

BOARD OF REGENTS BRIEFING PAPER

1. AGENDA ITEM TITLE: Clark County Elevated Expressway Project Update, UNLV

MEETING DATE: November 16, 2018

2. BACKGROUND & POLICY CONTEXT OF ISSUE:

Background

Over the past several years, Clark County undertook a process for the planning of a potential elevated expressway. UNLV was a participant and stakeholder in this process, including in the Transportation Investment Business Plan (“**TIBP**”) and the Southern Nevada Tourism Infrastructure Committee (“**SNTIC**”).

The Clark County effort for the planning and development of an elevated expressway had primarily been focused on improving vehicular movement in the central hospitality area near the Las Vegas Strip, and to/from McCarran International Airport. The elevated expressway as originally presented had two components—one component in the area west of the UNLV Maryland Campus (generally in the Swenson Street/Paradise Road area between Hacienda Avenue and Sands/Twain Avenue), and the second component generally on Koval Lane between Sands Avenue and Tropicana Avenue. It was the University administration’s understanding that, in December 2017, Clark County decided not to pursue the planning and development of this elevated expressway.

Rather, in January 2018, representatives from Clark County informally advised UNLV that they were considering planning a modified elevated expressway with a reduced scope from the original proposal. Clark County initially met with UNLV in May 2018 to share information on their planning work for a reduced scope elevated expressway (also known as the “Clark County Tropicana/Swenson Grade Separation Project”), generally in the area of Swenson Street/Paradise Road area between Hacienda Avenue and Naples Street (hereinafter, the “**Elevated Expressway**”).

Following the May 2018 meeting, UNLV advised Clark County that while it understands Clark County’s desire to improve vehicular movement at the Tropicana/Swenson intersection, it also had concerns about potential adverse impacts on UNLV. Moreover, UNLV expressed its desire to work with Clark County to mitigate these impacts while acknowledging the need to improve vehicular movement in this area.

Concurrent with these discussions, UNLV had engaged a consulting team as follows: (1) Kimley-Horn and Associates, Inc. (focused on traffic/access assessments, traffic/improvement options/alternatives and physical modeling); (2) the JARrett Company (focused on economic and related impacts with respect to noise, land-use, and other items); and (3) CSL International (focused on economic and related impacts with respect to signage, branding, and digital advertising). The Summary of UNLV Commissioned Impact Studies is incorporated hereto as “**Attachment 1.**” Moreover, the consultant reports are incorporated hereto as “**Attachments 2-4,**” respectively. The overall purpose of these consultant engagements has been to assist UNLV in assessing access, ingress, egress, visibility, view-shed, economic, brand, noise, land-use, business and other impacts to UNLV that may occur (collectively the “**Impact Study**”) from the Elevated Expressway plan.

Discussions on the Elevated Expressway between NSHE/UNLV and Clark County have been ongoing since the May 2018 meeting, including an information update provided to the Board of Regents at its October 19, 2018 meeting. During the meeting, several Regents expressed concerns related to the visibility, perception, and other potential impacts on UNLV as a result of the Elevated Expressway—notwithstanding any traffic, congestion or access benefits the Elevated Expressway is projected to provide.

Information Update

UNLV has completed the Impact Study conducted by the engaged consulting team, with each of the three consultants delivering a report on their respective scope of work and area of focus. The Impact Study identified the major impacts of the Elevated Expressway project in the following areas:

- Traffic and access
- Economic and related impacts, with respect to noise, land-use, visibility, view-shed and other items
- Economic and related impacts, with respect to signage, branding, digital advertising

In addition, the consultants proposed a number of alternatives and measures that could reduce or mitigate the negative impacts of the Elevated Expressway to UNLV, and potentially to other entities who may have an interest in mitigating these impacts to a major Southern Nevada gateway and visitor entry.

By way of this update, UNLV continues to update the NSHE and Board of Regents on the Elevated Expressway project and the items of interest and concern to UNLV. UNLV also continues to welcome the Board's input on this project related to the development of a process for collaboration between UNLV and Clark County—in our ongoing effort to support the goals of Clark County and UNLV, to reach an outcome that addresses the needs and concerns all project stakeholders.

In summary, UNLV understands Clark County's focus on improving traffic in this area for their stakeholders, including UNLV, and that the Elevated Expressway as proposed for traffic improvements also presents significant issues to UNLV's brand, presence, visibility, view-shed, perception and specific economic/business/operational items. UNLV's ultimate goal remains to collaborate with Clark County to achieve desired traffic improvements, and to eliminate or successfully mitigate any negative impacts to UNLV related to traffic/congestion improvement measures.

3. SPECIFIC ACTIONS BEING RECOMMENDED OR REQUESTED:

UNLV Acting President Marta Meana will present an update related to the Elevated Expressway project in the Swenson Street/Paradise area between Hacienda Avenue and Naples Street.

4. IMPETUS (WHY NOW?):

Clark County has recently been engaged in the planning/design process for the Elevated Expressway project, subject to the project having been placed in a hold status on October 5, 2018 by the Chair of the Clark County Board of County Commissioners, as impacts to UNLV are assessed and mitigated in concert with addressing traffic, congestion and mobility improvements. Furthermore, UNLV has completed its Impact Study on the Elevated Expressway. On this basis, it is timely for the Board of Regents to receive another information update on this item and to provide additional input and guidance.

5. CHECK THE NSHE STRATEGIC PLAN GOAL THAT IS SUPPORTED BY THIS REQUEST:

- Access (Increase participation in post-secondary education)
- Success (Increase student success)
- Close the Achievement Gap (Close the achievement gap among underserved student populations)
- Workforce (Collaboratively address the challenges of the workforce and industry education needs of Nevada)
- Research (Co-develop solutions to the critical issues facing 21st century Nevada and raise the overall research profile)
- Not Applicable to NSHE Strategic Plan Goals

INDICATE HOW THE PROPOSAL SUPPORTS THE SPECIFIC STRATEGIC PLAN GOAL

This item does not directly relate to a specific NSHE strategic plan goal(s). Rather, this item is expected to impact traffic, visibility, view-shed, noise, vibration and/or other items in the area adjacent to the UNLV Maryland Campus, UNLV Paradise Campus and the UNLV 42 acre site near Tropicana Avenue and Koval Lane. Arguably, however, adverse impacts on the image, visibility and view-shed, among other items, of UNLV, could negatively impact UNLV's ability to:

- Attract and retain students and faculty,
- Maintain and expand its connection with the community,
- Maintain and improve UNLV's future appeal as a venue/location for athletic, special and community events.

6. BULLET POINTS TO SUPPORT REQUEST/RECOMMENDATION:

- N/A – this is for information only.

7. POTENTIAL ARGUMENTS AGAINST THE REQUEST/RECOMMENDATION:

None noted.

8. ALTERNATIVE(S) TO WHAT IS BEING REQUESTED/RECOMMENDED:

None.

9. RECOMMENDATION FROM THE CHANCELLOR'S OFFICE:

10. COMPLIANCE WITH BOARD POLICY:

<input type="checkbox"/> Consistent With Current Board Policy: Title # _____ Chapter # _____ Section # _____
<input type="checkbox"/> Amends Current Board Policy: Title # _____ Chapter # _____ Section # _____
<input type="checkbox"/> Amends Current Procedures & Guidelines Manual: Chapter # _____ Section # _____
<input type="checkbox"/> Other: _____
<input type="checkbox"/> Fiscal Impact: Yes _____ No _____ Explain: _____



Attachment 1
Clark County Elevated Expressway Project Update
Summary of UNLV Commissioned Impact Studies

UNLV has completed the study conducted by the engaged consulting team, with each of the three consultants delivering a report on their respective scope of work and area of focus (collectively referred to as the “**Impact Study.**” The Impact Study studied and identified the major impacts of the Elevated Expressway project in the following areas:

1. Traffic and access study conducted by Kimley-Horn and Associates, Inc.
2. Economic and related impacts (i.e., noise, land-use, visibility, and view-shed) conducted by JABarrett Company.
3. Economic and related impacts (i.e., signage, branding, and digital advertising) conducted by CSL International.

In addition, the consultants proposed a number of alternatives, options, and measures that could reduce or mitigate the adverse impacts of the Elevated Expressway to UNLV.

Below is UNLV’s summary of the consultant’s findings noted in their Impact Study reports.

Impacts

1) Traffic and access:

- The Elevated Expressway is projected to provide significant benefits in moving traffic through Tropicana Avenue/Swenson Street and Tropicana Avenue/Paradise Road intersections, particularly moving grade separated traffic westbound on Tropicana Avenue and northbound on Swenson Street. The vehicles using the Elevated Expressway are largely projected to be non-UNLV bound traffic.
- Moving significant non-UNLV bound traffic through the noted intersections in a grade separated fashion is likely to generally improve traffic congestion at the reconstructed at-grade intersections impacted by the Elevated Expressway. This element of the Elevated Expressway is projected to also improve day-to-day typical access to the UNLV Maryland Campus from the at-grade Tropicana Avenue/Swenson Street intersection.
- Initial, preliminary and limited analysis suggests that the Elevated Expressway is not expected to adversely impact athletic, special or community event ingress and egress to the UNLV Thomas and Mack Center, or other campus event centers. This needs more study

and analysis, particularly related to opportunities for additional turn lanes, as noted below, downstream traffic weaving and other items.

- Roadway improvements of any nature at the Tropicana Avenue/Swenson Street intersection, be it an Elevated Expressway or another improvement, should include consideration of a third left turn lane from Tropicana Avenue eastbound to Swenson Street northbound, for eastbound event and other traffic from the Las Vegas Strip to the UNLV Thomas and Mack Center and other UNLV event and campus center destinations. The current Elevated Expressway design, or other roadway improvements in the area, does not include this item.
- Concerns exist related to ‘downstream’ impacts of the ‘free-flow’ traffic conditions created at the Elevated Expressway to other intersections that provide meaningful UNLV campus and property access, i.e. Swenson Street/Harmon Avenue, Tropicana Avenue/Deckow Lane and Tropicana Avenue/Koval Lane. Most notably, moving traffic more quickly through the noted grade separated intersections may have significant traffic and/or congestion impacts on these ‘downstream’ intersections.

2) Economic and related impacts, with respect to noise, land-use, visibility, view-shed and other items:

- The Elevated Expressway is projected to have significant adverse visibility, view-shed, noise, vibration, land-use and other impacts to the UNLV Maryland and Paradise campuses, resulting in an estimated \$10M - \$13M adverse economic impact and/or loss of value to its current land value and function of existing facilities, excluding economic impacts with respect to signage, branding, digital advertising.
 - i) When including economic impacts with respect to signage, branding, digital advertising, the total adverse economic impact and/or loss of value to its current land value and function of existing facilities is estimated at approximately \$11.5M - \$14.5M.
- Based on US Federal Highway Administration (“FHWA”) standards/information, additional adverse property value impacts may potentially occur for UNLV campuses and properties adjacent to the Elevated Expressway.
- The Elevated Expressway threatens the visibility, view-shed and ‘imageability’ of adjacent and proximal UNLV campuses and properties, generally, related to UNLV’s connection to the community and with respect to UNLV Top Tier/NSHE strategic goal pursuits.
- UNLV faces significant potential adverse impacts during the construction period of an Elevated Expressway.
- Potential adverse social and public safety issues at areas adjacent to and beneath the Elevated Expressway exist, if this project is undertaken. These potential adverse issues include:
 - i) Reduced general visibility, and areas being created that are protected from the elements yet not intended for occupancy, potentially leading to increases in criminal activity, blight and adverse behaviors/activities (i.e., graffiti, squatting, other items) in main frontage areas of UNLV properties and campuses.
 - ii) Reduced visibility/connection between UNLV campuses and properties, to adjacent properties and the community, posing a significant risk of UNLV becoming disconnected from the community it serves.

3) Economic and related impacts, with respect to signage, branding, digital advertising:

- The existing UNLV marquee and billboards at the Tropicana Avenue/Swenson Street intersection are significantly negatively impacted through visibility reductions in the 100 foot to 1,000 foot visibility range, with a projected 78% reduction of visibility in this range.
- UNLV branding visibility and value (through visibility of facilities such as the Thomas and Mack Center, Cox Pavilion, Mendenhall Center, UNLV signage, etc.) at the Tropicana Avenue/Swenson Street is significantly negatively impacted through visibility reductions in the 100 foot to 1,000 – 1,500 foot visibility range, with a projected 84% reduction in visibility/branding in this range.
- UNLV marquee and billboard value at the Tropicana Avenue/Swenson Street intersection are projected to be significantly negatively impacted by the Elevated Expressway project, with an estimated reduction in present day value of these assets between approximately \$1.13M – an 83% reduction in estimated present day value.
- UNLV branding value at the Tropicana Avenue/Swenson Street intersection is projected to be significantly negatively impacted by the Elevated Expressway project, with an estimated reduction in present day value of this asset of approximately \$270k - an estimated 81% reduction in present day value.

Alternatives and Mitigation Options/Measures

In light of both the traffic improvements and adverse impacts that the Elevated Expressway is projected to result in for UNLV, there are available project alternatives and mitigation measures available for this project that would reduce or eliminate adverse impacts, to differing degrees. Mitigation and compensation measures would need to be assessed for effectiveness (i.e., compensation in lieu of restoring a loss or prior condition, which may or may not be a desirable outcome.) Some specific options for project alternatives and mitigation measures include:

- Constructing the above grade roadway improvements adjacent and proximal to UNLV as below grade roadway improvements, similar to the portion of the current Elevated Expressway plan at the Tropicana Avenue/Paradise Road improvements currently planned.
- Compensation to UNLV to reasonably eliminate or offset adverse land-use, property value, facility, visibility, view-shed, branding, noise, vibration, economic, branding and other adverse impacts.
- Addressing some impacts in specific manners to restore or provide enhancements to diminishments to current prior function, value or condition (i.e. height or location adjustments to signage, billboards and marquees, landscaping improvements and screening measures to restore edge/boundary conditions).
- Study and implementation of a Transportation Demand Management (TDM) program, with all necessary stakeholders, to improve traffic, congestion and mobility in a more comprehensive fashion.
- Consideration of at-grade improvements (i.e., third turn lane from eastbound Tropicana Avenue to northbound Swenson Avenue, other measures) that would improve access to UNLV.
- Study and improvements to ‘downstream’ intersections that service and impact UNLV, which may be adversely affected by the Elevated Expressway project (Swenson

Street/Harmon Avenue, Tropicana Avenue/Deckow Lane and Tropicana Avenue/Koval Lane.)

- Meaningful consideration of aesthetic and mitigation related design, features and components of any potential at-grade or above-grade roadway improvements, surfaces, edges and boundaries.
- Other items upon further study and analysis.

Some of these mitigation measures for adverse impacts to UNLV may have meaningful impacts on Elevated Expressway or other project approach planning and delivery, which would need to be assessed.

While UNLV has significant concerns regarding the Elevated Expressway having adverse impacts to UNLV's campuses and properties, UNLV also believes that, aside from the traffic, congestion and mobility benefits it is projected to provide at two major intersections, the Elevated Expressway may pose potential significant concerns and issues to other stakeholders, including:

- a) Adverse 'downstream' impacts of the 'free-flow' traffic conditions created at the Elevated Expressway to other intersections that provide meaningful community and hospitality corridor access, i.e. Swenson Street/Harmon Avenue, Tropicana Avenue/Deckow Lane, Tropicana Avenue/Koval Lane and other 'downstream' intersections. Most notably, moving traffic more quickly through the noted grade separated intersections may have significant congestion impacts on 'downstream' intersections that may not yield overall traffic, congestion and mobility benefits.
- b) The community and visitor experience of entering a major Southern Nevada gateway at the proposed Elevated Expressway location may not be consistent with the expectations of entering a premier international urban hospitality destination. This may detract from the opportunities Southern Nevada has to create a full, comprehensive and suitable quality community and hospitality experience, through this gateway area, to its citizens and guests.

Studying and implementing a TDM program or other alternate options, to improve traffic, congestion and mobility in a comprehensive fashion and to consider existing and emerging transportation and mobility options/systems, may be a more effective way to provide solutions that are supportive of all stakeholder needs, compared to an Elevated Expressway. Components of a TDM program or other alternate options could include items such as:

- High capacity transit (public, private or public-private partnership options).
- Semi-autonomous or autonomous vehicle systems/networks.
- Subsurface express transportation.
- Surface local transportation.
- Other components.

UNLV recognizes that alternative solutions consistent with a TDM program or other alternate approaches may require capital and/or operating cost investments/allocations greater than current assigned resources for the Elevated Expressway project, as well as further feasibility assessments.

TRAFFIC REVIEW REPORT

**TROPICANA-SWENSON ELEVATED
ROADWAY**

Prepared for:

University of Nevada Las Vegas
4505 S. Maryland Parkway
Las Vegas, NV 89154

Prepared by:

Kimley»»Horn

October 2018

092751017

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TRAFFIC REVIEW REPORT

FOR

TROPICANA-SWENSON ELEVATED ROADWAY

Prepared for:

University of Nevada Las Vegas
4505 S. Maryland Parkway
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Prepared by:

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October 2018
092751017

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1. EXECUTIVE SUMMARY

The findings of the conducted review of the proposed elevated roadway includes the following based on the limits of available information during the evaluation and limits of the study itself:

- The proposed elevated roadway improvements will reduce existing traffic congestion at the at grade Tropicana Avenue / Paradise Road and Tropicana Avenue / Swenson Street signalized intersections and are expected to improve traffic flows to and from Thomas and Mack Center parking lots of the UNLV campus.
- It is recommended that the addition of eastbound to northbound triple left turn lanes at the Tropicana Avenue / Swenson Street intersection be considered if any road network improvements are to be made in this area.
- Further consideration should be given to the effects of the free-flow conditions of the elevated roadway at the downstream intersections of Tropicana Avenue and Koval Lane, as well as Swenson Street and Harmon Avenue.
- To further understand the visual impacts of the project, a photo simulation of aesthetic treatments to the proposed elevated roadway project should be conducted.

2. BACKGROUND

Kimley-Horn and Associates, Inc. has been retained by the University of Nevada Las Vegas (UNLV) to prepare a review of the vehicle access impacts to the UNLV campus as a result of the proposed Tropicana-Swenson Elevated Roadway project. The specific scope of this review is to include the following:

- Background review of relevant studies,
- Traffic analysis of Thomas and Mack Center event operations
- Summarize impacts of the proposed elevated roadway to UNLV traffic patterns

Conceptual plan and profile exhibits of the elevated roadway project are provided in **Appendix A**. To further understand the project the County presentation of before and after exhibits from the October 19, 2018 Board of Regents meeting are provided in **Appendix B**. The purpose of this review is to conduct an independent evaluation of the existing and future traffic conditions with respect to the UNLV campus and compare the findings to those identified by CH2M in the technical memorandum *Tropicana/Swenson Grade Separation Future Year Traffic Analysis* dated September 2018 as prepared for Clark County. The CH2M study is included in **Appendix C**. The review is to also identify additional traffic issues for UNLV and Clark County consideration as a result of the construction of the elevated roadway project.

In 2014 UNLV requested Kimley-Horn to identify and review alternatives to realign Swenson Street to the west. Three at-grade solutions were developed to relocate Swenson Street and its intersection with Tropicana Avenue with the primary purpose to expand the contiguous land area of the UNLV campus. These improvements generally maintained the existing traffic conditions along Tropicana Avenue. The July 15, 2014 memorandum review discussing these concepts are provided in **Appendix D**.

In addition to the at grade relocated intersection solutions, other alternatives have been explored over the years including below and above grade alternatives to separate the high-volume traffic movements along Tropicana Avenue. In the 2012 UNLV Master Plan, event traffic at UNLV from the Thomas and Mack Center and a proposed college football stadium were reviewed. Traffic evaluation from the Master Plan recommended the installation of triple left turn lanes for the east to north left at Swenson Street and for the west to south left at Paradise Road along Tropicana Avenue, in effect widening the roadway to the north for an additional turn lane in the median. The November 2012 *UNLV Master Plan Update – Preliminary Traffic Evaluation* traffic mitigation map is included in **Appendix E**.

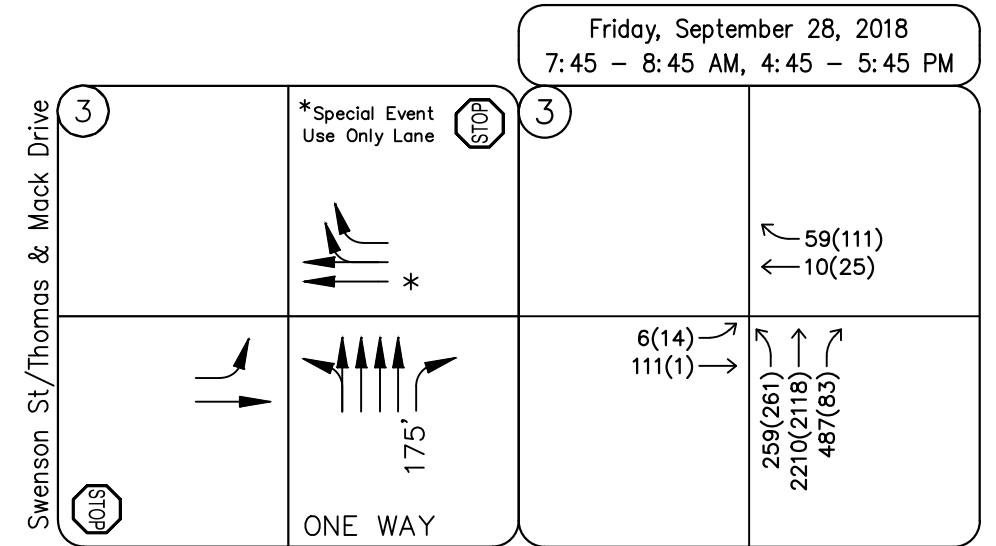
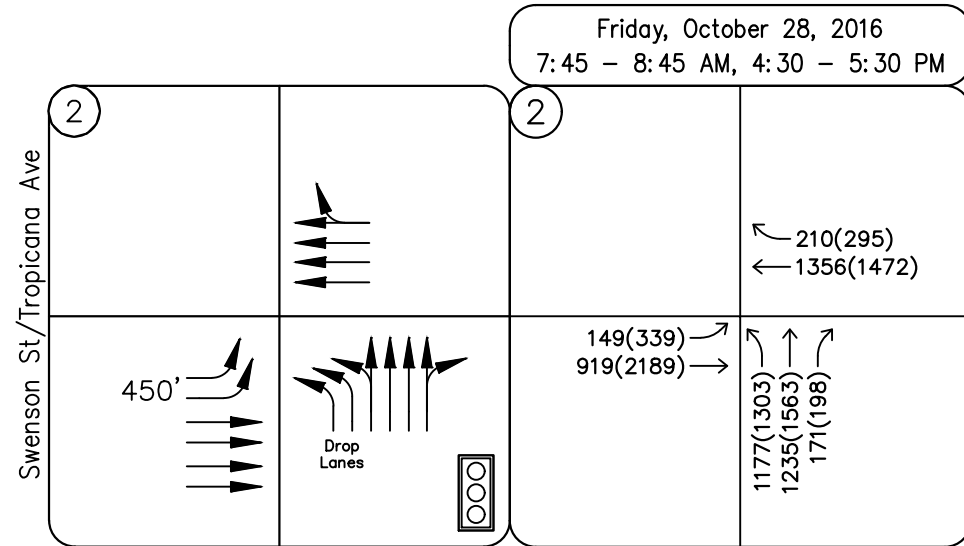
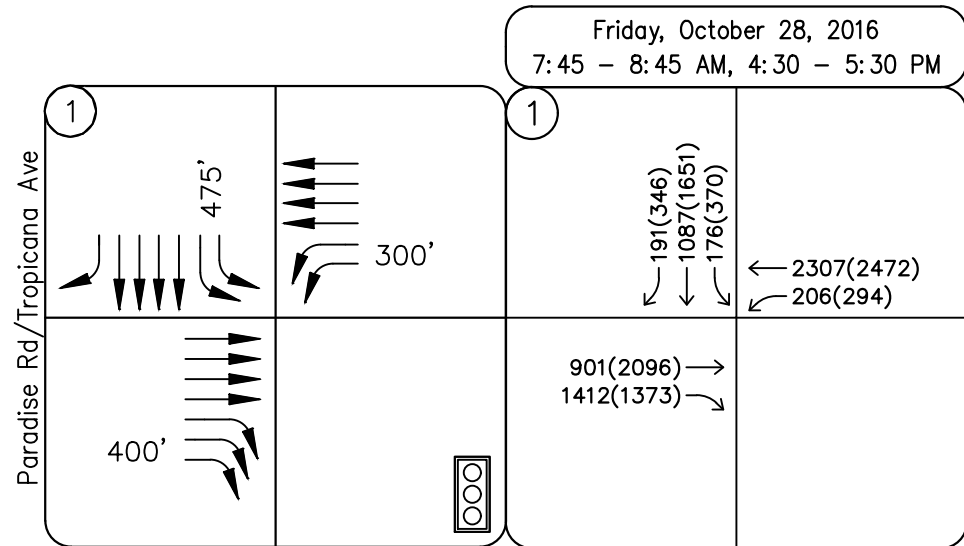
2.1. Existing Conditions

The existing peak hour turning movement volumes were identified in the CH2M study to occur on Fridays between 7:30-8:30AM and 4:30-5:30PM. CH2M identified these peak hours by utilizing historical hourly data from the Nevada Department of Transportation (NDOT) to identify the overall peak hour in the study area. The CH2M study is based upon data collected in October 2016. Kimley-Horn obtained the original Friday peak hour (10/28/16) source counts of the study intersections of Swenson Street and Paradise Road with Tropicana Avenue. Existing traffic volumes are included in **Appendix F**. AADT counts were similarly obtained independently from NDOT, the source used in the CH2M study. Selected NDOT AADT volumes are also provided in **Appendix F**.

Existing turning movement counts for the intersections of Paradise Road / Tropicana Avenue and Swenson Street / Tropicana Avenue from Friday, October 28, 2016 were used in the review. The AM peak hour for both study intersections was found to be 7:45AM-8:45AM and the PM peak hour was found to be 4:30PM-5:30PM. Average Annual Daily Traffic (AADT) volumes from 2015 and 2016 from NDOT count stations on Swenson Street, both north and south of Tropicana Avenue and on Tropicana Avenue, west of Swenson Street were included in the review. The existing peak hour and AADT volumes are summarized on **Figure 1**.

In order to aide in the determination of the vehicle demands for UNLV on Swenson Street, existing turning movement volumes were collected at the intersection of Thomas and Mack Drive and Swenson Street on Friday, September 28, 2018. The peak hour count volumes are included on **Figure 1**. The turning movement counts at the intersection indicate that approximately 250 vehicles per hour (vph) turn left at Thomas and Mack Drive, towards the airport TNC staging lot. The TNC lot was not in use during the CH2M 2016 counts. Additionally, approximately 500 vph turn right into the University at Thomas and Mack Drive during the AM peak hour. It should be noted that the peak school hour has been determined to be 9AM-10AM on Wednesdays, based on past UNLV Master Plan studies. The Friday counts are considered to represent only a portion of the peak UNLV vehicle traffic that uses Swenson Street as a route to/from UNLV.

In addition, the Friday AM and PM peak hour counts do not appear to account for Thomas and Mack event traffic. The 2012 background aerial photo utilized in **Figure 1** illustrates a Thomas and Mack event and the event traffic queued eastbound on Tropicana Avenue turning north onto Swenson Street.



AADT estimates obtained from by Nevada Department of Transportation (NDOT) count stations data.

Tropicana Avenue Count Station 2015* Data: 0030260 (0.1 mi E of Paradise Road)

North Swenson Street Count Station 2016 Data: 0030772 (300 ft N of Tropicana Avenue)

South Swenson Street Count Station 2016 Data: 0030770 (2,000 ft S of Tropicana Avenue)

*Note: Airport connector construction during 2016 may have diverted traffic to Tropicana Avenue, increasing AADT volumes for 2016, so 2015 volumes were used for estimations.



LEGEND

←XX(X) AM(PM) PEAK HOUR VOLUME

Photo Date: 2012 (used to highlight Thomas & Mack event traffic)

EXISTING ROADWAY - FRIDAY TRAFFIC VOLUMES

FIGURE 1 (10/31/2018)



Date: October 30, 2018 - 4:54pm / User: Taylor,Dunkle / Path: C:\Users\taylor.dunkle\AppData\Local\Temp\AcPublish_114380\Figures.dwg

3. ANALYSIS FINDINGS

This section of the review details the methodology and findings of the analysis completed by Kimley-Horn, independent of the CH2M study.

3.1. Project Redistribution of Existing Traffic

In order to determine the volume of northbound through vehicles on Swenson Street at Tropicana Avenue after the buildout of the elevated roadway project, Kimley-Horn studied the downstream intersection of Swenson Street and Thomas and Mack Drive. As seen in **Figure 1**, approximately 750 vehicles do not travel past Thomas and Mack Drive on Swenson Street during the AM peak hour. Due to access to University parking at Thomas and Mack to the east and the McCarran Airport TNC staging lot to the west, UNLV traffic on Swenson Street is expected to primarily approach from the west and south, while the TNC staging lot is expected to follow the existing trend of all turning movements at the intersection of the Swenson Street and Tropicana Avenue intersection. From existing distributions, it is anticipated that approximately 650 vehicles in the AM peak hour and 250 in the PM peak hour would not utilize the elevated roadway overpass and instead travel north on Swenson at grade to access the University or the TNC staging lots west of UNLV. Additionally, since the TNC lot airport staging was not operational during the 2016 count period, the distributed TNC trips were added to the existing 2016 counts at Swenson Street and Tropicana Avenue for the project redistribution traffic evaluation.

Recognizing the limited development between the beginning and end of the westbound elevated roadway, an estimate of 10% of the existing Swenson Street north to west traffic at Tropicana Avenue was considered to remain on grade with the elevated roadway project.

Figure 3 summarizes the redistributed existing 2018 traffic volumes (peak hour and AADT) with the construction of the elevated roadway project adjacent to the UNLV campus.

3.2. Thomas and Mack Event Traffic

The 18,000-seat arena on the UNLV campus, Thomas and Mack, hosts approximately 150 events per year. Arena events create different traffic patterns and demands than typical Friday peak hours. The type of events and number of attendees all impact the traffic demands for events at Thomas and Mack. For example, these events include various concerts, touring productions, sporting events, and high school and UNLV graduations.

It was beyond the scope of this review to estimate the specific special event traffic volumes at UNLV and the Thomas and Mack Center for the numerous types and size of events that occur throughout the year, however observations as studied in the previously mentioned November 2012 *UNLV Master Plan Update – Preliminary Traffic Evaluation* report are shown below in **Figure 2**.

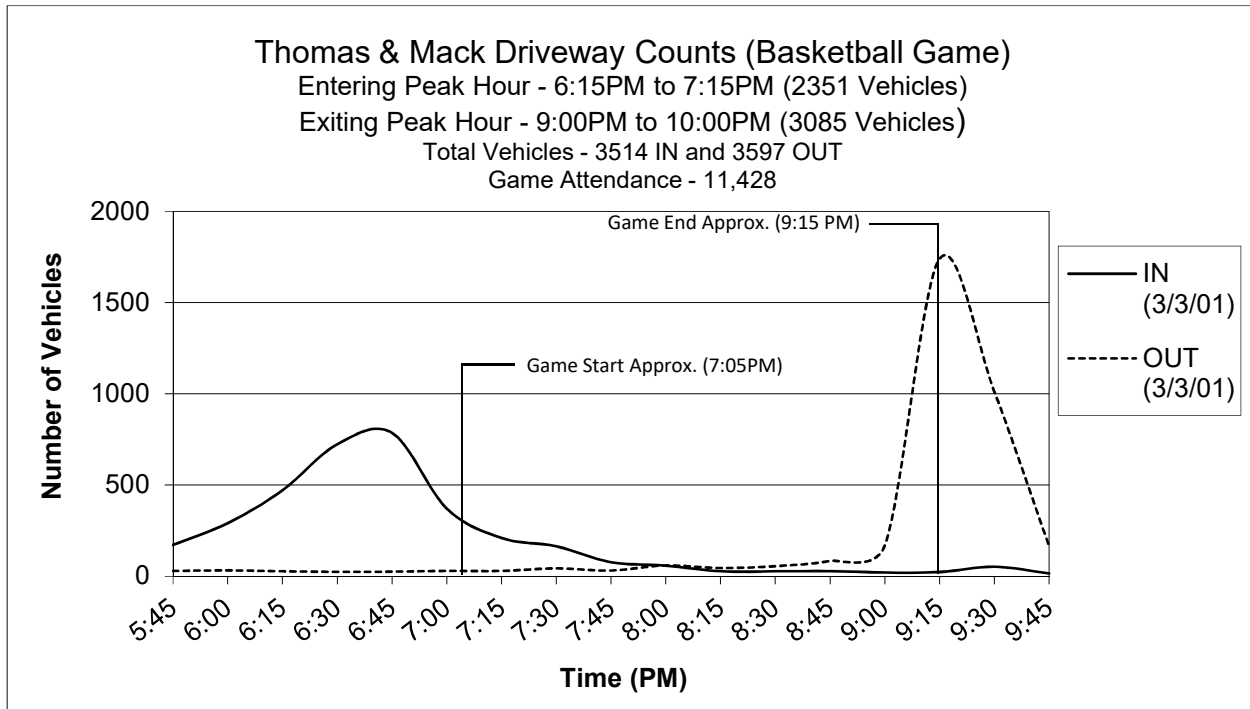


Figure 2 – Thomas and Mack Center Event Traffic Distribution

Counts at the driveways of the Thomas and Mack Center indicated that 2,351 vehicles entered the parking surrounding Thomas and Mack in the peak hour leading up to the start of an observed basketball game. Traffic studies associated with the 2012 UNLV Master Plan identified the benefits of installing eastbound to northbound triple left turns at the Tropicana Avenue / Swenson Street intersection. In order to better accommodate Thomas and Mack event traffic consideration should be given with any roadway improvements in the area for the installation of triple left turn lanes to reduce event traffic impacts along Tropicana Avenue.

From the conducted evaluation the proposed elevated roadway project is not expected to:

- Degrade the existing event traffic access to the UNLV campus and Thomas and Mack Center, from a traffic and circulation perspective
- Hinder Thomas and Mack event traffic egressing on Thomas and Mack Drive to Paradise Road or impact egressing event traffic on Swenson Street

Though not expected to negatively affect traffic flow into UNLV from Swenson Street, the current design of the elevated roadway restricts future changes to the geometry of the Tropicana/Swenson at grade intersection, limiting future consideration for triple left turn improvement if they are not considered at this time. Also not considered is the downstream weaving that is expected to occur on Swenson Street at the grade connection north of Thomas and Mack Drive. Traffic on the elevated roadway travel with free flow conditions may not create sufficient gaps for downstream traffic weaving. Daily UNLV and Thomas and Mack event traffic would be required to weave into this free flow traffic in order to make downstream left turn movements. For these reasons, Thomas and Mack event traffic should be considered at this time for any proposed roadway improvements in the Tropicana Avenue / Swenson Street area.

3.3. Findings and Conclusions

The conducted review estimates traffic volume demand of approximately 65% of the existing average daily traffic will use the elevated roadway traveling north, while the westbound elevated roadway would accommodate approximately 90% of the existing average daily traffic. It is important to note that the analysis considered Friday AM and PM peak hour traffic only. School traffic to UNLV is considered higher during the middle of the week than on Fridays. These conditions could result in higher traffic volumes than a typical Friday peak hour. However, upon reviewing the elevated roadway project, these higher traffic volumes are not expected to impact the current design and lane configurations for the elevated roadway.

Independent of other factors such as loss of visibility, increases in noise, and other potential impacts to the UNLV campus, the elevated roadway would, in our opinion, improve general traffic operations and reduce congestion at the Tropicana Avenue and Swenson Street intersection, by allowing vehicles proceeding to destinations other than UNLV to by-pass the existing at grade signalized intersections. However, with new traffic and access patterns, loss of campus visibility, Swenson Street northbound grade separated structures encouraging access to UNLV at the Swenson Street and Harmon Avenue intersection, and other components of the elevated roadway plan, the project may have both short and/or long-term impacts on access to the UNLV campus.

