

## Appendix D

# Change in Control of Access Request

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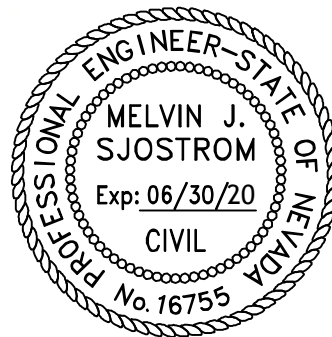


# CHANGE IN CONTROL OF ACCESS REQUEST

## I-15 & Harmon Avenue Direct-Access HOV Ramps I-15 Tropicana Project

Prepared for:

Nevada Department of Transportation



Prepared by:

10-14-19



CA Group, Inc.  
2785 South Rainbow Blvd  
Las Vegas, NV 89146





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## 1. INTRODUCTION

The Nevada Department of Transportation (NDOT) and the Federal Highway Administration (FHWA) are proposing a project to increase traffic capacity and reduce congestion at the I-15/Tropicana Avenue Interchange and its ramps, consisting of reconstructing the entirety of the interchange. To further address this need, High Occupancy Vehicle (HOV) ramps are proposed at the Harmon Avenue overpass, approximately 0.5 miles to the north of Tropicana Avenue (see Figure 1). These HOV ramps will be restricted to vehicles with two or more people including buses, carpools, and vanpools, as well as motorcycles and emergency vehicles.

The proposed improvements to the I-15/Tropicana Avenue Interchange will maintain existing ramp access locations to and from I-15 and will include additional turn lanes and improved intersection operations at the ramp termini. The Tropicana improvements, therefore, are not changing the existing access control. The new direct-access HOV ramps at Harmon Avenue, however, will provide new access points on I-15; a northbound (NB) off-ramp and a southbound (SB) on-ramp to/from the I-15 HOV lanes. Additionally, the northbound collector-distributor road (NB CD) entrance to I-15 is being modified from the existing single-lane entrance and merge to a dual-lane entrance, which will see both lanes drop in advance of the NB Tropicana entrance ramp. While this access control location is unchanged, the modification is expected to improve the operations of the northbound CD road.

The purpose of this CCOAR is to request a change of access to I-15 at the NB CD ramp and at Harmon Avenue as part of the I-15/Tropicana Avenue project. This CCOAR documents the results of the study that examined the impacts of adding direct-access HOV ramps at Harmon Avenue and expanding the NB CD road entrance on the I-15 corridor and adjacent roadway network.

### 1.1. Project Location and Description

The I-15/Tropicana Avenue project is located in central Las Vegas, Nevada. The project limits are as follows and are shown in Figure 1:

- I-15 from approximately the Russell Road underpass to the Flamingo Road underpass
- Tropicana Avenue from Polaris Avenue to Las Vegas Boulevard
- Harmon Avenue from Aldebaran Avenue to Aria Way

Please see Appendix A for a conceptual layout of the proposed improvements. Details of proposed project improvements consist of:

**Harmon Avenue** – Construction of HOV ramps in the median of I-15 connecting to the existing Harmon Avenue bridge structure would provide direct HOV access to and from Harmon Avenue to the south. The travel lanes on I-15 would be shifted outwards, passing between the existing Harmon Avenue bridge piers. The existing spans can accommodate the shifted roadway, and the existing bridge would not be replaced. The proposed shifting of I-15 SB to the west would require the existing open drainage channel to be converted to a reinforced concrete box (RCB). Drop inlets will be added along both I-15 SB shoulder and the NB Dean Martin Drive curb line to convey existing flows into the new RCB. North of Harmon Avenue,



pavement markings on I-15 would taper back to the existing I-15 configuration before the Flamingo Road overpass. Improvements on Harmon Avenue would consist of pavement resurfacing, restriping, barrier separation of the existing sidewalk and Harmon Avenue roadway, and signalization at the HOV ramps, and would extend from Polaris Avenue to Aria Way.

Harmon Avenue currently provides three through lanes in each direction over I-15. The proposed improvements would modify this configuration to provide a westbound (WB) left-turn lane and two WB through lanes, the eastbound (EB) approach would provide two through lanes and a shared through/right-turn lane.

