF $_{composite}$	0.85	0.76	0.79
Crash Costs*	$86,774,000	$86,774,000	$3,062,000
BCR	50.8	5.5	7.9

[1] ROW cost included for Roadway Improvements

Figure 7B:
Stewart Avenue and Eastern Avenue BCRs

NOTE(S):
*NDOT 2018 Crash Cost
Property Damage Only (PDO): $32,800
Injury (A), (B), and (C): $206,500
Fatal (K): $9,400,000

Annual 1.5% increase in ADT prediction

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January 2021

WOOD RODGERS

CICM
Citywide Intersection Crash Mitigation
City of Las Vegas Nevada

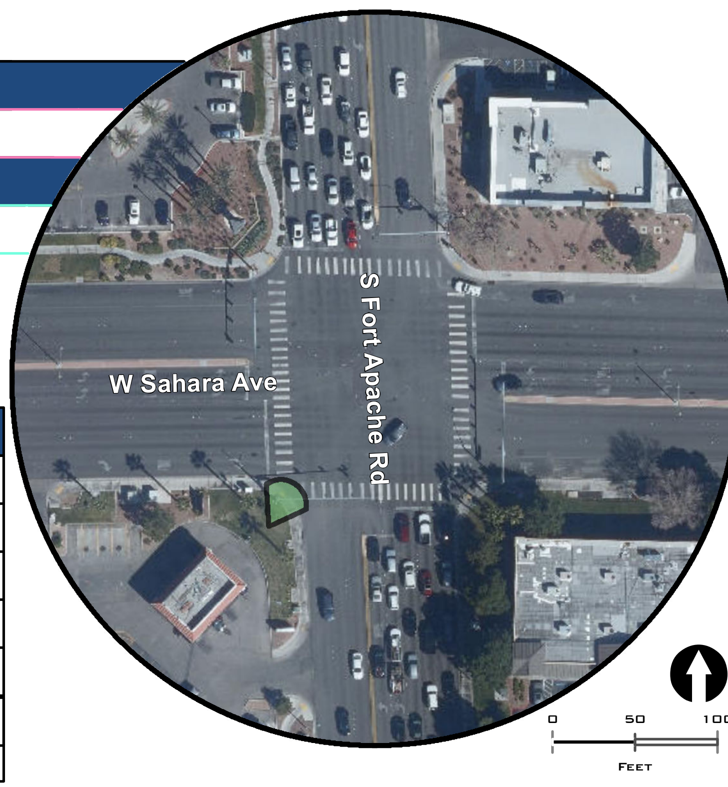
Roadway Data
Facilty Type: Control Type
Intersection: Signalized
Number of Approaches
4
Urban / Rural
Urban
Agency
City of Las Vegas
District - Ward
Ward 2
Daily Entering Traffic
72,050
Existing LOS: AM / (PM)
LOS D / (LOS E)
Mitigated LOS: AM / (PM)
LOS D / (LOS D)

3 Sahara Avenue and Fort Apache Road

Crash Data (2014 - 2018)

Total Crashes (PDO / Injury A/B/C / Fatal)	
124	(69) / (2/11/42) / (0)

Total Pedestrain & Bicyclist Crashes (PDO / Injury A/B/C / Fatal)	
1 & 1	(1) / (0/0/1) / (0)



Countermeasures Considered and Benefit Cost Evaluation

Improvements:	Minor Traffic Signal	Roadway [1]	Pedestrian Realm
Capital Cost	$262,000	$797,000	$85,000
Service Life	20 Years	20 Years	20 Years
Crash Savings	$9,591,000	$13,619,000	$233,000
CMF $_{composite}$	0.85	0.79	0.79
Crash Costs*	$63,937,000	$63,937,000	$1,124,000
BCR	36.6	17.1	2.7

[1] ROW cost included for Roadway Improvements

Figure 7C:
Sahara Avenue and Fort Apache Road BCRs

NOTE(S):
*NDOT 2018 Crash Cost
Property Damage Only (PDO): $32,800
Injury (A), (B), and (C): $206,500
Fatal (K): $9,400,000

Annual 1.5% increase in ADT prediction

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January 2021

WOOD RODGERS

CICM
Citywide Intersection Crash Mitigation

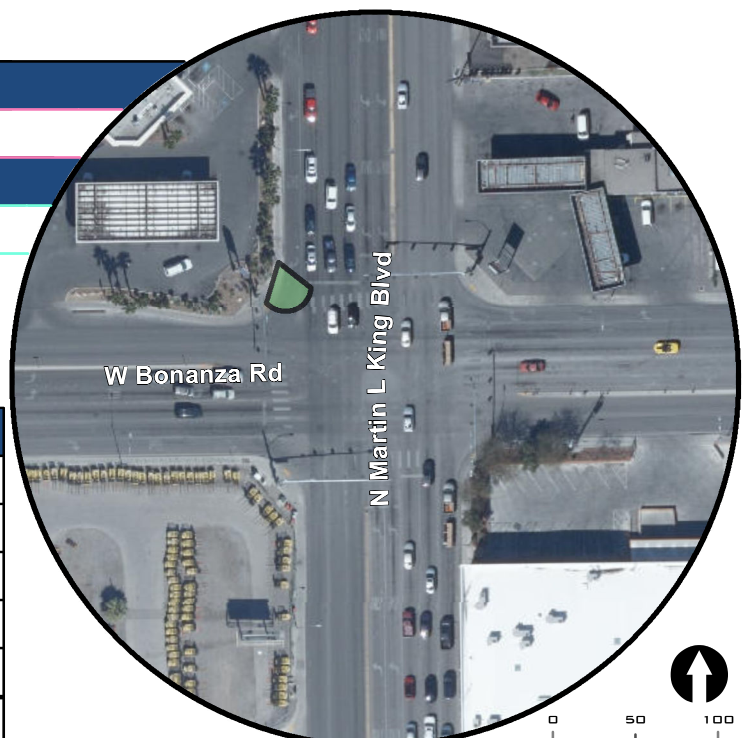
Roadway Data

Roadway Data
Facilty Type: Control Type
Intersection: Signalized
Number of Approaches
4
Urban / Rural
Urban
Agency
City of Las Vegas
District - Ward
Ward 5
Daily Entering Traffic
62,050
Existing LOS: AM / (PM)
LOS E / (LOS D)
Mitigated LOS: AM / (PM)
LOS D / (LOS D)

4 Bonanza Road and Martin Luther King Boulevard

Crash Data (2014 - 2018)

Total Crashes (PDO / Injury A/B/C / Fatal)	
120	(74) / (3/7/35) / (1)
Total Pedestrain & Bicyclist Crashes (PDO / Injury A/B/C / Fatal)	
5 & 1	(0) / (1/2/3) / (0)



Countermeasures Considered and Benefit Cost Evaluation

Improvements:	Minor Traffic Signal	Roadway [1]	Pedestrian Realm
Capital Cost	$256,000	$1,013,000	$80,000
Service Life	20 Years	20 Years	20 Years
Crash Savings	$14,871,000	$21,117,000	$1,204,000
CMF $_{composite}$	0.85	0.79	0.79
Crash Costs*	$99,139,000	$99,139,000	$5,816,000
BCR	58.1	20.8	15.0

[1] ROW cost included for Roadway Improvements

Figure 7D:
Bonanza Road and Martin Luther King Boulevard BCRs

NOTE(S):
*NDOT 2018 Crash Cost
Property Damage Only (PDO): $32,800
Injury (A), (B), and (C): $206,500
Fatal (K): $9,400,000

Annual 1.5% increase in ADT prediction

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January 2021

WOOD RODGERS

CICM
Citywide Intersection Crash Mitigation

CITY OF LAS VEGAS NEVADA

Roadway Data

Roadway Data
Facilty Type: Control Type
Intersection: Signalized
Number of Approaches
4
Urban / Rural
Urban
Agency
City of Las Vegas
District - Ward
Ward 5
Daily Entering Traffic
59,700
Existing LOS: AM / (PM)
LOS D / (LOS D)
Mitigated LOS: AM / (PM)
LOS D / (LOS D)

5 Lake Mead Boulevard and Rainbow Boulevard

Crash Data (2014 - 2018)

Total Crashes (PDO / Injury A/B/C / Fatal)	
118	(68) / (1/8/41) / (0)

Total Pedestrain & Bicyclist Crashes (PDO / Injury A/B/C / Fatal)	
4 & 1	(0) / (0/1/4) / (0)

Countermeasures Considered and Benefit Cost Evaluation

Improvements:	Minor Traffic Signal	Roadway [1]	Pedestrian Realm
Capital Cost	$256,000	$190,000	$80,000
Service Life	20 Years	20 Years	20 Years
Crash Savings	$8,841,000	$12,554,000	$1,004,000
$CMF_{composite}$	0.85	0.79	0.79
Crash Costs*	$58,937,000	$58,937,000	$4,847,000
BCR	34.5	66.1	12.5

[1] ROW cost included for Roadway Improvements

Figure 7E: Lake Mead Boulevard and Rainbow Boulevard BCRs

NOTE(S):
*NDOT 2018 Crash Cost
Property Damage Only (PDO): $32,800
Injury (A), (B), and (C): $206,500
Fatal (K): $9,400,000

Annual 1.5% increase in ADT prediction

DISCLAIMER(S):
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January 2021

WOOD RODGERS

CICM
Citywide Intersection Crash Mitigation

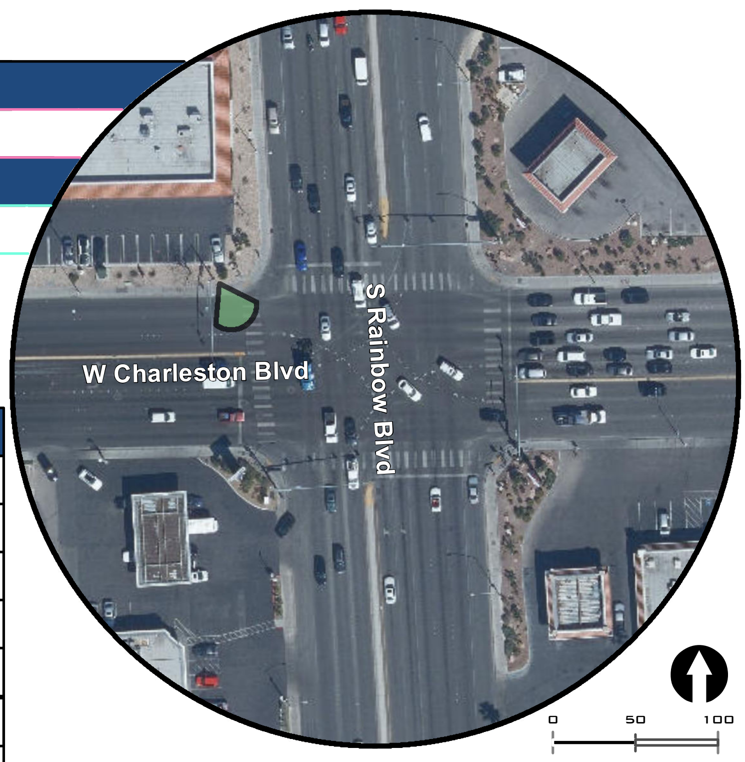
Roadway Data

Facilty Type: Control Type
Intersection: Signalized
Number of Approaches
4
Urban / Rural
Urban
Agency
City of Las Vegas
District - Ward
Ward 1
Daily Entering Traffic
90,488
Existing LOS: AM / (PM)
LOS F / (LOS F)
Mitigated LOS: AM / (PM)
LOS D / (LOS E)

6 Charleston Boulevard and Rainbow Boulevard

Crash Data (2014 - 2018)

Total Crashes (PDO / Injury A/B/C / Fatal)	
126	(65) / (4/16/41) / (0)
Total Pedestrain & Bicyclist Crashes (PDO / Injury A/B/C / Fatal)	
7 & 3	(0) / (2/4/4) / (0)



Countermeasures Considered and Benefit Cost Evaluation

Improvements:	Minor Traffic Signal	Roadway [1]	Pedestrian Realm
Capital Cost	$279,000	$2,945,000	$98,000
Service Life	20 Years	20 Years	20 Years
Crash Savings	$10,371,000	$16,593,000	$2,007,000
$CMF_{composite}$	0.85	0.76	0.79
Crash Costs*	$69,138,000	$69,138,000	$9,694,000
BCR	37.2	5.6	20.5

[1] ROW cost included for Roadway Improvements

Figure 7F:
Charleston Boulevard and Rainbow Boulevard BCRs

NOTE(S):
*NDOT 2018 Crash Cost
Property Damage Only (PDO): $32,800
Injury (A), (B), and (C): $206,500
Fatal (K): $9,400,000

Annual 1.5% increase in ADT prediction

DISCLAIMER(S):
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January 2021

WOOD RODGERS

CICM
Citywide Intersection Crash Mitigation

Roadway Data

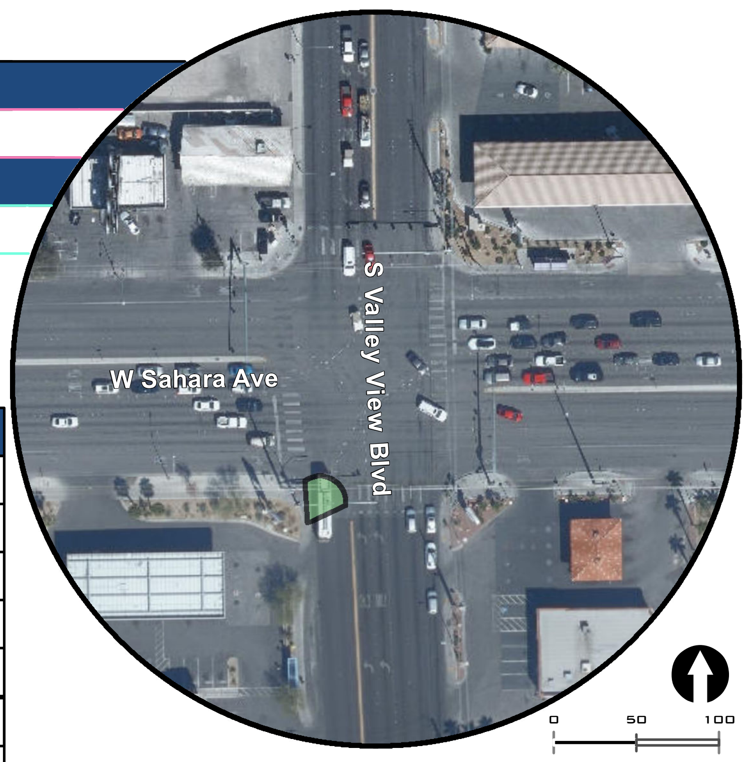
Roadway Data
Facilty Type: Control Type
Intersection: Signalized
Number of Approaches
4
Urban / Rural
Urban
Agency
City of Las Vegas
District - Ward
Ward 1
Daily Entering Traffic
71,813
Existing LOS: AM / (PM)
LOS E / (LOS E)
Mitigated LOS: AM / (PM)
LOS D / (LOS D)

7 Sahara Avenue and Valley View Boulevard

Crash Data (2014 - 2018)

Total Crashes (PDO / Injury A/B/C / Fatal)	
118	(65) / (4/13/36) / (0)

Total Pedestrain & Bicyclist Crashes (PDO / Injury A/B/C / Fatal)	
6 & 4	(0) / (0/6/4) / (0)



Countermeasures Considered and Benefit Cost Evaluation

Improvements:	Minor Traffic Signal	Roadway [1]	Pedestrian Realm
Capital Cost	$259,000	$459,000	$83,000
Service Life	20 Years	20 Years	20 Years
Crash Savings	$9,208,000	$13,075,000	$2,007,000
CMF $_{composite}$	0.85	0.79	0.79
Crash Costs*	$61,383,000	$61,383,000	$9,694,000
BCR	35.5	28.5	24.2

[1] ROW cost included for Roadway Improvements

Figure 7G:
Sahara Avenue and Valley View Boulevard BCRs

NOTE(S):
*NDOT 2018 Crash Cost
Property Damage Only (PDO): $32,800
Injury (A), (B), and (C): $206,500
Fatal (K): $9,400,000

Annual 1.5% increase in ADT prediction

DISCLAIMER(S):
Estimation of cost of labor, materials, and equipment are provided herein based on estimates of regional information at the time of the study. All values are represented as year 2020 "present values", where life-cycle maintenance/service costs are not included. No guarantee is implied that the proposals, bids, or actual costs will not vary.

January 2021

WOOD RODGERS

CICM
Citywide Intersection Crash Mitigation
City of Las Vegas Nevada

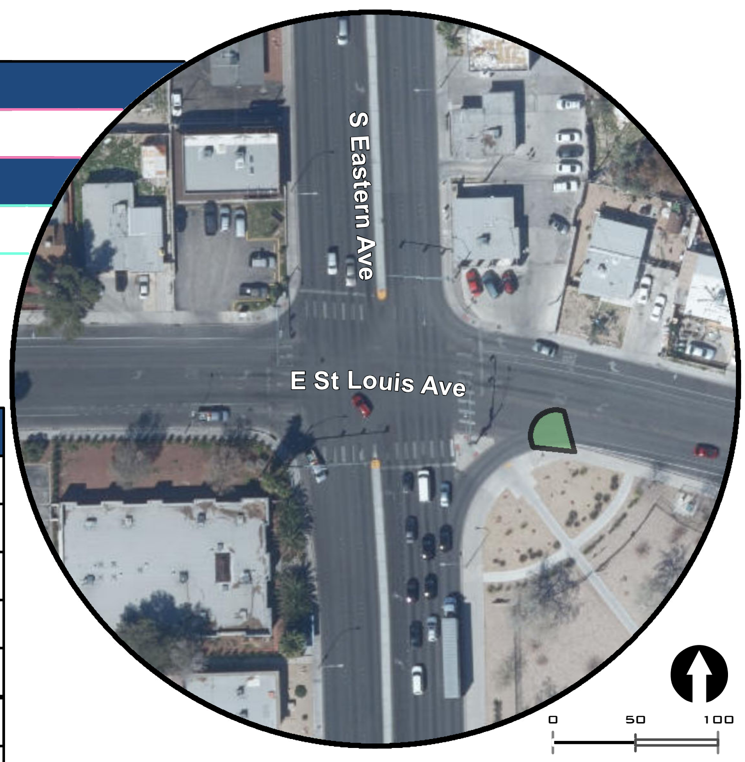
Roadway Data

Roadway Data
Facilty Type: Control Type
Intersection: Signalized
Number of Approaches
4
Urban / Rural
Urban
Agency
City of Las Vegas
District - Ward
Ward 3
Daily Entering Traffic
38,238
Existing LOS: AM / (PM)
LOS C / (LOS C)
Mitigated LOS: AM / (PM)
LOS C / (LOS C)

8 St. Louis Avenue and Eastern Avenue

Crash Data (2014 - 2018)

Total Crashes (PDO / Injury A/B/C / Fatal)	
35	(17) / (0/8/10) / (0)
Total Pedestrain & Bicyclist Crashes (PDO / Injury A/B/C / Fatal)	
7 & 2	(0) / (0/6/3) / (0)



Countermeasures Considered and Benefit Cost Evaluation

Improvements:	Minor Traffic Signal	Roadway [1]	Pedestrian Realm
Capital Cost	$239,000	$1,218,000	$67,000
Service Life	20 Years	20 Years	20 Years
Crash Savings	$3,010,000	$4,274,000	$1,806,000
CMF $_{composite}$	0.85	0.79	0.79
Crash Costs*	$20,066,000	$20,066,000	$8,724,000
BCR	12.6	3.5	27.0

[1] ROW cost included for Roadway Improvements

Figure 7H:
St. Louis Avenue and Eastern Avenue BCRs

NOTE(S):
*NDOT 2018 Crash Cost
Property Damage Only (PDO): $32,800
Injury (A), (B), and (C): $206,500
Fatal (K): $9,400,000

Annual 1.5% increase in ADT prediction

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January 2021

WOOD RODGERS

CICM
Citywide Intersection Crash Mitigation

Roadway Data

Roadway Data
Facilty Type: Control Type
Intersection: Signalized
Number of Approaches
4
Urban / Rural
Urban
Agency
City of Las Vegas
District - Ward
Ward 4 and Ward 5
Daily Entering Traffic
62,300
Existing LOS: AM / (PM)
LOS D / (LOS E)
Mitigated LOS: AM / (PM)
LOS D / (LOS D)

9 Rainbow Boulevard and Cheyenne Avenue

Crash Data (2014 - 2018)

Total Crashes (PDO / Injury A/B/C / Fatal)	
97	(60) / (2/4/31) / (0)

Total Pedestrain & Bicyclist Crashes (PDO / Injury A/B/C / Fatal)	
6 & 2	(1) / (2/1/4) / (0)

Countermeasures Considered and Benefit Cost Evaluation

Improvements:	Minor Traffic Signal	Roadway [1]	Pedestrian Realm
Capital Cost	$256,000	$2,260,000	$79,000
Service Life	20 Years	20 Years	20 Years
Crash Savings	$6,766,000	$10,825,000	$1,437,000
$CMF_{composite}$	0.85	0.76	0.79
Crash Costs*	$45,104,000	$45,104,000	$6,940,000
BCR	26.4	4.8	18.2

[1] ROW cost included for Roadway Improvements

Figure 7I:
Rainbow Boulevard and Cheyenne Avenue BCRs

NOTE(S):
*NDOT 2018 Crash Cost
Property Damage Only (PDO): $32,800
Injury (A), (B), and (C): $206,500
Fatal (K): $9,400,000

Annual 1.5% increase in ADT prediction

DISCLAIMER(S):
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January 2021

WOOD RODGERS

CICM
Citywide Intersection Crash Mitigation

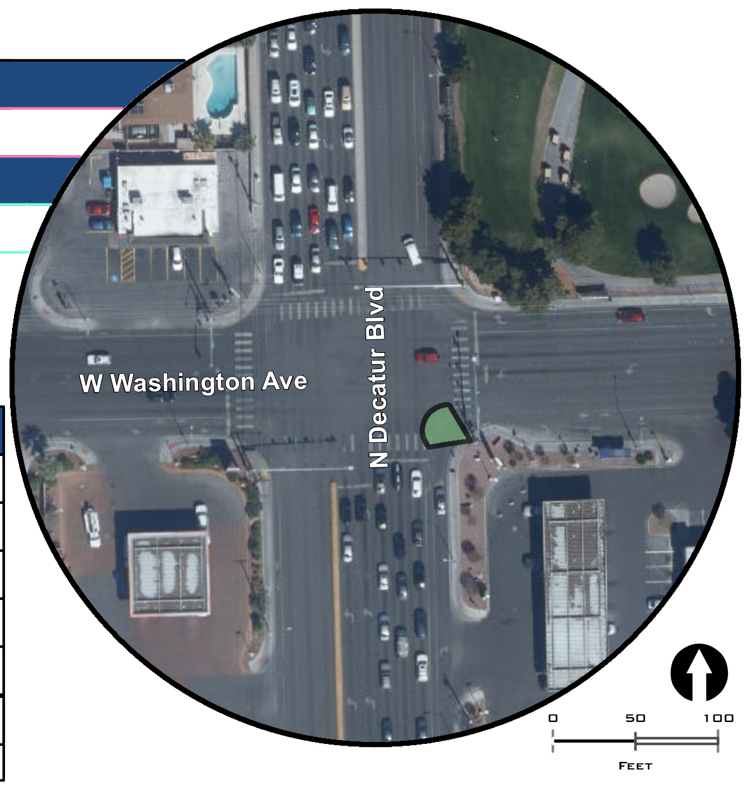
Roadway Data
Facilty Type: Control Type
Intersection: Signalized
Number of Approaches
4
Urban / Rural
Urban
Agency
City of Las Vegas
District - Ward
Ward 1 and Ward 5
Daily Entering Traffic
57,750
Existing LOS: AM / (PM)
LOS D / (LOS D)
Mitigated LOS: AM / (PM)
LOS D / (LOS D)

10 Washington Avenue and Decatur Boulevard

Crash Data (2014 - 2018)

Total Crashes (PDO / Injury A/B/C / Fatal)	
95	(44) / (3/11/37) / (0)

Total Pedestrain & Bicyclist Crashes (PDO / Injury A/B/C / Fatal)	
5 & 3	(0) / (3/2/3) / (0)



Countermeasures Considered and Benefit Cost Evaluation

Improvements:	Minor Traffic Signal	Roadway [1]	Pedestrian Realm
Capital Cost	$251,000	$2,006,000	$75,000
Service Life	20 Years	20 Years	20 Years
Crash Savings	$8,432,000	$11,973,000	$1,606,000
CMF $_{composite}$	0.85	0.79	0.79
Crash Costs*	$56,211,000	$56,211,000	$7,755,000
BCR	33.6	6.0	21.4

[1] ROW cost included for Roadway Improvements

Figure 7J:
Washington Avenue and Decatur Boulevard BCRs

NOTE(S):
*NDOT 2018 Crash Cost
Property Damage Only (PDO): $32,800
Injury (A), (B), and (C): $206,500
Fatal (K): $9,400,000

Annual 1.5% increase in ADT prediction

January 2021

DISCLAIMER(S):
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WOOD RODGERS

CICM
Citywide Intersection Crash Mitigation

5.

RECOMMENDATIONS

5. RECOMMENDATIONS

Traditionally, recommendations for intersections and roadway segments were made based on the operational performance and costs of improvements. However, in recent years, recommendations are being made based on operational performance, safety concerns, and cost considerations. For the *Systemic Approach*, the decision-making process does not just identify the most appropriate countermeasure for each individual study location, but instead it considers multiple locations with similar risk characteristics, selecting the preferred countermeasure(s) appropriate and affordable for widespread implementation. As a result, the selected countermeasures are intended to be widely implemented with identified low cost solutions.

In turn, Chapter 5 is broken up into three sections. The first section provides criteria needed for the short list of strategies used to develop the selected countermeasures for each of the target crash types. The selection of the countermeasures for deployment was determined based on the best safety improvements and the lowest costs to implement. The CICMP selected intersections were then evaluated utilizing Element 1 of the *Systemic Tool* by summarizing the effects of the proposed countermeasures on the candidate study locations. The second section and the third section of Chapter 5 evaluated Element 2 of the *Systemic Tool* by identifying potential sources for CICMP funding and then evaluating the potential program effectiveness as outlined in Element 3 of the *Systemic Tool*.

5.1. Network Recommendations

The CICMP network recommendations are explained in detail through the prioritization of projects, developing safety projects, and giving an overview of the safety improvements.

5.1.1. Prioritize Projects [Element 1]

The objective of the final step of Element 1 of the *Systemic Approach* selection process is to identify and develop a list of high-priority safety improvement projects. The list of projects considers the prioritized at-risk locations identified in earlier chapters and applies the most cost-effective countermeasures from the selected list.

Countermeasure Selection

The *Systemic Approach* decision-making process does not just identify the most appropriate countermeasure for an individual location, which is done when addressing "hot spots", but instead considers multiple locations with similar risk characteristics, selects appropriate countermeasures, and then deploys an affordable widespread implementation program. Table 6 identifies countermeasure programs and categorizes the countermeasures based on the facility and type of crash the deployment program would improve. Detailed descriptions of the selected countermeasures are provided on the following pages.

Signalized Intersections

Signalized intersection crashes, injuries, and fatalities have frequencies and characteristics associated with the type of facility area (intersection or mid-block) and time of occurrence (day or night). As shown in Table 6, the primary countermeasures implemented to help reduce the number of crashes at signalized intersections are a combination of traffic features and infrastructure improvements.

Table 6: Signalized Intersection and Pedestrian Countermeasures

Facility / Focus Crash Type	Countermeasure Category	Description of Countermeasure Improvement(s)	Effectiveness Estimated reduction in crashes	Relative Cost $= Low $$=Moderate $$$=High
Signalized Intersection	*Minor Traffic Signal Improvements*	• Twelve-inch LED lenses on all signal heads • Retroreflective backplates on all signal heads • A minimum of one traffic signal head per approach lane • Traffic signal phase timing in accordance with the ITE timing standards • Install pedestrian countdown timer • Restripe crosswalks and stop lines • Install curb ramps	0.85[1] can reduce angle crashes by 25-percent	$
	Roadway Improvements: Left-Turn Lanes and Left-Turn Phases at Signalized Intersections	• Construct left-turn pockets (where needed) • Through lane alignment • A minimum of one traffic signal head per approach lane (where needed) • Construct median islands (where needed)	0.76 can reduce left-turn crashes by 38-percent	$$ - $$$
Pedestrian	*Development of Municipality-Wide Pedestrian Safety Action Plans*	• Restripe a high visibility crosswalk • Modify signal phasing (implement a Leading Pedestrian Interval) • Install pedestrian countdown timer • Install ADA/PROWAG compliant curb ramps	0.79[1] effectiveness data of pedestrian safety countermeasures is limited	$ - $$

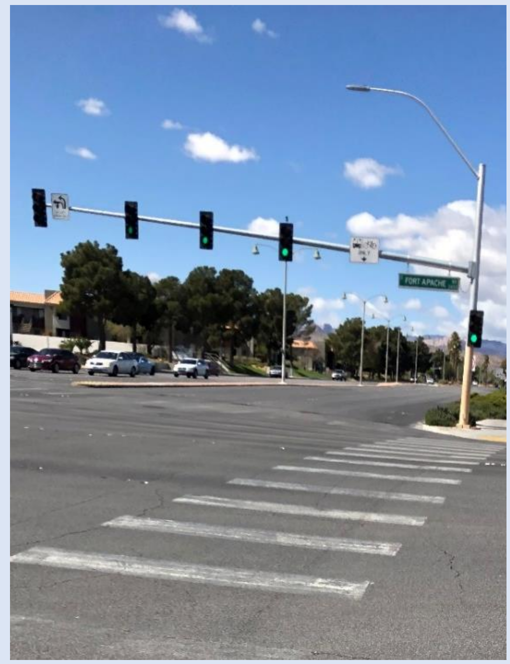
Note(s):
[1] Composite CMF was calculated by multiplying crash modification factors

These countermeasures should be combined with the 7-E's of safety (Engineering, Education, Encouragement, Enforcement, Evaluation, Engagement, Equity) to help reduce CICMP intersection crashes

Signalized Intersection Countermeasure #1 – Minor Traffic Signal Upgrades

Description: Minor traffic signal upgrades consists of updating all signal heads with the installation of backplates with retroreflective boarders, updating to 12-inch light-emitting diode (LED) lenses on all signal heads, providing a minimum of one signal head per approach lane, updating pedestrian signal heads with countdown timers, meeting ADA standards for pushbuttons and curb ramps, updating the signal timings, and restriping faded or missing stop lines and crosswalks.

Candidate Signalized Intersections: The recommended candidate signalized intersection crash thresholds for minor signal enhancements are urban signalized intersections that have 25 or more angle crashes in 5-years. Intersections that meet these thresholds need to be field reviewed to determine the following:



- Existing traffic signal shortfalls compared to proposed improvements
- Existence of sight distance limitations on any of the approaches and a determination of whether the limitation can be easily addressed – if so, sight distance improvements should be implemented at the same time as signal upgrades

In addition, a review of the physical characteristics of the intersection and the crash data is needed to determine if other crash patters exist and need to be addressed. Signalized intersections that have an extraordinary frequency of severe crashes may be further improved with reduced crash potential by upgrading the appropriate physical characteristics of the intersection.

Effectiveness: The research findings of effectiveness of signal upgrade enhancements are limited and confined to individual components, such as increased lens size, retimed signals, and upgraded warning sings. No research is known that collectively evaluates the overall impact of a set of signal upgrade improvements. However, based upon available research findings, it is estimated that the implementation of the overall set of signal upgrades at an "average" intersection can reduce angle crashes by 25-percent.

Guidance Report: The FHWA's *Low-Cost Safety Enhancements for Stop-Controlled and Signalized Intersections* provided guidance regarding minor traffic signal upgrades, specifically, the following FHWA website documents were utilized:

- https://safety.fhwa.dot.gov/intersection/other_topics/fhwasa09020/chap_3.cfm
- https://safety.fhwa.dot.gov/intersection/other_topics/fhwasa09020/fhwasa09020.pdf

Signalized Intersection Countermeasure #2 – Left-Turn Lanes and Left-Turn Phases at Signalized Intersections

Description: Left-turn lanes and left-turn phases at signalized intersections consists of the placement of left-turn lanes and/or left-turn signal phases on the approach to a high-speed intersection that has a high frequency and proportion of crashes involving left-turning vehicles either with opposing through vehicles (angle crashes and head-on crashes) or through rear-end crashes. It may also include a traffic signal modification to add an exclusive left-turn phase.

Candidate Signalized Intersections: The recommended candidate signalized intersection crash thresholds for left-turn lanes is urban signalized intersections that have speeds greater than 35 MPH and 30 or more crashes involving mainline left-turning vehicles in 5-years, of which 15 or more are angle crashes or head-on crashes with opposing through vehicles. Intersections that meet these thresholds need to be field reviewed to determine the following:

- Existence of left-turn lanes or left-turn signal phases at the intersection
- Existence of sight distance limitations on any of the through approaches of the intersection that can increase the potential of through vehicle collisions
- Existence of high intersection entry speeds on the mainline

In addition, a review of the physical characteristics of the intersection and the crash data is needed to determine if other crash concerns exist and will continue to exist with upgraded left-turn lanes.

Effectiveness: Incorporating left-turn lanes at intersections results in a crash reduction of 66-percent for left-turn crashes. Similarly, the addition of an exclusive left-turn phase to an added left-turn lane is estimated to reduce left-turn crashes by 38-percent.

Guidance Reports: The following two website documents were used to provide guidance regarding left-turn lanes and left-turn phases at signalized intersections:

- VDOT's *Guidance for Determination and Documentation of Left-Turn Phasing Mode* (Page 19)
  - https://www.virginiadot.org/VDOT/Business/asset_upload_file523_149245.pdf
- FHWA's Signalized Intersections: Informational Guide (Table 121 and Table 125)
  - https://www.fhwa.dot.gov/publications/research/safety/04091/12.cfm

Pedestrian Crashes

Pedestrian crashes, injuries, and fatalities have frequencies and characteristics associated with the crash location (intersection or mid-block), time of occurrence (day or night), type of area (urban or rural), and the age and sex of the pedestrian. The primary pedestrian countermeasures, shown in **Table 6**, combined with minor traffic signal upgrades and the 7-E's, can help reduce pedestrian crashes at the CICMP intersections.

Pedestrian Countermeasure #1 – Development of Municipality-Wide Pedestrian Safety Action Plans

Description: The development of municipality-wide pedestrian safety action plans has been supported by a variety of local entities. Regionally, the RTC has developed several studies and plans highlighting pedestrian safety including the 2017 *Regional Bicycle and Pedestrian Plan* and the 2018 *Pedestrian Comfort Study and Demonstration Projects*. The *Regional Bicycle and Pedestrian Plan*:

- Provides practitioners with the latest information available for improving the safety and mobility of those who walk and bicycle
- Identifies regionally significant bicycle and pedestrian facilities in the urbanized areas of Clark County
- Builds off of the *RTC Complete Streets Initiative* and will be included as a component of the next update to the RTC's RTP
- Implements a major theme of the *Southern Nevada Strong (SNS) Regional Plan*, which is to increase transportation choices for residents and visitors

Additionally, the *Pedestrian Comfort Study and Demonstration Projects* identified innovative strategies to address the challenges of the pedestrian environment in the Las Vegas Valley. The study assessed public perceptions of pedestrian safety and comfort and developed case studies that were documented to show successful, innovative approaches to improving the pedestrian experience. Each of the five temporary, low-cost case study demonstration sites implemented unique interventions, designed to test specific roadway design changes at each intersection. Within the City's jurisdiction, the intersection of Washington Avenue and J Street was evaluated.

Currently, the RTC is updating their *Pedestrian Safety Action Plan* and developing a *Regional Walkability Plan*.

Statewide, NDOT has developed the 2016 *Potential Pedestrian Safety Improvement Evaluation Guideline*, the 2017 *NDOT Complete Streets Policy*, and undertaken a series of Safety Management Plan (SMP) projects throughout Nevada. The SMP process is consistent with NDOT's *Nevada Strategic Highway Safety Plan's* (SHSP) goal of reducing crashes and fatalities, particularly at intersections, in half by 2030. Moreover, another SHSP goal is to reach zero fatalities as part of the *Nevada Zero Fatalities Safety Campaign*.

Effectiveness: The research findings on the effectiveness of pedestrian safety countermeasures are limited, in part because pedestrian crashes are infrequent occurrences. However, the most current information on the effectiveness of pedestrian safety countermeasures can be found at the *CMF Clearinghouse*.

Guidance Reports: The following three website documents were used to provide guidance regarding the development of municipality-wide pedestrian safety action plans:

- FHWA's Office of Safety *Proven Safety Countermeasures*
    - https://safety.fhwa.dot.gov/provencountermeasures/

- FHWA's *Toolbox of Countermeasures and Their Potential Effectiveness for Pedestrian Crashes*
    - https://safety.fhwa.dot.gov/ped_bike/tools_solve/ped_tctpepc/
- FHWA's *Pedestrian Safety Action Plan*
    - https://www.roadsbridges.com/us-dot-announces-first-ever-pedestrian-safety-action-plan

Pedestrian Countermeasure #2 – Reducing Pedestrian Crashes Through Innovative Crosswalks and Lowering Speed Limits

Description: The state of Nevada, and in particular the City, have begun countermeasure deployments to aide in reducing pedestrian crashes. For example, according to the Governors Highway Safety Association's (GHSA) 2020 *Pedestrian Traffic Fatalities by State*:

> *Nevada is applying the 7-E approach. The most significant return on investment this past year is the addition of nine new offset crosswalks and overhead flashers on Boulder Highway, a 14-mile stretch of state road across the eastern part of southern Nevada. This road was the deadliest in the state, responsible for 20-percent of pedestrian fatalities in Clark County in 2015. In August 2017, the first intersection was completed. Four pedestrians had been killed there in 2016, and three were killed prior to the installation in 2017. There have been zero fatalities there since. The final intersections were completed this year (2019); pedestrian fatalities on the road year-to-date total two.*
>
> *Many engineering improvements are being made in the two major population centers in the state, from pedestrian lead intervals to pedestrian specific lighting in the south to significant redesigns of the downtowns in the four largest cities in the state: Las Vegas, Henderson, North Las Vegas, and Reno. The most promising of all is the City of Las Vegas using USLIMITS2 to set lower speeds.*

According to the *City's Summary of USLIMITS2 Corridors*, *"Setting speed limits should be based on a balance of travel efficiency versus safety, specific to a roadway section. The USLIMITS2 tool is considered an expert system by FHWA and is used to set speed limits while considering roadway characteristics in addition to the 85th percentile speed."*

In addition to USLIMITS2, NDOT is starting to look at the National Association of City Transportation Officials' (NACTO) *City Limits: Setting Safe Speed Limits on Urban Streets*. According to NACTO, *"The methods outlined in City Limits can be combined, and, unlike percentile-based approaches, each is context-sensitive, allowing cities to holistically evaluate who is using streets and how people are using them, from people walking and biking, to those taking transit or visiting a school. The guidance ranges from step-by-step checklists for conducting activity level and conflict density analyses, to nuanced metrics for documenting speeds that go beyond percentile-based speed setting practices."*

Effectiveness: As mentioned in Chapter 3, according to America Walks' *Speed: A National Pedestrian Safety Issue*, *"If a pedestrian is hit by a vehicle that is traveling 20 MPH, the pedestrian survival rate is 95-percent. This drops to 60-percent at 30 MPH, and just 20-percent at 40 MPH."*

Guidance Reports: The following website documents and memorandums were used to provide guidance regarding reducing pedestrian crashes through innovative crosswalks and lowering speed limits:

- GHSA's 2020 *Pedestrian Traffic Fatalities by State: 2019 Preliminary Data*
    - https://www.ghsa.org/sites/default/files/2020-02/GHSA-Pedestrian-Spotlight-FINAL-rev2.pdf

- FHWA's *USLIMITS2*
  - https://safety.fhwa.dot.gov/provencountermeasures/uslimits2/
- NACTO's City Limits: Setting Safe Speed Limits on Urban Streets
  - https://nacto.org/safespeeds/
- America Walks' Speed: A National Pedestrian Safety Issue
  - https://www.scribd.com/document/126915771/America-Walks-Federal-position-Speed-A-National-Safety-Issue
- City of Las Vegas Transportation Engineering Division's *Summary of USLIMITS2 Corridors*
  - Memorandum is located in **Appendix F**

Hit-and-Run Crashes

According to the American Automobile Association's (AAA) *Hit-and-Run Crashes: Prevalence, Contributing Factors, and Countermeasures*:

> *Hit-and-run collisions are those in which at least one person involved in a crash flees the scene before offering any (or sufficient) information or aid to the other involved person(s) or fails to properly report the crash. Hit-and-run crashes contribute to the suffering and social and economic burdens typical of injury crashes but also can increase the severity of outcomes given delays in or the complete absence of medical attention for the victims. Moreover, hit-and-run violations – which are criminal offenses – can create additional burdens for law enforcement and for families looking for remediation and medical and insurance support.*

Over the past 30 years, 20-percent of pedestrian crash fatalities involved a hit-and-crash. Similarly, from 2006 through 2016, 19.5-percent of pedestrian crash fatalities involved a hit-and-run crash, whereas only 1-percent of vehicular crash fatalities involved a hit-and run crash. As a result, combining the 7-E's with hit-and-run countermeasures can help reduce hit-and-run crashes at the CICMP intersections.

Hit-and-Run Countermeasure #1 – Allow Undocumented Immigrants to Receive a Driver's License

Description: Numerous countermeasures were discussed in *AAA's Hit-and-Run Crashes: Prevalence, Contributing Factors, and Countermeasures*, including creating harsher traffic safety laws to punish the driver, Colorado's Medina Alert Program, and Los Angeles' Yellow Alert Program, all of which either do not appear to deter hit-and-run drivers or the effects are still to-be-determined. However, one particular law, initially enacted in California, allows undocumented immigrants to receive a drivers' license. In January 2014, a similar law was passed in Nevada allowing undocumented workers to receive a driver authorization card (DAC).

Effectiveness: Hit-and-run crashes were analyzed in every county in California before and after the law was put into place. The results showed that the number of crashes remained the same, but hit-and-run crashes decreased. The decrease in hit-and-run crashes was highest in counties that had the highest number of new licenses because it removed the incentive to leave the scene of the crash due to not having a valid driver's license.

Guidance Report: AAA's *Hit-and-Run Crashes: Prevalence, Contributing Factors, and Countermeasures* provided guidance regarding hit-and-run crashes, which is discussed in the following website document:

- https://aaafoundation.org/wp-content/uploads/2018/04/18-0058_Hit-and-Run-Brief_FINALv2.pdf

Countermeasure Summary - The selected countermeasures, including a roadmap for the City to utilize to incorporate the countermeasures, is provided in **Figure 8**.

5.1.2. Traffic Operations Analysis

In addition to safety countermeasures, traffic operations were analyzed to help find ways to improve the level-of-service (LOS) and queueing at each of the CICMP intersections. Well-functioning traffic signals clear traffic queues during each signal phase, which corresponds with less "red-light running", and in turn, less intersection crashes.

LOS

As outlined in *Technical Memorandum #1* (**Appendix A**), intersection LOS has been calculated using methods documented in the Transportation Research Board (TRB) Publication *Highway Capacity Manual, 6th Edition* (HCM). Each CICMP intersection was mitigated using Synchro 10 operational analysis software, in order to reach a goal of LOS D or better, as the City utilizes LOS D as the lowest acceptable LOS for intersections during the AM and PM peak periods. Additionally, the HCM defines unacceptable intersection operations as any intersection with a volume-to-capacity (v/c) ratio greater than one (1.0).

Each CICMP intersection was mitigated using a combination of:

- Adding left-turn pocket(s)
- Increasing the length of existing left-turn pocket(s)
- Adding right-turn pocket(s)
- Increasing the length of existing right-turn pocket(s)
- Adding through lane(s)
- Optimizing the signal
    - *Note: Optimizing the signal only optimized the selected signal and did not optimize or synchronize the adjacent signals in the signal network*

The resulting mitigated 2020 AM and 2020 PM peak hour LOS and v/c ratios for each CICMP intersection is provided in **Table 7**. Additionally, **Table 7** illustrates the comparison of the 2020 Existing Conditions and the 2020 Mitigated Conditions, including the overall change in delay between the two scenarios.

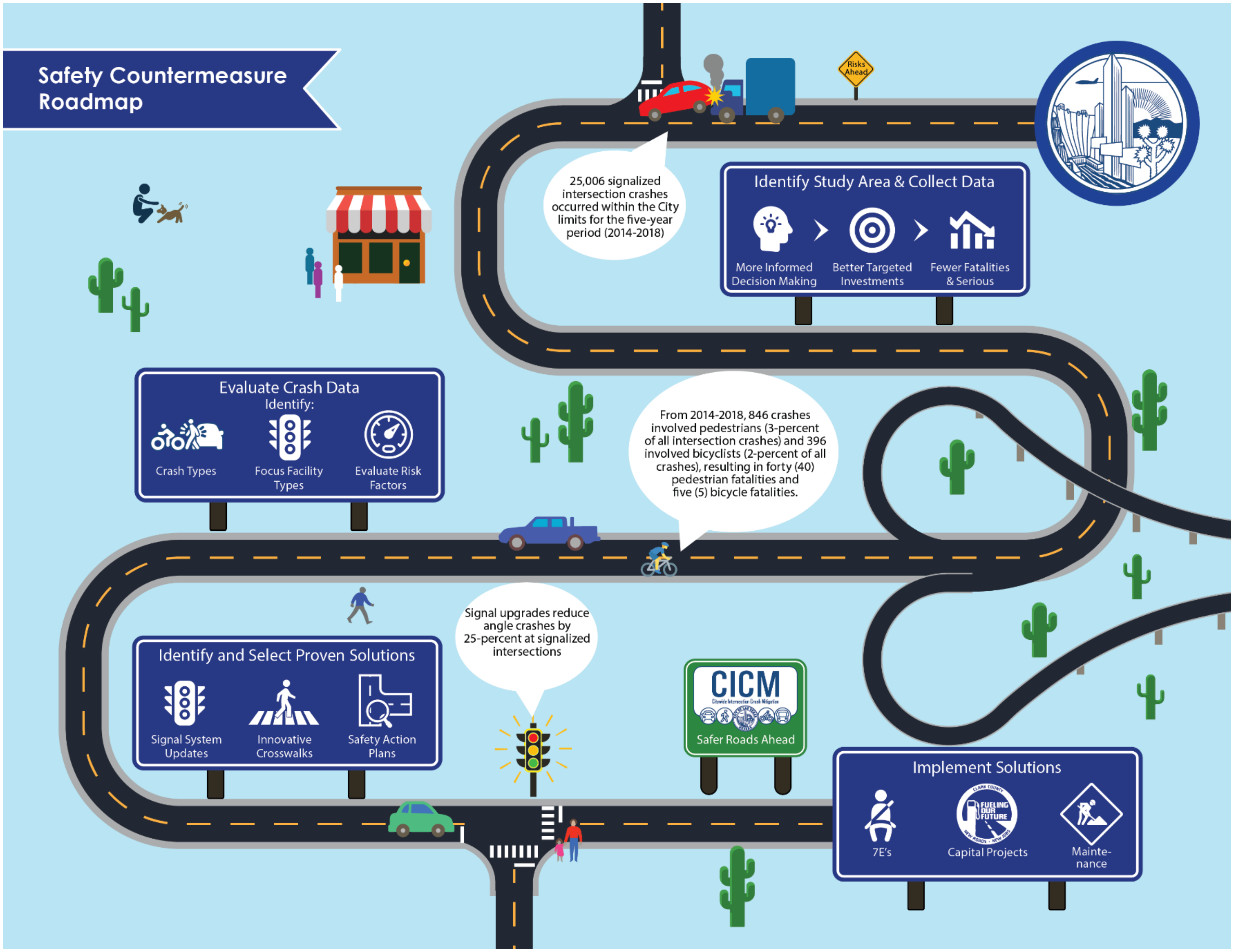


Figure 8: Countermeasure Roadmap

Table 7: Existing Conditions and 2020 Mitigated Conditions AM and PM Peak Hour Intersection LOS and V/C

ID	Intersection	Control Type	Peak Hour	2020 Existing Conditions			2020 Mitigated Conditions			Change in Delay
				Delay (S/V)[1]	LOS	V/C[2]	Delay (S/V)[1]	LOS	V/C[2]	
1	Durango Dr at Charleston Blvd	Signal	AM	46.7	D	<1	40.7	D	<1	6.0
			PM	74.7	E	>1	49.0	D	<1	25.7
2	Eastern Ave at Stewart Ave	Signal	AM	38.6	D	>1	43.7	D	<1	-5.1
			PM	69.4	E	>1	54.6	D	>1	14.8
3	Fort Apache Rd at Sahara Ave	Signal	AM	47.3	D	<1	43.4	D	<1	3.9
			PM	71.4	E	>1	55.0	D	<1	16.4
4	Martin L King Blvd at Bonanza Rd	Signal	AM	75.7	E	>1	47.0	D	<1	28.7
			PM	55.0	D	>1	47.3	D	<1	7.7
5	Lake Mead Blvd at Rainbow Blvd	Signal	AM	40.5	D	<1	39.0	D	<1	1.5
			PM	52.3	D	<1	49.5	D	<1	2.8
6	Charleston Blvd at Rainbow Blvd	Signal	AM	112.3	F	>1	44.9	D	<1	67.4
			PM	117.6	F	>1	55.9	E	<1	61.7
7	Valley View Blvd at Sahara Ave	Signal	AM	56.0	E	>1	47.8	D	<1	8.2
			PM	69.4	E	>1	51.1	D	<1	18.3
8	St Louis Ave at Eastern Ave	Signal	AM	26.9	C	<1	29.8	C	<1	-2.9
			PM	24.8	C	<1	31.0	C	<1	-6.2
9	Cheyenne Ave at Rainbow Blvd	Signal	AM	52.2	D	>1	37.9	D	<1	14.3
			PM	69.1	E	>1	51.9	D	<1	17.2
10	Decatur Blvd at Washington Ave	Signal	AM	47.5	D	<1	47.8	D	<1	-0.3
			PM	51.3	D	>1	47.0	D	<1	4.3

Notes:
[1] "Average" control delays (in seconds/vehicle) are indicated for signal-controlled intersections.
[2] V/C = Volume-to-capacity ratio

As shown in **Table 7** and illustrated in **Figure 9A** and **Figure 9B**, the only intersection that does not operate at LOS D or better once mitigation has been performed is the intersection of Charleston Boulevard and Rainbow Boulevard, which operates at a borderline LOS E (less than one second from LOS D) in the PM peak hour. Additionally, only one intersection has a v/c ratio greater than one, which is the intersection of Eastern Avenue and Stewart Avenue during the PM peak hour. The corresponding detailed Synchro 10 outputs can be viewed in **Appendix G**.

Queuing

As outlined in *Technical Memorandum #1* (**Appendix A**), vehicle storage deficiencies have been analyzed at all CICMP intersections by utilizing Synchro's 95th percentile queue lengths for left-turn pockets and right-turn pockets. The resulting mitigated 2020 AM and 2020 PM peak hour queues for each CICMP intersection is provided in **Table 8**. As illustrated in **Table 8**, once mitigation is performed, there will be no queueing deficiencies at any of the analyzed intersections. Similar to the LOS and v/c results, detailed Synchro 10 queueing outputs can be viewed in **Appendix G**.

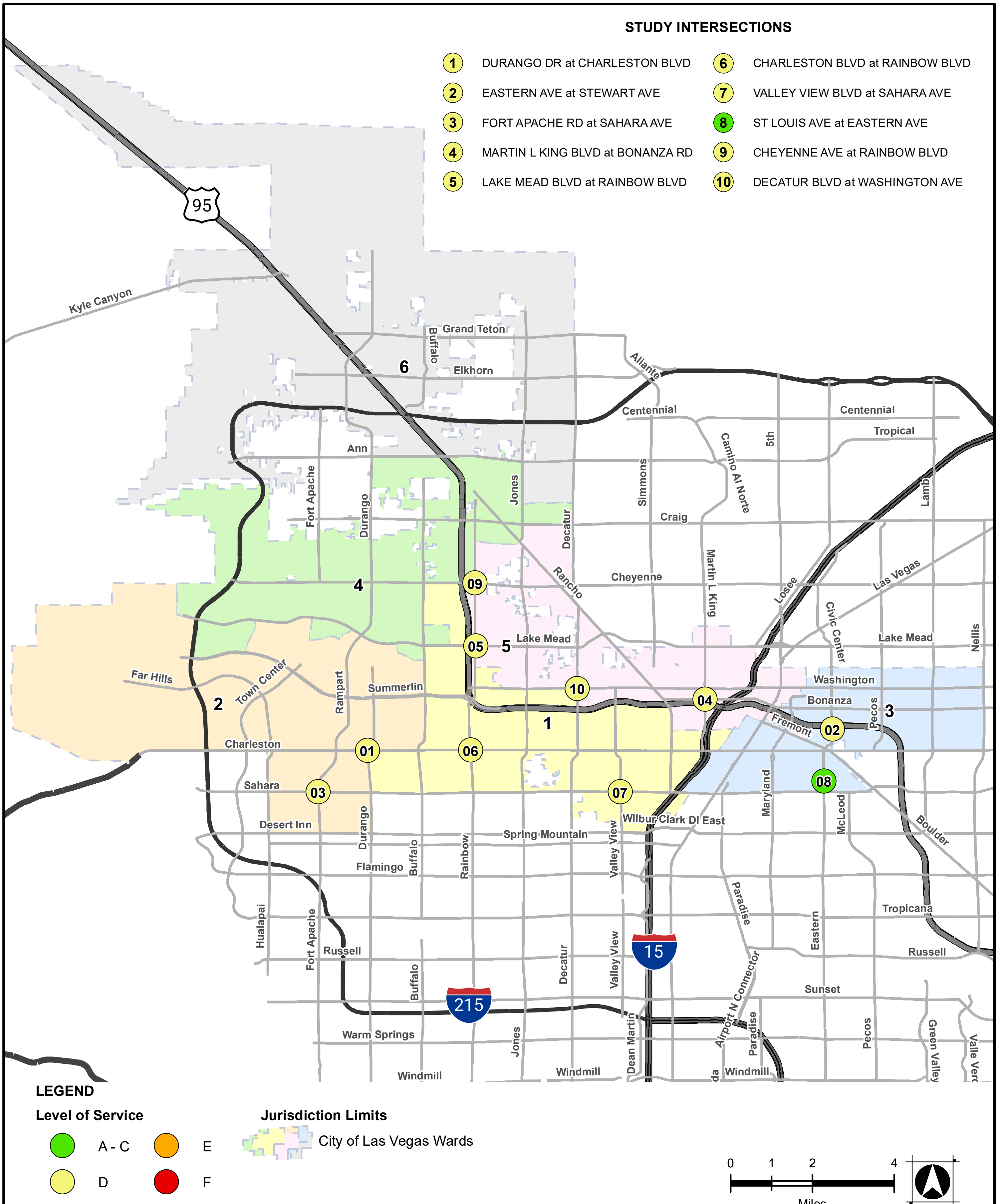


Figure 9A. 2020 Mitigated Study Intersection Traffic AM LOS

Las Vegas Citywide Intersection Crash Mitigation Program

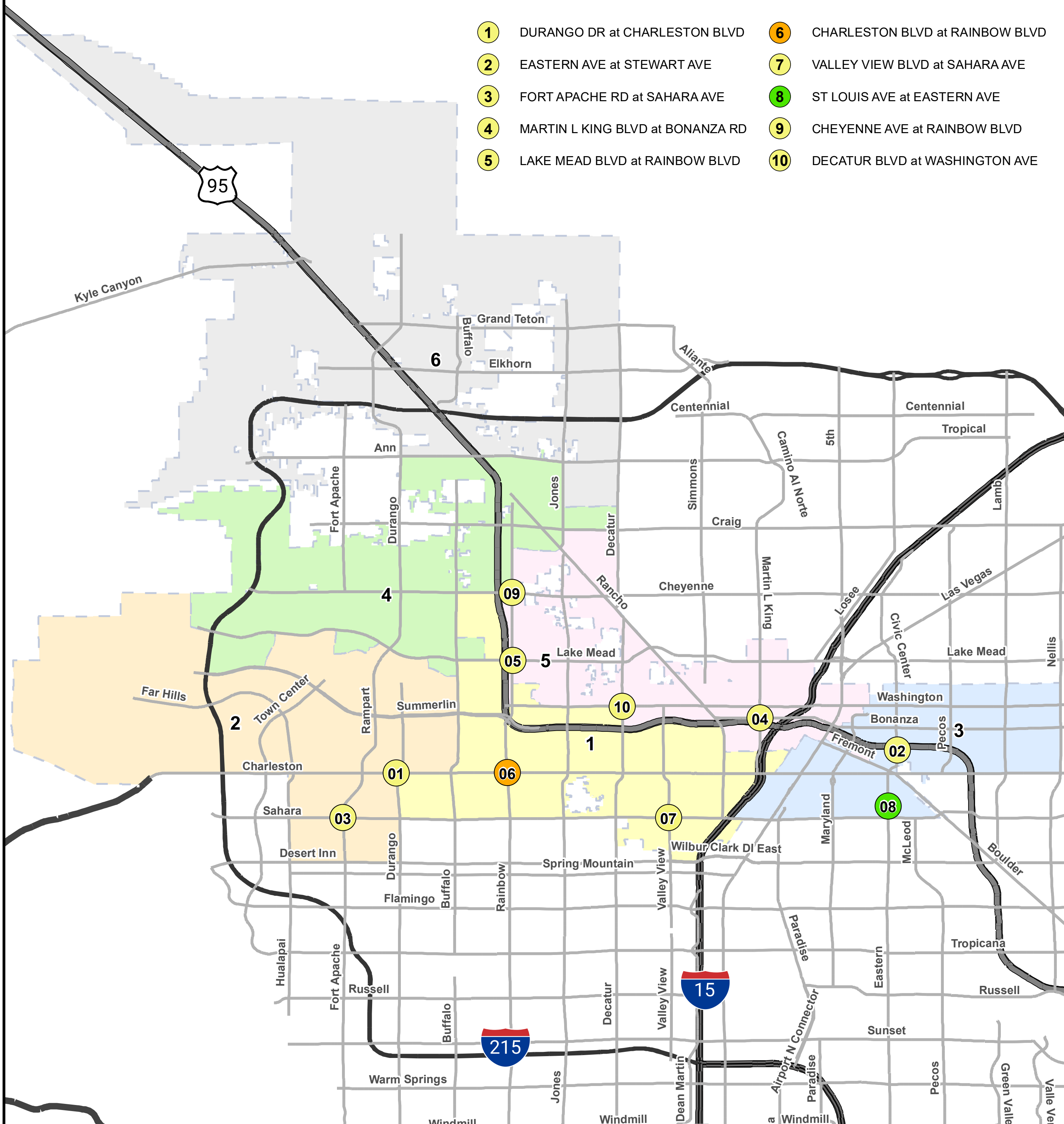
January 2021

WOOD RODGERS

CICM Citywide Intersection Crash Mitigation

STUDY INTERSECTIONS

1 DURANGO DR at CHARLESTON BLVD
2 EASTERN AVE at STEWART AVE
3 FORT APACHE RD at SAHARA AVE
4 MARTIN L KING BLVD at BONANZA RD
5 LAKE MEAD BLVD at RAINBOW BLVD
6 CHARLESTON BLVD at RAINBOW BLVD
7 VALLEY VIEW BLVD at SAHARA AVE
8 ST LOUIS AVE at EASTERN AVE
9 CHEYENNE AVE at RAINBOW BLVD
10 DECATUR BLVD at WASHINGTON AVE



LEGEND

Level of Service

A - C
E
D
F

Jurisdiction Limits

City of Las Vegas Wards

0 1 2 4
Miles
NORTH

Figure 9B. 2020 Mitigated Study Intersection Traffic PM LOS

Las Vegas Citywide Intersection Crash Mitigation Program
January 2021

WOOD RODGERS

CICM
Citywide Intersection Crash Mitigation

Table 8: 2020 Mitigated Conditions AM and PM Peak Hour Intersection LOS and V/C

ID #	Intersections	Peak Hour	Eastbound						Westbound						Northbound						Southbound					
			Left-Turn Bays			Right-Turn Bays			Left-Turn Bays			Right-Turn Bays			Left-Turn Bays			Right-Turn Bays			Left-Turn Bays			Right-Turn Bays		
			Number of Lanes	Storage Length (ft)[1]	Queue Length (ft)[2]	Number of Lanes	Storage Length (ft)[1]	Queue Length (ft)[2]	Number of Lanes	Storage Length (ft)[1]	Queue Length (ft)[2]	Number of Lanes	Storage Length (ft)[1]	Queue Length (ft)[2]	Number of Lanes	Storage Length (ft)[1]	Queue Length (ft)[2]	Number of Lanes	Storage Length (ft)[1]	Queue Length (ft)[2]	Number of Lanes	Storage Length (ft)[1]	Queue Length (ft)[2]	Number of Lanes	Storage Length (ft)[1]	Queue Length (ft)[2]
1	Durango Dr at Charleston Blvd	AM	**2**	**300**	82	**1**	**200**	72	**2**	**330**	117	**1**	**200**	0	**2**	**300**	98	**1**	**200**	15	**2**	**380**	78	**1**	**200**	81
		PM			179			120			170			10			247			118			70			138
2	Eastern Ave at Stewart Ave	AM	**2**	**310**	102	**1**	**150**	0	**2**	**300**	84	**1**	**300**	89	**2**	**300**	25	**1**	**150**	0	**2**	**300**	186	**1**	**150**	26
		PM			132			0			77			222			35			76			246			43
3	Fort Apache Rd at Sahara Ave	AM	2	325	101	1	180	21	2	315	77	**1**	**315**	25	2	260	72	**1**	**150**	78	2	350	202	**1**	**150**	23
		PM			198			0			286			171			224			91			230			96
4	Martin Luther King Blvd at Bonanza Rd	AM	2	300	31	1	200	188	**2**	**300**	104	**1**	**300**	7	2	300	65	**1**	**150**	46	2	400	104	1	165	0
		PM			74			89			252			214			92			43			155			0
5	Lake Mead Blvd at Rainbow Blvd	AM	2	450	167	1	135	19	2	250	86	1	160	14	2	240	68	1	230	24	2	250	40	1	315	25
		PM			384			101			135			105			133			63			75			80
6	Charleston Blvd at Rainbow Blvd	AM	**3**	**345**	57	**1**	**250**	171	**3**	**345**	102	**1**	**250**	12	**3**	**340**	85	**1**	**250**	112	**3**	**330**	140	1	245	50
		PM			185			72			157			179			177			154			210			73
7	Valley View Blvd at Sahara Ave	AM	2	315	99	1	135	85	2	345	118	1	160	32	2	270	82	**1**	**150**	42	2	345	115	**1**	**150**	0
		PM			135			54			202			107			208			98			174			34
8	St. Louis Ave at Eastern Ave	AM	**1**	**300**	37	1	115	0	**1**	**300**	142	1	85	0	1	230	37	**1**	**150**	18	1	230	114	**1**	**150**	0
		PM			120			0			128			39			51			86			84			0
9	Cheyenne Ave at Rainbow Blvd	AM	2	360	82	1	220	25	**2**	**300**	87	**1**	**150**	0	2	370	119	**1**	**150**	26	**2**	**300**	140	**1**	**150**	28
		PM			264			77			140			0			262			107			110			15
10	Decatur Blvd at Washington Ave	AM	**1**	**300**	78	**1**	**300**	149	**1**	**300**	189	**1**	**300**	23	**2**	**300**	113	1	310	0	**2**	**300**	167	**1**	**150**	0
		PM			144			39			259			275			186			49			118			0

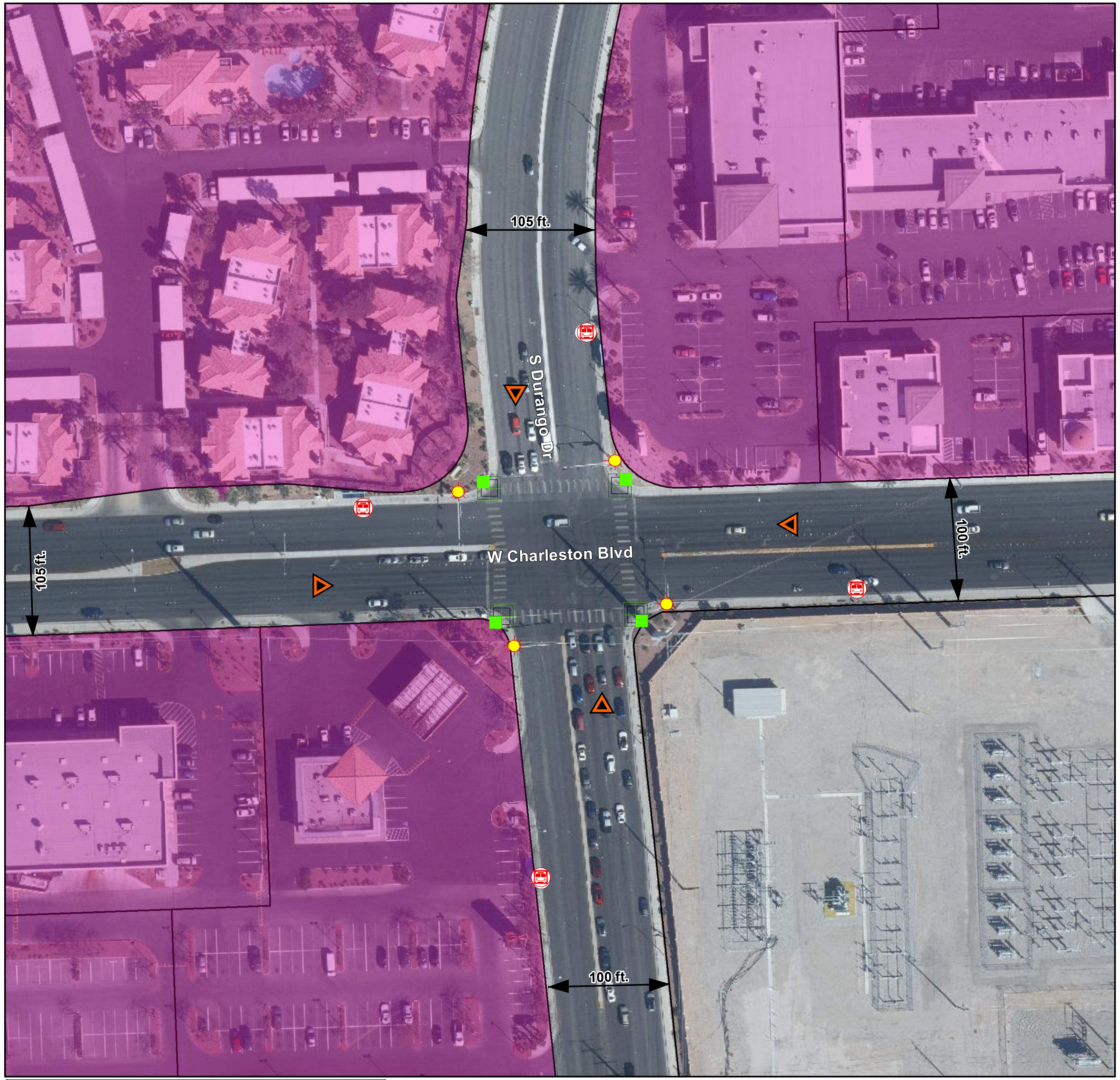
Notes:
[1] Storage lengths are the average length of each turn pocket movement, where the existing turn pocket lengths were measured from Google Earth.
[2] Queue length needs to be less than the storage length to prevent queues from spilling into through lanes.
Red Bold *highlights turn pockets where the number and/or length of the existing turn pockets has been increased*

5.1.3. Develop Safety Projects – Program Intersections

The countermeasures discussed earlier in this chapter were combined with the traffic operations analysis in the previous section and with the key initial findings discussed in Chapter 3 to develop recommendations that would improve the safety and operations of each CICMP intersection. The final intersection recommendations are summarized in **Figure 10A** through **Figure 10J**, which include:

- Aerial Image
- Roadway Right-of-Way
- Parcels and Easements
- Existing and Proposed Transit Stop Locations
- Existing and Proposed Mitigation for Signal System Improvements
- Existing and Proposed Mitigation for Roadway Improvements
- Existing and Proposed Mitigation for Multimodal Improvements (Including Bicycle Facility and Transit Facility and Amenity Improvements)
- Existing and Proposed Mitigation for Pedestrian Safety Improvements

Detailed spreadsheets identifying all of the recommended improvements are provided in **Appendix H**.



LEGEND

ROW | Easements | Parcel

Signal System: Retroreflective Backplates / Signal Heads Aligned with Lanes / Left-Turn Phasing / Mast Arm Lighting

	Existing	Mitigation
NB	No / No / Green Ball - Permitted / 1-Luminaire	**Yes / Yes / Protected / 2-Luminaires**
SB	No / No / Green Ball - Permitted / 1-Luminaire	**Yes / Yes / Protected / 2-Luminaires**
EB	No / No / Green Ball - Permitted / 1-Luminaire	**Yes / Yes / Protected / 2-Luminaires**
WB	No / No / Green Ball - Permitted / 1-Luminaire	**Yes / Yes / Protected / 2-Luminaires**

Roadway (Vehicle): Median Island / Through Lane Alignment / U-Turn Allowed (Sign) / Lane Geometrics

	Existing	Mitigation
NB	Yes / Yes / N/A / LT:1-300'; 3-Thru; RT:Shared	Yes / Yes **/ Yes / LT:2-300'**; 3-Thru; **RT:1-200'**
SB	Yes / No / N/A / LT:1-380'; 3-Thru; RT:Shared	Yes **/ Yes / Yes / LT:2-380'**; 3-Thru; **RT:1-200'**
EB	Yes / Yes / N/A / LT:1-220'; 3-Thru; RT:Shared	Yes / Yes **/ Yes / LT:2-300'**; 3-Thru; **RT:1-200'**
WB	Yes / No / N/A / LT:1-330'; 3-Thru; RT:Shared	Yes **/ Yes / Yes / LT:2-330'**; 3-Thru; **RT:1-200'**

Multimodal Transit Facilities: Turnout / Amenities — Multimodal Bicycle Facilities: Presence (Type)

	Existing Transit	Existing Bicycle	Mitigation Transit	Mitigation Bicycle
NB	No / Shelter	No	**Yes** / Shelter	No
SB	No / Shelter	No	**Yes** / Shelter	No
EB	No / Shelter in S/W	No	**Yes / Shelter behind S/W**	No
WB	No / Shelter	No	**Yes** / Shelter	No

Multimodal Pedestrian Facilities: Crosswalk / ADA Compliance

	Existing	Mitigation
NB	Yes / Non-Compliant	Yes / **Compliant**
SB	Yes / Non-Compliant	Yes / **Compliant**
EB	Yes / Non-Compliant	Yes / **Compliant**
WB	Yes / Non-Compliant	Yes / **Compliant**

0 50 100 Feet

Figure 10A. Systemic Improvements: 1. Durango Dr at Charleston Blvd

Las Vegas Citywide Intersection Crash Mitigation Program

January 2021

NOTE(S):
BOLD represents improvement opportunity

WOOD RODGERS

CICM Citywide Intersection Crash Mitigation

LEGEND

ROW | Existing Transit Stop | Easements | Parcel

	Existing	Mitigation
Signal System: Retroreflective Backplates / Signal Heads Aligned with Lanes / Left-Turn Phasing / Mast Arm Lighting		
NB	No / No / FYA - Permitted / 1-Luminaire	**Yes / Yes / Protected / 2-Luminaires**
SB	No / No / FYA - Permitted / 1-Luminaire	**Yes / Yes / Protected / 2-Luminaires**
EB	No / No / FYA - Permitted / 1-Luminaire	**Yes / Yes / Protected / 2-Luminaires**
WB	No / No / FYA - Permitted / 1-Luminaire	**Yes / Yes / Protected / 2-Luminaires**
Roadway (Vehicle): Median Island / Through Lane Alignment / U-Turn Allowed (Sign) / Lane Geometrics		
NB	Yes / Yes / N/A / LT:1-145'; 3-Thru; RT:Shared	Yes / Yes / **No / LT:2-300'**; 3-Thru; **RT:1-150'**
SB	Yes / No / N/A / LT:1-145'; 3-Thru; RT:Shared	Yes / **Yes / No / LT:2-300'**; 3-Thru; **RT:1-150'**
EB	No / Yes / N/A / LT:1-190'; 2-Thru; RT:Shared	**Yes** / Yes / **No / LT:2-310'**; 2-Thru; **RT:1-150'**
WB	No / Yes / N/A / LT:1-120'; 2-Thru; RT:1-150'	**Yes** / Yes / **No / LT:2-300'**; 2-Thru; **RT:1-300'**

	Existing Multimodal Transit Facilities: Turnout / Amenities	Existing Multimodal Bicycle Facilities: Presence (Type)	Mitigation Multimodal Transit Facilities: Turnout / Amenities	Mitigation Multimodal Bicycle Facilities: Presence (Type)
NB	No / Near-side Shelter in S/W	No	**Yes / Shelter behind S/W**	No
SB	No / Shelter in S/W	No	**Yes / Shelter behind S/W**	No
EB	Yes / Shelter	No	Yes / Shelter	No
WB	Yes (Pocket) / Shelter in S/W	US 95 Trail	Yes / **Shelter behind S/W**	US 95 Trail

	Existing	Mitigation
Multimodal Pedestrian Facilities: Crosswalk / ADA Compliance		
NB	Yes - Faded / Non-Compliant	Yes - **Restripe / Compliant**
SB	Yes - Faded / Non-Compliant	Yes - **Restripe / Compliant**
EB	Yes - Faded / Non-Compliant	Yes - **Restripe / Compliant**
WB	Yes - Faded / Non-Compliant	Yes - **Restripe / Compliant**

0 50 100
FEET

Figure 10B. Systemic Improvements: 2. Eastern Ave at Stewart Ave

Las Vegas Citywide Intersection Crash Mitigation Program

January 2021

NOTE(S):
BOLD represents improvement opportunity

CICM
Citywide Intersection Crash Mitigation

WOOD RODGERS

LEGEND

ROW | Existing Transit Stop | Easements | Parcel

Existing	Mitigation
Signal System: Retroreflective Backplates / Signal Heads Aligned with Lanes / Left-Turn Phasing / Mast Arm Lighting	**Signal System: Retroreflective Backplates / Signal Heads Aligned with Lanes / Left-Turn Phasing / Mast Arm Lighting**
NB No / No / Protected / 1-Luminaire	NB **Yes / Yes** / Protected / **2-Luminaires**
SB No / No / Protected / 1-Luminaire	SB **Yes / Yes** / Protected / **2-Luminaires**
EB No / No / Protected / 1-Luminaire	EB **Yes / Yes** / Protected / **2-Luminaires**
WB No / No / Protected / 1-Luminaire	WB **Yes / Yes** / Protected / **2-Luminaires**
Roadway (Vehicle): Median Island / Through Lane Alignment / U-Turn Allowed (Sign) / Lane Geometrics	**Roadway (Vehicle): Median Island / Through Lane Alignment / U-Turn Allowed (Sign) / Lane Geometrics**
NB Yes / Yes / Yes / LT:2-260'; 3-Thru; RT:Shared	NB Yes / Yes / Yes / LT:2-260'; 3-Thru; **RT:1-150'**
SB Yes / No / Yes / LT:2-350'; 3-Thru; RT:Shared	SB Yes / **Yes** / Yes / LT:2-350'; 3-Thru; **RT:1-150'**
EB Yes / No / Yes / LT:2-325'; 3-Thru; RT:1-180'	EB Yes / **Yes** / Yes / LT:2-325'; 3-Thru; RT:1-180'
WB Yes / Yes / Yes / LT:2-315'; 3-Thru; RT:1-180'	WB Yes / Yes / Yes / LT:2-315'; 3-Thru; **RT:1-315'**

Existing: Multimodal Transit Facilties: Turnout / Amenities	Existing: Multimodal Bicycle Facilities: Presence (Type)	Mitigation: Multimodal Transit Facilties: Turnout / Amenities	Mitigation: Multimodal Bicycle Facilities: Presence (Type)
NB No / No Amenities	NB No	NB **Yes / Shelter**	NB No
SB No / No Amenities	SB No	SB **Yes / Shelter**	SB No
EB BRT Bus Lane / Shelter	EB Shared w/ BRT	EB BRT Bus Lane / Shelter	EB Shared w/ BRT
WB BRT Bus Lane / Shelter	WB Shared w/ BRT	WB BRT Bus Lane / Shelter	WB Shared w/ BRT

Existing	Mitigation
Multimodal Pedestrian Facilties: Crosswalk / ADA Compliance	**Multimodal Pedestrian Facilties: Crosswalk / ADA Compliance**
NB Yes - Faded / Non-Compliant	NB Yes - **Restripe / Compliant**
SB Yes - Faded / Non-Compliant	SB Yes - **Restripe / Compliant**
EB Yes - Faded / Non-Compliant	EB Yes - **Restripe / Compliant**
WB Yes - Faded / Non-Compliant	WB Yes - **Restripe / Compliant**

0 50 100
Feet

Figure 10C. Systemic Improvements: 3. Fort Apache Rd at Sahara Ave

Las Vegas Citywide Intersection Crash Mitigation Program

January 2021

NOTE(S):
BOLD represents improvement opportunity

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Citywide Intersection Crash Mitigation

LEGEND
ROW
Easements
Parcel

Existing

Signal System:
Retroreflective Backplates / Signal Heads Aligned with Lanes / Left-Turn Phasing / Mast Arm Lighting

NB	No / No / Protected / 1-Luminaire
SB	No / No / Protected / 1-Luminaire
EB	No / No / Protected / 1-Luminaire
WB	No / No / Protected / 1-Luminaire

Roadway (Vehicle):
Median Island / Through Lane Alignment / U-Turn Allowed (Sign) / Lane Geometrics

NB	Yes / Yes / No / LT:2-300'; 3-Thru; RT:Shared
SB	Yes / Yes / N/A / LT:2-400'; 3-Thru; RT:1-165'
EB	Yes / Yes / No / LT:2-300'; 2-Thru; RT:1-200'
WB	Yes / Yes / No / LT:2-250'; 2-Thru; RT:1-180'

Multimodal Transit Facilties: Turnout / Amenities

NB	No / No Amenities
SB	No / No Amenities
EB	No / Shelter
WB	No / Shelter

Multimodal Bicycle Facilties: Presence (Type)

NB	No
SB	No
EB	Yes (EB Leg)
WB	No

Multimodal Pedestrian Facilties: Crosswalk / ADA Compliance

NB	Yes - Faded / Non-Compliant
SB	Yes - Faded / Non-Compliant
EB	Yes - Faded / Non-Compliant
WB	Yes - Faded / Non-Compliant

Mitigation

Signal System:
Retroreflective Backplates / Signal Heads Aligned with Lanes / Left-Turn Phasing / Mast Arm Lighting

NB	**Yes / Yes** / Protected / **2-Luminaires**
SB	**Yes / Yes** / Protected / **2-Luminaires**
EB	**Yes / Yes** / Protected / **2-Luminaires**
WB	**Yes / Yes** / Protected / **2-Luminaires**

Roadway (Vehicle):
Median Island / Through Lane Alignment / U-Turn Allowed (Sign) / Lane Geometrics

NB	Yes / Yes / No / LT:2-300'; 3-Thru; **RT:1-150'**
SB	Yes / Yes / **No** / LT:2-400'; 3-Thru; RT:1-165'
EB	Yes / Yes / No / LT:2-300'; 2-Thru; RT:1-200'
WB	Yes / Yes / No / **LT:2-300'**; 2-Thru; **RT:1-300'**

Multimodal Transit Facilties: Turnout / Amenities

NB	**Yes / Shelter**
SB	**Yes / Shelter**
EB	**Yes** / Shelter
WB	**Yes** / Shelter

Multimodal Bicycle Facilties: Presence (Type)

NB	No
SB	No
EB	Yes (EB Leg)
WB	No

Multimodal Pedestrian Facilties: Crosswalk / ADA Compliance

NB	Yes - **Restripe / Compliant**
SB	Yes - **Restripe / Compliant**
EB	Yes - **Restripe / Compliant**
WB	Yes - **Restripe / Compliant**

0 50 100
Feet

Figure 10D. Systemic Improvements: 4. Martin Luther King Blvd at Bonanza Rd

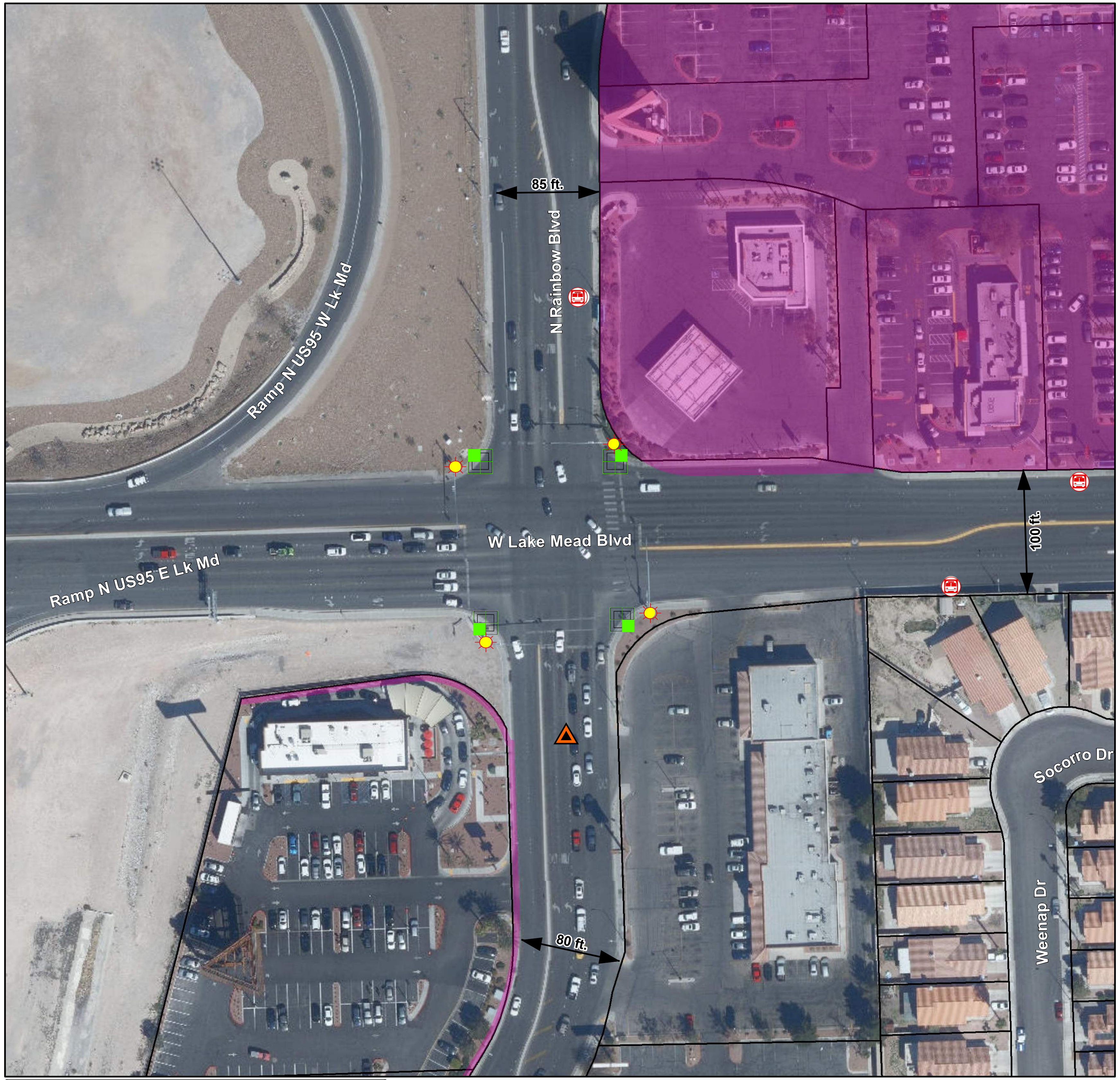
Las Vegas Citywide Intersection Crash Mitigation Program

January 2021

NOTE(S):
BOLD represents improvement opportunity

WOOD RODGERS

CICM
Citywide Intersection Crash Mitigation



LEGEND

ROW | Easements | Parcel

	Existing	Mitigation
	Signal System: Retroreflective Backplates / Signal Heads Aligned with Lanes / Left-Turn Phasing / Mast Arm Lighting	**Signal System:** Retroreflective Backplates / Signal Heads Aligned with Lanes / Left-Turn Phasing / Mast Arm Lighting
NB	No / No / Protected / 1-Luminaire	**Yes / Yes** / Protected / **2-Luminaires**
SB	No / No / Protected / 1-Luminaire	**Yes / Yes** / Protected / **2-Luminaires**
EB	No / No / Protected / 1-Luminaire	**Yes / Yes** / Protected / **2-Luminaires**
WB	No / No / Protected / 1-Luminaire	**Yes / Yes** / Protected / **2-Luminaires**
	Roadway (Vehicle): Median Island / Through Lane Alignment / U-Turn Allowed (Sign) / Lane Geometrics	**Roadway (Vehicle):** Median Island / Through Lane Alignment / U-Turn Allowed (Sign) / Lane Geometrics
NB	Yes / No / No / LT:2-240'; 2-Thru; RT:1-230'	Yes / **Yes** / No / LT:2-240'; 2-Thru; RT:1-230'
SB	Yes / Yes / No / LT:2-250'; 2-Thru; RT:1-315'	Yes / Yes / No / LT:2-250'; 2-Thru; RT:1-315'
EB	Yes / Yes / Yes / LT:2-450'; 3-Thru; RT:1-135'	Yes / Yes / Yes / LT:2-450'; 3-Thru; RT:1-135'
WB	Yes / Yes / Yes / LT:2-250'; 3-Thru; RT:1-160'	Yes / Yes / Yes / LT:2-250'; 3-Thru; RT:1-160'

	Existing: Multimodal Transit Facilties: Turnout / Amenities	Existing: Multimodal Bicycle Facilties: Presence (Type)	Mitigation: Multimodal Transit Facilties: Turnout / Amenities	Mitigation: Multimodal Bicycle Facilties: Presence (Type)
NB	No / Shelter	No	**Yes** / Shelter	No
SB	Yes (Pocket) / Shelter	No	Yes / Shelter	No
EB	No / Bench in S/W (Wall)	No	**Yes / Shelter behind S/W**	No
WB	No / Near-side Shelter	No	**Yes** / Shelter	No

	Existing	Mitigation
	Multimodal Pedestrian Facilties: Crosswalk / ADA Compliance	**Multimodal Pedestrian Facilties:** Crosswalk / ADA Compliance
NB	Yes - Faded / Non-Compliant	Yes - **Restripe / Compliant**
SB	No / Non-Compliant	No / **Compliant**
EB	Yes - Update / Non-Compliant	Yes - **Updated / Compliant**
WB	No / Non-Compliant	No / **Compliant**

0 50 100
Feet

Figure 10E. Systemic Improvements: 5. Lake Mead Blvd at Rainbow Blvd

Las Vegas Citywide Intersection Crash Mitigation Program

January 2021

NOTE(S):
BOLD represents improvement opportunity

CICM
Citywide Intersection Crash Mitigation

WOOD RODGERS

LEGEND
ROW
Easements
Parcel

	Existing	Mitigation
Signal System: Retroreflective Backplates / Signal Heads Aligned with Lanes / Left-Turn Phasing / Mast Arm Lighting		
NB	Yes - Some / No / Protected / 1-Luminaire	**Yes** / **Yes** / Protected / **2-Luminaires**
SB	Yes - Some / No / Protected / 1-Luminaire	**Yes** / **Yes** / Protected / **2-Luminaires**
EB	Yes - Some / No / Protected / 1-Luminaire	**Yes** / **Yes** / Protected / **2-Luminaires**
WB	Yes - Some / No / Protected / 1-Luminaire	**Yes** / **Yes** / Protected / **2-Luminaires**
Roadway (Vehicle): Median Island / Through Lane Alignment / U-Turn Allowed (Sign) / Lane Geometrics		
NB	Yes / No / Yes / LT:2-340'; 3-Thru; RT:1-120'	Yes / **Yes** / Yes / **LT:3-340'; 4-Thru; RT:1-250'**
SB	Yes / Yes / Yes / LT:2-330'; 3-Thru; RT:1-245'	Yes / Yes / Yes / **LT:3-330'; 4-Thru;** RT:1-245'
EB	Yes / Yes / Yes / LT:2-345'; 3-Thru; RT:Shared	Yes / Yes / Yes / **LT:3-345'**; 3-Thru; **RT:1-250'**
WB	Yes / No / Yes / LT:2-345'; 3-Thru; RT:Shared	Yes / **Yes** / Yes / **LT:3-345'**; 3-Thru; **RT:1-250'**

	Existing: Multimodal Transit Facilties: Turnout / Amenities	Existing: Multimodal Bicycle Facilties: Presence (Type)	Mitigation: Multimodal Transit Facilties: Turnout / Amenities	Mitigation: Multimodal Bicycle Facilties: Presence (Type)
NB	No - Wide Shoulder / Shelter	Wide Shoulder	**Yes** / Shelter	**No**
SB	No - Wide Shoulder / Shelter	Wide Shoulder	**Yes** / Shelter	**No**
EB	No / Shelter	No	**Yes** / Shelter	No
WB	No / Shelter	No	**Yes** / Shelter	No

	Existing: Multimodal Pedestrian Facilties: Crosswalk / ADA Compliance	Mitigation: Multimodal Pedestrian Facilties: Crosswalk / ADA Compliance
NB	Yes - Faded / Compliant	Yes - **Restripe** / Compliant
SB	Yes - Faded / Compliant	Yes - **Restripe** / Compliant
EB	Yes - Faded / Compliant	Yes - **Restripe** / Compliant
WB	Yes - Faded / Compliant	Yes - **Restripe** / Compliant

0 50 100
FEET

Figure 10F. Systemic Improvements: 6. Charleston Blvd at Rainbow Blvd

Las Vegas Citywide Intersection Crash Mitigation Program

January 2021

NOTE(S):
BOLD represents improvement opportunity

WOOD RODGERS

CICM
Citywide Intersection Crash Mitigation

LEGEND

ROW | Existing Transit Stop | Easements | Parcel

	Existing	Mitigation
Signal System: Retroreflective Backplates / Signal Heads Aligned with Lanes / Left-Turn Phasing / Mast Arm Lighting		
NB	No / No / Protected / 1-Luminaire	**Yes / Yes** / Protected / **2-Luminaires**
SB	No / No / Protected / West Crosswalk - 0 Lights	**Yes / Yes** / Protected / **2-Luminaires**
EB	No / No / Protected / 1-Luminaire	**Yes / Yes** / Protected / **2-Luminaires**
WB	No / No / Protected / 1-Luminaire	**Yes / Yes** / Protected / **2-Luminaires**
Roadway (Vehicle): Median Island / Through Lane Alignment / U-Turn Allowed (Sign) / Lane Geometrics		
NB	Yes / No / No / LT:2-270'; 3-Thru; RT:Shared	Yes / **Yes** / No / LT:2-270'; 3-Thru; **RT:1-150'**
SB	Yes / Yes / Yes / LT:2-345'; 2-Thru; RT:Shared	Yes / Yes / Yes / LT:2-345'; 2-Thru; **RT:1-150'**
EB	Yes / Yes / Yes / LT:2-315'; 3-Thru; RT:1-135'	Yes / Yes / Yes / LT:2-315'; 3-Thru; RT:1-135'
WB	Yes / Yes / Yes / LT:2-345'; 3-Thru; RT:1-160'	Yes / Yes / Yes / LT:2-345'; 3-Thru; RT:1-160'
Multimodal Transit Facilties: Turnout / Amenities		
NB	Yes (Pocket) / Shelter	Yes / Shelter
SB	Yes (Pocket) / Shelter	Yes / Shelter
EB	BRT Bus Lane / Shelters (2)	BRT Bus Lane / Shelters
WB	BRT Bus Lane / Near-side Shelter	BRT Bus Lane / Shelter
Multimodal Bicycle Facilties: Presence (Type)		
NB	No	No
SB	No	No
EB	Shared w/ BRT	Shared w/ BRT
WB	Shared w/ BRT	Shared w/ BRT
Multimodal Pedestrian Facilties: Crosswalk / ADA Compliance		
NB	Yes - Faded / Non-Compliant	Yes - **Restripe / Compliant**
SB	Yes - Faded / Non-Compliant	Yes - **Restripe / Compliant**
EB	Yes - Faded / Non-Compliant	Yes - **Restripe / Compliant**
WB	Yes - Faded / Non-Compliant	Yes - **Restripe / Compliant**

0 50 100
Feet

Figure 10G. Systemic Improvements: 7. Valley View Blvd at Sahara Ave

Las Vegas Citywide Intersection Crash Mitigation Program

January 2021

NOTE(S):
BOLD represents improvement opportunity

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Citywide Intersection Crash Mitigation

Signal System: Retroreflective Backplates / Signal Heads Aligned with Lanes / Left-Turn Phasing / Mast Arm Lighting

	Existing	Mitigation
NB	No / No / Protected / 1-Luminaire	**Yes / Yes** / Protected / **2-Luminaires**
SB	No / No / Protected / 1-Luminaire	**Yes / Yes** / Protected / **2-Luminaires**
EB	No / No / Green Ball - Permitted / 1-Luminaire	**Yes / Yes / Protected / 2-Luminaires**
WB	No / No / Green Ball - Permitted / 1-Luminaire	**Yes / Yes / Protected / 2-Luminaires**

Roadway (Vehicle): Median Island / Through Lane Alignment / U-Turn Allowed (Sign) / Lane Geometrics

	Existing	Mitigation
NB	Yes / Yes / N/A / LT:1-230'; 3-Thru; RT:Shared	Yes / Yes / **Yes** / LT:1-230'; 3-Thru; **RT:1-150'**
SB	Yes / Yes / N/A / LT:1-230'; 3-Thru; RT:Shared	Yes / Yes / **Yes** / LT:1-230'; 3-Thru; **RT:1-150'**
EB	No / No / No / LT:1-115'; 1-Thru; RT:1-115'	**Yes / Yes** / No / **LT:1-300';** 1-Thru; RT:1-115'
WB	No / No / No / LT:1-85'; 1-Thru; RT:1-85'	**Yes / Yes** / No / **LT:1-300';** 1-Thru; RT:1-85'

Multimodal Transit Facilties: Turnout / Amenities and **Multimodal Bicycle Facilties: Presence (Type)**

	Existing Transit	Existing Bicycle	Mitigation Transit	Mitigation Bicycle
NB	No / Bench in S/W (Building)	No	**Yes / Shelter behind S/W**	No
SB	No / Shelter	No	**Yes** / Shelter	No
EB	N/A / N/A	Yes	N/A / N/A	Yes
WB	N/A / N/A	Yes	N/A / N/A	Yes

Multimodal Pedestrian Facilties: Crosswalk / ADA Compliance

	Existing	Mitigation
NB	Yes - Faded / Non-Compliant	Yes - **Restripe / Compliant**
SB	Yes - Faded / Non-Compliant	Yes - **Restripe / Compliant**
EB	Yes - Faded / Non-Compliant	Yes - **Restripe / Compliant**
WB	Yes - Faded / Non-Compliant	Yes - **Restripe / Compliant**

0 50 100
Feet

Figure 10H. Systemic Improvements: 8. St Louis Ave at Eastern Ave

Las Vegas Citywide Intersection Crash Mitigation Program

January 2021

NOTE(S):
BOLD represents improvement opportunity

CICM
Citywide Intersection Crash Mitigation

Wood Rodgers

	Existing	Mitigation
Signal System: Retroreflective Backplates / Signal Heads Aligned with Lanes / Left-Turn Phasing / Mast Arm Lighting		
NB	No / No / Protected / 1-Luminaire	**Yes** / **Yes** / Protected / **2-Luminaires**
SB	No / No / Protected / 1-Luminaire	**Yes** / **Yes** / Protected / **2-Luminaires**
EB	No / No / Protected / 1-Luminaire	**Yes** / **Yes** / Protected / **2-Luminaires**
WB	No / No / Protected / 1-Luminaire	**Yes** / **Yes** / Protected / **2-Luminaires**
Roadway (Vehicle): Median Island / Through Lane Alignment / U-Turn Allowed (Sign) / Lane Geometrics		
NB	Yes / Yes / No / LT:2-370'; 2-Thru; RT:Shared	Yes / Yes / No / LT:2-370'; 2-Thru; **RT:1-150'**
SB	Yes / No / No / LT:1-85'; 2-Thru; RT:Shared	Yes / **Yes** / No / **LT:2-300'**; 2-Thru; **RT:1-150'**
EB	Yes / No / Yes / LT:2-360'; 3-Thru; RT:1-220'	Yes / **Yes** / Yes / LT:2-360'; 3-Thru; RT:1-220'
WB	Yes / No / N/A / LT:1-260'; 3-Thru; RT:Shared	Yes / **Yes** / **Yes** / **LT:2-300'**; 3-Thru; **RT:1-150'**
Multimodal Transit Facilites: Turnout / Amenities		
NB	No / Shelter	**Yes** / Shelter
SB	No / Shelter	**Yes** / Shelter
EB	No / Shelter in S/W	**Yes** / **Shelter behind S/W**
WB	No / Shelter	**Yes** / Shelter
Multimodal Bicycle Facilities: Presence (Type)		
NB	No	No
SB	No	No
EB	No	No
WB	No	No
Multimodal Pedestrian Facilties: Crosswalk / ADA Compliance		
NB	Yes - Faded / Non-Compliant	Yes - **Restripe / Compliant**
SB	Yes - Faded / Non-Compliant	Yes - **Restripe / Compliant**
EB	Yes - Faded / Non-Compliant	Yes - **Restripe / Compliant**
WB	Yes - Faded / Non-Compliant	Yes - **Restripe / Compliant**

0 50 100
Feet

Figure 10I. Systemic Improvements: 9. Cheyenne Ave at Rainbow Blvd

Las Vegas Citywide Intersection Crash Mitigation Program

January 2021

NOTE(S):
BOLD represents improvement opportunity

CICM
Citywide Intersection Crash Mitigation

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LEGEND

ROW | Existing Transit Stop | Easements | Parcel

	Existing	Mitigation
	Signal System: Retroreflective Backplates / Signal Heads Aligned with Lanes / Left-Turn Phasing / Mast Arm Lighting	**Signal System:** Retroreflective Backplates / Signal Heads Aligned with Lanes / Left-Turn Phasing / Mast Arm Lighting
NB	No / No / Protected / 1-Luminaire	**Yes / Yes** / Protected / **2-Luminaires**
SB	No / No / Protected / 1-Luminaire	**Yes / Yes** / Protected / **2-Luminaires**
EB	No / Yes / FYA - Permitted / 1-Luminaire	**Yes** / Yes / **Protected / 2-Luminaires**
WB	No / No / FYA - Permitted / 1-Luminaire	**Yes / Yes / Protected / 2-Luminaires**

	Existing	Mitigation
	Roadway (Vehicle): Median Island / Through Lane Alignment / U-Turn Allowed (Sign) / Lane Geometrics	**Roadway (Vehicle):** Median Island / Through Lane Alignment / U-Turn Allowed (Sign) / Lane Geometrics
NB	Yes / Yes / Yes / LT:2-240'; 3-Thru; RT:1-310'	Yes / Yes / Yes / **LT:2-300'**; 3-Thru; RT:1-310'
SB	Yes / Yes / Yes / LT:2-230'; 3-Thru; RT:Shared	Yes / Yes / Yes / **LT:2-300'**; 3-Thru; **RT:1-150'**
EB	No / No / No / LT:1-140'; 2-Thru; RT:1-140'	**Yes / Yes** / No / **LT:1-300'**; 2-Thru; **RT:1-300'**
WB	No / No / No / LT:1-140'; 2-Thru; RT:1-185'	**Yes / Yes** / No / **LT:1-300'**; 2-Thru; **RT:1-300'**

	Existing: Multimodal Transit Facilities: Turnout / Amenities	Existing: Multimodal Bicycle Facilities: Presence (Type)	Mitigation: Multimodal Transit Facilities: Turnout / Amenities	Mitigation: Multimodal Bicycle Facilities: Presence (Type)
NB	No - Wide Shoulder / Shelter	Yes	Wide Shoulder / Shelter	Yes
SB	No / Shelter	Yes	**Yes** / Shelter	Yes
EB	Yes (Pocket) / Shelter	Yes	Yes / Shelter	Yes
WB	Yes (Pocket) / Near-side Shelter	Yes	Yes / Shelter	Yes

	Existing	Mitigation
	Multimodal Pedestrian Facilties: Crosswalk / ADA Compliance	**Multimodal Pedestrian Facilties:** Crosswalk / ADA Compliance
NB	Yes - Faded / Non-Compliant	Yes - **Restripe / Compliant**
SB	Yes - Faded / Non-Compliant	Yes - **Restripe / Compliant**
EB	Yes - Faded / Non-Compliant	Yes - **Restripe / Compliant**
WB	Yes - Faded / Non-Compliant	Yes - **Restripe / Compliant**

0 50 100 Feet

Figure 10J. Systemic Improvements: 10. Decatur Blvd at Washington Ave

Las Vegas Citywide Intersection Crash Mitigation Program

January 2021

NOTE(S):
BOLD represents improvement opportunity

CICM Citywide Intersection Crash Mitigation

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5.1.4. Implementation Plan

The implementation of the recommended CICMP improvements was broken up into near-term projects and long-term projects. It should be noted that the recommendations should coincide with upcoming projects, when possible, such as the current redesign of the Valley View Boulevard and Sahara Avenue intersection.

Near-Term

Near-term improvements are projects that can be completed within the next 5-years, are low-to-medium costs, and provide instant safety upgrades to each CICMP intersection. The near-term recommendations include:

- Upgrading the length and number of left-turn lanes, right-turn lanes, and through lanes, including lining up approach through lanes with their corresponding receiving lanes
- Installing a traffic signal head above each approach lane, which include twelve-inch LED lenses and retroreflective backplates
- Installing dual luminaires at each intersection corner, one pointing to each crosswalk direction
- Installing transit turnouts at transit stops and moving all shelters and benches behind the sidewalk realm
- Updating sidewalks and curb ramps to ADA and/or PROWAG compliance
- Restriping intersection crosswalks to current standards
- Removing permitted left-turns and requiring left-turns to be protected
- Signifying whether U-turns are allowed at the intersection
- Installing median islands between traffic lanes moving in the opposite direction
- Optimizing the traffic signal operations, including innovative approaches such as leading pedestrian intervals (LPI)
- Installing pedestrian countdown timers on each intersection corner

Long-Term

Long-term improvements are projects that are larger in scale and include upgrades that require further review, design, and/or public involvement. The long-term improvements are anticipated to take more than five years, have low-to-high costs, and provide significant safety upgrades to each CICMP intersection. The long term recommendations include:

- Reconstructing and/or consolidating driveways to current intersection spacing standards
- Reducing the approaching speed limit to a maximum of 35 MPH, including re-engineering the arterial corridors to help slow down traffic
- Redesigning freeway interchanges near intersections to help slow down vehicles leaving the freeway
- Improving the sight distance at the intersection by redesigning the existing intersection

5.2. Funding

Element 2 of the *Systemic Approach* is defined as *Identify Funding for Systemic Program and Implementation*. As a result of the current COVID-19 pandemic, local funding sources are limited, and in turn, the City is focusing their attention on federal funding to help supplement the recommended safety projects. Therefore, the following funding sources are suggested to help create safer CICMP intersections:

- Highway Safety Improvement Program (HSIP)
- Surface Transportation Block Grant Program (STBG)
- Transportation Alternatives (TA) Set-Aside Program
- Congestion Mitigation and Air Quality Improvement Program (CMAQ)

HSIP

The HSIP is a federal program with a purpose to achieve a significant reduction in traffic fatalities and serious injuries on all public roads and requires a data-driven, strategic approach to improve highway safety with a focus on performance.

STBG

The STBG provides flexible funding that may be used by the City for projects to preserve and improve the conditions and performance on any Federal-aid highway, bridge, and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects including intercity bus terminals.

TA Set-Aside

The TA Set-Aside authorizes funding for programs and projects defined as transportation alternatives, including on-road and off-road pedestrian and bicycle facilities, infrastructure projects for improving non-driver access to public transportation and enhanced mobility, community improvement activities, and environmental mitigation.

CMAQ

The CMAQ program provides a flexible funding source for state and local governments to fund transportation projects and programs to help meet the requirements of the Clean Air Act (CAA). The CMAQ program covers a variety of eligible projects and programs including congestion reduction and traffic flow improvements, transit improvements, and bicycle and pedestrian facilities and programs.

5.3. Conclusion

Element 3 of the *Systemic Approach* is defined as *Perform Systemic Program Evaluation*. Since this is the first time the *Systemic Approach* is being used by the City, the program evaluation will need to be completed after the recommended countermeasures are incorporated and the resulting crashes are quantified. The reduction in crashes resulting from the implemented safety treatments, as well as how the safety treatments affect the frequency and severity of crashes, should be evaluated through the estimation of a new CMF. Furthermore, safety effectiveness evaluations can be used to compare safety improvements to the invested funding and the results can provide insight to the City regarding future decision making concerning the allocation of funds for City safety policies.

APPENDIX A:

Technical Memorandum #1

CICM

Citywide Intersection Crash Mitigation

Technical Memorandum #1 - Las Vegas, Nevada

Final Report

September 2020

WOOD RODGERS
BUILDING RELATIONSHIPS ONE PROJECT AT A TIME
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Las Vegas, NV 89123
Tel: 702.220.3680
Fax: 775.823.4066

TABLE OF CONTENTS

TABLES

FIGURES

CHARTS

APPENDICES

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Scott Rickert (Project Manager)

ACRONYMS AND ABBREVIATIONS

AASHTO	American Association of State Highway Transportation Officials
ADA	Americans with Disabilities Act
CICMP	*Citywide Intersection Crash Mitigation Program*
City	City of Las Vegas
EB	Eastbound
FAST	Freeway and Arterial System of Transportation
FHWA	Federal Highway Administration
FRI	Fuel Revenue Index
FYA	Flashing Yellow Arrow
HCM	*Highway Capacity Manual, 6th Edition*
HPP	High Priority Investment Program
LOS	Level-of-Service
NB	Northbound
NDOT	Nevada Department of Transportation
PDO	Property Damage Only
RBPP	Regional Bicycle and Pedestrian Plan
RTC	Regional Transportation Commission of Southern Nevada
RTP	*Regional Transportation Plan*
SB	Southbound
v/c	Volume/Capacity
WB	Westbound

EXECUTIVE SUMMARY

The City of Las Vegas' *Citywide Intersection Crash Mitigation Program* (CICMP) is a transportation engineering effort focused on traffic safety for all users, incorporating intersection roadway conditions, crash analysis, traffic and roadway engineering, and the application of the American Association of State Highway Transportation Officials (AASHTO) and the Federal Highway Administration (FHWA) methods to mitigate and reduce roadway crashes.

The CICMP was developed to identify the City of Las Vegas (City) intersections with the highest number of crashes and highest crash rates, with a particular focus on the most vulnerable users, including vehicle-pedestrian and vehicle-bicycle involved crashes. The CICMP will utilize the FHWA's *Systemic Approach* to develop countermeasures with future intersection improvements and traffic operations improvements to prevent future crashes in working towards the goal of *Vision Zero* – no fatalities or serious injuries involving road traffic.

The CICMP study area is the entire City jurisdictional limits, with a particular focus on intersections with the highest number of crashes (total crashes, pedestrian crashes, bicycle crashes) and crash rates. The purpose of the CICMP is to evaluate a selected number of intersections within the City, recommend improvements to address safety deficiencies, and prioritize the implementation of intersection improvement opportunities.

Existing Network Conditions

The entire City jurisdiction was evaluated for existing conditions and includes descriptions of the City's roadway network, traffic signals, pedestrian facilities, bicycle facilities, transit facilities, and the City's overall 5-year crash history (January 1, 2014 – January 1, 2019).

A total of 25,006 intersection crashes occurred within the City limits for the five-year period, resulting in 112 fatalities, 12,095 injuries, and 12,799 property damage only (PDO) crashes. Of those there were 846 pedestrian involved crashes (3-percent of all crashes) and 396 bicycle involved crashes (2-percent of all crashes), which resulted in forty (40) pedestrian fatalities and five (5) bicycle fatalities.

Existing Intersection Conditions

The City's 5-year crash history, provided by the Nevada Department of Transportation (NDOT), was categorized to help the City select ten (10) intersections to evaluate future safety improvement opportunities, and included the following groupings:

- Intersections with the highest total crashes
- Intersections with the highest total crashes, including freeway ramps
- Intersections with the highest total crash rates
- Intersections with the highest total crash rates, including freeway ramps
- Intersections with the highest pedestrian/bicyclist involved crashes
- Intersections with the highest pedestrian/bicyclist involved crash rates

The City's Transportation Engineering Division prioritized the lists of crashes to select the ten (10) intersections, of which five (5) were based on the overall highest crash locations for all transportation modes, and the other five (5) were based on crash locations with the highest pedestrian and bicycle involved crashes, which include:

- Crashes Involving All Transportation Modes
    1. Durango Drive and Charleston Boulevard
    2. Eastern Avenue and Stewart Avenue

3. Fort Apache Road and Sahara Avenue
4. Martin Luther King Boulevard and Bonanza Road
5. Rainbow Boulevard and Lake Mead Boulevard

- Crashes Involving Pedestrians and Bicyclists

6. Rainbow Boulevard and Charleston Boulevard
7. Valley View Boulevard and Sahara Avenue
8. Eastern Avenue and St. Louis Avenue
9. Rainbow Boulevard and Cheyenne Avenue
10. Decatur Boulevard and Washington Avenue

For the five-year period, there were a total of 1,203 crashes, resulting in 550 injuries, at the ten selected intersections. The injuries included 45 crashes involving pedestrians and 18 crashes involving bicyclists, with one reported fatality involving a motorcycle/moped. Angle and rear-end crashes were extremely common at all ten selected intersections, in fact, angle crashes and/or rear-end crashes were always the most common crash type. Intersections that include permissive left-turns (permitted green ball or flashing yellow arrow (FYA)) all have angle crashes as their most common crash type. In addition, hit-and-run crashes occurred frequently at each of the ten intersections and resulted in a total of 142 crashes, which accounted for 11.8-percent of all vehicle crash factors.

Part of the FHWA's Systemic Safety Planning Process includes identifying associated risk factors that led to the high number of crashes at the selected intersections. Therefore, a field review was performed on Thursday, March 26, 2020, where the following common concerns were identified:

- Driveway distances are too close to the intersection – 10 of 10 intersections
- Signal heads do not equal the number of approaching lanes – 10 of 10 intersections
- Signal heads do not have retroreflective backplates – 10 of 10 intersections
- Intersection corners do not have dual luminaires – 10 of 10 intersections
- Transit stops do not have bus turnouts or bus lanes – 9 of 10 intersections
- Intersection approaches do not have right-turn pockets – 9 of 10 intersections
- Intersection approaching through lanes do not line up with their receiving lane – 9 of 10 intersections
- Sidewalks have ADA concerns including sidewalk widths and ramps – 9 of 10 intersections
- Crosswalks need to be restriped – 9 of 10 intersections
- Approaching speed is posted at 45 MPH – 7 of 10 intersections
- Transit stops are located within the sidewalk realm, have no amenities, or do not exist – 7 of 10 intersections
- U-turns are not signified – 5 of 10 intersections
- Approach has a permitted green ball left-turn or a FYA left-turn – 4 of 10 intersections
- Intersection is located close to a freeway interchange – 4 of 10 intersections
- Approach does not have a median island – 3 of 10 intersections
- Sight distance concerns when approaching the intersection – 3 of 10 intersections

Additionally, traffic operations analysis was performed using Synchro 10 (utilizing the *Highway Capacity Manual, 6th Edition* (HCM)) and resulted in 9 out of 10 intersections having an intersection level-of-service (LOS) worse than LOS E, volume/capacity (v/c) ratio greater than one, and/or queue lengths greater than the existing queue storage lengths, including:

- Durango Drive and Charleston Boulevard – LOS, v/c, and queue deficiencies
- Eastern Avenue and Stewart Avenue – LOS, v/c, and queue deficiencies

- Fort Apache Road and Sahara Avenue – LOS, v/c, and queue deficiencies
- Martin Luther King Boulevard and Bonanza Road – LOS, v/c, and queue deficiencies
- Rainbow Boulevard and Charleston Boulevard – LOS, v/c, and queue deficiencies
- Valley View Boulevard and Sahara Avenue – LOS, v/c, and queue deficiencies
- Eastern Avenue and St. Louis Avenue – queue deficiencies
- Rainbow Boulevard and Cheyenne Avenue – LOS, v/c, and queue deficiencies
- Decatur Boulevard and Washington Avenue – v/c and queue deficiencies

Policies, Plans, and Studies

Policies, plans, and studies relevant to the CICMP were identified, analyzed, and summarized, including the *Draft City of Las Vegas Mobility Master Plan*, *Access 2040 Enhancing Mobility for Southern Nevada Residents: Regional Transportation Commission of Southern Nevada (RTC) 2017-2040 Regional Transportation Plan (RTP)*, and *2017 Regional Bicycle and Pedestrian Plan for Southern Nevada*.

Next Steps

Technical Memorandum #1 focuses on the Existing Conditions, whereas the mitigation, including the next steps in the FHWA's *Systemic Approach*, will be discussed in detail within the Final Technical Memorandum document.

1. INTRODUCTION

The City of Las Vegas' *Citywide Intersection Crash Mitigation Program* (CICMP) is a transportation engineering effort focused on traffic safety for all users, incorporating intersection roadway conditions, crash analysis, traffic and roadway engineering, and the application of the American Association of State Highway Transportation Officials (AASHTO) and the Federal Highway Administration (FHWA) methods to mitigate and reduce roadway crashes.

The CICMP was developed to identify the City of Las Vegas (City) intersections with the highest number of crashes and highest crash rates, with a particular focus on the most vulnerable users, including vehicle-pedestrian and vehicle-bicycle involved crashes. The CICMP will utilize the FHWA's *Systemic Approach* to develop countermeasures with future intersection improvements and traffic operations improvements to prevent future crashes and reach the goal of *Vision Zero* – no fatalities or serious injuries involving road traffic. The benefits of the *Systemic Approach* are it identifies a problem based on a system-wide analysis of the data, it looks for roadway characteristics that are frequently present in severe crashes, it focuses on one or more low-cost countermeasures that can be deployed widely across the system, and it identifies and prioritizes locations across the network for implementation. Whereas, the challenges of the *Systemic Approach* include the data availability dictates the level of detail in the analysis, resource availability determines the extent of the improvements, an agency's established priorities may dictate the direction of the analysis, and the relationship between the State and local agencies may impact the funding available.

1.1. Study Area

The CICMP study area is the entire City jurisdictional limits, with a particular focus on intersections with the highest number of crashes (total crashes, pedestrian crashes, bicycle crashes) and crash rates. A map identifying the City jurisdictional limits and its six (6) Wards can be viewed in Figure 1.

The City street system is composed of section line (mile) arterial streets, mid-section collector streets, and four (4) regional freeways, including:

- US 95 – runs both east-west and north-south through the middle of the entire City
- I-515 – runs east-west through the eastern City limits
- I-215 – runs east-west and north-south through the northern and western City limits
- I-15 – runs north-south through the eastern City limits

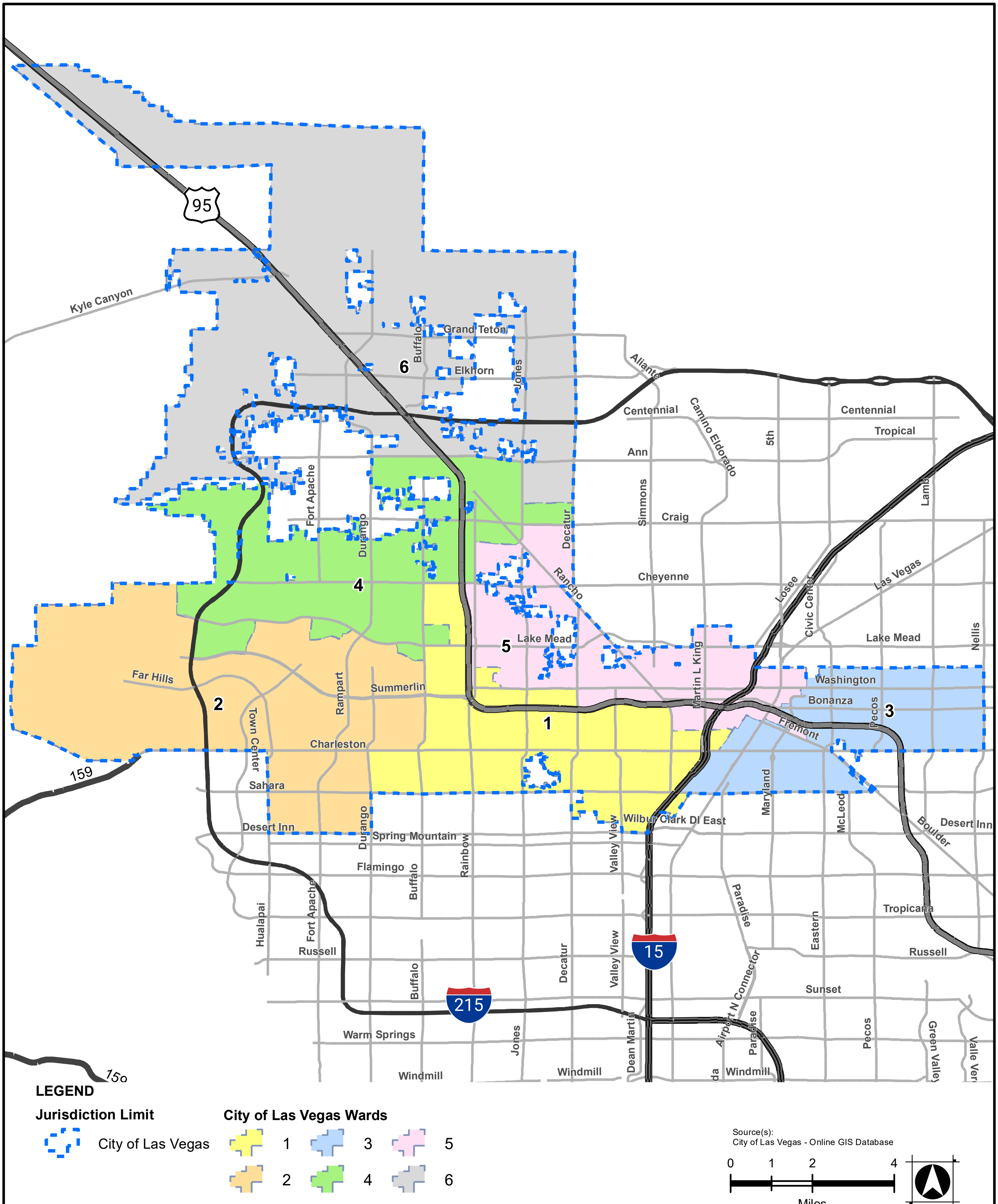

Figure 1. Study Area

Las Vegas Citywide Intersection Crash Mitigation Program

August 2020

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CICM
Citywide Intersection Crash Mitigation

1.2. Study Purpose

The CICMP has many purposes, including evaluating a selected number of intersections within the City, recommending improvements to address safety deficiencies, prioritizing the implementation of intersection improvement opportunities, determining the cost benefits of the recommended improvements, and helping the City apply for federal funding for safety projects.

Funding for the Program was provided by the Clark County approved measure that would allow a fuel tax to fund regional and local transportation projects throughout the Las Vegas Valley. The Fuel Revenue Index (FRI) ordinance was approved in September 2013 and helped fund transportation projects throughout Clark County, of which the City distributed a portion of their allocated money (based off of population and taxes) on the *Citywide Intersection Crash Mitigation Program*. The investment and allocation of these funds helped in the creation of jobs for people that built, maintained, and enhanced transportation infrastructure; improved overall commute times; diversified the economy; and helped in ensuring the region's ability to compete in transportation. The 3-year initial program, from 2014 to 2016, was extended for 10-years through 2026, as part of the November 2016 election. According to the Regional Transportation Commission of Southern Nevada (RTC), as of December 31, 2019, FRI is estimated to have created approximately 10,237 direct, indirect, and induced jobs, and generated $954 million in awarded FRI funding.

1.3. Report Organization

The remainder of this report is divided into the following chapters:

- Chapter 2: Existing Network Conditions – Includes descriptions of the City's roadway network, traffic signals, pedestrian facilities, bicycle facilities, transit facilities, and the City's overall 5-year crash history
- Chapter 3: Crash Intersection Analysis – Includes descriptions of the safety deficiencies at CICMP intersections based on crash history, rates, severity, factors, and patterns
- Chapter 4: Existing Intersection Conditions Field Review – Includes descriptions of selected intersection characteristics, field amenities, and operational deficiencies
- Chapter 5: Relevant Policies, Plans and Studies – Summarizes regional and local plans relevant to the study area.

2. EXISTING NETWORK CONDITIONS

The existing conditions for the entire City jurisdiction were evaluated, including the City's roadway network, traffic signals, pedestrian facilities, bicycle facilities, transit facilities, and crash history.

2.1 Existing Roadway Network

The existing City roadway network, illustrated in Figure 2, includes a breakdown of each roadway classification and traffic signal location within the City jurisdictional limits. All information within this figure was provided by the City's GIS department.

There are currently 627 signalized intersections within the City's limits and the signals are operated by the RTC's Freeway and Arterial System of Transportation (FAST) Traffic Management Center. RTC-FAST's Traffic Management Center monitors the operation of the signals and maintains the signal progression along the major arterial streets.

2.2 Pedestrian, Bicycle, Transit Facilities

Collaboration strategies currently underway between the City and the RTC that may improve multimodal travel include the addition of new bicycle infrastructure, transit circulators, upgraded transit services, and high capacity transit. In conjunction, Complete Street projects serve the needs of pedestrians, bicyclists, motorists, and public transportation by featuring widened sidewalks, bicycle lanes, additional landscaping and trees, crosswalks, signals, and additional lighting that make roadways safer and more attractive for all users. The existing multimodal infrastructure within the City, which improves mobility and enhances safety, is outlined in the following sections.

2.2.1 Pedestrian and Bicycle Facilities

As outlined in the *Regional Bicycle & Pedestrian Plan for Southern Nevada* (May 2017, RTC), classified bikeway facilities are as follows:

- Shared Roadway
- Bicycle Boulevard
- On-Street Bicycle Lane
- Buffered Bicycle Lane
- Shared Use Paths

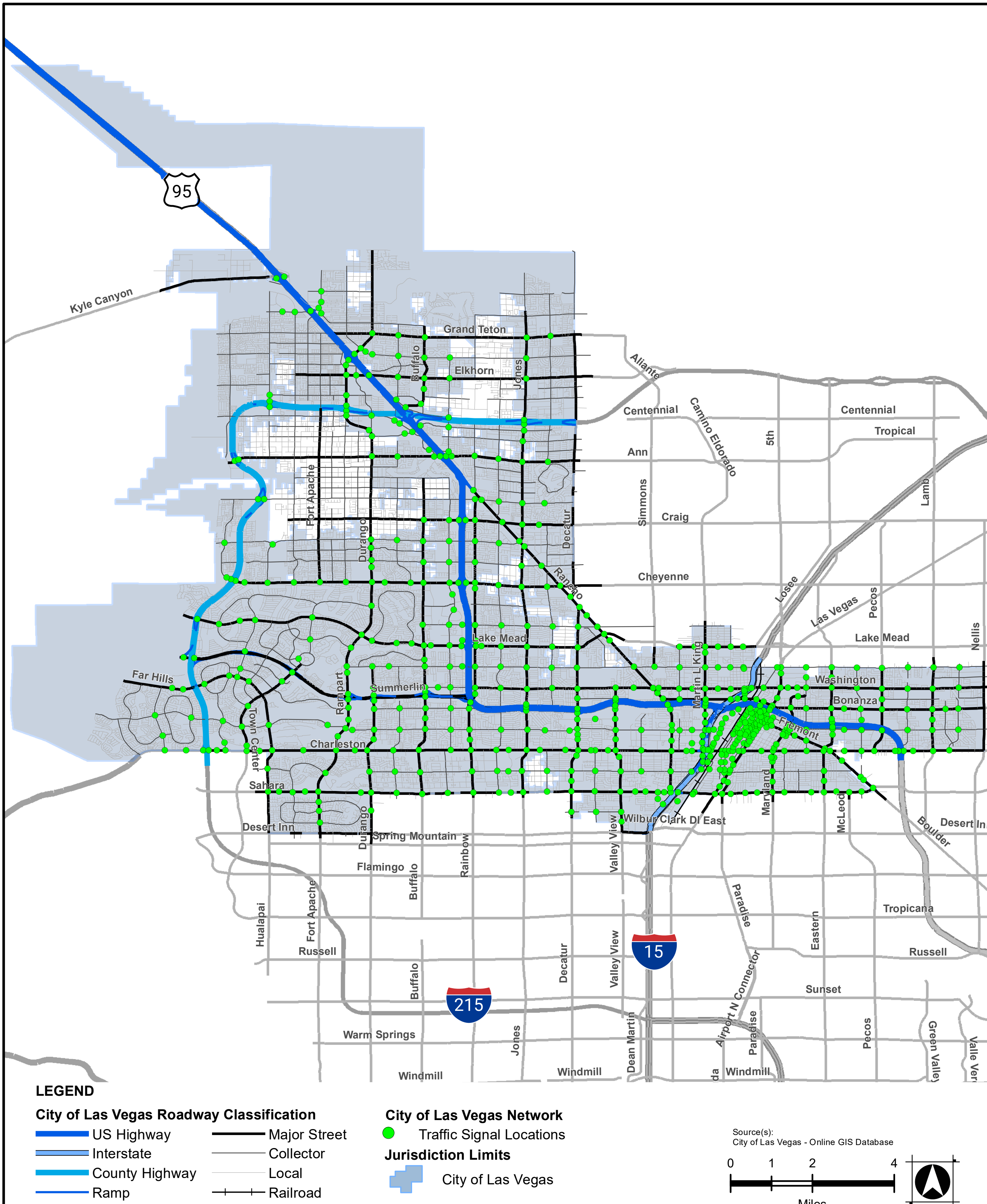

Figure 2. City of Las Vegas - Roadway Network

Las Vegas Citywide Intersection Crash Mitigation Program

August 2020

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CICM
Citywide Intersection Crash Mitigation

The City has an extensive network of bicycle lanes, buffered bicycle lanes, shared use paths, and trails. In fact, according to the City's *Transportation and Infrastructure Master Plan*, in 2018 the City was awarded Silver Bicycle Friendly Community status by the League of American Bicyclists for its efforts to expand, enhance, and improve the safety of the bicycle network.

The City continues to increase the number of bicycle lanes and trails, which currently sits at more than 465-miles, including 104-miles of trails and trail connecting sidewalks for walking and bicycling, and 26-miles of equestrian/pedestrian shared use trails. The City bicycle and pedestrian facilities have been identified using information from the latest City online GIS database and are illustrated in Figure 3.

2.2.2 Transit Facilities

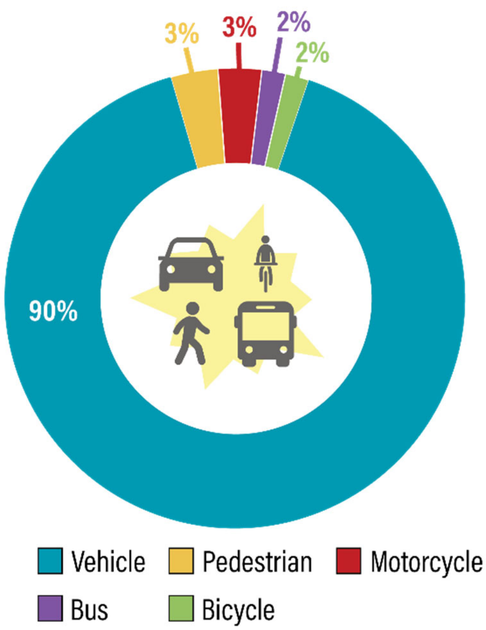
Existing transit services in the City were provided by the RTC, which operates bus services along and through the City limits. As shown in Figure 4, the existing transit service is evenly distributed in both the north-south and east-west directions and is linked to transit routes in other jurisdictions, including the City of North Las Vegas, the City of Henderson, and unincorporated Clark County.

2.3 Crash Data Evaluation

An important consideration in determining appropriate safety alternatives is identifying locations with a history of crashes. Crash history can help focus an analysis to "hot-spot" locations with the greatest potential for crash reduction. As part of the systemic approach, the evaluation of crashes within the City's jurisdiction was performed.

Crash data was provided by the Nevada Department of Transportation (NDOT) for the five-year period from January 1, 2014 to January 1, 2019. The crash data evaluated included all City crashes where the reporting officer designated the crash location at a distance within a 200-foot radius of an intersection roadway junction node. Crashes located at NDOT facilities within City limits, such as freeway ramp intersections, were eliminated from the analysis. The crash data was then broken down by crash mode (Chart 1 and Table 1), crash type (Chart 2 and Table 2), and crash severity (Table 3).

Chart 1. Network Crash Modes



Source: Wood Rodgers, September 2020

Table 1. Network Crash Modes

Mode Type	%	Total Mode Incidents
Vehicle	90%	22,615
Pedestrian	3%	846
Motorcycle	3%	742
Bus	2%	407
Bicycle	2%	396
Total		25,006

Source: Wood Rodgers, September 2020

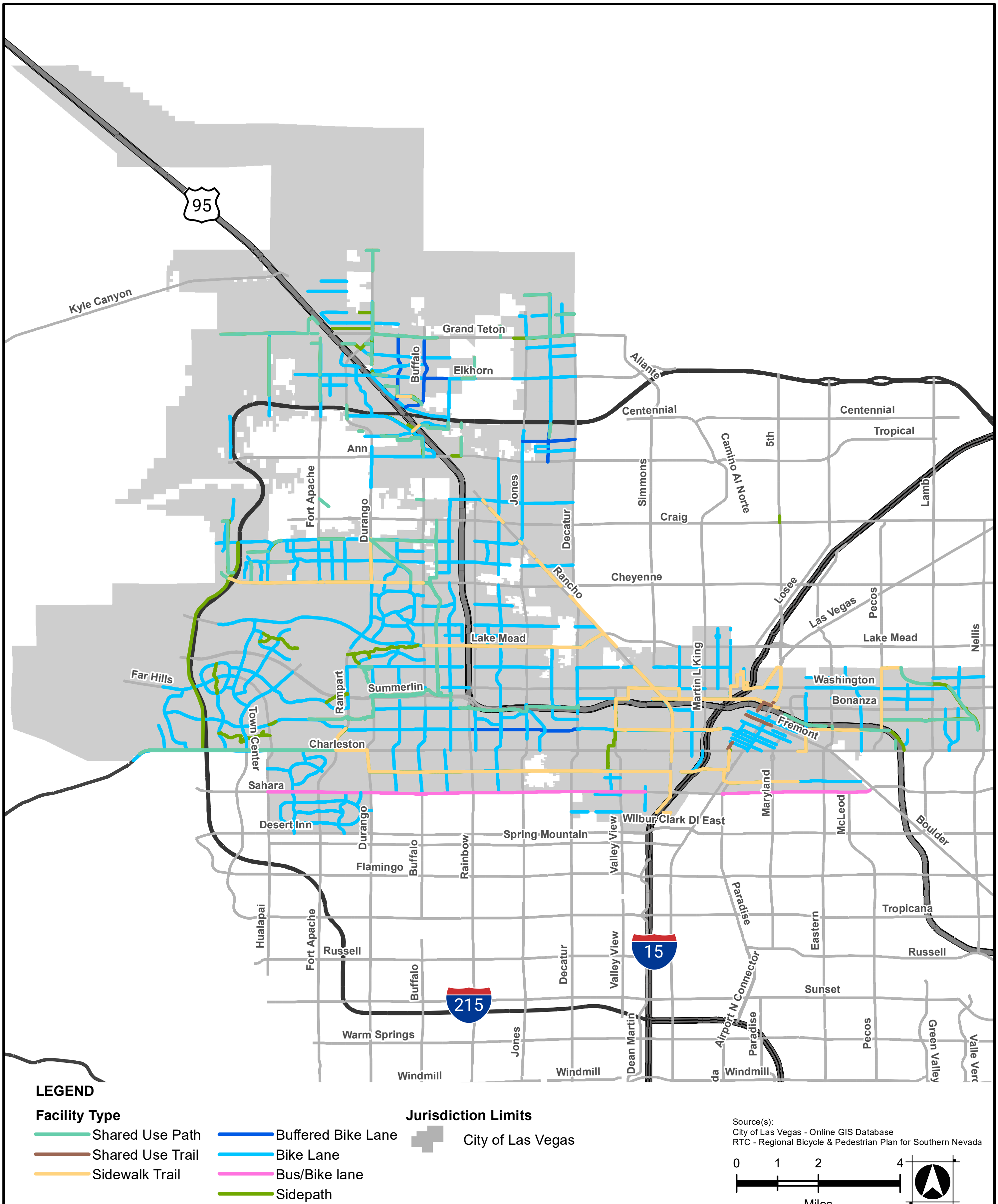


Figure 3. City of Las Vegas - Bicycle and Pedestrian Network

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August 2020

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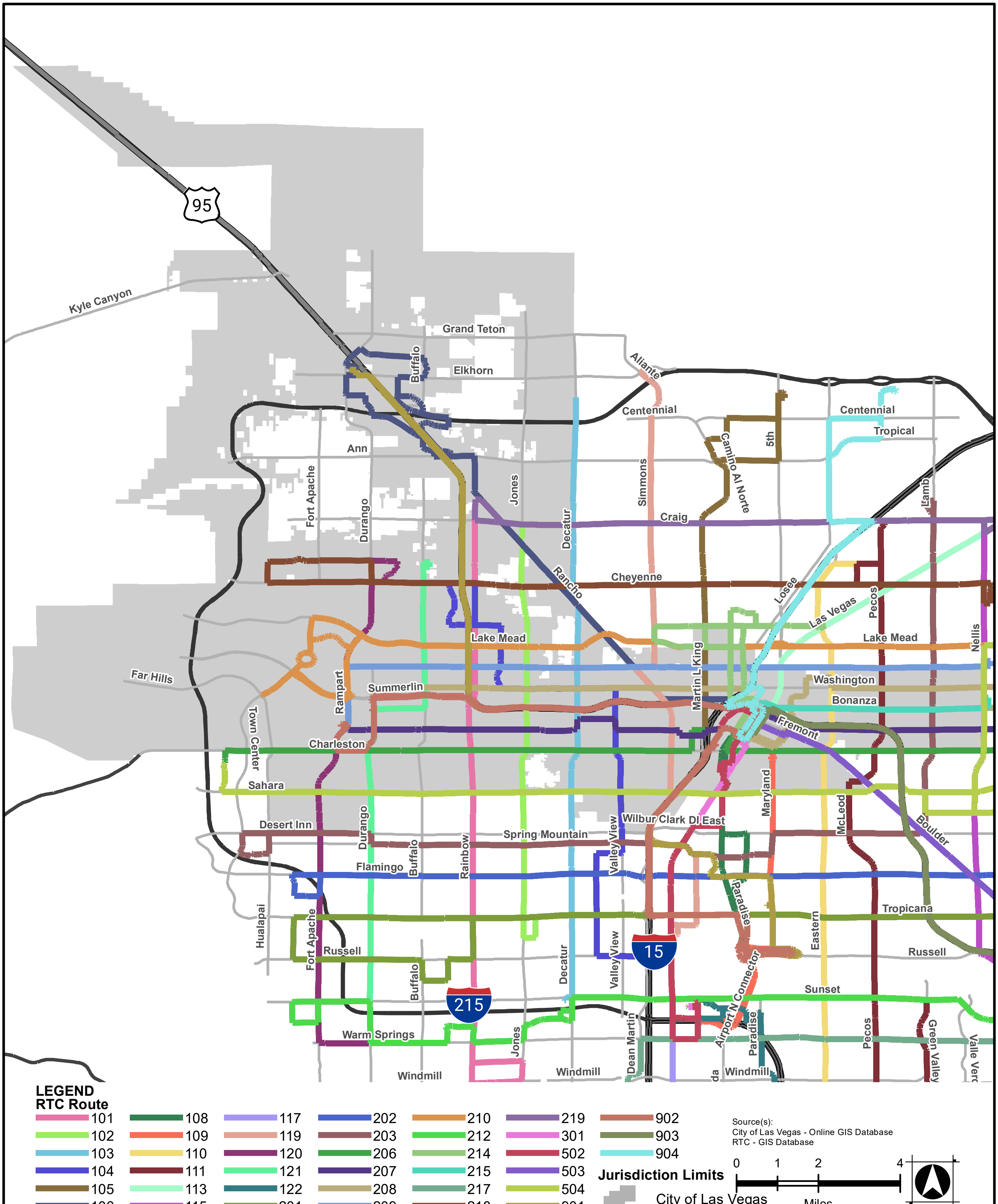
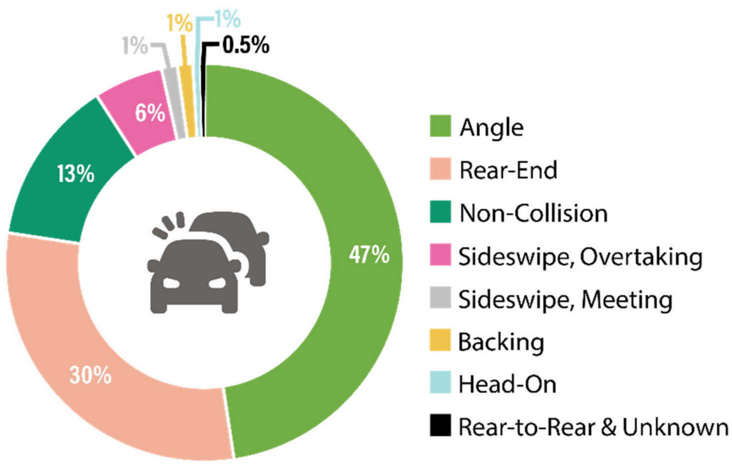


Figure 4. City of Las Vegas - Transit Network

Las Vegas Citywide Intersection Crash Mitigation Program

August 2020

Chart 2. Network Crash Type



Source: Wood Rodgers, September 2020

Table 2. Network Crash Type

Crash Type	%	Amount
Angle	47%	11,820
Rear-End	30%	7,393
Non-Collision	13%	3,346
Sideswipe, Overtaking	6%	1,398
Sideswipe, Meeting	1%	323
Backing	1%	307
Head-On	1%	160
Rear-To-Rear	0.5%	37
Unknown	0.5%	35

Source: Wood Rodgers, September 2020

Table 3. Network Crash Severity by Mode

Crash Severity	Overall	Vehicle	Bicycle	Pedestrian	Motorcycle/ Moped	Bus
Fatal (K)	112	44	5	40	22	1
Injury A	584	282	38	132	126	6
Injury B	3,168	2,372	171	329	270	26
Injury C	8,343	7,608	158	311	158	108
PDO	12,799	12,309	24	34	166	266
5 Year Total	**25,006**	**22,615**	**396**	**846**	**742**	**407**

Injury A = Incapacitating injury | Injury B = Non-incapacitating injury | Injury C = Possible injury | PDO = Property Damage Only

Source: Wood Rodgers, September 2020

The crash severity is based off of the KABCO scale, where:

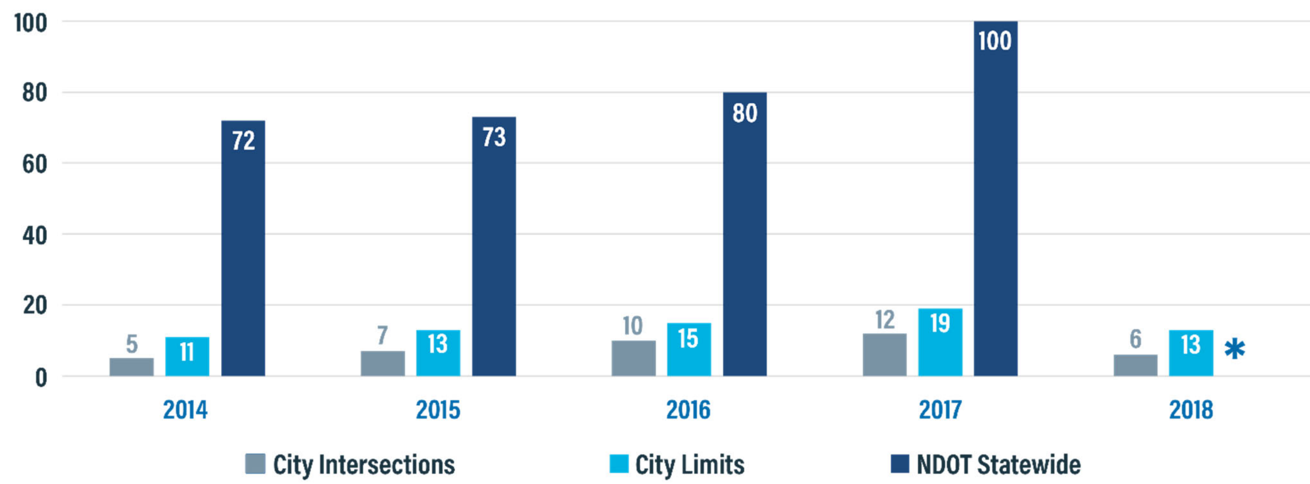
- K = Fatal Injury: Any injury that results in death within 30 days of the crash
- A = Suspected Serious Injury (Incapacitating Injury): Severe laceration; broken or distorted extremity; crush injuries; skull, chest, or abdominal injury (other than bruises or minor lacerations); significant burns; unconsciousness; and/or paralysis
- B = Suspected Minor Injury (Non-incapacitating injury): Lump on the head, abrasions, bruises, and/or minor lacerations
- C = Possible Injury: Momentary loss of consciousness, claim of injury, limping, pain, and or nausea
- O = No Apparent Injury

A total of 25,006 intersection crashes occurred within the City limits for the five-year period, resulting in 112 fatalities, 12,095 injuries, and 12,799 property damage only (PDO) crashes. Of these there were 846 pedestrian involved crashes (3-percent of all crashes) and 396 bicycle involved crashes (2-percent of all crashes). The total pedestrian fatalities (40 total) and bicycle fatalities (5 total) are illustrated in Figure 5, and the locations with the highest number of pedestrian involved fatality crashes are as follows:

- East Bonanza Road and 30th Street – 3 fatalities
- Charleston Boulevard and Maryland Parkway – 2 fatalities
- Sahara Avenue and Paseo Del Prado – 2 fatalities
- Sahara Avenue and Las Verdes Street – 2 fatalities

The 40 City intersection pedestrian fatalities for the five-year period were compared to the total number of pedestrian fatalities at City intersections and within City limits, as well as to the total number of pedestrian fatalities in the entire state of Nevada, as shown in Chart 3.

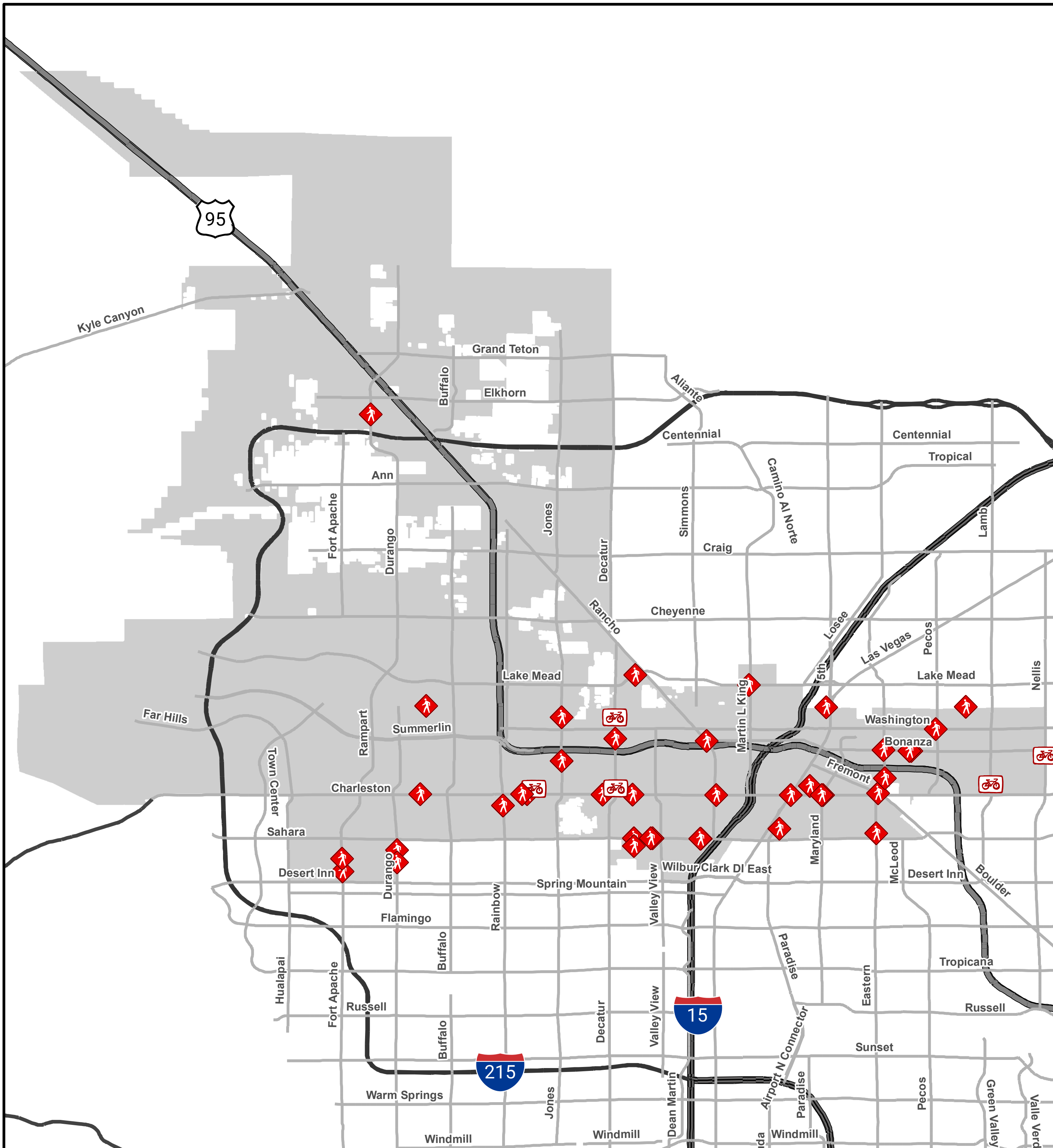
Chart 3. Network Pedestrian Fatal Crashes



**NDOT 2018 data not available. Note: NDOT statewide fatal crash data source: https://zerofatalitiesnv.com/be-pedestrian-safe/*
Source: Wood Rodgers, September 2020

Chart 3 shows an incremental increase in City intersection pedestrian crash fatalities from 2014 to 2017, however the pedestrian crash fatalities drop in 2018 closer to the 2014 to 2015 levels (for both the City intersections and City limits), which could be a resultant of the recent Pedestrian Safety Campaigns in the Las Vegas Valley. The pedestrian crash results should be compared to the 2018 and 2019 crash data, once released, to determine if the trend continues. Overall, the 40 pedestrian crash fatalities account for 36-percent of all intersection fatalities within City limits for the five-year time period.

While the number of crashes can be an indicator of intersection safety, traffic volume is also a factor. It is not unusual for locations with higher traffic volumes to experience more crashes, thus another measure of intersection safety is the crash rate. The intersection crash rate, based off of FHWA methodology, is calculated as the number of crashes per million vehicles entering the intersection and was calculated where intersection volume data was available. Intersections with the highest total crashes, highest crash rates, highest pedestrian and bicycle involved total crashes, and the highest pedestrian and bicycle involved crash rates can be viewed in Appendix A. The lists in Appendix A were utilized to select 10 intersections to evaluate further, which are described in detail in the following chapters.



LEGEND

Intersection Mode and Resulting Injury Crash Type

- One Cyclist Crash Resulting in a Fatality (5 Total Cyclist Fatalities)
- One Pedestrian Crash Resulting in a Fatality (40 Total Pedestrian Fatalities)

Jurisdiction Limits

- City of Las Vegas

NOTE(S):
5-Year Crash Data (Years 2014 to 2018)

Source(s):
NDOT - Traffic Safety Engineering Department

0 1 2 4
Miles
NORTH

Figure 5. Crash Locations - Fatal Pedestrian & Bicyclist Crashes

Las Vegas Citywide Intersection Crash Mitigation Program
August 2020

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3. CRASH INTERSECTION ANALYSIS

The City's 5-year crash history was categorized to help the City select ten (10) intersections to evaluate future safety improvement opportunities, and included the following groupings:

- Intersections with the highest total crashes
- Intersections with the highest total crashes, including freeway ramps
- Intersections with the highest total crash rates
- Intersections with the highest total crash rates, including freeway ramps
- Intersections with the highest pedestrian/bicyclist involved crashes
- Intersections with the highest pedestrian/bicyclist involved crash rates

The City's Transportation Engineering Division of Public Works prioritized the lists of crashes to select the ten (10) intersections, of which five (5) were based on the overall highest crash locations for all transportation modes, and the other five (5) were based on crash locations with the highest pedestrian and bicycle involved crashes. *Note: A few of the highest crash intersections, listed in* Appendix A*, are currently being analyzed as a part of other projects, thus they were eliminated from the selection.*

The ten (10) selected intersections to evaluate further include:

- Crashes Involving All Transportation Modes (Including Pedestrian and Bicycle Crashes)
    1. Durango Drive and Charleston Boulevard
    2. Eastern Avenue and Stewart Avenue
    3. Fort Apache Road and Sahara Avenue
    4. Martin Luther King Boulevard and Bonanza Road
    5. Rainbow Boulevard and Lake Mead Boulevard
- Crashes Involving Pedestrians and Bicyclists
    6. Rainbow Boulevard and Charleston Boulevard
    7. Valley View Boulevard and Sahara Avenue
    8. Eastern Avenue and St. Louis Avenue
    9. Rainbow Boulevard and Cheyenne Avenue
    10. Decatur Boulevard and Washington Avenue

Figure 6 illustrates the location of the ten (10) selected intersections within the City limits, where the crashes involving all transportation modes are represented by a magenta pink circle, and the crashes involving pedestrians and bicyclists are represented by a cyan blue circle.

3.1 Intersection Crash Rates

Intersection crash rates were calculated based off of the number of crashes per million vehicles entering the intersection, using FHWA methodology for the ten selected intersections, as shown in Table 4. These crash rates were compared to the NDOT four-year average crash rate for "Urban: Minor Arterial" of 2.56, which was calculated by averaging the crash rates from 2014-2017 for Urban: Minor Arterial. The resulting calculations show the crash rate for each of the ten (10) intersections was less than the statewide average. *Note: 2018 crash rates were not published at the time of the CICMP.*

Table 4: Selected Intersections and Crash Rates

ID	Intersections	Total Crashes[1]	Crash Rate Crashes per MEV[2]	Entering Vehicle Volumes[3]	Total Pedestrian & Cyclist Crashes	Crash Rate Crashes per MEV[2]
1	S Durango Dr at Charleston Blvd	193	1.54	68,663	1	0.01
2	Eastern Ave at Stewart Ave	177	1.83	53,025	4	0.04
3	Fort Apache Rd at Sahara Ave	124	0.94	72,050	2	0.02
4	Martin L King Blvd at Bonanza Rd	120	1.06	62,050	6	0.05
5	Lake Mead Blvd at Rainbow Blvd	118	1.08	59,700	5	0.05
6	Charleston Blvd at Rainbow Blvd	126	0.76	90,488	10	0.06
7	S Valley View Blvd at Sahara Ave	118	0.90	71,813	10	0.08
8	St Louis Ave at Eastern Ave	35	0.50	38,238	9	0.13
9	Cheyenne Ave at Rainbow Blvd	97	0.85	62,300	8	0.07
10	N Decatur Blvd at W Washington Ave	95	0.90	57,750	8	0.08

Notes:
[1]Source for Crash Data: NDOT 5-year 2014 to 2018 Database
[2]Million Entering Vehicles
[3]Source for Counts: City of Las Vegas Database (GIS)

Source: Wood Rodgers, September 2020

3.2 Intersection Crash Severity, Type, and Factors

Summary statistics were developed for the intersection crash severity, illustrated in Table 5, and the intersection crash type, illustrated in Table 6, for the ten selected intersections. As shown in Table 5, the majority of crashes are non-injury PDO crashes, and only one location (Martin Luther King Boulevard and Bonanza Road) had a fatal crash within the five-year period. Additionally, as shown in Table 6, the most common crash types are angle crashes and rear-end crashes.

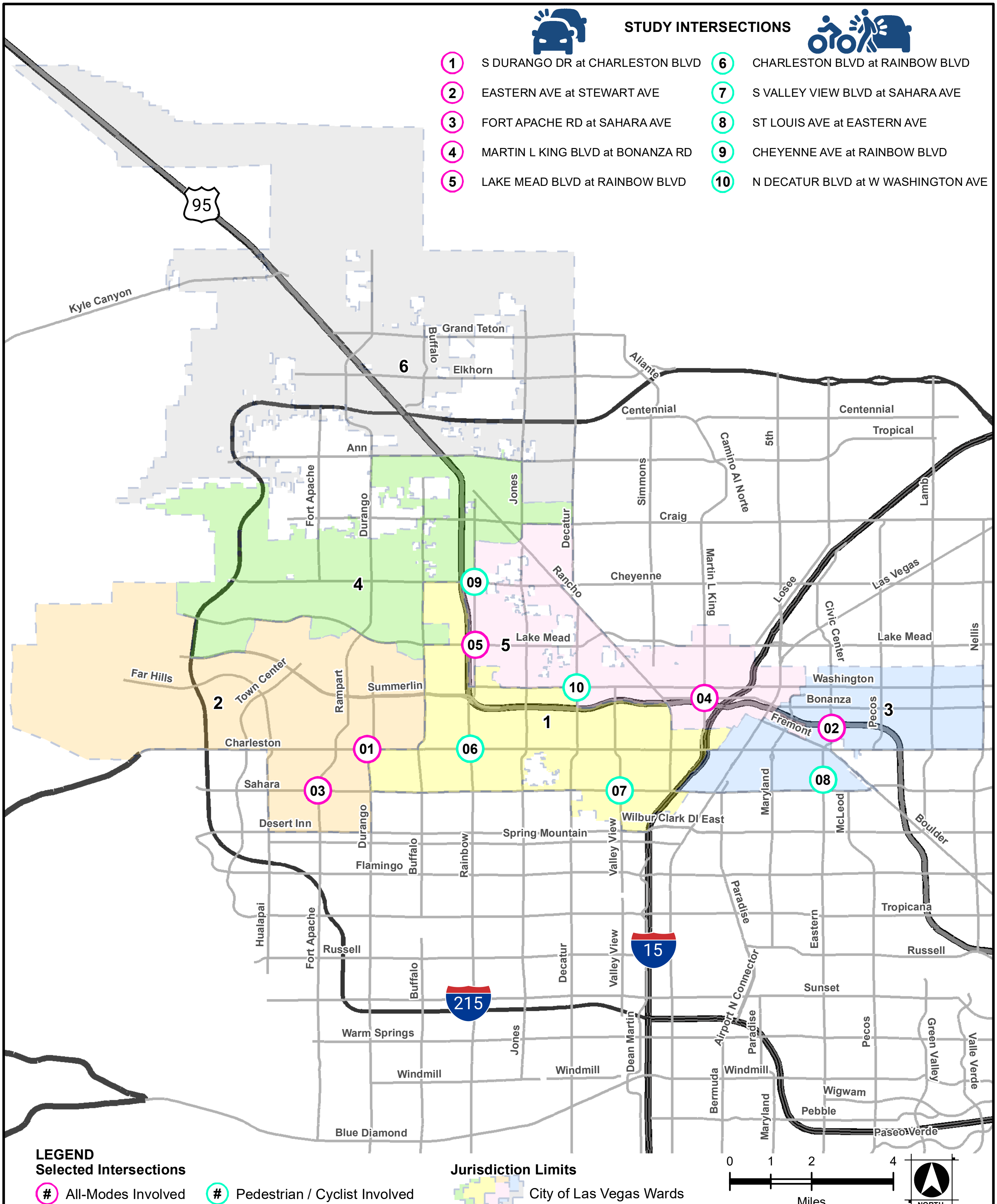

Figure 6. Study Intersections

Las Vegas Citywide Intersection Crash Mitigation Program

August 2020

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Table 5. Selected Intersection Severity Summary

Study Intersection	PDO	Injury	Fatal	Total
S Durango Dr at Charleston Blvd	86	107	-	193
Eastern Ave at Stewart Ave	104	73	-	177
Fort Apache Rd at Sahara Ave	69	55	-	124
Martin L King Blvd at Bonanza Rd	74	45	1	120
Lake Mead Blvd at Rainbow Blvd	68	50	-	118
Charleston Blvd at Rainbow Blvd	65	61	-	126
S Valley View Blvd at Sahara Ave	65	53	-	118
St Louis Ave at Eastern Ave	17	18	-	35
Cheyenne Ave at Rainbow Blvd	60	37	-	97
N Decatur Blvd at W Washington Ave	44	51	-	95

Source: Wood Rodgers, September 2020

Table 6. Selected Intersection Crash Type Summary

Crash Type	%	Amount
Angle	43%	513
Rear-End	37%	445
Non-Collision	9%	110
Sideswipe, Overtaking	7%	87
Sideswipe, Meeting	2%	20
Backing	1%	11
Head-On	1%	6
Unknown	0%	3
Rear-To Rear	0%	2

Source: Wood Rodgers, September 2020

Two figures were developed for each of the ten selected intersections to help identify crash factors and common trends. The first figure, Figure 7-1A through Figure 7-10A, illustrates a map with the location of PDO crashes, injury crashes, and fatality crashes involving pedestrians and bicyclists. This figure also illustrates charts showing a breakdown of both all crashes and pedestrian/bicycle crashes using the previous mentioned KABCO scale.

The second figure, Figure 7-1B through Figure 7-10B, illustrates a map separating the location of crashes involving vehicles, buses, motorcycles/mopeds, pedal cycles (bicycles), and pedestrians. Additionally, this figure illustrates charts showing a breakdown of the following crash factors:

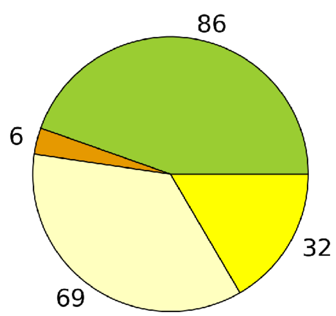
- Crashes by Age of Driver
- Crashes by Hour of Day
- Crashes by Day of Week
- Crashes by Month
- Lighting Conditions
- Vehicle 1 Driver Factor
- Crash Type
- Vehicle 1 Most Harmful Event
- Weather Factor
- Vehicle 1 Vehicle Factor

Note: Vehicle 1 is the at fault vehicle.