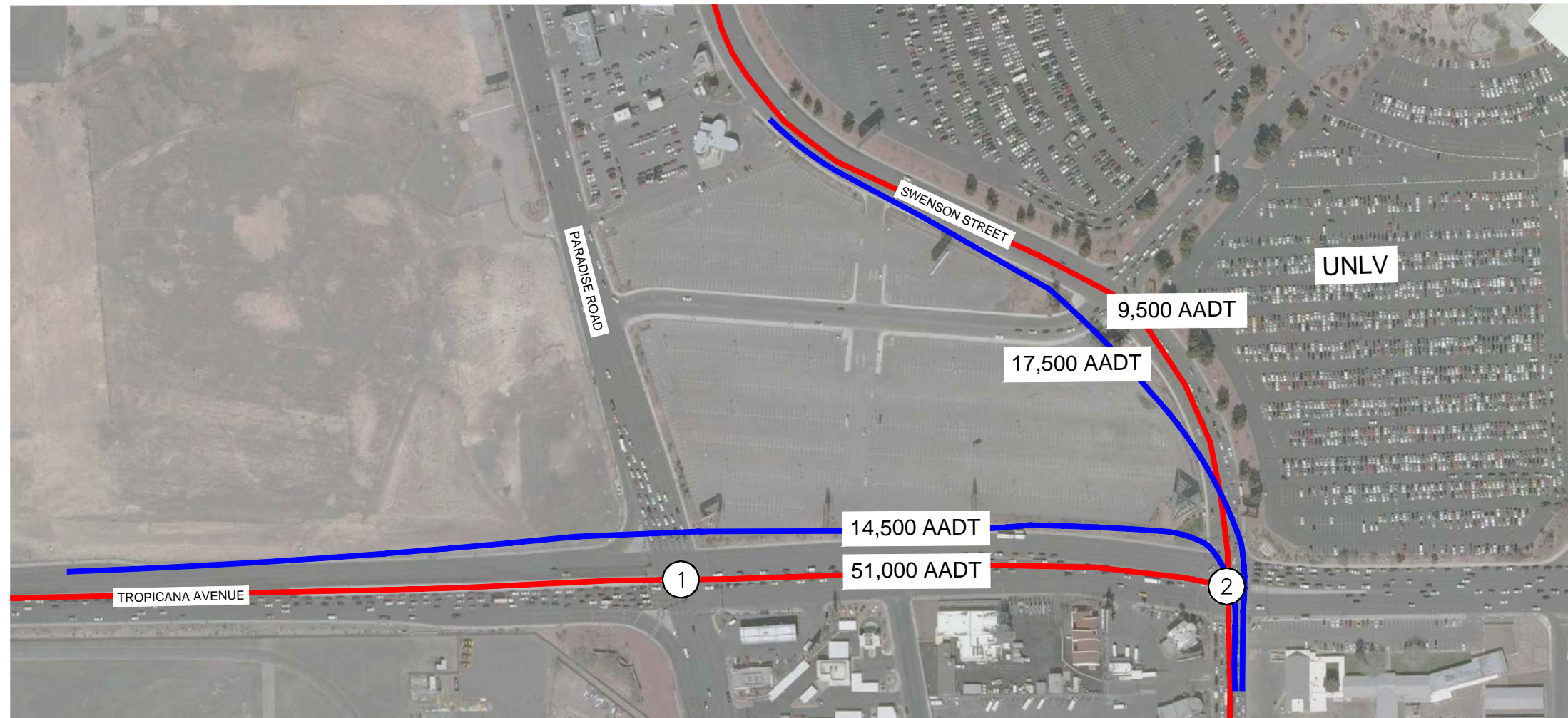
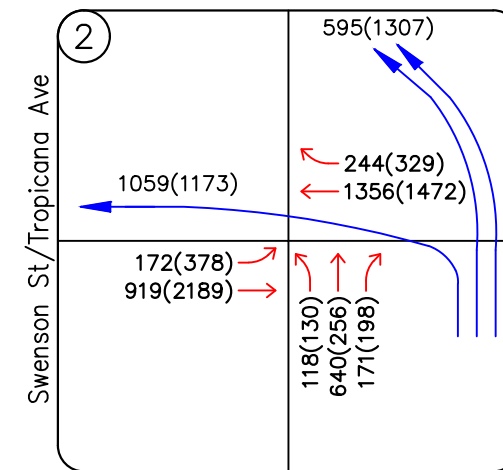
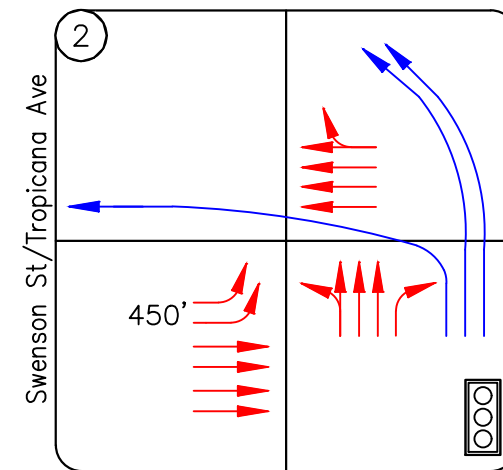
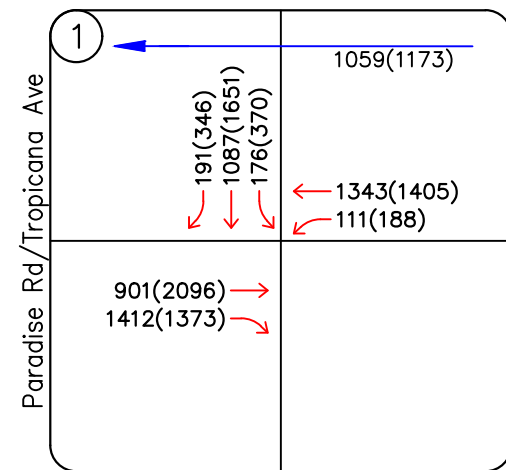
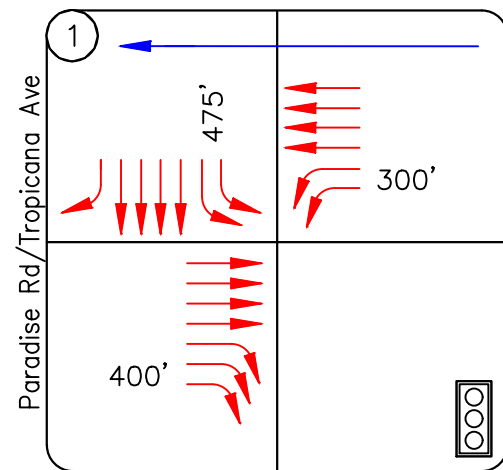


Photo Date: 2012 (used to highlight Thomas & Mack event traffic)

FUTURE ROADWAY CONDITIONS

FIGURE 3 (10/31/2018)



4. COMPARISON WITH CH2M TRAFFIC ANALYSIS

The traffic findings within this review support the typical weekday peak hour conclusions and recommendations identified in the CH2M traffic report. The higher on-street traffic volumes for Swenson Street, north of Tropicana Avenue, as identified from the 2018 Thomas and Mack Drive / Swenson Street intersection counts are not expected to have significant impact on the LOS improvements reported by CH2M for Swenson Street and Tropicana Avenue with the elevated roadway project. The conducted review estimates traffic volume demand of approximately 65% of the existing average daily traffic will use the elevated roadway traveling north (17,500 vpd which is less than the CH2M estimate of 22,450 vpd), while the westbound elevated roadway would accommodate approximately 90% of the existing average daily traffic, or 14,500 vpd (consistent with the CH2M reported volume of 14,660 vpd). The northbound AADT volumes is less due to UNLV student parking and the Airport TNC staging lot access. These findings are not expected to change the design of the northbound elevated roadway.

The findings and conclusions of the CH2M report stated:

“The northbound portion of the elevated connector will touch-down north of the main entrance to the Thomas and Mack Center. On days with major events at the arena, airport traffic with destinations to the north, will be able to bypass traffic entering the arena parking lots.”

However, it is the conclusion of this review that roadway improvements contemplated in this area, by the elevated roadway project or other intersection options, should consider the impacts of the Thomas and Mack event traffic. Any project planning or design should consider and address both typical day peak hour traffic volumes while UNLV is in session, as well as during Thomas and Mack event traffic.

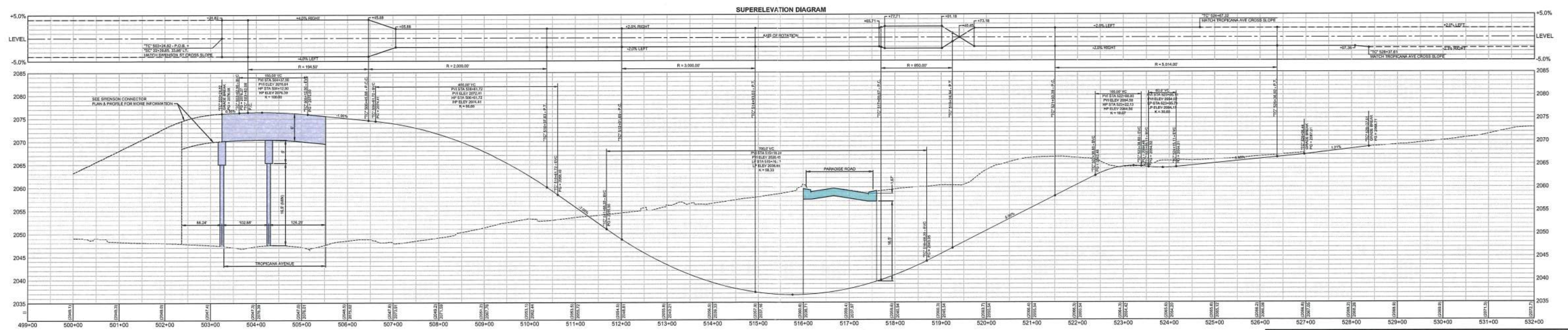
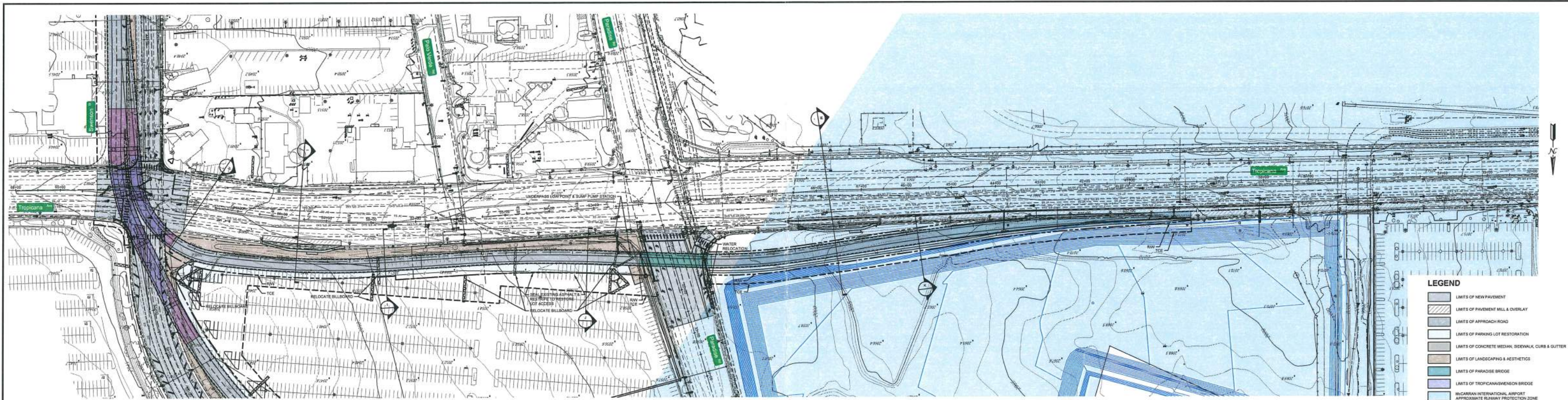
5. SUMMARY

The findings of the conducted review of the proposed elevated roadway includes the following based on the limits of available information during the evaluation and limits of the study itself:

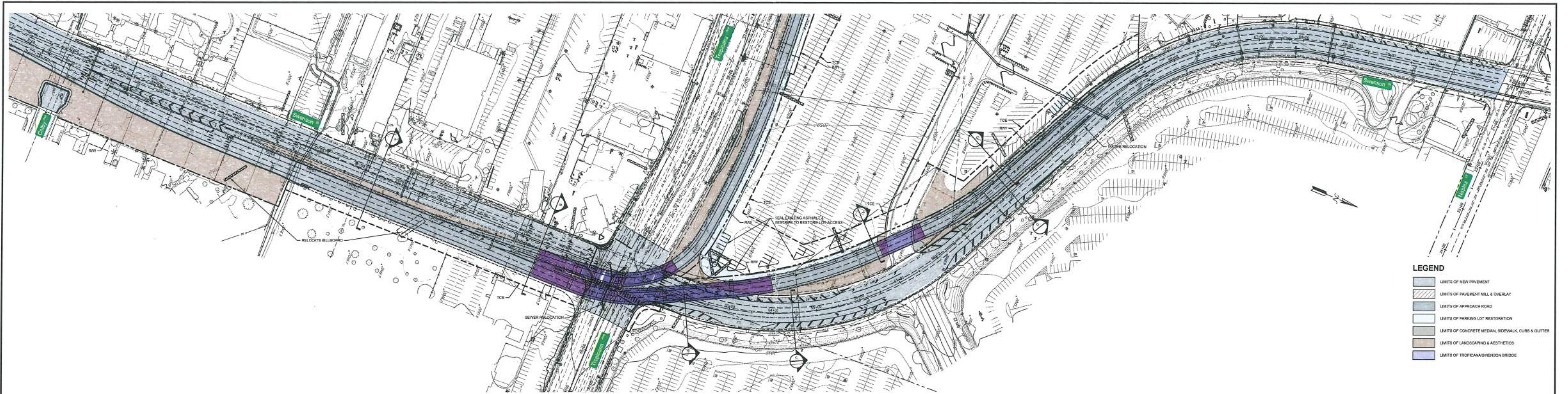
- The traffic conclusions within this review support the typical peak hour conclusions and recommendations identified in the CH2M traffic report. The proposed elevated roadway improvements will reduce existing traffic congestion at the at grade Tropicana Avenue / Paradise Road and Tropicana Avenue / Swenson Street signalized intersections. Removing traffic from several major traffic movements at the two intersections will improve traffic flows to and from the UNLV campus.
- Thomas and Mack event traffic creates different demands for the intersection of Swenson Street and Tropicana Avenue than average daily traffic conditions. As such, it is recommended that the addition of eastbound to northbound triple left turn lanes be considered if any road network improvements are to be made in this area.
- Further consideration should be given to the effects of the free-flow conditions of the elevated roadway at the downstream intersections of Tropicana Avenue and Koval Lane, as well as Swenson Street and Harmon Avenue. The intersection of Harmon Avenue and Swenson Street in particular serves as a main entrance to the UNLV campus. Allowing the upstream traffic volumes to operate as a free flow movement will only increase congestion at the next downstream intersection as a result of the lack of “congestion metering” of traffic volumes. The free flow traffic created by the elevated roadway is expected to impact access the UNLV 42-acre site at Tropicana Avenue and Koval Lane, as well as the UNLV campus access at Swenson Street and Harmon Avenue.
- At the request of the University Kimley-Horn gathered information on how the visual impacts like the proposed elevated roadway have been treated at other locations. Also gathered was representative imagery from existing campus structures that reinforce the campus theme and branding. The collected images are provided in **Appendix G**. Should the University request, Kimley-Horn can prepare photo simulations to apply some of the aesthetic treatments to the proposed elevated roadway project.

APPENDIX A

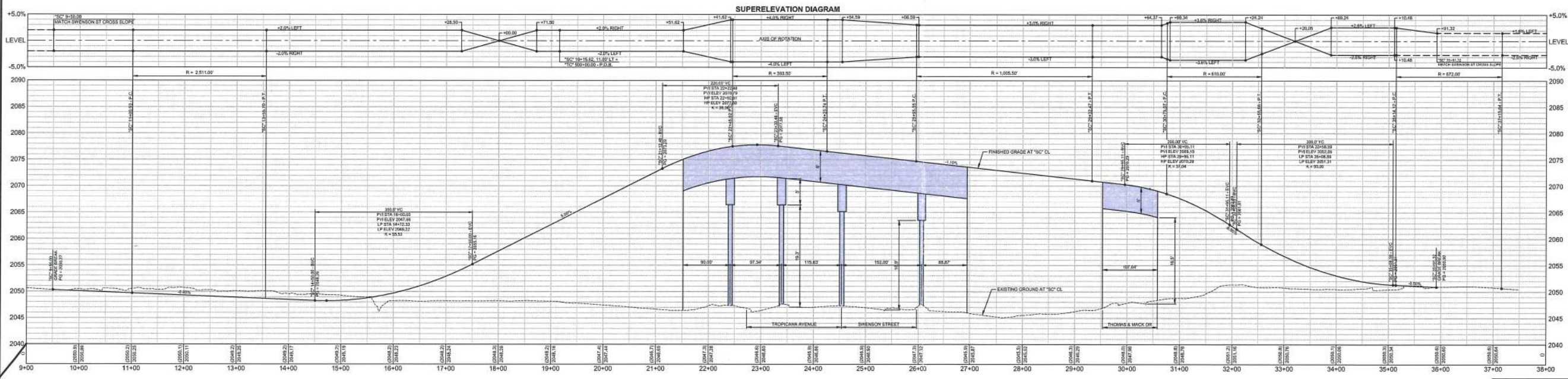
ELEVATED ROADWAY CONCEPT PLAN AND PROFILE PLANS (FROM CH2M REPORT)



TROPICANA / SWENSON GRADE SEPARATION
 Tropicana Avenue & Swenson Street
 Tropicana Connector Plan & Profile Exhibit



- LEGEND**
- LIMITS OF NEW PAVEMENT
 - LIMITS OF PAVEMENT MILL & OVERLAY
 - LIMITS OF APPROACH ROAD
 - LIMITS OF PARKING LOT RESTORATION
 - LIMITS OF CONCRETE MEDIAN, SIDEWALK, CURB & GUTTER
 - LIMITS OF LANDSCAPING & AESTHETICS
 - LIMITS OF TROPICANA/SWENSON BRIDGE



TROPICANA / SWENSON GRADE SEPARATION

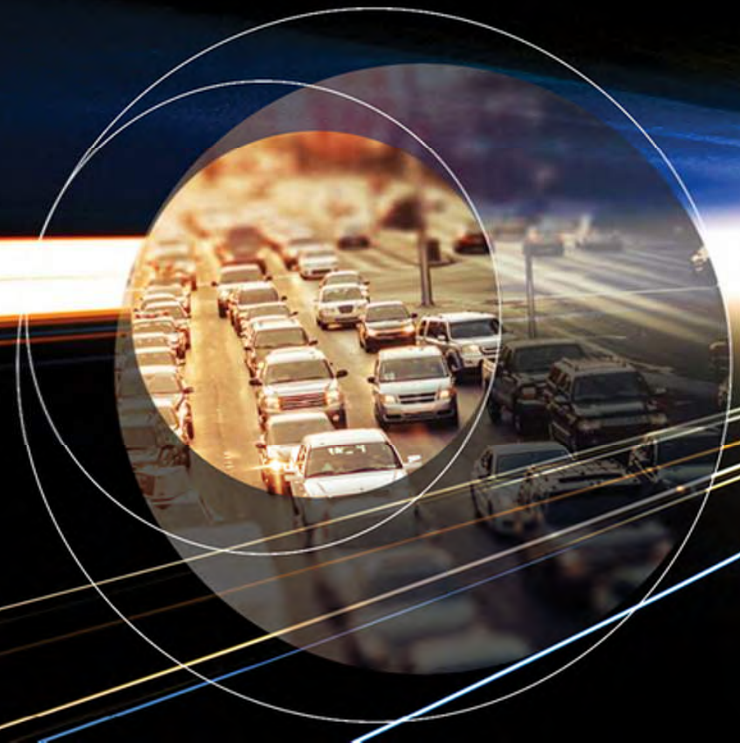
Tropicana Avenue & Swenson Street
Swenson St Plan & Profile Exhibit

APPENDIX B

OCTOBER 19, 2018 BOARD OF REGENTS MEETING CLARK COUNTY PUBLIC WORKS TROPICANA/SWENSON GRADE SEPARATION PROJECT PRESENTATION

Tropicana/Swenson Grade Separation Project

Clark County Public Works

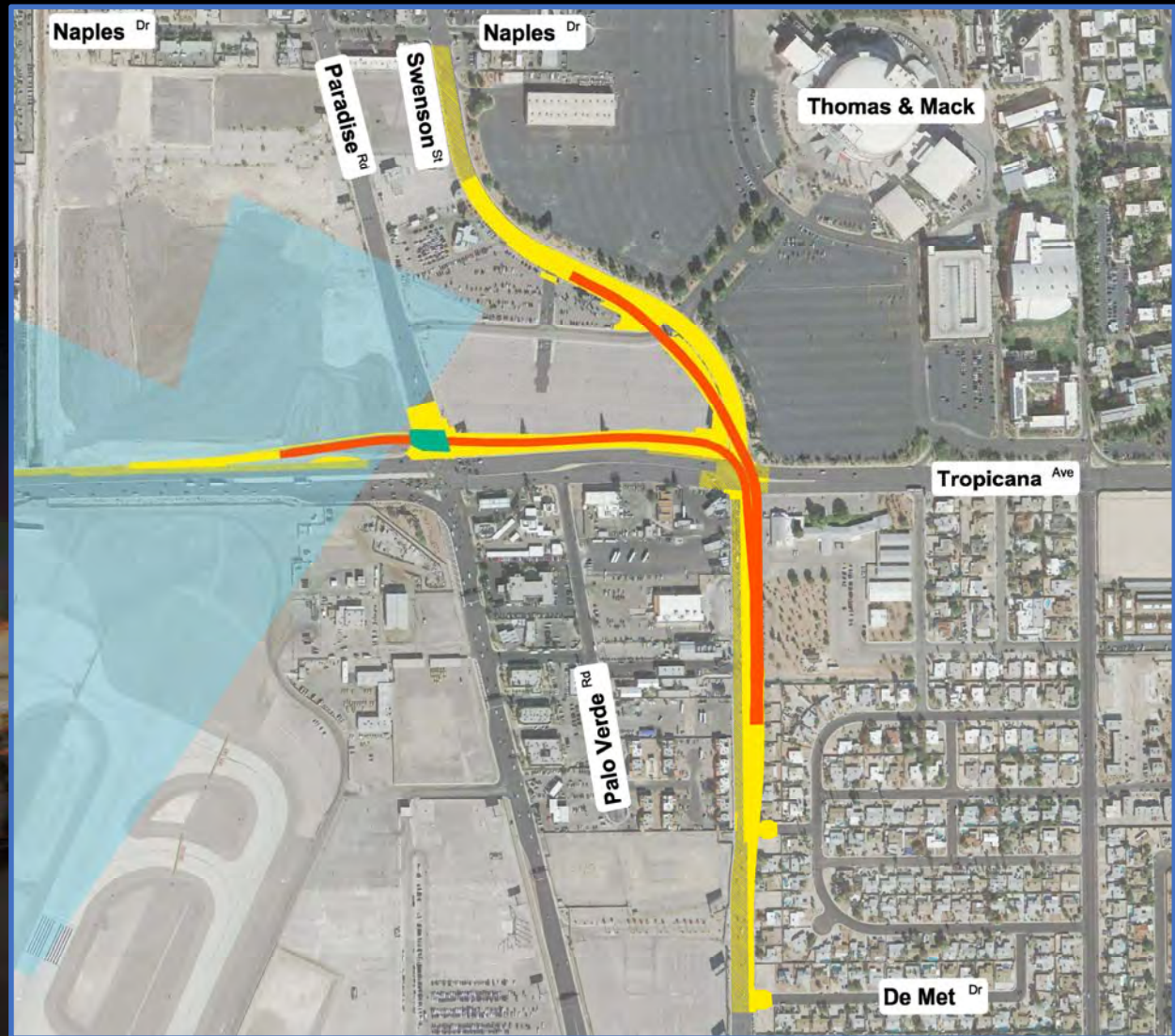


Project Development History



- TIBP
- SNTIC
- BCC
- Open House
- Interested Parties

- Project Overview
- Initial Alternatives
- Traffic Analysis Update
- Estimated Cost Comparison
- County Commission Decision



Thomas & Mack Visibility



BEFORE



AFTER



BEFORE



AFTER



BEFORE



AFTER



BEFORE



AFTER



BEFORE



AFTER



BEFORE



AFTER



BEFORE



AFTER



BEFORE



AFTER



BEFORE



AFTER



APPENDIX C
SEPTEMBER 2018 CH2M REPORT TEXT

Tropicana/ Swenson Grade Separation Future Year Traffic Analysis Results

To: Denis Cederburg, Clark County Department of Public Works
Joe Yatson, Clark County Department of Public Works
FROM: Jim Roldan, CH2M
Jose Herrera, CH2M
DATE: September 2018
PROJECT NUMBER: 683004

1. Introduction

In April 2016, the Regional Transportation Commission of Southern Nevada (RTC) published a comprehensive blueprint for a forward-looking transportation system that will serve Las Vegas' future transportation and economic development needs. That effort culminated in the Transportation Investment Business Plan (TIBP), a consensus document that articulates a vision for securing a better future for the Las Vegas of tomorrow. The TIBP initiative began in early 2014 by scoping the geographic bounds of the study area, defined roughly as the central Las Vegas metropolitan area or "Core Area," which encompasses the state's highest levels of employment and economic activity, including the Resort Corridor, McCarran International Airport, major convention centers, UNLV and Downtown Las Vegas. Chief TIBP objectives were to assess the Core Area's current transportation infrastructure and the region's needs; to identify potential transportation funding sources; and to recommend projects that best move people within the Core Area while furthering long-term economic growth and sustainability. Guided by a steering committee comprising key transportation, industry and government representatives, the TIBP development process was community-driven in every aspect, from its underlying research to its final recommendations. Throughout the plan's development, stakeholders worked together to collect data, assess needs, identify opportunities, develop and vet recommendations and establish priorities. Working groups were guided by private industry and public agency leaders, including resort operators, university representatives and local government officials. These working groups examined economic, land use and transportation system factors to better understand how these factors interact and to identify those infrastructure improvements that could maximize growth and return on investment for the region.

The plan recommends those infrastructure investments that hold the greatest potential to capitalize on our region's strengths, which are substantial. One of the recommended improvements outlined in the TIBP is the Koval/Swenson Express Airport Connector Elevated Couplet that was pursued by Clark County Public Works Department. The project (also known as the Elevated Airport Expressway Project) was to provide exclusive express access for vehicles traveling between McCarran International Airport and the Resort Corridor

using elevated structures and underpasses on segments of Koval Lane and Swenson Street, between Tropicana Avenue and Flamingo Road.

These segments would have formed a limited access couplet that accommodated the primary flow of traffic in and out of the airport, giving priority to those traveling to and from the Resort Corridor. Access to the exclusive facility would only be provided every half-mile via on-ramps or off-ramps at Tropicana Avenue, Harmon Avenue, and Flamingo Road.

CH2M has been tasked with studying the outbound expressway of the Elevated Airport Expressway Project. The following technical memorandums have been submitted to date for this project:

- *Traffic Analysis Methods and Assumptions* (submitted 11/1/16): The purpose of this memorandum was to document the methods and assumptions that will be used for performing the traffic analysis for the outbound expressway.
- *Existing Traffic Conditions and Model Calibration* (submitted 12/16/16): The purpose of this memorandum was to document the existing conditions analysis and microsimulation model calibration done as part of the overall traffic analysis for the outbound expressway.
- *Future Year Traffic Forecasts* (submitted 1/18/17): The purpose of this memorandum was to document the traffic forecasting done as part of the overall traffic analysis for the outbound expressway.
- *Future Year Traffic Analysis Results* (submitted 2/20/17): The purpose of this memorandum was to document the operational analysis results of multiple alternatives for the outbound expressway.

After the completion of the *Future Year Traffic Analysis Results Technical Memorandum*, CH2M provided their findings to the County. In December 2017, the County Commission Board voted to proceed with limited improvements for the outbound expressway project. One of these limited improvements is the Tropicana/Swenson Grade Separation Project (which is documented here). This alignment will begin on Swenson Street (south of Tropicana Avenue); carries 3 lanes north over Tropicana Avenue, with an exit ramp to westbound Tropicana Avenue, going underneath at Paradise Road and merging with westbound Tropicana Avenue, west of Paradise Road. Two lanes continue north of Swenson Street and come to grade north of Thomas & Mack Drive to merge with Swenson Street.

This project will include improvements to the southern portion of the outbound expressway around the Tropicana Avenue/Swenson Street and Tropicana Avenue/Paradise Road intersections. The purpose of this memorandum is to document the traffic analysis results for the future year (2040) with and without Tropicana/Swenson Grade Separation Project. The goal of the traffic analysis is to conduct operational analysis of Tropicana/Swenson Grade Separation to understand the future operations of the proposed project and help optimize the proposed geometric design.

2. Study Area

The study area was chosen to be wide enough to capture the changes in traffic operations from the proposed project. The traffic analysis study area is illustrated in **Exhibit 2-1**. The study area is much smaller than the study area analyzed in the traffic study performed for the original project due to the smaller project footprint. Changes in traffic operations, north of Tropicana Avenue, are not expected with the construction of this grade separation since the proposed improvements do not disrupt the existing roadway network.

The study area includes the following signalized intersections:

1. Swenson Street/Russell Road
2. Swenson Street/Tropicana Avenue
3. Paradise Road/Tropicana Avenue

The traffic analysis focuses on the operations of the study intersections.

3. Traffic Analysis Methodology

The traffic analysis was performed using Synchro (version 9). Synchro is a macroscopic analysis and optimization software application. Synchro supports the Highway Capacity Manual (HCM) methodology for unsignalized/signalized intersections and roundabouts. Synchro was used to perform a preliminary HCM-based analysis of the study intersections. Signal timing in Synchro was based on signal timing information provided by RTC Freeway and Arterial System of Transportation (FAST). For the future conditions, Synchro was used to develop and optimize signal timing. The HCM 2010 "Signalized Summary" report function in Synchro was used to determine the overall intersection level of service (LOS) and delay based on delay ranges summarized in **Table 3-1**.

The VISSIM software package was not used for this analysis because the primary use of VISSIM in the traffic study for the entire outbound expressway was to compare travel times among various alternatives and capture any improvements needed with the proposed project. For this study, since operational changes are expected at the intersection level, Synchro is an excellent tool that would capture any capacity issues with the construction of Tropicana/Swenson Grade Separation.

EXHIBIT 2-1
Study Area

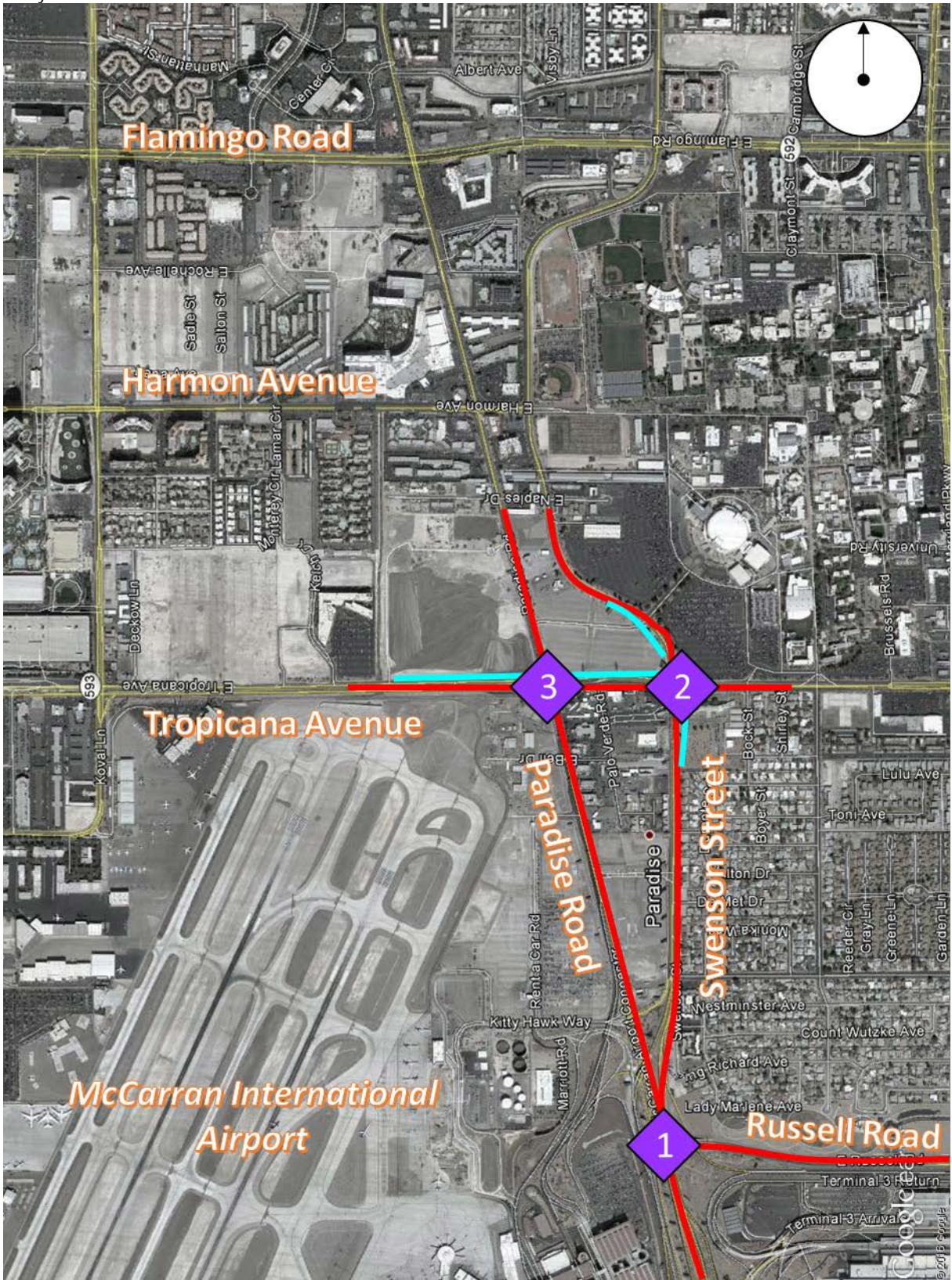


TABLE 3-1
HCM-Based Level of Service and Delay Ranges

Average Delay (seconds / vehicle)	LOS
Signalized Intersections	
< 10.0	A
> 10.0 to < 20.0	B
> 20.0 to < 35.0	C
> 35.0 to < 55.0	D
> 55.0 to < 80.0	E
> 80.0	F
Source: Highway Capacity Manual, 2010	

3.1 Analysis Years

Two years were analyzed: existing (2016) and design (2040). For the design year, the analysis includes Without Project (“no-build”) and With Project (“build”) scenarios. The Without Project scenario includes other planned/programmed improvements in the RTC’s Regional Transportation Plan (included in the approved 2035 RTC travel demand model), but without the Elevated Airport Expressway Project. Therefore, the resulting list of analysis scenarios is as follows:

- a. Existing (2016)
- b. Design Year (2040) Without Project
- c. Design Year (2040) With Project

3.2 Study Hours

Two peak hours were analyzed: AM (7:30 to 8:30 AM) and PM (4:30 to 5:30 PM). The peak hours were selected by reviewing historical hourly data from the Nevada Department of Transportation (NDOT) Traffic Records Information Access (TRINA) database in the study area. Although these hours selected may not actually represent the peak hour for all directions and at all locations, they were chosen to best represent the peak hour on an aggregate, area-wide basis.