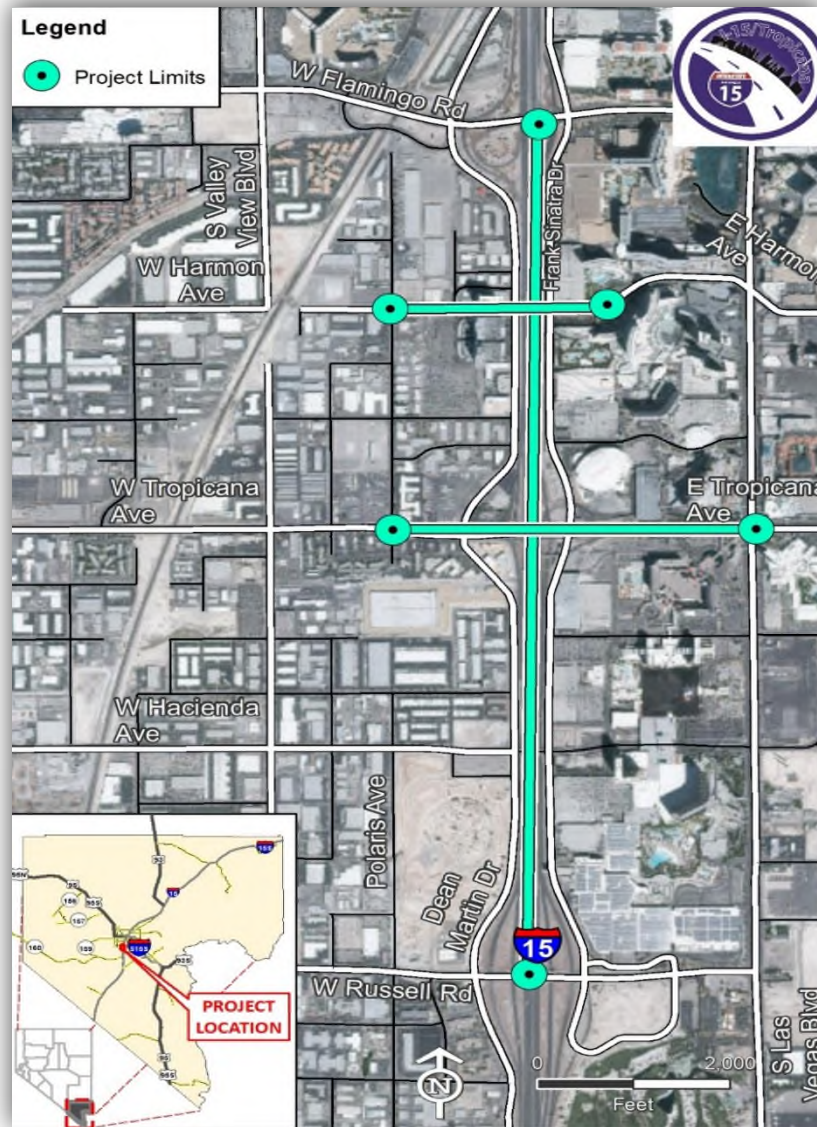


Figure 1: Project Location and Project Limits



**Tropicana Avenue** – Modifications to I-15 for the Harmon Avenue HOV ramps and NB CD road merge, along with provisions for a future widening for through lanes, will require the existing Tropicana Avenue overpass bridge to be replaced with a new, longer, higher structure. The structure will also be widened to accommodate the needed Tropicana Avenue lane configuration, including 10-foot sidewalks on each side. The I-15/Tropicana Avenue interchange configuration is replicated in the proposed layout, with a free-flow flyover proposed for the I-15 SB to Tropicana Avenue EB exiting traffic. New right-of-way would be required mainly on the north side of Tropicana Avenue. Pedestrian facilities are proposed to be improved throughout the limits on Tropicana Avenue, with ADA compliant sidewalks and ramps. The existing access control limits are not changed with the proposed improvements on Tropicana Avenue.

At the I-15 SB and NB ramp intersections, triple left-turn pockets would replace the existing dual left-turn lanes and allow for greater traffic capacity. The profile of Tropicana Avenue would be raised approximately three feet through the interchange to provide minimum vertical clearance over I-15 while allowing for additional depth of the new Tropicana Avenue overpass structure. As a result, the existing SB flyover bridge would be replaced with a raised and horizontally shifted profile, approximately 10 feet higher than the existing flyover structure.

**Northbound Collector-Distributor Road (NB CD)** – The NB CD road entrance to I-15 is being modified from the existing single-lane entrance and merge to a dual-lane entrance, which will see both lanes drop in advance of the NB Tropicana entrance ramp. While this access control location is unchanged, the modification is expected to improve the operations of the northbound CD road.

The proposed project improvements are shown in Appendix A.

### **1.2. Purpose of and Need for the Project**

The proposed project is an outgrowth of the I-15/Tropicana Interchange Feasibility Study and the Southern Nevada HOV Study Update, both prepared by NDOT in 2015. The I-15 Tropicana Interchange Feasibility Study identified four key benefits to traffic movement provided by the proposed improvements:

- Minimizing lane changing for HOVs on I-15 with the Harmon Ave HOV ramps
- Reducing traffic at the Tropicana Ave and Flamingo Rd interchanges with Harmon Ave HOV Ramps
- Reducing northbound CD road backup with second I-15 merge lane
- Releasing bottleneck on northbound CD road with improvements at Tropicana Ave interchange

Tropicana Avenue serves as the southern gateway to the resort corridor from the east and west valley, and it is a crucial access point connecting I-15 to the Las Vegas Strip, McCarran Airport, and UNLV. A combination of the following demonstrates the need for improvements at I-15/Tropicana Interchange:

- Roadway deficiencies will continue to contribute to congestion and travel delays
- Existing congestion will worsen with projected increases in both passenger vehicles and trucks along I-15 and Tropicana Avenue





- The higher crash rates experienced along Tropicana Avenue and I-15, compared to similar urban roadways in Nevada, make safety improvements a key need

Existing roadway deficiencies within the project limits, combined with high traffic volumes during the peak traffic periods (6:00 to 9:00 AM and 3:00 to 6:00 PM), are the primary contributors to traffic congestion and high crash rates in this corridor.