BICYCLE & PEDESTRIAN CRASH INJURY TYPES

	PDO	Injury*	Fatal
Bicycle	(0)	(1)	(0)
Pedestrian	(0)	(0)	(0)

All Crashes



LEGEND

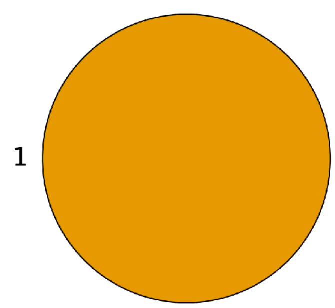
Injury Classificaion Rating

- Fatal (K)
- Incapacitating Injury (A)
- Non-incapacitating Injury (B)
- Possible Injury (C)
- Property Damage Only (PDO)

Intersection

200-ft Buffer

Bicycle



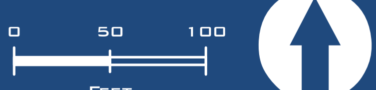
Pedestrian

NO CRASHES

Figure 7-1A. Injury Severity

1. S Durango Dr at W Charleston Blvd

August 2020



NOTE(S):
5-Year Crash Data
(Years 2014 to 2018)

*All Injury Classifications A, B, and C

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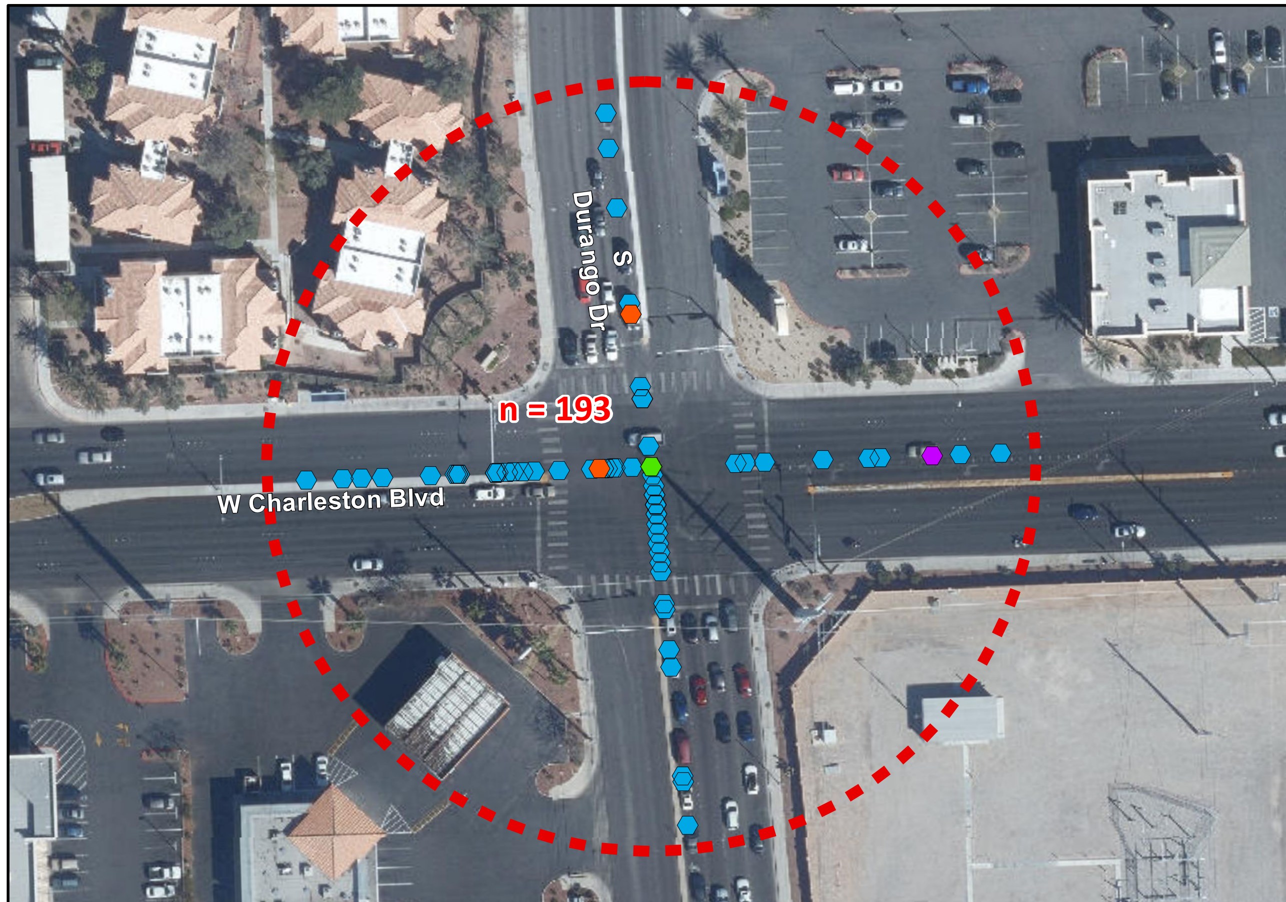


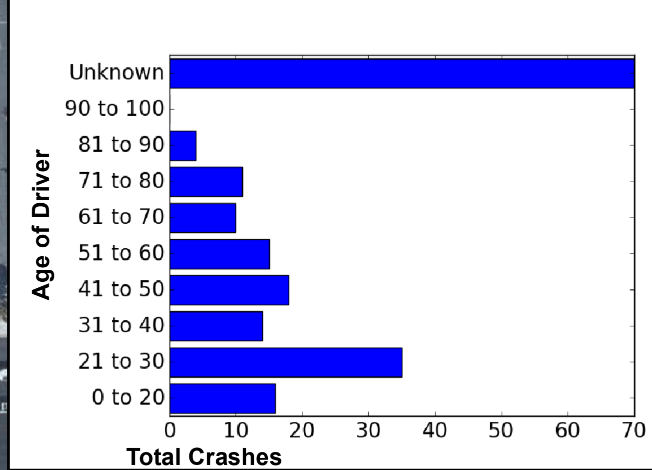
INTERSECTION 200-FT. BUFFER

INTERSECTION TOTAL CRASHES

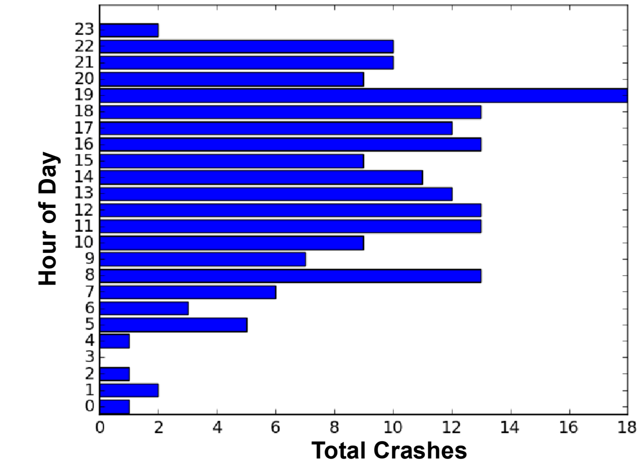
INTERSECTION CRASH MODE TYPE

PEDESTRIAN (0)
PEDAL CYCLE (1)
MOTORCYLE/MOPED (5)
BUS (1)
VEHICLE (186)

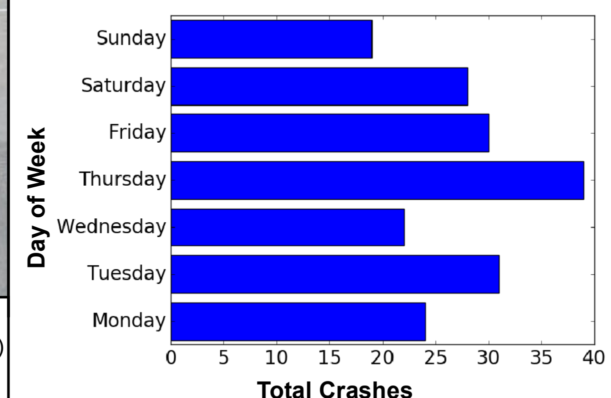
Crashes by Age of Driver



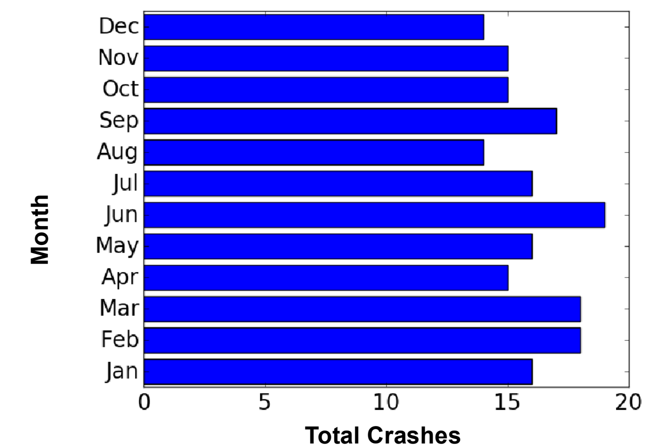
Crashes by Hour of Day



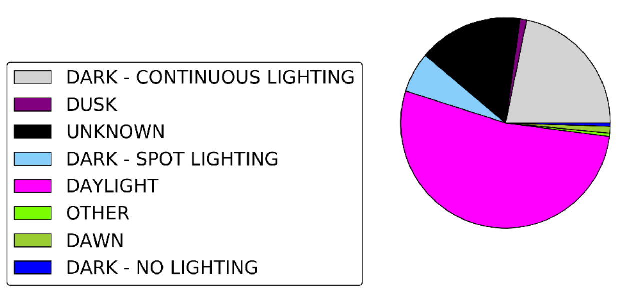
Crashes by Day of Week



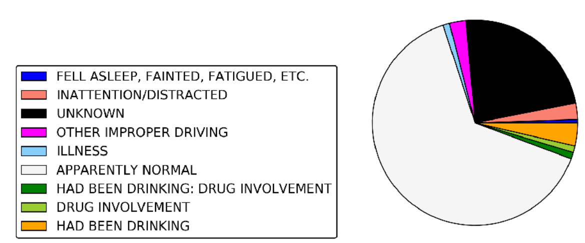
Crashes by Month



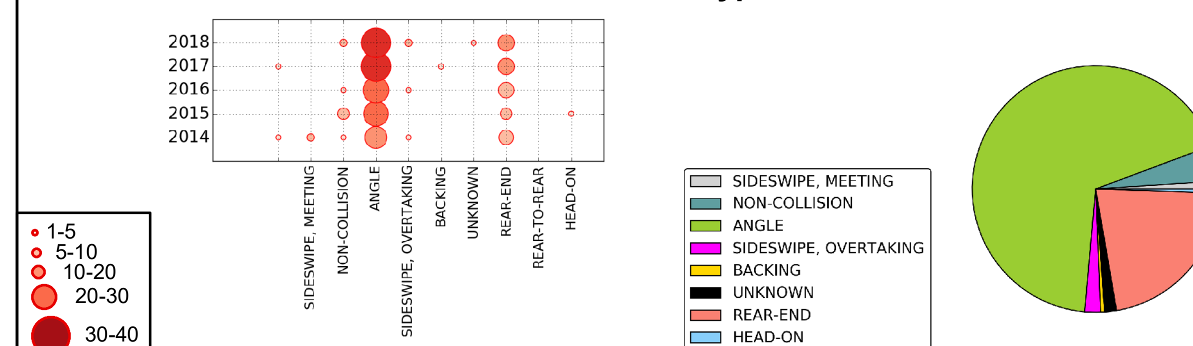
Lighting Conditions



Vehicle 1 Driver Factor

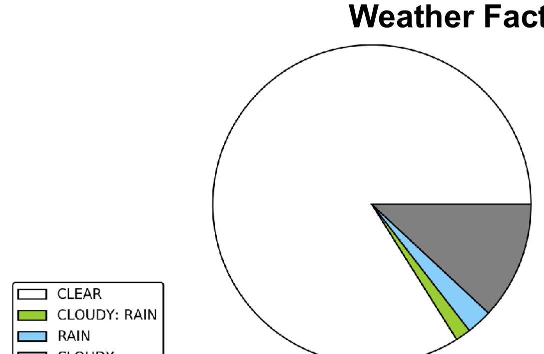


Crash Type



Vehicle 1 Most Harmful Event	Percent
UNKNOWN	80.8
MOTOR VEHICLE IN TRANSPORT	15.5
SLOW/STOPPED VEHICLE	2.1
TREE/SHRUB	0.5
RAN OFF ROAD RIGHT	0.5
OTHER FIXED OBJECTS (BUILDING, TUNNEL, ETC.)	0.5

Weather Factor



Vehicle 1 Vehicle Factor	Percent
FAILED TO YIELD RIGHT OF WAY	43.5
UNKNOWN	22.3
HIT AND RUN	8.8
OTHER IMPROPER DRIVING	5.7
FOLLOWED TOO CLOSELY	5.7
DISREGARDED TRAFFIC SIGNS, SIGNALS, ROAD MARKINGS	5.2
UNSAFE LANE CHANGE	4.1
FAILURE TO KEEP IN PROPER LANE OR RUNNING OFF ROAD	3.1
UNSAFE BACKING	0.5
MECHANICAL DEFECTS: ROAD DEFECT	0.5
MADE AN IMPROPER TURN	0.5

0 50 100
FEET

Figure 7-1B. Crash Factors

1. S Durango Dr at W Charleston Blvd

August 2020

NOTE(S):
5-Year Crash Data (Years 2014 to 2018)

Aerial representaion of crash locations is based on the documented distance, as recorded by the on-scene police officer

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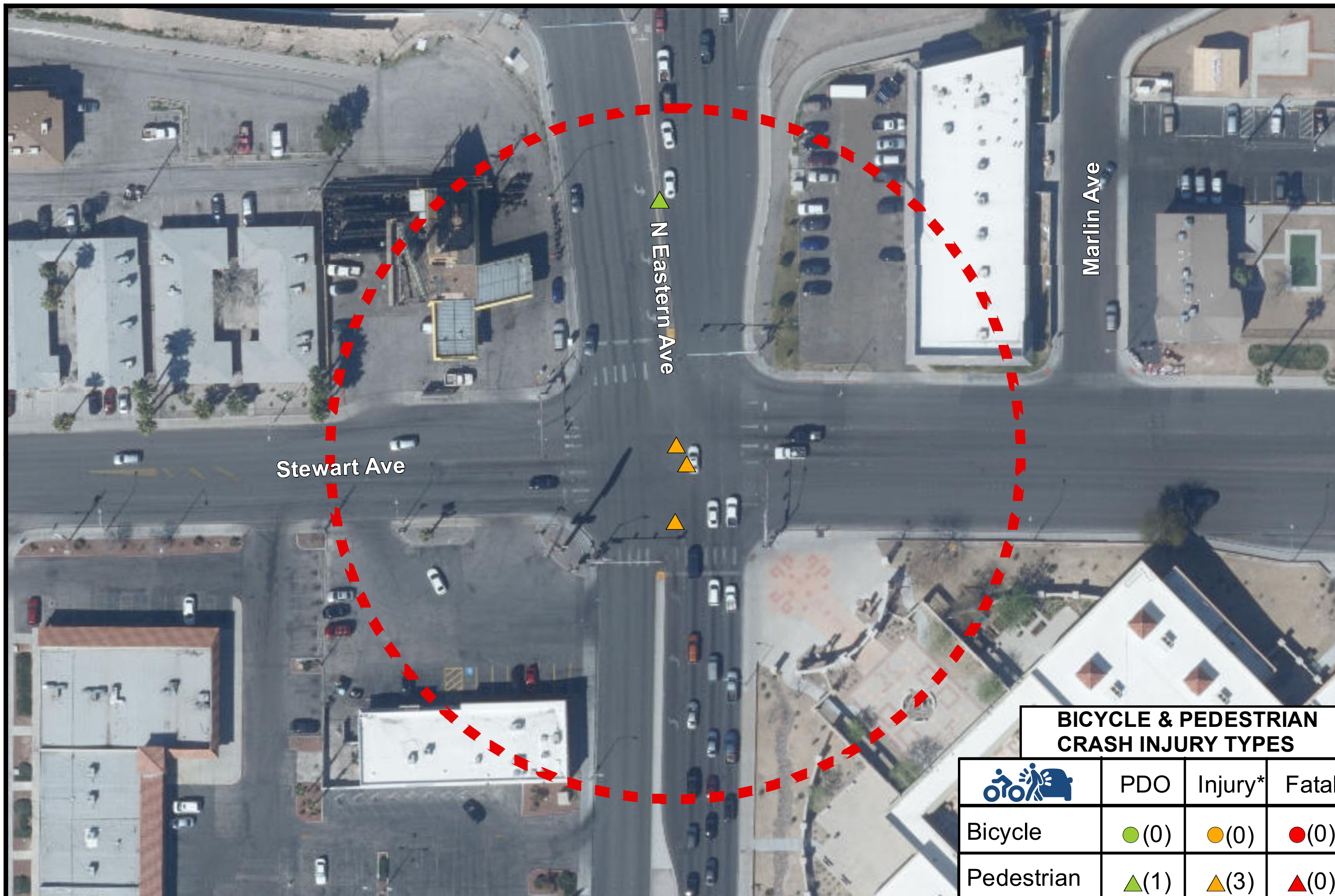
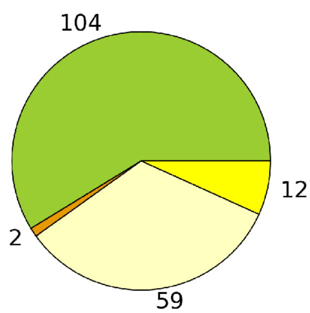


BICYCLE & PEDESTRIAN CRASH INJURY TYPES

	PDO	Injury*	Fatal
Bicycle	(0)	(0)	(0)
Pedestrian	(1)	(3)	(0)

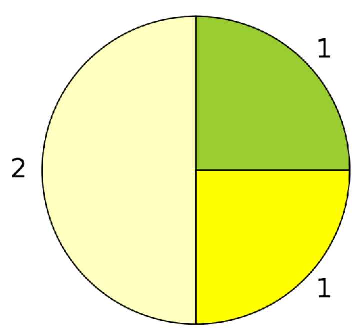
All Crashes



Bicycle

NO CRASHES

Pedestrian



LEGEND

Injury Classificaion Rating

- Fatal (K)
- Incapacitating Injury (A)
- Non-incapacitating Injury (B)
- Possible Injury (C)
- Property Damage Only (PDO)

Intersection

- 200-ft Buffer

Figure 7-2A. Injury Severity

2. Eastern Ave at Stewart Ave

August 2020

0 50 100
Feet

NOTE(S):
5-Year Crash Data
(Years 2014 to 2018)

*All Injury Classifications A, B, and C

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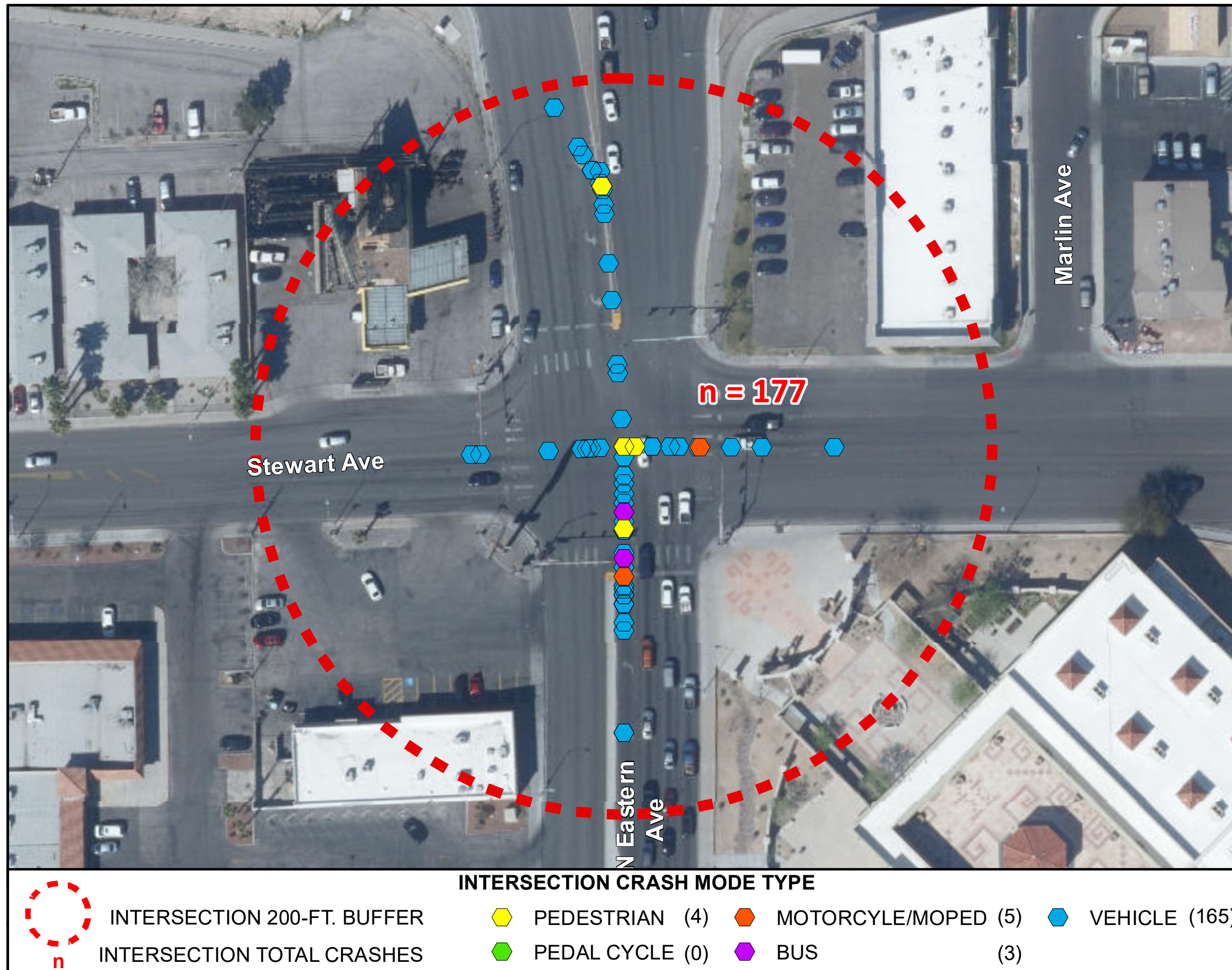
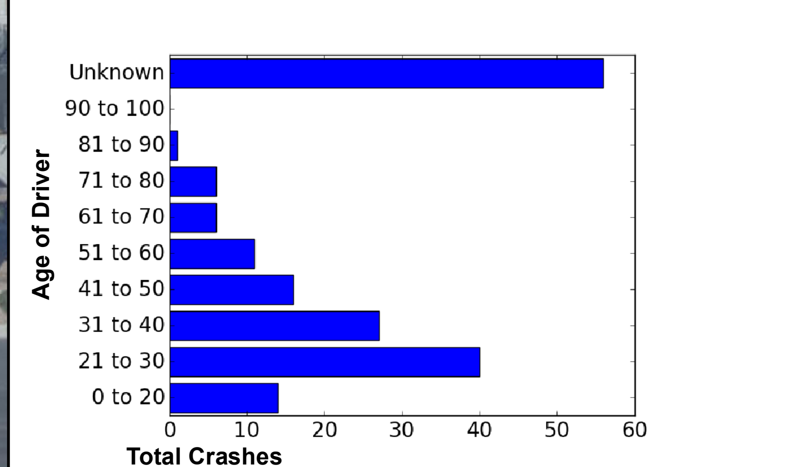
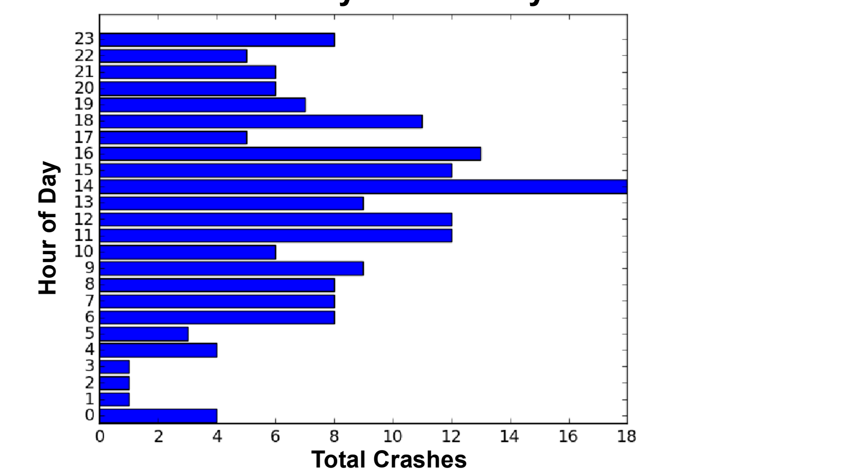


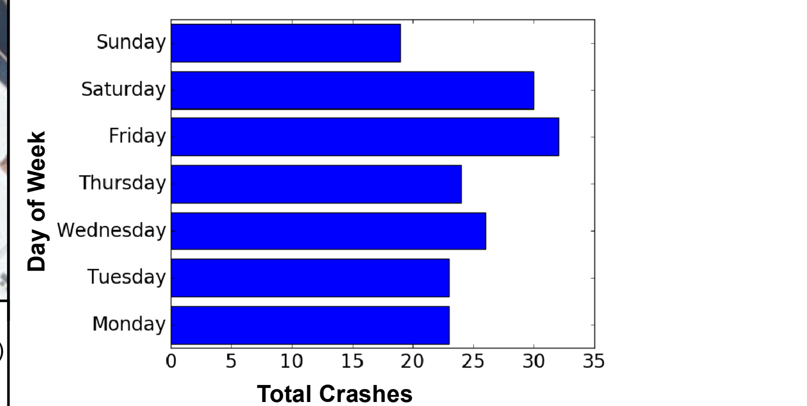
Crashes by Age of Driver



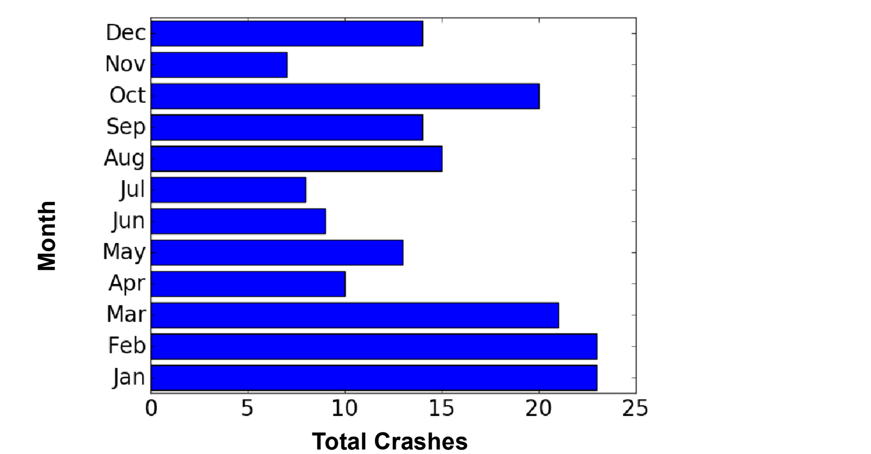
Crashes by Hour of Day



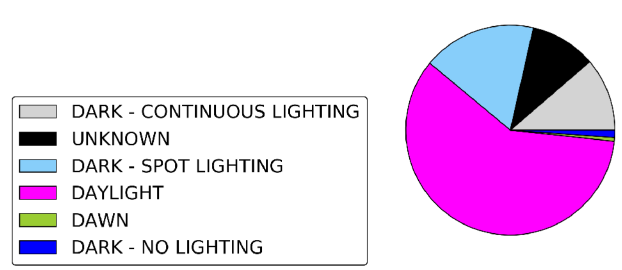
Crashes by Day of Week



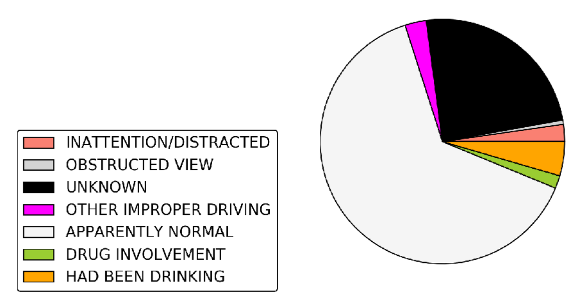
Crashes by Month



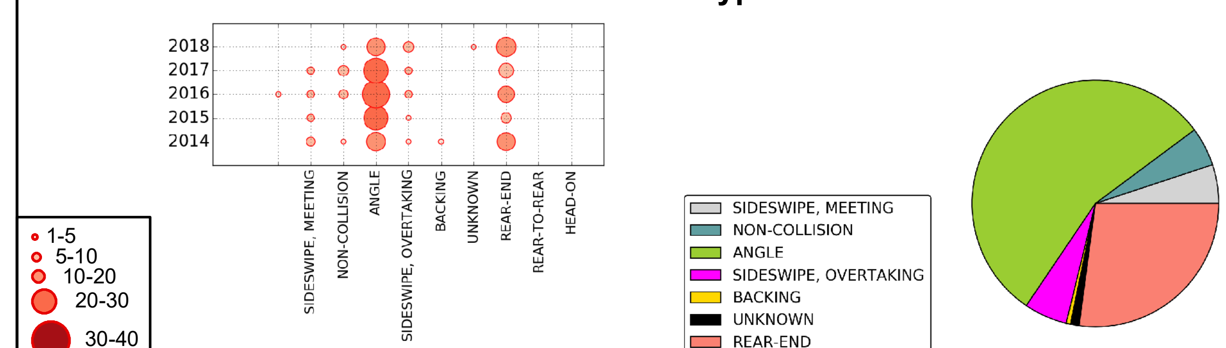
Lighting Conditions



Vehicle 1 Driver Factor

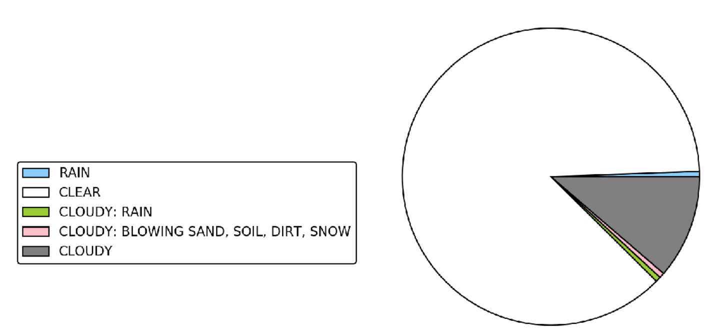


Crash Type



Vehicle 1 Most Harmful Event	Percent
UNKNOWN	92.7
MOTOR VEHICLE IN TRANSPORT	6.2
SLOW/STOPPED VEHICLE	1.1

Weather Factor



Vehicle 1 Vehicle Factor	Percent
UNKNOWN	33.9
DISREGARDED TRAFFIC SIGNS, SIGNALS, ROAD MARKINGS	20.3
FAILED TO YIELD RIGHT OF WAY	13
FOLLOWED TOO CLOSELY	6.8
HIT AND RUN	5.6
FAILURE TO KEEP IN PROPER LANE OR RUNNING OFF ROAD	5.6
OTHER IMPROPER DRIVING	4.5
UNSAFE LANE CHANGE	3.4
DRIVING TOO FAST FOR CONDITIONS	2.8
OPERATING VEHICLE IN ERRATIC, RECKLESS, CARELESS, NEGLIGENT OR AGGRESSIVE MANNER	1.7
MADE AN IMPROPER TURN	1.7
MECHANICAL DEFECTS: ROAD DEFECT	0.6

0 50 100
FEET

Figure 7-2B. Crash Factors

2. Eastern Ave at Stewart Ave

August 2020

NOTE(S):
5-Year Crash Data (Years 2014 to 2018)

Aerial representaion of crash locations is based on the documented distance, as recorded by the on-scene police officer

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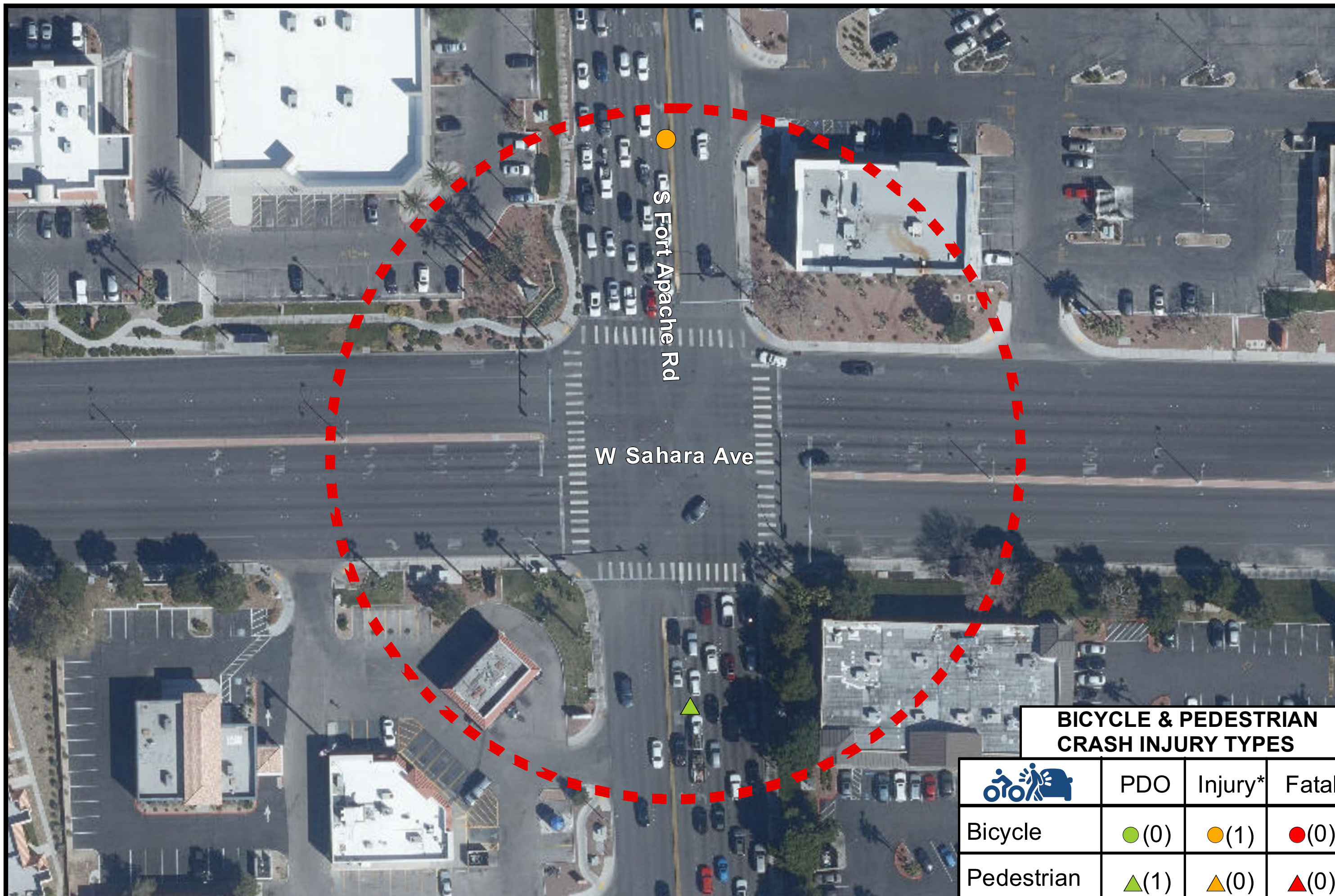
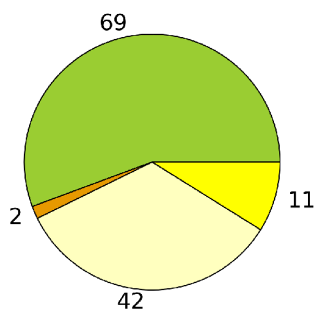


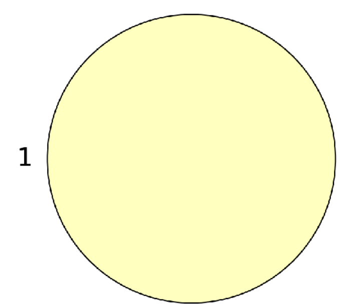
BICYCLE & PEDESTRIAN CRASH INJURY TYPES

	PDO	Injury*	Fatal
Bicycle	(0)	(1)	(0)
Pedestrian	(1)	(0)	(0)

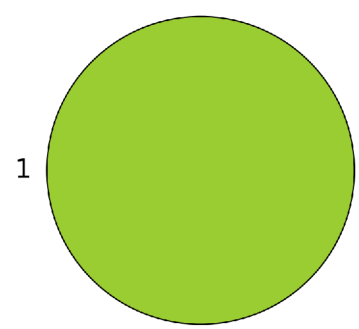
All Crashes



Bicycle



Pedestrian



LEGEND

Injury Classificaion Rating

- Fatal (K)
- Incapacitating Injury (A)
- Non-incapacitating Injury (B)
- Possible Injury (C)
- Property Damage Only (PDO)

Intersection

- 200-ft Buffer

Figure 7-3A. Injury Severity

3. Fort Apache Rd at Sahara Ave

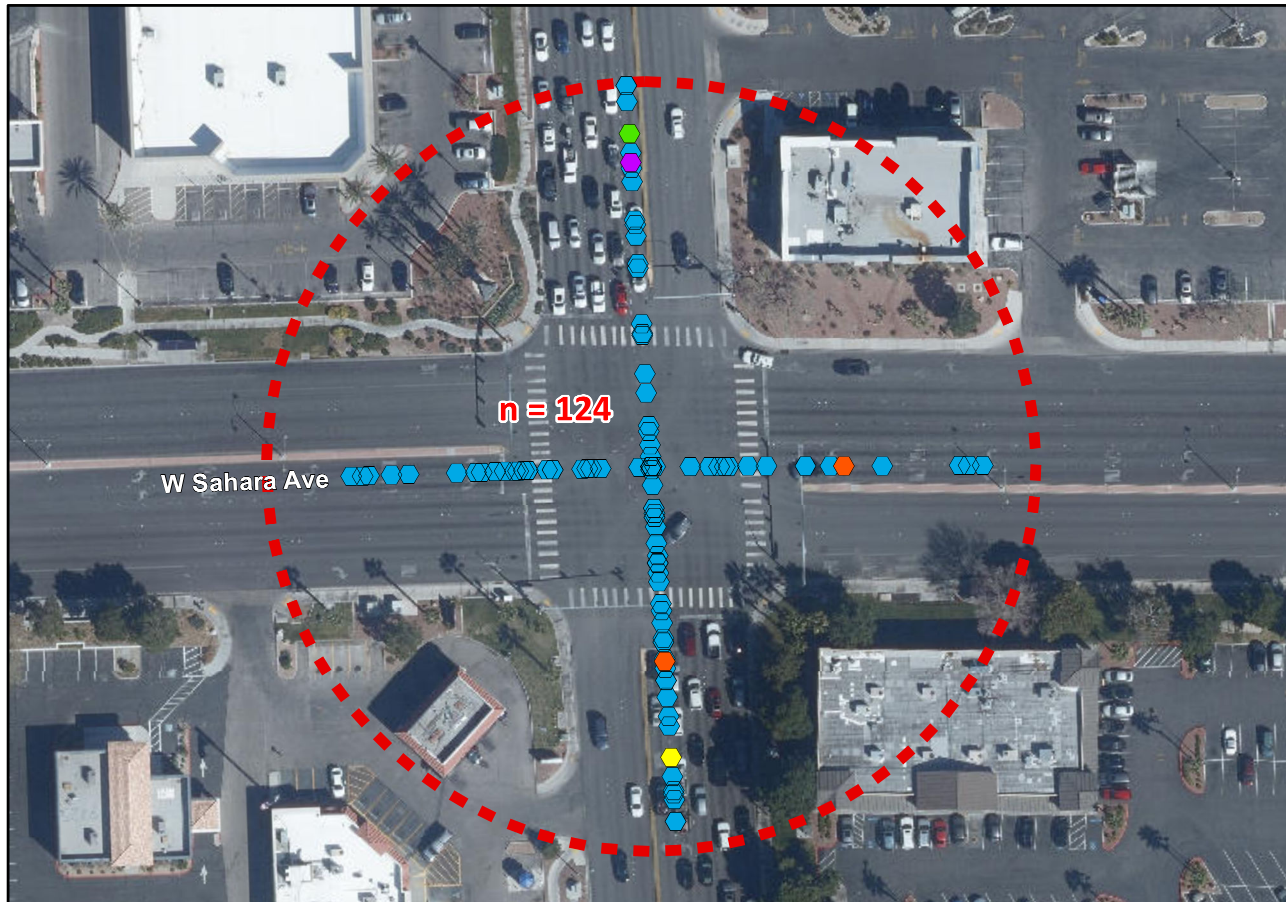
August 2020

NOTE(S):
5-Year Crash Data
(Years 2014 to 2018)

*All Injury Classifications A, B, and C

WOOD RODGERS

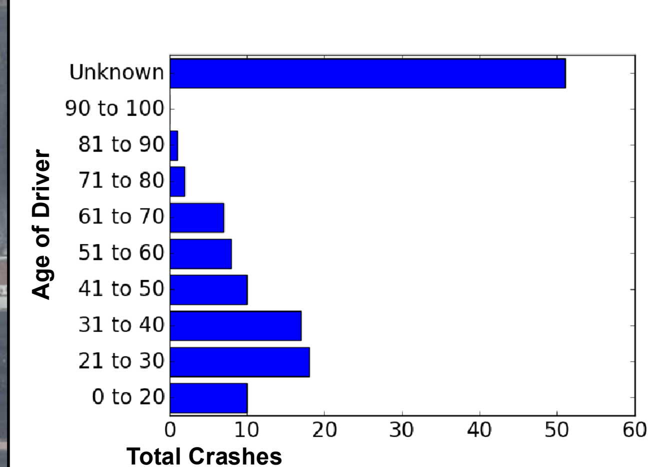
CICM
Citywide Intersection Crash Mitigation



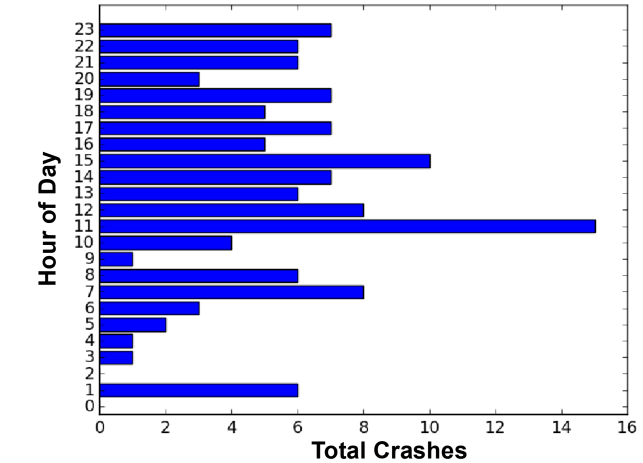
INTERSECTION CRASH MODE TYPE

- INTERSECTION 200-FT. BUFFER
- n INTERSECTION TOTAL CRASHES
- PEDESTRIAN (1)
- PEDAL CYCLE (1)
- MOTORCYLE/MOPED (2)
- BUS (1)
- VEHICLE (119)

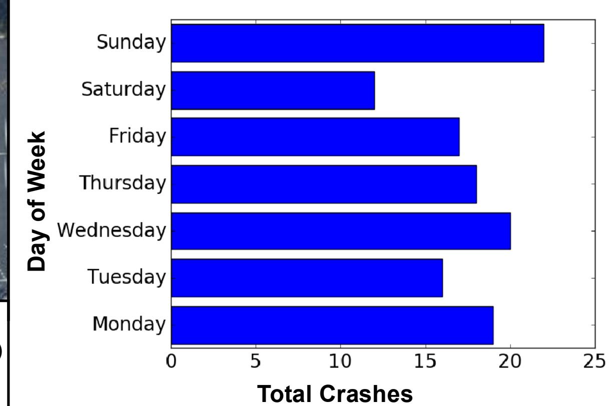
Crashes by Age of Driver



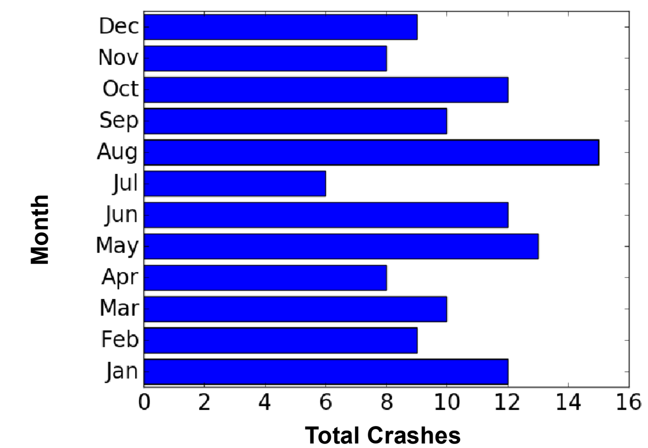
Crashes by Hour of Day



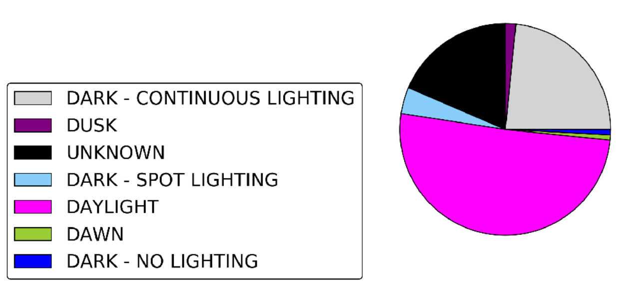
Crashes by Day of Week



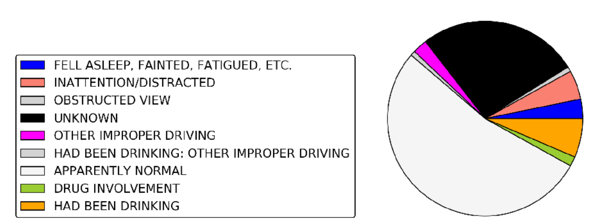
Crashes by Month



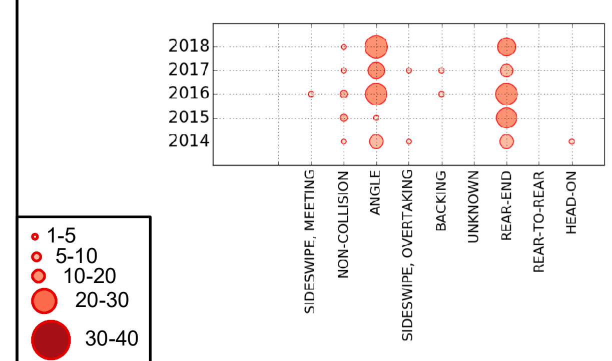
Lighting Conditions

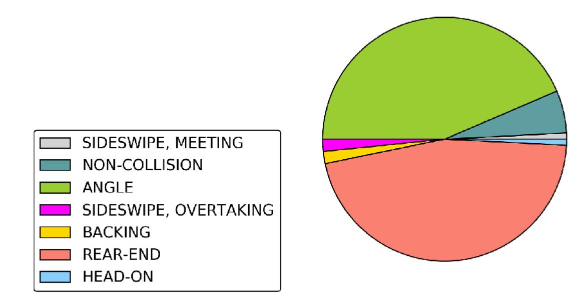


Vehicle 1 Driver Factor



Crash Type

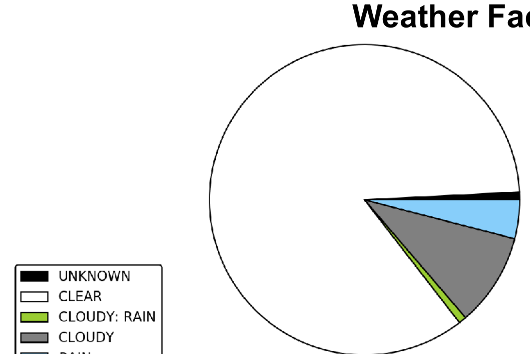




Vehicle 1 Most Harmful Event

Vehicle 1 Most Harmful Event	Percent
UNKNOWN	83.1
SLOW/STOPPED VEHICLE	9.7
MOTOR VEHICLE IN TRANSPORT	6.5
RAN OFF ROAD LEFT	0.8

Weather Factor



Vehicle 1 Vehicle Factor

Vehicle 1 Vehicle Factor	Percent
UNKNOWN	25
HIT AND RUN	16.9
FOLLOWED TOO CLOSELY	12.9
DISREGARDED TRAFFIC SIGNS, SIGNALS, ROAD MARKINGS	12.1
UNSAFE LANE CHANGE	9.7
FAILED TO YIELD RIGHT OF WAY	7.3
OTHER IMPROPER DRIVING	5.6
FAILURE TO KEEP IN PROPER LANE OR RUNNING OFF ROAD	4.8
DRIVING TOO FAST FOR CONDITIONS	4
MECHANICAL DEFECTS: ROAD DEFECT	1.6

0 50 100
FEET

Figure 7-3B. Crash Factors

3. Fort Apache Rd at Sahara Ave

August 2020

NOTE(S):
5-Year Crash Data (Years 2014 to 2018)

Aerial representaion of crash locations is based on the documented distance, as recorded by the on-scene police officer

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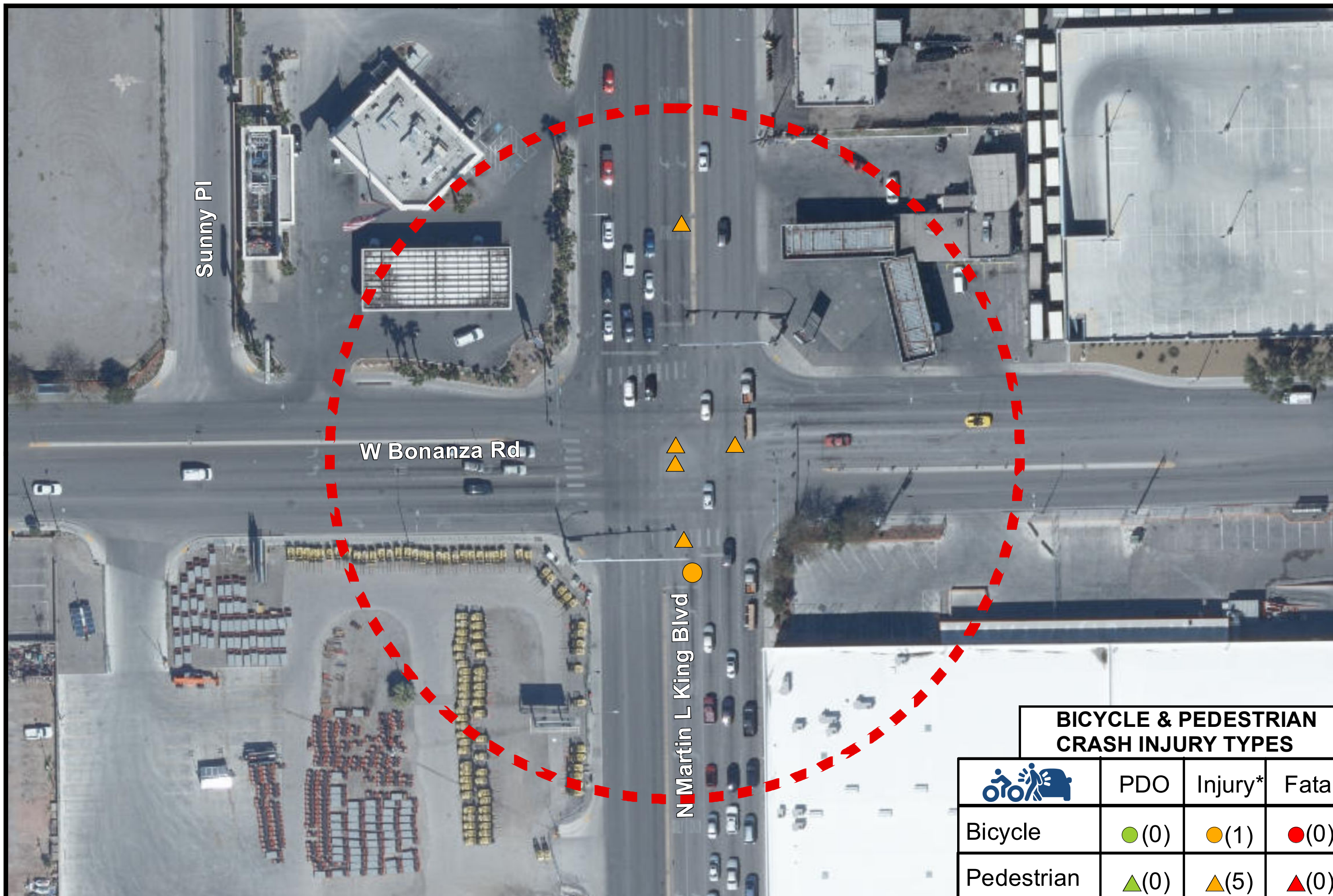
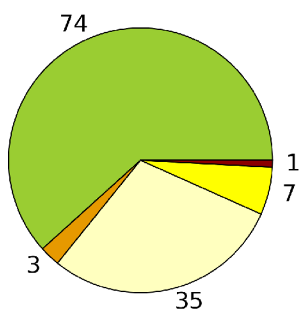


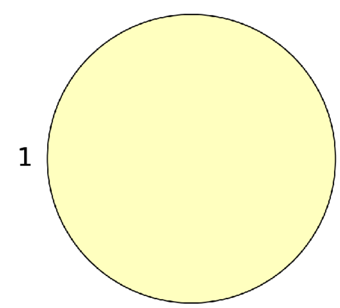
BICYCLE & PEDESTRIAN CRASH INJURY TYPES

	PDO	Injury*	Fatal
Bicycle	(0)	(1)	(0)
Pedestrian	(0)	(5)	(0)

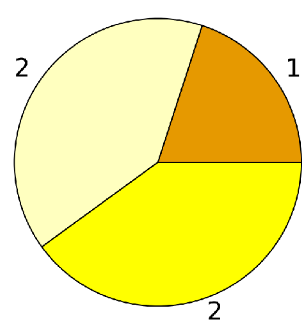
All Crashes



Bicycle



Pedestrian



LEGEND

Injury Classificaion Rating

- Fatal (K)
- Incapacitating Injury (A)
- Non-incapacitating Injury (B)
- Possible Injury (C)
- Property Damage Only (PDO)

Intersection

- 200-ft Buffer

Figure 7-4A. Injury Severity

4. Martin Luther King Blvd at Bonanza Rd

August 2020

0 50 100
Feet

NOTE(S):
5-Year Crash Data
(Years 2014 to 2018)

*All Injury Classifications A, B, and C

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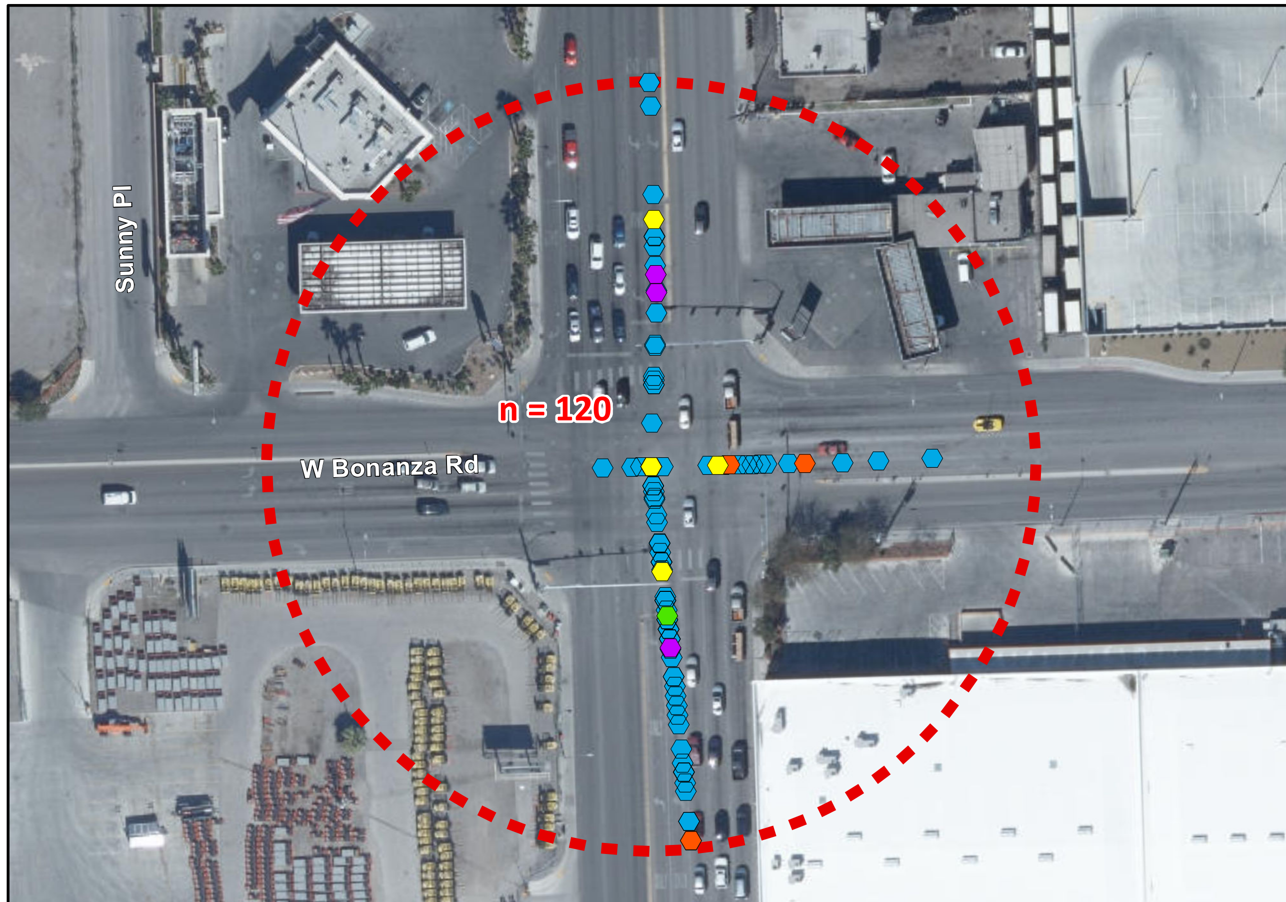
CICM
Citywide Intersection Crash Mitigation

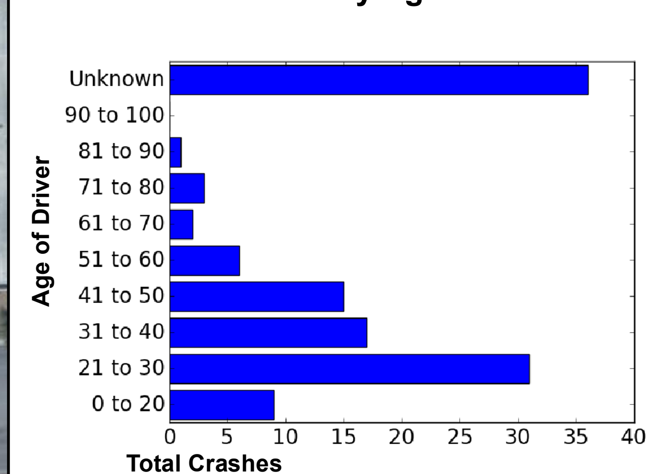


INTERSECTION CRASH MODE TYPE

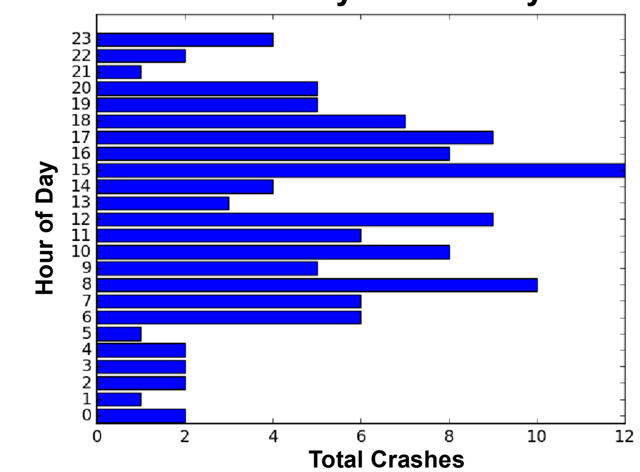
INTERSECTION 200-FT. BUFFER
INTERSECTION TOTAL CRASHES

PEDESTRIAN (5)
PEDAL CYCLE (1)
MOTORCYLE/MOPED (3)
BUS (3)
VEHICLE (108)

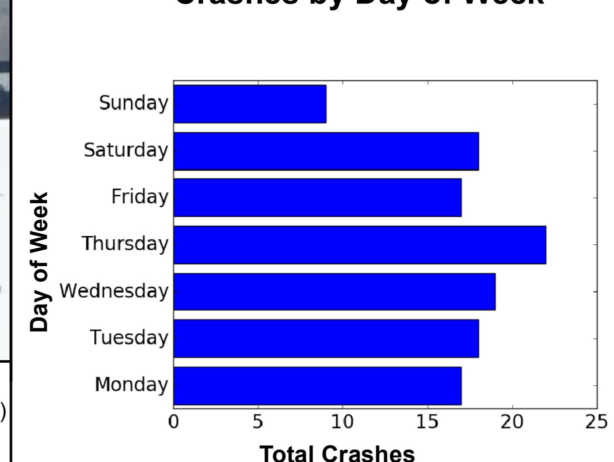
Crashes by Age of Driver



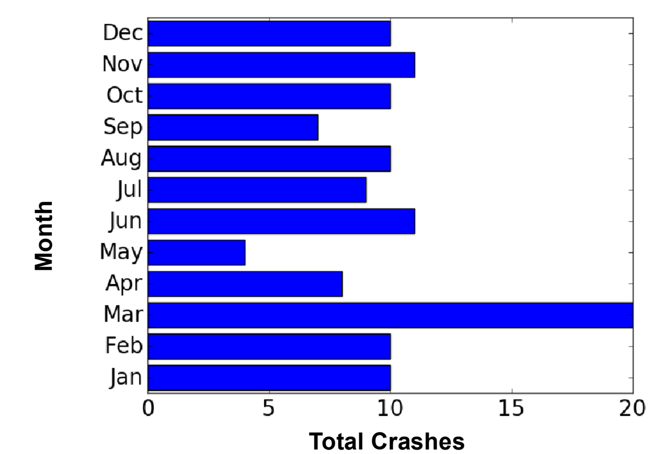
Crashes by Hour of Day



Crashes by Day of Week

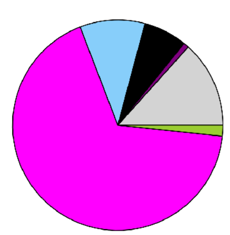


Crashes by Month



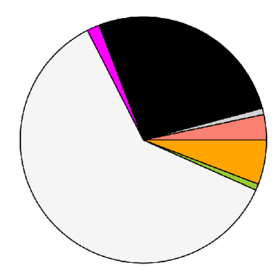
Lighting Conditions

DARK - CONTINUOUS LIGHTING
DUSK
UNKNOWN
DARK - SPOT LIGHTING
DAYLIGHT
DAWN

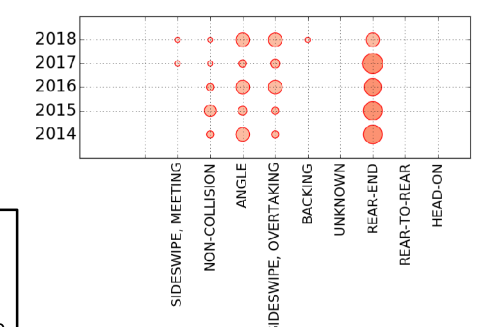


Vehicle 1 Driver Factor

INATTENTION/DISTRACTED
OBSTRUCTED VIEW
UNKNOWN
OTHER IMPROPER DRIVING
APPARENTLY NORMAL
DRUG INVOLVEMENT
HAD BEEN DRINKING

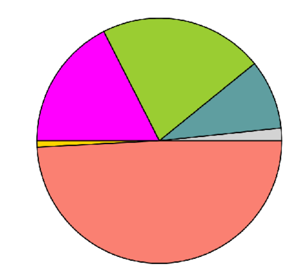


Crash Type



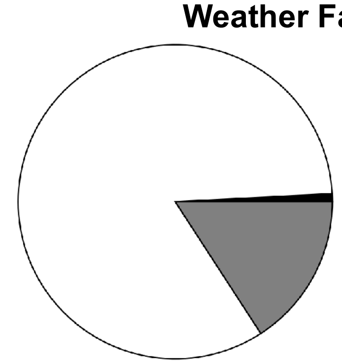
1-5
5-10
10-20
20-30
30-40

SIDESWIPE, MEETING
NON-COLLISION
ANGLE
SIDESWIPE, OVERTAKING
BACKING
REAR-END



Vehicle 1 Most Harmful Event	Percent
UNKNOWN	86.7
MOTOR VEHICLE IN TRANSPORT	5.8
SLOW/STOPPED VEHICLE	3.3
PEDESTRIAN	1.7
OTHER POST, POLE OR SUPPORT	0.8
OVERTURN/ROLLOVER	0.8
PEDAL CYCLE	0.8

Weather Factor



UNKNOWN
CLEAR
CLOUDY

Vehicle 1 Vehicle Factor	Percent
UNKNOWN	32.5
FOLLOWED TOO CLOSELY	15.8
DRIVING TOO FAST FOR CONDITIONS	11.7
HIT AND RUN	10
UNSAFE LANE CHANGE	9.2
FAILED TO YIELD RIGHT OF WAY	5.8
OTHER IMPROPER DRIVING	5.8
FAILURE TO KEEP IN PROPER LANE OR RUNNING OFF ROAD	3.3
MADE AN IMPROPER TURN	2.5
RAN OFF ROAD	0.8
WRONG SIDE OR WRONG WAY	0.8
OPERATING VEHICLE IN ERRATIC, RECKLESS, CARELESS, NEGLIGENT OR AGGRESSIVE MANNER	0.8
DISREGARDED TRAFFIC SIGNS, SIGNALS, ROAD MARKINGS	0.8

0 50 100
FEET

Figure 7-4B. Crash Factors

4. Martin Luther King Blvd at Bonanza Rd

August 2020

NOTE(S):
5-Year Crash Data (Years 2014 to 2018)

Aerial representaion of crash locations is based on the documented distance, as recorded by the on-scene police officer

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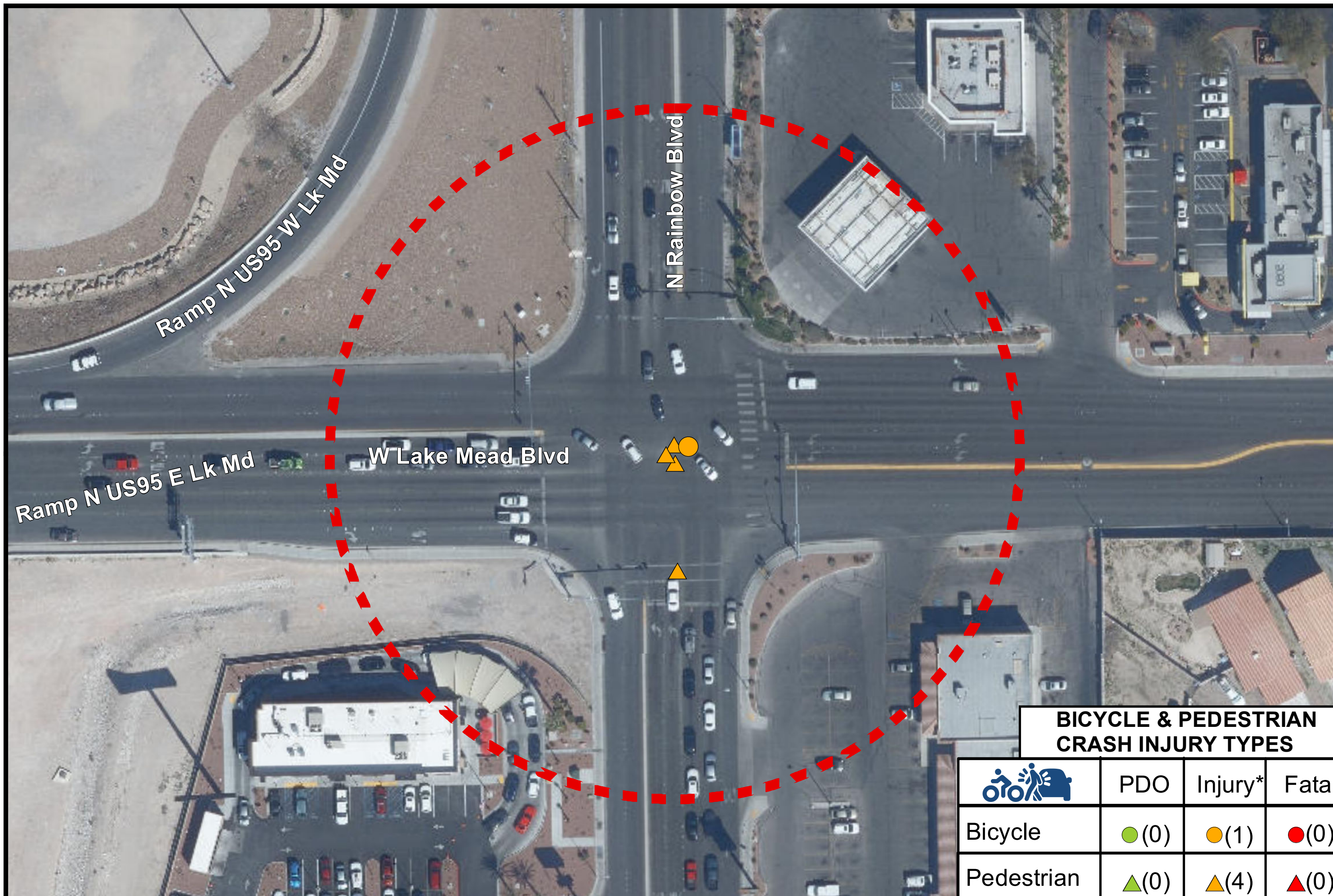
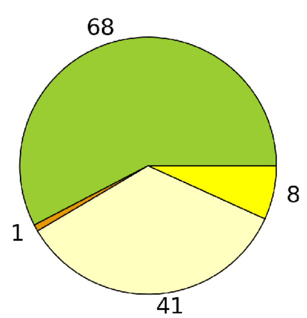


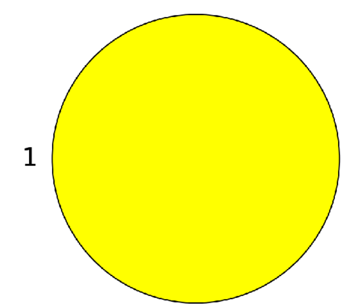
BICYCLE & PEDESTRIAN CRASH INJURY TYPES

	PDO	Injury*	Fatal
Bicycle	(0)	(1)	(0)
Pedestrian	(0)	(4)	(0)

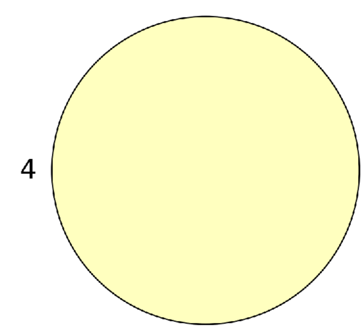
All Crashes



Bicycle



Pedestrian



LEGEND

Injury Classificaion Rating

- Fatal (K)
- Incapacitating Injury (A)
- Non-incapacitating Injury (B)
- Possible Injury (C)
- Property Damage Only (PDO)

Intersection

- 200-ft Buffer

Figure 7-5A. Injury Severity

5. Lake Mead Blvd at S Rainbow Blvd

August 2020

0 50 100

FEET

NOTE(S):
5-Year Crash Data
(Years 2014 to 2018)

*All Injury Classifications
A, B, and C

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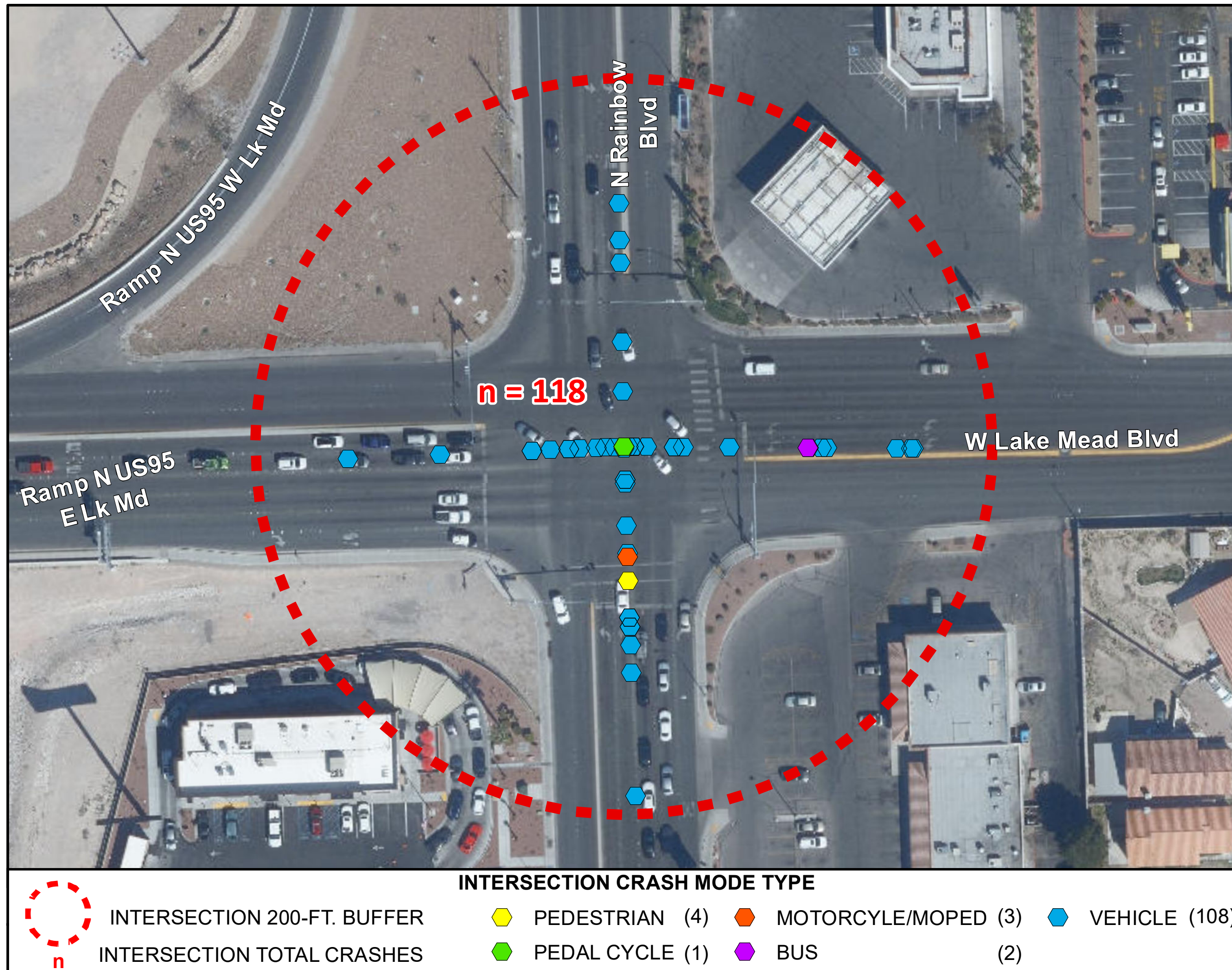
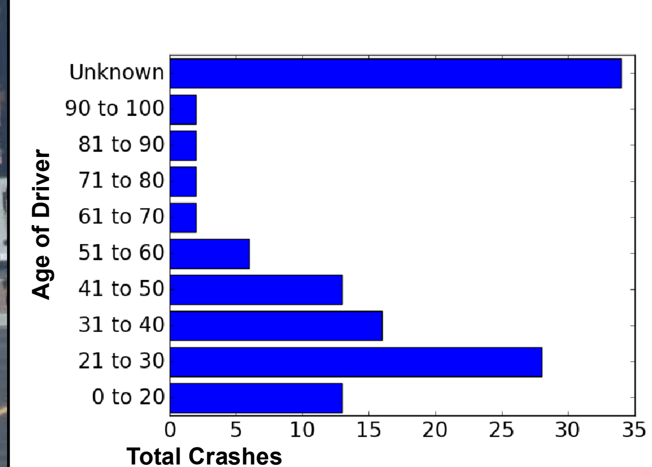
CICM
Citywide Intersection Crash Mitigation

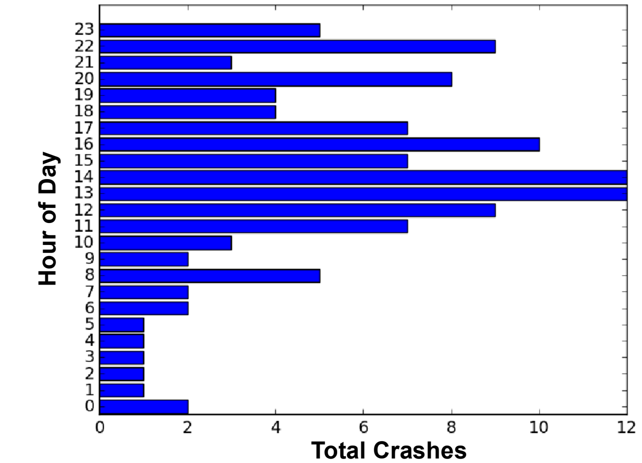
CITY OF LAS VEGAS NEVADA



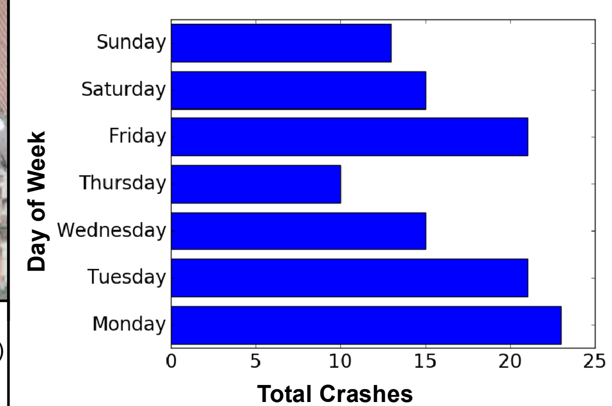
Crashes by Age of Driver



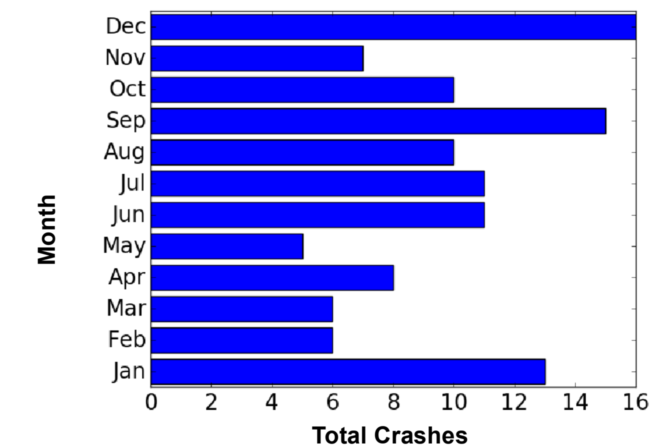
Crashes by Hour of Day



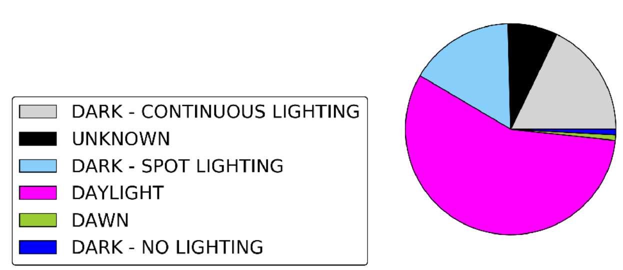
Crashes by Day of Week



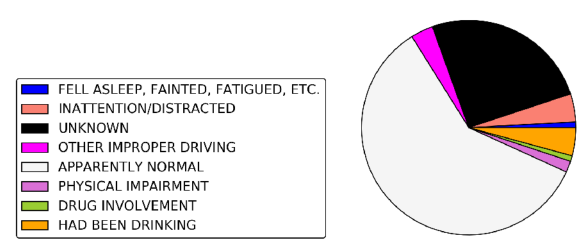
Crashes by Month



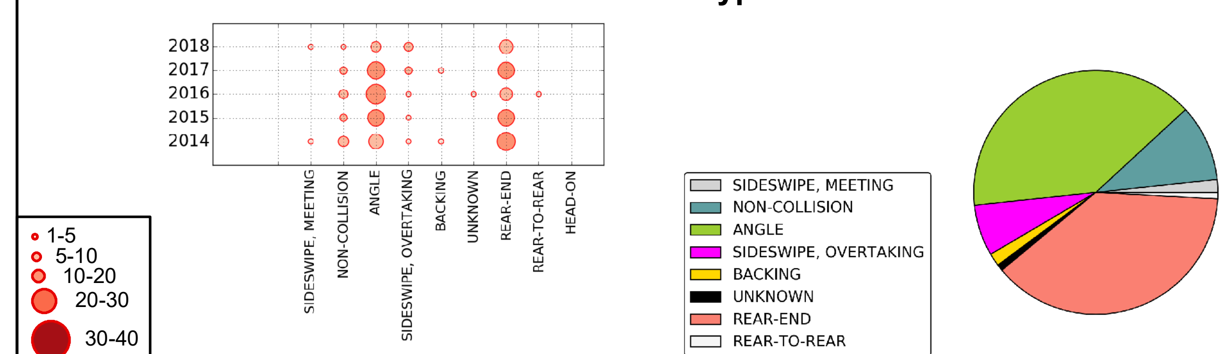
Lighting Conditions



Vehicle 1 Driver Factor

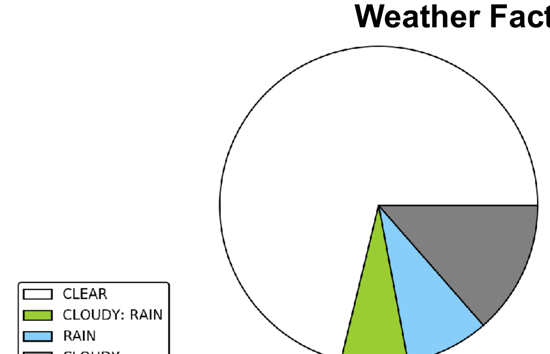


Crash Type



Vehicle 1 Most Harmful Event	Percent
UNKNOWN	90.7
MOTOR VEHICLE IN TRANSPORT	6.8
RAN OFF ROAD RIGHT	0.8
OTHER FIXED OBJECTS (BUILDING, TUNNEL, ETC.)	0.8
PEDAL CYCLE	0.8

Weather Factor



Vehicle 1 Vehicle Factor	Percent
UNKNOWN	31.4
DRIVING TOO FAST FOR CONDITIONS	13.6
HIT AND RUN	11
FAILED TO YIELD RIGHT OF WAY	11
DISREGARDED TRAFFIC SIGNS, SIGNALS, ROAD MARKINGS	7.6
FOLLOWED TOO CLOSELY	5.9
FAILURE TO KEEP IN PROPER LANE OR RUNNING OFF ROAD	5.9
OTHER IMPROPER DRIVING	5.1
UNSAFE LANE CHANGE	5.1
UNSAFE BACKING	2.5
OBJECT AVOIDANCE	0.8

0 50 100
FEET

Figure 7-5B. Crash Factors

5. Lake Mead Blvd at S Rainbow Blvd

August 2020

NOTE(S):
5-Year Crash Data (Years 2014 to 2018)

Aerial representaion of crash locations is based on the documented distance, as recorded by the on-scene police officer

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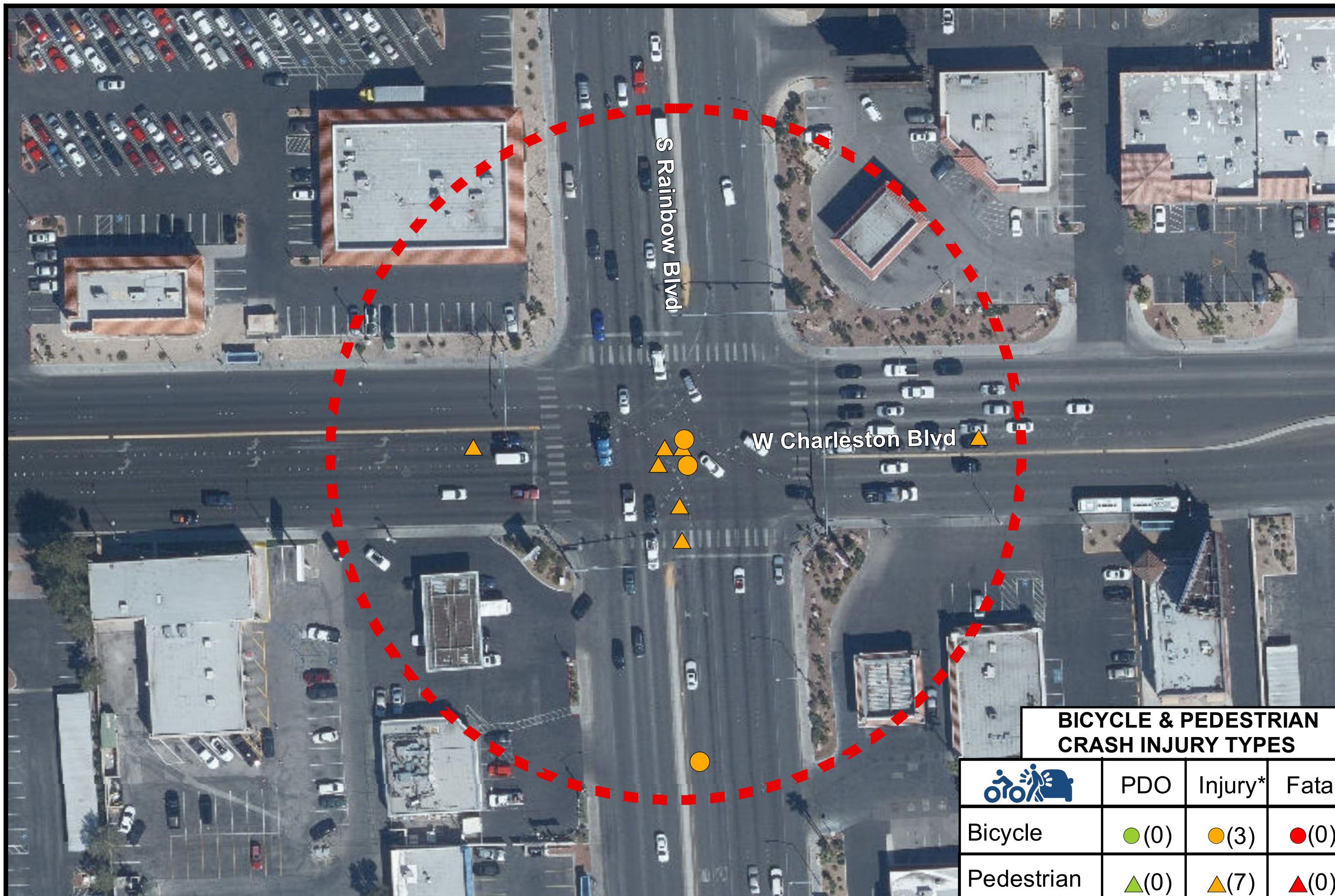
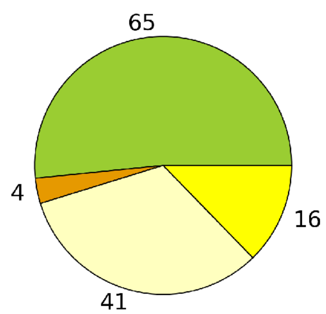


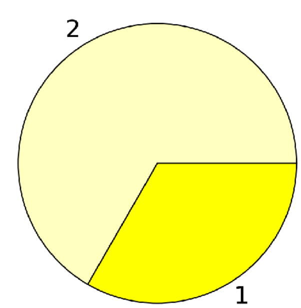
BICYCLE & PEDESTRIAN CRASH INJURY TYPES

	PDO	Injury*	Fatal
Bicycle	(0)	(3)	(0)
Pedestrian	(0)	(7)	(0)

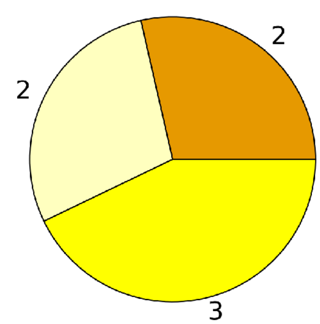
All Crashes



Bicycle



Pedestrian



LEGEND

Injury Classificaion Rating

- Fatal (K)
- Incapacitating Injury (A)
- Non-incapacitating Injury (B)
- Possible Injury (C)
- Property Damage Only (PDO)

Intersection

- 200-ft Buffer

Figure 7-6A. Injury Severity

6. W Charleston Blvd at S Rainbow Blvd

August 2020

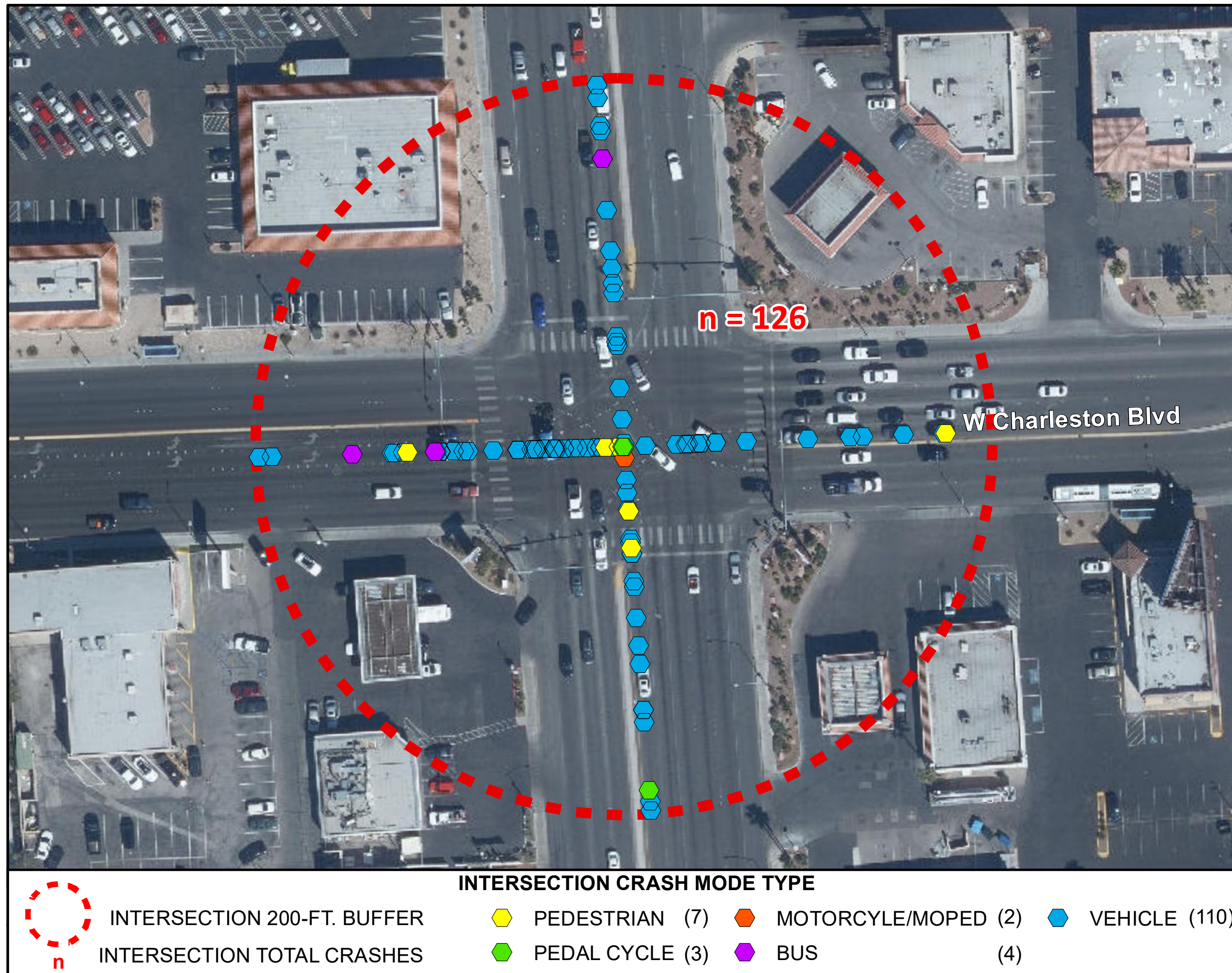
0 50 100
FEET

NOTE(S):
5-Year Crash Data
(Years 2014 to 2018)

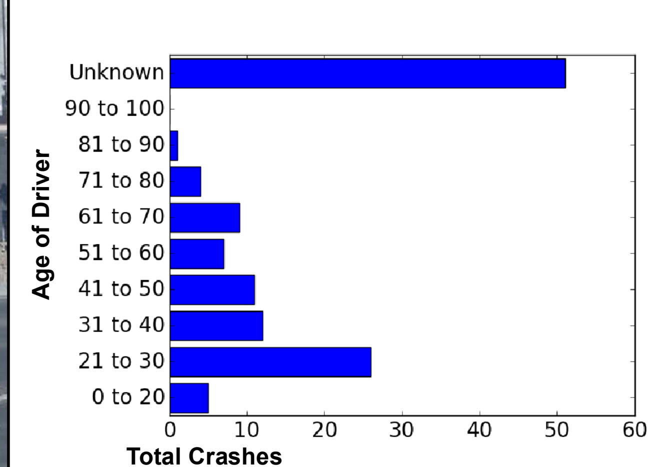
*All Injury Classifications A, B, and C

WOOD RODGERS

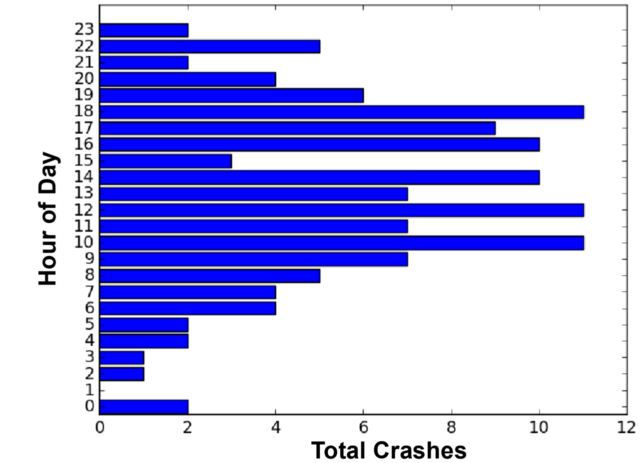
CICM
Citywide Intersection Crash Mitigation



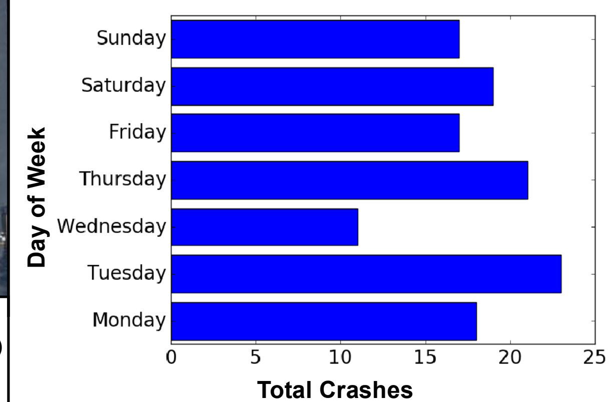
Crashes by Age of Driver



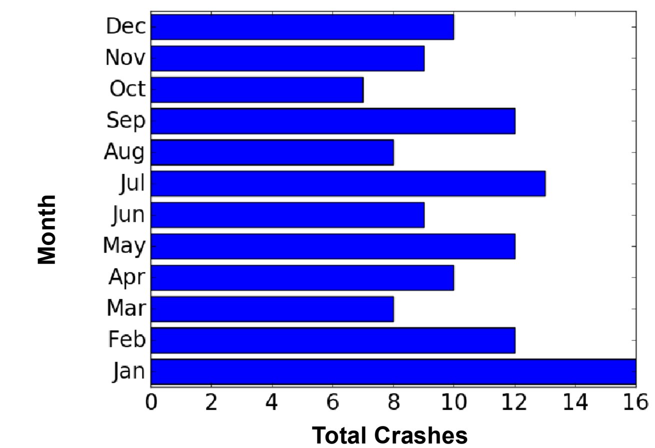
Crashes by Hour of Day



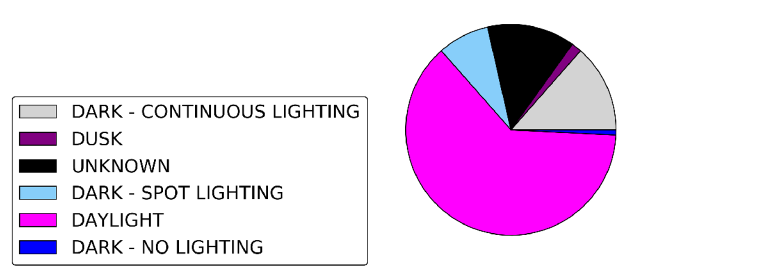
Crashes by Day of Week



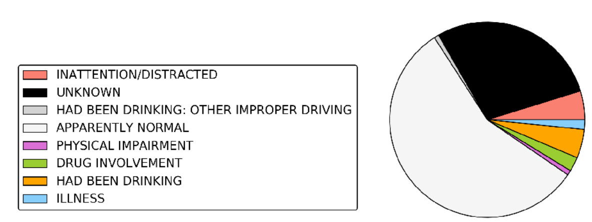
Crashes by Month



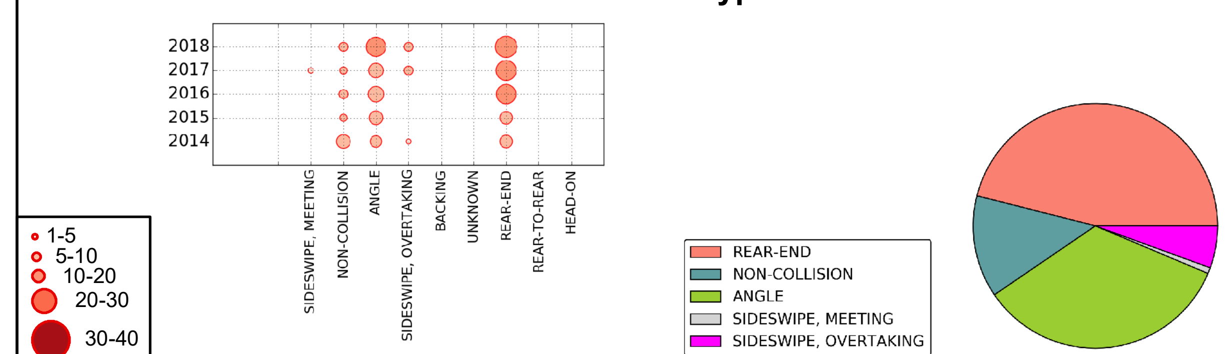
Lighting Conditions



Vehicle 1 Driver Factor

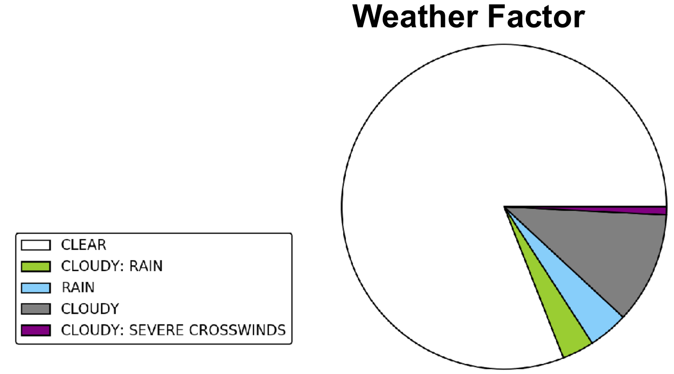


Crash Type



Vehicle 1 Most Harmful Event	Percent
UNKNOWN	85.7
MOTOR VEHICLE IN TRANSPORT	7.9
SLOW/STOPPED VEHICLE	2.4
PEDESTRIAN	1.6
LIGHT/LUMINARY SUPPORT	0.8
RAN OFF ROAD RIGHT	0.8
PEDAL CYCLE	0.8

Weather Factor



Vehicle 1 Vehicle Factor	Percent
UNKNOWN	39.7
HIT AND RUN	12.7
FOLLOWED TOO CLOSELY	11.9
OTHER IMPROPER DRIVING	11.1
FAILED TO YIELD RIGHT OF WAY	6.3
UNSAFE LANE CHANGE	4.8
FAILURE TO KEEP IN PROPER LANE OR RUNNING OFF ROAD	4
DISREGARDED TRAFFIC SIGNS, SIGNALS, ROAD MARKINGS	4
DRIVING TOO FAST FOR CONDITIONS	3.2
EXCEEDED AUTHORIZED SPEED LIMIT	0.8
MADE AN IMPROPER TURN	0.8
OBJECT AVOIDANCE	0.8

0 50 100
FEET

Figure 7-6B. Crash Factors

6. W Charleston Blvd at S Rainbow Blvd

August 2020

NOTE(S):
5-Year Crash Data (Years 2014 to 2018)

Aerial representaion of crash locations is based on the documented distance, as recorded by the on-scene police officer

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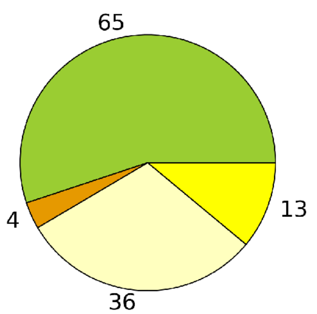
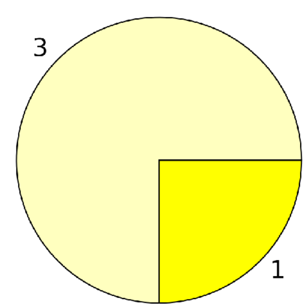
BICYCLE & PEDESTRIAN CRASH INJURY TYPES

	PDO	Injury*	Fatal
Bicycle	(0)	(4)	(0)
Pedestrian	(0)	(6)	(0)

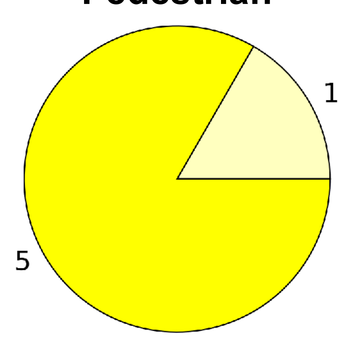
All Crashes



Bicycle



Pedestrian



LEGEND

Injury Classificaion Rating

- Fatal (K)
- Incapacitating Injury (A)
- Non-incapacitating Injury (B)
- Possible Injury (C)
- Property Damage Only (PDO)

Intersection

- 200-ft Buffer

Figure 7-7A. Injury Severity

7. S Valley View Blvd at W Sahara Ave

August 2020

0 50 100
FEET

NOTE(S):
5-Year Crash Data
(Years 2014 to 2018)

*All Injury Classifications A, B, and C

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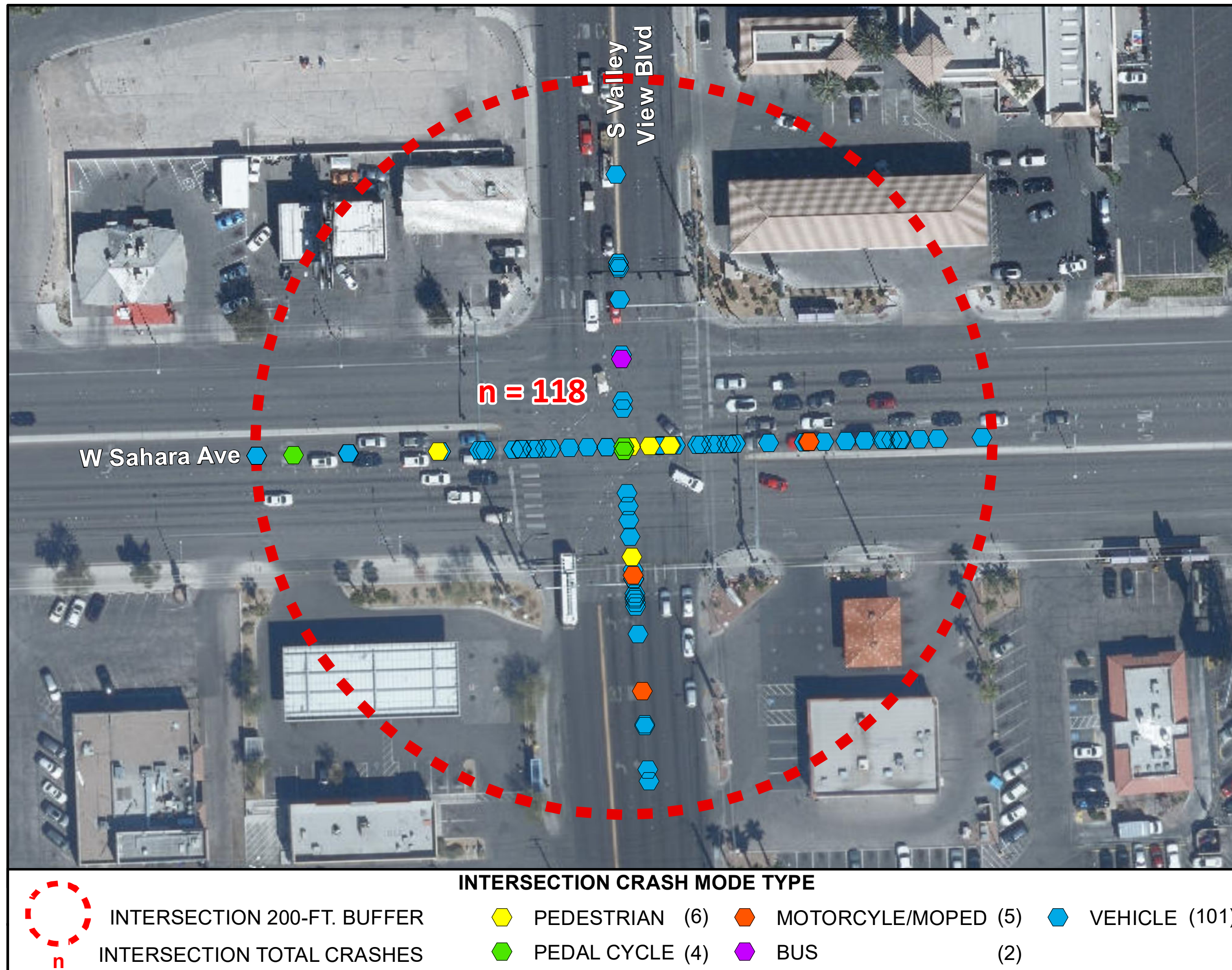
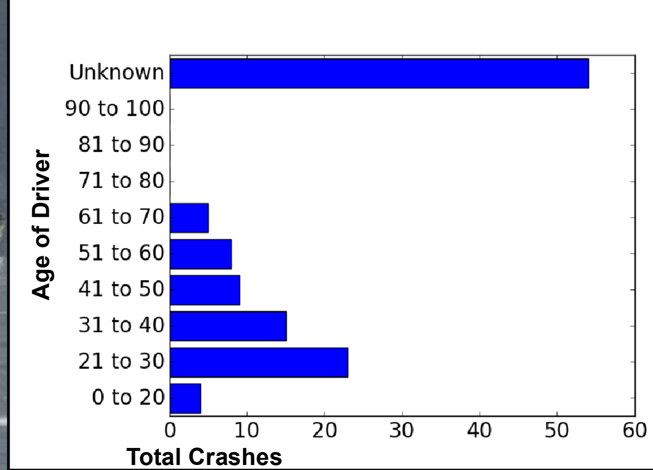
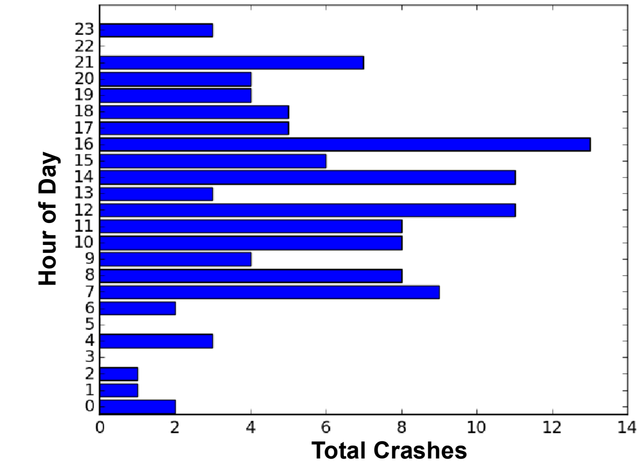


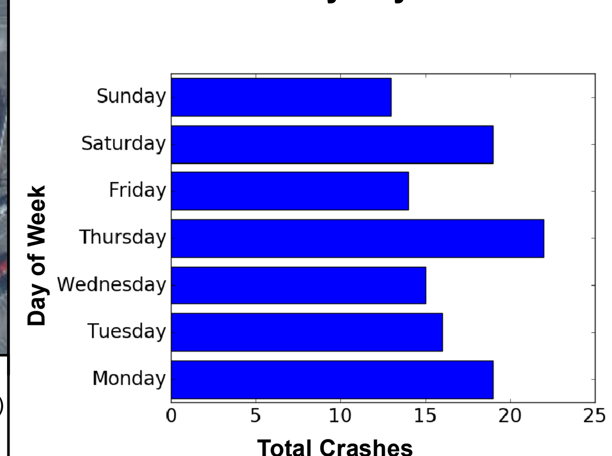
Crashes by Age of Driver



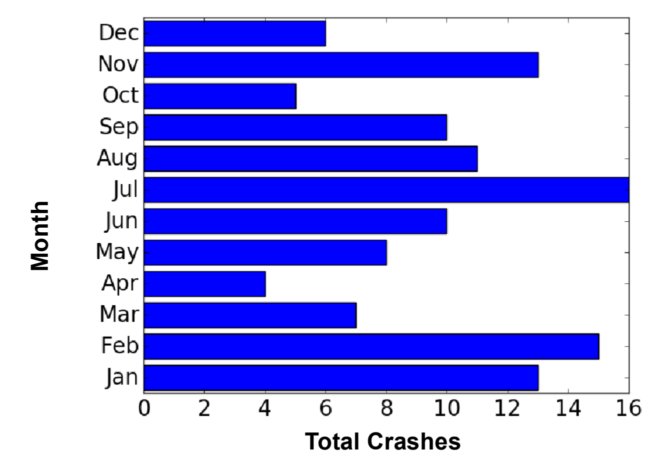
Crashes by Hour of Day



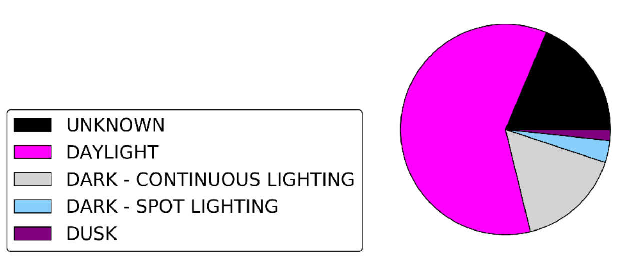
Crashes by Day of Week



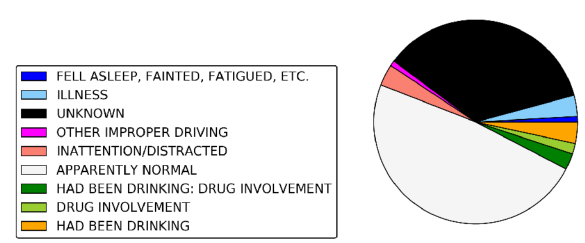
Crashes by Month



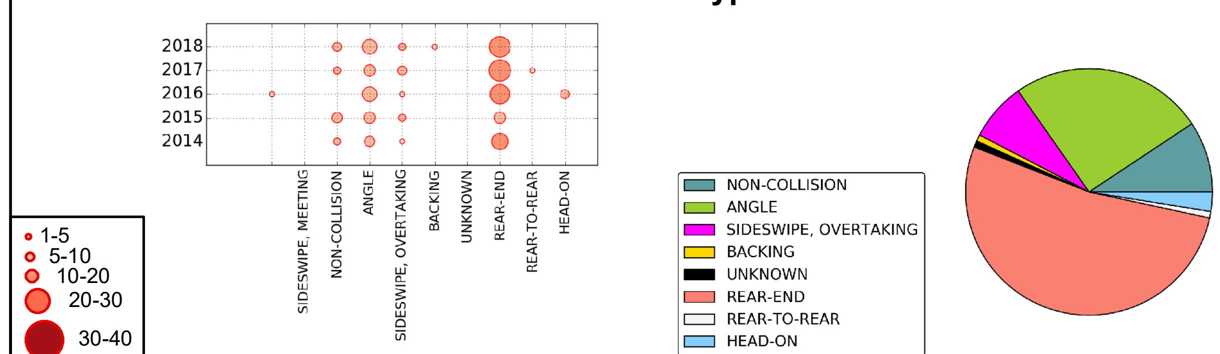
Lighting Conditions



Vehicle 1 Driver Factor

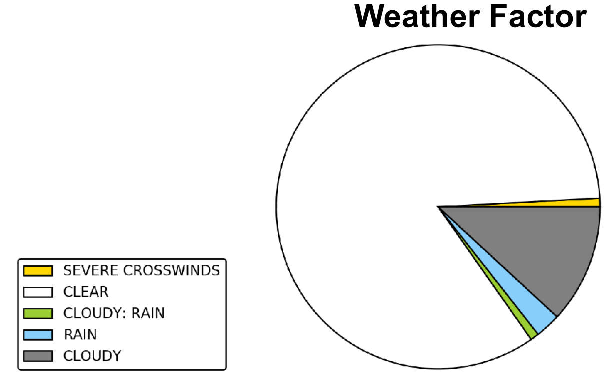


Crash Type



Vehicle 1 Most Harmful Event	Percent
UNKNOWN	87.3
SLOW/STOPPED VEHICLE	5.9
MOTOR VEHICLE IN TRANSPORT	5.9
PEDAL CYCLE	0.8

Weather Factor



Vehicle 1 Vehicle Factor	Percent
UNKNOWN	28.8
FOLLOWED TOO CLOSELY	20.3
HIT AND RUN	16.1
FAILED TO YIELD RIGHT OF WAY	9.3
OTHER IMPROPER DRIVING	7.6
DISREGARDED TRAFFIC SIGNS, SIGNALS, ROAD MARKINGS	5.9
UNSAFE LANE CHANGE	4.2
DROVE LEFT OF CENTER	2.5
DRIVING TOO FAST FOR CONDITIONS	1.7
MADE AN IMPROPER TURN	1.7
MECHANICAL DEFECTS: ROAD DEFECT	0.8
NO IMPROPER DRIVING	0.8

0 50 100
FEET

Figure 7-7B. Crash Factors

7. S Valley View Blvd at W Sahara Ave

August 2020

NOTE(S):
5-Year Crash Data (Years 2014 to 2018)

Aerial representaion of crash locations is based on the documented distance, as recorded by the on-scene police officer

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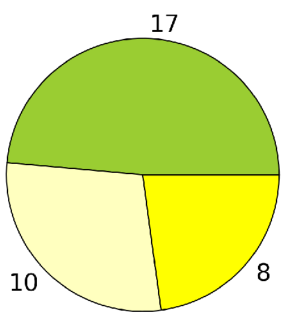
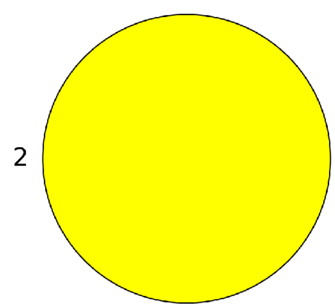
BICYCLE & PEDESTRIAN CRASH INJURY TYPES

	PDO	Injury*	Fatal
Bicycle	(0)	(2)	(0)
Pedestrian	(0)	(7)	(0)

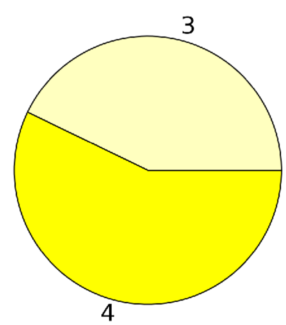
All Crashes



Bicycle



Pedestrian



LEGEND

Injury Classificaion Rating

- Fatal (K)
- Incapacitating Injury (A)
- Non-incapacitating Injury (B)
- Possible Injury (C)
- Property Damage Only (PDO)

Intersection

- 200-ft Buffer

Figure 7-8A. Injury Severity

8. St Louis Ave at Eastern Ave

August 2020

NOTE(S):
5-Year Crash Data
(Years 2014 to 2018)

*All Injury Classifications
A, B, and C

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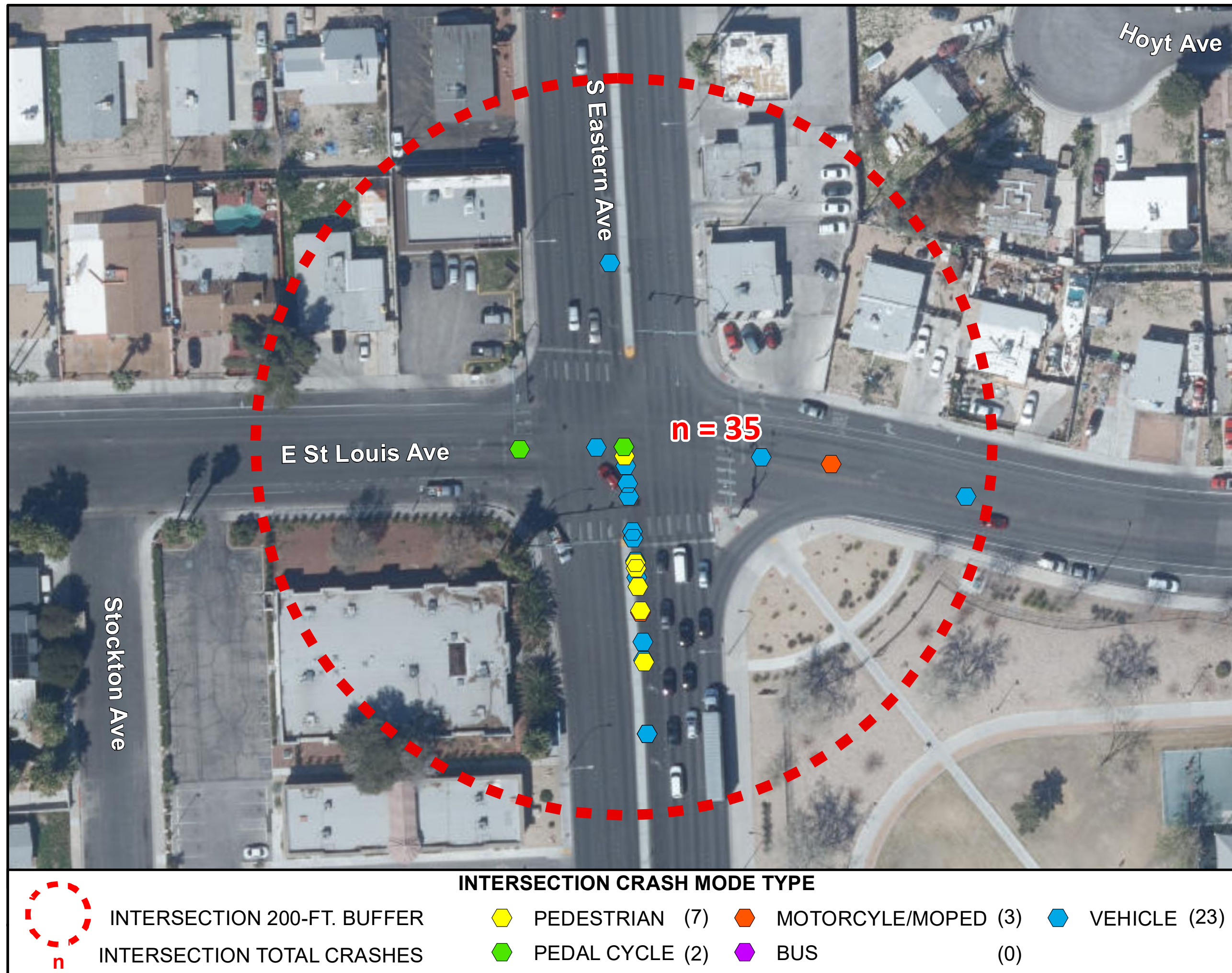
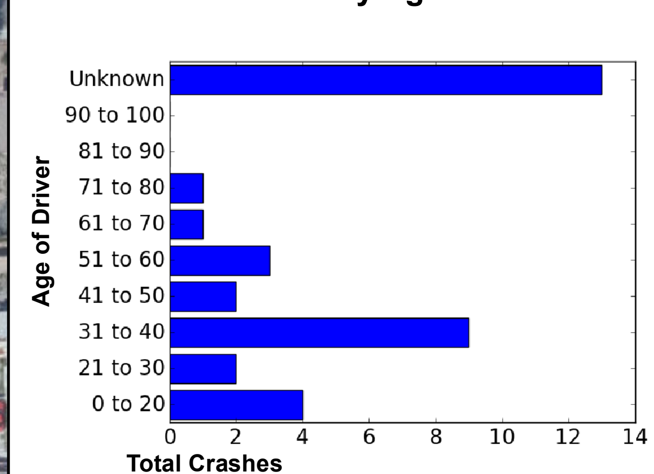
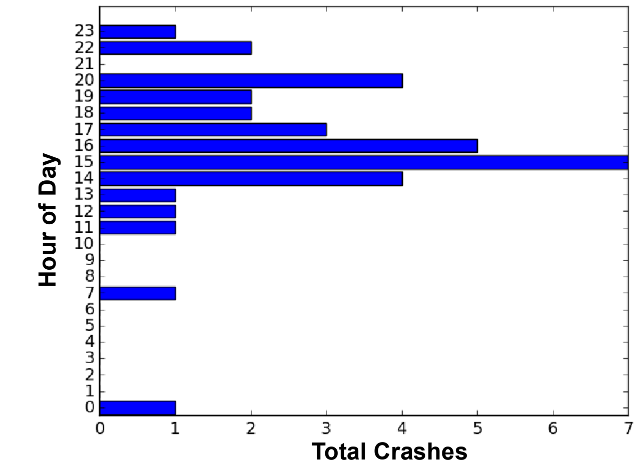


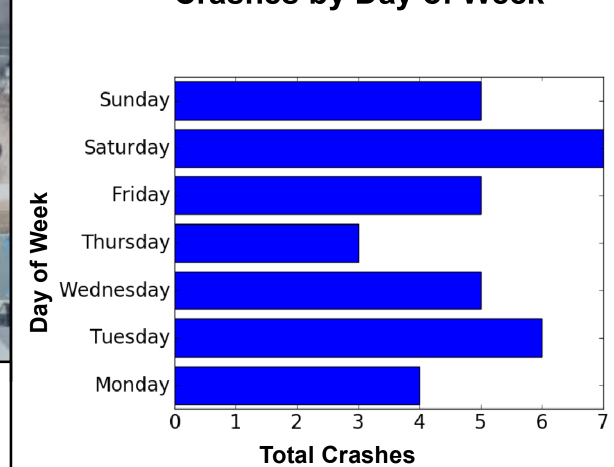
Crashes by Age of Driver



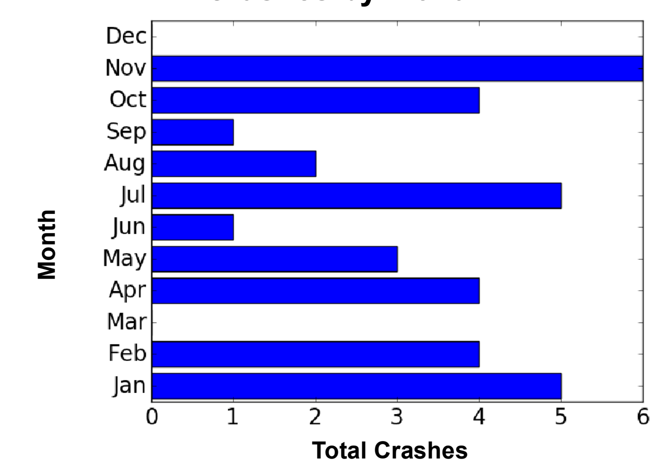
Crashes by Hour of Day



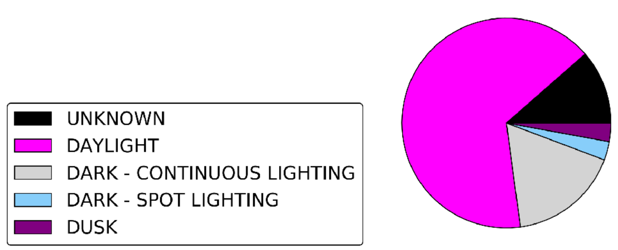
Crashes by Day of Week



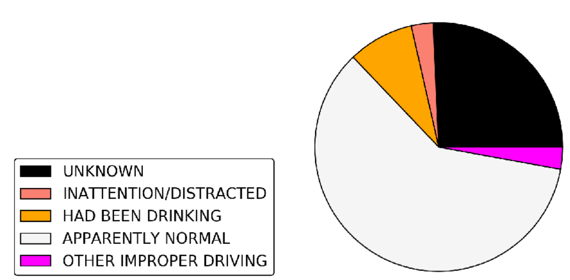
Crashes by Month



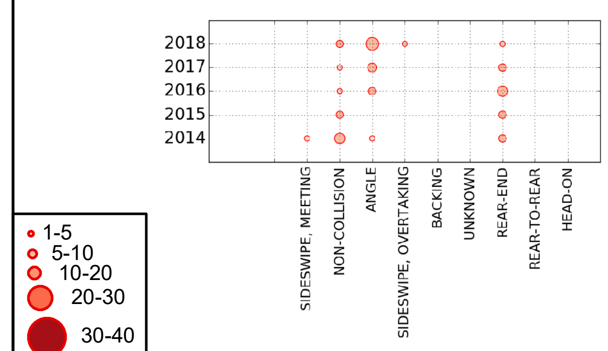
Lighting Conditions

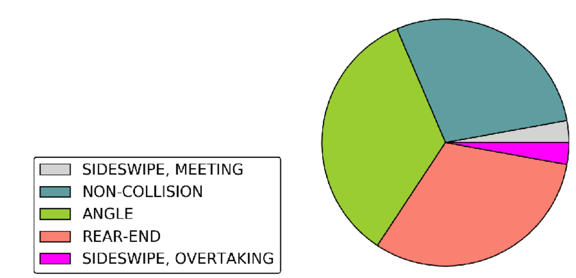


Vehicle 1 Driver Factor



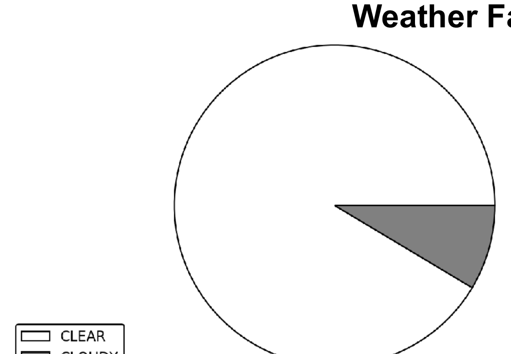
Crash Type





Vehicle 1 Most Harmful Event	Percent
UNKNOWN	82.9
MOTOR VEHICLE IN TRANSPORT	5.7
PEDAL CYCLE	5.7
SLOW/STOPPED VEHICLE	2.9
PEDESTRIAN	2.9

Weather Factor



Vehicle 1 Vehicle Factor	Percent
UNKNOWN	42.9
FOLLOWED TOO CLOSELY	14.3
UNSAFE LANE CHANGE	14.3
FAILED TO YIELD RIGHT OF WAY	11.4
OTHER IMPROPER DRIVING	8.6
HIT AND RUN	5.7
DISREGARDED TRAFFIC SIGNS, SIGNALS, ROAD MARKINGS	2.9

0 50 100
FEET

Figure 7-8B. Crash Factors
8. St Louis Ave at Eastern Ave
August 2020

NOTE(S):
5-Year Crash Data (Years 2014 to 2018)

Aerial representaion of crash locations is based on the documented distance, as recorded by the on-scene police officer

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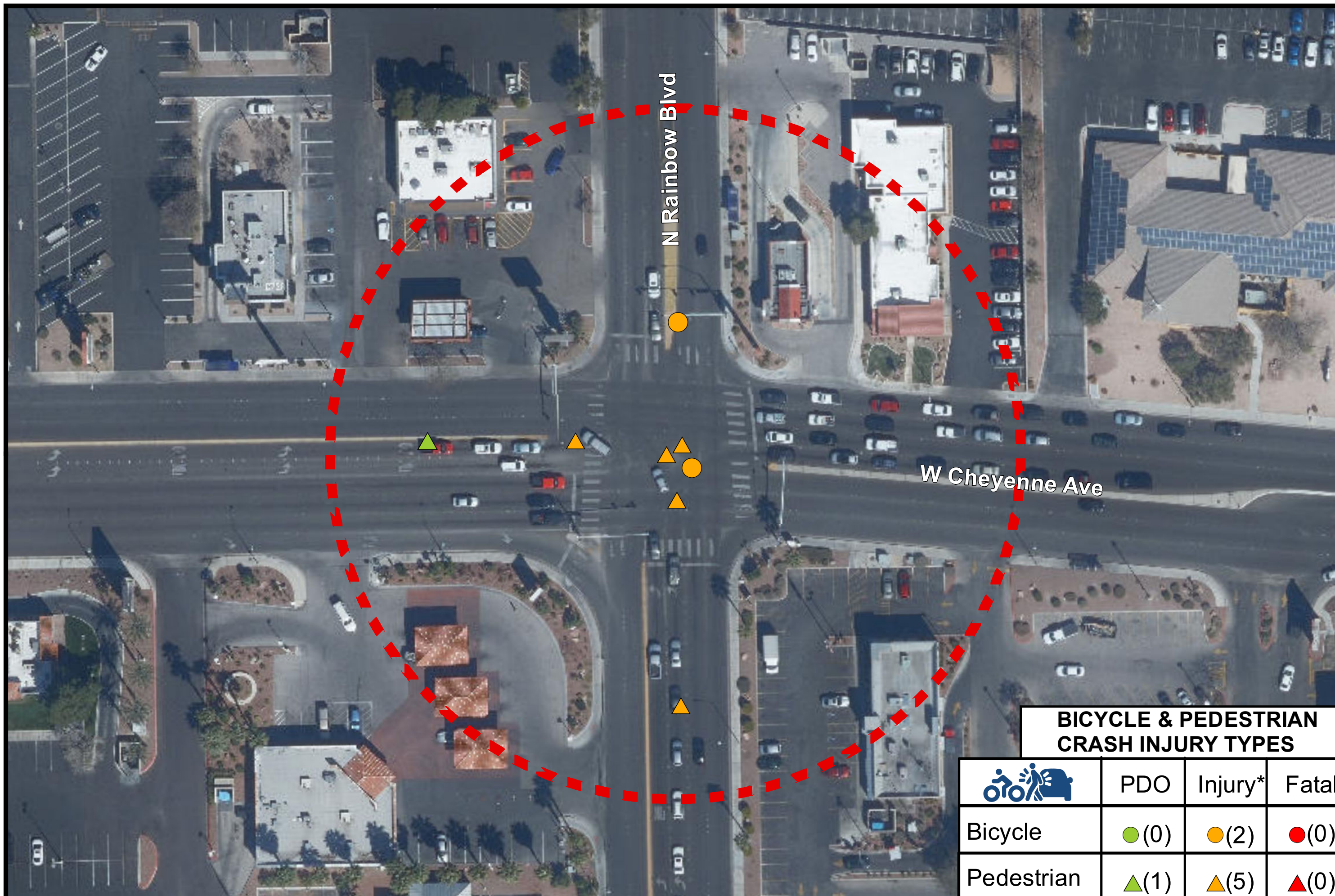
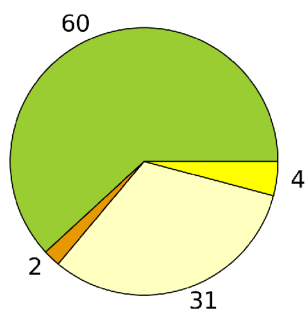
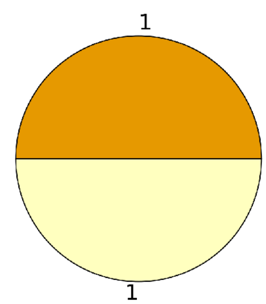


BICYCLE & PEDESTRIAN CRASH INJURY TYPES	PDO	Injury*	Fatal
Bicycle	●(0)	●(2)	●(0)
Pedestrian	▲(1)	▲(5)	▲(0)

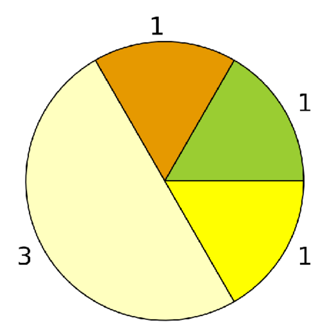
All Crashes



Bicycle



Pedestrian



LEGEND

Injury Classificaion Rating

- Fatal (K)
- Incapacitating Injury (A)
- Non-incapacitating Injury (B)
- Possible Injury (C)
- Property Damage Only (PDO)

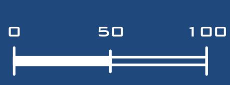
Intersection

- 200-ft Buffer

Figure 7-9A. Injury Severity

9. W Cheyenne Ave at Rainbow Blvd

August 2020



NOTE(S):
5-Year Crash Data
(Years 2014 to 2018)

*All Injury Classifications
A, B, and C

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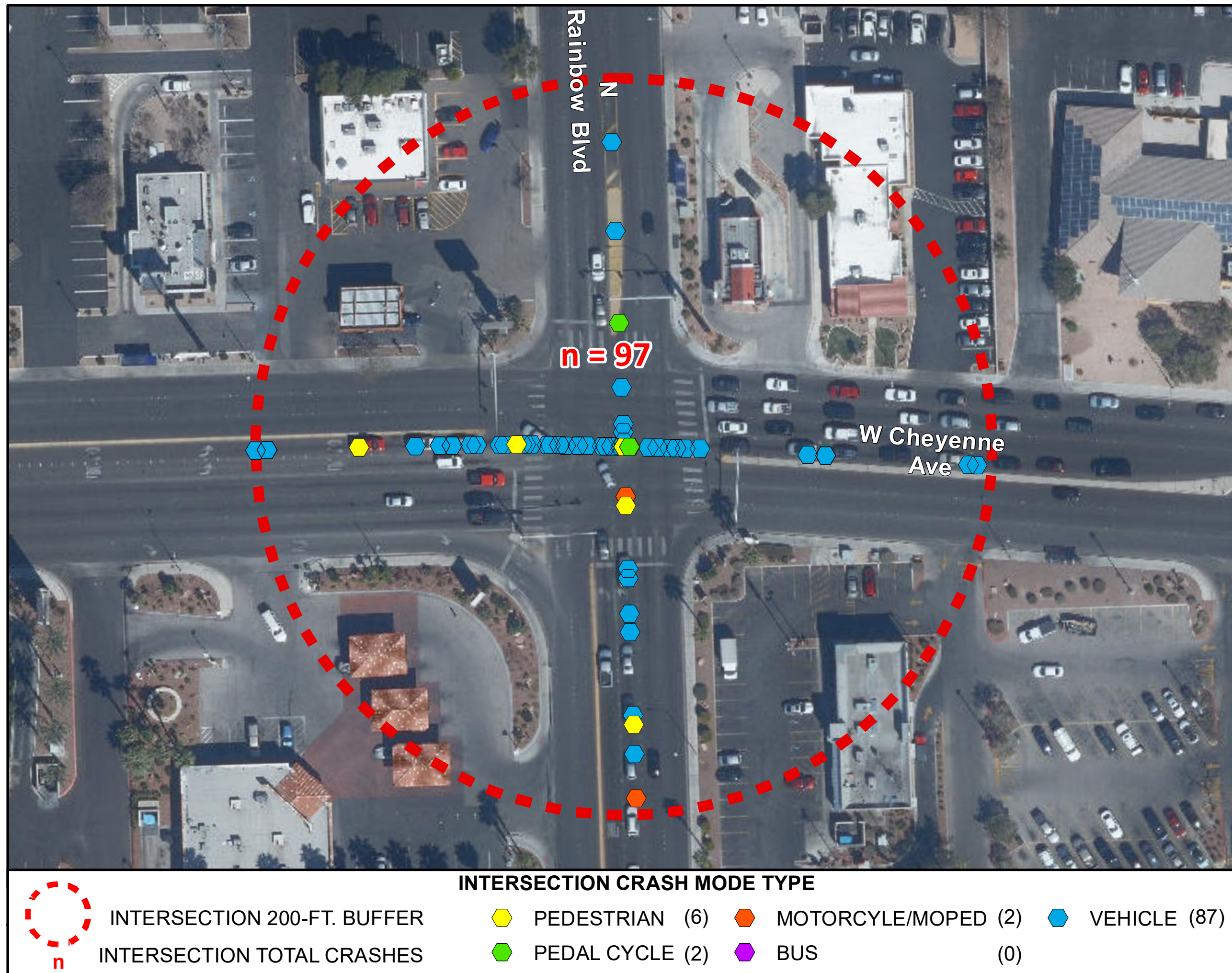
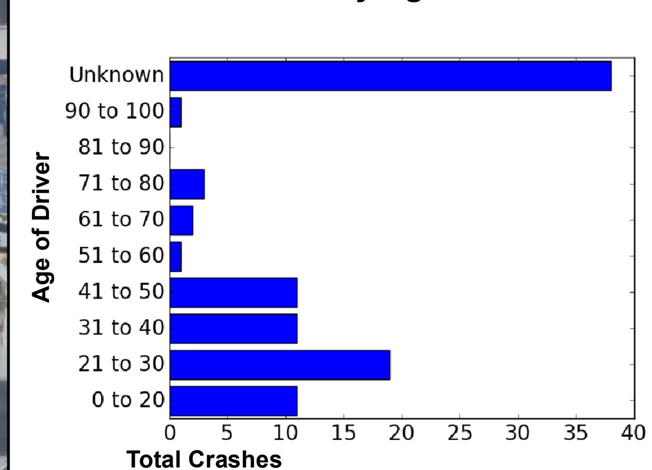
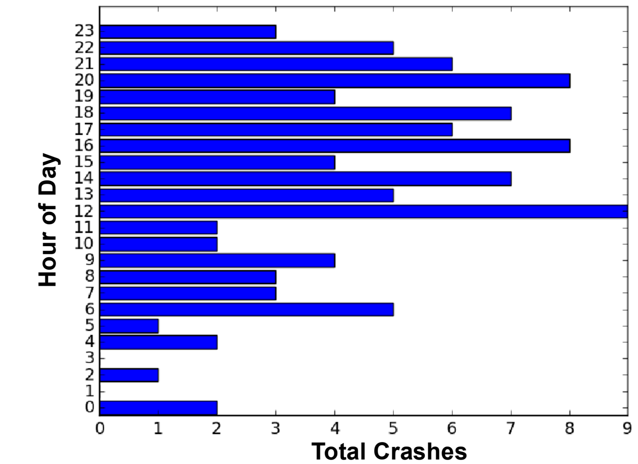


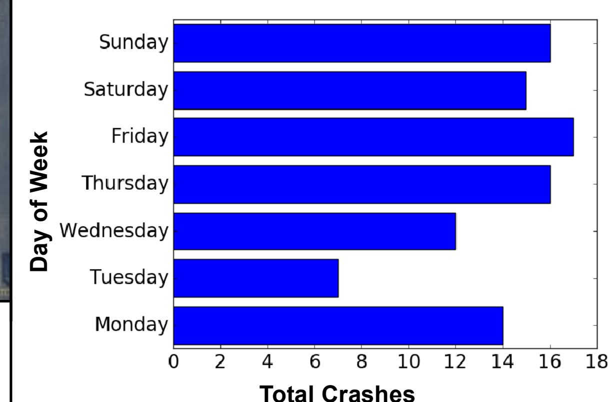
Crashes by Age of Driver



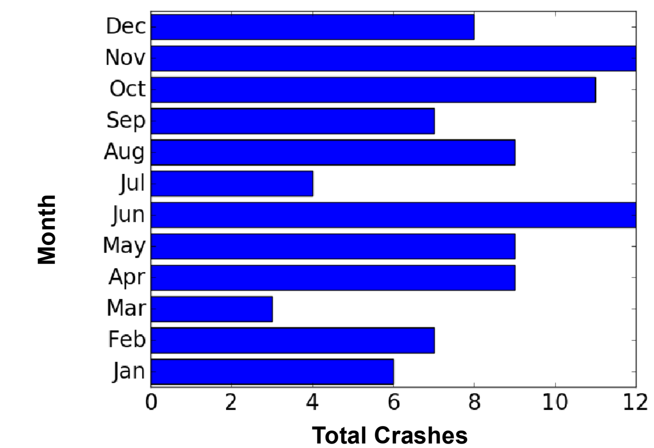
Crashes by Hour of Day



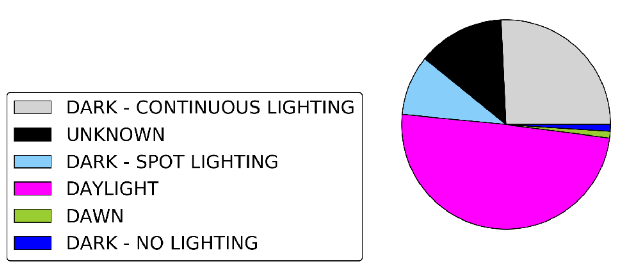
Crashes by Day of Week



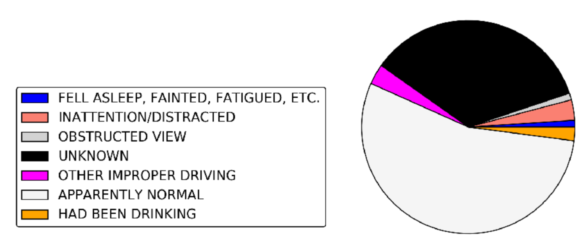
Crashes by Month



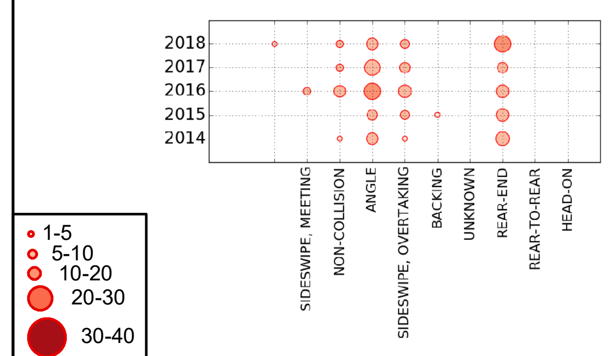
Lighting Conditions

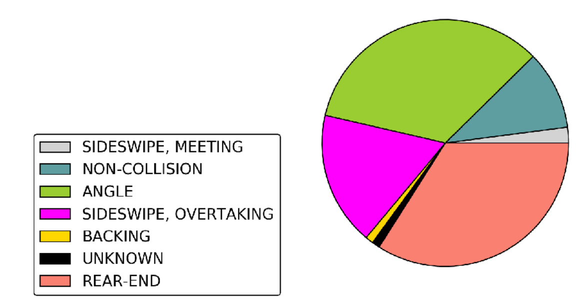


Vehicle 1 Driver Factor



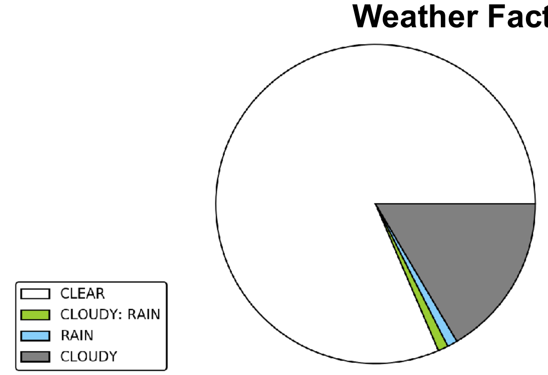
Crash Type





Vehicle 1 Most Harmful Event	Percent
UNKNOWN	88.7
MOTOR VEHICLE IN TRANSPORT	10.3
SLOW/STOPPED VEHICLE	1

Weather Factor



Vehicle 1 Vehicle Factor	Percent
UNKNOWN	29.9
HIT AND RUN	16.5
UNSAFE LANE CHANGE	14.4
FAILED TO YIELD RIGHT OF WAY	7.2
FAILURE TO KEEP IN PROPER LANE OR RUNNING OFF ROAD	7.2
DRIVING TOO FAST FOR CONDITIONS	6.2
DISREGARDED TRAFFIC SIGNS, SIGNALS, ROAD MARKINGS	6.2
OTHER IMPROPER DRIVING	5.2
FOLLOWED TOO CLOSELY	4.1
MADE AN IMPROPER TURN	2.1
DROVE LEFT OF CENTER	1

0 50 100
FEET

Figure 7-9B. Crash Factors

9. W Cheyenne Ave at Rainbow Blvd

August 2020

NOTE(S):
5-Year Crash Data (Years 2014 to 2018)

Aerial representaion of crash locations is based on the documented distance, as recorded by the on-scene police officer

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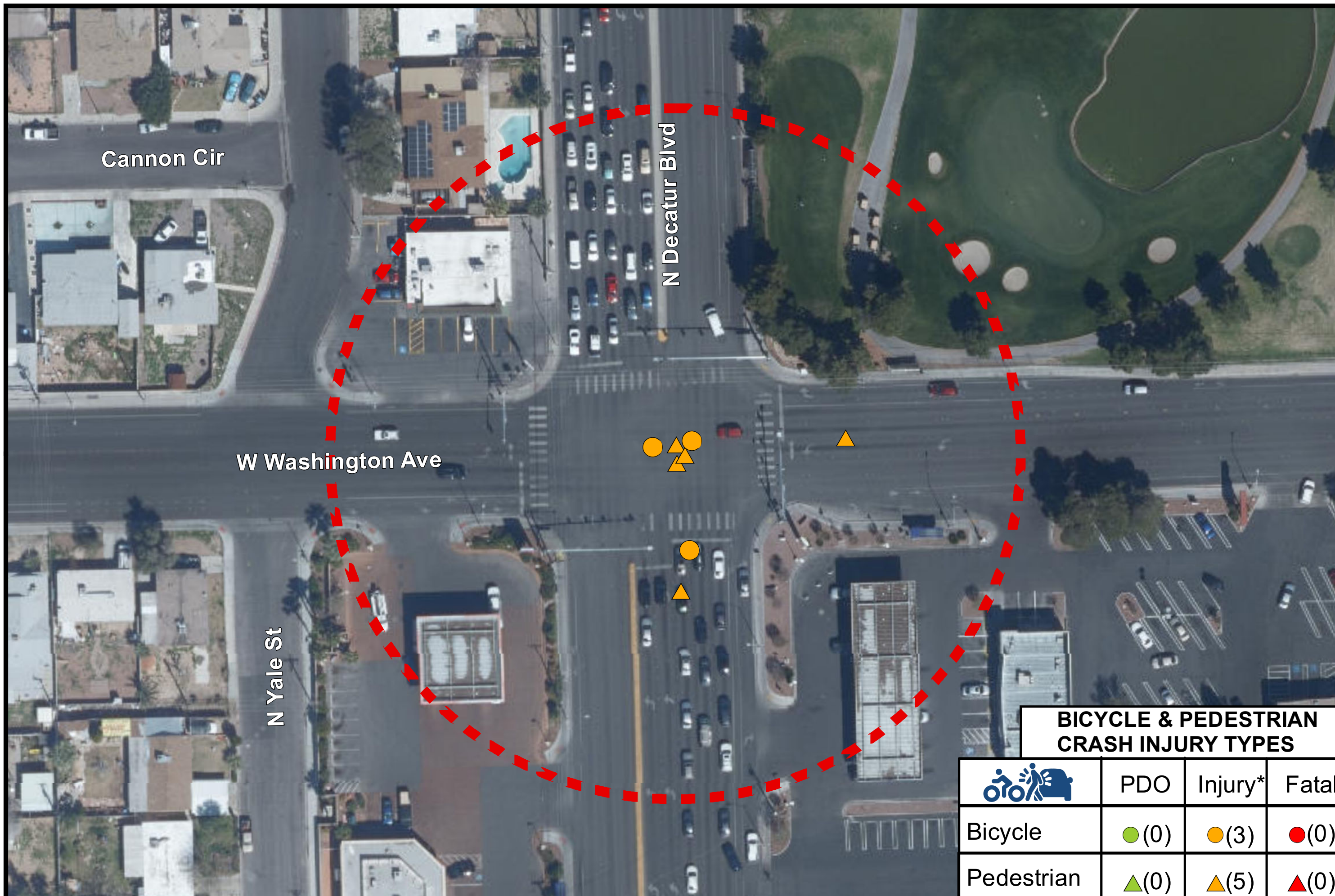
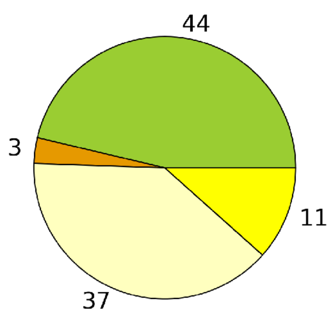


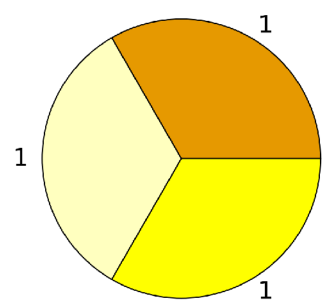
BICYCLE & PEDESTRIAN CRASH INJURY TYPES

	PDO	Injury*	Fatal
Bicycle	●(0)	●(3)	●(0)
Pedestrian	▲(0)	▲(5)	▲(0)

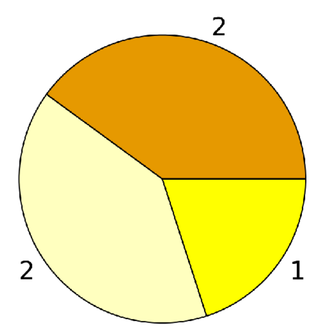
All Crashes



Bicycle



Pedestrian



LEGEND

Injury Classificaion Rating

- Fatal (K)
- Incapacitating Injury (A)
- Non-incapacitating Injury (B)
- Possible Injury (C)
- Property Damage Only (PDO)

Intersection

- 200-ft Buffer

Figure 7-10A. Injury Severity

10. N Decatur Blvd at W Washington Ave

August 2020

0 50 100
FEET

NOTE(S):
5-Year Crash Data
(Years 2014 to 2018)

*All Injury Classifications A, B, and C

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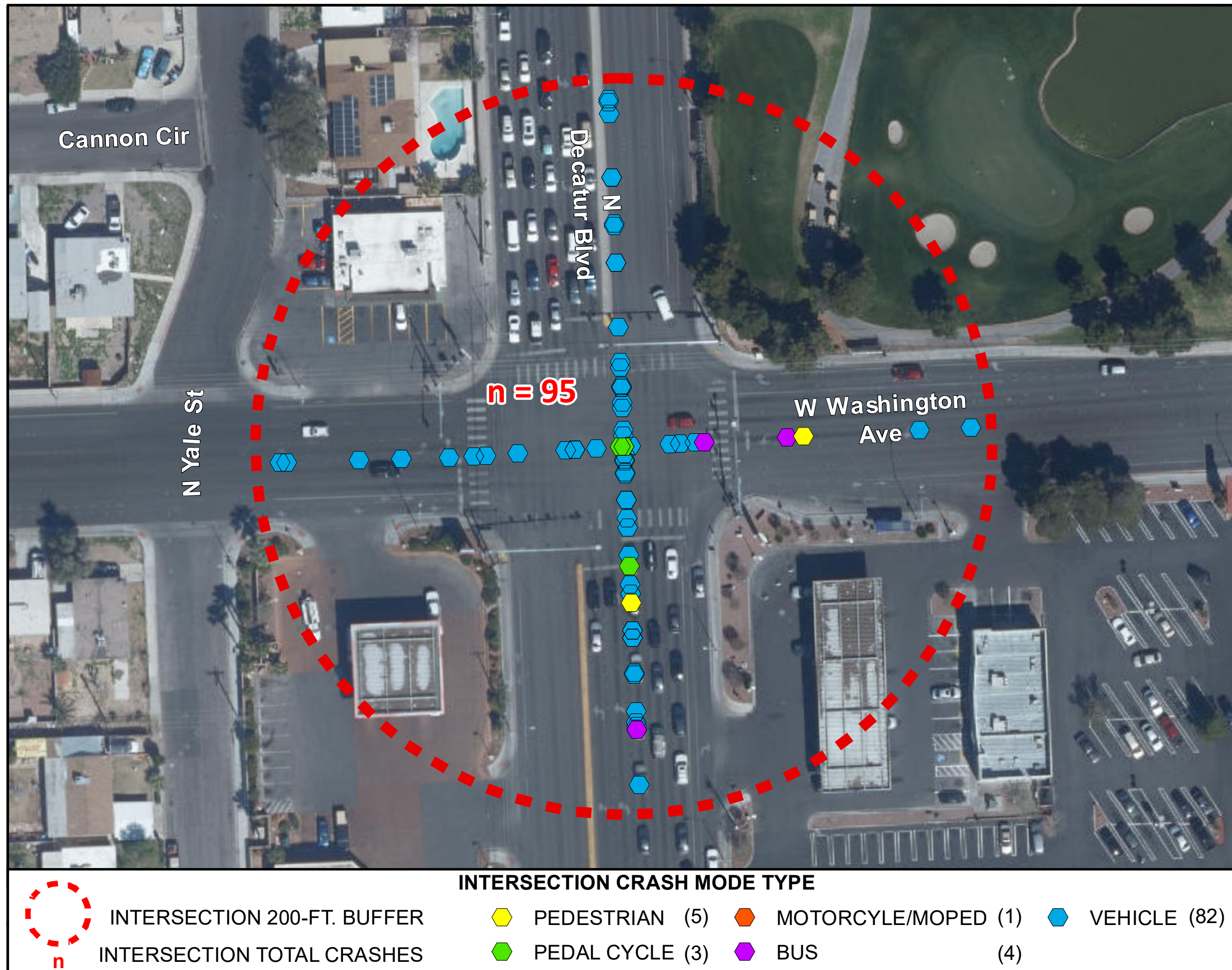
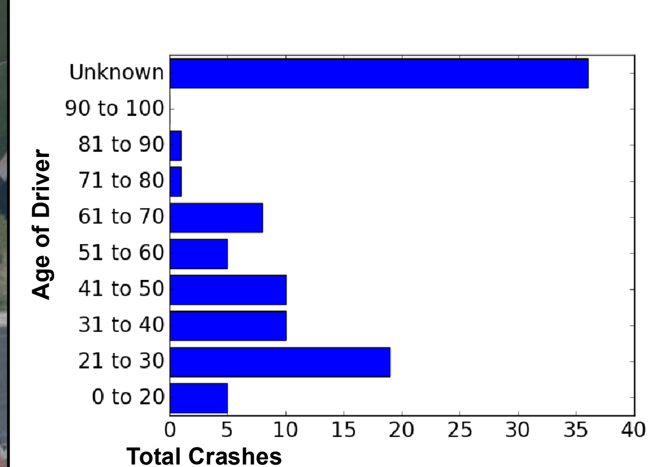
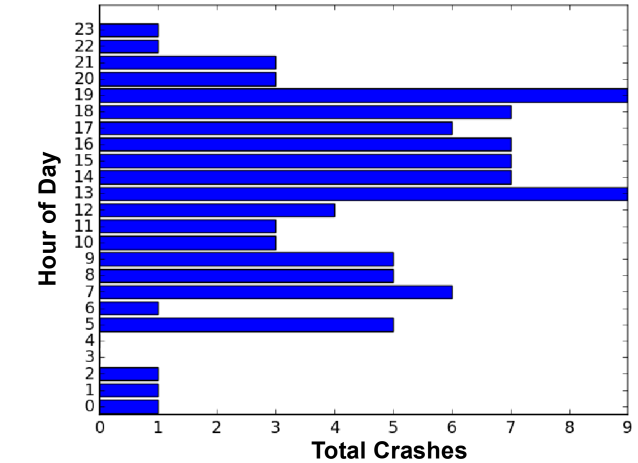


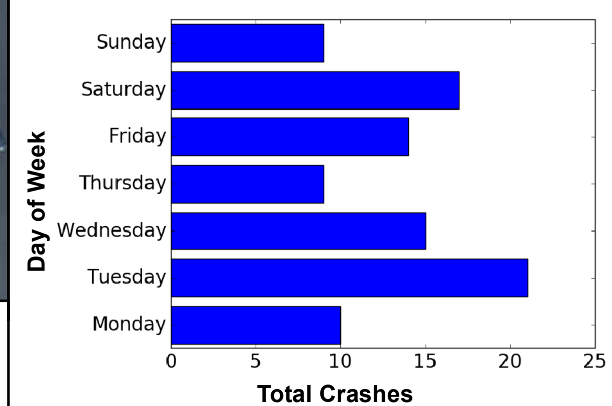
Crashes by Age of Driver



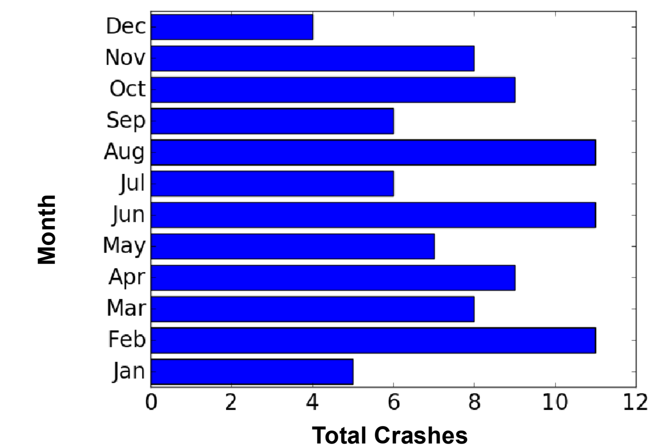
Crashes by Hour of Day



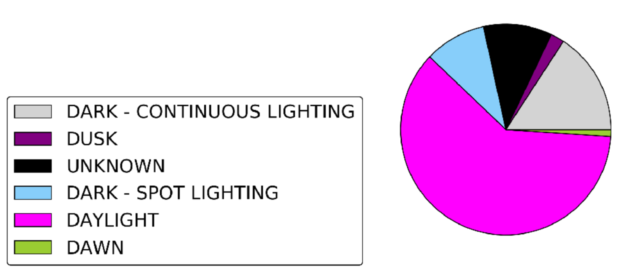
Crashes by Day of Week



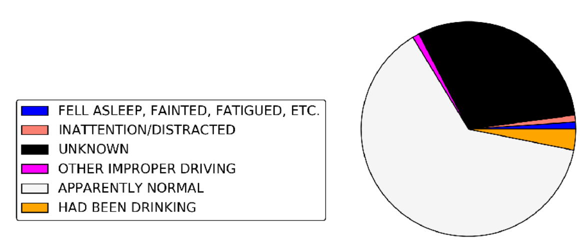
Crashes by Month



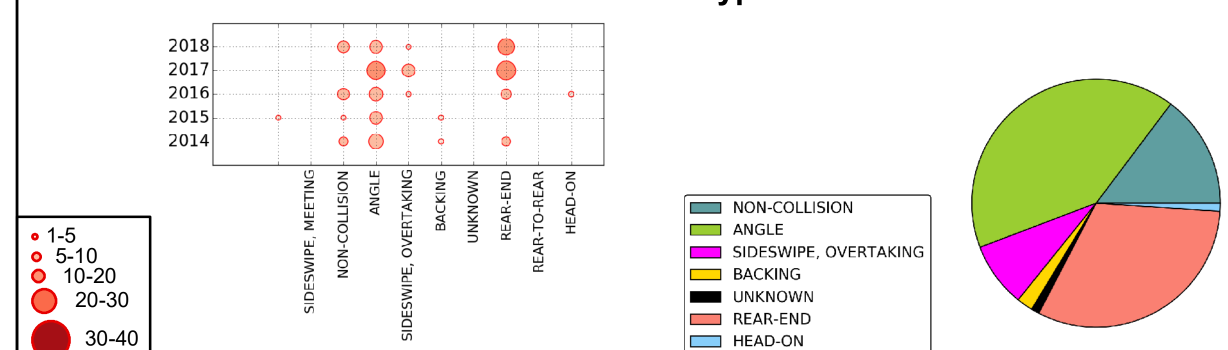
Lighting Conditions



Vehicle 1 Driver Factor

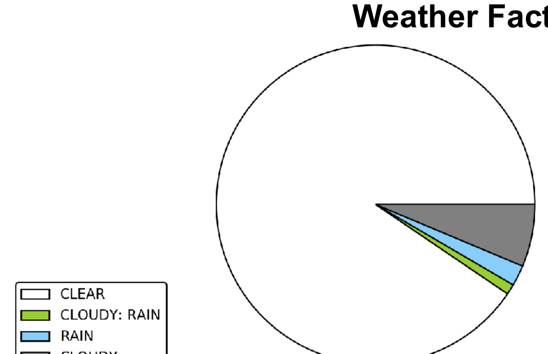


Crash Type



Vehicle 1 Most Harmful Event	Percent
UNKNOWN	84.2
MOTOR VEHICLE IN TRANSPORT	8.4
SLOW/STOPPED VEHICLE	4.2
PEDAL CYCLE	1.1
PEDESTRIAN	1.1
FENCE/WALL	1.1

Weather Factor



Vehicle 1 Vehicle Factor	Percent
UNKNOWN	27.4
FAILED TO YIELD RIGHT OF WAY	17.9
HIT AND RUN	16.8
FOLLOWED TOO CLOSELY	12.6
UNSAFE LANE CHANGE	8.4
DISREGARDED TRAFFIC SIGNS, SIGNALS, ROAD MARKINGS	6.3
OTHER IMPROPER DRIVING	5.3
MADE AN IMPROPER TURN	2.1
UNSAFE BACKING	1.1
DRIVING TOO FAST FOR CONDITIONS	1.1
FAILURE TO KEEP IN PROPER LANE OR RUNNING OFF ROAD	1.1

0 50 100
FEET

Figure 7-10B. Crash Factors
10. N Decatur Blvd at W Washington Ave
August 2020

NOTE(S):
5-Year Crash Data (Years 2014 to 2018)

Aerial representaion of crash locations is based on the documented distance, as recorded by the on-scene police officer

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As shown in **Figure 7-1A** through **Figure 7-10B**, the top contributing crash factors and the resulting crash severity for each of the selected intersections are as follows:

Durango Drive at Charleston Boulevard

- Top Factors
  - Age – Unknown
  - Hour – 7 PM
  - Day – Thursday
  - Month – June
  - Lighting – Daylight
  - Driver Factor – Normal
  - Type – Angle
  - Most Harmful – Unknown
  - Weather – Clear
  - Vehicle Factor – Failed to Yield Right-of-Way
    - Hit & Run – 3rd
- 193 Total Crashes
  - 0 Fatal
  - 107 Injuries (1 Bicycle)
  - 86 PDO

Eastern Avenue at Stewart Avenue

- Top Factors
  - Age – Unknown
  - Hour – 2 PM
  - Day – Friday
  - Month – January/February (tie)
  - Lighting – Daylight
  - Driver Factor – Normal
  - Type – Angle
  - Most Harmful – Unknown
  - Weather – Clear
  - Vehicle Factor – Unknown
    - Hit & Run – 5th
- 177 Total Crashes
  - 0 Fatal
  - 73 Injuries (3 Pedestrian)
  - 104 PDO (1 Pedestrian)

Fort Apache Road at Sahara Avenue

- Top Factors
  - Age – Unknown
  - Hour – 11 AM
  - Day – Sunday
  - Month – August
  - Lighting – Daylight
  - Driver Factor – Normal
  - Type – Rear-end
  - Most Harmful – Unknown
  - Weather – Clear
  - Vehicle Factor – Unknown
    - (Hit & Run – 2nd)
- 124 Total Crashes
  - 0 Fatal
  - 55 Injuries (1 Bicycle)
  - 69 PDO (1 Pedestrian)

Martin L King Boulevard at Bonanza Road

- Top Factors
  - Age – Unknown
  - Hour – 3 PM
  - Day – Thursday
  - Month – March
  - Lighting – Daylight
  - Driver Factor – Normal
  - Type – Rear-end
  - Most Harmful – Unknown
  - Weather – Clear
  - Vehicle Factor – Unknown
    - Hit & Run – 4th
- 120 Total Crashes
  - 1 Fatal
  - 45 Injuries (1 Bicycle, 5 Pedestrian)
  - 74 PDO

Rainbow Boulevard at Lake Mead Boulevard

- Top Factors
  - Age – Unknown
  - Hour – 1 PM/2 PM (tie)
  - Day – Monday
  - Month – December
  - Lighting – Daylight
  - Driver Factor – Normal
  - Type – Angle
  - Most Harmful – Unknown
  - Weather – Clear
  - Vehicle Factor – Unknown
    - Hit & Run – 3rd
- 118 Total Crashes
  - 0 Fatal
  - 50 Injuries (1 Bicycle, 4 Pedestrian)
  - 68 PDO

Rainbow Boulevard at Charleston Boulevard

- Top Factors
  - Age – Unknown
  - Hour – 10 AM/12 PM/6 PM (tie)
  - Day – Tuesday
  - Month – January
  - Lighting – Daylight
  - Driver Factor – Normal
  - Type – Rear-end
  - Most Harmful – Unknown
  - Weather – Clear
  - Vehicle Factor – Unknown
    - Hit & Run – 2nd
- 126 Total Crashes
  - 0 Fatal
  - 61 Injuries (3 Bicycle, 7 Pedestrian)
  - 65 PDO

Valley View Boulevard at Sahara Avenue

- Top Factors
  - Age – Unknown
  - Hour – 4 PM
  - Day – Thursday
  - Month – July
  - Lighting – Daylight
  - Driver Factor – Normal
  - Type – Rear-end
  - Most Harmful – Unknown
  - Weather – Clear
  - Vehicle Factor – Unknown
    - Hit & Run – 3rd
- 118 Total Crashes
  - 0 Fatal
  - 53 Injuries (4 Bicycle, 6 Pedestrian)
  - 65 PDO

Eastern Avenue at St. Louis Avenue

- Top Factors
  - Age – Unknown
  - Hour – 3 PM
  - Day – Saturday
  - Month – November
  - Lighting – Daylight
  - Driver Factor – Normal
  - Type – Angle
  - Most Harmful – Unknown
  - Weather – Clear
  - Vehicle Factor – Unknown
    - Hit & Run – 6th
- 35 Total Crashes
  - 0 Fatal
  - 18 Injuries (2 Bicycle, 7 Pedestrian)
  - 17 PDO

Rainbow Boulevard at Cheyenne Avenue

- Top Factors
  - Age – Unknown
  - Hour – 12 PM
  - Day – Friday
  - Month – June/November (tie)
  - Lighting – Daylight
  - Driver Factor – Normal
  - Type – Angle/Rear-end (tie)
  - Most Harmful – Unknown
  - Weather – Clear
  - Vehicle Factor – Unknown
    - Hit & Run – 2nd
- 97 Total Crashes
  - 0 Fatal
  - 37 Injuries (2 Bicycle, 5 Pedestrian)
  - 60 PDO (1 Pedestrian)

Decatur Boulevard at Washington Avenue

- Top Factors
  - Age – Unknown
  - Hour – 1 PM/7 PM (tie)
  - Day – Tuesday
  - Month – February/June/August (tie)
  - Lighting – Daylight
  - Driver Factor – Normal
  - Type – Angle
  - Most Harmful – Unknown
  - Weather – Clear
  - Vehicle Factor – Unknown
    - Hit & Run – 3rd
- 95 Total Crashes
  - 0 Fatal
  - 51 Injuries (3 Bicycle, 5 Pedestrian)
  - 44 PDO

3.3 Crash Intersection Patterns

For the five-year period, there were a total of 1,203 crashes, resulting in 550 injuries, at the ten selected intersections. The injuries included 45 crashes involving pedestrians and 18 crashes involving bicyclists, with one reported fatality involving a motorcycle/moped. Some common themes, with the exclusion of "Unknown" parameters, were angle crashes, rear-end crashes, and hit-and-run crashes.

Angle and rear-end crashes were extremely common at all ten selected intersections, in fact, angle crashes and/or rear-end crashes were always the most common crash type. Intersections that include permissive left-turns (permitted green ball or flashing yellow arrow (FYA)) all have angle crashes as their most common crash type. In addition, hit-and-run crashes occurred frequently at each of the ten intersections and resulted in a total of 142 crashes, which accounted for 11.8-percent of all vehicle crash factors.

Recommended mitigation measures will be addressed in a subsequent report.

4. EXISTING INTERSECTION CONDITIONS FIELD REVIEW

For each of the ten selected intersections, field reviews and traffic operations analysis were performed.

4.1 Intersection Field Conditions

A field review of the ten selected intersections was performed on Thursday, March 26, 2020. The data collected during the field review included intersection photos and the following characteristics:

- Roadway
  - City roadway classification and approaching posted speed limit
  - Intersection geometric configuration (number of through lanes and number/length of turn pockets) and U-Turn plaque sign assignment
  - Signal head lane alignment and whether signal heads have retroreflective backplates
  - Through lane alignment and whether median islands are present
- Multimodal
  - Crosswalk conditions and Americans with Disabilities Act (ADA) compliant sidewalks and ramps
  - Bicycle facility presence and condition
  - Transit facility turnouts and amenities
  - Lighting conditions and the presence of dual luminaires
- Safety
  - Driveway distances from the intersection
  - Signalized left-turn assignment
  - Surrounding characteristics, such as the proximity of a freeway interchange, sight distance, and land use

4.2 Pedestrian, Bicycle, Transit Facilities

Pedestrian, bicycle, and transit facilities have been identified using information from the latest City GIS database, RTC Transit Services GIS database, aerial imagery, and field reviews.

4.2.1 Pedestrian Facilities

All ten selected intersections have existing sidewalks along both sides of each arterial for each approach, however the intersection of Rainbow Boulevard and Lake Mead Boulevard does not have crosswalks in the southbound or westbound directions. Additionally, the following intersections are connected to the City's vast array of trails (previously illustrated in Figure 3):

- Durango Drive and Charleston Boulevard – sidewalk trail south and west of intersection
- Eastern Avenue and Stewart Avenue – shared use path between US 95 and Stewart Avenue and a sidewalk trail along Stewart Avenue
- Martin Luther King Boulevard and Bonanza Road – Pioneer Trail and Bonanza Trail both run along Bonanza Road
- Rainbow Boulevard and Lake Mead Boulevard – sidewalk trail along Lake Mead Boulevard

4.2.2 Bicycle Facilities

Marked bicycle facilities, shared bicycle facilities, and wide shoulders exist at six of the ten selected intersections, including:

- Fort Apache Road and Sahara Avenue – Designated RTC bus/bicycle lane runs along Sahara Avenue
- Martin Luther King Boulevard and Bonanza Road – Striped bicycle lane on Bonanza Road east of intersection (bicycle lane is dropped as it approaches the intersection)
- Rainbow Boulevard and Charleston Boulevard – Rainbow Boulevard does not have a designated bicycle lane, however it does have a wide striped shoulder that bicyclists can utilize; additionally, bicyclists can utilize Lorenzi Street (north-south parallel arterial, approximately 530-feet east of Rainbow Boulevard, which has a striped bicycle lane)
- Valley View Boulevard and Sahara Avenue – Designated RTC bus/bicycle lane runs along Sahara Avenue; additionally, bicyclists can utilize San Bernardino Avenue (east-west parallel arterial, approximately 370-feet south of Sahara Avenue, which has a striped bicycle lane)
- Eastern Avenue and St. Louis Avenue – Designated striped bicycle lanes are present along St. Louis Avenue
- Decatur Boulevard and Washington Avenue – Designated striped bicycle lanes are present along both Decatur Boulevard and Washington Avenue, however the bicycle lanes west of the intersection along Washington Avenue are disjointed

For all other CICMP intersections, bicycles need to share the road with vehicular traffic.