3.3 Project Alternative

Tropicana/Swenson Grade Separation Project includes the construction of a three-lane northbound flyover on Swenson Street that would start south of Tropicana Avenue and split into two downstream connectors. The first connector would be a two-lane continuation of the flyover that would bypass the Swenson Street/Tropicana Avenue intersection for northbound traffic and will touch-down at Swenson Street, north of Thomas and Mack Drive (arena parking access point). The second connector would be a one-lane connector that would continue westbound and travel under the Paradise Road, and join Tropicana Avenue west of Paradise Road. This connector would bypass the northbound left turns at the Tropicana Avenue intersection and bypass the westbound through movements at Paradise Road. **Exhibit 3-1** is an illustration of the Tropicana/Swenson Grade Separation alignment.

4. Existing Conditions Operational Summary

Existing intersection turning movement counts at the study intersections were used as inputs to the Synchro models. Existing Conditions field data were collected in October 2016 as part of the original traffic study effort (ultimate project). Existing Conditions AM and PM peak hour turning movement volumes are illustrated in **Exhibit 4-1**. These volumes represent a typical Friday, which is the day with the highest volumes during the week and therefore provide a conservative analysis.

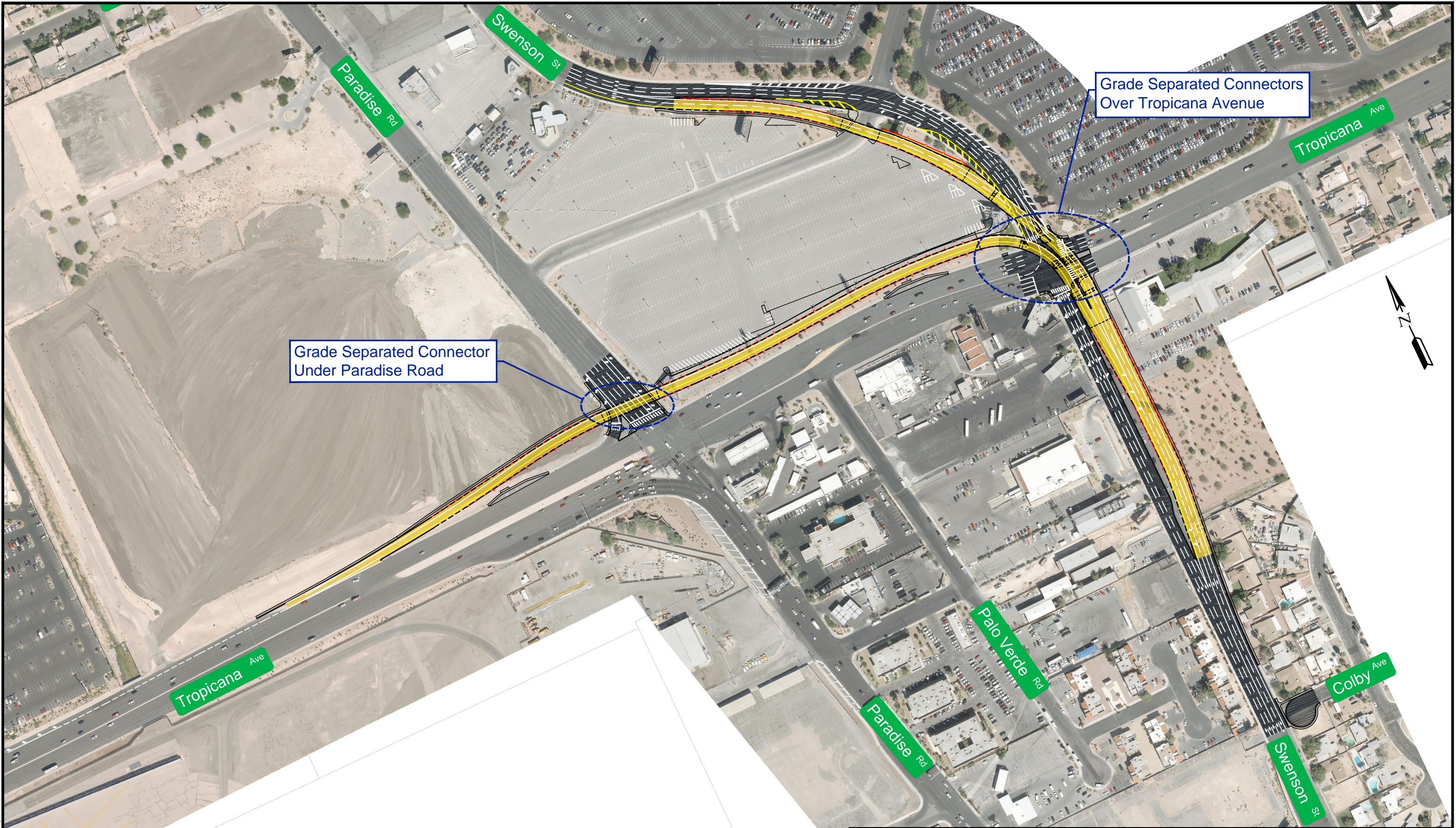
The results of the Existing Conditions analysis are summarized in **Table 4-1**. The operational analysis shows that in the AM peak hour the Paradise Road/Tropicana Avenue intersection is operating at LOS E. The two study intersections along Swenson Street currently operate at LOS D. In the PM peak hour, all intersections are operating at LOS D or better.

TABLE 4-1
Intersection Operation Summary – Existing Conditions

	North/South Street	East/West Street	Control	AM Peak Hour Delay (sec/veh)	LOS	PM Peak Hour Delay (sec/veh)	LOS
1	Swenson Street	Russell Road	Signal	36.4	D	35.7	D
2	Swenson Street	Tropicana Avenue	Signal	41.2	D*	35.1	D*
3	Paradise Road	Tropicana Avenue	Signal	60.9	E	37.2	D

* While these results were found to be calibrated to existing field measured conditions at this location in the original traffic study, LOS D is not consistent with typical peak period conditions. This may be due to data that was collected during an unusually low volume week. Future year models will account for this by factoring up traffic forecasts to reflect peak demand (i.e., when a convention or special event is occurring in town).

Exhibit 4-2 is an illustration of the PM peak hour LOS, provided as a summary as the worst-case operations during the day (since volumes are typically higher in the PM peak hour). Detailed results for all study intersections are provided in Attachment A.



Grade Separated Connector Under Paradise Road

Grade Separated Connectors Over Tropicana Avenue

TROPICANA / SWENSON GRADE SEPARATION

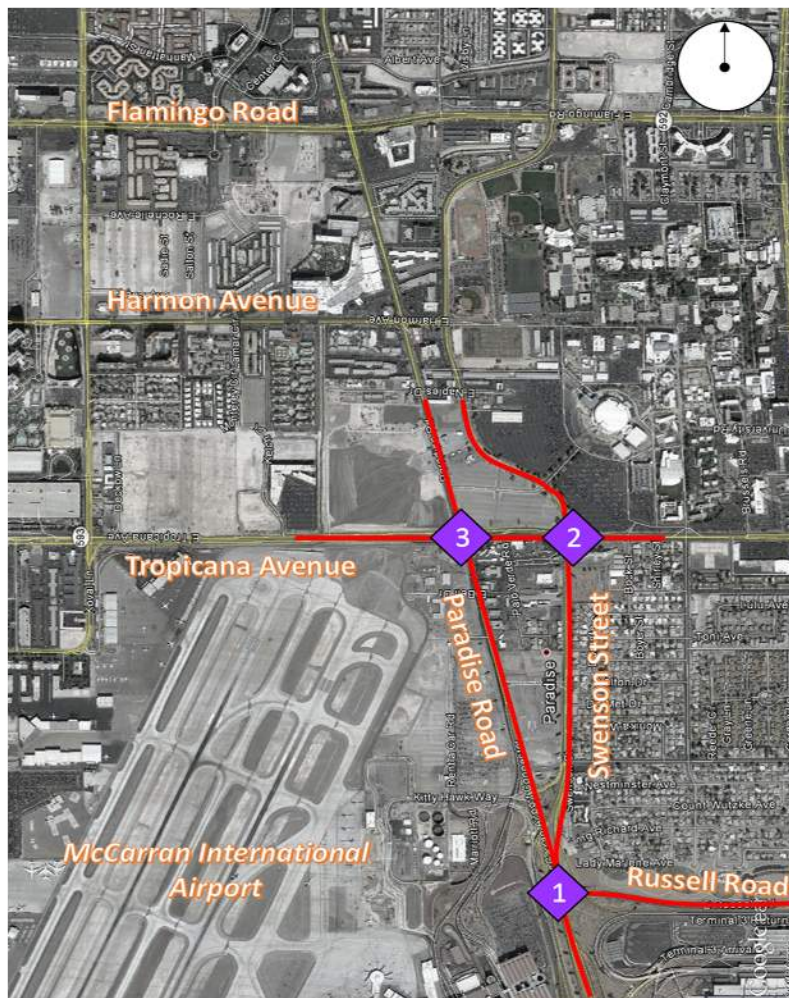
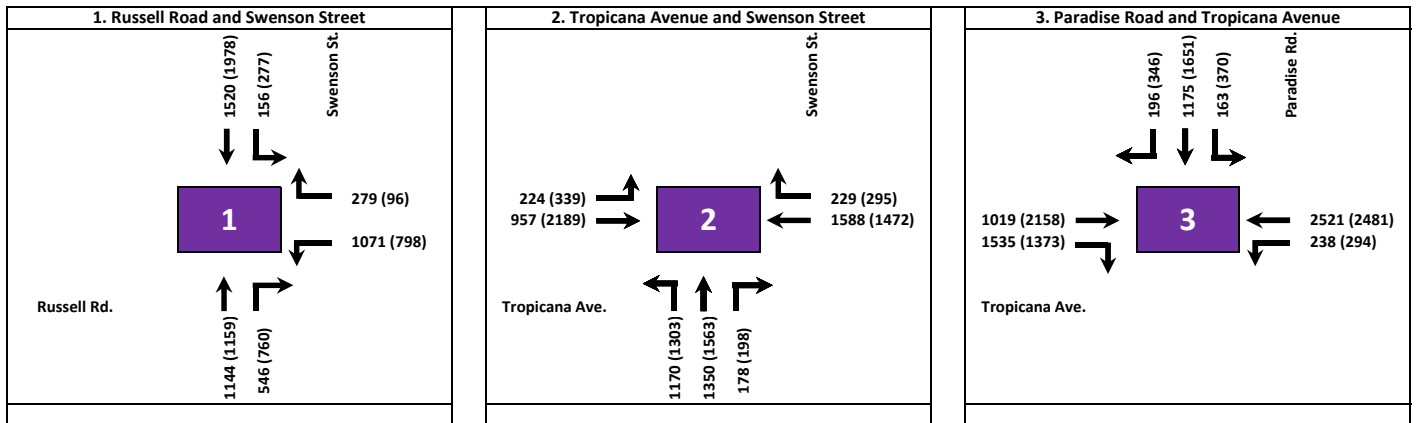
Tropicana Avenue & Swenson Street
Traffic Exhibit 3-1



083004 - Exhibit - Trop-Swenson Traffic.dwg

EXHIBIT 4-1

2016 Existing Conditions Turning Movement Volumes - AM and PM Peak Hour

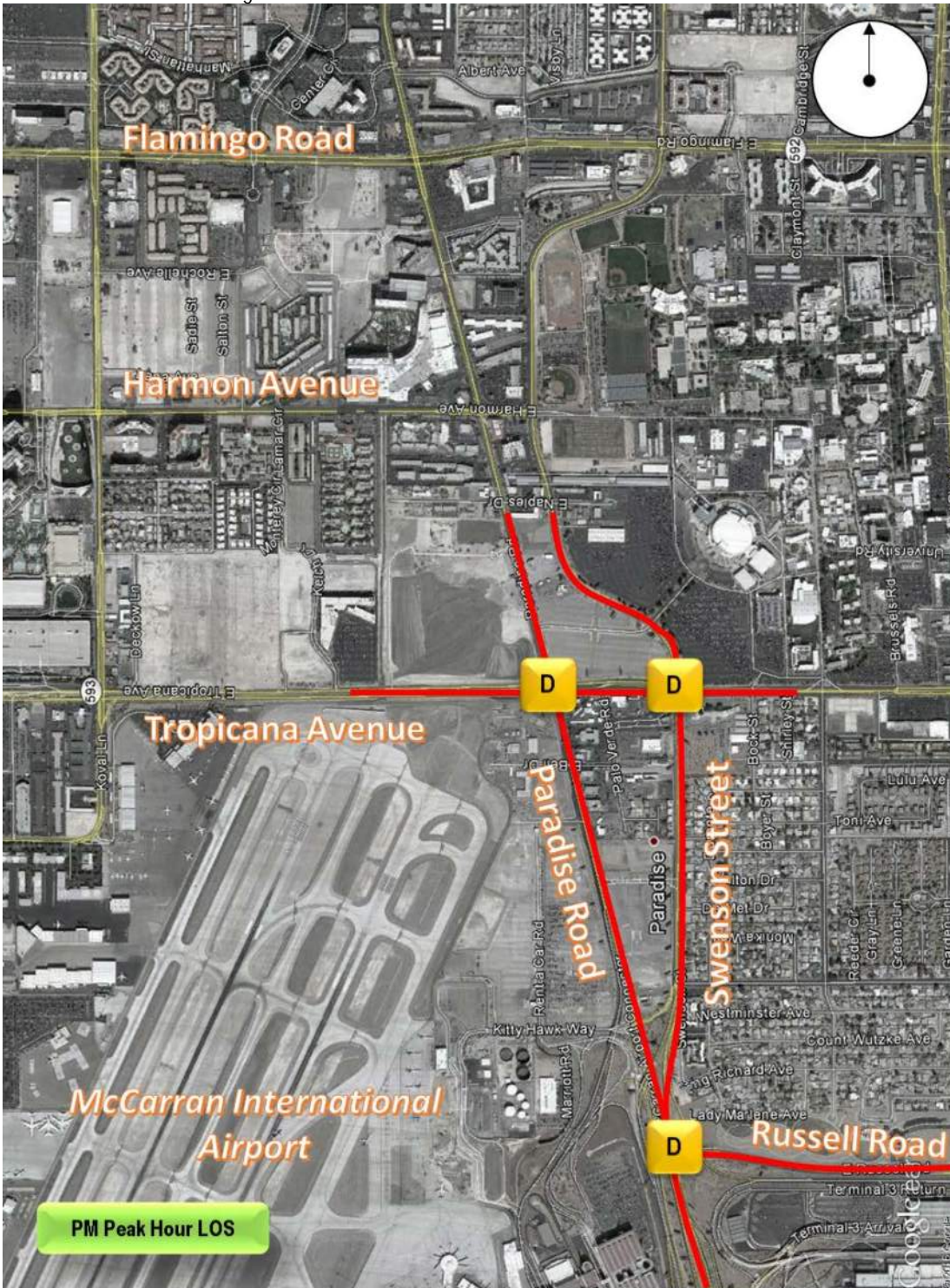


Legend

XX (YY) = 7:30-8:30 AM (4:30-5:30 PM)



EXHIBIT 4-2
PM Peak Hour LOS - Existing Conditions



5. Traffic Forecasting

Traffic forecasts from the original traffic study (ultimate project) were used for the Tropicana/Swenson Grade Separation analysis. The RTC Travel Demand Forecasting (TDF) model (2013-2035 Regional Transportation Plan, RTC 2009 Model, TransCAD 6.0) was used to develop the traffic volume projections for the horizon year 2040. Complete details on traffic forecasting methodology are located in the *Koval/Swenson Airport Express – Outbound Future Year Traffic Forecasts Memorandum*, submitted to Clark County Department of Public Works on January 18, 2017.

6. 2040 No-Build Results

This section summarizes the 2040 No-Build Conditions.

6.1 2040 No-Build Intersection Volumes

The 2040 No-Build AM and PM peak hour turning movement volumes are illustrated in **Exhibit 6-1**. These volumes were forecasted for a typical Friday, which is the day with the highest volumes during the week and therefore represent a conservative analysis.

6.2 2040 No-Build Operational Summary

The 2040 No-Build AM and PM peak hour traffic operational conditions were evaluated using Synchro. The results of the 2040 No-Build Conditions analysis are summarized in **Table 6-1**. The analysis shows that in the AM peak hour, all intersections will operate at LOS D or better with the exception of the Swenson Street and Tropicana Avenue intersection which is projected to operate at LOS E. In the PM peak hour, the intersection of Paradise Road and Tropicana Avenue will operate at LOS E. The intersections of Swenson Street/Russell Road and Swenson Road/Tropicana Avenue are projected to operate at LOS F.

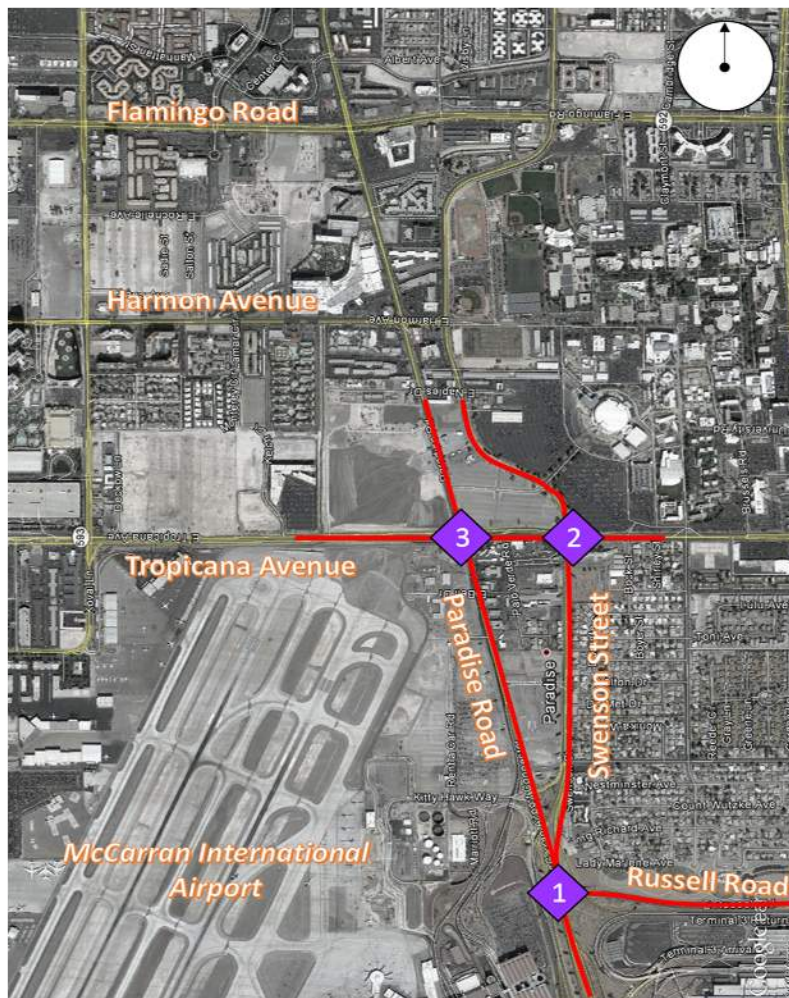
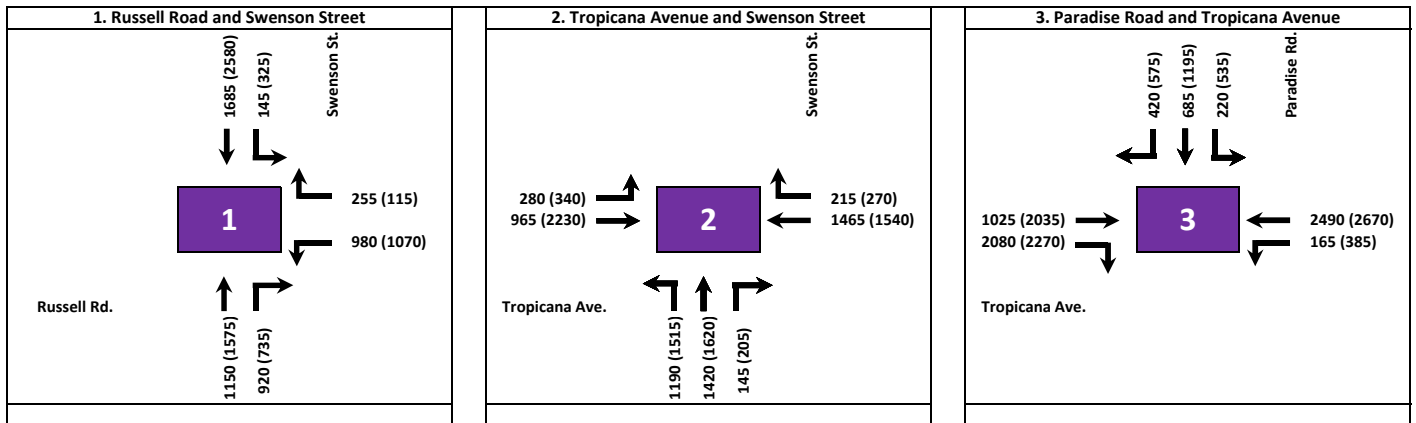
TABLE 6-1
Intersection Operation Summary – 2040 No-Build Conditions

	North/South Street	East/West Street	Control	AM Peak Hour Delay (sec/veh)	LOS	PM Peak Hour Delay (sec/veh)	LOS
1	Swenson Street	Russell Road	Signal	35.4	D	98.7	F
2	Swenson Street	Tropicana Avenue	Signal	56.8	E	86.0	F
3	Paradise Road	Tropicana Avenue	Signal	35.9	D	75.3	E

Exhibit 6-2 is an illustration of the PM peak hour LOS, provided as a summary as the worst-case operations during the day. Detailed results for all study intersections are provided in Attachment B.

EXHIBIT 6-1

2040 No-Build Turning Movement Volumes - AM and PM Peak Hour

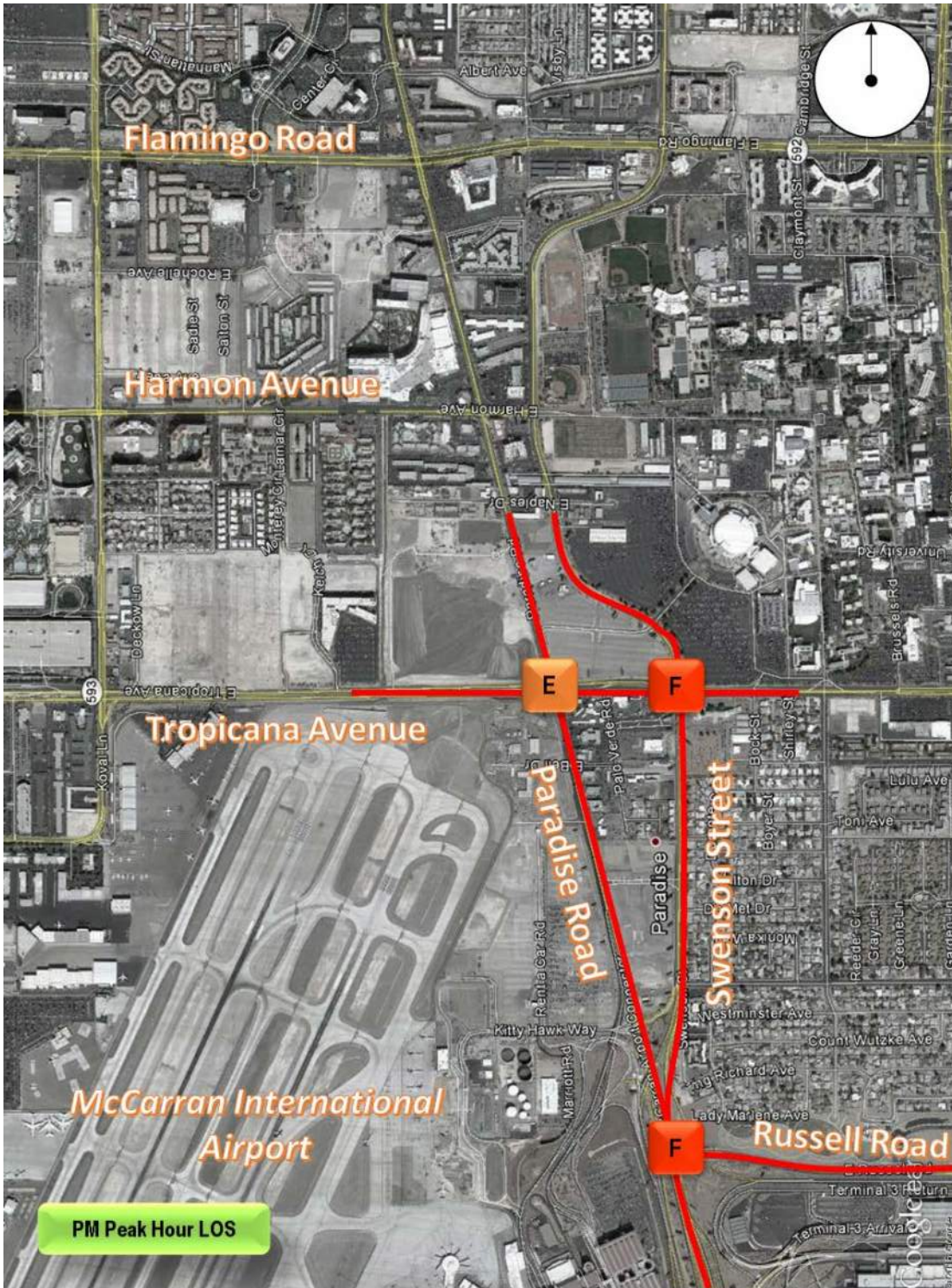


Legend

XX (YY) = 7:30-8:30 AM (4:30-5:30 PM)



EXHIBIT 6-2
PM Peak Hour LOS - 2040 No-Build Conditions



Comparison of Existing and 2040 No-Build conditions indicates that the average intersection delay in the PM peak hour increases from 36 seconds per vehicle (LOS D) to 87 seconds per vehicle (LOS F).

Table 6-2 is an operational performance comparison between Existing and 2040 No-Build Conditions. In the AM peak period, the Paradise Road and Tropicana Avenue intersection is projected to have a decrease in delay due to the Howard Hughes Parkway extension (separate project as identified in the latest RTC RTP, see *Future Year Traffic Forecasts Technical Memorandum* from the original study) in the 2040 No-Build condition (i.e., the Howard Hughes Parkway extension will reduce the amount of traffic on Paradise Road between Flamingo Road and Tropicana Avenue). In the PM peak period, all intersections are projected to have an increase in delay and worsen in LOS. Due to the amount of projected growth in the PM peak period, the Howard Hughes Parkway extension is not projected to provide the same benefit at the Paradise Road/Tropicana Avenue in the PM peak period. The majority of the intersections are projected to have a change in LOS from D to LOS F between Existing and 2040 No-Build Conditions.

TABLE 6-2
Intersections Operational Comparisons, 2040 No-Build and Existing

Intersection	AM Peak Hour Change in Delay (LOS)*	PM Peak Hour Change in Delay (LOS)*
Swenson Street/Russell Road	-1 (D→D)	+63 (D→F)
Swenson Street/Tropicana Avenue	+16 (D→E)	+51 (D→F)
Paradise Road/Tropicana Avenue	-25 (E→D)	+38 (D→E)

* Change in delay is the difference between Existing and 2040 No-Build Conditions.
Change in LOS reported as Existing LOS → No-Build LOS. Delay reported in seconds per vehicle.

7. 2040 Tropicana/Swenson Grade Separation Results

This section summarizes the 2040 Tropicana/Swenson Grade Separation Build Conditions.

7.1 2040 Tropicana/Swenson Grade Separation Volumes

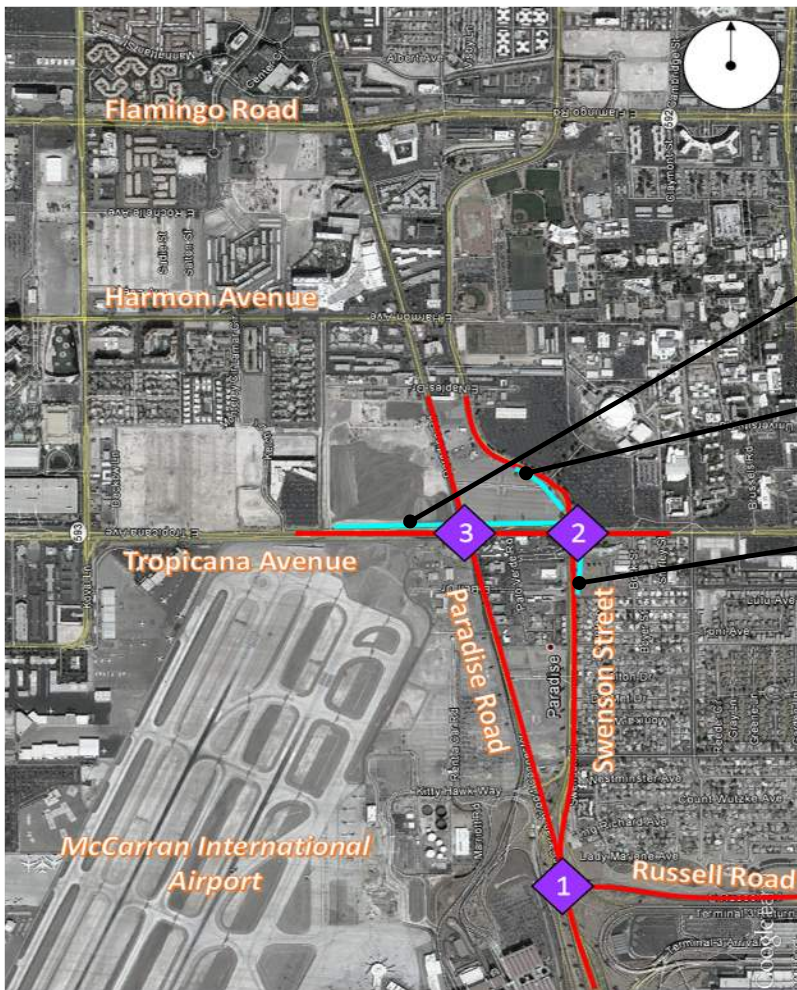
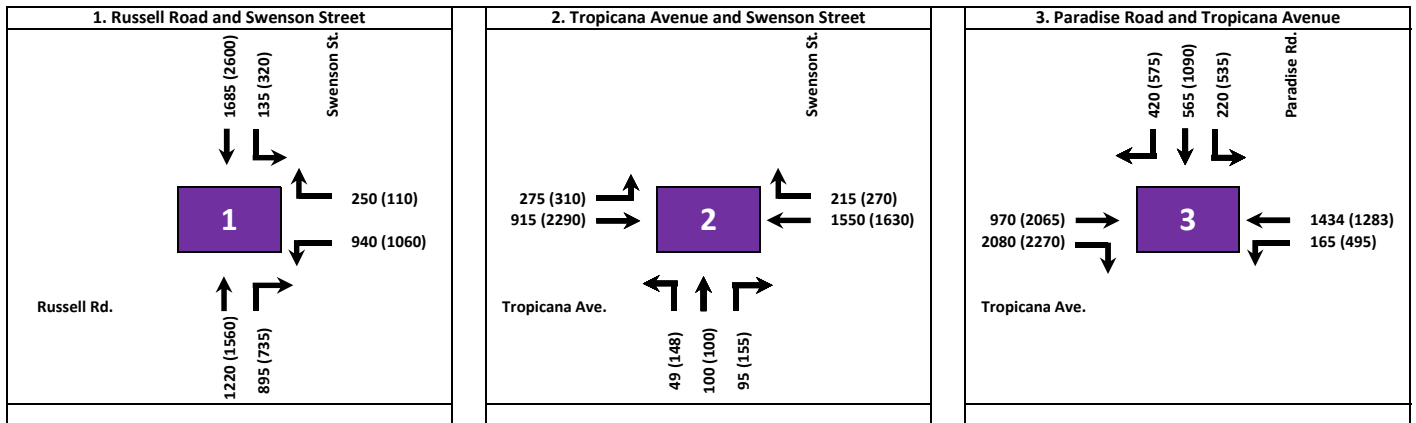
The peak period volumes for the 2040 Tropicana/Swenson Grade Separation project were generated from the travel demand model as discussed in Section 5. **Exhibit 7-1** illustrates the AM and PM peak hour turning movement volumes at the study intersections for the Tropicana/Swenson Grade Separation. Exhibit 7-1 also illustrates the 2040 daily and AM/PM peak hour traffic volumes along the Tropicana/Swenson Grade Separation alignment. The volumes on the elevated roadway are summarized for informational purposes as they do not factor into the study intersection analysis since the roadway is grade separated from the study intersections.

7.2 2040 Tropicana/Swenson Grade Separation Operational Summary

The 2040 Tropicana/Swenson Grade Separation AM and PM peak hour traffic operational conditions were evaluated using Synchro. The results of the 2040 Tropicana/Swenson Grade Separation analysis are summarized in **Table 7-1**.

EXHIBIT 7-1

2040 Tropicana/Swenson Grade Separation Build Turning Movement and Elevated Roadway Volumes- AM and PM Peak Hour



Westbound Split

ADT = 14,660 vehicles/day
 AM Peak Hour = 780 vehicles/hour
 PM Peak Hour = 1,070 vehicles/hour

Northbound Split

ADT = 22,450 vehicles/day
 AM Peak Hour = 1,320 vehicles/hour
 PM Peak Hour = 1,520 vehicles/hour

At Start of Elevated Expressway

ADT = 37,110 vehicles/day
 AM Peak Hour = 2,100 vehicles/hour
 PM Peak Hour = 2,590 vehicles/hour

Legend
 XX (YY) = 7:30-8:30 AM (4:30-5:30 PM)



The analysis shows that in the AM peak hour, all three intersections will operate at LOS D or better with the Tropicana/Swenson Grade Separation Project. In the PM peak hour, all intersections will operate at LOS D or better with the exception of the Swenson Street Russell Road intersection, which is projected to operate at LOS F (same as the No-Build Condition).

TABLE 7-1

Intersection Operation Summary – 2040 Tropicana/Swenson Grade Separation Build

	North/South Street	East/West Street	Control	AM Peak Hour Delay (sec/veh)	LOS	PM Peak Hour Delay (sec/veh)	LOS
1	Swenson Street	Russell Road	Signal	33.9	C	99.9	F
2	Swenson Street	Tropicana Avenue	Signal	33.5	C	33.8	C
3	Paradise Road	Tropicana Avenue	Signal	37.0	D	53.9	D

Exhibit 7-2 is an illustration of the PM peak hour LOS. Detailed results for all study intersections are provided in Attachment C.

Comparison of 2040 No-Build and Tropicana/Swenson Grade Separation Build conditions indicates that the average intersection delay in the PM peak period decreases from 87 seconds per vehicle (LOS F) to 63 seconds per vehicle (LOS E) with the Tropicana/Swenson Grade Separation Build. This equates to a reduction in delay of approximately 24%.

Table 7-2 is an operational performance comparison between 2040 No-Build and Tropicana/Swenson Grade Separation Build Conditions. In the AM peak period, all intersections are projected to have a slight to moderate change in delay. In the PM peak period, two intersections are projected to have a reduction in delay during with the Tropicana/Swenson Grade Separation Build. The intersection of Swenson Street and Russell Road is projected to have a slight increase in delay (+1 sec/veh on average) and remain at LOS F.