There is currently no direct HOV access provided to I-15 within the project limits. Instead, drivers access the HOV lanes through service interchanges which leads to vehicles weaving between the HOV lanes and four general-purpose lanes and one auxiliary lane to access on- and off-ramps. I-15 on-ramps that include ramp meters typically do not have HOV bypass lanes, although the I-15 on-ramps at Russell Road do provide HOV bypass lanes. The proposed direct-access HOV ramps would provide improved HOV access to the study area. It is expected that the direct-access HOV ramps at Harmon Avenue for NB exits and SB entrances would reduce travel time for transit vehicles and HOVs and would provide drivers with an incentive for transit use and ride sharing.

### **1.3. Study Corridor Traffic**

I-15 is functionally classified as “Urban Principal Arterial - Interstate” and Tropicana Avenue as “Urban Principal Arterial-Other.” The posted speed limits are 65 mph on I-15 and 35 mph on Tropicana Avenue. NDOT’s Traffic Records Information Access (TRINA) website reports average annual daily traffic (AADT) levels of 244,000 vehicles per day on I-15 south of Tropicana Avenue, and 87,000 vehicles per day on Tropicana Avenue east of I-15.

Harmon Avenue is an urban collector street that provides an east-west connection over I-15 within the study limits. Harmon Avenue is a six-lane facility that belongs to Clark County and serves as an entrance conduit to MGM’s City Center development east of I-15 and continues west to the Clark County’s proposed Harmon Avenue and Valley View Boulevard connector project. Lane widths correspond to Clark County standards with a single sidewalk over I-15 on the north side of Harmon Avenue. The posted speed limit is 35 mph. Traffic counts conducted in 2017 indicate that Harmon Avenue over I-15 is used by 480 vehicles in the EB direction, and 1,290 vehicles in the WB direction during the PM peak-hour.

Forecast traffic volumes for the year 2040 Build Alternative indicate that traffic levels on Harmon Avenue will increase to 1,260 in the EB direction, and 2,190 vehicles in the WB direction during the PM peak-hour. The forecasted year 2040 Build Alternative traffic volumes were 790 vehicles per hour for the NB HOV direct-access off-ramp and 1,160 vehicles per hour for the SB HOV direct-access on-ramp.

### **1.4. Review of Related Studies and Current Projects**

The I-15/Tropicana Interchange Feasibility Study identified over 50 alternative concepts to address existing design deficiencies and safety concerns at the I-15/Tropicana Avenue interchange. Throughout the study process, workshops were held with agency representatives from FHWA, NDOT, Clark County, and the Regional Transportation Commission (RTC). The Feasibility Study provides a detailed summary of



the project alternatives considered and rejected, as well as an explanation of the alternative development and evaluation process that was followed. The improvement concepts were evaluated and ranked under a specific set of evaluation criteria. Following on the recommendation of the Feasibility Study and including the refinements, the highest ranked alternative is a tight diamond interchange with a flyover from I-15 SB to Tropicana Avenue EB. A formal Environmental Assessment (EA) is currently underway for the project. This report was prepared assuming the EA results support the alternative from the Feasibility Study with the addition of the HOV access at Harmon Avenue.

The Southern Nevada HOV Study Update (2015) identified potential interchange locations on I-15 that should be considered to complete the southern Nevada HOV system. The study identified several locations, including Harmon Avenue at I-15, that would reduce traffic demand on local service interchanges. The Tropicana Avenue interchange would benefit from adjacent and separate freeway access for multi-modal vehicles (buses, commuter vans, etc.). NDOT reevaluated the HOV Study Update in 2018 based on new developments in the project corridor and public input received during the NEPA scoping. Revised recommendations for HOV ramp locations in the vicinity of Tropicana Avenue included connections at Harmon Avenue. The HOV connections at Harmon Avenue will be complemented by Clark County's planned extension of Harmon Avenue west over the Union Pacific Railroad (UPRR) tracks to connect with Valley View Boulevard.

As part of the NEPA process, several memorandums/reports listed below have been submitted to and approved by NDOT unless noted otherwise:

- Traffic Forecasting Methodology Memorandum, November 22, 2017
- Traffic Operations Methodology Memorandum, February 7, 2018
- Aimsun Next Base Model Development and Calibration Report, June 2018
- Traffic Operations Screening Methodology Memorandum, March 22, 2018
- Traffic Forecasting Memorandum, May 10, 2019
- Transportation System Performance Report, June 17, 2019
- Crash Analysis Report, May 31, 2018
- Crash Analysis Report Critical Crash Rate (CCR) Addendum, July 24, 2018
- Transportation Impact Analysis Report – Draft in progress

### **1.5. Study Scenarios & Study Area**

To assess the impacts of the project improvements at the I-15/Tropicana Avenue interchange and the direct-access HOV ramps at Harmon Avenue, a detailed traffic operational analysis was completed. For the proposed improvements, the opening year is 2020 and the design year is 2040. The traffic analysis was conducted for the following scenarios:

- 2017 Existing Conditions
- 2020 Opening Year No-Action
- 2020 Opening Year Build Alternative
- 2040 Design Year No-Action
- 2040 Design Year Build Alternative



It was decided by NDOT, along with FHWA, that the traffic analysis would be performed only for the highest peak period volumes, which in this case was the PM peak period. The PM peak period analyzed consisted of a four-hour time frame, from 3-7 PM. This four hour period included one hour for queue build-up, a two hour peak period, and one hour for queue dissipation.

The study area for traffic operation and safety analysis is shown in Figure 2.