4.2.3 Transit Facilities

As illustrated in Figure 8-A through Figure 8-J five out of ten intersections have at least one shelter or bench located in the sidewalk and nine out of ten intersections have transit stops without a turnout. In addition to this information, the RTC supplied September 2018 ridership data for each intersection transit stop, which were used to calculate monthly boardings and alightings. The routes that service each of the ten selected intersections, as well as the total ridership at each stop, include the following:

- Durango Dr. and Charleston Blvd.
  - Route 121, Route 206, Route 902
  - Durango Dr. NB = 3,274
  - Durango Dr. SB = 3,435
  - Charleston Blvd. EB = 3,848
  - Charleston Blvd. WB = 4,178
- Eastern Ave. and Stewart Ave.
  - Route 110, Route 207, Route 903
  - Eastern Ave. NB = 3,269
  - Eastern Ave. SB = 4,289
  - Stewart Ave. EB = 302
  - Stewart Ave. WB = 917
- Rainbow Blvd. and Lake Mead Blvd.
  - Route 101, Route 210
  - Rainbow Blvd. NB = 5,724
  - Rainbow Blvd. SB = 4,706
  - Lake Mead Blvd. EB = 4,962
  - Lake Mead Blvd. WB = 5,135
- Valley View Blvd. and Sahara Ave.
  - Route 104, Route 504
  - Valley View Blvd. NB = 4,342
  - Valley View Blvd. SB = 6,811
  - Sahara Ave. EB = 12,802
  - Sahara Ave. WB = 13,043
- Eastern Ave. and St. Louis Ave.
  - Route 110
  - Eastern Ave. NB = 1,187
  - Eastern Ave. SB = 1,731
- Fort Apache Rd. and Sahara Ave.
  - Route 120, Route 504
  - Fort Apache Rd. NB = 3,671
  - Fort Apache Rd. SB = 3,855
  - Sahara Ave. EB = 6,946
  - Sahara Ave. WB = 6,817
- Martin Luther King Blvd. and Bonanza Rd.
  - Route 105, Route 106
  - Martin Luther King Blvd. NB = 2,044
  - Martin Luther King Blvd. SB = 997
  - Bonanza Rd. EB = 1,379
  - Bonanza Rd. WB = 1,612
- Rainbow Blvd. and Charleston Blvd.
  - Route 101, Route 206
  - Rainbow Blvd. NB = 8,834
  - Rainbow Blvd. SB = 7,616
  - Charleston Blvd. EB = 11,195
  - Charleston Blvd. WB = 10,251
- Rainbow Blvd. and Cheyenne Ave.
  - Route 101, Route 104, Route 218
  - Rainbow Blvd. NB = 2,421
  - Rainbow Blvd. SB = 4,505
  - Cheyenne Ave. EB = 5,577
  - Cheyenne Ave. WB = 2,421
- Decatur Blvd. and Washington Ave.
  - Route 103, Route 104, Route 208
  - Decatur Blvd. NB = 5,988
  - Decatur Blvd. SB = 5,114
  - Washington Ave. EB = 3,204
  - Washington Ave. WB = 3,201

A detailed breakdown of the boardings and alightings for each intersection transit stop is provided in Appendix B.

Roadway

Classification / Speed Limit

NB	Major Street / 45 MPH
SB	Major Street / 35 MPH
EB	Major Street / 45 MPH
WB	Major Street / 45 MPH

U-Turn / Lane Geometrics

NB	N/A / LT:1-300'; 3-Thru; RT:Shared
SB	N/A / LT:1-380'; 3-Thru; RT:Shared
EB	N/A / LT:1-220'; 3-Thru; RT:Shared
WB	N/A / LT:1-330'; 3-Thru; RT:Shared

Signals: Retroreflective Backplates / Aligned with Lanes

NB	No / No
SB	No / No
EB	No / No
WB	No / No

Median Islands / Through Lane Alignment

NB	Yes / Yes
SB	Yes / No
EB	Yes / Yes
WB	Yes / No

Multimodal

Pedestrian Realm: Crosswalks / ADA

NB	Yes / Non-Compliant
SB	Yes / Non-Compliant
EB	Yes / Non-Compliant
WB	Yes / Non-Compliant

Bicycle Facilties

NB	No
SB	No
EB	No
WB	No

Transit Facilties: Turnout / Amenities

NB	No / Shelter
SB	No / Shelter
EB	No / Shelter in S/W
WB	No / Shelter

Lighting Conditions

NB	1-Luminaire
SB	1-Luminaire
EB	1-Luminaire
WB	1-Luminaire

Safety

5-Year Dataset (2014 to 2018)

Total Crashes

193

Pedestrian / Cyclist Crashes

0 / 1

Driveway Distance

NB	Westside - 70' / Eastside - 675'
SB	Westside - 240' / Eastside - 125'
EB	Northside - 215' / Southside - 95'
WB	Northside - 110' / Southside - 885'

Signalized Left-Turns

NB	Green Ball - Permitted
SB	Green Ball - Permitted
EB	Green Ball - Permitted
WB	Green Ball - Permitted

Surrounding Characteristics

Land Use

Commercial & Residential

Freeway Access

No

0 50 100
FEET

Figure 8-A. Existing Intersection Field Conditions
1. S Durango Dr at W Charleston Blvd
August 2020

NOTE(S):
Field Collection Date: Thursday, March 26th, 2020

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Roadway

Classification / Speed Limit

NB	Major Street / 35 MPH
SB	Major Street / 35 MPH
EB	Collector / 30 MPH
WB	Collector / 30 MPH

U-Turn / Lane Geometrics

NB	N/A / LT:1-145'; 3-Thru; RT:Shared
SB	N/A / LT:1-145'; 3-Thru; RT:Shared
EB	N/A / LT:1-190'; 2-Thru; RT:Shared
WB	N/A / LT:1-120'; 2-Thru; RT:1-150'

Signals: Retroreflective Backplates / Aligned with Lanes

NB	No / No
SB	No / No
EB	No / No
WB	No / No

Median Islands / Through Lane Alignment

NB	Yes / Yes
SB	Yes / No
EB	No / Yes
WB	No / Yes

Multimodal

Pedestrian Realm: Crosswalks / ADA

NB	Yes - Faded / Non-Compliant
SB	Yes - Faded / Non-Compliant
EB	Yes - Faded / Non-Compliant
WB	Yes - Faded / Non-Compliant

Bicycle Facilties

NB	No
SB	No
EB	No
WB	No

Transit Facilties: Turnout / Amenities

NB	No / Near-side Shelter in S/W
SB	No / Shelter in S/W
EB	Yes / Shelter
WB	Yes (Pocket) / Shelter in S/W

Lighting Conditions

NB	1-Luminaire
SB	1-Luminaire
EB	1-Luminaire
WB	1-Luminaire

Safety

5-Year Dataset (2014 to 2018)

Total Crashes

177

Pedestrian / Cyclist Crashes

4 / 0

Driveway Distance

NB	Westside - 15' / Eastside - 365'
SB	Westside - 170' / Eastside - 200'
EB	Northside - 5' / Southside - 10'
WB	Northside - 50' / Southside - 440'

Signalized Left-Turns

NB	FYA - Permitted
SB	FYA - Permitted
EB	FYA - Permitted
WB	FYA - Permitted

Surrounding Characteristics

Land Use

Commercial & Parks/Rec

Freeway Access

Yes

0 50 100
FEET

Figure 8-B. Existing Intersection Field Conditions
2. Eastern Ave at Stewart Ave
August 2020

NOTE(S):
Field Collection Date: Thursday, March 26th, 2020

WOOD RODGERS

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Citywide Intersection Crash Mitigation

Roadway

Classification / Speed Limit

NB	Major Street / 45 MPH
SB	Major Street / 45 MPH
EB	Major Street / 45 MPH
WB	Major Street / 45 MPH

U-Turn / Lane Geometrics

NB	Yes / LT:2-260'; 3-Thru; RT:Shared
SB	Yes / LT:2-350'; 3-Thru; RT:Shared
EB	Yes / LT:2-325'; 3-Thru; RT:1-180'
WB	Yes / LT:2-315'; 3-Thru; RT:1-180'

Signals: Retroreflective Backplates / Aligned with Lanes

NB	No / No
SB	No / No
EB	No / No
WB	No / No

Median Islands / Through Lane Alignment

NB	Yes / Yes
SB	Yes / No
EB	Yes / No
WB	Yes / Yes

Multimodal

Pedestrian Realm: Crosswalks / ADA

NB	Yes - Faded / Non-Compliant
SB	Yes - Faded / Non-Compliant
EB	Yes - Faded / Non-Compliant
WB	Yes - Faded / Non-Compliant

Bicycle Facilties

NB	No
SB	No
EB	Shared with BRT
WB	Shared with BRT

Transit Facilties: Turnout / Amenities

NB	No / No Amenities
SB	No / No Amenities
EB	BRT Bus Lane / Shelter
WB	BRT Bus Lane / Shelter

Lighting Conditions

NB	1-Luminaire
SB	1-Luminaire
EB	1-Luminaire
WB	1-Luminaire

Safety

5-Year Dataset (2014 to 2018)

Total Crashes

124

Pedestrian / Cyclist Crashes

1 / 1

Driveway Distance

NB	Westside - 65' / Eastside - 195'
SB	Westside - 245' / Eastside - 85'
EB	Northside - 555' / Southside - 110'
WB	Northside - 100' / Southside - 310'

Signalized Left-Turns

NB	Protected
SB	Protected
EB	Protected
WB	Protected

Surrounding Characteristics

Land Use

Commercial

Freeway Access

No

0 50 100
Feet

Figure 8-C. Existing Intersection Field Conditions
3. Fort Apache Rd at Sahara Ave
August 2020

NOTE(S):
Field Collection Date: Thursday, March 26th, 2020

WOOD RODGERS

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Citywide Intersection Crash Mitigation

Roadway

Classification / Speed Limit

NB	Major Street / 35 MPH
SB	Major Street / 35 MPH
EB	Major Street / 35 MPH
WB	Major Street / 35 MPH

U-Turn / Lane Geometrics

NB	No / LT:2-300'; 3-Thru; RT:Shared
SB	N/A / LT:2-400'; 3-Thru; RT:1-165'
EB	No / LT:2-300'; 2-Thru; RT:1-200'
WB	No / LT:2-250'; 2-Thru; RT:1-180'

Signals: Retroreflective Backplates / Aligned with Lanes

NB	No / No
SB	No / No
EB	No / No
WB	No / No

Median Islands / Through Lane Alignment

NB	Yes / Yes
SB	Yes / Yes
EB	Yes / Yes
WB	Yes / Yes

Multimodal

Pedestrian Realm: Crosswalks / ADA

NB	Yes - Faded / Non-Compliant
SB	Yes - Faded / Non-Compliant
EB	Yes - Faded / Non-Compliant
WB	Yes - Faded / Non-Compliant

Bicycle Facilties

NB	No
SB	No
EB	No - Striped not Signed
WB	No

Transit Facilties: Turnout / Amenities

NB	No / No Amenities
SB	No / No Amenities
EB	No / Shelter
WB	No / Shelter

Lighting Conditions

NB	1-Luminaire
SB	1-Luminaire
EB	1-Luminaire
WB	1-Luminaire

Safety

5-Year Dataset (2014 to 2018)

Total Crashes

120

Pedestrian / Cyclist Crashes

5 / 1

Driveway Distance

NB	Westside - 135' / Eastside - 265'
SB	Westside - 120' / Eastside - 10'
EB	Northside - 95' / Southside - 195'
WB	Northside - 15' / Southside - 85'

Signalized Left-Turns

NB	Protected
SB	Protected
EB	Protected
WB	Protected

Surrounding Characteristics

Land Use

Commercial & Industrial

Freeway Access

Yes

0 50 100
FEET

Figure 8-D. Existing Intersection Field Conditions
4. Martin Luther King Blvd at Bonanza Rd
August 2020

NOTE(S):
Field Collection Date: Thursday, March 26th, 2020

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Citywide Intersection Crash Mitigation

Roadway

Classification / Speed Limit

NB	Major Street / 35 MPH
SB	Major Street / 35 MPH
EB	Major Street / 35 MPH
WB	Major Street / 45 MPH

U-Turn / Lane Geometrics

NB	No / LT:2-240'; 2-Thru; RT:1-230'
SB	No / LT:2-250'; 2-Thru; RT:1-315'
EB	Yes / LT:2-450'; 3-Thru; RT:1-135'
WB	Yes / LT:2-250'; 3-Thru; RT:1-160'

Signals: Retroreflective Backplates / Aligned with Lanes

NB	No / No
SB	No / No
EB	No / No
WB	No / No

Median Islands / Through Lane Alignment

NB	Yes / No
SB	Yes / Yes
EB	Yes / Yes
WB	Yes / Yes

Multimodal

Pedestrian Realm: Crosswalks / ADA

NB	Yes - Faded / Non-Compliant
SB	No / Non-Compliant
EB	Yes - Update / Non-Compliant
WB	No / Non-Compliant

Bicycle Facilties

NB	No
SB	No
EB	No
WB	No

Transit Facilties: Turnout / Amenities

NB	No / Shelter
SB	Yes (Pocket) / Shelter
EB	No / Bench in S/W (Wall)
WB	No / Near-side Shelter

Lighting Conditions

NB	1-Luminaire
SB	1-Luminaire
EB	1-Luminaire
WB	1-Luminaire

Safety

5-Year Dataset (2014 to 2018)

Total Crashes

118

Pedestrian / Cyclist Crashes

4 / 1

Driveway Distance

NB	Westside - 155' / Eastside - 55'
SB	Westside - 445' / Eastside - 170'
EB	Northside - 235' / Southside - 300'
WB	Northside - 140' / Southside - 35'

Signalized Left-Turns

NB	Protected
SB	Protected
EB	Protected
WB	Protected

Surrounding Characteristics

Land Use

Commercial & Residential

Freeway Access

Yes

0 50 100
Feet

Figure 8-E. Existing Intersection Field Conditions
5. Lake Mead Blvd at S Rainbow Blvd
August 2020

NOTE(S):
Field Collection Date: Thursday, March 26th, 2020

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Roadway

Classification / Speed Limit

NB	Major Street / 45 MPH
SB	Major Street / 45 MPH
EB	Major Street / 45 MPH
WB	Major Street / 45 MPH

U-Turn / Lane Geometrics

NB	Yes / LT:2-340'; 3-Thru; RT:1-120'
SB	Yes / LT:2-330'; 3-Thru; RT:1-245'
EB	Yes / LT:2-345'; 3-Thru; RT:Shared
WB	Yes / LT:2-345'; 3-Thru; RT:Shared

Signals: Retroreflective Backplates / Aligned with Lanes

NB	Yes - Some / No
SB	Yes - Some / No
EB	Yes - Some / No
WB	Yes - Some / No

Median Islands / Through Lane Alignment

NB	Yes / No
SB	Yes / Yes
EB	Yes / Yes
WB	Yes / No

Multimodal

Pedestrian Realm: Crosswalks / ADA

NB	Yes - Faded / Compliant
SB	Yes - Faded / Compliant
EB	Yes - Faded / Compliant
WB	Yes - Faded / Compliant

Bicycle Facilties

NB	No - Wide Shoulder
SB	No - Wide Shoulder
EB	No
WB	No

Transit Facilties: Turnout / Amenities

NB	No - Wide Shoulder / Shelter
SB	No - Wide Shoulder / Shelter
EB	No / Shelter
WB	No / Shelter

Lighting Conditions

NB	1-Luminaire
SB	1-Luminaire
EB	1-Luminaire
WB	1-Luminaire

Safety

5-Year Dataset (2014 to 2018)

Total Crashes

126

Pedestrian / Cyclist Crashes

7 / 3

Driveway Distance

NB	Westside - 20' / Eastside - 115'
SB	Westside - 245' / Eastside - 110'
EB	Northside - 280' / Southside - 90'
WB	Northside - 125' / Southside - 25'

Signalized Left-Turns

NB	Protected
SB	Protected
EB	Protected
WB	Protected

Surrounding Characteristics

Land Use

Commercial

Freeway Access

No

0 50 100
FEET

Figure 8-F. Existing Intersection Field Conditions
6. W Charleston Blvd at S Rainbow Blvd
August 2020

NOTE(S):
Field Collection Date: Thursday, March 26th, 2020

WOOD RODGERS

CICM
Citywide Intersection Crash Mitigation

Roadway

Classification / Speed Limit

NB	Major Street / 35 MPH
SB	Major Street / 35 MPH
EB	Major Street / 45 MPH
WB	Major Street / 45 MPH

U-Turn / Lane Geometrics

NB	No / LT:2-270'; 3-Thru; RT:Shared
SB	Yes / LT:2-345'; 2-Thru; RT:Shared
EB	Yes / LT:2-315'; 3-Thru; RT:1-135'
WB	Yes / LT:2-345'; 3-Thru; RT:1-160'

Signals: Retroreflective Backplates / Aligned with Lanes

NB	No / No
SB	No / No
EB	No / No
WB	No / No

Median Islands / Through Lane Alignment

NB	Yes / No
SB	Yes / Yes
EB	Yes / Yes
WB	Yes / Yes

Multimodal

Pedestrian Realm: Crosswalks / ADA

NB	Yes - Faded / Non-Compliant
SB	Yes - Faded / Non-Compliant
EB	Yes - Faded / Non-Compliant
WB	Yes - Faded / Non-Compliant

Bicycle Facilties

NB	No
SB	No
EB	Shared with BRT
WB	Shared with BRT

Transit Facilities: Turnout / Amenities

NB	Yes (Pocket) / Shelter
SB	Yes (Pocket) / Shelter
EB	BRT Bus Lane / Shelters (2)
WB	BRT Bus Lane / Near-side Shelter

Lighting Conditions

NB	1-Luminaire
SB	West Crosswalk - 0 Lights
EB	1-Luminaire
WB	1-Luminaire

Safety

5-Year Dataset (2014 to 2018)

Total Crashes

118

Pedestrian / Cyclist Crashes

6 / 4

Driveway Distance

NB	Westside - 15' / Eastside - 20'
SB	Westside - 130' / Eastside - 60'
EB	Northside - 25' / Southside - 85'
WB	Northside - 75' / Southside - 10'

Signalized Left-Turns

NB	Protected
SB	Protected
EB	Protected
WB	Protected

Surrounding Characteristics

Land Use

Commercial

Freeway Access

No

0 50 100
FEET

Figure 8-G. Existing Intersection Field Conditions
7. S Valley View Blvd at W Sahara Ave
August 2020

NOTE(S):
Field Collection Date: Thursday, March 26th, 2020

WOOD RODGERS

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Citywide Intersection Crash Mitigation

Roadway

Classification / Speed Limit

NB	Major Street / 35 MPH
SB	Major Street / 35 MPH
EB	Local / 30 MPH
WB	Local / 30 MPH

U-Turn / Lane Geometrics

NB	N/A / LT:1-230'; 3-Thru; RT:Shared
SB	N/A / LT:1-230'; 3-Thru; RT:Shared
EB	No / LT:1-115'; 1-Thru; RT:1-115'
WB	No / LT:1-85'; 1-Thru; RT:1-85'

Signals: Retroreflective Backplates / Aligned with Lanes

NB	No / No
SB	No / No
EB	No / No
WB	No / No

Median Islands / Through Lane Alignment

NB	Yes / Yes
SB	Yes / Yes
EB	No / No
WB	No / No

Multimodal

Pedestrian Realm: Crosswalks / ADA

NB	Yes - Faded / Non-Compliant
SB	Yes - Faded / Non-Compliant
EB	Yes - Faded / Non-Compliant
WB	Yes - Faded / Non-Compliant

Bicycle Facilties

NB	No
SB	No
EB	Yes
WB	Yes

Transit Facilities: Turnout / Amenities

NB	No / Bench in S/W (Building)
SB	No / Shelter
EB	N/A / N/A
WB	N/A / N/A

Lighting Conditions

NB	1-Luminaire
SB	1-Luminaire
EB	1-Luminaire
WB	1-Luminaire

Safety

5-Year Dataset (2014 to 2018)

Total Crashes

35

Pedestrian / Cyclist Crashes

7 / 2

Driveway Distance

NB	Westside - 170' / Eastside - 690'
SB	Westside - 185' / Eastside - 65'
EB	Northside - 15' / Southside - 135'
WB	Northside - 15' / Southside >1,000'

Signalized Left-Turns

NB	Protected
SB	Protected
EB	Green Ball - Permitted
WB	Green Ball - Permitted

Surrounding Characteristics

Land Use

Residential & Parks/Rec

Freeway Access

No

0 50 100
Feet

Figure 8-H. Existing Intersection Field Conditions
8. St Louis Ave at Eastern Ave
August 2020

NOTE(S):
Field Collection Date: Thursday, March 26th, 2020

WOOD RODGERS

CICM
Citywide Intersection Crash Mitigation

Roadway

Classification / Speed Limit

NB	Major Street / 35 MPH
SB	Major Street / 35 MPH
EB	Major Street / 35 MPH
WB	Major Street / 45 MPH

U-Turn / Lane Geometrics

NB	No / LT:2-370'; 2-Thru; RT:Shared
SB	No / LT:1-85'; 2-Thru; RT:Shared
EB	Yes / LT:2-360'; 3-Thru; RT:1-220'
WB	N/A / LT:1-260'; 3-Thru; RT:Shared

Signals: Retroreflective Backplates / Aligned with Lanes

NB	No / No
SB	No / No
EB	No / No
WB	No / No

Median Islands / Through Lane Alignment

NB	Yes / Yes
SB	Yes / No
EB	Yes / No
WB	Yes / No

Multimodal

Pedestrian Realm: Crosswalks / ADA

NB	Yes - Faded / Non-Compliant
SB	Yes - Faded / Non-Compliant
EB	Yes - Faded / Non-Compliant
WB	Yes - Faded / Non-Compliant

Bicycle Facilties

NB	No
SB	No
EB	No
WB	No

Transit Facilties: Turnout / Amenities

NB	No / Shelter
SB	No / Shelter
EB	No / Shelter in S/W
WB	No / Shelter

Lighting Conditions

NB	1-Luminaire
SB	1-Luminaire
EB	1-Luminaire
WB	1-Luminaire

Safety

5-Year Dataset (2014 to 2018)

Total Crashes

97

Pedestrian / Cyclist Crashes

6 / 2

Driveway Distance

NB	Westside - 50' / Eastside - 205'
SB	Westside - 5' / Eastside - 125'
EB	Northside - 5' / Southside - 65'
WB	Northside <5' / Southside 95'

Signalized Left-Turns

NB	Protected
SB	Protected
EB	Protected
WB	Protected

Surrounding Characteristics

Land Use

Commercial

Freeway Access

Yes

0 50 100 Feet

Figure 8-I. Existing Intersection Field Conditions
9. W Cheyenne Ave at Rainbow Blvd
August 2020

NOTE(S):
Field Collection Date: Thursday, March 26th, 2020

WOOD RODGERS

CICM
Citywide Intersection Crash Mitigation

Roadway

Classification / Speed Limit

NB	Major Street / 45 MPH
SB	Major Street / 45 MPH
EB	Major Street / 35 MPH
WB	Major Street / 35 MPH

U-Turn / Lane Geometrics

NB	Yes / LT:2-240'; 3-Thru; RT:1-310'
SB	Yes / LT:2-230'; 3-Thru; RT:Shared
EB	No / LT:1-140'; 2-Thru; RT:1-140'
WB	No / LT:1-140'; 2-Thru; RT:1-185'

Signals: Retroreflective Backplates / Aligned with Lanes

NB	No / No
SB	No / No
EB	No / Yes
WB	No / No

Median Islands / Through Lane Alignment

NB	Yes / Yes
SB	Yes / Yes
EB	No / No
WB	No / No

Multimodal

Pedestrian Realm: Crosswalks / ADA

NB	Yes - Faded / Non-Compliant
SB	Yes - Faded / Non-Compliant
EB	Yes - Faded / Non-Compliant
WB	Yes - Faded / Non-Compliant

Bicycle Facilties

NB	Yes
SB	Yes
EB	Yes
WB	Yes - Disjointed

Transit Facilties: Turnout / Amenities

NB	No - Wide Shoulder / Shelter
SB	No / Shelter
EB	Yes (Pocket) / Shelter
WB	Yes (Pocket) / Near-side Shelter

Lighting Conditions

NB	1-Luminaire
SB	1-Luminaire
EB	1-Luminaire
WB	1-Luminaire

Safety

5-Year Dataset (2014 to 2018)

Total Crashes

95

Pedestrian / Cyclist Crashes

5 / 3

Driveway Distance

NB	Westside - 105' / Eastside - 80'
SB	Westside - 10' / Eastside ~2,000'
EB	Northside - 10' / Southside - 20'
WB	Northside >2,000' / Southside - 100'

Signalized Left-Turns

NB	Protected
SB	Protected
EB	FYA - Permitted
WB	FYA - Permitted

Surrounding Characteristics

Land Use

Comm., Res., Parks & Rec, School

Freeway Access

No

0 50 100
FEET

Figure 8-J. Existing Intersection Field Conditions
10. N Decatur Blvd at W Washington Ave
August 2020

NOTE(S):
Field Collection Date: Thursday, March 26th, 2020

WOOD RODGERS

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Citywide Intersection Crash Mitigation

4.3 Surrounding Characteristics

Zoning, land use, and community facilities are critical elements that affect the current and future travel demand and transportation characteristics of arterials. These surrounding characteristics were reviewed to find similarities and their impacts were analyzed to determine a relationship to transportation elements.

4.3.1 Zoning and Land Use

The field review characteristics were compared to the City's zoning and land use classifications for each intersection to determine if consistent features exist:

- Durango Drive and Charleston Boulevard
  - Field Review: Commercial, Residential
  - Zoning: Limited Commercial, Undeveloped, Medium Density Residential
  - Land Use: Service Commercial, Public Facility, Residential Condo Medium
- Eastern Avenue and Stewart Avenue
  - Field Review: Commercial, Parks and Recreation
  - Zoning: Medium Density Residential, Limited Commercial, Civic
  - Land Use: Medium, Mixed Use, Service Commercial, Public Facility
- Fort Apache Road and Sahara Avenue
  - Field Review: Commercial
  - Zoning: Limited Commercial
  - Land Use: Service Commercial
- Martin Luther King Boulevard and Bonanza Road
  - Field Review: Commercial, Industrial
  - Zoning: Commercial/Industrial, General Commercial, Industrial, Limited Commercial
  - Land Use: Mixed Use, Right-of-Way, Commercial, Light Industrial/Research
- Rainbow Boulevard and Lake Mead Boulevard
  - Field Review: Commercial, Residential
  - Zoning: Limited Commercial
  - Land Use: Service Commercial
- Rainbow Boulevard and Charleston Boulevard
  - Field Review: Commercial
  - Zoning: Limited Commercial
  - Land Use: Service Commercial, Mixed Use
- Valley view Boulevard and Sahara Avenue
  - Field Review: Commercial
  - Zoning: Limited Commercial
  - Land Use: Commercial
- Eastern Avenue and St. Louis Avenue
  - Field Review: Residential, Parks and Recreation
  - Zoning: Professional Office, Single Family Residential, Civic
  - Land Use: Office, Sub/Platted Parcel, Recreation, Open Space
- Rainbow Boulevard and Cheyenne Avenue
  - Field Review: Commercial
  - Zoning: Limited Commercial, Professional Office
  - Land Use: Service Commercial
- Decatur Boulevard and Washington Avenue
  - Field Review: Commercial, Residential, Parks and Recreation, School

- Zoning: Single Family Residential, Limited Commercial, Civic
- Land Use: Service Commercial, Public Facility

Common surrounding characteristics of the selected intersections are the presence of commercial, residential, and parks and recreation land uses, which are illustrated in Figure 9 and are described in more detail in Appendix C.

4.3.2 Community Facilities

In addition to the land uses illustrated in Figure 9, community facilities were identified and include the following:

- Eastern Avenue and Stewart Avenue
    - East Las Vegas Community Center (southeast quadrant)
    - Hadland Park (southeast quadrant)
- Eastern Avenue and St. Louis Avenue
    - Justice Myron E. Leavitt and Jaycee Community Park (southeast quadrant)
- Decatur Boulevard and Washington Boulevard
    - Municipal Golf Course (northeast quadrant)

Community facilities are highlighted and outlined within the intersection land use maps shown in Figure 9.

4.4 Intersection Field Condition Patterns

Part of the FHWA's Systemic Safety Planning Process includes identifying associated risk factors that led to the high number of crashes at the selected intersections. As illustrated in Figure 8-A through Figure 8-J, there are common concerns that exist at all ten of the selected intersections, including:

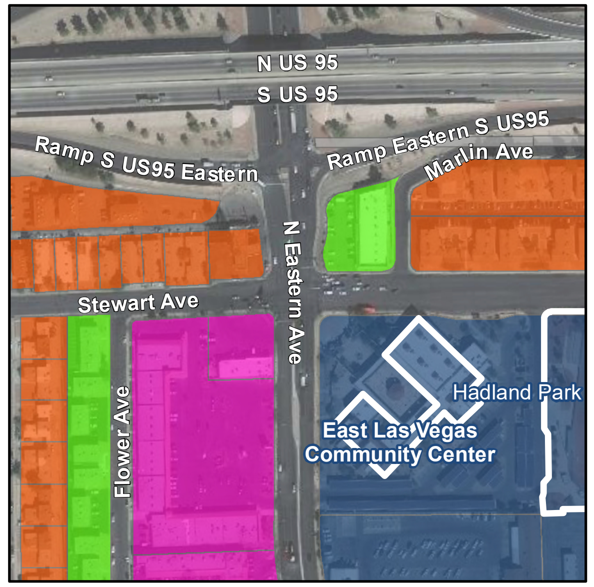
- Driveway distances are too close to the intersection – 10 of 10 intersections
- Signal heads do not equal the number of approaching lanes – 10 of 10 intersections
- Signal heads do not have retroreflective backplates – 10 of 10 intersections
- Intersection corners do not have dual luminaires – 10 of 10 intersections
- Transit stops do not have bus turnouts or bus lanes – 9 of 10 intersections
- Intersection approaches do not have right-turn pockets – 9 of 10 intersections
- Intersection approaching through lanes do not line up with their receiving lane – 9 of 10 intersections
- Sidewalks have ADA concerns including sidewalk widths and ramps – 9 of 10 intersections
- Crosswalks need to be restriped – 9 of 10 intersections
- Approaching speed is posted at 45 MPH – 7 of 10 intersections
- Transit stops are located within the sidewalk realm, have no amenities, or do not exist – 7 of 10 intersections
- U-turns are not signified – 5 of 10 intersections
- Approach has a permitted green ball left-turn or a FYA left-turn – 4 of 10 intersections
- Intersection is located close to a freeway interchange – 4 of 10 intersections
- Approach does not have a median island – 3 of 10 intersections
- Sight distance concerns as you approach the intersection – 3 of 10 intersections

A more detailed breakdown of each of the common concerns is located in Appendix D.

1. Durango Drive & Charleston Boulevard

City of Las Vegas Ward(s): 1 & 2

2. Eastern Avenue & Stewart Avenue



City of Las Vegas Ward(s): 3

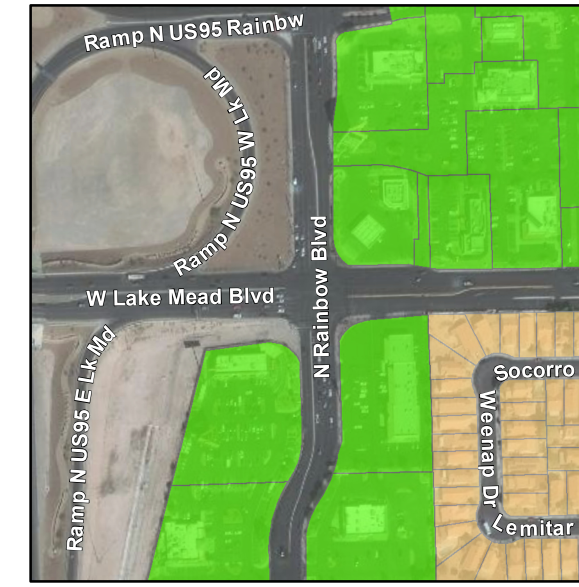
3. Fort Apache Road & Sahara Avenue

City of Las Vegas Ward(s): 2

4. MLK Boulevard & Bonanza Road

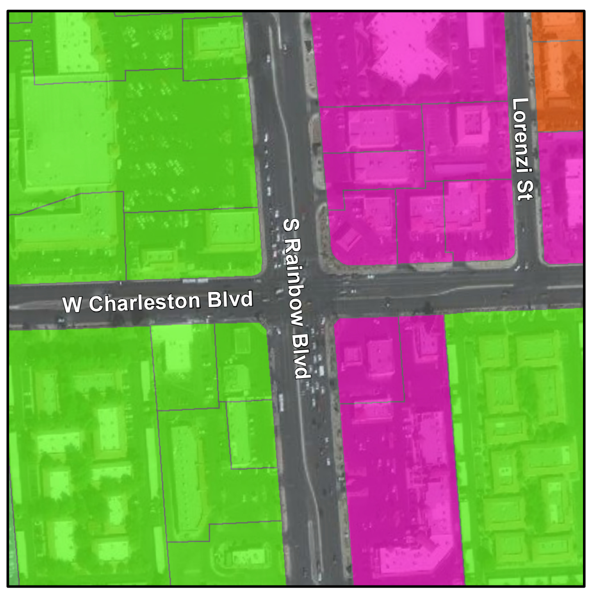
City of Las Vegas Ward(s): 5

5. Rainbow Boulevard & Lake Mead Boulevard



City of Las Vegas Ward(s): 5

6. Rainbow Boulevard & Charleston Boulevard

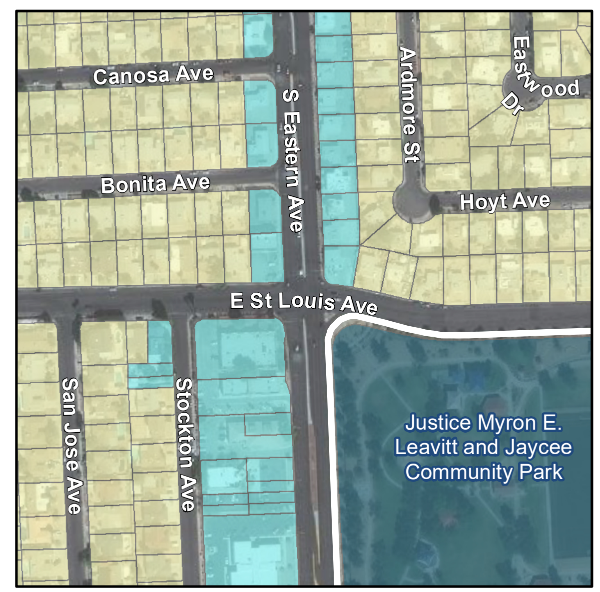


City of Las Vegas Ward(s): 1

7. Valley View Boulevard & Sahara Avenue

City of Las Vegas Ward(s): 1

8. Eastern Avenue & St. Louis Avenue

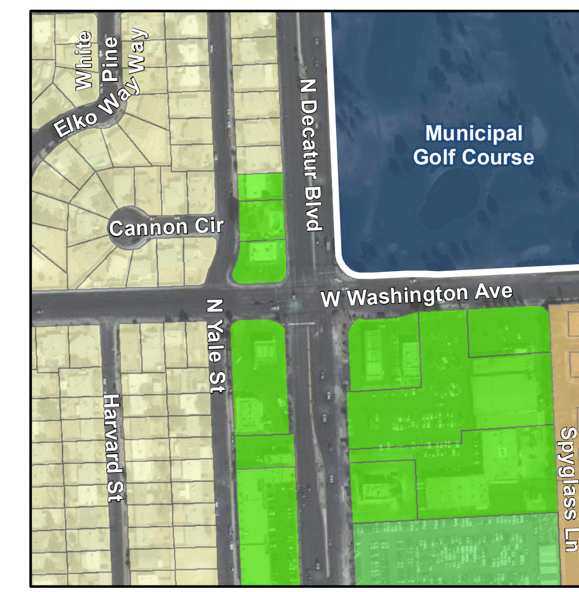


City of Las Vegas Ward(s): 3

9. Rainbow Boulevard & Cheyenne Avenue

City of Las Vegas Ward(s): 4 & 5

10. Decatur Boulevard & Washington Avenue



City of Las Vegas Ward(s): 1 & 5

LEGEND

Land Use

- Commercial (O,SC,GC)
- Desert Rural - up to 2.49 du/ac
- Form-Based Code
- General Commercial
- General Tourist Commercial
- High - 25+ du/ac
- Las Vegas Medical District
- Light Industrial / Research
- Low - up to 5.49
- Medium - Low - up to 8.49 du/ac
- Medium - Low Attached - up to 12.49 du/ac
- Medium - up to 25.49 du/ac
- Mixed Use (L,ML,M,H,O,SC,GC,PF)
- Office
- Park / Recreation / Open Space
- Planned Community Development
- Public Facility
- Right of Way
- Rural - up to 3.59 du/ac
- Rural Neighborhood Preservation - up to 2 du/ac
- Service Commercial
- Summerlin
- Town Center
- Traditional Neighborhood Development

City of Las Vegas Facilities

- Community Facilities and Services

Source(s):
City of Las Vegas - Online GIS Database

0 125 250
Feet

Figure 9. City of Las Vegas Selected Intersections Land Use and Community Facilities

Las Vegas Citywide Intersection Crash Mitigation Program

August 2020

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4.5 Intersection Traffic Volumes

Traffic volumes provide an indication of the vehicular demand on the street network. In fact, turning movement volumes document specific movements at intersections and can be an indicator of the need for additional lanes (through, left-turn, right-turn) or the need to adjust the timing of a signal.

The City provided AM and PM peak hour turning movement vehicular traffic, and total volumes for vehicular, pedestrian, and bicyclist traffic for all selected intersections, which were collected at various times between the years 2014 to 2018. The supplied volumes were projected to the existing year 2020, based on an agreed calculated annual growth rate of 1.5-percent per year. Figure 10A and Figure 10B illustrate the existing year 2020 peak hour traffic volumes, of which the intersection raw volumes and annual growth calculations can be found in Appendix E.

4.6 Traffic Operations Analysis

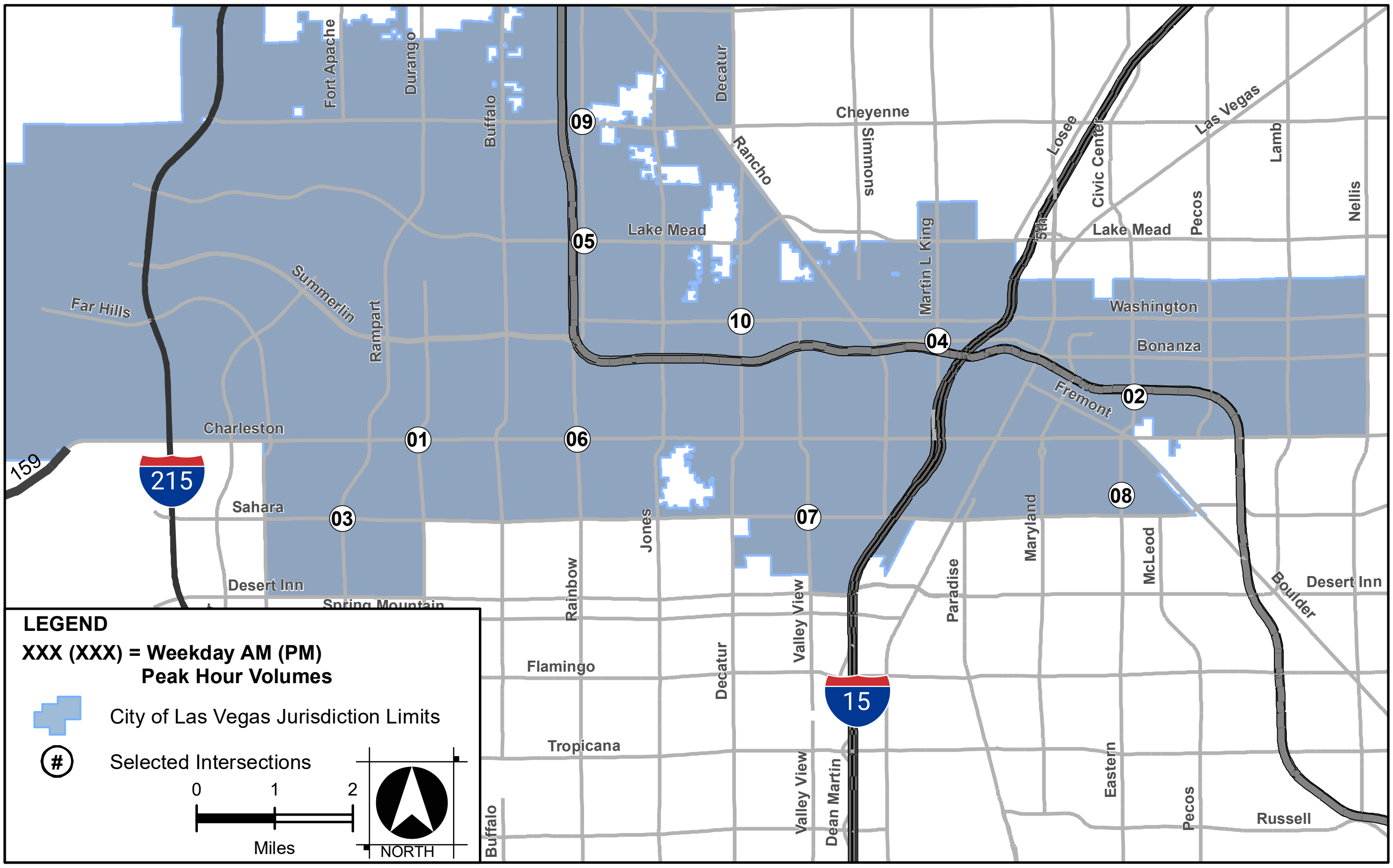
Traffic operations have been quantified through the determination of level-of-service (LOS). LOS is a qualitative measure of traffic operating conditions, whereby a letter grade "A" through "F" is assigned to an intersection or roadway segment, representing progressively worsening traffic operations. LOS A represents free-flow conditions with little to no delays, while LOS F represents jammed or gridlock conditions.

4.6.1 Intersection LOS

Intersection LOS has been calculated using methods documented in the Transportation Research Board Publication *Highway Capacity Manual, 6th Edition* (HCM). For signalized intersections, the intersection delays and LOS reported are the “average” values for the whole intersection, and the delay-based HCM LOS criteria are outlined in Table 7.

The City currently utilizes LOS D as the maximum LOS threshold for intersections during the AM and PM peak periods, which is also used by the RTC and is listed in their *Policy and Procedures Manual*. Additionally, the HCM defines unacceptable intersection operations as any intersection with a volume/capacity (v/c) ratio greater than one (1.0)

Synchro 10 operations analysis software was used to calculate the existing year 2020 AM and PM peak hour LOS and v/c ratios for each of the selected intersections, utilizing existing signal timings provided by RTC-FAST, the results of which are shown in Table 8.



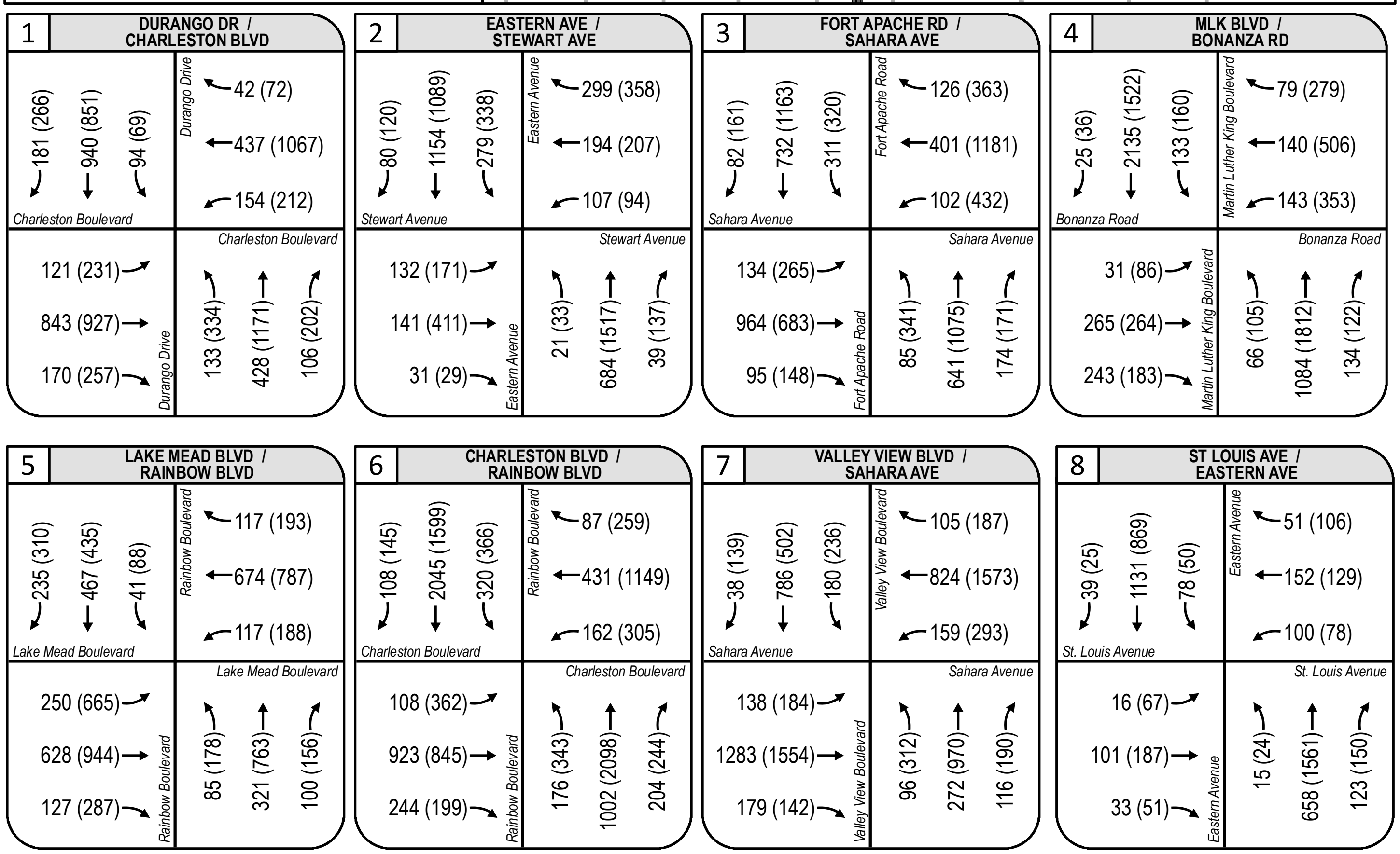


Figure 10A. Existing Year 2020 Peak Hour Traffic Volumes

Las Vegas Citywide Intersection Crash Mitigation Program

August 2020

NOTE(S):
Standard growth rate of 1.5%/Year used to project Year 2020 turning movement volumes

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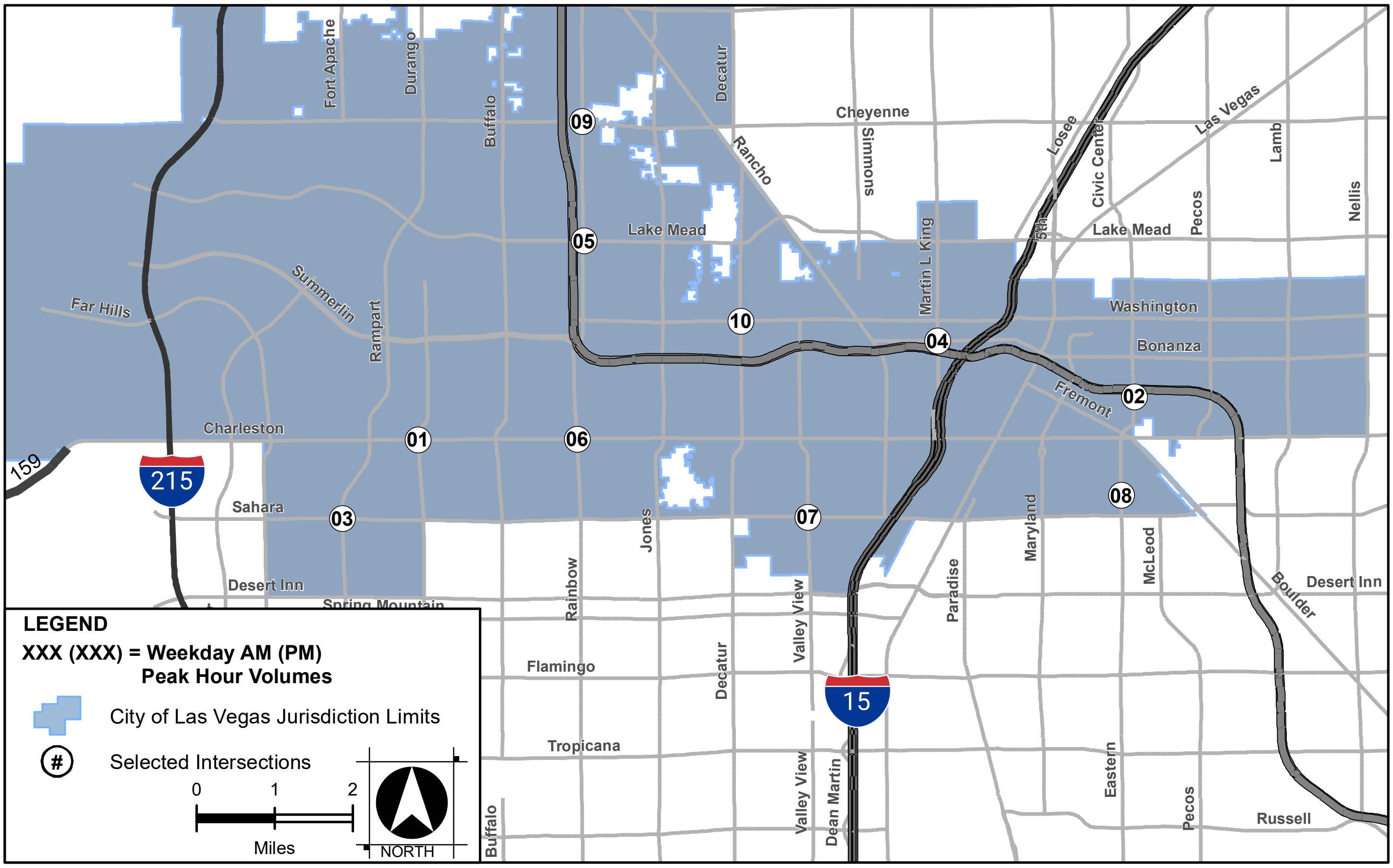

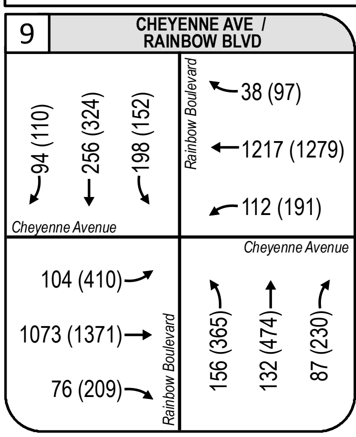

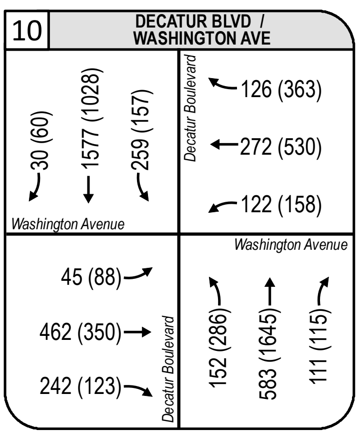

Figure 10B. Existing Year 2020 Peak Hour Traffic Volumes

Las Vegas Citywide Intersection Crash Mitigation Program
August 2020
NOTE(S):
Standard growth rate of 1.5%/Year used to project Year 2020 turning movement volumes

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Table 7. HCM LOS Definitions and Criteria for Intersections

LOS	Flow Type	Operational Characteristics	Intersection Control Delay (seconds/vehicle) Sign Control	One-Way-Stop; or All-Way-Stop Control
"A"	Stable Flow	Free-flow conditions with negligible to minimal delays. Excellent progression with most vehicles arriving during the green phase and not having to stop at all. Nearly all drivers find freedom of operation.	< 10	0 – 10
"B"	Stable Flow	Good progression with slight delays. Short cycle-lengths typical. Relatively more vehicles stop than under LOS "A". Vehicle platoons are formed. Drivers begin to feel somewhat restricted within groups of vehicles.	> 10 – 20	> 10 – 15
"C"	Stable Flow	Relatively higher delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear. The number of vehicles stopping is significant, although many still pass through without stopping. Most drivers feel somewhat restricted.	> 20 – 35	> 15 – 25
"D"	Approaching Unstable flow	Somewhat congested conditions. Longer but tolerable delays may result from unfavorable progression, long cycle lengths, and/or high volume-to-capacity ratios. Many vehicles are stopped. Individual cycle failures may be noticeable. Drivers feel restricted during short periods due to temporary back-ups.	> 35 – 55	> 25 – 35
"E"	Unstable Flow	Congested conditions. Significant delays result from poor progression, long cycle lengths, and high volume-to-capacity ratios. Individual cycle failures occur frequently. There are typically long queues of vehicles waiting upstream of the intersection. Driver maneuverability is very restricted.	> 55 – 80	> 35 – 50
"F"	Forced Flow	Content Jammed or gridlock type operating conditions. Generally considered to be unacceptable for most drivers. Zero or very poor progression, with over-saturation or high volume-to-capacity ratios. Several individual cycle failures occur. Queue spillovers from other locations restrict or prevent movement.	> 80	> 50

Source: HCM 6th Edition, Exhibits 19-8, 20-2 and 22-8.

Source: Wood Rodgers, September 2020

Table 8. 2020 Existing AM and PM Peak Hour Intersection LOS and V/C

#	Intersections	Control Type	LOS Criteria	Peak Hour	Existing Conditions Delay (S/V)[1]	LOS	V/C[2]
1	S Durango Dr at Charleston Blvd	Signal	D	AM	46.7	D	<1
				PM	74.7	E	>1
2	Eastern Ave at Stewart Ave	Signal	D	AM	38.6	D	>1
				PM	69.4	E	>1
3	Fort Apache Rd at Sahara Ave	Signal	D	AM	47.3	D	<1
				PM	71.4	E	>1
4	Martin L King Blvd at Bonanza Rd	Signal	D	AM	75.7	E	>1
				PM	55.0	D	>1
5	Lake Mead Blvd at Rainbow Blvd	Signal	D	AM	40.5	D	<1
				PM	52.3	D	<1
6	Charleston Blvd at Rainbow Blvd	Signal	D	AM	112.3	F	>1
				PM	117.6	F	>1
7	S Valley View Blvd at Sahara Ave	Signal	D	AM	56.0	E	>1
				PM	69.4	E	>1
8	St Louis Ave at Eastern Ave	Signal	D	AM	26.9	C	<1
				PM	24.8	C	<1
9	Cheyenne Ave at Rainbow Blvd	Signal	D	AM	52.2	D	>1
				PM	69.1	E	>1
10	N Decatur Blvd at W Washington Ave	Signal	D	AM	47.5	D	<1
				PM	51.3	D	>1

Notes: 1 "Average" control delays (in seconds/vehicle) are indicated for signal controlled intersections. | 2 V/C = Volume-to-capacity ratio.

Source: Wood Rodgers, September 2020

As shown in **Table 8** and illustrated in **Figure 11A** and **Figure 11B**, the following intersections are currently operating at LOS E or worse:

- Durango Drive and Charleston Boulevard – PM peak hour
- Eastern Avenue and Stewart Avenue – PM peak hour
- Fort Apache Road and Sahara Avenue – PM peak hour
- Martin Luther King Boulevard and Bonanza Road – AM peak hour
- Rainbow Boulevard and Charleston Boulevard – AM and PM peak hours
- Valley View Boulevard and Sahara Avenue – AM and PM peak hours
- Rainbow Boulevard and Cheyenne Avenue – PM peak hour

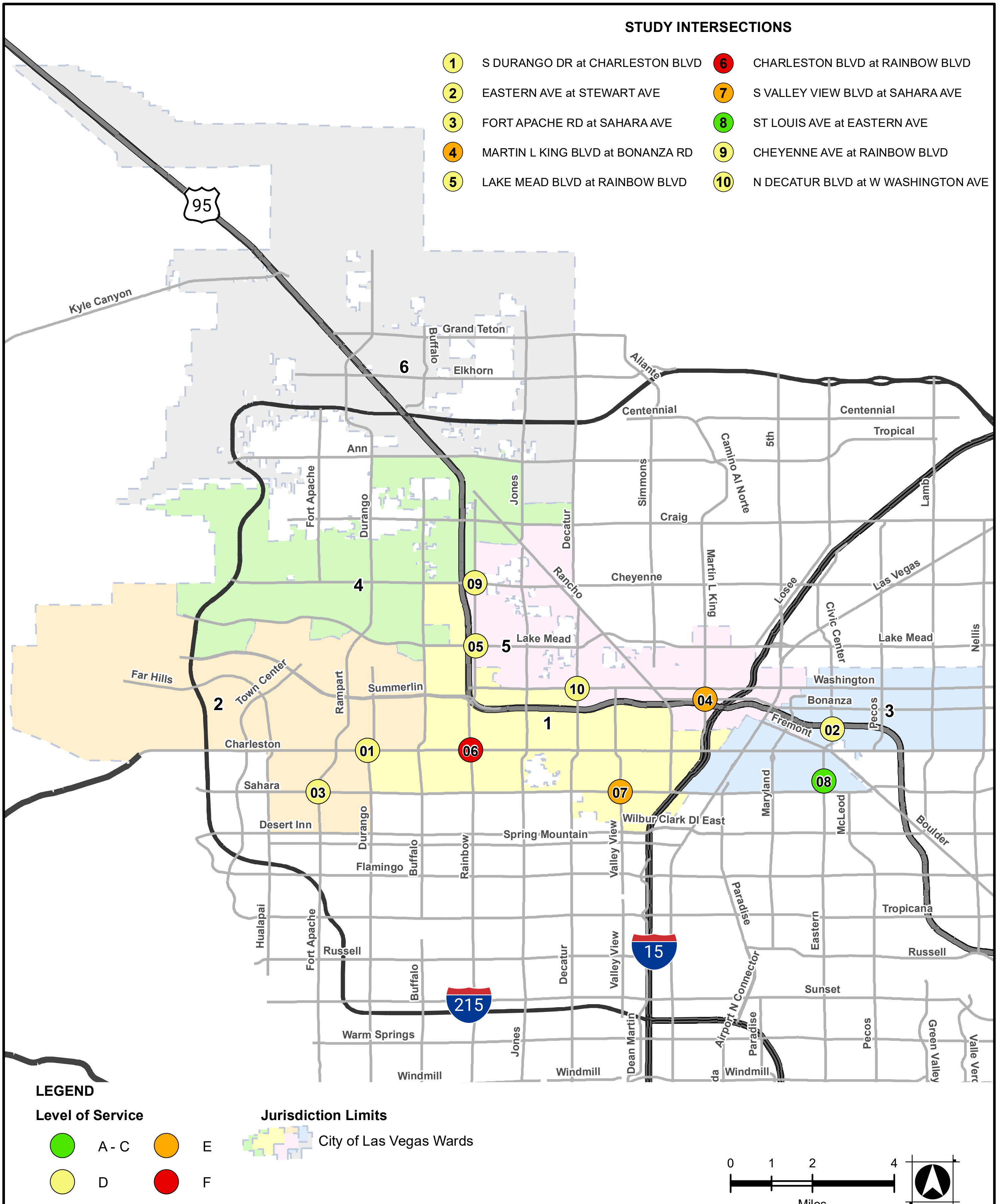

Figure 11A. Existing Study Intersection Traffic AM LOS

Las Vegas Citywide Intersection Crash Mitigation Program

August 2020

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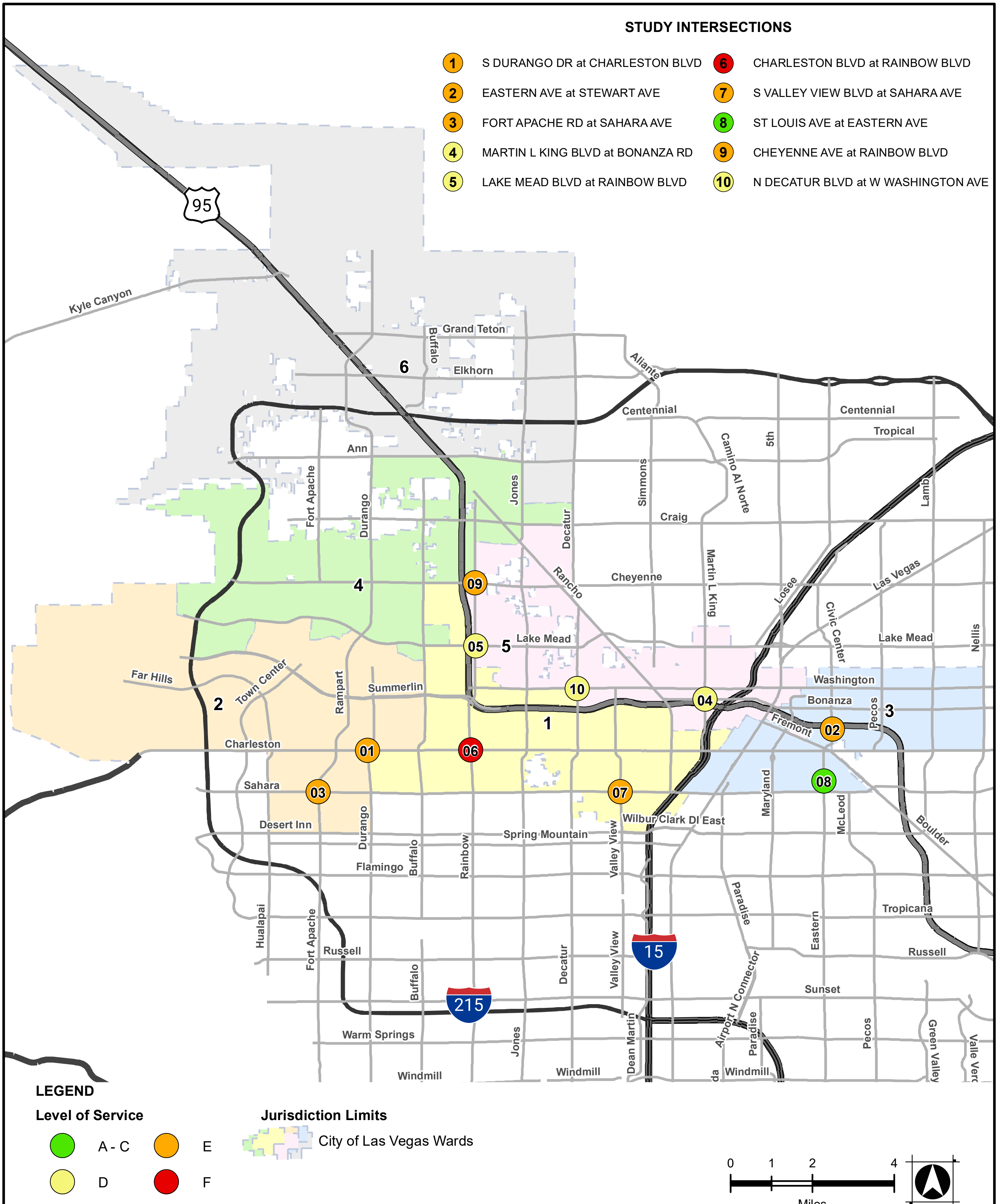

Figure 11B. Existing Study Intersection Traffic PM LOS

Las Vegas Citywide Intersection Crash Mitigation Program

August 2020

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Also shown in **Table 8**, the following intersections currently have a v/c ratio greater than one:

- Durango Drive and Charleston Boulevard – PM peak hour
- Eastern Avenue and Stewart Avenue – AM and PM peak hours
- Fort Apache Road and Sahara Avenue – PM peak hour
- Martin Luther King Boulevard and Bonanza Road – AM and PM peak hours
- Rainbow Boulevard and Charleston Boulevard – AM and PM peak hours
- Valley View Boulevard and Sahara Avenue – AM and PM peak hours
- Rainbow Boulevard and Cheyenne Avenue – AM and PM peak hours
- Decatur Boulevard and Washington Avenue – PM peak hour

The corresponding detailed Synchro 10 outputs can be viewed in **Appendix F**.

4.6.2 Queuing

Vehicle storage deficiencies have been analyzed at all CICMP intersections by utilizing Synchro's 95th percentile queue lengths for left-turn pockets and right-turn pockets. 95th percentile queues essentially represent a worst-case queue length that will be reached or exceeded only 5-percent of the time during the peak hour. **Table 9** shows the existing storage length of each intersection turn pocket, as well as its corresponding 95th percentile queue, and the queues that are higher than the storage length are in red font.

As shown in **Table 9,** the following turning movements operate with queuing deficiencies in the existing conditions:

- Durango Drive and Charleston Boulevard – eastbound left-turn bay (PM), northbound left-turn bay (PM)
- Eastern Avenue and Stewart Avenue – eastbound left-turn bay (PM), westbound left-turn bay (AM), westbound right-turn bay (PM), southbound left-turn bay (AM and PM)
- Fort Apache Road and Sahara Avenue – westbound left-turn bays (PM), westbound right-turn bay (PM), Northbound left-turn bays (PM)
- Martin Luther King Boulevard and Bonanza Road – westbound left-turn bays (PM)
- Rainbow Boulevard and Charleston Boulevard – eastbound left-turn bays (PM), northbound right-turn bay (PM), southbound left-turn bays (PM)
- Valley View Boulevard and Sahara Avenue – northbound left-turn bays (PM)
- Eastern Avenue and St. Louis Avenue – westbound left-turn bay (AM and PM)
- Rainbow Boulevard and Cheyenne Avenue – westbound left-turn bay (PM), southbound left-turn bay (AM and PM)
- Decatur Boulevard and Washington Avenue – eastbound right-turn bay (AM), westbound left-turn bay (AM and PM), westbound right-turn bay (PM)

Similar to the LOS results, detailed Synchro 10 outputs can be viewed in **Appendix F**.

Table 9. 2020 Existing AM and PM Peak Hour Intersection Queues

#	Intersections	Peak Hour	Eastbound						Westbound						Northbound						Southbound					
			Left-Turn Bays			Right-Turn Bays			Left-Turn Bays			Right-Turn Bays			Left-Turn Bays			Right-Turn Bays			Left-Turn Bays			Right-Turn Bays		
			# of Lanes	Storage Length (ft)[1]	Queue Length (ft)[2]	# of Lanes	Storage Length (ft)[1]	Queue Length (ft)[2]	# of Lanes	Storage Length (ft)[1]	Queue Length (ft)[2]	# of Lanes	Storage Length (ft)[1]	Queue Length (ft)[2]	# of Lanes	Storage Length (ft)[1]	Queue Length (ft)[2]	# of Lanes	Storage Length (ft)[1]	Queue Length (ft)[2]	# of Lanes	Storage Length (ft)[1]	Queue Length (ft)[2]	# of Lanes	Storage Length (ft)[1]	Queue Length (ft)[2]
1	Durango Dr at Charleston Blvd	AM	1	220	109	-	-	-	1	330	262	-	-	-	1	300	139	-	-	-	1	380	81	-	-	-
		PM			**284**			-			328			-			**721**			-			88			-
2	Eastern Ave at Stewart Ave	AM	1	190	153	-	-	-	1	120	**123**	1	150	144	1	145	20	-	-	-	1	145	**189**	-	-	-
		PM			**197**			-			111			**293**			28			-			**638**			-
3	Fort Apache Rd at Sahara Ave	AM	2	325	100	1	180	7	2	315	78	1	180	28	2	260	70	-	-	-	2	350	204	-	-	-
		PM			198			4			**381**			**281**			**287**			-			244			-
4	MLK Blvd at Bonanza Rd	AM	2	300	34	1	200	129	2	250	115	1	180	23	2	300	67	-	-	-	2	400	114	1	165	0
		PM			81			57			**309**			176			93			-			134			0
5	Rainbow Blvd at Lake Mead Blvd	AM	2	450	167	1	135	36	2	250	86	1	160	43	2	240	68	1	230	23	2	250	39	1	315	24
		PM			433			131			131			111			132			64			74			81
6	Rainbow Blvd at Charleston Blvd	AM	2	345	80	-	-	-	2	345	122	-	-	-	2	340	121	1	120	85	2	330	271	1	245	36
		PM			**396**			-			275			-			294			**204**			**403**			54
7	Valley View Blvd at Sahara Ave	AM	2	315	98	1	135	94	2	345	117	1	160	46	2	270	79	-	-	-	2	345	123	-	-	-
		PM			173			58			224			151			**282**			-			179			-
8	Eastern Ave at St Louis Ave	AM	1	115	30	1	115	9	1	85	**141**	1	85	28	1	230	37	-	-	-	1	230	119	-	-	-
		PM			106			31			**137**			44			50			-			82			-
9	Rainbow Blvd at Cheyenne Ave	AM	2	360	80	1	220	17	1	260	164	-	-	-	2	370	117	-	-	-	1	85	**389**	-	-	-
		PM			295			106			**305**			-			267			-			**270**			-
10	N Decatur Blvd at Washington Ave	AM	1	140	52	1	140	**161**	1	140	**172**	1	185	23	2	240	127	1	310	0	2	230	162	-	-	-
		PM			107			45			**180**			**225**			206			56			128			-

[1]Storage lengths are the average length of each turn pocket movement.
[2]Queue length needs to be less than the storage length to prevent queues from spilling into through lanes.

Source: Wood Rodgers, September 2020

5. RELEVANT POLICIES, PLANS & STUDIES

Policies, plans, and studies relevant to the CICMP were identified, analyzed, and summarized, including the *Draft City of Las Vegas Mobility Master Plan*, *Access 2040 Enhancing Mobility for Southern Nevada Residents: RTC 2017-2040 Regional Transportation Plan (RTP)*, and *2017 Regional Bicycle and Pedestrian Plan for Southern Nevada*.

5.1 Draft City of Las Vegas Mobility Master Plan

Plan Area: Local

Plan Type: Transportation Planning Document

Plan Overview: The Plan is set to identify current issues and needs in the community and set forth goals, policies, and actions to address these issues. The Plan informs decisions that City leadership and members of the City Council make in shaping the future of the City and gives direction to the municipality on the needs of its residents by establishing future goals. Additionally, the Plan aides in addressing potential challenges and opportunities that may arise within the City and Southern Nevada over the next 30 years. At the moment of the CICMP, the *City of Las Vegas Mobility Master Plan* was still in the Draft stages of publication.

Plan Draft Vision Statement: The City Plan is utilizing the following draft vision statement, guided by principles that will help measure success, weigh recommendations, foster community-driven implementation, and improve quality of life for all residents: *The City of Las Vegas will be a leader in resilient, healthy cities, leveraging the pioneering innovative spirit of its residents to provide equitable access to services, education, and jobs in the new economy.*

Plan Goals (related to CICMP): The set forth goals of the Mobility Master Plan in relation to the CICMP include the following: Ensuring the highest quality and safest roads possible; Providing safe and convenient mobility choices; and creating a “smart city” with intelligent infrastructure which can aide in safety related improvements.

Influence on CICMP: The Plan will address how multiple modes of transportation, public services, and other infrastructure will be improved in the future through various major projects. Major multi-use and bicycle system network projects include the *Stewart Avenue Enhanced Bike Corridor* and the *Charleston Boulevard Light Rail*.

5.2 Access 2040 Enhancing Mobility for Southern Nevada Residents: RTC 2017-2040 RTP

Plan Area: Regional

Plan Type: RTP

Plan Overview: The RTP is a comprehensive plan for the transportation system in the Las Vegas metropolitan area that details the transportation investment anticipated for a 20-year timeframe.

Plan Vision Statement: The transportation system of Southern Nevada will enhance and balance our defining regional characteristics:

- Strong and Vibrant Economy,
- Diverse and Welcoming Quality of Life, and
- Valuable Natural and Infrastructure Resources

Plan Goals (related to CICMP): ACCESS2040 establishes strategies that will implement the plan's goals and be used to evaluate potential projects and assess the region's overall transportation system performance. Primary strategies include improving safety, managing congestion, enhancing multimodal connectivity, and maintaining current infrastructure. Secondary strategies include improving access to essential services, providing accountable and transparent planning process, improving freight movement, improving public health related to transportation, conserving and protecting natural resources, and using innovative planning to address emerging technologies and trends.

Influence on CICMP: Identifies funded projects and ongoing resources of annual funding projects under the following categories:

- Federally-Funded and/or Regionally-Significant High Priority Investment Program
- Access2040 Long Range Projects (2021-2025)
- Locally-Funded Projects in High Priority Investment Program (HPP)

5.3 2017 Regional Bicycle and Pedestrian Plan for Southern Nevada

Plan Area: Regional

Plan Type: Regional Bicycle and Pedestrian Plan (RBPP)

Plan Overview: The RBPP provides a comprehensive overview of non-motorized planning activities at the RTC and outlines the vision and goals of the RBPP aligned with the values of Complete Streets initiatives.

Plan Vision Statement: Southern Nevada will develop a safe, connected, and convenient walking and bicycling system that serves as a viable transportation and recreation asset while advancing the region's economic, educational, health, and environmental goals.

Plan Goals (related to CICMP): Goal 1: Comfort and Safety – Develop comprehensive facilities throughout Southern Nevada that make bicycling and walking safe, comfortable, and convenient for all ages and abilities.

Goal 2: Access – Improve bicycling and walking access to community destinations across Southern Nevada including connections to transit.

Goal 3: Education and Encouragement – Encourage broader participation, appreciation, and awareness of walking and bicycling through program efforts targeted at all ages and abilities.

Goal 4: Equity and Health – Recognize the transportation system's impact on air quality and community health while providing ladders of opportunity to underserved neighborhoods.

Influence on CICMP: The report describes in detail the existing conditions, public outreach, and recommendations; in addition, it has a number of map illustrations identifying and prioritizing gaps in the regional bicycle and trail network.

5.4 Additional Policies, Plans, and Studies

Additional nationwide policies, plans, and studies have been reviewed to determine their impact and relevant features to the CICMP, which are provided in Appendix G.

Appendix A: Intersection Crash Tables

City of Las Vegas Intersections with the Highest Total Crashes (Ranked by Total Crashes)

Rank	Intersections without Freeway Facilities	Total Crashes	Crash Rate Crashes per MEV[1]	Entering Vehicle Volumes
1	SAHARA AVE at RANCHO DR	261	1.59	90,063
2	CHARLESTON BLVD at MARTIN L KING BLVD	219	1.80	66,688
3	S DURANGO DR at CHARLESTON BLVD	193	1.54	68,663
4	EASTERN AVE at STEWART AVE	177	1.83	53,025
5	HIGHLAND DR at SAHARA AVE	144	*	*
6	RAMPART BLVD at SUMMERLIN PKWY EB	135	1.44	51,463
7	RANCHO DR at KINGS WAY	133	*	*
8	CHARLESTON BLVD at GRAND CENTRAL PKWY	131	1.14	62,963
9	CHARLESTON BLVD at RAINBOW BLVD	126	0.76	90,488
10	FORT APACHE RD at SAHARA AVE	124	0.94	72,050
11	MARTIN L KING BLVD at BONANZA RD	120	1.06	62,050
12	S VALLEY VIEW BLVD at SAHARA AVE	118	0.90	71,813
13	LAKE MEAD BLVD at RAINBOW BLVD	118	1.08	59,700
14	LAS VEGAS BLVD at E BONANZA RD	117	1.40	45,725
15	EASTERN AVE at CHARLESTON BLVD	114	1.02	61,113
16	SAHARA AVE at PASEO DEL PRADO	110	1.05	57,675
17	S MARTIN L KING BLVD at PINTO LN	109	*	*
18	RANCHO DR at W WASHINGTON AVE	106	0.91	63,575
19	NELLIS BLVD at E WASHINGTON AVE	105	1.18	48,563
20	RANCHO DR at BONANZA RD	104	0.88	64,538
21	W OAKEY BLVD at S DECATUR BLVD	101	0.92	60,188
22	NELLIS BLVD at STEWART AVE	100	0.86	63,925
23	DREXEL RD at ANN RD	100	1.12	48,725
24	CHARLESTON BLVD at DECATUR BLVD	98	0.64	83,275
25	LAMB BLVD at OWENS AVE	98	1.12	47,925

Notes:
** No City counts provided at this location*
[1] Million Entering Vehicles
Source for Crash Data: NDOT 5-year 2014 to 2018 Database
Source for Counts: City of Las Vegas Database (GIS)

City of Las Vegas Intersections with the Highest Total Crashes (Ranked by Crash Rate)

Rank	Intersections without Freeway Facilities	Total Crashes	Crash Rate Crashes per MEV[1]	Entering Vehicle Volumes
1	RANCHO DR at BRYN MAWR AVE	15	65.75	125
2	RANCHO DR at RANCHO BEL AIR DR	13	15.90	448
3	MARTIN L KING BLVD at BALZAR AVE	22	14.52	830
4	RANCHO DR at CORAN LN	36	13.35	1,478
5	S DURANGO DR at SONETO LN	9	9.00	548
6	D ST at IR15 SB ON RAMP (FRCL41)	95	8.86	5,875
7	CHARLESTON BLVD at REDWOOD ST	42	8.26	2,785
8	LIRIO WAY at YERBA LN	10	4.02	1,363
9	S DURANGO DR at SPANISH ARCH WAY	5	3.42	802
10	N TORREY PINES DR at PEAK DR	35	2.51	7,636
11	D ST at W WASHINGTON AVE	49	2.30	11,675
12	CLARK AVE at 6TH ST	10	2.30	2,384
13	S CASINO CENTER BLVD at GARCES AVE	16	2.20	3,988
14	MARYLAND PKWY at FREMONT ST	46	2.05	12,275
15	4TH ST at HOOVER AVE	19	1.97	5,290
16	S 3RD ST at COOLIDGE AVE	7	1.87	2,048
17	EASTERN AVE at STEWART AVE	177	1.83	53,025
18	CHARLESTON BLVD at MARTIN L KING BLVD	219	1.80	66,688
19	STEWART AVE at MARYLAND PKWY	31	1.77	9,613
20	CARSON AVE at S 8TH ST	10	1.74	3,147
21	HARRISON AVE at D ST	23	1.67	7,550
22	N 13TH ST at STEWART AVE	46	1.62	15,588
23	W CINCINNATI AVE at FAIRFIELD AVE	15	1.61	5,114
24	SAHARA AVE at RANCHO DR	261	1.59	90,063
25	OWENS AVE at D ST	24	1.58	8,300

Notes:

[1] Million Entering Vehicles

Source for Crash Data: NDOT 5-year 2014 to 2018 Database Source for Counts: City of Las Vegas Database (GIS)

City of Las Vegas Intersections with the Highest Pedestrian / Cyclist Involved Crashes (Ranked by Total Crashes)

Rank	Intersections without Freeway Facilities	Total Pedestrian & Cyclist Crashes	Crash Rate Crashes per MEV[1]	Entering Vehicle Volumes
1	CHARLESTON BLVD at MARYLAND PKWY	13	0.12	58,025
2	CHARLESTON BLVD at RAINBOW BLVD	10	0.06	90,488
3	S VALLEY VIEW BLVD at SAHARA AVE	10	0.08	71,813
4	ST LOUIS AVE at EASTERN AVE	9	0.13	38,238
5	LAS VEGAS BLVD at E BONANZA RD	8	0.10	45,725
6	CHARLESTON BLVD at RANCHO DR	8	0.07	66,825
7	CHEYENNE AVE at RAINBOW BLVD	8	0.07	62,300
8	N DECATUR BLVD at W WASHINGTON AVE	8	0.08	57,750
9	CHARLESTON BLVD at LAS VEGAS BLVD	8	0.07	62,075
10	LAKE MEAD BLVD at MARTIN L KING BLVD	8	0.07	66,613
11	E BONANZA RD at EASTERN AVE	8	0.07	61,475
12	CIVIC CENTER DR at OWENS AVE	8	0.11	40,200
13	EASTERN AVE at HARRIS AVE	8	*	*
14	N EASTERN AVE at E MCWILLIAMS AVE	8	*	*
15	S 4TH ST at CARSON AVE	8	0.27	16,463
16	SAHARA AVE at PASEO DEL PRADO	7	0.07	57,675
17	NELLIS BLVD at STEWART AVE	7	0.06	63,925
18	NELLIS BLVD at HARRIS AVE	7	*	*
19	LAS VEGAS BLVD at CARSON AVE	7	0.14	28,400
20	CHARLESTON BLVD at S BRUCE ST	7	0.10	37,200
21	RAINBOW BLVD at CHEYENNE COMMONS ACCESS	7	0.14	27,575
22	MARTIN L KING BLVD at BONANZA RD	6	0.05	62,050
23	EASTERN AVE at CHARLESTON BLVD	6	0.05	61,113
24	CHARLESTON BLVD at DECATUR BLVD	6	0.04	83,275
25	LAKE MEAD BLVD at JONES BLVD	6	0.08	42,213

Notes:
** No City counts provided at this location*
[1] Million Entering Vehicles
Source for Crash Data: NDOT 5-year 2014 to 2018 Database Source for Counts: City of Las Vegas Database (GIS)

City of Las Vegas Intersections with the Highest Pedestrian / Cyclist Involved Crash Rates (Ranked by Crash Rate)

Rank	Intersections without Freeway Facilities	Total Pedestrian & Cyclist Crashes	Crash Rate Crashes per MEV[1]	Entering Vehicle Volumes
1	MARTIN L KING BLVD at BALZAR AVE	4	2.64	830
2	RANCHO DR at CORAN LN	3	1.11	1,478
3	S DURANGO DR at SONETO LN	1	1.00	548
4	S DURANGO DR at SPANISH ARCH WAY	1	0.68	802
5	CHARLESTON BLVD at REDWOOD ST	3	0.59	2,785
6	S CASINO CENTER BLVD at GARCES AVE	4	0.55	3,988
7	COOLIDGE AVE at S 1ST ST	1	0.53	1,041
8	LIRIO WAY at YERBA LN	1	0.40	1,363
9	HOOVER AVE at S 1ST ST	1	0.35	1,546
10	FRANKLIN AVE at S 6TH ST	1	0.27	2,047
11	S 4TH ST at CARSON AVE	8	0.27	16,463
12	CARSON AVE at S 3RD ST	4	0.26	8,288
13	S CASINO CENTER BLVD at CLARK AVE	3	0.24	6,900
14	N CASINO CENTER BLVD at FREMONT ST	4	0.23	9,660
15	VEGAS VISTA TRL at W ALEXANDER RD	2	0.22	4,934
16	THOM BLVD at BRENT LN	1	0.20	2,692
17	HOOVER AVE at S 3RD ST	1	0.19	2,845
18	N MAIN ST at OWENS AVE	6	0.19	17,675
19	MARYLAND PKWY at FREMONT ST	4	0.18	12,275
20	CARSON AVE at S 8TH ST	1	0.17	3,147
21	CARSON AVE at S CASINO CENTER BLVD	3	0.17	9,538
22	LAKE EAST DR at LAKE SAHARA DR	1	0.17	3,228
23	CLARK AVE at S 3RD ST	2	0.15	7,425
24	E BONNEVILLE AVE at S 6TH ST	1	0.15	3,737
25	E OGDEN AVE at N 3RD ST	2	0.14	7,663

Notes:
[1] Million Entering Vehicles
Source for Crash Data: NDOT 5-year 2014 to 2018 Database Source for Counts: City of Las Vegas Database (GIS)

City of Las Vegas Intersections with the Highest Pedestrian / Cyclist Involved Crashes (Ranked by Crash Fatalities)

Rank	Intersections without Freeway Facilities	Total Pedestrian & Cyclist Crashes	Crash Rate Crashes per MEV[1]	Total Pedestrian & Cyclist Crash Fatalities
1	E BONANZA RD at 30TH ST	4	*	3
2	CHARLESTON BLVD at MARYLAND PKWY	13	0	2
3	SAHARA AVE at PASEO DEL PRADO	7	0	2
4	SAHARA AVE at LAS VERDES ST	6	0	2
5	E BONANZA RD at EASTERN AVE	8	0	1
6	CHARLESTON BLVD at RANCHO DR	8	0	1
7	CHARLESTON BLVD at LAS VEGAS BLVD	8	0	1
8	LAKE MEAD BLVD at MARTIN L KING BLVD	8	0	1
9	JONES BLVD at CARMEN BLVD	6	0	1
10	N MAIN ST at OWENS AVE	6	0	1

Notes:

** No City counts provided at this location*

[1] Million Entering Vehicles

Source for Crash Data: NDOT 5-year 2014 to 2018 Database Source for Counts: City of Las Vegas Database (GIS)

Appendix B: Transit Ridership

TRANSIT FACILITIES

CICMP intersection transit stops, routes, and average monthly ridership – based on RTC's September 2018 ridership

Durango Drive at Charleston Boulevard

Route 121 (Durango / Buffalo Northbound-Southbound); Route 206 (Charleston Eastbound-Westbound); and Route 902 (Westcliff Airport Express: Eastbound / Southbound, towards McCarran Airport - Northbound / Westbound, towards Suncoast) are the RTC transit routes that service the Program intersection. The stop identification of the transit stops, route direction servicing the routes, and transit ridership are as follows:

- Stop ID 6540: SB Durango after Charleston); Total Ridership: 3,435
    - (Total Boardings: 2,187, Total Alightings: 1,248)
- Stop ID 6148: NB Durango after Charleston); Total Ridership: 3,274
    - (Total Boardings: 1,141, Total Alightings: 2,133)
- Stop ID 477: EB Charleston after Durango); Total Ridership: 3,848
    - (Total Boardings: 3,129, Total Alightings: 719)
- Stop ID 478: WB Charleston after Durango); Total Ridership: 4,178
    - (Total Boardings: 987, Total Alightings: 3,191)

Eastern Avenue at Stewart Avenue

Route 110 (Eastern Northbound-Southbound); Route 207 (Alta / Stewart Eastbound-Westbound); Route and 903 (Henderson & Downtown Express: Northwestbound, towards Downtown LV – Southeastbound, towards Boulder City) are the RTC transit routes that service the Program intersection. The stop identification of the transit stops and route direction servicing the routes are as follows:

- Stop ID 2630: EB Stewart after Eastern); Total Ridership: 302
    - (Total Boardings: 198, Total Alightings: 104)
- Stop ID 2631: WB Stewart after Eastern); Total Ridership: 917
    - (Total Boardings: 498, Total Alightings: 419)
- Stop ID 828: NB Eastern before Stewart); Total Ridership: 3,269
    - (Total Boardings: 1,539, Total Alightings: 1,730)
- Stop ID 886: SB Eastern after Stewart); Total Ridership: 4,289
    - (Total Boardings: 2,759, Total Alightings: 1,530)

Fort Apache Road at Sahara Avenue

Route 120 (Fort Apache / Rampart Northbound-Southbound) and Route 504 (SX A-B Sahara Express Westbound-Eastbound) are the RTC transit routes that service the Program intersection. The stop identification of the transit stops and route direction servicing the routes are as follows:

- Stop ID 5934: SB Fort Apache after Sahara); Total Ridership: 3,855
    - (Total Boardings: 2,536, Total Alightings: 1,319)
- Stop ID 5169: NB Fort Apache after Sahara); Total Ridership: 3,671
    - (Total Boardings: 1,187, Total Alightings: 2,484)
- Stop ID 3369: WB Sahara after Fort Apache); Total Ridership: 6,817
    - (Total Boardings: 1,477, Total Alightings: 5,340)
- Stop ID 2418: EB Sahara after Fort Apache); Total Ridership: 6,946
    - (Total Boardings: 5,526, Total Alightings: 1,420)

Martin L King Boulevard at Bonanza Road

Route 105 (Martin L. King Northbound-Southbound) and Route 106 (Rancho / Centennial Hills Northbound-Southbound) are the RTC transit routes that service the Program intersection. The stop identification of the transit stops and route direction servicing the routes are as follows:

- Stop ID 1639: NB Martin L King after Bonanza); Total Ridership: 2,044
  - (Total Boardings: 776, Total Alightings: 1,268)
- Stop ID 1640: SB Martin L King after Bonanza); Total Ridership: 997
  - (Total Boardings: 471, Total Alightings: 526)
- Stop ID 195: EB Bonanza after Martin L King); Total Ridership: 1,379
  - (Total Boardings: 811, Total Alightings: 568)
- Stop ID 196: WB Bonanza after Sunny); Total Ridership: 1,612
  - (Total Boardings: 903, Total Alightings: 709)

Rainbow Boulevard at Lake Mead Boulevard

Route 101 (Rainbow Northbound-Southbound) and Route 210 (Lake Mead Blvd Eastbound-Westbound) are the RTC transit routes that service the Program intersection. The stop identification of the transit stops and route direction servicing the routes are as follows:

- Stop ID 2210: NB Rainbow after Lake Mead); Total Ridership: 5,724
  - (Total Boardings: 1,884, Total Alightings: 3,840)
- Stop ID 2211: SB Rainbow after Lake Mead); Total Ridership: 4,706
  - (Total Boardings: 3,393, Total Alightings: 1,313)
- Stop ID 1498: EB Lake Mead after Rainbow); Total Ridership: 4,962
  - (Total Boardings: 3,469, Total Alightings: 1,493)
- Stop ID 1497: WB Lake Mead before Rainbow); Total Ridership: 5,135
  - (Total Boardings: 1,630, Total Alightings: 3,505)

Rainbow Boulevard at Charleston Boulevard

Route 101 Rainbow (Northbound-Southbound) and Route 206 (Charleston Eastbound-Westbound) are the RTC transit routes that service the Program intersection. The stop identification of the transit stops and route direction servicing the routes are as follows:

- Stop ID 515: EB Charleston after Rainbow); Total Ridership: 11,195
  - (Total Boardings: 7,658, Total Alightings: 3,537)
- Stop ID 516: WB Charleston after Rainbow); Total Ridership: 10,251
  - (Total Boardings: 3,085, Total Alightings: 7,166)
- Stop ID 2186: NB Rainbow after Charleston); Total Ridership: 8,834
  - (Total Boardings: 4,250, Total Alightings: 4,584)
- Stop ID 2187: SB Rainbow after Charleston); Total Ridership: 7,616
  - (Total Boardings: 4,943, Total Alightings: 2,673)

Valley View Boulevard at Sahara Avenue

Route 104 (Arville / Valley View Northbound-Southbound) and Route 504 (SX A-B Sahara Express Eastbound-Westbound) are the RTC transit routes that service the Program intersection. The stop identification of the transit stops and route direction servicing the routes are as follows:

- Stop ID 6398: SB Valley View after Sahara, Total Ridership: 6,811
    - (Total Boardings: 4,365, Total Alightings: 2,446)
- Stop ID 6304: WB Sahara before Valley View); Total Ridership: 13,043
    - (Total Boardings: 4,470, Total Alightings: 8,573)
- Stop ID 2925: NB Valley View after El Conlon); Total Ridership: 3,176
    - (Total Boardings: 461, Total Alightings: 2,715)
- Stop ID 2937: NB Valley View after Sahara); Total Ridership: 4,342
    - (Total Boardings: 2,609, Total Alightings: 1,733)
- Stop ID 2487: EB Sahara after Valley View); Total Ridership: 12,802
    - (Total Boardings: 8,577, Total Alightings: 4,225)

Eastern Avenue at St. Louis Avenue

Route 110 (Eastern Northbound-Southbound) is the RTC transit route that services the Program intersection. The stop identification of the transit stops and route direction servicing the route are as follows:

- Stop ID 884: NB Eastern after St Louis); Total Ridership: 1,187
    - (Total Boardings: 624, Total Alightings: 563)
- Stop ID 885: SB Eastern after St Louis); Total Ridership: 1,731
    - (Total Boardings: 801, Total Alightings: 930)

Rainbow Boulevard at Cheyenne Avenue

Route 101 (Rainbow Northbound-Southbound); Route 104 (Valley View / Arville Southbound); and Route 218 (Cheyenne Eastbound-Westbound) are the RTC transit routes that service the Program intersection. The stop identification of the transit stops and route direction servicing the routes are as follows:

- Stop ID 2213: NB Rainbow after Light Breeze); Total Ridership: 3,968
    - (Total Boardings: 544, Total Alightings: 3,424)
- Stop ID 588: EB Cheyenne after Rainbow); Total Ridership: 5,577
    - (Total Boardings: 3,691, Total Alightings: 1,886)
- Stop ID 589: WB Cheyenne after Rainbow); Total Ridership: 4,820
    - (Total Boardings: 1,686, Total Alightings: 3,134)
- Stop ID 2188: NB Rainbow after Cheyenne); Total Ridership: 2,421
    - (Total Boardings: 934, Total Alightings: 1,487)
- Stop ID 2189: SB Rainbow after Cheyenne); Total Ridership: 4,505
    - (Total Boardings: 3,305, Total Alightings: 1,20)

Decatur Boulevard at Washington Avenue

Route 103 (Decatur Northbound-Southbound); Route 104 (Arville / Valley View Northbound-Southbound); and Route 208 (Washington Eastbound-Westbound) are the RTC transit routes that service the Program intersection. The stop identification of the transit stops and route direction servicing the routes are as follows:

- Stop ID 3090: WB Washington before Decatur); Total Ridership: 3,201
    - (Total Boardings 1,800, Total Alightings: 1,401)
- Stop ID 3091: EB Washington after Decatur); Total Ridership: 3,204
    - (Total Boardings: 1,513, Total Alightings: 1,691)
- Stop ID 695: SB Decatur after Carmen); Total Ridership: 473
    - (Total Boardings: 304, Total Alightings: 169)
- Stop ID 754: NB Decatur after Washington); Total Ridership: 5,988
    - (Total Boardings: 2,416, Total Alightings: 3,572)
- Stop ID 755: SB Decatur after Washington); Total Ridership: 5,114
    - (Total Boardings: 3,444, Total Alightings: 1,670)

Appendix C: Land Uses

LAND USE

Durango Drive at Charleston Boulevard

Field Visit & Aerial Confirmation: Commercial & Residential
Zoning: Limited Commercial-Undeveloped-Medium Density Residential
Land Use: Service Commercial-Public Facility-Residential Condo Medium: up to 25.49 du/ac

Eastern Avenue at Stewart Avenue

Field Visit & Aerial Confirmation: Commercial & Parks/Rec
Zoning: Medium Density Residential-Limited Commercial-Civic
Land Use: Medium: up to 25.49 du/ac- Mixed Use (L,ML,M,H,O,SC,GC,PF)-Service Commercial-Public Facility

Fort Apache Road at Sahara Avenue

Field Visit & Aerial Confirmation: Commercial
Zoning: Limited Commercial
Land Use: Service Commercial

Martin L King Boulevard at Bonanza Road

Field Visit & Aerial Confirmation: Commercial & Industrial
Zoning: Commercial/Industrial- General Commercial-Industrial-Limited Commercial
Land Use: Mixed Use (L,ML,M,H,O,SC,GC,PF)-Right of Way-Commercial (O,SC,GC)-Light Industrial/Research

Rainbow Boulevard at Lake Mead Boulevard

Field Visit & Aerial Confirmation: Commercial & Residential
Zoning: Limited Commercial
Land Use: Service Commercial

Rainbow Boulevard at Charleston Boulevard

Field Visit & Aerial Confirmation: Commercial
Zoning: Limited Commercial
Land Use: Service Commercial-Mixed Use (L,ML,M,H,O,SC,GC,PF)

Valley View Boulevard at Sahara Avenue

Field Visit & Aerial Confirmation: Commercial
Zoning: Limited Commercial
Land Use: Commercial (O,SC,GC)

Eastern Avenue at St. Louis Avenue

Field Visit & Aerial Confirmation: Residential & Parks/Rec
Zoning: Professional Office-Single Family Residential-Civic
Land Use: Office-Sub/Platted Parcel: Low up to 5.49-Park/Recreation/Open Space

Rainbow Boulevard at Cheyenne Avenue

Field Visit & Aerial Confirmation: Commercial
Zoning: Limited Commercial-Professional Office
Land Use: Service Commercial

Decatur Boulevard at Washington Avenue

Field Visit & Aerial Confirmation: Commercial, Residential, Parks & Rec, School
Zoning: Single Family Residential-Limited Commercial-Civic
Land Use: Service Commercial-Public Facility

Appendix D: Intersection Concerns

Durango Drive at Charleston Boulevard

- Field Visit Improvement Opportunities
  - o Speed – 45 MPH in three directions (not southbound)
  - o Right-turn Pockets – None
  - o U-Turns – Not Signed
  - o Driveway Distances – As low as 70-feet from intersection
  - o Bus Turnouts – None
  - o Transit Safety – Northbound Shelter in Sidewalk
  - o Permitted Green Ball – All Directions
  - o ADA – Non-Compliant
  - o Luminaires – 1 at each Corner
  - o Retroreflective Backplates – None
  - o Signal Heads – Not Equal to Number of Lanes
  - o Through Lane Alignment – Not Straight in Southbound and Westbound Directions
  - o Sight Distance – Concerns from Southbound Curve

Eastern Avenue at Stewart Avenue

- Field Visit Improvement Opportunities
  - o Right-turn Pockets – One unmarked right-turn pocket in the westbound direction
  - o U-Turns – Not Signed
  - o Driveway Distances – As low as 5-feet from intersection
  - o Bus Turnouts – No Bus Turnout in Northbound and Southbound directions
  - o Transit Safety – Southbound and Westbound Shelters in Sidewalk
  - o Freeway Access – Close to Intersection
  - o Median Islands – No Median Islands on Stewart Avenue
  - o Permitted Flashing Yellow Arrow – All Directions
  - o Crosswalks – All Faded
  - o ADA – Non-Compliant
  - o Luminaires – 1 at each Corner
  - o Retroreflective Backplates – None
  - o Signal Heads – Not Equal to Number of Lanes
  - o Through Lane Alignment – Not Straight in Southbound Direction

Fort Apache Road at Sahara Avenue

- Field Visit Improvement Opportunities
  - o Speed – 45 MPH in all directions
  - o Right-turn Pockets – Shared in Northbound and Southbound Directions
  - o Driveway Distances – As low as 65-feet from intersection
  - o Bus Turnouts – No bus turnout in Northbound and Southbound Directions
  - o Transit Safety – No Amenities in Northbound and Southbound Directions
  - o Crosswalks – All Faded
  - o ADA – Non-Compliant
  - o Luminaires – 1 at each Corner
  - o Retroreflective Backplates – None
  - o Signal Heads – Not Equal to Number of Lanes
  - o Through Lane Alignment – Not Straight in Southbound and Eastbound Directions

Martin L King Boulevard at Bonanza Road

- Field Visit Improvement Opportunities
  - o Right-turn Pockets – Shared in Northbound Direction
  - o U-Turns – Not Signed in Southbound Direction
  - o Driveway Distances – As low as 10-feet from intersection
  - o Bus Turnouts – None
  - o Transit Safety – No Amenities in Northbound and Southbound Directions
  - o Freeway Access – Close to Intersection
  - o Crosswalks – All Faded
  - o ADA – Non-Compliant
  - o Luminaires – 1 at each Corner
  - o Retroreflective Backplates – None
  - o Signal Heads – Not Equal to Number of Lanes
  - *o Note: Bollard hit so hard in the Southwest corner of the Intersection that it bent in half*

Rainbow Boulevard at Lake Mead Boulevard

- Field Visit Improvement Opportunities
  - o Speed – 45 MPH in Westbound Direction
  - o U-Turns – Not signed in Northbound and Southbound Directions
  - o Driveway Distances – As low as 35-feet from intersection
  - o Bus Turnouts – None in Northbound, Eastbound, and Westbound Directions
  - o Transit Safety – Eastbound Bench is located within the Sidewalk and against a Block Wall
  - o Freeway Access – Close to Intersection
  - o Crosswalks – Faded in Northbound Direction, Needs Updating in Eastbound Direction
  - o ADA – Non-Compliant
  - o Luminaires – 1 at each Corner
  - o Retroreflective Backplates – None
  - o Signal Heads – Not Equal to Number of Lanes
  - o Through Lane Alignment – Not Straight in Northbound Direction
  - o Sight Distance – Concerns in Northbound, Southbound, and Eastbound Directions

Rainbow Boulevard at Charleston Boulevard

- Field Visit Improvement Opportunities
  - o Speed – 45 MPH in all directions
  - o Right-turn Pockets – Shared in Eastbound and Westbound Directions
  - o Driveway Distances – As low as 20-feet from intersection
  - o Bus Turnouts – None in Eastbound and Westbound Directions, Wide Shoulder in Northbound and Southbound Directions
  - o Crosswalks – All Faded
  - o Luminaires – 1 at each Corner
  - o Retroreflective Backplates – Some, not All
  - o Signal Heads – Not Equal to Number of Lanes
  - o Through Lane Alignment – Not Straight in Northbound and Westbound Direction

Valley View Boulevard at Sahara Avenue

- Field Visit Improvement Opportunities
  - o Speed – 45 MPH in Eastbound and Westbound Directions
  - o Right-turn Pockets – Shared in Northbound and Southbound Directions
  - o Driveway Distances – As low as 10-feet from intersection
  - o Crosswalks – All Faded
  - o ADA – Non-Compliant
  - o Luminaires – 1 at each Corner, except Northwest Corner has None
  - o Retroreflective Backplates – None
  - o Signal Heads – Not Equal to Number of Lanes
  - o Through Lane Alignment – Not Straight in Northbound Direction

Eastern Avenue at St. Louis Avenue

- Field Visit Improvement Opportunities
  - o Right-turn Pockets – Shared in Northbound and Southbound Directions
  - o U-Turns – Not Signed in Northbound and Southbound Directions
  - o Driveway Distances – As low as 15-feet from intersection
  - o Bus Turnouts – No Bus Turnouts in the Northbound and Southbound directions
  - o Transit Safety – Northbound Bench is located within the Sidewalk and against a Building
  - o Median Islands – No Median Islands on St. Louis Avenue
  - o Permitted Green Ball – Eastbound and Westbound Directions
  - o Crosswalks – All Faded
  - o ADA – Non-Compliant
  - o Luminaires – 1 at each Corner
  - o Retroreflective Backplates – None
  - o Signal Heads – Not Equal to Number of Lanes
  - o Through Lane Alignment – Not Straight in Eastbound and Westbound Directions
  - o Sight Distance – Concerns from Westbound Curve

Rainbow Boulevard at Cheyenne Avenue

- Field Visit Improvement Opportunities
  - o Speed – 45 MPH in Westbound Direction
  - o Right-turn Pockets – Shared in Northbound, Southbound, and Westbound Directions
  - o U-Turns – Not Signed in Westbound Direction
  - o Driveway Distances – As low as less than 5-feet from intersection
  - o Bus Turnouts – None
  - o Transit Safety – Eastbound Shelter is located within the Sidewalk
  - o Freeway Access – Close to Intersection
  - o Crosswalks – All Faded
  - o ADA – Non-Compliant
  - o Luminaires – 1 at each Corner
  - o Retroreflective Backplates – None
  - o Signal Heads – Not Equal to Number of Lanes
  - o Through Lane Alignment – Not Straight in Southbound, Eastbound, and Westbound Directions
  - *o Note: It was recognized that the inside northbound left-turn lane was not being utilized as all of the traffic was prepositioning to take a right-turn onto US 95 Northbound by using the outside northbound left-turn lane*

Decatur Boulevard at Washington Avenue

- Field Visit Improvement Opportunities
    - o Speed – 45 MPH in Northbound and Southbound Directions
    - o Right-turn Pockets – Shared in Southbound Direction
    - o U-Turns – Not Signed in Eastbound and Westbound Directions
    - o Driveway Distances – As low as 10-feet from intersection
    - o Bus Turnouts – No Bus Turnouts in the Northbound or Southbound Directions, but Northbound Direction has a Wide Shoulder
    - o Median Islands – No Median Islands on Washington Avenue
    - o Permitted Flashing Yellow Arrow – Eastbound and Westbound Directions
    - o Crosswalks – All Faded
    - o ADA – Non-Compliant
    - o Luminaires – 1 at each Corner
    - o Retroreflective Backplates – None
    - o Signal Heads – Not Equal to Number of Lanes, except in the Eastbound Direction
    - o Through Lane Alignment – Not Straight in Eastbound and Westbound Directions

Appendix E: Raw Intersection Volumes and 2020 Projections

Annual Growth Rate Calculations													
Station	**Description**	**AADT per Year**											
		2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Complete Growth**	**Growth since Counts**
Durango Drive & Charleston Boulevard													
0356	Charleston 800' W of Durango	35,000	35,000	35,000	34,000	33,500	28,200	32,000	36,000	37,000	**35,000**	0.00%	N/A
1488	Durango 230' S of Soneto		26,000	25,000	26,500	26,000	22,000	26,500	27,000	28,000	**28,300**	1.07%	N/A
Eastern Avenue & Stewart Avenue													
0651	Eastern 300' S of Stewart	34,000	31,000	31,000	31,000	28,500	32,000	31,000	**33,000**	34,000	34,500	0.16%	2.25%
Fort Apache Road & Sahara Avenue													
1083	Sahara .2 mi E of Fort Apache	33,000	31,000	31,000	27,000	28,500	**28,500**	32,000	33,000	34,000	35,000	0.66%	5.27%
1116	Fort Apache 725' S of Sahara	32,000	30,000	30,000	31,000	30,500	**32,000**	29,500	33,000	33,000	36,000	1.32%	2.99%
Martin Luther King Boulevard & Bonanza Road													
0319	Bonanza 960' W of MLK	10,000	10,000	10,000	8,700	9,300	**9,600**	10,000	10,000	10,900	11,000	1.06%	3.46%
Rainbow Boulevard & Lake Mead Boulevard													
0753	Lake Mead 315' W of James Bilbray	23,000	24,000	22,000	23,500	22,000	23,000	23,000	23,000	**25,000**	27,000	1.80%	8.00%
Charleston Boulevard & Rainbow Boulevard													
N/A												N/A	N/A
Valley View Boulevard & Sahara Avenue													
0610	Valley View 770' S of Sahara	26,000	24,000	24,000	24,000	21,000	**23,500**	27,500	28,000	29,000	33,500	2.86%	9.27%
0611	Valley View 150' N of La Pasada	25,000	20,000	22,000	21,500	15,000	**18,000**	24,000	23,000	24,000	32,800	3.06%	16.19%
Eastern Avenue & St Louis Avenue													
N/A												N/A	N/A
Rainbow Boulevard & Cheyenne Avenue													
0751	Cheyenne Ave 200' E of US 95	39,000	39,000	38,000	35,000	36,000	39,500	42,000	42,000	**43,000**	49,500	2.68%	15.12%
Decatur Boulevard & Washington Avenue													
0605	Decatur 350' N of Washington	35,000	36,000	37,000	36,000	32,000	32,000	29,500	**32,000**	36,000	39,000	1.21%	10.40%
											Average	1.44%	8.10%
											Agreed Growth Rate	**1.50%**	

Intersection:	CHARLESTON BLVD & DURANGO DR				**Daily total:**			
Date:	2/6/18	**EBT**	**17163**	**WBT**	**16400 =**	**33563**	**24hr**	**68663**
Counted By:	Jim Didway / Belete Diriba	**NBT**	**20713**	**SBT**	**14388 =**	**35100**	**total**	

DURANGO DR Southbound

End Time	Left Turn	Through	Right Turn	Peds	Bike	Approach Total
7:15 AM	14	183	30	6	0	227
7:30 AM	28	196	52	0	0	276
7:45 AM	23	227	48	0	0	298
8:00 AM	26	306	46	1	0	378
Hourly Total	**91**	**912**	**176**	**7**	**0**	**1179**
Percentage	7.7%	77.4%	14.9%			
Peak Hour Factor	0.81	0.75	0.85			0.78
LT X-Product	58,877					

thru lanes = 3
left turn lanes = 1
right turn lanes = 0
bike lanes = NO

CHARLESTON BLVD Westbound

End Time	Left Turn	Through	Right Turn	Peds	Bike	Approach Total
7:15 AM	41	94	5	3	0	140
7:30 AM	33	78	5	3	0	116
7:45 AM	42	109	10	1	0	161
8:00 AM	33	143	21	0	0	197
Hourly Total	**149**	**424**	**41**	**7**	**0**	**614**
Percentage	24.3%	69.1%	6.7%			
Peak Hour Factor	0.89	0.74	0.49			0.78
LT X-Product	163,900					

thru lanes = 3
left turn lanes = 1
right turn lanes = 0
bike lanes = NO

DURANGO DR Northbound

End Time	Left Turn	Through	Right Turn	Peds	Bike	Approach Total
7:15 AM	24	92	13	3	0	129
7:30 AM	29	87	23	3	0	139
7:45 AM	32	96	30	2	0	158
8:00 AM	44	140	37	0	0	221
Hourly Total	**129**	**415**	**103**	**8**	**0**	**647**
Percentage	19.9%	64.1%	15.9%			
Peak Hour Factor	0.73	0.74	0.70			0.73
LT X-Product	152,091					

thru lanes = 3
left turn lanes = 1
right turn lanes = 0
bike lanes = NO

CHARLESTON BLVD Eastbound

End Time	Left Turn	Through	Right Turn	Peds	Bike	Approach Total
7:15 AM	13	108	32	4	1	153
7:30 AM	23	198	49	1	0	270
7:45 AM	25	245	38	0	0	308
8:00 AM	56	267	46	1	1	369
Hourly Total	**117**	**818**	**165**	**6**	**2**	**1100**
Percentage	10.6%	74.4%	15.0%			
Peak Hour Factor	0.52	0.77	0.84			0.75
LT X-Product	71,838					

thru lanes = 3
left turn lanes = 1
right turn lanes = 0
bike lanes = NO

End Time	SB Left Turn	SB Through	SB Right Turn	SB Peds	SB	SB Approach Total	WB Left Turn	WB Through	WB Right Turn	WB Peds	WB	WB Approach Total	NB Left Turn	NB Through	NB Right Turn	NB Peds	NB	NB Approach Total	EB Left Turn	EB Through	EB Right Turn	EB Peds	EB	EB Approach Total
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Percentage	n/a	n/a	n/a				n/a	n/a	n/a				n/a	n/a	n/a				n/a	n/a	n/a			
Peak Hour Factor	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a
LT X-Product	n/a						n/a						n/a						n/a					

End Time	SB Left Turn	SB Through	SB Right Turn	SB Peds	SB Bike	SB Approach Total	WB Left Turn	WB Through	WB Right Turn	WB Peds	WB Bike	WB Approach Total	NB Left Turn	NB Through	NB Right Turn	NB Peds	NB Bike	NB Approach Total	EB Left Turn	EB Through	EB Right Turn	EB Peds	EB Bike	EB Approach Total
5:15 PM	16	216	71	1	0	303	53	247	13	3	0	313	73	272	48	2	0	393	56	200	58	1	0	314
5:30 PM	14	197	61	5	0	272	50	268	19	2	0	337	77	274	51	5	1	402	55	252	70	3	0	377
5:45 PM	17	218	55	0	0	290	45	244	23	2	0	312	90	324	51	5	0	465	52	219	55	2	0	326
6:00 PM	20	195	71	8	0	286	58	277	15	2	3	350	84	267	46	3	0	397	61	229	66	4	0	356
Hourly Total	**67**	**826**	**258**	**14**	**0**	**1151**	**206**	**1036**	**70**	**9**	**3**	**1312**	**324**	**1137**	**196**	**15**	**1**	**1657**	**224**	**900**	**249**	**10**	**0**	**1373**
Percentage	5.8%	71.8%	22.4%				15.7%	79.0%	5.3%				19.6%	68.6%	11.8%				16.3%	65.5%	18.1%			
Peak Hour Factor	0.84	0.95	0.91			0.95	0.89	0.94	0.76			0.94	0.90	0.88	0.96			0.89	0.92	0.89	0.89			0.91
LT X-Product	111,019						282,838						372,924						293,888					

Intersection: CHARLESTON BLVD & DURANGO DR

Date: 4/7/16

Counted By: Jim Didway / Belete Diriba

BIKE SHEET

		Daily total:					
EBT	0	WBT	38	=	38	24hr	50
NBT	13	SBT	0	=	13	total	

	DURANGO DR Southbound						CHARLESTON BLVD Westbound						DURANGO DR Northbound						CHARLESTON BLVD Eastbound					
End Time	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Hourly Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**2**
Percentage	n/a	n/a	n/a				n/a	n/a	n/a				n/a	n/a	n/a				50.0%	50.0%	n/a			
Peak Hour Factor	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a	0.25	0.25	n/a			0.50
LT X-Product	n/a						n/a						n/a						0					
	# thru lanes =			3			# thru lanes =			3			# thru lanes =			3			# thru lanes =			3		
	# left turn lanes =			1			# left turn lanes =			1			# left turn lanes =			1			# left turn lanes =			1		
	# right turn lanes =			0			# right turn lanes =			0			# right turn lanes =			0			# right turn lanes =			0		
	# bike lanes =			YES/NO			# bike lanes =			YES/NO			# bike lanes =			YES/NO			# bike lanes =			YES/NO		

End Time	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Percentage	n/a	n/a	n/a				n/a	n/a	n/a				n/a	n/a	n/a				n/a	n/a	n/a			
Peak Hour Factor	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a
LT X-Product	n/a						n/a						n/a						n/a					

End Time	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	1	2	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**2**	**0**	**0**	**0**	**3**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**
Percentage	n/a	n/a	n/a				33.3%	66.7%	n/a				n/a	n/a	100.0%				n/a	n/a	n/a			
Peak Hour Factor	n/a	n/a	n/a			n/a	0.25	0.25	n/a			0.25	n/a	n/a	0.25			0.25	n/a	n/a	n/a			n/a
LT X-Product	n/a						0						n/a						n/a					

			1,179					
			176	912	91			
			SBR	SBT	SBL			
1,100	117	EBL	2018 AM Durango & Charleston Traffic Volumes			WBR	41	614
	818	EBT				WBT	424	
	165	EBR				WBL	149	
			NBL	NBT	NBR			
			129	415	103			
			647					

			7					
			0	7	0			
			SBR	SBT	SBL			
6	0	EBL	2018 AM Durango & Charleston Pedestrian Volumes			WBR	0	7
	6	EBT				WBT	7	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	8	0			
			8					

			0					
			0	0	0			
			SBR	SBT	SBL			
2	1	EBL	2016 AM Durango & Charleston Bicycle Volumes			WBR	0	0
	1	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
			0					

			1,215					
			181	940	94			
			SBR	SBT	SBL			
1,133	121	EBL	2020 AM Durango & Charleston Traffic Volumes			WBR	42	633
	843	EBT				WBT	437	
	170	EBR				WBL	154	
			NBL	NBT	NBR			
			133	428	106			
			667					

			7					
			0	7	0			
			SBR	SBT	SBL			
6	0	EBL	2020 AM Durango & Charleston Pedestrian Volumes			WBR	0	7
	6	EBT				WBT	7	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	8	0			
			8					

			0					
			0	0	0			
			SBR	SBT	SBL			
2	1	EBL	2020 AM Durango & Charleston Bicycle Volumes			WBR	0	0
	1	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
			0					

				0.85	*0.75*	*0.81*				
				1,215						
				181	940	94				
				SBR	SBT	SBL				
0.52	1,134	121	EBL	2020 AM Durango & Charleston Traffic Volumes			WBR	42	633	*0.49*
0.77		843	EBT				WBT	437		*0.74*
0.84		170	EBR				WBL	154		*0.89*
				NBL	NBT	NBR				
				133	428	106				
				667						
				0.73	*0.74*	*0.70*				

			7					
			0	7	0			
			SBR	SBT	SBL			
6	0	EBL	2020 AM Durango & Charleston Pedestrian Volumes			WBR	0	7
	6	EBT				WBT	7	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	8	0			
			8					

			0					
			0	0	0			
			SBR	SBT	SBL			
2	1	EBL	2020 AM Durango & Charleston Bicycle Volumes			WBR	0	0
	1	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
			0					

			1,151					
			258	826	67			
			SBR	SBT	SBL			
	224	EBL	**2018 PM Durango & Charleston Traffic Volumes**			WBR	70	
1,373	900	EBT				WBT	1,036	**1,312**
	249	EBR				WBL	206	
			NBL	NBT	NBR			
			324	1,137	196			
			1,657					

			14					
			0	14	0			
			SBR	SBT	SBL			
	0	EBL	**2018 PM Durango & Charleston Pedestrian Volumes**			WBR	0	
10	10	EBT				WBT	9	**9**
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	15	0			
			15					

			0					
			0	0	0			
			SBR	SBT	SBL			
	0	EBL	**2016 PM Durango & Charleston Bicycle Volumes**			WBR	0	
0	0	EBT				WBT	2	**3**
	0	EBR				WBL	1	
			NBL	NBT	NBR			
			0	0	1			
			1					

			1,186					
			266	851	69			
			SBR	SBT	SBL			
	231	EBL	**2020 PM Durango & Charleston Traffic Volumes**			WBR	72	
1,414	927	EBT				WBT	1,067	**1,352**
	257	EBR				WBL	212	
			NBL	NBT	NBR			
			334	1,171	202			
			1,707					

			14					
			0	14	0			
			SBR	SBT	SBL			
	0	EBL	**2020 PM Durango & Charleston Pedestrian Volumes**			WBR	0	
10	10	EBT				WBT	9	**9**
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	15	0			
			15					

			0					
			0	0	0			
			SBR	SBT	SBL			
	0	EBL	**2020 PM Durango & Charleston Bicycle Volumes**			WBR	0	
0	0	EBT				WBT	2	**3**
	0	EBR				WBL	1	
			NBL	NBT	NBR			
			0	0	1			
			1					

				0.91	*0.95*	*0.84*				
				1,186						
				266	851	69				
				SBR	SBT	SBL				
0.92		231	EBL	**2020 PM Durango & Charleston Traffic Volumes**			WBR	72		*0.76*
0.89	**1,415**	927	EBT				WBT	1,067	**1,351**	*0.94*
0.89		257	EBR				WBL	212		*0.89*
				NBL	NBT	NBR				
				334	1,171	202				
				1,707						
				0.90	*0.88*	*0.96*				

			14					
			0	14	0			
			SBR	SBT	SBL			
	0	EBL	**2020 PM Durango & Charleston Pedestrian Volumes**			WBR	0	
10	10	EBT				WBT	9	**9**
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	15	0			
			15					

			0					
			0	0	0			
			SBR	SBT	SBL			
	0	EBL	**2020 PM Durango & Charleston Bicycle Volumes**			WBR	0	
0	0	EBT				WBT	2	**3**
	0	EBR				WBL	1	
			NBL	NBT	NBR			
			0	0	1			
			1					

Intersection:	STEWART AVE & EASTERN AVE			Daily total:			
Date:	10/4/16	EBT	7188	WBT	7763 =	14950	24hr 53025
Counted By:	Jim Didway / Belete Diriba	NBT	19863	SBT	18213 =	38075	total

	EASTERN AVE Southbound						STEWART AVE Westbound						EASTERN AVE Northbound						STEWART AVE Eastbound					
End Time	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total
7:15 AM	76	242	18	2	0	336	23	28	72	5	1	123	6	159	8	8	3	173	26	29	4	2	1	59
7:30 AM	74	233	20	1	2	327	24	38	57	3	0	119	4	126	10	8	0	140	36	30	5	4	0	71
7:45 AM	52	332	20	1	0	404	21	49	65	2	0	135	4	163	7	3	0	174	27	27	10	1	1	64
8:00 AM	61	280	17	1	0	358	33	68	88	1	0	189	6	196	12	8	0	214	35	47	10	3	1	92
Hourly Total	**263**	**1087**	**75**	**5**	**2**	**1425**	**101**	**183**	**282**	**11**	**1**	**566**	**20**	**644**	**37**	**27**	**3**	**701**	**124**	**133**	**29**	**10**	**3**	**286**
Percentage	**18.5%**	**76.3%**	**5.3%**				**17.8%**	**32.3%**	**49.8%**				**2.9%**	**91.9%**	**5.3%**				**43.4%**	**46.5%**	**10.1%**			
Peak Hour Factor	**0.87**	**0.82**	**0.94**			**0.88**	**0.77**	**0.67**	**0.80**			**0.75**	**0.83**	**0.82**	**0.77**			**0.82**	**0.86**	**0.71**	**0.73**			**0.78**
LT X-Product	**184,363**						**28,886**						**28,500**						**70,184**					

	Southbound	Westbound	Northbound	Eastbound
# thru lanes =	3	2	3	2
# left turn lanes =	1	1	1	1
# right turn lanes =	0	1	0	0
# bike lanes =	NO	NO	NO	NO

End Time	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Percentage	**n/a**	**n/a**	**n/a**				**n/a**	**n/a**	**n/a**				**n/a**	**n/a**	**n/a**				**n/a**	**n/a**	**n/a**			
Peak Hour Factor	**n/a**	**n/a**	**n/a**			**n/a**	**n/a**	**n/a**	**n/a**			**n/a**	**n/a**	**n/a**	**n/a**			**n/a**	**n/a**	**n/a**	**n/a**			**n/a**
LT X-Product	**n/a**						**n/a**						**n/a**						**n/a**					

End Time	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total
5:15 PM	86	264	22	2	0	372	16	51	59	1	0	126	9	394	44	5	2	447	35	91	11	9	1	137
5:30 PM	77	255	35	1	2	367	28	46	110	3	0	184	6	336	23	5	1	365	43	93	6	6	1	142
5:45 PM	71	216	23	8	0	310	21	55	74	10	2	150	10	367	36	6	0	413	47	120	4	6	0	171
6:00 PM	84	291	33	1	0	408	24	43	94	1	1	161	6	332	26	2	1	364	36	83	6	1	2	125
Hourly Total	**318**	**1026**	**113**	**12**	**2**	**1457**	**89**	**195**	**337**	**15**	**3**	**621**	**31**	**1429**	**129**	**18**	**4**	**1589**	**161**	**387**	**27**	**22**	**4**	**575**
Percentage	**21.8%**	**70.4%**	**7.8%**				**14.3%**	**31.4%**	**54.3%**				**2.0%**	**89.9%**	**8.1%**				**28.0%**	**67.3%**	**4.7%**			
Peak Hour Factor	**0.92**	**0.88**	**0.81**			**0.89**	**0.79**	**0.89**	**0.77**			**0.84**	**0.78**	**0.91**	**0.73**			**0.89**	**0.86**	**0.81**	**0.61**			**0.84**
LT X-Product	**505,302**						**51,175**						**45,167**						**99,981**					

Intersection:	STEWART AVE & EASTERN AVE	**BIKE SHEET**	Daily total:
Date:	4/7/16	EBT 50	WBT 38 = 88 24hr 163
Counted By:	Jim Didway / Belete Diriba	NBT 50	SBT 25 = 75 total

	EASTERN AVE Southbound						STEWART AVE Westbound						EASTERN AVE Northbound						STEWART AVE Eastbound					
End Time	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total
7:15 AM	0	0	0	0	0	0	0	1	0	0	0	1	0	1	2	0	0	3	1	0	0	0	0	1
7:30 AM	0	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Hourly Total	**0**	**1**	**1**	**0**	**0**	**2**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**1**	**2**	**0**	**0**	**3**	**2**	**1**	**0**	**0**	**0**	**3**
Percentage	n/a	50.0%	50.0%				n/a	100.0%	n/a				n/a	33.3%	66.7%				66.7%	33.3%	n/a			
Peak Hour Factor	n/a	0.25	0.25			0.25	n/a	0.25	n/a			0.25	n/a	0.25	0.25			0.25	0.50	0.25	n/a			0.75
LT X-Product	n/a						n/a						n/a						2					

	Southbound		Westbound		Northbound		Eastbound	
	# thru lanes =	3	# thru lanes =	3	# thru lanes =	3	# thru lanes =	3
	# left turn lanes =	1	# left turn lanes =	1	# left turn lanes =	1	# left turn lanes =	1
	# right turn lanes =	0	# right turn lanes =	0	# right turn lanes =	0	# right turn lanes =	0
	# bike lanes =	YES/NO	# bike lanes =	YES/NO	# bike lanes =	YES/NO	# bike lanes =	YES/NO

End Time	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Percentage	n/a	n/a	n/a				n/a	n/a	n/a				n/a	n/a	n/a				n/a	n/a	n/a			
Peak Hour Factor	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a
LT X-Product	n/a						n/a						n/a						n/a					

End Time	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	1	0	0	0	1
5:30 PM	0	1	0	1	0	2	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	1
5:45 PM	0	0	0	0	0	0	1	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	1	0	1	0	1	0	2
Hourly Total	**0**	**1**	**0**	**1**	**0**	**2**	**1**	**1**	**0**	**1**	**0**	**3**	**0**	**3**	**0**	**1**	**0**	**4**	**0**	**3**	**0**	**1**	**0**	**4**
Percentage	n/a	50.0%	n/a				33.3%	33.3%	n/a				n/a	75.0%	n/a				n/a	75.0%	n/a			
Peak Hour Factor	n/a	0.25	n/a			0.25	0.25	0.25	n/a			0.38	n/a	0.75	n/a			0.50	n/a	0.75	n/a			0.50
LT X-Product	n/a						3						n/a						n/a					

			1,425					
			75	1,087	263			
			SBR	SBT	SBL			
286	124	EBL	2016 AM Eastern & Stewart Traffic Volumes			WBR	282	566
	133	EBT				WBT	183	
	29	EBR				WBL	101	
			NBL	NBT	NBR			
			20	644	37			
			701					

			5					
			0	5	0			
			SBR	SBT	SBL			
10	0	EBL	2016 AM Eastern & Stewart Pedestrian Volumes			WBR	0	11
	10	EBT				WBT	11	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	27	0			
			27					

			2					
			1	1	0			
			SBR	SBT	SBL			
3	2	EBL	2016 AM Eastern & Stewart Bicycle Volumes			WBR	0	1
	1	EBT				WBT	1	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	1	2			
			3					

			1,512					
			80	1,154	279			
			SBR	SBT	SBL			
304	132	EBL	2020 AM Eastern & Stewart Traffic Volumes			WBR	299	601
	141	EBT				WBT	194	
	31	EBR				WBL	107	
			NBL	NBT	NBR			
			21	684	39			
			744					

			5					
			0	5	0			
			SBR	SBT	SBL			
11	0	EBL	2020 AM Eastern & Stewart Pedestrian Volumes			WBR	0	12
	11	EBT				WBT	12	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	29	0			
			29					

			2					
			1	1	0			
			SBR	SBT	SBL			
3	2	EBL	2020 AM Eastern & Stewart Bicycle Volumes			WBR	0	1
	1	EBT				WBT	1	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	1	2			
			3					

				0.94	*0.82*	*0.87*				
				1,513						
				80	1,154	279				
				SBR	SBT	SBL				
0.86	304	132	EBL	2020 AM Eastern & Stewart Traffic Volumes			WBR	299	600	*0.80*
0.71		141	EBT				WBT	194		*0.67*
0.73		31	EBR				WBL	107		*0.77*
				NBL	NBT	NBR				
				21	684	39				
				744						
				0.83	*0.82*	*0.77*				

			5					
			0	5	0			
			SBR	SBT	SBL			
11	0	EBL	2020 AM Eastern & Stewart Pedestrian Volumes			WBR	0	12
	11	EBT				WBT	12	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	29	0			
			29					

			2					
			1	1	0			
			SBR	SBT	SBL			
3	2	EBL	2020 AM Eastern & Stewart Bicycle Volumes			WBR	0	1
	1	EBT				WBT	1	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	1	2			
			3					

			1,457					
			113	1,026	318			
			SBR	SBT	SBL			
575	161	EBL	2016 PM Eastern & Stewart Traffic Volumes			WBR	337	621
	387	EBT				WBT	195	
	27	EBR				WBL	89	
			NBL	NBT	NBR			
			31	1,429	129			
			1,589					

			12					
			0	12	0			
			SBR	SBT	SBL			
22	0	EBL	2016 PM Eastern & Stewart Pedestrian Volumes			WBR	0	15
	22	EBT				WBT	15	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	18	0			
			18					

			2					
			0	2	0			
			SBR	SBT	SBL			
4	0	EBL	2016 PM Eastern & Stewart Bicycle Volumes			WBR	0	3
	4	EBT				WBT	2	
	0	EBR				WBL	1	
			NBL	NBT	NBR			
			0	4	0			
			4					

			1,546					
			120	1,089	338			
			SBR	SBT	SBL			
610	171	EBL	2020 PM Eastern & Stewart Traffic Volumes			WBR	358	659
	411	EBT				WBT	207	
	29	EBR				WBL	94	
			NBL	NBT	NBR			
			33	1,517	137			
			1,687					

			13					
			0	13	0			
			SBR	SBT	SBL			
23	0	EBL	2020 PM Eastern & Stewart Pedestrian Volumes			WBR	0	16
	23	EBT				WBT	16	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	19	0			
			19					

			2					
			0	2	0			
			SBR	SBT	SBL			
4	0	EBL	2020 PM Eastern & Stewart Bicycle Volumes			WBR	0	3
	4	EBT				WBT	2	
	0	EBR				WBL	1	
			NBL	NBT	NBR			
			0	4	0			
			4					

				0.81	*0.88*	*0.92*				
				1,547						
				120	1,089	338				
				SBR	SBT	SBL				
0.86	611	171	EBL	2020 PM Eastern & Stewart Traffic Volumes			WBR	358	659	*0.77*
0.81		411	EBT				WBT	207		*0.89*
0.61		29	EBR				WBL	94		*0.79*
				NBL	NBT	NBR				
				33	1,517	137				
				1,687						
				0.78	*0.91*	*0.73*				

			13					
			0	13	0			
			SBR	SBT	SBL			
23	0	EBL	2020 PM Eastern & Stewart Pedestrian Volumes			WBR	0	16
	23	EBT				WBT	16	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	19	0			
			19					

			2					
			0	2	0			
			SBR	SBT	SBL			
4	0	EBL	2020 PM Eastern & Stewart Bicycle Volumes			WBR	0	3
	4	EBT				WBT	2	
	0	EBR				WBL	1	
			NBL	NBT	NBR			
			0	4	0			
			4					

Intersection: SAHARA AVE & FT APACHE RD

Date: 5/6/14

Counted By: Jim Didway / Belete Diriba

Daily total:					
EBT	12525	WBT	22588 =	35113	24hr 72050
NBT	18138	SBT	18800 =	36938	total

FT APACHE RD Southbound / SAHARA AVE Westbound

End Time	SB Left Turn	SB Through	SB Right Turn	SB Peds	SB Approach Total	WB Left Turn	WB Through	WB Right Turn	WB Peds	WB Approach Total
7:15 AM	57	136	16	1	209	11	84	25	1	120
7:30 AM	50	116	13	4	179	20	67	22	2	109
7:45 AM	89	205	17	0	311	24	105	38	4	167
8:00 AM	88	212	29	3	329	38	111	30	3	179
Hourly Total	**284**	**669**	**75**	**8**	**1028**	**93**	**367**	**115**	**10**	**575**
Percentage	27.6%	65.1%	7.3%			16.2%	63.8%	20.0%		
Peak Hour Factor	0.80	0.79	0.65		0.78	0.61	0.83	0.76		0.80
LT X-Product	233,732					101,556				
# thru lanes =	3					3				
# left turn lanes =	2					2				
# right turn lanes =	0					1				
12:15 PM	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0
Hourly Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Percentage	n/a	n/a	n/a			n/a	n/a	n/a		
Peak Hour Factor	n/a	n/a	n/a		n/a	n/a	n/a	n/a		n/a
LT X-Product	n/a					n/a				
5:15 PM	78	240	29	4	347	97	272	74	6	443
5:30 PM	55	291	40	3	386	113	260	95	1	468
5:45 PM	75	271	39	2	385	95	293	86	9	474
6:00 PM	85	262	39	1	386	90	255	77	2	422
Hourly Total	**293**	**1064**	**147**	**10**	**1504**	**395**	**1080**	**332**	**18**	**1807**
Percentage	19.5%	70.7%	9.8%			21.9%	59.8%	18.4%		
Peak Hour Factor	0.86	0.91	0.92		0.97	0.87	0.92	0.87		0.95
LT X-Product	425,143					395,790				

FT APACHE RD Northbound / SAHARA AVE Eastbound

End Time	NB Left Turn	NB Through	NB Right Turn	NB Peds	NB Approach Total	EB Left Turn	EB Through	EB Right Turn	EB Peds	EB Approach Total
7:15 AM	15	103	21	4	139	30	159	15	3	204
7:30 AM	22	127	38	1	187	20	203	24	7	247
7:45 AM	24	157	45	8	226	32	199	21	4	252
8:00 AM	17	199	55	3	271	41	321	27	0	389
Hourly Total	**78**	**586**	**159**	**16**	**823**	**123**	**882**	**87**	**14**	**1092**
Percentage	9.5%	71.2%	19.3%			11.3%	80.8%	8.0%		
Peak Hour Factor	0.81	0.74	0.72		0.76	0.75	0.69	0.81		0.70
LT X-Product	80,184					70,725				
# thru lanes =	3					3				
# left turn lanes =	2					2				
# right turn lanes =	0					1				
12:15 PM	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0
Hourly Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Percentage	n/a	n/a	n/a			n/a	n/a	n/a		
Peak Hour Factor	n/a	n/a	n/a		n/a	n/a	n/a	n/a		n/a
LT X-Product	n/a					n/a				
5:15 PM	89	227	39	5	355	64	171	28	3	263
5:30 PM	79	269	38	5	386	64	154	29	7	247
5:45 PM	65	237	40	3	342	55	141	54	3	250
6:00 PM	79	250	39	13	368	59	159	24	10	242
Hourly Total	**312**	**983**	**156**	**26**	**1451**	**242**	**625**	**135**	**23**	**1002**
Percentage	21.5%	67.7%	10.8%			24.2%	62.4%	13.5%		
Peak Hour Factor	0.88	0.91	0.98		0.94	0.95	0.91	0.63		0.95
LT X-Product	469,248					437,294				

				1,028				
			75	669	284			
			SBR	SBT	SBL			
1,092	123	EBL	2014 AM Ft Apache & Sahara Traffic Volumes			WBR	115	575
	882	EBT				WBT	367	
	87	EBR				WBL	93	
			NBL	NBT	NBR			
			78	586	159			
				823				

				8				
			0	8	0			
			SBR	SBT	SBL			
14	0	EBL	2014 AM Ft Apache & Sahara Pedestrian Volumes			WBR	0	10
	14	EBT				WBT	10	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	16	0			
				16				

				0				
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	2014 AM Ft Apache & Sahara Bicycle Volumes			WBR	0	0
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

				1,124				
			82	732	311			
			SBR	SBT	SBL			
1,194	134	EBL	2020 AM Ft Apache & Sahara Traffic Volumes			WBR	126	629
	964	EBT				WBT	401	
	95	EBR				WBL	102	
			NBL	NBT	NBR			
			85	641	174			
				900				

				9				
			0	9	0			
			SBR	SBT	SBL			
15	0	EBL	2020 AM Ft Apache & Sahara Pedestrian Volumes			WBR	0	11
	15	EBT				WBT	11	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	17	0			
				17				

				0				
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	2020 AM Ft Apache & Sahara Bicycle Volumes			WBR	0	0
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

				0.65	*0.79*	*0.80*				
					1,125					
				82	732	311				
				SBR	SBT	SBL				
0.75	1,193	134	EBL	2020 AM Ft Apache & Sahara Traffic Volumes			WBR	126	629	*0.76*
0.69		964	EBT				WBT	401		*0.83*
0.81		95	EBR				WBL	102		*0.61*
				NBL	NBT	NBR				
				85	641	174				
					900					
				0.81	*0.74*	*0.72*				

				9				
			0	9	0			
			SBR	SBT	SBL			
15	0	EBL	2020 AM Ft Apache & Sahara Pedestrian Volumes			WBR	0	11
	15	EBT				WBT	11	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	17	0			
				17				

				0				
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	2020 AM Ft Apache & Sahara Bicycle Volumes			WBR	0	0
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

				1,504				
			147	1,064	293			
			SBR	SBT	SBL			
1,002	242	EBL	2014 PM Ft Apache & Sahara Traffic Volumes			WBR	332	1,807
	625	EBT				WBT	1,080	
	135	EBR				WBL	395	
			NBL	NBT	NBR			
			312	983	156			
				1,451				

				10				
			0	10	0			
			SBR	SBT	SBL			
23	0	EBL	2014 PM Ft Apache & Sahara Pedestrian Volumes			WBR	0	18
	23	EBT				WBT	18	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	26	0			
				26				

				0				
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	2014 PM Ft Apache & Sahara Bicycle Volumes			WBR	0	0
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

				1,645				
			161	1,163	320			
			SBR	SBT	SBL			
1,096	265	EBL	2020 PM Ft Apache & Sahara Traffic Volumes			WBR	363	1,976
	683	EBT				WBT	1,181	
	148	EBR				WBL	432	
			NBL	NBT	NBR			
			341	1,075	171			
				1,587				

				11				
			0	11	0			
			SBR	SBT	SBL			
25	0	EBL	2020 PM Ft Apache & Sahara Pedestrian Volumes			WBR	0	20
	25	EBT				WBT	20	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	28	0			
				28				

				0				
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	2020 PM Ft Apache & Sahara Bicycle Volumes			WBR	0	0
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

				0.92	*0.91*	*0.86*				
					1,644					
				161	1,163	320				
				SBR	SBT	SBL				
0.95	1,096	265	EBL	2020 PM Ft Apache & Sahara Traffic Volumes			WBR	363	1,976	*0.87*
0.91		683	EBT				WBT	1,181		*0.92*
0.63		148	EBR				WBL	432		*0.87*
				NBL	NBT	NBR				
				341	1,075	171				
					1,587					
				0.88	*0.91*	*0.98*				

				11				
			0	11	0			
			SBR	SBT	SBL			
25	0	EBL	2020 PM Ft Apache & Sahara Pedestrian Volumes			WBR	0	20
	25	EBT				WBT	20	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	28	0			
				28				

				0				
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	2020 PM Ft Apache & Sahara Bicycle Volumes			WBR	0	0
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

Intersection: BONANZA RD & ML KING BLVD
Date: 2/27/14
Counted By: Jim Didway / Belete Diriba

Daily total:

EBT	6088	WBT	13013 =	19100	24hr	62050
NBT	23313	SBT	19638 =	42950	total	

	ML KING BLVD Southbound					BONANZA RD Westbound					ML KING BLVD Northbound					BONANZA RD Eastbound				
End Time	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total
7:15 AM	35	445	6	1	486	17	26	20	1	63	18	266	24	1	308	5	63	39	7	107
7:30 AM	19	482	9	1	510	27	32	25	3	84	12	223	33	3	268	5	36	45	3	86
7:45 AM	36	456	5	4	497	33	33	12	2	78	16	258	29	3	303	11	70	55	6	136
8:00 AM	32	570	3	2	605	54	37	15	0	106	14	244	37	0	295	7	73	83	7	163
Hourly Total	**122**	**1953**	**23**	**8**	**2098**	**131**	**128**	**72**	**6**	**331**	**60**	**991**	**123**	**7**	**1174**	**28**	**242**	**222**	**23**	**492**
Percentage	5.8%	93.1%	1.1%			39.6%	38.7%	21.8%			5.1%	84.4%	10.5%			5.7%	49.2%	45.1%		
Peak Hour Factor	0.85	0.86	0.64		0.87	0.61	0.86	0.72		0.78	0.83	0.93	0.83		0.95	0.64	0.83	0.67		0.75
LT X-Product	143,228					64,452					125,880					9,268				
	# thru lanes =			3		# thru lanes =			2		# thru lanes =			3		# thru lanes =			2	
	# left turn lanes =			2		# left turn lanes =			2		# left turn lanes =			2		# left turn lanes =			2	
	# right turn lanes =			1		# right turn lanes =			1		# right turn lanes =			0		# right turn lanes =			1	

End Time	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Percentage	n/a	n/a	n/a			n/a	n/a	n/a			n/a	n/a	n/a			n/a	n/a	n/a		
Peak Hour Factor	n/a	n/a	n/a		n/a	n/a	n/a	n/a		n/a	n/a	n/a	n/a		n/a	n/a	n/a	n/a		n/a
LT X-Product	n/a					n/a					n/a					n/a				

End Time	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total
5:15 PM	37	326	11	7	374	70	91	53	3	214	23	427	24	6	474	23	58	49	4	130
5:30 PM	31	344	7	4	382	102	150	76	1	328	23	397	29	5	449	17	53	46	5	116
5:45 PM	42	381	7	4	430	81	128	61	3	270	20	372	31	2	423	18	90	41	8	149
6:00 PM	36	341	8	6	385	70	94	65	5	229	30	461	28	2	519	21	40	31	9	92
Hourly Total	**146**	**1392**	**33**	**21**	**1571**	**323**	**463**	**255**	**12**	**1041**	**96**	**1657**	**112**	**15**	**1865**	**79**	**241**	**167**	**26**	**487**
Percentage	9.3%	88.6%	2.1%			31.0%	44.5%	24.5%			5.1%	88.8%	6.0%			16.2%	49.5%	34.3%		
Peak Hour Factor	0.87	0.91	0.75		0.91	0.79	0.77	0.84		0.79	0.80	0.90	0.90		0.90	0.86	0.67	0.85		0.82
LT X-Product	272,290					157,301					150,816					82,239				

			2,098					
			23	1,953	122			
			SBR	SBT	SBL			
492	28	EBL	**2014 AM Martin Luther King & Bonanza Traffic Volumes**			WBR	72	**331**
	242	EBT				WBT	128	
	222	EBR				WBL	131	
			NBL	NBT	NBR			
			60	991	123			
			1,174					

			8					
			0	8	0			
			SBR	SBT	SBL			
23	0	EBL	**2014 AM Martin Luther King & Bonanza Pedestrian Volumes**			WBR	0	**6**
	23	EBT				WBT	6	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	7	0			
			7					

			0					
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	**2014 AM Martin Luther King & Bonanza Bicycle Volumes**			WBR	0	**0**
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
			0					

			2,294					
			25	2,135	133			
			SBR	SBT	SBL			
538	31	EBL	**2020 AM Martin Luther King & Bonanza Traffic Volumes**			WBR	79	**362**
	265	EBT				WBT	140	
	243	EBR				WBL	143	
			NBL	NBT	NBR			
			66	1,084	134			
			1,284					

			9					
			0	9	0			
			SBR	SBT	SBL			
25	0	EBL	**2020 AM Martin Luther King & Bonanza Pedestrian Volumes**			WBR	0	**7**
	25	EBT				WBT	7	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	8	0			
			8					

			0					
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	**2020 AM Martin Luther King & Bonanza Bicycle Volumes**			WBR	0	**0**
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
			0					

				0.64	*0.86*	*0.85*				
				2,293						
				25	2,135	133				
				SBR	SBT	SBL				
0.64	**539**	31	EBL	**2020 AM Martin Luther King & Bonanza Traffic Volumes**			WBR	79	**362**	*0.72*
0.83		265	EBT				WBT	140		*0.86*
0.67		243	EBR				WBL	143		*0.61*
				NBL	NBT	NBR				
				66	1,084	134				
				1,284						
				0.83	*0.93*	*0.83*				

			9					
			0	9	0			
			SBR	SBT	SBL			
25	0	EBL	**2020 AM Martin Luther King & Bonanza Pedestrian Volumes**			WBR	0	**7**
	25	EBT				WBT	7	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	8	0			
			8					

			0					
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	**2020 AM Martin Luther King & Bonanza Bicycle Volumes**			WBR	0	**0**
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
			0					

				1,571				
			33	1,392	146			
			SBR	SBT	SBL			
487	79	EBL	2014 PM Martin Luther King & Bonanza Traffic Volumes			WBR	255	1,041
	241	EBT				WBT	463	
	167	EBR				WBL	323	
			NBL	NBT	NBR			
			96	1,657	112			
				1,865				

				21				
			0	21	0			
			SBR	SBT	SBL			
26	0	EBL	2014 PM Martin Luther King & Bonanza Pedestrian Volumes			WBR	0	12
	26	EBT				WBT	12	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	15	0			
				15				

				0				
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	2014 PM Martin Luther King & Bonanza Bicycle Volumes			WBR	0	0
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

				1,718				
			36	1,522	160			
			SBR	SBT	SBL			
533	86	EBL	2020 PM Martin Luther King & Bonanza Traffic Volumes			WBR	279	1,138
	264	EBT				WBT	506	
	183	EBR				WBL	353	
			NBL	NBT	NBR			
			105	1,812	122			
				2,039				

				23				
			0	23	0			
			SBR	SBT	SBL			
28	0	EBL	2020 PM Martin Luther King & Bonanza Pedestrian Volumes			WBR	0	13
	28	EBT				WBT	13	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	16	0			
				16				

				0				
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	2020 PM Martin Luther King & Bonanza Bicycle Volumes			WBR	0	0
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

				0.75	*0.91*	*0.87*				
					1,718					
				36	1,522	160				
				SBR	SBT	SBL				
0.86	533	86	EBL	2020 PM Martin Luther King & Bonanza Traffic Volumes			WBR	279	1,138	*0.84*
0.67		264	EBT				WBT	506		*0.77*
0.85		183	EBR				WBL	353		*0.79*
				NBL	NBT	NBR				
				105	1,812	122				
					2,039					
				0.80	*0.90*	*0.90*				

				23				
			0	23	0			
			SBR	SBT	SBL			
28	0	EBL	2020 PM Martin Luther King & Bonanza Pedestrian Volumes			WBR	0	13
	28	EBT				WBT	13	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	16	0			
				16				

				0				
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	2020 PM Martin Luther King & Bonanza Bicycle Volumes			WBR	0	0
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

Intersection: LAKE MEAD BLVD & RAINBOW BLVD
Date: 10/3/17
Counted By: Jim Didway / Belete Diriba

			Daily total:			
EBT	22663		WBT	13975 =	36638	24hr 59700
NBT	13113		SBT	9950 =	23063	total

	RAINBOW BLVD Southbound						LAKE MEAD BLVD Westbound						RAINBOW BLVD Northbound						LAKE MEAD BLVD Eastbound					
End Time	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total
7:15 AM	3	47	29	0	0	79	17	137	27	1	0	181	28	70	22	6	0	120	57	171	42	0	0	270
7:30 AM	13	134	74	0	0	221	19	130	22	2	1	171	19	69	15	2	1	103	62	136	29	0	1	227
7:45 AM	9	135	49	0	0	193	35	171	23	2	0	229	13	78	27	2	0	118	47	127	29	0	0	203
8:00 AM	14	131	73	0	0	218	41	207	40	2	0	288	21	90	32	2	0	143	73	167	21	0	1	261
Hourly Total	**39**	**447**	**225**	**0**	**0**	**711**	**112**	**645**	**112**	**7**	**1**	**869**	**81**	**307**	**96**	**12**	**1**	**484**	**239**	**601**	**121**	**0**	**2**	**961**
Percentage	5.5%	62.9%	31.6%				12.9%	74.2%	12.9%				16.7%	63.4%	19.8%				24.9%	62.5%	12.6%			
Peak Hour Factor	0.70	0.83	0.76			0.80	0.68	0.78	0.70			0.75	0.72	0.85	0.75			0.85	0.82	0.88	0.72			0.89
LT X-Product	18,876						107,632						57,591						207,691					

	Southbound	Westbound	Northbound	Eastbound
# thru lanes =	2	3	2	3
# left turn lanes =	2	2	2	2
# right turn lanes =	1	1	1	1
# bike lanes =	NO	NO	NO	NO

End Time	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Percentage	n/a	n/a	n/a				n/a	n/a	n/a				n/a	n/a	n/a				n/a	n/a	n/a			
Peak Hour Factor	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a
LT X-Product	n/a						n/a						n/a						n/a					

End Time	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total
5:15 PM	21	91	73	0	0	185	43	210	45	5	0	298	48	190	44	6	0	282	140	218	86	0	0	444
5:30 PM	11	110	71	0	1	192	42	184	42	7	0	268	41	159	33	6	0	233	160	253	63	0	1	476
5:45 PM	26	101	73	0	1	200	39	192	47	2	0	278	46	195	44	4	0	285	149	196	78	0	0	423
6:00 PM	26	114	79	0	0	219	56	167	51	0	0	274	35	186	28	2	0	249	187	236	47	0	0	470
Hourly Total	**84**	**416**	**296**	**0**	**2**	**796**	**180**	**753**	**185**	**14**	**0**	**1118**	**170**	**730**	**149**	**18**	**0**	**1049**	**636**	**903**	**274**	**0**	**1**	**1813**
Percentage	10.6%	52.3%	37.2%				16.1%	67.4%	16.5%				16.2%	69.6%	14.2%				35.1%	49.8%	15.1%			
Peak Hour Factor	0.81	0.91	0.94			0.91	0.80	0.90	0.91			0.94	0.89	0.94	0.85			0.92	0.85	0.89	0.80			0.95
LT X-Product	88,116						326,340						135,320						711,048					

Intersection:	LAKE MEAD BLVD & RAINBOW BLVD	BIKE SHEET		Daily total:			
Date:	4/7/16	EBT	13	WBT	0 =	13	24hr 38
Counted By:	Jim Didway / Belete Diriba	NBT	0	SBT	25 =	25	total

	RAINBOW BLVD Southbound						LAKE MEAD BLVD Westbound						RAINBOW BLVD Northbound						LAKE MEAD BLVD Eastbound					
End Time	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	1
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Hourly Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**2**	**0**	**0**	**0**	**2**
Percentage	n/a	n/a	n/a				n/a	100.0%	n/a				n/a	100.0%	n/a				n/a	100.0%	n/a			
Peak Hour Factor	n/a	n/a	n/a			n/a	n/a	0.25	n/a			0.25	n/a	0.25	n/a			0.25	n/a	0.50	n/a			0.50
LT X-Product	n/a						n/a						n/a						n/a					
	# thru lanes =			3			# thru lanes =			3			# thru lanes =			3			# thru lanes =			3		
	# left turn lanes =			1			# left turn lanes =			1			# left turn lanes =			1			# left turn lanes =			1		
	# right turn lanes =			0			# right turn lanes =			0			# right turn lanes =			0			# right turn lanes =			0		
	# bike lanes =			YES/NO			# bike lanes =			YES/NO			# bike lanes =			YES/NO			# bike lanes =			YES/NO		

End Time	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Percentage	n/a	n/a	n/a				n/a	n/a	n/a				n/a	n/a	n/a				n/a	n/a	n/a			
Peak Hour Factor	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a
LT X-Product	n/a						n/a						n/a						n/a					

End Time	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
5:45 PM	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	**1**	**1**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**
Percentage	50.0%	50.0%	n/a				n/a	n/a	n/a				n/a	n/a	n/a				n/a	100.0%	n/a			
Peak Hour Factor	0.25	0.25	n/a			0.50	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a	n/a	0.25	n/a			0.25
LT X-Product	0						n/a						n/a						n/a					

				711				
			225	447	39			
			SBR	SBT	SBL			
961	239	EBL	**2017 AM Rainbow & Lake Mead Traffic Volumes**			WBR	112	**869**
	601	EBT				WBT	645	
	121	EBR				WBL	112	
			NBL	NBT	NBR			
			81	307	96			
				484				

				0				
			0	0	0			
			SBR	SBT	SBL			
7	0	EBL	**2017 AM Rainbow & Lake Mead Pedestrian Volumes**			WBR	0	**0**
	7	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	12	0			
				12				

				0				
			0	0	0			
			SBR	SBT	SBL			
2	0	EBL	**2016 AM Rainbow & Lake Mead Bicycle Volumes**			WBR	0	**1**
	2	EBT				WBT	1	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	1	0			
				1				

				743				
			235	467	41			
			SBR	SBT	SBL			
1,005	250	EBL	**2020 AM Rainbow & Lake Mead Traffic Volumes**			WBR	117	**909**
	628	EBT				WBT	674	
	127	EBR				WBL	117	
			NBL	NBT	NBR			
			85	321	100			
				506				

				0				
			0	0	0			
			SBR	SBT	SBL			
7	0	EBL	**2020 AM Rainbow & Lake Mead Pedestrian Volumes**			WBR	0	**0**
	7	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	13	0			
				13				

				0				
			0	0	0			
			SBR	SBT	SBL			
2	0	EBL	**2020 AM Rainbow & Lake Mead Bicycle Volumes**			WBR	0	**1**
	2	EBT				WBT	1	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	1	0			
				1				

				0.76	*0.83*	*0.70*				
					743					
				235	467	41				
				SBR	SBT	SBL				
0.82	**1,005**	250	EBL	**2020 AM Rainbow & Lake Mead Traffic Volumes**			WBR	117	**908**	*0.70*
0.88		628	EBT				WBT	674		*0.78*
0.72		127	EBR				WBL	117		*0.68*
				NBL	NBT	NBR				
				85	321	100				
					506					
				0.72	*0.85*	*0.75*				

				0				
			0	0	0			
			SBR	SBT	SBL			
7	0	EBL	**2020 AM Rainbow & Lake Mead Pedestrian Volumes**			WBR	0	**0**
	7	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	13	0			
				13				

				0				
			0	0	0			
			SBR	SBT	SBL			
2	0	EBL	**2020 AM Rainbow & Lake Mead Bicycle Volumes**			WBR	0	**1**
	2	EBT				WBT	1	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	1	0			
				1				

			796					
			296	416	84			
			SBR	SBT	SBL			
1,813	636	EBL	2017 PM Rainbow & Lake Mead Traffic Volumes			WBR	185	1,118
	903	EBT				WBT	753	
	274	EBR				WBL	180	
			NBL	NBT	NBR			
			170	730	149			
			1,049					

			0					
			0	0	0			
			SBR	SBT	SBL			
14	0	EBL	2017 PM Rainbow & Lake Mead Pedestrian Volumes			WBR	0	0
	14	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	18	0			
			18					

			2					
			0	1	1			
			SBR	SBT	SBL			
1	0	EBL	2016 PM Rainbow & Lake Mead Bicycle Volumes			WBR	0	0
	1	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
			0					

			832					
			310	435	88			
			SBR	SBT	SBL			
1,896	665	EBL	2020 PM Rainbow & Lake Mead Traffic Volumes			WBR	193	1,169
	944	EBT				WBT	787	
	287	EBR				WBL	188	
			NBL	NBT	NBR			
			178	763	156			
			1,097					

			0					
			0	0	0			
			SBR	SBT	SBL			
15	0	EBL	2020 PM Rainbow & Lake Mead Pedestrian Volumes			WBR	0	0
	15	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	19	0			
			19					

			2					
			0	1	1			
			SBR	SBT	SBL			
1	0	EBL	2020 PM Rainbow & Lake Mead Bicycle Volumes			WBR	0	0
	1	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
			0					

				0.94	*0.91*	*0.81*				
				833						
				310	435	88				
				SBR	SBT	SBL				
0.85	1,896	665	EBL	2020 PM Rainbow & Lake Mead Traffic Volumes			WBR	193	1,168	*0.91*
0.89		944	EBT				WBT	787		*0.90*
0.80		287	EBR				WBL	188		*0.80*
				NBL	NBT	NBR				
				178	763	156				
				1,097						
				0.89	*0.94*	*0.85*				

			0					
			0	0	0			
			SBR	SBT	SBL			
15	0	EBL	2020 PM Rainbow & Lake Mead Pedestrian Volumes			WBR	0	0
	15	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	19	0			
			19					

			2					
			0	1	1			
			SBR	SBT	SBL			
1	0	EBL	2020 PM Rainbow & Lake Mead Bicycle Volumes			WBR	0	0
	1	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
			0					

Intersection: CHARLESTON BLVD & RAINBOW BLVD
Date: 4/9/14
Counted By: Jim Didway / Belete Diriba

Daily total:

EBT	16075	WBT	19588 =	35663	24hr	90488
NBT	30700	SBT	24125 =	54825	total	

	RAINBOW BLVD Southbound					CHARLESTON BLVD Westbound					RAINBOW BLVD Northbound					CHARLESTON BLVD Eastbound				
End Time	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total
7:15 AM	66	413	17	3	496	37	104	16	2	157	67	201	31	5	299	22	200	65	4	287
7:30 AM	47	457	24	4	528	43	70	17	4	130	41	215	32	3	288	17	134	41	0	192
7:45 AM	79	439	26	6	544	41	103	18	1	162	25	207	46	2	278	21	218	58	2	297
8:00 AM	101	561	32	6	694	27	117	29	12	173	28	293	78	11	399	39	292	59	4	390
Hourly Total	**293**	**1870**	**99**	**19**	**2262**	**148**	**394**	**80**	**19**	**622**	**161**	**916**	**187**	**21**	**1264**	**99**	**844**	**223**	**10**	**1166**
Percentage	13.0%	82.7%	4.4%			23.8%	63.3%	12.9%			12.7%	72.5%	14.8%			8.5%	72.4%	19.1%		
Peak Hour Factor	0.73	0.83	0.77		0.81	0.86	0.84	0.69		0.90	0.60	0.78	0.60		0.79	0.63	0.72	0.86		0.75
LT X-Product	370,352					172,568					364,182					61,578				
# thru lanes =	3					3					3					3				
# left turn lanes =	2					2					2					2				
# right turn lanes =	1					0					1					0				

End Time	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Percentage	n/a	n/a	n/a			n/a	n/a	n/a			n/a	n/a	n/a			n/a	n/a	n/a		
Peak Hour Factor	n/a	n/a	n/a		n/a	n/a	n/a	n/a		n/a	n/a	n/a	n/a		n/a	n/a	n/a	n/a		n/a
LT X-Product	n/a					n/a					n/a					n/a				

End Time	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total
5:15 PM	87	367	30	19	484	84	240	66	7	390	79	473	52	11	604	76	183	49	18	308
5:30 PM	93	377	35	6	505	73	310	69	7	452	88	461	62	9	611	88	176	47	5	311
5:45 PM	73	351	34	9	458	44	242	57	3	343	64	463	52	8	579	101	224	40	4	365
6:00 PM	82	367	34	9	483	78	259	45	3	382	83	522	57	4	662	66	190	46	4	302
Hourly Total	**335**	**1462**	**133**	**43**	**1930**	**279**	**1051**	**237**	**20**	**1567**	**314**	**1919**	**223**	**32**	**2456**	**331**	**773**	**182**	**31**	**1286**
Percentage	17.4%	75.8%	6.9%			17.8%	67.1%	15.1%			12.8%	78.1%	9.1%			25.7%	60.1%	14.2%		
Peak Hour Factor	0.90	0.97	0.95		0.96	0.83	0.85	0.86		0.87	0.89	0.92	0.90		0.93	0.82	0.86	0.93		0.88
LT X-Product	822,760					358,794					606,020					518,677				

				2,262				
			99	1,870	293			
			SBR	SBT	SBL			
1,166	99	EBL	2014 AM Rainbow & Charleston Traffic Volumes			WBR	80	622
	844	EBT				WBT	394	
	223	EBR				WBL	148	
			NBL	NBT	NBR			
			161	916	187			
				1,264				

				19				
			0	19	0			
			SBR	SBT	SBL			
10	0	EBL	2014 AM Rainbow & Charleston Pedestrian Volumes			WBR	0	19
	10	EBT				WBT	19	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	21	0			
				21				

				0				
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	2014 AM Rainbow & Charleston Bicycle Volumes			WBR	0	0
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

				2,473				
			108	2,045	320			
			SBR	SBT	SBL			
1,275	108	EBL	2020 AM Rainbow & Charleston Traffic Volumes			WBR	87	680
	923	EBT				WBT	431	
	244	EBR				WBL	162	
			NBL	NBT	NBR			
			176	1,002	204			
				1,382				

				21				
			0	21	0			
			SBR	SBT	SBL			
11	0	EBL	2020 AM Rainbow & Charleston Pedestrian Volumes			WBR	0	21
	11	EBT				WBT	21	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	23	0			
				23				

				0				
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	2020 AM Rainbow & Charleston Bicycle Volumes			WBR	0	0
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

				0.77	*0.83*	*0.73*			
					2,473				
				108	2,045	320			
				SBR	SBT	SBL			
0.63	1,275	108	EBL	2020 AM Rainbow & Charleston Traffic Volumes			WBR	87	680
0.72		923	EBT				WBT	431	
0.86		244	EBR				WBL	162	
				NBL	NBT	NBR			
				176	1,002	204			
					1,382				
				0.60	*0.78*	*0.60*			

					21				
				0	21	0			
				SBR	SBT	SBL			
0.69	11	0	EBL	2020 AM Rainbow & Charleston Pedestrian Volumes			WBR	0	21
0.84		11	EBT				WBT	21	
0.86		0	EBR				WBL	0	
				NBL	NBT	NBR			
				0	23	0			
					23				

				0				
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	2020 AM Rainbow & Charleston Bicycle Volumes			WBR	0	0
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

				1,930				
			133	1,462	335			
			SBR	SBT	SBL			
	331	EBL	2014 PM Rainbow & Charleston Traffic Volumes			WBR	237	
1,286	773	EBT				WBT	1,051	1,567
	182	EBR				WBL	279	
			NBL	NBT	NBR			
			314	1,919	223			
				2,456				

				43				
			0	43	0			
			SBR	SBT	SBL			
	0	EBL	2014 PM Rainbow & Charleston Pedestrian Volumes			WBR	0	
31	31	EBT				WBT	20	20
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	32	0			
				32				

				0				
			0	0	0			
			SBR	SBT	SBL			
	0	EBL	2014 PM Rainbow & Charleston Bicycle Volumes			WBR	0	
0	0	EBT				WBT	0	0
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

				2,110				
			145	1,599	366			
			SBR	SBT	SBL			
	362	EBL	2020 PM Rainbow & Charleston Traffic Volumes			WBR	259	
1,406	845	EBT				WBT	1,149	1,713
	199	EBR				WBL	305	
			NBL	NBT	NBR			
			343	2,098	244			
				2,685				

				47				
			0	47	0			
			SBR	SBT	SBL			
	0	EBL	2020 PM Rainbow & Charleston Pedestrian Volumes			WBR	0	
34	34	EBT				WBT	22	22
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	35	0			
				35				

				0				
			0	0	0			
			SBR	SBT	SBL			
	0	EBL	2020 PM Rainbow & Charleston Bicycle Volumes			WBR	0	
0	0	EBT				WBT	0	0
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

				0.95	*0.97*	*0.90*				
					2,110					
				145	1,599	366				
				SBR	SBT	SBL				
0.82		362	EBL	2020 PM Rainbow & Charleston Traffic Volumes			WBR	259		*0.86*
0.86	1,406	845	EBT				WBT	1,149	1,713	*0.85*
0.93		199	EBR				WBL	305		*0.83*
				NBL	NBT	NBR				
				343	2,098	244				
					2,685					
				0.89	*0.92*	*0.90*				

				47				
			0	47	0			
			SBR	SBT	SBL			
	0	EBL	2020 PM Rainbow & Charleston Pedestrian Volumes			WBR	0	
34	34	EBT				WBT	22	22
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	35	0			
				35				

				0				
			0	0	0			
			SBR	SBT	SBL			
	0	EBL	2020 PM Rainbow & Charleston Bicycle Volumes			WBR	0	
0	0	EBT				WBT	0	0
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

Intersection: SAHARA AVE & VALLEY VIEW BLVD
Date: 11/18/14
Counted By: Jim Didway / Belete Diriba

			Daily total:				
EBT	21488		WBT	23475 =	44963	24hr	71813
NBT	16825		SBT	10025 =	26850	total	

	VALLEY VIEW BLVD Southbound					SAHARA AVE Westbound					VALLEY VIEW BLVD Northbound					SAHARA AVE Eastbound				
End Time	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total
7:15 AM	28	139	7	2	174	31	167	24	7	222	13	57	18	7	88	22	184	36	2	242
7:30 AM	22	162	12	2	196	34	174	27	5	235	26	65	25	8	116	23	271	27	2	321
7:45 AM	39	174	7	0	220	31	172	18	12	221	24	63	31	3	118	32	342	38	3	412
8:00 AM	76	244	9	3	329	49	241	27	8	317	25	64	32	4	121	49	376	63	5	488
Hourly Total	**165**	**719**	**35**	**7**	**919**	**145**	**754**	**96**	**32**	**995**	**88**	**249**	**106**	**22**	**443**	**126**	**1173**	**164**	**12**	**1463**
Percentage	**18.0%**	**78.2%**	**3.8%**			**14.6%**	**75.8%**	**9.6%**			**19.9%**	**56.2%**	**23.9%**			**8.6%**	**80.2%**	**11.2%**		
Peak Hour Factor	**0.54**	**0.74**	**0.73**		**0.70**	**0.74**	**0.78**	**0.89**		**0.78**	**0.85**	**0.96**	**0.83**		**0.92**	**0.64**	**0.78**	**0.65**		**0.75**
LT X-Product	**73,095**					**212,135**					**80,872**					**125,370**				
	# thru lanes =			2		**# thru lanes =**			3		**# thru lanes =**			3		**# thru lanes =**			3	
	# left turn lanes =			2		**# left turn lanes =**			2		**# left turn lanes =**			2		**# left turn lanes =**			2	
	# right turn lanes =			0		**# right turn lanes =**			1		**# right turn lanes =**			shared		**# right turn lanes =**			1	