TABLE 7-2

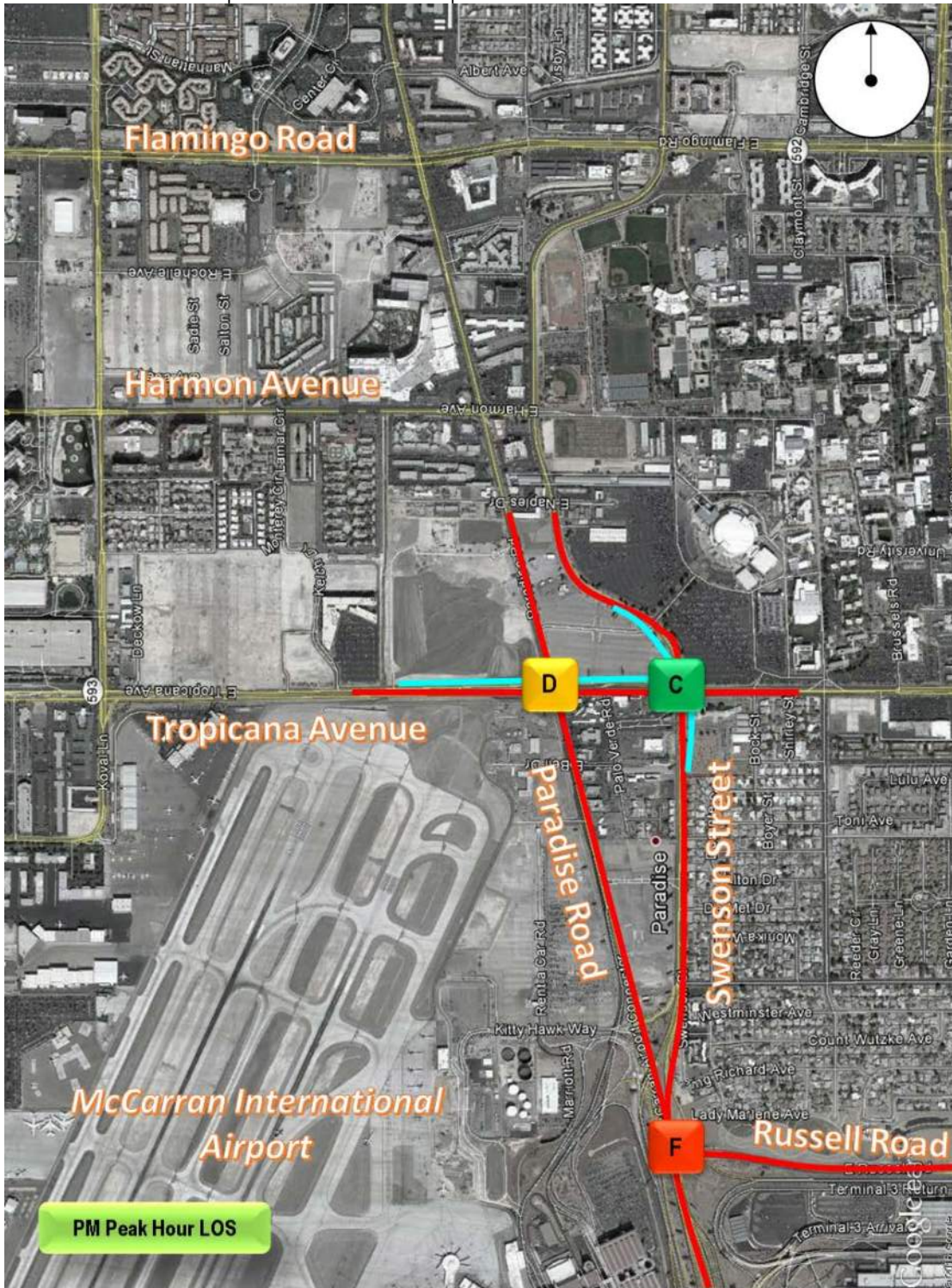
Intersections Operational Comparisons, 2040 No-Build and 2040 Build

Intersection	AM Peak Hour Change in Delay (LOS)*	PM Peak Hour Change in Delay (LOS)*
Swenson Street/Russell Road	-2 (D→C)	+1 (F→F)
Swenson Street/Tropicana Avenue	-24 (E→C)	-52 (F→C)
Paradise Road/Tropicana Avenue	+1 (D→D)	-21 (E→D)

* Change in delay is the difference between 2040 No Build and 2040 Build Conditions.
Change in LOS reported as Existing LOS → No-Build LOS. Delay reported in seconds per vehicle.

EXHIBIT 7-2

Peak Hour LOS - 2040 Tropicana/Swenson Grade Separation Build Conditions



8. Findings and Conclusions

The improvements associated with the Tropicana/Swenson Grade Separation Project show great benefit to the intersection operations on Tropicana Avenue between Paradise Road and Swenson Street. These operational improvements at the Tropicana Avenue intersections will benefit the outbound flow of airport traffic with destinations to the resort corridor or other areas to the north. The northbound portion of the elevated connector will touch-down north of the main entrance to the Thomas and Mack Center. On days with major events at the arena, airport traffic with destinations to the north, will be able bypass traffic entering the arena parking lots. This northbound portion is projected to serve 22,450 vehicles per day (1,320 in the AM peak hour and 1,520 in the PM peak hour).

The westbound portion of the elevated corridor will help outbound traffic bypass two extremely congested intersections. Drivers will no longer have to wait to make a northbound left at the Swenson Street/Tropicana Avenue intersection and then continue westbound past Paradise Road. These two intersections are programmed with long cycle lengths, to accommodate the high demand which both contribute to the degraded intersection operations. The westbound portion is projected to serve 14,660 vehicles per day (780 in the AM peak hour and 1,070 in the PM peak hour).

Tables 8-1 and 8-2 are average delay and LOS comparison between the 2016 Existing, 2040 No-Build, and the Build Alternative Conditions.

TABLE 8-1
AM Peak Hour Intersection Operations Comparison

Intersection	2016 Existing			2040 No-Build			2040 Build		
	Delay	LOS	→	Delay (Change)	LOS	→	Delay (Change)	LOS	
Swenson Street/ Russell Road	36	D	→	35 (-1)	D	→	34 (-1)	C	
Swenson Street/ Tropicana Avenue	41	D	→	57 (+16)	E	→	34 (-23)	C	
Paradise Road/ Tropicana Avenue	61	E	→	36 (-25)	D	→	37 (+1)	D	
AVERAGE	46	D	→	43 (-8%)	D	→	35 (-19%)	C	

TABLE 8-2
PM Peak Hour Intersection Operations Comparison

Intersection	2016 Existing			2040 No-Build			2040 Build		
	Delay	LOS	→	Delay (Change)	LOS	→	Delay (Change)	LOS	
Swenson Street/ Russell Road	36	D	→	99 (+63)	F	→	100 (+1)	F	
Swenson Street/ Tropicana Avenue	35	D	→	86 (+51)	F	→	34 (-52)	C	
Paradise Road/ Tropicana Avenue	37	D	→	75 (+38)	E	→	54 (-21)	D	
AVERAGE	36	D	→	87 (+140%)	F	→	63 (-24%)	E	

In the AM peak hour, operations between Existing and 2040 No-Build Conditions are projected to remain relatively constant. This is due to the Howard Hughes Parkway extension (separate project as identified in the latest RTC RTP), which will relieve AM traffic on Paradise Road between Flamingo Road and Tropicana Avenue (i.e., the Howard Hughes Parkway extension will reduce the amount of traffic on Paradise Road between Flamingo Road and Tropicana Avenue). However, in the PM peak hour, the Howard Hughes Parkway extension does not provide the same benefit. Average delay is projected to increase by 140% at the study intersections during the PM peak hour between Existing and 2040 No-Build Conditions. The average LOS is projected to worsen from LOS D to F in that same time period.

Intersection operations will improve significantly in 2040 with the Tropicana/Swenson Grade Separation improvements. In the AM peak hour, all study intersections are projected to operate at LOS D or better with an average decrease in delay of 19% compared to the No-Build Conditions. In the PM peak hour, a 24% reduction in average delay is expected with the project improvements. Due to the grade separation of critical movements through the Tropicana/Paradise and Tropicana/Swenson intersections, operations at these locations are projected to improve from LOS E/F to LOS D or better with the project improvements.

APPENDIX D

KIMLEY-HORN JULY 15, 2014 UNLV STADIUM – SWENSON STREET REALIGNMENT MEMORANDUM



MEMORANDUM

RE: *UNLV Stadium – Swenson Street Realignment*

From: *Kimley-Horn*

Date: *July 15, 2014*

This memorandum provides a summary of the concepts reviewed for the possible realignment of Swenson Street for a potential stadium on the UNLV Campus.

Introduction

Kimley-Horn was retained by UNLV Planning and Construction to identify and review alternatives for consideration relating to the realignment of Swenson Street. Various concepts were presented to UNLV Staff and the concepts included in this memorandum were determined to be worth further consideration. This memorandum provides an overview of three concepts considered for further evaluation. The potential cost of construction was estimated as well as the approximate amount of land acquisition that would be required to construct the concept. The preliminary cost estimates do not include utility relocations and adjustments and, demolition of existing structures and roadways, or right of way acquisition.

1. Alternative A

Alternative A, shown in **Figure 1**, modifies the Tropicana Boulevard/Paradise Road and Swenson Street intersections and relocates the north section of Swenson Street, to create more contiguous land for the UNLV campus. The major East to North left turn movement from Tropicana Avenue to Swenson Street is proposed to be relocated at the intersection of Paradise Road.

The following summarizes the property acquisition needed to implement Alternative A and an opinion of probable construction cost:

- The total property acquisition required for this Concept is approximately **1.0 acre** (roadway only)
- The Opinion of Probable Construction Cost is approximately **\$7,300,000***
- The total affected property is approximately **7.1 acres**

** Does not include utility relocations and adjustment, demolition of existing structures and roadways, or right of way acquisition.*

Table 1 shows the parcels affected by the proposed Alternative A. The acreage for acquiring each affected parcel as well as the approximate amount of acreage solely for road construction are reported.

Table 1 – Alternative A**

APN #	Total Acreage	Acreage Required
162-22-402-002	2.0	0.48
162-22-402-001	1.81	0.29
162-27-102-002	0.75	0.16
162-27-102-005	0.60	0.01
162-27-102-001	1.92	0.01
TOTAL	7.08	0.95

** Acreage requirements do not include existing County land areas

Figure 2 shows the parcels affected by the proposed Swenson Street Realignment of Alternative A.



Figure 1 – Swenson Street Realignment Alternative A



Figure 2 – Swenson Street Realignment Alternative A (Parcels Affected)

2. Alternative B

Alternative B, illustrated in **Figure 3** incorporates a “Tight Diamond Signalized Intersection Concept” along Tropicana Avenue. This would require the widening of Tropicana Avenue to provide dual turn lanes East to North. The existing Palo Verde Street section will also be widened and modified to become a through street to replace the northbound function of the current Swenson Street alignment. Alternative B proposes that Swenson Street be designed to end at Tropicana Avenue. This concept allows removal of the existing Swenson Street as shown.

The following summarizes the property acquisition needed to implement Alternative B and an opinion of probable construction cost:

- The total property acquisition required for this Concept is approximately **1.7 acres** (roadway only)
- The Opinion of Probable Construction Cost is approximately **\$8,000,000***
- The total affected property is approximately **16.6 acres**

** Does not include utility relocations and adjustment, demolition of existing structures and roadways, or right of way acquisition.*

Table 2 shows the parcels affected by the proposed Alternative B. The acreage for acquiring each affected parcel as well as the approximate amount of acreage solely for road construction are reported.

Table 2 – Alternative B – Parcels Affected and Acreage Required**

APN #	Total Acreage	Acreage Required
162-22-402-002	2.0	0.34
162-22-402-001	1.81	0.04
162-27-102-001	1.92	0.05
162-27-110-003	1.23	0.05
162-27-110-004	1.86	0.05
162-27-110-005	0.95	0.02
162-27-101-001	2.76	0.05
162-27-102-010	1.72	0.17
162-27-111-001	0.20	0.14
162-27-111-003	0.16	0.09
162-27-111-004	0.20	0.16
162-27-111-005	0.21	0.11
162-27-195-001	0.80	0.18
162-27-111-008	0.19	0.10
162-27-111-007	0.18	0.01
162-27-111-010	0.19	0.01
162-27-111-009	0.18	0.14
TOTAL	16.56	1.71

** Acreage requirements do not include existing County land areas

Figure 4 shows the parcels affected by the proposed Swenson Street Realignment of Alternative B.



Figure 3 – Swenson Street Realignment Alternative B



Figure 4 – Swenson Street Realignment Alternative B (Parcels Affected)

3. Alternative C

Figure 5 shows the concept of Alternative C. This concept creates a two-way Paradise Road intersection at Tropicana Avenue. Swenson Street is to be realigned to approach Tropicana Boulevard adjacent to Paradise Road as a two way street section, modifying the existing Tropicana Avenue/Paradise Road intersection to include a northbound approach. Of the three explored alternatives, this concept creates the largest amount of contiguous land area to the UNLV campus, but also requires the largest amount of land acquisition of the three alternatives.

The following summarizes the property acquisition needed to implement Alternative C and an opinion of probable construction cost:

- The total property acquisition required for this Concept is approximately **3.1 acres** (roadway only)
- The Opinion of Probable Construction Cost is approximately **\$6,900,000***
- The total affected property is approximately **15.3 acres**

** Does not include utility relocations and adjustment, demolition of existing structures and roadways, or right of way acquisition.*

Table 3 shows the parcels affected by the proposed Alternative C. The acreage for acquiring each affected parcel as well as the approximate amount of acreage solely for road construction are reported.

Table 3 – Alternative C – Parcels Affected and Acreage Required**

APN #	Total Acreage	Acreage Required
162-22-402-002	2.0	0.48
162-22-402-001	1.81	0.29
162-27-110-002	0.62	0.11
162-27-110-003	1.23	0.03
162-27-110-004	1.86	0.17
162-27-110-005	0.95	0.08
162-27-101-001	2.76	0.84
162-27-102-010	1.72	0.17
162-27-111-001	0.20	0.14
162-27-111-003	0.16	0.09
162-27-111-004	0.20	0.16
162-27-111-005	0.21	0.11
162-27-195-001	0.80	0.18
162-27-111-008	0.19	0.10
162-27-111-007	0.18	0.01
162-27-111-010	0.19	0.01
162-27-111-009	0.18	0.14
TOTAL	15.26	3.11

** Acreage requirements do not include existing County land areas

Figure 6 shows the parcels affected by the proposed Swenson Street Realignment of Alternative B.



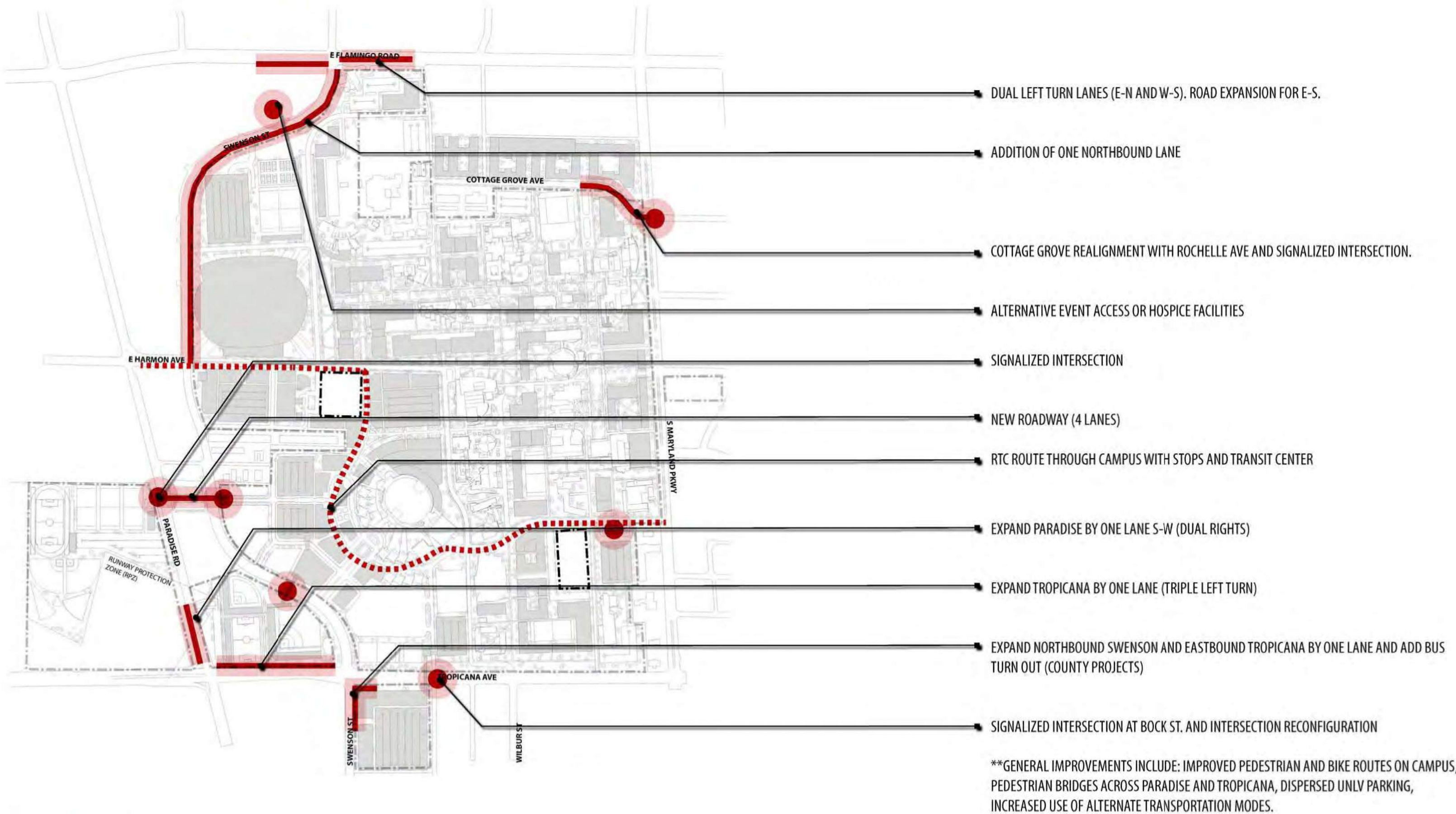
Figure 5 – Swenson Street Realignment Alternative C



Figure 6 – Swenson Street Realignment Alternative C (Parcels Affected)

APPENDIX E

NOVEMBER 2012 UNLV MASTER PLAN UPDATE – PRELIMINARY TRAFFIC EVALUATION MITIGATION MAP



APPENDIX F
EXISTING TRAFFIC VOLUMES

Silver State Traffic Data Collection, LLC

1819 Quarley Place
 Henderson, Nevada 89014
 702-217-1968
 sstraffic@msn.com

File Name : Tropicana-Paradise
 Site Code : 00003333
 Start Date : 10/28/2016
 Page No : 1

Groups Printed- Unshifted

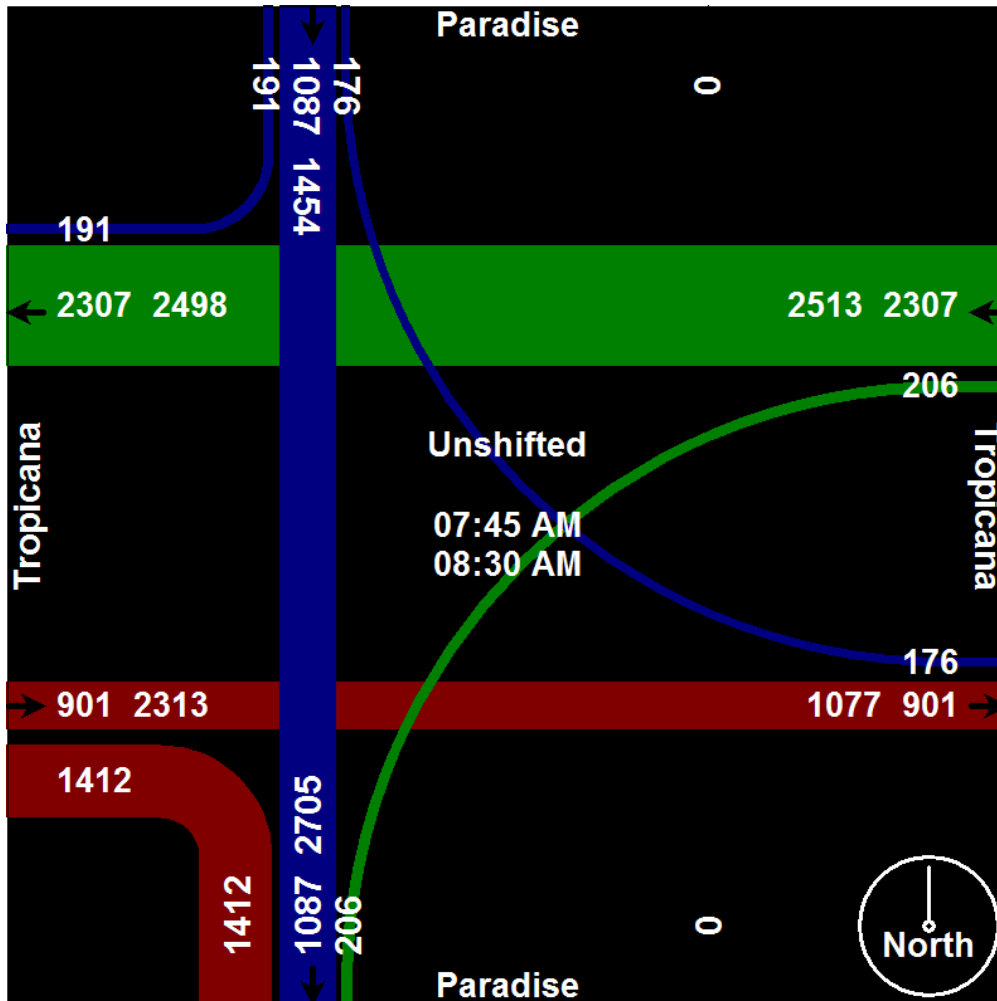
Start Time	Paradise Southbound				Tropicana Westbound				Tropicana Eastbound				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
07:00 AM	47	220	35	0	0	466	54	0	346	158	0	0	1326
07:15 AM	50	234	42	0	0	506	46	0	304	210	0	0	1392
07:30 AM	47	246	31	0	0	532	62	0	342	192	0	0	1452
07:45 AM	45	230	30	0	0	649	59	0	309	210	0	0	1532
Total	189	930	138	0	0	2153	221	0	1301	770	0	0	5702
08:00 AM	45	307	28	0	0	545	51	0	381	249	0	0	1606
08:15 AM	41	267	59	0	0	548	44	0	363	257	0	0	1579
08:30 AM	60	283	59	0	0	565	52	0	359	185	0	0	1563
08:45 AM	36	307	39	0	0	444	58	0	358	234	0	0	1476
Total	182	1164	185	0	0	2102	205	0	1461	925	0	0	6224
*** BREAK ***													
04:00 PM	46	321	91	0	0	537	75	0	290	435	0	0	1795
04:15 PM	83	307	104	0	0	634	57	0	375	443	0	0	2003
04:30 PM	91	401	90	0	0	627	71	0	321	546	0	0	2147
04:45 PM	72	412	103	0	0	602	62	0	337	521	0	0	2109
Total	292	1441	388	0	0	2400	265	0	1323	1945	0	0	8054
05:00 PM	97	411	95	0	0	607	83	0	403	463	0	0	2159
05:15 PM	86	427	82	0	0	636	78	0	312	566	0	0	2187
05:30 PM	90	420	100	0	0	534	101	0	329	462	0	0	2036
05:45 PM	104	343	94	0	0	553	94	0	290	449	0	0	1927
Total	377	1601	371	0	0	2330	356	0	1334	1940	0	0	8309
Grand Total	1040	5136	1082	0	0	8985	1047	0	5419	5580	0	0	28289
Apprch %	14.3	70.8	14.9	0	0	89.6	10.4	0	49.3	50.7	0	0	
Total %	3.7	18.2	3.8	0	0	31.8	3.7	0	19.2	19.7	0	0	

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File Name : Tropicana-Paradise
 Site Code : 00003333
 Start Date : 10/28/2016
 Page No : 2

Start Time	Paradise Southbound					Tropicana Westbound					Northbound	Tropicana Eastbound					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total		App. Total	Right	Thru	Left	Peds	
Peak Hour Analysis From 07:00 AM to 12:30 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	45	230	30	0	305	0	649	59	0	708	0	309	210	0	0	519	1532
08:00 AM	45	307	28	0	380	0	545	51	0	596	0	381	249	0	0	630	1606
08:15 AM	41	267	59	0	367	0	548	44	0	592	0	363	257	0	0	620	1579
08:30 AM	60	283	59	0	402	0	565	52	0	617	0	359	185	0	0	544	1563
Total Volume	191	1087	176	0	1454	0	2307	206	0	2513	0	1412	901	0	0	2313	6280
% App. Total	13.1	74.8	12.1	0		0	91.8	8.2	0			61	39	0	0		
PHF	.796	.885	.746	.000	.904	.000	.889	.873	.000	.887	.000	.927	.876	.000	.000	.918	.978

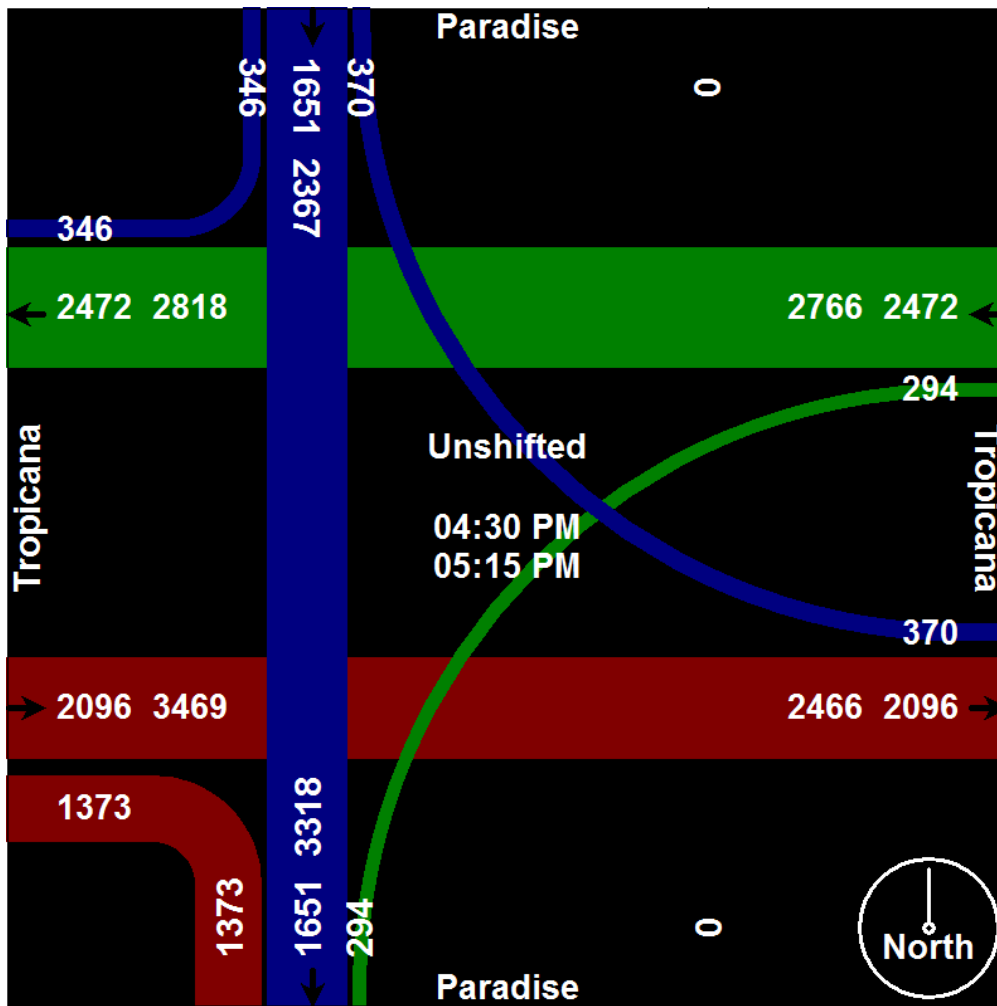


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File Name : Tropicana-Paradise
 Site Code : 00003333
 Start Date : 10/28/2016
 Page No : 3

Start Time	Paradise Southbound					Tropicana Westbound					Northbound	Tropicana Eastbound					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total		App. Total	Right	Thru	Left	Peds	
Peak Hour Analysis From 12:45 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	91	401	90	0	582	0	627	71	0	698	0	321	546	0	0	867	2147
04:45 PM	72	412	103	0	587	0	602	62	0	664	0	337	521	0	0	858	2109
05:00 PM	97	411	95	0	603	0	607	83	0	690	0	403	463	0	0	866	2159
05:15 PM	86	427	82	0	595	0	636	78	0	714	0	312	566	0	0	878	2187
Total Volume	346	1651	370	0	2367	0	2472	294	0	2766	0	1373	2096	0	0	3469	8602
% App. Total	14.6	69.8	15.6	0		0	89.4	10.6	0			39.6	60.4	0	0		
PHF	.892	.967	.898	.000	.981	.000	.972	.886	.000	.968	.000	.852	.926	.000	.000	.988	.983



Silver State Traffic Data Collection, LLC

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File Name : Tropicana-Swenson
Site Code : 00000066
Start Date : 10/28/2016
Page No : 1

Groups Printed- Unshifted

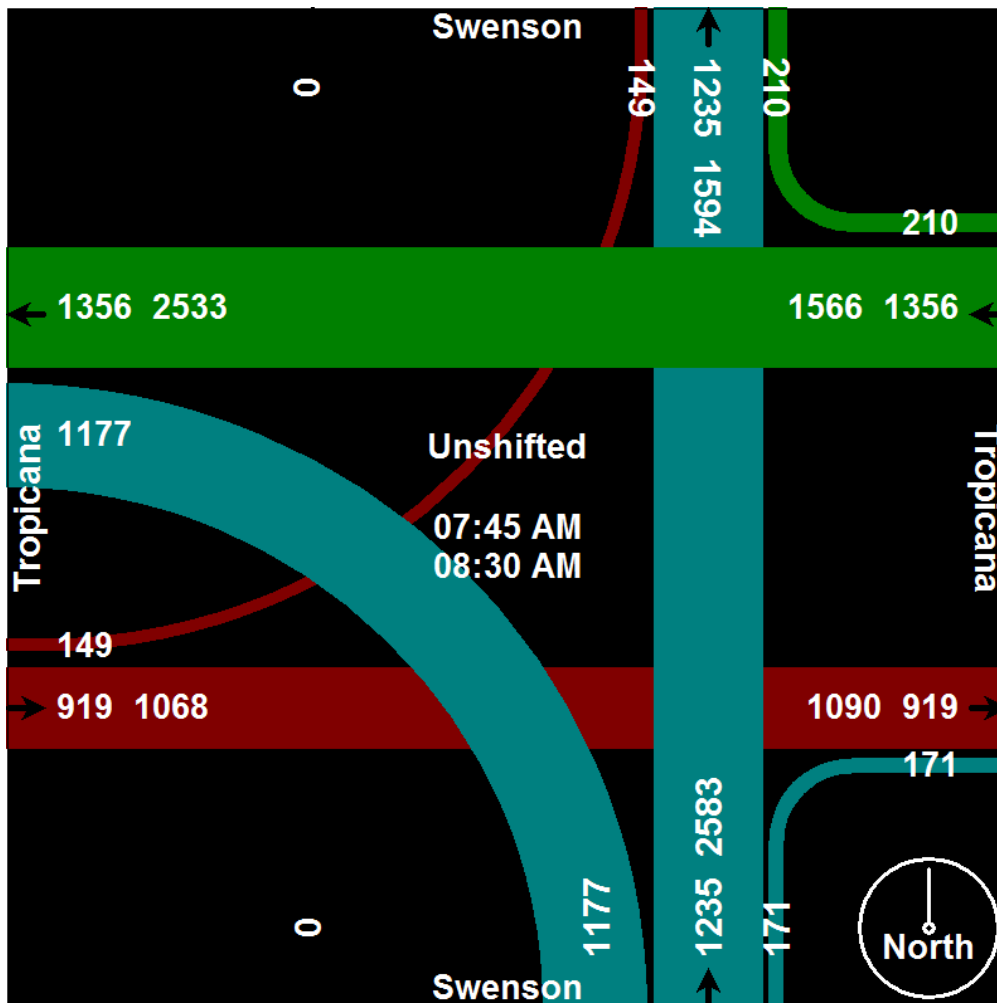
Start Time	Tropicana Westbound				Swenson Northbound				Tropicana Eastbound				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
07:00 AM	30	318	0	0	47	212	191	0	0	166	27	0	991
07:15 AM	49	322	0	0	44	274	226	0	0	174	93	0	1182
07:30 AM	50	385	0	0	39	313	196	0	0	156	94	0	1233
07:45 AM	59	422	0	0	59	306	306	0	0	214	43	0	1409
Total	188	1447	0	0	189	1105	919	0	0	710	257	0	4815
08:00 AM	43	314	0	0	33	291	299	0	0	229	33	0	1242
08:15 AM	56	323	0	0	31	317	263	0	0	271	34	0	1295
08:30 AM	52	297	0	0	48	321	309	0	0	205	39	0	1271
08:45 AM	54	252	0	0	40	319	264	0	0	228	48	0	1205
Total	205	1186	0	0	152	1248	1135	0	0	933	154	0	5013
*** BREAK ***													
04:00 PM	73	361	0	0	54	351	263	0	0	457	80	0	1639
04:15 PM	64	362	0	0	68	349	344	0	0	471	83	0	1741
04:30 PM	75	384	0	0	50	379	327	0	0	569	80	0	1864
04:45 PM	63	350	0	0	41	376	324	0	0	571	82	0	1807
Total	275	1457	0	0	213	1455	1258	0	0	2068	325	0	7051
05:00 PM	72	343	0	0	59	404	364	0	0	475	91	0	1808
05:15 PM	85	395	0	0	48	404	288	0	0	574	86	0	1880
05:30 PM	108	310	0	0	40	350	324	0	0	456	133	0	1721
05:45 PM	117	351	0	0	60	318	291	0	0	417	115	0	1669
Total	382	1399	0	0	207	1476	1267	0	0	1922	425	0	7078
Grand Total	1050	5489	0	0	761	5284	4579	0	0	5633	1161	0	23957
Apprch %	16.1	83.9	0	0	7.2	49.7	43.1	0	0	82.9	17.1	0	
Total %	4.4	22.9	0	0	3.2	22.1	19.1	0	0	23.5	4.8	0	

Silver State Traffic Data Collection, LLC

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File Name : Tropicana-Swenson
 Site Code : 00000066
 Start Date : 10/28/2016
 Page No : 2

Start Time	South bound	Tropicana Westbound					Swenson Northbound					Tropicana Eastbound					Int. Total
	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	0	59	422	0	0	481	59	306	306	0	671	0	214	43	0	257	1409
08:00 AM	0	43	314	0	0	357	33	291	299	0	623	0	229	33	0	262	1242
08:15 AM	0	56	323	0	0	379	31	317	263	0	611	0	271	34	0	305	1295
08:30 AM	0	52	297	0	0	349	48	321	309	0	678	0	205	39	0	244	1271
Total Volume	0	210	1356	0	0	1566	171	1235	1177	0	2583	0	919	149	0	1068	5217
% App. Total		13.4	86.6	0	0		6.6	47.8	45.6	0		0	86	14	0		
PHF	.000	.890	.803	.000	.000	.814	.725	.962	.952	.000	.952	.000	.848	.866	.000	.875	.926