Hacienda Avenue is included, as it was initially considered as a potential HOV ramp location. While it was not ultimately selected as an HOV interchange location, it was retained in all study network models.

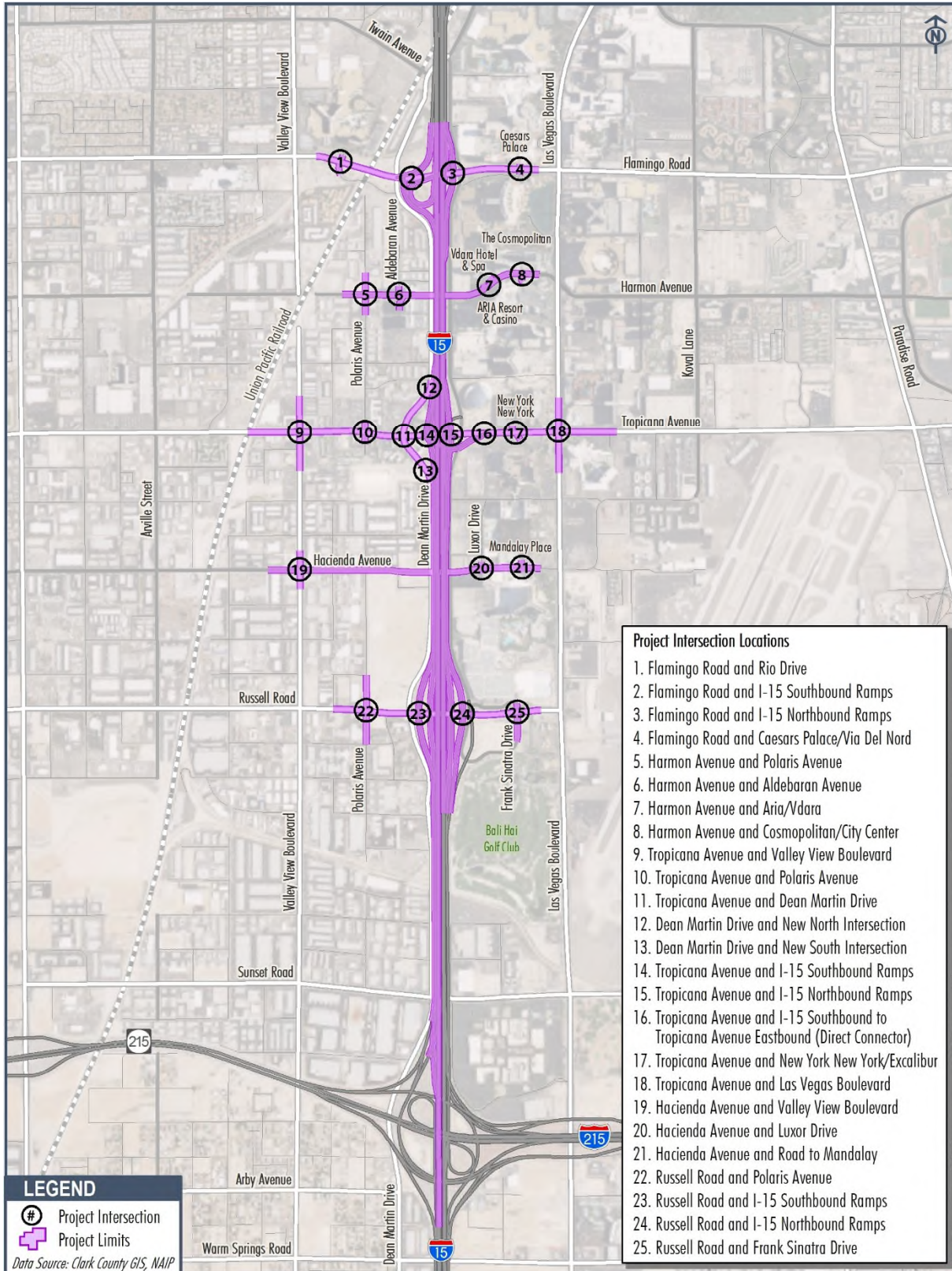


Figure 2: Project Study Area



## 2. STUDY METHODOLOGY

### 2.1. Data Collection

The study team gathered a wide range of traffic data to study the impacts of the proposed project. The traffic data was obtained from several sources:

- NDOT's short-term count stations and automated traffic recorders (ATRs)
- Field volume data collected as part of NDOT's Southern Nevada Traffic Study (SNTS)
- Field volume data collected for this project

### 2.2. Traffic Forecasting

The approved traffic forecasting and modelling methodology is documented in the project's *Traffic Forecasting Methodology Memorandum*, prepared by Jacobs Engineering Group dated November 22, 2017. The approved 2020 and 2040 traffic volumes for the No-Action and Build Alternatives are documented in the *Traffic Forecasting Memorandum*, prepared by Jacobs Engineering Group, dated May 10, 2019.

The basis of the 2020 and 2040 PM peak-hour traffic volumes was the SNTS Aimsun Next macro-model, provided to the design team by NDOT and calibrated to existing project conditions. The 2040 model volumes from Aimsun Next were verified and cross-checked with the accepted forecasted traffic volumes from the I-15/Tropicana Interchange Feasibility Study. Traffic forecasts were discussed with NDOT's Traffic Information Division to finalize the volumes for use in the operational analysis.