End Time	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Percentage	**n/a**	**n/a**	**n/a**			**n/a**	**n/a**	**n/a**			**n/a**	**n/a**	**n/a**			**n/a**	**n/a**	**n/a**		
Peak Hour Factor	**n/a**	**n/a**	**n/a**		**n/a**	**n/a**	**n/a**	**n/a**		**n/a**	**n/a**	**n/a**	**n/a**		**n/a**	**n/a**	**n/a**	**n/a**		**n/a**
LT X-Product	**n/a**					**n/a**					**n/a**					**n/a**				

End Time	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total
5:15 PM	56	104	31	2	191	54	355	41	9	450	63	191	41	10	295	26	375	30	2	431
5:30 PM	53	122	51	8	226	86	366	49	38	501	56	264	41	21	361	53	344	54	4	451
5:45 PM	53	123	27	0	203	59	386	43	15	488	94	219	60	9	373	38	358	25	0	421
6:00 PM	54	110	18	0	182	69	332	38	26	439	72	213	32	11	317	51	344	21	1	416
Hourly Total	**216**	**459**	**127**	**10**	**802**	**268**	**1439**	**171**	**88**	**1878**	**285**	**887**	**174**	**51**	**1346**	**168**	**1421**	**130**	**7**	**1719**
Percentage	**26.9%**	**57.2%**	**15.8%**			**14.3%**	**76.6%**	**9.1%**			**21.2%**	**65.9%**	**12.9%**			**9.8%**	**82.7%**	**7.6%**		
Peak Hour Factor	**0.96**	**0.93**	**0.62**		**0.89**	**0.78**	**0.93**	**0.87**		**0.94**	**0.76**	**0.84**	**0.73**		**0.90**	**0.79**	**0.95**	**0.60**		**0.95**
LT X-Product	**290,736**					**460,692**					**228,570**					**315,504**				

			919					
			35	719	165			
			SBR	SBT	SBL			
1,463	126	EBL	**2014 AM Valley View & Sahara Traffic Volumes**			WBR	96	**995**
	1,173	EBT				WBT	754	
	164	EBR				WBL	145	
			NBL	NBT	NBR			
			88	249	106			
			443					

			7					
			0	7	0			
			SBR	SBT	SBL			
12	0	EBL	**2014 AM Valley View & Sahara Pedestrian Volumes**			WBR	0	**32**
	12	EBT				WBT	32	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	22	0			
			22					

			0					
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	**2014 AM Valley View & Sahara Bicycle Volumes**			WBR	0	**0**
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
			0					

			1,005					
			38	786	180			
			SBR	SBT	SBL			
1,600	138	EBL	**2020 AM Valley View & Sahara Traffic Volumes**			WBR	105	**1,088**
	1,283	EBT				WBT	824	
	179	EBR				WBL	159	
			NBL	NBT	NBR			
			96	272	116			
			484					

			8					
			0	8	0			
			SBR	SBT	SBL			
13	0	EBL	**2020 AM Valley View & Sahara Pedestrian Volumes**			WBR	0	**35**
	13	EBT				WBT	35	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	24	0			
			24					

			0					
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	**2020 AM Valley View & Sahara Bicycle Volumes**			WBR	0	**0**
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
			0					

				0.73	*0.74*	*0.54*				
				1,004						
				38	786	180				
				SBR	SBT	SBL				
0.64	**1,600**	138	EBL	**2020 AM Valley View & Sahara Traffic Volumes**			WBR	105	**1,088**	*0.89*
0.78		1,283	EBT				WBT	824		*0.78*
0.65		179	EBR				WBL	159		*0.74*
				NBL	NBT	NBR				
				96	272	116				
				484						
				0.85	*0.96*	*0.83*				

			8					
			0	8	0			
			SBR	SBT	SBL			
13	0	EBL	**2020 AM Valley View & Sahara Pedestrian Volumes**			WBR	0	**35**
	13	EBT				WBT	35	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	24	0			
			24					

			0					
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	**2020 AM Valley View & Sahara Bicycle Volumes**			WBR	0	**0**
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
			0					

				802				
			127	459	216			
			SBR	SBT	SBL			
1,719	168	EBL	2014 PM Valley View & Sahara Traffic Volumes			WBR	171	1,878
	1,421	EBT				WBT	1,439	
	130	EBR				WBL	268	
			NBL	NBT	NBR			
			285	887	174			
				1,346				

				10				
			0	10	0			
			SBR	SBT	SBL			
7	0	EBL	2014 PM Valley View & Sahara Pedestrian Volumes			WBR	0	88
	7	EBT				WBT	88	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	51	0			
				51				

				0				
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	2014 PM Valley View & Sahara Bicycle Volumes			WBR	0	0
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

				877				
			139	502	236			
			SBR	SBT	SBL			
1,880	184	EBL	2020 PM Valley View & Sahara Traffic Volumes			WBR	187	2,053
	1,554	EBT				WBT	1,573	
	142	EBR				WBL	293	
			NBL	NBT	NBR			
			312	970	190			
				1,472				

				11				
			0	11	0			
			SBR	SBT	SBL			
8	0	EBL	2020 PM Valley View & Sahara Pedestrian Volumes			WBR	0	96
	8	EBT				WBT	96	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	56	0			
				56				

				0				
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	2020 PM Valley View & Sahara Bicycle Volumes			WBR	0	0
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

				0.62	*0.93*	*0.96*				
					877					
				139	502	236				
				SBR	SBT	SBL				
0.79	1,880	184	EBL	2020 PM Valley View & Sahara Traffic Volumes			WBR	187	2,053	*0.87*
0.95		1,554	EBT				WBT	1,573		*0.93*
0.60		142	EBR				WBL	293		*0.78*
				NBL	NBT	NBR				
				312	970	190				
					1,472					
				0.76	*0.84*	*0.73*				

				11				
			0	11	0			
			SBR	SBT	SBL			
8	0	EBL	2020 PM Valley View & Sahara Pedestrian Volumes			WBR	0	96
	8	EBT				WBT	96	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	56	0			
				56				

				0				
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	2020 PM Valley View & Sahara Bicycle Volumes			WBR	0	0
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

Intersection: ST LOUIS AVE & EASTERN AVE
Date: 10/6/15
Counted By: Jim Didway

Daily total:

EBT	3538	WBT	3625 =	7163	24hr	38238
NBT	20125	SBT	10950 =	31075	total	

	EASTERN AVE Southbound					ST LOUIS AVE Westbound					EASTERN AVE Northbound					ST LOUIS AVE Eastbound				
End Time	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total
7:15 AM	31	266	7	2	304	36	32	18	3	86	5	137	39	3	181	2	18	7	2	27
7:30 AM	8	207	11	0	226	23	30	5	1	58	3	158	28	9	189	4	18	5	5	27
7:45 AM	11	278	11	3	300	15	22	13	1	50	1	161	19	4	181	2	16	7	3	25
8:00 AM	22	299	7	0	328	19	57	11	2	87	5	155	28	5	188	7	42	12	0	61
Hourly Total	**72**	**1050**	**36**	**5**	**1158**	**93**	**141**	**47**	**7**	**281**	**14**	**611**	**114**	**21**	**739**	**15**	**94**	**31**	**10**	**140**
Percentage	6.2%	90.7%	3.1%			33.1%	50.2%	16.7%			1.9%	82.7%	15.4%			10.7%	67.1%	22.1%		
Peak Hour Factor	0.58	0.88	0.82		0.88	0.65	0.62	0.65		0.81	0.70	0.95	0.73		0.98	0.54	0.56	0.65		0.57
LT X-Product	**53,208**					**13,020**					**16,212**					**4,215**				
	# thru lanes =			3		**# thru lanes =**			1		**# thru lanes =**			3		**# thru lanes =**			1	
	# left turn lanes =			1		**# left turn lanes =**			1		**# left turn lanes =**			1		**# left turn lanes =**			1	
	# right turn lanes =			0		**# right turn lanes =**			1		**# right turn lanes =**			0		**# right turn lanes =**			1	
End Time	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Percentage	n/a	n/a	n/a			n/a	n/a	n/a			n/a	n/a	n/a			n/a	n/a	n/a		
Peak Hour Factor	n/a	n/a	n/a		n/a	n/a	n/a	n/a		n/a	n/a	n/a	n/a		n/a	n/a	n/a	n/a		n/a
LT X-Product	**n/a**					**n/a**					**n/a**					**n/a**				
End Time	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total	Left Turn	Through	Right Turn	Peds	Approach Total
5:15 PM	7	200	4	5	211	21	28	17	4	66	5	371	36	2	412	12	31	12	7	55
5:30 PM	4	189	7	1	200	24	36	29	1	89	9	391	34	9	434	17	45	16	1	78
5:45 PM	20	247	5	0	272	12	24	27	1	63	3	383	38	6	424	15	55	11	2	81
6:00 PM	15	171	7	1	193	15	32	25	0	72	5	304	31	8	340	18	43	8	5	69
Hourly Total	**46**	**807**	**23**	**7**	**876**	**72**	**120**	**98**	**6**	**290**	**22**	**1449**	**139**	**25**	**1610**	**62**	**174**	**47**	**15**	**283**
Percentage	5.3%	92.1%	2.6%			24.8%	41.4%	33.8%			1.4%	90.0%	8.6%			21.9%	61.5%	16.6%		
Peak Hour Factor	0.58	0.82	0.82		0.81	0.75	0.83	0.84		0.81	0.61	0.93	0.91		0.93	0.86	0.79	0.73		0.87
LT X-Product	**74,060**					**20,376**					**19,272**					**17,980**				

				1,158				
			36	1,050	72			
			SBR	SBT	SBL			
	15	EBL	**2015 AM Eastern & St Louis Traffic Volumes**			WBR	47	
140	94	EBT				WBT	141	**281**
	31	EBR				WBL	93	
			NBL	NBT	NBR			
			14	611	114			
				739				

				5				
			0	5	0			
			SBR	SBT	SBL			
	0	EBL	**2015 AM Eastern & St Louis Pedestrian Volumes**			WBR	0	
10	10	EBT				WBT	7	**7**
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	21	0			
				21				

				0				
			0	0	0			
			SBR	SBT	SBL			
	0	EBL	**2015 AM Eastern & St Louis Bicycle Volumes**			WBR	0	
0	0	EBT				WBT	0	**0**
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

				1,247				
			39	1,131	78			
			SBR	SBT	SBL			
	16	EBL	**2020 AM Eastern & St Louis Traffic Volumes**			WBR	51	
151	101	EBT				WBT	152	**303**
	33	EBR				WBL	100	
			NBL	NBT	NBR			
			15	658	123			
				796				

				5				
			0	5	0			
			SBR	SBT	SBL			
	0	EBL	**2020 AM Eastern & St Louis Pedestrian Volumes**			WBR	0	
11	11	EBT				WBT	8	**8**
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	23	0			
				23				

				0				
			0	0	0			
			SBR	SBT	SBL			
	0	EBL	**2020 AM Eastern & St Louis Bicycle Volumes**			WBR	0	
0	0	EBT				WBT	0	**0**
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

				0.82	*0.88*	*0.58*			
					1,248				
				39	1,131	78			
				SBR	SBT	SBL			
0.54		16	EBL	**2020 AM Eastern & St Louis Traffic Volumes**			WBR	51	
0.56	**150**	101	EBT				WBT	152	**303**
0.65		33	EBR				WBL	100	
				NBL	NBT	NBR			
				15	658	123			
					796				
				0.70	*0.95*	*0.73*			

					5				
				0	5	0			
				SBR	SBT	SBL			
0.65		0	EBL	**2020 AM Eastern & St Louis Pedestrian Volumes**			WBR	0	
0.62	**11**	11	EBT				WBT	8	**8**
0.65		0	EBR				WBL	0	
				NBL	NBT	NBR			
				0	23	0			
					23				

				0				
			0	0	0			
			SBR	SBT	SBL			
	0	EBL	**2020 AM Eastern & St Louis Bicycle Volumes**			WBR	0	
0	0	EBT				WBT	0	**0**
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

				876				
			23	807	46			
			SBR	SBT	SBL			
283	62	EBL	**2015 PM Eastern & St Louis Traffic Volumes**			WBR	98	**290**
	174	EBT				WBT	120	
	47	EBR				WBL	72	
			NBL	NBT	NBR			
			22	1,449	139			
				1,610				

				7				
			0	7	0			
			SBR	SBT	SBL			
15	0	EBL	**2015 PM Eastern & St Louis Pedestrian Volumes**			WBR	0	**6**
	15	EBT				WBT	6	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	25	0			
				25				

				0				
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	**2015 PM Eastern & St Louis Bicycle Volumes**			WBR	0	**0**
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

				944				
			25	869	50			
			SBR	SBT	SBL			
305	67	EBL	**2020 PM Eastern & St Louis Traffic Volumes**			WBR	106	**312**
	187	EBT				WBT	129	
	51	EBR				WBL	78	
			NBL	NBT	NBR			
			24	1,561	150			
				1,734				

				8				
			0	8	0			
			SBR	SBT	SBL			
16	0	EBL	**2020 PM Eastern & St Louis Pedestrian Volumes**			WBR	0	**6**
	16	EBT				WBT	6	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	27	0			
				27				

				0				
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	**2020 PM Eastern & St Louis Bicycle Volumes**			WBR	0	**0**
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

				0.82	*0.82*	*0.58*				
					944					
				25	869	50				
				SBR	SBT	SBL				
0.86	**305**	67	EBL	**2020 PM Eastern & St Louis Traffic Volumes**			WBR	106	**313**	*0.84*
0.79		187	EBT				WBT	129		*0.83*
0.73		51	EBR				WBL	78		*0.75*
				NBL	NBT	NBR				
				24	1,561	150				
					1,735					
				0.61	*0.93*	*0.91*				

				8				
			0	8	0			
			SBR	SBT	SBL			
16	0	EBL	**2020 PM Eastern & St Louis Pedestrian Volumes**			WBR	0	**6**
	16	EBT				WBT	6	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	27	0			
				27				

				0				
			0	0	0			
			SBR	SBT	SBL			
0	0	EBL	**2020 PM Eastern & St Louis Bicycle Volumes**			WBR	0	**0**
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

Intersection: CHEYENNE AVE & RAINBOW BLVD

Date: 1/17/17

Counted By: Jim Didway / Belete Diriba

			Daily total:			
EBT	23788		WBT	18738 =	42525	24hr 62300
NBT	12775		SBT	7000 =	19775	total

	RAINBOW BLVD Southbound						CHEYENNE AVE Westbound						RAINBOW BLVD Northbound						CHEYENNE AVE Eastbound					
End Time	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total
7:15 AM	19	51	39	1	0	109	24	251	8	1	0	283	40	29	21	1	0	90	28	258	15	6	0	301
7:30 AM	24	62	62	0	0	148	18	220	7	0	0	245	29	22	23	0	0	74	14	205	20	1	0	239
7:45 AM	19	51	32	0	0	102	35	322	5	0	0	362	42	42	11	0	0	95	34	247	14	3	0	295
8:00 AM	28	81	56	0	1	165	30	371	16	0	0	417	38	33	28	2	0	99	23	316	24	0	0	363
Hourly Total	**90**	**245**	**189**	**1**	**1**	**524**	**107**	**1164**	**36**	**1**	**0**	**1307**	**149**	**126**	**83**	**3**	**0**	**358**	**99**	**1026**	**73**	**10**	**0**	**1198**
Percentage	17.2%	46.8%	36.1%				8.2%	89.1%	2.8%				41.6%	35.2%	23.2%				8.3%	85.6%	6.1%			
Peak Hour Factor	0.80	0.76	0.76			0.79	0.76	0.78	0.56			0.78	0.89	0.75	0.74			0.90	0.73	0.81	0.76			0.83
LT X-Product	32,220						128,186						78,076						129,393					

	RAINBOW BLVD Southbound	CHEYENNE AVE Westbound	RAINBOW BLVD Northbound	CHEYENNE AVE Eastbound
# thru lanes =	2	3	2	3
# left turn lanes =	1	1	2	2
# right turn lanes =	0	0	0	1
# bike lanes =	NO	NO	NO	NO

End Time	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Percentage	n/a	n/a	n/a				n/a	n/a	n/a				n/a	n/a	n/a				n/a	n/a	n/a			
Peak Hour Factor	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a
LT X-Product	n/a						n/a						n/a						n/a					

End Time	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total
5:15 PM	31	67	26	0	0	124	38	290	16	5	0	344	99	123	57	2	0	279	90	344	51	5	0	485
5:30 PM	49	92	22	0	0	163	52	346	20	1	0	418	76	108	44	1	0	228	85	299	33	15	0	417
5:45 PM	25	68	27	1	1	120	44	282	32	10	1	358	92	128	58	5	0	278	120	374	64	11	0	558
6:00 PM	40	83	30	0	0	153	49	305	25	3	0	379	82	94	61	5	0	237	97	294	52	2	0	443
Hourly Total	**145**	**310**	**105**	**1**	**1**	**560**	**183**	**1223**	**93**	**19**	**1**	**1499**	**349**	**453**	**220**	**13**	**0**	**1022**	**392**	**1311**	**200**	**33**	**0**	**1903**
Percentage	25.9%	55.4%	18.8%				12.2%	81.6%	6.2%				34.1%	44.3%	21.5%				20.6%	68.9%	10.5%			
Peak Hour Factor	0.74	0.84	0.88			0.86	0.88	0.88	0.73			0.90	0.88	0.88	0.90			0.92	0.82	0.88	0.78			0.85
LT X-Product	148,190						348,249						195,440						587,608					

Intersection: CHEYENNE AVE & RAINBOW BLVD

BIKE SHEET

Date: 4/7/16

Counted By: Jim Didway / Belete Diriba

Daily total:					
EBT	0	WBT	13 =	13	24hr 25
NBT	0	SBT	13 =	13	total

	RAINBOW BLVD Southbound						CHEYENNE AVE Westbound						RAINBOW BLVD Northbound						CHEYENNE AVE Eastbound					
End Time	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Percentage	100.0%	n/a	n/a				n/a	n/a	n/a				n/a	n/a	n/a				n/a	n/a	n/a			
Peak Hour Factor	0.25	n/a	n/a			0.25	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a
LT X-Product	0						n/a						n/a						n/a					
	# thru lanes =			3			# thru lanes =			3			# thru lanes =			3			# thru lanes =			3		
	# left turn lanes =			1			# left turn lanes =			1			# left turn lanes =			1			# left turn lanes =			1		
	# right turn lanes =			0			# right turn lanes =			0			# right turn lanes =			0			# right turn lanes =			0		
	# bike lanes =			YES/NO			# bike lanes =			YES/NO			# bike lanes =			YES/NO			# bike lanes =			YES/NO		

End Time	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Percentage	n/a	n/a	n/a				n/a	n/a	n/a				n/a	n/a	n/a				n/a	n/a	n/a			
Peak Hour Factor	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a
LT X-Product	n/a						n/a						n/a						n/a					

End Time	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	1	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Percentage	n/a	100.0%	n/a				n/a	n/a	100.0%				n/a	n/a	n/a				n/a	n/a	n/a			
Peak Hour Factor	n/a	0.25	n/a			0.25	n/a	n/a	0.25			0.25	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a
LT X-Product	n/a						n/a						n/a						n/a					

			524					
			90	245	189			
			SBR	SBT	SBL			
1,198	99	EBL	2017 AM Rainbow & Lake Mead Traffic Volumes			WBR	36	1,307
	1,026	EBT				WBT	1,164	
	73	EBR				WBL	107	
			NBL	NBT	NBR			
			149	126	83			
			358					

			1					
			0	1	0			
			SBR	SBT	SBL			
10	0	EBL	2017 AM Rainbow & Lake Mead Pedestrian Volumes			WBR	0	1
	10	EBT				WBT	1	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	3	0			
			3					

			1					
			0	0	1			
			SBR	SBT	SBL			
0	0	EBL	2016 AM Rainbow & Lake Mead Bicycle Volumes			WBR	0	0
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
			0					

			548					
			94	256	198			
			SBR	SBT	SBL			
1,253	104	EBL	2020 AM Rainbow & Lake Mead Traffic Volumes			WBR	38	1,367
	1,073	EBT				WBT	1,217	
	76	EBR				WBL	112	
			NBL	NBT	NBR			
			156	132	87			
			374					

			1					
			0	1	0			
			SBR	SBT	SBL			
10	0	EBL	2020 AM Rainbow & Lake Mead Pedestrian Volumes			WBR	0	1
	10	EBT				WBT	1	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	3	0			
			3					

			1					
			0	0	1			
			SBR	SBT	SBL			
0	0	EBL	2020 AM Rainbow & Lake Mead Bicycle Volumes			WBR	0	0
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
			0					

				0.76	*0.76*	*0.80*				
				548						
				94	256	198				
				SBR	SBT	SBL				
0.73	1,253	104	EBL	2020 AM Rainbow & Lake Mead Traffic Volumes			WBR	38	1,367	*0.56*
0.81		1,073	EBT				WBT	1,217		*0.78*
0.76		76	EBR				WBL	112		*0.76*
				NBL	NBT	NBR				
				156	132	87				
				375						
				0.89	*0.75*	*0.74*				

			1					
			0	1	0			
			SBR	SBT	SBL			
10	0	EBL	2020 AM Rainbow & Lake Mead Pedestrian Volumes			WBR	0	1
	10	EBT				WBT	1	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	3	0			
			3					

			1					
			0	0	1			
			SBR	SBT	SBL			
0	0	EBL	2020 AM Rainbow & Lake Mead Bicycle Volumes			WBR	0	0
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
			0					

				560				
			105	310	145			
			SBR	SBT	SBL			
1,903	392	EBL	2017 PM Rainbow & Lake Mead Traffic Volumes			WBR	93	1,499
	1,311	EBT				WBT	1,223	
	200	EBR				WBL	183	
			NBL	NBT	NBR			
			349	453	220			
				1,022				

				1				
			0	1	0			
			SBR	SBT	SBL			
33	0	EBL	2017 PM Rainbow & Lake Mead Pedestrian Volumes			WBR	0	19
	33	EBT				WBT	19	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	13	0			
				13				

				1				
			0	1	0			
			SBR	SBT	SBL			
0	0	EBL	2016 PM Rainbow & Lake Mead Bicycle Volumes			WBR	1	1
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

				586				
			110	324	152			
			SBR	SBT	SBL			
1,990	410	EBL	2020 PM Rainbow & Lake Mead Traffic Volumes			WBR	97	1,567
	1,371	EBT				WBT	1,279	
	209	EBR				WBL	191	
			NBL	NBT	NBR			
			365	474	230			
				1,069				

				1				
			0	1	0			
			SBR	SBT	SBL			
35	0	EBL	2020 PM Rainbow & Lake Mead Pedestrian Volumes			WBR	0	20
	35	EBT				WBT	20	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	14	0			
				14				

				1				
			0	1	0			
			SBR	SBT	SBL			
0	0	EBL	2020 PM Rainbow & Lake Mead Bicycle Volumes			WBR	1	1
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

				0.88	*0.84*	*0.74*			
					586				
				110	324	152			
				SBR	SBT	SBL			
0.82	1,990	410	EBL	2020 PM Rainbow & Lake Mead Traffic Volumes			WBR	97	1,567
0.88		1,371	EBT				WBT	1,279	
0.78		209	EBR				WBL	191	
				NBL	NBT	NBR			
				365	474	230			
					1,069				
				0.88	*0.88*	*0.90*			

					1				
				0	1	0			
				SBR	SBT	SBL			
0.73	35	0	EBL	2020 PM Rainbow & Lake Mead Pedestrian Volumes			WBR	0	20
0.88		35	EBT				WBT	20	
0.88		0	EBR				WBL	0	
				NBL	NBT	NBR			
				0	14	0			
					14				

				1				
			0	1	0			
			SBR	SBT	SBL			
0	0	EBL	2020 PM Rainbow & Lake Mead Bicycle Volumes			WBR	1	1
	0	EBT				WBT	0	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
				0				

Intersection: WASHINGTON AVE & DECATUR BLVD
Date: 4/12/16
Counted By: Jim Didway / Belete Diriba

			Daily total:		
EBT	6613	WBT	12375 =	18988	24hr 57750
NBT	24088	SBT	14675 =	38763	total

	DECATUR BLVD Southbound						WASHINGTON AVE Westbound						DECATUR BLVD Northbound						WASHINGTON AVE Eastbound					
End Time	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total
7:15 AM	48	324	7	15	0	379	30	64	32	2	1	126	50	159	48	6	0	257	18	65	58	10	2	141
7:30 AM	43	315	8	16	0	366	22	39	22	5	0	83	43	118	26	4	0	187	1	68	52	4	0	121
7:45 AM	66	408	8	25	1	482	25	61	24	3	0	110	23	121	17	11	0	161	13	121	52	13	0	186
8:00 AM	87	439	5	6	0	531	38	92	41	6	0	171	27	151	14	8	0	192	10	181	66	1	0	257
Hourly Total	**244**	**1486**	**28**	**62**	**1**	**1758**	**115**	**256**	**119**	**16**	**1**	**490**	**143**	**549**	**105**	**29**	**0**	**797**	**42**	**435**	**228**	**28**	**2**	**705**
Percentage	13.9%	84.5%	1.6%				23.5%	52.2%	24.3%				17.9%	68.9%	13.2%				6.0%	61.7%	32.3%			
Peak Hour Factor	0.70	0.85	0.88			0.83	0.76	0.70	0.73			0.72	0.72	0.86	0.55			0.78	0.58	0.60	0.86			0.69
LT X-Product	194,468						81,075						251,394						20,580					
	# thru lanes =			3			# thru lanes =			2			# thru lanes =			3			# thru lanes =			2		
	# left turn lanes =			2			# left turn lanes =			1			# left turn lanes =			2			# left turn lanes =			1		
	# right turn lanes =			0			# right turn lanes =			1			# right turn lanes =			1			# right turn lanes =			1		
	# bike lanes =			YES			# bike lanes =			NO			# bike lanes =			YES			# bike lanes =			NO		

End Time	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total	Left Turn	Through	Right Turn	Peds		Approach Total
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Percentage	n/a	n/a	n/a				n/a	n/a	n/a				n/a	n/a	n/a				n/a	n/a	n/a			
Peak Hour Factor	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a	n/a	n/a	n/a			n/a
LT X-Product	n/a						n/a						n/a						n/a					

End Time	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total	Left Turn	Through	Right Turn	Peds	Bike	Approach Total
5:15 PM	46	246	18	4	1	310	39	98	90	3	0	227	50	363	24	5	0	437	20	59	22	5	0	101
5:30 PM	30	203	10	3	0	243	34	123	71	6	1	228	76	417	29	6	1	522	22	102	28	6	2	152
5:45 PM	37	250	17	3	1	304	40	135	93	4	2	268	88	366	26	7	0	480	16	88	30	2	0	134
6:00 PM	35	270	12	5	1	317	36	143	88	6	1	267	55	404	29	2	3	488	25	81	36	2	0	142
Hourly Total	**148**	**969**	**57**	**15**	**3**	**1174**	**149**	**499**	**342**	**19**	**4**	**990**	**269**	**1550**	**108**	**20**	**4**	**1927**	**83**	**330**	**116**	**15**	**2**	**529**
Percentage	12.6%	82.5%	4.9%				15.1%	50.4%	34.5%				14.0%	80.4%	5.6%				15.7%	62.4%	21.9%			
Peak Hour Factor	0.80	0.90	0.79			0.93	0.93	0.87	0.92			0.92	0.76	0.93	0.93			0.92	0.83	0.81	0.81			0.87
LT X-Product	285,196						78,821						315,806						82,170					

Street Nam	DECATUR BLVD		Southbound		WASHINGTON AVE		Westbound		DECATUR BLVD		Northbound		WASHINGTON AVE		Eastbound						
																		Bikes			
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds		sb	wb	nb	eb
6:45 AM	48	324	7	15	30	64	32	2	50	159	48	6	18	65	58	10		0	1	0	2
7:00 AM	43	315	8	16	22	39	22	5	43	118	26	4	1	68	52	4		0	0	0	0
7:15 AM	66	408	8	25	25	61	24	3	23	121	17	11	13	121	52	13		1	0	0	0
7:30 AM	87	439	5	6	38	92	41	6	27	151	14	8	10	181	66	1		0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
1:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
4:45 PM	46	246	18	4	39	98	90	3	50	363	24	5	20	59	22	5		1	0	0	0
5:00 PM	30	203	10	3	34	123	71	6	76	417	29	6	22	102	28	6		0	1	1	2
5:15 PM	37	250	17	3	40	135	93	4	88	366	26	7	16	88	30	2		1	2	0	0
5:30 PM	35	270	12	5	36	143	88	6	55	404	29	2	25	81	36	2		1	1	3	0

			1,758					
			28	1,486	244			
			SBR	SBT	SBL			
705	42	EBL	2016 AM Decatur & Washington Traffic Volumes			WBR	119	490
	435	EBT				WBT	256	
	228	EBR				WBL	115	
			NBL	NBT	NBR			
			143	549	105			
			797					

			62					
			0	62	0			
			SBR	SBT	SBL			
28	0	EBL	2016 AM Decatur & Washington Pedestrian Volumes			WBR	0	16
	28	EBT				WBT	16	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	29	0			
			29					

			1					
			0	1	0			
			SBR	SBT	SBL			
2	0	EBL	2016 AM Decatur & Washington Bicycle Volumes			WBR	0	1
	2	EBT				WBT	1	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
			0					

			1,866					
			30	1,577	259			
			SBR	SBT	SBL			
748	45	EBL	2020 AM Decatur & Washington Traffic Volumes			WBR	126	520
	462	EBT				WBT	272	
	242	EBR				WBL	122	
			NBL	NBT	NBR			
			152	583	111			
			846					

			66					
			0	66	0			
			SBR	SBT	SBL			
30	0	EBL	2020 AM Decatur & Washington Pedestrian Volumes			WBR	0	17
	30	EBT				WBT	17	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	31	0			
			31					

			1					
			0	1	0			
			SBR	SBT	SBL			
2	0	EBL	2020 AM Decatur & Washington Bicycle Volumes			WBR	0	1
	2	EBT				WBT	1	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
			0					

				0.88	*0.85*	*0.70*			
				1,866					
				30	1,577	259			
				SBR	SBT	SBL			
0.58	749	45	EBL	2020 AM Decatur & Washington Traffic Volumes			WBR	126	520
0.60		462	EBT				WBT	272	
0.86		242	EBR				WBL	122	
				NBL	NBT	NBR			
				152	583	111			
				846					
				0.72	*0.86*	*0.55*			

				66					
				0	66	0			
				SBR	SBT	SBL			
0.73	30	0	EBL	2020 AM Decatur & Washington Pedestrian Volumes			WBR	0	17
0.70		30	EBT				WBT	17	
0.76		0	EBR				WBL	0	
				NBL	NBT	NBR			
				0	31	0			
				31					

			1					
			0	1	0			
			SBR	SBT	SBL			
2	0	EBL	2020 AM Decatur & Washington Bicycle Volumes			WBR	0	1
	2	EBT				WBT	1	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	0	0			
			0					

			1,174					
			57	969	148			
			SBR	SBT	SBL			
529	83	EBL	2016 AM Decatur & Washington Traffic Volumes			WBR	342	990
	330	EBT				WBT	499	
	116	EBR				WBL	149	
			NBL	NBT	NBR			
			269	1,550	108			
			1,927					

			15					
			0	15	0			
			SBR	SBT	SBL			
15	0	EBL	2016 AM Decatur & Washington Pedestrian Volumes			WBR	0	19
	15	EBT				WBT	19	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	20	0			
			20					

			3					
			0	3	0			
			SBR	SBT	SBL			
2	0	EBL	2016 AM Decatur & Washington Bicycle Volumes			WBR	0	4
	2	EBT				WBT	4	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	4	0			
			4					

			1,246					
			60	1,028	157			
			SBR	SBT	SBL			
561	88	EBL	2020 AM Decatur & Washington Traffic Volumes			WBR	363	1,051
	350	EBT				WBT	530	
	123	EBR				WBL	158	
			NBL	NBT	NBR			
			286	1,645	115			
			2,045					

			16					
			0	16	0			
			SBR	SBT	SBL			
16	0	EBL	2020 AM Decatur & Washington Pedestrian Volumes			WBR	0	20
	16	EBT				WBT	20	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	21	0			
			21					

			3					
			0	3	0			
			SBR	SBT	SBL			
2	0	EBL	2020 AM Decatur & Washington Bicycle Volumes			WBR	0	4
	2	EBT				WBT	4	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	4	0			
			4					

				0.79	*0.90*	*0.80*				
				1,245						
				60	1,028	157				
				SBR	SBT	SBL				
0.83	561	88	EBL	2020 AM Decatur & Washington Traffic Volumes			WBR	363	1,051	*0.92*
0.81		350	EBT				WBT	530		*0.87*
0.81		123	EBR				WBL	158		*0.93*
				NBL	NBT	NBR				
				286	1,645	115				
				2,046						
				0.76	*0.93*	*0.93*				

			16					
			0	16	0			
			SBR	SBT	SBL			
16	0	EBL	2020 AM Decatur & Washington Pedestrian Volumes			WBR	0	20
	16	EBT				WBT	20	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	21	0			
			21					

			3					
			0	3	0			
			SBR	SBT	SBL			
2	0	EBL	2020 AM Decatur & Washington Bicycle Volumes			WBR	0	4
	2	EBT				WBT	4	
	0	EBR				WBL	0	
			NBL	NBT	NBR			
			0	4	0			
			4					

Appendix F: Synchro Results

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	121	843	170	154	437	42	133	428	106	94	940	181
Future Volume (veh/h)	121	843	170	154	437	42	133	428	106	94	940	181
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	233	1095	202	173	591	86	182	578	151	116	1253	213
Peak Hour Factor	0.52	0.77	0.84	0.89	0.74	0.49	0.73	0.74	0.70	0.81	0.75	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	393	1643	303	244	1715	246	211	1314	336	308	1319	224
Arrive On Green	0.07	0.38	0.38	0.07	0.38	0.38	0.09	0.32	0.32	0.06	0.30	0.30
Sat Flow, veh/h	1781	4318	796	1781	4507	647	1781	4046	1034	1781	4387	746
Grp Volume(v), veh/h	233	863	434	173	444	233	182	484	245	116	972	494
Grp Sat Flow(s),veh/h/ln	1781	1702	1709	1781	1702	1750	1781	1702	1675	1781	1702	1729
Q Serve(g_s), s	9.8	29.5	29.5	8.3	13.0	13.3	9.8	15.7	16.2	6.2	39.1	39.1
Cycle Q Clear(g_c), s	9.8	29.5	29.5	8.3	13.0	13.3	9.8	15.7	16.2	6.2	39.1	39.1
Prop In Lane	1.00		0.47	1.00		0.37	1.00		0.62	1.00		0.43
Lane Grp Cap(c), veh/h	393	1295	650	244	1295	666	211	1106	544	308	1024	520
V/C Ratio(X)	0.59	0.67	0.67	0.71	0.34	0.35	0.86	0.44	0.45	0.38	0.95	0.95
Avail Cap(c_a), veh/h	393	1295	650	244	1295	666	348	1106	544	488	1024	520
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.0	36.0	36.0	28.8	30.9	31.0	35.6	37.2	37.4	31.4	47.9	47.9
Incr Delay (d2), s/veh	1.6	2.7	5.4	7.8	0.2	0.4	6.0	1.3	2.7	0.3	18.3	28.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.9	12.4	12.9	3.9	5.3	5.6	4.5	6.6	6.9	2.7	19.0	20.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.6	38.7	41.4	36.6	31.1	31.4	41.7	38.5	40.0	31.7	66.3	76.7
LnGrp LOS	C	D	D	D	C	C	D	D	D	C	E	E
Approach Vol, veh/h		1530			850			911			1582	
Approach Delay, s/veh		37.9			32.3			39.5			67.0	
Approach LOS		D			C			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.2	48.3	15.0	59.5	13.9	51.7	15.0	59.5
Change Period (Y+Rc), s	* 5.3	* 6.2	5.5	6.2	5.6	6.2	* 5.2	6.2
Max Green Setting (Gmax), s	* 23	* 42	9.5	42.8	22.4	41.8	* 9.8	42.8
Max Q Clear Time (g_c+I1), s	11.8	41.1	10.3	31.5	8.2	18.2	11.8	15.3
Green Ext Time (p_c), s	0.2	0.8	0.0	7.4	0.1	6.4	0.0	6.1

Intersection Summary	
HCM 6th Ctrl Delay	46.7
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	843	170	154	437	42	133	428	106	94	940	181
Future Volume (vph)	121	843	170	154	437	42	133	428	106	94	940	181
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	220		0	330		0	300		0	380		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frt		0.977			0.981			0.969			0.978	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	4952	0	1770	4975	0	1770	4904	0	1770	4958	0
Flt Permitted	0.299			0.093			0.073			0.329		
Satd. Flow (perm)	555	4952	0	173	4975	0	136	4904	0	611	4958	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			20			48			24	
Link Speed (mph)		45			45			45			35	
Link Distance (ft)		993			1490			1225			1487	
Travel Time (s)		15.0			22.6			18.6			29.0	
Confl. Peds. (#/hr)	7		6	6		7	7		8	8		7
Confl. Bikes (#/hr)			2									
Peak Hour Factor	0.52	0.77	0.84	0.89	0.74	0.49	0.73	0.74	0.70	0.81	0.75	0.85
Adj. Flow (vph)	233	1095	202	173	591	86	182	578	151	116	1253	213
Shared Lane Traffic (%)												
Lane Group Flow (vph)	233	1297	0	173	677	0	182	729	0	116	1466	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane					Yes			Yes				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		
Detector Phase	7	4		3	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0		5.0	9.0		5.0	9.0	
Minimum Split (s)	10.2	36.2		10.5	35.2		10.3	35.2		10.6	35.9	
Total Split (s)	15.0	49.0		15.0	49.0		28.0	48.0		28.0	48.0	
Total Split (%)	10.7%	35.0%		10.7%	35.0%		20.0%	34.3%		20.0%	34.3%	
Maximum Green (s)	9.8	42.8		9.5	42.8		22.7	41.8		22.4	42.1	
Yellow Time (s)	3.0	4.7		3.0	4.7		3.0	4.7		3.0	4.0	
All-Red Time (s)	2.2	1.5		2.5	1.5		2.3	1.5		2.6	1.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.2	6.2		5.5	6.2		5.3	6.2		5.6	5.9	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.0	4.0		2.0	4.0	
Recall Mode	None	C-Max		None	None		None	Max		None	Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		23.0			22.0			22.0			23.0	
Pedestrian Calls (#/hr)		6			7			8			7	
Act Effct Green (s)	53.6	42.8		53.0	42.8		68.9	54.8		60.9	51.2	
Actuated g/C Ratio	0.38	0.31		0.38	0.31		0.49	0.39		0.44	0.37	
v/c Ratio	0.78	0.85		1.00	0.44		0.81	0.37		0.34	0.80	
Control Delay	49.9	50.8		102.5	38.9		58.4	29.2		21.9	43.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	49.9	50.8		102.5	38.9		58.4	29.2		21.9	43.8	
LOS	D	D		F	D		E	C		C	D	
Approach Delay		50.7			51.8			35.0			42.2	
Approach LOS		D			D			D			D	
90th %ile Green (s)	9.8	42.8		9.5	42.8		20.1	51.6		12.6	44.7	
90th %ile Term Code	Max	Coord		Max	Coord		Gap	MaxR		Gap	MaxR	
70th %ile Green (s)	9.8	42.8		9.5	42.8		15.9	53.5		10.7	48.9	
70th %ile Term Code	Max	Coord		Max	Coord		Gap	MaxR		Gap	MaxR	
50th %ile Green (s)	9.8	42.8		9.5	42.8		13.0	54.9		9.3	51.8	
50th %ile Term Code	Max	Coord		Max	Coord		Gap	MaxR		Gap	MaxR	
30th %ile Green (s)	9.8	42.8		9.5	42.8		10.7	56.2		8.0	54.1	
30th %ile Term Code	Max	Coord		Max	Coord		Gap	MaxR		Gap	MaxR	
10th %ile Green (s)	9.8	42.8		9.5	42.8		8.3	57.9		6.3	56.5	
10th %ile Term Code	Max	Coord		Max	Coord		Gap	MaxR		Gap	MaxR	
Stops (vph)	89	913		90	364		92	347		54	950	
Fuel Used(gal)	3	28		6	13		4	12		2	29	
CO Emissions (g/hr)	218	1983		407	905		264	819		128	2039	
NOx Emissions (g/hr)	42	386		79	176		51	159		25	397	
VOC Emissions (g/hr)	50	459		94	210		61	190		30	473	
Dilemma Vehicles (#)	0	36		0	17		0	19		0	39	
Queue Length 50th (ft)	140	398		108	176		112	160		55	427	
Queue Length 95th (ft)	109	370		#262	171		139	160		81	408	
Internal Link Dist (ft)		913			1410			1145			1407	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	220			330			300			380		
Base Capacity (vph)	297	1532		173	1534		333	1949		489	1828	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.78	0.85		1.00	0.44		0.55	0.37		0.24	0.80	

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 4:EBTL, Start of Green

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00

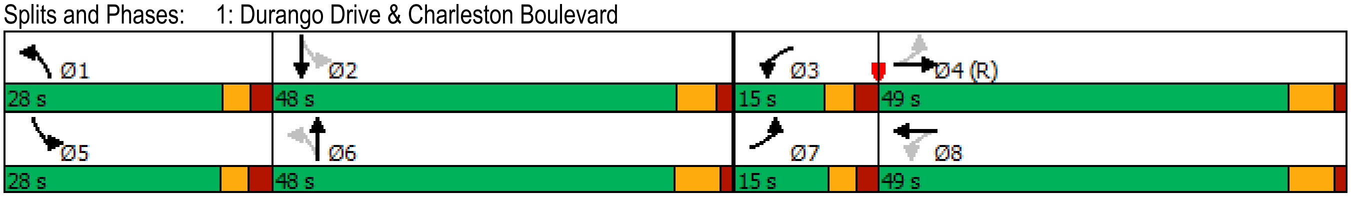
Intersection Signal Delay: 45.2 Intersection LOS: D

Intersection Capacity Utilization 85.0% ICU Level of Service E

Analysis Period (min) 15

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

Splits and Phases: 1: Durango Drive & Charleston Boulevard



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	132	141	31	107	194	299	21	684	39	279	1154	80
Future Volume (veh/h)	132	141	31	107	194	299	21	684	39	279	1154	80
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.97	0.99		0.97	1.00		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	153	199	42	139	290	374	25	834	51	321	1407	85
Peak Hour Factor	0.86	0.71	0.73	0.77	0.67	0.80	0.83	0.82	0.77	0.87	0.82	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	289	650	134	359	792	343	210	2181	133	444	2593	157
Arrive On Green	0.07	0.22	0.22	0.07	0.22	0.22	0.02	0.44	0.44	0.10	0.53	0.53
Sat Flow, veh/h	1781	2916	601	1781	3554	1539	1781	4910	299	1781	4914	297
Grp Volume(v), veh/h	153	119	122	139	290	374	25	577	308	321	975	517
Grp Sat Flow(s),veh/h/ln	1781	1777	1740	1781	1777	1539	1781	1702	1805	1781	1702	1806
Q Serve(g_s), s	9.3	7.8	8.2	8.4	9.7	31.2	1.1	15.9	16.0	13.5	26.5	26.5
Cycle Q Clear(g_c), s	9.3	7.8	8.2	8.4	9.7	31.2	1.1	15.9	16.0	13.5	26.5	26.5
Prop In Lane	1.00		0.35	1.00		1.00	1.00		0.17	1.00		0.16
Lane Grp Cap(c), veh/h	289	396	388	359	792	343	210	1512	802	444	1797	953
V/C Ratio(X)	0.53	0.30	0.31	0.39	0.37	1.09	0.12	0.38	0.38	0.72	0.54	0.54
Avail Cap(c_a), veh/h	289	397	389	359	792	343	346	1512	802	444	1797	953
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.0	45.3	45.5	38.4	46.0	54.4	21.1	26.0	26.1	18.7	21.9	21.9
Incr Delay (d2), s/veh	0.9	0.2	0.2	0.3	0.1	74.9	0.1	0.7	1.4	5.0	1.2	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.2	3.5	3.6	3.7	4.3	19.2	0.5	6.6	7.2	6.0	10.7	11.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.0	45.5	45.6	38.6	46.1	129.3	21.1	26.8	27.5	23.7	23.1	24.1
LnGrp LOS	D	D	D	D	D	F	C	C	C	C	C	C
Approach Vol, veh/h		394			803			910			1813	
Approach Delay, s/veh		43.4			83.6			26.8			23.5	
Approach LOS		D			F			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.3	79.7	15.0	37.0	20.0	68.0	15.0	37.0
Change Period (Y+Rc), s	* 5.2	* 5.8	5.4	* 5.8	5.4	* 5.8	5.6	* 5.8
Max Green Setting (Gmax), s	* 14	* 64	9.6	* 31	14.6	* 62	9.4	* 31
Max Q Clear Time (g_c+I1), s	3.1	28.5	10.4	10.2	15.5	18.0	11.3	33.2
Green Ext Time (p_c), s	0.0	8.2	0.0	0.8	0.0	4.1	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	38.6
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	132	141	31	107	194	299	21	684	39	279	1154	80
Future Volume (vph)	132	141	31	107	194	299	21	684	39	279	1154	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	190		0	120		150	145		0	145		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor	0.99	0.99		0.99		0.97		1.00		0.99	1.00	
Frt		0.974				0.850		0.991			0.991	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3428	0	1770	3539	1583	1770	5024	0	1770	5033	0
Flt Permitted	0.425			0.511			0.145			0.254		
Satd. Flow (perm)	783	3428	0	941	3539	1537	270	5024	0	469	5033	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16				267		9			9	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		779			1085			800			300	
Travel Time (s)		17.7			24.7			15.6			5.8	
Confl. Peds. (#/hr)	12		11	11		12	5		29	29		5
Confl. Bikes (#/hr)			3			1			3			2
Peak Hour Factor	0.86	0.71	0.73	0.77	0.67	0.80	0.83	0.82	0.77	0.87	0.82	0.94
Adj. Flow (vph)	153	199	42	139	290	374	25	834	51	321	1407	85
Shared Lane Traffic (%)												
Lane Group Flow (vph)	153	241	0	139	290	374	25	885	0	321	1492	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6		20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Detector Phase	7	4		3	8	8	1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0	10.0	5.0	15.0		5.0	15.0	
Minimum Split (s)	10.6	32.7		10.4	35.8	35.8	10.2	35.8		10.4	30.5	
Total Split (s)	15.0	37.0		15.0	37.0	37.0	19.0	68.0		20.0	69.0	
Total Split (%)	10.7%	26.4%		10.7%	26.4%	26.4%	13.6%	48.6%		14.3%	49.3%	
Maximum Green (s)	9.4	31.3		9.6	31.2	31.2	13.8	62.2		14.6	63.5	
Yellow Time (s)	3.0	3.6		3.0	3.6	3.6	3.0	4.0		3.0	4.0	
All-Red Time (s)	2.6	2.1		2.4	2.2	2.2	2.2	1.8		2.4	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.6	5.7		5.4	5.8	5.8	5.2	5.8		5.4	5.5	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Recall Mode	None	None		None	None	None	None	C-Max		None	Max	
Walk Time (s)		7.0			7.0	7.0		7.0			7.0	
Flash Dont Walk (s)		20.0			23.0	23.0		23.0			18.0	
Pedestrian Calls (#/hr)		11			12	12		29			5	
Act Effct Green (s)	30.5	21.0		30.5	20.7	20.7	79.6	73.6		93.1	86.5	
Actuated g/C Ratio	0.22	0.15		0.22	0.15	0.15	0.57	0.53		0.66	0.62	
v/c Ratio	0.65	0.46		0.53	0.56	0.82	0.12	0.33		0.73	0.48	
Control Delay	55.1	52.0		48.5	58.2	31.3	12.3	20.7		22.3	17.0	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	55.1	52.0		48.5	58.2	31.3	12.3	20.7		22.3	17.0	
LOS	E	D		D	E	C	B	C		C	B	
Approach Delay		53.2			44.0			20.5			18.0	
Approach LOS		D			D			C			B	
90th %ile Green (s)	9.4	31.1		9.6	31.0	31.0	6.4	62.2		14.8	71.1	
90th %ile Term Code	Max	Hold		Max	Gap	Gap	Gap	Coord		Max	Coord	
70th %ile Green (s)	9.4	30.1		9.6	30.0	30.0	5.7	62.2		15.8	72.8	
70th %ile Term Code	Max	Hold		Max	Ped	Ped	Gap	Coord		Max	Coord	
50th %ile Green (s)	9.4	16.9		9.6	16.8	16.8	5.1	76.2		15.0	86.6	
50th %ile Term Code	Max	Hold		Max	Gap	Gap	Gap	Coord		Gap	Coord	
30th %ile Green (s)	9.4	14.2		9.6	14.1	14.1	0.0	81.1		12.8	99.6	
30th %ile Term Code	Max	Hold		Max	Gap	Gap	Skip	Coord		Gap	Coord	
10th %ile Green (s)	9.4	12.6		8.6	11.5	11.5	0.0	86.1		10.4	102.2	
10th %ile Term Code	Max	Hold		Gap	Gap	Gap	Skip	Coord		Gap	Coord	
Stops (vph)	114	141		88	174	95	11	406		113	660	
Fuel Used(gal)	3	4		2	5	5	0	10		3	12	
CO Emissions (g/hr)	204	255		171	343	347	18	719		190	833	
NOx Emissions (g/hr)	40	50		33	67	67	3	140		37	162	
VOC Emissions (g/hr)	47	59		40	79	80	4	167		44	193	
Dilemma Vehicles (#)	0	0		0	0	0	0	26		0	44	
Queue Length 50th (ft)	119	103		107	135	101	6	156		101	253	
Queue Length 95th (ft)	153	100		123	118	144	20	206		189	335	
Internal Link Dist (ft)		699			1005			720			220	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	190			120		150	145			145		
Base Capacity (vph)	236	778		262	788	550	317	2644		450	3111	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.65	0.31		0.53	0.37	0.68	0.08	0.33		0.71	0.48	

Intersection Summary

Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 0 (0%), Referenced to phase 6:NBTL, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 27.4 Intersection LOS: C
Intersection Capacity Utilization 80.4% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 2: Eastern Avenue & Stewart Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	134	964	95	102	401	126	85	641	174	311	732	82
Future Volume (veh/h)	134	964	95	102	401	126	85	641	174	311	732	82
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	179	1397	117	167	483	166	105	866	242	389	927	126
Peak Hour Factor	0.75	0.69	0.81	0.61	0.83	0.76	0.81	0.74	0.72	0.80	0.79	0.65
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	228	1725	528	214	1704	524	152	1195	332	440	1751	237
Arrive On Green	0.07	0.34	0.34	0.06	0.33	0.33	0.04	0.30	0.30	0.13	0.39	0.39
Sat Flow, veh/h	3456	5106	1564	3456	5106	1569	3456	3956	1099	3456	4543	615
Grp Volume(v), veh/h	179	1397	117	167	483	166	105	745	363	389	694	359
Grp Sat Flow(s),veh/h/ln	1728	1702	1564	1728	1702	1569	1728	1702	1650	1728	1702	1754
Q Serve(g_s), s	7.1	34.9	7.5	6.7	9.7	11.0	4.2	27.4	27.6	15.5	22.0	22.2
Cycle Q Clear(g_c), s	7.1	34.9	7.5	6.7	9.7	11.0	4.2	27.4	27.6	15.5	22.0	22.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.67	1.00		0.35
Lane Grp Cap(c), veh/h	228	1725	528	214	1704	524	152	1029	499	440	1312	676
V/C Ratio(X)	0.78	0.81	0.22	0.78	0.28	0.32	0.69	0.72	0.73	0.88	0.53	0.53
Avail Cap(c_a), veh/h	336	1725	528	237	1704	524	358	1029	499	531	1312	676
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	64.4	42.2	33.2	64.7	34.3	34.7	66.0	43.6	43.7	60.1	33.2	33.3
Incr Delay (d2), s/veh	3.9	4.2	1.0	12.1	0.2	0.7	2.1	4.4	9.0	12.8	1.5	3.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	14.9	0.1	3.2	4.0	4.3	1.9	11.9	12.2	7.4	9.1	9.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	68.3	46.5	34.1	76.8	34.5	35.5	68.0	48.1	52.8	72.9	34.7	36.2
LnGrp LOS	E	D	C	E	C	D	E	D	D	E	C	D
Approach Vol, veh/h		1693			816			1213			1442	
Approach Delay, s/veh		47.9			43.4			51.2			45.4	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.7	60.6	14.1	53.6	23.3	49.0	14.6	53.0
Change Period (Y+Rc), s	5.5	6.7	5.4	* 6.3	5.5	6.7	5.4	* 6.3
Max Green Setting (Gmax), s	14.5	49.3	9.6	* 43	21.5	42.3	13.6	* 39
Max Q Clear Time (g_c+I1), s	6.2	24.2	8.7	36.9	17.5	29.6	9.1	13.0
Green Ext Time (p_c), s	0.1	8.1	0.0	5.1	0.3	5.5	0.1	7.1

Intersection Summary			
HCM 6th Ctrl Delay			47.3
HCM 6th LOS			D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

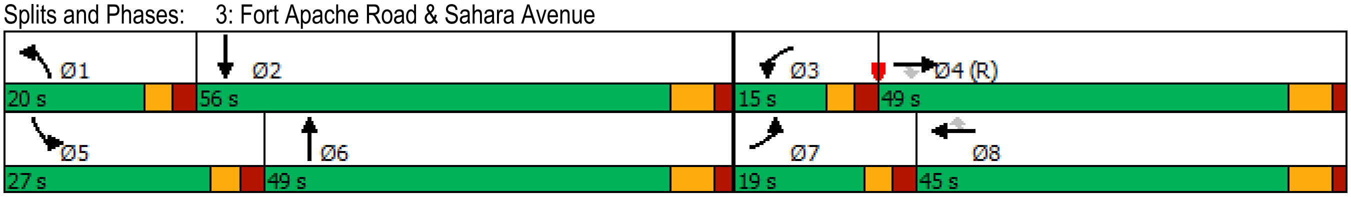
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	134	964	95	102	401	126	85	641	174	311	732	82
Future Volume (vph)	134	964	95	102	401	126	85	641	174	311	732	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	325		180	315		180	260		0	350		0
Storage Lanes	2		1	2		1	2		0	2		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	0.91	0.97	0.91	0.91
Ped Bike Factor			0.97			0.97		0.99			1.00	
Frt			0.850			0.850		0.967			0.982	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	4885	0	3433	4981	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1532	3433	5085	1541	3433	4885	0	3433	4981	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			157			166		52			19	
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		922			934			915			934	
Travel Time (s)		14.0			14.2			13.9			14.2	
Confl. Peds. (#/hr)			15			11			17			9
Peak Hour Factor	0.75	0.69	0.81	0.61	0.83	0.76	0.81	0.74	0.72	0.80	0.79	0.65
Adj. Flow (vph)	179	1397	117	167	483	166	105	866	242	389	927	126
Shared Lane Traffic (%)												
Lane Group Flow (vph)	179	1397	117	167	483	166	105	1108	0	389	1053	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8						
Detector Phase	7	4	4	3	8	8	1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	15.0	15.0	5.0	15.0	15.0	5.0	13.0		5.0	13.0	
Minimum Split (s)	10.4	36.3	36.3	10.4	37.3	37.3	10.5	44.7		10.5	45.7	
Total Split (s)	19.0	49.0	49.0	15.0	45.0	45.0	20.0	49.0		27.0	56.0	
Total Split (%)	13.6%	35.0%	35.0%	10.7%	32.1%	32.1%	14.3%	35.0%		19.3%	40.0%	
Maximum Green (s)	13.6	42.7	42.7	9.6	38.7	38.7	14.5	42.3		21.5	49.3	
Yellow Time (s)	3.0	4.7	4.7	3.0	4.7	4.7	3.0	4.7		3.0	4.7	
All-Red Time (s)	2.4	1.6	1.6	2.4	1.6	1.6	2.5	2.0		2.5	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.4	6.3	6.3	5.4	6.3	6.3	5.5	6.7		5.5	6.7	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	5.1	5.1	2.0	5.0	5.0	2.0	3.0		2.0	3.4	
Recall Mode	None	C-Max	C-Max	None	None	None	None	Max		None	Max	
Walk Time (s)		7.0	7.0		7.0	7.0		7.0			7.0	
Flash Dont Walk (s)		23.0	23.0		24.0	24.0		31.0			32.0	
Pedestrian Calls (#/hr)		15	15		11	11		17			9	
Act Effct Green (s)	11.4	43.0	43.0	9.3	40.9	40.9	8.7	44.6		19.2	55.1	
Actuated g/C Ratio	0.08	0.31	0.31	0.07	0.29	0.29	0.06	0.32		0.14	0.39	
v/c Ratio	0.64	0.89	0.20	0.74	0.33	0.29	0.49	0.70		0.83	0.53	
Control Delay	73.0	54.9	2.6	83.1	39.8	6.8	71.0	42.8		73.8	33.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	73.0	54.9	2.6	83.1	39.8	6.8	71.0	42.8		73.8	33.4	
LOS	E	D	A	F	D	A	E	D		E	C	
Approach Delay		53.2			42.0			45.3			44.3	
Approach LOS		D			D			D			D	
90th %ile Green (s)	13.6	42.7	42.7	9.6	38.7	38.7	11.4	42.3		21.5	52.4	
90th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Gap	MaxR		Max	MaxR	
70th %ile Green (s)	13.1	42.7	42.7	9.6	39.2	39.2	9.8	42.3		21.5	54.0	
70th %ile Term Code	Gap	Coord	Coord	Max	Coord	Coord	Gap	MaxR		Max	MaxR	
50th %ile Green (s)	11.7	42.7	42.7	9.6	40.6	40.6	8.7	43.7		20.1	55.1	
50th %ile Term Code	Gap	Coord	Coord	Max	Coord	Coord	Gap	MaxR		Gap	MaxR	
30th %ile Green (s)	10.2	42.7	42.7	9.6	42.1	42.1	7.6	45.8		18.0	56.2	
30th %ile Term Code	Gap	Coord	Coord	Max	Coord	Coord	Gap	MaxR		Gap	MaxR	
10th %ile Green (s)	8.2	44.3	44.3	8.0	44.1	44.1	6.0	48.8		15.0	57.8	
10th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR		Gap	MaxR	
Stops (vph)	128	886	3	97	307	14	80	671		297	599	
Fuel Used(gal)	4	28	1	4	10	1	3	20		10	18	
CO Emissions (g/hr)	307	1926	46	248	664	78	191	1418		717	1253	
NOx Emissions (g/hr)	60	375	9	48	129	15	37	276		139	244	
VOC Emissions (g/hr)	71	446	11	58	154	18	44	329		166	290	
Dilemma Vehicles (#)	0	34	0	0	14	0	0	29		0	29	
Queue Length 50th (ft)	82	447	0	78	126	0	48	312		178	263	
Queue Length 95th (ft)	100	356	7	78	150	28	70	286		204	269	
Internal Link Dist (ft)		842			854			835			854	
Turn Bay Length (ft)	325		180	315		180	260			350		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	333	1562	579	235	1486	568	355	1591		527	1971	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.54	0.89	0.20	0.71	0.33	0.29	0.30	0.70		0.74	0.53	

Intersection Summary	
Area Type: Other	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 4:EBT, Start of Green	
Natural Cycle: 115	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 47.1	Intersection LOS: D
Intersection Capacity Utilization 89.6%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 3: Fort Apache Road & Sahara Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	265	243	143	140	79	66	1084	134	133	2135	25
Future Volume (veh/h)	31	265	243	143	140	79	66	1084	134	133	2135	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	48	319	363	234	163	110	80	1166	161	156	2483	39
Peak Hour Factor	0.64	0.83	0.67	0.61	0.86	0.72	0.83	0.93	0.83	0.85	0.86	0.64
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	95	750	323	276	925	409	120	1940	268	200	2294	708
Arrive On Green	0.03	0.21	0.21	0.08	0.26	0.26	0.03	0.43	0.43	0.06	0.45	0.45
Sat Flow, veh/h	3456	3554	1529	3456	3554	1572	3456	4532	626	3456	5106	1576
Grp Volume(v), veh/h	48	319	363	234	163	110	80	876	451	156	2483	39
Grp Sat Flow(s),veh/h/ln	1728	1777	1529	1728	1777	1572	1728	1702	1754	1728	1702	1576
Q Serve(g_s), s	2.2	12.5	34.0	10.8	5.7	9.0	3.7	31.9	31.9	7.2	72.3	2.3
Cycle Q Clear(g_c), s	2.2	12.5	34.0	10.8	5.7	9.0	3.7	31.9	31.9	7.2	72.3	2.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.36	1.00		1.00
Lane Grp Cap(c), veh/h	95	750	323	276	925	409	120	1457	750	200	2294	708
V/C Ratio(X)	0.51	0.43	1.12	0.85	0.18	0.27	0.66	0.60	0.60	0.78	1.08	0.06
Avail Cap(c_a), veh/h	279	750	323	311	925	409	414	1457	750	421	2294	708
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	77.2	55.0	63.5	73.1	46.1	47.3	76.8	35.5	35.5	74.8	44.3	25.0
Incr Delay (d2), s/veh	1.6	0.5	88.0	16.1	0.1	0.5	2.3	1.8	3.5	2.5	45.5	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	5.7	21.1	5.4	2.6	3.6	1.7	13.6	14.4	3.3	39.5	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	78.8	55.6	151.5	89.2	46.3	47.8	79.1	37.3	39.0	77.3	89.8	25.2
LnGrp LOS	E	E	F	F	D	D	E	D	D	E	F	C
Approach Vol, veh/h		730			507			1407			2678	
Approach Delay, s/veh		104.8			66.4			40.2			88.1	
Approach LOS		F			E			D			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.3	78.4	18.3	42.0	14.7	75.0	10.4	49.9
Change Period (Y+Rc), s	* 5.7	* 6.1	5.5	* 8	5.4	* 6.1	6.0	8.0
Max Green Setting (Gmax), s	* 19	* 69	14.5	* 34	19.6	* 69	13.0	34.0
Max Q Clear Time (g_c+I1), s	5.7	74.3	12.8	36.0	9.2	33.9	4.2	11.0
Green Ext Time (p_c), s	0.1	0.0	0.1	0.0	0.2	16.2	0.0	1.9

Intersection Summary	
HCM 6th Ctrl Delay	75.7
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	265	243	143	140	79	66	1084	134	133	2135	25
Future Volume (vph)	31	265	243	143	140	79	66	1084	134	133	2135	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		200	250		180	300		0	400		165
Storage Lanes	2		1	2		1	2		0	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.91	0.91	0.97	0.91	1.00
Ped Bike Factor			0.95			0.98		1.00				0.97
Frt			0.850			0.850		0.982				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	3433	4978	0	3433	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	3539	1504	3433	3539	1549	3433	4978	0	3433	5085	1539
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			212			110		19				113
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		768			1088			490			1010	
Travel Time (s)		15.0			21.2			9.5			19.7	
Confl. Peds. (#/hr)			25			7			8			9
Peak Hour Factor	0.64	0.83	0.67	0.61	0.86	0.72	0.83	0.93	0.83	0.85	0.86	0.64
Adj. Flow (vph)	48	319	363	234	163	110	80	1166	161	156	2483	39
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	319	363	234	163	110	80	1327	0	156	2483	39
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm

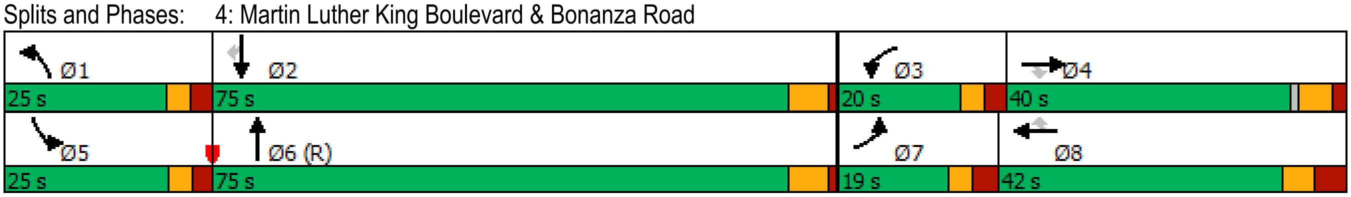
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8						2
Detector Phase	7	4	4	3	8	8	1	6		5	2	2
Switch Phase												
Minimum Initial (s)	5.0	11.0	11.0	5.0	11.0	11.0	5.0	13.0		5.0	13.0	13.0
Minimum Split (s)	11.0	37.0	37.0	10.5	42.0	42.0	10.7	33.1		10.4	33.1	33.1
Total Split (s)	19.0	40.0	40.0	20.0	42.0	42.0	25.0	75.0		25.0	75.0	75.0
Total Split (%)	11.8%	24.8%	24.8%	12.4%	26.1%	26.1%	15.5%	46.6%		15.5%	46.6%	46.6%
Maximum Green (s)	13.0	34.0	34.0	14.5	34.0	34.0	19.3	68.9		19.6	68.9	68.9
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.7		3.0	4.7	4.7
All-Red Time (s)	3.0	2.0	2.0	2.5	4.0	4.0	2.7	1.4		2.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	5.5	8.0	8.0	5.7	6.1		5.4	6.1	6.1
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	4.0		2.0	4.0	4.0
Recall Mode	None	None	None	None	None	None	None	C-Max		None	Max	Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0			7.0	7.0
Flash Dont Walk (s)		24.0	24.0		27.0	27.0		20.0			20.0	20.0
Pedestrian Calls (#/hr)		25	25		7	7		8			9	9
Act Effct Green (s)	6.7	27.4	27.4	13.7	34.0	34.0	8.2	85.2		11.7	88.5	88.5
Actuated g/C Ratio	0.04	0.17	0.17	0.09	0.21	0.21	0.05	0.53		0.07	0.55	0.55
v/c Ratio	0.34	0.53	0.84	0.80	0.22	0.27	0.46	0.50		0.63	0.89	0.04
Control Delay	80.8	63.2	43.5	92.6	52.5	9.5	82.3	26.1		83.5	38.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	80.8	63.2	43.5	92.6	52.5	9.5	82.3	26.1		83.5	38.0	0.1
LOS	F	E	D	F	D	A	F	C		F	D	A
Approach Delay		54.6			61.7			29.3			40.1	
Approach LOS		D			E			C			D	
90th %ile Green (s)	8.6	35.0	35.0	14.5	38.4	38.4	10.7	73.3		15.2	77.5	77.5
90th %ile Term Code	Gap	Max	Max	Max	Hold	Hold	Gap	Coord		Gap	Coord	Coord
70th %ile Green (s)	7.5	33.1	33.1	14.5	37.6	37.6	9.2	77.3		13.1	80.9	80.9
70th %ile Term Code	Gap	Gap	Gap	Max	Hold	Hold	Gap	Coord		Gap	Coord	Coord
50th %ile Green (s)	6.7	31.0	31.0	14.5	36.3	36.3	8.2	80.8		11.7	84.0	84.0
50th %ile Term Code	Gap	Ped	Ped	Max	Hold	Hold	Gap	Coord		Gap	Coord	Coord
30th %ile Green (s)	5.9	21.0	21.0	13.7	26.3	26.3	7.1	93.0		10.3	95.9	95.9
30th %ile Term Code	Gap	Gap	Gap	Gap	Hold	Hold	Gap	Coord		Gap	Coord	Coord
10th %ile Green (s)	0.0	16.8	16.8	11.2	31.5	31.5	5.7	101.8		8.2	104.0	104.0
10th %ile Term Code	Skip	Gap	Gap	Gap	Hold	Hold	Gap	Coord		Gap	Coord	Coord
Stops (vph)	29	234	106	137	113	10	63	762		127	1729	0
Fuel Used(gal)	1	7	4	5	3	1	2	17		4	45	0
CO Emissions (g/hr)	63	464	300	339	241	59	127	1155		293	3152	13
NOx Emissions (g/hr)	12	90	58	66	47	12	25	225		57	613	2
VOC Emissions (g/hr)	15	108	70	79	56	14	29	268		68	731	3
Dilemma Vehicles (#)	0	7	0	0	3	0	0	38		0	64	0
Queue Length 50th (ft)	25	158	160	126	74	0	43	336		84	876	0
Queue Length 95th (ft)	34	186	129	115	102	23	67	419		114	#962	0
Internal Link Dist (ft)		688			1008			410			930	
Turn Bay Length (ft)	300		200	250		180	300			400		165

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	277	769	492	309	792	432	411	2644		417	2793	896
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.17	0.41	0.74	0.76	0.21	0.25	0.19	0.50		0.37	0.89	0.04

Intersection Summary

Area Type: Other
Cycle Length: 161
Actuated Cycle Length: 161
Offset: 0 (0%), Referenced to phase 6:NBT, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 41.3 Intersection LOS: D
Intersection Capacity Utilization 87.6% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: Martin Luther King Boulevard & Bonanza Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	250	628	127	117	674	117	85	321	100	41	467	235
Future Volume (veh/h)	250	628	127	117	674	117	85	321	100	41	467	235
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	305	714	176	172	864	167	118	378	133	59	563	309
Peak Hour Factor	0.82	0.88	0.72	0.68	0.78	0.70	0.72	0.85	0.75	0.70	0.83	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	359	2090	637	223	1886	578	167	1149	500	111	1086	485
Arrive On Green	0.10	0.41	0.41	0.06	0.37	0.37	0.05	0.32	0.32	0.03	0.31	0.31
Sat Flow, veh/h	3456	5106	1556	3456	5106	1565	3456	3554	1546	3456	3554	1585
Grp Volume(v), veh/h	305	714	176	172	864	167	118	378	133	59	563	309
Grp Sat Flow(s),veh/h/ln	1728	1702	1556	1728	1702	1565	1728	1777	1546	1728	1777	1585
Q Serve(g_s), s	12.1	13.4	10.5	6.9	18.0	10.5	4.7	11.3	8.9	2.4	18.3	23.5
Cycle Q Clear(g_c), s	12.1	13.4	10.5	6.9	18.0	10.5	4.7	11.3	8.9	2.4	18.3	23.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	359	2090	637	223	1886	578	167	1149	500	111	1086	485
V/C Ratio(X)	0.85	0.34	0.28	0.77	0.46	0.29	0.71	0.33	0.27	0.53	0.52	0.64
Avail Cap(c_a), veh/h	570	2090	637	474	1886	578	395	1149	500	400	1086	485
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.7	28.4	27.5	64.5	33.5	31.2	65.6	35.9	35.1	66.7	40.1	41.9
Incr Delay (d2), s/veh	3.9	0.4	1.1	2.1	0.1	0.1	2.1	0.8	1.3	1.5	1.8	6.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	5.6	4.0	3.0	7.3	3.9	2.1	5.0	3.5	1.1	8.3	9.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	65.5	28.8	28.6	66.6	33.6	31.3	67.7	36.6	36.4	68.2	41.9	48.2
LnGrp LOS	E	C	C	E	C	C	E	D	D	E	D	D
Approach Vol, veh/h		1195			1203			629			931	
Approach Delay, s/veh		38.2			38.0			42.4			45.6	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.8	49.0	14.8	63.4	10.3	51.5	20.4	57.8
Change Period (Y+Rc), s	6.0	* 6.2	* 5.8	* 6.1	* 5.8	* 6.2	5.9	* 6.1
Max Green Setting (Gmax), s	16.0	* 43	* 19	* 38	* 16	* 43	23.1	* 34
Max Q Clear Time (g_c+I1), s	6.7	25.5	8.9	15.4	4.4	13.3	14.1	20.0
Green Ext Time (p_c), s	0.1	2.8	0.2	3.6	0.0	1.8	0.4	3.5

Intersection Summary	
HCM 6th Ctrl Delay	40.5
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	250	628	127	117	674	117	85	321	100	41	467	235
Future Volume (vph)	250	628	127	117	674	117	85	321	100	41	467	235
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	450		135	250		160	240		230	250		315
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor			0.98			0.99			0.97			
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1544	3433	5085	1563	3433	3539	1540	3433	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			152			133			133			309
Link Speed (mph)		35			45			35			35	
Link Distance (ft)		873			992			804			651	
Travel Time (s)		17.0			15.0			15.7			12.7	
Confl. Peds. (#/hr)			7						13			
Confl. Bikes (#/hr)			2			1			1			
Peak Hour Factor	0.82	0.88	0.72	0.68	0.78	0.70	0.72	0.85	0.75	0.70	0.83	0.76
Adj. Flow (vph)	305	714	176	172	864	167	118	378	133	59	563	309
Shared Lane Traffic (%)												
Lane Group Flow (vph)	305	714	176	172	864	167	118	378	133	59	563	309
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	13.0	13.0	5.0	13.0	13.0	5.0	11.0	11.0	5.0	11.0	11.0
Minimum Split (s)	10.9	32.1	32.1	10.8	22.5	22.5	11.0	42.2	42.2	10.8	22.5	22.5
Total Split (s)	29.0	44.0	44.0	25.0	40.0	40.0	22.0	49.0	49.0	22.0	49.0	49.0
Total Split (%)	20.7%	31.4%	31.4%	17.9%	28.6%	28.6%	15.7%	35.0%	35.0%	15.7%	35.0%	35.0%
Maximum Green (s)	23.1	37.9	37.9	19.2	33.9	33.9	16.0	42.8	42.8	16.2	42.8	42.8
Yellow Time (s)	3.0	4.7	4.7	3.0	4.7	4.7	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	2.9	1.4	1.4	2.8	1.4	1.4	3.0	2.2	2.2	2.8	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	6.1	6.1	5.8	6.1	6.1	6.0	6.2	6.2	5.8	6.2	6.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	C-Max	C-Max	None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)		7.0	7.0					7.0	7.0			
Flash Dont Walk (s)		19.0	19.0					29.0	29.0			
Pedestrian Calls (#/hr)		7	7					13	13			
Act Effct Green (s)	16.8	45.7	45.7	11.4	40.2	40.2	9.2	54.3	54.3	6.8	49.6	49.6
Actuated g/C Ratio	0.12	0.33	0.33	0.08	0.29	0.29	0.07	0.39	0.39	0.05	0.35	0.35
v/c Ratio	0.74	0.43	0.29	0.62	0.59	0.31	0.52	0.28	0.20	0.35	0.45	0.41
Control Delay	70.7	38.3	9.0	71.6	45.3	12.1	71.3	30.9	5.4	69.8	36.5	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.7	38.3	9.0	71.6	45.3	12.1	71.3	30.9	5.4	69.8	36.5	5.1
LOS	E	D	A	E	D	B	E	C	A	E	D	A
Approach Delay		42.3			44.5			33.1			28.2	
Approach LOS		D			D			C			C	
90th %ile Green (s)	21.3	42.3	42.3	14.8	35.7	35.7	12.1	50.2	50.2	8.8	46.7	46.7
90th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Gap	MaxR	MaxR
70th %ile Green (s)	18.6	44.3	44.3	12.8	38.4	38.4	10.4	51.4	51.4	7.6	48.4	48.4
70th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Gap	MaxR	MaxR
50th %ile Green (s)	16.8	45.7	45.7	11.4	40.2	40.2	9.2	52.2	52.2	6.8	49.6	49.6
50th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Gap	MaxR	MaxR
30th %ile Green (s)	14.9	47.1	47.1	10.0	42.1	42.1	8.0	53.0	53.0	6.0	50.8	50.8
30th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Gap	MaxR	MaxR
10th %ile Green (s)	12.2	49.1	49.1	8.0	44.8	44.8	6.3	64.8	64.8	0.0	52.5	52.5
10th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Skip	MaxR	MaxR
Stops (vph)	237	482	20	111	568	25	81	217	11	39	352	19
Fuel Used(gal)	7	12	1	4	18	1	2	6	1	1	8	1
CO Emissions (g/hr)	486	873	83	268	1232	95	163	385	54	75	581	104
NOx Emissions (g/hr)	95	170	16	52	240	18	32	75	11	15	113	20
VOC Emissions (g/hr)	113	202	19	62	286	22	38	89	13	17	135	24
Dilemma Vehicles (#)	0	23	0	0	24	0	0	12	0	0	17	0
Queue Length 50th (ft)	140	186	15	79	248	23	54	126	0	27	206	0
Queue Length 95th (ft)	167	230	36	86	260	43	68	161	23	39	245	24
Internal Link Dist (ft)		793			912			724			571	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	450		135	250		160	240		230	250		315
Base Capacity (vph)	566	1659	606	470	1461	544	392	1373	678	397	1253	760
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.43	0.29	0.37	0.59	0.31	0.30	0.28	0.20	0.15	0.45	0.41

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 115 (82%), Referenced to phase 4:EBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

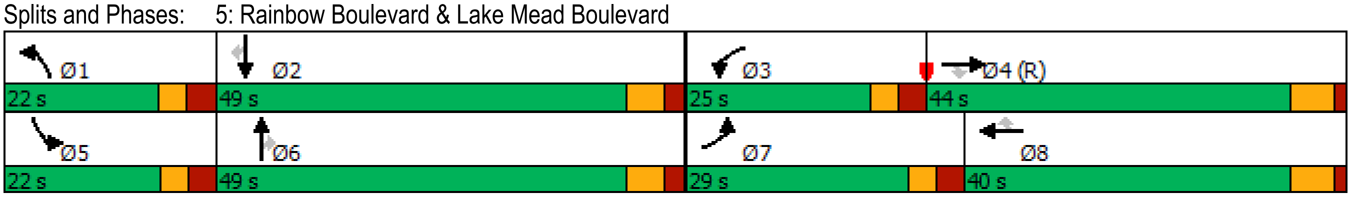
Maximum v/c Ratio: 0.74

Intersection Signal Delay: 38.2 Intersection LOS: D

Intersection Capacity Utilization 77.3% ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 5: Rainbow Boulevard & Lake Mead Boulevard



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	108	923	244	162	431	87	176	1002	204	320	2045	108
Future Volume (veh/h)	108	923	244	162	431	87	176	1002	204	320	2045	108
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.98	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	171	1282	284	188	513	126	293	1285	340	438	2464	140
Peak Hour Factor	0.63	0.72	0.86	0.86	0.84	0.69	0.60	0.78	0.60	0.73	0.83	0.77
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	220	1141	253	237	1146	273	339	1929	588	338	1943	593
Arrive On Green	0.06	0.27	0.27	0.07	0.28	0.28	0.10	0.38	0.38	0.10	0.38	0.38
Sat Flow, veh/h	3456	4171	924	3456	4095	977	3456	5106	1556	3456	5106	1559
Grp Volume(v), veh/h	171	1046	520	188	424	215	293	1285	340	438	2464	140
Grp Sat Flow(s),veh/h/ln	1728	1702	1691	1728	1702	1668	1728	1702	1556	1728	1702	1559
Q Serve(g_s), s	6.8	38.3	38.3	7.5	14.3	14.9	11.7	29.3	24.4	13.7	53.3	8.6
Cycle Q Clear(g_c), s	6.8	38.3	38.3	7.5	14.3	14.9	11.7	29.3	24.4	13.7	53.3	8.6
Prop In Lane	1.00		0.55	1.00		0.59	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	220	931	463	237	953	467	339	1929	588	338	1943	593
V/C Ratio(X)	0.78	1.12	1.12	0.79	0.45	0.46	0.86	0.67	0.58	1.30	1.27	0.24
Avail Cap(c_a), veh/h	323	931	463	318	953	467	348	1929	588	338	1943	593
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	64.6	50.8	50.9	64.2	41.5	41.7	62.2	36.2	34.7	63.2	43.4	29.5
Incr Delay (d2), s/veh	3.7	69.6	80.3	6.7	0.1	0.3	18.5	1.8	4.1	153.1	124.9	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	24.8	26.0	3.5	5.9	6.1	5.9	12.1	9.6	13.1	43.9	3.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	68.2	120.4	131.1	70.9	41.6	41.9	80.7	38.0	38.8	216.3	168.2	30.4
LnGrp LOS	E	F	F	E	D	D	F	D	D	F	F	C
Approach Vol, veh/h		1737			827			1918			3042	
Approach Delay, s/veh		118.5			48.4			44.7			168.8	
Approach LOS		F			D			D			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.6	59.7	15.7	45.0	20.0	59.3	14.8	45.9
Change Period (Y+Rc), s	5.9	* 6.4	6.1	6.7	* 6.3	* 6.4	5.9	6.7
Max Green Setting (Gmax), s	14.1	* 50	12.9	38.3	* 14	* 50	13.1	38.3
Max Q Clear Time (g_c+I1), s	13.7	55.3	9.5	40.3	15.7	31.3	8.8	16.9
Green Ext Time (p_c), s	0.0	0.0	0.1	0.0	0.0	6.3	0.1	2.4

Intersection Summary	
HCM 6th Ctrl Delay	112.3
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	108	923	244	162	431	87	176	1002	204	320	2045	108
Future Volume (vph)	108	923	244	162	431	87	176	1002	204	320	2045	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	345		0	345		0	340		120	330		245
Storage Lanes	2		0	2		0	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.91	0.91	0.97	0.91	0.91	0.97	0.91	1.00	0.97	0.91	1.00
Ped Bike Factor		1.00			0.99				0.96			0.96
Frt		0.973			0.970				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	4927	0	3433	4899	0	3433	5085	1583	3433	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	4927	0	3433	4899	0	3433	5085	1514	3433	5085	1519
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		35			41				167			125
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		1636			1478			1249			1239	
Travel Time (s)		24.8			22.4			18.9			18.8	
Confl. Peds. (#/hr)			11			21			23			21
Peak Hour Factor	0.63	0.72	0.86	0.86	0.84	0.69	0.60	0.78	0.60	0.73	0.83	0.77
Adj. Flow (vph)	171	1282	284	188	513	126	293	1285	340	438	2464	140
Shared Lane Traffic (%)												
Lane Group Flow (vph)	171	1566	0	188	639	0	293	1285	340	438	2464	140
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	Perm

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases									6			2
Detector Phase	7	4		3	8		1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0		5.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	10.9	44.7		11.1	44.7		10.9	36.3	36.3	11.3	36.4	36.4
Total Split (s)	19.0	45.0		19.0	45.0		20.0	56.0	56.0	20.0	56.0	56.0
Total Split (%)	13.6%	32.1%		13.6%	32.1%		14.3%	40.0%	40.0%	14.3%	40.0%	40.0%
Maximum Green (s)	13.1	38.3		12.9	38.3		14.1	49.7	49.7	13.7	49.6	49.6
Yellow Time (s)	3.0	4.7		3.0	4.7		3.0	4.7	4.7	3.0	4.7	4.7
All-Red Time (s)	2.9	2.0		3.1	2.0		2.9	1.6	1.6	3.3	1.7	1.7
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	6.7		6.1	6.7		5.9	6.3	6.3	6.3	6.4	6.4
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	None		None	None		None	Max	Max	None	C-Max	C-Max
Walk Time (s)		7.0			7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		31.0			31.0			23.0	23.0		23.0	23.0
Pedestrian Calls (#/hr)		11			21			23	23		21	21
Act Effct Green (s)	11.0	39.9		11.3	40.4		13.8	49.7	49.7	13.7	49.9	49.9
Actuated g/C Ratio	0.08	0.28		0.08	0.29		0.10	0.36	0.36	0.10	0.36	0.36
v/c Ratio	0.64	1.10		0.68	0.44		0.87	0.71	0.53	1.31	1.36	0.23
Control Delay	73.3	100.2		74.9	39.3		86.9	41.6	20.7	205.9	201.4	7.6
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	73.3	100.2		74.9	39.3		86.9	41.6	20.7	205.9	201.4	7.6
LOS	E	F		E	D		F	D	C	F	F	A
Approach Delay		97.6			47.4			44.8			193.1	
Approach LOS		F			D			D			F	
90th %ile Green (s)	13.1	38.3		12.9	38.3		14.1	49.7	49.7	13.7	49.6	49.6
90th %ile Term Code	Max	Max		Max	Hold		Max	Coord	Coord	Max	Coord	Coord
70th %ile Green (s)	12.7	38.3		12.9	38.7		14.1	49.7	49.7	13.7	49.6	49.6
70th %ile Term Code	Gap	Max		Max	Hold		Max	Coord	Coord	Max	Coord	Coord
50th %ile Green (s)	11.3	39.2		12.0	40.1		14.1	49.7	49.7	13.7	49.6	49.6
50th %ile Term Code	Gap	Max		Gap	Hold		Max	Coord	Coord	Max	Coord	Coord
30th %ile Green (s)	9.9	40.7		10.5	41.5		14.1	49.7	49.7	13.7	49.6	49.6
30th %ile Term Code	Gap	Max		Gap	Hold		Max	Coord	Coord	Max	Coord	Coord
10th %ile Green (s)	7.9	42.8		8.4	43.5		12.5	49.7	49.7	13.7	51.2	51.2
10th %ile Term Code	Gap	Max		Gap	Hold		Gap	Coord	Coord	Max	Coord	Coord
Stops (vph)	103	992		156	387		163	844	84	251	1568	16
Fuel Used(gal)	4	49		6	14		7	27	4	19	120	1
CO Emissions (g/hr)	282	3393		417	973		459	1895	249	1336	8374	86
NOx Emissions (g/hr)	55	660		81	189		89	369	48	260	1629	17
VOC Emissions (g/hr)	65	786		97	226		106	439	58	310	1941	20
Dilemma Vehicles (#)	0	37		0	15		0	36	0	0	53	0
Queue Length 50th (ft)	78	~590		87	163		137	368	122	~262	~1082	9
Queue Length 95th (ft)	80	446		122	191		121	350	85	#271	#1030	36
Internal Link Dist (ft)		1556			1398			1169			1159	
Turn Bay Length (ft)	345			345			340		120	330		245

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	321	1427		316	1443		345	1805	645	335	1813	621
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.53	1.10		0.59	0.44		0.85	0.71	0.53	1.31	1.36	0.23

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 128.3 (92%), Referenced to phase 2:SBT, Start of Green

Natural Cycle: 145

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.36

Intersection Signal Delay: 117.3 Intersection LOS: F

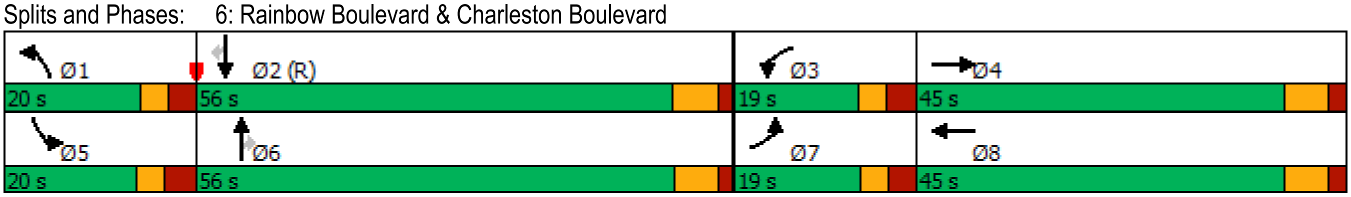
Intersection Capacity Utilization 96.1% ICU Level of Service F

Analysis Period (min) 15

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

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

Splits and Phases: 6: Rainbow Boulevard & Charleston Boulevard



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	138	1283	179	159	824	105	96	272	116	180	786	38
Future Volume (veh/h)	138	1283	179	159	824	105	96	272	116	180	786	38
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.97	1.00		0.97	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	216	1645	275	215	1056	118	113	283	140	333	1062	52
Peak Hour Factor	0.64	0.78	0.65	0.74	0.78	0.89	0.85	0.96	0.83	0.54	0.74	0.73
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	265	1881	578	262	1870	564	161	962	434	313	1124	55
Arrive On Green	0.08	0.37	0.37	0.08	0.37	0.37	0.05	0.28	0.28	0.09	0.33	0.33
Sat Flow, veh/h	3456	5106	1568	3456	5106	1540	3456	3410	1540	3456	3447	169
Grp Volume(v), veh/h	216	1645	275	215	1056	118	113	282	141	333	547	567
Grp Sat Flow(s),veh/h/ln	1728	1702	1568	1728	1702	1540	1728	1702	1546	1728	1777	1839
Q Serve(g_s), s	8.6	42.0	18.8	8.6	23.1	7.4	4.5	9.1	10.1	12.7	42.0	42.0
Cycle Q Clear(g_c), s	8.6	42.0	18.8	8.6	23.1	7.4	4.5	9.1	10.1	12.7	42.0	42.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.09
Lane Grp Cap(c), veh/h	265	1881	578	262	1870	564	161	960	436	313	580	600
V/C Ratio(X)	0.81	0.87	0.48	0.82	0.56	0.21	0.70	0.29	0.32	1.06	0.94	0.94
Avail Cap(c_a), veh/h	355	1929	593	286	1870	564	363	960	436	313	580	600
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	63.6	41.2	33.9	63.7	35.5	30.5	65.8	39.3	39.7	63.7	45.9	45.9
Incr Delay (d2), s/veh	7.6	4.9	0.9	14.4	1.2	0.8	2.1	0.8	2.0	68.2	25.9	25.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	17.8	7.1	4.2	9.6	2.8	2.0	3.9	4.1	8.5	22.4	23.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	71.2	46.1	34.7	78.1	36.7	31.3	67.8	40.1	41.6	131.9	71.8	71.3
LnGrp LOS	E	D	C	E	D	C	E	D	D	F	E	E
Approach Vol, veh/h		2136			1389			536			1447	
Approach Delay, s/veh		47.1			42.7			46.4			85.4	
Approach LOS		D			D			D			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.8	52.2	16.0	57.7	18.0	46.0	16.3	57.4				
Change Period (Y+Rc), s	* 5.3	* 6.5	5.4	* 6.1	* 5.3	6.5	5.6	* 6.1				
Max Green Setting (Gmax), s	* 15	* 38	11.6	* 53	* 13	39.5	14.4	* 50				
Max Q Clear Time (g_c+I1), s	6.5	44.0	10.6	44.0	14.7	12.1	10.6	25.1				
Green Ext Time (p_c), s	0.1	0.0	0.0	7.6	0.0	1.8	0.1	11.0				
Intersection Summary												
HCM 6th Ctrl Delay			56.0									
HCM 6th LOS			E									

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	138	1283	179	159	824	105	96	272	116	180	786	38
Future Volume (vph)	138	1283	179	159	824	105	96	272	116	180	786	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	315		135	345		160	270		0	345		0
Storage Lanes	2		1	2		1	2		0	2		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	0.91	0.97	0.95	0.95
Ped Bike Factor			0.97			0.93		0.99			1.00	
Frt			0.850			0.850		0.950			0.993	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	4771	0	3433	3511	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1530	3433	5085	1473	3433	4771	0	3433	3511	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			121			111		90			3	
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		967			793			658			756	
Travel Time (s)		14.7			12.0			12.8			14.7	
Confl. Peds. (#/hr)			13			35			24			8
Peak Hour Factor	0.64	0.78	0.65	0.74	0.78	0.89	0.85	0.96	0.83	0.54	0.74	0.73
Adj. Flow (vph)	216	1645	275	215	1056	118	113	283	140	333	1062	52
Shared Lane Traffic (%)												
Lane Group Flow (vph)	216	1645	275	215	1056	118	113	423	0	333	1114	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8						
Detector Phase	7	4	4	3	8	8	1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	15.0	15.0	5.0	15.0	15.0	5.0	13.0		5.0	13.0	
Minimum Split (s)	10.6	31.1	31.1	10.4	31.1	31.1	10.3	45.5		10.3	43.4	
Total Split (s)	20.0	59.0	59.0	17.0	56.0	56.0	20.0	46.0		18.0	44.0	
Total Split (%)	14.3%	42.1%	42.1%	12.1%	40.0%	40.0%	14.3%	32.9%		12.9%	31.4%	
Maximum Green (s)	14.4	52.9	52.9	11.6	49.9	49.9	14.7	39.5		12.7	37.6	
Yellow Time (s)	3.0	4.7	4.7	3.0	4.7	4.7	3.0	4.0		3.0	4.0	
All-Red Time (s)	2.6	1.4	1.4	2.4	1.4	1.4	2.3	2.5		2.3	2.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.6	6.1	6.1	5.4	6.1	6.1	5.3	6.5		5.3	6.4	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	C-Max	C-Max	None	Max		None	Max	
Walk Time (s)		7.0	7.0		7.0	7.0		7.0			7.0	
Flash Dont Walk (s)		18.0	18.0		18.0	18.0		32.0			30.0	
Pedestrian Calls (#/hr)		13	13		35	35		24			8	
Act Effct Green (s)	12.6	53.3	53.3	11.2	51.7	51.7	9.0	39.5		12.7	43.3	
Actuated g/C Ratio	0.09	0.38	0.38	0.08	0.37	0.37	0.06	0.28		0.09	0.31	
v/c Ratio	0.70	0.85	0.42	0.78	0.56	0.19	0.51	0.30		1.07	1.02	
Control Delay	74.3	45.0	19.5	83.2	36.8	6.9	71.3	31.3		129.7	80.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	74.3	45.0	19.5	83.2	36.8	6.9	71.3	31.3		129.7	80.7	
LOS	E	D	B	F	D	A	E	C		F	F	
Approach Delay		44.7			41.4			39.7			92.0	
Approach LOS		D			D			D			F	
90th %ile Green (s)	14.4	52.9	52.9	11.6	49.9	49.9	11.8	39.5		12.7	40.5	
90th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Gap	MaxR		Max	MaxR	
70th %ile Green (s)	14.4	52.9	52.9	11.6	49.9	49.9	10.1	39.5		12.7	42.2	
70th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Gap	MaxR		Max	MaxR	
50th %ile Green (s)	13.1	52.9	52.9	11.6	51.2	51.2	9.0	39.5		12.7	43.3	
50th %ile Term Code	Gap	Coord	Coord	Max	Coord	Coord	Gap	MaxR		Max	MaxR	
30th %ile Green (s)	11.6	52.9	52.9	11.6	52.7	52.7	7.9	39.5		12.7	44.4	
30th %ile Term Code	Gap	Coord	Coord	Max	Coord	Coord	Gap	MaxR		Max	MaxR	
10th %ile Green (s)	9.3	55.0	55.0	9.5	55.0	55.0	6.2	39.5		12.7	46.1	
10th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR		Max	MaxR	
Stops (vph)	132	1148	74	150	640	15	90	233		155	718	
Fuel Used(gal)	5	34	3	5	18	1	3	6		7	23	
CO Emissions (g/hr)	321	2382	192	376	1284	61	177	424		482	1638	
NOx Emissions (g/hr)	62	463	37	73	250	12	34	83		94	319	
VOC Emissions (g/hr)	74	552	45	87	298	14	41	98		112	380	
Dilemma Vehicles (#)	0	46	0	0	29	0	0	14		0	27	
Queue Length 50th (ft)	100	501	100	100	280	4	52	86		~172	~566	
Queue Length 95th (ft)	98	458	94	117	278	46	79	119		123	#505	
Internal Link Dist (ft)		887			713			578			676	
Turn Bay Length (ft)	315		135	345		160	270			345		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	353	1936	657	284	1879	614	360	1410		311	1087	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.61	0.85	0.42	0.76	0.56	0.19	0.31	0.30		1.07	1.02	

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 8:WBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.07

Intersection Signal Delay: 55.8 Intersection LOS: E

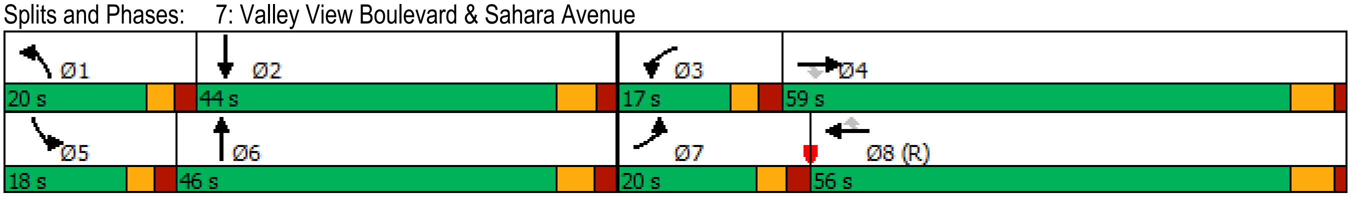
Intersection Capacity Utilization 86.4% ICU Level of Service E

Analysis Period (min) 15

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

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

Splits and Phases: 7: Valley View Boulevard & Sahara Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	101	33	100	152	51	15	658	123	78	1131	39
Future Volume (veh/h)	16	101	33	100	152	51	15	658	123	78	1131	39
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	30	180	51	154	245	78	21	693	0	134	1285	48
Peak Hour Factor	0.54	0.56	0.65	0.65	0.62	0.65	0.70	0.95	0.73	0.58	0.88	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	175	436	364	224	436	364	36	2867		157	3185	119
Arrive On Green	0.23	0.23	0.23	0.23	0.23	0.23	0.02	0.56	0.00	0.09	0.63	0.63
Sat Flow, veh/h	1051	1870	1563	1141	1870	1563	1781	5274	0	1781	5051	189
Grp Volume(v), veh/h	30	180	51	154	245	78	21	693	0	134	866	467
Grp Sat Flow(s),veh/h/ln	1051	1870	1563	1141	1870	1563	1781	1702	0	1781	1702	1836
Q Serve(g_s), s	3.6	11.4	3.6	18.5	16.2	5.6	1.6	9.6	0.0	10.4	17.6	17.6
Cycle Q Clear(g_c), s	19.8	11.4	3.6	30.0	16.2	5.6	1.6	9.6	0.0	10.4	17.6	17.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.10
Lane Grp Cap(c), veh/h	175	436	364	224	436	364	36	2867		157	2147	1158
V/C Ratio(X)	0.17	0.41	0.14	0.69	0.56	0.21	0.59	0.24		0.85	0.40	0.40
Avail Cap(c_a), veh/h	202	484	404	254	485	405	204	2867		202	2147	1158
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.1	45.6	42.6	58.3	47.4	43.3	68.0	15.6	0.0	62.9	12.8	12.8
Incr Delay (d2), s/veh	0.2	0.2	0.1	4.7	0.5	0.1	5.7	0.2	0.0	19.3	0.6	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	5.4	1.4	5.7	7.7	2.2	0.8	3.8	0.0	5.5	6.7	7.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.3	45.8	42.6	63.0	47.9	43.4	73.8	15.8	0.0	82.2	13.4	13.9
LnGrp LOS	E	D	D	E	D	D	E	B		F	B	B
Approach Vol, veh/h		261			477			714	A		1467	
Approach Delay, s/veh		46.4			52.0			17.5			19.8	
Approach LOS		D			D			B			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.8	93.8		38.4	17.5	84.1		38.4
Change Period (Y+Rc), s	5.0	* 5.5		* 5.8	5.1	5.5		* 5.8
Max Green Setting (Gmax), s	16.0	* 72		* 36	15.9	71.5		* 36
Max Q Clear Time (g_c+I1), s	3.6	19.6		21.8	12.4	11.6		32.0
Green Ext Time (p_c), s	0.0	7.1		0.7	0.1	3.4		0.6

Intersection Summary			
HCM 6th Ctrl Delay			26.9
HCM 6th LOS			C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	101	33	100	152	51	15	658	123	78	1131	39
Future Volume (vph)	16	101	33	100	152	51	15	658	123	78	1131	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	115		115	85		85	230		0	230		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor	0.99		0.97	0.99		0.98		0.98			1.00	
Frt			0.850			0.850		0.971			0.995	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	4846	0	1770	5053	0
Flt Permitted	0.318			0.473			0.950			0.950		
Satd. Flow (perm)	588	1863	1540	871	1863	1546	1770	4846	0	1770	5053	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			59			59		60			6	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		1078			724			717			783	
Travel Time (s)		24.5			16.5			14.0			15.3	
Confl. Peds. (#/hr)	8		11	11		8			23			5
Peak Hour Factor	0.54	0.56	0.65	0.65	0.62	0.65	0.70	0.95	0.73	0.58	0.88	0.82
Adj. Flow (vph)	30	180	51	154	245	78	21	693	168	134	1285	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	180	51	154	245	78	21	861	0	134	1333	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8		8						
Detector Phase	4	4	4	8	8	8	1	6		5	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	5.0	12.0		5.0	12.0	
Minimum Split (s)	34.8	34.8	34.8	33.7	33.7	33.7	10.0	26.5		10.1	26.4	
Total Split (s)	42.0	42.0	42.0	42.0	42.0	42.0	21.0	77.0		21.0	77.0	
Total Split (%)	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	15.0%	55.0%		15.0%	55.0%	
Maximum Green (s)	36.2	36.2	36.2	36.3	36.3	36.3	16.0	71.5		15.9	71.6	
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6	3.0	4.0		3.0	4.0	
All-Red Time (s)	2.2	2.2	2.2	2.1	2.1	2.1	2.0	1.5		2.1	1.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.8	5.8	5.8	5.7	5.7	5.7	5.0	5.5		5.1	5.4	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None	None	None	Max		None	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0		7.0			7.0	
Flash Dont Walk (s)	22.0	22.0	22.0	21.0	21.0	21.0		14.0			14.0	
Pedestrian Calls (#/hr)	11	11	11	8	8	8		23			5	
Act Effct Green (s)	25.8	25.8	25.8	25.9	25.9	25.9	6.3	83.7		14.1	95.7	
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18	0.18	0.04	0.60		0.10	0.68	
v/c Ratio	0.28	0.52	0.15	0.96	0.71	0.23	0.26	0.29		0.75	0.39	
Control Delay	52.3	55.6	8.7	115.9	63.9	16.6	72.1	14.2		86.3	11.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	52.3	55.6	8.7	115.9	63.9	16.6	72.1	14.2		86.3	11.6	
LOS	D	E	A	F	E	B	E	B		F	B	
Approach Delay		46.1			73.0			15.6			18.4	
Approach LOS		D			E			B			B	
90th %ile Green (s)	36.2	36.2	36.2	36.3	36.3	36.3	8.4	71.5		15.9	79.2	
90th %ile Term Code	Hold	Hold	Hold	Max	Max	Max	Gap	Coord		Max	Coord	
70th %ile Green (s)	30.5	30.5	30.5	30.6	30.6	30.6	7.0	75.6		17.5	86.3	
70th %ile Term Code	Hold	Hold	Hold	Gap	Gap	Gap	Gap	Coord		Gap	Coord	
50th %ile Green (s)	26.0	26.0	26.0	26.1	26.1	26.1	6.1	82.5		15.1	91.7	
50th %ile Term Code	Hold	Hold	Hold	Gap	Gap	Gap	Gap	Coord		Gap	Coord	
30th %ile Green (s)	21.4	21.4	21.4	21.5	21.5	21.5	0.0	89.5		12.7	107.4	
30th %ile Term Code	Hold	Hold	Hold	Gap	Gap	Gap	Skip	Coord		Gap	Coord	
10th %ile Green (s)	15.1	15.1	15.1	15.2	15.2	15.2	0.0	99.3		9.2	113.7	
10th %ile Term Code	Hold	Hold	Hold	Gap	Gap	Gap	Skip	Coord		Gap	Coord	
Stops (vph)	14	88	5	97	139	14	16	349		73	495	
Fuel Used(gal)	0	2	0	3	4	1	0	9		2	13	
CO Emissions (g/hr)	27	173	25	242	252	38	29	624		165	915	
NOx Emissions (g/hr)	5	34	5	47	49	7	6	121		32	178	
VOC Emissions (g/hr)	6	40	6	56	58	9	7	145		38	212	
Dilemma Vehicles (#)	0	0	0	0	0	0	0	28		0	42	
Queue Length 50th (ft)	24	150	0	140	211	14	19	126		120	194	
Queue Length 95th (ft)	30	122	9	141	181	28	37	186		119	279	
Internal Link Dist (ft)		998			644			637			703	
Turn Bay Length (ft)	115		115	85		85	230			230		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	152	481	441	225	483	444	202	2920		205	3454	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.20	0.37	0.12	0.68	0.51	0.18	0.10	0.29		0.65	0.39	

Intersection Summary	
Area Type: Other	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 122 (87%), Referenced to phase 2:SBT, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.96	
Intersection Signal Delay: 28.4	Intersection LOS: C
Intersection Capacity Utilization 58.3%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 8: Eastern Avenue & St. Louis Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	104	1073	76	112	1217	38	156	132	87	198	256	94
Future Volume (veh/h)	104	1073	76	112	1217	38	156	132	87	198	256	94
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	142	1325	100	147	1560	68	175	176	118	248	337	124
Peak Hour Factor	0.73	0.81	0.76	0.76	0.78	0.56	0.89	0.75	0.74	0.80	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	193	1909	588	171	2056	90	227	536	340	196	772	279
Arrive On Green	0.06	0.37	0.37	0.10	0.41	0.41	0.07	0.26	0.26	0.11	0.30	0.30
Sat Flow, veh/h	3456	5106	1572	1781	5016	219	3456	2083	1321	1781	2547	920
Grp Volume(v), veh/h	142	1325	100	147	1059	569	175	149	145	248	233	228
Grp Sat Flow(s),veh/h/ln	1728	1702	1572	1781	1702	1831	1728	1777	1627	1781	1777	1690
Q Serve(g_s), s	5.7	30.7	6.0	11.4	37.3	37.3	7.0	9.5	10.2	15.4	14.7	15.2
Cycle Q Clear(g_c), s	5.7	30.7	6.0	11.4	37.3	37.3	7.0	9.5	10.2	15.4	14.7	15.2
Prop In Lane	1.00		1.00	1.00		0.12	1.00		0.81	1.00		0.54
Lane Grp Cap(c), veh/h	193	1909	588	171	1395	750	227	457	418	196	538	512
V/C Ratio(X)	0.74	0.69	0.17	0.86	0.76	0.76	0.77	0.33	0.35	1.27	0.43	0.44
Avail Cap(c_a), veh/h	523	1909	588	277	1395	750	484	457	418	196	538	512
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	65.1	37.0	29.3	62.3	35.4	35.4	64.4	42.2	42.4	62.3	39.1	39.3
Incr Delay (d2), s/veh	2.1	2.1	0.6	7.7	2.8	5.1	2.1	1.9	2.3	153.6	2.5	2.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	13.0	2.3	5.4	15.5	17.1	3.1	4.4	4.4	15.3	6.8	6.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.1	39.2	29.9	70.1	38.2	40.5	66.5	44.0	44.7	215.9	41.7	42.1
LnGrp LOS	E	D	C	E	D	D	E	D	D	F	D	D
Approach Vol, veh/h		1567			1775			469			709	
Approach Delay, s/veh		41.1			41.6			52.6			102.8	
Approach LOS		D			D			D			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.6	48.4	18.6	58.4	21.0	42.0	13.6	63.4				
Change Period (Y+Rc), s	5.4	6.0	* 5.2	* 6	5.6	6.0	* 5.8	* 6				
Max Green Setting (Gmax), s	19.6	32.0	* 22	* 44	15.4	36.0	* 21	* 44				
Max Q Clear Time (g_c+I1), s	9.0	17.2	13.4	32.7	17.4	12.2	7.7	39.3				
Green Ext Time (p_c), s	0.2	5.1	0.1	9.0	0.0	4.2	0.2	4.2				
Intersection Summary												
HCM 6th Ctrl Delay			52.2									
HCM 6th LOS			D									

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	104	1073	76	112	1217	38	156	132	87	198	256	94
Future Volume (vph)	104	1073	76	112	1217	38	156	132	87	198	256	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	360		220	260		0	370		0	85		0
Storage Lanes	2		1	1		0	2		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	0.91	0.97	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor			0.97		1.00			0.99			1.00	
Frt			0.850		0.994			0.940			0.960	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	1770	5052	0	3433	3306	0	1770	3385	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1539	1770	5052	0	3433	3306	0	1770	3385	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			112		5			110			35	
Link Speed (mph)		35			45			35			35	
Link Distance (ft)		778			1071			690			688	
Travel Time (s)		15.2			16.2			13.4			13.4	
Confl. Peds. (#/hr)			10			1			3			1
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.73	0.81	0.76	0.76	0.78	0.56	0.89	0.75	0.74	0.80	0.76	0.76
Adj. Flow (vph)	142	1325	100	147	1560	68	175	176	118	248	337	124
Shared Lane Traffic (%)												
Lane Group Flow (vph)	142	1325	100	147	1628	0	175	294	0	248	461	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane											Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

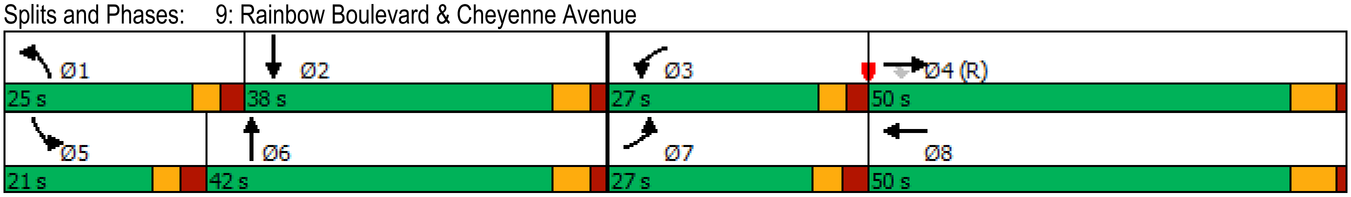
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4									
Detector Phase	7	4	4	3	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	15.0	15.0	5.0	15.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	10.8	32.0	32.0	10.2	30.0		10.4	38.0		10.6	38.0	
Total Split (s)	27.0	50.0	50.0	27.0	50.0		25.0	42.0		21.0	38.0	
Total Split (%)	19.3%	35.7%	35.7%	19.3%	35.7%		17.9%	30.0%		15.0%	27.1%	
Maximum Green (s)	21.2	44.0	44.0	21.8	44.0		19.6	36.0		15.4	32.0	
Yellow Time (s)	3.0	4.7	4.7	3.0	4.7		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.8	1.3	1.3	2.2	1.3		2.4	2.0		2.6	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.8	6.0	6.0	5.2	6.0		5.4	6.0		5.6	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	4.9	4.9	2.0	4.7		2.0	6.2		2.0	6.1	
Recall Mode	None	C-Max	C-Max	None	None		None	Max		None	Max	
Walk Time (s)		7.0	7.0		7.0			7.0			7.0	
Flash Dont Walk (s)		19.0	19.0		17.0			25.0			25.0	
Pedestrian Calls (#/hr)		10	10		1			3			1	
Act Effct Green (s)	10.2	49.9	49.9	15.9	55.0		11.5	36.0		15.4	40.1	
Actuated g/C Ratio	0.07	0.36	0.36	0.11	0.39		0.08	0.26		0.11	0.29	
v/c Ratio	0.57	0.73	0.16	0.73	0.82		0.62	0.32		1.28	0.46	
Control Delay	71.4	42.8	5.1	80.2	42.5		71.7	26.8		206.9	40.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	71.4	42.8	5.1	80.2	42.5		71.7	26.8		206.9	40.1	
LOS	E	D	A	F	D		E	C		F	D	
Approach Delay		43.0			45.6			43.5			98.4	
Approach LOS		D			D			D			F	
90th %ile Green (s)	13.3	44.0	44.0	21.8	51.9		15.0	36.0		15.4	36.6	
90th %ile Term Code	Gap	Coord	Coord	Max	Coord		Gap	MaxR		Max	MaxR	
70th %ile Green (s)	11.5	47.3	47.3	18.5	53.7		12.9	36.0		15.4	38.7	
70th %ile Term Code	Gap	Coord	Coord	Gap	Coord		Gap	MaxR		Max	MaxR	
50th %ile Green (s)	10.2	49.8	49.8	16.0	55.0		11.5	36.0		15.4	40.1	
50th %ile Term Code	Gap	Coord	Coord	Gap	Coord		Gap	MaxR		Max	MaxR	
30th %ile Green (s)	8.9	52.3	52.3	13.5	56.3		10.1	36.0		15.4	41.5	
30th %ile Term Code	Gap	Coord	Coord	Gap	Coord		Gap	MaxR		Max	MaxR	
10th %ile Green (s)	7.1	56.0	56.0	9.8	58.1		8.0	36.0		15.4	43.6	
10th %ile Term Code	Gap	Coord	Coord	Gap	Coord		Gap	MaxR		Max	MaxR	
Stops (vph)	98	918	8	107	1094		148	109		154	263	
Fuel Used(gal)	3	22	1	4	33		4	3		10	7	
CO Emissions (g/hr)	198	1558	40	275	2319		291	217		733	459	
NOx Emissions (g/hr)	39	303	8	54	451		57	42		143	89	
VOC Emissions (g/hr)	46	361	9	64	538		67	50		170	106	
Dilemma Vehicles (#)	0	38	0	0	45		0	8		0	12	
Queue Length 50th (ft)	65	383	0	131	481		80	70		~285	168	
Queue Length 95th (ft)	80	407	17	164	458		117	84		#389	186	
Internal Link Dist (ft)		698			991			610			608	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	360		220	260			370			85		
Base Capacity (vph)	519	1811	620	275	1987		480	931		194	994	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.27	0.73	0.16	0.53	0.82		0.36	0.32		1.28	0.46	

Intersection Summary	
Area Type: Other	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 4:EBT, Start of Green	
Natural Cycle: 115	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.28	
Intersection Signal Delay: 52.8	Intersection LOS: D
Intersection Capacity Utilization 85.7%	ICU Level of Service E
Analysis Period (min) 15	

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

Splits and Phases: 9: Rainbow Boulevard & Cheyenne Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	462	242	122	272	126	152	583	111	259	1577	30
Future Volume (veh/h)	45	462	242	122	272	126	152	583	111	259	1577	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.95	1.00		0.95	1.00		0.98	1.00		0.94
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	78	770	281	161	389	173	211	678	202	370	1855	34
Peak Hour Factor	0.58	0.60	0.86	0.76	0.70	0.73	0.72	0.86	0.55	0.70	0.85	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	281	894	379	186	957	408	217	1977	599	426	2308	42
Arrive On Green	0.04	0.25	0.25	0.06	0.27	0.27	0.06	0.39	0.39	0.12	0.45	0.45
Sat Flow, veh/h	1781	3554	1508	1781	3554	1513	3456	5106	1547	3456	5156	94
Grp Volume(v), veh/h	78	770	281	161	389	173	211	678	202	370	1224	665
Grp Sat Flow(s),veh/h/ln	1781	1777	1508	1781	1777	1513	1728	1702	1547	1728	1702	1847
Q Serve(g_s), s	4.5	29.0	24.0	8.7	12.6	13.2	8.5	13.1	12.9	14.7	43.4	43.5
Cycle Q Clear(g_c), s	4.5	29.0	24.0	8.7	12.6	13.2	8.5	13.1	12.9	14.7	43.4	43.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.05
Lane Grp Cap(c), veh/h	281	894	379	186	957	408	217	1977	599	426	1524	827
V/C Ratio(X)	0.28	0.86	0.74	0.87	0.41	0.42	0.97	0.34	0.34	0.87	0.80	0.80
Avail Cap(c_a), veh/h	312	959	407	186	959	408	217	1977	599	711	1524	827
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.7	50.1	48.2	42.3	42.0	42.2	65.5	30.3	30.2	60.3	33.3	33.4
Incr Delay (d2), s/veh	0.2	7.1	5.6	31.1	0.1	0.3	52.5	0.5	1.5	3.1	4.6	8.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	13.7	9.6	5.8	5.5	5.0	5.3	5.4	5.1	6.5	18.1	20.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.9	57.2	53.8	73.4	42.1	42.5	118.0	30.8	31.8	63.4	37.9	41.5
LnGrp LOS	D	E	D	E	D	D	F	C	C	E	D	D
Approach Vol, veh/h		1129			723			1091			2259	
Approach Delay, s/veh		54.9			49.1			47.8			43.2	
Approach LOS		D			D			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	15.0	68.6	15.0	41.4	23.5	60.1	12.5	43.9				
Change Period (Y+Rc), s	* 6.2	* 5.9	* 6.3	* 6.2	* 6.2	* 5.9	* 6.3	* 6.2				
Max Green Setting (Gmax), s	* 8.8	* 60	* 8.7	* 38	* 29	* 40	* 8.7	* 38				
Max Q Clear Time (g_c+I1), s	10.5	45.5	10.7	31.0	16.7	15.1	6.5	15.2				
Green Ext Time (p_c), s	0.0	7.4	0.0	2.5	0.5	3.2	0.0	1.9				

Intersection Summary		
HCM 6th Ctrl Delay		47.5
HCM 6th LOS		D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	462	242	122	272	126	152	583	111	259	1577	30
Future Volume (vph)	45	462	242	122	272	126	152	583	111	259	1577	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	140		140	140		185	240		310	230		0
Storage Lanes	1		1	1		1	2		1	2		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.91	1.00	0.97	0.91	0.91
Ped Bike Factor	0.99		0.95	0.99		0.97			0.94		1.00	
Frt			0.850			0.850			0.850		0.997	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	5085	1583	3433	5058	0
Flt Permitted	0.428			0.112			0.950			0.950		
Satd. Flow (perm)	789	3539	1508	207	3539	1533	3433	5085	1484	3433	5058	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			168			173			179		2	
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		1199			1771			701			721	
Travel Time (s)		23.4			34.5			10.6			10.9	
Confl. Peds. (#/hr)	17		30	30		17			31			66
Confl. Bikes (#/hr)			2			1						1
Peak Hour Factor	0.58	0.60	0.86	0.76	0.70	0.73	0.72	0.86	0.55	0.70	0.85	0.88
Adj. Flow (vph)	78	770	281	161	389	173	211	678	202	370	1855	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	78	770	281	161	389	173	211	678	202	370	1889	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8			6			
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	11.0	11.0	5.0	11.0	11.0	5.0	13.0	13.0	5.0	13.0	
Minimum Split (s)	11.3	42.2	42.2	11.3	43.2	43.2	11.2	30.9	30.9	11.2	28.9	
Total Split (s)	15.0	44.0	44.0	15.0	44.0	44.0	15.0	46.0	46.0	35.0	66.0	
Total Split (%)	10.7%	31.4%	31.4%	10.7%	31.4%	31.4%	10.7%	32.9%	32.9%	25.0%	47.1%	
Maximum Green (s)	8.7	37.8	37.8	8.7	37.8	37.8	8.8	40.1	40.1	28.8	60.1	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.7	4.7	3.0	4.7	
All-Red Time (s)	3.3	2.2	2.2	3.3	2.2	2.2	3.2	1.2	1.2	3.2	1.2	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.3	6.2	6.2	6.3	6.2	6.2	6.2	5.9	5.9	6.2	5.9	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	None	None	None	None	None	None	Max	Max	None	C-Max	
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	
Flash Dont Walk (s)		29.0	29.0		30.0	30.0		18.0	18.0		16.0	
Pedestrian Calls (#/hr)		30	30		17	17		31	31		66	
Act Effct Green (s)	42.5	34.8	34.8	44.3	35.7	35.7	10.7	52.5	52.5	19.5	61.2	
Actuated g/C Ratio	0.30	0.25	0.25	0.32	0.26	0.26	0.08	0.38	0.38	0.14	0.44	
v/c Ratio	0.27	0.88	0.56	0.99	0.43	0.33	0.81	0.36	0.30	0.78	0.85	
Control Delay	32.2	62.4	21.9	105.0	45.0	7.2	85.8	33.4	7.8	69.5	40.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	32.2	62.4	21.9	105.0	45.0	7.2	85.8	33.4	7.8	69.5	40.4	
LOS	C	E	C	F	D	A	F	C	A	E	D	
Approach Delay		50.2			49.3			38.8			45.1	
Approach LOS		D			D			D			D	
90th %ile Green (s)	8.7	37.8	37.8	8.7	37.8	37.8	8.8	44.4	44.4	24.5	60.1	
90th %ile Term Code	Max	Max	Max	Max	Hold	Hold	Max	Coord	Coord	Gap	Coord	
70th %ile Green (s)	8.7	37.8	37.8	8.7	37.8	37.8	8.8	47.4	47.4	21.5	60.1	
70th %ile Term Code	Max	Max	Max	Max	Hold	Hold	Max	Coord	Coord	Gap	Coord	
50th %ile Green (s)	8.6	36.1	36.1	8.7	36.2	36.2	10.5	51.1	51.1	19.5	60.1	
50th %ile Term Code	Gap	Gap	Gap	Max	Hold	Hold	Max	Coord	Coord	Gap	Coord	
30th %ile Green (s)	7.3	33.5	33.5	8.7	34.9	34.9	13.1	55.8	55.8	17.4	60.1	
30th %ile Term Code	Gap	Gap	Gap	Max	Hold	Hold	Max	Coord	Coord	Gap	Coord	
10th %ile Green (s)	5.6	28.7	28.7	8.7	31.8	31.8	12.3	63.6	63.6	14.4	65.7	
10th %ile Term Code	Gap	Gap	Gap	Max	Hold	Hold	Gap	Coord	Coord	Gap	Coord	
Stops (vph)	30	434	86	77	222	14	130	414	16	244	1410	
Fuel Used(gal)	1	13	4	5	8	2	5	12	1	8	38	
CO Emissions (g/hr)	64	918	267	332	534	133	347	822	62	553	2675	
NOx Emissions (g/hr)	12	179	52	65	104	26	68	160	12	108	520	
VOC Emissions (g/hr)	15	213	62	77	124	31	80	191	14	128	620	
Dilemma Vehicles (#)	0	14	0	0	7	0	0	21	0	0	57	
Queue Length 50th (ft)	47	352	86	102	156	0	99	164	13	170	565	
Queue Length 95th (ft)	52	254	161	#172	153	23	#127	206	0	162	578	
Internal Link Dist (ft)		1119			1691			621			641	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	140		140	140		185	240		310	230		
Base Capacity (vph)	305	955	529	162	955	540	262	1905	667	706	2212	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.26	0.81	0.53	0.99	0.41	0.32	0.81	0.36	0.30	0.52	0.85	

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 2:SBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.99

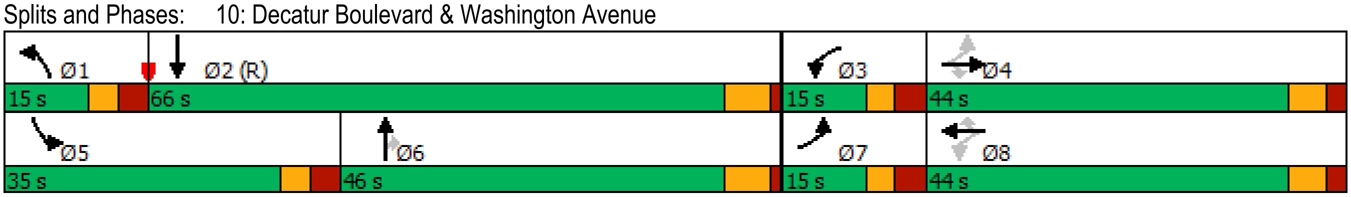
Intersection Signal Delay: 45.5 Intersection LOS: D

Intersection Capacity Utilization 86.5% ICU Level of Service E

Analysis Period (min) 15

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

Splits and Phases: 10: Decatur Boulevard & Washington Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	231	927	257	212	1067	72	334	1171	202	69	851	266
Future Volume (veh/h)	231	927	257	212	1067	72	334	1171	202	69	851	266
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.98	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	251	1042	289	238	1135	95	371	1331	210	82	896	292
Peak Hour Factor	0.92	0.89	0.89	0.89	0.94	0.76	0.90	0.88	0.96	0.84	0.95	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	315	1625	450	288	1948	163	239	1362	215	129	951	309
Arrive On Green	0.10	0.41	0.41	0.09	0.41	0.41	0.10	0.31	0.31	0.05	0.25	0.25
Sat Flow, veh/h	1781	3967	1100	1781	4791	401	1781	4427	698	1781	3795	1232
Grp Volume(v), veh/h	251	894	437	238	806	424	371	1023	518	82	803	385
Grp Sat Flow(s),veh/h/ln	1781	1702	1663	1781	1702	1788	1781	1702	1722	1781	1702	1622
Q Serve(g_s), s	13.1	33.6	33.7	12.4	29.5	29.5	16.7	47.6	47.6	5.4	37.0	37.3
Cycle Q Clear(g_c), s	13.1	33.6	33.7	12.4	29.5	29.5	16.7	47.6	47.6	5.4	37.0	37.3
Prop In Lane	1.00		0.66	1.00		0.22	1.00		0.41	1.00		0.76
Lane Grp Cap(c), veh/h	315	1394	681	288	1384	727	239	1047	530	129	853	407
V/C Ratio(X)	0.80	0.64	0.64	0.83	0.58	0.58	1.55	0.98	0.98	0.63	0.94	0.95
Avail Cap(c_a), veh/h	377	1394	681	311	1384	727	239	1047	530	231	853	407
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.2	37.8	37.8	31.1	36.9	36.9	47.2	54.8	54.8	46.5	58.8	58.9
Incr Delay (d2), s/veh	7.9	2.3	4.6	14.3	0.8	1.5	267.3	22.9	34.0	1.9	19.5	32.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.1	14.2	14.3	6.3	12.2	13.0	25.0	23.2	25.1	2.5	18.2	18.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.1	40.1	42.5	45.4	37.7	38.4	314.5	77.7	88.8	48.4	78.3	91.8
LnGrp LOS	D	D	D	D	D	D	F	E	F	D	E	F
Approach Vol, veh/h		1582			1468			1912			1270	
Approach Delay, s/veh		40.3			39.1			126.7			80.5	
Approach LOS		D			D			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	22.0	46.3	20.0	71.7	12.9	55.4	20.4	71.3				
Change Period (Y+Rc), s	* 5.3	* 6.2	5.5	6.2	5.6	6.2	* 5.2	6.2				
Max Green Setting (Gmax), s	* 17	* 40	16.5	63.8	16.4	39.8	* 21	59.8				
Max Q Clear Time (g_c+I1), s	18.7	39.3	14.4	35.7	7.4	49.6	15.1	31.5				
Green Ext Time (p_c), s	0.0	0.7	0.1	13.9	0.1	0.0	0.2	12.5				
Intersection Summary												
HCM 6th Ctrl Delay			74.7									
HCM 6th LOS			E									

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	231	927	257	212	1067	72	334	1171	202	69	851	266
Future Volume (vph)	231	927	257	212	1067	72	334	1171	202	69	851	266
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	220		0	330		0	300		0	380		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor		0.99		1.00	1.00			0.99			0.99	
Frt		0.967			0.988			0.980			0.963	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	4888	0	1770	5013	0	1770	4958	0	1770	4856	0
Flt Permitted	0.121			0.108			0.089			0.100		
Satd. Flow (perm)	225	4888	0	201	5013	0	166	4958	0	186	4856	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		52			10			18			49	
Link Speed (mph)		45			45			45			35	
Link Distance (ft)		993			1490			1225			1487	
Travel Time (s)		15.0			22.6			18.6			29.0	
Confl. Peds. (#/hr)	9		10	10		9	14		15	15		14
Confl. Bikes (#/hr)						3			1			
Peak Hour Factor	0.92	0.89	0.89	0.89	0.94	0.76	0.90	0.88	0.96	0.84	0.95	0.91
Adj. Flow (vph)	251	1042	289	238	1135	95	371	1331	210	82	896	292
Shared Lane Traffic (%)												
Lane Group Flow (vph)	251	1331	0	238	1230	0	371	1541	0	82	1188	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane					Yes			Yes				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		
Detector Phase	7	4		3	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0		5.0	9.0		5.0	9.0	
Minimum Split (s)	10.2	36.2		10.5	35.2		10.3	35.2		10.6	35.9	
Total Split (s)	26.0	70.0		22.0	66.0		22.0	46.0		22.0	46.0	
Total Split (%)	16.3%	43.8%		13.8%	41.3%		13.8%	28.8%		13.8%	28.8%	
Maximum Green (s)	20.8	63.8		16.5	59.8		16.7	39.8		16.4	40.1	
Yellow Time (s)	3.0	4.7		3.0	4.7		3.0	4.7		3.0	4.0	
All-Red Time (s)	2.2	1.5		2.5	1.5		2.3	1.5		2.6	1.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.2	6.2		5.5	6.2		5.3	6.2		5.6	5.9	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.0	4.0		2.0	4.0	
Recall Mode	None	C-Max		None	None		None	Max		None	Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		23.0			22.0			22.0			23.0	
Pedestrian Calls (#/hr)		10			9			15			14	
Act Effct Green (s)	83.4	64.3		79.2	62.5		62.4	47.0		49.6	40.1	
Actuated g/C Ratio	0.52	0.40		0.50	0.39		0.39	0.29		0.31	0.25	
v/c Ratio	0.86	0.67		0.93	0.63		1.60	1.05		0.55	0.95	
Control Delay	55.8	39.5		75.2	41.2		321.9	90.5		46.4	71.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	55.8	39.5		75.2	41.2		321.9	90.5		46.4	71.9	
LOS	E	D		E	D		F	F		D	E	
Approach Delay		42.1			46.7			135.4			70.2	
Approach LOS		D			D			F			E	
90th %ile Green (s)	20.8	63.8		16.5	59.8		16.7	43.6		12.6	40.1	
90th %ile Term Code	Max	Coord		Max	Coord		Max	MaxR		Gap	MaxR	
70th %ile Green (s)	20.8	63.8		16.5	59.8		16.7	45.6		10.6	40.1	
70th %ile Term Code	Max	Coord		Max	Coord		Max	MaxR		Gap	MaxR	
50th %ile Green (s)	20.1	63.8		16.5	60.5		16.7	47.0		9.2	40.1	
50th %ile Term Code	Gap	Coord		Max	Coord		Max	MaxR		Gap	MaxR	
30th %ile Green (s)	16.7	63.8		16.5	63.9		16.7	48.4		7.8	40.1	
30th %ile Term Code	Gap	Coord		Max	Coord		Max	MaxR		Gap	MaxR	
10th %ile Green (s)	12.3	66.1		14.2	68.3		16.7	50.2		6.0	40.1	
10th %ile Term Code	Gap	Coord		Gap	Coord		Max	MaxR		Gap	MaxR	
Stops (vph)	139	914		125	896		189	1198		47	1004	
Fuel Used(gal)	6	29		7	32		27	51		2	36	
CO Emissions (g/hr)	408	1995		479	2216		1880	3573		122	2508	
NOx Emissions (g/hr)	79	388		93	431		366	695		24	488	
VOC Emissions (g/hr)	95	462		111	514		436	828		28	581	
Dilemma Vehicles (#)	0	37		0	36		0	39		0	34	
Queue Length 50th (ft)	154	402		164	384		~503	~635		55	436	
Queue Length 95th (ft)	#284	449		#328	441		#721	#745		88	#528	
Internal Link Dist (ft)		913			1410			1145			1407	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	220			330			300			380		
Base Capacity (vph)	321	1994		261	1962		232	1467		228	1253	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.78	0.67		0.91	0.63		1.60	1.05		0.36	0.95	

Intersection Summary

Area Type: Other

Cycle Length: 160

Actuated Cycle Length: 160

Offset: 0 (0%), Referenced to phase 4:EBTL, Start of Green

Natural Cycle: 115

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.60

Intersection Signal Delay: 77.5 Intersection LOS: E

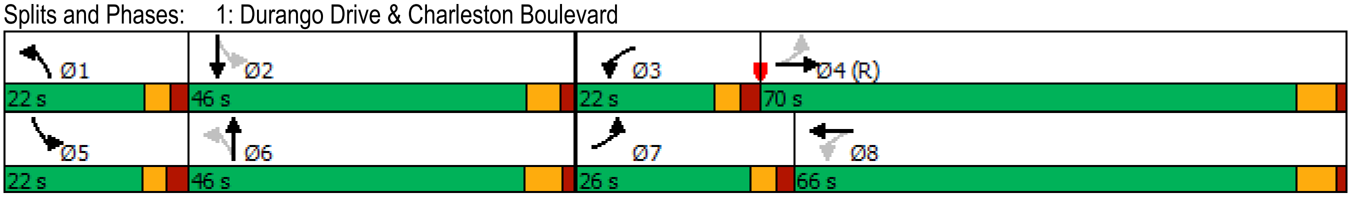
Intersection Capacity Utilization 99.3% ICU Level of Service F

Analysis Period (min) 15

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

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

Splits and Phases: 1: Durango Drive & Charleston Boulevard



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	171	411	29	94	207	358	33	1517	137	338	1089	120
Future Volume (veh/h)	171	411	29	94	207	358	33	1517	137	338	1089	120
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.95	0.99		0.95	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	199	507	48	119	233	465	42	1667	188	367	1238	148
Peak Hour Factor	0.86	0.81	0.61	0.79	0.89	0.77	0.78	0.91	0.73	0.92	0.88	0.81
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	296	741	70	238	792	337	237	2096	236	260	2402	287
Arrive On Green	0.07	0.23	0.23	0.06	0.22	0.22	0.03	0.45	0.45	0.10	0.52	0.52
Sat Flow, veh/h	1781	3266	308	1781	3554	1513	1781	4642	522	1781	4609	551
Grp Volume(v), veh/h	199	275	280	119	233	465	42	1221	634	367	914	472
Grp Sat Flow(s),veh/h/ln	1781	1777	1798	1781	1777	1513	1781	1702	1760	1781	1702	1756
Q Serve(g_s), s	9.4	19.8	20.0	7.1	7.6	31.2	1.8	43.0	43.2	13.6	24.6	24.6
Cycle Q Clear(g_c), s	9.4	19.8	20.0	7.1	7.6	31.2	1.8	43.0	43.2	13.6	24.6	24.6
Prop In Lane	1.00		0.17	1.00		1.00	1.00		0.30	1.00		0.31
Lane Grp Cap(c), veh/h	296	403	408	238	792	337	237	1537	794	260	1774	915
V/C Ratio(X)	0.67	0.68	0.69	0.50	0.29	1.38	0.18	0.79	0.80	1.41	0.52	0.52
Avail Cap(c_a), veh/h	296	403	408	245	792	337	362	1537	794	260	1774	915
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.4	49.5	49.6	39.6	45.2	54.4	20.3	32.8	32.9	39.1	21.9	21.9
Incr Delay (d2), s/veh	4.8	3.9	4.0	0.6	0.1	188.0	0.1	4.3	8.2	206.9	1.1	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	9.3	9.5	3.2	3.4	29.5	0.7	18.3	19.9	24.1	10.0	10.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	47.2	53.4	53.6	40.3	45.3	242.4	20.4	37.2	41.1	246.0	23.0	24.0
LnGrp LOS	D	D	D	D	D	F	C	D	D	F	C	C
Approach Vol, veh/h		754			817			1897			1753	
Approach Delay, s/veh		51.8			156.8			38.1			70.0	
Approach LOS		D			F			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.2	78.8	14.5	37.5	19.0	69.0	15.0	37.0
Change Period (Y+Rc), s	* 5.2	* 5.8	5.4	* 5.8	5.4	* 5.8	5.6	* 5.8
Max Green Setting (Gmax), s	* 14	* 64	9.6	* 31	13.6	* 63	9.4	* 31
Max Q Clear Time (g_c+I1), s	3.8	26.6	9.1	22.0	15.6	45.2	11.4	33.2
Green Ext Time (p_c), s	0.0	7.5	0.0	1.6	0.0	8.9	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	69.4
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	171	411	29	94	207	358	33	1517	137	338	1089	120
Future Volume (vph)	171	411	29	94	207	358	33	1517	137	338	1089	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	190		0	120		150	145		0	145		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor	0.98	1.00		0.99		0.96	1.00	1.00			1.00	
Frt		0.987				0.850		0.985			0.984	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3478	0	1770	3539	1583	1770	4989	0	1770	4986	0
Flt Permitted	0.549			0.213			0.156			0.058		
Satd. Flow (perm)	1007	3478	0	392	3539	1525	290	4989	0	108	4986	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7				208		18			19	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		779			1085			800			300	
Travel Time (s)		17.7			24.7			15.6			5.8	
Confl. Peds. (#/hr)	16		23	23		16	13		19	19		13
Confl. Bikes (#/hr)			4			3			4			2
Peak Hour Factor	0.86	0.81	0.61	0.79	0.89	0.77	0.78	0.91	0.73	0.92	0.88	0.81
Adj. Flow (vph)	199	507	48	119	233	465	42	1667	188	367	1238	148
Shared Lane Traffic (%)												
Lane Group Flow (vph)	199	555	0	119	233	465	42	1855	0	367	1386	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6		20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Detector Phase	7	4		3	8	8	1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0	10.0	5.0	15.0		5.0	15.0	
Minimum Split (s)	10.6	32.7		10.4	35.8	35.8	10.2	35.8		10.4	30.5	
Total Split (s)	15.0	37.0		15.0	37.0	37.0	19.0	69.0		19.0	69.0	
Total Split (%)	10.7%	26.4%		10.7%	26.4%	26.4%	13.6%	49.3%		13.6%	49.3%	
Maximum Green (s)	9.4	31.3		9.6	31.2	31.2	13.8	63.2		13.6	63.5	
Yellow Time (s)	3.0	3.6		3.0	3.6	3.6	3.0	4.0		3.0	4.0	
All-Red Time (s)	2.6	2.1		2.4	2.2	2.2	2.2	1.8		2.4	1.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.6	5.7		5.4	5.8	5.8	5.2	5.8		5.4	5.5	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Recall Mode	None	None		None	None	None	None	C-Max		None	Max	
Walk Time (s)		7.0			7.0	7.0		7.0			7.0	
Flash Dont Walk (s)		20.0			23.0	23.0		23.0			18.0	
Pedestrian Calls (#/hr)		23			16	16		19			13	
Act Effct Green (s)	39.2	29.7		38.7	29.1	29.1	69.8	63.2		84.7	75.4	
Actuated g/C Ratio	0.28	0.21		0.28	0.21	0.21	0.50	0.45		0.60	0.54	
v/c Ratio	0.60	0.75		0.60	0.32	0.96	0.20	0.82		1.46	0.51	
Control Delay	46.5	57.7		48.0	47.7	63.1	15.0	36.9		260.6	22.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	46.5	57.7		48.0	47.7	63.1	15.0	36.9		260.6	22.1	
LOS	D	E		D	D	E	B	D		F	C	
Approach Delay		54.7			56.5			36.4			72.0	
Approach LOS		D			E			D			E	
90th %ile Green (s)	9.4	31.3		9.6	31.2	31.2	7.3	63.2		13.6	70.0	
90th %ile Term Code	Max	Max		Max	Max	Max	Gap	Coord		Max	Coord	
70th %ile Green (s)	9.4	31.3		9.6	31.2	31.2	6.4	63.2		13.6	70.9	
70th %ile Term Code	Max	Hold		Max	Max	Max	Gap	Coord		Max	Coord	
50th %ile Green (s)	9.4	31.3		9.6	31.2	31.2	5.8	63.2		13.6	71.5	
50th %ile Term Code	Max	Hold		Max	Max	Max	Gap	Coord		Max	Coord	
30th %ile Green (s)	9.4	31.0		9.5	30.8	30.8	5.3	63.2		14.0	72.4	
30th %ile Term Code	Max	Hold		Gap	Gap	Gap	Gap	Coord		Max	Coord	
10th %ile Green (s)	9.4	23.6		7.4	21.3	21.3	0.0	63.2		23.5	92.4	
10th %ile Term Code	Max	Hold		Gap	Gap	Gap	Skip	Coord		Max	Coord	
Stops (vph)	151	398		70	171	195	16	1391		180	745	
Fuel Used(gal)	3	10		2	5	9	0	32		20	14	
CO Emissions (g/hr)	244	702		147	329	609	29	2268		1399	955	
NOx Emissions (g/hr)	47	136		29	64	118	6	441		272	186	
VOC Emissions (g/hr)	57	163		34	76	141	7	526		324	221	
Dilemma Vehicles (#)	0	0		0	0	0	0	59		0	43	
Queue Length 50th (ft)	136	244		78	93	252	15	526		~433	300	
Queue Length 95th (ft)	197	273		111	132	293	28	591		#638	342	
Internal Link Dist (ft)		699			1005			720			220	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	190			120		150	145			145		
Base Capacity (vph)	333	783		203	788	501	306	2262		251	2695	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.60	0.71		0.59	0.30	0.93	0.14	0.82		1.46	0.51	

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 6:NBTL, Start of Green

Natural Cycle: 125

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.46

Intersection Signal Delay: 54.2 Intersection LOS: D

Intersection Capacity Utilization 94.8% ICU Level of Service F

Analysis Period (min) 15

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

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

Splits and Phases: 2: Eastern Avenue & Stewart Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	265	683	148	432	1181	363	341	1075	171	320	1163	161
Future Volume (veh/h)	265	683	148	432	1181	363	341	1075	171	320	1163	161
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.97	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	279	751	235	497	1284	417	388	1181	174	372	1278	175
Peak Hour Factor	0.95	0.91	0.63	0.87	0.92	0.87	0.88	0.91	0.98	0.86	0.91	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	327	1284	387	488	1522	463	429	1366	201	417	1369	187
Arrive On Green	0.09	0.25	0.25	0.14	0.30	0.30	0.12	0.31	0.31	0.12	0.30	0.30
Sat Flow, veh/h	3456	5106	1538	3456	5106	1553	3456	4475	659	3456	4534	621
Grp Volume(v), veh/h	279	751	235	497	1284	417	388	898	457	372	960	493
Grp Sat Flow(s),veh/h/ln	1728	1702	1538	1728	1702	1553	1728	1702	1730	1728	1702	1751
Q Serve(g_s), s	12.7	20.7	21.6	22.6	37.7	41.2	17.7	39.9	39.9	17.0	43.8	43.8
Cycle Q Clear(g_c), s	12.7	20.7	21.6	22.6	37.7	41.2	17.7	39.9	39.9	17.0	43.8	43.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.38	1.00		0.35
Lane Grp Cap(c), veh/h	327	1284	387	488	1522	463	429	1039	528	417	1028	528
V/C Ratio(X)	0.85	0.59	0.61	1.02	0.84	0.90	0.90	0.86	0.87	0.89	0.93	0.93
Avail Cap(c_a), veh/h	423	1427	430	488	1522	463	443	1039	528	464	1028	528
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	71.3	52.6	52.9	68.7	52.6	53.9	69.1	52.5	52.5	69.3	54.3	54.3
Incr Delay (d2), s/veh	12.6	0.5	2.1	45.4	5.9	23.2	21.5	9.6	17.1	17.9	16.1	25.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.1	8.8	8.5	12.9	16.6	18.7	9.0	18.0	19.4	8.4	20.6	22.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	83.9	53.1	55.0	114.1	58.5	77.1	90.6	62.0	69.5	87.2	70.3	80.1
LnGrp LOS	F	D	D	F	E	E	F	E	E	F	E	F
Approach Vol, veh/h		1265			2198			1743			1825	
Approach Delay, s/veh		60.2			74.6			70.4			76.4	
Approach LOS		E			E			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.4	55.0	28.0	46.5	24.8	55.5	20.5	54.0
Change Period (Y+Rc), s	5.5	6.7	5.4	* 6.3	5.5	6.7	5.4	* 6.3
Max Green Setting (Gmax), s	20.5	48.3	22.6	* 45	21.5	47.3	19.6	* 48
Max Q Clear Time (g_c+I1), s	19.7	45.8	24.6	23.6	19.0	41.9	14.7	43.2
Green Ext Time (p_c), s	0.1	1.8	0.0	5.6	0.3	3.5	0.4	3.3

Intersection Summary	
HCM 6th Ctrl Delay	71.4
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑↑↑	↱	↰↰	↑↑↑	↱	↰↰	↑↑↱		↰↰	↑↑↱	
Traffic Volume (vph)	265	683	148	432	1181	363	341	1075	171	320	1163	161
Future Volume (vph)	265	683	148	432	1181	363	341	1075	171	320	1163	161
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	325		180	315		180	260		0	350		0
Storage Lanes	2		1	2		1	2		0	2		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	0.91	0.97	0.91	0.91
Ped Bike Factor			0.95			0.96		0.99			1.00	
Frt			0.850			0.850		0.981			0.982	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	4959	0	3433	4979	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1502	3433	5085	1516	3433	4959	0	3433	4979	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			219			233		17			16	
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		922			934			915			934	
Travel Time (s)		14.0			14.2			13.9			14.2	
Confl. Peds. (#/hr)			25			20			28			11
Peak Hour Factor	0.95	0.91	0.63	0.87	0.92	0.87	0.88	0.91	0.98	0.86	0.91	0.92
Adj. Flow (vph)	279	751	235	497	1284	417	388	1181	174	372	1278	175
Shared Lane Traffic (%)												
Lane Group Flow (vph)	279	751	235	497	1284	417	388	1355	0	372	1453	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	

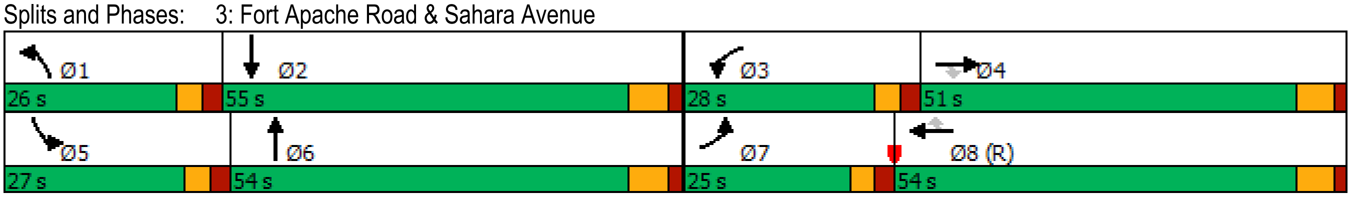
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8						
Detector Phase	7	4	4	3	8	8	1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	15.0	15.0	5.0	15.0	15.0	5.0	13.0		5.0	13.0	
Minimum Split (s)	10.4	36.3	36.3	10.4	37.3	37.3	10.5	44.7		10.5	45.7	
Total Split (s)	25.0	51.0	51.0	28.0	54.0	54.0	26.0	54.0		27.0	55.0	
Total Split (%)	15.6%	31.9%	31.9%	17.5%	33.8%	33.8%	16.3%	33.8%		16.9%	34.4%	
Maximum Green (s)	19.6	44.7	44.7	22.6	47.7	47.7	20.5	47.3		21.5	48.3	
Yellow Time (s)	3.0	4.7	4.7	3.0	4.7	4.7	3.0	4.7		3.0	4.7	
All-Red Time (s)	2.4	1.6	1.6	2.4	1.6	1.6	2.5	2.0		2.5	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.4	6.3	6.3	5.4	6.3	6.3	5.5	6.7		5.5	6.7	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	C-Max	C-Max	None	Max		None	Max	
Walk Time (s)		7.0	7.0		7.0	7.0		7.0			7.0	
Flash Dont Walk (s)		23.0	23.0		24.0	24.0		31.0			32.0	
Pedestrian Calls (#/hr)		25	25		20	20		28			11	
Act Effct Green (s)	17.5	44.7	44.7	22.6	49.8	49.8	20.2	48.3		20.5	48.6	
Actuated g/C Ratio	0.11	0.28	0.28	0.14	0.31	0.31	0.13	0.30		0.13	0.30	
v/c Ratio	0.75	0.53	0.41	1.03	0.81	0.66	0.90	0.90		0.85	0.95	
Control Delay	81.7	50.4	8.9	113.5	56.0	26.1	92.6	61.9		85.9	68.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	81.7	50.4	8.9	113.5	56.0	26.1	92.6	61.9		85.9	68.0	
LOS	F	D	A	F	E	C	F	E		F	E	
Approach Delay		49.6			63.3			68.7			71.7	
Approach LOS		D			E			E			E	
90th %ile Green (s)	19.6	44.7	44.7	22.6	47.7	47.7	20.5	47.3		21.5	48.3	
90th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Max	MaxR		Max	MaxR	
70th %ile Green (s)	19.6	44.7	44.7	22.6	47.7	47.7	20.5	47.3		21.5	48.3	
70th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Max	MaxR		Max	MaxR	
50th %ile Green (s)	18.2	44.7	44.7	22.6	49.1	49.1	20.5	47.3		21.5	48.3	
50th %ile Term Code	Gap	Coord	Coord	Max	Coord	Coord	Max	MaxR		Max	MaxR	
30th %ile Green (s)	16.3	44.7	44.7	22.6	51.0	51.0	20.5	48.2		20.6	48.3	
30th %ile Term Code	Gap	Coord	Coord	Max	Coord	Coord	Max	MaxR		Gap	MaxR	
10th %ile Green (s)	13.6	44.7	44.7	22.6	53.7	53.7	18.8	51.3		17.5	50.0	
10th %ile Term Code	Gap	Coord	Coord	Max	Coord	Coord	Gap	MaxR		Gap	MaxR	
Stops (vph)	254	566	18	387	1070	151	319	1136		304	1215	
Fuel Used(gal)	9	18	1	17	34	6	12	37		11	41	
CO Emissions (g/hr)	640	1267	96	1217	2371	420	868	2601		791	2899	
NOx Emissions (g/hr)	124	247	19	237	461	82	169	506		154	564	
VOC Emissions (g/hr)	148	294	22	282	550	97	201	603		183	672	
Dilemma Vehicles (#)	0	21	0	0	37	0	0	38		0	40	
Queue Length 50th (ft)	147	245	12	~284	458	172	208	499		197	545	
Queue Length 95th (ft)	198	291	4	#381	526	281	#287	#564		244	#645	
Internal Link Dist (ft)		842			854			835			854	
Turn Bay Length (ft)	325		180	315		180	260			350		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	420	1420	577	484	1583	632	439	1507		461	1524	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.66	0.53	0.41	1.03	0.81	0.66	0.88	0.90		0.81	0.95	

Intersection Summary

Area Type: Other
Cycle Length: 160
Actuated Cycle Length: 160
Offset: 0 (0%), Referenced to phase 8:WBT, Start of Green
Natural Cycle: 125
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.03
Intersection Signal Delay: 64.3 Intersection LOS: E
Intersection Capacity Utilization 95.5% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Fort Apache Road & Sahara Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	86	264	183	353	506	279	105	1812	122	160	1522	36
Future Volume (veh/h)	86	264	183	353	506	279	105	1812	122	160	1522	36
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.98	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	100	394	215	447	657	332	131	2013	136	184	1673	48
Peak Hour Factor	0.86	0.67	0.85	0.79	0.77	0.84	0.80	0.90	0.90	0.87	0.91	0.75
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	142	650	277	419	923	405	176	2317	156	229	2492	763
Arrive On Green	0.04	0.18	0.18	0.12	0.26	0.26	0.05	0.47	0.47	0.07	0.49	0.49
Sat Flow, veh/h	3456	3554	1512	3456	3554	1561	3456	4883	328	3456	5106	1563
Grp Volume(v), veh/h	100	394	215	447	657	332	131	1400	749	184	1673	48
Grp Sat Flow(s),veh/h/ln	1728	1777	1512	1728	1777	1561	1728	1702	1807	1728	1702	1563
Q Serve(g_s), s	4.6	16.4	21.8	19.5	27.0	32.2	6.0	59.1	59.9	8.5	40.2	2.6
Cycle Q Clear(g_c), s	4.6	16.4	21.8	19.5	27.0	32.2	6.0	59.1	59.9	8.5	40.2	2.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.18	1.00		1.00
Lane Grp Cap(c), veh/h	142	650	277	419	923	405	176	1615	858	229	2492	763
V/C Ratio(X)	0.70	0.61	0.78	1.07	0.71	0.82	0.74	0.87	0.87	0.80	0.67	0.06
Avail Cap(c_a), veh/h	386	750	319	419	923	405	629	1615	858	421	2492	763
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	76.2	60.5	62.7	70.8	54.1	56.0	75.4	37.8	38.0	74.1	31.4	21.8
Incr Delay (d2), s/veh	2.4	1.4	11.2	63.3	2.8	13.0	2.3	6.5	12.0	2.5	1.5	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	7.5	9.2	12.3	12.4	14.1	2.7	25.7	29.0	3.8	16.8	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	78.6	61.9	73.9	134.0	57.0	69.0	77.7	44.3	49.9	76.7	32.9	21.9
LnGrp LOS	E	E	E	F	E	E	E	D	D	E	C	C
Approach Vol, veh/h		709			1436			2280			1905	
Approach Delay, s/veh		67.9			83.7			48.1			36.8	
Approach LOS		E			F			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.9	84.7	25.0	37.4	16.1	82.5	12.6	49.8
Change Period (Y+Rc), s	* 5.7	* 6.1	5.5	* 8	5.4	* 6.1	6.0	8.0
Max Green Setting (Gmax), s	* 29	* 54	19.5	* 34	19.6	* 64	18.0	34.0
Max Q Clear Time (g_c+I1), s	8.0	42.2	21.5	23.8	10.5	61.9	6.6	34.2
Green Ext Time (p_c), s	0.2	9.6	0.0	3.2	0.2	1.9	0.1	0.0

Intersection Summary			
HCM 6th Ctrl Delay			55.0
HCM 6th LOS			D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	86	264	183	353	506	279	105	1812	122	160	1522	36
Future Volume (vph)	86	264	183	353	506	279	105	1812	122	160	1522	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		200	250		180	300		0	400		165
Storage Lanes	2		1	2		1	2		0	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.91	0.91	0.97	0.91	1.00
Ped Bike Factor			0.95			0.97		1.00				0.95
Frt			0.850			0.850		0.991				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	3433	5027	0	3433	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	3539	1497	3433	3539	1536	3433	5027	0	3433	5085	1500
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			215			223		8				150
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		768			1088			490			1010	
Travel Time (s)		15.0			21.2			9.5			19.7	
Confl. Peds. (#/hr)			28			13			16			23
Peak Hour Factor	0.86	0.67	0.85	0.79	0.77	0.84	0.80	0.90	0.90	0.87	0.91	0.75
Adj. Flow (vph)	100	394	215	447	657	332	131	2013	136	184	1673	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	100	394	215	447	657	332	131	2149	0	184	1673	48
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8						2
Detector Phase	7	4	4	3	8	8	1	6		5	2	2
Switch Phase												
Minimum Initial (s)	5.0	11.0	11.0	5.0	11.0	11.0	5.0	13.0		5.0	13.0	13.0
Minimum Split (s)	11.0	37.0	37.0	10.5	42.0	42.0	10.7	33.1		10.4	33.1	33.1
Total Split (s)	24.0	40.0	40.0	25.0	42.0	42.0	35.0	70.0		25.0	60.0	60.0
Total Split (%)	14.9%	24.8%	24.8%	15.5%	26.1%	26.1%	21.7%	43.5%		15.5%	37.3%	37.3%
Maximum Green (s)	18.0	34.0	34.0	19.5	34.0	34.0	29.3	63.9		19.6	53.9	53.9
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.7		3.0	4.7	4.7
All-Red Time (s)	3.0	2.0	2.0	2.5	4.0	4.0	2.7	1.4		2.4	1.4	1.4
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	5.5	8.0	8.0	5.7	6.1		5.4	6.1	6.1
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	4.0		2.0	4.0	4.0
Recall Mode	None	None	None	None	None	None	None	Max		None	C-Max	C-Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0			7.0	7.0
Flash Dont Walk (s)		24.0	24.0		27.0	27.0		20.0			20.0	20.0
Pedestrian Calls (#/hr)		28	28		13	13		16			23	23
Act Effct Green (s)	9.1	30.4	30.4	19.5	38.3	38.3	10.5	75.1		13.0	77.3	77.3
Actuated g/C Ratio	0.06	0.19	0.19	0.12	0.24	0.24	0.07	0.47		0.08	0.48	0.48
v/c Ratio	0.52	0.59	0.47	1.08	0.78	0.62	0.58	0.91		0.66	0.69	0.06
Control Delay	82.9	62.8	9.5	130.4	64.4	22.3	83.3	47.3		83.4	35.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	82.9	62.8	9.5	130.4	64.4	22.3	83.3	47.3		83.4	35.3	0.1
LOS	F	E	A	F	E	C	F	D		F	D	A
Approach Delay		49.5			75.2			49.4			39.1	
Approach LOS		D			E			D			D	
90th %ile Green (s)	11.9	35.0	35.0	19.5	40.1	40.1	13.8	66.7		16.8	69.4	69.4
90th %ile Term Code	Gap	Hold	Hold	Max	Max	Max	Gap	Coord		Gap	Coord	Coord
70th %ile Green (s)	10.3	35.0	35.0	19.5	41.7	41.7	11.9	68.9		14.6	71.3	71.3
70th %ile Term Code	Gap	Hold	Hold	Max	Max	Max	Gap	Coord		Gap	Coord	Coord
50th %ile Green (s)	9.1	33.0	33.0	19.5	40.9	40.9	10.5	72.5		13.0	74.7	74.7
50th %ile Term Code	Gap	Hold	Hold	Max	Gap	Gap	Gap	Coord		Gap	Coord	Coord
30th %ile Green (s)	7.9	27.6	27.6	19.5	36.7	36.7	9.2	79.5		11.4	81.4	81.4
30th %ile Term Code	Gap	Hold	Hold	Max	Gap	Gap	Gap	Coord		Gap	Coord	Coord
10th %ile Green (s)	6.3	21.4	21.4	19.5	32.1	32.1	7.3	87.9		9.2	89.5	89.5
10th %ile Term Code	Gap	Hold	Hold	Max	Gap	Gap	Gap	Coord		Gap	Coord	Coord
Stops (vph)	82	235	19	307	464	86	100	1631		153	1163	0
Fuel Used(gal)	3	7	2	14	14	4	3	38		5	31	0
CO Emissions (g/hr)	178	462	106	1010	986	287	203	2639		352	2153	18
NOx Emissions (g/hr)	35	90	21	197	192	56	40	513		68	419	4
VOC Emissions (g/hr)	41	107	25	234	228	67	47	612		82	499	4
Dilemma Vehicles (#)	0	6	0	0	13	0	0	58		0	47	0
Queue Length 50th (ft)	53	197	0	~269	336	98	70	784		98	509	0
Queue Length 95th (ft)	81	179	57	#309	340	176	93	#970		134	602	0
Internal Link Dist (ft)		688			1008			410			930	
Turn Bay Length (ft)	300		200	250		180	300			400		165

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	383	769	493	415	850	538	624	2349		417	2439	797
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.26	0.51	0.44	1.08	0.77	0.62	0.21	0.91		0.44	0.69	0.06

Intersection Summary

Area Type: Other

Cycle Length: 161

Actuated Cycle Length: 161

Offset: 0 (0%), Referenced to phase 2:SBT, Start of Green

Natural Cycle: 140

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.08

Intersection Signal Delay: 52.2 Intersection LOS: D

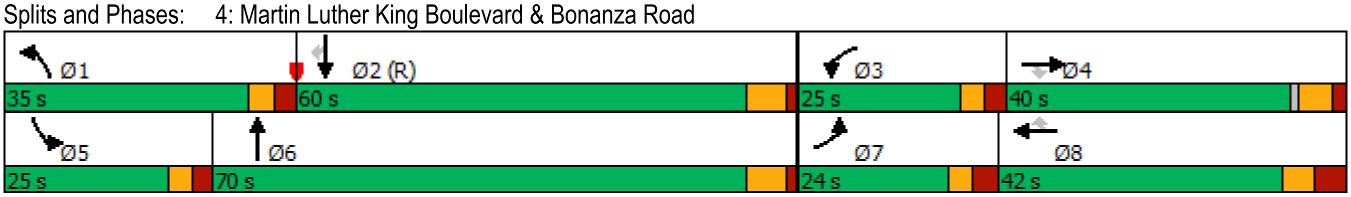
Intersection Capacity Utilization 90.9% ICU Level of Service E

Analysis Period (min) 15

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

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

Splits and Phases: 4: Martin Luther King Boulevard & Bonanza Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	665	944	287	188	787	193	178	763	156	88	435	310
Future Volume (veh/h)	665	944	287	188	787	193	178	763	156	88	435	310
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	782	1061	359	235	874	212	200	812	184	109	478	330
Peak Hour Factor	0.85	0.89	0.80	0.80	0.90	0.91	0.89	0.94	0.85	0.81	0.91	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	825	2035	617	287	1236	384	249	985	430	156	883	389
Arrive On Green	0.24	0.40	0.40	0.08	0.24	0.24	0.07	0.28	0.28	0.05	0.25	0.25
Sat Flow, veh/h	3456	5106	1548	3456	5106	1585	3456	3554	1552	3456	3554	1563
Grp Volume(v), veh/h	782	1061	359	235	874	212	200	812	184	109	478	330
Grp Sat Flow(s),veh/h/ln	1728	1702	1548	1728	1702	1585	1728	1777	1552	1728	1777	1563
Q Serve(g_s), s	31.2	22.1	25.4	9.4	21.9	16.4	8.0	30.0	13.6	4.4	16.4	28.2
Cycle Q Clear(g_c), s	31.2	22.1	25.4	9.4	21.9	16.4	8.0	30.0	13.6	4.4	16.4	28.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	825	2035	617	287	1236	384	249	985	430	156	883	389
V/C Ratio(X)	0.95	0.52	0.58	0.82	0.71	0.55	0.80	0.82	0.43	0.70	0.54	0.85
Avail Cap(c_a), veh/h	842	2035	617	474	1236	384	346	985	430	227	883	389
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.4	32.0	33.0	63.2	48.5	46.4	64.0	47.4	41.5	65.9	45.7	50.1
Incr Delay (d2), s/veh	19.1	0.1	0.9	2.2	3.4	5.6	6.1	7.8	3.1	2.1	2.4	20.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.6	9.1	9.4	4.1	9.5	6.9	3.7	14.2	5.5	2.0	7.5	12.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	71.5	32.1	33.9	65.4	51.9	52.0	70.1	55.2	44.6	68.1	48.0	70.3
LnGrp LOS	E	C	C	E	D	D	E	E	D	E	D	E
Approach Vol, veh/h		2202			1321			1196			917	
Approach Delay, s/veh		46.4			54.3			56.1			58.4	
Approach LOS		D			D			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.1	41.0	17.4	61.9	12.1	45.0	39.3	40.0
Change Period (Y+Rc), s	6.0	* 6.2	* 5.8	* 6.1	* 5.8	* 6.2	5.9	* 6.1
Max Green Setting (Gmax), s	14.0	* 34	* 19	* 49	* 9.2	* 39	34.1	* 34
Max Q Clear Time (g_c+I1), s	10.0	30.2	11.4	27.4	6.4	32.0	33.2	23.9
Green Ext Time (p_c), s	0.1	1.1	0.3	5.9	0.0	2.4	0.2	3.1

Intersection Summary		
HCM 6th Ctrl Delay		52.3
HCM 6th LOS		D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	665	944	287	188	787	193	178	763	156	88	435	310
Future Volume (vph)	665	944	287	188	787	193	178	763	156	88	435	310
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	450		135	250		160	240		230	250		315
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor			0.96						0.97			0.99
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1526	3433	5085	1583	3433	3539	1530	3433	3539	1561
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			233			161			161			330
Link Speed (mph)		35			45			35			35	
Link Distance (ft)		873			992			804			651	
Travel Time (s)		17.0			15.0			15.7			12.7	
Confl. Peds. (#/hr)			15						19			
Confl. Bikes (#/hr)			1									2
Peak Hour Factor	0.85	0.89	0.80	0.80	0.90	0.91	0.89	0.94	0.85	0.81	0.91	0.94
Adj. Flow (vph)	782	1061	359	235	874	212	200	812	184	109	478	330
Shared Lane Traffic (%)												
Lane Group Flow (vph)	782	1061	359	235	874	212	200	812	184	109	478	330
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	13.0	13.0	5.0	13.0	13.0	5.0	11.0	11.0	5.0	11.0	11.0
Minimum Split (s)	10.9	32.1	32.1	10.8	22.5	22.5	11.0	42.2	42.2	10.8	22.5	22.5
Total Split (s)	40.0	55.0	55.0	25.0	40.0	40.0	20.0	45.0	45.0	15.0	40.0	40.0
Total Split (%)	28.6%	39.3%	39.3%	17.9%	28.6%	28.6%	14.3%	32.1%	32.1%	10.7%	28.6%	28.6%
Maximum Green (s)	34.1	48.9	48.9	19.2	33.9	33.9	14.0	38.8	38.8	9.2	33.8	33.8
Yellow Time (s)	3.0	4.7	4.7	3.0	4.7	4.7	3.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	2.9	1.4	1.4	2.8	1.4	1.4	3.0	2.2	2.2	2.8	2.2	2.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	6.1	6.1	5.8	6.1	6.1	6.0	6.2	6.2	5.8	6.2	6.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	None	None	None	C-Max	C-Max	None	Max	Max	None	Max	Max
Walk Time (s)		7.0	7.0					7.0	7.0			
Flash Dont Walk (s)		19.0	19.0					29.0	29.0			
Pedestrian Calls (#/hr)		15	15					19	19			
Act Effct Green (s)	33.4	54.2	54.2	13.9	34.6	34.6	12.1	39.8	39.8	8.2	35.7	35.7
Actuated g/C Ratio	0.24	0.39	0.39	0.10	0.25	0.25	0.09	0.28	0.28	0.06	0.26	0.26
v/c Ratio	0.95	0.54	0.49	0.69	0.70	0.41	0.68	0.81	0.33	0.55	0.53	0.51
Control Delay	74.4	34.9	13.6	71.4	51.6	14.7	73.7	54.1	9.8	74.2	47.8	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	74.4	34.9	13.6	71.4	51.6	14.7	73.7	54.1	9.8	74.2	47.8	7.3
LOS	E	C	B	E	D	B	E	D	A	E	D	A
Approach Delay		45.4			49.2			50.5			36.4	
Approach LOS		D			D			D			D	
90th %ile Green (s)	34.1	50.2	50.2	17.9	33.9	33.9	14.0	38.8	38.8	9.2	33.8	33.8
90th %ile Term Code	Max	Coord	Coord	Gap	Coord	Coord	Max	MaxR	MaxR	Max	MaxR	MaxR
70th %ile Green (s)	34.1	52.5	52.5	15.6	33.9	33.9	14.0	38.8	38.8	9.2	33.8	33.8
70th %ile Term Code	Max	Coord	Coord	Gap	Coord	Coord	Max	MaxR	MaxR	Max	MaxR	MaxR
50th %ile Green (s)	34.1	54.2	54.2	13.9	33.9	33.9	12.5	39.2	39.2	8.8	35.3	35.3
50th %ile Term Code	Max	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Gap	MaxR	MaxR
30th %ile Green (s)	34.1	55.8	55.8	12.3	33.9	33.9	11.0	40.3	40.3	7.7	36.8	36.8
30th %ile Term Code	Max	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Gap	MaxR	MaxR
10th %ile Green (s)	30.8	58.2	58.2	9.9	37.2	37.2	8.8	41.9	41.9	6.1	39.0	39.0
10th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Gap	MaxR	MaxR
Stops (vph)	614	715	80	178	702	46	170	693	25	84	368	29
Fuel Used(gal)	19	18	3	6	22	2	5	18	1	2	9	2
CO Emissions (g/hr)	1319	1261	224	430	1542	167	348	1261	98	166	632	149
NOx Emissions (g/hr)	257	245	44	84	300	33	68	245	19	32	123	29
VOC Emissions (g/hr)	306	292	52	100	357	39	81	292	23	38	147	35
Dilemma Vehicles (#)	0	34	0	0	28	0	0	27	0	0	15	0
Queue Length 50th (ft)	362	272	79	108	268	37	92	365	15	50	199	0
Queue Length 95th (ft)	#433	330	131	131	320	111	132	448	64	74	261	81
Internal Link Dist (ft)		793			912			724			571	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	450		135	250		160	240		230	250		315
Base Capacity (vph)	836	1967	733	470	1255	512	343	1005	550	225	903	644
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.94	0.54	0.49	0.50	0.70	0.41	0.58	0.81	0.33	0.48	0.53	0.51