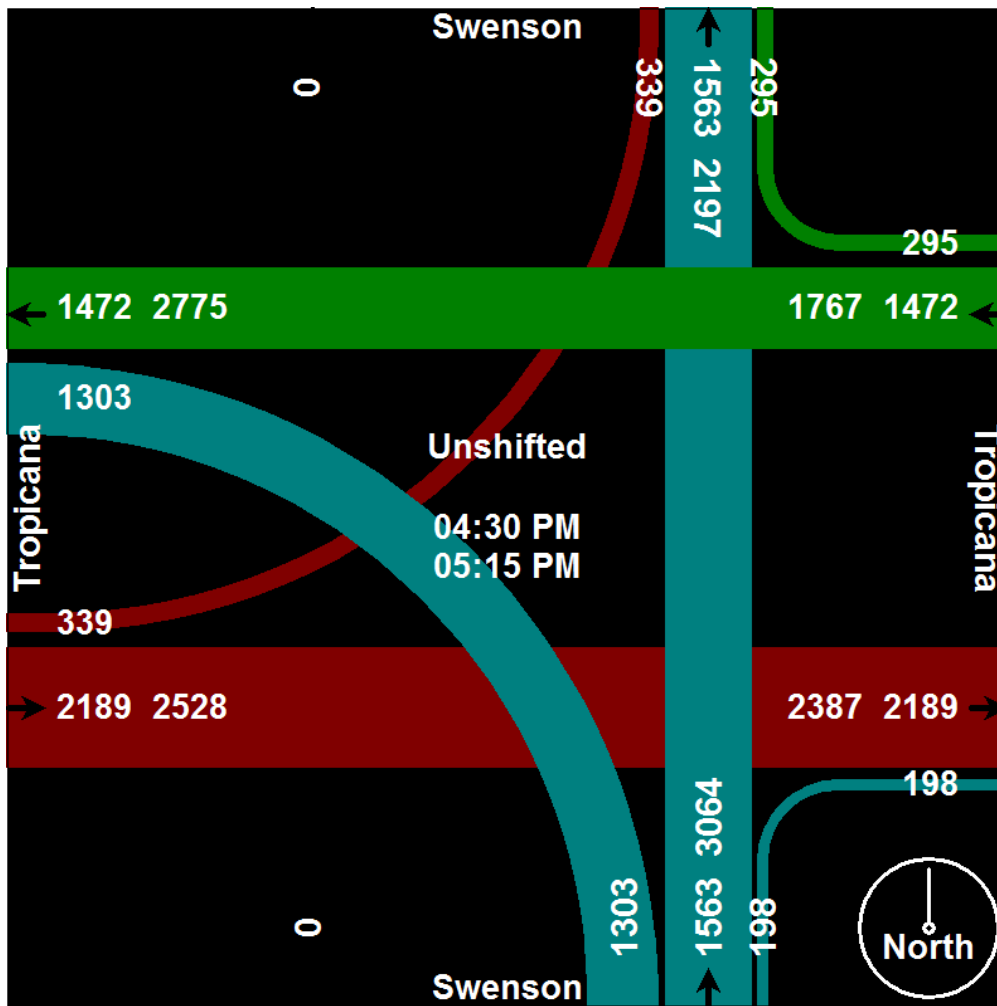


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File Name : Tropicana-Swenson
 Site Code : 00000066
 Start Date : 10/28/2016
 Page No : 3

Start Time	South bound	Tropicana Westbound					Swenson Northbound					Tropicana Eastbound					Int. Total
	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	0	75	384	0	0	459	50	379	327	0	756	0	569	80	0	649	1864
04:45 PM	0	63	350	0	0	413	41	376	324	0	741	0	571	82	0	653	1807
05:00 PM	0	72	343	0	0	415	59	404	364	0	827	0	475	91	0	566	1808
05:15 PM	0	85	395	0	0	480	48	404	288	0	740	0	574	86	0	660	1880
Total Volume	0	295	1472	0	0	1767	198	1563	1303	0	3064	0	2189	339	0	2528	7359
% App. Total		16.7	83.3	0	0		6.5	51	42.5	0		0	86.6	13.4	0		
PHF	.000	.868	.932	.000	.000	.920	.839	.967	.895	.000	.926	.000	.953	.931	.000	.958	.979



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1819 Quarley Place
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File Name : Swenson-Thomas and Mack Dr
 Site Code : 00000000
 Start Date : 9/28/2018
 Page No : 1

Groups Printed- Unshifted

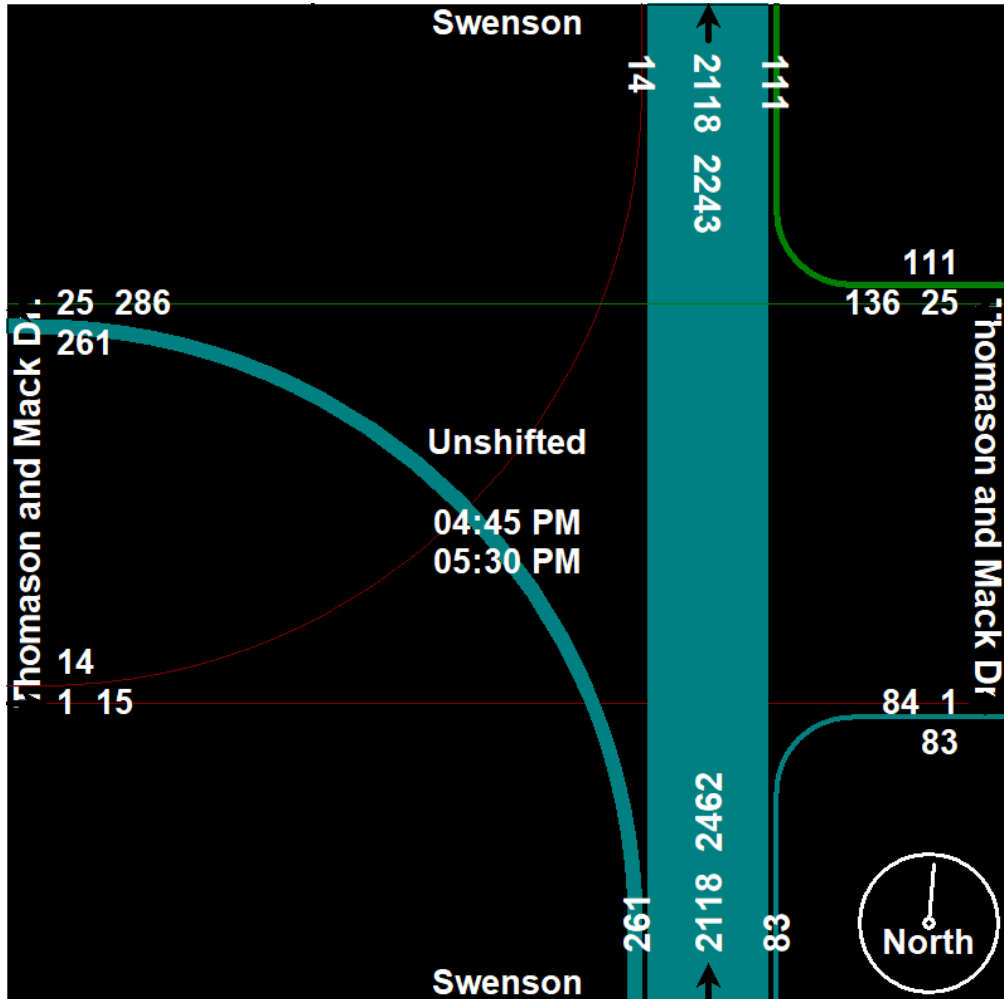
Start Time	Thomason and Mack Dr. Westbound				Swenson Northbound				Thomason and Mack Dr. Eastbound				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
07:00 AM	4	2	0	0	43	275	16	0	0	1	0	0	341
07:15 AM	4	1	0	0	95	522	42	0	0	0	0	0	664
07:30 AM	5	4	0	0	93	507	44	0	0	6	0	0	659
07:45 AM	9	3	0	0	168	582	46	0	0	2	2	0	812
Total	22	10	0	0	399	1886	148	0	0	9	2	0	2476
08:00 AM	19	1	0	0	138	567	48	0	0	13	2	0	788
08:15 AM	11	2	0	0	101	495	77	0	0	33	1	0	720
08:30 AM	20	4	0	0	80	566	88	0	0	63	1	0	822
08:45 AM	30	7	0	0	88	521	103	0	0	57	6	0	812
Total	80	14	0	0	407	2149	316	0	0	166	10	0	3142
*** BREAK ***													
04:00 PM	9	7	0	0	17	532	84	0	0	0	0	0	649
04:15 PM	6	8	0	0	12	528	78	0	0	5	5	0	642
04:30 PM	13	2	0	0	9	432	70	0	0	1	6	0	533
04:45 PM	22	8	0	0	25	560	68	0	0	0	3	0	686
Total	50	25	0	0	63	2052	300	0	0	6	14	0	2510
05:00 PM	36	9	0	0	19	522	63	0	0	1	5	0	655
05:15 PM	39	3	0	0	17	489	75	0	0	0	5	0	628
05:30 PM	14	5	0	0	22	547	55	0	0	0	1	0	644
05:45 PM	8	6	0	0	9	478	78	0	0	2	4	0	585
Total	97	23	0	0	67	2036	271	0	0	3	15	0	2512
Grand Total	249	72	0	0	936	8123	1035	0	0	184	41	0	10640
Apprch %	77.6	22.4	0	0	9.3	80.5	10.3	0	0	81.8	18.2	0	
Total %	2.3	0.7	0	0	8.8	76.3	9.7	0	0	1.7	0.4	0	

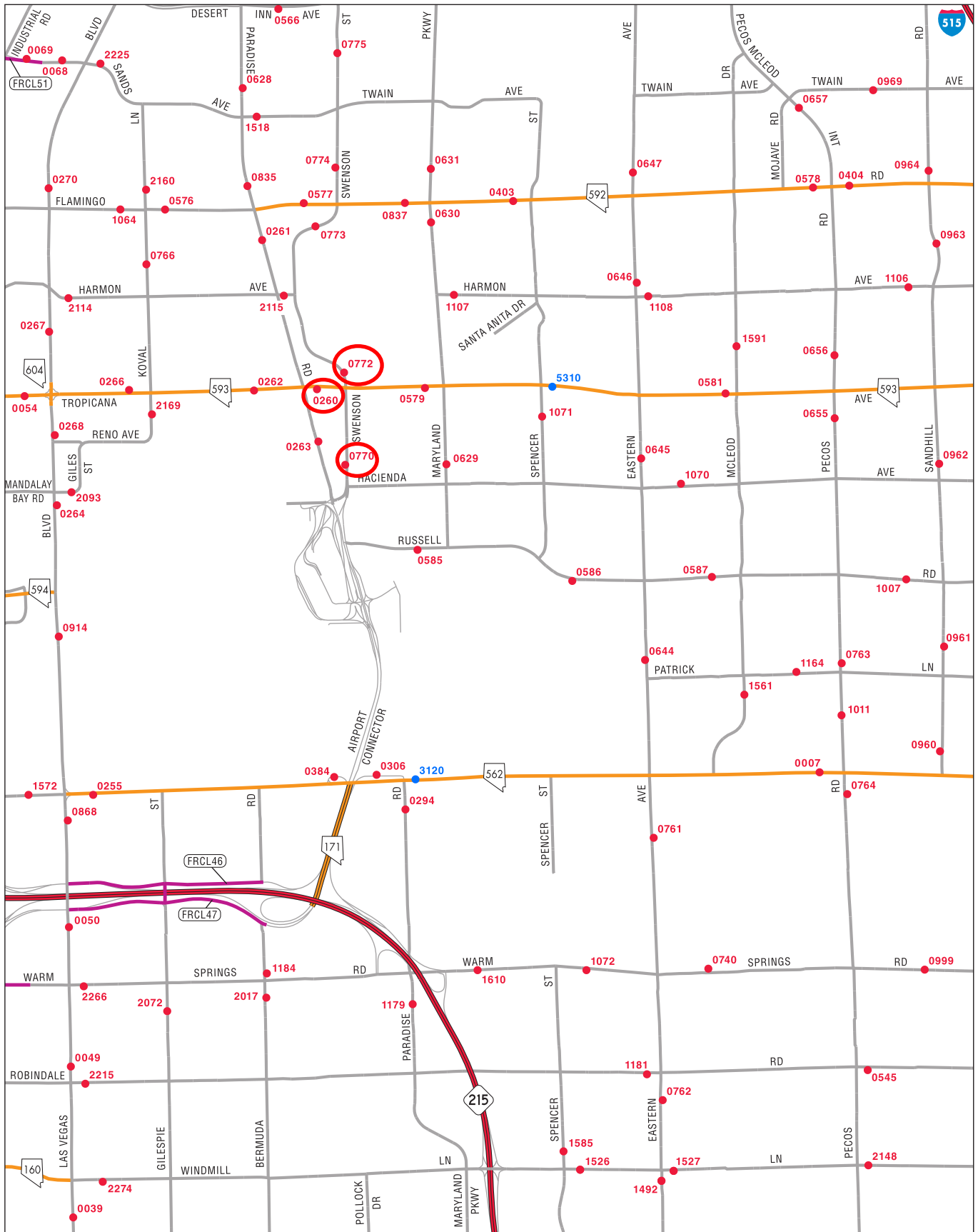
Silver State Traffic Data Collection, LLC

1819 Quarley Place
 Henderson, Nevada 89014
 702-898-1968 - Office
 702-217-1968 - Cell
 sstraffic@msn.com

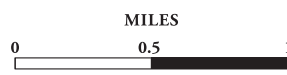
File Name : Swenson-Thomas and Mack Dr
 Site Code : 00000000
 Start Date : 9/28/2018
 Page No : 3

Start Time	South bound	Thomason and Mack Dr. Westbound					Swenson Northbound					Thomason and Mack Dr. Eastbound					Int. Total
	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	0	22	8	0	0	30	25	560	68	0	653	0	0	3	0	3	686
05:00 PM	0	36	9	0	0	45	19	522	63	0	604	0	1	5	0	6	655
05:15 PM	0	39	3	0	0	42	17	489	75	0	581	0	0	5	0	5	628
05:30 PM	0	14	5	0	0	19	22	547	55	0	624	0	0	1	0	1	644
Total Volume	0	111	25	0	0	136	83	2118	261	0	2462	0	1	14	0	15	2613
% App. Total		81.6	18.4	0	0		3.4	86	10.6	0		0	6.7	93.3	0		
PHF	.000	.712	.694	.000	.000	.756	.830	.946	.870	.000	.943	.000	.250	.700	.000	.625	.952





Las Vegas
Urbanized Area



Sheet C-3
Clark (003)

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Station	Route / Location	AADT	AADT	AADT	AADT	AADT	AADT	AADT	AADT	AADT	AADT
0030239	IR15, S/B on-ramp of the Speedway-Hollywood Intch 'Exit 54'	4,700	4,100	3,400	3,600	3,200	3,700	3,400	3,500	4,000	3,900
0030242	US95, at the NV-CA Stateline 1 mi S of SR-163 (Laughlin Hw)	3,500	4,400	4,100	3,400	3,100	2,900	2,900	3,100	3,400	3,000
0030243	SR582, Boulder Hw, .2 mi S of SR-564 (Lake Mead Pk)	27,000	27,000	29,000	25,000	24,000	22,000	20,500	22,000	23,500	22,000
0030244	SR564, Lake Mead Pk, 600ft E of SR-582 (Boulder Hw)	38,000	38,000	38,000	38,000	37,000	31,500	34,000	34,000	33,000	31,000
0030245	SR564, Lake Mead Pk, .2 mi W of SR-582 (Boulder Hw)	38,000	38,000	37,000	37,000	37,000	35,500	38,000	36,500	34,500	38,000
0030246	IR215, Btwn the US-95/I-215 Henderson Intch 'Exit 1' and the Gibson Intch 'Exit 2'	114,000	114,000	114,000	108,000	108,000	111,000	112,000	115,000	117,000	120,000
0030249	Sunset Rd, .1 mi W of SR-582 (Boulder Hw)	18,000	17,000	15,000	13,000	12,000	11,000	12,000	11,500	12,000	14,000
0030250	Sunset Rd, .2 mi E of Green Valley Pk	34,000	28,000	29,000	28,000	28,000	26,500	26,000	27,500	25,000	31,000
0030251	Green Valley Pk, .1 mi S of Sunset Rd	32,000	27,000	25,000	24,000	23,000	21,500	23,000	21,500	21,000	22,000
0030255	SR562, Sunset Rd, .1 Mi. E of Las Vegas Bl	28,000	26,000	22,000	22,000	25,000	24,500	23,500	24,500	24,500	25,000
0030258	SR582, Boulder Hw, .25 mi N of SR-593 (Tropicana Av)	38,000	36,000	36,000	32,000	32,000	30,000	28,500	29,500	30,000	34,000
0030259	SR593, Tropicana Av, .1 mi W of SR-582 (Boulder Hw)	19,000	19,000	20,000	19,000	18,000	16,500	15,500	17,000	17,500	17,000
0030260	SR593, Tropicana Av, .1 mi E of Paradise Rd	83,000	79,000	79,000	65,000	72,000	70,500	68,000	64,500	65,500	85,000
0030261	Paradise Rd, 400ft S of SR-592 (Flamingo Rd)	41,000	43,000	41,000	39,000	40,000	38,000	37,000	38,000	37,500	40,000
0030262	SR593, Tropicana Av, .25 mi W of Paradise Rd	100,000	92,000	90,000	91,000	96,000	90,000	91,500	92,000	95,000	97,500
0030263	Paradise Rd, .2 mi S of SR-593 (Tropicana Av)	36,000	34,000	34,000	35,000	35,000	34,000	35,000	36,000	36,500	37,500
0030264	Las Vegas Bl, 1000ft N of Four Seasons Rd N of Russell Rd	50,000	51,000	47,000	47,000	47,000	48,000	49,000	52,000	48,000	49,000

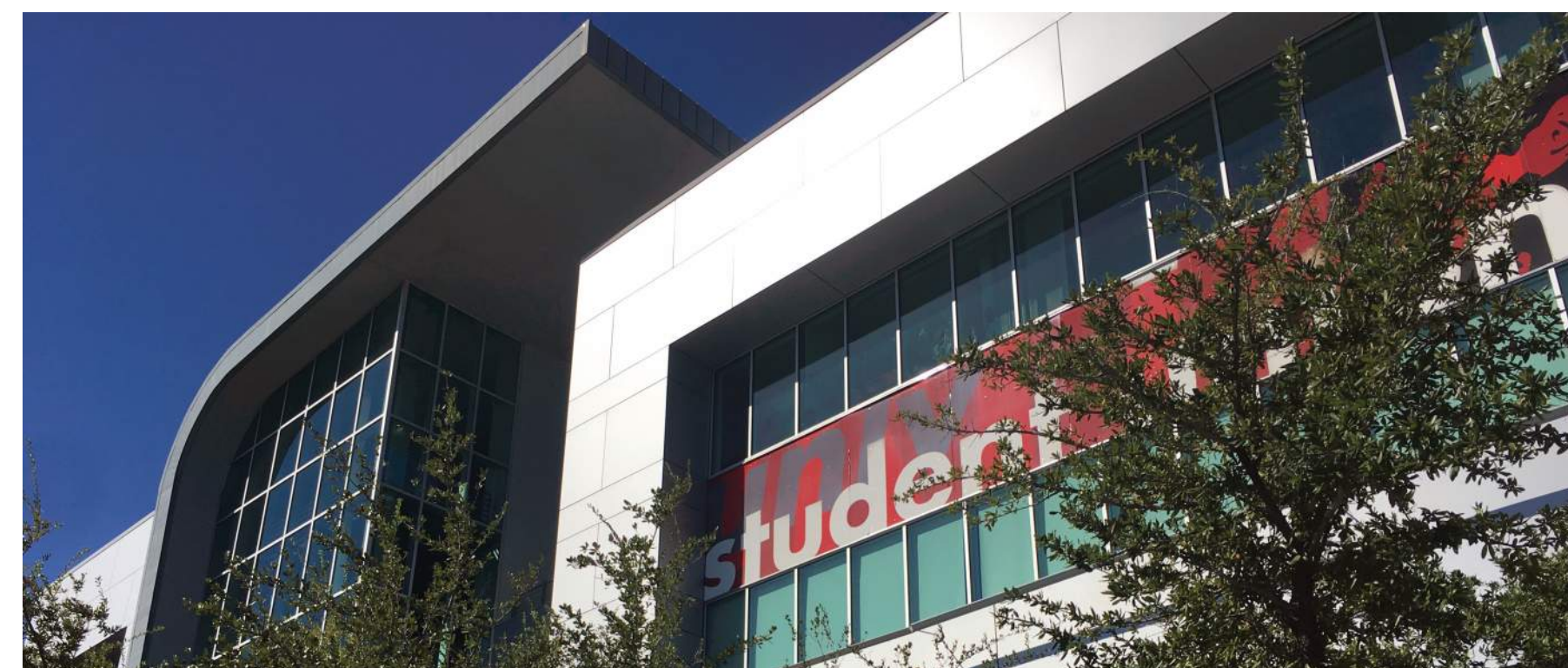
Color indicates that the AADT value is estimated

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Station	Route / Location	AADT	AADT	AADT	AADT	AADT	AADT	AADT	AADT	AADT	AADT
0030762	Eastern Av, btwn Robindale Rd & Buckboard Ln	38,000	37,000	33,000	34,000	33,000	32,500	31,000	29,000	29,500	25,000
0030763	Pecos Rd, 150ft N of Patrick Ln	32,000	27,000	29,000	26,000	28,000	22,500	23,500	23,500	23,000	22,500
0030764	Pecos Rd, .2 mi N of Warm Springs.	25,000	22,000	24,000	21,000	19,000	18,500	19,000	19,000	20,000	20,500
0030766	Koval Ln, .25 mi S of SR-592 (Flamingo Rd)	36,000	32,000	33,000	27,000	31,000	29,000	29,000	25,500	32,500	31,000
0030767	Antelope Wy, 500ft N of Alta Dr	3,700	3,300	3,200	4,300	4,200	3,900	3,800	3,200	4,400	4,700
0030768	US95, S/B on-ramp of the Skye Canyon Intch 'Exit 95'.					5,800	5,400	5,600	5,800	6,500	6,500
0030769	Lindell Rd, S of SR-160 and S of Pebble.					200	500	550	600	600	600
0030770	Swenson St, 150ft S of De Met Dr	26,000	28,000	27,000	25,000	25,000	25,000	25,000	25,000	25,500	26,000
0030772	Swenson St, 300ft N of SR-593 (Tropicana Av)	25,000	27,000	26,000	24,000	25,000	22,500	25,000	21,500	26,500	27,000
0030773	Swenson St, 600ft S of SR-592 (Flamingo Rd)	22,000	20,000	15,000	16,000	16,000	14,500	15,000	15,500	16,500	17,000
0030774	Swenson St, .1 mi N of SR-592 (Flamingo Rd)	18,000	16,000	11,000	14,000	15,000	13,500	12,500	12,500	13,000	14,000
0030775	Swenson St, 100ft S of Sierra Vista Dr	18,000	18,000	13,000	14,000	13,000	11,500	10,500	11,500	13,000	13,000
0030776	Joe W Brown Dr, 100ft N of Desert Inn Rd	15,000	14,000	12,000	12,000	11,000	10,500	10,500	11,000	9,400	12,000
0030777	SR146, (St Rose Pkwy), .7 mi E of Eastern Av	39,000	37,000	37,000	34,000	33,000	34,000	34,000	36,000	39,500	43,000
0030779	IR515, US-95, N/B on-ramp of the Charleston Intch 'Exit 72'	17,000	18,000	17,000	18,000	18,000	17,500	18,500	17,500	19,000	19,000
0030780	IR515, US-95, N/B on-ramp of the Las Vegas Bl Intch 'Exit 75B'	8,200	8,300	11,000	9,200	9,600	8,700	8,400	10,000	9,800	12,000
0030781	IR515, US-95, S/B off-ramp of the Las Vegas Bl Intch 'Exit 75B'	7,400	7,500	9,100	7,600	8,000	7,300	8,400	8,900	9,200	8,600

Color indicates that the AADT value is estimated

APPENDIX G

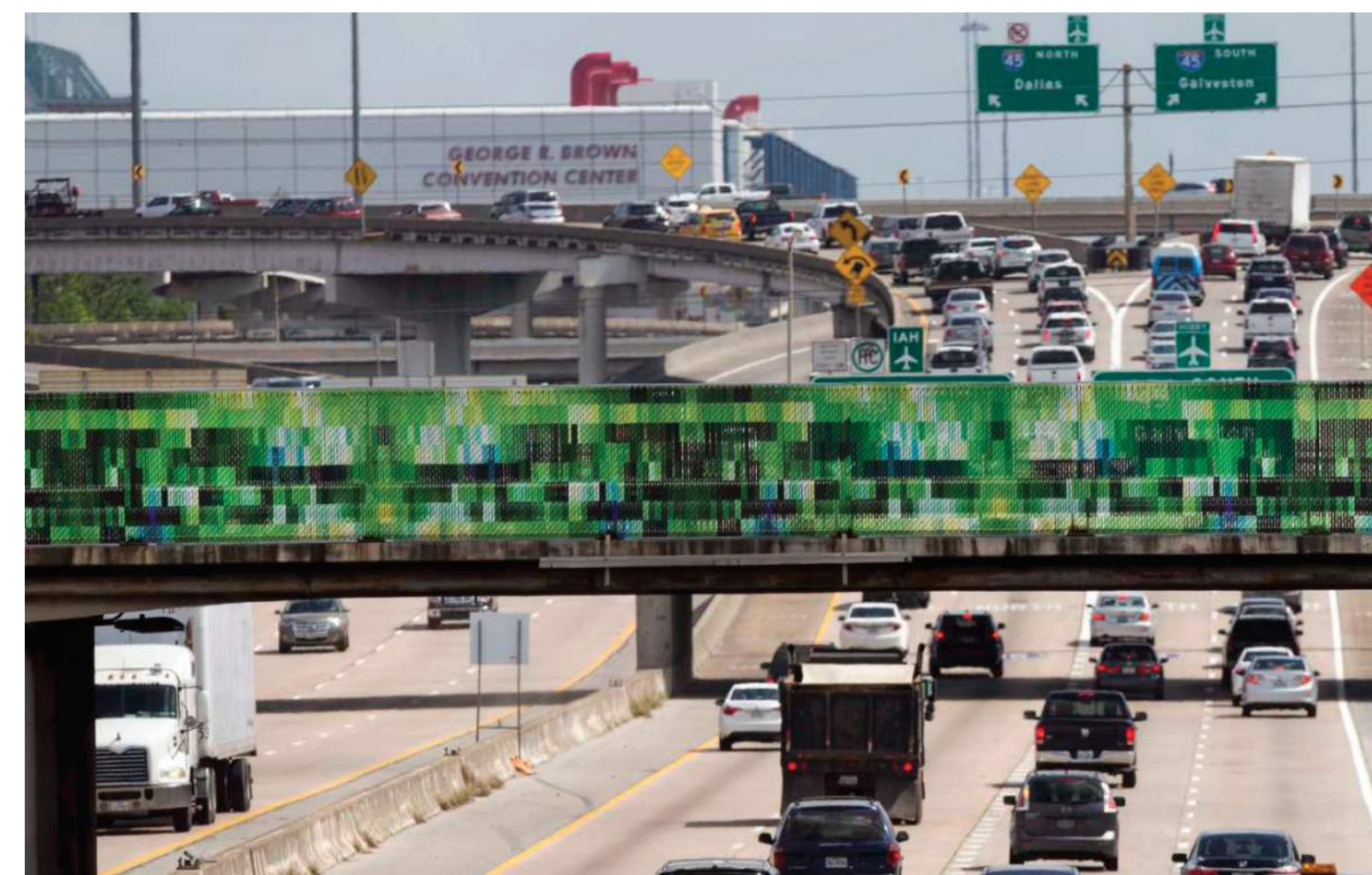
UNLV INSPIRATION IMAGERY AND ROADWAY TREATMENT EXHIBITS



UNLV

ELEVATED ROADWAY: CAMPUS INSPIRATION
UNIVERSITY OF NEVADA LAS VEGAS

Kimley»Horn
DRAFT

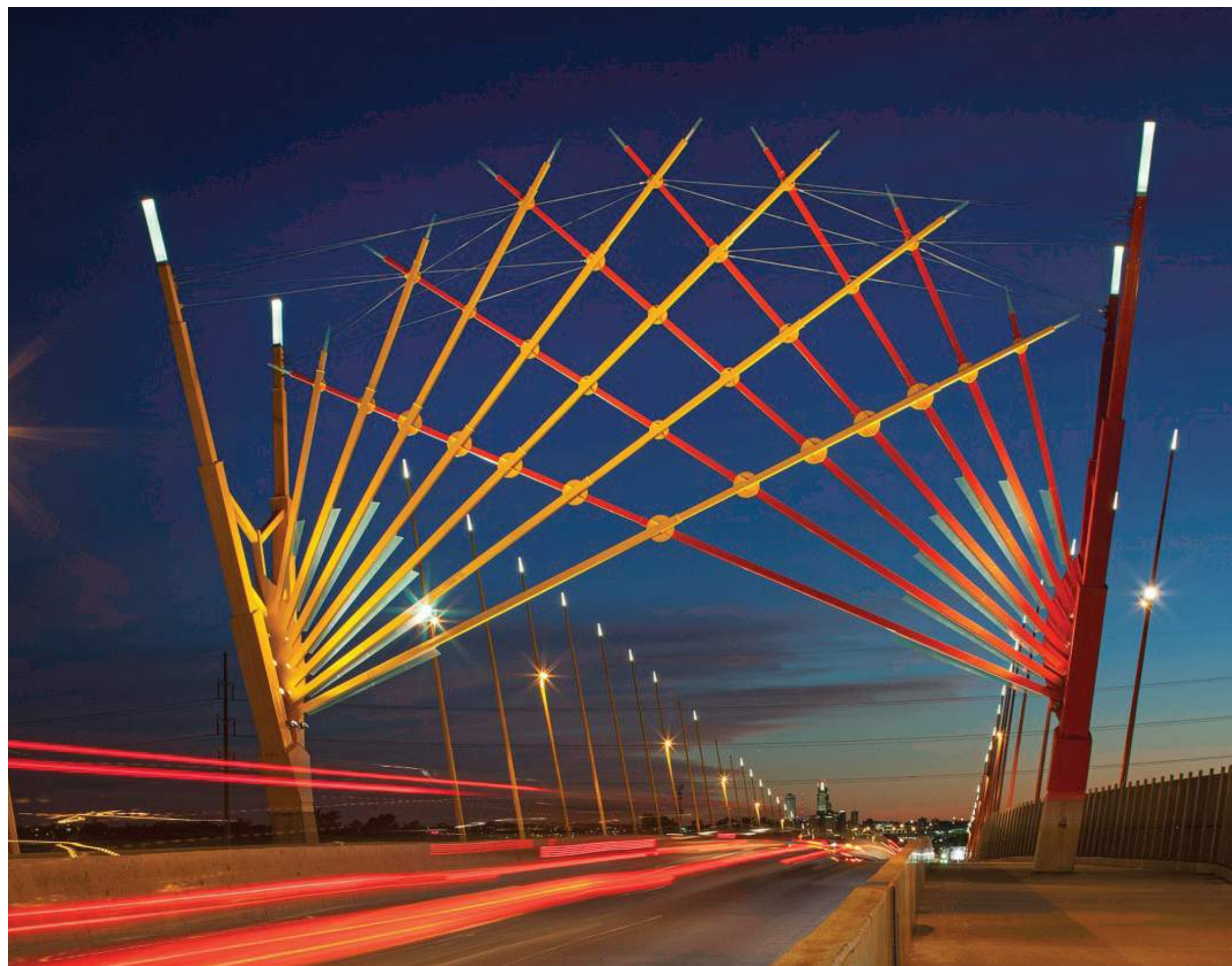
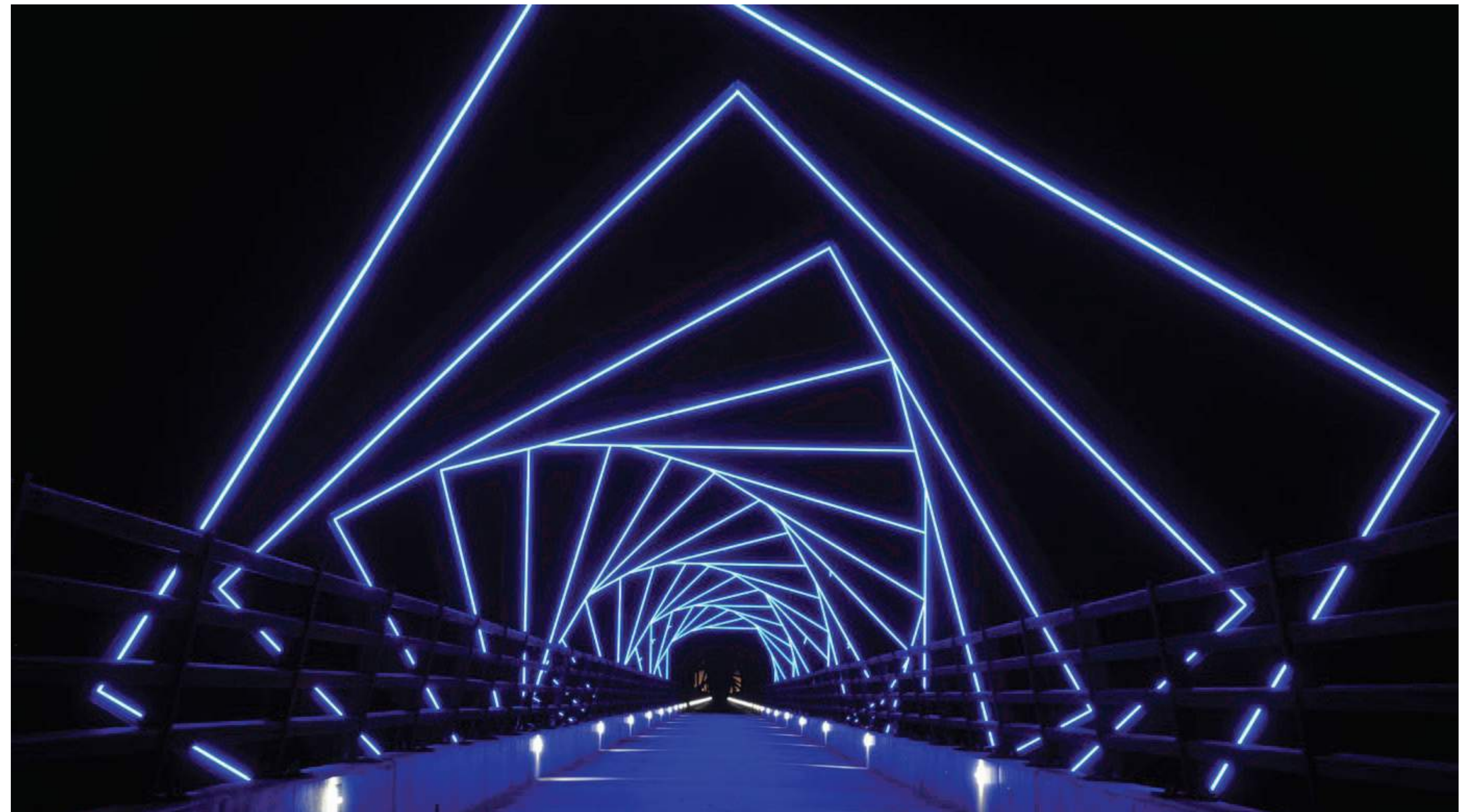