### 2.3. Traffic Operations Analysis

The approved traffic operations analysis methodology is documented in the *Traffic Operations Methodology Memorandum*, dated February 7, 2018. The memorandum explains the methodology and assumptions used for the traffic operations analysis, including measures of effectiveness agreed to during a coordination meeting with FHWA (Jan. 31 – Feb. 1, 2018). The results of the traffic operations analysis for 2017 Existing Conditions, 2020 No-Action Alternative, and the 2040 No-Action Alternative were included in the *Transportation System Performance Report* and approved by NDOT. The traffic operations analysis for the 2020 Build Alternative and the 2040 Build Alternative are documented in the *Transportation Impact Analysis Report* currently being prepared by CA Group.

The measure of effectiveness considered to determine the future traffic operations used the concept of "latent vehicles." Latent vehicles refer to the number of vehicles that are expected to be contained in the traffic simulation but are not simulated because of the limited physical capacity of the model network to process vehicles. The vehicles are outside the model primarily but not only because the entire road system is saturated. It could also be because operations at bottleneck locations near the boundaries of the model do not allow vehicles to go freely beyond those locations and in the absence of alternative routes, vehicles are backed up outside the model perimeter and unable to enter the network. If the bottleneck conditions were removed, the volume of the latent vehicles would see a significant reduction.



In addition to latent vehicles, Total Network Delay and Average Network Delay were also considered. Total Network Delay measures the amount of time each vehicle is delayed in the simulation and sums them all together into a single delay time. The better the network operates, the lower the delay time. Average Network Delay is a measure of the amount of (average) delay experienced by each vehicle in the simulation. The better the network operates, the lower the delay time.

Table 1 shows the network performance results comparison for the year 2020 No-Action and 2020 Build Alternatives. The Build Alternative performs better than the No-Action Alternative for all performance criteria.

**Table 1: 2020 Network Performance**

Parameter	2020 No-Action	2020 Build	Percent Decrease
Latent Vehicles (number of vehicles)	9,937	1	99%
Total Network Delay (hours)	17,043	7,509	44%
Average Network Delay (seconds per vehicle)	308	135	44%

Table 2 shows the network performance results for the year 2040 No-Action and Build Alternatives. The Build Alternative performs better than the No-Action Alternative for all performance criteria.

**Table 2: 2040 Network Performance**

Parameter	2040 No-Action	2040 Build	Percent Decrease
Latent Vehicles (number of vehicles)	29,956	222	99%
Total Network Delay (hours)	32,244	14,800	54%
Average Network Delay (seconds per vehicle)	487	223	54%

#### 2.4. Traffic Safety Analysis

The traffic safety analysis included analyzing the existing crash data for the three-year period from June 1, 2014, to June 1, 2017, and the results were documented in the *Crash Analysis Report* and subsequent *Critical Crash Rate Addendum*. The Predictive crash analysis from Part-C of Highway Safety Manual (HSM) was used to determine the effectiveness of the proposed improvements and revealed a total crash reduction of approximately 25 percent in the 2040 Build Alternative compared to 2040 No-Action condition.

However, the team did not identify any published document exclusively for the safety performance of direct-access ramps. NDOT’s Managed Lanes and Ramp Metering Manual states that direct access ramps reduce weaving across general-purpose lanes and promote time savings for managed lane volumes (<https://www.nevadadot.com/home/showdocument?id=4714>). The Washington State Department of Transportation’s states that an operational and safety benefit is expected since HOVs, including larger transit vehicles, no longer have to merge left and make multiple lane changes across the general purpose



lanes to access the HOV lane (<https://www.wsdot.wa.gov/travel/highways-bridges/hov/direct-access-ramps>).

The proposed direct-access ramps include a left-side off-ramp for NB traffic and a left-side merge for SB traffic (the left-side off-ramp and merge are typical with this design). However, the diverge and merge would be direct to the HOV lane, which would have lower densities than general-purpose lanes. Safety research indicates that a left-side freeway off-ramp has a crash modification factor (CMF) of 1.49, or a 49 percent increase in crashes (CMFClearinghouse.org, CMF ID: 2521), but these data are for general purpose traffic, not HOV-only traffic. When taking into consideration the HOV signs that will be installed, Nevada DOT expects that the direct-access ramps will have no adverse effect on crashes.

### 3. INTERSTATE SYSTEM CHANGE OF ACCESS REQUIREMENTS

The following section addresses compliance with the revised FHWA's policy Interstate Access Policy Points dated May 22, 2017, regarding requests for new/revised access to the existing interstate system.

#### 3.1. Policy Point Number 1

**Policy Point #1:** *An operation and safety analysis has concluded that the proposed access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, and ramps intersections with crossroad) or on the local street network based on both the current and planned future traffic projections.*

#### **Compliance with Policy Point #1**

The proposed changes in access at the NB CD Road entrance to I-15 and at the Harmon HOV ramps are recommended to enhance the operations of the interchange based on future traffic demands. Detailed results of the traffic operations analysis are included in the *Transportation System Performance Report and Transportation Impact Analysis Report*. The study area for the traffic analysis included the adjacent interchanges on I-15 at Flamingo Road to the north and Russell Road to the south, as well as the adjacent key intersections on Harmon Avenue and Tropicana Avenue immediately east and west of I-15.

The network performance from the traffic operations analysis showed that the Build Alternative which includes the proposed changed access points performs better than the No-Action Alternative for all performance criteria (Table 1 and Table 2).