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 124.5 (89%), Referenced to phase 8:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.95

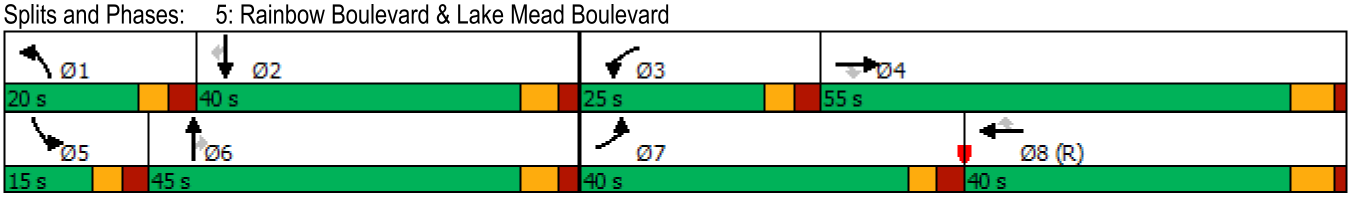
Intersection Signal Delay: 45.9 Intersection LOS: D

Intersection Capacity Utilization 88.3% ICU Level of Service E

Analysis Period (min) 15

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

Splits and Phases: 5: Rainbow Boulevard & Lake Mead Boulevard



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	362	845	199	305	1149	259	343	2098	244	366	1599	145
Future Volume (veh/h)	362	845	199	305	1149	259	343	2098	244	366	1599	145
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.98	1.00		0.97	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	441	983	214	367	1352	301	385	2280	271	407	1648	153
Peak Hour Factor	0.82	0.86	0.93	0.83	0.85	0.86	0.89	0.92	0.90	0.90	0.97	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	283	1075	233	365	1177	262	424	2001	604	296	1824	544
Arrive On Green	0.08	0.26	0.26	0.11	0.28	0.28	0.12	0.39	0.39	0.09	0.36	0.36
Sat Flow, veh/h	3456	4164	904	3456	4158	924	3456	5106	1543	3456	5106	1522
Grp Volume(v), veh/h	441	803	394	367	1107	546	385	2280	271	407	1648	153
Grp Sat Flow(s),veh/h/ln	1728	1702	1664	1728	1702	1678	1728	1702	1543	1728	1702	1522
Q Serve(g_s), s	13.1	36.6	36.8	16.9	45.3	45.3	17.6	62.7	20.7	13.7	49.0	11.5
Cycle Q Clear(g_c), s	13.1	36.6	36.8	16.9	45.3	45.3	17.6	62.7	20.7	13.7	49.0	11.5
Prop In Lane	1.00		0.54	1.00		0.55	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	283	879	429	365	964	475	424	2001	604	296	1824	544
V/C Ratio(X)	1.56	0.91	0.92	1.01	1.15	1.15	0.91	1.14	0.45	1.38	0.90	0.28
Avail Cap(c_a), veh/h	283	879	429	365	964	475	434	2001	604	296	1824	544
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	73.4	57.6	57.7	71.5	57.3	57.4	69.3	48.6	35.9	73.2	48.8	36.7
Incr Delay (d2), s/veh	268.0	13.6	24.0	48.5	78.9	89.5	21.6	69.4	2.4	188.9	7.8	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.3	17.1	18.0	9.8	29.6	30.6	8.9	38.6	8.1	13.8	21.6	4.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	341.5	71.2	81.7	120.0	136.2	146.9	90.9	118.1	38.3	262.1	56.6	38.0
LnGrp LOS	F	E	F	F	F	F	F	F	D	F	E	D
Approach Vol, veh/h		1638			2020			2936			2208	
Approach Delay, s/veh		146.5			136.2			107.1			93.2	
Approach LOS		F			F			F			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	25.5	63.6	23.0	48.0	20.0	69.1	19.0	52.0				
Change Period (Y+Rc), s	5.9	* 6.4	6.1	6.7	* 6.3	* 6.4	5.9	6.7				
Max Green Setting (Gmax), s	20.1	* 57	16.9	41.3	* 14	* 63	13.1	45.3				
Max Q Clear Time (g_c+I1), s	19.6	51.0	18.9	38.8	15.7	64.7	15.1	47.3				
Green Ext Time (p_c), s	0.1	3.6	0.0	1.3	0.0	0.0	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			117.6									
HCM 6th LOS			F									

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	362	845	199	305	1149	259	343	2098	244	366	1599	145
Future Volume (vph)	362	845	199	305	1149	259	343	2098	244	366	1599	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	345		0	345		0	340		120	330		245
Storage Lanes	2		0	2		0	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.91	0.91	0.97	0.91	0.91	0.97	0.91	1.00	0.97	0.91	1.00
Ped Bike Factor		0.99			0.99				0.93			0.91
Frt		0.973			0.973				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	4900	0	3433	4913	0	3433	5085	1583	3433	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	4900	0	3433	4913	0	3433	5085	1477	3433	5085	1448
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		29			31				108			149
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		1636			1478			1249			1239	
Travel Time (s)		24.8			22.4			18.9			18.8	
Confl. Peds. (#/hr)			34			22			35			47
Peak Hour Factor	0.82	0.86	0.93	0.83	0.85	0.86	0.89	0.92	0.90	0.90	0.97	0.95
Adj. Flow (vph)	441	983	214	367	1352	301	385	2280	271	407	1648	153
Shared Lane Traffic (%)												
Lane Group Flow (vph)	441	1197	0	367	1653	0	385	2280	271	407	1648	153
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	Perm

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases									6			2
Detector Phase	7	4		3	8		1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0		5.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	10.9	44.7		11.1	44.7		10.9	36.3	36.3	11.3	36.4	36.4
Total Split (s)	19.0	48.0		23.0	52.0		26.0	69.0	69.0	20.0	63.0	63.0
Total Split (%)	11.9%	30.0%		14.4%	32.5%		16.3%	43.1%	43.1%	12.5%	39.4%	39.4%
Maximum Green (s)	13.1	41.3		16.9	45.3		20.1	62.7	62.7	13.7	56.6	56.6
Yellow Time (s)	3.0	4.7		3.0	4.7		3.0	4.7	4.7	3.0	4.7	4.7
All-Red Time (s)	2.9	2.0		3.1	2.0		2.9	1.6	1.6	3.3	1.7	1.7
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.9	6.7		6.1	6.7		5.9	6.3	6.3	6.3	6.4	6.4
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	None		None	None		None	C-Max	C-Max	None	Max	Max
Walk Time (s)		7.0			7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		31.0			31.0			23.0	23.0		23.0	23.0
Pedestrian Calls (#/hr)		34			22			35	35		47	47
Act Effct Green (s)	13.1	41.3		16.9	45.3		19.7	62.7	62.7	13.7	57.0	57.0
Actuated g/C Ratio	0.08	0.26		0.11	0.28		0.12	0.39	0.39	0.09	0.36	0.36
v/c Ratio	1.57	0.93		1.01	1.17		0.91	1.14	0.42	1.39	0.91	0.25
Control Delay	316.5	69.6		119.8	132.8		95.4	115.3	22.8	244.7	57.5	6.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	316.5	69.6		119.8	132.8		95.4	115.3	22.8	244.7	57.5	6.4
LOS	F	E		F	F		F	F	C	F	E	A
Approach Delay		136.1			130.4			104.1			88.5	
Approach LOS		F			F			F			F	
90th %ile Green (s)	13.1	41.3		16.9	45.3		20.1	62.7	62.7	13.7	56.6	56.6
90th %ile Term Code	Max	Max		Max	Max		Max	Coord	Coord	Max	Coord	Coord
70th %ile Green (s)	13.1	41.3		16.9	45.3		20.1	62.7	62.7	13.7	56.6	56.6
70th %ile Term Code	Max	Max		Max	Max		Max	Coord	Coord	Max	Coord	Coord
50th %ile Green (s)	13.1	41.3		16.9	45.3		20.1	62.7	62.7	13.7	56.6	56.6
50th %ile Term Code	Max	Max		Max	Max		Max	Coord	Coord	Max	Coord	Coord
30th %ile Green (s)	13.1	41.3		16.9	45.3		20.1	62.7	62.7	13.7	56.6	56.6
30th %ile Term Code	Max	Max		Max	Max		Max	Coord	Coord	Max	Coord	Coord
10th %ile Green (s)	13.1	41.3		16.9	45.3		17.9	62.7	62.7	13.7	58.8	58.8
10th %ile Term Code	Max	Hold		Max	Max		Gap	Coord	Coord	Max	Coord	Coord
Stops (vph)	254	956		272	1186		320	1822	107	277	1465	16
Fuel Used(gal)	30	38		14	66		13	89	4	25	50	2
CO Emissions (g/hr)	2120	2640		961	4636		938	6215	310	1721	3481	109
NOx Emissions (g/hr)	412	514		187	902		183	1209	60	335	677	21
VOC Emissions (g/hr)	491	612		223	1074		217	1440	72	399	807	25
Dilemma Vehicles (#)	0	31		0	37		0	57	0	0	49	0
Queue Length 50th (ft)	~335	442		~204	~744		207	~1019	121	~290	604	3
Queue Length 95th (ft)	#396	475		#275	#762		#294	#1104	204	#403	672	54
Internal Link Dist (ft)		1556			1398			1169			1159	
Turn Bay Length (ft)	345			345			340		120	330		245

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	281	1286		362	1413		431	1992	644	293	1812	612
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	0
Reduced v/c Ratio	1.57	0.93		1.01	1.17		0.89	1.14	0.42	1.39	0.91	0.25

Intersection Summary

Area Type: Other

Cycle Length: 160

Actuated Cycle Length: 160

Offset: 156.4 (98%), Referenced to phase 6:NBT, Start of Green

Natural Cycle: 145

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.57

Intersection Signal Delay: 112.2 Intersection LOS: F

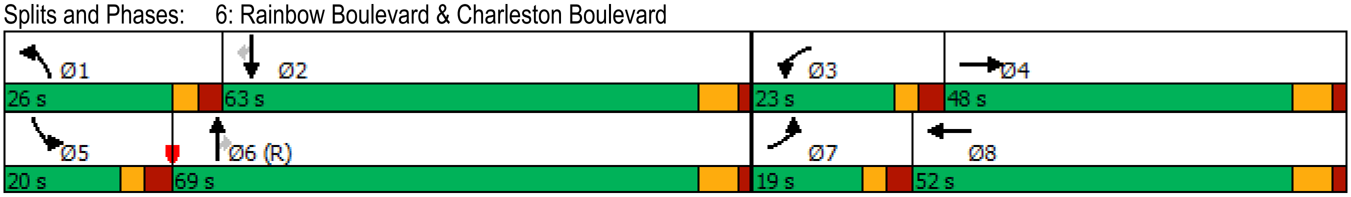
Intersection Capacity Utilization 112.4% ICU Level of Service H

Analysis Period (min) 15

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

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

Splits and Phases: 6: Rainbow Boulevard & Charleston Boulevard



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	184	1554	142	293	1573	187	312	970	190	236	502	139
Future Volume (veh/h)	184	1554	142	293	1573	187	312	970	190	236	502	139
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.92	1.00		0.95	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	233	1636	237	376	1691	215	411	1155	260	246	540	224
Peak Hour Factor	0.79	0.95	0.60	0.78	0.93	0.87	0.76	0.84	0.73	0.96	0.93	0.62
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	246	1697	523	415	1940	557	361	1311	295	289	727	300
Arrive On Green	0.07	0.33	0.33	0.12	0.38	0.38	0.10	0.32	0.32	0.08	0.30	0.30
Sat Flow, veh/h	3456	5106	1574	3456	5106	1465	3456	4119	927	3456	2442	1010
Grp Volume(v), veh/h	233	1636	237	376	1691	215	411	954	461	246	392	372
Grp Sat Flow(s),veh/h/ln	1728	1702	1574	1728	1702	1465	1728	1702	1642	1728	1777	1675
Q Serve(g_s), s	10.7	50.4	18.9	17.2	49.1	17.1	16.7	42.5	42.5	11.2	31.8	32.0
Cycle Q Clear(g_c), s	10.7	50.4	18.9	17.2	49.1	17.1	16.7	42.5	42.5	11.2	31.8	32.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.56	1.00		0.60
Lane Grp Cap(c), veh/h	246	1697	523	415	1940	557	361	1083	523	289	529	498
V/C Ratio(X)	0.95	0.96	0.45	0.91	0.87	0.39	1.14	0.88	0.88	0.85	0.74	0.75
Avail Cap(c_a), veh/h	246	1697	523	423	1944	558	361	1083	523	361	529	498
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	74.0	52.5	42.0	69.5	46.0	36.0	71.7	51.7	51.7	72.3	50.7	50.7
Incr Delay (d2), s/veh	42.2	14.8	2.8	21.8	4.8	0.6	90.9	10.3	18.9	12.4	9.1	9.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.2	23.3	7.7	8.8	21.1	6.1	11.9	19.6	20.1	5.5	15.5	14.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	116.2	67.3	44.8	91.3	50.7	36.7	162.6	62.0	70.6	84.7	59.8	60.5
LnGrp LOS	F	E	D	F	D	D	F	E	E	F	E	E
Approach Vol, veh/h		2106			2282			1826			1010	
Approach Delay, s/veh		70.2			56.1			86.8			66.1	
Approach LOS		E			E			F			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	22.0	54.1	24.6	59.3	18.7	57.4	17.0	66.9
Change Period (Y+Rc), s	* 5.3	* 6.5	5.4	* 6.1	* 5.3	6.5	5.6	* 6.1
Max Green Setting (Gmax), s	* 17	* 48	19.6	* 53	* 17	47.5	11.4	* 61
Max Q Clear Time (g_c+I1), s	18.7	34.0	19.2	52.4	13.2	44.5	12.7	51.1
Green Ext Time (p_c), s	0.0	2.7	0.0	0.5	0.2	1.9	0.0	8.3

Intersection Summary		
HCM 6th Ctrl Delay		69.4
HCM 6th LOS		E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	184	1554	142	293	1573	187	312	970	190	236	502	139
Future Volume (vph)	184	1554	142	293	1573	187	312	970	190	236	502	139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	315		135	345		160	270		0	345		0
Storage Lanes	2		1	2		1	2		0	2		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	0.91	0.97	0.95	0.95
Ped Bike Factor			0.97			0.81		0.99			0.99	
Frt			0.850			0.850		0.972			0.956	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	4871	0	3433	3358	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1540	3433	5085	1278	3433	4871	0	3433	3358	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			135			98		32			40	
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		967			793			658			756	
Travel Time (s)		14.7			12.0			12.8			14.7	
Confl. Peds. (#/hr)			8			96			56			11
Peak Hour Factor	0.79	0.95	0.60	0.78	0.93	0.87	0.76	0.84	0.73	0.96	0.93	0.62
Adj. Flow (vph)	233	1636	237	376	1691	215	411	1155	260	246	540	224
Shared Lane Traffic (%)												
Lane Group Flow (vph)	233	1636	237	376	1691	215	411	1415	0	246	764	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8						
Detector Phase	7	4	4	3	8	8	1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	15.0	15.0	5.0	15.0	15.0	5.0	13.0		5.0	13.0	
Minimum Split (s)	10.6	31.1	31.1	10.4	31.1	31.1	10.3	45.5		10.3	43.4	
Total Split (s)	17.0	59.0	59.0	25.0	67.0	67.0	22.0	54.0		22.0	54.0	
Total Split (%)	10.6%	36.9%	36.9%	15.6%	41.9%	41.9%	13.8%	33.8%		13.8%	33.8%	
Maximum Green (s)	11.4	52.9	52.9	19.6	60.9	60.9	16.7	47.5		16.7	47.6	
Yellow Time (s)	3.0	4.7	4.7	3.0	4.7	4.7	3.0	4.0		3.0	4.0	
All-Red Time (s)	2.6	1.4	1.4	2.4	1.4	1.4	2.3	2.5		2.3	2.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.6	6.1	6.1	5.4	6.1	6.1	5.3	6.5		5.3	6.4	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0		2.0	2.0	
Recall Mode	None	C-Max	C-Max	None	None	None	None	Max		None	Max	
Walk Time (s)		7.0	7.0		7.0	7.0		7.0			7.0	
Flash Dont Walk (s)		18.0	18.0		18.0	18.0		32.0			30.0	
Pedestrian Calls (#/hr)		8	8		96	96		56			11	
Act Effct Green (s)	11.4	53.3	53.3	19.2	60.9	60.9	16.7	49.3		14.9	47.6	
Actuated g/C Ratio	0.07	0.33	0.33	0.12	0.38	0.38	0.10	0.31		0.09	0.30	
v/c Ratio	0.95	0.97	0.39	0.91	0.87	0.39	1.15	0.93		0.77	0.74	
Control Delay	119.5	67.3	19.1	96.2	52.1	21.3	154.7	63.8		87.0	53.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	119.5	67.3	19.1	96.2	52.1	21.3	154.7	63.8		87.0	53.2	
LOS	F	E	B	F	D	C	F	E		F	D	
Approach Delay		67.7			56.5			84.3			61.4	
Approach LOS		E			E			F			E	
90th %ile Green (s)	11.4	52.9	52.9	19.6	60.9	60.9	16.7	47.5		16.7	47.6	
90th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Max	MaxR		Max	MaxR	
70th %ile Green (s)	11.4	52.9	52.9	19.6	60.9	60.9	16.7	47.5		16.7	47.6	
70th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Max	MaxR		Max	MaxR	
50th %ile Green (s)	11.4	52.9	52.9	19.6	60.9	60.9	16.7	48.4		15.8	47.6	
50th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Max	MaxR		Gap	MaxR	
30th %ile Green (s)	11.4	52.9	52.9	19.6	60.9	60.9	16.7	50.2		14.0	47.6	
30th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Max	MaxR		Gap	MaxR	
10th %ile Green (s)	11.4	54.9	54.9	17.6	60.9	60.9	16.7	52.8		11.4	47.6	
10th %ile Term Code	Max	Coord	Coord	Gap	Coord	Coord	Max	MaxR		Gap	MaxR	
Stops (vph)	166	1430	47	274	1429	75	263	1039		227	543	
Fuel Used(gal)	8	49	2	11	43	3	13	28		7	15	
CO Emissions (g/hr)	538	3414	142	745	2975	189	929	1985		501	1015	
NOx Emissions (g/hr)	105	664	28	145	579	37	181	386		98	197	
VOC Emissions (g/hr)	125	791	33	173	690	44	215	460		116	235	
Dilemma Vehicles (#)	0	47	0	0	49	0	0	35		0	20	
Queue Length 50th (ft)	127	620	78	203	600	86	~258	523		130	363	
Queue Length 95th (ft)	#173	#727	58	224	666	151	#282	538		179	443	
Internal Link Dist (ft)		887			713			578			676	
Turn Bay Length (ft)	315		135	345		160	270			345		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	244	1694	603	420	1935	547	358	1522		358	1027	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.95	0.97	0.39	0.90	0.87	0.39	1.15	0.93		0.69	0.74	

Intersection Summary

Area Type: Other

Cycle Length: 160

Actuated Cycle Length: 160

Offset: 0 (0%), Referenced to phase 4:EBT, Start of Green

Natural Cycle: 140

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.15

Intersection Signal Delay: 67.5 Intersection LOS: E

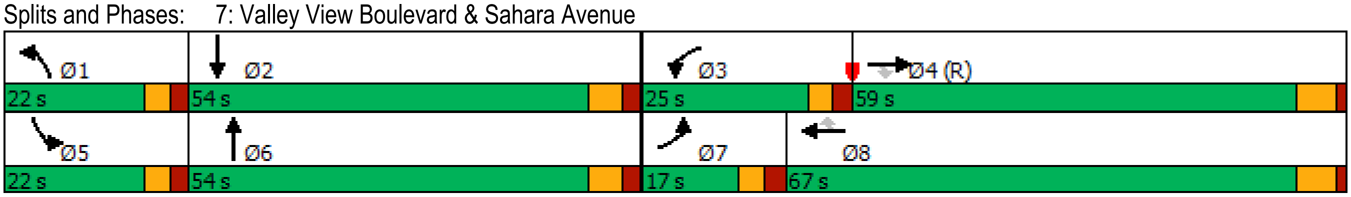
Intersection Capacity Utilization 97.5% ICU Level of Service F

Analysis Period (min) 15

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

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

Splits and Phases: 7: Valley View Boulevard & Sahara Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	187	51	78	129	106	24	1561	150	50	869	25
Future Volume (veh/h)	67	187	51	78	129	106	24	1561	150	50	869	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.98	0.99		0.98	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	78	237	70	104	155	126	39	1678	0	86	1060	30
Peak Hour Factor	0.86	0.79	0.73	0.75	0.83	0.84	0.61	0.93	0.91	0.58	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	221	424	351	173	424	351	50	3044		107	3209	91
Arrive On Green	0.23	0.23	0.23	0.23	0.23	0.23	0.03	0.60	0.00	0.06	0.63	0.63
Sat Flow, veh/h	1086	1870	1551	1063	1870	1551	1781	5274	0	1781	5103	144
Grp Volume(v), veh/h	78	237	70	104	155	126	39	1678	0	86	707	383
Grp Sat Flow(s),veh/h/ln	1086	1870	1551	1063	1870	1551	1781	1702	0	1781	1702	1843
Q Serve(g_s), s	9.1	15.7	5.1	13.5	9.8	9.6	3.0	27.7	0.0	6.7	13.6	13.6
Cycle Q Clear(g_c), s	18.9	15.7	5.1	29.2	9.8	9.6	3.0	27.7	0.0	6.7	13.6	13.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.00	1.00		0.08
Lane Grp Cap(c), veh/h	221	424	351	173	424	351	50	3044		107	2141	1159
V/C Ratio(X)	0.35	0.56	0.20	0.60	0.37	0.36	0.78	0.55		0.80	0.33	0.33
Avail Cap(c_a), veh/h	256	484	401	208	485	402	204	3044		253	2141	1159
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.7	48.0	43.9	60.9	45.7	45.6	67.6	17.0	0.0	65.0	12.2	12.2
Incr Delay (d2), s/veh	0.4	0.4	0.1	1.3	0.2	0.2	9.1	0.7	0.0	5.2	0.4	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	7.4	2.0	3.7	4.6	3.7	1.5	10.7	0.0	3.2	5.2	5.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.0	48.4	44.0	62.2	45.9	45.8	76.7	17.7	0.0	70.1	12.6	12.9
LnGrp LOS	D	D	D	E	D	D	E	B		E	B	B
Approach Vol, veh/h		385			385			1717	A		1176	
Approach Delay, s/veh		48.7			50.3			19.1			16.9	
Approach LOS		D			D			B			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.0	93.5		37.5	13.5	89.0		37.5				
Change Period (Y+Rc), s	5.0	* 5.5		* 5.8	5.1	5.5		* 5.8				
Max Green Setting (Gmax), s	16.0	* 72		* 36	19.9	67.5		* 36				
Max Q Clear Time (g_c+I1), s	5.0	15.6		20.9	8.7	29.7		31.2				
Green Ext Time (p_c), s	0.0	5.3		1.1	0.1	11.1		0.5				

Intersection Summary			
HCM 6th Ctrl Delay			24.8
HCM 6th LOS			C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	187	51	78	129	106	24	1561	150	50	869	25
Future Volume (vph)	67	187	51	78	129	106	24	1561	150	50	869	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	115		115	85		85	230		0	230		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor	0.99		0.97	0.99		0.98		0.99			1.00	
Frt			0.850			0.850		0.987			0.996	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	4971	0	1770	5059	0
Flt Permitted	0.514			0.311			0.950			0.950		
Satd. Flow (perm)	951	1863	1528	571	1863	1550	1770	4971	0	1770	5059	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			58			124		16			4	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		1078			724			717			783	
Travel Time (s)		24.5			16.5			14.0			15.3	
Confl. Peds. (#/hr)	6		16	16		6			27			8
Peak Hour Factor	0.86	0.79	0.73	0.75	0.83	0.84	0.61	0.93	0.91	0.58	0.82	0.82
Adj. Flow (vph)	78	237	70	104	155	126	39	1678	165	86	1060	30
Shared Lane Traffic (%)												
Lane Group Flow (vph)	78	237	70	104	155	126	39	1843	0	86	1090	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8		8						
Detector Phase	4	4	4	8	8	8	1	6		5	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	5.0	12.0		5.0	12.0	
Minimum Split (s)	34.8	34.8	34.8	33.7	33.7	33.7	10.0	26.5		10.1	26.4	
Total Split (s)	42.0	42.0	42.0	42.0	42.0	42.0	21.0	73.0		25.0	77.0	
Total Split (%)	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	15.0%	52.1%		17.9%	55.0%	
Maximum Green (s)	36.2	36.2	36.2	36.3	36.3	36.3	16.0	67.5		19.9	71.6	
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6	3.0	4.0		3.0	4.0	
All-Red Time (s)	2.2	2.2	2.2	2.1	2.1	2.1	2.0	1.5		2.1	1.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.8	5.8	5.8	5.7	5.7	5.7	5.0	5.5		5.1	5.4	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None	None	None	Max		None	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0		7.0			7.0	
Flash Dont Walk (s)	22.0	22.0	22.0	21.0	21.0	21.0		14.0			14.0	
Pedestrian Calls (#/hr)	16	16	16	6	6	6		27			8	
Act Effct Green (s)	23.9	23.9	23.9	24.0	24.0	24.0	7.6	88.6		11.2	94.3	
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.17	0.17	0.05	0.63		0.08	0.67	
v/c Ratio	0.48	0.75	0.23	1.07	0.49	0.34	0.41	0.59		0.61	0.32	
Control Delay	60.6	68.9	15.7	164.6	56.1	10.0	75.5	17.3		79.6	11.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	60.6	68.9	15.7	164.6	56.1	10.0	75.5	17.3		79.6	11.2	
LOS	E	E	B	F	E	A	E	B		E	B	
Approach Delay		57.5			70.3			18.5			16.2	
Approach LOS		E			E			B			B	
90th %ile Green (s)	34.1	34.1	34.1	34.2	34.2	34.2	10.7	73.6		15.9	79.0	
90th %ile Term Code	Hold	Hold	Hold	Gap	Gap	Gap	Gap	Coord		Gap	Coord	
70th %ile Green (s)	29.0	29.0	29.0	29.1	29.1	29.1	8.8	81.5		13.1	86.0	
70th %ile Term Code	Ped	Ped	Ped	Hold	Hold	Hold	Gap	Coord		Gap	Coord	
50th %ile Green (s)	22.3	22.3	22.3	22.4	22.4	22.4	7.5	90.1		11.2	94.0	
50th %ile Term Code	Gap	Gap	Gap	Hold	Hold	Hold	Gap	Coord		Gap	Coord	
30th %ile Green (s)	19.2	19.2	19.2	19.3	19.3	19.3	6.2	95.2		9.2	98.4	
30th %ile Term Code	Gap	Gap	Gap	Hold	Hold	Hold	Gap	Coord		Gap	Coord	
10th %ile Green (s)	14.7	14.7	14.7	14.8	14.8	14.8	0.0	102.4		6.5	114.1	
10th %ile Term Code	Gap	Gap	Gap	Hold	Hold	Hold	Skip	Coord		Gap	Coord	
Stops (vph)	59	174	12	71	112	14	23	976		48	366	
Fuel Used(gal)	2	5	1	3	3	1	1	22		1	10	
CO Emissions (g/hr)	120	360	46	241	197	62	47	1555		102	688	
NOx Emissions (g/hr)	23	70	9	47	38	12	9	302		20	134	
VOC Emissions (g/hr)	28	84	11	56	46	14	11	360		24	160	
Dilemma Vehicles (#)	0	0	0	0	0	0	0	61		0	32	
Queue Length 50th (ft)	66	211	9	~110	131	2	35	324		77	140	
Queue Length 95th (ft)	106	236	31	#137	168	44	50	501		82	200	
Internal Link Dist (ft)		998			644			637			703	
Turn Bay Length (ft)	115		115	85		85	230			230		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	245	481	438	148	483	493	202	3150		251	3408	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.32	0.49	0.16	0.70	0.32	0.26	0.19	0.59		0.34	0.32	

Intersection Summary

Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 133 (95%), Referenced to phase 2:SBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 27.0 Intersection LOS: C
Intersection Capacity Utilization 79.7% ICU Level of Service D
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: Eastern Avenue & St. Louis Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	410	1371	209	191	1279	97	365	474	230	152	324	110
Future Volume (veh/h)	410	1371	209	191	1279	97	365	474	230	152	324	110
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	500	1558	268	217	1453	133	415	539	256	205	386	125
Peak Hour Factor	0.82	0.88	0.78	0.88	0.88	0.73	0.88	0.88	0.90	0.74	0.84	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	523	1711	515	240	1491	136	461	598	283	196	620	198
Arrive On Green	0.15	0.34	0.34	0.13	0.31	0.31	0.13	0.26	0.26	0.11	0.24	0.24
Sat Flow, veh/h	3456	5106	1535	1781	4745	434	3456	2326	1101	1781	2638	843
Grp Volume(v), veh/h	500	1558	268	217	1042	544	415	411	384	205	258	253
Grp Sat Flow(s),veh/h/ln	1728	1702	1535	1781	1702	1776	1728	1777	1651	1781	1777	1704
Q Serve(g_s), s	20.1	40.9	19.7	16.8	42.4	42.4	16.6	31.3	31.5	15.4	18.2	18.6
Cycle Q Clear(g_c), s	20.1	40.9	19.7	16.8	42.4	42.4	16.6	31.3	31.5	15.4	18.2	18.6
Prop In Lane	1.00		1.00	1.00		0.24	1.00		0.67	1.00		0.49
Lane Grp Cap(c), veh/h	523	1711	515	240	1070	558	461	457	424	196	418	401
V/C Ratio(X)	0.96	0.91	0.52	0.90	0.97	0.97	0.90	0.90	0.90	1.05	0.62	0.63
Avail Cap(c_a), veh/h	523	1711	515	277	1070	558	484	457	424	196	418	401
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	58.9	44.5	37.5	59.7	47.4	47.4	59.7	50.3	50.3	62.3	47.9	48.1
Incr Delay (d2), s/veh	28.2	8.0	1.8	26.2	22.0	32.3	18.4	23.4	25.2	77.0	6.7	7.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.8	18.3	7.5	9.2	20.6	23.1	8.4	16.8	15.9	11.1	8.8	8.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	87.1	52.6	39.2	85.8	69.4	79.8	78.2	73.7	75.5	139.3	54.6	55.4
LnGrp LOS	F	D	D	F	E	E	E	E	E	F	D	E
Approach Vol, veh/h		2326			1803			1210			716	
Approach Delay, s/veh		58.5			74.5			75.8			79.1	
Approach LOS		E			E			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.1	38.9	24.1	52.9	21.0	42.0	27.0	50.0
Change Period (Y+Rc), s	5.4	6.0	* 5.2	* 6	5.6	6.0	* 5.8	* 6
Max Green Setting (Gmax), s	19.6	32.0	* 22	* 44	15.4	36.0	* 21	* 44
Max Q Clear Time (g_c+I1), s	18.6	20.6	18.8	42.9	17.4	33.5	22.1	44.4
Green Ext Time (p_c), s	0.1	4.7	0.1	1.1	0.0	1.9	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	69.1
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	410	1371	209	191	1279	97	365	474	230	152	324	110
Future Volume (vph)	410	1371	209	191	1279	97	365	474	230	152	324	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	360		220	260		0	370		0	85		0
Storage Lanes	2		1	1		0	2		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	0.91	0.97	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor			0.93		1.00			0.99			1.00	
Frt			0.850		0.987			0.952			0.963	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	1770	4999	0	3433	3337	0	1770	3396	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1477	1770	4999	0	3433	3337	0	1770	3396	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			172		11			55			29	
Link Speed (mph)		35			45			35			35	
Link Distance (ft)		778			1071			690			688	
Travel Time (s)		15.2			16.2			13.4			13.4	
Confl. Peds. (#/hr)			35			20			14			1
Confl. Bikes (#/hr)						1						1
Peak Hour Factor	0.82	0.88	0.78	0.88	0.88	0.73	0.88	0.88	0.90	0.74	0.84	0.88
Adj. Flow (vph)	500	1558	268	217	1453	133	415	539	256	205	386	125
Shared Lane Traffic (%)												
Lane Group Flow (vph)	500	1558	268	217	1586	0	415	795	0	205	511	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane											Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4									
Detector Phase	7	4	4	3	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	15.0	15.0	5.0	15.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	10.8	32.0	32.0	10.2	30.0		10.4	38.0		10.6	38.0	
Total Split (s)	27.0	50.0	50.0	27.0	50.0		25.0	42.0		21.0	38.0	
Total Split (%)	19.3%	35.7%	35.7%	19.3%	35.7%		17.9%	30.0%		15.0%	27.1%	
Maximum Green (s)	21.2	44.0	44.0	21.8	44.0		19.6	36.0		15.4	32.0	
Yellow Time (s)	3.0	4.7	4.7	3.0	4.7		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.8	1.3	1.3	2.2	1.3		2.4	2.0		2.6	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.8	6.0	6.0	5.2	6.0		5.4	6.0		5.6	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	4.9	4.9	2.0	4.7		2.0	6.2		2.0	6.1	
Recall Mode	None	None	None	None	C-Max		None	Max		None	Max	
Walk Time (s)		7.0	7.0		7.0			7.0			7.0	
Flash Dont Walk (s)		19.0	19.0		17.0			25.0			25.0	
Pedestrian Calls (#/hr)		35	35		20			14			1	
Act Effct Green (s)	21.2	46.0	46.0	19.8	44.0		19.0	36.0		15.4	32.6	
Actuated g/C Ratio	0.15	0.33	0.33	0.14	0.31		0.14	0.26		0.11	0.23	
v/c Ratio	0.96	0.93	0.45	0.87	1.01		0.89	0.89		1.06	0.63	
Control Delay	90.0	56.8	15.9	89.4	71.1		81.3	59.1		138.5	49.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	90.0	56.8	15.9	89.4	71.1		81.3	59.1		138.5	49.6	
LOS	F	E	B	F	E		F	E		F	D	
Approach Delay		59.2			73.3			66.7			75.0	
Approach LOS		E			E			E			E	
90th %ile Green (s)	21.2	44.0	44.0	21.8	44.0		19.6	36.0		15.4	32.0	
90th %ile Term Code	Max	Coord	Coord	Max	Coord		Max	MaxR		Max	MaxR	
70th %ile Green (s)	21.2	44.0	44.0	21.8	44.0		19.6	36.0		15.4	32.0	
70th %ile Term Code	Max	Coord	Coord	Max	Coord		Max	MaxR		Max	MaxR	
50th %ile Green (s)	21.2	44.0	44.0	21.8	44.0		19.6	36.0		15.4	32.0	
50th %ile Term Code	Max	Coord	Coord	Max	Coord		Max	MaxR		Max	MaxR	
30th %ile Green (s)	21.2	46.7	46.7	19.1	44.0		19.6	36.0		15.4	32.0	
30th %ile Term Code	Max	Coord	Coord	Gap	Coord		Max	MaxR		Max	MaxR	
10th %ile Green (s)	21.2	51.1	51.1	14.7	44.0		16.6	36.0		15.4	35.0	
10th %ile Term Code	Max	Coord	Coord	Gap	Coord		Gap	MaxR		Max	MaxR	
Stops (vph)	372	1235	62	178	1250		341	610		128	364	
Fuel Used(gal)	13	33	2	7	45		10	17		6	9	
CO Emissions (g/hr)	882	2296	162	491	3147		729	1159		420	648	
NOx Emissions (g/hr)	172	447	32	95	612		142	226		82	126	
VOC Emissions (g/hr)	204	532	38	114	729		169	269		97	150	
Dilemma Vehicles (#)	0	47	0	0	47		0	25		0	15	
Queue Length 50th (ft)	236	514	65	193	~532		193	346		~203	210	
Queue Length 95th (ft)	#295	#596	106	#305	#620		#267	#422		#270	251	
Internal Link Dist (ft)		698			991			610			608	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	360		220	260			370			85		
Base Capacity (vph)	519	1669	600	275	1578		480	898		194	812	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.96	0.93	0.45	0.79	1.01		0.86	0.89		1.06	0.63	

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 8:WBT, Start of Green

Natural Cycle: 135

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.06

Intersection Signal Delay: 66.8 Intersection LOS: E

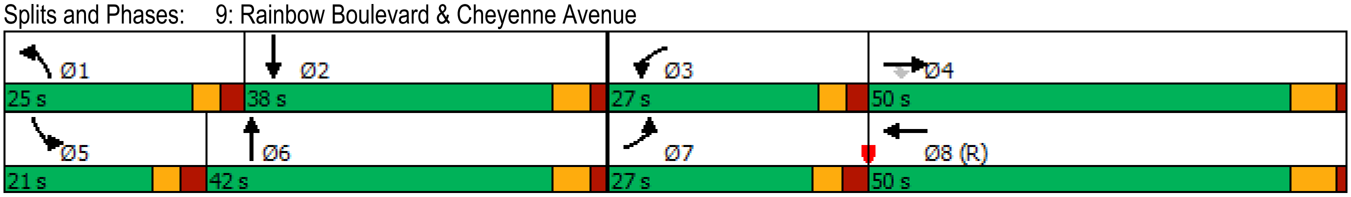
Intersection Capacity Utilization 95.1% ICU Level of Service F

Analysis Period (min) 15

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

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

Splits and Phases: 9: Rainbow Boulevard & Cheyenne Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	88	350	123	158	530	363	286	1645	115	157	1028	60
Future Volume (veh/h)	88	350	123	158	530	363	286	1645	115	157	1028	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	0.99		0.96	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	106	432	152	170	609	395	376	1769	124	196	1142	76
Peak Hour Factor	0.83	0.81	0.81	0.93	0.87	0.92	0.76	0.93	0.93	0.80	0.90	0.79
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	201	785	336	291	884	379	423	2401	725	240	2035	135
Arrive On Green	0.06	0.22	0.22	0.09	0.25	0.25	0.12	0.47	0.47	0.07	0.42	0.42
Sat Flow, veh/h	1781	3554	1521	1781	3554	1523	3456	5106	1542	3456	4882	325
Grp Volume(v), veh/h	106	432	152	170	609	395	376	1769	124	196	796	422
Grp Sat Flow(s),veh/h/ln	1781	1777	1521	1781	1777	1523	1728	1702	1542	1728	1702	1802
Q Serve(g_s), s	7.3	17.3	13.8	11.7	24.9	39.8	17.1	44.9	7.4	9.0	28.5	28.5
Cycle Q Clear(g_c), s	7.3	17.3	13.8	11.7	24.9	39.8	17.1	44.9	7.4	9.0	28.5	28.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.18
Lane Grp Cap(c), veh/h	201	785	336	291	884	379	423	2401	725	240	1419	751
V/C Ratio(X)	0.53	0.55	0.45	0.58	0.69	1.04	0.89	0.74	0.17	0.82	0.56	0.56
Avail Cap(c_a), veh/h	294	884	378	335	884	379	579	2401	725	341	1419	751
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.8	55.3	54.0	43.6	54.5	60.1	69.1	34.4	24.4	73.5	35.5	35.5
Incr Delay (d2), s/veh	0.8	0.2	0.4	0.8	1.9	57.7	10.0	2.1	0.5	6.8	1.6	3.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	7.8	5.4	5.3	11.4	21.3	8.1	18.5	2.9	4.2	11.9	12.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	46.6	55.5	54.3	44.4	56.4	117.8	79.1	36.4	24.9	80.2	37.1	38.5
LnGrp LOS	D	E	D	D	E	F	E	D	C	F	D	D
Approach Vol, veh/h		690			1174			2269			1414	
Approach Delay, s/veh		53.9			75.3			42.9			43.5	
Approach LOS		D			E			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.8	72.6	20.1	41.5	17.3	81.1	15.6	46.0
Change Period (Y+Rc), s	* 6.2	* 5.9	* 6.3	* 6.2	* 6.2	* 5.9	* 6.3	* 6.2
Max Green Setting (Gmax), s	* 27	* 51	* 18	* 40	* 16	* 62	* 18	* 40
Max Q Clear Time (g_c+I1), s	19.1	30.5	13.7	19.3	11.0	46.9	9.3	41.8
Green Ext Time (p_c), s	0.5	5.0	0.1	2.0	0.1	7.7	0.1	0.0

Intersection Summary	
HCM 6th Ctrl Delay	51.3
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

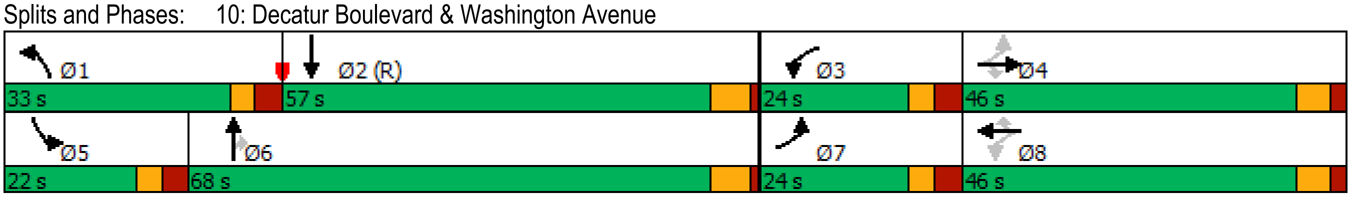
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	88	350	123	158	530	363	286	1645	115	157	1028	60
Future Volume (vph)	88	350	123	158	530	363	286	1645	115	157	1028	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	140		140	140		185	240		310	230		0
Storage Lanes	1		1	1		1	2		1	2		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.91	1.00	0.97	0.91	0.91
Ped Bike Factor	0.99		0.97	0.99		0.96			0.95		1.00	
Frt			0.850			0.850			0.850		0.991	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	5085	1583	3433	5025	0
Flt Permitted	0.194			0.271			0.950			0.950		
Satd. Flow (perm)	358	3539	1529	500	3539	1519	3433	5085	1498	3433	5025	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			147			286			107		7	
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		1199			1771			701			721	
Travel Time (s)		23.4			34.5			10.6			10.9	
Confl. Peds. (#/hr)	20		16	16		20			21			16
Confl. Bikes (#/hr)			2			4			4			3
Peak Hour Factor	0.83	0.81	0.81	0.93	0.87	0.92	0.76	0.93	0.93	0.80	0.90	0.79
Adj. Flow (vph)	106	432	152	170	609	395	376	1769	124	196	1142	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	106	432	152	170	609	395	376	1769	124	196	1218	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8			6			
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	11.0	11.0	5.0	11.0	11.0	5.0	13.0	13.0	5.0	13.0	
Minimum Split (s)	11.3	42.2	42.2	11.3	43.2	43.2	11.2	30.9	30.9	11.2	28.9	
Total Split (s)	24.0	46.0	46.0	24.0	46.0	46.0	33.0	68.0	68.0	22.0	57.0	
Total Split (%)	15.0%	28.8%	28.8%	15.0%	28.8%	28.8%	20.6%	42.5%	42.5%	13.8%	35.6%	
Maximum Green (s)	17.7	39.8	39.8	17.7	39.8	39.8	26.8	62.1	62.1	15.8	51.1	
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.7	4.7	3.0	4.7	
All-Red Time (s)	3.3	2.2	2.2	3.3	2.2	2.2	3.2	1.2	1.2	3.2	1.2	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.3	6.2	6.2	6.3	6.2	6.2	6.2	5.9	5.9	6.2	5.9	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	None	None	None	None	None	None	Max	Max	None	C-Max	
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	
Flash Dont Walk (s)		29.0	29.0		30.0	30.0		18.0	18.0		16.0	
Pedestrian Calls (#/hr)		16	16		20	20		21	21		16	
Act Effct Green (s)	42.7	31.4	31.4	50.4	35.3	35.3	21.8	75.3	75.3	13.4	66.9	
Actuated g/C Ratio	0.27	0.20	0.20	0.32	0.22	0.22	0.14	0.47	0.47	0.08	0.42	
v/c Ratio	0.54	0.62	0.36	0.61	0.78	0.71	0.81	0.74	0.16	0.68	0.58	
Control Delay	47.1	62.3	10.2	48.0	65.8	22.3	80.4	38.4	7.5	83.3	38.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	47.1	62.3	10.2	48.0	65.8	22.3	80.4	38.4	7.5	83.3	38.8	
LOS	D	E	B	D	E	C	F	D	A	F	D	
Approach Delay		48.5			48.6			43.7			45.0	
Approach LOS		D			D			D			D	
90th %ile Green (s)	15.0	38.7	38.7	17.7	41.4	41.4	27.2	62.1	62.1	16.9	51.8	
90th %ile Term Code	Gap	Hold	Hold	Max	Gap	Gap	Gap	Coord	Coord	Max	Coord	
70th %ile Green (s)	12.5	36.0	36.0	17.4	40.9	40.9	24.0	66.9	66.9	15.1	58.0	
70th %ile Term Code	Gap	Ped	Ped	Gap	Hold	Hold	Gap	Coord	Coord	Gap	Coord	
50th %ile Green (s)	11.8	33.1	33.1	15.7	37.0	37.0	21.8	73.1	73.1	13.5	64.8	
50th %ile Term Code	Gap	Hold	Hold	Gap	Ped	Ped	Gap	Coord	Coord	Gap	Coord	
30th %ile Green (s)	10.1	26.7	26.7	14.3	30.9	30.9	19.6	82.5	82.5	11.9	74.8	
30th %ile Term Code	Gap	Hold	Hold	Gap	Gap	Gap	Gap	Coord	Coord	Gap	Coord	
10th %ile Green (s)	7.6	22.6	22.6	11.1	26.1	26.1	16.4	92.1	92.1	9.6	85.3	
10th %ile Term Code	Gap	Hold	Hold	Gap	Gap	Gap	Gap	Coord	Coord	Gap	Coord	
Stops (vph)	63	312	16	113	486	104	272	1310	17	151	825	
Fuel Used(gal)	2	10	1	4	18	7	9	37	1	5	24	
CO Emissions (g/hr)	145	686	101	308	1226	494	655	2562	64	369	1674	
NOx Emissions (g/hr)	28	133	20	60	238	96	127	498	12	72	326	
VOC Emissions (g/hr)	34	159	23	71	284	115	152	594	15	85	388	
Dilemma Vehicles (#)	0	9	0	0	13	0	0	51	0	0	34	
Queue Length 50th (ft)	77	217	4	129	314	104	200	558	10	104	362	
Queue Length 95th (ft)	107	234	45	180	357	225	206	701	56	128	473	
Internal Link Dist (ft)		1119			1691			621			641	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	140		140	140		185	240		310	230		
Base Capacity (vph)	265	880	490	302	892	596	577	2394	761	344	2106	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.40	0.49	0.31	0.56	0.68	0.66	0.65	0.74	0.16	0.57	0.58	

Intersection Summary	
Area Type: Other	
Cycle Length: 160	
Actuated Cycle Length: 160	
Offset: 0 (0%), Referenced to phase 2:SBT, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 45.7	Intersection LOS: D
Intersection Capacity Utilization 84.2%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 10: Decatur Boulevard & Washington Avenue



Appendix G: National Policies, Plans, and Studies

pdf file name: 2012 GilbertAZ_IntersectionImprovementMas

Document Type: Regional Master Plan Traffic Study

Study: Town of Gilbert, AZ: Improvement Master Plan - Final Report, September 2012

Overview:

The study evaluated the needs of the region's continued high rate of growth within the Town of Gilbert, Arizona, the southeast valley, and Pinal County; which places an increasing burden on the Town's transportation system. The purpose of this study was to evaluate the existing and projected demand at the major arterial intersections within the Town, recommend improvements to address level of service and safety deficiencies, and prioritize the implementation of the improvements.

Major Goals:

Relation to the CLV Crash Mitigation Study (CLVCMS) / Study Findings:

The results of this study will provide staff with a blueprint for implementing intersection improvements.

Topical Details (if applicable) / Influence on CLVCMS:

Identified a series of improvement projects at various intersection to enhance intersection performance and provided the construction planning cost estimates for each intersection.

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pdf file name: 2014 Bentonville_Volume 3 - Final Analysis (PDF)

Document Type: Traffic Study

Study: City of Bentonville: City Wide Traffic Study Volume 3 – Final Analysis, January 2014

Overview:

The study evaluated the needs of the information from the Final Analysis volume of the Bentonville City Wide Traffic Study and provided recommendations for improvement projects for the short term, mid-term, and long term. The Study recommended that corridor and intersection improvements be made at the various locations.

Major Goal:

The purpose of the final analysis for the city-wide traffic study in Bentonville was to evaluate the fourteen locations identified during the preliminary analysis as the intersections in greatest need of improvement.

Relation to the CLV Crash Mitigation Study (CLVCMS) / Study Findings:

Topical Details (if applicable) / Influence on CLVCMS:

Identified a series of improvement projects at various intersection based on previous traffic studies and projects. The following tasks were included in the traffic study to provide planning level cost estimates for each of the fourteen elected study intersections:

- Determine existing conditions
- Collect updated traffic data
- Conduct crash analysis
- Conduct roadway geometric analysis
- Conduct operational analysis
- Develop an opinion of probable costs for recommended improvements

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pdf file name: 2017 Missouri Springfield Street and Intersection Pedestrian Safety Study

Document Type: Safety Study

Study: City of Springfield, Missouri: Street and Intersection Pedestrian Safety Study, December, 2017

Overview:

The report investigated several elements affecting pedestrian safety and developed recommendations for pedestrian activity regulations on and around certain roadways, medians, and islands located in the City of Springfield.

Major Goals:

City has launched an initiative pedestrian safety campaign aimed to foster an awareness in motorists and pedestrians to look out for one another by initiating a cultural change to be more pedestrian responsible and friendly. Additionally, the City of Springfield has investigated pedestrian safety issues in the City and provide recommendations for enhancing the safety of pedestrians and motorists within the City.

Relation to the CLV Crash Mitigation Study (CLVCMS) / Study Findings:

The report conclusively demonstrates that arterial roadways with higher speeds and traffic volumes present a heightened potential for dangers for both pedestrians and motorists. Additionally, at certain intersections, drivers only expect to see pedestrians in designated areas.

Topical Details (if applicable) / Influence on CLVCMS:

Key Takeaways / recommendations:

National Statistics

The Federal Highway Administration (FHWA) has been working to reduce pedestrian fatalities by supplying extra resources to cities and states with the highest pedestrian fatalities and fatality rates since 20041. States and local agencies have also been encouraged to develop their own Pedestrian Safety Action Plans to improve pedestrian safety in local communities. Even so, the percent of pedestrian fatalities has maintained an increasing trend from 11% to 15% of the total number of traffic related fatalities during the past 10 years (2006 to 2015)2. In 2015, there were 5,376 pedestrians killed in traffic crashes, a 9.5% increase from the 4,910 pedestrian fatalities in 20142. This is the highest number of pedestrians killed in a single year since 19962. An estimated 70,000 pedestrians were injured in traffic crashes in 2015. In the same year, 76% of pedestrian fatalities occurred in urban areas and more than one in five pedestrian deaths was the result of a collision with a vehicle at an intersection. On average, two pedestrians were killed every three hours, and a pedestrian was injured every eight minutes in traffic crashes in 2015.

Improving pedestrian safety is a national and international priority to which several agencies and organizations are committed. A sample of prominent organizations working on this issue are discussed below.

Federal Highway Administration (FHWA)

The FHWA was founded in 1966; however, the organization's responsibilities were included in the Office of Road Inquiry, founded in 1893, which changed names several times over the years15. The FHWA is an organization aimed at providing "stewardship over the construction, maintenance, and preservation of the Nation's highways, bridges, and tunnels" through research, technology, and policy.

The FHWA is working to improve pedestrian safety and reduce pedestrian fatalities and injuries16. The administration produced the Pedestrian Safety Strategic Plan which is a 15-year plan developed to address pedestrian safety and provide professionals and stakeholders with resources and information needed to solve problems in roadways. As described in the previous section, the FHWA has been working to reduce pedestrian fatalities by providing extra resources to 16 states with cities that have the highest number of pedestrian fatalities or highest pedestrian fatality rates.

National Highway Traffic Safety Administration (NHTSA)

NHTSA is a government agency with a goal to "save lives, prevent injuries, and reduce economic costs due to road traffic crashes through education, research, safety standards, and enforcement."19The agency maintains a webpage specific to pedestrian safety that includes resources on safety tips, research on safety countermeasures, statistics on crashes, and much more.

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pdf file name(s): 2013 Hillsborough Crash Severity Reduction & 2013 Hillsborough State of System

Document Type:

Study: Congestion Management and Crash Mitigation Process: State of the System, June, 2012

& Congestion Management/Crash Mitigation Process Crash Severity Reduction Report, January 2013

Overview:

Provides information on transportation system performance and alternative strategies to alleviate congestion and enhance mobility for all users.

Major Goals:

Reduce the frequency and severity of crashes focusing on the highest crash areas, and improve the safety and comfort of bicycling and walking trips—while complementing the MPO's ongoing efforts to evaluate innovative infrastructure strategies.

Relation to the CLV Crash Mitigation Study (CLVCMS) / Study Findings:

Topical Details (if applicable) / Influence on CLVCMS:

Key Takeaways / recommendations:

Section 1 focuses on the county's crash history and provides a summary of the current state and local agency safety programs and policies. Section 2 identifies and evaluates alternative roadway infrastructure strategies that could complement existing safety programs and policies in efforts to reduce severe injury crashes and improve mobility. Section 3 provides the study's recommendations.

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pdf file name: 2015 MAG Safety Plan & STSP-Tech-Memo-01_10.2.13_Final_Rev

Document Type: Safety Plan

Study: 2015 MAG Strategic Transportation Safety Plan, October 2015

Overview:

The STSP establishes the regional vision, goals, objectives, strategies, countermeasures, and performance measures for making systematic improvements in transportation safety. It is a data-driven, multi-year comprehensive plan that establishes goals, objectives, and key action areas and integrates the four E's of highway safety – Engineering, Education, Enforcement and Emergency Medical Services (EMS).

Major Goals:

Working toward the regional vision of "Zero Deaths – Zero Injuries", the report STSP established a regional target to reduce fatalities and serious injuries in the region by three to seven percent in the next five (5) years, from the base year of 2013.

Relation to the CLV Crash Mitigation Study (CLVCMS) / Study Findings:

Topical Details (if applicable) / Influence on CLVCMS:

The review of historical crash data from 2008 through 2012 revealed that 21 percent of all fatal crashes involve a pedestrian.

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pdf file name: 2017 Minnesota MN_trafficsafetyatrcistudy

Document Type: Traffic Safety Study

Study: A Study of the Traffic Safety at Reduced Conflict Intersections in Minnesota, May 2017

Overview:

This report includes findings from a safety performance evaluation of Minnesota Reduced Conflict Intersections.

Major Goals:

The Reduced Conflict Intersections aim to reduce the number of fatal and serious injury right-angle crashes. Based on the reports after crash data, the RCI is reducing the target crashes (fatal, injury, and right-angle crashes).

Relation to the CLV Crash Mitigation Study (CLVCMS) / Study Findings:

The target crash of the Reduced Conflict Intersection, which is the Fatal and Serious-Injury Right-angle Crash, has been reduced by 100%.

Topical Details (if applicable) / Influence on CLVCMS:

Key Takeaways / recommendations:

The Reduced Conflict Intersection (RCI) is an at-grade intersection on multi-lane high- speed expressways.

The Reduced Conflict Intersection is a newer treatment where minor road drivers who want to continue through the intersection and along the minor road or who want to turn left, will now take a different path. These drivers will turn right onto the major road, drive to a designated U-turn, turn around, and then turn right onto the minor road. There are no changes for the expressway drivers.

The RCI is significantly less costly and take less time to construct than traditional interchanges.

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pdf file name: 2017 Denver-pedestrian-crash-analysis-2017

Document Type: Study Report

Study: Denver, Colorado: Pedestrian Crash Analysis-Understanding and Reducing Pedestrian & Motor Vehicle Crashes, October 2017

Overview:

This report functions as a baseline to understand and analyze future events and trends related to pedestrian crashes. The analysis identifies the overall context for crash characteristics including crash typologies and circumstances related to the crashes as recorded in the crash reports

Major Goals:

This Pedestrian Crash Analysis expands upon Public Works' commitment to improve safety for all roadway users, focusing on the most vulnerable users

Key Takeaways / recommendations:

Denver Public Works can use this report's findings as a guide for planning and capital improvement projects that will best improve road safety for pedestrians. The findings in this report will supplement the findings and recommendations of the City's Vision Zero Action Plan

Crash Reporting Process

The crashes described in this report include crashes that were reported by police between 2011 and 2015 The State of Colorado follows standard crash reporting procedures.

pdf file name: 2017 Minneapolis

Document Type: Safety Study

Study: Minneapolis Pedestrian Crash Study, 2017

Overview:

The study assessed trends, contributing factors, and characteristics of pedestrian crashes in the City of Minneapolis over the past 10 years to better understand where, how, and why pedestrian crashes are occurring in Minneapolis.

Major Goals:

This study was initiated to better understand where, how, and why these pedestrian crashes are occurring in Minneapolis.

Relation to the CLV Crash Mitigation Study (CLVCMS) / Study Findings:

This report begins with an overview of national trends in pedestrians' crashes; discusses crash and other data available in Minneapolis; discusses the approach and methodology used for the pedestrian crash analysis and presents the results of the analysis. The results include details on when crashes are occurring and how those crashes correlate with street characteristics, intersections, demographics, and other factors.

Key Takeaways / recommendations:

Efforts to improve pedestrian safety should involve all 6 E's - engineering, education, enforcement, encouragement, evaluation, and equity.

This data-driven approach will be valuable in future planning and programming of projects to improve pedestrian safety. The results of this analysis are intended to be used in both reactive and proactive ways – to reduce crashes that are happening and identify areas where crashes could happen in the future.

This study is an informational document that looks at pedestrian crash trends city-wide. The information is intended to be used to identify locations for future studies and develop strategies for capital improvement programs.

There is a growing trend across the United States to focus on systemic safety improvements to improve safety at locations that may not have had a crash yet. The results of this analysis can be used by Minneapolis departments and committees, as well as other agencies with infrastructure in Minneapolis, to implement design, policy, and other countermeasures to reduce pedestrian crashes.

……

pdf file name: 2017 Boulder Crash Analysis & 2017 Boulder Safe Streets

Document Type: Traffic Crash Reports

Study: Boulder County Traffic Crashes & Safe Streets Boulder report, May 2016

Overview:

The Report on Progress provides an overview of the Toward Vision Zero strategy, and the Safe Streets Boulder report is a detailed look at Boulder's traffic safety data and strategies for improving safety.

Major Goals:

This report reviews recent trends and provides a comprehensive analysis of collision data. A primary purpose of the evaluation is to identify overall trends and guide strategies for mitigating future collisions, particularly those that result in serious injuries and fatalities.

Relation to the CLV Crash Mitigation Study (CLVCMS) / Study Findings:

The report provides an overview of the city's efforts to continuously improve safety for all modes of travel.

Key Takeaways / recommendations:

This report identifies a plan of action for reducing the number and severity of collisions. The action plan outlines a comprehensive approach that includes engineering, education, enforcement and evaluation strategies. Action items are grouped by strategy area and include the following:

Human and Economic Impact

Traffic collisions impact not only the people involved in the collisions, but also their families, employers and society as a whole. Victims of traffic collisions suffer economic consequences in the form of medical expenses, property damage and loss of productivity, as well as physical pain, disability and emotional impacts. However, this only accounts for a portion of total costs associated with collisions. A study by the National Highway Traffic Safety Administration found that more than 75 percent of collision costs are borne by society in the form of insurance premiums, taxes and congestion-related costs such as travel delay, excess fuel consumption and environmental impacts.

The societal costs of the 3,392 collisions that occurred in Boulder in 2014 is estimated at more than $99 million. This was calculated using cost estimates by crash severity developed by the Federal Highway Administration (FHWA) and published in the Highway Safety Manual. These cost estimates incorporate both monetary losses associated with medical care, emergency services, property damage and lost productivity, as well as costs related to reduction in quality of life.

……

pdf file name: 2016 CDOT Safety Mitigation

Document Type: Annual Report

Study: FASTER Safety Mitigation 2016 Annual Report, June, 2017

Overview:

FASTER Safety is subdivided into Asset Management use of FASTER Safety Revenue (FSAM) and FASTER Safety Mitigation (FSM). The FSM program is focused on mitigating documented safety hazards and preventing future crashes with two specific goals:

- Reduce total highway crashes
- Reduce severity of highway crashes

Major Goals:

CDOT will achieve the program goals by selecting projects using the following eight criteria:

- Reduce existing crashes;
- Reduce existing crash severity;
- Address system weaknesses;
- Enhance other highway features and/or functions;
- Provide proven safety measures for a systematic/preventative location;
- Improve pedestrian/bicycle safety;
- Leveraging funding opportunities with an existing project; and
- Encourage cooperative efforts with local agencies.

Key Takeaways / recommendations:

It is CDOT's objective to maximize crash reduction within the limitations of available budgets by making road safety improvements at locations where it does the most good or prevents the most crashes.

………

pdf file name: 2017 Hillsborough Vision Zero

Document Type: Safety Action Plan

Study: Vision Zero Hillsborough- Action Plan, December 2017

Overview:

The Vision Zero Action Plan was collaboratively developed by the MPO Policy Committee, with members representing Tampa City Council, the Hillsborough County Commission, HART Board, and others in 2016 and 2017. Resolutions passed by government agencies and business commit these organizations to incorporating the plan into their operations. The Action Plan, is one of four Action Tracks documents.

Major Goals

A Vision Zero policy establishes a goal of reducing traffic fatalities and serious injuries to zero, typically by a target date. In Hillsborough County, a Vision Zero goal resolution has been adopted by the Tampa City Council, Hillsborough County Commission, Temple Terrace City Council, Plant City Commission, and by the School Board of Hillsborough County.

………

pdf file name: 2015 DC_2013-2015 Annual DC Crash Analysis Report

Document Type: Traffic Safety Report

Study: Traffic Safety Statistics Report for the District of Columbia (2013-2015), December, 2016

Overview:

This report is a compilation crash statistics and analyses for roadways in the District of Columbia during the period 2013 through 2015. The data covers all roadway classifications.

Major Goals:

Provides a resource for identifying safety trends, development of countermeasures, and evaluating the results of highway safety programs, projects, and policies.

Relation to the CLV Crash Mitigation Study (CLVCMS) / Study Findings:

This report provides a summary of findings and provides a brief summary of traffic crashes; general crash statistics including impaired driver involvement, special vehicle (e.g. truck, bus, and motorcycle), and pedestrian involvement. The report also provides the list of high-hazardous crash locations and patterns at intersections and corridors and information regarding vehicle miles traveled, fatality and injury rates per 100 million vehicle miles traveled. Additionally, the Appendix of the report provides information not he top 100 high crash locations.

……

pdf file name: 2015 Ann Arbor_Final Report

Document Type: intersection Improvement Study

Study: City of Ann Arbor Intersection Improvement Study, March 2015

Overview:

Public concern regarding the current configuration, at the intersection of Dhu Varren Road, Green Road, and Nixon Road has prompted the City of Ann Arbor to retain to undertake an analysis of potential improvement options.

Major Goals:

The primary goal of this study is to identify an intersection configuration that would improve capacity and operational efficiency by providing various concepts with resulting operational level-of-service results and cost estimates.

……

pdf file name: 2012 Oregon_Intersection_Safety_Implementation_Plan

Document Type: Transportation Safety Action Plan

Study: Oregon Intersection Safety Implementation Plan, June 2012

Overview:

The Oregon DOT pursued identifying and implementing strategies and countermeasures in the intersection areas that will continue the reduction of intersection fatalities within the state.

Major Goals:

Oregon’s Transportation Safety Action Plan (TSAP) includes an overall goal of reducing fatality rate to less than 9.25 per 100,000 population in 2020. The purpose of this plan is to provide the specifics on countermeasure implementation actions, key steps, schedules, and investments needed to achieve that goal.

Relation to the CLV Crash Mitigation Study (CLVCMS) / Study Findings:

Provides details regarding countermeasures, actions, deployment characteristics, costs, impacts, and key steps that have to be taken to significantly improve intersection safety.

Key Takeaways / recommendations:

The traditional approach of relying primarily on pursuing major improvements at high-crash intersections must be complemented with a) a expansion of the systematic approach that involves deploying large numbers of relatively low-cost, cost-effective countermeasures at many targeted high-crash intersections and b) a comprehensive approach that coordinates an engineering, education, and enforcement (3E) initiative on corridors with high numbers of severe intersection crashes.

APPENDIX B:

Crash Data |

Intersection Tables

APPENDIX B

Table B1 - Intersection Crash Data: Vehicle 1 Action Summary

Vehicle 1 Action \ ID. Intersection	1. Durango Dr at Charleston Blvd	2. Eastern Ave at Stewart Ave	3. Fort Apache Rd at Sahara Ave	4. Martin L King Blvd at Bonanza Rd	5. Lake Mead Blvd at Rainbow Blvd	6. Charleston Blvd at Rainbow Blvd	7. Valley View Blvd at Sahara Ave	8. St Louis Ave at Eastern Ave	9. Cheyenne Ave at Rainbow Blvd	10. Decatur Blvd at Washington Ave	Total
BACKING UP	1	1	2	1	3	0	2	0	0	2	12
CHANGING LANES	11	8	8	20	11	10	5	3	12	7	95
GOING STRAIGHT	55	106	89	73	66	78	83	17	54	49	670
MAKING U-TURN	8	2	0	0	0	1	2	0	0	0	13
NOT REPORTED	10	10	10	10	13	7	8	3	15	13	99
OTHER TURNING MOVEMENT	0	1	0	0	0	0	0	0	0	0	1
PASSING OTHER VEHICLE	0	0	0	1	0	1	0	0	0	2	4
RACING	0	1	0	0	0	0	0	0	0	0	1
STOPPED	0	3	1	1	1	0	1	0	0	1	8
TRAVELING WRONG WAY	0	0	0	0	0	0	1	0	0	0	1
TURNING LEFT	98*	33	5	4	7	11	9	9	7	14	197
TURNING RIGHT	8	8	7	8	13	12	5	2	5	6	74
UNKNOWN	2	3	2	2	4	4	1	1	4	0	23
(blank): not recorded	0	1	0	0	0	2	1	0	0	1	5
Grand Total	193	177	124	120	118	126	118	35	97	95	1,203

Notes:
*__*__ accounts for __54.9%__ (50.7 %: Turning Left + 4.01 %: Making U-Turn) of V1 Action crashes at this intersection*

Sources:
Crash Data: NDOT 5-year 2014 to 2018 Database

Table B2 - Intersection Crash Data: Vehicle 1 & 2 Driver Factors Involving Drinking

V1 & V2 Driver Factors\ ID. Intersection	1. Durango Dr at Charleston Blvd	2. Eastern Ave at Stewart Ave	3. Fort Apache Rd at Sahara Ave	4. Martin L King Blvd at Bonanza Rd	5. Lake Mead Blvd at Rainbow Blvd	6. Charleston Blvd at Rainbow Blvd	7. Valley View Blvd at Sahara Ave	8. St Louis Ave at Eastern Ave	9. Cheyenne Ave at Rainbow Blvd	10. Decatur Blvd at Washington Ave	Total
HAD BEEN DRINKING	7	8	8	7	5	6	4	3	2	3	53
HAD BEEN DRINKING (V2 Driver Factors)	0	0	0	1	1	0	0	0	1	0	3
HAD BEEN DRINKING: DRUG INVOLVEMENT	2	0	0	0	0	0	3	0	0	0	5
HAD BEEN DRINKING: OTHER IMPROPER DRIVING	0	0	1	0	0	1	0	0	0	0	2
Grand Total	9	8	9	8	6	7	7	3	3	3	63
% of All Crashes	5%	5%	7%	7%	5%	6%	6%	9%	3%	3%	100%

Notes:

Sources:
Crash Data: NDOT 5-year 2014 to 2018 Database

Table B3 - Intersection Crash Data: Crash Type Summary

Crash Type \ ID. Intersection	1. Durango Dr at Charleston Blvd	2. Eastern Ave at Stewart Ave	3. Fort Apache Rd at Sahara Ave	4. Martin L King Blvd at Bonanza Rd	5. Lake Mead Blvd at Rainbow Blvd	6. Charleston Blvd at Rainbow Blvd	7. Valley View Blvd at Sahara Ave	8. St Louis Ave at Eastern Ave	9. Cheyenne Ave at Rainbow Blvd	10. Decatur Blvd at Washington Ave	Total
ANGLE	131	98	54	26	47	43	30	12	33	39	513
BACKING	1	1	2	1	2	0	1	0	1	2	11
HEAD-ON	1	0	1	0	0	0	3	0	0	1	6
NON-COLLISION	9	9	7	11	12	17	11	10	10	14	110
REAR-END	42	48	57	59	45	58	62	11	33	30	445
REAR-TO-REAR	0	0	0	0	1	0	1	0	0	0	2
SIDESWIPE, MEETING	2	9	1	2	2	1	0	1	2	0	20
SIDESWIPE, OVERTAKING	4	10	2	21	8	7	9	1	17	8	87
UNKNOWN	1	1	0	0	1	0	0	0	0	0	3
(blank): not recorded	2	1	0	0	0	0	1	0	1	1	6
Grand Total	193	177	124	120	118	126	118	35	97	95	1,203

Notes:

Sources:
Crash Data: NDOT 5-year 2014 to 2018 Database

Table B4 - Intersection Crash Data: Crash Injury Severity Summary

Injury Severity \ ID. Intersection	1. Durango Dr at Charleston Blvd	2. Eastern Ave at Stewart Ave	3. Fort Apache Rd at Sahara Ave	4. Martin L King Blvd at Bonanza Rd	5. Lake Mead Blvd at Rainbow Blvd	6. Charleston Blvd at Rainbow Blvd	7. Valley View Blvd at Sahara Ave	8. St Louis Ave at Eastern Ave	9. Cheyenne Ave at Rainbow Blvd	10. Decatur Blvd at Washington Ave	Total
A	6	2	2	3	1	4	4	0	2	3	27
B	32	12	11	7	8	16	13	8	4	11	122
C	69	59	42	35	41	41	36	10	31	37	401
K	0	0	0	1	0	0	0	0	0	0	1
PDO	86	104	69	74	68	65	65	17	60	44	652
Grand Total	193	177	124	120	118	126	118	35	97	95	1,203

Notes:

Sources:
Crash Data: NDOT 5-year 2014 to 2018 Database

Table B5 - Intersection Crash Data: Crash Mode Summary

Crash Mode \ ID. Intersection	1. Durango Dr at Charleston Blvd	2. Eastern Ave at Stewart Ave	3. Fort Apache Rd at Sahara Ave	4. Martin L King Blvd at Bonanza Rd	5. Lake Mead Blvd at Rainbow Blvd	6. Charleston Blvd at Rainbow Blvd	7. Valley View Blvd at Sahara Ave	8. St Louis Ave at Eastern Ave	9. Cheyenne Ave at Rainbow Blvd	10. Decatur Blvd at Washington Ave	Total
BUS	1	3	1	3	2	4	2	0	0	4	20
MOTORCYLE/MOPED	5	5	2	3	3	2	5	3	2	1	31
PEDAL CYCLE	1	0	1	1	1	3	4	2	2	3	18
PEDESTRIAN	0	4	1	5	4	7	6	7	6	5	45
VEHICLE	186	165	119	108	108	110	101	23	87	82	1,089
Grand Total	193	177	124	120	118	126	118	35	97	95	1,203

Notes:

Sources:
Crash Data: NDOT 5-year 2014 to 2018 Database

APPENDIX C-1:

RTC Regional Project Coordination Committee | RTC Regional Bicycle & Pedestrian Plan | City of Las Vegas Capital Improvement Projects

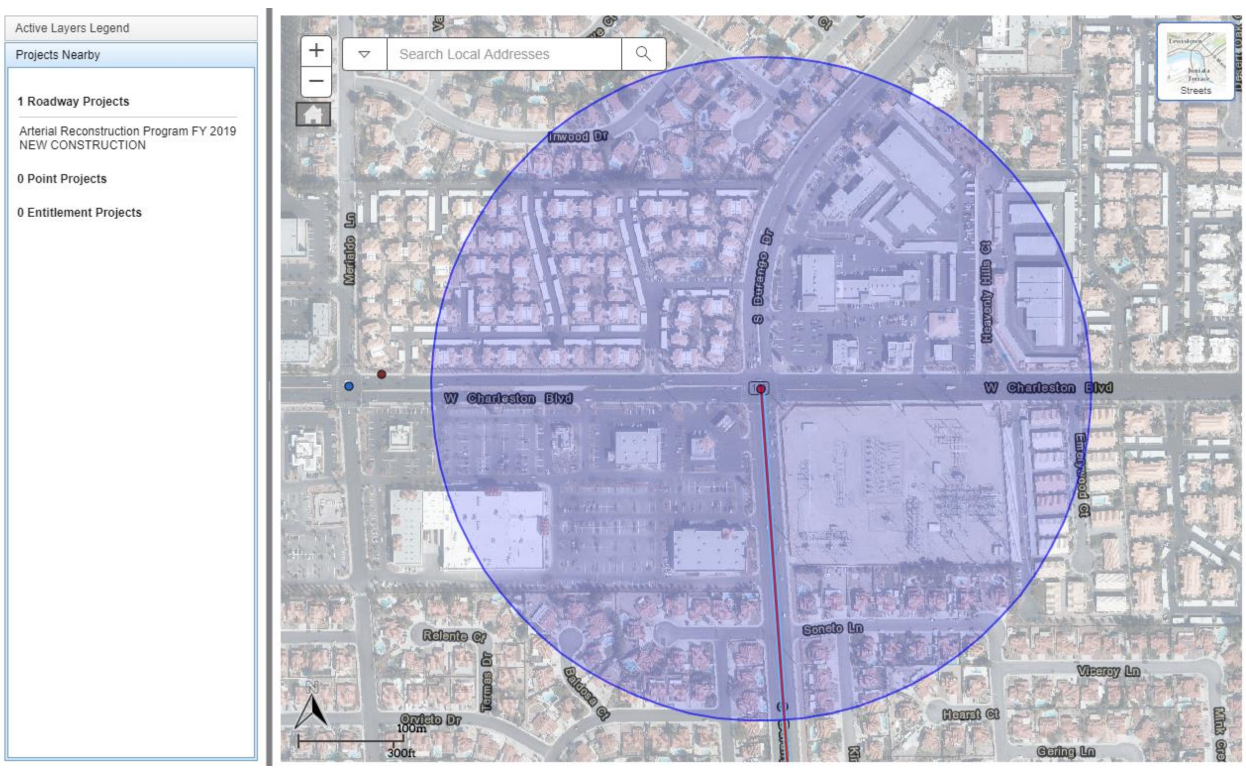
1. S DURANGO DR at CHARLESTON BLVD

RTC Regional Projects

Construction Projects

Project Details: Intersection improvements at Charleston/Durango
CHARLESTON AT DURANGO INTERSECTION IMPROVEMENTS
Project Status: CONSTRUCTION
RTC Project Number: 009P-MVFT
Project Type: Traffic Signal/ITS Improvement
Const. Start: Tue, 31 Mar 2020
Est. Const. End: Q2 - 2020
Owner: Las Vegas
Entity Project Number: CL20140115
Participant: NDOT

Project Details: PAVEMENT OVERLAY - DURANGO, SAHARA TO CHARLESTON
Arterial Reconstruction Program FY 2019
Project Status: NEW CONSTRUCTION
RTC Project Number: 135AB3-MVFT
Project Type: Roadway Improvements
Const. Start: Wed, 25 Mar 2020
Est. Const. End: Q2 - 2020
Owner: Las Vegas



City of Las Vegas Capital Improvement Projects

Intersection

Project Details:
NAME Charleston @ Durango/Rancho Intersection Improvements (AKA Traffic Package 6B)
STATUS Construction
PHASE
DESIGNSTAR
DESIGNENDD
STARTDATE 7/1/2006
ENDDATE 6/30/2021
CATEGORY Civil
PLAN_NO 107v4797-B
TOTALESTIM 3304000
FUNDING NDOT, RTC
FUNDEDAMT 3304000
DESCRIPTIO Modify intersections to provide dual left turn lanes, exclusive right turn lanes, and other geometric improvements to improve traffic safety. Project ID# 25814
Program 405000 - TRAFFIC IMPROVEMENTS
Department Public Works

Roadway

Project Details:
NAME Pavement Overlay - Durango, Sahara to Charleston
STYLEURL Road Construction
STATUS Design
PHASE DESIGN
DESIGNSTAR None
DESIGNENDD
STARTDATE 6/30/2020
ENDDATE 12/31/2020
CATEGORY ROADWAY
PLAN_NO None
TOTALESTIM 0
FUNDING Primary Funding: Undefined
FUNDEDAMT 0
DESCRIPTIO PAVEMENT OVERLAY - DURANGO, SAHARA TO CHARLESTON
AGENCY Las Vegas

Regional Bicycle and Pedestrian Plan - Recommended Facilities

Project Details:
NAME DURANGO DR
FROM_ST WESTCLIFF
TO_ST CACTUS AVE
TYPE Bike lane
JURISDICTI LAS VEGAS
MILES 3.086917
NOTES Narrow lanes to make bike lanes, possible widening in some spots; utility projects from Vegas to Edna and Sahara to Warm Springs ending Dec 2016.

2. **EASTERN AVE at STEWART AVE**

RTC Regional Projects

Design Projects

Project Details: 12 Bus turnouts along Eastern and Nellis between Owens Avenue and Charleston Boulevard.
Eastern and Nellis Bus Turnouts
Project Status: DESIGN
RTC Project Number: 146Q-MVFT
Project Type: Roadway Improvements
Design Start: Tue, 05 Jun 2012
Design End:
Owner: Las Vegas
Entity Project Number: CL20100195
Participant: NDOT

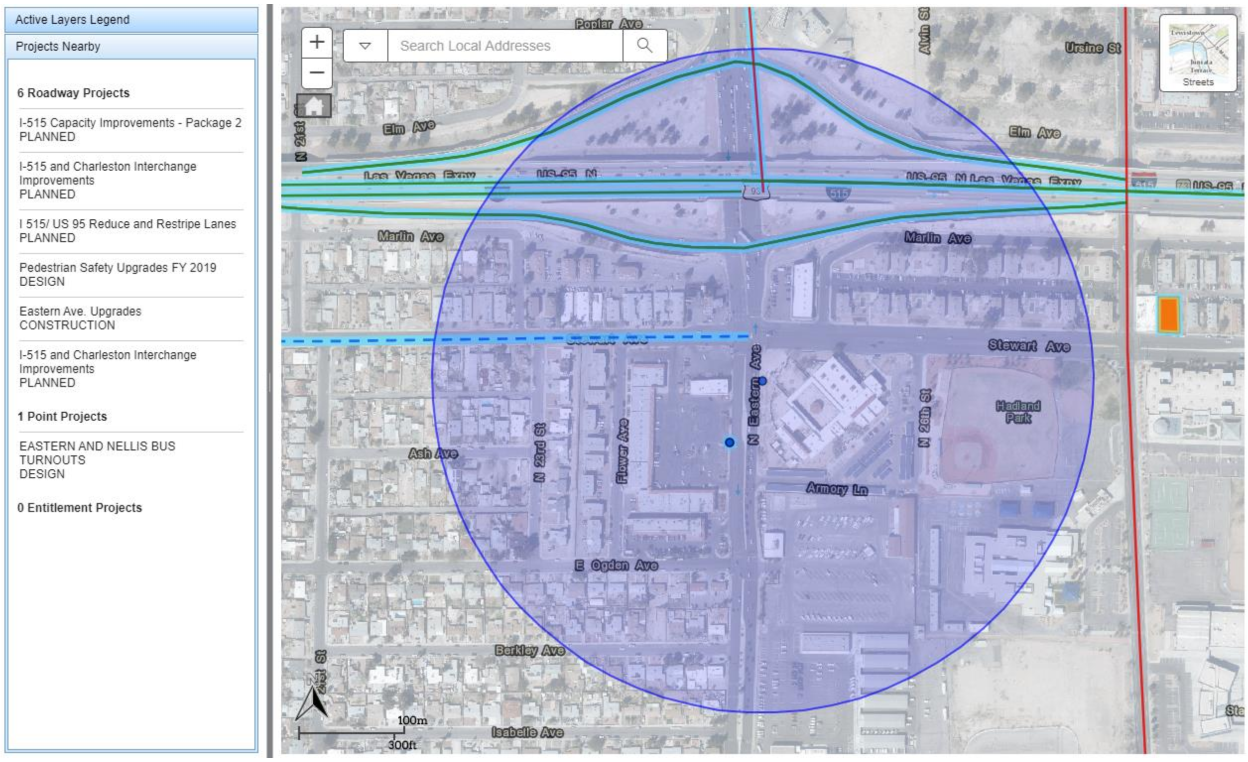
Project Details: Pedestrian Safety Upgrades FY 2019
Pedestrian Safety Upgrades FY 2019
Project Status: DESIGN
RTC Project Number: 178N-MVFT
Project Type: Bicycle/Pedestrian Safety Improvements
Design Start: Thu, 10 Jan 2019
Design End:
Owner: Las Vegas

Planned Projects

I-515 and Charleston Interchange Improvements
Project Status: PLANNED
Project Type: Roadway Improvements
Owner: NDOT
Entity Project Number: CL20130030

Construction Projects

Project Details: Planned improvements call for sidewalks, better lighting, and pedestrian crosswalks as well as bicycle lanes, raised medians, and better transit access. Other improvements entail midblock crossings
Eastern Ave. Upgrades
Project Status: CONSTRUCTION
Project Type: Pedestrian Safety Improvements
Const. Start: Mon, 24 Jun 2019
Est. Const. End: Q1 - 2020
Owner: NDOT



City of Las Vegas Capital Improvement Projects

None

Regional Bicycle and Pedestrian Plan - Recommended Facilities

Project Details:

NAME STEWART

FROM_ST BRUCE - EASTERN

TO_ST EASTERN NELLIS

TYPE Separated bike lane

JURISDICTI LAS VEGAS

MILES 3.002167 + 0.521587

NOTES Original Type: Enhanced bike corridor; remove parking only

3. **FORT APACHE RD at SAHARA AVE**

RTC Regional Projects

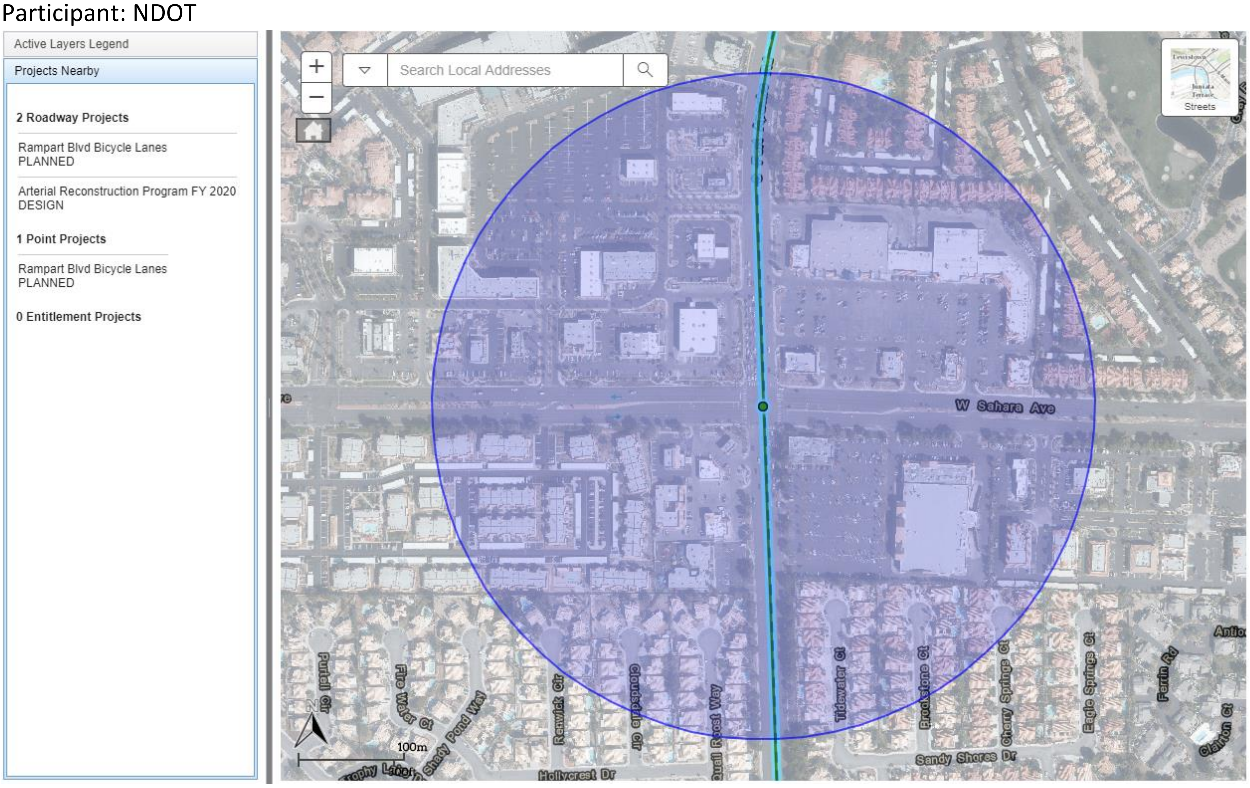
Design Projects

Project Details: Fort Apache Road, Desert Inn Road to Charleston Boulevard
Arterial Reconstruction Program FY 2020
Project Status: DESIGN
RTC Project Number: 135AE-MVFT
Project Type: Roadway Improvements
Design Start: Thu, 10 Oct 2019
Design End:
Owner: Las Vegas

Planned Projects

Rampart Blvd Bicycle Lanes
Project Status: PLANNED
Project Type: Bicycle/Pedestrian Safety Improvements
Owner: Las Vegas
Entity Project Number: CL20140117
Participant: NDOT

City-Wide Intersection Improvements
Project Status: PLANNED
Project Type: Roadway Improvements
Owner: Las Vegas
Entity Project Number: CL20140115
Participant: NDOT



City of Las Vegas Capital Improvement Projects

None

Regional Bicycle and Pedestrian Plan - Recommended Facilities

Project Details:

NAME	RAMPART
FROM_ST	CANYON RUN
TO_ST	DESERT INN
TYPE	Bike lane
JURISDICTI	LAS VEGAS
MILES	3.220456
NOTES	Bike lane retrofit

4. MARTIN L KING BLVD at BONANZA RD

RTC Regional Projects

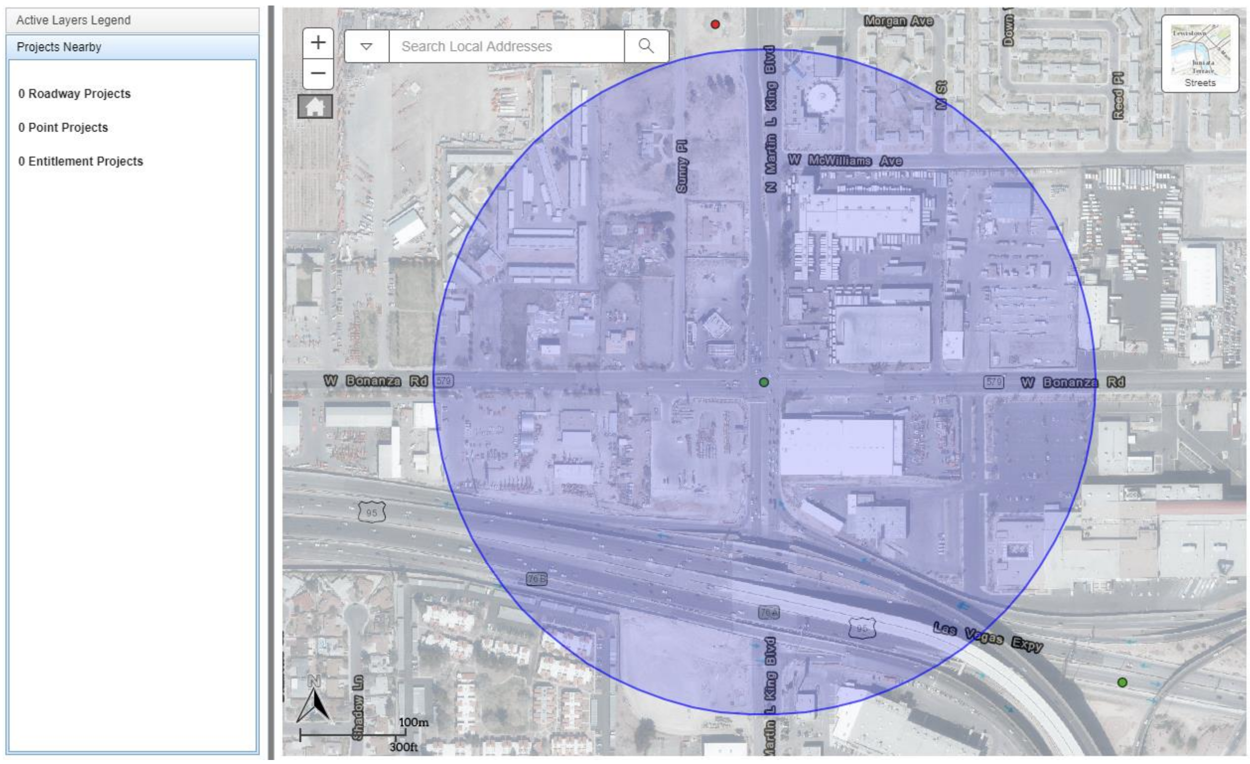
Planned Projects

Bonanza and Mlk

Project Status: PLANNED

Project Type: Bicycle/Pedestrian Safety Improvements

Owner: Las Vegas



City of Las Vegas Capital Improvement Projects

Roadway

Project Details:

NAME MARTIN L KING BOULEVARD WIDENING

STYLEURL Unknown

STATUS Completed

PHASE COMPLETED

STARTDATE 3/3/2008

ENDDATE 7/30/2010

CATEGORY None

PLAN_NO 107v4655

TOTALESTIM 39026946

FUNDING Primary Funding: RTC

FUNDEDAMT 45806992

LOCATION MARTIN LUTHER KING BOULEVARD BETWEEN SYMPHONY PARK DRIVE AND CAREY AVENUE

DESCRIPTIO The roadway design shall include new construction and upgrade of existing asphalt for 6 travel lanes. Improvements will also include curb, gutter, sidewalk, residential and commercial driveways, sidewalk ramps, storm drainage facilities, water and sa
AGENCY Las Vegas

Project Details:
NAME BONANZA ROAD - MARTIN L KING TO D STREET
STYLEURL Road Construction
STATUS Cancelled
PHASE HOLD
STARTDATE None
ENDDATE None
CATEGORY ROADWAY
PLAN_NO None
TOTALESTIM 0
FUNDING Primary Funding: Undefined
FUNDEDAMT 0
LOCATION BONANZA ROAD FROM MARTIN L KING TO D STREET
DESCRIPTIO Streetscape and bike lane retrofit on Bonanza Road from Martin L King to D Street
AGENCY Las Vegas

Regional Bicycle and Pedestrian Plan - Recommended Facilities
Project Details:

5. LAKE MEAD BLVD at RAINBOW BLVD

RTC Regional Projects

No Listed Projects

City of Las Vegas Capital Improvement Projects

None

Regional Bicycle and Pedestrian Plan Recommended Facilities

Project Details:

NAME RAINBOW BLVD

FROM_ST LONE MOUNTAIN RD

TO_ST WESTCLIFF DR

TYPE Bike lane

JURISDICTI LAS VEGAS

MILES 5.157287

NOTES 10.5' lanes and 7' parking (where present) will create enough space for 5-6' bike lanes.

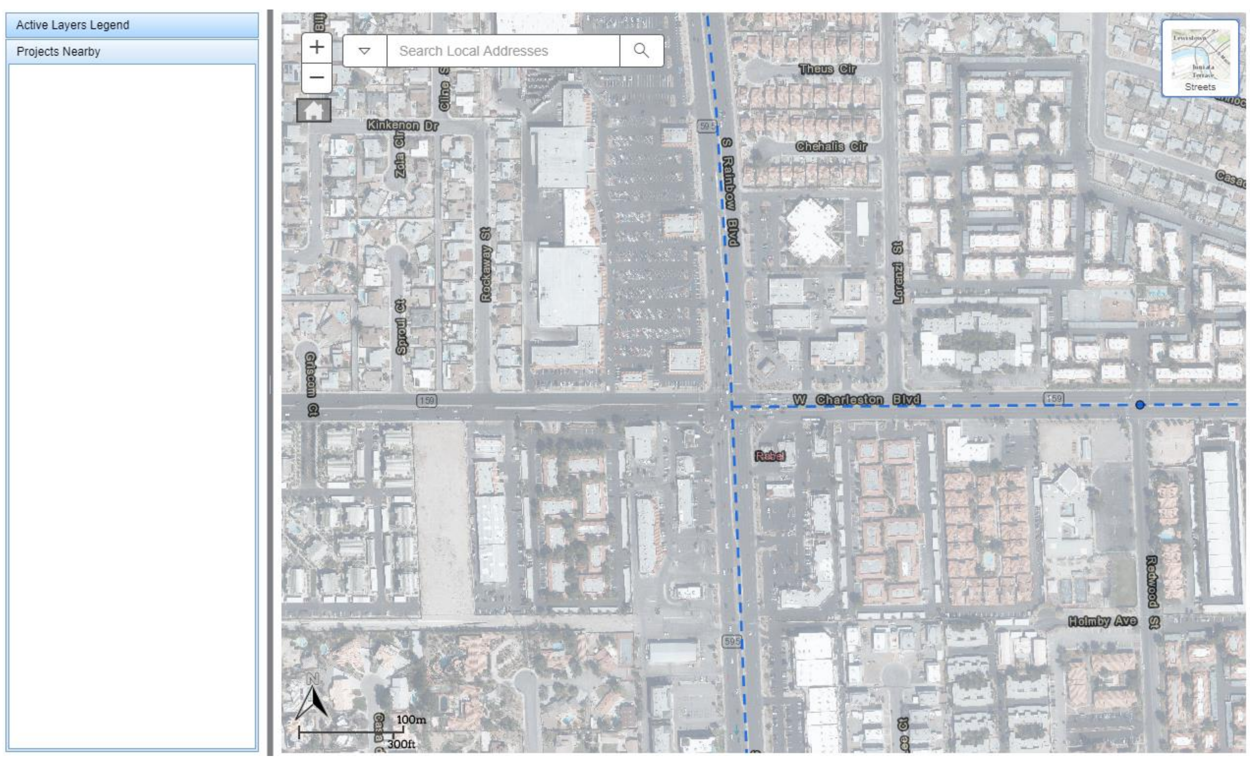
6. **CHARLESTON BLVD at RAINBOW BLVD**

RTC Regional Projects

Design Projects

Project Details: Pavement overlay – Charleston Boulevard from Rainbow to Jones
Charleston Boulevard Pavement Overlay Rainbow to Jones
Project Status: DESIGN
Project Type: Roadway Improvements
Design Start: Tue, 01 Jan 2019
Design End: Q4 - 2019
Owner: Las Vegas

Project Details: Transportation corridor improvements on Rainbow Boulevard from Westcliff Drive to Sahara Avenue. The improvements include widening sidewalks, landscaping, dedicated bus/bike lane and median improvements
Rainbow Boulevard Improvements - Westcliff to Sahara
Project Status: DESIGN
RTC Project Number: 010J-Q10
Project Type: Roadway Improvements
Design Start: Thu, 06 Jun 2019
Design End:
Owner: Las Vegas
Entity Project Number: CL20170033
Participant: NDOT



City of Las Vegas Capital Improvement Projects

RTC Regional Projects

Roadway

Project Details:

NAME ITS COMMUNICATIONS INFRASTRUCTURE PH 1A

STATUS Completed

PHASE COMPLETED

STARTDATE 9/13/2010

ENDDATE 6/22/2011

PLAN_NO 676-07-01

TOTALESTIM 2379650

FUNDING Primary Funding: RTC

FUNDEDAMT 3975003

LOCATION "CHARLESTON BOULEVARD BETWEEN I215 & DECATUR BOULEVARD;
RAINBOW BOULEVARD BETWEEN SAHARA AVENUE & CHARLESTON BOULEVARD"

DESCRIPTIO Design and construction of Intelligent Transportation System (ITS) improvements for new and upgrade of existing traffic signal interconnect communications infrastructure on Charleston Boulevard from Desert Foothills to Montclair, on Rainbow Boulevard

AGENCY Las Vegas

Regional Bicycle and Pedestrian Plan Recommended Facilities

Project Details:

NAME RAINBOW BLVD

FROM_ST WESTCLIFF DR

TO_ST SAHARA AVE

TYPE Separated bike lane

JURISDICTI LAS VEGAS

MILES 2.051062

NOTES Original Type: BIKE LANE; wide shoulder

7. S VALLEY VIEW BLVD at SAHARA AVE

RTC Regional Projects

No Listed Projects

****Entitlement***

Project Details: S Valley View Blvd & El Conlon Ave
APN: 16208199007
Tentative Map Info: L17-00971
Jurisdiction: Las Vegas

City of Las Vegas Capital Improvement Projects

None

Regional Bicycle and Pedestrian Plan Recommended Facilities

None

8. **ST LOUIS AVE at EASTERN AVE**

RTC Regional Projects

Design Projects

Project Details: 12 Bus turnouts along Eastern and Nellis between Owens Avenue and Charleston Boulevard.

Eastern and Nellis Bus Turnouts

Project Status: DESIGN

RTC Project Number: 146Q-MVFT

Project Type: Roadway Improvements

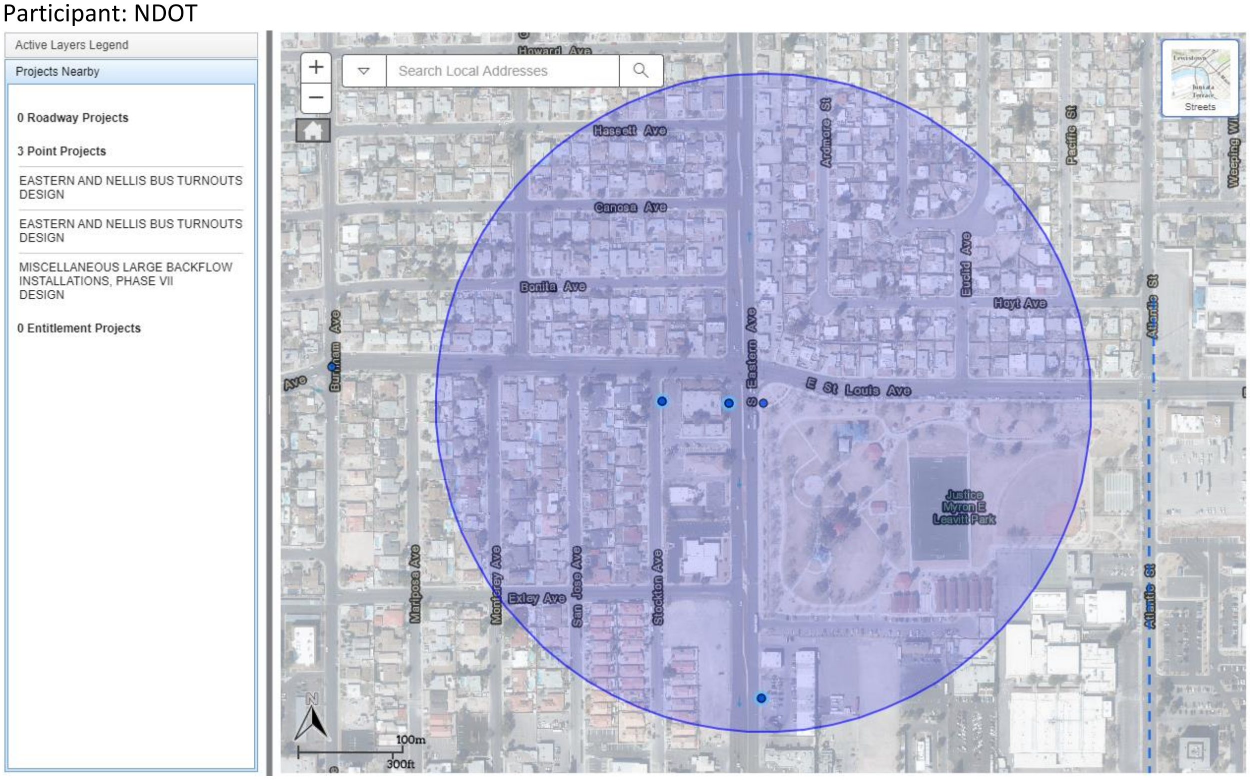
Design Start: Tue, 05 Jun 2012

Design End:

Owner: Las Vegas

Entity Project Number: CL20100195

Participant: NDOT



City of Las Vegas Capital Improvement Projects

None

Regional Bicycle and Pedestrian Plan Recommended Facilities

Project Details:

NAME WYOMING - ST LOUIS

FROM_ST OAKEY BLVD

TO_ST MARYLAND PKWY

TYPE Buffered bike lane

JURISDICTI LAS VEGAS

MILES 2.630129

NOTES Original Type: Enhanced bike corridor; existing shoulder/parking

9. CHEYENNE AVE at RAINBOW BLVD

RTC Regional Projects

Design Projects

Project Details: Design for dedicated right turn lane improvements at six intersections
Right Turn Intersection Improvements
Project Status: DESIGN
RTC Project Number: 051R-MVFT
Project Type: Roadway Improvements
Design Start: Wed, 05 Oct 2016
Design End:
Owner: Las Vegas
Entity Project Number: CL20130040
Participant: NDOT

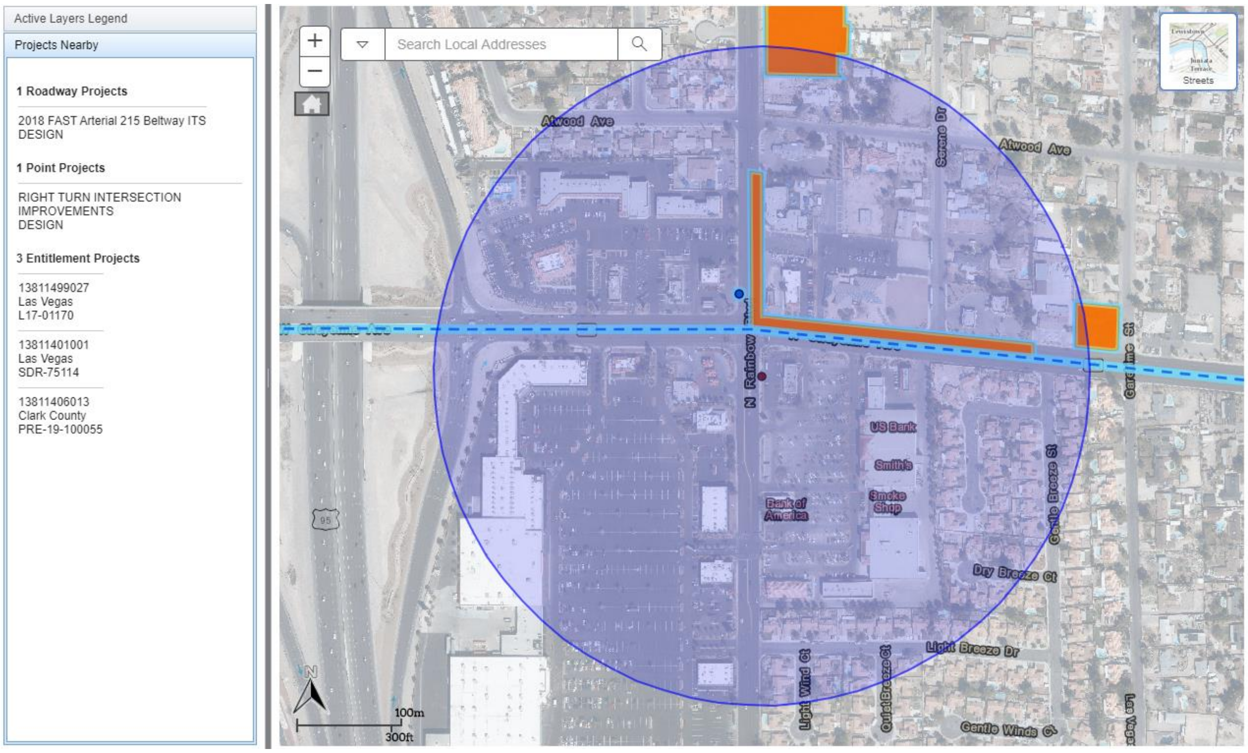
Project Details: 2018 FAST Arterial & 215 Beltway ITS
2018 FAST Arterial 215 Beltway ITS
Project Status: DESIGN
RTC Project Number: 144V-FTI2
Project Type: ITS/system Efficiency
Design Start: Sun, 01 Jul 2018
Design End: Q2 - 2019
Owner: RTC FAST

Soon to be Advertised Projects

Project Details: Design for dedicated right turn lane improvements at six intersections
Right Turn Intersection Improvements
Project Status: SOON TO ADVERTISE
RTC Project Number: 051R-MVFT
Project Type: Roadway Improvements
Design End:
Advertise Date:
Owner: Las Vegas
Entity Project Number: CL20130040
Participant: NDOT

****Entitlement***

Project Details: N RAINBOW BLVD & W CHEYENNE AVE
13811499027
Tentative Map Info: L17-01170
Jurisdiction: Las Vegas



City of Las Vegas Capital Improvement Projects

None

Regional Bicycle and Pedestrian Plan Recommended Facilities

Project Details:
NAME CHEYENNE
FROM_ST RONEMUS - RAINBOW
TO_ST RAINBOW - RANCHO
TYPE Sidepath
JURISDICTI LAS VEGAS
MILES 0.884521 + 1.601642
NOTES Narrower lanes and sidepath or two-way separated bike lane. Requires moving curb. Narrower lanes and sidepath or two-way separated bike lane. b. Requires NDOT coordination.

Project Details:
NAME RAINBOW BLVD
FROM_ST LONE MOUNTAIN RD
TO_ST WESTCLIFF DR
TYPE Bike lane
JURISDICTI LAS VEGAS
MILES 5.157287
NOTES 10.5' lanes and 7' parking (where present) will create enough space for 5-6' bike lanes.

10. N DECATUR BLVD at W WASHINGTON AVE

RTC Regional Projects

Construction Projects

Project Details: PIPELINE REPLACEMENT, WASHINGTON AVE./DECATUR BLVD. PIPELINE REPLACEMENT, WASHINGTON AVE./DECATUR BLVD.

Project Status: CONSTRUCTION

Project Type: Utility Improvements

Const. Start: Mon, 11 Mar 2019

Est. Const. End: Q4 - 2019

Owner: LVVWD

Entity Project Number: C1431

City of Las Vegas Capital Improvement Projects

Roadway

Project Details:

NAME MARTIN L KING BOULEVARD WIDENING

STATUS Completed

PHASE COMPLETED

STARTDATE	3/3/2008
ENDDATE	7/30/2010
CATEGORY	None
PLAN_NO	107v4655
TOTALESTIM	39026946
FUNDING	Primary Funding: RTC
FUNDEDAMT	45806992
LOCATION	MARTIN LUTHER KING BOULEVARD BETWEEN SYMPHONY PARK DRIVE AND CAREY AVENUE

DESCRIPTION The roadway design shall include new construction and upgrade of existing asphalt for 6 travel lanes. Improvements will also include curb, gutter, sidewalk, residential and commercial driveways, sidewalk ramps, storm drainage facilities, water
AGENCY Las Vegas

Project Details:
NAME BONANZA ROAD - MARTIN L KING TO D STREET
STATUS Cancelled
PHASE HOLD
STARTDATE None
ENDDATE None
CATEGORY ROADWAY
PLAN_NO None
TOTALESTIM 0
FUNDING Primary Funding: Undefined
FUNDEDAMT 0
LOCATION BONANZA ROAD FROM MARTIN L KING TO D STREET
DESCRIPTIO Streetscape and bike lane retrofit on Bonanza Road from Martin L King to D Street
AGENCY Las Vegas

Regional Bicycle and Pedestrian Plan Recommended Facilities
Project Details:
NAME WASHINGTON AV
FROM_ST MICHAEL - DECATUR
TO_ST DECATUR - VALLET VIEW
TYPE Separated bike lane
JURISDICTI LAS VEGAS
MILES 0.503108 + 4009.235379
NOTES Original Type: SBL; replace existing parking - may require lane narrowing in some segments; long term as bike lane recently added

Project Details:
NAME DECATUR
FROM_ST CHURCHILL
TO_ST BONANZA
TYPE Separated bike lane
JURISDICTI LAS VEGAS
MILES 1.103085
NOTES Original Type: BIKE LANE; use shoulder, parking, and existing BL width. Long term as road way recently overlaid.

APPENDIX C-2:

Durango Drive and Charleston Boulevard Construction Plans

DEPARTMENT OF PUBLIC WORKS

Mayor:
CAROLYN G. GOODMAN

City Council:
LOIS TARKANIAN (Mayor Pro-Tem)
STAVROS S. ANTHONY
BOB COFFIN
STEVEN G. SEROKA
MICHELE FIORE
CEDRIC CREAR

City Manager:
SCOTT D. ADAMS

Director of Public Works:
MIKE JANSSEN, P.E., P.T.O.E.

City Engineer:
ALLEN E. PAVELKA, P.E.

CITY OF LAS VEGAS
NEVADA

Reviewed By:

CLV CITY ENGINEER — DATE

Michael Sturdivant — 9.13.18
CLV PROJECT MANAGER — DATE

CLV CITY TRAFFIC ENGINEER — DATE

CLV CONSTRUCTION MANAGER — DATE

REGIONAL TRANSPORTATION COMMISSION OF SOUTHERN NEVADA — DATE

9/13/18
SOUTHWEST GAS CORPORATION — DATE

Diane M. — 9.13-18
CENTRAL TELEPHONE COMPANY d/b/a CENTURYLINK — DATE

THE AFFIXED CENTURYLINK NEVADA APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUTES AND/OR PUBLIC UTILITY COMMISSION STANDARD REGULATIONS.

COX COMMUNICATIONS LAS VEGAS, INC. — DATE

9.18.18
NV ENERGY – DISTRIBUTION — DATE

NV ENERGY ACKNOWLEDGES THAT WE HAVE RECEIVED YOUR PLANS AND WILL PROVIDE SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NV ENERGY RESERVES THE RIGHT TO ADDRESS ANY EXISTING OR FUTURE CONFLICTS ONCE THE FINAL DESIGN IS COMPLETED. THE NEW SERVICE AND THE RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA PUBLIC UTILITY COMMISSION'S RULES AND REGULATIONS.

Lisa Haney — 9-13-18
NV ENERGY - TRANSMISSION — DATE

APPROVED FOR CONSTRUCTION
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES
PROJECT NO. 125396 FIRST APPROVED DATE: 9/25/18
SHEETS: ~~G-2~~, R-1, R-2, AND R-3, G-1, G-3

THE SIGNATURE ABOVE ACKNOWLEDGES THAT THE UTILITY COMPANY REPRESENTATIVE HAS REVIEWED THE PLANS, AND THAT TO THE BEST OF HIS OR HER KNOWLEDGE THE UTILITY LINES ARE SHOWN IN THE CORRECT LOCATIONS AND ARE THE CORRECT SIZES. WHILE SUCH DATA HAS BEEN COLLECTED WITH REASONABLE CARE, THERE IS NO EXPRESSED OR IMPLIED GUARANTEE THAT THE LOCATIONS ARE EXACT. THE CONTRACTOR SHALL BEAR THE RESPONSIBILITY OF OBTAINING THE ACTUAL FIELD LOCATIONS.

THE SIGNATURE ABOVE FURTHER ACKNOWLEDGES THAT THE UTILITY COMPANY DOES NOT ANTICIPATE CONSTRUCTION OR MAINTENANCE IN THE PROJECT AREA FOR FIVE (5) YEARS IN CONFORMANCE WITH THE CLV NO-CUT POLICY.

TRAFFIC PACKAGE 6B
(CHARLESTON BOULEVARD/DURANGO DRIVE)

BID NO. 19.25814-DC
NDOT PROJ. NO. S1-0159(011)

Funded By:
CITY OF LAS VEGAS
FEDERAL HAZARD ELIMINATION FUNDS
REGIONAL TRANSPORTATION COMMISSION
OF SOUTHERN NEVADA

F:\PW_TEAM\TEAM 4-JEREMY'S TEAM\1-DESIGN\TRAFFIC PACKAGE NO. 6\DRAWINGS\TP6B\TP6B FRONT PAGES.DWG
8/28/18

NO.	DATE	SHEET	REVISIONS

PREPARED BY
DEPARTMENT OF PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT

PREPARED FOR
CITY OF LAS VEGAS
H# 25814 | BID# 19.25814
DATE: 2018-04-24 | DESIGNED BY:
SUBMITTAL STAGE: FOR CONSTRUCTION | DRAWN BY: TRW | CHECKED BY: MASt

TITLE
TRAFFIC PACKAGE 6B
CHARLESTON/DURANGO

SHEET
COVER SHEET

Michael Sturdivant 6.20.20
8-28-18

SHEET
G-1
1 OF 21
DRAW'G NO.
107-V4797-b

PROJ #125396 AGR #116300 QS 138-32-SE, 163-05-SE
NDOT PROJ. NO. S1-0159(011)

CITY OF LAS VEGAS GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA", LATEST ISSUE; THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA", LATEST REVISED EDITION; THE "SUMMERLIN IMPROVEMENT STANDARDS" FOR WORK IN THE SUMMERLIN AREA; AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY; THE UNIFORM BUILDING CODE; AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS "DEVIATIONS FROM STANDARDS".
2. THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A RESEARCH OF THE AVAILABLE RECORDS. EXISTING UTILITIES AS SHOWN FROM CLV PLANS LIBRARY ARE APPROXIMATE AND FOR RECORD PURPOSES. EXISTING UTILITIES ARE LOCATED ON PLANS ONLY FOR THE CONVENIENCE OF THE CONTRACTOR. EXISTING UTILITY SERVICE LATERALS MAY NOT BE SHOWN ON THE PLANS. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, LOCATE ALL UNDERGROUND AND OVERHEAD INTERFERENCE WHICH MAY AFFECT HIS OPERATION DURING CONSTRUCTION AND SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COST AND LIABILITY IN CONNECTION THEREWITH.
3. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING UTILITY LINES, STRUCTURES AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE, AND ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORY TO THE CITY ENGINEER OR OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.
4. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS, ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.
5. TYPE V CEMENT SHALL BE USED IN ALL OFF-SITE CONCRETE WORK. CONCRETE TO BE 3000 P.S.I. MINIMUM @ 28 DAYS. MIX DESIGN TO BE APPROVED BY THE QUALITY CONTROL DIVISION, PRIOR TO THE USE ON THE PROJECT.
6. PERMITS ARE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR SHALL SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS CONSTRUCTION.
7. EXPANSION JOINTS REQUIRED, MAXIMUM EVERY 300' IN EXTRUDED-TYPE CURB.
8. AC PAVEMENT TO BE 1/2" ABOVE LIP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMPS.
9. CURB AND GUTTER WITH A GRADE OF LESS THAN FOUR-TENTHS OF ONE PERCENT SHALL BE WATER-TESTED AS SOON AS POSSIBLE AFTER CONSTRUCTION. ANY CURB AND GUTTER FOUND TO BE UNACCEPTABLE TO THE CITY SHALL BE REMOVED AND REPLACED PER USD 216.
10. SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER USD 235, CASE I. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY PROJECT REPRESENTATIVE.
11. CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF TRANSITIONS TO BE AS SHOWN ON PLANS, OR AS DESIGNATED IN THE FIELD BY CITY PROJECT REPRESENTATIVE.
12. EXACT LOCATION OF ALL SAWCUT LINES MAY BE DETERMINED IN THE FIELD BY A CITY PROJECT REPRESENTATIVE IF LOCATION ON PLANS IS NOT CLEARLY SHOWN, OR EXISTING PAVEMENT CONDITION REQUIRES RELOCATIONS.
13. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED, AND SHALL BE DONE ONLY BY A NEVADA PROFESSIONAL LAND SURVEYOR IN ACCORDANCE WITH THE UNIFORM STANDARD DRAWINGS - CLARK COUNTY AREA. A RECORD-OF-SURVEY FOR REPLACEMENT OF PERMANENT SURVEY MONUMENTS SHALL BE SUBMITTED TO THE CITY ENGINEER FOR APPROVAL PRIOR TO RECORDING. THE RECORD-OF-SURVEY SHALL BE PREPARED IN ACCORDANCE WITH NEVADA REVISED STATUTES 625.350.
14. UTILITY COMPANY METER BOXES, MANHOLE LIDS, VALVE COVERS, ETC., SHALL BE LOCATED OUT OF DRIVEWAYS, DRIVEWAY APRONS, FLOWLINES, AND CROSS GUTTERS UNLESS WRITTEN APPROVAL IS GRANTED BY THE AFFECTED UTILITY COMPANY AND THE CITY ENGINEER.
15. ALL WALLS, NEW OR EXISTING, ARE ONLY SHOWN ON CIVIL PLANS FOR THE PURPOSE OF REVIEWING GRADING RELATIONSHIPS; FLOOD CONTROL AND SIGHT DISTANCE AT INTERSECTIONS. NEW WALLS REQUIRE A SEPARATE PERMIT AND INSPECTION BY THE CLV BUILDING DEPARTMENT.
16. ASPHALT MIX DESIGN MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO THE PLACEMENT OF ASPHALT WITHIN CITY RIGHTS OF WAY.
17. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, SEWER CLEANOUTS, ETC. TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.
18. MATERIALS, HANDLING AND PLACEMENT OF PORTLAND CEMENT CONCRETE SHALL BE IN ACCORDANCE WITH APPLICABLE SECTIONS OF NDOT AND CLARK COUNTY AREA SPECIFICATIONS (AS APPLICABLE) AND THE PLANS AND DETAILS SHOWN HEREON.
19. WHEN INSTALLING UNDERGROUND FACILITIES THAT REQUIRE UNDERGROUND LOCATING DEVICES SUCH AS MARKER BALLS, LOCATING RIBBON, ETC, THE CONTRACTOR SHALL PROVIDE WRITTEN DOCUMENTATION TO THE ENGINEER CERTIFYING THAT ALL DEVICES HAVE BEEN PLACED AND VERIFIED TO BE IN GOOD WORKING CONDITION PRIOR TO THE CONSTRUCTION OF ANY ROAD BASE.
20. NEWLY INSTALLED AND EXISTING UTILITIES EXPOSED DURING CONSTRUCTION SHALL BE SURVEYED AND DOCUMENTED PER SECTION 622 OF THE SPECIAL PROVISIONS.
21. CCTV VIDEO INSPECTION IS REQUIRED FOR ALL SEWER AND STORM DRAINS. THE CCTV VIDEO INSPECTIONS NEED TO BE PERFORMED PER THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS LATEST ADDITION.
22. A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

REVISED JULY 23, 2015 (CPM VERSION)

CITY OF LAS VEGAS GRADING NOTES

1. IN THE EVENT THAT ANY UNFORESEEN CONDITIONS NOT COVERED BY THESE NOTES ARE ENCOUNTERED DURING GRADING OPERATIONS, THE OWNER/ENGINEER SHALL BE IMMEDIATELY NOTIFIED FOR DIRECTION.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PERFORM ALL NECESSARY CUTS AND FILLS WITHIN THE LIMITS OF THIS PROJECT AND THE RELATED OFF-SITE WORK, SO AS TO GENERATE THE DESIRED SUBGRADE, FINISH GRADES AND SLOPES SHOWN.
3. CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR ALL EXCAVATION. ADEQUATE SHORING SHALL BE DESIGNED AND PROVIDED BY THE CONTRACTOR TO PREVENT UNDERMINING OF ANY ADJACENT FEATURES OR FACILITIES AND/OR CAVING OF THE EXCAVATION.
4. THE GRADING CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE OWNER TO PROVIDE FOR THE REQUIREMENTS OF THE PROJECT STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND ASSOCIATED PERMIT.
5. ALL CUT AND FILL SLOPES SHALL BE PROTECTED UNTIL EFFECTIVE EROSION CONTROL HAS BEEN ESTABLISHED.
6. THE USE OF POTABLE WATER WITHOUT A SPECIAL PERMIT FOR BUILDING OR CONSTRUCTION PURPOSES INCLUDING CONSOLIDATION OF BACKFILL OR DUST CONTROL IS PROHIBITED. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FOR CONSTRUCTION WATER.
7. THE CONTRACTOR SHALL MAINTAIN THE STREETS, SIDEWALKS AND ALL OTHER PUBLIC RIGHT- OF-WAY IN A CLEAN, SAFE AND USABLE CONDITION. ALL SPILLS OF SOIL, ROCK OR CONSTRUCTION DEBRIS SHALL BE PROMPTLY REMOVED FROM THE PUBLICLY OWNED PROPERTY DURING CONSTRUCTION AND UPON COMPLETION OF THE PROJECT. ALL ADJACENT PROPERTY, PRIVATE OR PUBLIC SHALL BE MAINTAINED IN A CLEAN, SAFE AND USABLE CONDITION.
8. IN THE EVENT THAT ANY TEMPORARY CONSTRUCTION ITEM IS REQUIRED THAT IS NOT SHOWN ON THESE DRAWINGS, SUCH ITEM SHALL BE PROVIDED, AS DIRECTED BY THE CITY ENGINEER, AT NO EXPENSE TO THE CITY OF LAS VEGAS. TEMPORARY CONSTRUCTION INCLUDES DITCHES, BERMS, ROAD SIGNS AND BARRICADES, ETC.

REVISED APRIL 13, 2015 (CPM VERSION)

ABBREVIATIONS

@	AT	LF	LINEAL FOOT, LINEAR FEET
AB	ABANDONED	LT	LEFT
AC	ASPHALTIC CONCRETE	LVVWD	LAS VEGAS VALLEY WATER DISTRICT
ACP	ASBESTOS CEMENT PIPE	MH	MANHOLE
AEP	AUTHORIZATION TO ENTER PROPERTY	MLCP	MULTI-LAYER COMPOSITE PIPE
APPROX	APPROXIMATE	MTR	METER
AVAR	AIR VALVE ASSEMBLY	NDOT	NEVADA DEPT OF TRANSPORTATION
B/C, BC	BACK OF CURB	NTS	NOT TO SCALE
BCR	BACK OF CURB RADIUS	NVE	NV ENERGY
BM	BENCHMARK	OHP	OVERHEAD POWER LINE
BOT	BOTTOM	OHU	OVERHEAD UTILITIES
BR	BACK OF RAMP	PB	PULL BOX
C & G	CURB AND GUTTER	PC	POINT OF CURVATURE
CALC'D	CALCULATED	P.I.P.	PROTECT IN PLACE
CATV, TV	CABLE TELEVISION	PP	POWER POLE
CC	CLARK COUNTY	PRC	POINT OF REVERSE CURVE
CCPW	CLARK COUNTY PUBLIC WORKS	PT	POINT OF TANGENCY
CIPP	CURED-IN-PLACE PIPE	℘, PL	PROPERTY LINE
℄, CL	CENTERLINE	R RADIUS	RT RIGHT
CLSM	CONTROLLED LOW STRENGTH MATERIAL	R/W, R.O.W.	RIGHT OF WAY
CLV	CITY OF LAS VEGAS	SCCP	STEEL CYLINDER CONCRETE PIPE
CMP	CORRUGATED METAL PIPE	SD	STORM DRAIN
CONC	CONCRETE	SF	SQUARE FOOT
COND	CONDUCTOR	SP	SPECIAL PROVISIONS
CPM	CAPITAL PROJECT MANAGEMENT	SS	SANITARY SEWER
D, DIA	DIAMETER	STA.	STATION
DCSWCS	DESIGN & CONSTRUCTION STDS FOR WASTEWATER COLLECTION SYSTEMS	STD	STANDARD
		STL	STREET LIGHT
DG	DECOMPOSED GRANITE	SV	SPRINKLER VALVE
DIP	DUCTILE IRON PIPE	S/W	SIDEWALK
D/W	DRIVEWAY	SWG	SOUTHWEST GAS
DWG	DRAWING	SY	SQUARE YARD
ECR	END OF CURB RETURN (AT B/C)	T, TEL	TELEPHONE
ELEC, E	ELECTRIC	TC	TOP OF CURB
ELEV	ELEVATION	TCE	TEMP. CONSTRUCTION EASEMENT
EOP, EP	EDGE OF PAVEMENT	TEMP.	TEMPORARY
EX.	EXISTING	TRANS.	TRANSITION
FAST	FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (INTERCONNECT)	TRC	TOP OF RAMP CURB
		TS	TRAFFIC SIGNAL
FC	FACE OF CURB	TYP.	TYPICAL
FD	FOUND	UDACS	UNIFORM DESIGN & CONSTRUCTION STDS FOR POTABLE WATER DISTRIBUTION SYSTEMS
FG	FINISHED GRADE		
FH, HYD	FIRE HYDRANT		
FT	FOOT, FEET	USD	UNIFORM STANDARD DRAWING
G	GAS	USS	UNIFORM STD SPECIFICATIONS
GM	GAS METER	W	WATER LINE
GV	GAS VALVE	WC	WHEEL CHAIR
GW	GUY WIRE	WM	WATER METER
HP	HIGH PRESSURE	WV	WATER VALVE
INT	INTERSECTION	W/	WITH
IRR	IRRIGATION	Δ	INCLUDED DELTA ANGLE
L	LENGTH		

CITY OF LAS VEGAS STREET LIGHT NOTES

1. ALL STREET LIGHTING INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE STREET LIGHTING PLANS, THE "UNIFORM STANDARD SPECIFICATION FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA", LATEST REVISION (USS), AND THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA" (USD), LATEST REVISION.
2. NO DEVIATION OF STREET LIGHT, PULL BOX, CONDUITS (ETC.) LOCATIONS SHALL BE PERMITTED WITHOUT WRITTEN APPROVAL OF THE TRAFFIC AND CITY ENGINEER. ANY DEVIATION FROM THE PLAN LOCATION WILL REQUIRE COMPLIANCE WITH SECTION 623 OF THE USS.
3. ALL EXISTING STREET LIGHTING SHALL REMAIN OPERATIONAL DURING CONSTRUCTION IN ACCORDANCE WITH SECTION 623 G.03.01 OF THE USS.
4. ALL EMPTY CONDUIT SHALL HAVE AT LEAST ONE GREEN No. #8 AWG WIRE INSTALLED AS TRACER WIRE IN ACCORDANCE WITH SECTION 623 G.02.01 OF THE USS PRIOR TO BACKFILLING AND FINAL INSPECTION.
5. ANY STRUCTURE SUCH AS BLOCK WALLS, CHAIN LINK FENCES, RETAINING WALLS, ETC., SHALL LEAVE A MINIMUM CLEARANCE IN COMPLIANCE WITH USD NO. 320A WHEN POLE IS INSTALLED BEHIND SIDEWALK, AND SHALL AT NO TIME COMPLETELY ENCLOSE THE STREET LIGHTING POLE.
6. AS-BUILT DRAWINGS SHALL BE SUPPLIED TO THE TRAFFIC ENGINEERING DIVISION PRIOR TO ANY PRE-FINAL INSPECTION. THE AS-BUILT DRAWING NEEDS TO BE STAMPED AS-BUILT AND SIGNED BY THE PREPARER.
7. SERVICE POINTS SHALL BE COORDINATED WITH NV ENERGY, AND WHEREVER POSSIBLE, BE LOCATED NEAR THE CENTER OF THE CIRCUIT. SERVICE POINTS SHALL BE SHOWN ON THE PLANS.
8. THE CONTRACTOR SHALL FURNISH COMPLETE CONDUIT, WIRE, ETC. FROM SERVICE TO TRANSFORMERS AND CONTROL SYSTEMS IF REQUIRED ON THE PLANS OR IN THE SPECIAL PROVISIONS.
9. ALL STREET LIGHTING AND TRAFFIC SIGNAL EQUIPMENT REMOVED AND / OR DESIGNATED TO BE SALVAGED SHALL BE DELIVERED BY THE CONTRACTOR TO THE APPROPRIATE CLV SERVICE YARD WITH A MEANS TO UNLOAD. A MINIMUM 24-HOUR NOTICE OF DELIVERY IS REQUIRED. CALL 229-6331 TO SET UP DELIVERY TIME AND LOCATION. REPAIR OF ANY DAMAGE TO EQUIPMENT DURING THIS PROCESS WILL BE THE CONTRACTOR'S RESPONSIBILITY, AT NO ADDITIONAL COST TO THE CITY.

REVISED JUNE 28, 2016 (CPM VERSION)

CITY OF LAS VEGAS SEWER NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS AND THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, AS AMENDED. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE AWARE OF THE CONTENTS OF THE ABOVE SPECIFICATIONS.
2. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PERFORM CONSTRUCTION AS PER PLANS. ANY ADDITIONS, DELETIONS, OR CHANGES SHALL FIRST MEET WITH THE APPROVAL OF THE CITY ENGINEER.
3. CHISEL "S" OR "G" IN CURBS WHERE SEWER OR GAS LATERALS PASS UNDER THE CURB.
4. POLYVINYL (PVC) SEWER PIPE SHALL MEET ASTM D-3034 SDR 35 SPECIFICATIONS, INSTALLED WITH SAND BEDDING AND BACKFILL OF TYPE II AGGREGATE BASE.
5. ALL MANHOLES PAVED IN STREETS EIGHTY (80') FOOT R/W AND LARGER SHALL HAVE CONCRETE COLLARS. STREETS LESS THAN EIGHTY (80') FOOT R/W WILL REQUIRE RETROFIT IF PAVING DOES NOT CONFORM TO CITY STANDARDS AT THE MANHOLE.
6. TEE SADDLES SHALL BE USED TO CONNECT SEWER LATERALS TO EXISTING MAIN LINES UP TO TWELVE INCH (12") DIAMETER. CONNECTIONS TO FIFTEEN INCH (15") OR LARGER MAINS SHALL REQUIRE SPECIAL PROCEDURES. IN LINE "Y" 'S SHALL BE USED ON LINES TWELVE INCHES (12") OR ABOVE.
7. WATER MAINS SHALL BE PROTECTED IN ACCORDANCE WITH LVVWD STANDARDS WHENEVER A SEWER MAIN CROSSES OVER A WATER MAIN OR THE SEWER IS LESS THAN EIGHTEEN INCH (18") UNDER A WATER MAIN.
8. ALL CONTRACTORS INSTALLING SEWER MAINS THAT WILL BE UNDER THE JURISDICTION OF THE CITY OF LAS VEGAS MUST BE STATE OF NEVADA CLASS "A" CONTRACTORS.
9. THE CITY OF LAS VEGAS WILL NOT ACCEPT ANY SEWER MAINS WHICH HAVE A VERTICAL DEFLECTION OF MORE THAN ONE TENTH (0.1) OF A FOOT FROM THE APPROVED CONSTRUCTION PLANS AT ANY LOCATION. SEWER MAINS FOUND TO EXCEED THIS TOLERANCE WILL HAVE TO BE REPAIRED OR REMOVED OR REPLACED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO ACCEPTANCE BY THE CITY OF LAS VEGAS.
10. INSTALLATION OF CURVED SEWERS REQUIRES THE USE OF C-900 PVC PIPE WHICH ALLOWS FOR PIPE DEFLECTION AT THE JOINTS.

REVISED JANUARY 13, 2015

CITY OF LAS VEGAS TRAFFIC NOTES

1. ALL CONSTRUCTION SIGNING, BARRICADING, AND TRAFFIC DELINEATION SHALL CONFORM TO THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", LATEST EDITION.
2. THE STREET SIGN CONTRACTOR SHALL OBTAIN STREET NAMES AND BLOCK NUMBERING FROM THE PLANNING DEPARTMENT PRIOR TO CONSTRUCTION.
3. BEFORE ANY WORK IS STARTED IN THE RIGHT-OF-WAY, THE CONTRACTOR SHALL INSTALL ALL ADVANCE WARNING SIGNS FOR THE CONSTRUCTION ZONE. THE CONTRACTOR SHALL INSTALL TEMPORARY STOP SIGNS AT ALL NEW STREET ENCROACHMENTS INTO EXISTING CITY STREETS WHERE WARRANTED IMMEDIATELY AFTER FIRST GRADING WORK IS ACCOMPLISHED, AND SHALL MAINTAIN SAID SIGNS UNTIL PERMANENT SIGNS ARE INSTALLED.
4. WHEN A DESIGNATED "SUGGESTED ROUTE TO SCHOOL" IS ENCROACHED UPON BY A CONSTRUCTION WORK ZONE AND PUBLIC WORKS STAFF IDENTIFIES A NEED FOR STUDENTS TO BE ASSISTED IN THE SAFE CROSSING THROUGH THAT WORK ZONE, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE A QUALIFIED "CROSSING GUARD". THE GUARD SHALL BE PRESENT FOR THE FULL DURATION OF TIME THAT CHILDREN ARE LIKELY TO BE PRESENT.
5. IF THE IMPROVEMENTS NECESSITATE THE OBLITERATION, TEMPORARY OBSTRUCTION, TEMPORARY REMOVAL OR RELOCATION OF ANY EXISTING TRAFFIC PAVEMENT MARKING, SUCH PAVEMENT MARKING SHALL BE RESTORED OR REPLACED WITH LIKE MATERIALS TO THE SATISFACTION OF THE CITY TRAFFIC ENGINEER.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL PERMANENT SIGNS SHOWN ON THE PLANS. ALL NEW TRAFFIC SIGNS SHALL UTILIZE TYPE XI RETROREFLECTIVE SHEETING IN ACCORDANCE WITH CCAUSS 627 AND 716 AND SHALL HAVE AN ANTI-GRAFFITI PROTECTIVE OVERLAY FILM THAT IS A MATCHING COMPONENT TO, AND OF THE SAME MANUFACTURER AS THE RETROREFLECTIVE SHEETING TO WHICH IT IS APPLIED. STREET NAME SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CURRENT CITY STANDARDS. ALL OTHER SIGNS SHALL BE STANDARD SIZE UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGN POSTS SHALL BE INSTALLED IN ACCORDANCE WITH THE CURRENT CITY STANDARDS.
7. WHEN A PROPOSED STREET LIGHT STANDARD IS LOCATED WITHIN FIVE (5') FEET OF ANY PROPOSED SIGN SHOWN ON THE PLANS TO BE MOUNTED ON A SIGNPOST, THE SIGN SHALL BE MOUNTED ON THE STREET LIGHT STANDARD AND THE SIGNPOST SHALL BE ELIMINATED.
8. ALL PERMANENT TRAFFIC CONTROL DEVICES CALLED FOR HEREON SHALL BE IN PLACE AND IN FINAL POSITION PRIOR TO ALLOWING ANY PUBLIC TRAFFIC ONTO THE PORTIONS OF THE ROAD(S) BEING IMPROVED HERE UNDER, REGARDLESS OF THE STATUS OF COMPLETION OF PAVING OR OTHER OFF-SITE IMPROVEMENTS CALLED FOR BY THESE PLANS.
9. STREET SIGNS AND STOP SIGNS SHALL BE INSTALLED PER CITY STANDARD SPECIFICATIONS FOR PLACEMENT OF STREET NAME SIGNS.
10. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TRAFFIC CONTROL DEVICES AND FLAGGERS TO INSURE THE SAFETY OF THE PUBLIC IN OR AROUND THE WORK AREA. THE CONTRACTOR SHALL HAVE A CERTIFIED ATSSA TRAFFIC CONTROL TECHNICIAN OR IMSA WORK ZONE SAFETY SPECIALIST SET UP, MAINTAIN AND/OR REMOVE ALL TRAFFIC CONTROL DEVICES IN THE CITY OF LAS VEGAS RIGHT OF WAY.
11. WORK IN PUBLIC STREETS, ONCE BEGUN, SHALL BE EXPEDITED TO COMPLETION SO AS TO PROVIDE MINIMUM INCONVENIENCE TO ADJACENT PROPERTY OWNERS AND TO THE TRAVELING PUBLIC.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING RTC TRANSIT IF THE CONSTRUCTION INTERRUPTS OR RELOCATES A BUS STOP OR HAS AN ADVERSE EFFECT ON BUS SERVICE ON THAT STREET TO ARRANGE FOR TEMPORARY RELOCATION OF STOP.
13. GUARDS SHALL BE OBTAINED BY CONTACTING THE METROPOLITAN POLICE DEPARTMENT SPECIAL EVENTS UNIT (PHONE # 828-3442) WHO WILL PROVIDE OFFICERS PROPERLY TRAINED IN TRAFFIC CONTROL. FEES FOR THE USE OF THESE OFFICERS SHALL BE SET BY METRO AND WILL BE PAID BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR ALL ARRANGEMENTS WITH METRO.
14. ANY WORK WITHIN 300' OF A SIGNALIZED INTERSECTION WILL BE NIGHT WORK, UNLESS DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.
15. THE CONTRACTOR SHALL CONTACT THE TRAFFIC ENGINEERING DIVISION (TRANSPORTATION SECTION) THROUGH THE PROJECT'S OFFSITE INSPECTOR PRIOR TO INITIATING PAVING TO RECEIVE DIRECTION FOR ANY PERMANENT OR TEMPORARY MODIFICATIONS TO THE APPROVED DRAWINGS REGARDING FINAL PAVEMENT TRANSITIONS, MARKINGS AND SIGNING THAT ARE REQUIRED TO MATCH ADJACENT ROADWAY SEGMENTS. THE CONTRACTOR SHALL PROVIDE A DRAWING FOR APPROVAL BY THE TRAFFIC ENGINEERING DIVISION DEPICTING ANY ADJUSTMENTS TO THE FINAL PAVEMENT MARKINGS AND SIGNAGE, WHICH MAY INCLUDE OMITTING, ADDING OR MODIFYING PAVEMENT MARKINGS AND TRAFFIC CONTROL SIGNS SUCH THAT ADEQUATE TRANSITIONS AND LANE TERMINATIONS BETWEEN ADJACENT ROADWAY SEGMENTS ARE CONSTRUCTED.

REVISED JULY 13, 2013

CALL BEFORE CONSTRUCTION

BEFORE YOU DIG	USA NORTH	811 OR 800-227-2600
BEFORE YOU UNDERGROUND	F.A.S.T.	702-432-5300
	CLARK COUNTY TRAFFIC OPERATIONS	702-455-7511
	CITY OF LAS VEGAS T.E.F.O.	702-229-6611
BEFORE YOU OVERHEAD	NV ENERGY	702-227-2929

SHEET INDEX

ALIGNMENT ABBREVIATIONS

BASIS OF BEARINGS

NORTH 89°40'03" EAST BEING THE BEARING OF THE SOUTH LINE OF THE SOUTHEAST QUARTER (SE 1/4) OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 32, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA, AS SHOWN ON THAT CERTAIN MAP ON FILE IN THE CLARK COUNTY RECORDER'S OFFICE, IN BOOK 80, PAGE 82 OF PLATS.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK STATION 0LV00 32SES

RIVET AND PLATE IN TOP OF CURB AT THE NORTHEAST CORNER OF CHARLESTON BOULEVARD AND DURANGO DRIVE.

ELEVATION = 811.6065 METERS (NAVD'88 PUBLISHED)
ELEVATION = 2662.75 U.S. SURVEY FEET (NAVD'88 PUBLISHED)

LEGEND

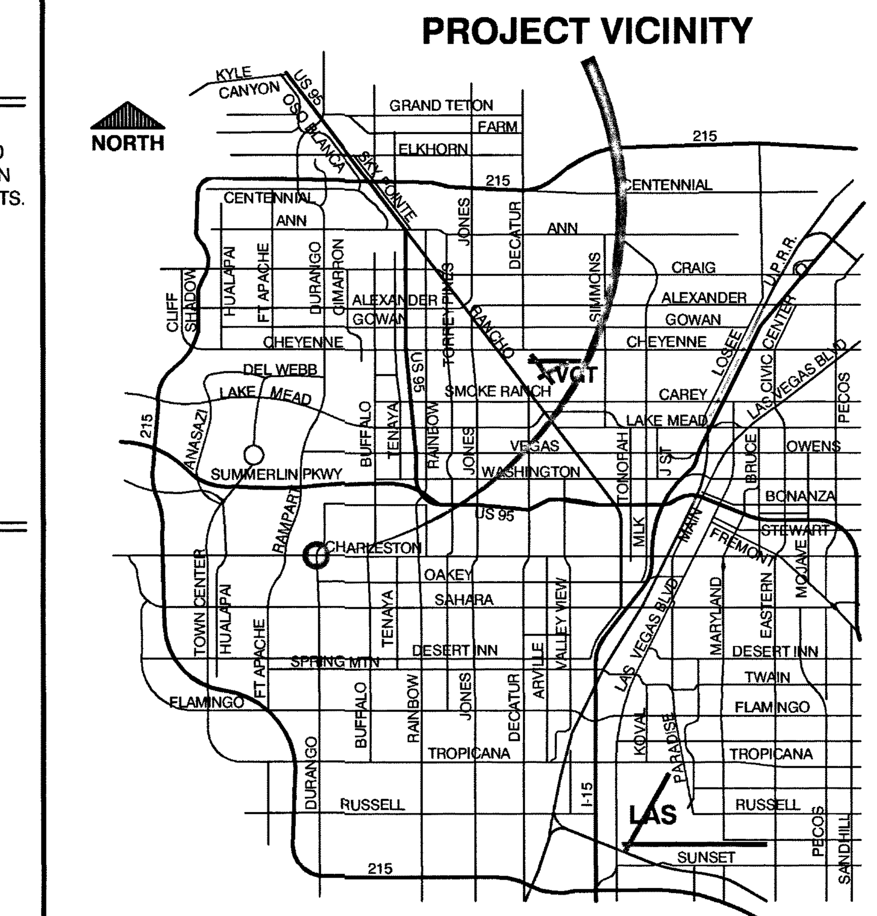
CENTERLINE	LIMITS OF DEMO/REMOVAL
EDGE OF PAVEMENT	ASPHALT
FLOWLINE	CONCRETE
BACK OF CURB	LANDSCAPING
SIDEWALK	ADA RAMP
RIGHT OF WAY LINE	EXISTING BUILDING
PROPERTY LINE	AUTHORIZATION TO ENTER PROPERTY (AEP)
PATCH / SAWCUT LINE	
GRADE BREAK	
PIPE < 18"	
PIPE < OR = 18"	
CONDUIT	
(2020) CONTOUR - MAJOR	
(2019) CONTOUR - MINOR	

ANTENNA / TOWER	SHRUB
AREA LIGHT	SIDEWALK RAMP
BENCHMARK	SIGN
BLOW OFF	STREET LIGHT
BUS BUS SHELTER	STORM DRAIN INLET
CABINET	SURVEY MONUMENT
FIRE HYDRANT	TRAFFIC PED. SIGNAL
HC PARKING SYMBOL	TRAFFIC SIGNAL POLE
IRR. CONTROLER	TREE
LOOP DETECTOR	UTILITY POLE
MANHOLE	UTILITY POLE GUY WIRE
METER (BOX)	VALVE
METER (PEDISTAL)	VAULT
PALM TREE	WHEEL STOP
PULLBOX	

VICINITY MAP

NOT TO SCALE

PROJECT VICINITY



NO.	DATE	SHEET	REVISIONS

PREPARED BY
DEPARTMENT OF PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT

PREPARED FOR
CITY OF LAS VEGAS

H# 25814
BID# 18.25814
DATE: 2018-04-24
DESIGNED BY:
DRAWN BY: TRW
CHECKED BY: MAS
SUBMITTAL STAGE: FOR CONSTRUCTION

TITLE
TRAFFIC PACKAGE 6B
CHARLESTON/DURANGO

SHEET
GENERAL NOTES, LEGEND, KEY MAP, AND INDEX

SHEET
G-2
2 OF 21
DRAWING NO.
107-V4797-b

NDOT PROJ. NO. S1-0159(011)

F:\PW_TEAM\TEAM 4-JEREMY'S TEAM\1-DESIGN\TRAFFIC PACKAGE NO. 6\DRAWINGS\TP'6B\TP6B FRONT PAGES.DWG
4/30/18

LVVWD STANDARD NOTES

LVVWD PROJ.# 125396

1. NO WORK SHALL BEGIN UNTIL THE WATER PLANS HAVE BEEN APPROVED FOR CONSTRUCTION BY THE LVVWD. FOLLOWING WATER PLAN APPROVAL, NOTICE SHALL BE GIVEN TO THE LVVWD COMMUNICATION SUPPORT CENTER (258-7171) TWO (2) WORKING DAYS PRIOR TO THE START OF CONSTRUCTION. FOR FUTURE INSPECTIONS, NOTICE MUST BE GIVEN BY 2:00 P.M. THE BUSINESS DAY PRIOR TO THE REOUESTED LVVWD INSPECTION. WHEN REOUESTING INSPECTIONS, PLEASE REFER TO THE PROJECT# IDENTIFIED ABOVE.
2. ALL WORK SHALL CONFORM TO LVVWD STANDARD PLATES, DRAWINGS, AND SPECIFICATIONS, AND TO THE 2010 EDITION OF THE UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR POTABLE WATER SYSTEMS (UDACS). THE LATEST EDITION OF UDACS SHALL SUPERSEDE ANY CONFLICTS CONTAINED IN THE APPROVED DRAWINGS AND/OR SPECIFICATIONS.
3. ALL WORK, EXCEPT AS MODIFIED BY THESE PLANS OR BY NOTE 2 ABOVE, SHALL BE DONE IN ACCORDANCE WITH THE MOST RECENT DRAFT OR EDITION OF THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFFSITE IMPROVEMENT, CLARK COUNTY AREA.
4. A SINGLE PIPE MATERIAL SHALL BE USED THROUGHOUT THE PROJECT UNLESS OTHERWISE APPROVED BY THE LVVWD.
5. ALL SERVICE LATERALS TWO (2) INCHES IN DIAMETER AND SMALLER SHALL BE TYPE K COPPER TUBING WITH LVVWD APPROVED SERVICE SADDLES.
6. ALL WATER METER BOXES SHALL BE LOCATED OUTSIDE OF DRIVEWAY AREAS.
7. ALL VALVES SHALL BE LOCATED OUTSIDE OF DRIVEWAYS, VALLEY AND CURB GUTTERS.
8. ALL WATER AND STORM DRAIN OR SANITARY SEWER CROSSINGS SHALL CONFORM TO SECTION 2.22 OF THE 2010 EDITION OF THE UDACS.
9. ALL WATER FACILITIES SHALL BE FILLED, DISINFECTED, PRESSURE TESTED, FLUSHED, FILLED AND AN ACCEPTABLE WATER SAMPLE OBTAINED, PRIOR TO CONNECTION TO THE LVVWD DISTRIBUTION SYSTEM.
10. THE CONTRACTOR MUST OBTAIN ALL METERS TWO (2) INCHES AND SMALLER FROM LVVWD CENTRAL STORES. TELEPHONE 258-3152 OR 258-3802, TWO (2) WORKING DAYS PRIOR TO METER PICKUP.
11. ANY INTERRUPTION OF SERVICE MUST BE PERFORMED IN ACCORDANCE WITH UDACS SECTION 3.14.01, AND APPROVED BY THE LVVWD INSPECTION DIVISION PRIOR TO SHUTDOWN. PROPER WRITTEN NOTIFICATION MUST BE GIVEN TO ALL AFFECTED CUSTOMERS.
12. ALL WATER FACILITY CONSTRUCTION MATERIALS USED MUST BE AS LISTED ON THE LVVWD PRE-APPROVED MATERIALS AND MANUFACTURER'S LISTING FOR NEW FACILITIES, LATEST REVISION, OR SPECIFICALLY APPROVED ON THESE PLANS.
13. TELEPHONE "CALL BEFORE YOU DIG" AT "811" OR 1-800-227-2600
14. THE INSTALLATION OF LAS VEGAS VALLEY WATER DISTRICT (LVVWD) MUNICIPAL WATER FACILITIES WITHIN ALL STREETS IS ASSUMED TO BE IN COMPLIANCE WITH THE UNIFORM STANDARDS, INCLUDING THE PLACEMENT OF ASPHALT PAVING STREET SURFACES. ANY REPAIR WORK DONE BY THE LVVWD TO THE MUNICIPAL FACILITIES WILL INCLUDE THE PLACEMENT OF ANY APPROPRIATELY SIZED ASPHALT REPAIR PATCH ON THE STREET SURFACE.

    ANY DECORATIVE PAVING SURFACE WITHIN THE STREET IS THE RESPONSIBILITY OF THE OWNER'S ASSOCIATION, OR THE INDIVIDUAL PROPERTY OWNERS IF NO OWNER'S ASSOCIATION IS IN EXISTENCE, OR THE AGENCY HAVING JURISDICTION. DECORATIVE SURFACE MATERIALS PLACED WITHIN THE TEN FOOT EASEMENT ABUTTING A PUBLIC OR PRIVATE STREET, IF DISTURBED BY THE LVVWD DURING THE REPAIR OR OPERATION OF ITS FACILITIES, WILL BE REPLACED BY LVVWD WITH AN APPROPRIATELY SIZED PLAIN FINISH CONCRETE PATCH. THE LVVWD WILL NOT RESTORE, AND WILL NOT BE RESPONSIBLE FOR THE RESTORATION OF, ANY DECORATIVE PAVING SURFACE WITHIN THE STREET. THE LVVWD WILL NOT ATTEMPT TO MATCH COLOR OR FINISH OF ANY ADJACENT MATERIALS.
15. NO LEAD COMPLIANCE NOTE:
    TO COMPLY WITH THE FEDERAL SAFE DRINKING WATER ACT, ALL WATER WORKSBRASS PRODUCTS PROPOSED TO BE RELOCATED, OR INSTALLED AS NEW MUST BE INSTALLED WITH THE LEAD FREE APPROVED PRODUCT. THE OLD LEADED PRODUCT MAY NOT BE REUSED.

APPROVED FOR CONSTRUCTION

Y. Dishari

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES

DATE: 9/25/18 PROJECT# 125396

CITY OF LAS VEGAS FIRE AND RESCUE NOTES

1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE AND RESCUE ADOPTED FIRE CODE ORDINANCE #6325 FOR HYDRANT SPECIFICATIONS AND HYDRANT INSTALLATION SPECIFICATIONS.
2. ONLY FIRE HYDRANTS THAT ARE ON THE LAS VEGAS VALLEY WATER DISTRICT'S APPROVED PRODUCTS LIST ARE ALLOWED TO BE INSTALLED.
3. A PERMIT IS REQUIRED FROM LAS VEGAS FIRE AND RESCUE FOR THE INSTALLATION OF ON-SITE WATER LINES AND FIRE HYDRANTS. THE PERMIT AND CONTRACTORS MATERIAL TEST CERTIFICATE FOR UNDERGROUND PIPING FORM SHALL BE OBTAINED FROM THE FIRE PROTECTION ENGINEER BEFORE COMMENCEMENT OF WORK. IFC § 105.7.12
4. ON ANY RESIDENTIAL OR COMMERCIAL INSTALLATIONS, FIRE HYDRANTS SHALL BE INSTALLED AND FIRE APPARATUS ACCESS ROADS SHALL BE MAINTAINED BEFORE COMMENCEMENT OF ANY COMBUSTIBLE CONSTRUCTION. ALL FIRE HYDRANTS SHALL BE IN GOOD WORKING ORDER AND SHALL BE CAPABLE OF DELIVERING THE REOUIRED FIRE FLOW. IFC § 3310, § 3312
5. TO IDENTIFY THE FIRE HYDRANT LOCATIONS, THE CONTRACTOR SHALL PLACE A BLUE REFLECTIVE MARKER AT THE CENTER LINE OF THE STREET ADJACENT TO THE FIRE HYDRANTS. IFC § 507.5.7.3
6. ALL UNDERGROUND INSPECTIONS, PRESSURE AND FLUSH VERIFICATIONS OF ALL FIRE HYDRANTS AND FIRE LINES, SHALL BE CONDUCTED BEFORE COVERING THE LINES. CENTER LOADING IS ACCEPTABLE FOR THE HYDRO TESTS WITH PRIOR FIRE PREVENTION APPROVAL. IFC § 106.3
7. ALL ON-SITE UNDERGROUND WATER MAINS AND MATERIALS SHALL BE U.L. LISTED, A.W.W.A APPROVED AND SHALL BE RATED FOR THE APPROPRIATE WORKING PRESSURE. IFC § 507.2.1, NFPA 24
8. PAINTING OF CURBS, FIRE HYDRANTS, PADS, PROTECTION OF FIRE HYDRANTS FROM PHYSICAL DAMAGE, AND ALL OTHER WORK NECESSARY PER PLANS SHALL BE COMPLETED BEFORE APPROVAL BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION. IFC § 507
9. PRIVATE HYDRANTS SHALL BE PAINTED RED. IFC § 507.5.7.1
10. PRIOR TO THE FINAL OCCUPANCY, A FIRE FLOW TEST SHALL BE WITNESSED BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION TO VERIFY AVAILABILITY OF THE REQUIRED FIRE FLOW. IFC § 507
11. FIRE HYDRANT SPACING SHALL BE AS FOLLOWS: IFC § C102
    - RESIDENTIAL - 500 FT UNSPRINKLERED; 600 FT SPRINKLERED.
    - COMMERCIAL - 300 FT UNSPRINKLERED; 400 FT SPRINKLERED.
12. WHERE THE WATER MAINS ARE EXTENDED ALONG STREETS OR NEW STREETS ARE INSTALLED WHERE FIRE HYDRANTS ARE NOT NEEDED FOR PROTECTION OF THE STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AT A MAXIMUM OF 1000 FT SPACING, TO PROVIDE FOR TRANSPORTATION HAZARDS. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS OR HAVE FOUR (4) OR MORE TRAFFIC LANES AND HAVE A TRAFFIC COUNT OF MORE THAN 30,000 PER DAY, HYDRANTS ARE REOUIRED ON EACH SIDE OF THE STREET SPACED AT 500 FT ON AN ALTERNATING BASIS. IFC § C102.8
13. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN THE RADIUS OF A CUL-DE-SAC OR WITHIN 20 FT OF THE PERIMETER OF THE RADIUS OF THE CUL-DE-SAC.
14. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN 6 FT OF ANY CURB RETURN, DRIVEWAY, POWER POLE, STREETLIGHT OR ANY OTHER OBSTRUCTION. IFC § C102.12
15. A MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A ONE-TWO FAMILY DWELLING SHALL NOT EXCEED 300 FT, AS MEASURED BY AN APPROVED ROUTE. IFC § 102.4
16. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FIRE DEPARTMENT CONNECTION (FDC) SHALL NOT EXCEED 100 FT, AS MEASURED BY AN APPROVED ROUTE. IFC § C102.7
17. THE MAXIMUM DISTANCE FROM A HYDRANT TO THE END OF A DEAD-END STREET SHALL NOT EXCEED 200 FT. IFC § C102.6
18. TWO (2) SOURCES OF SUPPLY ARE REQUIRED WHENEVER THERE IS 4 OR MORE FIRE HYDRANTS/SPRINKLER LEAD-INS ARE INSTALLED ON A SINGLE SYSTEM. SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 2 FIRE HYDRANTS CAN BE OUT OF SERVICE DUE TO A BREAK IN A WATER MAIN. IFC § C104
19. ALL FIRE APPARATUS ACCESS ROADS SHALL BE PAVED TO PROVIDE ALL-WEATHER DRIVING CAPABILITIES, AND SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF THE FIRE APPARATUS. IFC § 503.2.3
20. THE GRADIENT FOR THE FIRE APPARATUS ACCESS ROADS SHALL NOT EXCEED 12%. ANGLES OF APPROACH AND ANGLES OF DEPARTURE SHALL NOT EXCEED 6% FOR 25 FT PRIOR TO OR AFTER THE GRADE CHANGE. ADJACENT TO THE STRUCTURES GRADIENT SHALL NOT EXCEED 6%. IFC § 503.2.7; 503.2.8
21. THE TURNING RADIUS OF THE FIRE APPARATUS ACCESS ROADS SHALL BE NO LESS THAN 52 FT OUTSIDE AND 28 FT INSIDE TURNING RADIUS. IFC § 503.2.4
22. VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL NOT BE LESS THAN 13FT 6 INS. IFC § 503.2.1
23. FIRE DEPARTMENT ACCESS ROADS SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF NOT LESS THAN 40 FT FLOW LINE TO FLOW LINE WITH PARALLEL PARKING PERMITTED ON BOTH SIDES. NOT LESS THAN 32 FT WIDE, FLOW LINE TO FLOW LINE, WHERE PARKING IS PERMITTED ONLY ON ONE SIDE OF THE FIRE APPARATUS ACCESS ROAD. NOT LESS THAN 24FT WIDE, FLOW LINE TO FLOW LINE, WHERE NO PARKING IS PERMITTED ON EITHER SIDE. FIRE LANES THROUGH PARKING LOTS SHALL BE NOT LESS THAN 24 FT. IFC § 503.2.1.1
24. A FIRE APPARATUS ACCESS ROAD SHALL BE REQUIRED WHEN ANY PORTION OF AN EXTERIOR WALL OF THE FIRST STORY IS LOCATED MORE THAN 150 FT FROM A FIRE DEPARTMENT VEHICLE ACCESS. THIS DISTANCE COULD BE INCREASED TO 250 FT IF THE BUILDING IS SPRINKLERED. IFC § 503.1.1
25. APPROVED SECONDARY FIRE APPARATUS ACCESS SHALL BE PROVIDED FOR 100 OR MORE DWELLING UNITS, ROAD(S) WITH DEAD-ENDS OR WITH A SINGLE POINT OF ACCESS IN EXCESS OF 600 FT. COMMERCIAL AND INDUSTRIAL DEVELOPMENTS WHERE BUILDINGS EXCEED 2 STORIES OR 30 FEET IN HEIGHT, OR EXCEEDING 62,000 SQUARE FEET IN AREA. IFC § 503.1.2
26. ALL DEAD-END FIRE APPARATUS ROADS AND/OR FIRE LANES, PUBLIC OR PRIVATE, IN EXCESS OF 150 FT IN LENGTH SHALL BE PROVIDED WITH AN APPROVED TURN AROUND HAVING A MINIMUM DIAMETER OF 81 FT. IFC § 503.2.5
27. ALL FIRE APPARATUS ACCESS ROADS SHALL BE MARKED BY PLACING APPROVED SIGNS AT THE START OF THE DESIGNATED FIRE LANE, ONE SIGN AT THE END OF THE FIRE LANE AND WITH SIGNS AT INTERVALS OF 100 FT ALONG THE DESIGNATED FIRE LANES. SIGNS TO BE PLACED ON BOTH SIDES OF AN ACCESS ROADWAY IF NEEDED TO PREVENT PARKING ON EITHER SIDE. SIGNS TO BE INSTALLED NO HIGHER THAN 10 FT OR LESS THAN 6 FT FROM THE ROADWAY LEVEL. THE CURB ALONG OR ON THE PAVEMENT OR CEMENT (IF NO CURB IS PROVIDED) SHALL BE PAINTED WITH A RED WEATHER RESISTANT PAINT IN ADDITION TO THE SIGNS. IFC § 503.3
28. ELECTRICALLY CONTROLLED ACCESS GATES SHALL BE PROVIDED WITH AN APPROVED EMERGENCY VEHICLE DETECTOR/RECEIVER SYSTEM. SAID SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE IFC § 503.6 AND IFC APPENDIX M.

REVISED MARCH 1, 2016

RTC NOTES

1. THE CONTRACTOR SHALL NOT BE ALLOWED TO CLOSE MORE THAN ONE CONSECUTIVE BUS STOP ON THE SAME SIDE OF THE STREET. TEMPORARY CLOSURES SHALL BE PWD (PERSONS WITH DISABILITY) ACCESSIBLE BEFORE ANY BUS STOP CAN BE CLOSED. THE CONTRACTOR SHALL NOTIFY CARL SCARBROUGH AT (702) 676-1608 OR ERIC TRAASDAHL AT (702) 676-1633, AT LEAST SEVEN WORKING DAYS IN ADVANCE.
2. THE CONTRACTOR SHALL SUBMIT A BUS STOP CLOSURES SCHEDULE WITH THE TRAFFIC CONTROL PLAN. THE BUS STOP CLOSURE SCHEDULE SHALL IDENTIFY SPECIFIC DURATIONS AND TIMES OF THE DAY FOR ALL PROPOSED BUS STOP CLOSURES. BUS STOP CLOSURES ARE NOT TO EXCEED TWO CONSECUTIVE STOPS AT ONE TIME, OR MORE THAN 1,000 FEET AT A TIME. PERSONS WITH DISABILITIES SHALL HAVE ACCESS TO BUS STOPS. THE CONTRACTOR SHALL PROVIDE A 100 FOOT LONG BY 10 FEET WIDE GRAVELED TURN OUT AT TEMPORARY BUS STOPS.