UNLV

ELEVATED ROADWAY: BRIDGE TREATMENT (OTHER LOCATIONS)
UNIVERSITY OF NEVADA LAS VEGAS

Kimley»Horn

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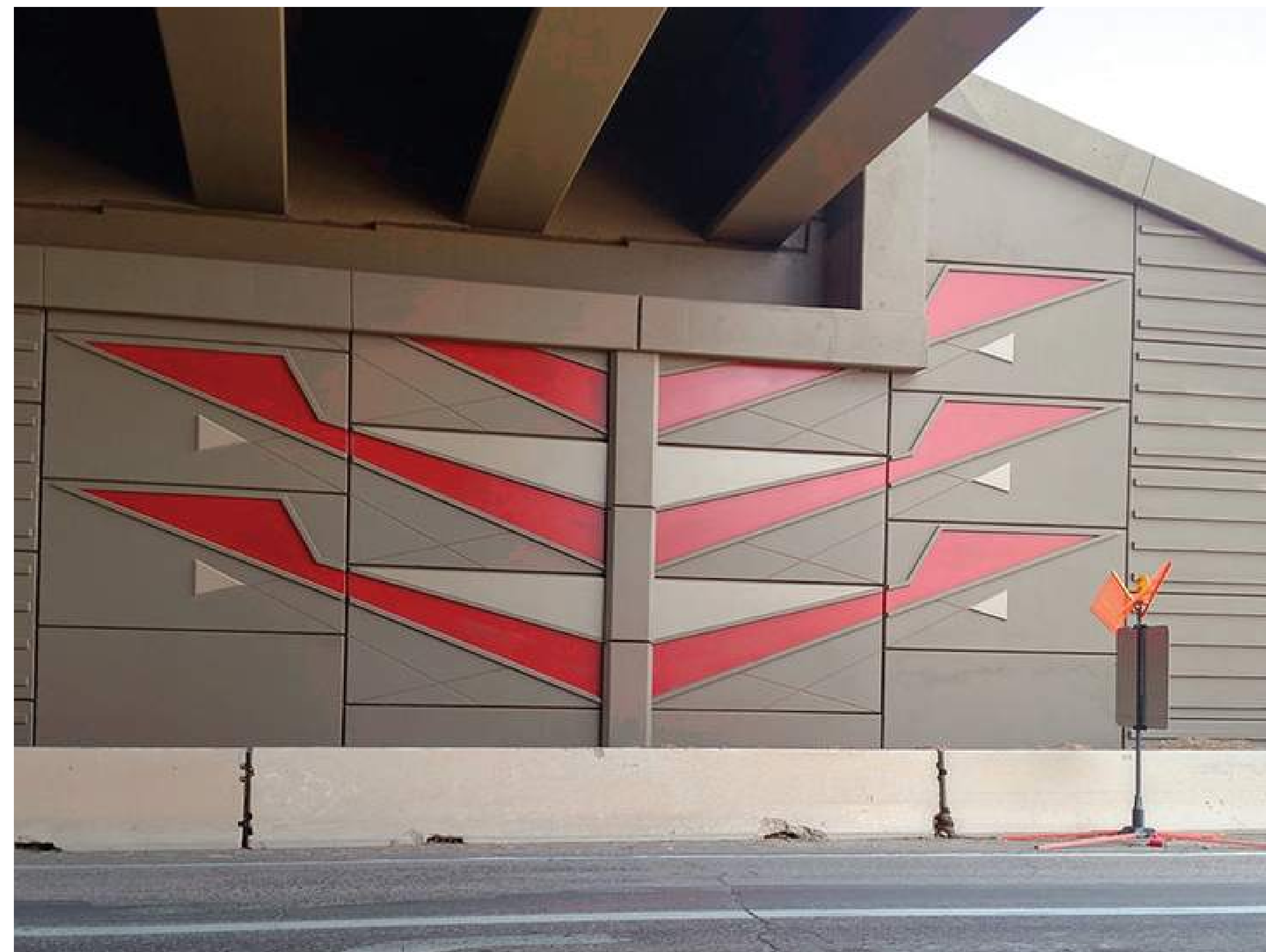
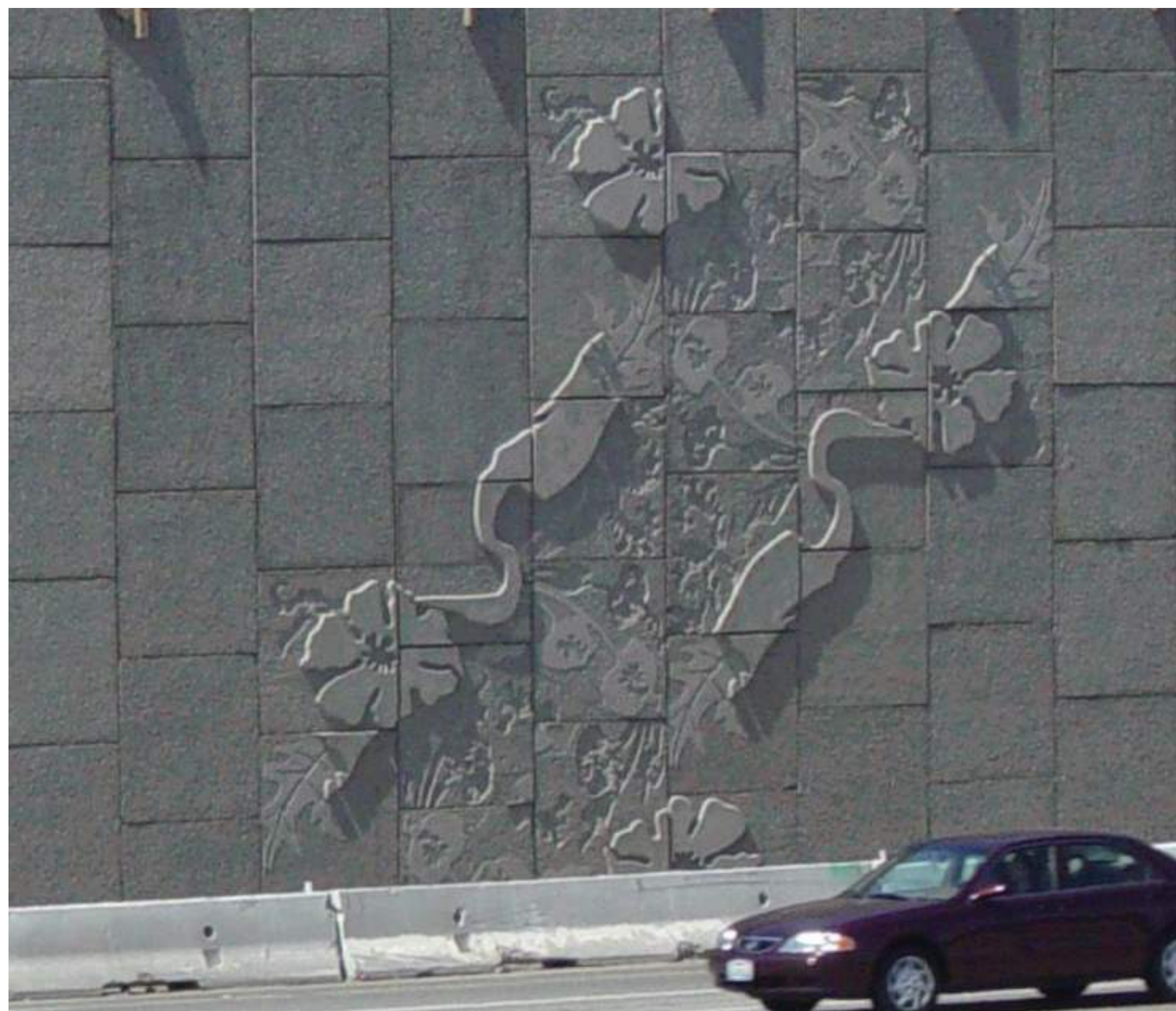


UNLV

ELEVATED ROADWAY: LIGHT TREATMENT (OTHER LOCATIONS)
UNIVERSITY OF NEVADA LAS VEGAS

Kimley»Horn

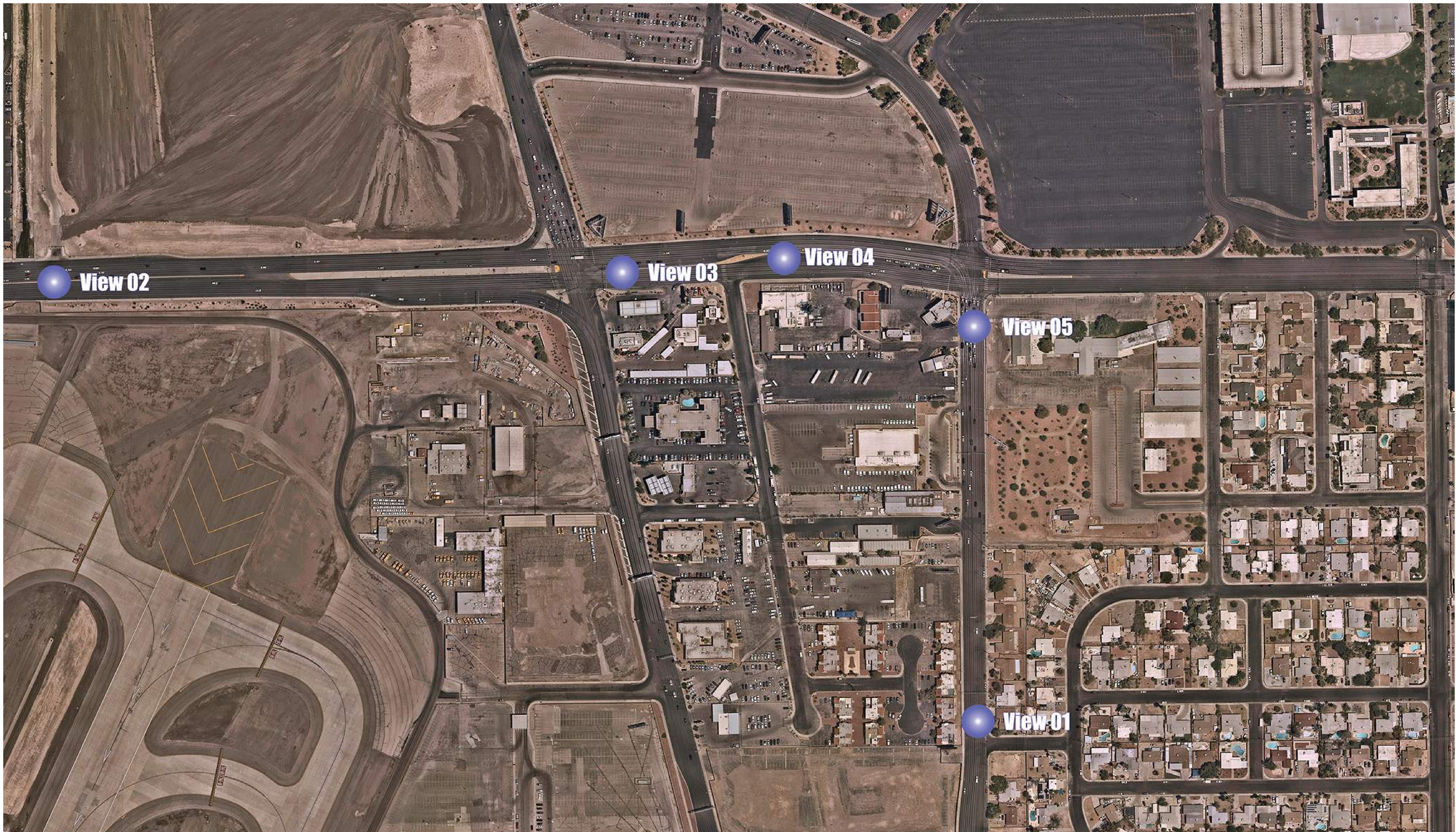
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UNLV

ELEVATED ROADWAY: WALL TREATMENT (OTHER LOCATIONS)
UNIVERSITY OF NEVADA LAS VEGAS

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UNLV

3D MODEL: AERIAL MAP
UNIVERSITY OF NEVADA LAS VEGAS

Kimley»Horn

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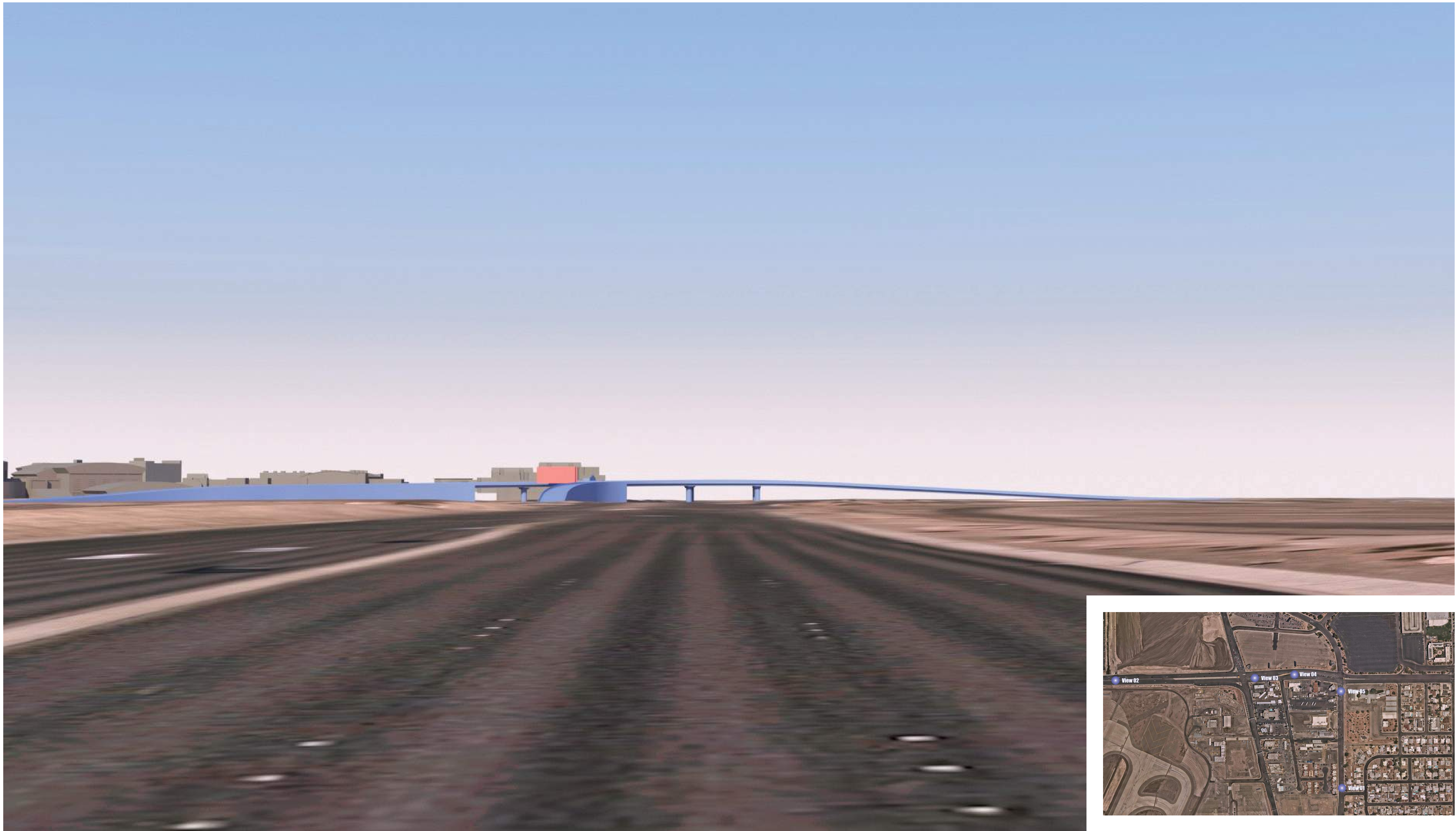


UNLV

3D MODEL: VIEW 01
UNIVERSITY OF NEVADA LAS VEGAS

Kimley»Horn

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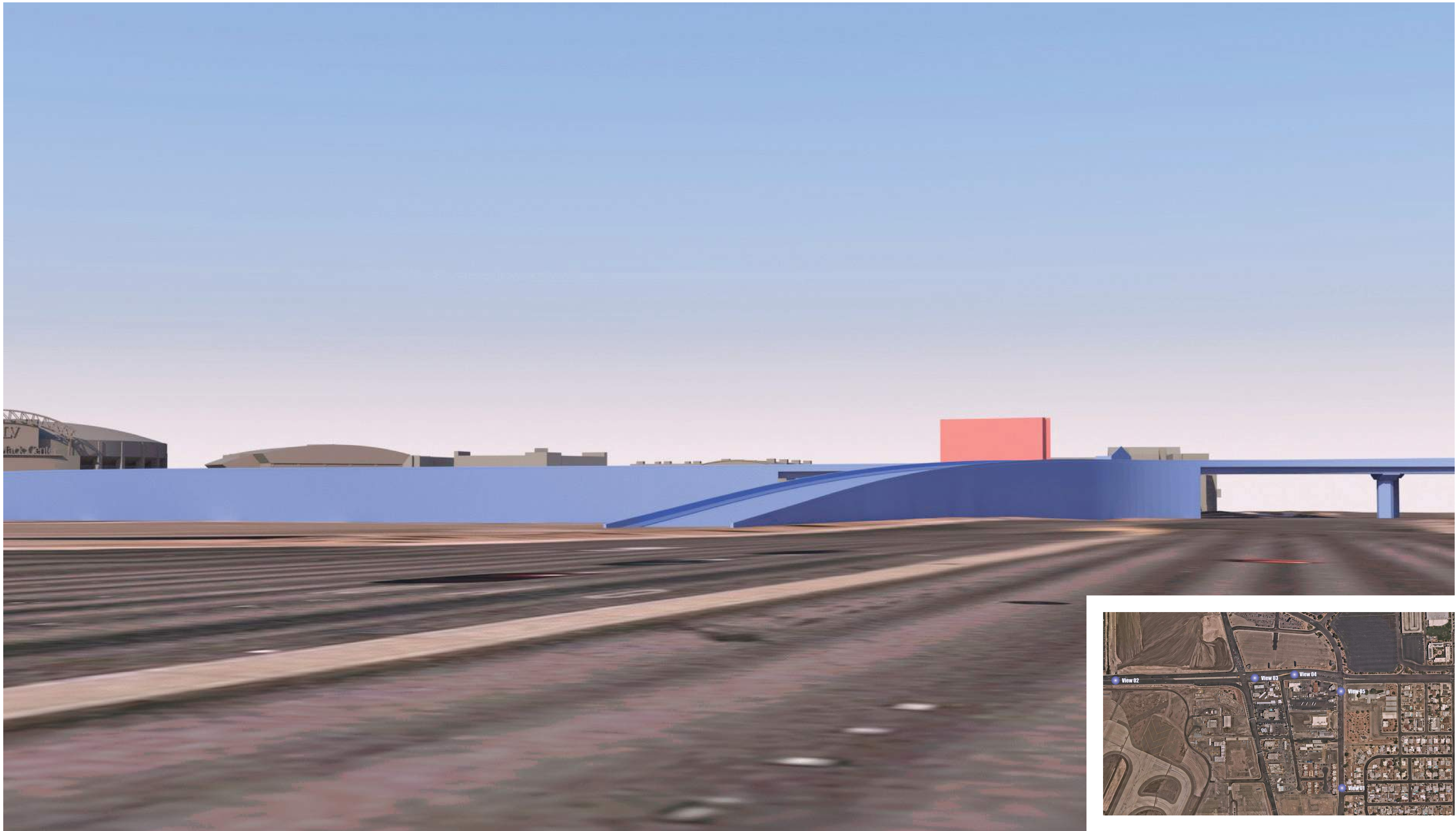


UNLV

3D MODEL: VIEW 02
UNIVERSITY OF NEVADA LAS VEGAS

Kimley»Horn

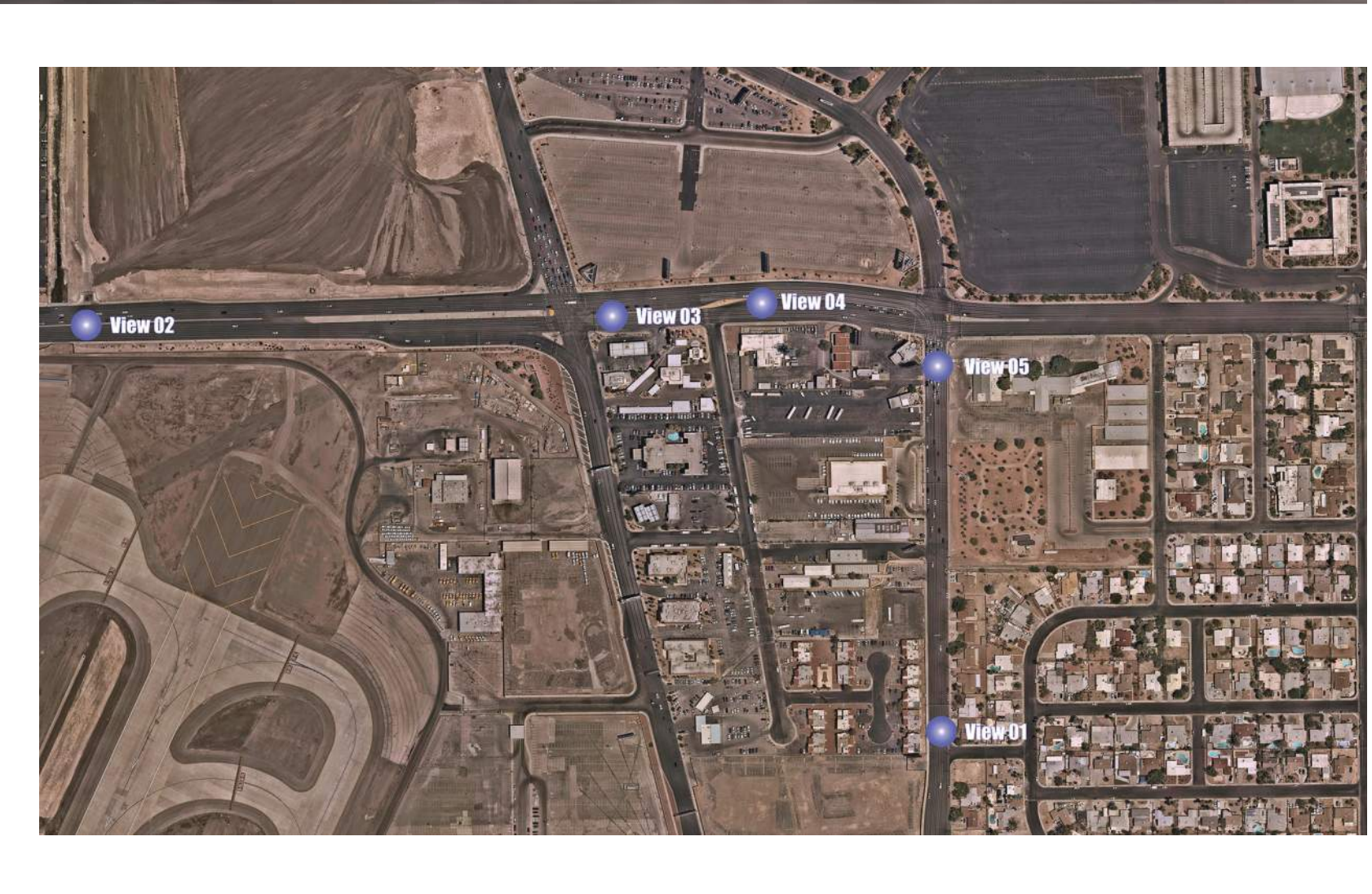
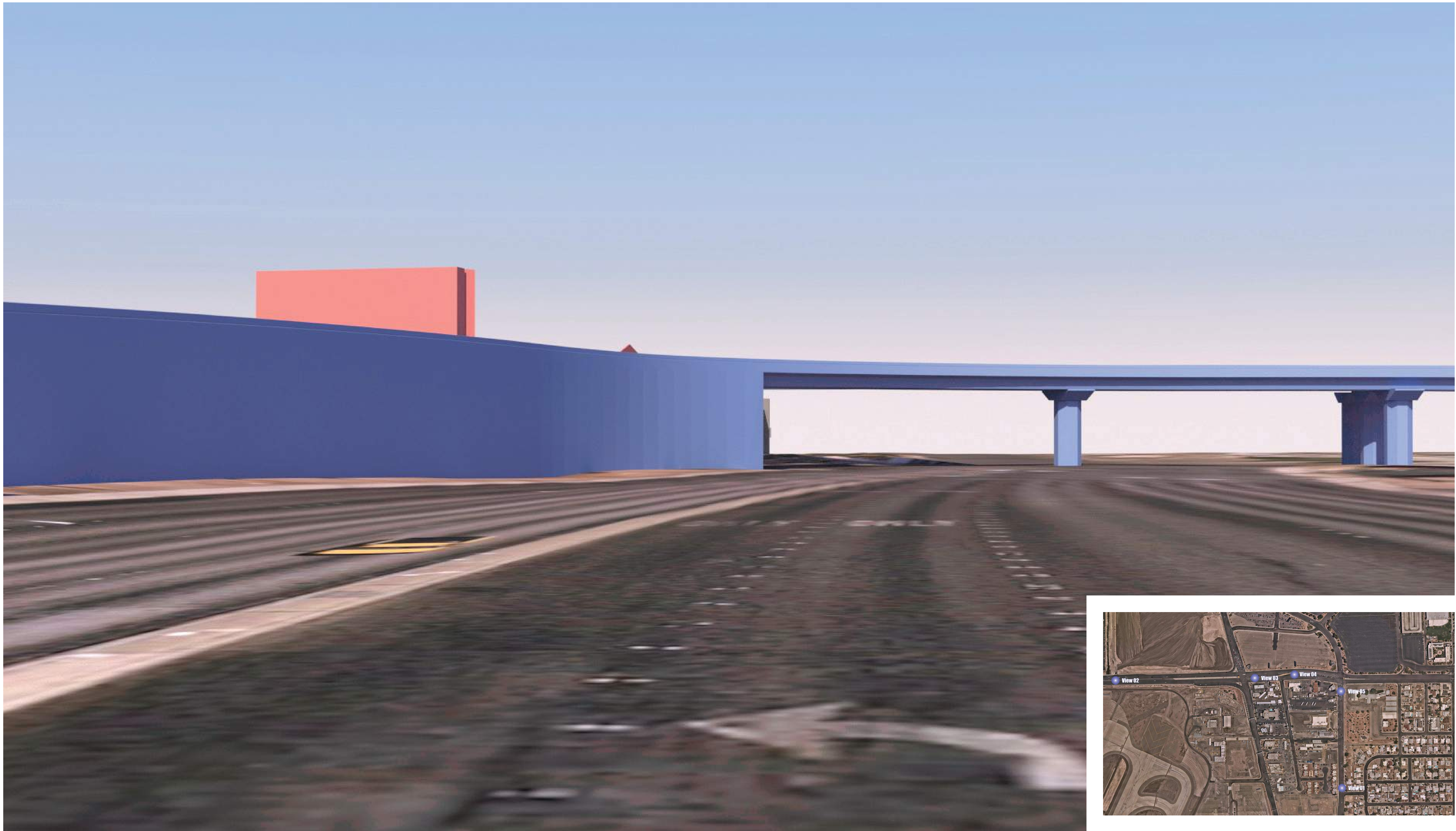
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3D MODEL: VIEW 03
UNIVERSITY OF NEVADA LAS VEGAS



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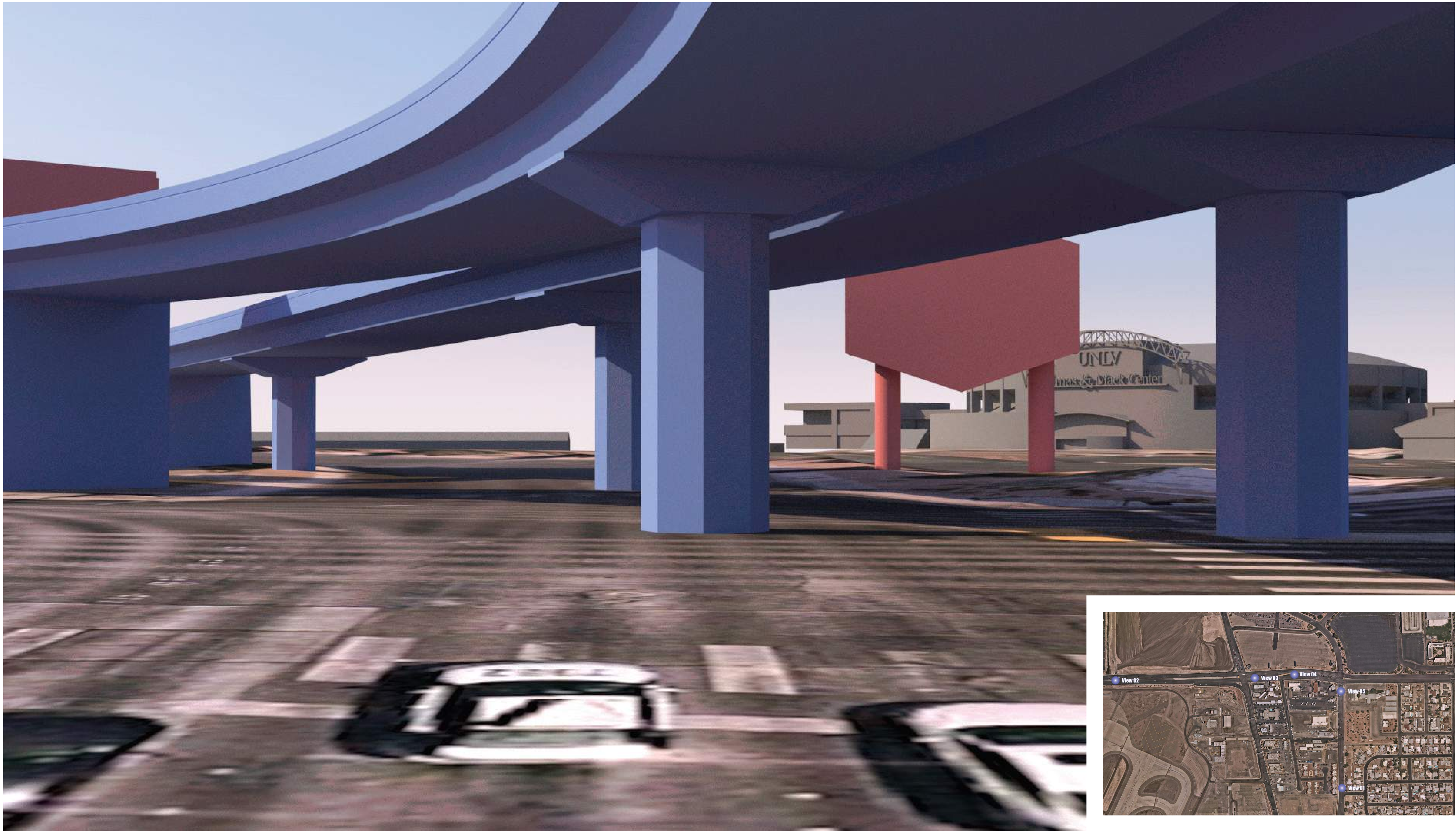


UNLV

3D MODEL: VIEW 04
UNIVERSITY OF NEVADA LAS VEGAS

Kimley»Horn

DRAFT



UNLV

3D MODEL: VIEW 05
UNIVERSITY OF NEVADA LAS VEGAS

Kimley»Horn

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Attachment 3

**A Socioeconomic Analysis of the Proposed
Elevated Roadway at Swenson Street,
Tropicana Avenue and Paradise Road on
the University of Nevada Las Vegas**

NOVEMBER 2018

The JBarrett Company

INTELLIGENTLY FORWARD. FASTER.

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Introduction

In April 2016, the Regional Transportation Commission of Southern Nevada (RTC) published a comprehensive business plan for a forward-looking transportation system to serve the area around the Las Vegas Strip and downtown Las Vegas, including McCarran International Airport and UNLV. The RTC's almost two-year collaborative effort resulted in the Transportation Investment Business Plan (TIBP).

The TIBP contained suites of recommendations including roadway investments, high capacity transit infrastructure, pedestrian improvements as well as recommended transportation policies to complement the infrastructure recommendations. One of the recommended roadway improvements outlined in the TIBP was a complex of grade separated roadways for cars exiting the airport northbound on Swenson Street. The project is called the Tropicana Swenson Paradise Grade Separation Project.

At the very end of the study portion of the TIBP, Clark County came forward with an elevated roadway plan that incorporated the Tropicana/Swenson/Paradise Grade Separation Project and expanded the elevated elements into a two-way elevated couplet that extended all the way to the Flamingo/Koval intersection and added a return elevated roadway back to McCarran International Airport—thus becoming an elevated couplet. Clark County eventually called the expanded elevated roadway project the Koval/Swenson Express Airport Connector Elevated Couplet. The project is also known as the Elevated Airport Expressway Project and its purpose was to provide exclusive express access for vehicles traveling between McCarran International Airport and the Las Vegas Strip area using elevated structures and underpasses on segments of Koval Lane and Swenson Street, between Tropicana Avenue and Flamingo Road.

This much longer, elevated, roadway couplet concept faced significant community and stakeholder opposition, especially from the Nevada Resort Association (NRA)—a trade organization made up of hotel/casino/resort properties in and around the Las Vegas Resort Corridor. Shortly after the written opposition from the NRA became public, Clark County cut the elevated elements entirely out of the project, except for the area around UNLV. It is noteworthy that one of the primary concerns cited by those who opposed the elevated couplet was the negative visual impacts associated with the elevated roadway concept.

UNLV staff reached out to a team of consultants to assist them with a more formal, economically based assessment of the general visual, social and environmental aspects of the currently proposed elevated road on UNLV. After our analysis, the elevated roadway's impact on UNLV are adverse.

The JABarrett Company has worked cooperatively with CSL International, an experienced consulting firm for athletic and sports venues, and Kimley Horn, a worldwide traffic engineering consulting firm, to produce this analysis. The remainder of this report contains that analysis.

Executive Summary

Roadway improvements such as the subject elevated roadway can result in significant project benefits for much of the region such as improved access, decreases in travel time or safety improvements. For the proposed elevated roadway project at Swenson Street and Tropicana Avenue, there will certainly be an improvement in the speed at which northbound cars and trucks can move to cross over Tropicana Avenue and then underneath Paradise Road. Vehicles travelling northbound on Swenson will be able to move in an unobstructed fashion after the elevated roadway is completed. However, with large transport infrastructure projects, such as the proposed elevated roadway project, there are many beneficiaries, but there are also some parties who do not benefit much from the project but end up bearing a disproportionate burden of the project's negative externalities and adverse effects.

It is clear from our analysis that UNLV will bear the brunt of the negative, adverse impacts from this project. While the general public will benefit from the project, UNLV will have to deal with the negative visual Impacts, increased noise and vibration, roadway disruption and noise from the construction of the project, and other emissions from a roadway that will also block out the light of the sun for many hours of the day to portions of the Paradise Campus of UNLV. The elevated roadway will also block the view of motorists who will no longer be able to see an important gateway to UNLV. The concentrated construction of elevated and depressed roadway sections in this small geographic area will combine to have a significant adverse economic, social, and aesthetic impact on portions of the UNLV Maryland Campus, the UNLV Paradise Campus and, potentially, the UNLV 42-acre campus at Tropicana Avenue and Koval Lane.

CSL has identified the direct financial loss to UNLV due to blocked views of UNLV's marquee, billboards and branding to be \$1,465,142. This amount does not include direct and Indirect economic adverse impacts from the loss of important and strategic views of the UNLV gateway, which are very difficult to assess and quantify in dollar figures, but nevertheless, still occur.

In addition to the visual impacts to UNLV the elevated roadway will significantly increase the noise and vibration levels on portions of UNLV's Maryland Campus, and UNLV's Paradise Campus due to the roadway changing from an at-grade intersection with Tropicana to an elevated freeway where autos are travelling much faster, higher and much closer to noise sensitive areas of the university. Based on the literature reviews of general adverse noise and emission impacts on land values to properties directly adjacent to or within 150 meters from freeways/highways of roughly 5% to 10% property value reduction (or .53% reduction in value per decibel increase in roadway noise), the elevated roadway may have an adverse property value range of \$2-4 Million.

The combination of higher speed, elevated auto traffic being moved directly adjacent to the primary classroom and computer research/survey lab of the Auditorium in Building 100 of the Paradise Campus will cause auto noise levels to increase to a level that will cause much of the building to no longer be viable for use as classroom, office, laboratory/research/survey and general group use that it is used for currently.

We estimate that about 20,000 square feet of Building 100 of the UNLV Paradise Campus will have noise impacts so high that those portions of the existing building will no longer be viable for educational use. The overall cost to replace the portions of the impacted building is estimated to be between \$8,000,000 and \$9,000,000. When you combine the totals of the building replacement cost, the property value decrease from noise and emissions with the opportunity cost to business activity from the loss of line of sight, the total range of estimated financial impact to UNLV is \$11,468,142 - \$14,468,142.