Analysis of the 2020 No-Action Alternative indicated a Total Network Delay of 17,043 hours – significantly higher than 7,509 hours for the 2020 Build Alternative. Similarly, the Average Network Delay of 308 sec/veh in the No-Action Alternative is significantly higher than the 135 sec/veh for the 2020 Build Alternative.

Analysis of the 2040 No-Action Alternative indicated a Total Network Delay of 32,244 hours – significantly higher than 14,800 hours for the 2040 Build Alternative. Similarly, the Average Network Delay of 487



sec/veh in the No-Action Alternative is significantly higher than the 223 sec/veh for the 2040 Build Alternative.

The traffic safety analyses indicate that the Build Alternative will have less crashes compared to the No-Action Alternative.

A guide sign concept plan was developed for the project improvements to confirm that the interstate guide sign spacing and locations do not provide conflicting information to drivers and is feasible to be implemented within the existing right of way. The guide sign concept included signing for the Harmon Avenue direct-access HOV ramps and revised NB CD entrance to I-15 and is included in Appendix B.

In summary, the traffic analysis documented in the *Transportation System Performance Report and Transportation Impact Analysis Report* prepared as a part of this project indicates that the Build Alternative will outperform the No-Action Alternative.

### 3.2. Policy Point Number 2

**Policy Point #2:** *The proposed access connects to a public road only and will provide for all traffic movements. Less than “full interchanges” may be considered on a case-by-case basis for applications requiring special access, such as managed lanes (e.g. transit or high occupancy vehicle and high occupancy toll lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards.*

#### **Compliance with Policy Point #2**

The proposed project upgrades the existing interchange at Tropicana Avenue and I-15 and constructs a new half diamond HOV direct-access interchange at Harmon Avenue to improve traffic operations and safety while providing access to public roads for all traffic movements.

There is no change to the Tropicana Avenue interchange access from the existing condition.

The proposed modifications to the existing NB CD road entrance to I-15 will be accomplished as part of the interchange reconstruction, which includes pavement widening to meet all interstate standards. The modifications to the existing NB CD road entrance to I-15 are proposed to enhance the operation while maintaining the current location of the NB CD road entrance to I-15.

The new access to and from Harmon Avenue is proposed to be special-use HOV direct-access with two or more persons required for HOV compliance. The proposed interchange is less than a full interchange but meets the requirements for a partial interchange based on the restricted HOV access and is in compliance with this policy.

The Southern Nevada HOV Study evaluated a full HOV interchange at Harmon Avenue, it was not recommended over the half interchange configuration for several reasons. Chief among these reasons was the limitations of the adjacent roadway network to support the demands a full interchange would impose on it. Other future improvements recommended in the Southern Nevada HOV study will provide additional





connectivity to I-15 for HOV traffic. These future improvements are not included in the Tropicana I-15 project. The current design does not preclude the future construction of full interchange improvements, specifically a SB off-ramp and NB on-ramp for additional direct-access HOV connections to Harmon Avenue.

The HOV improvements were originally included in the No-Action analysis during the Feasibility Study and were assumed to be built as a standalone project. NDOT determined that to minimize disruption to the I-15 corridor and to expedite the HOV ramp construction, improvements to both the Tropicana Avenue interchange and the Harmon Avenue direct-access HOV ramps should be developed concurrently.

Harmon Avenue is a public street owned and maintained by Clark County. Harmon Avenue provides access to residential and commercial properties on the east and west sides of I-15.

The proposed improvements will be designed to meet or exceed current standards for Federal-aid projects on the Interstate system with minor exceptions. The *Design Exceptions Memo, dated April 12, 2019* identified two requested design exceptions for improvements along Harmon Avenue.

1. The proposed HOV direct-access ramps at Harmon Avenue will be constructed in the median between the NB and SB travel lanes on I-15. The desired inside and outside shoulder widths are 4 feet and 8 feet respectively. The current design provides a minimum two-foot inside shoulder and an outside shoulder of 6 feet on the NB off-ramp and SB on-ramp. With this design exception, no new right-of-way is required for placement of these ramps.
2. The Harmon Avenue HOV direct-access ramps will have a 420-foot vertical sag curve, which is adequate for a 40-mph design speed. At the physical gore, the ramp is designed to have a 50-mph design speed which would require a 534-foot vertical sag curve. Lengthening the curve to 534 feet would extend the gore areas further south or would require increasing the ramp grade to move the curve north. The design exception is mitigated with the area being well lit by high-mast lighting and high levels of surrounding ambient light, minimizing the safety/headlight sight distance concerns.

The proposed partial interchange at Harmon Avenue for HOV access will provide connections to/from the south on I-15. HOV traffic to/from the north will be able to use the existing interchange at Flamingo Road 0.5 miles to the north or the reconstructed Tropicana Avenue interchange 0.5 miles to the south. Existing I-15 route signing should provide guidance to these interchanges and access to I-15.

## **4. SUMMARY AND CONCLUSIONS**

### **4.1. Summary**

This CCOAR documents the various tasks that NDOT and the study team have completed to develop the desired Tropicana Interchange improvements and direct-access HOV ramps at Harmon Avenue along I-15 in Las Vegas, Nevada. The proposed new HOV interchange was analyzed for two future year scenarios, 2020 opening year and 2040 design year, to accommodate expected traffic growth. The direct-access HOV



ramps would provide improved local access for transit vehicles and HOVs, and encourage rideshare or transit use.