REVISED FEBRUARY 14, 2013

SOUTHERN NEVADA - SOUTHWEST GAS CORPORATION GENERAL NOTES

1. IN THE EVENT OF NATURAL GAS EMERGENCIES CALL 911 AND 1-877-860-6020
2. THERE SHALL BE A MINIMUM HORIZONTAL AND VERTICAL CLEARANCE OF 12-INCHES BETWEEN NATURAL GAS FACILITIES AND ANY UNDERGROUND FACILITIES AND/OR STRUCTURES, INCLUDING BUT NOT LIMITED TO WATER, SEWER, STORM DRAIN, COMMUNICATIONS, AND ELECTRIC
3. FOR VALVE ADJUSTMENT CONTACT 702-668-6107 48 HOURS PRIOR TO CONSTRUCTION
4. IN THE EVENT OF A NATURAL GAS CONFLICT WITH PROPOSED UTILITIES AND/OR STRUCTURES CONTACT 702-365-2099

APPROVED FOR CONSTRUCTION

SOUTHWEST GAS CORPORATION — DATE 9/13/18

REVISIONS: NO. | DATE | SHEET

PREPARED BY: DEPARTMENT OF PUBLIC WORKS CAPITAL PROJECT MANAGEMENT

PREPARED FOR: CITY OF LAS VEGAS

H# 25814 BID# 18.25814

DATE: 2018-04-24 DESIGNED BY:

SUBMITTAL STAGE: FOR CONSTRUCTION DRAWN BY: TRW CHECKED BY: MASI

TITLE: TRAFFIC PACKAGE 6B CHARLESTON/DURANGO

SHEET: GENERAL NOTES

Michael Sturdivant 06.30.20

09.20.18

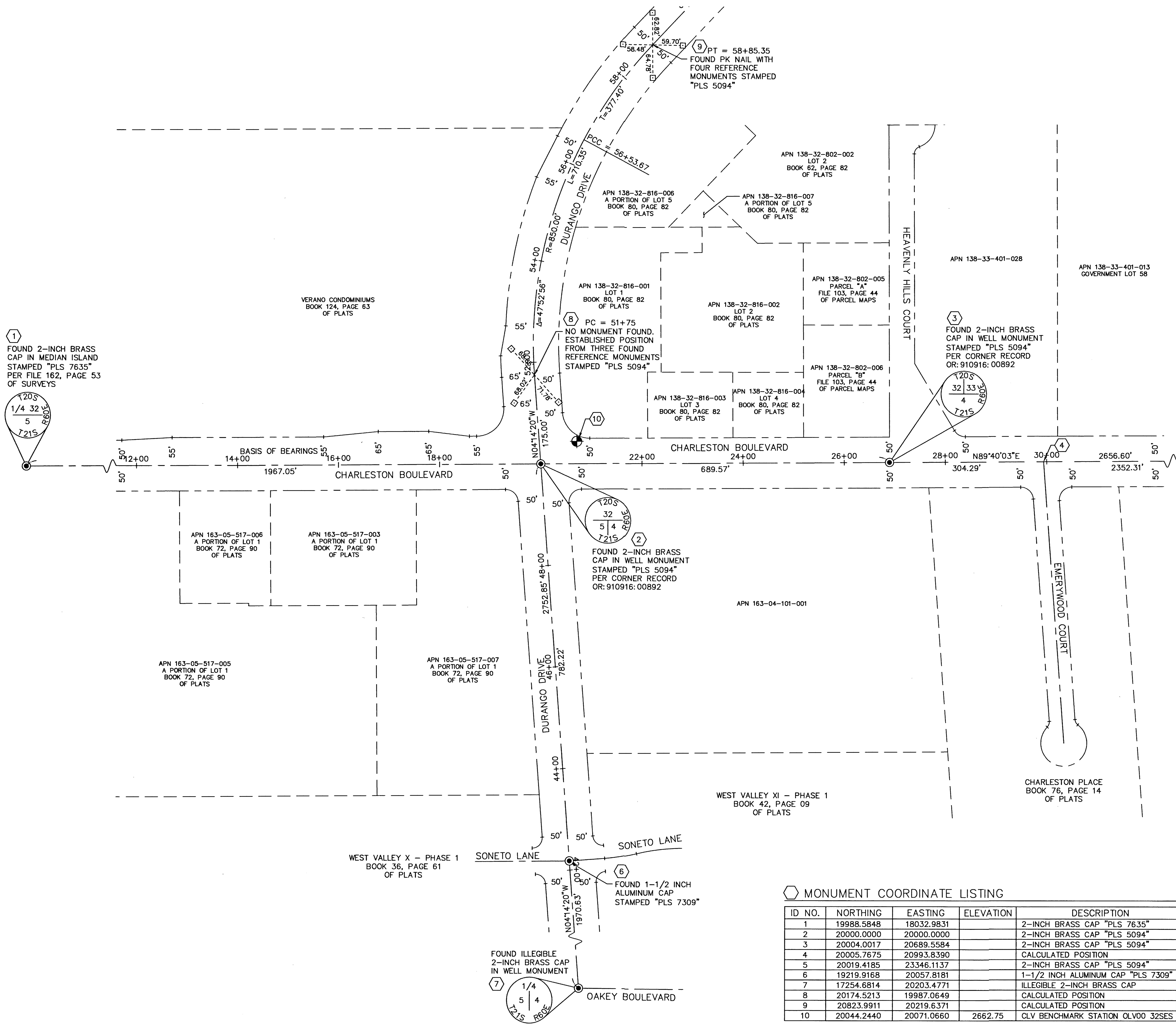
SHEET G-3

3 OF 21

DRAWING NO. 107-V4797-b

NDOT PROJ. NO. S1-0159(011) PROJ #125396 AGR #116300 QS 138-32-SE, 163-05-SE

8/14/18 F:\PW_TEAM\TEAM 4-JEREMY'S TEAM\1-DESIGN\TRAFFIC PACKAGE NO. 6\DRAWINGS\TP6B\TP6B FRONT PAGES.DWG



MONUMENT COORDINATE LISTING

ID NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	19988.5848	18032.9831		2-INCH BRASS CAP "PLS 7635"
2	20000.0000	20000.0000		2-INCH BRASS CAP "PLS 5094"
3	20004.0017	20689.5584		2-INCH BRASS CAP "PLS 5094"
4	20005.7675	20993.8390		CALCULATED POSITION
5	20019.4185	23346.1137		2-INCH BRASS CAP "PLS 5094"
6	19219.9168	20057.8181		1-1/2 INCH ALUMINUM CAP "PLS 7309"
7	17254.6814	20203.4771		ILLEGIBLE 2-INCH BRASS CAP
8	20174.5213	19987.0649		CALCULATED POSITION
9	20823.9911	20219.6371		CALCULATED POSITION
10	20044.2440	20071.0660	2662.75	CLV BENCHMARK STATION OLV00 32SES

Orth-Rodgers and Associates, Inc.
TRANSPORTATION ENGINEERS and PLANNERS
8871 West Flamingo Road, Suite 202
Los Vegas, NV 89147 (702) 233-4060

GRAPHIC SCALE

100 0 50 100 200

1 INCH = 100 FEET

BASIS OF BEARINGS

NORTH 89°40'03" EAST BEING THE BEARING OF THE SOUTH LINE OF THE SOUTHEAST QUARTER (SE 1/4) OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 32, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA, AS SHOWN ON THAT CERTAIN MAP ON FILE IN THE CLARK COUNTY RECORDER'S OFFICE, IN BOOK 80, PAGE 82 OF PLATS.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK STATION OLV00 32SES

RIVET AND PLATE IN TOP OF CURB AT THE NORTHEAST CORNER OF CHARLESTON BOULEVARD AND DURANGO DRIVE.

ELEVATION = 811.6065 meters (NAVD'88 PUBLISHED)
ELEVATION = 2662.75 U.S. SURVEY FEET (NAVD'88 PUBLISHED)

LEGEND

STREET CENTERLINE
EXISTING RIGHT-OF-WAY LINE
PROPOSED RIGHT-OF-WAY LINE
ASSESSOR'S PARCEL LINE
FOUND MONUMENT AS NOTED
FOUND REFERENCE MONUMENT IN TOP OF CURB STAMPED "PLS 5094" AND DISTANCE AS SHOWN
(5) MONUMENT COORDINATE INDENTIFIER
APN ASSESSOR'S PARCEL NUMBER
BENCHMARK
RIGHT-OF-WAY ACQUISITION
AUTHORIZATION TO ENTER PROPERTY (AEP)

NO.	DATE:	DESCRIPTION	APP'D

REVISIONS

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION

CITY ENGINEER: DAVID N. BOWERS, P.E., P.T.O.E.
PROJECT MANAGER: MICHAEL STURDIVANT, P.E.
DESIGNED BY: DRC
DRAWN BY: ML
CHECKED BY: SG
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: NONE
DATE: 2013-11-21

CITY OF LAS VEGAS NEVADA

TITLE: TRAFFIC PACKAGE 6B CHARLESTON/DURANGO, CHARLESTON/RANCHO

SHEET: CHARLESTON BOULEVARD AND DURANGO DRIVE HORIZONTAL CONTROL PLAN

REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA WALTER C. VODRAZKA, JR. EXP. 06-30-14 CIVIL No. 19183

12-3-13

Sheet HC-1

4 of 21

DRAWING NO. 107-V4797-b

H# 06-25814 NDOT PROJ. NO SI-0159(011)

Orth-Rodgers and Associates, Inc.
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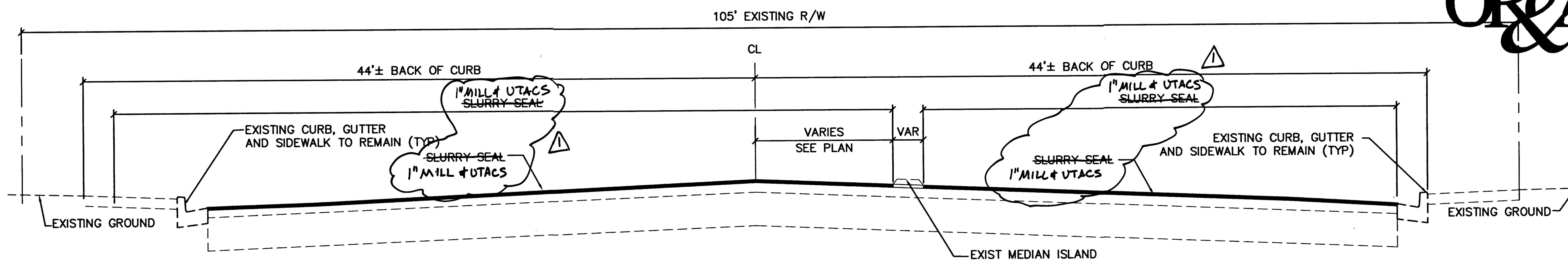
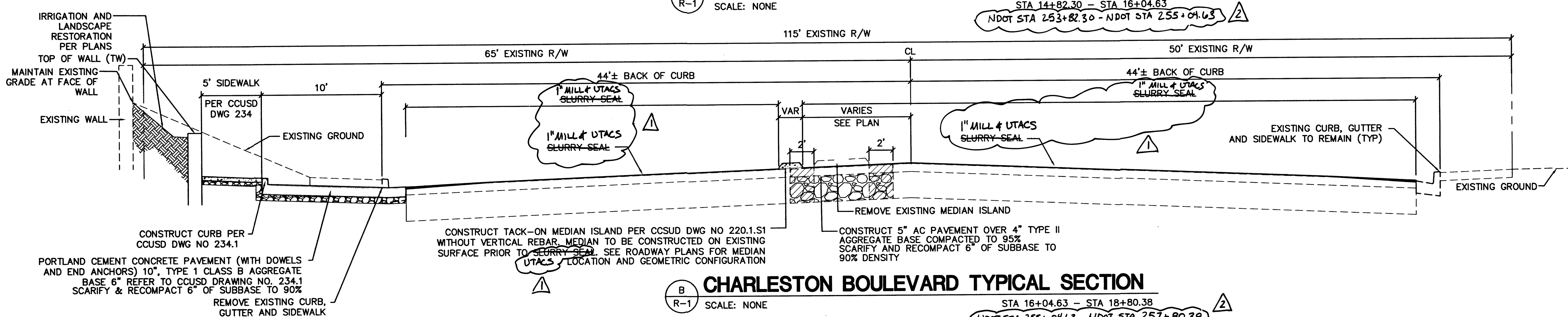
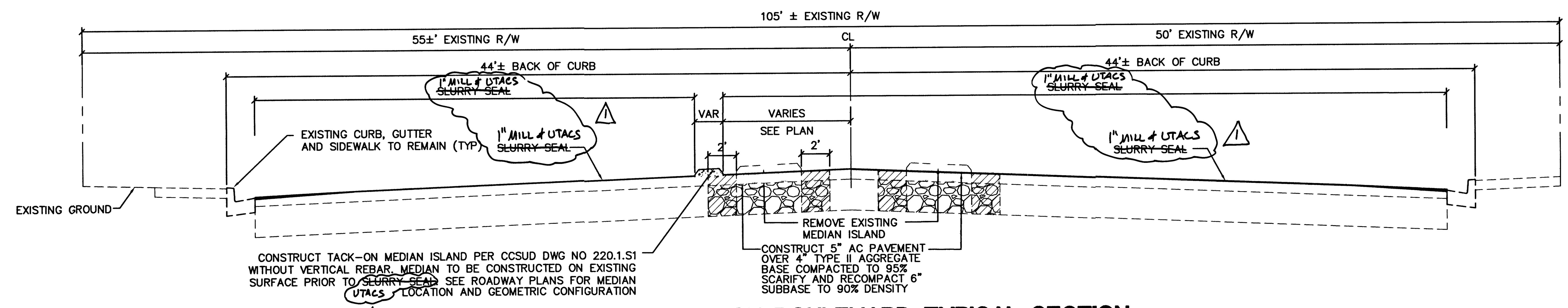
8871 West Flamingo Road, Suite 202
Las Vegas, NV 89147 (702) 233-4060



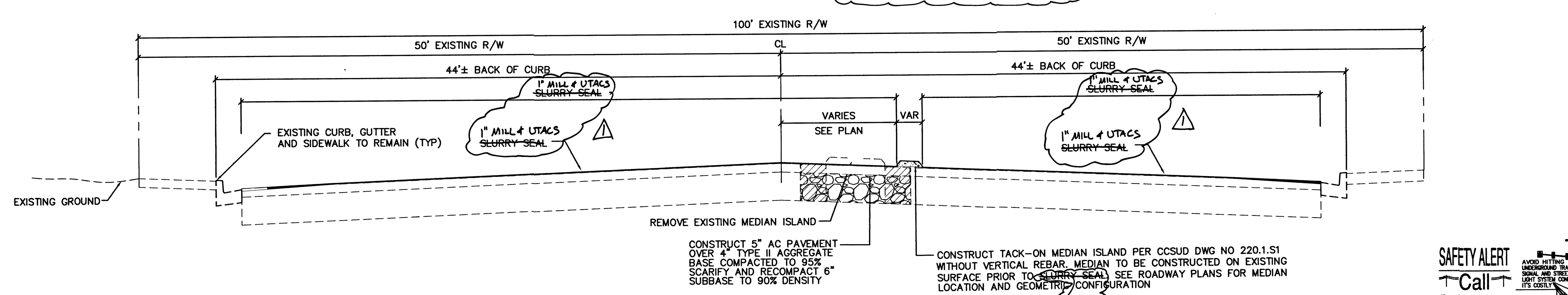
A R-1 CHARLESTON BOULEVARD TYPICAL SECTION
SCALE: NONE
STA 14+82.30 – STA 16+04.63
NDOT STA 253+82.30 - NDOT STA 255+04.63 ⚠2



B R-1 CHARLESTON BOULEVARD TYPICAL SECTION
SCALE: NONE
STA 16+04.63 – STA 18+80.38 ⚠2
NDOT STA 255+04.63 - NDOT STA 257+80.38



C R-1 CHARLESTON BOULEVARD TYPICAL SECTION
SCALE: NONE
STA 18+80.38 – STA 22+67.75 ⚠2
NDOT STA 257+80.38 - NDOT STA 261+67.75



D R-2 CHARLESTON BOULEVARD TYPICAL SECTION
SCALE: NONE
⚠2 STA 22+67.75 – STA 26+33
NDOT STA 261+67.75 - NDOT STA 265+33

PROFESSIONAL ENGINEER STATE OF NEVADA — MICHAEL STURDIVANT — Exp. 06.30.20 — CIVIL — No. 016535
08.20.18
FOR REVISION ⚠1 ONLY

SAFETY ALERT
Call Before You Overhead 1-702-227-2929
Call before you UnderGround 1-702-432-5300 F.A.S.T.
Call before you Dig — Call 811 — 1-800-227-2600 — 1-702-455-7544

REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA — WALTER C. VODRAZKA, JR. — EXP. 06-30-14 — CIVIL — No. 19183 — 2-3-13

NO.	DATE:	DESCRIPTION	APP'D
⚠1	8.20.18	REPLACE SLURRY W/ UTACS	
⚠2	9.20.18	NDOT STATIONING	

REVISIONS

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION

CITY ENGINEER: DAVID N. BOWERS, P.E., P.T.O.E.
PROJECT MANAGER: MICHAEL STURDIVANT, P.E.
DESIGNED BY: RM, WV
DRAWN BY: JS, NV
CHECKED BY: RM, ST, WV
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: NONE
DATE: 2013-11-21

CITY OF LAS VEGAS NEVADA

TITLE: TRAFFIC PACKAGE 6B
CHARLESTON/DURANGO, CHARLESTON/RANCHO
SHEET: TYPICAL SECTIONS

Sheet X-1
5 of 21
DRAWING NO. 107-V4797-b

H# 06-25814 NDOT PROJ. NO SI-0159(011)

OR&A
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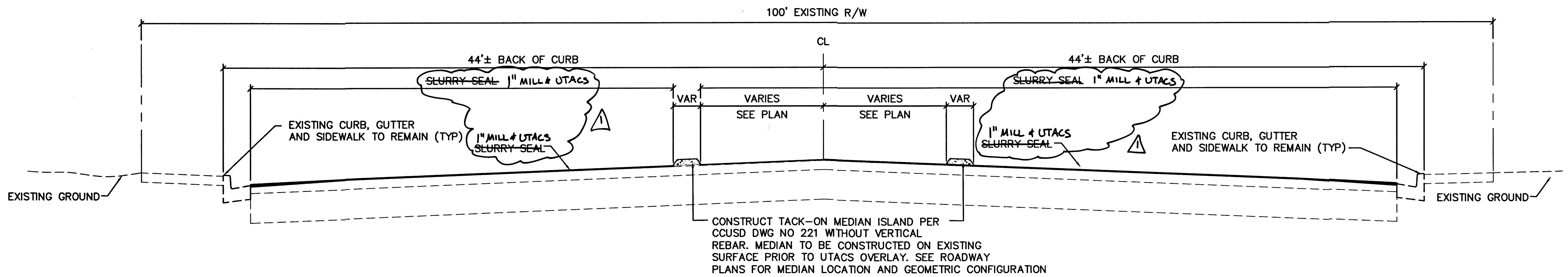
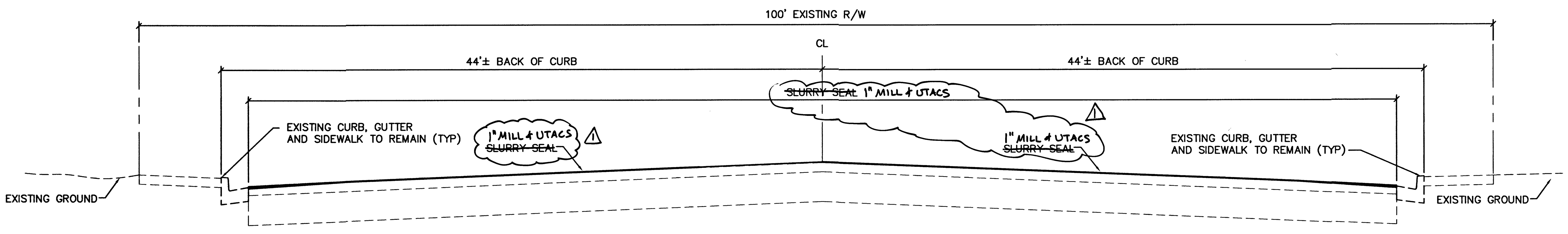
Las Vegas, NV 89147 (702) 233–4060



E R-2 CHARLESTON BOULEVARD TYPICAL SECTION

SCALE: NONE

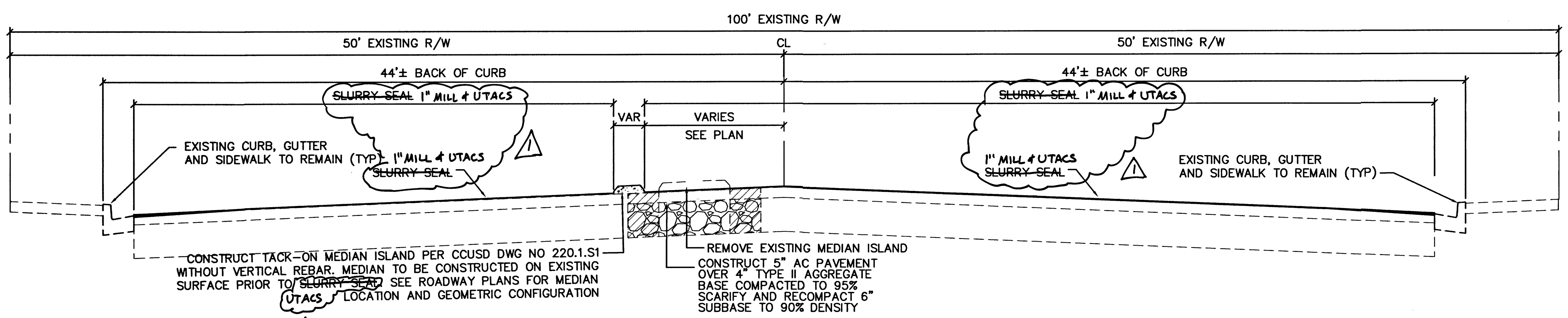
~~STA 26+33 – STA 26+91.57~~
NDOT STA 265+33 – NDOT STA 265+91.57



F R-3 DURANGO DRIVE TYPICAL SECTION

SCALE: NONE

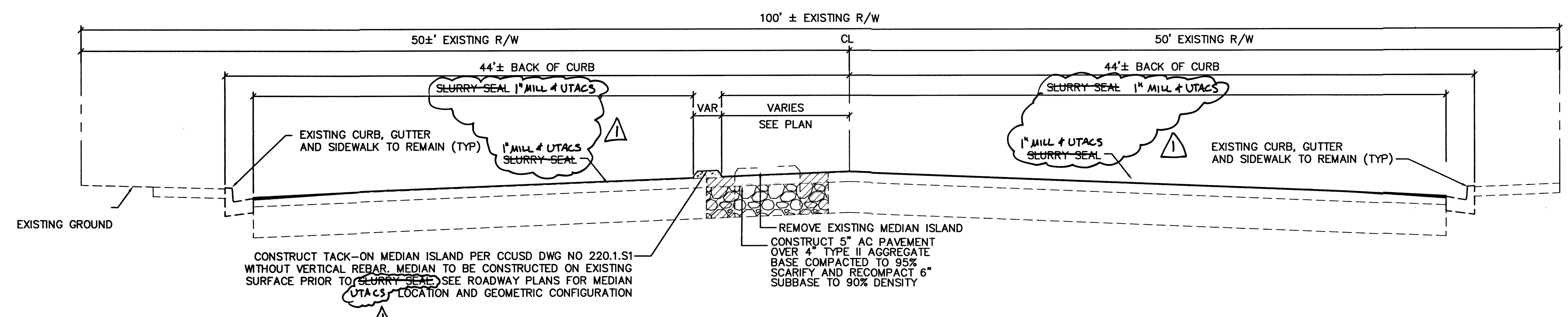
STA 43+88.82 – STA 46+15.32



G R-3 DURANGO DRIVE TYPICAL SECTION

SCALE: NONE

STA 46+15.32 – STA 48+81.07



H R-3 DURANGO DRIVE TYPICAL SECTION

SCALE: NONE

STA 48+81.07 – 51+60.27

08.20.18
FOR REVISION 1 ONLY

SAFETY ALERT
Call Before You Overhead 1-702-227-2929
AVOID HITTING UNDERGROUND TRAFFIC SIGNAL AND STREET LIGHT SYSTEM CONDUITS IT'S COSTLY! Call before you UnderGround 1-702-432-5300 F.A.S.T.
Call before you Dig. Call 811. 1-800-227-2600 1-702-455-7544

NO.	DATE:	DESCRIPTION	APP'D
2	8.20.19	NDOT STATIONING	
1	8.2018	REPLACE SLURRY W/ UTACS	

REVISIONS

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION

CITY ENGINEER: DAVID N. BOWERS, P.E., P.T.O.E.
PROJECT MANAGER: MICHAEL STURDIVANT, P.E.
DESIGNED BY: RM, WV
DRAWN BY: JS, NV
CHECKED BY: RM, ST, WV
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: NONE
DATE: 2013-11-21

CITY OF LAS VEGAS NEVADA

TITLE: TRAFFIC PACKAGE 6B
CHARLESTON/DURANGO, CHARLESTON/RANCHO

SHEET: TYPICAL SECTIONS

WALTER C. VODRAZKA, JR. CIVIL No. 19183 12-3-13

Sheet X-2
6 of 21
DRAWING NO. 107-V4797-b

H# 06-25814 NDOT PROJ. NO SI-0159(011)

Orth-Rodgers and Associates, Inc.
TRANSPORTATION ENGINEERS and PLANNERS
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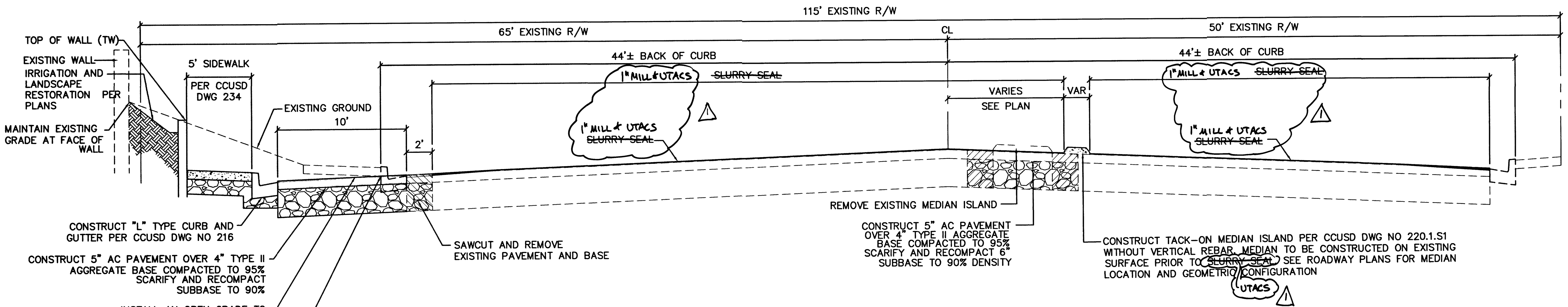
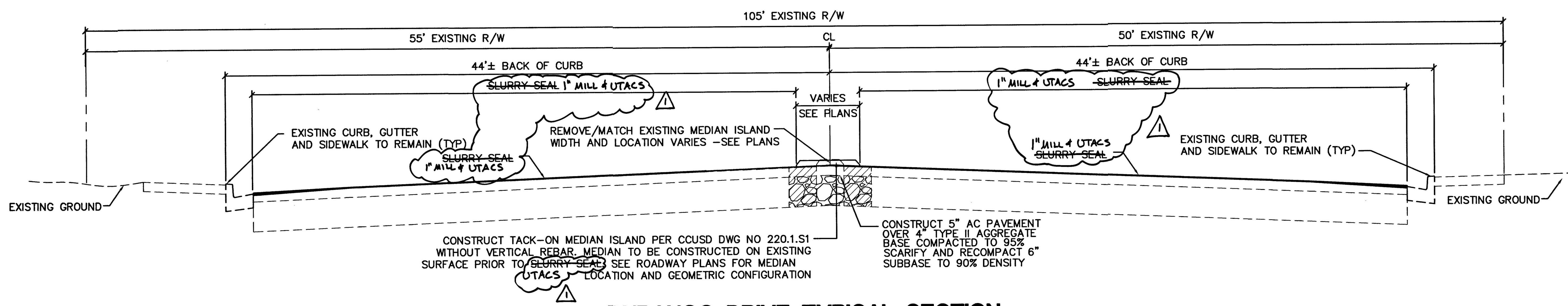


I R-4 **DURANGO DRIVE TYPICAL SECTION**
SCALE: NONE
STA 51+60.27 – STA 54+40.37



J R-4 **DURANGO DRIVE TYPICAL SECTION**
SCALE: NONE
STA 54+40.37 – STA 55+87.94

PROFESSIONAL ENGINEER STATE OF NEVADA — EXP. 6.30.20 — CIVIL — No 016535
8.20.18
FOR REVISION 1 ONLY

SAFETY ALERT
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Call before you Dig
Call 811
1-800-227-2600
1-702-455-7544

REVISIONS
NO.	DATE:	DESCRIPTION	APP'D
1	8.20.18	Replace slurry w/ UTACS	

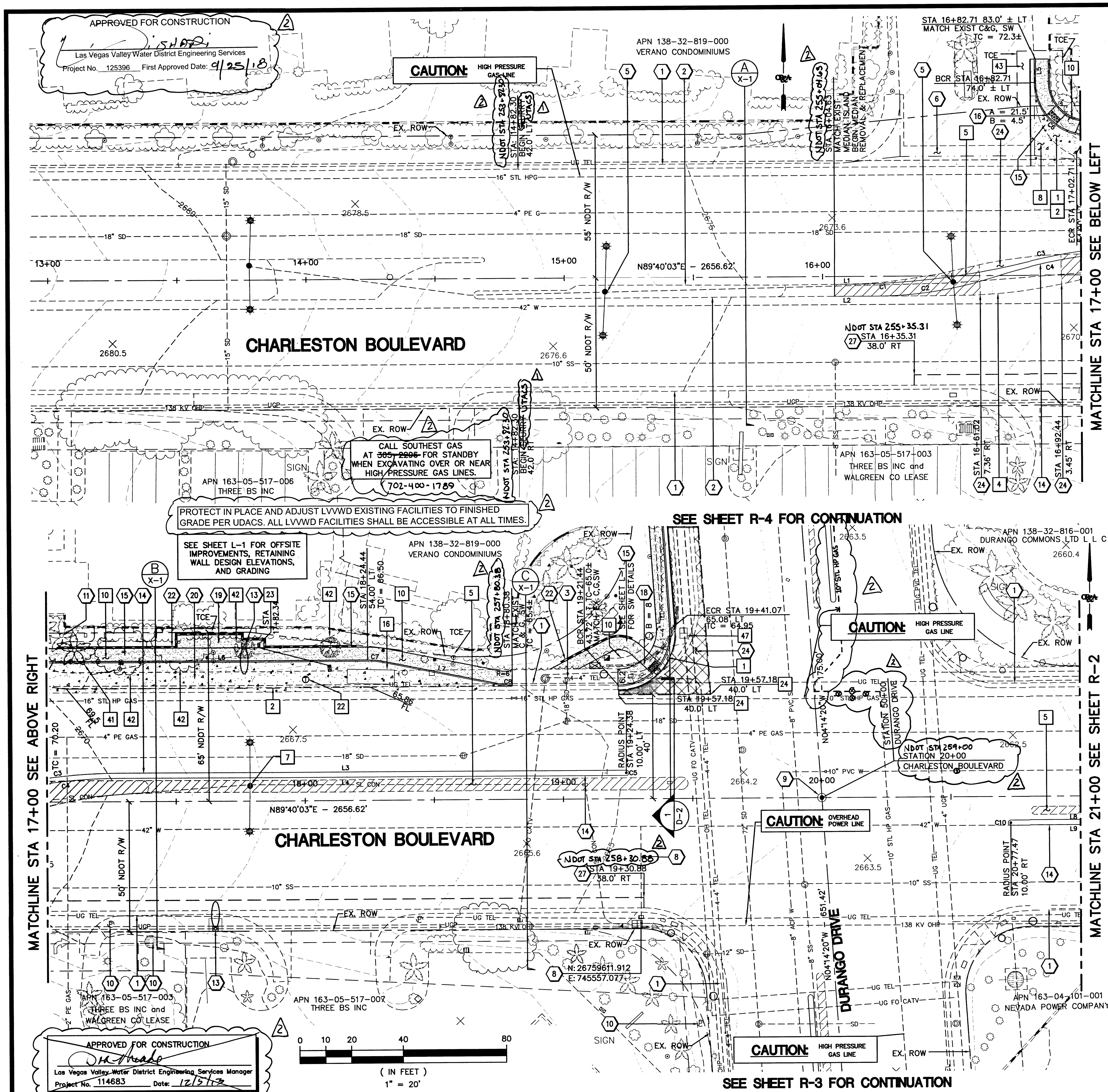
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION
CITY ENGINEER: DAVID N. BOWERS, P.E., P.T.O.E.
PROJECT MANAGER: MICHAEL STURDIVANT, P.E.
DESIGNED BY: RM, WV — HORIZONTAL SCALE: AS SHOWN
DRAWN BY: JS, NV — VERTICAL SCALE: NONE
CHECKED BY: RM, ST, WV — DATE: 2013-11-21
CITY OF LAS VEGAS NEVADA

TITLE: TRAFFIC PACKAGE 6B
CHARLESTON/DURANGO, CHARLESTON/RANCHO
SHEET: TYPICAL SECTIONS

REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA — WALTER C. VODRAZKA, JR. — EXP. 06-30-14 — CIVIL — No. 19183
12-3-13

Sheet X-3
7 of 21
DRAWING NO. 107-V4797-b

H# 06-25814 NDOT PROJ. NO SI-0159(011)



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Las Vegas, NV 89147 (702) 233-4060

APPROVED FOR CONSTRUCTION
SOUTHWEST GAS CORPORATION — DATE 9/13/18

REMOVAL/RELOCATION NOTES

1. REMOVE SIDEWALK RAMP
2. REMOVE CURB, GUTTER AND SIDEWALK
4. REMOVE MEDIAN ISLAND CURB
5. REMOVE MEDIAN ISLAND SURFACE
7. REMOVE AND SALVAGE LUMINAIRE. REUSE LED HEAD. SEE SHEET S-1.
8. REMOVE CROSS GUTTER
10. LANDSCAPE AND IRRIGATION REMOVAL
16. RELOCATE BUS SHELTER AND TRASH CAN(S) TO NEW BUS SHELTER PAD
22. ADJUST MANHOLE, FRAME AND COVER TO FINISH GRADE PER CCUSD 403 OR 404. (BY CENTURY LINK)
23. RELOCATE TELEPHONE SWITCH BOX (BY CENTURY LINK)
24. SAWCUT AND REMOVE EXISTING AC PAVEMENT AND BASE
41. REMOVE TREE > 1' DIAMETER
42. REMOVE TREE < 1' DIAMETER
43. REMOVE AND REPLACE STAMPED CONCRETE TO NEAREST EXPANSION JOINT (INCIDENTAL TO BUS TURN OUT)
47. RELOCATE CATV VAULT (BY COX COMMUNICATIONS)

CONSTRUCTION NOTES

1. PROTECT IN PLACE CURB & GUTTER AND/OR SIDEWALK
2. PROTECT IN PLACE MEDIAN ISLAND CURB
3. PROTECT IN PLACE DROP INLET
5. PROTECT IN PLACE LUMINAIRE
6. PROTECT IN PLACE CROSS GUTTER
8. PROTECT IN PLACE EXISTING LVVWD CATHODIC PROTECTION (CP) STATION AND LEADS TO 42" WL
9. PROTECT IN PLACE SURVEY MONUMENT
10. PROTECT IN PLACE POWER FACILITIES
11. PROTECT IN PLACE EXISTING TREE
13. INSTALL NEW LUMINAIRE FROM SALVAGED LED HEADS. SEE SHEET S-1
14. CONSTRUCT TACK ON ISLAND PER CCUSD 220.1.S1 WITHOUT VERTICAL REBAR. MEDIAN TO BE CONSTRUCTED ON EXISTING OR MILLED SURFACE PRIOR TO ~~SLURRY SEAL~~ UTACS
15. CONSTRUCT 5' WIDE SIDEWALK PER CCUSD 234
16. CONSTRUCT SIDEWALK RAMP PER CCUSD 235 CASE I
18. CONSTRUCT SIDEWALK RAMP PER CCUSD 235 CASE III
19. CONSTRUCT BUS SHELTER PAD PER CCUSD 234.2
20. CONSTRUCT BUS TURNOUT PER CCUSD 234.1
22. CONSTRUCT RETAINING WALL PER SNBO REGIONAL STANDARDS, DWG NO B-100-2. SEE SHEET D-1 FOR STANDARD DETAIL AND SHEET L-1 FOR WALL ELEVATION
24. CONSTRUCT 5" AC PAVEMENT OVER 4" TYPE II AGGREGATE BASE COMPACTED TO 95%
27. SAWCUT AND TRENCH PER ~~DETAIL 'A', SHEET D-2.~~ NDOT STANDARD PLANS T-30.2.4

8.20.18 FOR REVISION 2 ONLY

LINE AND CURVE DATA

FACE OF MEDIAN LINE TABLE		
LINE	BEARING	DISTANCE
L1	S89°38'20"W	5.34'
L2	S89°38'20"W	16.41'
L3	S89°40'03"W	196.16'
L4	S89°40'03"W	196.16'
L8	N89°40'03"E	219.33'
L9	S89°40'03"W	219.33'

BACK OF CURB LINE TABLE		
LINE	BEARING	DISTANCE
L5	S00°19'57"E	9.00'
L6	S89°40'03"W	121.73'
L7	N79°01'21"W	45.05'

FACE OF MEDIAN CURVE TABLE

CURVE	RADIUS	LENGTH	DELTA	TANGENT	PC STA	OFFSET	PT STA	OFFSET
C1	300.00'	70.87'	13°32'07"	35.60'	16+09.97	3.00' R	16+80.18	5.37' L
C2	150.00'	46.34'	17°42'07"	23.36'	16+21.04	7.62' R	16+66.65	0.50' R
C3	202.00'	48.49'	13°45'15"	24.36'	16+80.18	5.37' L	17+28.23	11.00' L
C4	200.00'	62.56'	17°55'15"	31.54'	16+66.65	0.50' R	17+28.22	9.00' L
C5	1.00'	3.14'	180°00'00"	INFINITE'	19+24.38	11.00' L	19+24.38	9.00' L
C10	1.00'	3.14'	180°00'00"	INFINITE'	20+73.10	11.00' R	20+73.10	9.00' R

BACK OF CURB CURVE TABLE

CURVE	RADIUS	LENGTH	DELTA	TANGENT	PC STA	OFFSET	PT STA	OFFSET
C6	20.00'	31.42'	90°00'00"	20.00'	16+82.71	74.00' L	17+02.71	54.00' L
C7	35.00'	6.91'	11°18'36"	3.47'	18+24.44	54.00' L	18+31.30	53.32' L
C8	25.00'	4.93'	11°18'36"	2.48'	18+75.48	44.49' L	18+80.38	44.00' L
C9	20.00'	32.82'	94°01'22"	21.46'	19+21.44	43.72' L	19+41.43	65.08' L

PAVEMENT LEGEND

- EXISTING MEDIAN SURFACE TO BE REMOVED
- EXISTING PAVEMENT TO BE REMOVED
- NEW PAVEMENT SEE CONSTRUCTION NOTE FOR SECTION
- 10" 4000 PSI CONCRETE OVER 6" TYPE II AGGREGATE BASE PER CCUSD DWG NO 234.1 (TO BE PAID UNDER ITEM ~~402.03~~ 409.01 (NDOT) 'BUS TURNOUT')

1" MILL & UTACS ~~SLURRY SEAL~~-REMOVAL OF EXISTING RAISED PAVEMENT MARKERS AND ANY OTHER PAVEMENT MARKINGS SHALL BE INCLUDED IN THE BID PRICE FOR ~~SLURRY~~ UTACS ~~SEAL~~. NO ADDITIONAL PAYMENT WILL BE MADE

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Call before you Dig — Call 811 — 1-800-227-2600 — 1-702-455-7544

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION

CITY ENGINEER: DAVID N. BOWERS, P.E., P.T.O.E.
PROJECT MANAGER: MICHAEL STURDIVANT, P.E.
DESIGNED BY: RM, WV — HORIZONTAL SCALE: AS SHOWN
DRAWN BY: JS, NV — VERTICAL SCALE: NONE
CHECKED BY: RM, ST, WV — DATE: 2013-11-21

REVISIONS

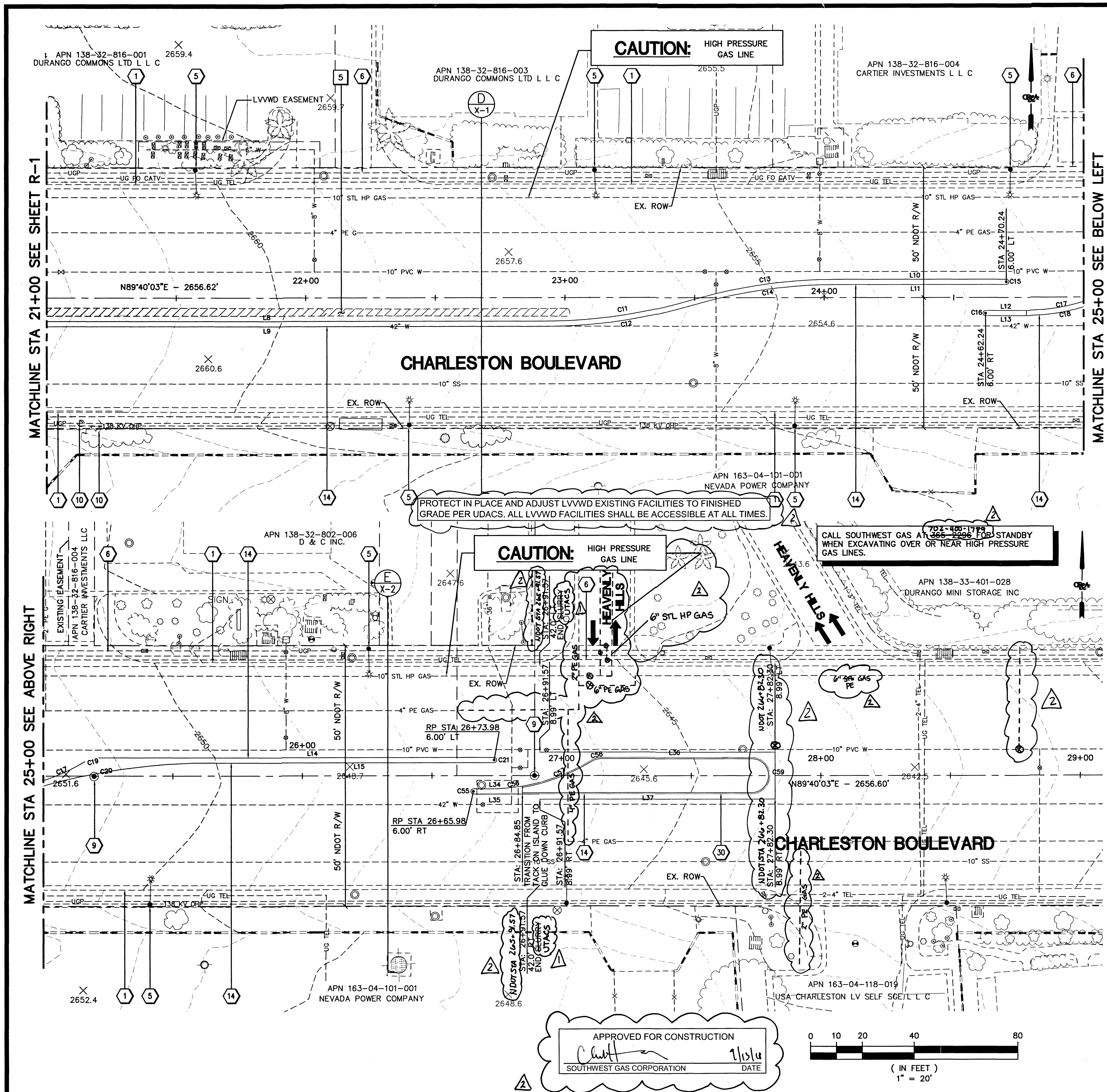
NO.	DATE:	DESCRIPTION	APP'D
1	10.4.18	CONSTRUCTION NOTE 27 EDIT	
2	8.20.19	LVVWD STATION, LVVWD NOTE, SW GAS	
3	8.20.18	REPLACE SLURRY W/ UTACS	

TITLE: TRAFFIC PACKAGE 6B
CHARLESTON/DURANGO, CHARLESTON/RANCHO
SHEET: CHARLESTON BOULEVARD ROADWAY IMPROVEMENTS
STA 13+00 TO STA 21+00

PROJ #125396 AGR #116300 QS 138-32-SE, 163-05-SE

NDOT PROJ. NO SI-0159(011)
H# 06-25814

Sheet R-1
8 of 21
DRAWING NO. 107-V4797-b



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Las Vegas, NV 89147 (702) 233-4060

REMOVAL/RELOCATION NOTES

5 REMOVE MEDIAN ISLAND SURFACE

CONSTRUCTION NOTES

1. PROTECT IN PLACE CURB & GUTTER AND/OR SIDEWALK
5. PROTECT IN PLACE LUMINAIRE
6. PROTECT IN CROSS GUTTER
9. PROTECT IN PLACE SURVEY MONUMENT
10. PROTECT IN PLACE POWER FACILITIES
14. CONSTRUCT TACK ON ISLAND PER CCUSD 220.1.S1 WITHOUT ~~VERTICAL REBAR~~ MEDIAN TO BE CONSTRUCTED ON EXISTING OR MILLED SURFACE PRIOR TO ~~SLURRY SEAL~~. UTACS 1
30. CONSTRUCT "A" TYPE GLUE DOWN CURB WITH CONCRETE FILL PER NDOT STANDARD DWG R-5.1.1

LINE AND CURVE DATA

FACE OF MEDIAN LINE TABLE

LINE	BEARING	DISTANCE
L8	N89°40'03"E	219.33'
L9	S89°40'03"W	219.33'
L10	N89°40'03"E	65.81'
L11	S89°40'03"W	65.81'
L12	N89°40'03"E	15.77'
L13	S89°40'03"W	15.77'
L14	S89°40'03"W	115.83'
L15	S89°40'03"W	115.83'

FACE OF MEDIAN LINE TABLE

LINE	BEARING	DISTANCE
L34	N89°40'02"E	9.00'
L35	N89°42'53"E	18.87'
L36	S89°40'03"W	57.33'
L37	N89°37'29"E	88.46'

FACE OF MEDIAN CURVE TABLE

CURVE	RADIUS	LENGTH	DELTA	TANGENT	PC STA OFFSET	PT STA OFFSET
C10	1.00'	3.14'	180°00'00"	INFINITE'	20+73.10 11.00' R	20+73.10 9.00' R
C11	200.00'	56.76'	16°15'37"	28.57'	22+92.43 9.00 R	23+48.43 1.00' R
C12	202.00'	57.33'	16°15'37"	28.86'	22+92.43 11.00' R	23+48.99 2.92' R
C13	200.00'	56.76'	16°15'37"	28.57'	23+48.43 1.00' R	24+04.43 7.00' L
C14	198.00'	56.19'	16°15'37"	28.29'	23+48.99 2.92' R	24+04.43 5.00' L
C15	1.00'	3.14'	180°00'00"	INFINITE'	24+70.24 7.00' L	24+70.24 5.00' L
C16	1.00'	3.14'	180°00'00"	INFINITE'	24+62.24 7.00' R	24+62.24 5.00' R
C17	74.00'	40.04'	31°00'10"	20.52'	24+78.02 5.00' R	25+16.13 5.57' L
C18	76.00'	18.87'	14°13'41"	9.49'	24+78.02 7.00' R	24+96.70 4.67' R
C19	10.00'	5.41'	31°00'10"	2.77'	25+16.13 5.57' L	25+21.28 7.00' L
C20	250.00'	62.08'	14°13'41"	31.20'	24+96.70 4.67' R	25+58.14 3.00' L
C21	1.00'	3.14'	180°00'00"	INFINITE'	26+73.98 7.00' L	26+73.98 5.00' L
C55	1.00'	3.14'	180°00'00"	INFINITE'	26+65.98 7.00' R	26+65.98 5.00' R
C56	74.00'	9.93'	7°41'12"	4.97'	26+65.98 5.00' R	26+84.85 4.00' R
C57	74.00'	27.79'	21°30'51"	14.06'	26+84.85 4.00' R	27+10.76 5.56' L
C58	10.00'	5.49'	31°26'15"	2.81'	27+10.76 5.56' L	27+15.98 7.00' L
C59	7.00'	21.99'	180°00'00"	INFINITE'	27+73.41 7.00' L	27+73.41 7.00' R

PAVEMENT LEGEND

1" MILL & UTACS ~~SLURRY SEAL~~-REMOVAL OF EXISTING RAISED PAVEMENT MARKERS AND ANY OTHER PAVEMENT MARKINGS SHALL BE INCLUDED IN THE BID PRICE FOR ~~SLURRY SEAL~~ UTACS. NO ADDITIONAL PAYMENT WILL BE MADE

EXISTING MEDIAN SURFACE TO BE REMOVED

NOTE:
CALL SOUTHWEST GAS AT ~~365-2296~~ 702-400-1789 FOR STANDBY WHEN EXCAVATING OVER OR NEAR HIGH PRESSURE GAS LINES

APPROVED FOR CONSTRUCTION
Las Vegas Valley Water District Engineering Services Manager
Project No. 114683 Date: 12/5/13

APPROVED FOR CONSTRUCTION
Las Vegas Valley Water District Engineering Services
Project No. 125396 First Approved Date: 9/25/18

8.20.19
FOR REVISION 2 ONLY

SAFETY ALERT
Call Before You Overhead
1-702-227-2929
Call UnderGround 1-702-432-5300
F.A.S.T.
Call before you Dig
Call 811
1-800-227-2600
1-702-455-7544

REVISIONS

NO.	DATE:	DESCRIPTION	APP'D
2	8.20.18	ADD NDOT STATIONS, LVVWD NOTES & SW GAS NOTES	
1	9.20.18	REPLACE SLURRY W/ UTACS	

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION
CITY OF LAS VEGAS NEVADA
CITY ENGINEER: DAVID N. BOWERS, P.E., P.T.O.E.
PROJECT MANAGER: MICHAEL STURDIVANT, P.E.
DESIGNED BY: RM, WV
DRAWN BY: JS, NV
CHECKED BY: RM, ST, WV
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: NONE
DATE: 2013-11-21

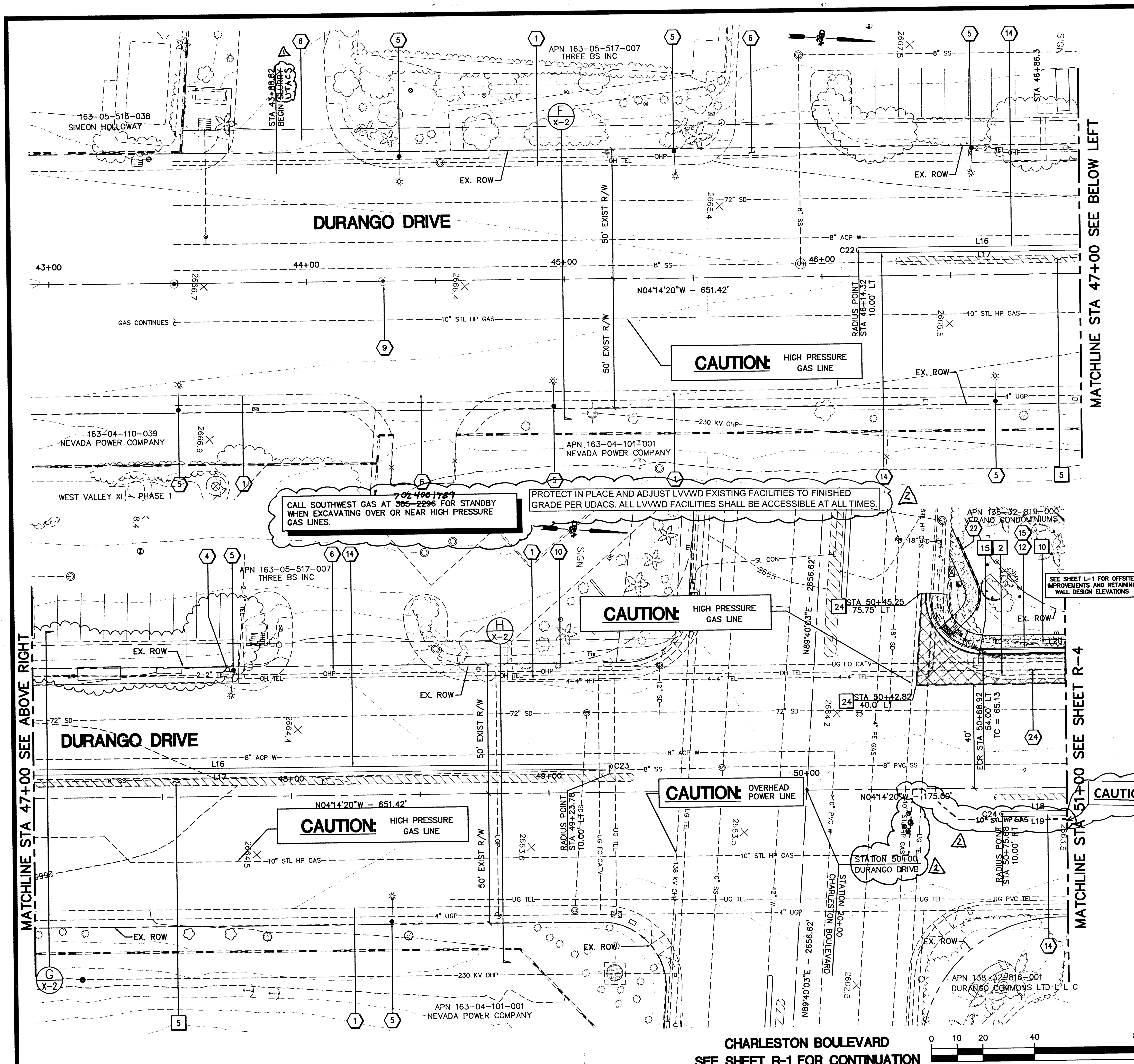
TITLE: TRAFFIC PACKAGE 6B
CHARLESTON/DURANGO, CHARLESTON/RANCHO
SHEET: CHARLESTON BOULEVARD ROADWAY IMPROVEMENTS
STA 21+00 TO STA 29+00

PROJ #125396 AGR #116300 QS 138-32-SE, 163-05-SE

REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA WALTER C. VODRAZKA, JR. EXP. 06-30-14 CIVIL No. 19183
12-3-13

Sheet R-2
9 of 21
DRAWING NO. 107-V4797-b

NDOT PROJ. NO SI-0159(011)
H# 06-25814



Orth–Rodgers and Associates, Inc.
TRANSPORTATION ENGINEERS and PLANNERS
8871 West Flamingo Road, Suite 202
Las Vegas, NV 89147 (702) 233–4060

REMOVAL/RELOCATION NOTES

2 REMOVE CURB, GUTTER AND SIDEWALK
5 REMOVE MEDIAN ISLAND SURFACE
10 LANDSCAPE AND IRRIGATION REMOVAL
15 RELOCATE CATV VAULT AND/OR BOX BEHIND NEW SIDEWALK (BY COX COMMUNICATIONS)
24 SAWCUT AND REMOVE EXISTING AC PAVEMENT AND BASE

CONSTRUCTION NOTES

1 PROTECT IN PLACE CURB & GUTTER AND/OR SIDEWALK
4 PROTECT IN PLACE FIRE HYDRANT
5 PROTECT IN PLACE LUMINAIRE
6 PROTECT IN PLACE CROSS GUTTER
9 PROTECT IN PLACE SURVEY MONUMENT
10 PROTECT IN PLACE POWER FACILITIES
12 CONSTRUCT "L" TYPE CURB AND GUTTER PER CCUSD. 216
14 CONSTRUCT TACK ON ISLAND PER CCUSD 220.1.S1 WITHOUT VERTICAL REBAR MEDIAN TO BE CONSTRUCTED ON EXISTING OR MILLED SURFACE PRIOR TO ~~SLURRY SEAL~~ UTACS 1
15 CONSTRUCT 5' WIDE SIDEWALK PER CCUSD 234
22 CONSTRUCT RETAINING WALL PER SOUTHERN NEVADA BUILDING OFFICIALS REGIONAL STANDARDS, DWG NO B-101. SEE SHEET D-1 FOR STANDARD DETAIL AND SHEET L-1 FOR WALL ELEVATIONS.
24 CONSTRUCT 5" AC PAVEMENT OVER 4" TYPE II AGGREGATE BASE COMPACTED TO 95%. MATCH EXISITNG.

LINE AND CURVE DATA

BACK OF CURB LINE TABLE

LINE	BEARING	DISTANCE
L20	S04°14'20"E	106.08'

FACE OF MEDIAN LINE TABLE

LINE	BEARING	DISTANCE
L16	S04°14'20"E	309.45'
L17	S04°14'20"E	309.45'
L18	N04°14'20"W	99.32'
L19	N04°14'20"W	99.32'

FACE OF MEDIAN CURVE TABLE

CURVE	RADIUS	LENGTH	DELTA	TANGENT	PC STA OFFSET	PT STA OFFSET
C22	1.00'	3.14'	180°00'00"	INFINITE'	46+14.32 11.00' L	46+14.32 9.00' L
C23	1.00'	3.14'	180°00'00"	INFINITE'	49+23.78 11.00' L	49+23.78 9.00' L
C24	1.00'	3.14'	180°00'00"	INFINITE'	50+75.68 9.00' R	50+75.68 11.00' R

6.30.20
8.20.18
FOR REVISION 1 ONLY & 2

APPROVED FOR CONSTRUCTION
Las Vegas Valley Water District Engineering Services Manager
Project No. 114683 Date: 12/5/13

APPROVED FOR CONSTRUCTION
Las Vegas Valley Water District Engineering Services
Project No. 125396 First Approved Date: 9/25/18

PAVEMENT LEGEND

EXISTING PAVEMENT TO BE REMOVED

NEW PAVEMENT SEE CONSTRUCTION NOTE FOR SECTION

1" MILL & UTACS ~~SLURRY SEAL~~ - REMOVAL OF EXISTING RAISED PAVEMENT MARKERS AND ANY OTHER PAVEMENT MARKINGS SHALL BE INCLUDED IN THE BID PRICE FOR ~~SLURRY SEAL~~ UTACS. NO ADDITIONAL PAYMENT WILL BE MADE.

EXISTING MEDIAN SURFACE TO BE REMOVED

APPROVED FOR CONSTRUCTION
SOUTHWEST GAS CORPORATION DATE 9/13/18

SAFETY ALERT
Call Before You Overhead 1-702-227-2929

AVOID HITTING UNDERGROUND TRAFFIC SIGNAL AND STREET LIGHT SYSTEM CONDUITS. IT'S COSTLY!
Call 1-702-432-5300 F.A.S.T.

Call before you Dig
Call 811 UnderGround before you 1-800-227-2600 1-702-455-7544

WALTER C. VODRAZKA, JR. CIVIL No. 18183
12-3-13

REVISIONS

NO.	DATE:	DESCRIPTION	APP'D
1	8.20.18	REPLACE SLURRY W/ UTACS	
2	8.20.18		

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION

CITY ENGINEER: DAVID N. BOWERS, P.E., P.T.O.E.
PROJECT MANAGER: MICHAEL STURDIVANT, P.E.
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: NONE
DATE: 2013-11-21
DESIGNED BY: RM, WV
DRAWN BY: JS, NV
CHECKED BY: RM, ST, WV

CITY OF LAS VEGAS NEVADA

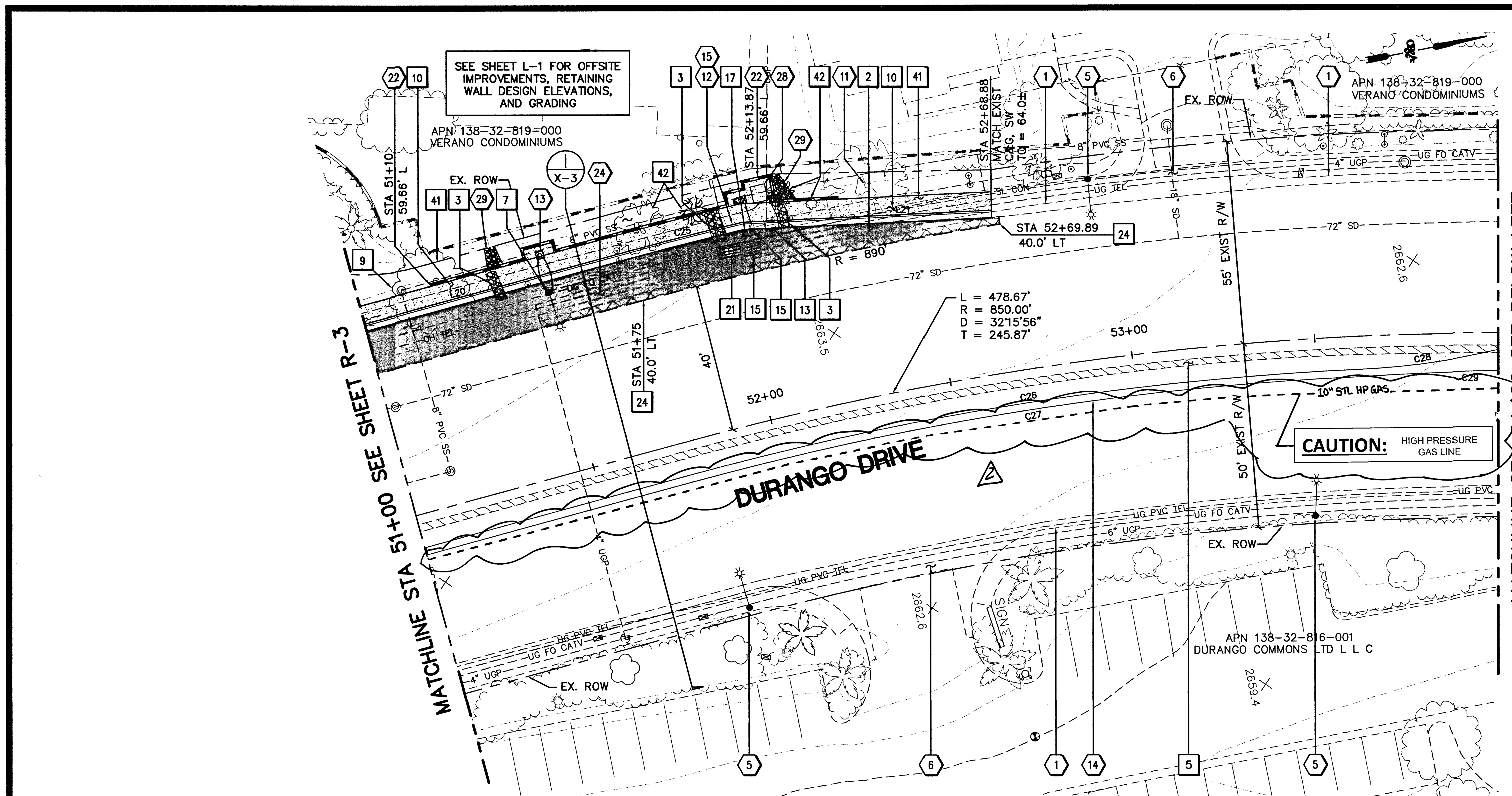
TITLE: TRAFFIC PACKAGE 6B CHARLESTON/DURANGO, CHARLESTON/RANCHO

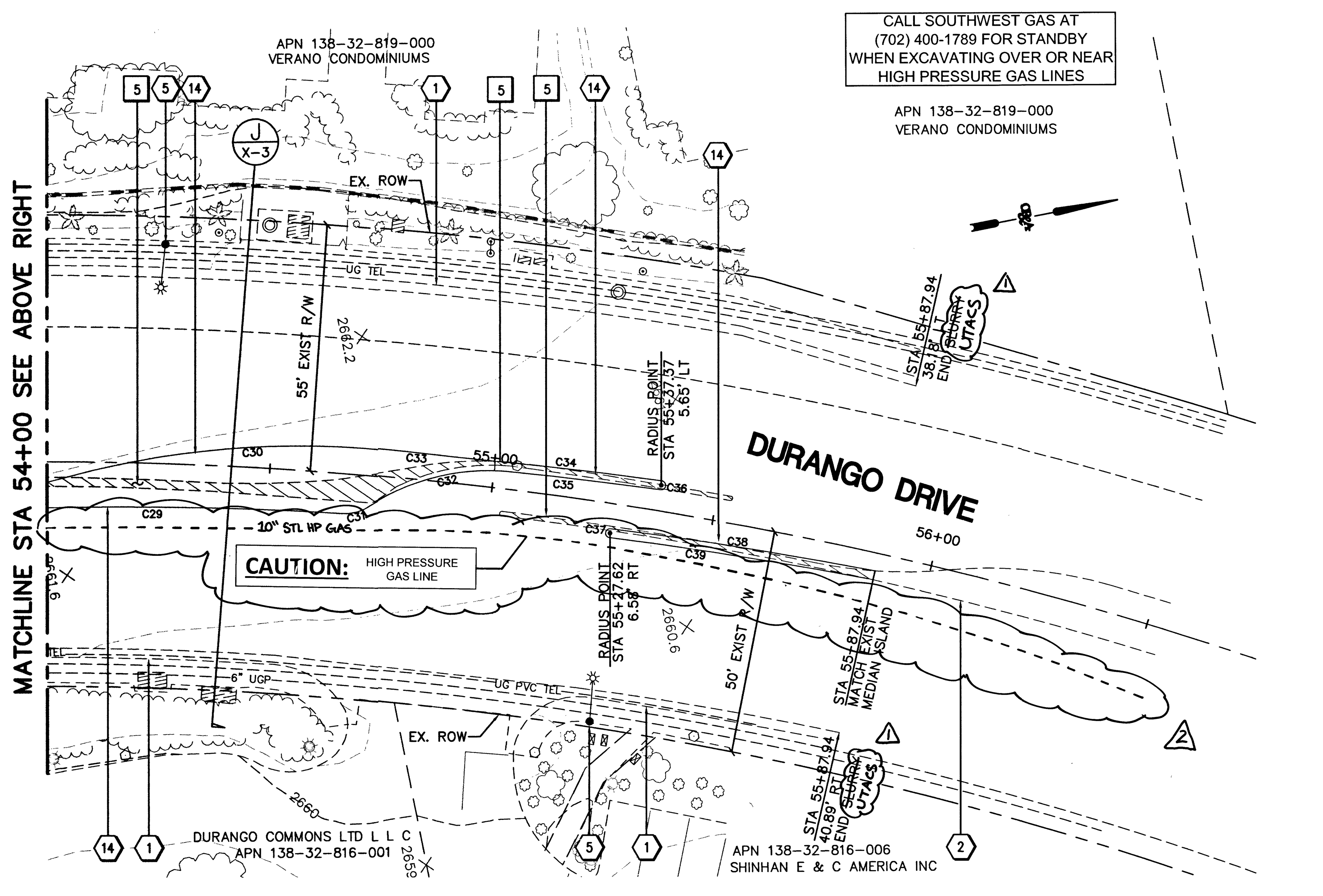
SHEET: DURANGO DRIVE ROADWAY IMPROVEMENTS STA 43+00 TO STA 51+00

PROJ #125396 AGR #116300 QS 138-32-SE, 163-05-SE

Sheet R-3
10 of 21
DRAWING NO. 107-V4797-b

H# 06-25814 NDOT PROJ. NO SI-0159(011)





0 10 20 40 80

(IN FEET)
1" = 20'

Orth-Rodgers and Associates, Inc.
TRANSPORTATION ENGINEERS and PLANNERS
8871 West Flamingo Road, Suite 202
Las Vegas, NV 89147 (702) 233-4060

REMOVAL/RELOCATION NOTES

- 2 REMOVE CURB, GUTTER AND SIDEWALK
- 3 REMOVE EXISTING RIPRAP
- 5 REMOVE MEDIAN ISLAND SURFACE
- 7 REMOVE AND SALVAGE LUMINAIRE. SEE SHEET S-4.
- 9 VERTICALLY ADJUST MANHOLE, FRAME AND COVER TO FINISH GRADE PER CCUSD 403 OR 404
- 10 LANDSCAPE AND IRRIGATION REMOVAL
- 13 REMOVE EXISITNG POWER TRANSFORMER XX547 (BY NV ENERGY)
- 15 RELOCATE CATV VAULT AND/OR BOX BEHIND NEW SIDEWALK (BY COX COMMUNICATIONS)
- 17 RELOCATE SERVICE PEDESTAL AND ALL ASSOCIATED CONDUIT AND WIRING TO A NEW FOUNDATION BEHIND NEW SIDEWALK (BY NV ENERGY)
- 21 REMOVE EXISTING TELEPHONE VAULT AND REPLACE WITH NEW MANHOLE, FRAME AND COVER. (BY CENTURY LINK)
- 24 SAWCUT AND REMOVE EXISTING AC PAVEMENT AND BASE
- 41 REMOVE TREE > 1' DIAMETER
- 42 REMOVE TREE < 1' DIAMETER

Michael Sturdivant 6.30.20

CONSTRUCTION NOTES

- 1 PROTECT IN PLACE CURB & GUTTER AND/OR SIDEWALK
- 2 PROTECT IN PLACE MEDIAN ISLAND CURB
- 5 PROTECT IN PLACE LUMINAIRE
- 6 PROTECT IN PLACE CROSS GUTTER
- 11 PROTECT IN PLACE EXISTING TREE
- 12 CONSTRUCT "L" TYPE CURB AND GUTTER PER CCUSD 216
- 13 INSTALL NEW LUMINAIRE. SEE SHEET S-4
- 14 CONSTRUCT TACK ON ISLAND PER CCUSD 220.1.S1 WITHOUT VERTICAL REBAR MEDIAN TO BE CONSTRUCTED ON EXISTING OR MILLED SURFACE PRIOR TO ~~SLURRY SEAL~~ UTACS
- 15 CONSTRUCT 5' WIDE SIDEWALK PER CCUSD 234
- 22 CONSTRUCT RETAINING WALL PER SNBO REGIONAL STANDARDS, DWG NO B-100-2. SEE SHEET D-1 FOR STANDARD DETAIL.
- 24 CONSTRUCT 5" AC PAVEMENT OVER 4" TYPE II AGGREGATE BASE COMPACTED TO 95%
- 28 INSTALL NEW TRANSFORMER BY NV ENERGY. SEE NV ENERGY DESIGN PLANS FOR DETAILS.
- 29 INSTALL NEW RIPRAP TO MAINTAIN EXISTING FLOWLINE. SEE NOTE 5 ON SNBO REGIONAL STANDARD DWG NO B-100-2. SEE SHEET D-1 FOR STANDARD DETAIL.

8.20.18
FOR REVISION 1 ONLY

LINE AND CURVE DATA

BACK OF CURB CURVE TABLE

CURVE	RADIUS	LENGTH	DELTA	TANGENT	PC STA	OFFSET	PT STA	OFFSET
C25	904.00'	31.63'	2°00'18"	15.82'	51+75.00	54.00' L	52+04.74	54.00' L

FACE OF MEDIAN LINE TABLE

LINE	BEARING	DISTANCE
L18	N04°14'20"W	99.32'
L19	N04°14'20"W	99.32'

BACK OF CURB LINE TABLE

LINE	BEARING	DISTANCE
L20	S04°14'20"E	106.08'
L21	N08°17'14"E	67.90'

FACE OF MEDIAN CURVE TABLE

CURVE	RADIUS	LENGTH	DELTA	TANGENT	PC STA	OFFSET	PT STA	OFFSET
C26	841.00'	185.02'	12°36'18"	92.88'	51+75.00	9.00' R	53+62.00	9.00' R
C27	839.00'	184.47'	12°35'52"	92.61'	51+75.00	11.00' R	53+61.90	11.00' R
C28	200.00'	43.32'	12°24'32"	21.74'	53+62.00	9.00' R	54+05.16	3.24' R
C29	841.00'	103.86'	7°04'33"	52.00'	53+61.90	11.00' R	54+66.97	8.90' R
C30	200.00'	76.48'	21°54'33"	38.71'	54+05.16	3.24' R	54+80.53	5.91' L
C31	10.00'	6.25'	35°47'50"	3.23'	54+66.97	8.90' R	54+72.83	6.87' L
C32	856.00'	19.60'	1°18'43"	9.80'	54+72.83	6.87' L	55+02.14	3.88' L
C33	50.00'	31.70'	36°19'26"	16.40'	54+80.53	5.91' L	54+99.99	5.84' L
C34	948.00'	37.63'	2°16'28"	18.82'	54+99.99	5.84' L	55+37.34	6.65' L
C35	946.00'	35.44'	2°08'47"	17.72'	55+02.14	3.88' L	55+37.39	4.65' L
C36	1.00'	3.14'	180°00'00"	INFINITE'	55+37.34	6.65' L	55+37.39	4.65' L
C37	1.00'	3.14'	180°00'00"	INFINITE'	55+27.60	5.58' R	55+27.64	7.58' R
C38	936.00'	60.02'	3°40'27"	30.02'	55+27.60	5.58' R	55+87.94	4.00' R
C39	934.00'	59.84'	3°40'15"	29.93'	55+27.64	7.58' R	55+87.95	6.00' R

PAVEMENT LEGEND

- EXISTING PAVEMENT TO BE REMOVED
- NEW PAVEMENT SEE CONSTRUCTION NOTE FOR SECTION
- 1" MILL & UTACS ~~SLURRY SEAL~~-REMOVAL OF EXISTING RAISED PAVEMENT MARKERS AND ANY OTHER PAVEMENT MARKINGS SHALL BE INCLUDED IN THE BID PRICE FOR ~~SLURRY SEAL~~ UTACS. NO ADDITIONAL PAYMENT WILL BE MADE
- EXISTING MEDIAN SURFACE TO BE REMOVED

APPROVED FOR CONSTRUCTION
9/13/18
SOUTHWEST GAS CORPORATION DATE

SAFETY ALERT
Call Before You Overhead 1-702-227-2929

AVOID HITTING UNDERGROUND TRAFFIC SIGNAL AND STREET LIGHT SYSTEM CONDUITS IT'S COSTLY
Call before you UnderGround 1-702-432-5300 F.A.S.T.

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811
OR 1-800-227-2600
AND CLARK COUNTY TRAFFIC OPERATIONS 1-702-455-7544

REVISIONS

NO.	DATE:	DESCRIPTION	APP'D
1	8.20.18		
2	8.20.18	REPLACE SLURRY W/ UTACS	

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION

CITY ENGINEER: DAVID N. BOWERS, P.E., P.T.O.E.
PROJECT MANAGER: MICHAEL STURDIVANT, P.E.
DESIGNED BY: RM, WV
DRAWN BY: JS, NV
CHECKED BY: RM, ST, WV
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: NONE
DATE: 2013-11-21

CITY OF LAS VEGAS NEVADA

TITLE: TRAFFIC PACKAGE 6B
CHARLESTON/DURANGO, CHARLESTON/RANCHO

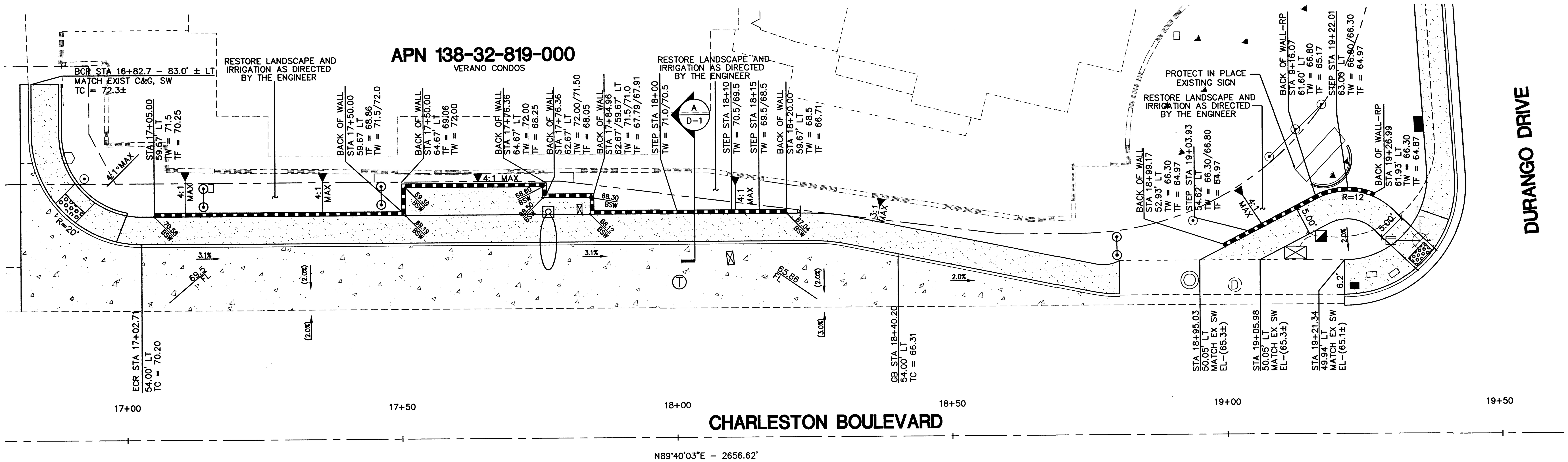
SHEET: DURANGO DRIVE ROADWAY IMPROVEMENTS
STA 51+00 TO STA 57+00

REGISTERED PROFESSIONAL ENGINEER WALTER C. VODRAZKA, JR. EXP. 06-30-14 CIVIL No. 19183
12-3-13

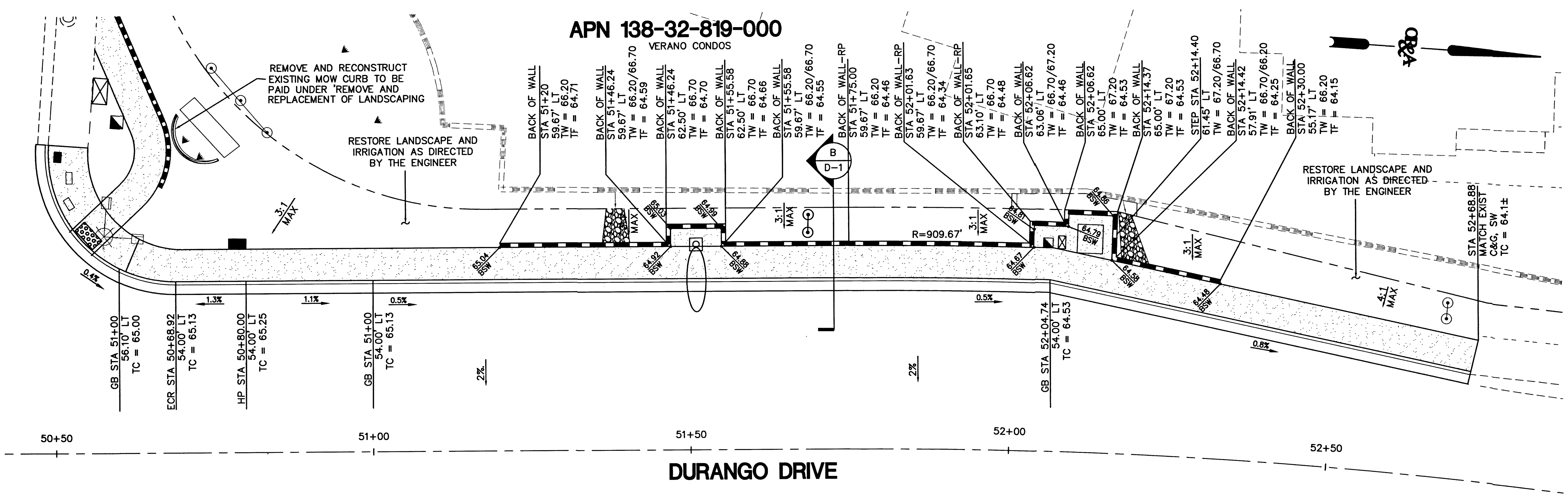
Sheet R-4
11 of 21
DRAWING NO. 107-V4797-b

NDOT PROJ. NO SI-0159(011)
H# 06-25814

Orth-Rodgers and Associates, Inc.
TRANSPORTATION ENGINEERS and PLANNERS
8871 West Flamingo Road, Suite 202
Las Vegas, NV 89147 (702) 233-4060



CONSTRUCT RETAINING WALL PER SNBO REGIONAL STANDARDS, DWG NO B-100-2. SEE SHEET D-1 FOR STANDARD DETAIL.



SAFETY ALERT
Call Before You Overhead 1-702-227-2929
Call before you UnderGround 1-702-432-5300 F.A.S.T.
Call before you Dig 811 1-800-227-2600 1-702-455-7544

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION
CITY ENGINEER: DAVID N. BOWERS, P.E., P.T.O.E.
PROJECT MANAGER: MICHAEL STURDIVANT, P.E.
DESIGNED BY: RM, WV
DRAWN BY: JS, NV
CHECKED BY: RM, ST, WV
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: NONE
DATE: 2013-11-21

REVISIONS: NO. | DATE | DESCRIPTION | APP'D

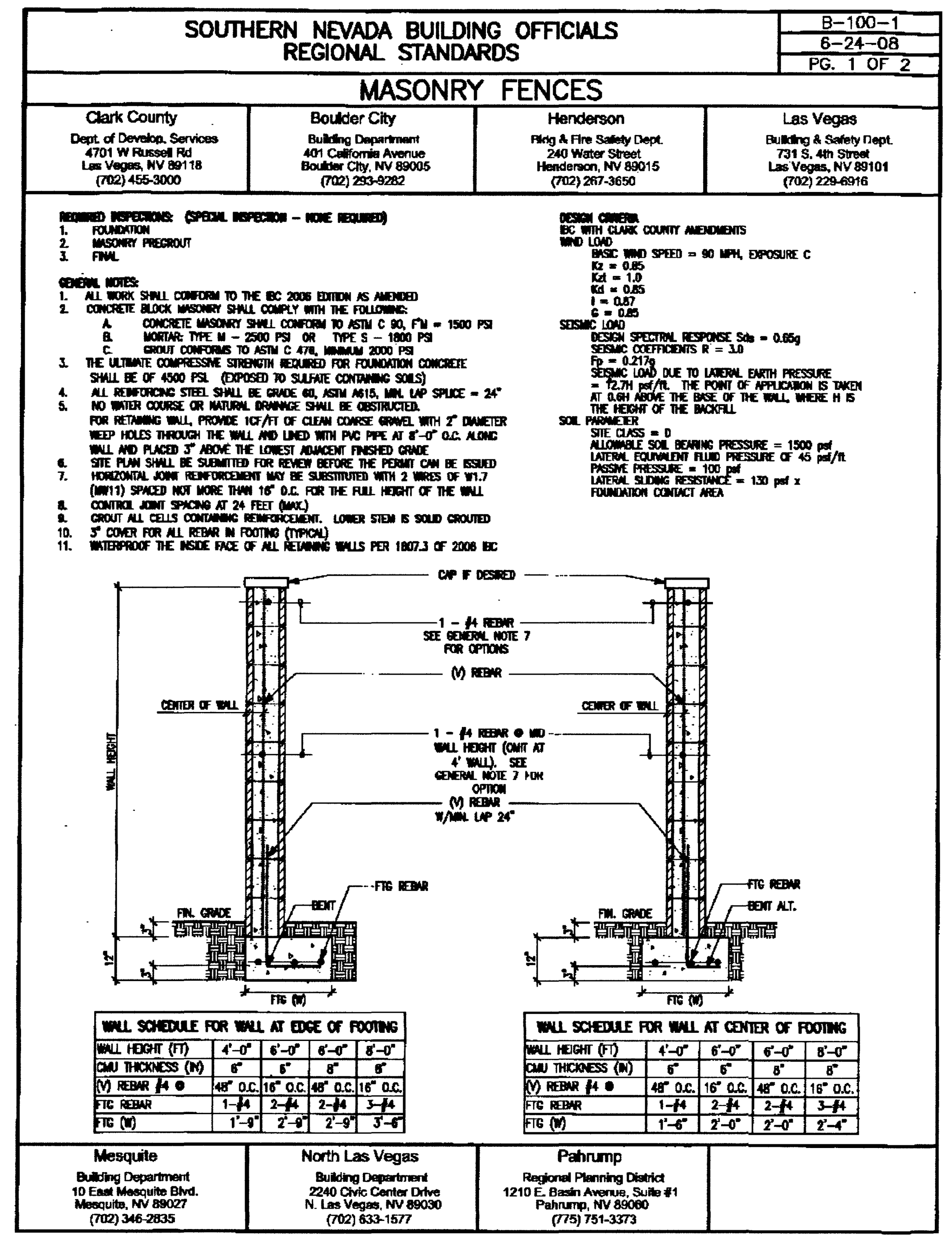
TITLE: TRAFFIC PACKAGE 6B
CHARLESTON/DURANGO, CHARLESTON/RANCHO
SHEET: CHARLESTON/DURANGO CHARLESTON/DURANGO RETAINING WALL DESIGN ELEVATIONS AND GRADING

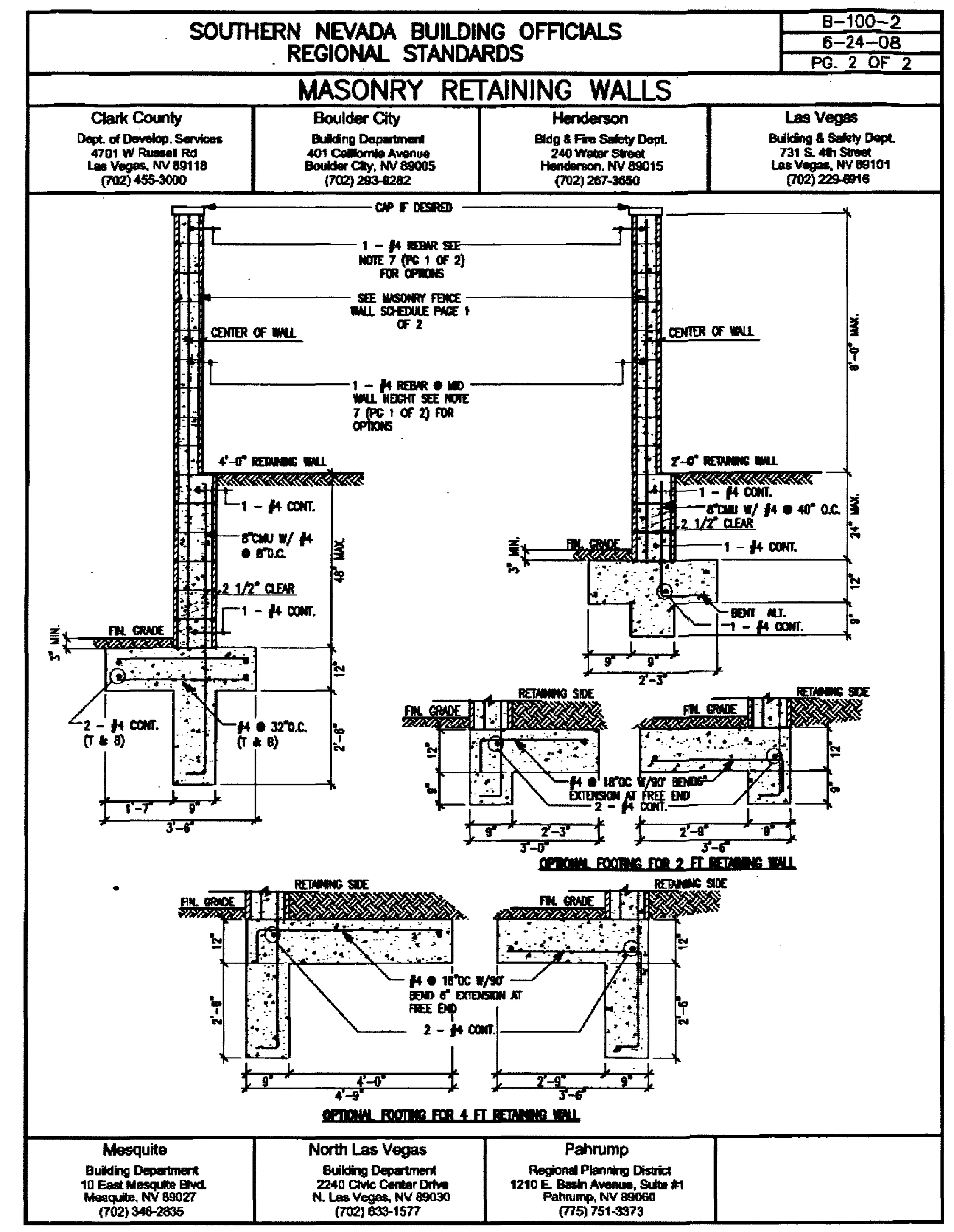
WALTER C. VODRAZKA, JR. CIVIL No. 19163

Sheet L-1
12 of 21
DRAWING NO. 107-V4797-b

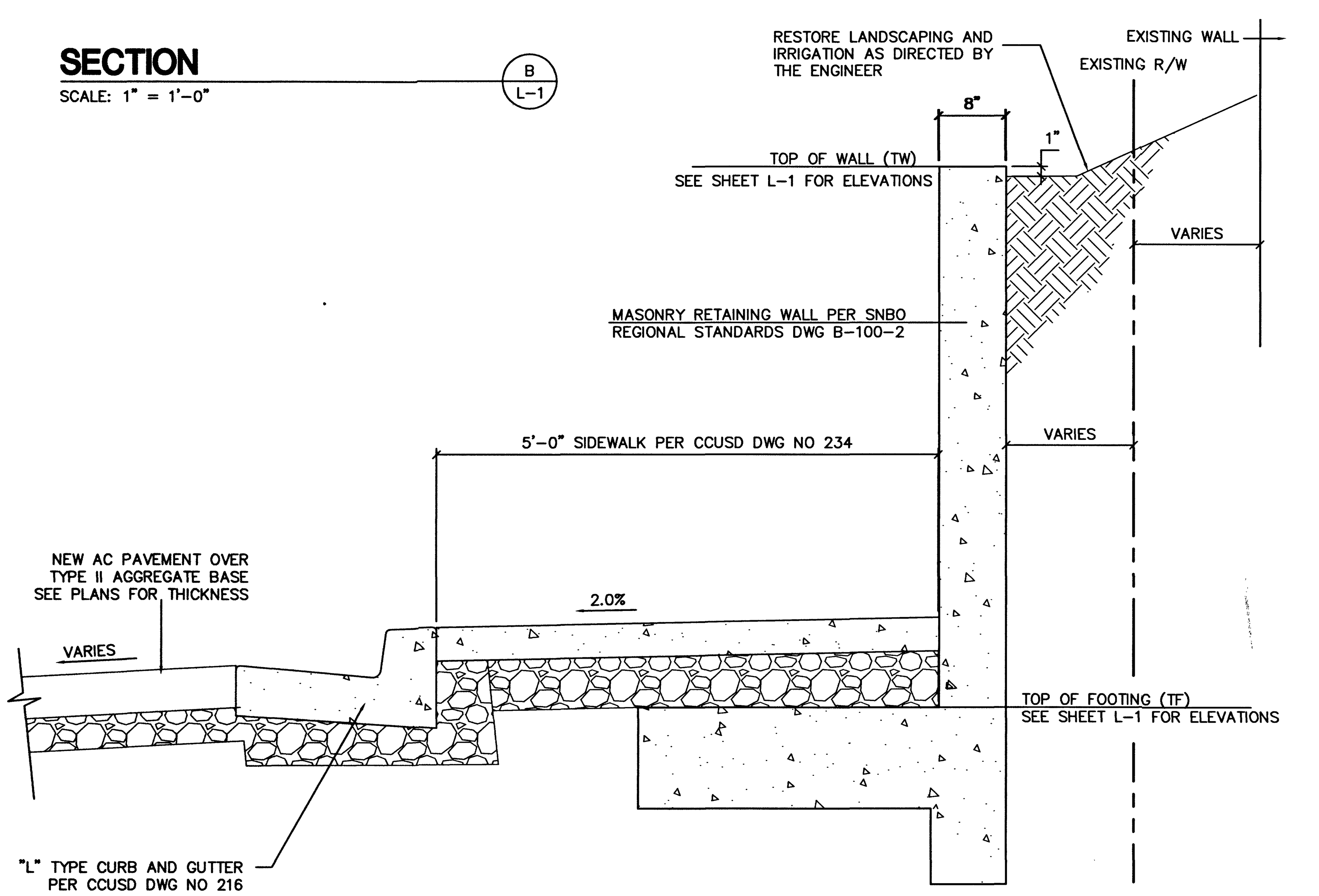
H# 06-25814 NDOT PROJ. NO SI-0159(011)

Orth–Rodgers and Associates, Inc.
TRANSPORTATION ENGINEERS and PLANNERS
8871 West Flamingo Road, Suite 202
Las Vegas, NV 89147 (702) 233-4060

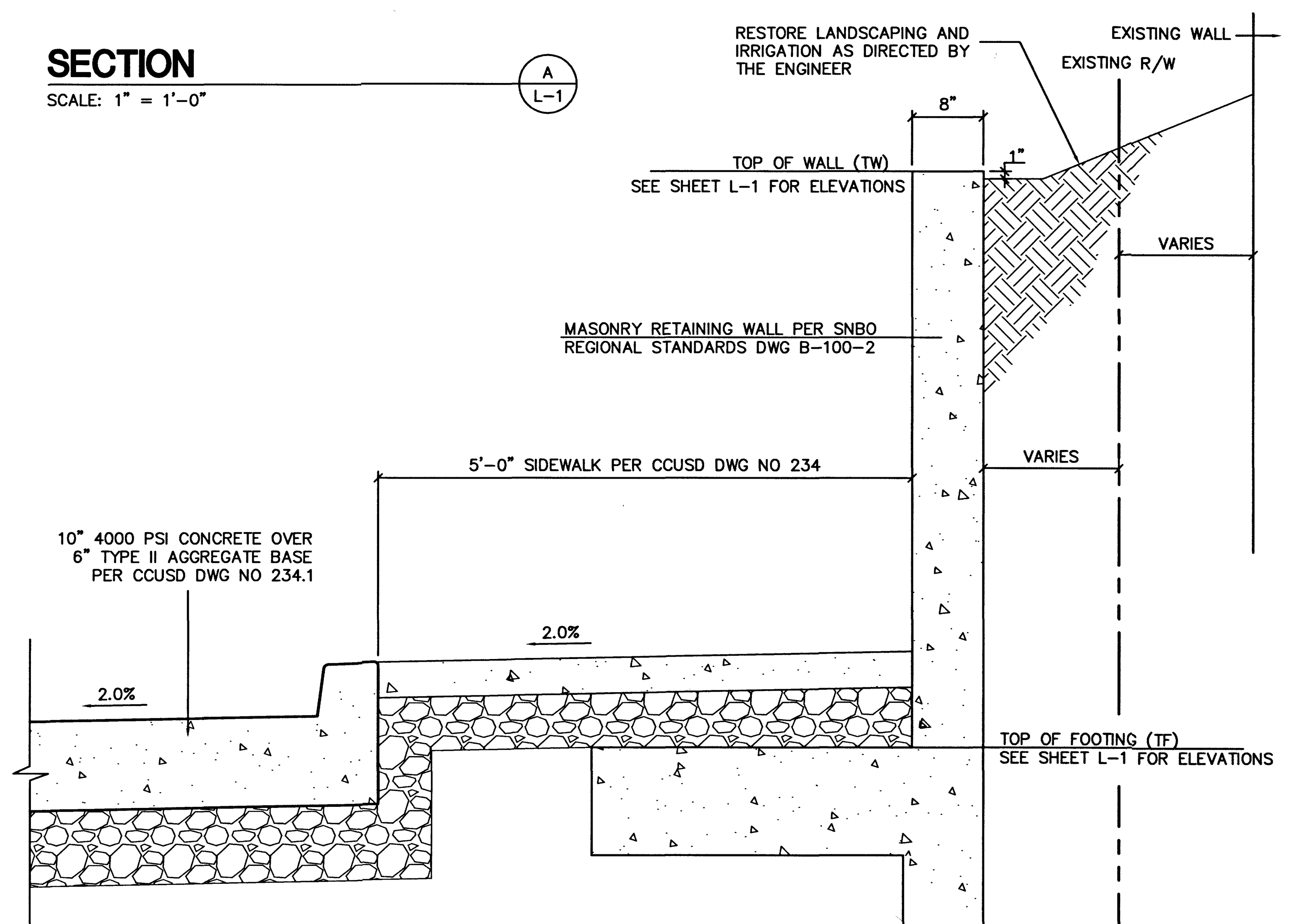




SECTION
SCALE: 1" = 1'-0"



SECTION
SCALE: 1" = 1'-0"



REVISIONS			
NO.	DATE:	DESCRIPTION	APP'D

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION

CITY ENGINEER: DAVID N. BOWERS, P.E., P.T.O.E.
PROJECT MANAGER: MICHAEL STURDIVANT, P.E.
DESIGNED BY: RM, WV
DRAWN BY: JS, NV
CHECKED BY: RM, ST, WV
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: NONE
DATE: 2013-11-21

CITY OF LAS VEGAS NEVADA

TITLE: TRAFFIC PACKAGE 6B
CHARLESTON/DURANGO, CHARLESTON/RANCHO

SHEET: RETAINING WALL DETAILS

REGISTERED PROFESSIONAL ENGINEER WALTER C. VODRAZKA, JR. EXP. 06-30-14 CIVIL No. 19183 STATE OF NEVADA
12-3-13

Sheet D-1
13 of 21
DRAWING NO. 107-V4797-b

H# 06-25814 NDOT PROJ. NO SI-0159(011)

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TRANSPORTATION ENGINEERS and PLANNERS
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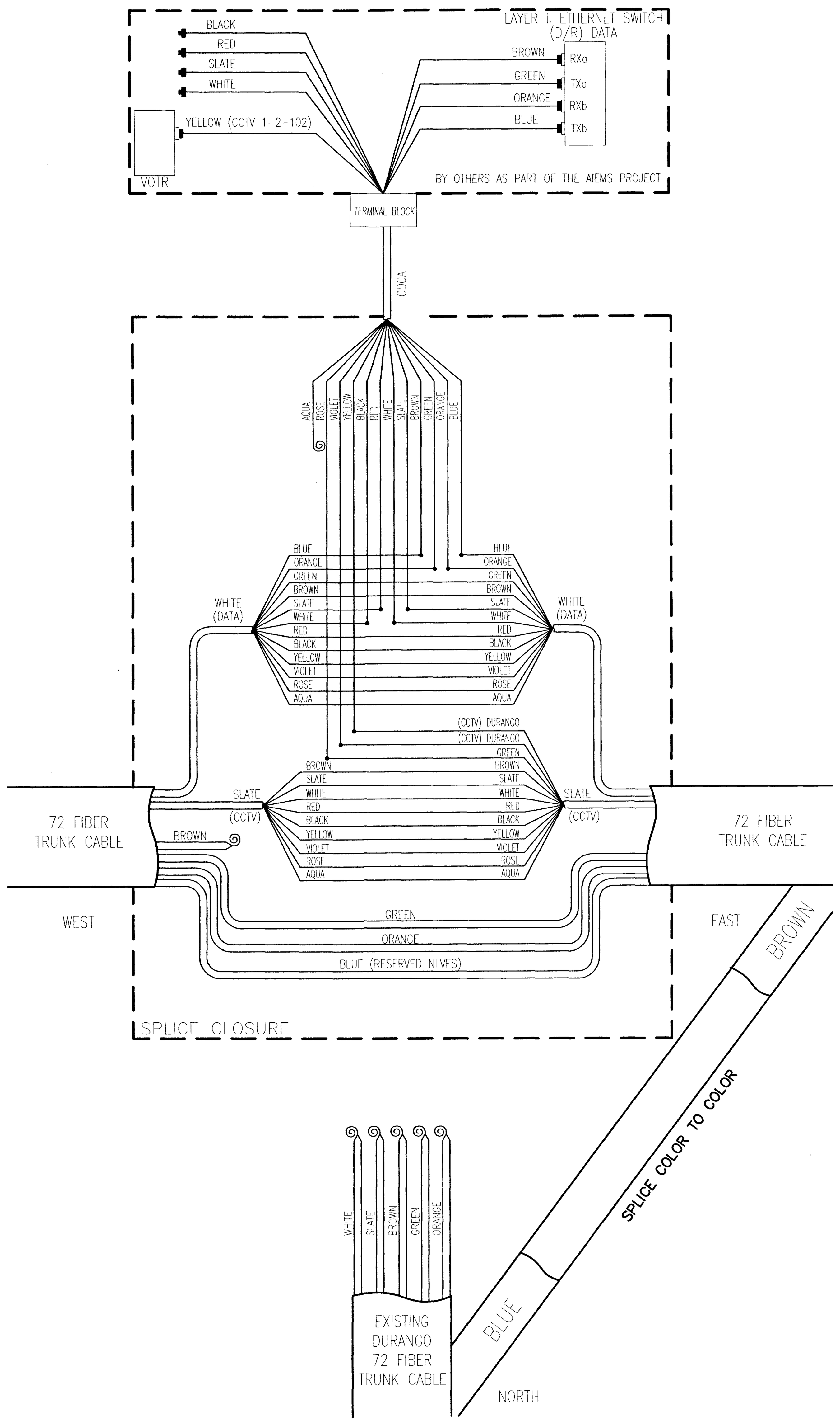
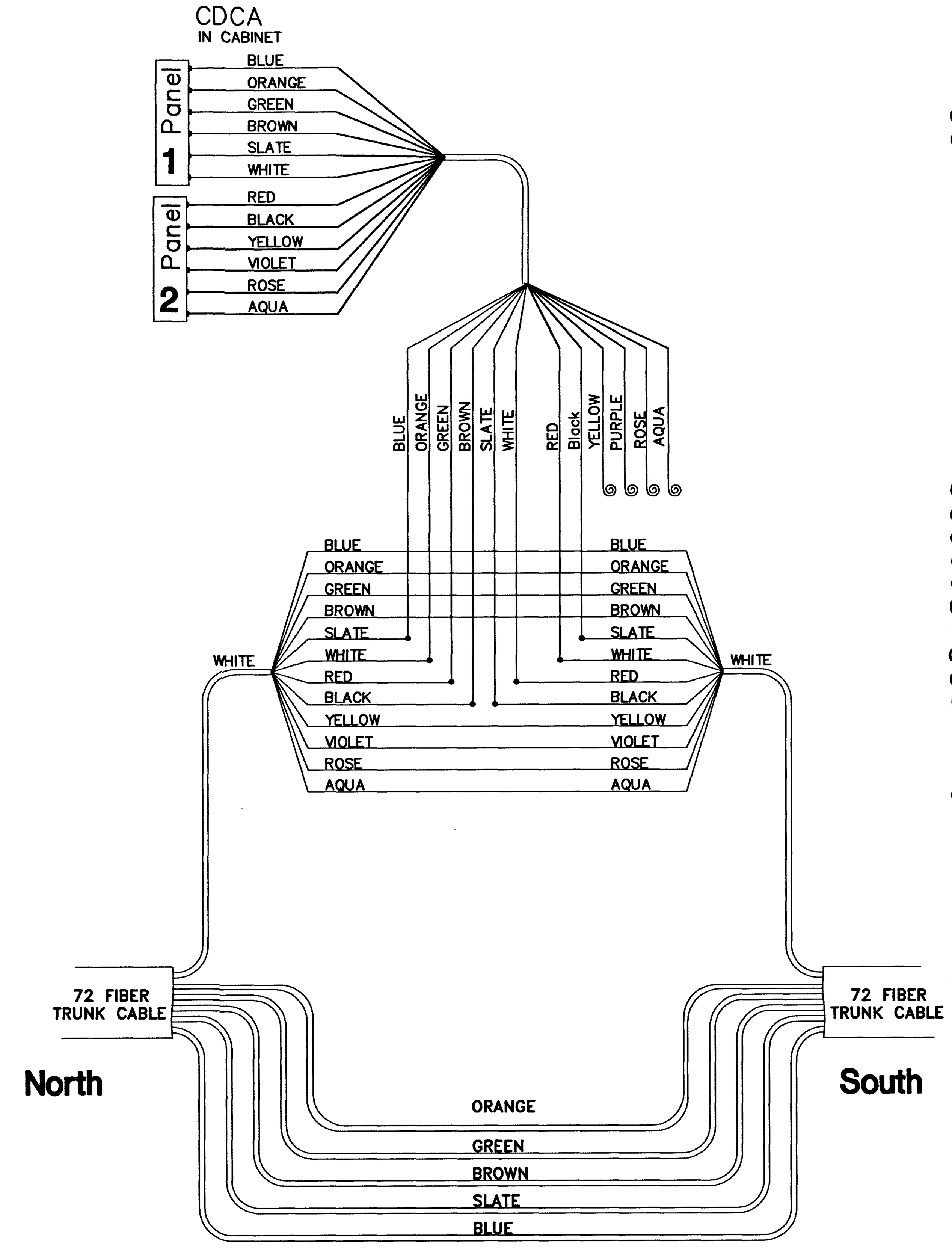
Las Vegas, NV 89147 (702) 233-4060



TYPE 3A DURANGO & CHARLESTON SPLICE DIAGRAM

SCALE: NONE

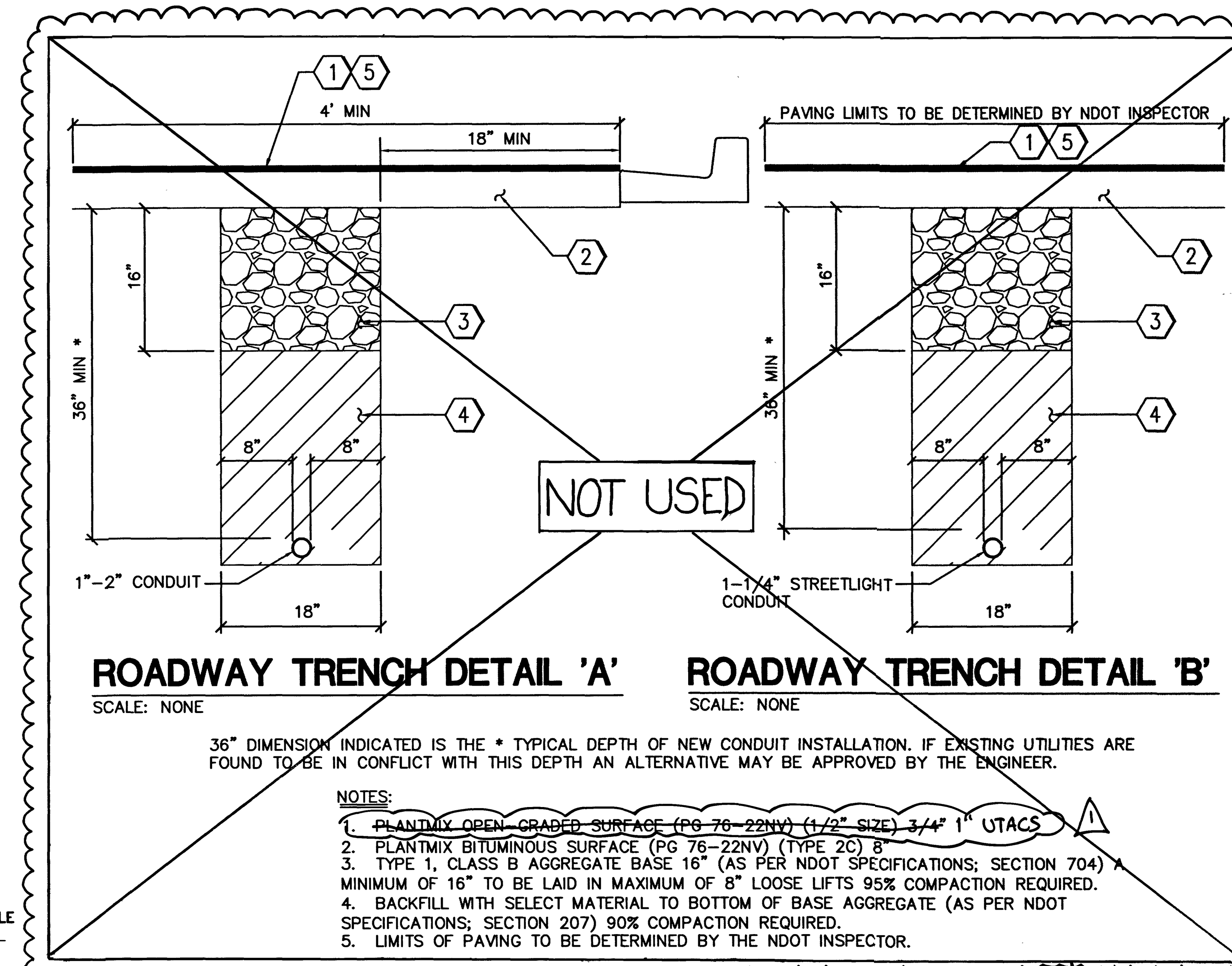
2 / T-1



TYPE 3 RANCHO & CHARLESTON SPLICE DIAGRAM

SCALE: NONE

3 / T-3



ROADWAY TRENCH DETAIL 'A'

SCALE: NONE

ROADWAY TRENCH DETAIL 'B'

SCALE: NONE

36" DIMENSION INDICATED IS THE * TYPICAL DEPTH OF NEW CONDUIT INSTALLATION. IF EXISTING UTILITIES ARE FOUND TO BE IN CONFLICT WITH THIS DEPTH AN ALTERNATIVE MAY BE APPROVED BY THE ENGINEER.

NOTES:

1. ~~PLANTMIX OPEN-GRADED SURFACE (PG 76-22NV) (1/2" SIZE) 3/4"~~ 1" UTACS
2. PLANTMIX BITUMINOUS SURFACE (PG 76-22NV) (TYPE 2C) 8"
3. TYPE 1, CLASS B AGGREGATE BASE 16" (AS PER NDOT SPECIFICATIONS; SECTION 704) * MINIMUM OF 16" TO BE LAID IN MAXIMUM OF 8" LOOSE LIFTS 95% COMPACTION REQUIRED.
4. BACKFILL WITH SELECT MATERIAL TO BOTTOM OF BASE AGGREGATE (AS PER NDOT SPECIFICATIONS; SECTION 207) 90% COMPACTION REQUIRED.
5. LIMITS OF PAVING TO BE DETERMINED BY THE NDOT INSPECTOR.

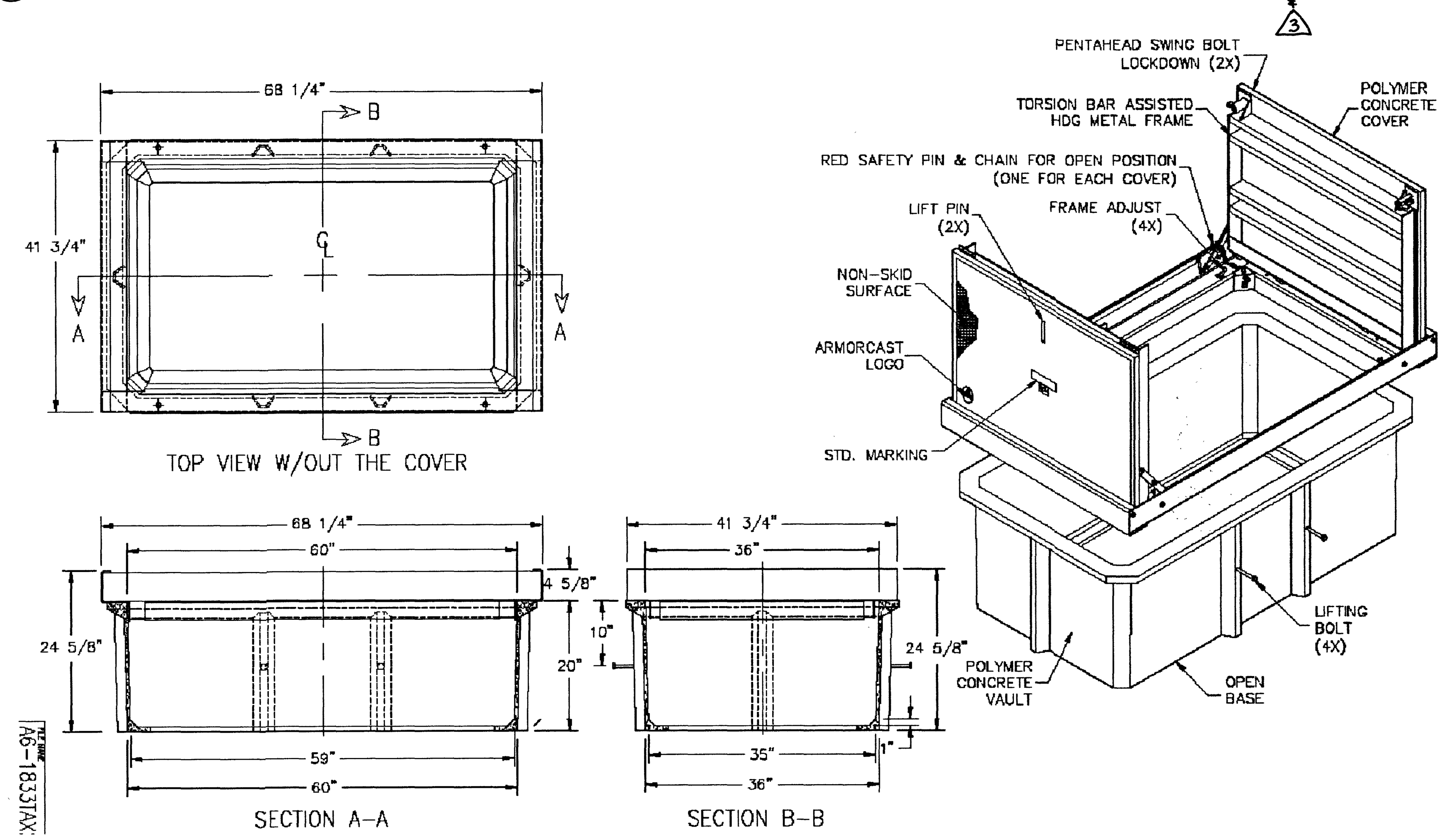
USE NDOT STANDARD PLANS T-30.2.4 FOR ALL TRENCHES

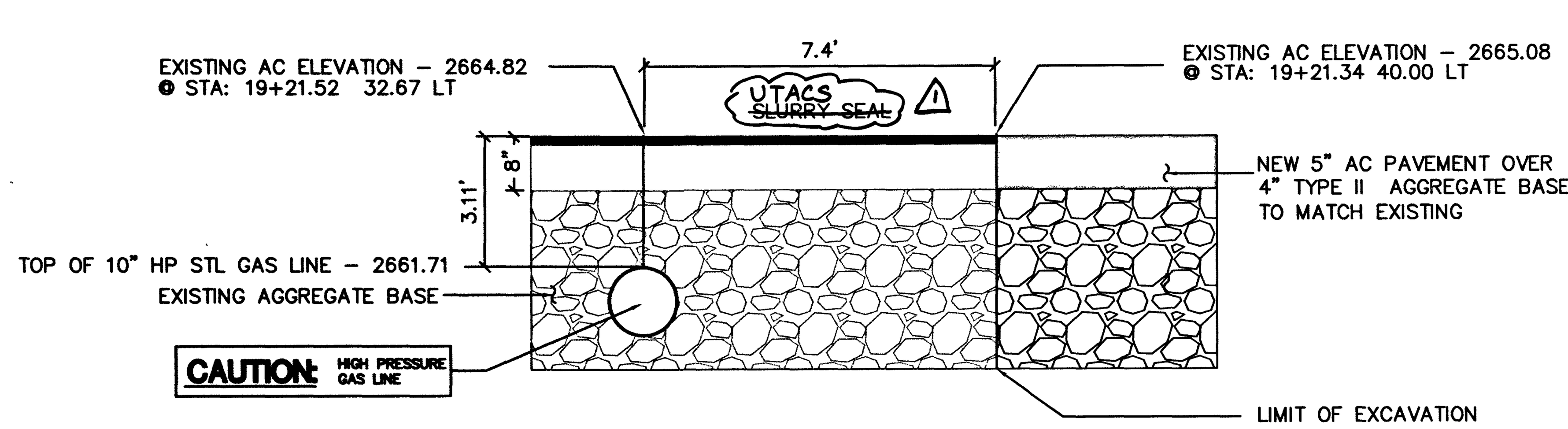
Michael J. Sturdivant 6.30.20
8.20.18
FOR REVISION 1 ONLY

TYPE 100 SPLICE VAULT

NO SCALE

1 / –





CHARLESTON AND DURANGO HP GAS LINE LOCATION SECTION

SCALE: NONE

1 / R-1

CALL SOUTHWEST GAS AT ~~365-2296~~ 702-400-1789 FOR STANDBY WHEN EXCAVATING OVER OR NEAR HIGH PRESSURE GAS LINES.

76-1833TAX

REVISIONS			
NO.	DATE:	DESCRIPTION	APP'D
1	10.4.18	TRENCH DETAIL EDIT	
2	8.20.18	SWG NOTE	
3	8.20.19	REPLACE SLURRY SEAL W/ UTACS	

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION

CITY ENGINEER: DAVID N. BOWERS, P.E., P.T.O.E.
PROJECT MANAGER: MICHAEL STURDIVANT, P.E.
DESIGNED BY: RM, WV
DRAWN BY: JS, WV
CHECKED BY: RM, ST, WV
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: NONE
DATE: 2013-11-21

CITY OF LAS VEGAS NEVADA

TITLE: TRAFFIC PACKAGE 6B
CHARLESTON/DURANGO, CHARLESTON/RANCHO

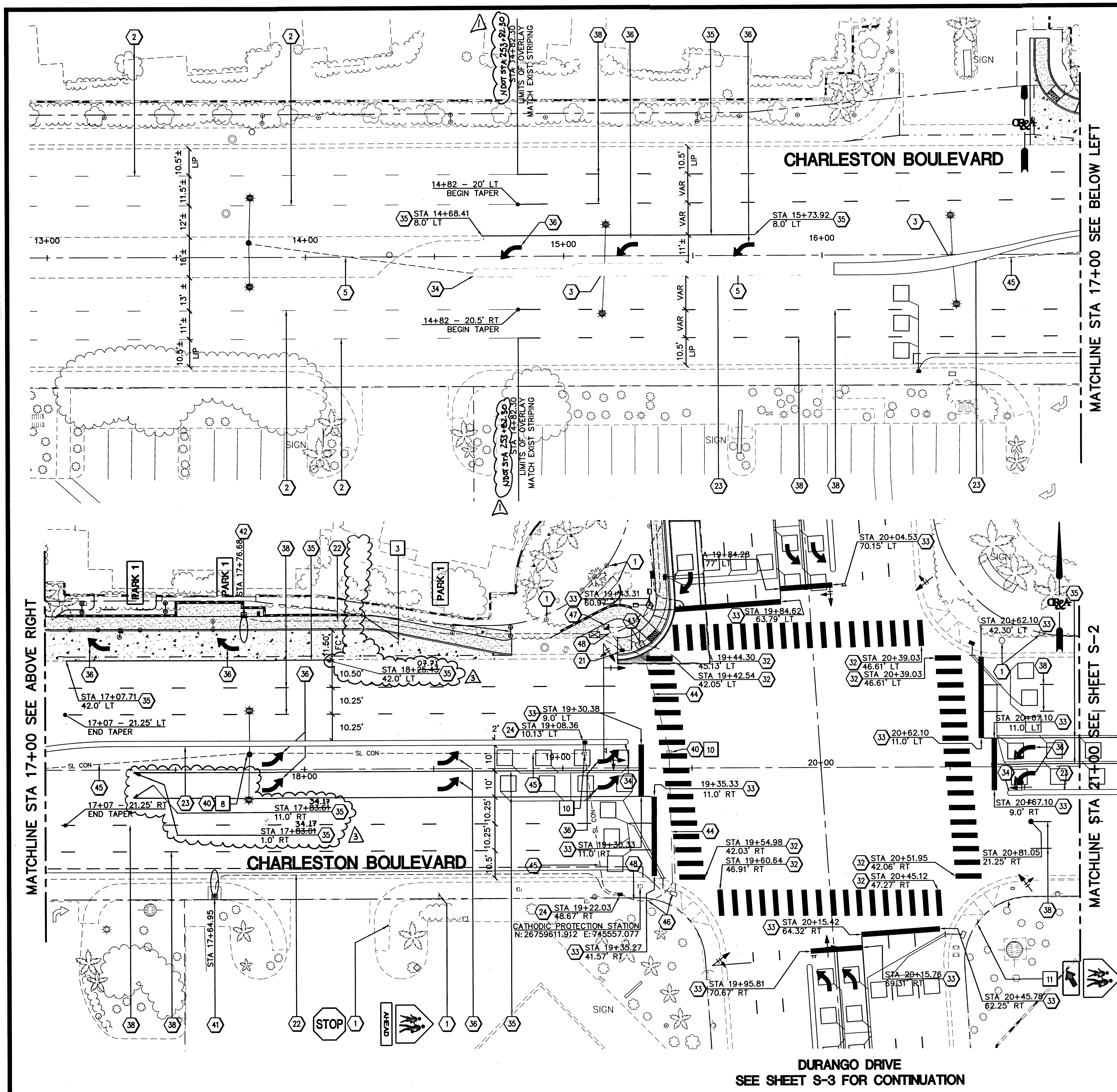
SHEET: MISCELLANEOUS DETAILS

REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA WALTER A. VODRAZKA, JR. EXP. 06-30-14 CIVIL No. 19183 12-3-13

Sheet D-2
14 of 21
DRAWING NO. 107-V4797-b

NDOT PROJ. NO SI-0159(011)

H# 06-25814



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TRANSPORTATION ENGINEERS and PLANNERS
8871 West Flamingo Road, Suite 202
Las Vegas, NV 89147 (702) 233-4060

REMOVAL/RELOCATION NOTES

- 3 REMOVE SIGN PANEL AND POST
- 8 REMOVE AND SALVAGE STREETLIGHT POLE AND LUMINAIRE. TO BE DELIVERED BY THE CONTRACTOR TO THE CITY OF LAS VEGAS, 3104 EAST BONANZA ROAD. REMOVE CRASH CAP AND FOUNDATION DOWN TO BELOW SUBGRADE AND CUT STEEL CAGE.
- 10 REMOVE EXISTING PULLBOX
- 11 REMOVE SIGN PANEL AND POST

CONSTRUCTION NOTES

- 1 PROTECT IN PLACE EXISTING SIGN PANEL AND/OR POST
- 2 PROTECT IN PLACE STRIPING AND/OR PAVEMENT MARKINGS
- 3 PROTECT IN PLACE POLE AND LUMINAIRE
- 5 PROTECT IN EXISTING STREETLIGHT CONDUIT
- 21 INSTALL No. 3-1/2 PULLBOX LABELED "STREETLIGHT" PER CCUSD 705 AND BOND PER CCUSD 323.
- 22 INSTALL (2) #4 THW-2 WIRE WITH 1 #8 THW-2 GROUND IN 2" SCH 40 PVC CONDUIT UNLESS OTHERWISE NOTED PER CCUSD SECTION 623 G.02.01 AND CCUSD 733
- 23 PAINT ENTIRE MEDIAN REFLECTIVE YELLOW
- 24 INSTALL NEW NO 3-1/2 PULLBOX LABELED "STREETLIGHT" PER CCUSD 705 AND BOND PER CCUSD 323. INTERCEPT AND EXTEND EXISTING STREETLIGHT CONDUIT TO NEW NO. 3-1/2 PULLBOX.
- 32 INSTALL PERMANENT PAVEMENT MARKING FILM (WHITE CROSSWALK LINES) PER NDOT STD DWG T-38.1.3
- 33 INSTALL PERMANENT PAVEMENT MARKING FILM (24" WHITE STOP BAR) PER NDOT STD DWG T-38.1.3
- 34 INSTALL YELLOW MEDIAN NOSE MARKINGS PER NDOT STD DWG T-38.1.5
- 35 INSTALL STORAGE LANE LINE WITH RAISED PAVEMENT MARKERS PER NDOT STD DWG T-38.1.2
- 36 INSTALL PERMANENT PAVEMENT MARKING FILM (WHITE ARROW) PER NDOT STD DWG T-38.1.2
- 38 INSTALL BROKEN WHITE LANE LINE WITH RAISED PAVEMENT MARKERS PER NDOT STD DWG T-37.1.1
- 40 JOIN EXISTING CONDUIT TO MAKE CONTINUOUS.
- 41 INSTALL NEW 250W 11 GAUGE STREETLIGHT POLE AND LUMINAIRE WITH 8' MAST ARM PER CCUSD 314 AND 321.
- 42 INSTALL NEW 250W 7 GAUGE STREETLIGHT POLE AND LUMINAIRE WITH 18' MAST ARM PER CCUSD 316, 321, AND 320.1.
- 43 ONCE EXISTING NO. 5 PULLBOX IS REMOVED AND EXISTING 2" CONDUIT IS ABANDONED (SEE SHEETS T-1 AND T-2), INTERCEPT AND EXTEND EXISTING 2" CONDUIT TO NEW NO. 3-1/2 PULLBOX
- 44 INSTALL (4) #4 THW-2 WIRE WITH (2) #8 THW-2 GROUND IN EXISTING 2" CONDUIT.
- 45 PULL OUT EXISTING WIRE FROM LUMINAIRE AT STA 16+50.63 AND INSTALL NEW (2) #4 THW-2 WIRE WITH (1) #8 THW-2 GROUND IN EXISTING 2" CONDUIT.
- 46 ONCE EXISTING SERVICE PEDESTAL AND CONTROLLER CABINET ARE REMOVED AND EXISTING 2" CONDUIT IS ABANDONED (SEE SHEETS T-1 AND T-2), EXTEND EXISTING 2" CONDUIT FROM P-30 PULLBOX TO NEW NO. 3-1/2 PULLBOX.
- 47 NEW SERVICE PEDESTAL (SEE SHEETS T-1 AND T-2)
- 48 INSTALL (4) #4 THW-2 WIRE WITH (2) #8 THW-2 GROUND IN 2" SCH 40 PVC CONDUIT UNLESS OTHERWISE NOTED PER CCUSD SECTION 623 G.02.01 AND CCUSD 733

0 10 20 40 80
(IN FEET)
1" = 20'

8.20.18
FOR REVISION 1 ONLY & 3

SAFETY ALERT
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1-702-227-2929
Call 1-702-432-5300 F.A.S.T.
Call 811 before you Dig
1-800-227-2600
1-702-455-7544

NO.	DATE:	DESCRIPTION	APP'D
3	10.4.18	LANE LENGTHS, R/R NOTE 2	
1	8.20.18	NDOT STATION/NA	

REVISIONS

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION

CITY ENGINEER: DAVID N. BOWERS, P.E., P.T.O.E.
PROJECT MANAGER: MICHAEL STURDIVANT, P.E.
DESIGNED BY: RM, WV
DRAWN BY: JS, NV
CHECKED BY: RM, ST, WV
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: NONE
DATE: 2013-11-21

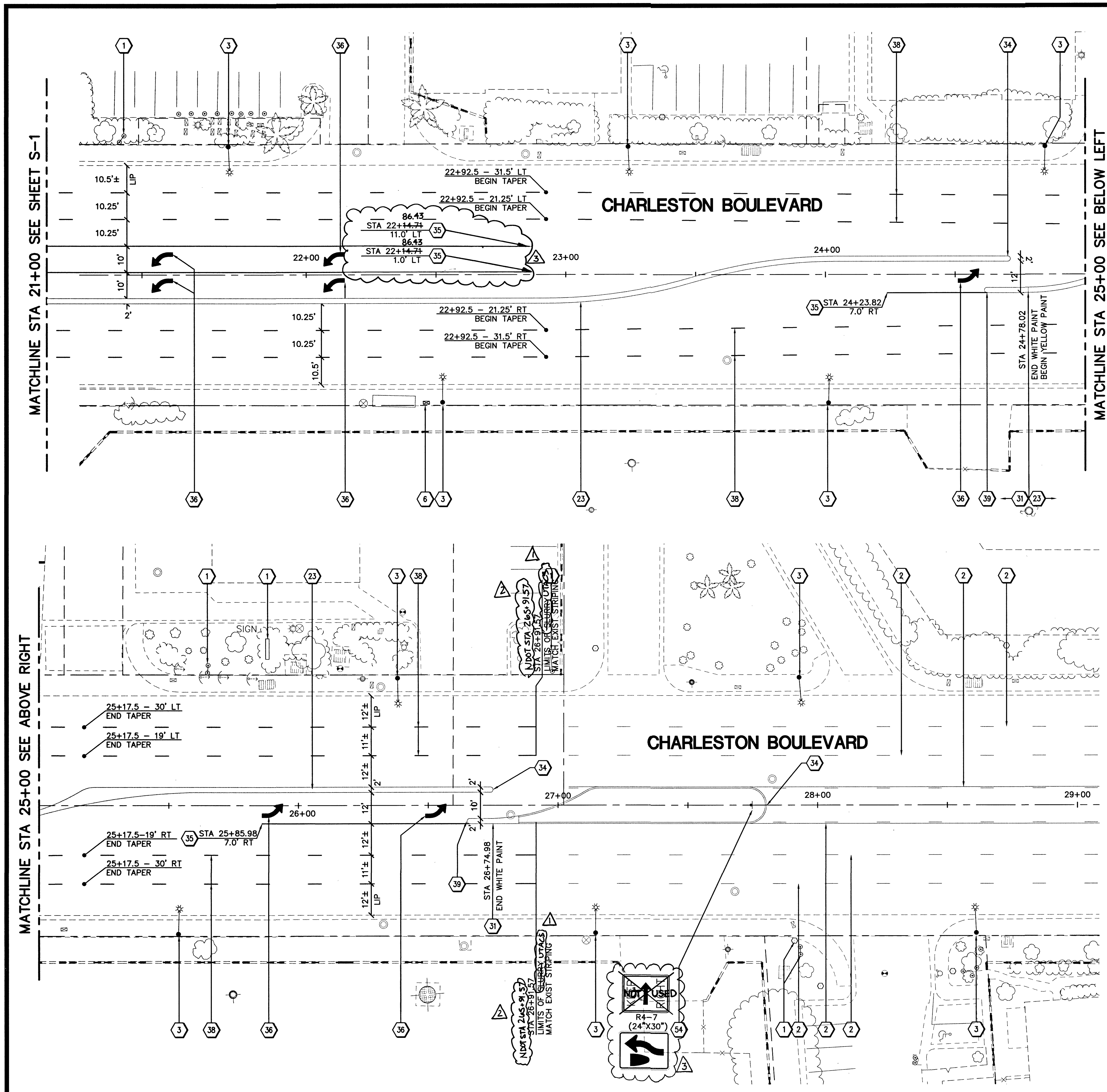
CITY OF LAS VEGAS NEVADA

TITLE: TRAFFIC PACKAGE 6B
CHARLESTON/DURANGO, CHARLESTON/RANCHO
SHEET: CHARLESTON BOULEVARD STRIPING, SIGNAGE, AND LIGHTING IMPROVEMENTS STA 13+00 TO 21+00

WALTER C. VODRAZKA, JR. CIVIL No. 19163 EXP. 06-30-14
12-3-13

Sheet S-1
15 of 21
DRAWING NO. 107-V4797-b

NDOT PROJ. NO SI-0159(011)
H# 06-25814



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TRANSPORTATION ENGINEERS and PLANNERS
8871 West Flamingo Road, Suite 202
Las Vegas, NV 89147 (702) 233-4060

CONSTRUCTION NOTES

1. PROTECT IN PLACE EXISTING SIGN PANEL AND/OR POST
2. PROTECT IN PLACE STRIPING AND/OR PAVEMENT MARKINGS
3. PROTECT IN PLACE POLE AND LUMINAIRE
6. PROTECT IN EXISTING STREETLIGHT PULLBOX
23. PAINT ENTIRE MEDIAN REFLECTIVE YELLOW
31. PAINT ENTIRE MEDIAN REFLECTIVE WHITE
34. INSTALL YELLOW MEDIAN NOSE MARKINGS PER NDOT STD DWG T-38.1.5
35. INSTALL STORAGE LANE LINE WITH RAISED PAVEMENT MARKERS PER NDOT STD DWG T-38.1.2
36. INSTALL PERMANENT PAVEMENT MARKING FILM (WHITE ARROW) PER NDOT STD DWG T-38.1.2
38. INSTALL BROKEN WHITE LANE LINE WITH RAISED PAVEMENT MARKERS PER NDOT STD DWG T-37.1.1
39. INSTALL WHITE MEDIAN NOSE MARKINGS PER NDOT STD DWG T-38.1.5
54. INSTALL NEW SIGN PANEL AND POST

Michael A. Sturdivant 6.20.20

8.20.18
For Revision 1 only
2 & 3

SAFETY ALERT
Call Before You Overhead
1-702-227-2929

AVOID HITTING UNDERGROUND TRAFFIC SIGNAL AND STREET LIGHT SYSTEM CONDUITS IT'S COSTLY
Call before you UnderGround
1-702-432-5300
F.A.S.T.

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811
OR 1-800-227-2600
AND 1-702-455-7544

REVISIONS			
NO.	DATE:	DESCRIPTION	APP'D
3	10.4.18	LANE LENGTHS, SIGN	
2	8.20.19	NDOT STATIONING	
1	8.20.18	REPLACE SLURRY W/ UTACS	

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION

CITY OF LAS VEGAS NEVADA

CITY ENGINEER: DAVID N. BOWERS; P.E., P.T.O.E.
PROJECT MANAGER: MICHAEL STURDIVANT, P.E.

DESIGNED BY: RM, WV
DRAWN BY: JS, NV
CHECKED BY: RM, ST, WV

HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: NONE
DATE: 2013-11-21

TITLE: TRAFFIC PACKAGE 6B
CHARLESTON/DURANGO, CHARLESTON/RANCHO

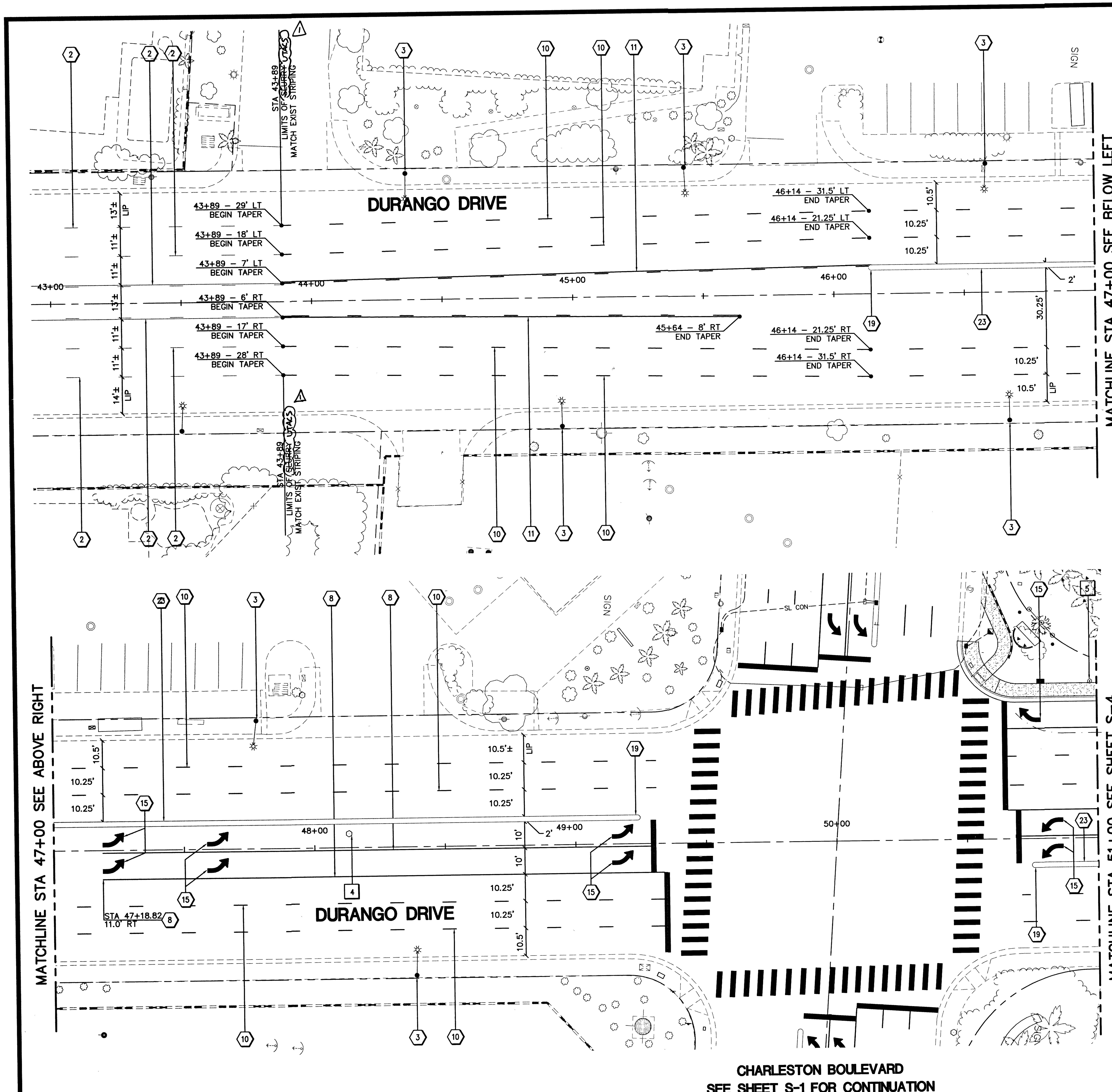
SHEET: CHARLESTON BOULEVARD STRIPING, SIGNAGE, AND LIGHTING IMPROVEMENTS STA 21+00 TO 29+00

REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA
WALTER C. VODRAZKA, JR.
EXP. 06-30-14
CIVIL
No. 19183
12-3-13

Sheet S-2
16 of 21

DRAWING NO.
107-V4797-b

H# 06-25814 NDOT PROJ. NO SI-0159(011)



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REMOVAL/RELOCATION NOTES

4. REMOVE AND SALVAGE TRAFFIC SIGN PANEL(S) AND/OR POST AND CONTACT CLV TRAFFIC ENGINEERING FIELD OPERATIONS AT 604-1522 TO ARRANGE DELIVERY OF SALVAGED SIGNS
5. RELOCATE FLAG POLE TO BEHIND NEW SIDEWALK

CONSTRUCTION NOTES

2. PROTECT IN PLACE STRIPING AND/OR PAVEMENT MARKINGS
3. PROTECT IN PLACE POLE AND LUMINAIRE
8. INSTALL STORAGE LANE LINE WITH RAISED PAVEMENT MARKERS PER CCUSD 246
10. INSTALL TYPE 4 LANE LINE PER CCUSD DWG NO 244A
11. INSTALL TYPE 2 CENTERLINE WITH RAISED PAVEMENT MARKERS PER CCUSD 244
15. INSTALL PERMANENT PAVEMENT MARKING FILM (WHITE ARROW) PER CCUSD 246
19. INSTALL YELLOW MEDIAN NOSE MARKINGS PER CCUSD 248.
23. PAINT ENTIRE MEDIAN REFLECTIVE YELLOW

8.20.18
FOR REVISION 1 ONLY

0 10 20 40 80
(IN FEET)
1" = 20'

SAFETY ALERT
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Call before you UnderGround 1-702-432-5300 F.A.S.T.
Call 811 before you Dig 1-800-227-2600 1-702-455-7544

REVISIONS			
NO.	DATE:	DESCRIPTION	APP'D
1	8.20.18	REPLACE SLURRY W/ UTACS	

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION

CITY ENGINEER: DAVID N. BOWERS, P.E., P.T.O.E.
PROJECT MANAGER: MICHAEL STURDIVANT, P.E.
DESIGNED BY: RM, WV — HORIZONTAL SCALE: AS SHOWN
DRAWN BY: JS, NV — VERTICAL SCALE: NONE
CHECKED BY: RM, ST, WV — DATE: 2013-11-21

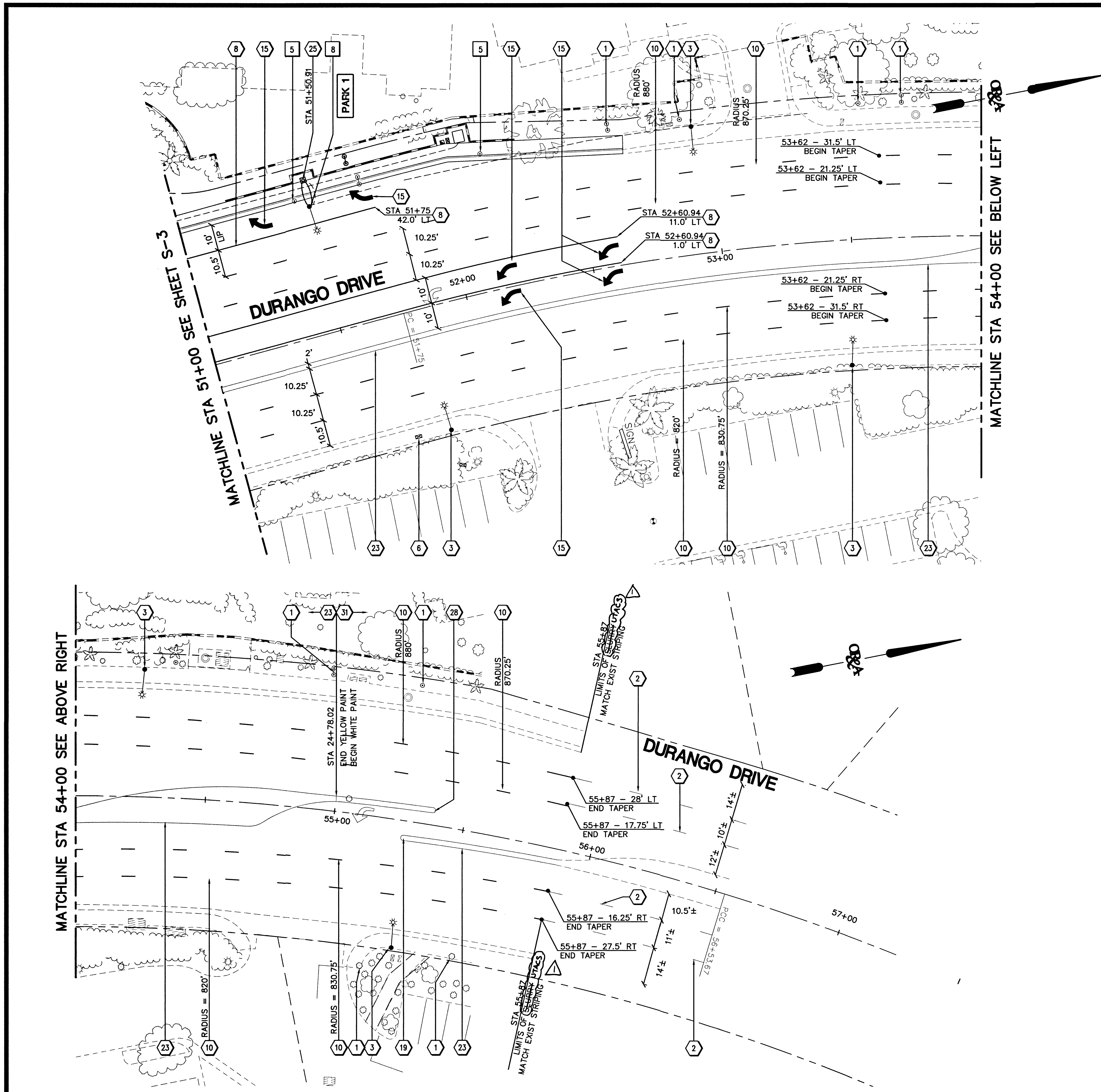
TITLE: TRAFFIC PACKAGE 6B CHARLESTON/DURANGO, CHARLESTON/RANCHO

SHEET: DURANGO DRIVE STRIPING, SIGNAGE, AND LIGHTING IMPROVEMENTS STA 43+00 TO 51+00

WALTER G. VODRAZKA, JR. CIVIL No. 19183 12-3-13

Sheet S-3
17 of 21
DRAWING NO. 107-V4797-b

H# 06-25814 NDOT PROJ. NO SI-0159(011)



![Orth-Rodgers and Associates logo: OR&A]

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Las Vegas, NV 89147 (702) 233–4060

REMOVAL/RELOCATION NOTES

- [5] RELOCATE FLAG POLE TO BEHIND NEW SIDEWALK
- [8] REMOVE AND SALVAGE STREETLIGHT POLE AND LUMINAIRE. TO BE DELIVERED BY THE CONTRACTOR TO THE CITY OF LAS VEGAS, 3104 EAST BONANZA ROAD. REMOVE CRASH CAP AND FOUNDATION DOWN TO BELOW SUBGRADE AND CUT STEEL CAGE.

CONSTRUCTION NOTES

- (1) PROTECT IN PLACE EXISTING SIGN PANEL AND/OR POST
- (2) PROTECT IN PLACE STRIPING AND/OR PAVEMENT MARKINGS
- (3) PROTECT IN PLACE POLE AND LUMINAIRE
- (6) PROTECT IN EXISTING STREETLIGHT PULLBOX
- (8) INSTALL STORAGE LANE LINE WITH RAISED PAVEMENT MARKERS PER CCUSD 246
- (10) INSTALL TYPE 4 LANE LINE PER CCUSD DWG NO 244A
- (15) INSTALL PERMANENT PAVEMENT MARKING FILM (WHITE ARROW) PER CCUSD 246
- (19) INSTALL YELLOW MEDIAN NOSE MARKINGS PER CCUSD 248.
- (23) PAINT ENTIRE MEDIAN REFLECTIVE YELLOW
- (25) INSTALL NEW 250W 7 GAUGE STREETLIGHT POLE AND LUMINAIRE WITH 18' MAST ARM PER CCUSD NO's 316, 321, AND 320A. INTERCEPT EXISTING STREETLIGHT CONDUIT, EXTEND TO NEW POLE, AND PULL NEW (2) #4 THW WIRE AND (1) #8 GROUND TO NEAREST SPLICE POINT
- (28) INSTALL WHITE MEDIAN NOSE MARKINGS PER CCUSD 248.
- (31) PAINT ENTIRE MEDIAN REFLECTIVE WHITE

0 10 20 40 80
(IN FEET)
1" = 20'

8.20.18
FOR REVISION ⚠1 ONLY

SAFETY ALERT
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Before You
Overhead
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AVOID HITTING UNDERGROUND TRAFFIC SIGNAL AND STREET LIGHT SYSTEM CONDUITS IT'S COSTLY
Call before you Dig
Call UnderGround
1-702-432-5300
F.A.S.T.
Call 811
1-800-227-2600
1-702-455-7544

REVISIONS

NO.	DATE:	DESCRIPTION	APP'D
1	8.20.18	Replace slurry w/UTACS	

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION

CITY ENGINEER: DAVID N. BOWERS, P.E., P.T.O.E.
PROJECT MANAGER: MICHAEL STURDIVANT, P.E.
DESIGNED BY: RM, ST, WV
DRAWN BY: JS, NV
CHECKED BY: RM, RR
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: NONE
DATE: 2013-11-21

CITY OF LAS VEGAS NEVADA

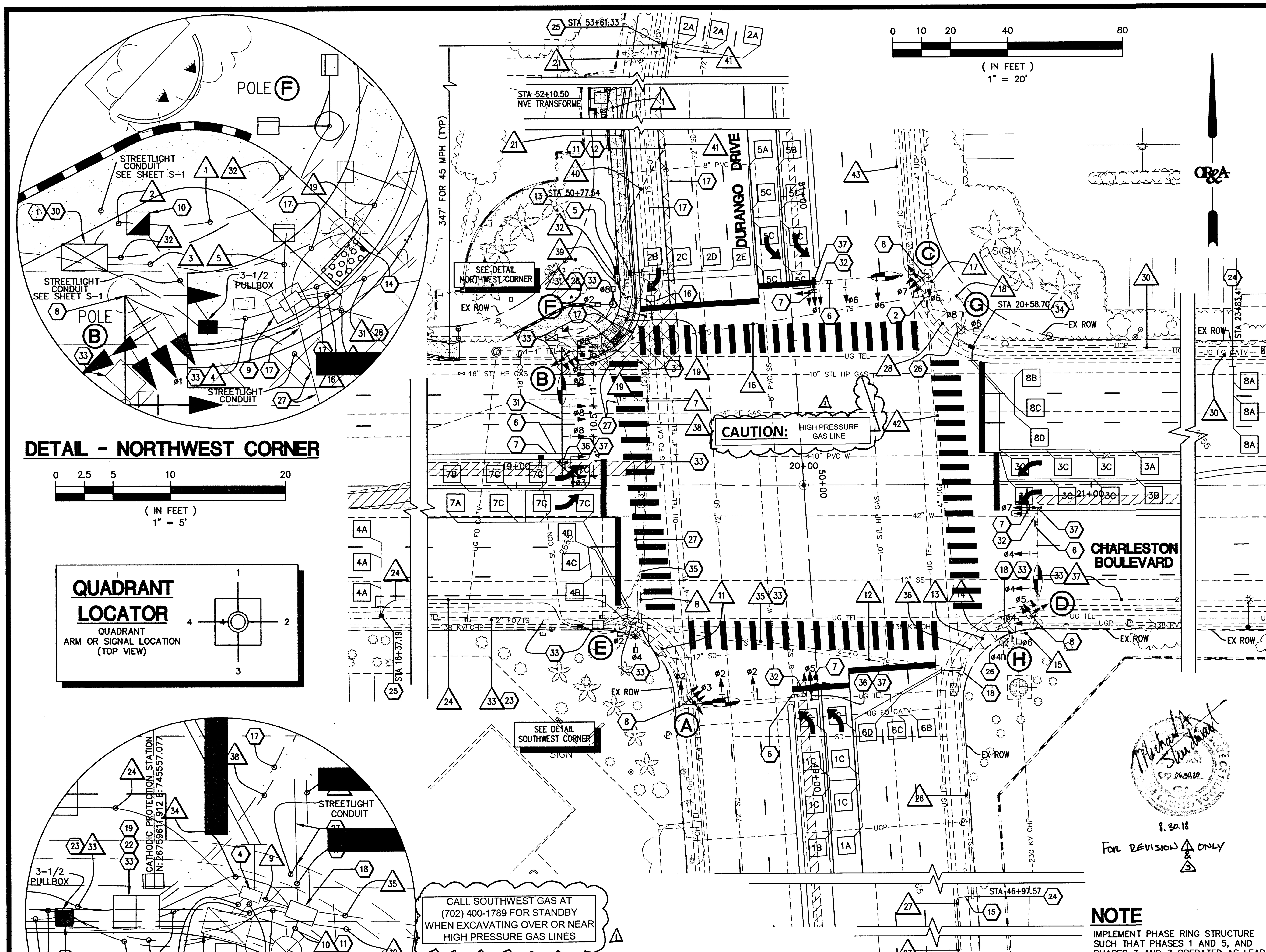
TITLE: TRAFFIC PACKAGE 6B
CHARLESTON/DURANGO, CHARLESTON/RANCHO

SHEET: DURANGO DRIVE STRIPING, SIGNAGE, AND LIGHTING
IMPROVEMENTS STA 51+00 TO 57+00

REGISTERED PROFESSIONAL ENGINEER WALTER C. VODRAZKA, JR. EXP. 06-30-14 CIVIL No. 19183 STATE OF NEVADA
12-3-13

Sheet S-4
18 of 21
DRAWING NO. 107-V4797-b

H# 06-25814 NDOT PROJ. NO SI-0159(011)



NOTE

IMPLEMENT PHASE RING STRUCTURE SUCH THAT PHASES 1 AND 5, AND PHASES 3 AND 7 OPERATED AS LEAD-LAG LEFT TURNS ONLY AND ARE NOT PERMITTED TO RUN AT THE SAME TIME

LOOP DETECTION NOTES

1. ALL LOOPS SHALL HOME RUN TO CONTROLLER CABINET PER SPECIAL PROVISIONS 623T.02.04
2. CABLE-IN-DUCT LOOPS SHALL BE INSTALLED IN SAW CUT SLOTS IN THE PAVEMENT, PER SPECIAL PROVISIONS 623T02.04
3. LOOPS SHALL BE CENTERED IN TRAVEL LANES.
4. PROVIDE THREE (3) MULTI-CONDUCTOR LOOP LEAD-IN CABLES (PER APPROACH, 12 TOTAL) TO TRAFFIC SIGNAL CONTROLLER CABINET VIA 2" CONDUIT.
5. ONE OF THE THREE (3) MULTI-CONDUCTOR LOOP LEAD IN CABLES (FOR EACH APPROACH) WILL GO INTO THE LOOP PULLBOX FOR THE LEFT TURN LANE LOOPS FOR LOOP GROUPS 1A,1B,1C; 3A,3B,3C; 5A,5B,5C; 7A,7B,7C.
6. ONE OF THE THREE (3) MULTI-CONDUCTOR CABLES WILL EXTEND TO SERVICE THE ADVANCED DETECTION LOOPS, 2A, 4A, 6A, AND 8A.
7. ONE EACH MULTI-CONDUCTOR CABLES WILL EXTEND TO SERVICE THE DETECTION LOOPS 2B-2E, 5A-5C; 6B-6D, 1A-1C; 4B-4D, 7A-7C AND 8B-8D, 3A-3C.
8. SOUTHBOUND RIGHT TURN LOOP SHALL BE ON A DETECTION DELAY.
9. SEE CONDUIT AND WIRE SCHEDULE FOR LOOP LOCATION ROUTING.

ø2 & ø5 ø2 & ø6 ø1 & ø6 ø4 & ø7 ø4 & ø8 ø3 & ø8

PHASE DIAGRAM

FLASHING OPERATION SHALL BE ALL RED
OPTICOM PREEMPTION SHALL BE PHASES 2, 4, 6 & 8
PHASE 1/PHASE 5 AND PHASE 3/PHASE 7
LEFT TURNS MUST LEAD LAG

ON LEFT ARROW ONLY
RNV1-3 (30" x 36")

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GENERAL NOTES

SEE SHEET T-4 FOR CLV TRAFFIC SIGNAL NOTES
SEE SHEET T-2 FOR CONDUIT AND WIRE SCHEDULE
SEE SHEET T-2 FOR POLE AND EQUIPMENT SCHEDULE

CONSTRUCTION NOTES

1. INSTALL TYPE 'R' CONTROLLER CABINET PER CCUSD 803 AND USS 623 ON TYPE J FOUNDATION PER CCUSD 725 SEE NOTES 14 AND 15, SHEET T-4. INSTALL TWO (2) CHANNEL BACK-MOUNTED DETECTOR AMPLIFIER IN THE CONTROLLER CABINET WHICH EACH ACCOMODATE 24 SEPARATE CHANNELS LAYER 2 FIELD HARDENED ETHERNET SWITCH, VIDEO ENCODER.
2. PROTECT IN PLACE NO 7 PULLBOX
3. INTERCEPT EXISTING CONDUIT RUN 7. PULL OUT SIGNAL WIRE FROM EXISTING TYPE 200 SPLICE VAULT AND RE-ROUTE THROUGH NEW CONDUIT RUN 6 TO NEW TYPE 100 SPLICE VAULT ON NW CORNER.
4. PROTECT IN PLACE EXISTING NO 5 PULLBOX AND STUBOUTS.
5. INSTALL NEW TYPE 200 SPLICE VAULT
6. INSTALL RNV1-3 (30"X36") ON MAST ARM ADJACENT TO LEFT TURN SIGNAL HEAD PER CCUSD 818.2
7. REPLACE EXISTING M-5 SIGNAL HEAD WITH NEW M-2 ALL ARROWS 3 SECTION SIGNAL HEAD (RED, YELLOW, GREEN).
8. REPLACE EXISTING 5 SECTION SIGNAL HEAD WITH NEW B-2T ALL ARROWS 3 SECTION SIGNAL HEAD (RED, YELLOW, GREEN).
9. REMOVE EXISTING NO 5 PULLBOX AND INSTALL NEW TYPE 100 SPLICE VAULT (SEE DETAIL ON SHEET D-2). 3
10. INSTALL NEW 200 AMP PADMOUNT SERVICE. SERVICE SHALL HAVE 1-60 AMP SINGLE POLE BREAKER FOR SIGNAL, AND ONE ~~60~~ 40 AMP ~~TWO~~ SINGLE POLE BREAKER FOR INTERSECTION STREETLIGHT. SEE NOTE 4, SHEET T-4.
11. INTERCEPT EXISTING CONDUIT RUN 41 AND EXTEND TO NEW P-30 PULLBOX ON NORTHWEST CORNER.
12. PULL OUT EXISTING FIBER OPTIC CABLE FROM EXISTING TYPE 100 SPLICE VAULT AT SOUTHWEST CORNER AND REROUTE THROUGH NEW CONDUIT RUNS 40, 39, AND 38 ONCE NEW RUNS ARE COMPLETE.
13. INSTALL NEW NO 5 PULLBOX PER CCUSD 706 AND STUB OUT 2" LOOP CONDUIT.
14. REMOVE EXISTING POLE AND SALVAGE PER CLV SALVAGE NOTE, THIS SHEET. CHIP DOWN EXISTING FOUNDATION 18" BELOW GRADE AND CUT OFF ANCHOR BOLTS.
15. INTERCEPT EXISTING CONDUIT AND EXTEND TO NEW NO. 3.5 PULLBOX.
16. REMOVE EXISTING TYPE 200 SPLICE VAULT. INTERCEPT EXISTING CONDUIT 38 AND EXTEND TO NEW TYPE 200 SPLICE VAULT ON NORTHWEST CORNER.
17. ABANDON IN PLACE EXISTING CONDUIT AND/OR CONDUCTORS.
18. PROTECT IN PLACE EXISTING P-30 PULLBOX AND STUBOUTS.
19. PROTECT IN PLACE EXISTING SPLICE VAULT
20. REMOVE AND SALVAGE EXISTING CABINET AND CONTROLLER PER CLV SALVAGE NOTE AFTER NEW CABINET AND CONTROLLER ARE OPERATIONAL. CHIP DOWN EXISTING FOUNDATION 18".
21. REMOVE AND SALVAGE EXISTING SERVICE PEDESTAL PER CLV SALVAGE NOTE AFTER NEW SERVICE PEDESTAL IS OPERATIONAL. CHIP DOWN EXISTING FOUNDATION 18".
22. RECONNECT SPLICE. SEE DETAIL 2, SHEET D-2.
23. ABANDON IN PLACE EXISTING ADVANCE LOOP LEAD-IN CABLE.
24. PROTECT IN PLACE NO 3 1/2 LOOP PULLBOX AND STUBOUTS.
25. INSTALL NEW NO 3 1/2 PULLBOX PER CCUSD 705 AND STUB OUT 2" LOOP CONDUIT.
26. INSTALL NEW PEDESTRIAN PUSH BUTTONS. SEE CITY OF LAS VEGAS TRAFFIC SIGNAL NOTES, SHEET T-4.
27. INTERCEPT EXISTING 2" CONDUIT AND PULL OUT EXISTING SIGNAL WIRE. PROTECT IN PLACE ABANDONED 2" CONDUIT TO BE USED FOR FOR STREETLIGHTING (SEE NOTE 43, SHEET S-1).
28. PULL OUT EXISTING CCTV CABLE AND RE-ROUTE TO CONTROLLER CABINET THROUGH CONDUIT RUNS 3 AND 4. ABANDON 2" CONDUIT.
29. PULLOUT EXISTING FIBER OPTIC CABLE AND ABANDON IN PLACE CONDUIT.
30. INSTALL CDCA UNIT IN CONTROLLER CABINET PER CCUSD 767.
31. REMOVE AND SALVAGE EXISTING MAST ARM AND SIGNAL HEADS ON POLE B. INSTALL 3 GREEN BALL M-2 SIGNAL HEADS, ILLUMINATED STREET SIGN NAME AND OPTICOM SENSORS TO NEW MAST ARM AND SALVAGE EXISTING R10-12 SIGN PANEL.
32. REMOVE AND SALVAGE EXISTING R10-12 SIGN PANELS.
33. INSTALLED PER CHARLESTON 1A ITS PROJECT DRAWING #107V4474-FIB
34. REMOVE EXISTING 3-1/2 PULLBOX AND INSTALL NEW NO 5 PULLBOX PER CCUSD 706 AND STUB OUT 2" LOOP CONDUIT.
35. INTERCEPT EXISTING CONDUIT RUN 7. PULL OUT SIGNAL WIRE FROM EXISTING SPLICE VAULT AND RE-ROUTE THROUGH NEW CONDUIT RUN 8 TO EXISTING P-30 PULLBOX ON SW CORNER.
36. REMOVE AND RELOCATE EXISTING OPTICOM SENSORS
37. OPTICAL PREEMPTION UNITS WILL BE GTT (ENCODING CAPABLE) MODEL 764 PHASE SELECTOR INSTALLED IN A MODEL 760 CARD RACK, WITH A 768 AUXILLARY INTERFACE PANEL MTD IN THE CABINET AND FULLY WIRED FOR GREEN SENSE CAPABILITIES. OPTICAL SENSORS WILL BE MODEL 721 AND WILL BE INTERFACED TO THE TRAFFIC SIGNAL CONTROLLER WITH M-138 CABLE.

CLV SALVAGE NOTE

EXISTING TRAFFIC EQUIPMENT REMOVED AND NOT RELOCATED SHALL BE SALVAGED BY THE CONTRACTOR AND DELIVERED TO THE CITY OF LAS VEGAS, 3104 EAST BONANZA ROAD ALL STREETLIGHT AND TRAFFIC SIGNAL EQUIPMENT REMOVED SHALL BE RETURNED TO THE CLV EAST SERVICE YARD. CALL 229-3661, 24 HOURS BEFORE DELIVERY, TO SET UP TIME. CONTRACTOR MUST HAVE A MEANS TO UNLOAD EQUIPMENT. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGE INCURRED IN THIS PROCESS.

TRAFFIC SIGNAL SERVICE NOTE

TRAFFIC SIGNAL MUST REMAIN OPERATIONAL AT ALL TIMES. IT IS EXPECTED THAT THE CONTRACTOR MAY NEED TO USE OVERHEAD TEMPORARY WIRING TO KEEP THE SIGNAL OPERATIONAL DURING CONDUIT AND CONDUCTOR EXTENSIONS AND RE-ROUTING, NEW SIGNAL CABINET REWIRING, AND INTER-CONNECT CONDUIT EXTENSIONS AND RE-ROUTING. THIS WORK SHALL BE INCIDENTAL TO THE TRAFFIC SIGNAL LUMP SUM PRICE, AND SHOULD BE INCLUDED IN THE CONTRACTOR'S BID PRICE.

SAFETY ALERT Call Before You Overhead 1-702-227-2929
1-702-432-5300 F.A.S.T.
Call before you Dig. Call 811 UnderGround

NO.	DATE:	DESCRIPTION	APP'D
4	9.30.18	Sub Revisions	
3	10.4.18	Construction Note 10	

REVISIONS

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION

CITY ENGINEER: DAVID N. BOWERS, P.E., P.T.O.E.
PROJECT MANAGER: MICHAEL STURDIVANT, P.E.
DESIGNED BY: RM, WV HORIZONTAL SCALE: AS SHOWN
DRAWN BY: JS, NV VERTICAL SCALE: NONE
CHECKED BY: RM, ST, WV DATE: 2013-11-21

TITLE: TRAFFIC PACKAGE 6B
CHARLESTON/DURANGO, CHARLESTON/RANCHO
SHEET: CHARLESTON/DURANGO TRAFFIC SIGNAL MODIFICATON PLAN - 1

Sheet T-1
19 of 21
DRAWING NO. 107-V4797-b

H# 06-25814 NDOT PROJ. NO SI-0159(011)

Orth–Rodgers and Associates, Inc.
TRANSPORTATION ENGINEERS and PLANNERS
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Las Vegas, NV 89147 (702) 233–4060

CONDUIT AND WIRE SCHEDULE - CHARLESTON AND DURANGO

CONDUIT

WIRE & CABLE	FROM	TO	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20 NOT USED	21	22	23 NOT USED	24	25 NOT USED	26	27	28	29 NOT USED	30	31 ABANDONED	32	33 FIBER	34 FIBER	35 FIBER	36 FIBER	37 FIBER	38 FIBER	39 FIBER	40 FIBER	41 FIBER	42 INTERCONNECT	43 INTERCONNECT
(3) #3/0 THW	NV ENERGY SERVICE	SERVICE PEDESTAL	●																																									
(2) #4 (1 BLACK, 1 WHITE) FOR CONTROLLER (2) #4 (1 BLACK, 1 WHITE) FOR LUMINAIRES (1) #8 AWG THW GROUND	SERVICE PEDESTAL	CONTROLLER		●																																								
25C #14 SIGNAL CABLE, (1) #8 AWG THW GROUND, (2) #10 AWG THW, EMERGENCY VEHICLE PRE-EMPT CABLE	CONTROLLER	POLE A			●			●	●	●			●																															
25C #14 SIGNAL CABLE, (1) #8 AWG THW GROUND, (2) #10 AWG THW, EMERGENCY VEHICLE PRE-EMPT CABLE	CONTROLLER	POLE B			●	●																																						
25C #14 SIGNAL CABLE, (1) #8 AWG THW GROUND, (2) #10 AWG THW, EMERGENCY VEHICLE PRE-EMPT CABLE	CONTROLLER	POLE C			●													●	●																									
25C #14 SIGNAL CABLE, (1) #8 AWG THW GROUND, (2) #10 AWG THW, EMERGENCY VEHICLE PRE-EMPT CABLE	CONTROLLER	POLE D			●			●	●	●				●	●		●																											
15C #14 SIGNAL CABLE, (1) #8 AWG THW GROUND	CONTROLLER	POLE E			●			●	●	●		●																																
15C #14 SIGNAL CABLE, (1) #8 AWG THW GROUND	CONTROLLER	POLE F			●		●																																					
15C #14 SIGNAL CABLE, (1) #8 AWG THW GROUND	CONTROLLER	POLE G			●													●		●																								
15C #14 SIGNAL CABLE, (1) #8 AWG THW GROUND	CONTROLLER	POLE H			●			●	●	●	●			●	●	●																												
6-PAIR 18 AWG MULTI CONDUCTOR LOOP LEAD-IN CABLE	CONTROLLER	LOOP PULL BOX ADVANCED 4A			●			●	●	●	●													●		●																		
6-PAIR 18 AWG MULTI CONDUCTOR LOOP LEAD-IN CABLE	CONTROLLER	LOOP PULL BOX 4B,4C,4D			●			●	●	●	●													●																				
6-PAIR 18 AWG MULTI CONDUCTOR LOOP LEAD-IN CABLE	CONTROLLER	LOOP PULL BOX 7A,7B,7C			●			●	●	●	●													●																				
6-PAIR 18 AWG MULTI CONDUCTOR LOOP LEAD-IN CABLE	CONTROLLER	LOOP PULL BOX ADVANCED 2A			●																●		●																					
6-PAIR 18 AWG MULTI CONDUCTOR LOOP LEAD-IN CABLE	CONTROLLER	LOOP PULL BOX 2B,2C,2D,2E			●																●																							
6-PAIR 18 AWG MULTI CONDUCTOR LOOP LEAD-IN CABLE	CONTROLLER	LOOP PULL BOX 5A,5B,5C			●																●																							
6-PAIR 18 AWG MULTI CONDUCTOR LOOP LEAD-IN CABLE	CONTROLLER	LOOP PULL BOX ADVANCED 8A			●													●												●		●												
6-PAIR 18 AWG MULTI CONDUCTOR LOOP LEAD-IN CABLE	CONTROLLER	LOOP PULL BOX 8B,8C,8D			●													●												●														
6-PAIR 18 AWG MULTI CONDUCTOR LOOP LEAD-IN CABLE	CONTROLLER	LOOP PULL BOX 3A,3B,3C			●													●												●														
6-PAIR 18 AWG MULTI CONDUCTOR LOOP LEAD-IN CABLE	CONTROLLER	LOOP PULL BOX ADVANCED 6A			●			●	●	●				●														●	●															
6-PAIR 18 AWG MULTI CONDUCTOR LOOP LEAD-IN CABLE	CONTROLLER	LOOP PULL BOX 6B,6C,6D			●			●	●	●				●																														
6-PAIR 18 AWG MULTI CONDUCTOR LOOP LEAD-IN CABLE	CONTROLLER	LOOP PULL BOX 1A,1B,1C			●			●	●	●				●																														
CCTV CABLE PER CCUSD 766	CONTROLLER	POLE B			●	●																																						
CDCA ITS DROP CABLE GP2G012FR-60 AND 6 PAIR PE39 NO. 22AWG INTERCONNECT CABLE PER USS 623	CONTROLLER	TYPE 100 SPLICE VAULT																															●						●	●				
CONDUIT NUMBER & SIZE (IC) = INTERCONNECT			1-3"	1-3"	5-3"	EXISTS 2"	2"	2-3"	EXISTS 2-3"	2"	2"	2"	EXISTS 2"	EXISTS 2-2"	EXISTS 2"	EXISTS 2"	EXISTS 2"	EXISTS 2-2"	EXISTS 2"	EXISTS 2"	2" LOOP		2" LOOP	EXISTS 2" LOOP		2" LOOP		EXISTS 2" LOOP	2" LOOP	EXISTS 2" LOOP		EXISTS 2" LOOP	EXISTS 2"	3"	EXISTS 2"	EXISTS 2"	EXISTS 2"	EXISTS 2"	EXISTS 2"	EXISTS 4"	2"	2"	EXISTS 2"	EXISTS 2" IC	EXISTS 2" IC

POLE AND EQUIPMENT SCHEDULE - CHARLESTON AND DURANGO

POLE							NEW SIGNALS (VEHICLE)		NEW SIGNALS (PEDESTRIAN)		NEW PEDESTRIAN PUSH BUTTONS		REMARKS
POLE	LOCATION STATION* (CHARLESTON)	POLE TYPE / FOUND TYPE	EXISTING SIGNAL ARM QUAD	EXISTING SIGNAL ARM LNG	EXISTING LUMINAIRE ARM QUAD	EXISTING LUMINAIRE ARM LNG	TYPE	QUAD	TYPE	QUAD	QUAD	ARROW	
(A)	EXISTS STA 19+57.6± OFF 76.0'± RT	EX. XX EXISTS	2	–	2	15'	NEW M–2 (ARROWS) NEW B–2T	MAST ARM 4	–	–	– –	– –	POLE AND FOUNDATION EXISTS
(B)	EXISTS STA 19+15.9± OFF 47.9'± LT	EX. XX–A EXISTS	3	45' NEW	3	15'	2 NEW M–2 (1 ARROW) NEW B–2T	MAST ARM 1	–	–	– –	– –	POLE AND FOUNDATION EXISTS
(C)	EXISTS STA 20+43.4± OFF 73.1'± LT	EX. XX EXISTS	4	–	4	15'	NEW M–2 (ARROWS) NEW B–2T	MAST ARM 2	–	–	– –	– –	POLE AND FOUNDATION EXISTS
(D)	EXISTS STA 20+81.4± OFF 48.0'± RT	EX. XX EXISTS	1	–	1	15'	NEW M–2 (ARROWS) NEW B–2T	MAST ARM 3	–	–	– –	– –	POLE AND FOUNDATION EXISTS
(E)	STA 19+41.37 OFF 51.73' RT	EXISTS 1B EX. C	–	–	–	–	– – –	MAST ARM –	EXISTS	EXISTS	EXISTS EXISTS	LEFT RIGHT	POLE AND FOUNDATION EXISTS
(F)*	STA 19+33.75 OFF 62.60' LT	1B C	–	–	–	–	– – –	MAST ARM –	W–3T	1 & 4	2 ø8 3 ø8	LEFT RIGHT	POLE FOUNDATION AT BACK OF SIDEWALK ELEVATION
(G)	EXISTS STA 20+54.8' OFF 53.54'± LT	EXISTS 1B EX. C	–	–	–	–	– – –	MAST ARM –	EXISTS	EXISTS	EXISTS EXISTS	LEFT RIGHT	POLE AND FOUNDATION EXISTS
(H)	STA 20+69.39 OFF 54.49' RT	EXISTS 1B EX. C	–	–	–	–	– – –	MAST ARM –	EXISTS	EXISTS	EXISTS EXISTS	LEFT RIGHT	POLE AND FOUNDATION EXISTS

* EXACT POLE LOCATION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION AND SHALL BE APPROVED BY THE ENGINEER

RTC–FAST NOTES:
- THE CONTRACTOR IS TO MAINTAIN AND KEEP OPERATIONAL ALL EXISTING ITS INFRASTRUCTURE WITHIN THE CONSTRUCTION LIMITS. IF ANY EXISTING ITS INFRASTRUCTURE IS DAMAGED DUE TO CONSTRUCTION WITHIN THE PROJECT LIMITS THE CONTRACTOR IS TO IMMEDIATELY CONTACT MR. JESUS "CHUY" MARMOLEJO (RTC/FAST MANAGER TRAFFIC SYSTEM MAINTENANCE) AT 702–604–7078 CELL OR AT 702–432–5300 GENERAL.
- IF ANY EXISTING FIBER OPTIC CABLE IS TO BE CUT OR SPLICED, ALONG OR ADJACENT TO THE PROJECT LIMITS, THE CONTRACTOR IS TO CONTACT MR. JESUS "CHUY" MARMOLEJO TWO (2) WEEKS IN ADVANCE FOR SYSTEM SHUTDOWN COORDINATION.