UNLV Total Estimated Financial Impact

	Paradise Campus	Maryland Campus	Total
Visual Impacts (CSL)	Unknown	\$1,468,142-	\$1,468,142
Building Replacement Value	\$8-9 Million	-	\$8-9 Million
Social Impacts	Unknown	Unknown	-
Property Values Impacts from Noise & Emissions	\$1-2 Million	\$1-2 Million	\$2-4 Million
			\$11,468,142 - \$14,468,142

The following are the JABarrett Companies’ recommendations in order of priority of the most effective measures that Clark County should consider to either avoid the potential negative externalities from the proposed elevated roadway or to otherwise mitigate them or compensate UNLV for them:

- Clark County should construct a below grade tunnel (similar to what is being proposed by Clark County at Paradise Road) so that the line of sight problems and the noise problems etc., could be eliminated or at least considerably reduced.
- Clark County should compensate UNLV for the cumulative damage caused by the elevated roadway in the form of monetary, or in-kind contributions such as land, provision of new buildings and facilities, development rights, etc.
- Re-establish unobstructed views of the UNLV Marquee and the UNLV billboards where Clark County would pay for either a new Marquee and or elevate the existing marquee and the existing billboards so that exposure to motorists of the billboard and marquee messages would be as close as possible to the current condition.
- Create, as part of the design, other interesting and attractive features of the elevated roadway design that would preserve the “gateway” themes and context of one of the primary entrances to UNLV. Such features include but are not limited to: incorporation of UNLV architecture, themes, school colors, lighting enhancements, signage, wayfinding, etc., into the elevated roadway elements.
- Regardless of if the elevated roadway is constructed, Clark County should work with all stakeholders in the McCarran International Airport, UNLV and the Resort Corridor area to implement a comprehensive Transportation Demand Management (TDM) program to more effectively manage the single occupant vehicle transportation problem that is taking up so much of the existing roadway capacity in the region.
- Overlay the proposed concrete elevated roadway with a permeable asphalt top layer. Permeable asphalt has been shown to decrease tire/roadway interface noise considerably.
- Screen the undesirable view of the monolithic concrete masonry retaining wall directly adjacent to Building 100 of the Paradise Campus. Clark County could soften and screen this view by incorporating landscaping and other aesthetic elements as part of the project along the entire western boundary of the Paradise Campus. Large plantings of dense vegetation would help to soften the view and screen the monolithic bridge structure and would also mitigate traffic noise as the landscaping matures.

Description of Proposed Grade Separated Roadway

The proposed design now underway includes a series of two elevated and branching bridges from south of Tropicana Avenue on Swenson Street heading to the north and west. The western elevated roadway will then transition from a maximum height of about 27 feet above grade to a subterranean segment that will go underneath Paradise Road and then daylight west of Paradise Road where it will merge into westbound Tropicana Avenue. The northern elevated roadway will attain a maximum height of about 30 feet above grade and then gradually descend back to grade and merge into northbound Swenson Street. This combination of grade separated elements will have a significant environmental, economic and visual impact to both roadway users and to those on the UNLV campus. (Figure 1)

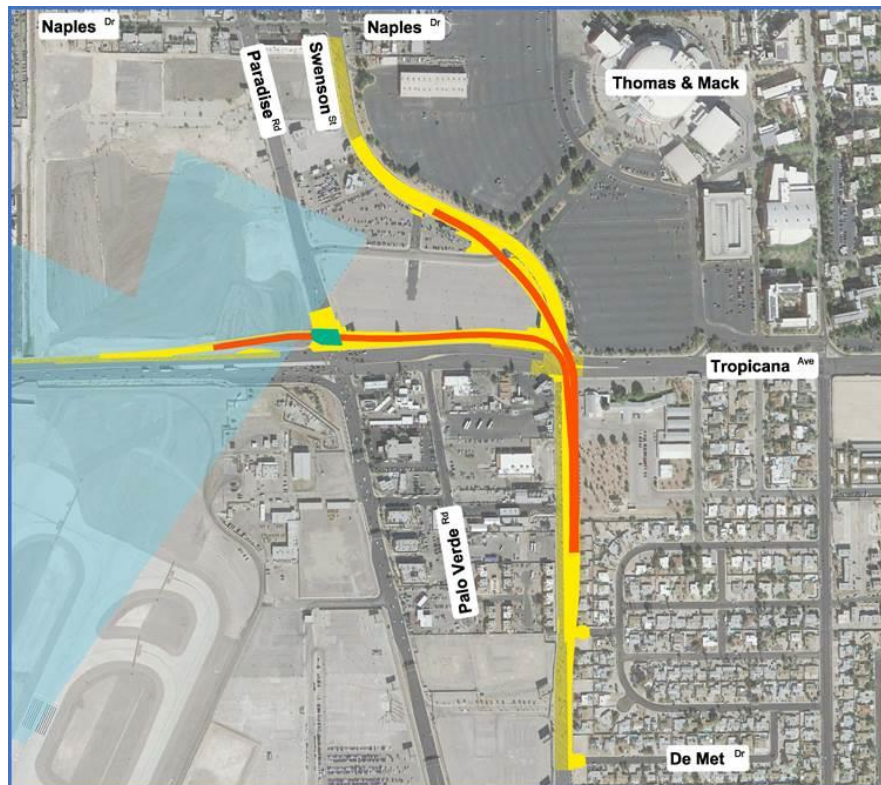


Figure 1. Proposed Grade Separated Roadway. (Image source: CH2m)

Why Are Views from the Road to UNLV and from UNLV to the Community so Important?

The type of roadway constructed has been shown to have a tremendous impact on property values. Lewis et al.'s (1997) property-value models study predicted that depressed freeways contributed most to adjacent residential property values, while at-grade freeways were most valued by commercial uses, and elevated freeways were least valued by both land use types. The reasons elevated roadways had more adverse impacts on adjacent land uses is because of the increased noise and visual impact they provide compared to below grade or at grade roadways. There is a research basis to support the fact that elevated freeways have the most undesirable effects on adjacent land uses.

Transportation Factors Affecting Visual Quality in a Community

According to the Federal Highway Administration, transportation projects can directly affect the visual quality of an area in the following ways:

- Construction of new structures may disrupt the visual quality of an area by the addition of a sizable new element.

- Projects that require the addition of new elements to an area also affect visual quality by blocking views of existing community features, including significant landmarks, open space, and special vistas. (Appleyard, 1964)
- A transportation project (such as an elevated rail line or highway) could also have negative localized effects on noise levels and views along its route. These effects could then reduce the attractiveness of locations along that route as a place to live and work. Although the effect is manifested directly through reduced property values, it might also be a factor affecting businesses' decisions about remaining and expanding. (TRB, 2001)

Researchers have shown that the views to and from the road is the basis for much of what we know about our everyday environment and for our mental image of our surroundings. That is why citizens and community stakeholders are rightly concerned with the visual character of the highways traversing their community. Again, FHWA Research shows that not only do these first impressions count in how a community is perceived, but they also affect the community's social civility and economic vitality.

Swenson Street at Tropicana Avenue is one of the first roads that will leave an impression on visitors to Las Vegas as it is the first intersection tourists will see as they arrive from McCarran International Airport. It is important to remember that roads move more than people, goods, and services—they are extensions of a community's values and aesthetic preferences (James L. Thompson and Joseph P. Suntum Miller, 2017). For the above reasons, the FHWA is now focusing increased attention to the adverse effects of new highway construction on the viewscape both in cities and in rural areas. FHWA guidance requires that the social and economic effects of new roadway and bridge construction need to be fully considered by the roadway project sponsors because the social and economic effects of these projects can be substantial, and they are important to the quality of people's lives. (Federal Highway Administration, 1988)

Unfortunately for UNLV, since the federal government is not involved, Clark County is not required to follow the FHWA's guidelines for visual impact assessment and roadway noise. As such, Clark County must decide if they will follow the federal guidance of visual impact assessments and noise abatement criteria or not. At this point it seems clear that Clark County is not pursuing any impact assessment of the roadway. That means that UNLV will be left on its own to deal with the negative consequences (social, economic, visual, environmental, etc.) that this project will bring to the area. Just because Clark County is not obligated by the federal government to follow federal requirements to conduct an adequate visual impact and other environmental assessments and provide compensation for the adverse impacts created by the project, does not mean that those adverse impacts do not exist. Our visual impact assessment will provide an overview of the visual impacts of the project on UNLV.

For purposes of this visual impact assessment overview, we will divide the effects we examine into two clusters: transportation system effects and social and economic effects. Transportation system effects pertain to changes in how well the transportation system serves its users. We acknowledge that the proposed elevated roadway project will benefit some portions of the transportation system by improving travel times and reduce operating costs for auto users in the project corridor and to those downstream of the project area. UNLV, however, will by and large, and aside from secondary traffic benefits of vehicles with destinations other than UNLV traversing the Swenson/Tropicana Intersection more quickly, not be the recipient of such direct benefits. To the contrary, our analysis indicates UNLV will bear a disproportionate burden of the negative impacts associated with the completion of the project. From a visibility standpoint those negative impacts include:

- Loss of line of sight from northbound Swenson Street and eastbound Tropicana to the southern gateway of UNLV and the Thomas & Mack Center and the Sky View Pavilion—an important gateway to UNLV. (Figures 2-12)

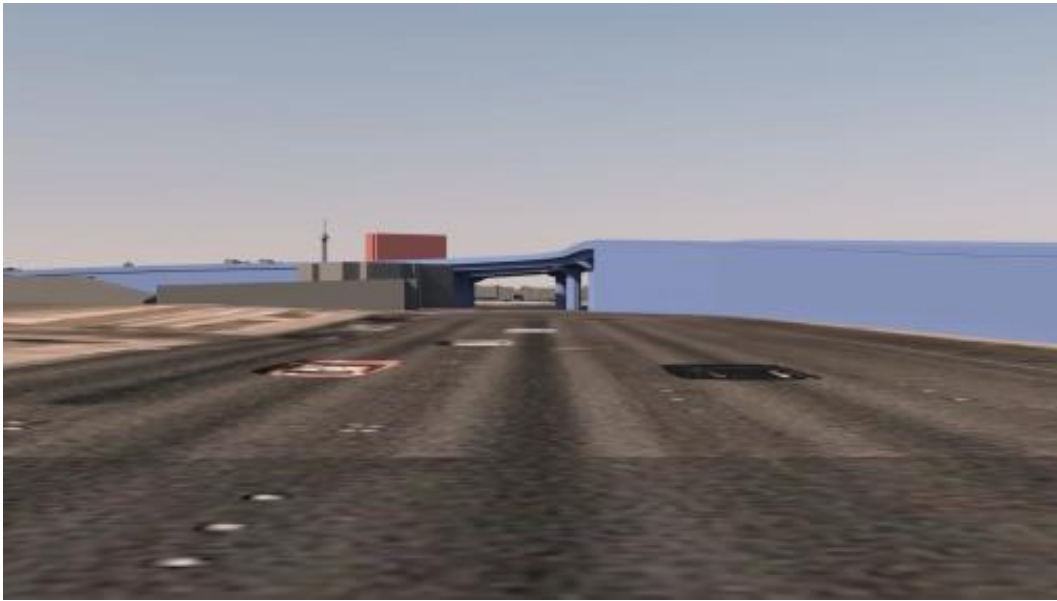


Figure 2. Swenson St. NB 1000' (Image source: Kimley Horn)



Figure 3. Swenson St. NB Current View (Image source: Clark County)



Figure 4. Swenson St. NB With Elevated Roadway (Image source: Clark County)



Figure 5. Swenson St. NB Current View (Image source: Clark County)



Figure 6. Swenson St. NB with Elevated Roadway (Image source: Clark County)



Figure 7. Swenson St. NB 400' (Image source: Kimley Horn)



Figure 8. Swenson St. NB at Tropicana Ave. Current View (Image source: Clark County)



Figure 9. Swenson St. NB at Tropicana Ave. with Elevated Roadway (Image source: Clark County)



Figure 10. Tropicana Ave. EB Facing Northeast Current View (Image source: Clark County)



Figure 11. Tropicana Ave. EB Facing Northeast with Elevated Roadway (Image source: Clark County)

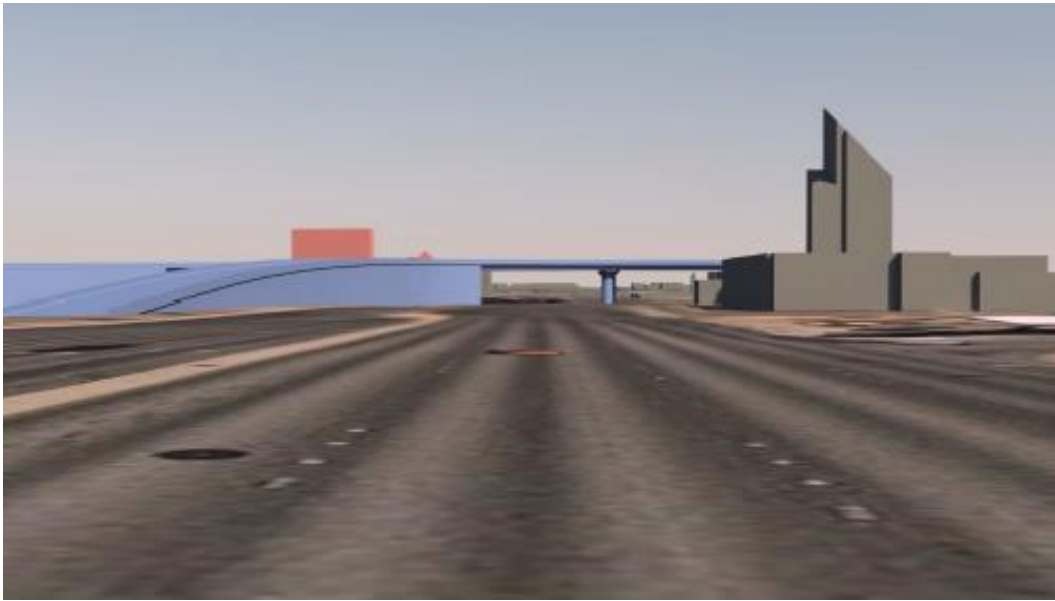


Figure 12. Tropicana Ave. EB 1000' (Image source: Kimley Horn)

- The elevated roadway will also block the views of UNLV's marquee and other billboards owned by UNLV in the project area and the view of the Strip. (Figures 13-14)

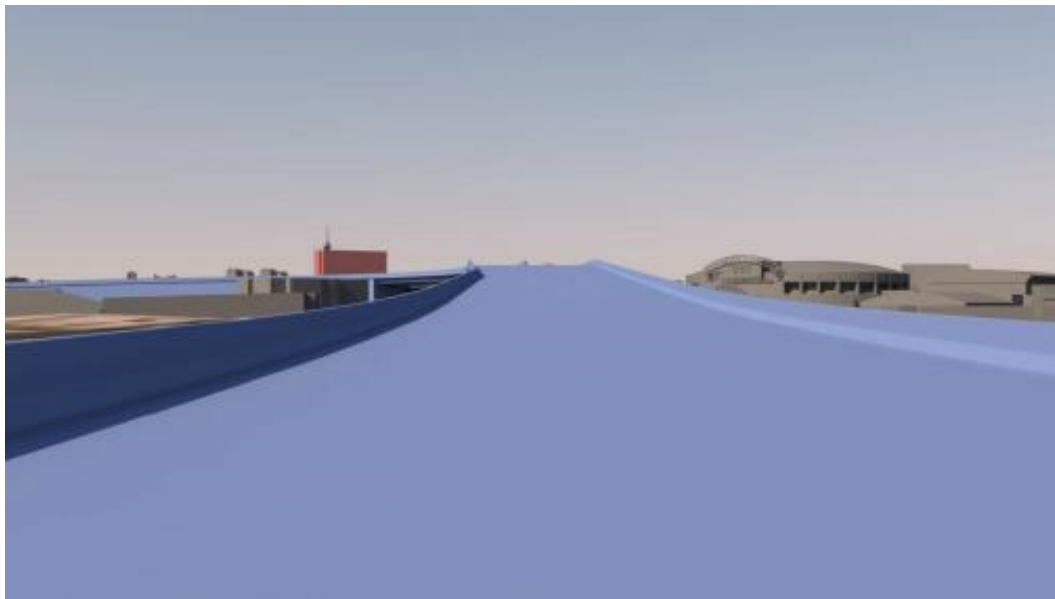


Figure 13. Swenson St. NB to Tropicana Ave. WB Ramp 1000' (Image source: Kimley Horn)

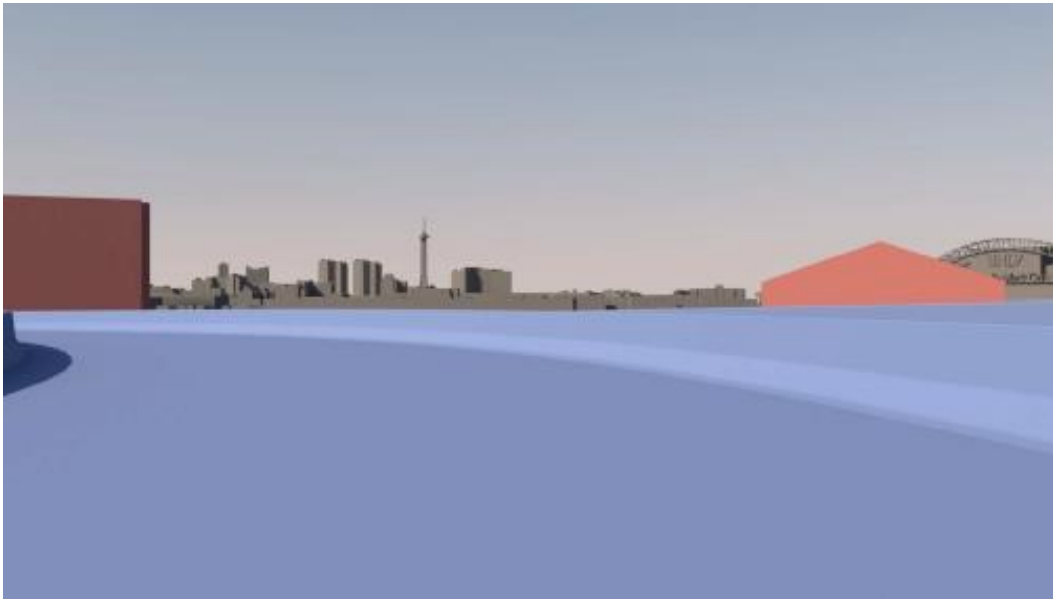


Figure 14. Swenson St. NB to Tropicana Ave. WB Ramp 200' (Image source: Kimley Horn)

- The westward view of the Las Vegas Strip and the community from the Paradise Campus of UNLV south of Tropicana Avenue (Figure 15) will be obliterated by the elevated roadway. This area will have a 30-foot-tall retaining wall at the far western end of Building 100 of the Paradise Campus, which will turn the area into a no man's land. (Figures 16-17)



Figure 15. Current Westward View of the Las Vegas Strip from Building 100



Figure 16. Elevated Roadway Blocked View from SW Corner of Building 100, Facing NW (Image source: Clark County and CivilFX)



Figure 17. Elevated Roadway Blocked View from SW Corner of Building 100, Facing SW (Image source: Clark County and CivilFX)

- Finally, it is important to keep in mind that traffic flowing northbound on Swenson Street will now be moving at a much faster rate of flow—likely around 45 - 55 mph. The faster a person moves, the smaller the area on which they can focus their attention. At 25 mph, a driver can see a view approximately 100° wide; at 45 mph, the view drops to 65°; and at 65 mph, it drops to a narrow 40°, substantially reducing what is seen—since the speed of motorists passing this area will be greatly increased, their ability to even see what is left of the views of UNLV will be compromised (Federal Highway Administration, 2015)

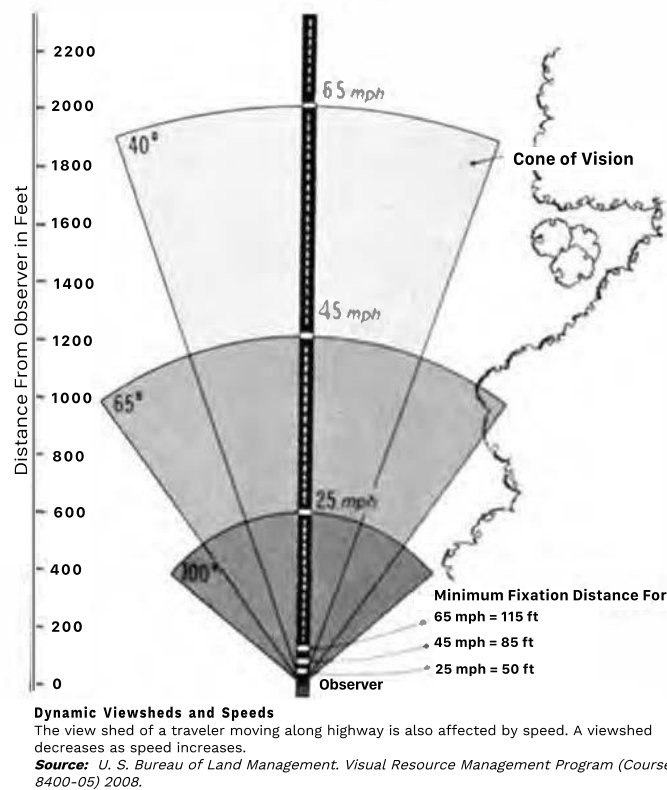


Figure 18. Dynamic Viewsheds and Speeds

Mitigation Measures to Reduce the Visual Impacts of the Elevated Roadway on UNLV

Considering the significant visual impact of the elevated roadway on UNLV as shown above, Clark County should consider implementing visual impact mitigation techniques into the project. According to FHWA guidance on mitigation of project related visual impacts, there are four primary categories for project sponsors to provide potential mitigation, which are (1) Avoidance, (2) Minimization, (3) Compensation, and (4) Enhancement. We will provide at least one example of potential mitigation for each category. They are as follows:

Avoidance

Find alternatives to the proposed project that maintain the existing visual character and that do not disrupt the visual landscape and maintain existing views for all viewer groups.

Mitigation Measure: Construct a below grade tunnel instead of an elevated flyover. This could be accomplished by pursuing a below grade separation like what Clark County is pursuing at Paradise Road. Tunneling under Tropicana Avenue and continuing that sub surface roadway through until daylighting past Paradise Road and merging into Swenson Street past Thomas & Mack Drive is an option the County could consider instead of an elevated roadway. This below grade option may require additional funds but would apply funds that may be necessary for other mitigation options that may be limited in their ability to address Impacts to UNLV. The result would be an overall lower Impact project on UNLV that also achieves the desired traffic Improvements. Additionally, provision of a below grade tunnel instead of a large, elevated, concrete structure so close to the Runway Protection Zones and Aircraft Departure Critical Areas at McCarran International Airport would be desirable from an aviation safety/obstruction removal standpoint.

Minimization

Choose options that do the least harm to the affected visual resources or maintain, to the largest extent possible, existing views for most viewer groups.

Mitigation Measure: Design the project in a manner that incorporates attractive [roadside] landscaping. Landscaping serves as a buffer and screens nuisance lighting resulting from oncoming vehicle headlights and roadway lighting and helps prevent or reduce nuisance lighting from affecting private properties. The Paradise Campus of UNLV immediately east of the northbound Swenson Street elevated roadway would benefit from landscaping. However, landscaping may only provide minimal mitigation based on the estimated level of impact from the elevated roadway and would not restore loss of visibility, views, etc.

Compensation

Re-establish similar views of the same visual feature or create substitute views of similar visual features or other interesting features.

Mitigation Measure: Re-establish unobstructed views of the UNLV Marquee and the UNLV billboards where Clark County would pay for either a new Marquee and or elevate the existing marquee and the existing billboards so that exposure to motorists of the billboard and marquee messages would be like the current condition. However, using this mitigation measure may not fully restore the existing visibility and the number of viewers of the UNLV Marquee and billboards.

Mitigation Measure: Create, as part of the design, other interesting and attractive features of the elevated roadway design that would preserve the “gateway” themes and context of one of the primary entrances to UNLV. Such features include but are not limited to: incorporation of UNLV architecture, themes, school colors, lighting enhancements, signage, wayfinding, etc., into the elevated roadway elements.

Mitigation Measure: Direct or indirect financial or in-kind compensation (up to and including providing land to restore UNLV visibility and viewshed, to some degree, as part of the mitigation) to UNLV to compensate for the damages done to UNLV’s business concerns.

Enhancement

Screen undesirable views.

Mitigation Measure: Screen the undesirable view of the monolithic concrete masonry retaining wall directly adjacent to the Paradise Campus. (Figures 7-9). Clark County could soften and screen this view by incorporating landscaping and other aesthetic elements as part of the project along the east side of Swenson Street along the entire portion of the Paradise Campus. Large plantings of dense vegetation would help to soften the view and screen the monolithic bridge structure and would also mitigate traffic noise as the landscaping matures. However, landscaping may only provide minimal mitigation based on the estimated level of impact from the elevated roadway and would not restore loss of visibility, views, etc.

Create desirable views.

Mitigation Measure: Create, as part of the design, other interesting and attractive features of the elevated roadway design that would preserve the “gateway” themes and context of one of the primary entrances to UNLV. Such features include but are not limited to: incorporation of UNLV architecture, themes, school colors, lighting enhancements, signage, wayfinding, etc., into the elevated roadway elements. This option is like the mitigation measure discussed above under the compensation category.

Elevated Roadway Traffic Noise Impacts on the Viability of the UNLV Paradise Campus

Besides the extensive visual impact from the elevated roadway that has been demonstrated above, there will be severe traffic noise impacts on UNLV from the elevated roadway. The existing slower, stop and go of traffic from the

at-grade intersection of Tropicana Avenue with northbound Swenson Street will be supplemented by a high speed, elevated roadway full of continuously moving automobile traffic, which will increase roadway traffic noise levels throughout the day and night.

According to guidance from the Federal Highway Administration, the level of highway traffic noise depends on three things:

- The volume of the traffic—essentially the more automobiles the greater the noise
- The number of trucks in the flow of the traffic— large trucks produce up to 28 times the sound energy of a typical car
- The speed of the traffic—the faster a vehicle travels, the more noise is generated from three sources of automobile noise, which are:
 - Tire to pavement noise
 - Aerodynamic noise
 - Powertrain noise (Robert J Bernhard & Ulf Sandberg, 2005)

Finally, any condition such as a steep incline (which is exactly what is being proposed as part of this elevated roadway project) that causes heavy laboring of motor vehicle engines will also increase traffic noise levels. (Federal Highway Administration, 2017)

Estimated Noise Impact of Elevated Roadway

Before we discuss increased roadway noise, we should note here that the area around the Swenson Street intersection with Tropicana Avenue is already a very noisy place. Much of the Paradise Campus of UNLV lies within what is known as the Ldn 65 decibel zone (average annual noise exposure from aircraft of 65+ decibels) of aircraft noise coming from aircraft landing and taking off from McCarran International Airport. Figure 19 shows the aircraft noise exposure map for McCarran.

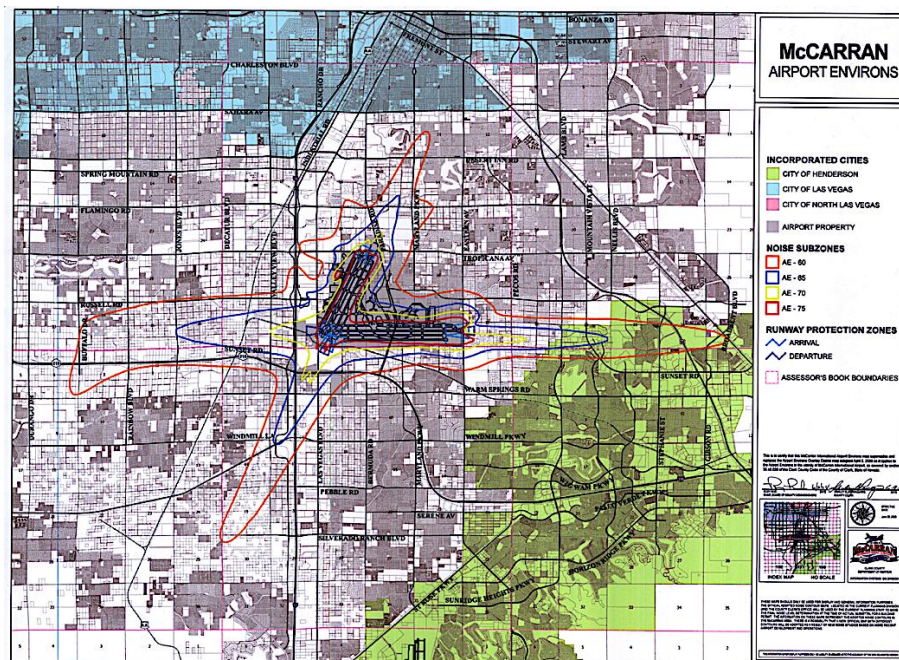


Figure 19. McCarran Airport Environs (Image source: Clark County)

According to the Federal Aviation Administration, aircraft noise levels greater than 65 decibels averaged over a 24-hour period constitutes a noise level high enough to have significant noise impacts for humans unless mitigation measures are provided. The combination of the already high aircraft noise levels with the new addition of the higher speed and greater volume of traffic using an elevated roadway that will be moved 40+ feet closer to Building 100 of the Paradise Campus of UNLV will create very annoying and disruptive noise for UNLV.

As stated above, the FHWA has shown that autos that travel at higher speeds produce more noise and that a higher volume of traffic produces even more noise. It is also clear from the Engineering analysis completed by Ch2m, Clark County's engineering consultant helping with the design of the elevated roadway, that the unobstructed travel and higher speeds of the elevated roadway will attract more vehicle traffic than the no build scenario (37,110 cars per day in the year 2040 under the build scenario versus only 32,000 cars per day under the no build scenario). It should be noted that Clark County retained a 47-foot easement that runs east of the current Swenson Street alignment when UNLV bought the Paradise Campus property from the Clark County Department of Aviation. The purpose of the easement was to widen Swenson Street if future traffic warranted doing so. However, at that time, neither party contemplated building an elevated expressway in the easement. When you consider that the elevated roadway will be more than 40 feet closer to the noise sensitive land uses on the Paradise Campus of UNLV (the noise increase will be much higher than the current at-grade roadway configuration).

But how much higher will the noise impact be? It is impossible to know exactly what the impact will be until the roadway is constructed and detailed noise measurements are taken. It is possible, however, to use a screening tool to generate an estimate of the future noise impact by using a roadway noise traffic model to see if additional noise measurements and analysis are warranted. One of the most accurate and reliable screening tools to estimate roadway traffic noise is the FHWA's Traffic Noise Prediction Model Manual Method and Look Up Tables, which was based on extensive noise measurements done in 1995. This screening tool is used in a general way to provide rough estimates of overall noise generated from new roadways for land use planning purposes and to verify that additional, more detailed noise measurements and/or noise modeling for specific and detailed roadway scenarios are justified.

We used the FHWA's Manual Method Traffic Noise Screening nomograph to generate a rough estimate of the increased noise impacts from the elevated roadway on Building 100 at the Paradise Campus of UNLV. The use of the method requires estimated peak hour traffic volumes along with the estimated speed of the traffic. Based on the analysis done for Clark County by their engineering consultant Ch2M, we used a peak hour estimate of 3,200 vehicles at an estimated average speed of 45 miles per hour. The output of the FHWA nomograph for these parameters can be seen in the below in Figure 20.

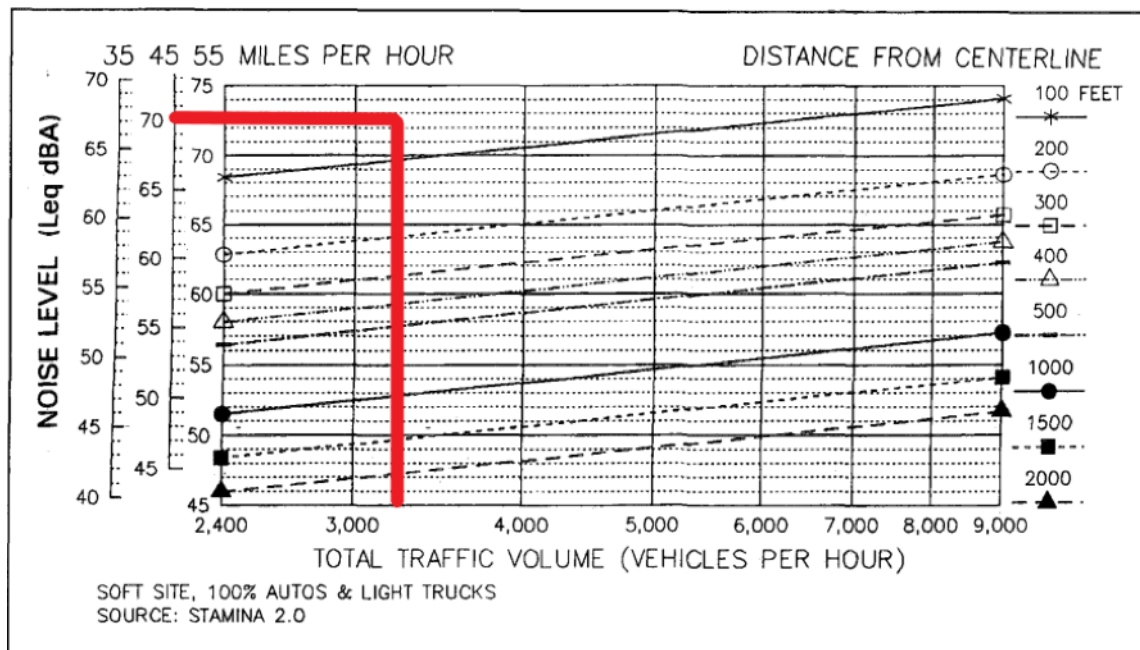


Figure 20. FHWA Estimated Traffic Noise Level (Leq dBA)

The estimated noise level of the roadway can be determined by first finding the total peak hour traffic volume on the X axis at the bottom of the nomograph in Figure 20 above as shown by the bottom origin of the red line at about 3,200 cars per day. Then follow the red line up to the intersection of the distance to the line representing the distance from the receptor point (the SW corner of the Auditorium at Building 100 of the Paradise Campus) to the centerline

of the new roadway (about 40 feet). Then follow the red line to the far left of the nomograph until it intersects with the 45 mph Y Axis, which in this case is at 71 decibels.

The use of this simplified approach when screening roadway traffic noise that involves medium or heavy-duty truck traffic should include an upward adjustment to Leq values (Barboza, Carpenter & Roche, 1995). According to the United States Environmental Protection Agency, a peak hour mix of 96% autos and light duty trucks and 4% medium and heavy-duty trucks indicates the need for an adjustment upward of about 5 decibels (FHWA RD-78-64, 1978). Our counts indicate the percentage of medium and heavy-duty trucks is only about 3% of total traffic. As such, we recommend an adjustment of 4 decibels to the nomograph, which would yield an estimate of 75 decibels Leq at the SW Corner and the NW Corner of Building 100 of the Paradise Campus after the elevated roadway is complete.

However, according to research (Barboza, Carpenter & Roche, 1995), the presence of any of the following factors in a preliminary traffic noise screening suggests that more detailed noise modeling should be performed:

- Elevated or depressed roadways
- Receptor affected by several different noise sources
- A larger than expected mixture of medium or heavy-duty trucks
- Noise levels at or above 67 decibels (Leq)

In the case of the Paradise Campus, three of the above conditions are met as the roadway being estimated is an elevated roadway, there are numerous sources of noise in the area (aircraft noise and roadway noise from Tropicana Avenue), and preliminary noise level estimate at 75 decibels (Leq) is much higher than 67 decibels (Leq). Once the preliminary screening analysis indicated very high noise levels from the proposed elevated roadway would be present, and the presence of other significant noise sources, we looked for other more detailed ways to estimate total noise impacts in the area to ascertain if noise mitigation measures are advisable or necessary.

A more sophisticated approach for predicating traffic noise impacts consists of the use of a computerized noise prediction model called the Traffic Noise Model (TNM)—current version 2.5, which has been developed by the FHWA. The TNM, or its predecessor, has been used for the past several decades. The TNM is based on the FHWA Manual Model nomographs used above, but it has much more specific application capability due to its computerization. With the TNM it is possible to perform detailed analyses including very complex roadway geometries and various receptor locations. Unfortunately, the use of this model is no longer accepted by the FHWA due to the database of vehicles from the noise measurements from the vehicle fleet being so out of date (1994 and 1995) (Federal Highway Administration, Traffic Noise Model)

The use of this outdated model's vehicle noise profiles tends to either underestimate or overestimate roadway noise. The FHWA has been developing a new version of the model to address this problem in version 2.5, but the new version of the software (version 3.0), even though promised to be made available in 2018, is still not available (Federal Highway Administration, n.d.). So, the use of an alternative traffic noise estimation model is necessary.