A key component of this CCOAR is the discussion of the various tasks that the study team completed to show compliance with each of the FHWA's two change of access policy points.

The traffic operation analysis documented in the *Transportation System Performance Report and Transportation Impact Analysis Report* indicates that the Build Alternative will outperform the No-Action Alternative. The performance measures included:

- The Build Alternative has 99% less latent vehicles compared to No-Action Alternative
- Total Network Delay in the Build Alternative is 44% (2020) and 54% (2040) less compared to the No-Action Alternatives
- The year 2020 Build Alternative has an Average Network Delay of 135 sec/veh compared to 308 sec/veh in the No-Action Alternative. A similar trend was observed in the year 2040 with an Average Network Delay of 223 sec/veh in the Build Alternative compared to 487 sec/veh in the No-Action Alternative

The safety analysis indicated that the addition of the project improvements and direct-access HOV ramps at Harmon Avenue would reduce the total number of crashes by 25 percent in the year 2040.

#### **4.2. Conclusions**

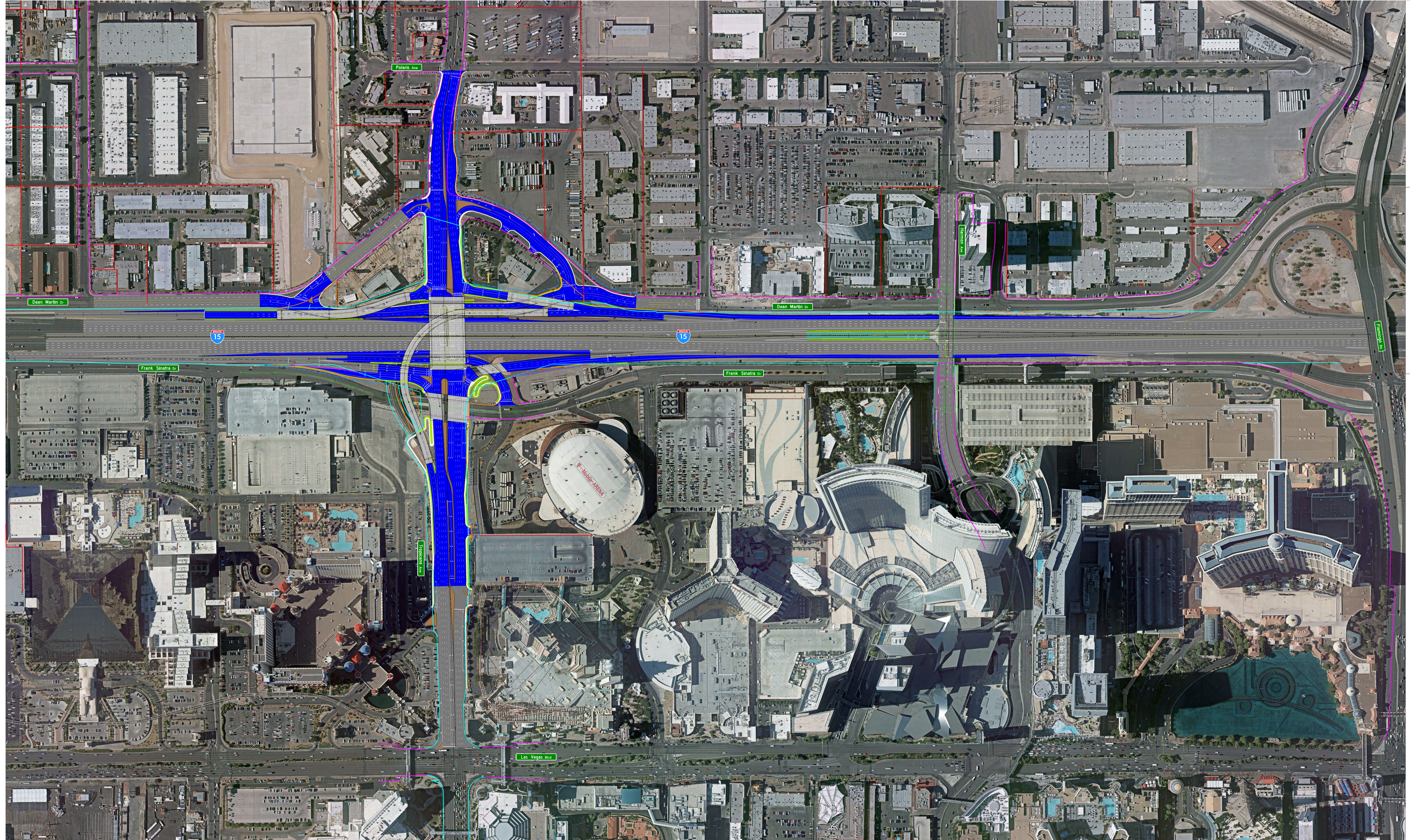
The proposed improvements at the I-15 and Tropicana Avenue interchange, the NB CD entrance to I-15, and the new direct-access HOV ramps at Harmon Avenue will improve traffic operations on I-15, the NB CD, and Tropicana Avenue. This Change in Control of Access Request is aligned with FHWA's goals for the I-15 interstate system as an interstate commerce corridor and will result in improved future operations. The proposed changes have been shown to considerably improve traffic operations and traffic safety of the interchange and adjacent roadways in the study area and are consistent with both land and transportation plan uses. The HOV direct-access ramps at Harmon Avenue comply with the Southern Nevada HOV Study Update (2015) and its 2018 re-evaluation recommendations. Based on the information presented in this report, an FHWA approval of this Change in Control of Access is requested.