BREAKER SCHEDULE

TRAFFIC SIGNAL/STREETLIGHT

200 AMP 240V PAD MOUNTED SERVICE

WITH	
2 ~~1~~ 2 ~~1~~ POLE 60 ~~40~~ AMP CIRCUIT BREAKER/S	STREETLIGHT
1 1 POLE 15 AMP CIRCUIT BREAKER/S	STREETLIGHT
1 1 POLE 40 AMP CIRCUIT BREAKER/S	SIGNAL LUMINAIRES
1 1 POLE 60 AMP CIRCUIT BREAKER/S	TS CONTROLLER
1 1 BY–PASS SWITCH PER CONTRACTOR	STREETLIGHT
2 2 POLE 60 AMP CONTACTOR/S	**STREETLIGHT**

3

PROFESSIONAL ENGINEER STATE OF NEVADA
CIVIL
No 016535
Exp. 6.30.20
10.04.2018
FOR REVISION 3 ONLY.

SAFETY ALERT
Call Before You Overhead
1-702-227-2929

AVOID HITTING UNDERGROUND TRAFFIC SIGNAL AND STREET LIGHT SYSTEM CONDUITS. IT'S COSTLY.
Call before you UnderGround
1-702-432-5300
F.A.S.T.

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811
1-800-227-2600
1-702-455-7544

REVISIONS			
NO.	DATE:	DESCRIPTION	APP'D
3	10.4.18	BREAKER SCHEDULE	

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DESIGN SECTION

CITY OF LAS VEGAS NEVADA

CITY ENGINEER: DAVID N. BOWERS, P.E., P.T.O.E.
PROJECT MANAGER: MICHAEL STURDIVANT, P.E.
DESIGNED BY: RM, WV
DRAWN BY: JS, NV
CHECKED BY: RM, ST, WV
HORIZONTAL SCALE: AS SHOWN
VERTICAL SCALE: NONE
DATE: 2013–11–21

TITLE: TRAFFIC PACKAGE 6B
CHARLESTON/DURANGO, CHARLESTON/RANCHO
SHEET: CHARLESTON/DURANGO TRAFFIC SIGNAL MODIFICATION PLAN - 2

REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA
WALTER C. VODRAZKA, JR.
EXP. 06-30-14
CIVIL
No. 19183
12-3-13

Sheet T-2
20 of 21
DRAWING NO. 107-V4797-b

H# 06-25814 NDOT PROJ. NO SI-0159(011)

CLV TRAFFIC SIGNAL NOTES

1. ALL WORK PERFORMED ON ANY TRAFFIC SIGNAL COMPONENT MUST BE UNDER THE DIRECT ON-SITE SUPERVISION OF AN IMSA CERTIFIED TECHNICIAN. THE LEVEL OF CERTIFICATION REQUIRED SHALL BE LEVEL II.

2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGE TO ALL EXISTING UTILITIES. THE LOCATIONS OF UNDERGROUND UTILITIES AS SHOWN ON THE PLANS ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES TO VERIFY IN THE FIELD THE LOCATIONS OF THEIR INSTALLATIONS 72 HOURS PRIOR TO CONSTRUCTION.

CALL-BEFORE-YOU-OVERHEAD	1-702-227-2929
CALL-BEFORE-YOU-DIG	1-800-227-2600
STREETLIGHTS	1-702-229-6331
F.A.S.T.	1-702-432-5300

3. ALL TRAFFIC SIGNAL INSTALLATIONS SHALL CONFORM TO THE UNIFORM STANDARD DRAWINGS SPECIFICATIONS AND SPECIAL PROVISIONS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, VOLUMES I AND II, ADOPTED BY THE REGIONAL TRANSPORTATION COMMISSION APRIL 8, 1992 WITH ALL SUBSEQUENT REVISIONS. BRACKET MOUNTED (SIDE-MOUNTED) VEHICLE SIGNAL ASSEMBLIES WITH 2 OR MORE SIGNAL HEADS SHALL HAVE AN ADDITIONAL ELBOW AS SHOWN IN UNIFORM STANDARD DRAWING NUMBER 863 AND SHOWN AS OPTION B IN UNIFORM STANDARD DRAWING NUMBER 844, AND SHALL HAVE A MENERALLAC SUPPORT AS SHOWN IN UNIFORM STANDARD DRAWING NUMBER 863 IF ONE OF THE SIGNAL HEADS CONTAINS 4 OR MORE SIGNAL MODULES.

4. SERVICE SHALL HAVE 1-60 AMP SINGLE POLE BREAKER FOR SIGNAL, AND ONE 40 AMP SINGLE POLE BREAKERS FOR STREET LIGHTS. SERVICE SHALL BE 200 AMP PADMOUNT.

5. LINE SIDE OF METER TO BE WIRED WITH THREE #3/0 AWG THW. LOAD SIDE SHALL BE WIRED WITH FOUR #4 AWG THW (2 BLACK, 2 WHITE) AND ONE #8 AWG THW (GREEN).

6. LUMINAIRES ON ALL SIGNAL POLES SHALL BE L.E.D. AS APPROVED BY THE CITY OF LAS VEGAS (CLV). INTERSECTION LIGHTING SHALL MEET THE REQUIREMENTS OF UNIFORM STANDARD DRAWING NUMBER 300.S3. EACH LUMINAIRE SHALL HAVE AN INDIVIDUAL 1000 WATT P.E. CONTROL. FOR LUMINAIRES THERE SHALL BE 2(TWO)-#4 AWG THW CONDUCTORS FROM THE SERVICE TO THE CABINET. IN THE CABINET, THE #4 AWG THW CONDUCTORS SHALL BRANCH OFF INTO #10 AWG THW CONDUCTORS INDIVIDUALLY FUSED WITH 10 AMP FUSES. THERE SHALL BE NO SPLICES BETWEEN THE CABINET AND LUMINAIRE FIXTURES.

7. THE INTERNALLY ILLUMINATED STREET NAME SIGNS SHALL BE WIRED TO THE LUMINAIRES PHOTO CELL FOR CONTROL WITH #10 AWG THW COPPER STRANDED WIRE (TYPICAL). THE SIGN SHALL BE WIRED TO THE LUMINAIRE DIRECTLY ABOVE IT. IN THE EVENT THERE IS NO LUMINAIRE ON THE TRAFFIC SIGNAL POLE, THE 1000 WATT P.E. CONTROL SHALL BE MOUNTED ON THE POLE CAP. ALL NEW ILLUMINATED STREET NAME SIGNS SHALL HAVE LIGHT EMITTING DIODE (LED) LAMPS PER SECTION 623 T.02.16 OF THE SPECIAL PROVISIONS.

8. CHECK CONDUIT AND CABLE SCHEDULE FOR CONDUIT, CABLE, AND WIRE SIZE. VERIFY ALL EXISTING CONDUIT RUNS.

9. ALL PULLBOXES SHALL BE IN ACCORDANCE WITH UNIFORM STANDARD DRAWINGS NO. 705, NO. 706, AND NO. 707.

10. TRAFFIC SIGNAL CABLE SHALL BE 15 OR 25 CONDUCTOR #14 AWG SOLID (TYPICAL) CABLE AND SHALL CONFORM TO IMSA SPEC. NO. 20-1.

11. PEDESTRIAN PUSH BUTTONS SHALL BE AUDIBLE TACTILE "POLARA iNAVIGATOR" TYPE (2-WIRE PEDESTRIAN PUSHBUTTON SYSTEM WITH iN2 PUSH BUTTON STATIONS AND SHELF-MOUNT BIU CONTROL UNIT WITH SDLC CABLE) OR CAMPBELL COMPANY WiAPPS WIRELESSPEDESTRIAN PUSHBUTTON SYSTEM WITH APC IN ACCORDANCE WITH CITY OF LAS VEGAS SPECIAL PROVISIONS AND SECTION 623 OF THE CCA USS. PUSH BUTTON SIGNS SHALL BE R10-3e PER MUTCD, 2009 EDITION, WITH FULL MOUNTING BRACKETS, AS MODIFIED BY THE MANUFACTURER TO FIT ON A 9"X12" SIGN, AND SHALL BE PORCELAIN-ENAMELED METAL. ALL PUSH BUTTONS TO BE MOUNTED 42" ABOVE SIDEWALK. THE MAXIMUM HORIZONTAL REACH DISTANCE IS TO BE 10". SIDEWALK RAMPS WILL BE ACCORDING TO U.S.D. No. 235 (1-4) LATEST EDITION. WHEN AN EXISTING SIGNAL WITH EXISTING AUDIBLE-TACILE PUSH BUTTONS IS MODIFIED, THE CONTRACTOR SHALL VERIFY NEW PEDESTRIAN PUSH BUTTONS OR CABINET EQUIPMENT MATCHES THE MANUFACTURE AND MODEL OF ANY EXISTING EQUIPMENT SCHEDULED TO REMAIN, TO PROVIDE A FULLY FUNCTIONING SYSTEM. THE CONTRACTOR SHALL PROVIDE AND INSTALL ALL CABINET EQUIPMENT, INCLUDING THE PEDESTRIAN PUSH BUTTON CONTROL UNIT, INTERFACE PANEL AND ANY REQUIRED HARNESSES, TO PROVIDE A FULLY FUNCTIONING SYSTEM.

12. THE ROUTING AND TERMINATION OF CONDUITS AND THE PLACING OF POLES AND CABINETS SHALL BE AS INDICATED ON THE PLANS. ALL CHANGES SHALL BE APPROVED BY THE ENGINEER.

13. MAST ARM R10-12 SIGNS TO BE ADJACENT (NO GAP) TO THE M-5 SIGNAL HEAD. WHERE FLASHING YELLOW ARROW LEFT TURN SIGNALS ARE USED, A MAST ARM R10-12F "LEFT TURN YIELD ON FLASHING YELLOW ARROW" SIGN SHALL BE MOUNTED ADJACENT TO THE M-4 SIGNAL HEAD.

14. TRAFFIC SIGNAL CABINET SHALL BE A TYPE VIII CABINET UNLESS OTHERWISE SPECIFIED IN THE PLANS. THIS IS COMMONLY REFERRED TO AS AN "R" CABINET. THE CABINET SHALL CONFORM TO THE CLARK COUNTY AREA UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS AND THE CITY OF LAS VEGAS SPECIAL PROVISIONS. INSTALL CABINET NEAR THE R.O.W. LINE OR AS SHOWN ON THE DRAWINGS. THE TRAFFIC SIGNAL CONTROLLER CABINET, SHALL BE EQUIPPED WITH 16 LOAD BAY POSITIONS,SHALL BE A 48 DETECTOR CHANNEL R CABINET AND SHALL INCLUDE TWO (2) RACK-MOUNTED, 12 SLOT, LOOP DETECTION RACKS, WITH 2 DETECTOR LOOP CHANNELS PER SLOT FULLY WIRED SO THAT ALL CHANNELS ARE USABLE AND 4 CHANNEL SLOTS THAT CAN ACCOMMODATE VIDEO DETECTION CARDS. THE CABINET SHALL CONTAIN A 764 OPTICOM PHASE SELECTOR IN A 760 RACK, WITH A 768 AUXILIARY INTERFACE PANEL MOUNTED IN THE CABINET AND FULLY WIRED FOR GREEN SENSE CAPABILITIES.

15. THE CONTRACTOR SHALL SUPPLY A MALFUNCTION MANAGEMENT UNIT (MMU) TO THE CITY OF LAS VEGAS TRAFFIC SIGNAL REPAIR SHOP A MINIMUM OF FOURTEEN DAYS PRIOR TO SIGNAL TURN-ON OR PRIOR TO CONVERTING TO A NEW PHASING SCHEME, FOR TESTING AND PROGRAMMING PURPOSES. THE MMU SHALL BE A MODEL MMU-1600GE AS MANUFACTURED BY RENO A&E, OR APPROVED EQUAL. THE CONTRACTOR SHALL DELIVER THE MMU TO AND PICKUP THE CONTROLLER AT 2985 RONEMUS DRIVE. CONTRACTOR SHALL NOTIFY THE TRAFFIC SIGNAL REPAIR SHOP (229-6075) SEVEN DAYS PRIOR TO PICK UP. THE CITY, AT ITS DISCRETION, MAY PROVIDE A DIFFERENT MODEL MMU FOR INITIAL TURN-ON, IN WHICH CASE CITY PERSONNEL WILL SWAP THE MMU AFTER THE PROJECT IS ACCEPTED.

16. CONTRACTOR SHALL POTHOLE SIGNAL POLE LOCATIONS PRIOR TO ORDERING OF POLES.

17. ALL MAST ARMS TO BE HOT-DIP GALVANIZED BY THE MANUFACTURER THE MAST ARM IS TO BE FABRICATED WITH END TENON ONLY. THE END TENON SHALL BE FACTORY INSTALLED AND THE REMAINING TENONS SHALL BE FABRICATED IN THE FIELD AT THE LOCATION SHOWN ON THE PLANS OR AS DIRECTED BY THE TRAFFIC ENGINEER AND/OR HIS AUTHORIZED REPRESENTATIVE. FOR TENON FABRICATION DETAILS SEE CLARK COUNTY AREA U.S.D. NO. 808 SHEET 2. ALL WELDING SHALL CONFORM TO AWS D 2.0, "SPECIFICATION FOR WELDED HIGHWAYS AND RAILWAY BRIDGES," AND TO ANY ADDITIONAL REQUIREMENTS OF SECTION 623 OF THE SPECIFICATIONS. ALL EXPOSED WELDS, SHALL BE PAINTED AS PROVIDED FOR REPAIRING DAMAGED GALVANIZED SURFACES.

18. ALL VEHICLE AND PEDESTRIAN SIGNAL INDICATIONS SHALL HAVE LIGHT EMITTING DIODE (LED) TYPE INDICATIONS, IN CONFORMANCE TO CITY OF LAS VEGAS SPECIAL PROVISIONS AND TO SECTION 623 OF THE CCA USS. All pedestrian signal faces shall provide "Walking Person", "Hand", and "Countdown" messages as provided by Duralight model #JXM-400-VIEIL or Dialight model #430-6479-001X, or approved equal. THE "COUNTDOWN" MESSAGE SHALL NOT FLASH. WHERE EXISTING SIGNALS ARE MODIFIED, THE CONTRACTOR SHALL VERIFY THAT LED PEDESTRIAN INDICATIONS FOR A SPECIFIC PHASE ARE OF THE SAME MANUFACTURE SO THAT THEY FUNCTION CORRECTLY, OR SHALL REPLACE ALL COUNTDOWN PEDESTRIAN INDICATIONS FOR THAT PHASE.

19. VIDEO DETECTION SYSTEMS WILL BE EITHER ITERIS EDGE 2 WITH EDGECONNECT PAK, (IP addressable); PEEK VideoTrak IQ (with Ethernet port); OR TRAFICON VIP WITH VIEWCOM (IP ADDRESSABLE). WHEN VIDEO DETECTION IS SPECIFIED ON THE TRAFFIC SIGNAL PLANS. ALL VIDEO DETECTION SYSTEMS WILL BE STAND ALONE SYSTEMS TO INCLUDE ALL NECESSARY EQUIPMENT TO PROGRAM THE VIDEO DETECTION SYSTEM. A PROGRAMMING "MOUSE", KEYPAD OR LAPTAOP COMPUTER (IF REQUIRED FOR PROGRAMMING THE VIDEO DETECTION SYSTEM) AND APPROPRIATE SOFTWARE WILL BE SUPPLIED WITH EACH VIDEO SYSTEM. PERSONAL COMPUTERS (PCs) MAY NOT BE SUBSTITUTED FOR LAPTOPS. A VIDEO MONITOR (COLOR FLAT SCREEN) 9" TO 13" WILL BE SUPPLIED WITH EACH VIDEO DETECTION SYSTEM. EACH VIDEO CAMERA WILL HAVE POWER AND VIDEO CABLE DIRECTLY FROM THE CABINET. COAXIAL CABLE WILL BE TYPE 8281 (SOLID CENTER CONDUCTOR). CAMERAS THAT USE A PREFABRICATED CABLE INTEGRATING POWER AND COAXIAL CABLE INTO A SINGLE WEATHERPROOF CONNECTOR ARE ACCEPTABLE. "BNC" ARE THE ONLY ACCEPTABLE TERMINATION OF COAXIAL CABLES. CAMERAS WILL BE MOUNTED PER MANUFACTURER'S RECOMMENDATIONS AND PER CLV TRAFFIC ENGINEER APPROVAL. VIDEO CAMERAS SHALL BE COLOR AND SHALL BE MOUNTED ON A MINIMUM 6 FOOT RISER ON THE SIGNAL MAST ARM WITH EXTENSION BRACKETS (TYPE AB-0166-5-62 OR EQUIVALENT). THE LOCATION OF THE CAMERA ON THE MAST ARM SHALL BE APPROVED BY THE TRAFFIC SIGNAL SUPERVISOR. A VIDEO FILTER (CX06-BNYC OR EQUIVALENT) WILL BE INSTALLED IN THE SIGNAL CABINET FOR EACH CAMERA VIDEO INPUT. VIDEO DETECTION PROCESSORS AND COMMUNICATIONS CARDS SHALL BE PROVIDED WITH THE LATEST VERSIONS OF THE MANUFACTURER'S SOFTWARE. THE CONTRACTOR SHALL AIM CAMERAS AND PROGRAM AND CONFIGURE THE VIDEO DETECTION PROCESSORS TO PROVIDE A FULLY FUNCTIONING SYSTEM.

20. WHERE NEW LOOPS WILL BE OVERLAID WITH NEW PAVEMENT, LOOP DETECTORS SHALL BE PREFORMED LOOPS AS MANUFACTURED BY RENO A & E OR NEVER-FAIL LOOP SYSTEMS, AND ALL LOOPS SHALL BE INSTALLED IN THE ROADWAY PRIOR TO PLACEMENT OF THE FINAL PAVEMENT LIFT. WHERE NEW LOOPS ARE INSTALLED THAT ARE NOT OVERLAID WITH NEW PAVEMENT, LOOPS SHALL BE CABLE-IN-DUCT PER SECTION 623 T.02.04.C OF THE CITY OF LAS VEGAS SPECIAL PROVISIONS. LOOP LEAD-IN CABLE SHALL BE 6-PAIR 18 AWG MULTIPLE CONDUCTOR CABLE AS SPECIFIED IN SECTION 623T.02.04 OF THE CLV SPECIAL PROVISIONS. ALL WIRING HARNESSES, RACK POSITIONS, AND LOOP LEAD-IN CABLE SHALL BE CLEARLY MARKED AS TO THE APPROPRIATE PHASE AND LETTER DESIGNATION TO WHICH IT BELONGS AS SHOWN ON THE TRAFFIC SIGNAL PLANS. LOOPS SHALL BE LOCATED AS SHOWN ON THE TRAFFIC SIGNAL PLANS AND APPROVED BY THE CLV TRAFFIC ENGINEERING DIVISION PRIOR TO INSTALLATION. REFER TO SECTION 623T.02.04 OF THE CLV SPECIAL PROVISIONS FOR ADDITIONAL REQUIREMENTS.

21. OPTICAL PREEMPTION UNITS WILL BE GLOBAL TRAFFIC TECHNOLOGIES (ENCODING CAPABLE), MODEL 764 OPTICOM PHASE SELECTOR INSTALLED IN A MODEL 760 RACK WITH A MODEL 768 AUXILIARY INTERFACE PANEL (AIP) MOUNTED IN THE CABINET AND FULLY WIRED FOR GREEN SENSE CAPABILITIES. OPTICAL SENSORS WILL BE MODEL 721 WITH ONE DETECTOR PER DIRECTION, UNLESS SHOWN OTHERWISE IN THE PLANS, AND WILL BE INTERFACED TO THE TRAFFIC SIGNAL CONTROLLER CABINET WITH M-138 CABLE. THE SOUTHBOUND OPTICOM DETECTOR SHALL BE WIRED TO INPUT PREEMPTS ON CHANNEL 1 IN THE PHASE SELECTOR, EASTBOUND ON CHANNEL 2, NORTHBOUND ON CHANNEL 3, AND WESTBOUND ON CHANNEL 4, UNLESS VARIATIONS ARE APPROVED BY THE TRAFFIC SIGNAL SUPERVISOR. WHEN 764 PHASE SELECTORS ARE ADDED TO A CABINET WITHOUT A 768 AIP, THE CONTRACTOR SHALL INSTALL AND WIRE A NEW 768 AIP.

22. IF THE IMPROVEMENTS NECESSITATE THE OBLITERATION, TEMPORARY CONSTRUCTION, TEMPORARY REMOVAL, OR RELOCATION OF ANY EXISTING TRAFFIC PAVEMENT MARKING, SUCH PAVEMENT MARKING SHALL BE RESTORED OR REPLACED AT THE CONTRACTORS EXPENSE TO THE SATISFACTION OF THE CITY.

23. INTERCONNECT CABLE SHALL BE AS SHOWN IN THE WIRE SCHEDULE.

24. THE CONTRACTOR SHALL INSTALL CROSSWALKS, STOP BARS, STRIPING AND SIGNS AS IDENTIFIED ON THE PLANS.

25. WHERE THE PLANS CALL FOR REMOVAL AND SALVAGE OF EXISTING TRAFFIC SIGNAL EQUIPMENT, THE CONTRACTOR SHALL CALL 702-229-6331 TO SPEAK TO A TRAFFIC FIELD SUPERVISOR TO ARRANGE FOR DELIVERY TIMES AND LOCATIONS.

26. THE CONTRACTOR SHALL MAINTAIN EXISTING SIGNALS THROUGH THE LIFE OF THE PROJECT PER SECTION 623 G.03.01N OF THE CLV SPECIAL PROVISIONS.

REVISED 2/27/18 (CPM VERSION)

NO.	DATE	SHEET	REVISIONS

PREPARED BY
DEPARTMENT OF PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT

PREPARED FOR
CITY OF LAS VEGAS

H# 25814 | BID# 18.25814
DATE: 2018-04-30 | DESIGNED BY:
SUBMITTAL STAGE: FOR CONSTRUCTION | DRAWN BY: TRW | CHECKED BY: MASI

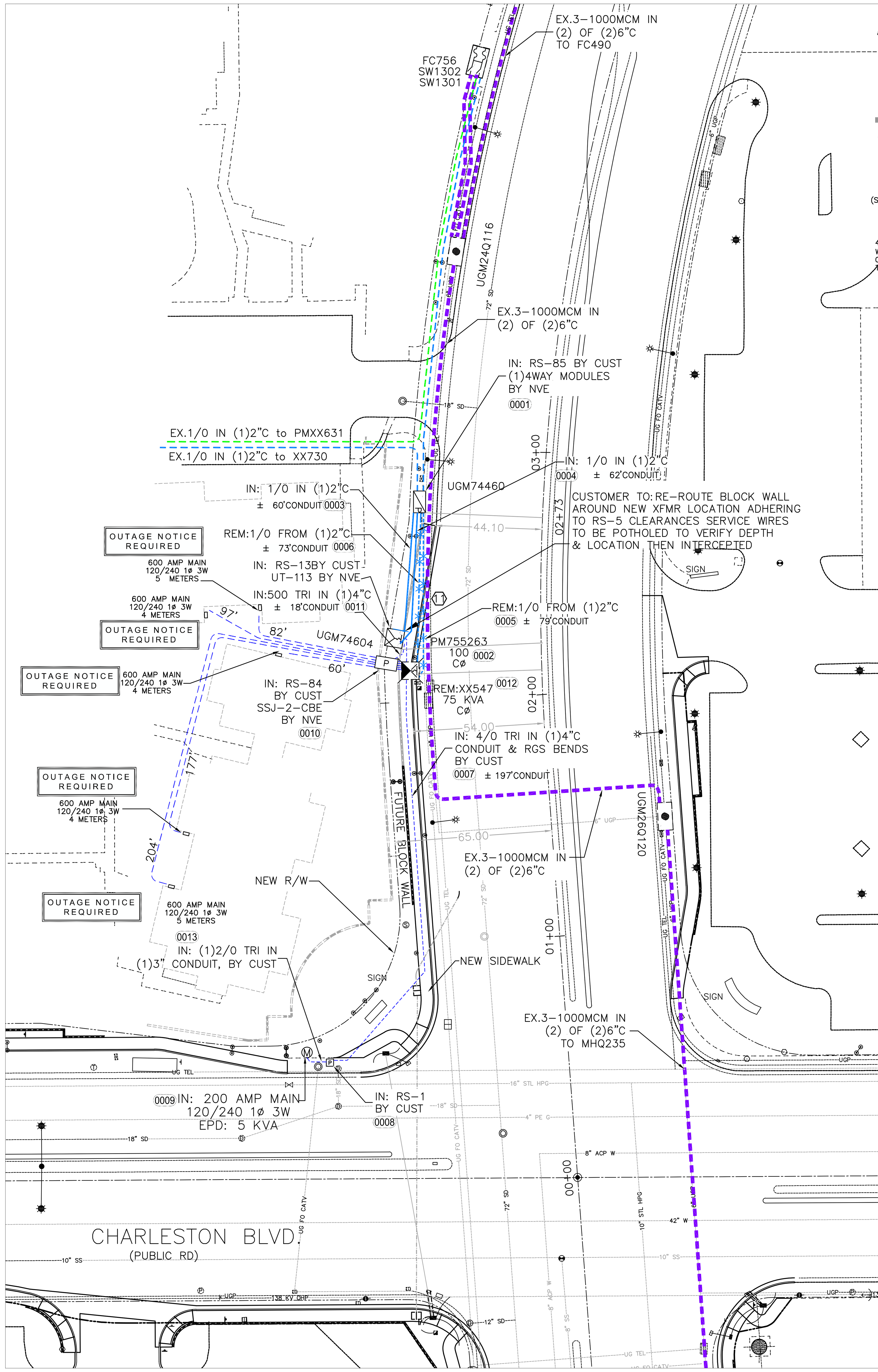
TITLE
TRAFFIC PACKAGE 6B
CHARLESTON/DURANGO

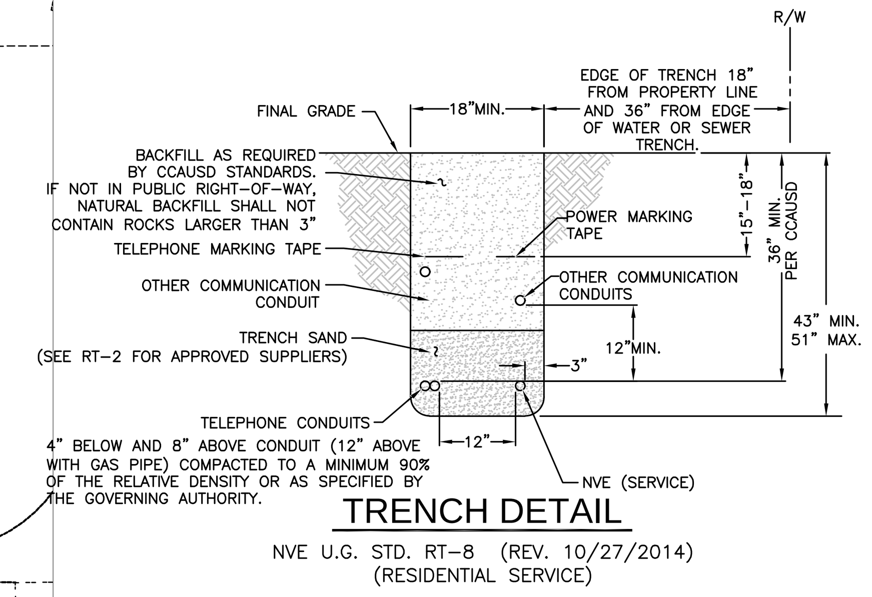
SHEET
TRAFFIC SIGNAL NOTES

04.30.2018

SHEET
T-4
21 OF 21
DRAWING NO.
107-V4797-b

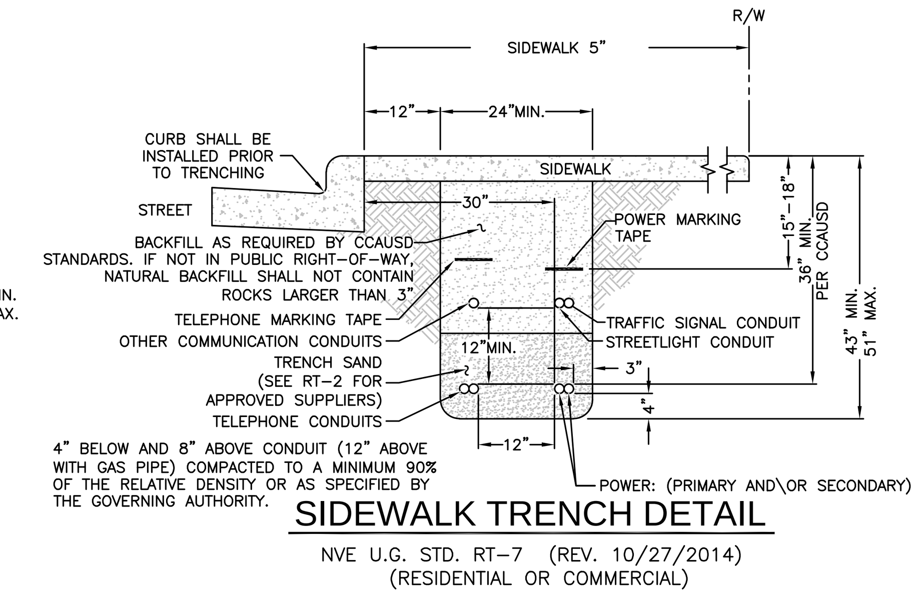
4/30/18 F:\PW_TEAM\TEAM 4-JEREMY'S TEAM\1-DESIGN\TRAFFIC PACKAGE NO. 6\DRAWINGS\TP6B\TP6B FRONT PAGES.DWG





TRENCH DETAIL

NVE U.G. STD. RT–8 (REV. 10/27/2014)
(RESIDENTIAL SERVICE)



SIDEWALK TRENCH DETAIL

NVE U.G. STD. RT–7 (REV. 10/27/2014)
(RESIDENTIAL OR COMMERCIAL)

N

T,R,S: 20– 60– 32

APN:

* BUY AMERICA LAW AND BUY AMERICA REQUIREMENTS APPLY TO THIS PROJECT *

BUY AMERICA MATERIAL FOR NV ENERGY PERSONNEL TO INSTALL IS STAGED SEPARATELY FROM REGULAR STOCK ITEMS.

NV ENERGY PERSONNEL TO PULL BUY AMERICA MATERIAL ONLY FROM THE DESIGNATED NON–STOCK SUPPLY FOR THIS PROJECT.

NV ENERGY PERSONNEL AND NV ENERGY CONTRACTORS MUST COMPLY WITH BUY AMERICA LAW AND BUY AMERICA REQUIREMENTS.

NV ENERGY BETTERMENT PROCESS

DEVELOPER TO INSTALL ALL CONDUIT/SUBSTRUCTURES PER NV ENERGY DESIGN. ALL CONDUIT/SUBSTRUCTURES IDENTIFIED AS AN NV ENERGY BETTERMENT UPGRADE WILL BE CREDITED TO THE DEVELOPER VIA THE NV ENERGY BETTERMENT PROCESS.

CONSTRUCTION / INSPECTION REQUIREMENTS

WORK MUST CONFORM TO NVE ELECTRIC SERVICE STANDARDS, AVAILABLE AT: www.nvenergy.com/business/newconstruction/newconstructionS/servicestandards.cfm

NVE INSPECTOR MUST BE PRESENT TO INSPECT TRENCHING (SCHEDULE AT LEAST 72 HOURS IN ADVANCE) AT EACH OF THE FOLLOWING STAGES:
1. BOTTOM SAND AND CONDUIT INSTALLED
2. TOP SAND INSTALLED
3. BACKFILL INSTALLED

CONDUIT MUST BE MANDRILLED PRIOR TO RELEASE (COORDINATE WITH INSPECTOR).

NVE STAND BY CREW IS REQUIRED WHEN WORKING AT AN ENERGIZED VAULT OR TRANSFORMER. CALL STAND BY NUMBER (SEE TITLE BLOCK) TO SCHEDULE.

NVE ELECTRICAL INSTALLATION WILL NOT BE SCHEDULED UNTIL AFTER THE NVE INSPECTOR HAS COMPLETED THE OFFICIAL RELEASE.

METER(S) WILL NOT BE SET UNTIL ALL OF THE FOLLOWING ARE COMPLETE:
- [INSTRUMENT–RATED ONLY] METERING EQUIPMENT HAS BEEN SUBMITTED TO NVE METERING ENGINEER AND APPROVED. (submittals_southern@nvenergy.com)
- APPLICATION FOR METER SET HAS BEEN SUBMITTED TO NVE'S NEW DEVELOPMENT CENTER. FORM AVAILABLE AT: www.nvenergy.com/brochures_arch/new_construction/meter_set.pdf
- THE LOCAL BUILDING AUTHORITY HAS INSPECTED AND APPROVED THE METERING EQUIPMENT.
- METERING EQUIPMENT IS ACCESSIBLE AND CLEARLY IDENTIFIED WITH PERMANENT MARKINGS. ADDRESSES, SUITE NUMBERS, AND STREET SIGNS ARE POSTED IN PERMANENT LOCATIONS (SEE RPI–G).

TRACK PROJECT STATUS ONLINE WITH NVE'S DEVELOPER DASHBOARD: www.nvenergy.com/business/newconstruction/newconstructionS/developerdashboard.cfm

CENTERLINE STATION TABLE

#	STREET INTERSECTION	STA	HEADED
A	"CH"CHARLESTON BLVD	00+00	EAST
	"D"DURANGO DR.	00+00	NORTH
B	"A"ALTA DR	00+00	EAST
	"D"DURANGO DR.	28+45	NORTH

STATION TABLE

MAXIMO STATION	CORNER	CENTER LINE STATION	SIDE	OFFSET CL TO BOC	OFFSET CL TO ROW	OFFSET CL TO CLOSEST FACE OF SUBSTRUCTURE	SUBSTRUCTURE INFORMATION
0002	SOUTH	"D"02+23	LT	54'	65'	59'	RS–13 – 4.25' X 4.75'
		FIELD NOTES:					OPERATING NUMBER: PM755263
							PAGE NUMBER: 1
	NORTH	"D"02+27.25	LT	54'	65'	59'	EASEMENT NUMBER: FUTURE
		FIELD NOTES:					TYP. EASEMENT LAYOUT: FUTURE
0010	SOUTH	"D"02+10	LT	54'	65'	60'	RS–84 – 4.67' X 3.17'
		FIELD NOTES:					OPERATING NUMBER: UGM74604
							PAGE NUMBER:
	NORTH	"D"02+13.17	LT	54'	65'	60'	EASEMENT NUMBER: FUTURE
		FIELD NOTES:					TYP. EASEMENT LAYOUT: FUTURE
0001	SOUTH	"D"02+73	LT	44.10'	55'	44.58	RS–85 – 7.67' X 3.67'
		FIELD NOTES:					OPERATING NUMBER: UGM74460
							PAGE NUMBER: 1
	NORTH	"D"02+80.67	LT	44.10'	55'	44.58'	EASEMENT NUMBER: FUTURE
		FIELD NOTES:					TYP. EASEMENT LAYOUT: FUTURE

GENERAL NOTES:

ANY NOTES LOCATED IN DRAWING AREA TAKE PRECEDENCE OVER STANDARD NOTES.

REFER TO A CURRENT NVEnergy ELECTRIC SERVICE REQUIREMENTS HANDBOOK FOR FURTHER CLARIFICATION OF NVEnergy STANDARDS.

THE APPLICANT SHALL INFORM THE INSPECTOR AT LEAST 48 HOURS BEFORE COMMENCING ANY ITEM OF CONSTRUCTION OR INSTALLATION OF MATERIAL TO ENABLE PROPER INSPECTION OF MATERIALS AND WORKMANSHIP. MAIN TRENCH WIRE PULLS TO BE SCHEDULED 72 HOURS IN ADVANCE OF INSTALLATION. APPLICANT'S PROJECT WILL NOT BE SCHEDULED UNTIL FINAL APPROVAL FROM NVEnergy UNDERGROUND & ELECTRICAL INSPECTORS.

ALL WORK SHALL BE ACCOMPLISHED IN STRICT ACCORDANCE WITH THE SPECIFICATIONS SET FORTH IN THE ELECTRIC SERVICE REQUIREMENTS HANDBOOK, AS CURRENTLY ADOPTED BY NVEnergy. THE CONTRACTOR SHALL SECURE COPIES OF THE AFOREMENTIONED CONSTRUCTION SPECIFICATIONS ON HIS OR HER OWN BEHALF.

SYMBOLS ARE NOT TO SCALE AND DO NOT NECESSARILY REPRESENT ACTUAL LOCATIONS OF FACILITIES.

THIS DRAWING ILLUSTRATES DATA COLLECTED FROM VARIOUS SOURCES AND MAY NOT REPRESENT A SURVEY OF THE PREMISES.

APPLICANT SHALL FIELD DETERMINE POSITION AND DEPTH OF EXISTING UTILITY EQUIPMENT PRIOR TO COMMENCING CONSTRUCTION.

USE CAUTION PRIOR TO EXCAVATION. CHECK TO ENSURE ADDITIONAL DEPTH IS NOT REQUIRED TO ACCOMMODATE GAS AND/OR WATER FACILITIES AND DRAINAGE CHANNELS.

CALL NVEnergy UNDERGROUND INSPECTORS 48 HOURS PRIOR TO START OF CONSTRUCTION FOR TRENCH INSPECTION BEFORE COVERING TRENCH.

ALL NVEnergy CABLE TO BE INSTALLED BEHIND CURB, UNLESS OTHERWISE STATED.

APPLICANT IS RESPONSIBLE FOR STAKING OF PROPERTY CORNERS & ELEVATIONS.

ALL HANDHOLES AND PULLBOXES SHALL BE INSTALLED TO FINISHED GRADE OR 6" ABOVE IF GRADE IS NOT ESTABLISHED.

ANY SUBSTRUCTURE VAULT INSTALLED IN GRAVEL, GRASS, OR BARE GROUND WILL REQUIRE A CONCRETED 8" WIDE AND 6" DEEP COLLAR AROUND BOX IN ACCORDANCE TO RS–G6.

2" PLASTIC CONDUIT BENDS (90°, 45°) WITH 36" MIN. RADIUS. (USE FIBERGLASS IF CONDUIT LENGTH IS OVER 500')

3" & 4" PLASTIC CONDUIT BENDS (90°, 45°) WITH 36" MIN. RADIUS.
(USE RGS IF CONDUIT LENGTH IS OVER 100')

6" PLASTIC CONDUIT BENDS (90°, 45°) WITH 48" MIN. RADIUS. (USE RGS IF CONDUIT LENGTH IS OVER 100')

WHEN INSTALLING CONDUIT IN FIELD, USE APPROPRIATE BENDS TO COMPLETE THE INSTALLATION.

DEFLECTION OF CONDUIT BENDS AND CONDUIT NOT TO EXCEED NVEnergy STANDARDS.

EXISTING STUB–OUT/CONDUIT INSTALLED BY PREVIOUS CONTRACTOR / DEVELOPER. NVEnergy DOES NOT GUARANTEE LOCATION, LENGTH, OR ACCESSIBILITY OF EXISTING STUB–OUT/CONDUIT. IF UTILIZING ANY PORTION OF EXISTING CONDUIT, IT MUST BE MANDRELED PRIOR TO FINAL RELEASE.

PREVIOUSLY MANDRELED CONDUIT WHICH HAS BEEN IN THE GROUND FOR OVER 6 MONTHS MUST BE RE–MANDRILLED PRIOR TO FINAL RELEASE.

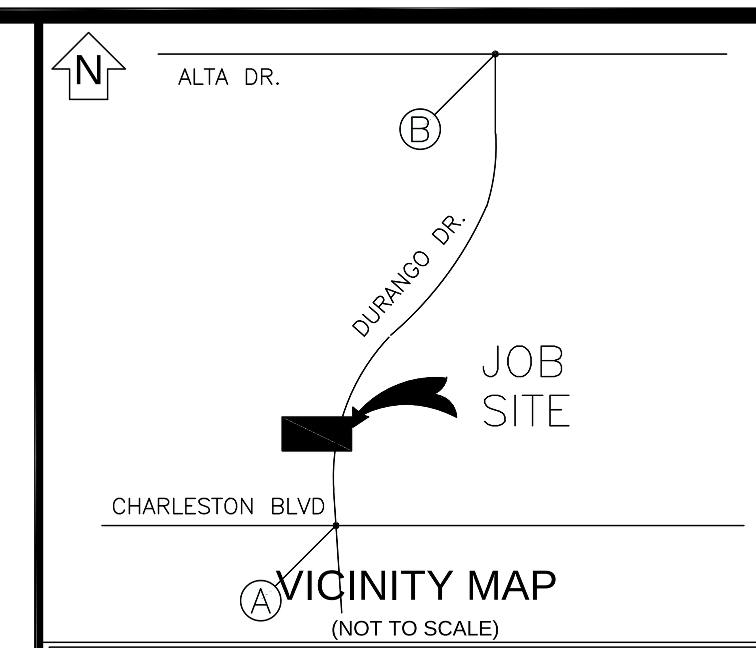
WHEN NVEnergy FACILITIES ARE TO BE REMOVED, NVEnergy WILL REMOVE ALL WIRES AND EQUIPMENT. NVEnergy IS NOT RESPONSIBLE FOR THE REMOVAL OF CONDUIT RUNS OR SUBSTRUCTURES FROM THE PROPERTY.

NO COVERED PARKING IN FRONT OF EQUIPMENT.

ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF–SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA", LATEST ISSUE; THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA", LATEST ISSUE; AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY; ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE.

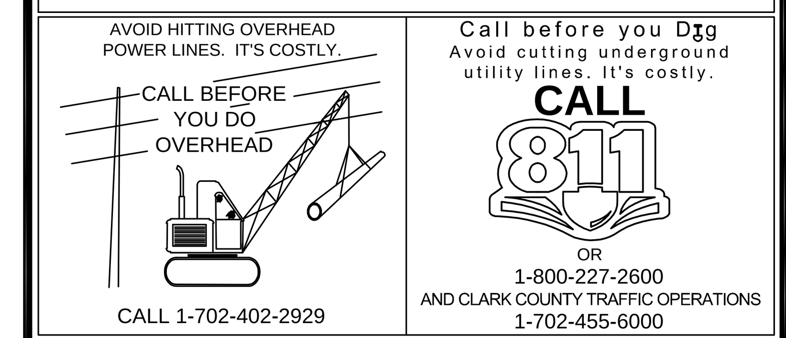
CIVIL LINETYPE LEGEND

CENTERLINE
PROPERTY LINE/ROW
CURB
EDGE OF PAVEMENT
EDGE OF SIDEWALK
SEWER LINE
WATER LINE
COHW WATER LINE
LVVWD WATER LINE
SNWA WATER LINE
GAS LINE
TELEPHONE LINE
CABLE TV LINE
CABLE TV LINE
STORM DRAIN LINE
FIRE HYDRANT
SERVICE INDICATOR
SIGNAL LIGHT
STREET LIGHT



VICINITY MAP
(NOT TO SCALE)

EVERY EFFORT HAS BEEN MADE TO IDENTIFY ALL NVE FACILITIES. THE CUSTOMER SHALL CONFIRM THE EXISTENCE AND LOCATION OF THESE FACILITIES.



REVISIONS

NO.	DESCRIPTION	DATE	G.A.

BUY AMERICA

PROJECT PURPOSE:
RELOCATE EXISTING ONE PHASE TRANSFORMER

EXHIBIT 'A'

NVEnergy INFORMATION:
COORDINATOR: DARRYL THOMAS
PHONE: 702–419–1138
DESIGNER: JORGE NAJERA D.F. KL
DCA: N/A
INSPECTOR: 402–3008
STAND BY: 402–4114, 402–4117,402–4118
DISTRICT: LAS VEGAS NORTH

JPA INFORMATION:
JPA ADMIN PHONE: JPA#:

CUSTOMER INFORMATION:
APPLICANT: CLV
ENGINEER: CLV
CONTACT: MICHAEL STURDIVANT 702–229–6734
APPROVAL DATE: 07/24/2017

GOVERNMENT INFORMATION:
AGENCY: CITY OF LAS VEGAS
APPROVAL DATE: 07/24/2017

FOR EACH SERVICE POINT (POINT OF DELIVERY), ENERGY FOR EACH TENANT SPACE WILL BE MEASURED THROUGH ONE WATTHOUR METER. ENERGY FOR ALL NON-TENANT SPACE WILL BE MEASURED THROUGH ONE WATTHOUR METER. CONTACT NVE METER OPERATIONS FOR MULTIPLE RATE CLASS INSTALLATIONS.

NVEnergy

CLV-TRAFFIC PACKAGE 6B
#BA
CHARLESTON BLVD AND DURANGO DR

PROJ. ID: 3001789766 SCALE: 1" = 30'
SHEET # 1 OF 1 DATE: 06/20/2017

dt12917
7/24/2017 8:03 AM

RTC NOTES:

BACKFILL AND RIGHT OF WAY RESTORATION SHALL CONFORM TO CLARK COUNTY UNIFORM STANDARD DRAWINGS

1	500.1	0 TO 5 YEARS PAVEMENT RESTORATION LONGITUDINAL CUT
2	500.2	0 TO 5 YEARS PAVEMENT RESTORATION TRANSVERSE CUT
3	500.3	OVER 5 YEARS PAVEMENT RESTORATION LONGITUDINAL CUT. GREATER THAN 60' R.O.W
4	500.4	OVER 5 YRS PAVEMENT RESTORATION LONGITUDINAL CUT. 60' R.O.W OR LESS
5	500.5	OVER 5 YRS PAVEMENT RESTORATION TRANSVERSE ALL R.O.W WIDTHS
6	501	TYPICAL UNDERGROUND UTILITY LOCATIONS IN RESIDENTIAL STREETS 60' OR LESS R.O.W.
7	501.1	TYPICAL UTILITY UNDERGROUND LOCATIONS IN STREETS WITH GREATER THAN 60' R.O.W.
8	503	METHOD B FOR RIGID AND FLEXIBLE PIPE TRENCH BACKFILL – PAVED AREAS
9	503.1	METHOD A FOR FLEXIBLE PIPE TRENCH BACKFILL – PAVED AREAS
11	BACKFILL IN UNPAVED AREA AS REQUIRED BY LOCAL CODE OR AS APPROVED BY AGENCY.	
12	234	SIDEWALK
13	506	UTILITY POTHOLE REPAIR
14	216	"L" TYPE CURB AND GUTTER

NVE WILL NOT VERIFY THE EXISTING CONDUIT. CUSTOMER TO ENSURE ITS INTEGRITY AND REPAIR IF NECESSARY.

NOTE:

NPC FACILITIES (SUBSTRUCTURES) ARE NOT TO BE WITHIN 10' OF STREET LIGHT BASES, AND NPC CONDUITS ARE NOT TO CONFLICT WITH STREET LIGHT BASES

OUTAGE NOTICE REQUIRED

NV ENERGY SCHEDULING NOTE: DAY (LANE BLOCKS)

THIS PROJECT WAS ESTIMATED WITH THE ASSUMPTION THAT ALL THE WORK BEING PERFORMED ON THIS PROJECT BY NV ENERGY CREWS CAN BE DONE DURING THE DAYTIME AND WILL REQUIRE TRAFFIC CONTROL.

GOVERNMENT APPROVAL OF THESE DRAWINGS DOES NOT INDICATE APPROVAL OF TRAFFIC CONTROL. PLEASE REFER TO THE BARRICADE PLAN FOR APPROVED TRAFFIC CONTROL REQUIREMENTS.

TRANSFORMER CONNECTED LOAD

TRANSFORMER #: PM755263

	APD	EPD	TOTAL
C ø	87	5	92

!!!! CAUTION !!!!

ENERGIZED CABLES...
CALL BEFORE YOU DIG

NOTE: ALL THE ABOVE GROUND UTILITY APPURTENANCES SHALL CONFORM TO THE REQUIREMENTS OF CLV UNIFIED DEVELOPMENT CODE TITLE 19.06 AND 19.08

APPROVED FOR CONSTRUCTION

THIS APPROVAL IS FOR WORK IN CLV R/W & EASEMENT ONLY. OBTAINING PERMISSIONS OR EASEMENTS FOR WORK SHOWN ON PRIVATE PROPERTY IS THE RESPONSIBILITY OF THE UTILITY.

APPROVAL BY: DATE

CITY OF LAS VEGAS
PERMIT REQUIRED*

CONTACT CLV LAND DEVELOPMENT (229–6371) CLV CONSTRUCTION SERVICES MUST BE NOTIFIED 24 HOURS PRIOR TO COMMENCING CONSTRUCTION (229–6337)

HANSEN

DATE

*NVE INSPECTOR MUST BE NOTIFIED BY FAX 48 HOURS PRIOR TO COMMENCING CONSTRUCTION & WILL VERIFY CITY PERMIT FOR WORK DONE IN STREETS OR SIDEWALK.
FAX PERMIT TO:
LAS VEGAS NORTH (RYAN CENTER): 402–4354
LAS VEGAS SOUTH (BELTWAY CENTER): 402–6864

APPENDIX D-1:

FHWA's Introduction to Crash Modification Factors

CMF

CRASH MODIFICATION FACTORS **IN PRACTICE**

INTRODUCTION TO CRASH MODIFICATION FACTORS

DEFINITION A crash modification factor (CMF) is a measure of the safety effectiveness of a particular treatment or design element.

APPLICATION CMFs are applied to the estimated crashes *without* treatment to compute the estimated crashes *with* treatment, as shown by Equation 1.

Estimated Crashes WITH Treatment = CMF * Estimated Crashes WITHOUT Treatment {1}

A CMF less than 1.0 indicates that a treatment has the potential to reduce crashes.

Example: A CMF for total crashes for installing centerline rumble strips on rural major collector roads has been estimated to be 0.86 (1). This CMF indicates that the frequency of total crashes with the treatment is estimated to be 86 percent of the estimated crash frequency without the treatment. In other words, the CMF indicates that there will be a 14 percent reduction in total estimated crash frequency.

A CMF greater than 1.0 indicates that a treatment has the potential to increase crashes.

Example: A CMF for total crashes for converting an urban four-lane cross-section to a five-lane cross-section has been estimated to be 1.11 (2). This CMF indicates that there will be an 11 percent increase in the estimated total crash frequency.

The application of an appropriate CMF can influence the decision to implement a particular project, and the misapplication of CMFs can lead to misinformed decisions. Key factors to consider when applying CMFs include: 1) selection of an appropriate CMF, 2) estimation of crashes without treatment, 3) application of CMFs by type and severity, and 4) estimation of the combined effect for multiple treatments.

Selecting an Appropriate CMF

The CMF selection process involves several considerations, including the availability of related CMFs, the applicability of available CMFs, and the quality of applicable CMFs. The key to selecting an appropriate CMF is to identify the CMF that best matches the scenario at hand.

Availability: The *Highway Safety Manual (HSM) (3)* and *CMF Clearinghouse (4)* are the two primary sources of CMFs.

Applicability: Several variables can be used to match a CMF to a given scenario including treatment type, roadway type, area type, segment or intersection geometry, segment or intersection traffic control, traffic volume, and state from which the CMF was developed. The HSM and CMF Clearinghouse provide information to help users identify applicable situations.

Quality: If multiple applicable CMFs exist for a given treatment, then the quality or standard error can be used to differentiate the results. The CMF Clearinghouse provides quality ratings for CMFs which may be used for this purpose. In the absence of a quality rating, CMFs may be compared by their

U.S. Department of Transportation
Federal Highway Administration

Federal Highway Administration, Office of Safety, 1200 New Jersey Avenue SE, Washington, DC 20590

standard error where a smaller standard error indicates a greater level of certainty for a CMF estimate.

Ultimately, CMFs should be applied to situations that closely match those from which the CMF was developed. However, it is critical for practitioners to use engineering judgment when a CMF is not available for the situations encountered as there are some cases for which a CMF that was developed for different conditions might be the best available.

Estimating Crashes without Treatment

The CMF is applied to the estimated crashes *without treatment* to estimate crashes *with* treatment (assuming the countermeasure of interest is implemented). Hence, the safety performance *without treatment* has to be estimated before applying CMFs. The HSM presents several methods for estimating the safety performance of a roadway or intersection. The most simplistic method to estimate crashes without treatment is to compute the long-term (i.e., 5+ years) average crash frequency before treatment. In this method, it is assumed that the crash history before treatment will represent the future safety performance in the absence of changes. The Empirical Bayes method, described in the HSM, is a more rigorous method for estimating crashes without treatment as it combines information from the site of interest with information from other similar sites.

Applying CMFs by Type and Severity

CMFs may apply to total crashes or to target crash types and severities. It is often useful to estimate the change in crashes by type and severity, but this should only be done when there are CMFs available for the specific crash types and severities in question. The crash type associated with a CMF defines the crashes for which the related CMF is applicable. Crash severity is defined by the most severe outcome of those involved in the crash. It is not appropriate to apply a CMF for a specific crash type or severity to other crash types and severities because a countermeasure may reduce certain crash types or severities while increasing other crash types and severities.

Estimating the Effects of Multiple Treatments

There are relatively few studies that estimate CMFs for combinations of countermeasures. It is far more common for studies to estimate CMFs for individual countermeasures. Consequently, it is difficult to accurately estimate the effects of combinations of countermeasures. Methods have been proposed for combining the CMFs developed from individual countermeasures to approximate the effect of multiple countermeasures, but there has been little research to support any specific method. The current practice for many agencies is to assume that CMFs are multiplicative; this is the current method presented in the *HSM (3)* and posted on the *CMF Clearinghouse (4)*. In brief, this proposed approach (and many of the alternatives) is problematic in the sense that applying the combined CMF may overestimate or underestimate the true crash effects, particularly if the countermeasures target similar crash types. More information regarding the application of multiple CMFs is available in recent articles *(5, 6)*.

Readers can refer to the CMF Clearinghouse for more information (www.cmfclearinghouse.org). The CMF Clearinghouse includes a web-based database of CMFs along with supporting documentation to help users identify the most appropriate countermeasure for their safety needs.

REFERENCES

1. Persaud, B. N., Retting, R. A., and Lyon, C., "Crash Reduction Following Installation of Centerline Rumble Strips on Rural Two-Lane Roads." Insurance Institute for Highway Safety, Arlington, VA, 2003.
2. Bauer, K. M., Harwood, D. W., Hughes, W. E., and Richard, K. R., "Safety Effects of Narrow Lanes and Shoulder-Use Lanes to Increase Capacity of Urban Freeways." In, *Transportation Research Record: Journal of the Transportation Research Board, No. 1897*, Transportation Research Board of the National Academies, Washington, D.C., 2004.
3. American Association of State Highway and Transportation Officials (AASHTO). *Highway Safety Manual*, 1st Edition, Washington, DC, 2010.
4. Crash Modification Factors (CMF) Clearinghouse. Federal Highway Administration. Available online at: www.cmfclearinghouse.org
5. Gross, F. and Yunk, K. "Crash Modification Factors: An Overview of Its Applications." *Public Roads*. Federal Highway Administration, Washington, D.C., 2011.
6. Gross, F., Hamidi, A., and Yunk, K. *Investigation of Existing and Alternative Methods for Combining Multiple CMFs*. Federal Highway Administration, Washington, D.C., 2011.

Application of CMFs is as follows:

Long-term avg. crashes with countermeasure
= CMF * Long-term avg. crashes without countermeasure

Multiply the CMF by an estimate of crashes without the countermeasure to estimate the long-term average crashes without crashes with the countermeasure.

Applied Steps:

1. Defined the base condition
   - Intersections / Junctions
     - i. area type, traffic control, number of approaches, and number of lanes on the major and minor roads.
   - Estimated the number of crashes for the base condition.
     - i. safety performance of the base condition (expected crash frequency)

2. Applied the CMF to estimate the safety performance for the condition with the countermeasure of interest
   - Select an appropriate CMF (applied the appropriate CMFs within the context of their developed based on the FHWA's CMF Clearinghouse and other resources on the web page)
   - Estimate the crashes for the condition with the countermeasure, multiply the estimated crashes for the base condition by the CMF

3. Computed and interpreted confidence intervals

   Computing the confidence interval can help you make even more informed decisions. Specifically, the confidence interval helps to understand the reliability of the CMF and statistical significance of the change in crashes. Moreover, the CMF represents an average value based on several data points. The confidence interval tells you that the true value of the CMF is likely to fall within some range at the given level of confidence.
   - 95% confined interval was used for the Program

4. Estimated combined countermeasure effects, if applicable
   - Define the scenario of interest.
     - i. what are the target crash types? i.e. roadway characteristics; traffic volume
     - ii. what are the countermeasures of interest? i.e. crash type and severity; time of day; and specific portion of the road
   - Understand the limits of the combined countermeasure effect.
     - i. Note: the maximum effect of any countermeasure or combination of countermeasures is a crash reduction of 100 percent (or a CMF of 0)
   - Determine the potential for overlapping effects among countermeasures.
     - i. Note: potential overlap is defined with respect to target crashes and represents the likelihood that the individual countermeasure would address the same crash types.
   - Categorize the magnitude of individual countermeasure effects.

CATEGORIZE THE MAGNITUDE OF INDIVIDUAL COUNTERMEASURE EFFECTS

Individual Effect	Assigned Magnitude
< 10% change	Small
10 - 25% change	Medium
> 25% change	Large

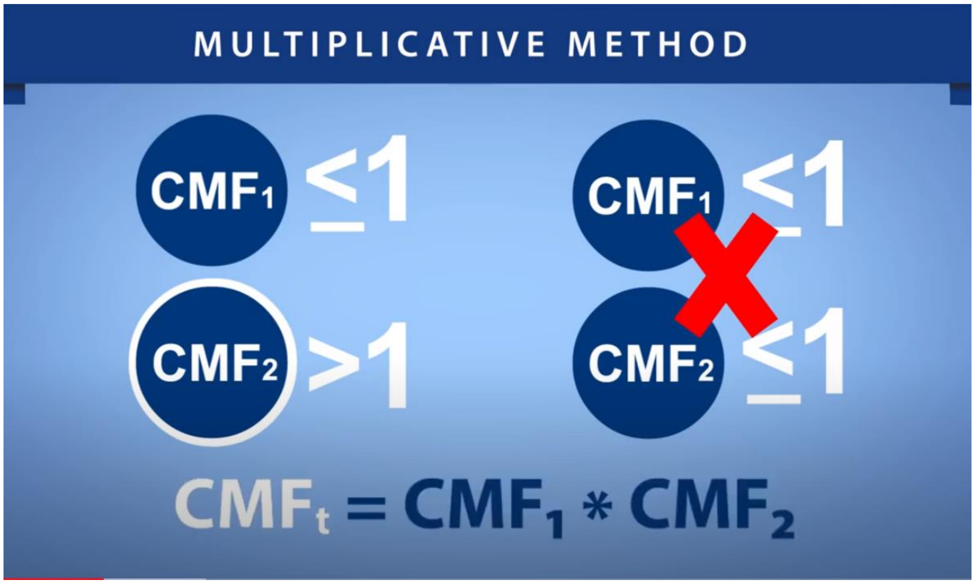
$CMF_1 = 0.92$ small $\quad$ $CMF_2 = 0.85$ medium

- <u>Select method</u>

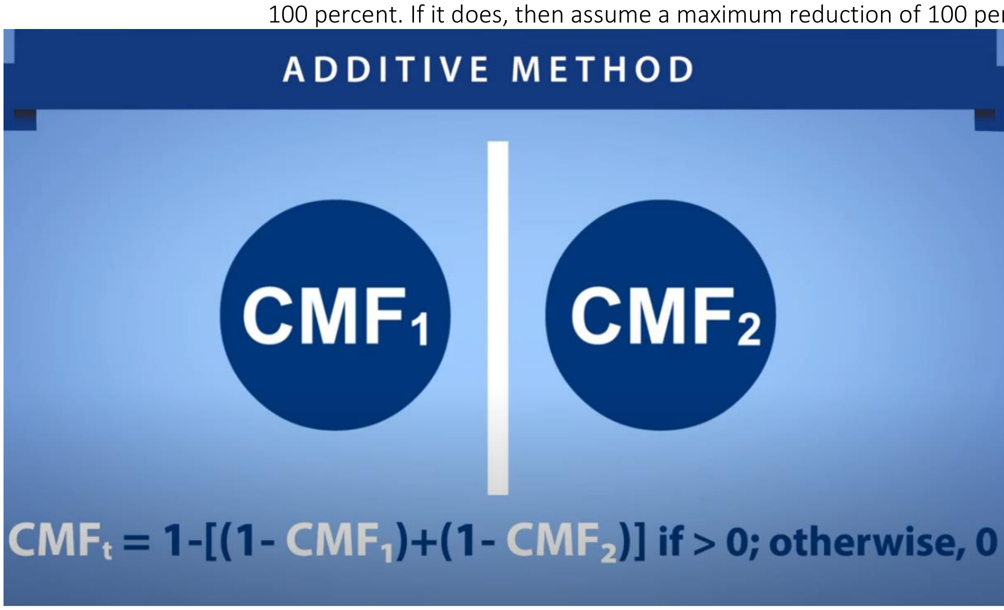
Magnitude	Overlap	Method
One or more CMFs > 1.0	Not Applicable	Multiplicative
Both CMFs < 1.0	Zero Overlap or Enhancing Effects	Additive
	Complete Overlap	Dominant effect
	Some Overlap	Dominant effect OR Dominant common residuals; whichever produces the greatest reduction (i.e., smallest combined CMF)

The Multiplicative Method, the Additive Method, the Dominant Effect Method, and the Dominant Common Residuals Method. Source: USDOT, FHWA

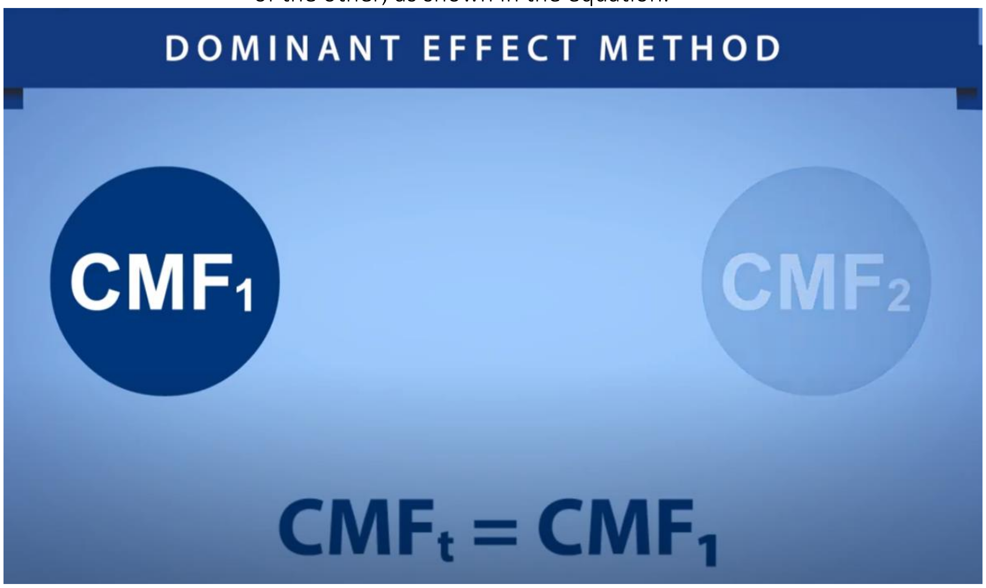
1. **multiplicative method** - is appropriate for scenarios where one or more CMFs are greater than one. If both CMFs are less than or equal to one, then one of the other methods is more appropriate. Using the multiplicative method, you simply multiply the two CMFs as shown in the equation where CMF1 and CMF2 are the applicable CMFs for the individual countermeasures and CMFt represents the combined effect of the two countermeasures.



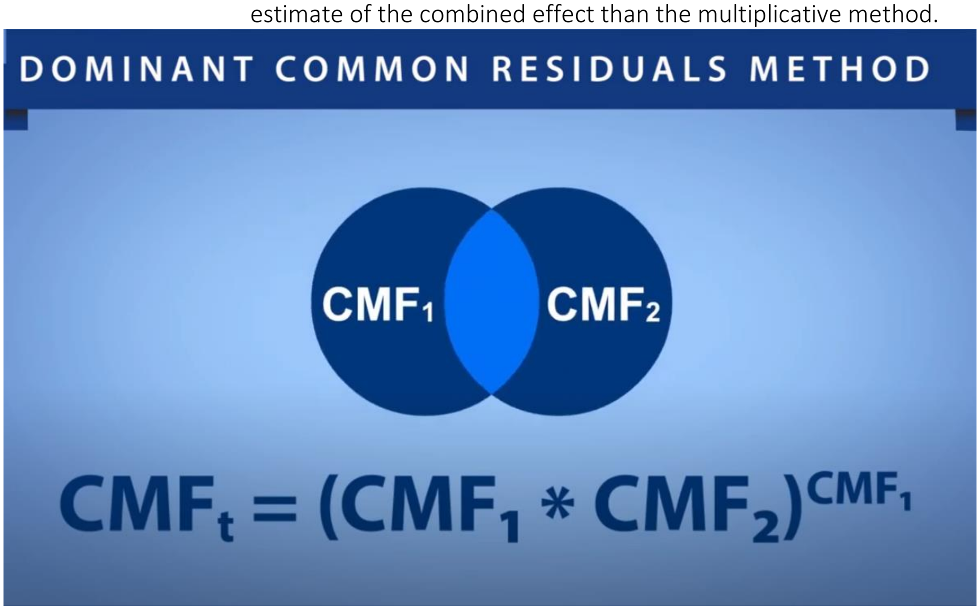
2. additive method- is appropriate for scenarios where there is no overlap expected among the countermeasure effects or where there is an expected enhancing effect among the countermeasures. Using the additive method, you simply add the two effects as shown in the equation where CMF1 and CMF2 are the applicable CMFs for the individual countermeasures and CMFt represents the combined effect of the two countermeasures. Note: do not add the CMFs. Further, there is a need to confirm that the combined effect does not exceed 100 percent. If it does, then assume a maximum reduction of 100 percent.



3. dominant effect method - only considers the effect of the countermeasure with the smallest CMF. This method is appropriate for scenarios where there is complete overlap expected among the countermeasure effects. Using the dominant effect method, you simply apply the smallest CMF, ignoring the effect of the other, as shown in the equation.



4. dominant common residuals method - considers the effect of both countermeasures but reduces the effectiveness of the second countermeasure. This method is appropriate for scenarios where there is some overlap expected among the countermeasure effects. The dominant common residuals method is similar to the multiplicative method, except the result is raised to the power of the smallest CMF as shown in the equation. This provides a more conservative estimate of the combined effect than the multiplicative method.



- Estimate the combined effect of two or more countermeasures, when applicable
  Summary example table used to determine method:

CMFS FOR CENTER LINE RUMBLE STRIPS AND SHOULDER RUMBLE STRIPS

Countermeasure	CMF	Applicable Crash Type	Applicable Crash Severity	Applicable Facility Type
Install center line rumble strips	0.912	Run-off-road head-on, and sideswipe	All	Urban and rural, 2 lane, undivided roads
Install shoulder rumble strips	0.844	Run-off-road head-on, and sideswipe	All	Urban and rural, 2 lane, undivided roads

Summary of Considerations to Select an Appropriate Method	
Direction of CMF values	Both CMFs < 1.0
Potential overlap	Some
Magnitude of effects	Small and medium
Applicability of CMFs	Same crash type and severity

Source of steps and images:
Safety Data and Analysis: Application of CMFs, USDOT FHWA
Roadway Safety Analysis Videos for CMFs, CMF Clearinghouse

APPENDIX D-2:

Application of Crash Modification Factors | Multiplicative Method

Crash Modification Factor Determination

Signal System Updates: Signal Heads/ Retroreflective Backplates/ Luminaires / Ped Countdown Signals

Description:

Improvements consist of the following minor traffic signal enhancements:

	CMF:
Countermeasure: Implement systemic signing and visibility improvements at signalized intersections	**0.949**
Source: http://www.cmfclearinghouse.org/detail.cfm?facid=8927	
Countermeasure: Replace Incandescent Traffic Signal Bulbs with Light Emitting Diodes (LEDs)	
Source: http://www.cmfclearinghouse.org/detail.cfm?facid=4898	**0.982**
Countermeasure: Install pedestrian countdown timer	
Source: http://www.cmfclearinghouse.org/detail.cfm?facid=8790	**0.912**

CMF (combined): (CMF $_1$) x (CMF $_2$) x (CMF $_3$) = 0.949*0.982*0.912

Includes Clearinghouse CMF ID 8927; 4898; and 8790

CMF (combined): **0.850**

Estimated Crash Savings = CMF (combined) x Total Crash Cost

Roadway Improvements: High Visibility Crosswalks / Left-Turn Pockets (where needed) / Through Lane Alignment / Signal Head per approach (where needed) / Median Islands (where needed) / Transit Turn-out (where needed)

Description:

Improvements consist of the following roadway enhancements:

Countermeasure: Provide a left-turn lane on one major-road approach	**0.76**
Source: http://www.cmfclearinghouse.org/detail.cfm?facid=263	
Countermeasure: Resurface pavement	
Source: http://www.cmfclearinghouse.org/detail.cfm?facid=10280	**0.787**

Left-Turn Treatment
CMF **0.760**

Includes Clearinghouse CMF ID 263

Intersection Rehabilitation
CMF **0.787**

Includes Clearinghouse CMF ID 10280

Estimated Crash Savings = CMF x Total Crash Cost

Pedestrian Realm Improvements: High Visibility Crosswalks / Modify signal phasing (implement a leading pedestrian interval) / Install pedestrian countdown timer

Description:

Improvements consist of the following pedestrian facility enhancements:

Countermeasure: Modify signal phasing (implement a leading pedestrian interval)	
Source: http://www.cmfclearinghouse.org/detail.cfm?facid=9916	**0.87**
Countermeasure: Install pedestrian countdown timer	
Source: http://www.cmfclearinghouse.org/detail.cfm?facid=8790	**0.912**

CMF (combined): (CMF $_1$) x (CMF $_2$) = 0.87*0.912

Includes Clearinghouse CMF ID 9916 and 8790

CMF (combined): **0.793**

Estimated Crash Savings = CMF x Total Crash Cost

APPENDIX E-1:

Program Intersections | Crash Cost

S DURANGO DR at CHARLESTON BLVD	PDO	Injury	Fatal	
	86	107	0	
Total	86	107	0	
Total Annual	17.200	21.400	0.000	
Year 1	17.458	21.721	0.000	
Year 2	17.720	22.047	0.000	
Year 3	17.986	22.378	0.000	
Year 4	18.255	22.713	0.000	
Year 5	18.529	23.054	0.000	
Year 6	18.807	23.400	0.000	
Year 7	19.089	23.751	0.000	
Year 8	19.376	24.107	0.000	
Year 9	19.666	24.469	0.000	
Year 10	19.961	24.836	0.000	
Year 11	20.261	25.208	0.000	
Year 12	20.565	25.586	0.000	
Year 13	20.873	25.970	0.000	
Year 14	21.186	26.360	0.000	
Year 15	21.504	26.755	0.000	
Year 16	21.827	27.156	0.000	
Year 17	22.154	27.564	0.000	
Year 18	22.486	27.977	0.000	
Year 19	22.824	28.397	0.000	
Year 20	23.166	28.823	0.000	
Total 20 Yr	403.693	502.269	0.000	
Cost Per Crash	$ 32,800	$ 206,500	$ 9,400,000	
Total Costs By Type	**$ 13,241,130**	**$ 103,718,584**	**$ -**	$ 116,959,714
Total Crash Costs			**$ 116,959,714**	

S DURANGO DR at CHARLESTON BLVD	PDO	Injury	Fatal	
PED/CYCLE	0	1	0	
Total	0	1	0	
Total Annual	0.000	0.200	0.000	
Year 1	0.000	0.203	0.000	
Year 2	0.000	0.206	0.000	
Year 3	0.000	0.209	0.000	
Year 4	0.000	0.212	0.000	
Year 5	0.000	0.215	0.000	
Year 6	0.000	0.219	0.000	
Year 7	0.000	0.222	0.000	
Year 8	0.000	0.225	0.000	
Year 9	0.000	0.229	0.000	
Year 10	0.000	0.232	0.000	
Year 11	0.000	0.236	0.000	
Year 12	0.000	0.239	0.000	
Year 13	0.000	0.243	0.000	
Year 14	0.000	0.246	0.000	
Year 15	0.000	0.250	0.000	
Year 16	0.000	0.254	0.000	
Year 17	0.000	0.258	0.000	
Year 18	0.000	0.261	0.000	
Year 19	0.000	0.265	0.000	
Year 20	0.000	0.269	0.000	
Total 20 Yr	0.000	4.694	0.000	
Cost Per Crash	$ 32,800	$ 206,500	$ 9,400,000	
Total Costs By Type	**$ -**	**$ 969,333**	**$ -**	$ 969,333
Total Crash Costs			**$ 969,333**	

Cost Analysis			
Description	**Minor Traffic Signal Updates**	**Roadway Improvements**	**Pedestrian Realm Update**
Capital Cost	$ 262,000	$ 3,340,000	$ 85,000
Estimated Service Life	20 yrs	20 yrs	20 yrs
Estimated Crash Savings	$ 17,554,575	$ 28,070,331	$ 200,225
$CMF_{combined}$	0.85	0.76	0.79
Total Crash Costs	$ 116,959,714	$ 116,959,714	$ 969,333
BCR	**67.00**	**8.40**	**2.36**

EASTERN AVE at STEWART AVE	PDO	Injury	Fatal	
	104	73	0	
Total	104	73	0	
Total Annual	20.800	14.600	0.000	
Year 1	21.112	14.819	0.000	
Year 2	21.429	15.041	0.000	
Year 3	21.750	15.267	0.000	
Year 4	22.076	15.496	0.000	
Year 5	22.408	15.728	0.000	
Year 6	22.744	15.964	0.000	
Year 7	23.085	16.204	0.000	
Year 8	23.431	16.447	0.000	
Year 9	23.783	16.693	0.000	
Year 10	24.139	16.944	0.000	
Year 11	24.501	17.198	0.000	
Year 12	24.869	17.456	0.000	
Year 13	25.242	17.718	0.000	
Year 14	25.621	17.984	0.000	
Year 15	26.005	18.253	0.000	
Year 16	26.395	18.527	0.000	
Year 17	26.791	18.805	0.000	
Year 18	27.193	19.087	0.000	
Year 19	27.601	19.373	0.000	
Year 20	28.015	19.664	0.000	
Total 20 Yr	488.187	342.670	0.000	
Cost Per Crash	$ 32,800	$ 206,500	$ 9,400,000	
Total Costs By Type	**$ 16,012,529**	**$ 70,761,277**	**$ -**	$ 86,773,806
Total Crash Costs			**$ 86,773,806**	

EASTERN AVE at STEWART AVE	PDO	Injury	Fatal	
PED/CYCLE	1	3	0	
Total	1	3	0	
Total Annual	0.200	0.600	0.000	
Year 1	0.203	0.609	0.000	
Year 2	0.206	0.618	0.000	
Year 3	0.209	0.627	0.000	
Year 4	0.212	0.637	0.000	
Year 5	0.215	0.646	0.000	
Year 6	0.219	0.656	0.000	
Year 7	0.222	0.666	0.000	
Year 8	0.225	0.676	0.000	
Year 9	0.229	0.686	0.000	
Year 10	0.232	0.696	0.000	
Year 11	0.236	0.707	0.000	
Year 12	0.239	0.717	0.000	
Year 13	0.243	0.728	0.000	
Year 14	0.246	0.739	0.000	
Year 15	0.250	0.750	0.000	
Year 16	0.254	0.761	0.000	
Year 17	0.258	0.773	0.000	
Year 18	0.261	0.784	0.000	
Year 19	0.265	0.796	0.000	
Year 20	0.269	0.808	0.000	
Total 20 Yr	4.694	14.082	0.000	
Cost Per Crash	$ 32,800	$ 206,500	$ 9,400,000	
Total Costs By Type	**$ 153,967**	**$ 2,907,998**	**$ -**	$ 3,061,964
Total Crash Costs			**$ 3,061,964**	

Cost Analysis			
Description	**Minor Traffic Signal Updates**	**Roadway Improvements**	**Pedestrian Realm Update**
Capital Cost	$ 256,000	$ 3,796,000	$ 80,000
Estimated Service Life	20 yrs	20 yrs	20 yrs
Estimated Crash Savings	$ 13,016,071	$ 20,825,713	$ 633,827
$CMF_{combined}$	0.85	0.76	0.79
Total Crash Costs	$ 86,773,806	$ 86,773,806	$ 3,061,964
BCR	**50.84**	**5.49**	**7.92**

FORT APACHE RD at SAHARA AVE	PDO	Injury	Fatal	
	69	55	0	
Total	69	55	0	
Total Annual	13.800	11.000	0.000	
Year 1	14.007	11.165	0.000	
Year 2	14.217	11.332	0.000	
Year 3	14.430	11.502	0.000	
Year 4	14.647	11.675	0.000	
Year 5	14.867	11.850	0.000	
Year 6	15.090	12.028	0.000	
Year 7	15.316	12.208	0.000	
Year 8	15.546	12.391	0.000	
Year 9	15.779	12.577	0.000	
Year 10	16.015	12.766	0.000	
Year 11	16.256	12.957	0.000	
Year 12	16.500	13.152	0.000	
Year 13	16.747	13.349	0.000	
Year 14	16.998	13.549	0.000	
Year 15	17.253	13.753	0.000	
Year 16	17.512	13.959	0.000	
Year 17	17.775	14.168	0.000	
Year 18	18.041	14.381	0.000	
Year 19	18.312	14.596	0.000	
Year 20	18.587	14.815	0.000	
Total 20 Yr	323.893	258.176	0.000	
Cost Per Crash	$ 32,800	$ 206,500	$ 9,400,000	
Total Costs By Type	**$ 10,623,697**	**$ 53,313,291**	**$ -**	$ 63,936,988
Total Crash Costs			**$ 63,936,988**	

FORT APACHE RD at SAHARA AVE	PDO	Injury	Fatal	
PED/CYCLE	1	1	0	
Total	1	1	0	
Total Annual	0.200	0.200	0.000	
Year 1	0.203	0.203	0.000	
Year 2	0.206	0.206	0.000	
Year 3	0.209	0.209	0.000	
Year 4	0.212	0.212	0.000	
Year 5	0.215	0.215	0.000	
Year 6	0.219	0.219	0.000	
Year 7	0.222	0.222	0.000	
Year 8	0.225	0.225	0.000	
Year 9	0.229	0.229	0.000	
Year 10	0.232	0.232	0.000	
Year 11	0.236	0.236	0.000	
Year 12	0.239	0.239	0.000	
Year 13	0.243	0.243	0.000	
Year 14	0.246	0.246	0.000	
Year 15	0.250	0.250	0.000	
Year 16	0.254	0.254	0.000	
Year 17	0.258	0.258	0.000	
Year 18	0.261	0.261	0.000	
Year 19	0.265	0.265	0.000	
Year 20	0.269	0.269	0.000	
Total 20 Yr	4.694	4.694	0.000	
Cost Per Crash	$ 32,800	$ 206,500	$ 9,400,000	
Total Costs By Type	**$ 153,967**	**$ 969,333**	**$ -**	$ 1,123,299
Total Crash Costs			**$ 1,123,299**	

Cost Analysis			
Description	**Minor Traffic Signal Updates**	**Roadway Improvements**	**Pedestrian Realm Update**
Capital Cost	$ 262,000	$ 797,000	$ 85,000
Estimated Service Life	20 yrs	20 yrs	20 yrs
Estimated Crash Savings	$ 9,590,548	$ 13,618,578	$ 232,523
$CMF_{combined}$	0.85	0.79	0.79
Total Crash Costs	$ 63,936,988	$ 63,936,988	$ 1,123,299
BCR	**36.61**	**17.09**	**2.74**

MARTIN L KING BLVD at BONANZA RD	PDO	Injury	Fatal	
	74	45	1	
Total	74	45	1	
Total Annual	14.800	9.000	0.200	
Year 1	15.022	9.135	0.203	
Year 2	15.247	9.272	0.206	
Year 3	15.476	9.411	0.209	
Year 4	15.708	9.552	0.212	
Year 5	15.944	9.696	0.215	
Year 6	16.183	9.841	0.219	
Year 7	16.426	9.989	0.222	
Year 8	16.672	10.138	0.225	
Year 9	16.922	10.291	0.229	
Year 10	17.176	10.445	0.232	
Year 11	17.434	10.602	0.236	
Year 12	17.695	10.761	0.239	
Year 13	17.961	10.922	0.243	
Year 14	18.230	11.086	0.246	
Year 15	18.503	11.252	0.250	
Year 16	18.781	11.421	0.254	
Year 17	19.063	11.592	0.258	
Year 18	19.349	11.766	0.261	
Year 19	19.639	11.943	0.265	
Year 20	19.933	12.122	0.269	
Total 20 Yr	347.364	211.235	4.694	
Cost Per Crash	$ 32,800	$ 206,500	$ 9,400,000	
Total Costs By Type	**$ 11,393,530**	**$ 43,619,965**	**$ 44,124,582**	$ 99,138,077
Total Crash Costs			**$ 99,138,077**	

MARTIN L KING BLVD at BONANZA RD	PDO	Injury	Fatal	
PED/CYCLE	0	6	0	
Total	0	6	0	
Total Annual	0.000	1.200	0.000	
Year 1	0.000	1.218	0.000	
Year 2	0.000	1.236	0.000	
Year 3	0.000	1.255	0.000	
Year 4	0.000	1.274	0.000	
Year 5	0.000	1.293	0.000	
Year 6	0.000	1.312	0.000	
Year 7	0.000	1.332	0.000	
Year 8	0.000	1.352	0.000	
Year 9	0.000	1.372	0.000	
Year 10	0.000	1.393	0.000	
Year 11	0.000	1.414	0.000	
Year 12	0.000	1.435	0.000	
Year 13	0.000	1.456	0.000	
Year 14	0.000	1.478	0.000	
Year 15	0.000	1.500	0.000	
Year 16	0.000	1.523	0.000	
Year 17	0.000	1.546	0.000	
Year 18	0.000	1.569	0.000	
Year 19	0.000	1.592	0.000	
Year 20	0.000	1.616	0.000	
Total 20 Yr	0.000	28.165	0.000	
Cost Per Crash	$ 32,800	$ 206,500	$ 9,400,000	
Total Costs By Type	**$ -**	**$ 5,815,995**	**$ -**	$ 5,815,995
Total Crash Costs			**$ 5,815,995**	

Cost Analysis			
Description	**Minor Traffic Signal Updates**	**Roadway Improvements**	**Pedestrian Realm Update**
Capital Cost	$ 256,000	$ 1,013,000	$ 80,000
Estimated Service Life	20 yrs	20 yrs	20 yrs
Estimated Crash Savings	$ 14,870,712	$ 21,116,410	$ 1,203,911
$CMF_{combined}$	0.85	0.79	0.79
Total Crash Costs	$ 99,138,077	$ 99,138,077	$ 5,815,995
BCR	**58.09**	**20.85**	**15.05**

LAKE MEAD BLVD at RAINBOW BLVD	PDO	Injury	Fatal	
	68	50	0	
Total	68	50	0	
Total Annual	13.600	10.000	0.000	
Year 1	13.804	10.150	0.000	
Year 2	14.011	10.302	0.000	
Year 3	14.221	10.457	0.000	
Year 4	14.435	10.614	0.000	
Year 5	14.651	10.773	0.000	
Year 6	14.871	10.934	0.000	
Year 7	15.094	11.098	0.000	
Year 8	15.320	11.265	0.000	
Year 9	15.550	11.434	0.000	
Year 10	15.783	11.605	0.000	
Year 11	16.020	11.779	0.000	
Year 12	16.260	11.956	0.000	
Year 13	16.504	12.136	0.000	
Year 14	16.752	12.318	0.000	
Year 15	17.003	12.502	0.000	
Year 16	17.258	12.690	0.000	
Year 17	17.517	12.880	0.000	
Year 18	17.780	13.073	0.000	
Year 19	18.047	13.270	0.000	
Year 20	18.317	13.469	0.000	
Total 20 Yr	319.199	234.705	0.000	
Cost Per Crash	$ 32,800	$ 206,500	$ 9,400,000	
Total Costs By Type	**$ 10,469,731**	**$ 48,466,628**	**$ -**	$ 58,936,359
Total Crash Costs			**$ 58,936,359**	

LAKE MEAD BLVD at RAINBOW BLVD	PDO	Injury	Fatal	
PED/CYCLE	0	5	0	
Total	0	5	0	
Total Annual	0.000	1.000	0.000	
Year 1	0.000	1.015	0.000	
Year 2	0.000	1.030	0.000	
Year 3	0.000	1.046	0.000	
Year 4	0.000	1.061	0.000	
Year 5	0.000	1.077	0.000	
Year 6	0.000	1.093	0.000	
Year 7	0.000	1.110	0.000	
Year 8	0.000	1.126	0.000	
Year 9	0.000	1.143	0.000	
Year 10	0.000	1.161	0.000	
Year 11	0.000	1.178	0.000	
Year 12	0.000	1.196	0.000	
Year 13	0.000	1.214	0.000	
Year 14	0.000	1.232	0.000	
Year 15	0.000	1.250	0.000	
Year 16	0.000	1.269	0.000	
Year 17	0.000	1.288	0.000	
Year 18	0.000	1.307	0.000	
Year 19	0.000	1.327	0.000	
Year 20	0.000	1.347	0.000	
Total 20 Yr	0.000	23.471	0.000	
Cost Per Crash	$ 32,800	$ 206,500	$ 9,400,000	
Total Costs By Type	**$ -**	**$ 4,846,663**	**$ -**	$ 4,846,663
Total Crash Costs			**$ 4,846,663**	

Cost Analysis			
Description	**Minor Traffic Signal Updates**	**Roadway Improvements**	**Pedestrian Realm Update**
Capital Cost	$ 256,000	$ 190,000	$ 80,000
Estimated Service Life	20 yrs	20 yrs	20 yrs
Estimated Crash Savings	$ 8,840,454	$ 12,553,444	$ 1,003,259
$CMF_{combined}$	0.85	0.79	0.79
Total Crash Costs	$ 58,936,359	$ 58,936,359	$ 4,846,663
BCR	**34.53**	**66.07**	**12.54**

CHARLESTON BLVD at RAINBOW BLVD	PDO	Injury	Fatal	
	65	61	0	
Total	65	61	0	
Total Annual	13.000	12.200	0.000	
Year 1	13.195	12.383	0.000	
Year 2	13.393	12.569	0.000	
Year 3	13.594	12.757	0.000	
Year 4	13.798	12.949	0.000	
Year 5	14.005	13.143	0.000	
Year 6	14.215	13.340	0.000	
Year 7	14.428	13.540	0.000	
Year 8	14.644	13.743	0.000	
Year 9	14.864	13.949	0.000	
Year 10	15.087	14.159	0.000	
Year 11	15.313	14.371	0.000	
Year 12	15.543	14.587	0.000	
Year 13	15.776	14.805	0.000	
Year 14	16.013	15.027	0.000	
Year 15	16.253	15.253	0.000	
Year 16	16.497	15.482	0.000	
Year 17	16.744	15.714	0.000	
Year 18	16.995	15.950	0.000	
Year 19	17.250	16.189	0.000	
Year 20	17.509	16.432	0.000	
Total 20 Yr	305.117	286.340	0.000	
Cost Per Crash	$ 32,800	$ 206,500	$ 9,400,000	
Total Costs By Type	**$ 10,007,831**	**$ 59,129,286**	**$ -**	$ 69,137,117
Total Crash Costs			**$ 69,137,117**	

CHARLESTON BLVD at RAINBOW BLVD	PDO	Injury	Fatal	
PED/CYCLE	0	10	0	
Total	0	10	0	
Total Annual	0.000	2.000	0.000	
Year 1	0.000	2.030	0.000	
Year 2	0.000	2.060	0.000	
Year 3	0.000	2.091	0.000	
Year 4	0.000	2.123	0.000	
Year 5	0.000	2.155	0.000	
Year 6	0.000	2.187	0.000	
Year 7	0.000	2.220	0.000	
Year 8	0.000	2.253	0.000	
Year 9	0.000	2.287	0.000	
Year 10	0.000	2.321	0.000	
Year 11	0.000	2.356	0.000	
Year 12	0.000	2.391	0.000	
Year 13	0.000	2.427	0.000	
Year 14	0.000	2.464	0.000	
Year 15	0.000	2.500	0.000	
Year 16	0.000	2.538	0.000	
Year 17	0.000	2.576	0.000	
Year 18	0.000	2.615	0.000	
Year 19	0.000	2.654	0.000	
Year 20	0.000	2.694	0.000	
Total 20 Yr	0.000	46.941	0.000	
Cost Per Crash	$ 32,800	$ 206,500	$ 9,400,000	
Total Costs By Type	**$ -**	**$ 9,693,326**	**$ -**	$ 9,693,326
Total Crash Costs			**$ 9,693,326**	

Cost Analysis			
Description	**Minor Traffic Signal Updates**	**Roadway Improvements**	**Pedestrian Realm Update**
Capital Cost	$ 279,000	$ 2,945,000	$ 98,000
Estimated Service Life	20 yrs	20 yrs	20 yrs
Estimated Crash Savings	$ 10,370,568	$ 16,592,908	$ 2,006,518
$CMF_{combined}$	0.85	0.76	0.79
Total Crash Costs	$ 69,137,117	$ 69,137,117	$ 9,693,326
BCR	**37.17**	**5.63**	**20.47**

S VALLEY VIEW BLVD at SAHARA AVE	PDO	Injury	Fatal	
	65	53	0	
Total	65	53	0	
Total Annual	13.000	10.600	0.000	
Year 1	13.195	10.759	0.000	
Year 2	13.393	10.920	0.000	
Year 3	13.594	11.084	0.000	
Year 4	13.798	11.250	0.000	
Year 5	14.005	11.419	0.000	
Year 6	14.215	11.590	0.000	
Year 7	14.428	11.764	0.000	
Year 8	14.644	11.941	0.000	
Year 9	14.864	12.120	0.000	
Year 10	15.087	12.302	0.000	
Year 11	15.313	12.486	0.000	
Year 12	15.543	12.674	0.000	
Year 13	15.776	12.864	0.000	
Year 14	16.013	13.057	0.000	
Year 15	16.253	13.252	0.000	
Year 16	16.497	13.451	0.000	
Year 17	16.744	13.653	0.000	
Year 18	16.995	13.858	0.000	
Year 19	17.250	14.066	0.000	
Year 20	17.509	14.277	0.000	
Total 20 Yr	305.117	248.788	0.000	
Cost Per Crash	$ 32,800	$ 206,500	$ 9,400,000	
Total Costs By Type	**$ 10,007,831**	**$ 51,374,626**	**$ -**	$ 61,382,456
Total Crash Costs			**$ 61,382,456**	

S VALLEY VIEW BLVD at SAHARA AVE	PDO	Injury	Fatal	
PED/CYCLE	0	10	0	
Total	0	10	0	
Total Annual	0.000	2.000	0.000	
Year 1	0.000	2.030	0.000	
Year 2	0.000	2.060	0.000	
Year 3	0.000	2.091	0.000	
Year 4	0.000	2.123	0.000	
Year 5	0.000	2.155	0.000	
Year 6	0.000	2.187	0.000	
Year 7	0.000	2.220	0.000	
Year 8	0.000	2.253	0.000	
Year 9	0.000	2.287	0.000	
Year 10	0.000	2.321	0.000	
Year 11	0.000	2.356	0.000	
Year 12	0.000	2.391	0.000	
Year 13	0.000	2.427	0.000	
Year 14	0.000	2.464	0.000	
Year 15	0.000	2.500	0.000	
Year 16	0.000	2.538	0.000	
Year 17	0.000	2.576	0.000	
Year 18	0.000	2.615	0.000	
Year 19	0.000	2.654	0.000	
Year 20	0.000	2.694	0.000	
Total 20 Yr	0.000	46.941	0.000	
Cost Per Crash	$ 32,800	$ 206,500	$ 9,400,000	
Total Costs By Type	**$ -**	**$ 9,693,326**	**$ -**	$ 9,693,326
Total Crash Costs			**$ 9,693,326**	

Cost Analysis			
Description	**Minor Traffic Signal Updates**	**Roadway Improvements**	**Pedestrian Realm Update**
Capital Cost	$ 259,000	$ 459,000	$ 83,000
Estimated Service Life	20 yrs	20 yrs	20 yrs
Estimated Crash Savings	$ 9,207,368	$ 13,074,463	$ 2,006,518
$CMF_{combined}$	0.85	0.79	0.79
Total Crash Costs	$ 61,382,456	$ 61,382,456	$ 9,693,326
BCR	**35.55**	**28.48**	**24.17**

ST LOUIS AVE at EASTERN AVE	PDO	Injury	Fatal	
	17	18	0	
Total	17	18	0	
Total Annual	3.400	3.600	0.000	
Year 1	3.451	3.654	0.000	
Year 2	3.503	3.709	0.000	
Year 3	3.555	3.764	0.000	
Year 4	3.609	3.821	0.000	
Year 5	3.663	3.878	0.000	
Year 6	3.718	3.936	0.000	
Year 7	3.773	3.995	0.000	
Year 8	3.830	4.055	0.000	
Year 9	3.888	4.116	0.000	
Year 10	3.946	4.178	0.000	
Year 11	4.005	4.241	0.000	
Year 12	4.065	4.304	0.000	
Year 13	4.126	4.369	0.000	
Year 14	4.188	4.434	0.000	
Year 15	4.251	4.501	0.000	
Year 16	4.315	4.568	0.000	
Year 17	4.379	4.637	0.000	
Year 18	4.445	4.706	0.000	
Year 19	4.512	4.777	0.000	
Year 20	4.579	4.849	0.000	
Total 20 Yr	79.800	84.494	0.000	
Cost Per Crash	$ 32,800	$ 206,500	$ 9,400,000	
Total Costs By Type	**$ 2,617,433**	**$ 17,447,986**	**$ -**	$ 20,065,419
Total Crash Costs			**$ 20,065,419**	

ST LOUIS AVE at EASTERN AVE	PDO	Injury	Fatal	
PED/CYCLE	0	9	0	
Total	0	9	0	
Total Annual	0.000	1.800	0.000	
Year 1	0.000	1.827	0.000	
Year 2	0.000	1.854	0.000	
Year 3	0.000	1.882	0.000	
Year 4	0.000	1.910	0.000	
Year 5	0.000	1.939	0.000	
Year 6	0.000	1.968	0.000	
Year 7	0.000	1.998	0.000	
Year 8	0.000	2.028	0.000	
Year 9	0.000	2.058	0.000	
Year 10	0.000	2.089	0.000	
Year 11	0.000	2.120	0.000	
Year 12	0.000	2.152	0.000	
Year 13	0.000	2.184	0.000	
Year 14	0.000	2.217	0.000	
Year 15	0.000	2.250	0.000	
Year 16	0.000	2.284	0.000	
Year 17	0.000	2.318	0.000	
Year 18	0.000	2.353	0.000	
Year 19	0.000	2.389	0.000	
Year 20	0.000	2.424	0.000	
Total 20 Yr	0.000	42.247	0.000	
Cost Per Crash	$ 32,800	$ 206,500	$ 9,400,000	
Total Costs By Type	**$ -**	**$ 8,723,993**	**$ -**	$ 8,723,993
Total Crash Costs			**$ 8,723,993**	

Cost Analysis			
Description	**Minor Traffic Signal Updates**	**Roadway Improvements**	**Pedestrian Realm Update**
Capital Cost	$ 239,000	$ 1,218,000	$ 67,000
Estimated Service Life	20 yrs	20 yrs	20 yrs
Estimated Crash Savings	$ 3,009,813	$ 4,273,934	$ 1,805,867
CMF $_{combined}$	0.85	0.79	0.79
Total Crash Costs	$ 20,065,419	$ 20,065,419	$ 8,723,993
BCR	**12.59**	**3.51**	**26.95**

CHEYENNE AVE at RAINBOW BLVD	PDO	Injury	Fatal	
	60	37	0	
Total	60	37	0	
Total Annual	12.000	7.400	0.000	
Year 1	12.180	7.511	0.000	
Year 2	12.363	7.624	0.000	
Year 3	12.548	7.738	0.000	
Year 4	12.736	7.854	0.000	
Year 5	12.927	7.972	0.000	
Year 6	13.121	8.091	0.000	
Year 7	13.318	8.213	0.000	
Year 8	13.518	8.336	0.000	
Year 9	13.721	8.461	0.000	
Year 10	13.926	8.588	0.000	
Year 11	14.135	8.717	0.000	
Year 12	14.347	8.848	0.000	
Year 13	14.563	8.980	0.000	
Year 14	14.781	9.115	0.000	
Year 15	15.003	9.252	0.000	
Year 16	15.228	9.390	0.000	
Year 17	15.456	9.531	0.000	
Year 18	15.688	9.674	0.000	
Year 19	15.923	9.819	0.000	
Year 20	16.162	9.967	0.000	
Total 20 Yr	281.646	173.682	0.000	
Cost Per Crash	$ 32,800	$ 206,500	$ 9,400,000	
Total Costs By Type	**$ 9,237,998**	**$ 35,865,305**	**$ -**	$ 45,103,302
Total Crash Costs			**$ 45,103,302**	

Cost Analysis			
Description	**Minor Traffic Signal Updates**	**Roadway Improvements**	**Pedestrian Realm Update**
Capital Cost	$ 256,000	$ 2,260,000	$ 79,000
Estimated Service Life	20 yrs	20 yrs	20 yrs
Estimated Crash Savings	$ 6,765,495	$ 10,824,793	$ 1,436,434
$CMF_{combined}$	0.85	0.76	0.79
Total Crash Costs	$ 45,103,302	$ 45,103,302	$ 6,939,295
BCR	**26.43**	**4.79**	**18.18**

CHEYENNE AVE at RAINBOW BLVD	PDO	Injury	Fatal	
PED/CYCLE	1	7	0	
Total	1	7	0	
Total Annual	0.200	1.400	0.000	
Year 1	0.203	1.421	0.000	
Year 2	0.206	1.442	0.000	
Year 3	0.209	1.464	0.000	
Year 4	0.212	1.486	0.000	
Year 5	0.215	1.508	0.000	
Year 6	0.219	1.531	0.000	
Year 7	0.222	1.554	0.000	
Year 8	0.225	1.577	0.000	
Year 9	0.229	1.601	0.000	
Year 10	0.232	1.625	0.000	
Year 11	0.236	1.649	0.000	
Year 12	0.239	1.674	0.000	
Year 13	0.243	1.699	0.000	
Year 14	0.246	1.724	0.000	
Year 15	0.250	1.750	0.000	
Year 16	0.254	1.777	0.000	
Year 17	0.258	1.803	0.000	
Year 18	0.261	1.830	0.000	
Year 19	0.265	1.858	0.000	
Year 20	0.269	1.886	0.000	
Total 20 Yr	4.694	32.859	0.000	
Cost Per Crash	$ 32,800	$ 206,500	$ 9,400,000	
Total Costs By Type	**$ 153,967**	**$ 6,785,328**	**$ -**	$ 6,939,295
Total Crash Costs			**$ 6,939,295**	

N DECATUR BLVD at W WASHINGTON AVE	PDO	Injury	Fatal	
	44	51	0	
Total	44	51	0	
Total Annual	8.800	10.200	0.000	
Year 1	8.932	10.353	0.000	
Year 2	9.066	10.508	0.000	
Year 3	9.202	10.666	0.000	
Year 4	9.340	10.826	0.000	
Year 5	9.480	10.988	0.000	
Year 6	9.622	11.153	0.000	
Year 7	9.767	11.320	0.000	
Year 8	9.913	11.490	0.000	
Year 9	10.062	11.663	0.000	
Year 10	10.213	11.838	0.000	
Year 11	10.366	12.015	0.000	
Year 12	10.521	12.195	0.000	
Year 13	10.679	12.378	0.000	
Year 14	10.839	12.564	0.000	
Year 15	11.002	12.752	0.000	
Year 16	11.167	12.944	0.000	
Year 17	11.335	13.138	0.000	
Year 18	11.505	13.335	0.000	
Year 19	11.677	13.535	0.000	
Year 20	11.852	13.738	0.000	
Total 20 Yr	206.541	239.399	0.000	
Cost Per Crash	$ 32,800	$ 206,500	$ 9,400,000	
Total Costs By Type	**$ 6,774,532**	**$ 49,435,961**	**$ -**	$ 56,210,492
Total Crash Costs			**$ 56,210,492**	

N DECATUR BLVD at W WASHINGTON AVE	PDO	Injury	Fatal	
PED/CYCLE	0	8	0	
Total	0	8	0	
Total Annual	0.000	1.600	0.000	
Year 1	0.000	1.624	0.000	
Year 2	0.000	1.648	0.000	
Year 3	0.000	1.673	0.000	
Year 4	0.000	1.698	0.000	
Year 5	0.000	1.724	0.000	
Year 6	0.000	1.750	0.000	
Year 7	0.000	1.776	0.000	
Year 8	0.000	1.802	0.000	
Year 9	0.000	1.829	0.000	
Year 10	0.000	1.857	0.000	
Year 11	0.000	1.885	0.000	
Year 12	0.000	1.913	0.000	
Year 13	0.000	1.942	0.000	
Year 14	0.000	1.971	0.000	
Year 15	0.000	2.000	0.000	
Year 16	0.000	2.030	0.000	
Year 17	0.000	2.061	0.000	
Year 18	0.000	2.092	0.000	
Year 19	0.000	2.123	0.000	
Year 20	0.000	2.155	0.000	
Total 20 Yr	0.000	37.553	0.000	
Cost Per Crash	$ 32,800	$ 206,500	$ 9,400,000	
Total Costs By Type	**$ -**	**$ 7,754,661**	**$ -**	$ 7,754,661
Total Crash Costs			**$ 7,754,661**	

Cost Analysis

Description	**Minor Traffic Signal Updates**	**Roadway Improvements**	**Pedestrian Realm Update**
Capital Cost	$ 251,000	$ 2,006,000	$ 75,000
Estimated Service Life	20 yrs	20 yrs	20 yrs
Estimated Crash Savings	$ 8,431,574	$ 11,972,835	$ 1,605,215
$CMF_{combined}$	0.85	0.79	0.79
Total Crash Costs	$ 56,210,492	$ 56,210,492	$ 7,754,661
BCR	**33.59**	**5.97**	**21.40**

APPENDIX E-2:

Program Intersections | Improvement Cost

Intersection Number	Intersection			Signal System															
	North-South Arterial	East-West Arterial	Direction	Pole & Mast Arm	Cost	Total	Signal Head with Retroreflective Backplate	Cost	Total	Pedestrian Push Button	Cost	Total	U-Turn Sign	Cost	Total	Luminaire	Cost	Total	Signal System Total
1	Durango Drive	Charleston Boulevard	NB SB EB WB	4	$ 20,000.00	$ 80,000.00	24	$ 1,800.00	$ 43,200.00	8	$ 500.00	$ 4,000.00	4	$ 100.00	$ 400.00	8	$ 5,000.00	$ 40,000.00	$ 167,600.00
2	Eastern Avenue	Stewart Avenue	NB SB EB WB	4	$ 20,000.00	$ 80,000.00	22	$ 1,800.00	$ 39,600.00	8	$ 500.00	$ 4,000.00	4	$ 100.00	$ 400.00	8	$ 5,000.00	$ 40,000.00	$ 164,000.00
3	Fort Apache Road	Sahara Avenue	NB SB EB WB	4	$ 20,000.00	$ 80,000.00	24	$ 1,800.00	$ 43,200.00	8	$ 500.00	$ 4,000.00	4	$ 100.00	$ 400.00	8	$ 5,000.00	$ 40,000.00	$ 167,600.00
4	Martin Luther King Boulevard	Bonanza Road	NB SB EB WB	4	$ 20,000.00	$ 80,000.00	22	$ 1,800.00	$ 39,600.00	8	$ 500.00	$ 4,000.00	4	$ 100.00	$ 400.00	8	$ 5,000.00	$ 40,000.00	$ 164,000.00
5	Rainbow Boulevard	Lake Mead Boulevard	NB SB EB WB	4	$ 20,000.00	$ 80,000.00	22	$ 1,800.00	$ 39,600.00	8	$ 500.00	$ 4,000.00	4	$ 100.00	$ 400.00	8	$ 5,000.00	$ 40,000.00	$ 164,000.00
6	Rainbow Boulevard	Charleston Boulevard	NB SB EB WB	4	$ 20,000.00	$ 80,000.00	30	$ 1,800.00	$ 54,000.00	8	$ 500.00	$ 4,000.00	4	$ 100.00	$ 400.00	8	$ 5,000.00	$ 40,000.00	$ 178,400.00
7	Valley View Boulevard	Sahara Avenue	NB SB EB WB	4	$ 20,000.00	$ 80,000.00	23	$ 1,800.00	$ 41,400.00	8	$ 500.00	$ 4,000.00	4	$ 100.00	$ 400.00	8	$ 5,000.00	$ 40,000.00	$ 165,800.00
8	Eastern Avenue	St. Louis Avenue	NB SB EB WB	4	$ 20,000.00	$ 80,000.00	16	$ 1,800.00	$ 28,800.00	8	$ 500.00	$ 4,000.00	4	$ 100.00	$ 400.00	8	$ 5,000.00	$ 40,000.00	$ 153,200.00
9	Rainbow Boulevard	Cheyenne Avenue	NB SB EB WB	4	$ 20,000.00	$ 80,000.00	22	$ 1,800.00	$ 39,600.00	8	$ 500.00	$ 4,000.00	4	$ 100.00	$ 400.00	8	$ 5,000.00	$ 40,000.00	$ 164,000.00
10	Decatur Boulevard	Washington Avenue	NB SB EB WB	4	$ 20,000.00	$ 80,000.00	20	$ 1,800.00	$ 36,000.00	8	$ 500.00	$ 4,000.00	4	$ 100.00	$ 400.00	8	$ 5,000.00	$ 40,000.00	$ 160,400.00

Intersection Number	Intersection			Turn Pockets												Pedestrians							
	North-South Arterial	East-West Arterial	Direction	Added Left-Turn Pockets	Added Feet & ROW Needed	Added Through Lanes	Added Feet & ROW Needed	Added Right-Turn Pockets	Added Feet & ROW Needed	Construction Cost - Left-Turn	Construction Cost - Right-Turn	Construction Cost Total	Total ROW	ROW Cost		Pedestrian Ramp	Cost	Total	Crosswalk	Linear Feet	Cost/ Foot	Total	Pedestrian Total
1	Durango Drive	Charleston Boulevard	NB	1-300'	3000	-	-	1-200'	2000	$ 75,000.00	$ 50,000.00	$ 575,000.00	21,900	$ 100.00	$ 2,190,000.00	4	$ 4,000.00	$ 16,000.00	4	480	$ 80.00	$ 38,400.00	$ 54,400.00
			SB	1-380'	3800	-	-	1-200'	2000														
			EB	1-300' / +80'	3800	-	-	1-200'	2000														
			WB	1-330'	3300	-	-	1-200'	2000														
2	Eastern Avenue	Stewart Avenue	NB	1-300' / +155'	4550	-	-	1-150'	1500	$ 75,000.00	$ 50,000.00	$ 800,000.00	24,200	$ 100.00	$ 2,420,000.00	4	$ 4,000.00	$ 16,000.00	4	440	$ 80.00	$ 35,200.00	$ 51,200.00
			SB	1-300' / +155'	4550	-	-	1-150'	1500														
			EB	1-310' / +120'	4300	-	-	1-150'	1500														
			WB	1-300' / +180'	4800	-	-	+150'	1500														
3	Fort Apache Road	Sahara Avenue	NB	-	-	-	-	1-150'	1500	$ 75,000.00	$ 50,000.00	$ 150,000.00	4,350	$ 100.00	$ 435,000.00	4	$ 4,000.00	$ 16,000.00	4	480	$ 80.00	$ 38,400.00	$ 54,400.00
			SB	-	-	-	-	1-150'	1500														
			EB	-	-	-	-	-	-														
			WB	-	-	-	-	+135'	1350														
4	Martin Luther King Boulevard	Bonanza Road	NB	-	-	-	-	1-150'	1500	$ 75,000.00	$ 50,000.00	$ 250,000.00	3,700	$ 100.00	$ 370,000.00	4	$ 4,000.00	$ 16,000.00	4	440	$ 80.00	$ 35,200.00	$ 51,200.00
			SB	-	-	-	-	-	-														
			EB	-	-	-	-	-	-														
			WB	+50' (x2)	1000	-	-	+120'	1200														
5	Rainbow Boulevard	Lake Mead Boulevard	NB	-	-	-	-	-	-	$ 75,000.00	$ 50,000.00	$ -	0	$ 100.00	$ -	4	$ 4,000.00	$ 16,000.00	2	440	$ 80.00	$ 35,200.00	$ 51,200.00
			SB	-	-	-	-	-	-														
			EB	-	-	-	-	-	-														
			WB	-	-	-	-	-	-														
6	Rainbow Boulevard	Charleston Boulevard	NB	1-340'	3400	1-12' x 5280'	Restripe	+130'	1300	$ 75,000.00	$ 50,000.00	$ 450,000.00	19,900	$ 100.00	$ 1,990,000.00	4	$ 4,000.00	$ 16,000.00	4	580	$ 80.00	$ 46,400.00	$ 62,400.00
			SB	1-330'	3300	1-12' x 5280'	Restripe	-	-														
			EB	1-345'	3450	-	-	1-250'	2500														
			WB	1-345'	3450	-	-	1-250'	2500														
7	Valley View Boulevard	Sahara Avenue	NB	-	-	-	-	1-150'	1500	$ 75,000.00	$ 50,000.00	$ 100,000.00	3,000	$ 100.00	$ 300,000.00	4	$ 4,000.00	$ 16,000.00	4	460	$ 80.00	$ 36,800.00	$ 52,800.00
			SB	-	-	-	-	1-150'	1500														
			EB	-	-	-	-	-	-														
			WB	-	-	-	-	-	-														
8	Eastern Avenue	St. Louis Avenue	NB	-	-	-	-	1-150'	1500	$ 75,000.00	$ 50,000.00	$ 250,000.00	7,000	$ 100.00	$ 700,000.00	4	$ 4,000.00	$ 16,000.00	4	330	$ 80.00	$ 26,400.00	$ 42,400.00
			SB	-	-	-	-	1-150'	1500														
			EB	+185'	1850	-	-	-	-														
			WB	+215'	2150	-	-	-	-														
9	Rainbow Boulevard	Cheyenne Avenue	NB	-	-	-	-	1-150'	1500	$ 75,000.00	$ 50,000.00	$ 450,000.00	13,050	$ 100.00	$ 1,305,000.00	4	$ 4,000.00	$ 16,000.00	4	430	$ 80.00	$ 34,400.00	$ 50,400.00
			SB	1-300' / +215'	5150	-	-	1-150'	1500														
			EB	-	-	-	-	-	-														
			WB	1-300' / +40'	3400	-	-	1-150'	1500														
10	Decatur Boulevard	Washington Avenue	NB	+60' (x2)	1200	-	-	-	-	$ 75,000.00	$ 50,000.00	$ 600,000.00	10,050	$ 100.00	$ 1,005,000.00	4	$ 4,000.00	$ 16,000.00	4	400	$ 80.00	$ 32,000.00	$ 48,000.00
			SB	+70' (x2)	1400	-	-	1-150'	1500														
			EB	+160'	1600	-	-	+160'	1600														
			WB	+160'	1600	-	-	+115'	1150														

Other Items to Consider, but not Included:

Median Islands

Loops

Mill/Overlay/Striping - Line Up Lanes

Raised Markers

Other Items to Consider, but not Included:

Sidewalk Improvements (Including Moving Poles)

Driveway Consolidation

Intersection Number	Intersection			Transit			Speed Limit Sign			Total Cost							
	North-South Arterial	East-West Arterial	Direction	Turnout	Cost	Turnout Total	Speed Limit Sign	Cost	Total	Total	Design Services	Construction Management	Total	Contingency	Total	ROW Cost	Final Cost
1	**Durango Drive**	**Charleston Boulevard**	NB SB EB WB	4	$ 40,000.00	$160,000.00	8	$ 200.00	$ 1,600.00	$ 958,600.00	$ 95,860.00	$ 95,860.00	$ 1,150,320.00	$ 345,096.00	$ 1,495,416.00	$ 2,190,000.00	**$ 3,685,416.00**
2	**Eastern Avenue**	**Stewart Avenue**	NB SB EB WB	2	$ 40,000.00	$ 80,000.00	8	$ 200.00	$ 1,600.00	$ 1,096,800.00	$ 109,680.00	$ 109,680.00	$ 1,316,160.00	$ 394,848.00	$ 1,711,008.00	$ 2,420,000.00	**$ 4,131,008.00**
3	**Fort Apache Road**	**Sahara Avenue**	NB SB EB WB	2	$ 40,000.00	$ 80,000.00	8	$ 200.00	$ 1,600.00	$ 453,600.00	$ 45,360.00	$ 45,360.00	$ 544,320.00	$ 163,296.00	$ 707,616.00	$ 435,000.00	**$ 1,142,616.00**
4	**Martin Luther King Boulevard**	**Bonanza Road**	NB SB EB WB	4	$ 40,000.00	$160,000.00	8	$ 200.00	$ 1,600.00	$ 626,800.00	$ 62,680.00	$ 62,680.00	$ 752,160.00	$ 225,648.00	$ 977,808.00	$ 370,000.00	**$ 1,347,808.00**
5	**Rainbow Boulevard**	**Lake Mead Boulevard**	NB SB EB WB	3	$ 40,000.00	$120,000.00	8	$ 200.00	$ 1,600.00	$ 336,800.00	$ 33,680.00	$ 33,680.00	$ 404,160.00	$ 121,248.00	$ 525,408.00	$ -	**$ 525,408.00**
6	**Rainbow Boulevard**	**Charleston Boulevard**	NB SB EB WB	4	$ 40,000.00	$160,000.00	8	$ 200.00	$ 1,600.00	$ 852,400.00	$ 85,240.00	$ 85,240.00	$ 1,022,880.00	$ 306,864.00	$ 1,329,744.00	$ 1,990,000.00	**$ 3,319,744.00**
7	**Valley View Boulevard**	**Sahara Avenue**	NB SB EB WB	0	$ 40,000.00	$ -	8	$ 200.00	$ 1,600.00	$ 320,200.00	$ 32,020.00	$ 32,020.00	$ 384,240.00	$ 115,272.00	$ 499,512.00	$ 300,000.00	**$ 799,512.00**
8	**Eastern Avenue**	**St. Louis Avenue**	NB SB EB WB	2	$ 40,000.00	$ 80,000.00	8	$ 200.00	$ 1,600.00	$ 527,200.00	$ 52,720.00	$ 52,720.00	$ 632,640.00	$ 189,792.00	$ 822,432.00	$ 700,000.00	**$ 1,522,432.00**
9	**Rainbow Boulevard**	**Cheyenne Avenue**	NB SB EB WB	4	$ 40,000.00	$160,000.00	8	$ 200.00	$ 1,600.00	$ 826,000.00	$ 82,600.00	$ 82,600.00	$ 991,200.00	$ 297,360.00	$ 1,288,560.00	$ 1,305,000.00	**$ 2,593,560.00**
10	**Decatur Boulevard**	**Washington Avenue**	NB SB EB WB	1	$ 40,000.00	$ 40,000.00	8	$ 200.00	$ 1,600.00	$ 850,000.00	$ 85,000.00	$ 85,000.00	$ 1,020,000.00	$ 306,000.00	$ 1,326,000.00	$ 1,005,000.00	**$ 2,331,000.00**
				Assumed Easement - No ROW												**AVERAGE =**	**$ 2,139,850.40**
																$ 10,715,000.00	

Intersection Number	North-South Arterial	East-West Arterial	Minor Traffic Signal Upgrades	Design Services	Construction Management	Total	Contingency	Final Total	Rounded Final Total
1	**Durango Drive**	**Charleston Boulevard**	$ 167,600.00	$ 16,760.00	$ 16,760.00	$ 201,120.00	$ 60,336.00	$ 261,456.00	**$ 262,000.00**
2	**Eastern Avenue**	**Stewart Avenue**	$ 164,000.00	$ 16,400.00	$ 16,400.00	$ 196,800.00	$ 59,040.00	$ 255,840.00	**$ 256,000.00**
3	**Fort Apache Road**	**Sahara Avenue**	$ 167,600.00	$ 16,760.00	$ 16,760.00	$ 201,120.00	$ 60,336.00	$ 261,456.00	**$ 262,000.00**
4	**Martin Luther King Boulevard**	**Bonanza Road**	$ 164,000.00	$ 16,400.00	$ 16,400.00	$ 196,800.00	$ 59,040.00	$ 255,840.00	**$ 256,000.00**
5	**Rainbow Boulevard**	**Lake Mead Boulevard**	$ 164,000.00	$ 16,400.00	$ 16,400.00	$ 196,800.00	$ 59,040.00	$ 255,840.00	**$ 256,000.00**
6	**Rainbow Boulevard**	**Charleston Boulevard**	$ 178,400.00	$ 17,840.00	$ 17,840.00	$ 214,080.00	$ 64,224.00	$ 278,304.00	**$ 279,000.00**
7	**Valley View Boulevard**	**Sahara Avenue**	$ 165,800.00	$ 16,580.00	$ 16,580.00	$ 198,960.00	$ 59,688.00	$ 258,648.00	**$ 259,000.00**
8	**Eastern Avenue**	**St. Louis Avenue**	$ 153,200.00	$ 15,320.00	$ 15,320.00	$ 183,840.00	$ 55,152.00	$ 238,992.00	**$ 239,000.00**
9	**Rainbow Boulevard**	**Cheyenne Avenue**	$ 164,000.00	$ 16,400.00	$ 16,400.00	$ 196,800.00	$ 59,040.00	$ 255,840.00	**$ 256,000.00**
10	**Decatur Boulevard**	**Washington Avenue**	$ 160,400.00	$ 16,040.00	$ 16,040.00	$ 192,480.00	$ 57,744.00	$ 250,224.00	**$ 251,000.00**

TOTAL: $ 2,576,000.00

Intersection Number	North-South Arterial	East-West Arterial	Roadway Improvements	Design Services	Construction Management	Total	Contingency	Final Total	ROW Cost	Final Total + ROW	Rounded Final Total
1	**Durango Drive**	**Charleston Boulevard**	$ 736,600.00	$ 73,660.00	$ 73,660.00	$ 883,920.00	$ 265,176.00	$ 1,149,096.00	$ 2,190,000.00	$ 3,339,096.00	**$ 3,340,000.00**
2	**Eastern Avenue**	**Stewart Avenue**	$ 881,600.00	$ 88,160.00	$ 88,160.00	$ 1,057,920.00	$ 317,376.00	$ 1,375,296.00	$ 2,420,000.00	$ 3,795,296.00	**$ 3,796,000.00**
3	**Fort Apache Road**	**Sahara Avenue**	$ 231,600.00	$ 23,160.00	$ 23,160.00	$ 277,920.00	$ 83,376.00	$ 361,296.00	$ 435,000.00	$ 796,296.00	**$ 797,000.00**
4	**Martin Luther King Boulevard**	**Bonanza Road**	$ 411,600.00	$ 41,160.00	$ 41,160.00	$ 493,920.00	$ 148,176.00	$ 642,096.00	$ 370,000.00	$ 1,012,096.00	**$ 1,013,000.00**
5	**Rainbow Boulevard**	**Lake Mead Boulevard**	$ 121,600.00	$ 12,160.00	$ 12,160.00	$ 145,920.00	$ 43,776.00	$ 189,696.00	$ -	$ 189,696.00	**$ 190,000.00**
6	**Rainbow Boulevard**	**Charleston Boulevard**	$ 611,600.00	$ 61,160.00	$ 61,160.00	$ 733,920.00	$ 220,176.00	$ 954,096.00	$ 1,990,000.00	$ 2,944,096.00	**$ 2,945,000.00**
7	**Valley View Boulevard**	**Sahara Avenue**	$ 101,600.00	$ 10,160.00	$ 10,160.00	$ 121,920.00	$ 36,576.00	$ 158,496.00	$ 300,000.00	$ 458,496.00	**$ 459,000.00**
8	**Eastern Avenue**	**St. Louis Avenue**	$ 331,600.00	$ 33,160.00	$ 33,160.00	$ 397,920.00	$ 119,376.00	$ 517,296.00	$ 700,000.00	$ 1,217,296.00	**$ 1,218,000.00**
9	**Rainbow Boulevard**	**Cheyenne Avenue**	$ 611,600.00	$ 61,160.00	$ 61,160.00	$ 733,920.00	$ 220,176.00	$ 954,096.00	$ 1,305,000.00	$ 2,259,096.00	**$ 2,260,000.00**
10	**Decatur Boulevard**	**Washington Avenue**	$ 641,600.00	$ 64,160.00	$ 64,160.00	$ 769,920.00	$ 230,976.00	$ 1,000,896.00	$ 1,005,000.00	$ 2,005,896.00	**$ 2,006,000.00**

TOTAL: $ 18,024,000.00

Intersection Number	North-South Arterial	East-West Arterial	Pedestrian Realm Update	Design Services	Construction Management	Total	Contingency	Final Total	Rounded Final Total
1	**Durango Drive**	**Charleston Boulevard**	$ 54,400.00	$ 5,440.00	$ 5,440.00	$ 65,280.00	$ 19,584.00	$ 84,864.00	**$ 85,000.00**
2	**Eastern Avenue**	**Stewart Avenue**	$ 51,200.00	$ 5,120.00	$ 5,120.00	$ 61,440.00	$ 18,432.00	$ 79,872.00	**$ 80,000.00**
3	**Fort Apache Road**	**Sahara Avenue**	$ 54,400.00	$ 5,440.00	$ 5,440.00	$ 65,280.00	$ 19,584.00	$ 84,864.00	**$ 85,000.00**
4	**Martin Luther King Boulevard**	**Bonanza Road**	$ 51,200.00	$ 5,120.00	$ 5,120.00	$ 61,440.00	$ 18,432.00	$ 79,872.00	**$ 80,000.00**
5	**Rainbow Boulevard**	**Lake Mead Boulevard**	$ 51,200.00	$ 5,120.00	$ 5,120.00	$ 61,440.00	$ 18,432.00	$ 79,872.00	**$ 80,000.00**
6	**Rainbow Boulevard**	**Charleston Boulevard**	$ 62,400.00	$ 6,240.00	$ 6,240.00	$ 74,880.00	$ 22,464.00	$ 97,344.00	**$ 98,000.00**
7	**Valley View Boulevard**	**Sahara Avenue**	$ 52,800.00	$ 5,280.00	$ 5,280.00	$ 63,360.00	$ 19,008.00	$ 82,368.00	**$ 83,000.00**
8	**Eastern Avenue**	**St. Louis Avenue**	$ 42,400.00	$ 4,240.00	$ 4,240.00	$ 50,880.00	$ 15,264.00	$ 66,144.00	**$ 67,000.00**
9	**Rainbow Boulevard**	**Cheyenne Avenue**	$ 50,400.00	$ 5,040.00	$ 5,040.00	$ 60,480.00	$ 18,144.00	$ 78,624.00	**$ 79,000.00**
10	**Decatur Boulevard**	**Washington Avenue**	$ 48,000.00	$ 4,800.00	$ 4,800.00	$ 57,600.00	$ 17,280.00	$ 74,880.00	**$ 75,000.00**
								TOTAL:	$ 812,000.00

APPENDIX F:

City of Las Vegas | USLimits2 Study

Memorandum

City of Las Vegas
Department of Public Works
Transportation Engineering Division

To: Eric Meyer, PE, PTOE

From: Sean Robinson, PE

CC: Gena Kendall, PE, PTOE, Mike Janssen, PE. PTOE

Date: September 13, 2017

Re: Summary of US Limits2 Corridors: Decatur Blvd. (Sahara to Rancho), Durango Dr. (Cheyenne to Alexander), Fort Apache Dr. (Desert Inn to Charleston), Rampart Blvd. (Charleston to Cheyenne)

This memorandum is a summary of the results from the US Limits2 Study performed for the following corridors(segments): Decatur Blvd. (Sahara to Rancho), Durango Dr. (Cheyenne to Alexander), Fort Apache Dr. (Desert Inn to Charleston) and Rampart Blvd (Charleston to Cheyenne). The US Limits2 is a tool designed to help practitioners set reasonable, safe and consistent speed limits for specific segments of roads and was developed by the Federal Highway Administration (FHWA). Typically, speed limits are set per the Manual of Uniform Traffic Control Devices (MUTCD) recommendations and to be within 5mph of the 85^{th} percentile speed of free-flowing traffic but the MUTCD does not consider road characteristics such as; shoulder conditions, grade alignment, sight distance and reported crash experience for a 12-month. Setting speed limits should be based on a balance of travel efficiency versus safety specific to a roadway section. The US Limits2 tool is considered an expert system by FHWA and is used to set speed limits while considering roadway characteristics in addition to the 85^{th} percentile speed. The following inputs for roadway characteristics are needed to evaluate speed limits for existing roadways: length of roadway section, current speed limit, adverse roadway alignment, one-way street, divided or undivided roadway, number of through lanes, adjacent land use time, number of driveways, number of signals, crash data, observed 85^{th} percentile speed, observed 50^{th} percentile speed, average daily trips, on street parking and pedestrian and bicyclist activity. Below is a summary of results for the studied corridors separated into the individual segments that were evaluated.

Summary of US Limits2 Results

Corridor (Roadway Segment)	*Posted Speed Limit (mph)*	*US Limits2 Recommended Speed Limit (mph)*
Decatur Blvd. (Sahara to Rancho)	**45**	**40**
Decatur Blvd. (Sahara to Charleston)	45	40
Decatur Blvd. (Charleston to Washington)	45	40
Decatur Blvd. (Washington to Lake Mead)	45	45
Decatur Blvd. (Lake Mead to Rancho)	45	45
Durango Dr. (Cheyenne to Alexander)	**45**	**45**
Durango Dr. (Gowan to Alexander)	45	45
Durango Dr. (Cheyenne to Gowan)	45	40
Fort Apache Dr. (Desert Inn to Charleston)	**45**	**50**
Fort Apache Dr. (Desert Inn to Sahara)	45	45
Fort Apache Dr. (Sahara to Charleston)	45	50
Rampart Dr. (Charleston to Cheyenne)	**45**	**45**
Rampart Dr. (Lake Mead to Cheyenne)	45	45
Rampart Dr. (Vegas to Lake Mead)	45	45
Rampart Dr. (Alta to Vegas)	45	45
Rampart Dr. (Charleston to Alta)	45	45

Recommendations and Analysis
(Appendix A – US Limits2 Evaluation)

Decatur Blvd. (Sahara to Rancho) – Recommendation would be to reduce the posted 45mph to 40mph based on the US Limits2 tool, along with a comprehensive crash study to identify engineering and/or traffic control deficiencies and appropriate corrective action taken. The speed limit should only be reduced as a last measure after all other treatments have either been tried or ruled out. The reduction recommendation is due to an undesired crash rate for two of the four segments studied. The entire studied corridor had a total of 560 total crashes of which 345 were injury crashes over a three-year time period. Two of the four segments studied from Sahara to Charleston and Charleston to Washington made up nearly 70% of the total crashes (388) and 67% of the injury crashes, which resulted in recommended reductions in speed limits for these two sections from posted 45mph to 40mph. Furthermore, the single segment of Charleston to Washington made up 42% (236) of the total crashes and 40% (139) of injury crashes which is also above the desired crash rate. It is also worth mentioning that there have been no fatalities along this studied corridor in the past three years. The segment from Charleston to Washington has a relative high volume of average daily trips (ADT) at almost 43,000 trips/day, and is unique due to its proximity to US95 on and off ramps. Due to the large ADT, the resulting 85% speed for these two segments was 47mph/49mph compared to the other segments which have a lower ADT but higher speeds at 53mph/50mph. These 85% speeds are much closer to the posted 45mph than the US Limits2 recommended at 40mph. This suggests that the recommendation in reduction of speed is largely based on high crash rates as compared to the 85% speed and/or posted speed. Meaning a reduction in the speed limit from 45mph to 40mph may not ultimately reduce crash rates and instead the speed limit should only be reduced as a last measure after all other treatments have either been tried or ruled out.

Durango Dr. (Cheyenne to Alexander) – Recommendation would be to maintain current speed limit at 45mph based on the US Limits2 evaluation.

Fort Apache Dr. (Desert Inn to Charleston) – Recommendation would be to maintain current speed limit at 45mph despite the evaluation tool recommending an increase to 50mph from the posted 45mph. The increase recommendation is largely based on a higher 85th percentile speed compared to the posted 45mph. It is also recommended to maintain the 45mph to continue a consistent speed limit along the Fort Apache Dr./Rampart Dr. corridor. Fort Apache Dr./Rampart Dr. are the same corridor divided at Charleston Blvd. The recommended speed limit for Rampart Dr. (Charleston to Cheyenne) is 40mph, while the recommended speed limit for Fort Apache Dr. (Desert Inn to Charleston) is 50mph. When these segments are evaluated together the recommendation is 45mph.

Rampart Dr. (Charleston to Cheyenne) – Recommendation would be to maintain current speed limit at 45mph based on the US Limits2 evaluation.

APPENDIX G-1:

Synchro Level-of-Service | Existing Mitigated AM Report

HCM 6th Signalized Intersection Summary
1: Durango Drive & Charleston Boulevard

01/18/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	121	843	170	154	437	42	133	428	106	94	940	181
Future Volume (veh/h)	121	843	170	154	437	42	133	428	106	94	940	181
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	233	1095	202	173	591	86	182	578	151	116	1253	213
Peak Hour Factor	0.52	0.77	0.84	0.89	0.74	0.49	0.73	0.74	0.70	0.81	0.75	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	284	1874	571	223	1784	550	231	1933	596	163	1832	565
Arrive On Green	0.08	0.37	0.37	0.06	0.35	0.35	0.07	0.38	0.38	0.05	0.36	0.36
Sat Flow, veh/h	3456	5106	1555	3456	5106	1576	3456	5106	1575	3456	5106	1574
Grp Volume(v), veh/h	233	1095	202	173	591	86	182	578	151	116	1253	213
Grp Sat Flow(s),veh/h/ln	1728	1702	1555	1728	1702	1576	1728	1702	1575	1728	1702	1574
Q Serve(g_s), s	9.3	24.2	13.2	6.9	11.9	5.3	7.3	11.1	9.2	4.6	29.2	14.0
Cycle Q Clear(g_c), s	9.3	24.2	13.2	6.9	11.9	5.3	7.3	11.1	9.2	4.6	29.2	14.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	284	1874	571	223	1784	550	231	1933	596	163	1832	565
V/C Ratio(X)	0.82	0.58	0.35	0.78	0.33	0.16	0.79	0.30	0.25	0.71	0.68	0.38
Avail Cap(c_a), veh/h	420	1874	571	346	1784	550	346	1933	596	222	1832	565
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	63.2	35.7	32.2	64.5	33.5	31.3	64.3	30.5	29.9	65.8	38.2	33.3
Incr Delay (d2), s/veh	5.0	1.3	1.7	2.2	0.2	0.2	3.6	0.4	1.0	3.2	2.1	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.2	10.0	5.2	3.1	4.9	2.0	3.3	4.5	3.6	2.1	12.4	5.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	68.2	37.0	33.9	66.8	33.7	31.5	67.9	30.9	30.9	69.0	40.2	35.2
LnGrp LOS	E	D	C	E	C	C	E	C	C	E	D	D
Approach Vol, veh/h		1530			850			911			1582	
Approach Delay, s/veh		41.4			40.2			38.3			41.7	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.4	55.2	14.0	56.4	11.6	58.0	16.5	53.9
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	14.0	48.0	14.0	44.0	9.0	53.0	17.0	41.0
Max Q Clear Time (g_c+I1), s	9.3	31.2	8.9	26.2	6.6	13.1	11.3	13.9
Green Ext Time (p_c), s	0.1	11.0	0.1	9.9	0.0	6.8	0.2	6.0

Intersection Summary	
HCM 6th Ctrl Delay	40.7
HCM 6th LOS	D

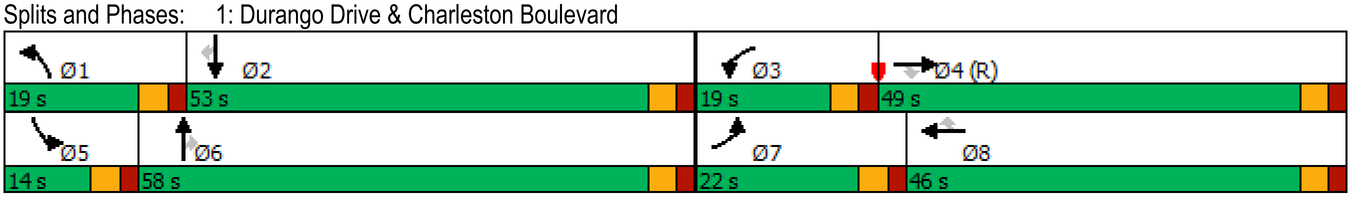
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	843	170	154	437	42	133	428	106	94	940	181
Future Volume (vph)	121	843	170	154	437	42	133	428	106	94	940	181
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		200	330		200	300		200	380		200
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Ped Bike Factor	1.00		0.98	1.00		0.98	1.00		0.98	1.00		0.98
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3420	5085	1551	3428	5085	1551	3428	5085	1549	3418	5085	1551
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			164			94			151			163
Link Speed (mph)		45			45			45			35	
Link Distance (ft)		993			1490			1225			1487	
Travel Time (s)		15.0			22.6			18.6			29.0	
Confl. Peds. (#/hr)	7		6	6		7	7		8	8		7
Confl. Bikes (#/hr)			2									
Peak Hour Factor	0.52	0.77	0.84	0.89	0.74	0.49	0.73	0.74	0.70	0.81	0.75	0.85
Adj. Flow (vph)	233	1095	202	173	591	86	182	578	151	116	1253	213
Shared Lane Traffic (%)												
Lane Group Flow (vph)	233	1095	202	173	591	86	182	578	151	116	1253	213
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane					Yes			Yes				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	40.0	40.0	10.0	40.0	40.0	10.0	40.0	40.0	10.0	40.0	40.0
Total Split (s)	22.0	49.0	49.0	19.0	46.0	46.0	19.0	58.0	58.0	14.0	53.0	53.0
Total Split (%)	15.7%	35.0%	35.0%	13.6%	32.9%	32.9%	13.6%	41.4%	41.4%	10.0%	37.9%	37.9%
Maximum Green (s)	17.0	44.0	44.0	14.0	41.0	41.0	14.0	53.0	53.0	9.0	48.0	48.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	4.0	4.0	2.0	4.0	4.0
Recall Mode	None	C-Max	C-Max	None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Flash Dont Walk (s)		31.0	31.0		31.0	31.0		31.0	31.0		31.0	31.0
Pedestrian Calls (#/hr)		6	6		7	7		8	8		7	7
Act Effct Green (s)	13.7	46.8	46.8	11.2	44.3	44.3	11.5	53.8	53.8	8.2	50.5	50.5
Actuated g/C Ratio	0.10	0.33	0.33	0.08	0.32	0.32	0.08	0.38	0.38	0.06	0.36	0.36
v/c Ratio	0.70	0.64	0.32	0.63	0.37	0.15	0.65	0.30	0.22	0.58	0.68	0.32
Control Delay	72.1	42.0	9.8	72.4	38.2	6.3	72.9	30.6	5.0	75.6	40.6	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.1	42.0	9.8	72.4	38.2	6.3	72.9	30.6	5.0	75.6	40.6	10.2
LOS	E	D	A	E	D	A	E	C	A	E	D	B
Approach Delay		42.4			42.0			34.8			39.1	
Approach LOS		D			D			C			D	
90th %ile Green (s)	17.0	44.0	44.0	14.0	41.0	41.0	14.0	53.0	53.0	9.0	48.0	48.0
90th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Max	MaxR	MaxR	Max	MaxR	MaxR
70th %ile Green (s)	15.5	45.2	45.2	12.8	42.5	42.5	13.2	53.0	53.0	9.0	48.8	48.8
70th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Max	MaxR	MaxR
50th %ile Green (s)	13.8	46.6	46.6	11.4	44.2	44.2	11.8	53.0	53.0	9.0	50.2	50.2
50th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Max	MaxR	MaxR
30th %ile Green (s)	12.2	48.0	48.0	10.0	45.8	45.8	10.3	54.1	54.1	7.9	51.7	51.7
30th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Gap	MaxR	MaxR
10th %ile Green (s)	9.9	50.0	50.0	8.0	48.1	48.1	8.2	55.7	55.7	6.3	53.8	53.8
10th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Gap	MaxR	MaxR
Stops (vph)	115	701	31	146	331	5	127	290	11	90	779	37
Fuel Used(gal)	4	21	2	6	12	1	5	10	1	3	24	3
CO Emissions (g/hr)	279	1493	127	390	821	37	322	676	76	219	1658	182
NOx Emissions (g/hr)	54	291	25	76	160	7	63	132	15	43	323	35
VOC Emissions (g/hr)	65	346	29	90	190	8	75	157	18	51	384	42
Dilemma Vehicles (#)	0	30	0	0	16	0	0	15	0	0	34	0
Queue Length 50th (ft)	107	310	24	79	152	0	84	134	0	53	354	30
Queue Length 95th (ft)	82	305	72	117	157	0	98	133	15	78	329	81
Internal Link Dist (ft)		913			1410			1145			1407	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	300		200	330		200	300		200	380		200
Base Capacity (vph)	416	1698	627	343	1609	555	343	1952	688	220	1834	663
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.64	0.32	0.50	0.37	0.15	0.53	0.30	0.22	0.53	0.68	0.32

Intersection Summary	
Area Type: Other	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 4:EBT, Start of Green	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 39.8	Intersection LOS: D
Intersection Capacity Utilization 83.6%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Durango Drive & Charleston Boulevard



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	132	141	31	107	194	299	21	684	39	279	1154	80
Future Volume (veh/h)	132	141	31	107	194	299	21	684	39	279	1154	80
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.96	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	153	199	42	139	290	374	25	834	51	321	1407	85
Peak Hour Factor	0.86	0.71	0.73	0.77	0.67	0.80	0.83	0.82	0.77	0.87	0.82	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	202	937	406	188	922	400	77	1783	532	375	2225	668
Arrive On Green	0.06	0.26	0.26	0.05	0.26	0.26	0.02	0.35	0.35	0.11	0.44	0.44
Sat Flow, veh/h	3456	3554	1541	3456	3554	1543	3456	5106	1524	3456	5106	1533
Grp Volume(v), veh/h	153	199	42	139	290	374	25	834	51	321	1407	85
Grp Sat Flow(s),veh/h/ln	1728	1777	1541	1728	1777	1543	1728	1702	1524	1728	1702	1533
Q Serve(g_s), s	6.1	6.1	2.9	5.5	9.2	33.2	1.0	17.8	3.2	12.8	30.0	4.6
Cycle Q Clear(g_c), s	6.1	6.1	2.9	5.5	9.2	33.2	1.0	17.8	3.2	12.8	30.0	4.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	202	937	406	188	922	400	77	1783	532	375	2225	668
V/C Ratio(X)	0.76	0.21	0.10	0.74	0.31	0.93	0.33	0.47	0.10	0.85	0.63	0.13
Avail Cap(c_a), veh/h	321	1066	462	296	1041	452	123	1783	532	592	2225	668
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	64.9	40.2	39.0	65.2	41.8	50.7	67.4	35.4	30.7	61.3	30.8	23.6
Incr Delay (d2), s/veh	2.2	0.0	0.0	2.2	0.1	24.0	0.9	0.9	0.4	4.2	1.4	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	2.7	1.1	2.5	4.1	15.5	0.4	7.5	1.2	5.8	12.5	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.1	40.2	39.1	67.4	41.9	74.7	68.3	36.3	31.0	65.5	32.1	24.0
LnGrp LOS	E	D	D	E	D	E	E	D	C	E	C	C
Approach Vol, veh/h		394			803			910			1813	
Approach Delay, s/veh		50.5			61.6			36.9			37.7	
Approach LOS		D			E			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.1	66.0	12.6	41.9	20.2	53.9	13.2	41.3				
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0				
Max Green Setting (Gmax), s	5.0	61.0	12.0	42.0	24.0	42.0	13.0	41.0				
Max Q Clear Time (g_c+I1), s	3.0	32.0	7.5	8.1	14.8	19.8	8.1	35.2				
Green Ext Time (p_c), s	0.0	8.2	0.1	0.9	0.4	4.0	0.1	1.2				
Intersection Summary												
HCM 6th Ctrl Delay			43.7									
HCM 6th LOS			D									

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	132	141	31	107	194	299	21	684	39	279	1154	80
Future Volume (vph)	132	141	31	107	194	299	21	684	39	279	1154	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	310		150	300		300	300		150	300		150
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Ped Bike Factor	0.99		0.97	0.99		0.97	1.00		0.94	0.98		0.98
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3400	3539	1540	3399	3539	1541	3427	5085	1494	3355	5085	1551
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			132			315			132			94
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		779			1085			800			850	
Travel Time (s)		17.7			24.7			15.6			16.6	
Confl. Peds. (#/hr)	12		11	11		12	5		29	29		5
Confl. Bikes (#/hr)			3			1			3			2
Peak Hour Factor	0.86	0.71	0.73	0.77	0.67	0.80	0.83	0.82	0.77	0.87	0.82	0.94
Adj. Flow (vph)	153	199	42	139	290	374	25	834	51	321	1407	85
Shared Lane Traffic (%)												
Lane Group Flow (vph)	153	199	42	139	290	374	25	834	51	321	1407	85
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	40.0	40.0	10.0	40.0	40.0	10.0	33.0	33.0	10.0	33.0	33.0
Total Split (s)	18.0	47.0	47.0	17.0	46.0	46.0	10.0	47.0	47.0	29.0	66.0	66.0
Total Split (%)	12.9%	33.6%	33.6%	12.1%	32.9%	32.9%	7.1%	33.6%	33.6%	20.7%	47.1%	47.1%
Maximum Green (s)	13.0	42.0	42.0	12.0	41.0	41.0	5.0	42.0	42.0	24.0	61.0	61.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	Max	Max
Walk Time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Flash Dont Walk (s)		31.0	31.0		31.0	31.0		24.0	24.0		24.0	24.0
Pedestrian Calls (#/hr)		11	11		12	12		29	29		5	5
Act Effct Green (s)	10.4	23.2	23.2	9.8	22.5	22.5	5.7	69.6	69.6	17.4	85.4	85.4
Actuated g/C Ratio	0.07	0.17	0.17	0.07	0.16	0.16	0.04	0.50	0.50	0.12	0.61	0.61
v/c Ratio	0.60	0.34	0.12	0.58	0.51	0.73	0.18	0.33	0.06	0.75	0.45	0.09
Control Delay	72.4	51.1	0.6	72.6	55.3	18.1	67.6	24.2	0.2	70.4	18.2	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.4	51.1	0.6	72.6	55.3	18.1	67.6	24.2	0.2	70.4	18.2	3.4
LOS	E	D	A	E	E	B	E	C	A	E	B	A
Approach Delay		54.0			40.9			24.1			26.7	
Approach LOS		D			D			C			C	
90th %ile Green (s)	13.0	36.0	36.0	12.0	35.0	35.0	6.8	49.9	49.9	22.1	65.2	65.2
90th %ile Term Code	Max	Hold	Hold	Max	Ped	Ped	Gap	Coord	Coord	Gap	Coord	Coord
70th %ile Green (s)	11.9	35.6	35.6	11.3	35.0	35.0	6.0	53.7	53.7	19.4	67.1	67.1
70th %ile Term Code	Gap	Hold	Hold	Gap	Ped	Ped	Gap	Coord	Coord	Gap	Coord	Coord
50th %ile Green (s)	10.6	17.5	17.5	10.0	16.9	16.9	5.5	75.1	75.1	17.4	87.0	87.0
50th %ile Term Code	Gap	Hold	Hold	Gap	Gap	Gap	Gap	Coord	Coord	Gap	Coord	Coord
30th %ile Green (s)	9.3	14.7	14.7	8.8	14.2	14.2	0.0	81.0	81.0	15.5	101.5	101.5
30th %ile Term Code	Gap	Hold	Hold	Gap	Gap	Gap	Skip	Coord	Coord	Gap	Coord	Coord
10th %ile Green (s)	7.4	12.0	12.0	6.9	11.5	11.5	0.0	88.4	88.4	12.7	106.1	106.1
10th %ile Term Code	Gap	Hold	Hold	Gap	Gap	Gap	Skip	Coord	Coord	Gap	Coord	Coord
Stops (vph)	125	119	0	101	170	58	21	411	0	265	623	7
Fuel Used(gal)	3	3	0	3	5	4	1	10	0	8	16	1
CO Emissions (g/hr)	240	208	13	213	333	276	40	728	16	539	1121	42
NOx Emissions (g/hr)	47	41	3	41	65	54	8	142	3	105	218	8
VOC Emissions (g/hr)	56	48	3	49	77	64	9	169	4	125	260	10
Dilemma Vehicles (#)	0	0	0	0	0	0	0	24	0	0	41	0
Queue Length 50th (ft)	70	90	0	64	135	50	11	149	0	147	232	0
Queue Length 95th (ft)	102	86	0	84	113	89	25	228	0	186	341	26
Internal Link Dist (ft)		699			1005			720			770	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	310		150	300		300	300		150	300		150
Base Capacity (vph)	318	1061	554	294	1036	674	138	2528	809	588	3101	982
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.19	0.08	0.47	0.28	0.55	0.18	0.33	0.06	0.55	0.45	0.09

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 6:NBT, Start of Green

Natural Cycle: 95

Control Type: Actuated-Coordinated

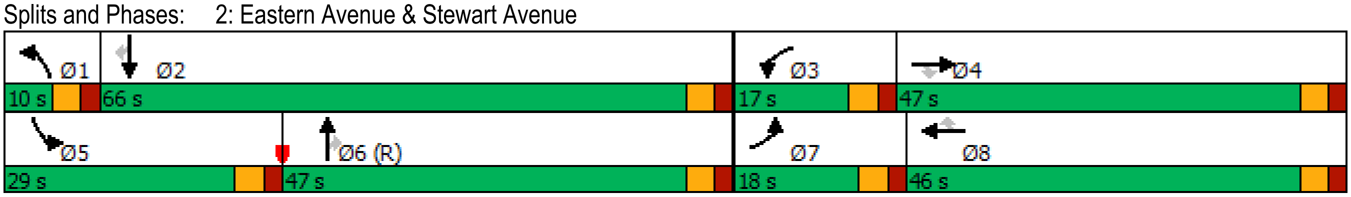
Maximum v/c Ratio: 0.75

Intersection Signal Delay: 31.8 Intersection LOS: C

Intersection Capacity Utilization 65.3% ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 2: Eastern Avenue & Stewart Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	134	964	95	102	401	126	85	641	174	311	732	82
Future Volume (veh/h)	134	964	95	102	401	126	85	641	174	311	732	82
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	179	1397	117	167	483	166	105	866	242	389	927	126
Peak Hour Factor	0.75	0.69	0.81	0.61	0.83	0.76	0.81	0.74	0.72	0.80	0.79	0.65
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	227	2012	618	215	1994	614	151	1394	425	441	1824	562
Arrive On Green	0.07	0.39	0.39	0.06	0.39	0.39	0.04	0.27	0.27	0.13	0.36	0.36
Sat Flow, veh/h	3456	5106	1567	3456	5106	1572	3456	5106	1555	3456	5106	1573
Grp Volume(v), veh/h	179	1397	117	167	483	166	105	866	242	389	927	126
Grp Sat Flow(s),veh/h/ln	1728	1702	1567	1728	1702	1572	1728	1702	1555	1728	1702	1573
Q Serve(g_s), s	7.1	31.9	6.8	6.7	8.9	10.1	4.2	20.8	18.8	15.5	20.0	7.8
Cycle Q Clear(g_c), s	7.1	31.9	6.8	6.7	8.9	10.1	4.2	20.8	18.8	15.5	20.0	7.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	227	2012	618	215	1994	614	151	1394	425	441	1824	562
V/C Ratio(X)	0.79	0.69	0.19	0.78	0.24	0.27	0.70	0.62	0.57	0.88	0.51	0.22
Avail Cap(c_a), veh/h	296	2012	618	272	1994	614	197	1394	425	568	1824	562
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	64.4	35.4	27.8	64.7	28.7	29.1	66.0	44.5	43.8	60.0	35.3	31.4
Incr Delay (d2), s/veh	7.4	2.0	0.7	7.9	0.1	0.5	3.7	2.1	5.5	10.6	1.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	13.2	2.6	3.1	3.6	3.8	1.9	8.8	7.7	7.3	8.3	3.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	71.8	37.4	28.5	72.5	28.9	29.6	69.7	46.6	49.3	70.6	36.4	32.4
LnGrp LOS	E	D	C	E	C	C	E	D	D	E	D	C
Approach Vol, veh/h		1693			816			1213			1442	
Approach Delay, s/veh		40.4			37.9			49.2			45.3	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.1	55.0	13.7	60.2	22.9	43.2	14.2	59.7
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	8.0	50.0	11.0	51.0	23.0	35.0	12.0	50.0
Max Q Clear Time (g_c+I1), s	6.2	22.0	8.7	33.9	17.5	22.8	9.1	12.1
Green Ext Time (p_c), s	0.0	8.3	0.1	13.3	0.4	5.0	0.1	8.0

Intersection Summary	
HCM 6th Ctrl Delay	43.4
HCM 6th LOS	D

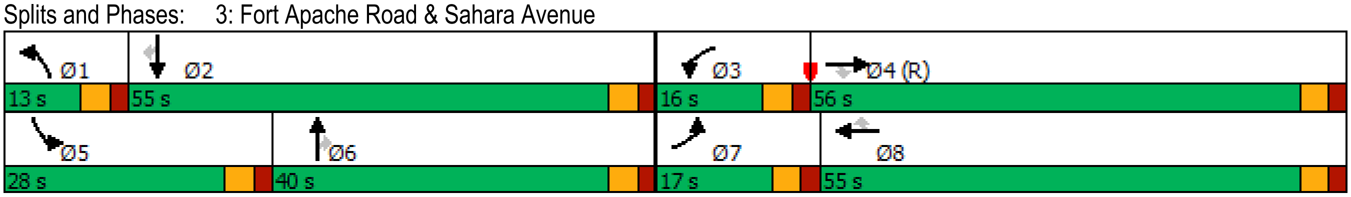
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	134	964	95	102	401	126	85	641	174	311	732	82
Future Volume (vph)	134	964	95	102	401	126	85	641	174	311	732	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	325		180	315		315	260		150	350		150
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Ped Bike Factor			0.97			0.98			0.97			0.98
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1536	3433	5085	1544	3433	5085	1533	3433	5085	1548
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			132			166			165			104
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		922			934			915			934	
Travel Time (s)		14.0			14.2			13.9			14.2	
Confl. Peds. (#/hr)			15			11			17			9
Peak Hour Factor	0.75	0.69	0.81	0.61	0.83	0.76	0.81	0.74	0.72	0.80	0.79	0.65
Adj. Flow (vph)	179	1397	117	167	483	166	105	866	242	389	927	126
Shared Lane Traffic (%)												
Lane Group Flow (vph)	179	1397	117	167	483	166	105	866	242	389	927	126
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	40.0	40.0	10.0	40.0	40.0	10.0	40.0	40.0	10.0	40.0	40.0
Total Split (s)	17.0	56.0	56.0	16.0	55.0	55.0	13.0	40.0	40.0	28.0	55.0	55.0
Total Split (%)	12.1%	40.0%	40.0%	11.4%	39.3%	39.3%	9.3%	28.6%	28.6%	20.0%	39.3%	39.3%
Maximum Green (s)	12.0	51.0	51.0	11.0	50.0	50.0	8.0	35.0	35.0	23.0	50.0	50.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	5.1	5.1	2.0	5.0	5.0	2.0	3.0	3.0	2.0	3.4	3.4
Recall Mode	None	C-Max	C-Max	None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Flash Dont Walk (s)		31.0	31.0		31.0	31.0		31.0	31.0		31.0	31.0
Pedestrian Calls (#/hr)		15	15		11	11		17	17		9	9
Act Effct Green (s)	10.8	51.9	51.9	10.1	51.2	51.2	7.5	38.3	38.3	19.7	50.5	50.5
Actuated g/C Ratio	0.08	0.37	0.37	0.07	0.37	0.37	0.05	0.27	0.27	0.14	0.36	0.36
v/c Ratio	0.68	0.74	0.18	0.67	0.26	0.25	0.57	0.62	0.45	0.81	0.51	0.20
Control Delay	75.8	41.3	4.1	77.1	31.8	5.2	76.9	47.3	17.1	71.7	36.3	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.8	41.3	4.1	77.1	31.8	5.2	76.9	47.3	17.1	71.7	36.3	8.9
LOS	E	D	A	E	C	A	E	D	B	E	D	A
Approach Delay		42.4			35.7			43.8			43.4	
Approach LOS		D			D			D			D	
90th %ile Green (s)	12.0	51.0	51.0	11.0	50.0	50.0	8.0	35.0	35.0	23.0	50.0	50.0
90th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Max	MaxR	MaxR	Max	MaxR	MaxR
70th %ile Green (s)	12.0	51.0	51.0	11.0	50.0	50.0	8.0	35.8	35.8	22.2	50.0	50.0
70th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Max	MaxR	MaxR	Gap	MaxR	MaxR
50th %ile Green (s)	11.7	51.0	51.0	11.0	50.3	50.3	8.0	37.9	37.9	20.1	50.0	50.0
50th %ile Term Code	Gap	Coord	Coord	Max	Coord	Coord	Max	MaxR	MaxR	Gap	MaxR	MaxR
30th %ile Green (s)	10.2	52.2	52.2	9.8	51.8	51.8	7.6	40.0	40.0	18.0	50.4	50.4
30th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Gap	MaxR	MaxR
10th %ile Green (s)	8.2	54.2	54.2	7.8	53.8	53.8	6.0	43.0	43.0	15.0	52.0	52.0
10th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Gap	MaxR	MaxR
Stops (vph)	129	818	7	98	273	12	81	552	50	295	557	15
Fuel Used(gal)	4	24	1	3	8	1	3	17	2	10	17	1
CO Emissions (g/hr)	313	1682	51	240	589	73	199	1177	158	705	1172	58
NOx Emissions (g/hr)	61	327	10	47	115	14	39	229	31	137	228	11
VOC Emissions (g/hr)	72	390	12	56	136	17	46	273	37	163	272	13
Dilemma Vehicles (#)	0	34	0	0	14	0	0	23	0	0	26	0
Queue Length 50th (ft)	82	406	0	77	113	0	48	255	54	178	242	13
Queue Length 95th (ft)	101	324	21	77	132	25	72	246	78	202	244	23
Internal Link Dist (ft)		842			854			835			854	
Turn Bay Length (ft)	325		180	315		315	260		150	350		150

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	294	1884	652	269	1859	669	196	1392	539	563	1833	624
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.74	0.18	0.62	0.26	0.25	0.54	0.62	0.45	0.69	0.51	0.20

Intersection Summary	
Area Type: Other	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 4:EBT, Start of Green	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 42.0	Intersection LOS: D
Intersection Capacity Utilization 88.0%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 3: Fort Apache Road & Sahara Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	265	243	143	140	79	66	1084	134	133	2135	25
Future Volume (veh/h)	31	265	243	143	140	79	66	1084	134	133	2135	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	48	319	363	234	163	110	80	1166	161	156	2483	39
Peak Hour Factor	0.64	0.83	0.67	0.61	0.86	0.72	0.83	0.93	0.83	0.85	0.86	0.64
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	104	885	383	247	1032	457	123	2432	751	204	2553	788
Arrive On Green	0.03	0.25	0.25	0.07	0.29	0.29	0.04	0.48	0.48	0.06	0.50	0.50
Sat Flow, veh/h	3456	3554	1537	3456	3554	1574	3456	5106	1577	3456	5106	1576
Grp Volume(v), veh/h	48	319	363	234	163	110	80	1166	161	156	2483	39
Grp Sat Flow(s),veh/h/ln	1728	1777	1537	1728	1777	1574	1728	1702	1577	1728	1702	1576
Q Serve(g_s), s	1.9	10.4	32.5	9.4	4.8	7.5	3.2	21.7	8.3	6.2	66.3	1.8
Cycle Q Clear(g_c), s	1.9	10.4	32.5	9.4	4.8	7.5	3.2	21.7	8.3	6.2	66.3	1.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	104	885	383	247	1032	457	123	2432	751	204	2553	788
V/C Ratio(X)	0.46	0.36	0.95	0.95	0.16	0.24	0.65	0.48	0.21	0.76	0.97	0.05
Avail Cap(c_a), veh/h	123	888	384	247	1032	457	123	2432	751	272	2553	788
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	66.8	43.4	51.7	64.7	37.0	37.9	66.7	24.9	21.4	64.9	34.1	17.9
Incr Delay (d2), s/veh	1.2	0.4	32.9	42.6	0.1	0.4	9.2	0.7	0.7	5.9	12.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	4.6	15.9	5.6	2.1	2.9	1.6	8.9	3.2	2.9	29.2	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.9	43.7	84.6	107.4	37.1	38.3	75.8	25.6	22.0	70.8	46.5	18.1
LnGrp LOS	E	D	F	F	D	D	E	C	C	E	D	B
Approach Vol, veh/h		730			507			1407			2678	
Approach Delay, s/veh		65.6			69.8			28.0			47.5	
Approach LOS		E			E			C			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.0	75.0	15.0	39.9	13.3	71.7	9.2	45.6				
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0				
Max Green Setting (Gmax), s	5.0	70.0	10.0	35.0	11.0	64.0	5.0	40.0				
Max Q Clear Time (g_c+I1), s	5.2	68.3	11.4	34.5	8.2	23.7	3.9	9.5				
Green Ext Time (p_c), s	0.0	1.7	0.0	0.2	0.1	16.5	0.0	2.0				
Intersection Summary												
HCM 6th Ctrl Delay			47.0									
HCM 6th LOS			D									

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	265	243	143	140	79	66	1084	134	133	2135	25
Future Volume (vph)	31	265	243	143	140	79	66	1084	134	133	2135	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		200	300		300	300		150	400		165
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Ped Bike Factor			0.96			0.98			0.98			0.97
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	3539	1518	3433	3539	1551	3433	5085	1546	3433	5085	1543
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			132			132			132			94
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		768			1088			490			1010	
Travel Time (s)		15.0			21.2			9.5			19.7	
Confl. Peds. (#/hr)			25			7			8			9
Peak Hour Factor	0.64	0.83	0.67	0.61	0.86	0.72	0.83	0.93	0.83	0.85	0.86	0.64
Adj. Flow (vph)	48	319	363	234	163	110	80	1166	161	156	2483	39
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	319	363	234	163	110	80	1166	161	156	2483	39
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	40.0	40.0	10.0	40.0	40.0	10.0	33.0	33.0	10.0	33.0	33.0
Total Split (s)	10.0	40.0	40.0	15.0	45.0	45.0	10.0	69.0	69.0	16.0	75.0	75.0
Total Split (%)	7.1%	28.6%	28.6%	10.7%	32.1%	32.1%	7.1%	49.3%	49.3%	11.4%	53.6%	53.6%
Maximum Green (s)	5.0	35.0	35.0	10.0	40.0	40.0	5.0	64.0	64.0	11.0	70.0	70.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	4.0	4.0	2.0	4.0	4.0
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	Max	Max
Walk Time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Flash Dont Walk (s)		31.0	31.0		31.0	31.0		24.0	24.0		24.0	24.0
Pedestrian Calls (#/hr)		25	25		7	7		8	8		9	9
Act Effct Green (s)	5.0	29.9	29.9	10.0	36.9	36.9	5.5	70.2	70.2	9.9	74.6	74.6
Actuated g/C Ratio	0.04	0.21	0.21	0.07	0.26	0.26	0.04	0.50	0.50	0.07	0.53	0.53
v/c Ratio	0.39	0.42	0.85	0.96	0.17	0.22	0.60	0.46	0.19	0.64	0.92	0.05
Control Delay	75.6	48.4	51.2	111.0	39.6	4.5	84.5	24.4	6.0	75.7	37.2	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.6	48.4	51.2	111.0	39.6	4.5	84.5	24.4	6.0	75.7	37.2	0.1
LOS	E	D	D	F	D	A	F	C	A	E	D	A
Approach Delay		51.6			64.9			25.7			38.9	
Approach LOS		D			E			C			D	
90th %ile Green (s)	5.0	35.0	35.0	10.0	40.0	40.0	5.0	64.0	64.0	11.0	70.0	70.0
90th %ile Term Code	Max	Max	Max	Max	Hold	Hold	Max	Coord	Coord	Max	Coord	Coord
70th %ile Green (s)	5.0	35.0	35.0	10.0	40.0	40.0	5.0	64.0	64.0	11.0	70.0	70.0
70th %ile Term Code	Max	Max	Max	Max	Hold	Hold	Max	Coord	Coord	Max	Coord	Coord
50th %ile Green (s)	5.0	35.0	35.0	10.0	40.0	40.0	5.0	64.3	64.3	10.7	70.0	70.0
50th %ile Term Code	Max	Ped	Ped	Max	Hold	Hold	Max	Coord	Coord	Gap	Coord	Coord
30th %ile Green (s)	5.0	26.3	26.3	10.0	31.3	31.3	6.9	74.3	74.3	9.4	76.8	76.8
30th %ile Term Code	Max	Gap	Gap	Max	Hold	Hold	Gap	Coord	Coord	Gap	Coord	Coord
10th %ile Green (s)	0.0	18.2	18.2	10.0	33.2	33.2	5.5	84.3	84.3	7.5	86.3	86.3
10th %ile Term Code	Skip	Gap	Gap	Max	Hold	Hold	Gap	Coord	Coord	Gap	Coord	Coord
Stops (vph)	30	221	155	128	105	6	61	687	19	127	1799	0
Fuel Used(gal)	1	6	5	5	3	1	2	14	1	4	45	0
CO Emissions (g/hr)	61	401	353	372	211	52	128	1005	55	278	3163	13
NOx Emissions (g/hr)	12	78	69	72	41	10	25	196	11	54	615	2
VOC Emissions (g/hr)	14	93	82	86	49	12	30	233	13	64	733	3
Dilemma Vehicles (#)	0	9	0	0	3	0	0	39	0	0	74	0
Queue Length 50th (ft)	22	126	202	111	58	0	37	268	14	72	789	0
Queue Length 95th (ft)	31	157	188	104	84	7	#65	313	46	104	796	0
Internal Link Dist (ft)		688			1008			410			930	
Turn Bay Length (ft)	300		200	300		300	300		150	400		165

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	122	884	478	245	1011	537	134	2548	840	269	2710	866
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.36	0.76	0.96	0.16	0.20	0.60	0.46	0.19	0.58	0.92	0.05

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 6:NBT, Start of Green

Natural Cycle: 125

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.96

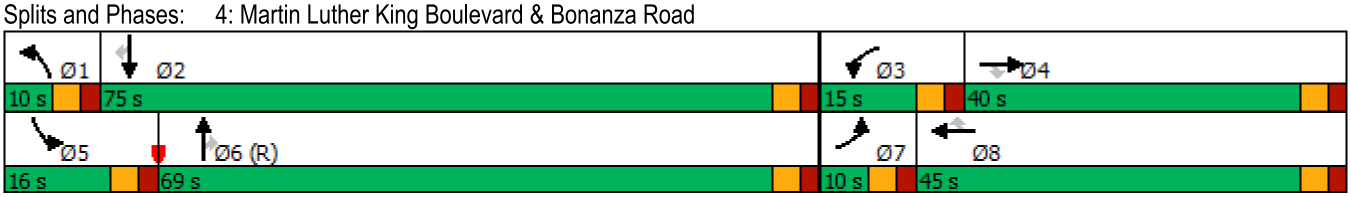
Intersection Signal Delay: 39.6 Intersection LOS: D

Intersection Capacity Utilization 85.9% ICU Level of Service E

Analysis Period (min) 15

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

Splits and Phases: 4: Martin Luther King Boulevard & Bonanza Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	250	628	127	117	674	117	85	321	100	41	467	235
Future Volume (veh/h)	250	628	127	117	674	117	85	321	100	41	467	235
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	305	714	176	172	864	167	118	378	133	59	563	309
Peak Hour Factor	0.82	0.88	0.72	0.68	0.78	0.70	0.72	0.85	0.75	0.70	0.83	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	360	2207	673	222	2003	614	166	1168	508	111	1111	496
Arrive On Green	0.10	0.43	0.43	0.06	0.39	0.39	0.05	0.33	0.33	0.03	0.31	0.31
Sat Flow, veh/h	3456	5106	1557	3456	5106	1565	3456	3554	1547	3456	3554	1585
Grp Volume(v), veh/h	305	714	176	172	864	167	118	378	133	59	563	309
Grp Sat Flow(s),veh/h/ln	1728	1702	1557	1728	1702	1565	1728	1777	1547	1728	1777	1585
Q Serve(g_s), s	12.1	12.9	10.1	6.9	17.3	10.2	4.7	11.2	8.8	2.4	18.1	23.3
Cycle Q Clear(g_c), s	12.1	12.9	10.1	6.9	17.3	10.2	4.7	11.2	8.8	2.4	18.1	23.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	360	2207	673	222	2003	614	166	1168	508	111	1111	496
V/C Ratio(X)	0.85	0.32	0.26	0.77	0.43	0.27	0.71	0.32	0.26	0.53	0.51	0.62
Avail Cap(c_a), veh/h	617	2207	673	395	2003	614	321	1168	508	173	1111	496
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.6	26.2	25.4	64.5	31.1	28.9	65.7	35.3	34.5	66.7	39.3	41.1
Incr Delay (d2), s/veh	2.2	0.4	0.9	2.2	0.1	0.1	2.1	0.7	1.3	1.5	1.7	5.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	5.3	3.9	3.0	7.0	3.8	2.1	5.0	3.5	1.1	8.2	9.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	63.8	26.6	26.4	66.7	31.2	29.0	67.8	36.0	35.8	68.2	41.0	46.9
LnGrp LOS	E	C	C	E	C	C	E	D	D	E	D	D
Approach Vol, veh/h		1195			1203			629			931	
Approach Delay, s/veh		36.1			35.9			41.9			44.7	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.7	48.8	14.0	65.5	9.5	51.0	19.6	59.9
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	13.0	40.0	16.0	51.0	7.0	46.0	25.0	42.0
Max Q Clear Time (g_c+I1), s	6.7	25.3	8.9	14.9	4.4	13.2	14.1	19.3
Green Ext Time (p_c), s	0.1	2.7	0.2	3.8	0.0	1.8	0.4	4.0

Intersection Summary	
HCM 6th Ctrl Delay	39.0
HCM 6th LOS	D

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	250	628	127	117	674	117	85	321	100	41	467	235
Future Volume (vph)	250	628	127	117	674	117	85	321	100	41	467	235
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	450		135	250		160	240		230	250		315
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor			0.98			0.99			0.97			
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1546	3433	5085	1563	3433	3539	1539	3433	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			174			171			133			309
Link Speed (mph)		35			45			35			35	
Link Distance (ft)		873			992			804			651	
Travel Time (s)		17.0			15.0			15.7			12.7	
Confl. Peds. (#/hr)			7						13			
Confl. Bikes (#/hr)			2			1			1			
Peak Hour Factor	0.82	0.88	0.72	0.68	0.78	0.70	0.72	0.85	0.75	0.70	0.83	0.76
Adj. Flow (vph)	305	714	176	172	864	167	118	378	133	59	563	309
Shared Lane Traffic (%)												
Lane Group Flow (vph)	305	714	176	172	864	167	118	378	133	59	563	309
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	33.0	33.0	10.0	10.0	10.0	10.0	40.0	40.0	10.0	10.0	10.0
Total Split (s)	30.0	56.0	56.0	21.0	47.0	47.0	18.0	51.0	51.0	12.0	45.0	45.0
Total Split (%)	21.4%	40.0%	40.0%	15.0%	33.6%	33.6%	12.9%	36.4%	36.4%	8.6%	32.1%	32.1%
Maximum Green (s)	25.0	51.0	51.0	16.0	42.0	42.0	13.0	46.0	46.0	7.0	40.0	40.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	C-Max	C-Max	None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)		4.0	4.0					4.0	4.0			
Flash Dont Walk (s)		24.0	24.0					31.0	31.0			
Pedestrian Calls (#/hr)		7	7					13	13			
Act Effct Green (s)	16.8	55.6	55.6	11.4	50.2	50.2	9.2	48.6	48.6	6.4	43.8	43.8
Actuated g/C Ratio	0.12	0.40	0.40	0.08	0.36	0.36	0.07	0.35	0.35	0.05	0.31	0.31
v/c Ratio	0.74	0.35	0.25	0.62	0.47	0.25	0.52	0.31	0.21	0.38	0.51	0.44
Control Delay	70.5	30.6	4.9	71.6	36.2	5.2	71.3	35.0	6.0	71.8	41.6	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.5	30.6	4.9	71.6	36.2	5.2	71.3	35.0	6.0	71.8	41.6	5.9
LOS	E	C	A	E	D	A	E	C	A	E	D	A
Approach Delay		37.0			37.0			35.7			31.7	
Approach LOS		D			D			D			C	
90th %ile Green (s)	21.4	52.2	52.2	14.8	45.6	45.6	12.1	46.0	46.0	7.0	40.9	40.9
90th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Max	MaxR	MaxR
70th %ile Green (s)	18.7	54.2	54.2	12.8	48.3	48.3	10.4	46.0	46.0	7.0	42.6	42.6
70th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Max	MaxR	MaxR
50th %ile Green (s)	16.8	55.6	55.6	11.4	50.2	50.2	9.2	46.2	46.2	6.8	43.8	43.8
50th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Gap	MaxR	MaxR
30th %ile Green (s)	14.9	57.0	57.0	10.0	52.1	52.1	8.0	47.0	47.0	6.0	45.0	45.0
30th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Gap	MaxR	MaxR
10th %ile Green (s)	12.2	59.0	59.0	8.0	54.8	54.8	6.3	58.0	58.0	0.0	46.7	46.7
10th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Skip	MaxR	MaxR
Stops (vph)	237	429	12	111	510	11	81	231	11	39	376	21
Fuel Used(gal)	7	11	1	4	16	1	2	6	1	1	9	2
CO Emissions (g/hr)	486	775	71	268	1094	71	163	411	55	76	628	108
NOx Emissions (g/hr)	94	151	14	52	213	14	32	80	11	15	122	21
VOC Emissions (g/hr)	113	180	16	62	254	16	38	95	13	18	146	25
Dilemma Vehicles (#)	0	23	0	0	24	0	0	12	0	0	17	0
Queue Length 50th (ft)	140	165	1	79	221	0	54	135	0	27	220	0
Queue Length 95th (ft)	167	205	19	86	234	14	68	169	24	40	261	25
Internal Link Dist (ft)		793			912			724			571	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	450		135	250		160	240		230	250		315
Base Capacity (vph)	613	2019	718	392	1823	670	318	1229	621	171	1107	707
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.35	0.25	0.44	0.47	0.25	0.37	0.31	0.21	0.35	0.51	0.44

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 4:EBT, Start of Green

Natural Cycle: 95

Control Type: Actuated-Coordinated

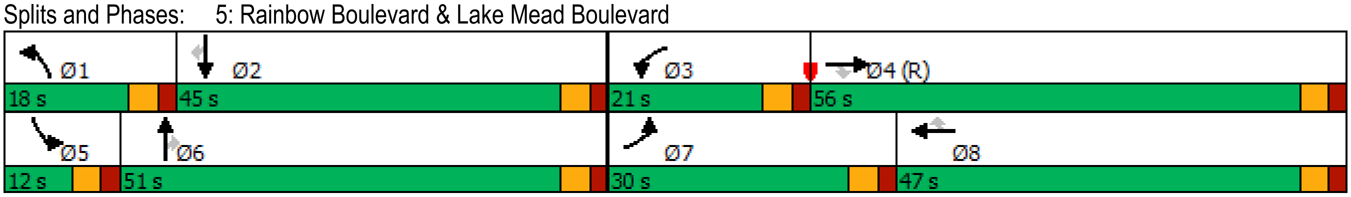
Maximum v/c Ratio: 0.74

Intersection Signal Delay: 35.5 Intersection LOS: D

Intersection Capacity Utilization 76.4% ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 5: Rainbow Boulevard & Lake Mead Boulevard



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	108	923	244	162	431	87	176	1002	204	320	2045	108
Future Volume (veh/h)	108	923	244	162	431	87	176	1002	204	320	2045	108
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.98	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	171	1282	284	188	513	126	293	1285	340	438	2464	140
Peak Hour Factor	0.63	0.72	0.86	0.86	0.84	0.69	0.60	0.78	0.60	0.73	0.83	0.77
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	215	1554	477	215	1554	472	323	2620	634	517	2868	696
Arrive On Green	0.04	0.30	0.30	0.04	0.30	0.30	0.06	0.41	0.41	0.10	0.45	0.45
Sat Flow, veh/h	5023	5106	1568	5023	5106	1552	5023	6434	1558	5023	6434	1563
Grp Volume(v), veh/h	171	1282	284	188	513	126	293	1285	340	438	2464	140
Grp Sat Flow(s),veh/h/ln	1674	1702	1568	1674	1702	1552	1674	1609	1558	1674	1609	1563
Q Serve(g_s), s	4.7	32.7	21.5	5.2	10.9	8.6	8.1	20.7	23.2	12.0	48.2	7.6
Cycle Q Clear(g_c), s	4.7	32.7	21.5	5.2	10.9	8.6	8.1	20.7	23.2	12.0	48.2	7.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	215	1554	477	215	1554	472	323	2620	634	517	2868	696
V/C Ratio(X)	0.79	0.83	0.60	0.87	0.33	0.27	0.91	0.49	0.54	0.85	0.86	0.20
Avail Cap(c_a), veh/h	215	1678	515	215	1678	510	323	2620	634	646	2868	696
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	66.4	45.2	41.4	66.6	37.7	36.9	65.1	30.7	31.5	61.7	34.9	23.6
Incr Delay (d2), s/veh	17.0	3.0	1.0	29.2	0.0	0.1	27.3	0.7	3.2	7.2	3.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	13.8	8.3	2.8	4.5	3.2	4.2	7.9	9.0	5.4	18.7	2.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	83.4	48.2	42.3	95.8	37.7	37.0	92.4	31.4	34.7	68.9	38.5	24.3
LnGrp LOS	F	D	D	F	D	D	F	C	C	E	D	C
Approach Vol, veh/h		1737			827			1918			3042	
Approach Delay, s/veh		50.7			50.8			41.3			42.2	
Approach LOS		D			D			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.0	67.4	11.0	47.6	19.4	62.0	11.0	47.6				
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0				
Max Green Setting (Gmax), s	9.0	59.0	6.0	46.0	18.0	50.0	6.0	46.0				
Max Q Clear Time (g_c+I1), s	10.1	50.2	7.2	34.7	14.0	25.2	6.7	12.9				
Green Ext Time (p_c), s	0.0	7.1	0.0	4.9	0.4	6.9	0.0	2.3				
Intersection Summary												
HCM 6th Ctrl Delay			44.9									
HCM 6th LOS			D									

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	108	923	244	162	431	87	176	1002	204	320	2045	108
Future Volume (vph)	108	923	244	162	431	87	176	1002	204	320	2045	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	345		250	345		250	340		250	330		245
Storage Lanes	3		1	3		1	3		1	3		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.94	0.91	1.00	0.94	0.91	1.00	0.94	0.86	1.00	0.94	0.86	1.00
Ped Bike Factor			0.98			0.97			0.96			0.97
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	4990	5085	1583	4990	5085	1583	4990	6408	1583	4990	6408	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	4990	5085	1549	4990	5085	1535	4990	6408	1526	4990	6408	1529
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			143			132			132			94
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		1636			1478			1249			1239	
Travel Time (s)		24.8			22.4			18.9			18.8	
Confl. Peds. (#/hr)			11			21			23			21
Peak Hour Factor	0.63	0.72	0.86	0.86	0.84	0.69	0.60	0.78	0.60	0.73	0.83	0.77
Adj. Flow (vph)	171	1282	284	188	513	126	293	1285	340	438	2464	140
Shared Lane Traffic (%)												
Lane Group Flow (vph)	171	1282	284	188	513	126	293	1285	340	438	2464	140
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		36			36			36			36	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm

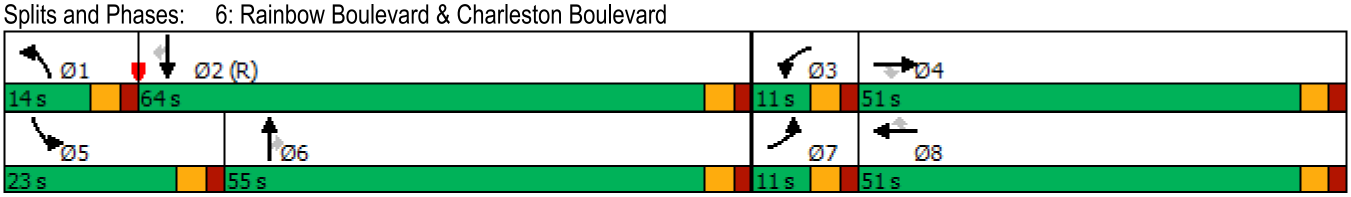
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	51.0	51.0	10.0	51.0	51.0	10.0	44.0	44.0	10.0	44.0	44.0
Total Split (s)	11.0	51.0	51.0	11.0	51.0	51.0	14.0	55.0	55.0	23.0	64.0	64.0
Total Split (%)	7.9%	36.4%	36.4%	7.9%	36.4%	36.4%	10.0%	39.3%	39.3%	16.4%	45.7%	45.7%
Maximum Green (s)	6.0	46.0	46.0	6.0	46.0	46.0	9.0	50.0	50.0	18.0	59.0	59.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	None	None	None	None	None	None	Max	Max	None	C-Max	C-Max
Walk Time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Flash Dont Walk (s)		42.0	42.0		42.0	42.0		35.0	35.0		35.0	35.0
Pedestrian Calls (#/hr)		11	11		21	21		23	23		21	21
Act Effct Green (s)	6.0	42.9	42.9	6.0	42.9	42.9	10.0	55.1	55.1	16.1	61.2	61.2
Actuated g/C Ratio	0.04	0.31	0.31	0.04	0.31	0.31	0.07	0.39	0.39	0.12	0.44	0.44
v/c Ratio	0.80	0.82	0.50	0.88	0.33	0.22	0.83	0.51	0.50	0.76	0.88	0.19
Control Delay	92.6	50.0	21.5	103.3	37.7	5.7	83.3	33.9	22.9	69.4	41.0	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	92.6	50.0	21.5	103.3	37.7	5.7	83.3	33.9	22.9	69.4	41.0	9.9
LOS	F	D	C	F	D	A	F	C	C	E	D	A
Approach Delay		49.5			47.7			39.5			43.7	
Approach LOS		D			D			D			D	
90th %ile Green (s)	6.0	46.0	46.0	6.0	46.0	46.0	9.0	50.0	50.0	18.0	59.0	59.0
90th %ile Term Code	Max	Max	Max	Max	Ped	Ped	Max	Coord	Coord	Max	Coord	Coord
70th %ile Green (s)	6.0	46.0	46.0	6.0	46.0	46.0	9.0	50.0	50.0	18.0	59.0	59.0
70th %ile Term Code	Max	Ped	Ped	Max	Ped	Ped	Max	Coord	Coord	Max	Coord	Coord
50th %ile Green (s)	6.0	46.0	46.0	6.0	46.0	46.0	9.0	51.4	51.4	16.6	59.0	59.0
50th %ile Term Code	Max	Hold	Hold	Max	Ped	Ped	Max	Coord	Coord	Gap	Coord	Coord
30th %ile Green (s)	6.0	40.3	40.3	6.0	40.3	40.3	12.3	58.7	58.7	15.0	61.4	61.4
30th %ile Term Code	Max	Gap	Gap	Max	Hold	Hold	Gap	Coord	Coord	Gap	Coord	Coord
10th %ile Green (s)	6.0	36.0	36.0	6.0	36.0	36.0	10.5	65.2	65.2	12.8	67.5	67.5
10th %ile Term Code	Max	Gap	Gap	Max	Hold	Hold	Gap	Coord	Coord	Gap	Coord	Coord
Stops (vph)	100	833	99	147	322	9	159	745	98	304	1803	25
Fuel Used(gal)	4	30	5	7	11	1	6	24	4	11	56	1
CO Emissions (g/hr)	309	2066	342	475	800	73	447	1699	267	760	3911	98
NOx Emissions (g/hr)	60	402	67	92	156	14	87	331	52	148	761	19
VOC Emissions (g/hr)	72	479	79	110	185	17	103	394	62	176	906	23
Dilemma Vehicles (#)	0	29	0	0	14	0	0	36	0	0	72	0
Queue Length 50th (ft)	55	383	98	61	127	0	95	268	147	138	606	25
Queue Length 95th (ft)	57	328	171	#102	149	12	85	259	112	140	577	50
Internal Link Dist (ft)		1556			1398			1169			1159	
Turn Bay Length (ft)	345		250	345		250	340		250	330		245

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	213	1670	604	213	1670	592	354	2520	680	641	2800	720
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.77	0.47	0.88	0.31	0.21	0.83	0.51	0.50	0.68	0.88	0.19

Intersection Summary	
Area Type: Other	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 2:SBT, Start of Green	
Natural Cycle: 125	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.88	
Intersection Signal Delay: 44.4	Intersection LOS: D
Intersection Capacity Utilization 83.5%	ICU Level of Service E
Analysis Period (min) 15	

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

Splits and Phases: 6: Rainbow Boulevard & Charleston Boulevard



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	138	1283	179	159	824	105	96	272	116	180	786	38
Future Volume (veh/h)	138	1283	179	159	824	105	96	272	116	180	786	38
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.97	1.00		0.97	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	216	1645	275	215	1056	118	113	283	140	333	1062	52
Peak Hour Factor	0.64	0.78	0.65	0.74	0.78	0.89	0.85	0.96	0.83	0.54	0.74	0.73
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	265	1909	586	262	1904	574	159	1418	429	384	1218	540
Arrive On Green	0.08	0.37	0.37	0.08	0.37	0.37	0.05	0.28	0.28	0.11	0.34	0.34
Sat Flow, veh/h	3456	5106	1569	3456	5106	1540	3456	5106	1544	3456	3554	1574
Grp Volume(v), veh/h	216	1645	275	215	1056	118	113	283	140	333	1062	52
Grp Sat Flow(s),veh/h/ln	1728	1702	1569	1728	1702	1540	1728	1702	1544	1728	1777	1574
Q Serve(g_s), s	8.6	41.7	18.6	8.6	22.9	7.3	4.5	5.9	10.1	13.3	39.2	3.1
Cycle Q Clear(g_c), s	8.6	41.7	18.6	8.6	22.9	7.3	4.5	5.9	10.1	13.3	39.2	3.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	265	1909	586	262	1904	574	159	1418	429	384	1218	540
V/C Ratio(X)	0.81	0.86	0.47	0.82	0.55	0.21	0.71	0.20	0.33	0.87	0.87	0.10
Avail Cap(c_a), veh/h	346	1969	605	272	1904	574	173	1418	429	494	1218	540
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	63.7	40.5	33.3	63.8	34.7	29.8	65.9	38.7	40.2	61.2	43.1	31.3
Incr Delay (d2), s/veh	8.4	4.2	0.8	16.3	1.2	0.8	9.4	0.3	2.0	10.4	8.7	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	17.6	7.1	4.3	9.5	2.8	2.2	2.5	4.0	6.3	18.5	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	72.1	44.7	34.1	80.0	35.9	30.6	75.3	39.0	42.2	71.6	51.8	31.6
LnGrp LOS	E	D	C	F	D	C	E	D	D	E	D	C
Approach Vol, veh/h		2136			1389			536			1447	
Approach Delay, s/veh		46.1			42.3			47.5			55.6	
Approach LOS		D			D			D			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.4	53.0	15.6	57.3	20.6	43.9	15.7	57.2				
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0				
Max Green Setting (Gmax), s	7.0	48.0	11.0	54.0	20.0	35.0	14.0	51.0				
Max Q Clear Time (g_c+I1), s	6.5	41.2	10.6	43.7	15.3	12.1	10.6	24.9				
Green Ext Time (p_c), s	0.0	3.0	0.0	8.7	0.3	1.4	0.1	11.2				
Intersection Summary												
HCM 6th Ctrl Delay			47.8									
HCM 6th LOS			D									

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	138	1283	179	159	824	105	96	272	116	180	786	38
Future Volume (vph)	138	1283	179	159	824	105	96	272	116	180	786	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	315		135	345		160	270		150	345		150
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00
Ped Bike Factor			0.97			0.94			0.96			0.98
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1538	3433	5085	1493	3433	5085	1520	3433	3539	1549
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			132			132			140			94
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		967			793			658			756	
Travel Time (s)		14.7			12.0			12.8			14.7	
Confl. Peds. (#/hr)			13			35			24			8
Peak Hour Factor	0.64	0.78	0.65	0.74	0.78	0.89	0.85	0.96	0.83	0.54	0.74	0.73
Adj. Flow (vph)	216	1645	275	215	1056	118	113	283	140	333	1062	52
Shared Lane Traffic (%)												
Lane Group Flow (vph)	216	1645	275	215	1056	118	113	283	140	333	1062	52
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	37.0	37.0	10.0	37.0	37.0	10.0	40.0	40.0	10.0	40.0	40.0
Total Split (s)	19.0	59.0	59.0	16.0	56.0	56.0	12.0	40.0	40.0	25.0	53.0	53.0
Total Split (%)	13.6%	42.1%	42.1%	11.4%	40.0%	40.0%	8.6%	28.6%	28.6%	17.9%	37.9%	37.9%
Maximum Green (s)	14.0	54.0	54.0	11.0	51.0	51.0	7.0	35.0	35.0	20.0	48.0	48.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	None	None	None	C-Max	C-Max	None	Max	Max	None	Max	Max
Walk Time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Flash Dont Walk (s)		28.0	28.0		28.0	28.0		31.0	31.0		31.0	31.0
Pedestrian Calls (#/hr)		13	13		35	35		24	24		8	8
Act Effct Green (s)	12.4	54.3	54.3	10.7	52.6	52.6	6.9	37.7	37.7	17.3	48.1	48.1
Actuated g/C Ratio	0.09	0.39	0.39	0.08	0.38	0.38	0.05	0.27	0.27	0.12	0.34	0.34
v/c Ratio	0.71	0.84	0.41	0.82	0.55	0.18	0.67	0.21	0.27	0.78	0.87	0.09
Control Delay	75.2	43.5	17.6	87.5	36.0	4.2	85.2	40.7	7.7	72.8	52.2	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.2	43.5	17.6	87.5	36.0	4.2	85.2	40.7	7.7	72.8	52.2	0.9
LOS	E	D	B	F	D	A	F	D	A	E	D	A
Approach Delay		43.4			41.3			41.4			55.1	
Approach LOS		D			D			D			E	
90th %ile Green (s)	14.0	54.0	54.0	11.0	51.0	51.0	7.0	35.0	35.0	20.0	48.0	48.0
90th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Max	MaxR	MaxR	Max	MaxR	MaxR
70th %ile Green (s)	14.0	54.0	54.0	11.0	51.0	51.0	7.0	35.2	35.2	19.8	48.0	48.0
70th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Max	MaxR	MaxR	Gap	MaxR	MaxR
50th %ile Green (s)	13.1	54.0	54.0	11.0	51.9	51.9	7.0	37.1	37.1	17.9	48.0	48.0
50th %ile Term Code	Gap	Coord	Coord	Max	Coord	Coord	Max	MaxR	MaxR	Gap	MaxR	MaxR
30th %ile Green (s)	11.6	54.0	54.0	11.0	53.4	53.4	7.0	39.1	39.1	15.9	48.0	48.0
30th %ile Term Code	Gap	Coord	Coord	Max	Coord	Coord	Max	MaxR	MaxR	Gap	MaxR	MaxR
10th %ile Green (s)	9.3	55.3	55.3	9.7	55.7	55.7	6.3	41.9	41.9	13.1	48.7	48.7
10th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Gap	MaxR	MaxR
Stops (vph)	132	1134	67	149	634	9	91	207	14	171	711	1
Fuel Used(gal)	5	34	3	6	18	1	3	5	1	5	18	0
CO Emissions (g/hr)	323	2344	182	385	1270	52	196	357	59	345	1258	15
NOx Emissions (g/hr)	63	456	35	75	247	10	38	69	11	67	245	3
VOC Emissions (g/hr)	75	543	42	89	294	12	45	83	14	80	292	4
Dilemma Vehicles (#)	0	46	0	0	29	0	0	10	0	0	28	0
Queue Length 50th (ft)	100	495	90	101	278	0	53	73	0	153	477	0
Queue Length 95th (ft)	99	452	85	118	274	32	#82	103	42	115	430	0
Internal Link Dist (ft)		887			713			578			676	
Turn Bay Length (ft)	315		135	345		160	270		150	345		150

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	343	1970	677	269	1910	643	171	1367	511	490	1217	594
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.84	0.41	0.80	0.55	0.18	0.66	0.21	0.27	0.68	0.87	0.09

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 8:WBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

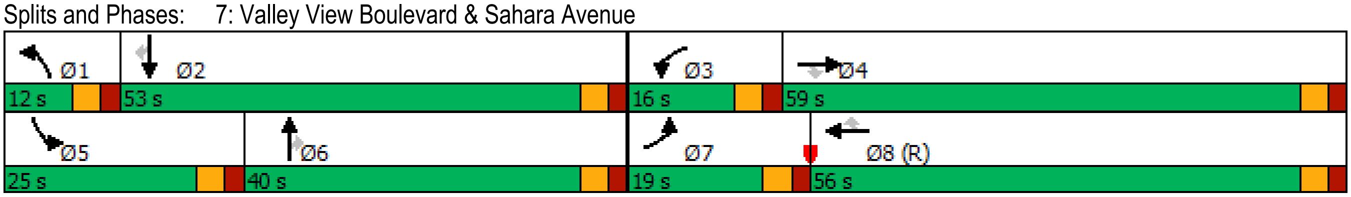
Intersection Signal Delay: 45.8 Intersection LOS: D

Intersection Capacity Utilization 81.8% ICU Level of Service D

Analysis Period (min) 15

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

Splits and Phases: 7: Valley View Boulevard & Sahara Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	101	33	100	152	51	15	658	123	78	1131	39
Future Volume (veh/h)	16	101	33	100	152	51	15	658	123	78	1131	39
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	30	180	51	154	245	78	21	693	0	134	1285	48
Peak Hour Factor	0.54	0.56	0.65	0.65	0.62	0.65	0.70	0.95	0.73	0.58	0.88	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	44	266	220	180	409	341	36	2682		158	3034	938
Arrive On Green	0.02	0.14	0.14	0.10	0.22	0.22	0.02	0.53	0.00	0.09	0.59	0.59
Sat Flow, veh/h	1781	1870	1548	1781	1870	1561	1781	5106	1585	1781	5106	1578
Grp Volume(v), veh/h	30	180	51	154	245	78	21	693	0	134	1285	48
Grp Sat Flow(s),veh/h/ln	1781	1870	1548	1781	1870	1561	1781	1702	1585	1781	1702	1578
Q Serve(g_s), s	2.3	12.8	4.1	11.9	16.5	5.8	1.6	10.4	0.0	10.4	19.1	1.8
Cycle Q Clear(g_c), s	2.3	12.8	4.1	11.9	16.5	5.8	1.6	10.4	0.0	10.4	19.1	1.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	44	266	220	180	409	341	36	2682		158	3034	938
V/C Ratio(X)	0.68	0.68	0.23	0.85	0.60	0.23	0.59	0.26		0.85	0.42	0.05
Avail Cap(c_a), veh/h	102	428	354	318	655	546	89	2682		280	3034	938
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	67.7	57.0	53.3	61.9	49.2	45.0	68.0	18.2	0.0	62.9	15.4	11.9
Incr Delay (d2), s/veh	17.2	1.1	0.2	10.9	0.5	0.1	5.7	0.2	0.0	4.8	0.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	6.2	1.6	6.0	7.8	0.0	0.8	4.2	0.0	4.9	7.4	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	84.9	58.2	53.5	72.8	49.7	45.1	73.8	18.5	0.0	67.6	15.8	12.0
LnGrp LOS	F	E	D	E	D	D	E	B		E	B	B
Approach Vol, veh/h		261			477			714	A		1467	
Approach Delay, s/veh		60.3			56.4			20.1			20.5	
Approach LOS		E			E			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.8	88.2	19.2	24.9	17.4	78.5	8.4	35.6
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	7.0	56.0	25.0	32.0	22.0	41.0	8.0	49.0
Max Q Clear Time (g_c+I1), s	3.6	21.1	13.9	14.8	12.4	12.4	4.3	18.5
Green Ext Time (p_c), s	0.0	7.4	0.3	0.6	0.1	3.3	0.0	1.1

Intersection Summary	
HCM 6th Ctrl Delay	29.8
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

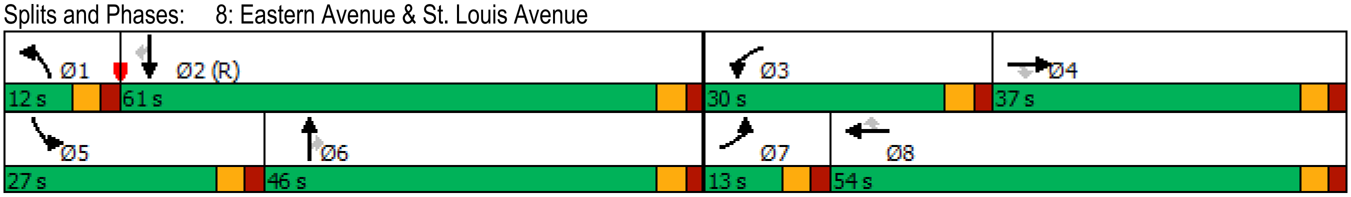
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	101	33	100	152	51	15	658	123	78	1131	39
Future Volume (vph)	16	101	33	100	152	51	15	658	123	78	1131	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		115	300		85	230		150	230		150
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.99		0.97	0.99		0.98			0.89			0.96
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	5085	1583	1770	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1756	1863	1539	1747	1863	1548	1770	5085	1413	1770	5085	1521
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			171			132			171			132
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		1078			724			717			783	
Travel Time (s)		24.5			16.5			14.0			15.3	
Confl. Peds. (#/hr)	8		11	11		8			23			5
Peak Hour Factor	0.54	0.56	0.65	0.65	0.62	0.65	0.70	0.95	0.73	0.58	0.88	0.82
Adj. Flow (vph)	30	180	51	154	245	78	21	693	168	134	1285	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	30	180	51	154	245	78	21	693	168	134	1285	48
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	33.0	33.0	10.0	37.0	37.0	10.0	23.0	23.0	10.0	23.0	23.0
Total Split (s)	13.0	37.0	37.0	30.0	54.0	54.0	12.0	46.0	46.0	27.0	61.0	61.0
Total Split (%)	9.3%	26.4%	26.4%	21.4%	38.6%	38.6%	8.6%	32.9%	32.9%	19.3%	43.6%	43.6%
Maximum Green (s)	8.0	32.0	32.0	25.0	49.0	49.0	7.0	41.0	41.0	22.0	56.0	56.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	2.0	2.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	None	None	None	None	None	None	Max	Max	None	C-Max	C-Max
Walk Time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Flash Dont Walk (s)		24.0	24.0		28.0	28.0		14.0	14.0		14.0	14.0
Pedestrian Calls (#/hr)		11	11		8	8		23	23		5	5
Act Effct Green (s)	7.2	20.1	20.1	17.4	34.8	34.8	6.3	67.5	67.5	15.0	80.2	80.2
Actuated g/C Ratio	0.05	0.14	0.14	0.12	0.25	0.25	0.04	0.48	0.48	0.11	0.57	0.57
v/c Ratio	0.33	0.67	0.14	0.70	0.53	0.16	0.26	0.28	0.22	0.71	0.44	0.05
Control Delay	73.7	68.3	0.8	75.1	49.2	1.0	72.1	24.8	4.8	79.9	20.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	73.7	68.3	0.8	75.1	49.2	1.0	72.1	24.8	4.8	79.9	20.5	0.1
LOS	E	E	A	E	D	A	E	C	A	E	C	A
Approach Delay		55.8			49.6			22.1			25.3	
Approach LOS		E			D			C			C	
90th %ile Green (s)	8.0	28.0	28.0	23.7	43.7	43.7	8.4	47.5	47.5	20.8	59.9	59.9
90th %ile Term Code	Max	Ped	Ped	Gap	Hold	Hold	Gap	Coord	Coord	Gap	Coord	Coord
70th %ile Green (s)	8.0	28.0	28.0	20.0	40.0	40.0	7.0	54.6	54.6	17.4	65.0	65.0
70th %ile Term Code	Max	Ped	Ped	Gap	Hold	Hold	Gap	Coord	Coord	Gap	Coord	Coord
50th %ile Green (s)	7.8	17.9	17.9	17.4	27.5	27.5	6.1	69.7	69.7	15.0	78.6	78.6
50th %ile Term Code	Gap	Gap	Gap	Gap	Hold	Hold	Gap	Coord	Coord	Gap	Coord	Coord
30th %ile Green (s)	0.0	15.2	15.2	14.9	35.1	35.1	0.0	77.4	77.4	12.5	94.9	94.9
30th %ile Term Code	Skip	Gap	Gap	Gap	Hold	Hold	Skip	Coord	Coord	Gap	Coord	Coord
10th %ile Green (s)	0.0	11.4	11.4	11.1	27.5	27.5	0.0	88.4	88.4	9.1	102.5	102.5
10th %ile Term Code	Skip	Gap	Gap	Gap	Hold	Hold	Skip	Coord	Coord	Gap	Coord	Coord
Stops (vph)	17	94	0	95	127	0	16	396	12	73	649	0
Fuel Used(gal)	0	3	0	3	3	0	0	10	1	2	16	0
CO Emissions (g/hr)	33	194	20	183	215	21	29	678	59	158	1118	15
NOx Emissions (g/hr)	6	38	4	36	42	4	6	132	12	31	218	3
VOC Emissions (g/hr)	8	45	5	42	50	5	7	157	14	37	259	4
Dilemma Vehicles (#)	0	0	0	0	0	0	0	24	0	0	40	0
Queue Length 50th (ft)	27	161	0	137	209	0	19	131	0	120	242	0
Queue Length 95th (ft)	37	132	0	142	167	0	37	215	18	114	362	0
Internal Link Dist (ft)		998			644			637			703	
Turn Bay Length (ft)	300		115	300		85	230		150	230		150

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	101	425	483	316	652	627	92	2452	770	278	2911	927
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.42	0.11	0.49	0.38	0.12	0.23	0.28	0.22	0.48	0.44	0.05

Intersection Summary	
Area Type: Other	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 2:SBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.71	
Intersection Signal Delay: 30.7	Intersection LOS: C
Intersection Capacity Utilization 54.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 8: Eastern Avenue & St. Louis Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	104	1073	76	112	1217	38	156	132	87	198	256	94
Future Volume (veh/h)	104	1073	76	112	1217	38	156	132	87	198	256	94
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	142	1325	100	147	1560	68	175	176	118	248	337	124
Peak Hour Factor	0.73	0.81	0.76	0.76	0.78	0.56	0.89	0.75	0.74	0.80	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	190	2335	720	195	2343	727	224	913	406	298	990	435
Arrive On Green	0.05	0.46	0.46	0.06	0.46	0.46	0.06	0.26	0.26	0.09	0.28	0.28
Sat Flow, veh/h	3456	5106	1575	3456	5106	1584	3456	3554	1580	3456	3554	1563
Grp Volume(v), veh/h	142	1325	100	147	1560	68	175	176	118	248	337	124
Grp Sat Flow(s),veh/h/ln	1728	1702	1575	1728	1702	1584	1728	1777	1580	1728	1777	1563
Q Serve(g_s), s	5.7	26.6	5.2	5.9	33.3	3.4	7.0	5.4	8.4	9.9	10.6	8.7
Cycle Q Clear(g_c), s	5.7	26.6	5.2	5.9	33.3	3.4	7.0	5.4	8.4	9.9	10.6	8.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	190	2335	720	195	2343	727	224	913	406	298	990	435
V/C Ratio(X)	0.75	0.57	0.14	0.75	0.67	0.09	0.78	0.19	0.29	0.83	0.34	0.28
Avail Cap(c_a), veh/h	247	2335	720	272	2343	727	296	913	406	395	990	435
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	65.2	27.8	22.0	65.1	29.5	21.4	64.5	40.7	41.8	63.0	40.2	39.6
Incr Delay (d2), s/veh	5.9	1.0	0.4	4.2	0.9	0.1	6.7	0.5	1.8	8.5	0.9	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	11.0	1.9	2.7	13.3	1.3	3.3	2.4	3.4	4.7	4.8	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	71.1	28.8	22.4	69.3	30.4	21.5	71.2	41.1	43.6	71.5	41.2	41.2
LnGrp LOS	E	C	C	E	C	C	E	D	D	E	D	D
Approach Vol, veh/h		1567			1775			469			709	
Approach Delay, s/veh		32.3			33.3			53.0			51.8	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.1	44.0	12.9	69.0	17.1	41.0	12.7	69.3
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	12.0	39.0	11.0	58.0	16.0	35.0	10.0	59.0
Max Q Clear Time (g_c+I1), s	9.0	12.6	7.9	28.6	11.9	10.4	7.7	35.3
Green Ext Time (p_c), s	0.1	6.6	0.1	19.3	0.2	3.8	0.0	17.5

Intersection Summary			
HCM 6th Ctrl Delay			37.9
HCM 6th LOS			D

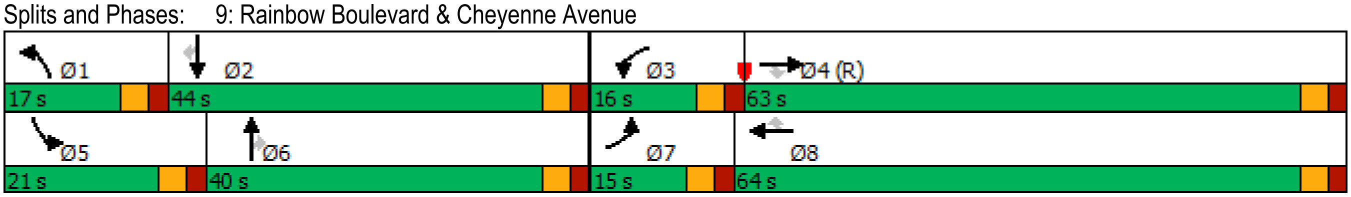
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	104	1073	76	112	1217	38	156	132	87	198	256	94
Future Volume (vph)	104	1073	76	112	1217	38	156	132	87	198	256	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	360		220	300		150	370		150	300		150
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor			0.97			0.99			0.98			0.99
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1541	3433	5085	1562	3433	3539	1559	3433	3539	1561
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			94			94			118			124
Link Speed (mph)		35			45			35			35	
Link Distance (ft)		778			1071			690			688	
Travel Time (s)		15.2			16.2			13.4			13.4	
Confl. Peds. (#/hr)			10			1			3			1
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.73	0.81	0.76	0.76	0.78	0.56	0.89	0.75	0.74	0.80	0.76	0.76
Adj. Flow (vph)	142	1325	100	147	1560	68	175	176	118	248	337	124
Shared Lane Traffic (%)												
Lane Group Flow (vph)	142	1325	100	147	1560	68	175	176	118	248	337	124
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane											Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	33.0	33.0	10.0	33.0	33.0	10.0	40.0	40.0	10.0	37.0	37.0
Total Split (s)	15.0	63.0	63.0	16.0	64.0	64.0	17.0	40.0	40.0	21.0	44.0	44.0
Total Split (%)	10.7%	45.0%	45.0%	11.4%	45.7%	45.7%	12.1%	28.6%	28.6%	15.0%	31.4%	31.4%
Maximum Green (s)	10.0	58.0	58.0	11.0	59.0	59.0	12.0	35.0	35.0	16.0	39.0	39.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	4.9	4.9	2.0	4.7	4.7	2.0	6.2	6.2	2.0	6.1	6.1
Recall Mode	None	C-Max	C-Max	None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Flash Dont Walk (s)		24.0	24.0		24.0	24.0		31.0	31.0		28.0	28.0
Pedestrian Calls (#/hr)		10	10		1	1		3	3		1	1
Act Effct Green (s)	9.2	59.3	59.3	9.7	59.8	59.8	10.7	37.1	37.1	13.9	40.3	40.3
Actuated g/C Ratio	0.07	0.42	0.42	0.07	0.43	0.43	0.08	0.26	0.26	0.10	0.29	0.29
v/c Ratio	0.63	0.62	0.14	0.62	0.72	0.09	0.67	0.19	0.24	0.73	0.33	0.23
Control Delay	76.4	33.2	5.9	74.6	35.6	2.2	75.5	41.0	8.1	73.9	40.7	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.4	33.2	5.9	74.6	35.6	2.2	75.5	41.0	8.1	73.9	40.7	7.3
LOS	E	C	A	E	D	A	E	D	A	E	D	A
Approach Delay		35.4			37.6			45.6			46.5	
Approach LOS		D			D			D			D	
90th %ile Green (s)	10.0	58.0	58.0	11.0	59.0	59.0	12.0	35.0	35.0	16.0	39.0	39.0
90th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Max	MaxR	MaxR	Max	MaxR	MaxR
70th %ile Green (s)	10.0	58.0	58.0	11.0	59.0	59.0	12.0	35.0	35.0	16.0	39.0	39.0
70th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Max	MaxR	MaxR	Max	MaxR	MaxR
50th %ile Green (s)	10.0	58.6	58.6	10.4	59.0	59.0	11.5	36.6	36.6	14.4	39.5	39.5
50th %ile Term Code	Max	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Gap	MaxR	MaxR
30th %ile Green (s)	8.9	59.9	59.9	9.1	60.1	60.1	10.1	38.3	38.3	12.7	40.9	40.9
30th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Gap	MaxR	MaxR
10th %ile Green (s)	7.1	61.8	61.8	7.2	61.9	61.9	8.0	40.7	40.7	10.3	43.0	43.0
10th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Gap	MaxR	MaxR
Stops (vph)	100	816	11	108	979	2	149	101	11	189	198	11
Fuel Used(gal)	3	19	1	4	29	0	4	3	1	5	5	1
CO Emissions (g/hr)	206	1357	42	267	2059	21	300	176	46	376	341	48
NOx Emissions (g/hr)	40	264	8	52	401	4	58	34	9	73	66	9
VOC Emissions (g/hr)	48	315	10	62	477	5	70	41	11	87	79	11
Dilemma Vehicles (#)	0	38	0	0	44	0	0	5	0	0	9	0
Queue Length 50th (ft)	65	343	3	68	429	0	80	65	0	114	128	0
Queue Length 95th (ft)	82	344	25	87	395	0	119	82	26	140	144	28
Internal Link Dist (ft)		698			991			610			608	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	360		220	300		150	370		150	300		150
Base Capacity (vph)	245	2152	706	269	2171	721	294	938	500	392	1017	537
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.62	0.14	0.55	0.72	0.09	0.60	0.19	0.24	0.63	0.33	0.23

Intersection Summary	
Area Type: Other	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 4:EBT, Start of Green	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 39.0	Intersection LOS: D
Intersection Capacity Utilization 79.2%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 9: Rainbow Boulevard & Cheyenne Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	462	242	122	272	126	152	583	111	259	1577	30
Future Volume (veh/h)	45	462	242	122	272	126	152	583	111	259	1577	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.96	1.00		0.98	1.00		0.94
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	78	770	281	161	389	173	211	678	202	370	1855	34
Peak Hour Factor	0.58	0.60	0.86	0.76	0.70	0.73	0.72	0.86	0.55	0.70	0.85	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	98	872	370	184	1044	446	258	1973	598	422	2215	648
Arrive On Green	0.05	0.25	0.25	0.10	0.29	0.29	0.07	0.39	0.39	0.12	0.43	0.43
Sat Flow, veh/h	1781	3554	1506	1781	3554	1517	3456	5106	1547	3456	5106	1494
Grp Volume(v), veh/h	78	770	281	161	389	173	211	678	202	370	1855	34
Grp Sat Flow(s),veh/h/ln	1781	1777	1506	1781	1777	1517	1728	1702	1547	1728	1702	1494
Q Serve(g_s), s	6.1	29.2	24.2	12.5	12.2	12.7	8.4	13.2	12.9	14.7	45.2	1.8
Cycle Q Clear(g_c), s	6.1	29.2	24.2	12.5	12.2	12.7	8.4	13.2	12.9	14.7	45.2	1.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	98	872	370	184	1044	446	258	1973	598	422	2215	648
V/C Ratio(X)	0.80	0.88	0.76	0.87	0.37	0.39	0.82	0.34	0.34	0.88	0.84	0.05
Avail Cap(c_a), veh/h	153	888	377	204	1044	446	272	1973	598	543	2215	648
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	65.4	50.9	49.0	61.9	39.2	39.4	63.8	30.4	30.3	60.4	35.2	23.0
Incr Delay (d2), s/veh	6.7	9.9	7.7	27.9	0.1	0.2	15.6	0.5	1.5	10.6	4.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	14.1	9.8	7.1	5.3	4.8	4.2	5.4	5.1	7.0	18.7	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	72.1	60.8	56.7	89.8	39.3	39.6	79.4	30.9	31.9	71.0	39.2	23.1
LnGrp LOS	E	E	E	F	D	D	E	C	C	E	D	C
Approach Vol, veh/h		1129			723			1091			2259	
Approach Delay, s/veh		60.6			50.6			40.4			44.2	
Approach LOS		E			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.4	65.7	19.5	39.3	22.1	59.1	12.7	46.1
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	11.0	58.0	16.0	35.0	22.0	47.0	12.0	39.0
Max Q Clear Time (g_c+I1), s	10.4	47.2	14.5	31.2	16.7	15.2	8.1	14.7
Green Ext Time (p_c), s	0.0	6.4	0.0	1.6	0.4	3.2	0.0	1.9

Intersection Summary		
HCM 6th Ctrl Delay		47.8
HCM 6th LOS		D

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	462	242	122	272	126	152	583	111	259	1577	30
Future Volume (vph)	45	462	242	122	272	126	152	583	111	259	1577	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		300	300		300	300		310	300		150
Storage Lanes	1		1	1		1	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Ped Bike Factor	0.99		0.95	0.99		0.97			0.94			0.88
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1749	3539	1506	1748	3539	1531	3433	5085	1484	3433	5085	1392
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			186			173			202			94
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		1199			1771			701			721	
Travel Time (s)		23.4			34.5			10.6			10.9	
Confl. Peds. (#/hr)	17		30	30		17			31			66
Confl. Bikes (#/hr)			2			1						1
Peak Hour Factor	0.58	0.60	0.86	0.76	0.70	0.73	0.72	0.86	0.55	0.70	0.85	0.88
Adj. Flow (vph)	78	770	281	161	389	173	211	678	202	370	1855	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	78	770	281	161	389	173	211	678	202	370	1855	34
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	40.0	40.0	10.0	40.0	40.0	10.0	30.0	30.0	10.0	30.0	30.0
Total Split (s)	17.0	40.0	40.0	21.0	44.0	44.0	16.0	52.0	52.0	27.0	63.0	63.0
Total Split (%)	12.1%	28.6%	28.6%	15.0%	31.4%	31.4%	11.4%	37.1%	37.1%	19.3%	45.0%	45.0%
Maximum Green (s)	12.0	35.0	35.0	16.0	39.0	39.0	11.0	47.0	47.0	22.0	58.0	58.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	None	None	None	None	None	None	Max	Max	None	C-Max	C-Max
Walk Time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Flash Dont Walk (s)		31.0	31.0		31.0	31.0		21.0	21.0		21.0	21.0
Pedestrian Calls (#/hr)		30	30		17	17		31	31		66	66
Act Effct Green (s)	9.9	33.6	33.6	15.0	38.7	38.7	10.8	52.5	52.5	18.9	60.6	60.6
Actuated g/C Ratio	0.07	0.24	0.24	0.11	0.28	0.28	0.08	0.38	0.38	0.14	0.43	0.43
v/c Ratio	0.63	0.91	0.56	0.85	0.40	0.32	0.80	0.36	0.30	0.80	0.84	0.05
Control Delay	84.7	66.7	19.9	97.0	42.4	6.9	84.9	33.2	5.3	72.0	40.5	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	84.7	66.7	19.9	97.0	42.4	6.9	84.9	33.2	5.3	72.0	40.5	0.2
LOS	F	E	B	F	D	A	F	C	A	E	D	A
Approach Delay		56.3			46.1			38.0			45.1	
Approach LOS		E			D			D			D	
90th %ile Green (s)	12.0	35.0	35.0	16.0	39.0	39.0	11.0	47.0	47.0	22.0	58.0	58.0
90th %ile Term Code	Max	Max	Max	Max	Hold	Hold	Max	Coord	Coord	Max	Coord	Coord
70th %ile Green (s)	12.0	35.0	35.0	16.0	39.0	39.0	11.0	47.6	47.6	21.4	58.0	58.0
70th %ile Term Code	Max	Max	Max	Max	Hold	Hold	Max	Coord	Coord	Gap	Coord	Coord
50th %ile Green (s)	10.5	35.0	35.0	16.0	40.5	40.5	11.0	49.6	49.6	19.4	58.0	58.0
50th %ile Term Code	Gap	Max	Max	Max	Hold	Hold	Max	Coord	Coord	Gap	Coord	Coord
30th %ile Green (s)	8.7	33.9	33.9	15.3	40.5	40.5	11.7	53.5	53.5	17.3	59.1	59.1
30th %ile Term Code	Gap	Gap	Gap	Gap	Hold	Hold	Gap	Coord	Coord	Gap	Coord	Coord
10th %ile Green (s)	6.1	29.2	29.2	11.5	34.6	34.6	9.5	65.0	65.0	14.3	69.8	69.8
10th %ile Term Code	Gap	Gap	Gap	Gap	Hold	Hold	Gap	Coord	Coord	Gap	Coord	Coord
Stops (vph)	43	431	76	113	215	14	142	414	10	246	1373	0
Fuel Used(gal)	1	14	4	5	7	2	5	12	1	8	37	0
CO Emissions (g/hr)	104	945	255	337	520	132	355	821	52	564	2619	10
NOx Emissions (g/hr)	20	184	50	66	101	26	69	160	10	110	510	2
VOC Emissions (g/hr)	24	219	59	78	121	31	82	190	12	131	607	2
Dilemma Vehicles (#)	0	15	0	0	7	0	0	21	0	0	56	0
Queue Length 50th (ft)	70	356	71	145	149	0	98	168	0	170	564	0
Queue Length 95th (ft)	78	262	149	#189	151	23	113	200	0	167	577	0
Internal Link Dist (ft)		1119			1691			621			641	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	300		300	300		300	300		310	300		150
Base Capacity (vph)	151	884	516	202	1000	557	272	1908	683	539	2200	655
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.87	0.54	0.80	0.39	0.31	0.78	0.36	0.30	0.69	0.84	0.05

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 2:SBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.91

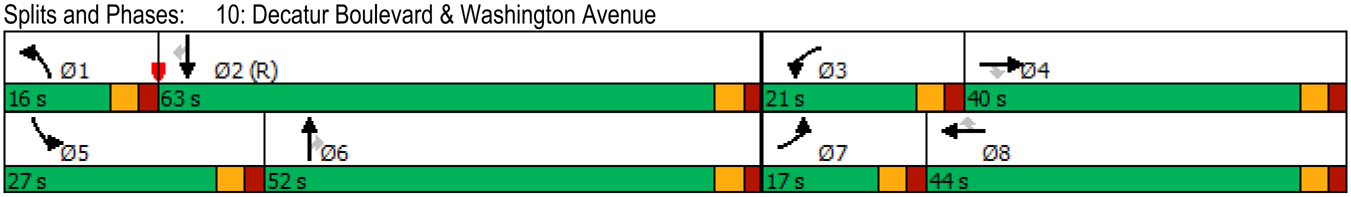
Intersection Signal Delay: 46.2 Intersection LOS: D

Intersection Capacity Utilization 81.4% ICU Level of Service D

Analysis Period (min) 15

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

Splits and Phases: 10: Decatur Boulevard & Washington Avenue



APPENDIX G-2:

Synchro Level-of-Service |

Existing Mitigated PM Report

HCM 6th Signalized Intersection Summary
1: Durango Drive & Charleston Boulevard

01/18/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	231	927	257	212	1067	72	334	1171	202	69	851	266
Future Volume (veh/h)	231	927	257	212	1067	72	334	1171	202	69	851	266
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.98	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	251	1042	289	238	1135	95	371	1331	210	82	896	292
Peak Hour Factor	0.92	0.89	0.89	0.89	0.94	0.76	0.90	0.88	0.96	0.84	0.95	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	296	1988	612	283	1968	598	418	1883	570	121	1444	441
Arrive On Green	0.09	0.39	0.39	0.08	0.39	0.39	0.12	0.37	0.37	0.04	0.28	0.28
Sat Flow, veh/h	3456	5106	1573	3456	5106	1551	3456	5106	1546	3456	5106	1560
Grp Volume(v), veh/h	251	1042	289	238	1135	95	371	1331	210	82	896	292
Grp Sat Flow(s),veh/h/ln	1728	1702	1573	1728	1702	1551	1728	1702	1546	1728	1702	1560
Q Serve(g_s), s	11.5	25.1	22.0	10.9	28.1	6.4	16.9	35.6	15.9	3.8	24.4	26.4
Cycle Q Clear(g_c), s	11.5	25.1	22.0	10.9	28.1	6.4	16.9	35.6	15.9	3.8	24.4	26.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	296	1988	612	283	1968	598	418	1883	570	121	1444	441
V/C Ratio(X)	0.85	0.52	0.47	0.84	0.58	0.16	0.89	0.71	0.37	0.68	0.62	0.66
Avail Cap(c_a), veh/h	432	1988	612	410	1968	598	583	1883	570	173	1444	441
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	72.1	37.5	36.5	72.4	38.8	32.2	69.2	43.1	36.9	76.3	49.9	50.6
Incr Delay (d2), s/veh	7.1	1.0	2.6	7.0	0.5	0.2	9.4	2.3	1.8	2.4	2.0	7.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.3	10.5	8.8	5.0	11.7	2.4	7.9	15.1	6.2	1.7	10.7	11.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	79.2	38.5	39.1	79.5	39.4	32.4	78.6	45.4	38.7	78.7	51.9	58.2
LnGrp LOS	E	D	D	E	D	C	E	D	D	E	D	E
Approach Vol, veh/h		1582			1468			1912			1270	
Approach Delay, s/veh		45.1			45.4			51.1			55.1	
Approach LOS		D			D			D			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	24.4	50.2	18.1	67.3	10.6	64.0	18.7	66.7				
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0				
Max Green Setting (Gmax), s	27.0	40.0	19.0	54.0	8.0	59.0	20.0	53.0				
Max Q Clear Time (g_c+I1), s	18.9	28.4	12.9	27.1	5.8	37.6	13.5	30.1				
Green Ext Time (p_c), s	0.5	6.8	0.2	12.5	0.0	13.2	0.2	11.2				
Intersection Summary												
HCM 6th Ctrl Delay			49.0									
HCM 6th LOS			D									

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	231	927	257	212	1067	72	334	1171	202	69	851	266
Future Volume (vph)	231	927	257	212	1067	72	334	1171	202	69	851	266
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		200	330		200	300		200	380		200
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Ped Bike Factor	1.00		0.97	1.00		0.97	0.99		0.97	1.00		0.97
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3424	5085	1543	3422	5085	1542	3414	5085	1531	3422	5085	1535
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			231			116			138			239
Link Speed (mph)		45			45			45			35	
Link Distance (ft)		993			1490			1225			1487	
Travel Time (s)		15.0			22.6			18.6			29.0	
Confl. Peds. (#/hr)	9		10	10		9	14		15	15		14
Confl. Bikes (#/hr)						3			1			
Peak Hour Factor	0.92	0.89	0.89	0.89	0.94	0.76	0.90	0.88	0.96	0.84	0.95	0.91
Adj. Flow (vph)	251	1042	289	238	1135	95	371	1331	210	82	896	292
Shared Lane Traffic (%)												
Lane Group Flow (vph)	251	1042	289	238	1135	95	371	1331	210	82	896	292
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane					Yes			Yes				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

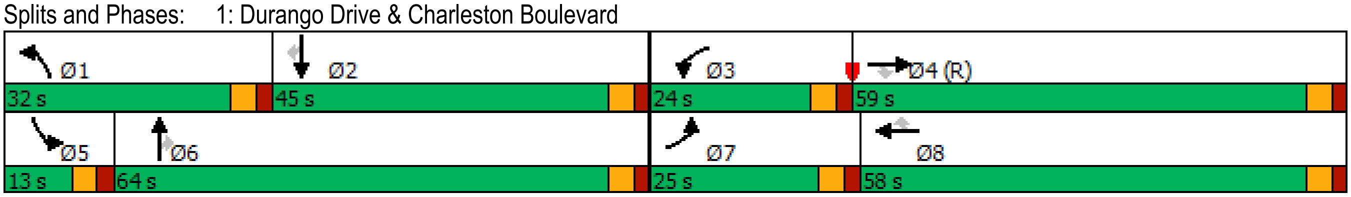
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	40.0	40.0	10.0	40.0	40.0	10.0	40.0	40.0	10.0	40.0	40.0
Total Split (s)	25.0	59.0	59.0	24.0	58.0	58.0	32.0	64.0	64.0	13.0	45.0	45.0
Total Split (%)	15.6%	36.9%	36.9%	15.0%	36.3%	36.3%	20.0%	40.0%	40.0%	8.1%	28.1%	28.1%
Maximum Green (s)	20.0	54.0	54.0	19.0	53.0	53.0	27.0	59.0	59.0	8.0	40.0	40.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	4.0	4.0	2.0	4.0	4.0
Recall Mode	None	C-Max	C-Max	None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Flash Dont Walk (s)		31.0	31.0		31.0	31.0		31.0	31.0		31.0	31.0
Pedestrian Calls (#/hr)		10	10		9	9		15	15		14	14
Act Effct Green (s)	15.9	57.7	57.7	15.3	57.1	57.1	21.6	59.6	59.6	7.4	45.4	45.4
Actuated g/C Ratio	0.10	0.36	0.36	0.10	0.36	0.36	0.14	0.37	0.37	0.05	0.28	0.28
v/c Ratio	0.74	0.57	0.41	0.73	0.63	0.15	0.80	0.70	0.32	0.52	0.62	0.48
Control Delay	82.9	43.0	10.5	83.2	44.9	3.7	80.4	45.2	13.7	86.3	52.6	13.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	82.9	43.0	10.5	83.2	44.9	3.7	80.4	45.2	13.7	86.3	52.6	13.1
LOS	F	D	B	F	D	A	F	D	B	F	D	B
Approach Delay		43.4			48.4			48.6			45.7	
Approach LOS		D			D			D			D	
90th %ile Green (s)	20.0	54.0	54.0	19.0	53.0	53.0	26.9	59.0	59.0	8.0	40.1	40.1
90th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Gap	MaxR	MaxR	Max	MaxR	MaxR
70th %ile Green (s)	17.8	55.8	55.8	17.2	55.2	55.2	23.8	59.0	59.0	8.0	43.2	43.2
70th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Max	MaxR	MaxR
50th %ile Green (s)	16.0	57.6	57.6	15.4	57.0	57.0	21.6	59.0	59.0	8.0	45.4	45.4
50th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Max	MaxR	MaxR
30th %ile Green (s)	14.2	59.3	59.3	13.7	58.8	58.8	19.4	59.8	59.8	7.2	47.6	47.6
30th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Gap	MaxR	MaxR
10th %ile Green (s)	11.6	61.9	61.9	11.1	61.4	61.4	16.2	61.3	61.3	5.7	50.8	50.8
10th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Gap	MaxR	MaxR
Stops (vph)	221	731	46	201	869	4	318	974	52	66	729	50
Fuel Used(gal)	8	23	3	8	31	1	12	32	3	2	24	4
CO Emissions (g/hr)	569	1620	194	569	2158	56	844	2251	197	171	1659	275
NOx Emissions (g/hr)	111	315	38	111	420	11	164	438	38	33	323	54
VOC Emissions (g/hr)	132	376	45	132	500	13	196	522	46	40	385	64
Dilemma Vehicles (#)	0	29	0	0	33	0	0	37	0	0	27	0
Queue Length 50th (ft)	134	321	40	126	360	0	197	435	50	43	300	41
Queue Length 95th (ft)	179	379	120	170	429	10	247	477	118	70	368	138
Internal Link Dist (ft)		913			1410			1145			1407	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	300		200	330		200	300		200	380		200
Base Capacity (vph)	429	1834	704	407	1814	624	579	1895	656	171	1443	606
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.57	0.41	0.58	0.63	0.15	0.64	0.70	0.32	0.48	0.62	0.48

Intersection Summary

Area Type: Other
Cycle Length: 160
Actuated Cycle Length: 160
Offset: 0 (0%), Referenced to phase 4:EBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 46.6 Intersection LOS: D
Intersection Capacity Utilization 90.6% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 1: Durango Drive & Charleston Boulevard



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	171	411	29	94	207	358	33	1517	137	338	1089	120
Future Volume (veh/h)	171	411	29	94	207	358	33	1517	137	338	1089	120
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.96	1.00		0.97	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	199	507	48	119	233	465	42	1667	188	367	1238	148
Peak Hour Factor	0.86	0.81	0.61	0.79	0.89	0.77	0.78	0.91	0.73	0.92	0.88	0.81
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	246	927	397	166	844	360	99	2015	608	414	2480	751
Arrive On Green	0.07	0.26	0.26	0.05	0.24	0.24	0.03	0.39	0.39	0.12	0.49	0.49
Sat Flow, veh/h	3456	3554	1520	3456	3554	1517	3456	5106	1540	3456	5106	1546
Grp Volume(v), veh/h	199	507	48	119	233	465	42	1667	188	367	1238	148
Grp Sat Flow(s),veh/h/ln	1728	1777	1520	1728	1777	1517	1728	1702	1540	1728	1702	1546
Q Serve(g_s), s	7.9	17.2	3.4	4.8	7.5	27.4	1.7	41.1	11.8	14.6	23.0	5.4
Cycle Q Clear(g_c), s	7.9	17.2	3.4	4.8	7.5	27.4	1.7	41.1	11.8	14.6	23.0	5.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	246	927	397	166	844	360	99	2015	608	414	2480	751
V/C Ratio(X)	0.81	0.55	0.12	0.72	0.28	1.29	0.42	0.83	0.31	0.89	0.50	0.20
Avail Cap(c_a), veh/h	272	965	413	222	914	390	123	2015	608	444	2480	751
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	64.1	44.6	39.5	65.7	43.5	36.3	66.8	38.1	29.2	60.7	24.4	10.1
Incr Delay (d2), s/veh	13.5	0.3	0.1	3.9	0.1	149.9	1.1	4.1	1.3	17.3	0.7	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	7.7	1.3	2.2	3.3	25.2	0.8	17.6	4.6	7.4	9.4	2.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	77.6	44.9	39.5	69.6	43.6	186.2	67.9	42.1	30.5	78.0	25.2	10.7
LnGrp LOS	E	D	D	E	D	F	E	D	C	E	C	B
Approach Vol, veh/h		754			817			1897			1753	
Approach Delay, s/veh		53.2			128.5			41.6			35.0	
Approach LOS		D			F			D			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	73.0	11.7	41.5	21.8	60.3	15.0	38.3
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	5.0	68.0	9.0	38.0	18.0	55.0	11.0	36.0
Max Q Clear Time (g_c+I1), s	3.7	25.0	6.8	19.2	16.6	43.1	9.9	29.4
Green Ext Time (p_c), s	0.0	7.4	0.0	2.3	0.1	6.8	0.0	1.3

Intersection Summary	
HCM 6th Ctrl Delay	54.6
HCM 6th LOS	D

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	171	411	29	94	207	358	33	1517	137	338	1089	120
Future Volume (vph)	171	411	29	94	207	358	33	1517	137	338	1089	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	310		150	300		300	300		150	300		150
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Ped Bike Factor	0.99		0.96	0.99		0.97	0.99		0.96	1.00		0.97
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3385	3539	1517	3386	3539	1531	3413	5085	1517	3417	5085	1533
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			132			261			94			114
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		779			1085			800			850	
Travel Time (s)		17.7			24.7			15.6			16.6	
Confl. Peds. (#/hr)	16		23	23		16	13		19	19		13
Confl. Bikes (#/hr)			4			3			4			2
Peak Hour Factor	0.86	0.81	0.61	0.79	0.89	0.77	0.78	0.91	0.73	0.92	0.88	0.81
Adj. Flow (vph)	199	507	48	119	233	465	42	1667	188	367	1238	148
Shared Lane Traffic (%)												
Lane Group Flow (vph)	199	507	48	119	233	465	42	1667	188	367	1238	148
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

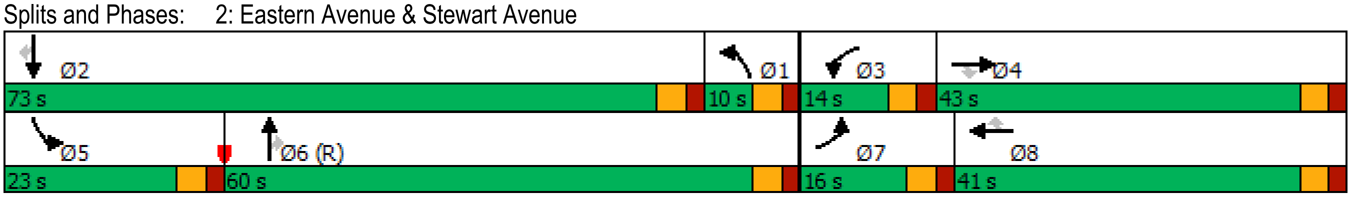
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	40.0	40.0	10.0	40.0	40.0	10.0	33.0	33.0	10.0	33.0	33.0
Total Split (s)	16.0	43.0	43.0	14.0	41.0	41.0	10.0	60.0	60.0	23.0	73.0	73.0
Total Split (%)	11.4%	30.7%	30.7%	10.0%	29.3%	29.3%	7.1%	42.9%	42.9%	16.4%	52.1%	52.1%
Maximum Green (s)	11.0	38.0	38.0	9.0	36.0	36.0	5.0	55.0	55.0	18.0	68.0	68.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	Max	Max
Walk Time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Flash Dont Walk (s)		31.0	31.0		31.0	31.0		24.0	24.0		24.0	24.0
Pedestrian Calls (#/hr)		23	23		16	16		19	19		13	13
Act Effct Green (s)	10.6	30.7	30.7	8.3	28.4	28.4	5.0	63.1	63.1	17.8	78.0	78.0
Actuated g/C Ratio	0.08	0.22	0.22	0.06	0.20	0.20	0.04	0.45	0.45	0.13	0.56	0.56
v/c Ratio	0.77	0.65	0.11	0.59	0.32	0.90	0.34	0.73	0.26	0.84	0.44	0.16
Control Delay	82.8	53.1	0.5	76.0	47.3	43.6	73.8	35.4	14.4	77.0	20.4	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	82.8	53.1	0.5	76.0	47.3	43.6	73.8	35.4	14.4	77.0	20.4	6.0
LOS	F	D	A	E	D	D	E	D	B	E	C	A
Approach Delay		57.6			49.4			34.1			31.1	
Approach LOS		E			D			C			C	
90th %ile Green (s)	11.0	38.0	38.0	9.0	36.0	36.0	5.0	55.0	55.0	18.0	68.0	68.0
90th %ile Term Code	Max	Hold	Hold	Max	Max	Max	Max	Coord	Coord	Max	Coord	Coord
70th %ile Green (s)	11.0	37.0	37.0	9.0	35.0	35.0	5.0	55.0	55.0	19.0	69.0	69.0
70th %ile Term Code	Max	Hold	Hold	Max	Ped	Ped	Max	Coord	Coord	Max	Coord	Coord
50th %ile Green (s)	11.0	35.0	35.0	9.0	33.0	33.0	5.0	56.3	56.3	19.7	71.0	71.0
50th %ile Term Code	Max	Ped	Ped	Max	Hold	Hold	Max	Coord	Coord	Gap	Coord	Coord
30th %ile Green (s)	11.0	24.9	24.9	8.1	22.0	22.0	5.0	69.3	69.3	17.7	82.0	82.0
30th %ile Term Code	Max	Hold	Hold	Gap	Gap	Gap	Max	Coord	Coord	Gap	Coord	Coord
10th %ile Green (s)	9.0	18.8	18.8	6.4	16.2	16.2	0.0	80.1	80.1	14.7	99.8	99.8
10th %ile Term Code	Gap	Gap	Gap	Gap	Hold	Hold	Skip	Coord	Coord	Gap	Coord	Coord
Stops (vph)	162	362	0	90	169	169	31	1227	45	315	630	19
Fuel Used(gal)	5	9	0	3	5	7	1	29	2	10	16	1
CO Emissions (g/hr)	337	625	13	192	327	499	64	2021	107	681	1115	72
NOx Emissions (g/hr)	66	122	2	37	64	97	13	393	21	132	217	14
VOC Emissions (g/hr)	78	145	3	45	76	116	15	468	25	158	258	17
Dilemma Vehicles (#)	0	0	0	0	0	0	0	54	0	0	39	0
Queue Length 50th (ft)	92	214	0	55	92	190	19	490	54	168	262	15
Queue Length 95th (ft)	#132	234	0	77	125	222	35	563	76	#246	308	43
Internal Link Dist (ft)		699			1005			720			770	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	310		150	300		300	300		150	300		150
Base Capacity (vph)	269	960	507	220	910	587	122	2293	736	454	2831	904
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.53	0.09	0.54	0.26	0.79	0.34	0.73	0.26	0.81	0.44	0.16

Intersection Summary

Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 0 (0%), Referenced to phase 6:NBT, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 38.9 Intersection LOS: D
Intersection Capacity Utilization 80.7% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Eastern Avenue & Stewart Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	265	683	148	432	1181	363	341	1075	171	320	1163	161
Future Volume (veh/h)	265	683	148	432	1181	363	341	1075	171	320	1163	161
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.97	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	279	751	235	497	1284	417	388	1181	174	372	1278	175
Peak Hour Factor	0.95	0.91	0.63	0.87	0.92	0.87	0.88	0.91	0.98	0.86	0.91	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	326	1422	430	549	1751	534	447	1459	440	420	1419	435
Arrive On Green	0.09	0.28	0.28	0.16	0.34	0.34	0.13	0.29	0.29	0.12	0.28	0.28
Sat Flow, veh/h	3456	5106	1542	3456	5106	1557	3456	5106	1538	3456	5106	1566
Grp Volume(v), veh/h	279	751	235	497	1284	417	388	1181	174	372	1278	175
Grp Sat Flow(s),veh/h/ln	1728	1702	1542	1728	1702	1557	1728	1702	1538	1728	1702	1566
Q Serve(g_s), s	11.1	17.4	18.2	19.8	30.9	33.6	15.4	30.1	12.8	14.8	33.7	12.7
Cycle Q Clear(g_c), s	11.1	17.4	18.2	19.8	30.9	33.6	15.4	30.1	12.8	14.8	33.7	12.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	326	1422	430	549	1751	534	447	1459	440	420	1419	435
V/C Ratio(X)	0.85	0.53	0.55	0.91	0.73	0.78	0.87	0.81	0.40	0.89	0.90	0.40
Avail Cap(c_a), veh/h	346	1422	430	592	1751	534	568	1459	440	444	1419	435
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	62.4	42.7	43.0	57.9	40.4	41.3	59.8	46.5	40.3	60.5	48.7	41.1
Incr Delay (d2), s/veh	17.8	0.4	1.5	16.8	2.8	10.8	11.3	5.0	2.7	18.3	9.5	2.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.6	7.2	7.0	9.7	13.0	14.1	7.3	13.1	5.1	7.4	15.2	5.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	80.3	43.1	44.4	74.7	43.1	52.1	71.0	51.4	42.9	78.8	58.2	43.8
LnGrp LOS	F	D	D	E	D	D	E	D	D	E	E	D
Approach Vol, veh/h		1265			2198			1743			1825	
Approach Delay, s/veh		51.5			52.0			54.9			61.0	
Approach LOS		D			D			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.1	43.9	27.2	44.0	22.0	45.0	18.2	53.0
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	23.0	35.0	24.0	38.0	18.0	40.0	14.0	48.0
Max Q Clear Time (g_c+I1), s	17.4	35.7	21.8	20.2	16.8	32.1	13.1	35.6
Green Ext Time (p_c), s	0.7	0.0	0.5	5.3	0.2	4.7	0.1	7.6

Intersection Summary	
HCM 6th Ctrl Delay	55.0
HCM 6th LOS	D

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	265	683	148	432	1181	363	341	1075	171	320	1163	161
Future Volume (vph)	265	683	148	432	1181	363	341	1075	171	320	1163	161
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	325		180	315		315	260		150	350		150
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Ped Bike Factor			0.96			0.96			0.96			0.98
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1518	3433	5085	1527	3433	5085	1512	3433	5085	1544
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			235			300			132			132
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		922			934			915			934	
Travel Time (s)		14.0			14.2			13.9			14.2	
Confl. Peds. (#/hr)			25			20			28			11
Peak Hour Factor	0.95	0.91	0.63	0.87	0.92	0.87	0.88	0.91	0.98	0.86	0.91	0.92
Adj. Flow (vph)	279	751	235	497	1284	417	388	1181	174	372	1278	175
Shared Lane Traffic (%)												
Lane Group Flow (vph)	279	751	235	497	1284	417	388	1181	174	372	1278	175
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm

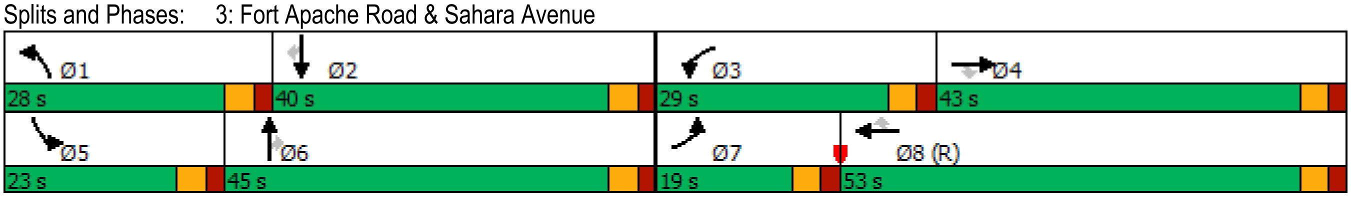
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	40.0	40.0	10.0	40.0	40.0	10.0	40.0	40.0	10.0	40.0	40.0
Total Split (s)	19.0	43.0	43.0	29.0	53.0	53.0	28.0	45.0	45.0	23.0	40.0	40.0
Total Split (%)	13.6%	30.7%	30.7%	20.7%	37.9%	37.9%	20.0%	32.1%	32.1%	16.4%	28.6%	28.6%
Maximum Green (s)	14.0	38.0	38.0	24.0	48.0	48.0	23.0	40.0	40.0	18.0	35.0	35.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	C-Max	C-Max	None	Max	Max	None	Max	Max
Walk Time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Flash Dont Walk (s)		31.0	31.0		31.0	31.0		31.0	31.0		31.0	31.0
Pedestrian Calls (#/hr)		25	25		20	20		28	28		11	11
Act Effct Green (s)	13.7	38.9	38.9	23.1	48.3	48.3	20.4	40.4	40.4	17.6	37.6	37.6
Actuated g/C Ratio	0.10	0.28	0.28	0.16	0.34	0.34	0.15	0.29	0.29	0.13	0.27	0.27
v/c Ratio	0.83	0.53	0.40	0.88	0.73	0.58	0.78	0.81	0.33	0.86	0.93	0.34
Control Delay	82.4	44.7	6.8	74.3	43.3	13.6	68.8	51.3	12.9	80.0	63.1	14.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	82.4	44.7	6.8	74.3	43.3	13.6	68.8	51.3	12.9	80.0	63.1	14.2
LOS	F	D	A	E	D	B	E	D	B	E	E	B
Approach Delay		46.0			44.7			51.4			61.8	
Approach LOS		D			D			D			E	
90th %ile Green (s)	14.0	38.0	38.0	24.0	48.0	48.0	23.0	40.0	40.0	18.0	35.0	35.0
90th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Max	MaxR	MaxR	Max	MaxR	MaxR
70th %ile Green (s)	14.0	38.0	38.0	24.0	48.0	48.0	23.0	40.0	40.0	18.0	35.0	35.0
70th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Max	MaxR	MaxR	Max	MaxR	MaxR
50th %ile Green (s)	14.0	38.0	38.0	24.0	48.0	48.0	21.0	40.0	40.0	18.0	37.0	37.0
50th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Gap	MaxR	MaxR	Max	MaxR	MaxR
30th %ile Green (s)	14.0	38.5	38.5	23.5	48.0	48.0	18.9	40.0	40.0	18.0	39.1	39.1
30th %ile Term Code	Max	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Max	MaxR	MaxR
10th %ile Green (s)	12.7	41.9	41.9	20.1	49.3	49.3	15.9	42.1	42.1	15.9	42.1	42.1
10th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Gap	MaxR	MaxR
Stops (vph)	248	567	14	405	1011	92	323	975	39	298	1036	39
Fuel Used(gal)	9	17	1	14	30	4	11	30	2	11	35	2
CO Emissions (g/hr)	637	1213	88	992	2107	304	756	2079	136	759	2438	135
NOx Emissions (g/hr)	124	236	17	193	410	59	147	404	26	148	474	26
VOC Emissions (g/hr)	148	281	20	230	488	70	175	482	32	176	565	31
Dilemma Vehicles (#)	0	24	0	0	42	0	0	38	0	0	39	0
Queue Length 50th (ft)	130	215	0	228	375	79	176	367	28	173	421	30
Queue Length 95th (ft)	#198	260	0	#286	433	171	224	426	91	#230	#541	96
Internal Link Dist (ft)		842			854			835			854	
Turn Bay Length (ft)	325		180	315		315	260		150	350		150

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	343	1412	591	588	1752	722	563	1467	530	441	1367	511
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.53	0.40	0.85	0.73	0.58	0.69	0.81	0.33	0.84	0.93	0.34

Intersection Summary

Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 0 (0%), Referenced to phase 8:WBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 51.0 Intersection LOS: D
Intersection Capacity Utilization 92.3% ICU Level of Service F
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Fort Apache Road & Sahara Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	86	264	183	353	506	279	105	1812	122	160	1522	36
Future Volume (veh/h)	86	264	183	353	506	279	105	1812	122	160	1522	36
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	100	394	215	447	657	332	131	2013	136	184	1673	48
Peak Hour Factor	0.86	0.67	0.85	0.79	0.77	0.84	0.80	0.90	0.90	0.87	0.91	0.75
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	146	728	311	469	1061	467	173	2115	649	353	2382	729
Arrive On Green	0.04	0.20	0.20	0.14	0.30	0.30	0.05	0.41	0.41	0.10	0.47	0.47
Sat Flow, veh/h	3456	3554	1520	3456	3554	1564	3456	5106	1567	3456	5106	1562
Grp Volume(v), veh/h	100	394	215	447	657	332	131	2013	136	184	1673	48
Grp Sat Flow(s),veh/h/ln	1728	1777	1520	1728	1777	1564	1728	1702	1567	1728	1702	1562
Q Serve(g_s), s	4.0	13.9	14.3	18.0	22.3	26.5	5.2	53.4	6.3	7.1	36.4	2.4
Cycle Q Clear(g_c), s	4.0	13.9	14.3	18.0	22.3	26.5	5.2	53.4	6.3	7.1	36.4	2.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	146	728	311	469	1061	467	173	2115	649	353	2382	729
V/C Ratio(X)	0.69	0.54	0.69	0.95	0.62	0.71	0.76	0.95	0.21	0.52	0.70	0.07
Avail Cap(c_a), veh/h	197	888	380	469	1168	514	173	2115	649	353	2382	729
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	66.1	49.8	31.5	60.1	42.3	43.7	65.7	39.6	17.1	59.6	29.6	20.6
Incr Delay (d2), s/veh	2.5	0.9	5.0	29.6	1.1	4.7	15.8	11.1	0.7	0.7	1.8	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	6.3	5.7	9.8	9.9	10.8	2.7	23.9	3.0	3.1	15.0	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	68.6	50.7	36.4	89.7	43.3	48.4	81.5	50.7	17.8	60.2	31.4	20.7
LnGrp LOS	E	D	D	F	D	D	F	D	B	E	C	C
Approach Vol, veh/h		709			1436			2280			1905	
Approach Delay, s/veh		48.9			58.9			50.5			33.9	
Approach LOS		D			E			D			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.0	70.3	24.0	33.7	19.3	63.0	10.9	46.8
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	7.0	59.0	19.0	35.0	8.0	58.0	8.0	46.0
Max Q Clear Time (g_c+I1), s	7.2	38.4	20.0	16.3	9.1	55.4	6.0	28.5
Green Ext Time (p_c), s	0.0	15.3	0.0	4.4	0.0	2.5	0.0	7.3

Intersection Summary	
HCM 6th Ctrl Delay	47.3
HCM 6th LOS	D

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	86	264	183	353	506	279	105	1812	122	160	1522	36
Future Volume (vph)	86	264	183	353	506	279	105	1812	122	160	1522	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		200	300		300	300		150	400		165
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Ped Bike Factor			0.96			0.97			0.96			0.95
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	3539	1512	3433	3539	1540	3433	5085	1527	3433	5085	1511
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			171			140			132			132
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		768			1088			490			1010	
Travel Time (s)		15.0			21.2			9.5			19.7	
Confl. Peds. (#/hr)			28			13			16			23
Peak Hour Factor	0.86	0.67	0.85	0.79	0.77	0.84	0.80	0.90	0.90	0.87	0.91	0.75
Adj. Flow (vph)	100	394	215	447	657	332	131	2013	136	184	1673	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	100	394	215	447	657	332	131	2013	136	184	1673	48
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm

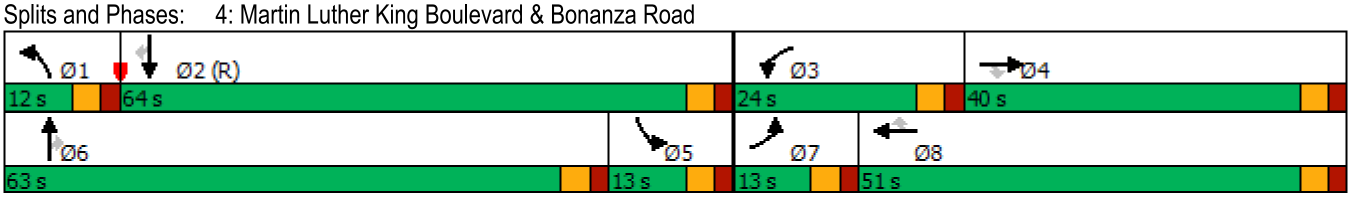
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	40.0	40.0	10.0	40.0	40.0	10.0	33.0	33.0	10.0	33.0	33.0
Total Split (s)	13.0	40.0	40.0	24.0	51.0	51.0	12.0	63.0	63.0	13.0	64.0	64.0
Total Split (%)	9.3%	28.6%	28.6%	17.1%	36.4%	36.4%	8.6%	45.0%	45.0%	9.3%	45.7%	45.7%
Maximum Green (s)	8.0	35.0	35.0	19.0	46.0	46.0	7.0	58.0	58.0	8.0	59.0	59.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lead	Lead	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	4.0	4.0	2.0	4.0	4.0
Recall Mode	None	None	None	None	None	None	None	Max	Max	None	C-Max	C-Max
Walk Time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Flash Dont Walk (s)		31.0	31.0		31.0	31.0		24.0	24.0		24.0	24.0
Pedestrian Calls (#/hr)		28	28		13	13		16	16		23	23
Act Effct Green (s)	7.5	28.6	28.6	19.0	40.1	40.1	7.4	64.4	64.4	8.0	65.0	65.0
Actuated g/C Ratio	0.05	0.20	0.20	0.14	0.29	0.29	0.05	0.46	0.46	0.06	0.46	0.46
v/c Ratio	0.55	0.55	0.48	0.96	0.65	0.61	0.72	0.86	0.18	0.94	0.71	0.06
Control Delay	76.0	51.8	14.6	92.8	46.3	28.4	87.3	39.6	4.9	114.9	33.2	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.0	51.8	14.6	92.8	46.3	28.4	87.3	39.6	4.9	114.9	33.2	0.2
LOS	E	D	B	F	D	C	F	D	A	F	C	A
Approach Delay		43.9			56.7			40.3			40.2	
Approach LOS		D			E			D			D	
90th %ile Green (s)	8.0	35.0	35.0	19.0	46.0	46.0	7.0	58.0	58.0	8.0	59.0	59.0
90th %ile Term Code	Max	Ped	Ped	Max	Max	Max	Max	Coord	Coord	Max	Coord	Coord
70th %ile Green (s)	8.0	35.0	35.0	19.0	46.0	46.0	7.0	58.0	58.0	8.0	59.0	59.0
70th %ile Term Code	Max	Ped	Ped	Max	Hold	Hold	Max	Coord	Coord	Max	Coord	Coord
50th %ile Green (s)	8.0	35.0	35.0	19.0	46.0	46.0	7.0	58.0	58.0	8.0	59.0	59.0
50th %ile Term Code	Max	Ped	Ped	Max	Hold	Hold	Max	Coord	Coord	Max	Coord	Coord
30th %ile Green (s)	7.4	21.2	21.2	19.0	32.8	32.8	8.9	71.8	71.8	8.0	70.9	70.9
30th %ile Term Code	Gap	Hold	Hold	Max	Gap	Gap	Gap	Coord	Coord	Max	Coord	Coord
10th %ile Green (s)	5.9	16.8	16.8	19.0	29.9	29.9	7.1	76.2	76.2	8.0	77.1	77.1
10th %ile Term Code	Gap	Gap	Gap	Max	Hold	Hold	Gap	Coord	Coord	Max	Coord	Coord
Stops (vph)	83	228	40	320	429	140	96	1528	13	141	1196	0
Fuel Used(gal)	2	6	2	12	12	5	3	33	1	6	30	0
CO Emissions (g/hr)	170	417	130	828	837	340	207	2273	46	417	2123	18
NOx Emissions (g/hr)	33	81	25	161	163	66	40	442	9	81	413	4
VOC Emissions (g/hr)	39	97	30	192	194	79	48	527	11	97	492	4
Dilemma Vehicles (#)	0	9	0	0	14	0	0	63	0	0	54	0
Queue Length 50th (ft)	46	160	31	211	259	142	61	644	2	87	476	0
Queue Length 95th (ft)	74	151	89	#252	266	214	#92	#757	43	#155	537	0
Internal Link Dist (ft)		688			1008			410			930	
Turn Bay Length (ft)	300		200	300		300	300		150	400		165

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	196	884	506	465	1162	600	181	2338	773	196	2360	772
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.45	0.42	0.96	0.57	0.55	0.72	0.86	0.18	0.94	0.71	0.06

Intersection Summary	
Area Type: Other	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 2:SBT, Start of Green	
Natural Cycle: 125	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.96	
Intersection Signal Delay: 44.4	Intersection LOS: D
Intersection Capacity Utilization 86.9%	ICU Level of Service E
Analysis Period (min) 15	

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

Splits and Phases: 4: Martin Luther King Boulevard & Bonanza Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	665	944	287	188	787	193	178	763	156	88	435	310
Future Volume (veh/h)	665	944	287	188	787	193	178	763	156	88	435	310
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	782	1061	359	235	874	212	200	812	184	109	478	330
Peak Hour Factor	0.85	0.89	0.80	0.80	0.90	0.91	0.89	0.94	0.85	0.81	0.91	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	843	1956	593	284	1131	351	249	1041	455	155	944	415
Arrive On Green	0.24	0.38	0.38	0.08	0.22	0.22	0.07	0.29	0.29	0.04	0.27	0.27
Sat Flow, veh/h	3456	5106	1547	3456	5106	1585	3456	3554	1554	3456	3554	1563
Grp Volume(v), veh/h	782	1061	359	235	874	212	200	812	184	109	478	330
Grp Sat Flow(s),veh/h/ln	1728	1702	1547	1728	1702	1585	1728	1777	1554	1728	1777	1563
Q Serve(g_s), s	31.0	22.7	18.9	9.4	22.5	16.8	8.0	29.3	6.3	4.4	16.0	27.5
Cycle Q Clear(g_c), s	31.0	22.7	18.9	9.4	22.5	16.8	8.0	29.3	6.3	4.4	16.0	27.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	843	1956	593	284	1131	351	249	1041	455	155	944	415
V/C Ratio(X)	0.93	0.54	0.61	0.83	0.77	0.60	0.80	0.78	0.40	0.70	0.51	0.79
Avail Cap(c_a), veh/h	1012	2079	630	370	1131	351	321	1041	455	173	944	415
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.7	33.6	18.2	63.3	51.2	49.0	64.0	45.4	9.1	65.9	43.6	47.8
Incr Delay (d2), s/veh	11.7	0.1	1.0	8.9	5.2	7.5	8.3	5.8	2.7	8.3	1.9	14.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	14.7	9.3	6.6	4.4	9.9	7.3	3.8	13.7	5.0	2.1	7.3	12.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	63.4	33.7	19.1	72.1	56.4	56.5	72.3	51.2	11.7	74.3	45.6	62.3
LnGrp LOS	E	C	B	E	E	E	E	D	B	E	D	E
Approach Vol, veh/h		2202			1321			1196			917	
Approach Delay, s/veh		41.9			59.2			48.6			55.0	
Approach LOS		D			E			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.1	42.2	16.5	58.6	11.3	46.0	39.2	36.0
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	13.0	35.0	15.0	57.0	7.0	41.0	41.0	31.0
Max Q Clear Time (g_c+I1), s	10.0	29.5	11.4	24.7	6.4	31.3	33.0	24.5
Green Ext Time (p_c), s	0.1	1.5	0.1	6.5	0.0	3.0	1.2	2.4

Intersection Summary	
HCM 6th Ctrl Delay	49.5
HCM 6th LOS	D

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	665	944	287	188	787	193	178	763	156	88	435	310
Future Volume (vph)	665	944	287	188	787	193	178	763	156	88	435	310
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	450		135	250		160	240		230	250		315
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor			0.97						0.97			0.99
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1529	3433	5085	1583	3433	3539	1529	3433	3539	1562
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			256			171			160			330
Link Speed (mph)		35			45			35			35	
Link Distance (ft)		873			992			804			651	
Travel Time (s)		17.0			15.0			15.7			12.7	
Confl. Peds. (#/hr)			15						19			
Confl. Bikes (#/hr)			1									2
Peak Hour Factor	0.85	0.89	0.80	0.80	0.90	0.91	0.89	0.94	0.85	0.81	0.91	0.94
Adj. Flow (vph)	782	1061	359	235	874	212	200	812	184	109	478	330
Shared Lane Traffic (%)												
Lane Group Flow (vph)	782	1061	359	235	874	212	200	812	184	109	478	330
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	33.0	33.0	10.0	10.0	10.0	10.0	40.0	40.0	10.0	10.0	10.0
Total Split (s)	46.0	62.0	62.0	20.0	36.0	36.0	18.0	46.0	46.0	12.0	40.0	40.0
Total Split (%)	32.9%	44.3%	44.3%	14.3%	25.7%	25.7%	12.9%	32.9%	32.9%	8.6%	28.6%	28.6%
Maximum Green (s)	41.0	57.0	57.0	15.0	31.0	31.0	13.0	41.0	41.0	7.0	35.0	35.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lead	Lead	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	None	None	None	C-Max	C-Max	None	Max	Max	None	Max	Max
Walk Time (s)		4.0	4.0					4.0	4.0			
Flash Dont Walk (s)		24.0	24.0					31.0	31.0			
Pedestrian Calls (#/hr)		15	15					19	19			
Act Effct Green (s)	35.8	58.8	58.8	13.2	36.2	36.2	11.7	41.0	41.0	7.0	36.3	36.3
Actuated g/C Ratio	0.26	0.42	0.42	0.09	0.26	0.26	0.08	0.29	0.29	0.05	0.26	0.26
v/c Ratio	0.89	0.50	0.45	0.73	0.67	0.40	0.70	0.78	0.33	0.64	0.52	0.51
Control Delay	63.2	31.0	10.2	74.8	50.1	13.1	75.8	51.8	9.5	82.3	47.1	7.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.2	31.0	10.2	74.8	50.1	13.1	75.8	51.8	9.5	82.3	47.1	7.1
LOS	E	C	B	E	D	B	E	D	A	F	D	A
Approach Delay		39.1			48.6			49.3			36.9	
Approach LOS		D			D			D			D	
90th %ile Green (s)	41.0	57.0	57.0	15.0	31.0	31.0	13.0	41.0	41.0	7.0	35.0	35.0
90th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Max	MaxR	MaxR	Max	MaxR	MaxR
70th %ile Green (s)	39.1	57.0	57.0	15.0	32.9	32.9	13.0	41.0	41.0	7.0	35.0	35.0
70th %ile Term Code	Gap	Coord	Coord	Max	Coord	Coord	Max	MaxR	MaxR	Max	MaxR	MaxR
50th %ile Green (s)	36.3	58.1	58.1	13.9	35.7	35.7	12.5	41.0	41.0	7.0	35.5	35.5
50th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Max	MaxR	MaxR
30th %ile Green (s)	33.5	59.7	59.7	12.3	38.5	38.5	11.0	41.0	41.0	7.0	37.0	37.0
30th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Max	MaxR	MaxR
10th %ile Green (s)	29.1	62.1	62.1	9.9	42.9	42.9	8.8	41.0	41.0	7.0	39.2	39.2
10th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Hold	MaxR	MaxR
Stops (vph)	627	674	62	180	695	40	171	689	25	85	366	28
Fuel Used(gal)	17	17	3	6	22	2	5	18	1	3	9	2
CO Emissions (g/hr)	1220	1187	201	441	1520	158	354	1234	98	177	627	148
NOx Emissions (g/hr)	237	231	39	86	296	31	69	240	19	34	122	29
VOC Emissions (g/hr)	283	275	47	102	352	37	82	286	23	41	145	34
Dilemma Vehicles (#)	0	34	0	0	28	0	0	27	0	0	15	0
Queue Length 50th (ft)	354	258	58	108	264	29	92	357	16	51	198	0
Queue Length 95th (ft)	384	302	101	135	329	105	133	437	63	75	258	80
Internal Link Dist (ft)		793			912			724			571	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	450		135	250		160	240		230	250		315
Base Capacity (vph)	1005	2135	790	367	1314	536	318	1036	560	171	918	649
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.50	0.45	0.64	0.67	0.40	0.63	0.78	0.33	0.64	0.52	0.51

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 8:WBT, Start of Green

Natural Cycle: 95

Control Type: Actuated-Coordinated

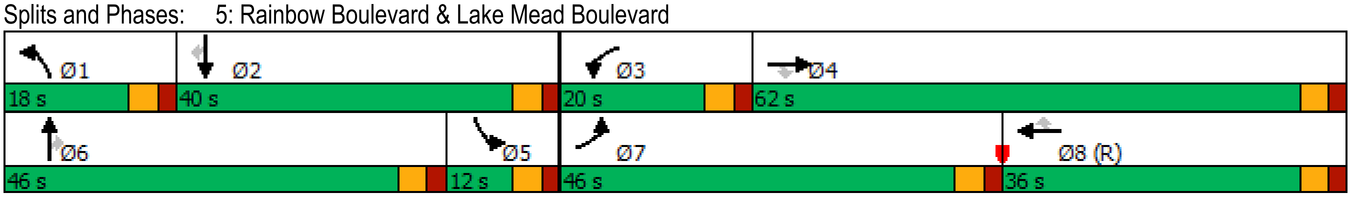
Maximum v/c Ratio: 0.89

Intersection Signal Delay: 43.1 Intersection LOS: D

Intersection Capacity Utilization 84.2% ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 5: Rainbow Boulevard & Lake Mead Boulevard



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	362	845	199	305	1149	259	343	2098	244	366	1599	145
Future Volume (veh/h)	362	845	199	305	1149	259	343	2098	244	366	1599	145
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.97	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	441	983	214	367	1352	301	385	2280	271	407	1648	153
Peak Hour Factor	0.82	0.86	0.93	0.83	0.85	0.86	0.89	0.92	0.90	0.90	0.97	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	502	1529	459	433	1459	442	453	2493	598	465	2510	596
Arrive On Green	0.10	0.30	0.30	0.09	0.29	0.29	0.09	0.39	0.39	0.09	0.39	0.39
Sat Flow, veh/h	5023	5106	1531	5023	5106	1548	5023	6434	1542	5023	6434	1528
Grp Volume(v), veh/h	441	983	214	367	1352	301	385	2280	271	407	1648	153
Grp Sat Flow(s),veh/h/ln	1674	1702	1531	1674	1702	1548	1674	1609	1542	1674	1609	1528
Q Serve(g_s), s	13.9	26.7	13.9	11.5	41.2	21.3	12.1	53.8	20.9	12.8	33.6	10.9
Cycle Q Clear(g_c), s	13.9	26.7	13.9	11.5	41.2	21.3	12.1	53.8	20.9	12.8	33.6	10.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	502	1529	459	433	1459	442	453	2493	598	465	2510	596
V/C Ratio(X)	0.88	0.64	0.47	0.85	0.93	0.68	0.85	0.91	0.45	0.87	0.66	0.26
Avail Cap(c_a), veh/h	534	1529	459	534	1468	445	565	2493	598	471	2510	596
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	71.0	48.6	26.7	72.1	55.5	30.3	71.7	46.5	36.4	71.7	40.0	33.1
Incr Delay (d2), s/veh	14.0	0.7	0.3	8.7	10.2	3.4	8.3	6.6	2.5	15.8	1.4	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.5	11.3	5.1	5.2	18.6	8.3	5.5	22.0	8.2	6.1	13.3	4.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	85.0	49.3	27.0	80.7	65.7	33.7	80.1	53.1	38.9	87.5	41.4	34.1
LnGrp LOS	F	D	C	F	E	C	F	D	D	F	D	C
Approach Vol, veh/h		1638			2020			2936			2208	
Approach Delay, s/veh		56.0			63.7			55.3			49.4	
Approach LOS		E			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.4	67.4	18.8	52.9	19.8	67.0	21.0	50.7
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	18.0	59.0	17.0	46.0	15.0	62.0	17.0	46.0
Max Q Clear Time (g_c+I1), s	14.1	35.6	13.5	28.7	14.8	55.8	15.9	43.2
Green Ext Time (p_c), s	0.3	8.8	0.3	4.4	0.0	5.0	0.1	1.9

Intersection Summary		
HCM 6th Ctrl Delay		55.9
HCM 6th LOS		E

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	362	845	199	305	1149	259	343	2098	244	366	1599	145
Future Volume (vph)	362	845	199	305	1149	259	343	2098	244	366	1599	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	345		250	345		250	340		250	330		245
Storage Lanes	3		1	3		1	3		1	3		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.94	0.91	1.00	0.94	0.91	1.00	0.94	0.86	1.00	0.94	0.86	1.00
Ped Bike Factor			0.95			0.97			0.95			0.93
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	4990	5085	1583	4990	5085	1583	4990	6408	1583	4990	6408	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	4990	5085	1509	4990	5085	1529	4990	6408	1497	4990	6408	1475
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			206			185			165			123
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		1636			1478			1249			1239	
Travel Time (s)		24.8			22.4			18.9			18.8	
Confl. Peds. (#/hr)			34			22			35			47
Peak Hour Factor	0.82	0.86	0.93	0.83	0.85	0.86	0.89	0.92	0.90	0.90	0.97	0.95
Adj. Flow (vph)	441	983	214	367	1352	301	385	2280	271	407	1648	153
Shared Lane Traffic (%)												
Lane Group Flow (vph)	441	983	214	367	1352	301	385	2280	271	407	1648	153
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		36			36			36			36	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	51.0	51.0	10.0	51.0	51.0	10.0	44.0	44.0	10.0	44.0	44.0
Total Split (s)	22.0	51.0	51.0	22.0	51.0	51.0	23.0	67.0	67.0	20.0	64.0	64.0
Total Split (%)	13.8%	31.9%	31.9%	13.8%	31.9%	31.9%	14.4%	41.9%	41.9%	12.5%	40.0%	40.0%
Maximum Green (s)	17.0	46.0	46.0	17.0	46.0	46.0	18.0	62.0	62.0	15.0	59.0	59.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lead	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	Max	Max
Walk Time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Flash Dont Walk (s)		42.0	42.0		42.0	42.0		35.0	35.0		35.0	35.0
Pedestrian Calls (#/hr)		34	34		22	22		35	35		47	47
Act Effct Green (s)	16.5	46.5	46.5	15.4	45.4	45.4	16.1	63.0	63.0	15.0	61.9	61.9
Actuated g/C Ratio	0.10	0.29	0.29	0.10	0.28	0.28	0.10	0.39	0.39	0.09	0.39	0.39
v/c Ratio	0.85	0.67	0.37	0.76	0.94	0.53	0.77	0.90	0.39	0.87	0.66	0.24
Control Delay	86.8	52.5	7.8	81.4	68.5	21.4	80.6	51.8	14.9	90.7	42.5	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	86.8	52.5	7.8	81.4	68.5	21.4	80.6	51.8	14.9	90.7	42.5	9.5
LOS	F	D	A	F	E	C	F	D	B	F	D	A
Approach Delay		55.9			63.8			52.2			49.1	
Approach LOS		E			E			D			D	
90th %ile Green (s)	17.0	46.0	46.0	17.0	46.0	46.0	18.0	62.0	62.0	15.0	59.0	59.0
90th %ile Term Code	Max	Ped	Ped	Max	Max	Max	Max	Coord	Coord	Max	Coord	Coord
70th %ile Green (s)	17.0	46.0	46.0	17.0	46.0	46.0	18.0	62.0	62.0	15.0	59.0	59.0
70th %ile Term Code	Max	Ped	Ped	Max	Max	Max	Max	Coord	Coord	Max	Coord	Coord
50th %ile Green (s)	17.0	46.9	46.9	16.1	46.0	46.0	16.7	62.0	62.0	15.0	60.3	60.3
50th %ile Term Code	Max	Hold	Hold	Gap	Max	Max	Gap	Coord	Coord	Max	Coord	Coord
30th %ile Green (s)	17.0	48.4	48.4	14.6	46.0	46.0	15.1	62.0	62.0	15.0	61.9	61.9
30th %ile Term Code	Max	Hold	Hold	Gap	Max	Max	Gap	Coord	Coord	Max	Coord	Coord
10th %ile Green (s)	14.7	45.4	45.4	12.4	43.1	43.1	12.9	67.2	67.2	15.0	69.3	69.3
10th %ile Term Code	Gap	Hold	Hold	Gap	Gap	Gap	Gap	Coord	Coord	Hold	Coord	Coord
Stops (vph)	345	729	22	293	1076	86	329	1908	70	344	1294	26
Fuel Used(gal)	15	27	3	12	40	5	12	63	4	14	43	2
CO Emissions (g/hr)	1016	1893	189	812	2827	327	874	4394	251	977	2992	124
NOx Emissions (g/hr)	198	368	37	158	550	64	170	855	49	190	582	24
VOC Emissions (g/hr)	235	439	44	188	655	76	202	1018	58	226	693	29
Dilemma Vehicles (#)	0	24	0	0	34	0	0	65	0	0	50	0
Queue Length 50th (ft)	163	332	6	134	505	99	141	657	74	151	419	20
Queue Length 95th (ft)	185	365	72	157	527	179	177	707	154	#210	468	73
Internal Link Dist (ft)		1556			1398			1169			1159	
Turn Bay Length (ft)	345		250	345		250	340		250	330		245

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	530	1482	585	530	1461	571	561	2525	690	467	2479	646
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.66	0.37	0.69	0.93	0.53	0.69	0.90	0.39	0.87	0.66	0.24

Intersection Summary

Area Type: Other

Cycle Length: 160

Actuated Cycle Length: 160

Offset: 0 (0%), Referenced to phase 6:NBT, Start of Green

Natural Cycle: 135

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

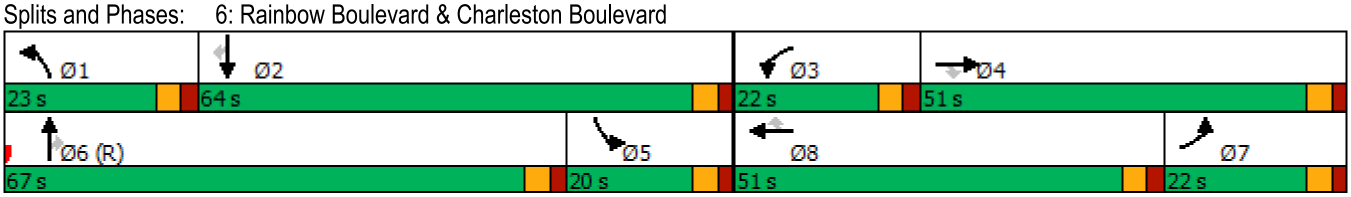
Intersection Signal Delay: 54.8 Intersection LOS: D

Intersection Capacity Utilization 93.6% ICU Level of Service F

Analysis Period (min) 15

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

Splits and Phases: 6: Rainbow Boulevard & Charleston Boulevard



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	184	1554	142	293	1573	187	312	970	190	236	502	139
Future Volume (veh/h)	184	1554	142	293	1573	187	312	970	190	236	502	139
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.93	1.00		0.94	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	233	1636	237	376	1691	215	411	1155	260	246	540	224
Peak Hour Factor	0.79	0.95	0.60	0.78	0.93	0.87	0.76	0.84	0.73	0.96	0.93	0.62
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	280	1806	557	420	2013	579	456	1517	444	293	888	391
Arrive On Green	0.08	0.35	0.35	0.12	0.39	0.39	0.13	0.30	0.30	0.08	0.25	0.25
Sat Flow, veh/h	3456	5106	1574	3456	5106	1469	3456	5106	1495	3456	3554	1564
Grp Volume(v), veh/h	233	1636	237	376	1691	215	411	1155	260	246	540	224
Grp Sat Flow(s),veh/h/ln	1728	1702	1574	1728	1702	1469	1728	1702	1495	1728	1777	1564
Q Serve(g_s), s	9.3	42.7	16.0	15.0	42.0	9.7	16.4	28.8	20.7	9.8	18.8	13.0
Cycle Q Clear(g_c), s	9.3	42.7	16.0	15.0	42.0	9.7	16.4	28.8	20.7	9.8	18.8	13.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	280	1806	557	420	2013	579	456	1517	444	293	888	391
V/C Ratio(X)	0.83	0.91	0.43	0.90	0.84	0.37	0.90	0.76	0.59	0.84	0.61	0.57
Avail Cap(c_a), veh/h	296	1806	557	420	2013	579	469	1517	444	321	888	391
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	63.4	43.0	34.4	60.6	38.4	13.3	59.9	44.7	41.9	63.1	46.4	25.4
Incr Delay (d2), s/veh	16.0	8.0	2.4	20.7	3.5	0.6	19.4	3.7	5.6	15.1	3.1	6.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	18.7	6.4	7.7	17.5	3.1	8.4	12.6	8.2	4.9	8.7	5.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	79.4	51.1	36.8	81.4	41.9	13.8	79.3	48.4	47.4	78.2	49.5	31.3
LnGrp LOS	E	D	D	F	D	B	E	D	D	E	D	C
Approach Vol, veh/h		2106			2282			1826			1010	
Approach Delay, s/veh		52.6			45.8			55.2			52.5	
Approach LOS		D			D			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.5	40.0	22.0	54.5	16.9	46.6	16.3	60.2
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	19.0	35.0	17.0	49.0	13.0	41.0	12.0	54.0
Max Q Clear Time (g_c+I1), s	18.4	20.8	17.0	44.7	11.8	30.8	11.3	44.0
Green Ext Time (p_c), s	0.1	2.4	0.0	3.9	0.1	4.5	0.0	8.5

Intersection Summary			
HCM 6th Ctrl Delay			51.1
HCM 6th LOS			D

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	184	1554	142	293	1573	187	312	970	190	236	502	139
Future Volume (vph)	184	1554	142	293	1573	187	312	970	190	236	502	139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	315		135	345		160	270		150	345		150
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00
Ped Bike Factor			0.98			0.86			0.92			0.98
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	5085	1583	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1548	3433	5085	1369	3433	5085	1460	3433	3539	1544
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			132			132			156			168
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		967			793			658			756	
Travel Time (s)		14.7			12.0			12.8			14.7	
Confl. Peds. (#/hr)			8			96			56			11
Peak Hour Factor	0.79	0.95	0.60	0.78	0.93	0.87	0.76	0.84	0.73	0.96	0.93	0.62
Adj. Flow (vph)	233	1636	237	376	1691	215	411	1155	260	246	540	224
Shared Lane Traffic (%)												
Lane Group Flow (vph)	233	1636	237	376	1691	215	411	1155	260	246	540	224
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm

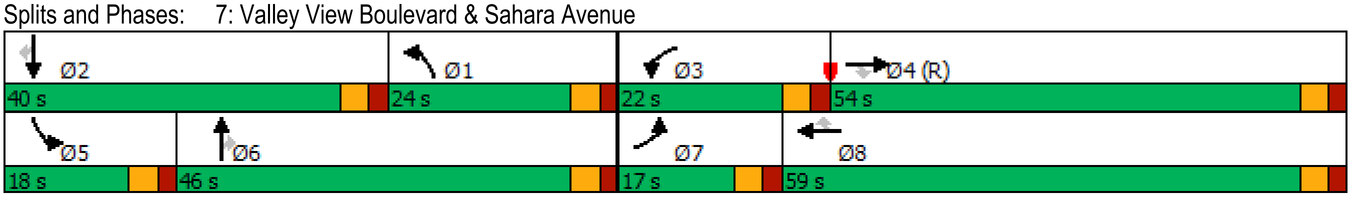
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	37.0	37.0	10.0	37.0	37.0	10.0	40.0	40.0	10.0	40.0	40.0
Total Split (s)	17.0	54.0	54.0	22.0	59.0	59.0	24.0	46.0	46.0	18.0	40.0	40.0
Total Split (%)	12.1%	38.6%	38.6%	15.7%	42.1%	42.1%	17.1%	32.9%	32.9%	12.9%	28.6%	28.6%
Maximum Green (s)	12.0	49.0	49.0	17.0	54.0	54.0	19.0	41.0	41.0	13.0	35.0	35.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	4.0	4.0	2.0	4.0	4.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	C-Max	C-Max	None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Flash Dont Walk (s)		28.0	28.0		28.0	28.0		31.0	31.0		31.0	31.0
Pedestrian Calls (#/hr)		8	8		96	96		56	56		11	11
Act Effct Green (s)	11.6	49.2	49.2	16.8	54.4	54.4	19.0	41.5	41.5	12.5	35.0	35.0
Actuated g/C Ratio	0.08	0.35	0.35	0.12	0.39	0.39	0.14	0.30	0.30	0.09	0.25	0.25
v/c Ratio	0.82	0.91	0.38	0.92	0.86	0.35	0.88	0.77	0.48	0.80	0.61	0.44
Control Delay	85.2	52.4	16.4	88.4	44.7	13.3	80.4	49.0	18.9	82.1	49.9	15.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	85.2	52.4	16.4	88.4	44.7	13.3	80.4	49.0	18.9	82.1	49.9	15.0
LOS	F	D	B	F	D	B	F	D	B	F	D	B
Approach Delay		52.0			48.9			51.8			50.0	
Approach LOS		D			D			D			D	
90th %ile Green (s)	12.0	49.0	49.0	17.0	54.0	54.0	19.0	41.0	41.0	13.0	35.0	35.0
90th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Max	MaxR	MaxR	Max	MaxR	MaxR
70th %ile Green (s)	12.0	49.0	49.0	17.0	54.0	54.0	19.0	41.0	41.0	13.0	35.0	35.0
70th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Max	MaxR	MaxR	Max	MaxR	MaxR
50th %ile Green (s)	12.0	49.0	49.0	17.0	54.0	54.0	19.0	41.0	41.0	13.0	35.0	35.0
50th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Max	MaxR	MaxR	Max	MaxR	MaxR
30th %ile Green (s)	12.0	49.0	49.0	17.0	54.0	54.0	19.0	41.0	41.0	13.0	35.0	35.0
30th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Max	MaxR	MaxR	Max	MaxR	MaxR
10th %ile Green (s)	10.2	50.2	50.2	15.8	55.8	55.8	19.0	43.4	43.4	10.6	35.0	35.0
10th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Hold	MaxR	MaxR	Gap	MaxR	MaxR
Stops (vph)	172	1419	47	269	1410	53	290	864	64	223	437	34
Fuel Used(gal)	6	44	2	10	40	2	9	21	2	7	11	1
CO Emissions (g/hr)	453	3074	136	708	2792	149	613	1453	148	483	778	101
NOx Emissions (g/hr)	88	598	27	138	543	29	119	283	29	94	151	20
VOC Emissions (g/hr)	105	713	32	164	647	34	142	337	34	112	180	23
Dilemma Vehicles (#)	0	55	0	0	56	0	0	34	0	0	18	0
Queue Length 50th (ft)	109	521	67	176	516	49	192	353	74	114	230	40
Queue Length 95th (ft)	135	590	54	#202	582	107	208	375	98	#174	294	34
Internal Link Dist (ft)		887			713			578			676	
Turn Bay Length (ft)	315		135	345		160	270		150	345		150

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	294	1788	629	416	1974	612	465	1506	542	318	884	512
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.91	0.38	0.90	0.86	0.35	0.88	0.77	0.48	0.77	0.61	0.44

Intersection Summary

Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 0 (0%), Referenced to phase 4:EBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 50.7 Intersection LOS: D
Intersection Capacity Utilization 93.1% ICU Level of Service F
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Valley View Boulevard & Sahara Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	187	51	78	129	106	24	1561	150	50	869	25
Future Volume (veh/h)	67	187	51	78	129	106	24	1561	150	50	869	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	78	237	70	104	155	126	39	1678	0	86	1060	30
Peak Hour Factor	0.86	0.79	0.73	0.75	0.83	0.84	0.61	0.93	0.91	0.58	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	98	315	259	127	345	285	235	2847		107	2480	764
Arrive On Green	0.06	0.17	0.17	0.07	0.18	0.18	0.13	0.56	0.00	0.06	0.49	0.49
Sat Flow, veh/h	1781	1870	1540	1781	1870	1544	1781	5106	1585	1781	5106	1572
Grp Volume(v), veh/h	78	237	70	104	155	126	39	1678	0	86	1060	30
Grp Sat Flow(s),veh/h/ln	1781	1870	1540	1781	1870	1544	1781	1702	1585	1781	1702	1572
Q Serve(g_s), s	6.1	16.9	5.5	8.1	10.3	7.6	2.7	30.3	0.0	6.7	18.9	1.0
Cycle Q Clear(g_c), s	6.1	16.9	5.5	8.1	10.3	7.6	2.7	30.3	0.0	6.7	18.9	1.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	98	315	259	127	345	285	235	2847		107	2480	764
V/C Ratio(X)	0.79	0.75	0.27	0.82	0.45	0.44	0.17	0.59		0.80	0.43	0.04
Avail Cap(c_a), veh/h	153	387	319	191	428	353	235	2847		165	2480	764
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	65.4	55.5	50.7	64.1	50.8	28.6	53.9	20.4	0.0	65.0	23.4	9.9
Incr Delay (d2), s/veh	14.3	4.8	0.2	15.5	0.3	0.4	0.1	0.9	0.0	7.5	0.5	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	8.4	2.2	4.2	4.9	2.9	1.2	12.0	0.0	3.2	7.7	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	79.7	60.2	50.9	79.6	51.1	29.0	54.1	21.3	0.0	72.5	23.9	10.0
LnGrp LOS	E	E	D	E	D	C	D	C		E	C	A
Approach Vol, veh/h		385			385			1717	A		1176	
Approach Delay, s/veh		62.5			51.6			22.0			27.1	
Approach LOS		E			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.5	73.0	15.0	28.6	13.4	83.1	12.7	30.8
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	8.0	68.0	15.0	29.0	13.0	63.0	12.0	32.0
Max Q Clear Time (g_c+I1), s	4.7	20.9	10.1	18.9	8.7	32.3	8.1	12.3
Green Ext Time (p_c), s	0.0	5.8	0.1	0.7	0.0	10.5	0.0	0.7

Intersection Summary	
HCM 6th Ctrl Delay	31.0
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	187	51	78	129	106	24	1561	150	50	869	25
Future Volume (vph)	67	187	51	78	129	106	24	1561	150	50	869	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		115	300		85	230		150	230		150
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.99		0.96	0.98		0.98			0.88			0.95
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	5085	1583	1770	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1758	1863	1527	1739	1863	1552	1770	5085	1389	1770	5085	1503
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			132			132			94			94
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		1078			724			717			783	
Travel Time (s)		24.5			16.5			14.0			15.3	
Confl. Peds. (#/hr)	6		16	16		6			27			8
Peak Hour Factor	0.86	0.79	0.73	0.75	0.83	0.84	0.61	0.93	0.91	0.58	0.82	0.82
Adj. Flow (vph)	78	237	70	104	155	126	39	1678	165	86	1060	30
Shared Lane Traffic (%)												
Lane Group Flow (vph)	78	237	70	104	155	126	39	1678	165	86	1060	30
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	33.0	33.0	10.0	37.0	37.0	10.0	23.0	23.0	10.0	23.0	23.0
Total Split (s)	17.0	34.0	34.0	20.0	37.0	37.0	13.0	68.0	68.0	18.0	73.0	73.0
Total Split (%)	12.1%	24.3%	24.3%	14.3%	26.4%	26.4%	9.3%	48.6%	48.6%	12.9%	52.1%	52.1%
Maximum Green (s)	12.0	29.0	29.0	15.0	32.0	32.0	8.0	63.0	63.0	13.0	68.0	68.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	2.0	2.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	None	None	None	None	None	None	Max	Max	None	C-Max	C-Max
Walk Time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Flash Dont Walk (s)		24.0	24.0		28.0	28.0		14.0	14.0		14.0	14.0
Pedestrian Calls (#/hr)		16	16		6	6		27	27		8	8
Act Effct Green (s)	10.4	22.6	22.6	12.7	24.8	24.8	7.4	74.1	74.1	10.6	79.3	79.3
Actuated g/C Ratio	0.07	0.16	0.16	0.09	0.18	0.18	0.05	0.53	0.53	0.08	0.57	0.57
v/c Ratio	0.60	0.79	0.20	0.65	0.47	0.33	0.42	0.62	0.21	0.64	0.37	0.03
Control Delay	80.8	74.4	1.2	80.1	55.1	8.6	77.5	26.1	10.0	83.9	18.7	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	80.8	74.4	1.2	80.1	55.1	8.6	77.5	26.1	10.0	83.9	18.7	0.1
LOS	F	E	A	F	E	A	E	C	B	F	B	A
Approach Delay		62.4			46.6			25.7			23.0	
Approach LOS		E			D			C			C	
90th %ile Green (s)	12.0	29.0	29.0	15.0	32.0	32.0	8.0	63.0	63.0	13.0	68.0	68.0
90th %ile Term Code	Max	Max	Max	Max	Ped	Ped	Max	Coord	Coord	Max	Coord	Coord
70th %ile Green (s)	12.0	28.0	28.0	15.0	31.0	31.0	8.0	63.9	63.9	13.1	69.0	69.0
70th %ile Term Code	Max	Ped	Ped	Max	Hold	Hold	Max	Coord	Coord	Gap	Coord	Coord
50th %ile Green (s)	11.5	22.2	22.2	13.5	24.2	24.2	8.0	73.1	73.1	11.2	76.3	76.3
50th %ile Term Code	Gap	Gap	Gap	Gap	Hold	Hold	Hold	Coord	Coord	Gap	Coord	Coord
30th %ile Green (s)	9.6	19.1	19.1	11.4	20.9	20.9	8.0	80.3	80.3	9.2	81.5	81.5
30th %ile Term Code	Gap	Gap	Gap	Gap	Hold	Hold	Hold	Coord	Coord	Gap	Coord	Coord
10th %ile Green (s)	7.1	14.7	14.7	8.4	16.0	16.0	0.0	90.4	90.4	6.5	101.9	101.9
10th %ile Term Code	Gap	Gap	Gap	Gap	Hold	Hold	Skip	Coord	Coord	Gap	Coord	Coord
Stops (vph)	64	177	0	74	112	13	23	1084	37	48	471	0
Fuel Used(gal)	2	5	0	2	3	1	1	25	1	1	12	0
CO Emissions (g/hr)	141	376	31	148	195	60	47	1714	95	105	823	10
NOx Emissions (g/hr)	27	73	6	29	38	12	9	334	19	20	160	2
VOC Emissions (g/hr)	33	87	7	34	45	14	11	397	22	24	191	2
Dilemma Vehicles (#)	0	0	0	0	0	0	0	56	0	0	31	0
Queue Length 50th (ft)	69	211	0	92	129	0	35	388	32	77	196	0
Queue Length 95th (ft)	120	248	0	128	172	39	51	511	86	84	233	0
Internal Link Dist (ft)		998			644			637			703	
Turn Bay Length (ft)	300		115	300		85	230		150	230		150

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	151	385	420	189	425	456	101	2692	779	164	2881	892
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.62	0.17	0.55	0.36	0.28	0.39	0.62	0.21	0.52	0.37	0.03

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 2:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

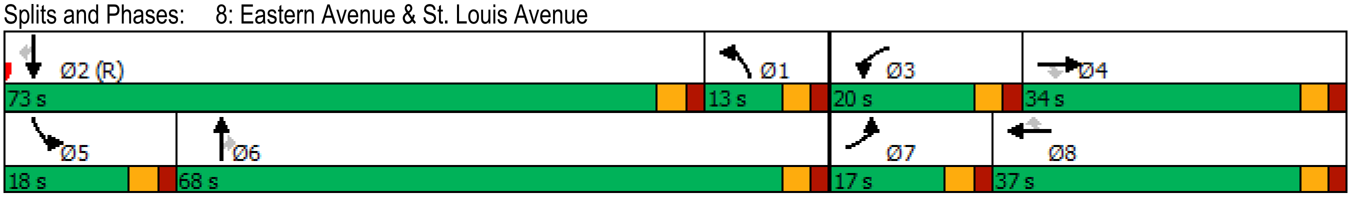
Maximum v/c Ratio: 0.79

Intersection Signal Delay: 30.7 Intersection LOS: C

Intersection Capacity Utilization 70.7% ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 8: Eastern Avenue & St. Louis Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	410	1371	209	191	1279	97	365	474	230	152	324	110
Future Volume (veh/h)	410	1371	209	191	1279	97	365	474	230	152	324	110
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	500	1558	268	217	1453	133	415	539	256	205	386	125
Peak Hour Factor	0.82	0.88	0.78	0.88	0.88	0.73	0.88	0.88	0.90	0.74	0.84	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	548	2021	611	266	1605	483	462	1026	451	254	812	357
Arrive On Green	0.16	0.40	0.40	0.08	0.31	0.31	0.13	0.29	0.29	0.07	0.23	0.23
Sat Flow, veh/h	3456	5106	1543	3456	5106	1535	3456	3554	1562	3456	3554	1562
Grp Volume(v), veh/h	500	1558	268	217	1453	133	415	539	256	205	386	125
Grp Sat Flow(s),veh/h/ln	1728	1702	1543	1728	1702	1535	1728	1777	1562	1728	1777	1562
Q Serve(g_s), s	19.9	37.1	17.8	8.7	38.2	9.1	16.6	17.8	19.5	8.2	13.2	9.4
Cycle Q Clear(g_c), s	19.9	37.1	17.8	8.7	38.2	9.1	16.6	17.8	19.5	8.2	13.2	9.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	548	2021	611	266	1605	483	462	1026	451	254	812	357
V/C Ratio(X)	0.91	0.77	0.44	0.82	0.91	0.28	0.90	0.53	0.57	0.81	0.48	0.35
Avail Cap(c_a), veh/h	592	2021	611	346	1605	483	494	1026	451	346	812	357
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.9	36.8	30.9	63.6	46.0	36.0	59.7	41.8	42.4	63.9	46.7	45.3
Incr Delay (d2), s/veh	17.0	2.2	1.0	8.6	8.9	1.4	17.6	1.9	5.1	6.9	2.0	2.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.9	15.6	6.6	4.1	16.9	3.6	8.3	8.1	8.0	3.8	6.0	3.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	75.0	38.9	31.9	72.2	54.9	37.4	77.3	43.7	47.5	70.7	48.7	48.0
LnGrp LOS	E	D	C	E	D	D	E	D	D	E	D	D
Approach Vol, veh/h		2326			1803			1210			716	
Approach Delay, s/veh		45.9			55.7			56.0			54.9	
Approach LOS		D			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.7	37.0	15.8	60.4	15.3	45.4	27.2	49.0
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	20.0	32.0	14.0	54.0	14.0	38.0	24.0	44.0
Max Q Clear Time (g_c+I1), s	18.6	15.2	10.7	39.1	10.2	21.5	21.9	40.2
Green Ext Time (p_c), s	0.2	5.9	0.1	12.9	0.1	8.9	0.3	3.4

Intersection Summary			
HCM 6th Ctrl Delay			51.9
HCM 6th LOS			D

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	410	1371	209	191	1279	97	365	474	230	152	324	110
Future Volume (vph)	410	1371	209	191	1279	97	365	474	230	152	324	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	360		220	300		150	370		150	300		150
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor			0.94			0.96			0.97			0.99
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	5085	1483	3433	5085	1517	3433	3539	1538	3433	3539	1561
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			193			171			213			171
Link Speed (mph)		35			45			35			35	
Link Distance (ft)		778			1071			690			688	
Travel Time (s)		15.2			16.2			13.4			13.4	
Confl. Peds. (#/hr)			35			20			14			1
Confl. Bikes (#/hr)						1						1
Peak Hour Factor	0.82	0.88	0.78	0.88	0.88	0.73	0.88	0.88	0.90	0.74	0.84	0.88
Adj. Flow (vph)	500	1558	268	217	1453	133	415	539	256	205	386	125
Shared Lane Traffic (%)												
Lane Group Flow (vph)	500	1558	268	217	1453	133	415	539	256	205	386	125
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane											Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

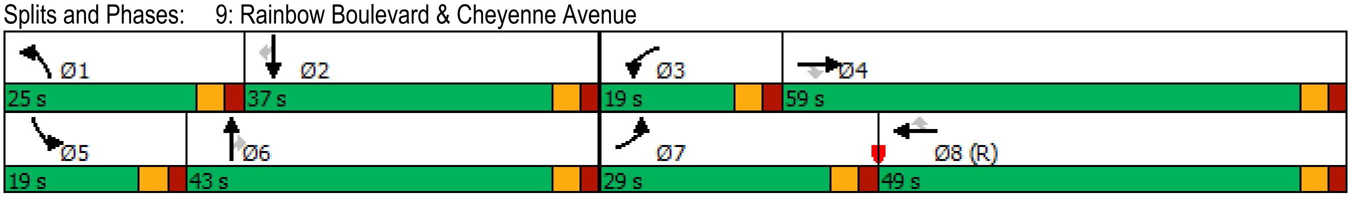
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	33.0	33.0	10.0	33.0	33.0	10.0	40.0	40.0	10.0	37.0	37.0
Total Split (s)	29.0	59.0	59.0	19.0	49.0	49.0	25.0	43.0	43.0	19.0	37.0	37.0
Total Split (%)	20.7%	42.1%	42.1%	13.6%	35.0%	35.0%	17.9%	30.7%	30.7%	13.6%	26.4%	26.4%
Maximum Green (s)	24.0	54.0	54.0	14.0	44.0	44.0	20.0	38.0	38.0	14.0	32.0	32.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	4.9	4.9	2.0	4.7	4.7	2.0	6.2	6.2	2.0	6.1	6.1
Recall Mode	None	None	None	None	C-Max	C-Max	None	Max	Max	None	Max	Max
Walk Time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Flash Dont Walk (s)		24.0	24.0		24.0	24.0		31.0	31.0		28.0	28.0
Pedestrian Calls (#/hr)		35	35		20	20		14	14		1	1
Act Effct Green (s)	22.8	55.6	55.6	12.4	45.2	45.2	19.2	39.8	39.8	12.2	32.8	32.8
Actuated g/C Ratio	0.16	0.40	0.40	0.09	0.32	0.32	0.14	0.28	0.28	0.09	0.23	0.23
v/c Ratio	0.89	0.77	0.38	0.71	0.89	0.22	0.88	0.54	0.43	0.69	0.47	0.25
Control Delay	76.5	40.2	10.4	75.3	52.8	2.7	79.8	45.0	11.0	74.1	48.5	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.5	40.2	10.4	75.3	52.8	2.7	79.8	45.0	11.0	74.1	48.5	3.1
LOS	E	D	B	E	D	A	E	D	B	E	D	A
Approach Delay		44.5			51.8			49.7			47.9	
Approach LOS		D			D			D			D	
90th %ile Green (s)	24.0	54.0	54.0	14.0	44.0	44.0	20.0	38.0	38.0	14.0	32.0	32.0
90th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Max	MaxR	MaxR	Max	MaxR	MaxR
70th %ile Green (s)	24.0	54.0	54.0	14.0	44.0	44.0	20.0	38.0	38.0	14.0	32.0	32.0
70th %ile Term Code	Max	Coord	Coord	Max	Coord	Coord	Max	MaxR	MaxR	Max	MaxR	MaxR
50th %ile Green (s)	24.0	54.8	54.8	13.2	44.0	44.0	20.0	39.3	39.3	12.7	32.0	32.0
50th %ile Term Code	Max	Coord	Coord	Gap	Coord	Coord	Max	MaxR	MaxR	Gap	MaxR	MaxR
30th %ile Green (s)	22.8	56.4	56.4	11.6	45.2	45.2	19.6	40.8	40.8	11.2	32.4	32.4
30th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Gap	MaxR	MaxR
10th %ile Green (s)	19.4	58.7	58.7	9.3	48.6	48.6	16.4	43.0	43.0	9.0	35.6	35.6
10th %ile Term Code	Gap	Coord	Coord	Gap	Coord	Coord	Gap	MaxR	MaxR	Gap	MaxR	MaxR
Stops (vph)	385	1164	46	184	1165	4	343	393	41	145	273	4
Fuel Used(gal)	12	28	2	7	37	1	10	10	2	4	7	1
CO Emissions (g/hr)	810	1934	137	457	2596	54	722	675	138	289	480	45
NOx Emissions (g/hr)	158	376	27	89	505	11	140	131	27	56	93	9
VOC Emissions (g/hr)	188	448	32	106	602	13	167	156	32	67	111	10
Dilemma Vehicles (#)	0	49	0	0	45	0	0	17	0	0	12	0
Queue Length 50th (ft)	230	452	43	100	465	0	192	220	29	94	161	0
Queue Length 95th (ft)	264	502	77	140	514	0	#262	276	107	110	198	15
Internal Link Dist (ft)		698			991			610			608	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	360		220	300		150	370		150	300		150
Base Capacity (vph)	588	2018	704	343	1640	605	490	1006	589	343	828	496
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.77	0.38	0.63	0.89	0.22	0.85	0.54	0.43	0.60	0.47	0.25

Intersection Summary

Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 0 (0%), Referenced to phase 8:WBT, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 48.1 Intersection LOS: D
Intersection Capacity Utilization 90.2% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 9: Rainbow Boulevard & Cheyenne Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	88	350	123	158	530	363	286	1645	115	157	1028	60
Future Volume (veh/h)	88	350	123	158	530	363	286	1645	115	157	1028	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.96	1.00		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	106	432	152	170	609	395	376	1769	124	196	1142	76
Peak Hour Factor	0.83	0.81	0.81	0.93	0.87	0.92	0.76	0.93	0.93	0.80	0.90	0.79
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	128	830	356	193	960	412	428	2269	685	243	1997	604
Arrive On Green	0.07	0.23	0.23	0.11	0.27	0.27	0.12	0.44	0.44	0.07	0.39	0.39
Sat Flow, veh/h	1781	3554	1523	1781	3554	1527	3456	5106	1541	3456	5106	1544
Grp Volume(v), veh/h	106	432	152	170	609	395	376	1769	124	196	1142	76
Grp Sat Flow(s),veh/h/ln	1781	1777	1523	1781	1777	1527	1728	1702	1541	1728	1702	1544
Q Serve(g_s), s	8.2	14.8	11.9	13.2	21.1	35.7	15.0	41.2	6.8	7.8	24.6	4.4
Cycle Q Clear(g_c), s	8.2	14.8	11.9	13.2	21.1	35.7	15.0	41.2	6.8	7.8	24.6	4.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	128	830	356	193	960	412	428	2269	685	243	1997	604
V/C Ratio(X)	0.82	0.52	0.43	0.88	0.63	0.96	0.88	0.78	0.18	0.81	0.57	0.13
Avail Cap(c_a), veh/h	191	888	381	229	965	414	543	2269	685	272	1997	604
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	64.1	46.8	45.7	61.5	45.0	50.3	60.3	33.1	23.5	64.1	33.4	27.3
Incr Delay (d2), s/veh	10.6	0.2	0.3	24.5	1.0	33.0	11.0	2.7	0.6	13.0	1.2	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.1	6.6	4.5	7.2	9.4	17.2	7.1	16.9	2.6	3.8	10.1	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	74.7	47.0	46.0	85.9	46.0	83.3	71.3	35.8	24.1	77.1	34.6	27.7
LnGrp LOS	E	D	D	F	D	F	E	D	C	E	C	C
Approach Vol, veh/h		690			1174			2269			1414	
Approach Delay, s/veh		51.0			64.4			41.0			40.2	
Approach LOS		D			E			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	22.3	59.7	20.2	37.7	14.9	67.2	15.1	42.8				
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0				
Max Green Setting (Gmax), s	22.0	45.0	18.0	35.0	11.0	56.0	15.0	38.0				
Max Q Clear Time (g_c+I1), s	17.0	26.6	15.2	16.8	9.8	43.2	10.2	37.7				
Green Ext Time (p_c), s	0.4	5.0	0.1	2.0	0.0	7.0	0.0	0.2				
Intersection Summary												
HCM 6th Ctrl Delay			47.0									
HCM 6th LOS			D									

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	88	350	123	158	530	363	286	1645	115	157	1028	60
Future Volume (vph)	88	350	123	158	530	363	286	1645	115	157	1028	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		300	300		300	300		310	300		150
Storage Lanes	1		1	1		1	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.91	1.00	0.97	0.91	1.00
Ped Bike Factor	0.99		0.97	0.99		0.96			0.95			0.96
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	5085	1583	3433	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1751	3539	1532	1751	3539	1522	3433	5085	1506	3433	5085	1519
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			152			216			110			132
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		1199			1771			701			721	
Travel Time (s)		23.4			34.5			10.6			10.9	
Confl. Peds. (#/hr)	20		16	16		20			21			16
Confl. Bikes (#/hr)			2			4			4			3
Peak Hour Factor	0.83	0.81	0.81	0.93	0.87	0.92	0.76	0.93	0.93	0.80	0.90	0.79
Adj. Flow (vph)	106	432	152	170	609	395	376	1769	124	196	1142	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	106	432	152	170	609	395	376	1769	124	196	1142	76
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

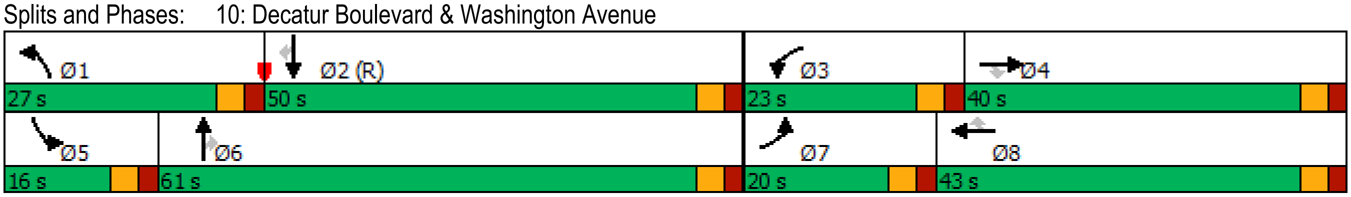
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4			8			6			2
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	40.0	40.0	10.0	40.0	40.0	10.0	30.0	30.0	10.0	30.0	30.0
Total Split (s)	20.0	40.0	40.0	23.0	43.0	43.0	27.0	61.0	61.0	16.0	50.0	50.0
Total Split (%)	14.3%	28.6%	28.6%	16.4%	30.7%	30.7%	19.3%	43.6%	43.6%	11.4%	35.7%	35.7%
Maximum Green (s)	15.0	35.0	35.0	18.0	38.0	38.0	22.0	56.0	56.0	11.0	45.0	45.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	None	None	None	None	None	None	Max	Max	None	C-Max	C-Max
Walk Time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Flash Dont Walk (s)		31.0	31.0		31.0	31.0		21.0	21.0		21.0	21.0
Pedestrian Calls (#/hr)		16	16		20	20		21	21		16	16
Act Effct Green (s)	12.1	28.3	28.3	16.3	32.4	32.4	19.1	64.6	64.6	10.9	56.4	56.4
Actuated g/C Ratio	0.09	0.20	0.20	0.12	0.23	0.23	0.14	0.46	0.46	0.08	0.40	0.40
v/c Ratio	0.69	0.61	0.35	0.83	0.74	0.76	0.80	0.75	0.16	0.74	0.56	0.11
Control Delay	84.6	53.7	8.4	90.7	55.4	31.6	72.1	35.4	6.6	79.7	35.5	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	84.6	53.7	8.4	90.7	55.4	31.6	72.1	35.4	6.6	79.7	35.5	0.4
LOS	F	D	A	F	E	C	E	D	A	E	D	A
Approach Delay		48.5			52.5			39.9			39.7	
Approach LOS		D			D			D			D	
90th %ile Green (s)	15.0	35.0	35.0	18.0	38.0	38.0	22.0	56.0	56.0	11.0	45.0	45.0
90th %ile Term Code	Max	Ped	Ped	Max	Max	Max	Max	Coord	Coord	Max	Coord	Coord
70th %ile Green (s)	14.8	35.0	35.0	18.0	38.2	38.2	21.7	56.0	56.0	11.0	45.3	45.3
70th %ile Term Code	Gap	Ped	Ped	Max	Hold	Hold	Gap	Coord	Coord	Max	Coord	Coord
50th %ile Green (s)	12.7	29.7	29.7	18.0	35.0	35.0	19.6	59.8	59.8	12.5	52.7	52.7
50th %ile Term Code	Gap	Hold	Hold	Max	Ped	Ped	Gap	Coord	Coord	Gap	Coord	Coord
30th %ile Green (s)	10.6	22.7	22.7	15.6	27.7	27.7	17.5	70.7	70.7	11.0	64.2	64.2
30th %ile Term Code	Gap	Hold	Hold	Gap	Gap	Gap	Gap	Coord	Coord	Gap	Coord	Coord
10th %ile Green (s)	7.5	19.0	19.0	11.7	23.2	23.2	14.6	80.4	80.4	8.9	74.7	74.7
10th %ile Term Code	Gap	Hold	Hold	Gap	Gap	Gap	Gap	Coord	Coord	Gap	Coord	Coord
Stops (vph)	84	308	15	147	478	164	273	1343	17	149	786	0
Fuel Used(gal)	3	9	1	6	16	8	9	36	1	5	22	0
CO Emissions (g/hr)	203	641	97	422	1143	574	622	2519	62	359	1539	20
NOx Emissions (g/hr)	40	125	19	82	222	112	121	490	12	70	299	4
VOC Emissions (g/hr)	47	149	22	98	265	133	144	584	14	83	357	5
Dilemma Vehicles (#)	0	11	0	0	16	0	0	59	0	0	37	0
Queue Length 50th (ft)	95	187	0	152	266	154	173	511	7	90	304	0
Queue Length 95th (ft)	144	205	39	#259	311	275	186	605	49	118	388	0
Internal Link Dist (ft)		1119			1691			621			641	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	300		300	300		300	300		310	300		150
Base Capacity (vph)	189	884	497	227	961	570	539	2345	753	276	2047	690
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.49	0.31	0.75	0.63	0.69	0.70	0.75	0.16	0.71	0.56	0.11

Intersection Summary

Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 0 (0%), Referenced to phase 2:SBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 43.6 Intersection LOS: D
Intersection Capacity Utilization 79.5% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 10: Decatur Boulevard & Washington Avenue



APPENDIX H:

Program Intersections | Identified Improvements

GENERAL INFORMATION			ROADWAY														
Roadway Name & Direction			Classification/Speed			U-Turn		Lane Geometrics/U-Turn									
North-South Arterial	East-West Arterial	Direction	Classification	Existing Speed	Recommended Speed	Existing Signified	Recommended Signified	Existing Left-Turn Pockets - Number & Length	Protected/ Permitted	Recommended Left-Turn Pockets Number & Length	Protected/ Permitted	ROW Needed (ft^2)	Existing Through Lanes	Recommended Through Lanes	Existing Right-Turn Pockets	Recommended Right-Turn Pockets	ROW Needed (ft^2)
Durango Drive	Charleston Boulevard	NB	Major Street	45	35	N/A	Yes - Allowed	1-300'	Permitted	2-300'	Protected	3,000	3	3	Shared	1-200'	2,000
		SB	Major Street	35	35	N/A	Yes - Allowed	1-380'	Permitted	2-380'	Protected	3,800	3	3	Shared	1-200'	2,000
		EB	Major Street	45	35	N/A	Yes - Allowed	1-220'	Permitted	2-300'	Protected	3,800	3	3	Shared	1-200'	2,000
		WB	Major Street	45	35	N/A	Yes - Allowed	1-330'	Permitted	2-330'	Protected	3,300	3	3	Shared	1-200'	2,000
Eastern Avenue	Stewart Avenue	NB	Major Street	35	35	N/A	Yes - Prohibited	1-145'	FYA	2-300'	Protected	4,550	3	3	Shared	1-150'	1,500
		SB	Major Street	35	35	N/A	Yes - Prohibited	1-145'	FYA	2-300'	Protected	4,550	3	3	Shared	1-150'	1,500
		EB	Collector	30	30	N/A	Yes - Prohibited	1-190'	FYA	2-310'	Protected	4,300	2	2	Shared	1-150'	1,500
		WB	Collector	30	30	N/A	Yes - Prohibited	1-120'	FYA	2-300'	Protected	4,800	2	2	1-150'	1-300'	1,500
Fort Apache Road	Sahara Avenue	NB	Major Street	45	35	Yes - Allowed	Yes - Allowed	2-260'	Protected	2-260'	Protected	0	3	3	Shared	1-150'	1,500
		SB	Major Street	45	35	Yes - Allowed	Yes - Allowed	2-350'	Protected	2-350'	Protected	0	3	3	Shared	1-150'	1,500
		EB	Major Street	45	35	Yes - Allowed	Yes - Allowed	2-325'	Protected	2-325'	Protected	0	3	3	1-180'	1-180'	0
		WB	Major Street	45	35	Yes - Allowed	Yes - Allowed	2-315'	Protected	2-315'	Protected	0	3	3	1-180'	1-315'	1,350
Martin Luther King Boulevard	Bonanza Road	NB	Major Street	35	35	Yes - Prohibited	Yes - Prohibited	2-300'	Protected	2-300'	Protected	0	3	3	Shared	1-150'	1,500
		SB	Major Street	35	35	N/A	Yes - Prohibited	2-400'	Protected	2-400'	Protected	0	3	3	1-165'	1-165'	0
		EB	Major Street	35	35	Yes - Prohibited	Yes - Prohibited	2-300'	Protected	2-300'	Protected	0	2	2	1-200'	1-200'	0
		WB	Major Street	35	35	Yes - Prohibited	Yes - Prohibited	2-250'	Protected	2-300'	Protected	1,000	2	2	1-180'	1-300'	1,200
Rainbow Boulevard	Lake Mead Boulevard	NB	Major Street	35	35	Yes - Prohibited	Yes - Prohibited	2-240'	Protected	2-240'	Protected	0	2	2	1-230'	1-230'	0
		SB	Major Street	35	35	Yes - Prohibited	Yes - Prohibited	2-250'	Protected	2-250'	Protected	0	2	2	1-315'	1-315'	0
		EB	Major Street	35	35	Yes - Allowed	Yes - Allowed	2-450'	Protected	2-450'	Protected	0	3	3	1-135'	1-135'	0
		WB	Major Street	45	35	Yes - Allowed	Yes - Allowed	2-250'	Protected	2-250'	Protected	0	3	3	1-160'	1-160'	0
Rainbow Boulevard	Charleston Boulevard	NB	Major Street	45	35	Yes - Allowed	Yes - Allowed	2-340'	Protected	3-340'	Protected	3,400	3	4	1-120'	1-250'	1,300
		SB	Major Street	45	35	Yes - Allowed	Yes - Allowed	2-330'	Protected	3-330'	Protected	3,300	3	4	1-245'	1-245'	0
		EB	Major Street	45	35	Yes - Allowed	Yes - Allowed	2-345'	Protected	3-345'	Protected	3,450	3	3	Shared	1-250'	2,500
		WB	Major Street	45	35	Yes - Allowed	Yes - Allowed	2-345'	Protected	3-345'	Protected	3,450	3	3	Shared	1-250'	2,500
Valley View Boulevard	Sahara Avenue	NB	Major Street	35	35	Yes - Prohibited	Yes - Prohibited	2-270'	Protected	2-270'	Protected	0	3	3	Shared	1-150'	1,500
		SB	Major Street	35	35	Yes - Allowed	Yes - Allowed	2-345'	Protected	2-345'	Protected	0	2	2	Shared	1-150'	1,500
		EB	Major Street	45	35	Yes - Allowed	Yes - Allowed	2-315'	Protected	2-315'	Protected	0	3	3	1-135'	1-135'	N/A
		WB	Major Street	45	35	Yes - Allowed	Yes - Allowed	2-345'	Protected	2-345'	Protected	0	3	3	1-160'	1-160'	N/A
Eastern Avenue	St. Louis Avenue	NB	Major Street	35	35	N/A	Yes - Allowed	1-230'	Protected	1-230'	Protected	0	3	3	Shared	1-150'	1,500
		SB	Major Street	35	35	N/A	Yes - Allowed	1-230'	Protected	1-230'	Protected	0	3	3	Shared	1-150'	1,500
		EB	Local	30	30	Yes - Prohibited	Yes - Prohibited	1-115'	Permitted	1-300'	Protected	1,850	1	1	1-115'	1-115'	0
		WB	Local	30	30	Yes - Prohibited	Yes - Prohibited	1-85'	Permitted	1-300'	Protected	2,150	1	1	1-85'	1-85'	0
Rainbow Boulevard	Cheyenne Avenue	NB	Major Street	35	35	Yes - Prohibited	Yes - Prohibited	2-370'	Protected	2-370'	Protected	0	2	2	Shared	1-150'	1,500
		SB	Major Street	35	35	Yes - Prohibited	Yes - Prohibited	1-85'	Protected	2-300'	Protected	5,150	2	2	Shared	1-150'	1,500
		EB	Major Street	35	35	Yes - Allowed	Yes - Allowed	2-360'	Protected	2-360'	Protected	0	3	3	1-220'	1-220'	0
		WB	Major Street	45	35	N/A	Yes - Allowed	1-260'	Protected	2-300'	Protected	3,400	3	3	Shared	1-150'	1,500
Decatur Boulevard	Washington Avenue	NB	Major Street	45	35	Yes - Allowed	Yes - Allowed	2-240'	Protected	2-300'	Protected	1,200	3	3	1-310'	1-310'	0
		SB	Major Street	45	35	Yes - Allowed	Yes - Allowed	2-230'	Protected	2-300'	Protected	1,400	3	3	Shared	1-150'	1,500
		EB	Major Street	35	35	Yes - Prohibited	Yes - Prohibited	1-140'	FYA	1-300'	Protected	1,600	2	2	1-140'	1-300'	1,600
		WB	Major Street	35	35	Yes - Prohibited	Yes - Prohibited	1-140'	FYA	1-300'	Protected	1,600	2	2	1-185'	1-300'	1,150

Green = Recommendations Can Be Performed Immediately || *Red = Recommendations Need Further Discussion*

ROADWAY												
Roadway Name & Direction			Signals: Retroreflective Backplates/Aligned with Lanes/Pole/Mast Arm/Pedestrian Push Button				Lighting Conditions		Median Islands/Through Lane Alignment			
North-South Arterial	East-West Arterial	Direction	Existing Retroreflective Backplates	Recommended Retroreflective Backplates	Existing Signal Heads Aligned With Lanes	Recommended Signal Heads Aligned With Lanes	Existing Lighting	Recommended Lighting	Existing Median Islands	Recommended Median Islands	Existing Through Lane Alignment	Recommended Through Lane Alignment
Durango Drive	Charleston Boulevard	NB	No	Yes - 6	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	Yes	Yes
		SB	No	Yes - 6	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	No	Yes
		EB	No	Yes - 6	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	Yes	Yes
		WB	No	Yes - 6	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	No	Yes
Eastern Avenue	Stewart Avenue	NB	No	Yes - 6	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	Yes	Yes
		SB	No	Yes - 6	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	No	Yes
		EB	No	Yes - 5	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	No	Yes	Yes	Yes
		WB	No	Yes - 5	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	No	Yes	Yes	Yes
Fort Apache Road	Sahara Avenue	NB	No	Yes - 6	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	Yes	Yes
		SB	No	Yes - 6	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	No	Yes
		EB	No	Yes - 6	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	No	Yes
		WB	No	Yes - 6	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	Yes	Yes
Martin Luther King Boulevard	Bonanza Road	NB	No	Yes - 6	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	Yes	Yes
		SB	No	Yes - 6	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	Yes	Yes
		EB	No	Yes - 5	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	Yes	Yes
		WB	No	Yes - 5	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	Yes	Yes
Rainbow Boulevard	Lake Mead Boulevard	NB	No	Yes - 5	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	No	Yes
		SB	No	Yes - 5	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	Yes	Yes
		EB	No	Yes - 6	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	Yes	Yes
		WB	No	Yes - 6	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	Yes	Yes
Rainbow Boulevard	Charleston Boulevard	NB	Yes - Some	Yes - 8	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	No	Yes
		SB	Yes - Some	Yes - 8	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	Yes	Yes
		EB	Yes - Some	Yes - 7	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	Yes	Yes
		WB	Yes - Some	Yes - 7	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	No	Yes
Valley View Boulevard	Sahara Avenue	NB	No	Yes - 6	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	No	Yes
		SB	No	Yes - 5	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	West Crosswalk - 0 Lights	2-Luminaires	Yes	Yes	Yes	Yes
		EB	No	Yes - 6	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	Yes	Yes
		WB	No	Yes - 6	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	Yes	Yes
Eastern Avenue	St. Louis Avenue	NB	No	Yes - 5	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	Yes	Yes
		SB	No	Yes - 5	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	Yes	Yes
		EB	No	Yes - 3	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	No	Yes	No	Yes
		WB	No	Yes - 3	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	No	Yes	No	Yes
Rainbow Boulevard	Cheyenne Avenue	NB	No	Yes - 5	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	Yes	Yes
		SB	No	Yes - 5	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	No	Yes
		EB	No	Yes - 6	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	No	Yes
		WB	No	Yes - 6	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	No	Yes
Decatur Boulevard	Washington Avenue	NB	No	Yes - 6	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	Yes	Yes
		SB	No	Yes - 6	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	Yes	Yes	Yes	Yes
		EB	No	Yes - 4	Yes	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	No	Yes	No	Yes
		WB	No	Yes - 4	No	Yes - New Pole, Mast Arm, Pedestrian Push Button	1-Luminaire	2-Luminaires	No	Yes	No	Yes
Green = Recommendations Can Be Performed Immediately || *Red = Recommendations Need Further Discussion*												

MULTIMODAL								
Roadway Name & Direction			Pedestrian Realm: Crosswalks/ADA				Bicycle Facilities	
North-South Arterial	East-West Arterial	Direction	Existing Crosswalks	Recommended Crosswalks	Existing ADA	Recommended ADA	Existing Bike Lanes	Recommended Bike Lanes
Durango Drive	Charleston Boulevard	NB	Yes	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
		SB	Yes	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
		EB	Yes	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
		WB	Yes	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
Eastern Avenue	Stewart Avenue	NB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
		SB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
		EB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
		WB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	Proposed
Fort Apache Road	Sahara Avenue	NB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
		SB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
		EB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	Shared with BRT	Shared with BRT
		WB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	Shared with BRT	Shared with BRT
Martin Luther King Boulevard	Bonanza Road	NB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
		SB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
		EB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No - Striped not Signed	EB Side - Stripe & Sign
		WB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
Rainbow Boulevard	Lake Mead Boulevard	NB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
		SB	No	No	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
		EB	Yes - Update	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
		WB	No	No	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
Rainbow Boulevard	Charleston Boulevard	NB	Yes - Faded	Yes - Restripe	Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA, where necessary	No - Wide Shoulder	No
		SB	Yes - Faded	Yes - Restripe	Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA, where necessary	No - Wide Shoulder	No
		EB	Yes - Faded	Yes - Restripe	Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA, where necessary	No	No
		WB	Yes - Faded	Yes - Restripe	Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA, where necessary	No	No
Valley View Boulevard	Sahara Avenue	NB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
		SB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
		EB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	Shared with BRT	Shared with BRT
		WB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	Shared with BRT	Shared with BRT
Eastern Avenue	St. Louis Avenue	NB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
		SB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
		EB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	Yes	Yes
		WB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	Yes	Yes
Rainbow Boulevard	Cheyenne Avenue	NB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
		SB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
		EB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
		WB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	No	No
Decatur Boulevard	Washington Avenue	NB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	Yes	Yes
		SB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	Yes	Yes
		EB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	Yes	Yes
		WB	Yes - Faded	Yes - Restripe	Non-Compliant	Reconstruct Pedestrian Ramp and Update Sidewalk to PROWAG/ADA	Yes - Disjointed	Yes - Align
Green = Recommendations Can Be Performed Immediately || *Red = Recommendations Need Further Discussion*								

MULTIMODAL							DRIVEWAYS - TBD	
Roadway Name & Direction			Transit Facilities: Turnout Amenities				Driveway Distance	
North-South Arterial	East-West Arterial	Direction	Existing Bus Turnout	Recommended Bus Turnout	Existing Transit Safety/Amenities	Recommended Transit Safety/Amenities	Existing Driveway Distance	Driveway Distance to Code
Durango Drive	Charleston Boulevard	NB	No	Yes	Shelter	Shelter	Westside - 70' / Eastside - 675'	35 MPH: Eastside - 450' / Westside - 310' || 45 MPH: Eastside - 600' / Westside - 450'
		SB	No	Yes	Shelter	Shelter	Westside - 240' / Eastside - 125'	35 MPH: Westside - 450' / Eastside - 310'
		EB	No	Yes	Shelter in S/W	Shelter behind S/W	Northside - 215' / Southside - 95'	35 MPH: Southside - 450' / Northside - 310' || 45 MPH: Southside - 600' / Northside - 450'
		WB	No	Yes	Shelter	Shelter	Northside - 110' / Southside - 885'	35 MPH: Northside - 450' / Southside - 310' || 45 MPH: Northside - 600' / Southside - 450'
Eastern Avenue	Stewart Avenue	NB	No	Yes	Near-side Shelter in S/W	Shelter behind S/W	Westside - 15' / Eastside - 365'	35 MPH: Eastside - 450' / Westside - 310'
		SB	No	Yes	Shelter in S/W	Shelter behind S/W	Westside - 170' / Eastside - 200'	35 MPH: Westside - 450' / Eastside - 310'
		EB	Yes	Yes	Shelter	Shelter	Northside - 5' / Southside - 10'	30 MPH: Southside - 375' / Northside - 290'
		WB	Yes (Pocket)	Yes (Pocket)	Shelter in S/W	Shelter behind S/W	Northside - 50' / Southside - 440'	30 MPH: Northside - 375' / Southside - 290'
Fort Apache Road	Sahara Avenue	NB	No	Yes	No Amenities	Shelter	Westside - 65' / Eastside - 195'	35 MPH: Eastside - 450' / Westside - 310' || 45 MPH: Eastside - 600' / Westside - 450'
		SB	No	Yes	No Amenities	Shelter	Westside - 245' / Eastside - 85'	35 MPH: Westside - 450' / Eastside - 310' || 45 MPH: Westside - 600' / Eastside - 450'
		EB	BRT Bus Lane	BRT Bus Lane	Shelter	Shelter	Northside - 555' / Southside - 110'	35 MPH: Southside - 450' / Northside - 310' || 45 MPH: Southside - 600' / Northside - 450'
		WB	BRT Bus Lane	BRT Bus Lane	Shelter	Shelter	Northside - 100' / Southside - 310'	35 MPH: Northside - 450' / Southside - 310' || 45 MPH: Northside - 600' / Southside - 450'
Martin Luther King Boulevard	Bonanza Road	NB	No	Yes	No Amenities	Shelter	Westside - 135' / Eastside - 265'	35 MPH: Eastside - 450' / Westside - 310'
		SB	No	Yes	No Amenities	Shelter	Westside - 120' / Eastside - 10'	35 MPH: Westside - 450' / Eastside - 310'
		EB	No	Yes	Shelter	Shelter	Northside - 95' / Southside - 195'	35 MPH: Southside - 450' / Northside - 310'
		WB	No	Yes	Shelter	Shelter	Northside - 15' / Southside - 85'	35 MPH: Northside - 450' / Southside - 310'
Rainbow Boulevard	Lake Mead Boulevard	NB	No	Yes	Shelter	Shelter	Westside - 155' / Eastside - 55'	35 MPH: Eastside - 450' / Westside - 310'
		SB	Yes (Pocket)	Yes (Pocket)	Shelter	Shelter	Westside - 445' / Eastside - 170'	35 MPH: Westside - 450' / Eastside - 310'
		EB	No	Yes	Bench in S/W (Wall)	Shelter behind S/W	Northside - 235' / Southside - 300'	35 MPH: Southside - 450' / Northside - 310'
		WB	No	Yes	Near-side Shelter	Shelter	Northside - 140' / Southside - 35'	35 MPH: Northside - 450' / Southside - 310' || 45 MPH: Northside - 600' / Southside - 450'
Rainbow Boulevard	Charleston Boulevard	NB	No - Wide Shoulder	Yes	Shelter	Shelter	Westside - 20' / Eastside - 115'	35 MPH: Eastside - 450' / Westside - 310' || 45 MPH: Eastside - 600' / Westside - 450'
		SB	No - Wide Shoulder	Yes	Shelter	Shelter	Westside - 245' / Eastside - 110'	35 MPH: Westside - 450' / Eastside - 310' || 45 MPH: Westside - 600' / Eastside - 450'
		EB	No	Yes	Shelter	Shelter	Northside - 280' / Southside - 90'	35 MPH: Southside - 450' / Northside - 310' || 45 MPH: Southside - 600' / Northside - 450'
		WB	No	Yes	Shelter	Shelter	Northside - 125' / Southside - 25'	35 MPH: Northside - 450' / Southside - 310' || 45 MPH: Northside - 600' / Southside - 450'
Valley View Boulevard	Sahara Avenue	NB	Yes (Pocket)	Yes (Pocket)	Shelter	Shelter	Westside - 15' / Eastside - 20'	35 MPH: Eastside - 450' / Westside - 310'
		SB	Yes (Pocket)	Yes (Pocket)	Shelter	Shelter	Westside - 130' / Eastside - 60'	35 MPH: Westside - 450' / Eastside - 310'
		EB	BRT Bus Lane	BRT Bus Lane	Shelters (2)	Shelters (2)	Northside - 25' / Southside - 85'	35 MPH: Southside - 450' / Northside - 310' || 45 MPH: Southside - 600' / Northside - 450'
		WB	BRT Bus Lane	BRT Bus Lane	Near-side Shelter	Near-side Shelter	Northside - 75' / Southside - 10'	35 MPH: Northside - 450' / Southside - 310' || 45 MPH: Northside - 600' / Southside - 450'
Eastern Avenue	St. Louis Avenue	NB	No	Yes	Bench in S/W (Building)	Shelter behind S/W	Westside - 170' / Eastside - 690'	35 MPH: Eastside - 450' / Westside - 310'
		SB	No	Yes	Shelter	Shelter	Westside - 185' / Eastside - 65'	35 MPH: Westside - 450' / Eastside - 310'
		EB	N/A	N/A	N/A	N/A	Northside - 15' / Southside - 135'	30 MPH: Southside - 375' / Northside - 290'
		WB	N/A	N/A	N/A	N/A	Northside - 15' / Southside >1,000'	30 MPH: Northside - 375' / Southside - 290'
Rainbow Boulevard	Cheyenne Avenue	NB	No	Yes	Shelter	Shelter	Westside - 50' / Eastside - 205'	35 MPH: Eastside - 450' / Westside - 310'
		SB	No	Yes	Shelter	Shelter	Westside - 5' / Eastside - 125'	35 MPH: Westside - 450' / Eastside - 310'
		EB	No	Yes	Shelter in S/W	Shelter behind S/W	Northside - 5' / Southside - 65'	35 MPH: Southside - 450' / Northside - 310'
		WB	No	Yes	Shelter	Shelter	Northside <5' / Southside 95'	35 MPH: Northside - 450' / Southside - 310' || 45 MPH: Northside - 600' / Southside - 450'
Decatur Boulevard	Washington Avenue	NB	No - Wide Shoulder	No - Wide Shoulder	Shelter	Shelter	Westside - 105' / Eastside - 80'	35 MPH: Eastside - 450' / Westside - 310' || 45 MPH: Eastside - 600' / Westside - 450'
		SB	No	Yes	Shelter	Shelter	Westside - 10' / Eastside ~2,000'	35 MPH: Westside - 450' / Eastside - 310' || 45 MPH: Westside - 600' / Eastside - 450'
		EB	Yes (Pocket)	Yes (Pocket)	Shelter	Shelter	Northside - 10' / Southside - 20'	35 MPH: Southside - 450' / Northside - 310'
		WB	Yes (Pocket)	Yes (Pocket)	Near-side Shelter	Shelter	Northside >2,000' / Southside - 100'	35 MPH: Northside - 450' / Southside - 310'
Green = Recommendations Can Be Performed Immediately || *Red = Recommendations Need Further Discussion*								