# Appendix A

## Preliminary Design Concept





I-15 Tropicana  
Interchange  
Reconstruction  
and  
Harmon HOV  
Ramps

NORTH

**PRELIMINARY  
ONLY**

SUBJECT TO REVISION

-LEGEND-

- MILL AND OVERLAY
- NEW PAVEMENT
- HOV RAMP
- NEW BRIDGE
- EXISTING RIGHT-OF-WAY (INDOT)
- EXISTING RIGHT-OF-WAY (CCI)
- PROPERTY BOUNDARY
- PROPOSED RIGHT-OF-WAY
- PROPOSED TCE



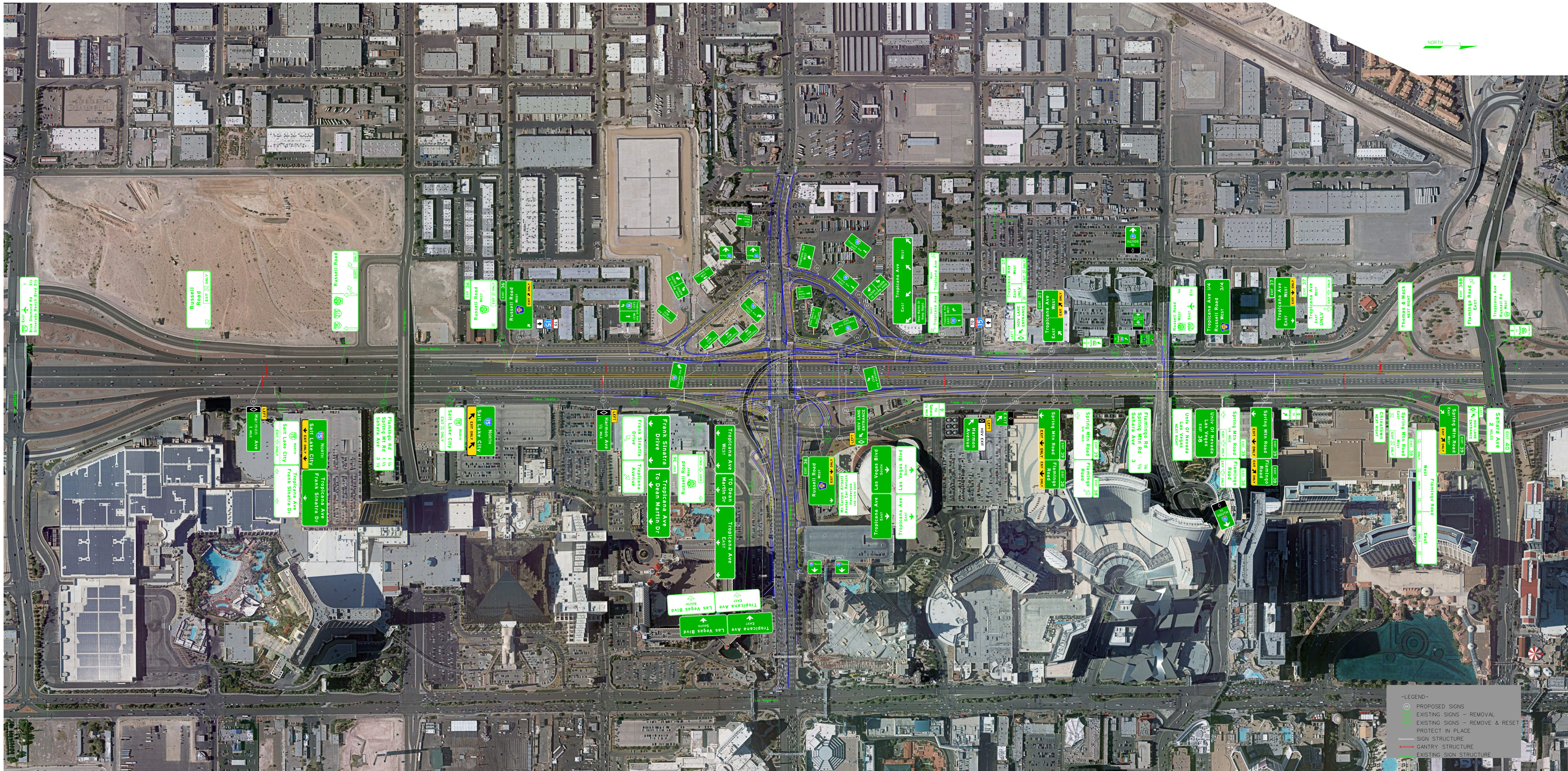


# Appendix B

## Guide Sign Concept Plan







- LEGEND—
- PROPOSED SIGNS
  - EXISTING SIGNS - REMOVAL
  - EXISTING SIGNS - REMOVE & RESET
  - PROTECT IN PLACE
  - SIGN STRUCTURE
  - GANTRY STRUCTURE
  - EXISTING SIGN STRUCTURE