We selected the Netherlands "Dutch" model because of its ease of use and its similarities in algorithm design and function to the FHWA's Traffic Noise Model, but with a more current roadway traffic noise database. The Dutch model follows the principles and capabilities of the US model as follows:

- Modeling of standard vehicle types, including automobiles, vans/medium trucks, heavy trucks, and motorcycles.
- Modeling of the effects of different pavement types.
- Multiple diffraction analysis.
- Ability to model elevated roadway noise impacts.
- Ability to model ground noise effects by surface type.

Use of the Dutch model is not intended as a substitute for detailed noise modeling, but as an additional and, likely, more accurate screening tool when compared to the FHWA Manual Method used above. Again, use of such tools should not preclude either UNLV or Clark County from conducting more detailed modeling and actual noise

measurements. If screening results indicate that noise estimates are significant, or if the scenario is rather complex, then additional, more detailed modeling and measurements are justified.

Like the FHWA Traffic Noise Model, The Dutch Model required specific inputs about the volume of traffic, the speed of traffic, and the distribution of cars, trucks, motorcycles and heavy trucks in the vehicle fleet that is currently using Swenson Street. To establish accurate traffic volume, we used the data from Ch2m for Swenson Street, as contained in their Technical Memorandum to Clark County on the Tropicana/Swenson Grade Separation traffic analysis memo from September 2018, supplements from NDOT's Traffic Records Information Access Program and our own vehicle traffic counts. We then estimated the breakdown of traffic by conducting field counts of the number of cars, vans, motorcycles and heavy trucks for various hours of the day. We then normalized and averaged the vehicle counts to populate the model for 24-hour use.

Other model inputs included the height of the elevated roadway, its position in relation to the measurement points of the Paradise Campus (at the northwest and southwest corner of the Auditorium and the southwest corner of the Client Services Center), and the type of ground surface between Swenson Street and the Paradise Campus (hard or soft), etc. (Please see more details on the noise model input parameters for various scenarios found in Appendix B).

The output from the Dutch model indicated that noise levels outside, at the northwest corner and southwest corners of the auditorium, are at or above a decibel level of 79 Ldn. Ldn is a noise descriptor typically used for roadway, airport and industrial noise measurement where noise levels are averaged over a 24-hour period. (Federal Highway Administration, May 1996). The federal government considers noise levels at or greater than 75 decibels Ldn to be severe and harmful to human health (Federal Aviation Administration, July 2015). 79 Ldn represents an extremely high level of roadway noise that, if realized by the construction of the new elevated roadway, will create significant disruption to the outdoor and indoor activities at the Paradise Campus of UNLV.

It is significant that Clark County Code (Title 30—Airport Environs Overlay District), which is based on federal noise standards, indicates that schools (educational services) and related structures in an area at or above 75 dB Ldn are not compatible with such a high noise level and are prohibited by code, even if the school were to incorporate noise attenuation in its construction. (Clark County Code)

The predicted Ldn noise level at the southwest end of the Client Services Center of Building 100 of the Paradise Campus (about 200 feet from the proposed elevated roadway) was estimated to be 69 Ldn—once again a very high level of noise that is not considered to be appropriate for noise sensitive land uses such as schools, offices and outdoor recreation areas unless mitigation measures such as noise attenuation (soundproofing) is incorporated into the construction.

Clark County's current code requires a 25-decibel noise attenuated standard for schools and related buildings in an area of 65-70 Ldn noise exposure. But noise attenuation may be quite problematic for the Paradise Campus as Building 100 was constructed in 1946 and there are no known records of any specific sound attenuation improvements to the structure. During our tour of the building we noted single pane windows in all the windows and the presence of roadway noise at various points inside the building from the at-grade intersection of Tropicana Ave. and Swenson St., which indicates a lack of soundproofing at those areas. Soundproofing such an old building to a decibel reduction standard that will make the building quiet enough to be viable for education services may be prohibitively expensive or not may not even be possible.

As mentioned above, the western portion of the Paradise Campus at UNLV is already in an aircraft noise level zone of 65-70. The initial roadway noise screening analysis indicates that the additional noise from the elevated roadway combined with the high ambient noise level from aircraft overflight will create, depending on location in the center and western portion of Building 100 of the Paradise Campus, average noise levels from 70 Ldn to 79Ldn. According to Clark County Code, FHWA Guidelines and FAA Guidelines, if these very high and severe noise levels are realized, the center and western portion of Building 100 (Figure 21 below) will no longer be viable for educational use, unless mitigation measures are undertaken.

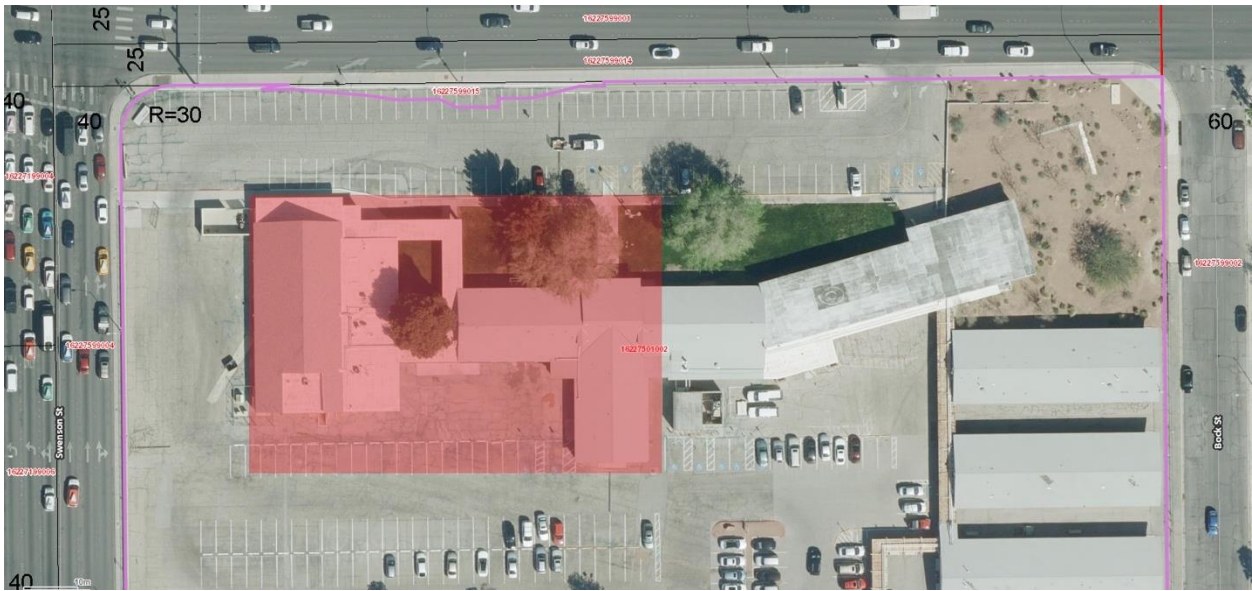


Figure 21. Aerial View of UNLV Paradise Campus, Building 100 – Area of New High Traffic Noise Impact from Elevated Roadway Shaded in Red.

Our review of the UNLV Board of Regents approved master plan for the Paradise Campus of UNLV indicates that a series of classrooms and office buildings are planned for construction along the western edge of the property up against the boundary of Swenson Street as can be seen in Figure 22 below.

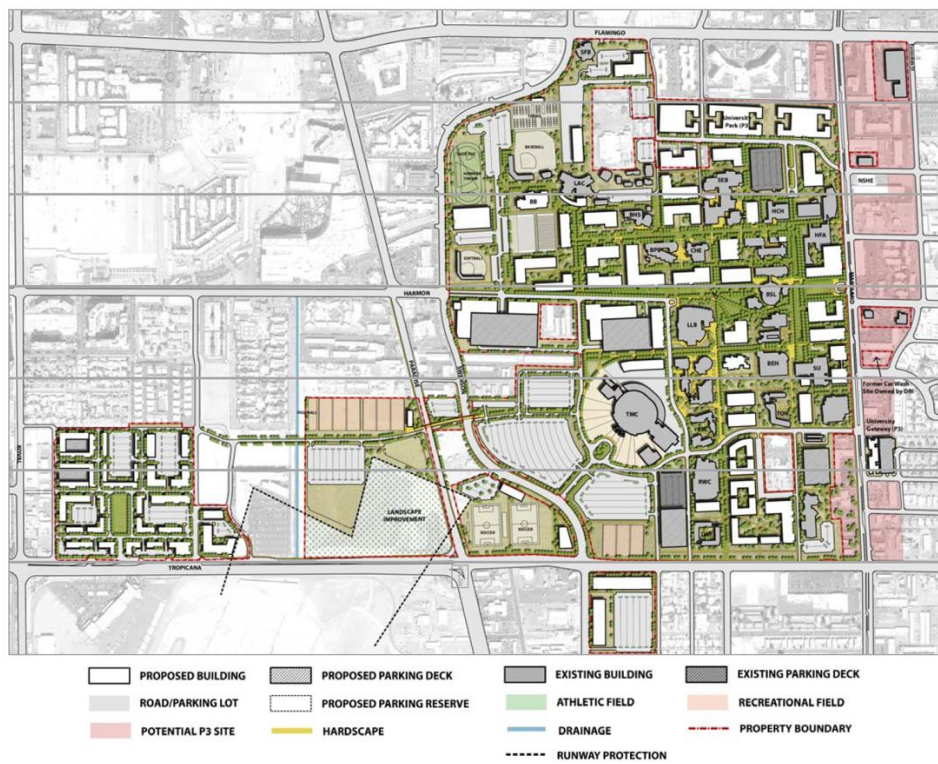


Figure 22. UNLV Board of Regents Campus Master Plan (Image Source: Smith Group JIR)

Considering the higher speeds and closer proximity of auto traffic from the elevated roadway in this location, it is highly doubtful that this master plan is feasible if the elevated roadway is built as currently planned.

Mitigation Measures to Reduce the Traffic Noise Impacts of the Elevated Roadway on UNLV

Considering the increase in traffic volume, proximity and speed that the elevated roadway will bring to the Paradise Campus of UNLV, Clark County should consider implementing noise abatement and mitigation measures as part of the project once supplemental noise measurements can verify the projected noise increases. Once again, we recommend following the precedent that the FHWA has established on what types of mitigation and abatement measures have been previously used for similar roadway projects and deemed effective. We will provide at least one example of potential mitigation for each of the following four categories:

Avoidance

Find alternatives to the proposed project that will not avoid an increase of roadway noise above the level at the current at grade intersection.

Mitigation Measure: Consider a below grade (tunnel) option instead of a flyover. Even if a tunnel is built, the roadway will still result in a significant increase in traffic noise due to higher traffic volume and higher speeds, but it will be possible to construct at least a 12-foot high noise barrier directly on the far east edge of the right of way. Such noise barriers have been proven to provide a significant noise reduction to land uses immediately adjacent to the noise barrier. This mitigation measure will reduce much of the additional roadway noise impact, but it may also result in unwanted visibility impacts. If the roadway is built as an elevated roadway as currently planned, such a noise barrier would not be practical and would result in a much greater adverse visual impact.

Minimization

Choose options that would minimize the noise impact on the Paradise Campus.

Mitigation Measure: Limit the hours of construction to nighttime hours to avoid noise disturbances during the mostly daytime operations of the Paradise Campus.

Mitigation Measure: Overlay the proposed concrete elevated roadway with a permeable asphalt top layer. Permeable asphalt has been shown to decrease tire/roadway interface noise considerably.

Compensation

Re-establish or provide substitute facilities in a place where they are not impacted.

Mitigation Measure: Clark County could purchase land near UNLV and pay for the construction of a new classroom/office complex.

Mitigation Measure: Provide direct compensation or in-kind contributions such as land or other assets to UNLV.

Enhancement

Screen undesirable views.

Mitigation Measure: Screen the undesirable view of the monolithic concrete masonry retaining wall directly adjacent to Building 100 of the Paradise Campus (Figures 23-24). Clark County could soften and screen this view by incorporating landscaping and other aesthetic elements as part of the project along the entire western boundary of the Paradise Campus. Large plantings of dense vegetation would help to soften the view and screen the monolithic bridge structure and would also mitigate traffic noise as the landscaping matures. However, landscaping may only provide minimal mitigation based on the estimated level of impact from the elevated roadway and would not restore loss of visibility, views, etc.



Figure 23. Paradise Wall, Facing NW (Image source: Clark County and CivilFX)



Figure 24. Paradise Wall, Facing SW (Image Source: Clark County and CivilFX)

Create desirable views.

Mitigation Measure: Create, as part of the design, other interesting and attractive features of the elevated roadway design that would preserve the “gateway” themes and context of one of the primary entrances to UNLV. Such features include but are not limited to: incorporation of UNLV architecture, themes, school colors, lighting enhancements, signage, wayfinding, etc., into the elevated roadway elements. Although this option is like the mitigation measure discussed above under the compensation category, these mitigation measures would not restore lost existing views in an equivalent fashion.

Construction Impacts

Besides visual impacts and noise impacts from the proposed elevated roadway, UNLV will bear a significant impact from the noise, vibration and traffic disruption that will occur during the construction of the road. Roadway construction-associated impacts can also reduce property values in the short term, while projects are underway: Downs’s data (1992) suggested that property values did not reach pre-construction levels until approximately five years after roadway-project completion. These negative impacts are on the order of \$0.05 to \$0.50 per square foot of land, and \$0.50 per square foot of structure. (Brian ten Siethoff Cambridge Systematics).

Social Impacts of Elevated Roadways

During the late 1950s, the 1960s and 1970s there was substantial federal funding to build the Interstate highway system across the United States. The federal share of the building was as high as 90% and gas taxes were raised to provide the funds. As part of this Interstate system many elevated viaducts, bridges and highways were constructed through the middle of urbanized areas with the hope that they would foster urban renewal and economic redevelopment. When few to none of those benefits materialized, skepticism toward elevated highways began to grow and intensified through the 1960s, until the interstate and elevated freeway road-building era was over by the 1970s. Shortly after Jane Jacobs and other New York City stakeholders defeated Robert Moses' grand plan for the expansion of elevated roadways in New York City in the 1970s, elevated skyways in urban areas fell out of favor and have gradually seen growing opposition from both the public and public officials.

Opposition to these types of elevated expressways in urbanized areas arose, as many city residents were faced with the unattractive prospect of moving or continuing to deal with the less-than-beneficial consequences of having an elevated highway near them. There now is trend towards the removal or relocation of urban, elevated roadways. Portland, OR, Seattle WA and San Francisco CA have torn down their elevated freeways that blocked access from their downtowns to the local waterfronts. Other eastern and midwestern cities such as Buffalo NY, Dallas TX, New Orleans, LA, and even car friendly Detroit MI, are going through a process of deciding what to do with their elevated roadways (Bailey, 2016).

One such city is Syracuse, NY. In Syracuse an elevated viaduct of Interstate 81 cuts off Syracuse University from Downtown Syracuse. Many observers have cited the elevated roadway as a barrier to economic development and an impediment to the mission of the University. After several years of discussion, Syracuse and the New York Department of Transportation have still yet to decide on what approach they will take. The two remaining options being discussed are either tearing down the elevated road and transforming it into a boulevard of some sort like what Seoul, Korea, Portland OR and San Francisco CA have done or completely redesigning and relocating the elevated portion of the Interstate. Either option will be of considerable benefit to Syracuse University.

It should come as no surprise that people who live in neighborhoods next to or near an elevated freeway do not have good things to report about how the roadway impacts their quality of life. Typical complaints include roadway noise and vibrations, blocked views and visual blight, toxic air pollution and noxious odors, unwanted light pollution from high mast roadway lighting and automobile headlights, decreased property values, negative public health impacts, barriers to movement, and isolation of neighborhoods. We have previously discussed and cited the issues of blocked views and roadway noise, and a discussion of the negative impacts that freeways, highways and elevated roadways have on property values is contained in Appendix A. Additionally, crime and crime related social problems from elevated roadways is also a frequently cited complaint and will be discussed next.

Criminal Activity and Elevated Roadways

Some authors (Ebling & Rhodes-Conway, 2013) have noted that travelling underneath a freeway does not just pose safety hazards to pedestrians, cyclists and drivers of automobiles because of restricted sight lines paired with the higher speeds of vehicles. They go on to state that land directly below an elevated freeway is not easily visible to the public and can be a haven for undesirable or criminal activities. Other scholars (Davies & Johnson 2015) have noted that criminal behavior is higher along higher speed and higher volume roadways. They have also noted that elevated roadways inherently have visibility and clear line of sight issues for all roadway users. Visibility is always limited due to the overhead freeway's lanes, pillars, and massive retaining walls. As such, elevated roadways can send a message to potential criminals that their presence and their criminal activities will be difficult to notice. Elevated roadways also tend to attract trash and graffiti and other indicators of neglect that send the message that no one is watching and that no one cares.

According to the Center for Problem Oriented Policing, offenders look for heavily traveled streets and locations near major highways, where there are many potential victims, where risk of apprehension is low because they can easily remain unseen, and where they can easily escape. Stated another way it can be assumed that greater awareness corresponds to higher risk of apprehension of criminals. Inversely, the presence of an elevated roadway with its lowering of public visibility due to shadows, pillars blocking views of cars and pedestrians, etc., provides a physical

environment where overall awareness is reduced and thus, risk of apprehension of criminals is lower. Because so many negative externalities such as crime, health, declining property values, aesthetic and safety concerns are associated with elevated roadways, communities around the country have been studying options to still move traffic and people other than via an elevated roadway.

Alternatives to Elevated Roadways

As has been stated, several cities in North America, are going through a process to decide what to do with their elevated roadways. After community involvement and extensive study, the viable options include:

- Convert to a surface boulevard supplemented with mass transit
- Construct a sunken expressway
- Cap or deck the highway
- Relocate the highway
- Build a tunnel
- Complete removal supplemented with other travel options--Transportation Demand Management (TDM)

Each of these cities is involved with an extensive community visioning and public and stakeholder involvement program to decide how best to proceed.

Journalist Tom Bailey recently quoted Patrick Kennedy--an urban designer and co-head of the effort in Dallas, TX to replace one of their overhead freeways. Kennedy concluded: "Building highways through the center of our cities has proven to be one of the great follies of the 20th century... the emerging trend to selectively remove them is simply a correction to the systemic overshoot. Highways have an appropriate place. Our job for the 21st century is to prune the highway system so that both the highways and our cities can function better." (Bailey, 2016)

Conclusion

Our analysis has demonstrated that there will be several adverse impacts to UNLV from the proposed elevated roadway project. Besides the increased noise from the closer proximity, higher vehicle speed and higher traffic volume that the road will bring the Paradise Campus and Maryland Campus, portions of the UNLV campus north and south of Tropicana will experience the loss of significant views and motorists along both northbound Swenson and Eastbound Tropicana will not be able to view significant portions of the UNLV campus gateway and its signage.

Effects such as a change in visual quality are bound to be rather subjective in nature. What is visually appealing to one person may not be so to another, and it is difficult to assign a numerical value to such things. In fact, many social and economic effects are qualitative in nature and must be treated as such in impact analyses. Simply because it is difficult to place such impacts into a dollar figure does not mean that the impacts are not real.

However, the private market is not so subjective in nature when it comes to actual economic impacts that result from blocked views of property, and in this case the blocked views of billboards, which generate a significant amount of annual revenue for UNLV. When the impacts of the proposed elevated roadway are evaluated under the lenses of the private market's view of the adverse property value impacts associated with blocked views, a more quantitative focus emerges. This study has shown that the combined impact of increased noise, vibrations, construction impacts, increased light emissions combined with the blocked views of UNLV from the proposed project and the blocked views from the Thomas & Mack Center and the Paradise Campus have a combined estimated adverse economic impact on UNLV from \$11,468,142 to \$14,468,142, not including the difficult to quantify social and visual adverse impacts from elevated roadways discussed above.

Equity can be defined in terms of at least one major theory called the hold harmless theory. Stated in specific terms related to this proposed, elevated roadway project, the hold harmless theory postulates that if the major beneficiaries of the elevated roadway project were to sufficiently compensate UNLV, which bears the costs of the adverse effects of the elevated roadway project, UNLV would, in theory, be indifferent to the elevated roadway. And those who benefit can compensate those who bear the costs and yet still experience net benefits.

In this study we have asked the question of who would benefit and who would bear the costs of the Swenson/Tropicana/Paradise Grade Separated Roadway project? As has been asserted in the above analysis, the

proposed elevated roadway project's users are the clear beneficiaries. However, there are also parties who do not share in those benefits but who bear the burden of absorbing the roadway project's negative externalities such as increased traffic noise, visual blight, blocked views, construction impacts, etc. This study has shown that UNLV is the recipient, not of benefits, but of burdens. As such, Clark County should seek to establish equity by seeking to compensate UNLV in some fashion for its disproportionate burdens from this project.

Appendix A

Literature Review of Adverse Impacts from Blocked Views & Highway Noise on Properties Directly Adjacent to the Highway

It has been well established that the construction of new, high speed, roadway access has been well correlated with increases in property value due to the improved access the new transportation improvement provides to property. However, it has also been well established that appreciation in property values from improved roadway access does not occur for the properties directly adjacent to the new roadway(s), and that certain noise sensitive land uses such as residences, hospitals and schools (Mohring 1961) are negatively impacted by the noise, emissions, and vibrations that close proximity to major roadways presents (e.g., Nelson, 1982).

The largest state Department of Transportation in the United States is the California Department of Transportation (CDOT). CDOT has a budget and scope that is larger than all the other state departments of transportation west of the continental divide put together. Due to their tremendous size and scope the CDOT has compiled a tremendous amount of technical studies, including detailed research and analysis of the socioeconomic impacts of freeways on adjacent properties.

A recently updated study for CDOT (2011) included an analysis on the negative property value impacts on properties that were directly adjacent to new roadways. These constituted more than 20 independent studies conducted by private academics, the Federal Highway Administration (FHWA) or the Transportation Research Board (TRB). All these studies indicated negative property value impacts on properties immediately adjacent to new freeway type facilities. These various studies indicated that the range of adverse impacts to property values for properties within 500 feet of an adjacent freeway was generally between 5% to 10% with some studies going as high as 16.6%. The range of most of the studies surveyed found that price appreciation for properties abutting the freeway, or within approximately 500 feet (about 150 meters) of it, lagged that of properties in either the secondary impact or control zone. These property value reductions correlated well with the higher noise impacts associated with noise sensitive properties that are closer or directly adjacent to the highway noise source. All the Researchers attributed these diminished property values primarily to adverse environmental effects such as noise, vibration and air pollution from the new roadway infrastructure.

The amount of the lag in appreciation due to proximity to the freeway, however, varied from study to study. One study conducted in Northern Virginia from 1962 to 1978 found that properties within 1,125 feet of the freeway appreciated by approximately \$3,000-\$3,500 (in 1978 dollars) less than equivalent properties farther from the freeway, which represented approximately a 5% lag in appreciation (Langley 1981). In another study, researchers found that noise was a significant factor in explaining residential price variation. Data were gathered on all valid property sales between 1969 and 1971 for four residential areas in the eastern U.S. Researchers found that, due to noise pollution, prices for properties abutting the freeway were 6.6% lower than the average price of all properties in the four study areas (Gamble, et. al., 1974). (Source California Department of Transportation, Appendix D Transportation Effects on Property Value, 2011 Update)

A recent study quantified the adverse property effects of both aircraft noise and traffic noise on noise sensitive land uses. The conclusions of that study were that for aircraft noise the reduction of property value was .80% per dB increase of aircraft noise. For roadway traffic, the reduction in property value equated to .53% per increase dB of traffic noise (Nelson, 2008). Based on an estimated increase of roadway noise from the new elevated roadway of about 15 decibels, as determined by output from the traffic noise screening model, that would yield a 7.95% decrease in the portion of UNLV's property value within about 500 feet of the boundary of the elevated roadway.

Upon review of recent land transactions and appraisals for large parcels of property along Tropicana Avenue and in the UNLV area, typical selling prices per acre are about \$2,000,000. Taking \$2,000,000 per acre as a baseline assumed value for the Paradise Campus portion of UNLV and multiplying that amount by the acreage of the Paradise Campus (10 acres) and using the range of property value impacts identified by the CDOT research (5-10%) we come up with a range of property value reduction from \$1,000,000 to \$2,000,000. A similar figure can be obtained for the portion of the Maryland Campus of UNLV in and around the northeast corner of Tropicana Avenue and Swenson Street.

Negative economic impacts to property are not just limited to noise; blocked views from properties are also subject to compensation (please see Figures 2-12). Thompson and Suntum Miller (2017) have written that courts have found that property owners, which have significant views from their property that are blocked by public projects in the public right of way, are eligible for compensation.

The construction of the project will also reduce the value of UNLV's property. Studies done by the FHWA (2017) show that property values take up to 5 years to recover their value from the impact of construction.

Appendix B

Noise Modeling Results of Elevated Roadway on Select Areas of Paradise Campus from Dutch Roadway Noise Emissions Model 2002

Run #1. Conservative Run—Roadway traffic at Ch2m estimated 32,000 AADT—skewed to reflect daytime operations (7:00 am to 10:00 pm) only to eliminate nighttime noise 10dB penalty and recalculate Ldn to Leq - Leq = 75 dBA (Location at northwest Corner of Auditorium).

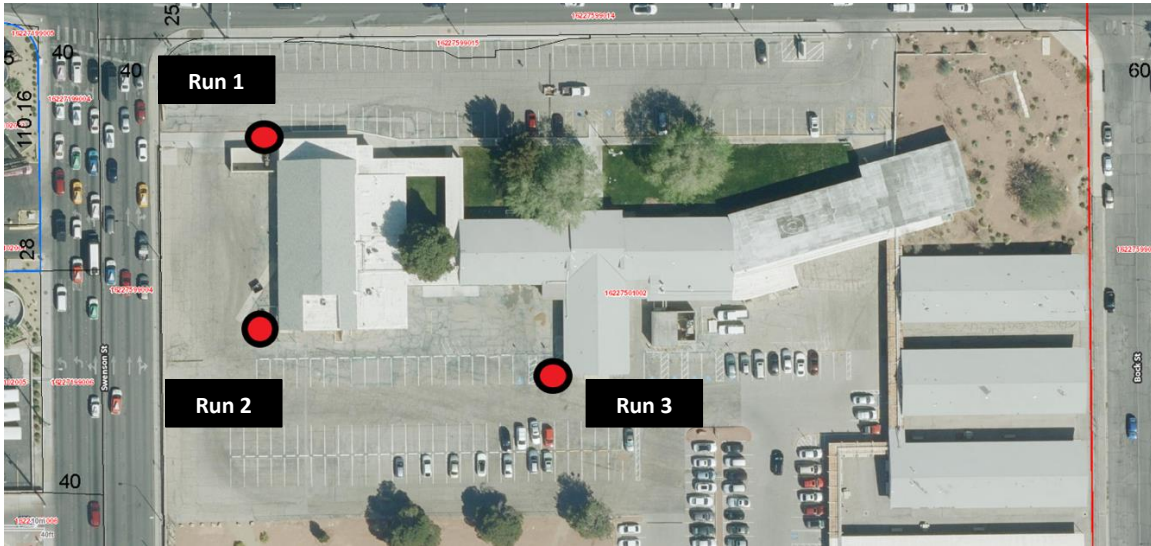


Figure 25. Noise Model Estimate Locations for Runs #1, #2 and #3

Data on road		
Road traffic input data help	Day: 7.00-22.00	Night: 22.00-7.00
Motorcycles per hour	4	0
Cars per hour	2010	0
Speed cars	45	0
Number of vans/hr	93	
Number of heavy trucks/hr	26	0
Speed trucks	40	0
Road surface help	Concrete	
<input type="radio"/> kilometers per hour <input checked="" type="radio"/> miles per hour		

data on geometry help	
Height of road	5
Horizontal distance in meters from center of road <i>Fill in 0 (zero, not blank!) when you want to calculate the distance for a given noise level</i>	12
Height of house or observer	5
View angle (127 grad= full view)	127
Fraction sound absorbing soil (0=all hard, non absorbing; 1= all absorbing)	0
Percentage reflection from opposite side (0=no surface; 1= all reflective).	0
Distance to reflective surface on opposite side	0
Height of reflecting object (must be at least 5 m)	0
Distance to intersection	25
Calculated Noise Level (Ldn) <i>(Or fill in (>40) if you want to calculate distance; distance must be set to zero)</i>	75
Night LAeq is	8

Figure 26. Run #1 - All Nighttime Roadway Traffic Penalty Removed—Location at NW Corner of Auditorium

Run #2. Roadway Traffic at CH2m estimated 32,000 AADT Ldn=79 (Location at southwest corner of Auditorium).

Data on road			
Road traffic input data help	Day: 7.00-22.00	Night: 22.00-7.00	
Motorcycles per hour	4	1	
Cars per hour	1601	510	
Speed cars	45	50	<input type="radio"/> kilometers per hour <input checked="" type="radio"/> miles per hour
Number of vans/hr	93	13	
Number of heavy trucks/hr	26	5	
Speed trucks	40	45	
Road surface help	Concrete		

data on geometry help	
Height of road	8
Horizontal distance in meters from center of road <i>Fill in 0 (zero, not blank!) when you want to calculate the distance for a given noise level</i>	10
Height of house or observer	2
View angle (127 grad= full view)	127
Fraction sound absorbing soil (0=all hard, non absorbing; 1= all absorbing)	0
Percentage reflection from opposite side (0=no surface; 1= all reflective).	0
Distance to reflective surface on opposite side	0
Height of reflecting object (must be at least 5 m)	0
Distance to intersection	25
Calculated Noise Level (Ldn) <i>(Or fill in (>40) if you want to calculate distance; distance must be set to zero)</i>	79
Night LAeq is	72

Figure 27. Run #2 – Location at SW Corner of Auditorium

Run #3. Roadway Traffic at CH2m estimated 32,000 AADT Ldn = 69 (Location at southwest corner of Client Services Center)

Data on road			
Road traffic input data help	Day: 7.00-22.00	Night: 22.00-7.00	
Motorcycles per hour	4	1	
Cars per hour	1601	510	
Speed cars	45	50	<input type="radio"/> kilometers per hour <input checked="" type="radio"/> miles per hour
Number of vans/hr	93	13	
Number of heavy trucks/hr	26	5	
Speed trucks	40	45	
Road surface help	Concrete		

data on geometry help	
Height of road	8
Horizontal distance in meters from center of road <i>Fill in 0 (zero, not blank!) when you want to calculate the distance for a given noise level</i>	61
Height of house or observer	2
View angle (127 grad= full view)	127
Fraction sound absorbing soil (0=all hard, non absorbing; 1= all absorbing)	0
Percentage reflection from opposite side (0=no surface; 1= all reflective).	0
Distance to reflective surface on opposite side	0
Height of reflecting object (must be at least 5 m)	0
Distance to intersection	0
Calculated Noise Level (Ldn) <i>(Or fill in (>40) if you want to calculate distance; distance must be set to zero)</i>	69
Night LAeq is	61

Figure 28. Run #3 - Location at SW Corner of Client Services Center



Figure 29. Classroom Inside of Auditorium on Furthest West Side of Paradise Campus - Building 100



Figure 30. South side of Paradise Campus - Building 100, Facing North



Figure 31. Full Lot X of Paradise Campus, Facing Northwest



Figure 32. Semi-trailer Truck Traffic on Swenson St., South of Tropicana Ave., Facing Southwest



Figure 33. Traffic on Swenson St., South of Tropicana Ave., Facing Southwest



Figure 34. Motorcycle and Heavy Truck Traffic on Swenson St., South of Tropicana Ave., Facing Southwest



Figure 35. School Bus and Tour Bus Traffic on Swenson St., South of Tropicana Ave., Facing East.



Figure 36. Heavy Truck on Swenson St., South of Tropicana Ave., Facing Southeast.



Figure 37. Morning Traffic Including Heavy Truck on Swenson St., South of Tropicana Ave., Facing Northeast.

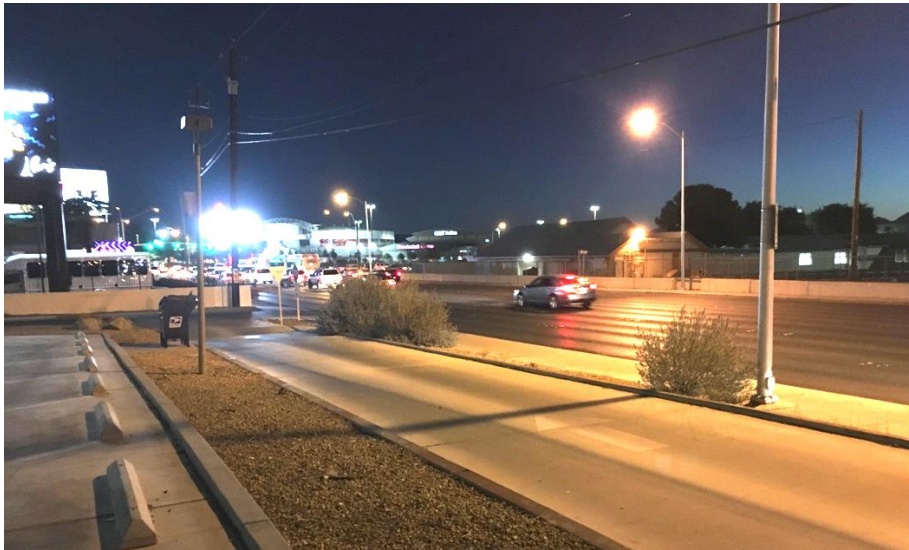


Figure 38. Morning Traffic (6 a.m.) on Swenson St., Facing Northwest

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UNIVERSITY OF NEVADA LAS VEGAS

FOUNDED 1957

SIGNAGE ANALYSIS

OCTOBER 16, 2018



October 16, 2018

David Frommer
Executive Director and University Architect
UNLV Planning and Construction
University of Nevada, Las Vegas
4505 S. Maryland Parkway
Las Vegas, NV 89154

Dear Mr. Frommer:

Conventions, Sports & Leisure International ("CSL") is pleased to present this draft report to the University of Nevada, Las Vegas ("UNLV" or "Client") for consulting services related to the Signage Valuation. UNLV engaged CSL to conduct an examination of the County's proposed elevated roadway and the impact on visibility and revenue associated with the marquee, three sided billboard and various UNLV branding around the intersection of Tropicana and Swenson. The attached report summarizes our research and analyses and is intended to assist UNLV in better understanding the signage value.

The information contained in this report is based on estimates, assumptions and other information developed from research of the markets, knowledge of the billboard industry and other factors, including certain information provided by you and others.

We sincerely appreciate the opportunity to assist you with this project and would be pleased to be of further assistance in the interpretation and application of the study's findings.

Very truly yours,

A handwritten signature in black ink that reads "CSL International". The signature is written in a cursive, flowing style.

CSL International

SIGNAGE VALUATION

ASSUMPTIONS

University of Nevada, Las Vegas (“UNLV”) engaged Conventions, Sports & Leisure International (“CSL”) to review Clark County’s proposed elevated roadway plans at the corner of Tropicana and Swenson, understand the impact from relocating vehicles traveling north on Swenson and the obstruction caused to billboards and UNLV signage visibility around Tropicana and Swenson, and project the value loss associated with the northeast digital marquee, northwest three sided billboard, UNLV entrance sign and additional UNLV branding (“Signage”).

CSL analyzed the following as it relates to the elevated roadway obstruction:

NORTHEAST DIGITAL MARQUEE

- Board is 17 feet high by 32 feet wide
- 4 week rate of \$5,000 (per sponsor)
- Eight (8) sponsors rotate
- 100 percent occupancy
- Valuation is for gross revenue and does not factor in any revenue split

NORTHWEST THREE SIDED BILLBOARD

- Board is 20 feet high by 60 feet wide
- 4 week rate varies from \$3,000 to \$7,725 for the boards
- Tri-board has three (3) billboard placements
- 100 percent occupancy
- Valuation is for gross revenue and does not factor in any revenue split

UNLV BRANDING

- UNLV entrance sign, Thomas & Mack Center, Cox Pavilion, Mendenhall Center and from the Marquee Static



SIGNAGE VALUATION

MARQUEE & BILLBOARD VISIBILITY

In order to understand the impact to the northeast digital marquee and northwest three-sided billboards, CSL measured visibility from 1,000 feet to 100 feet. The table to the right shows the prorated visibility for both the marquee and the billboard at each distance.

As shown, visibility is significantly impacted by the new ramp, especially from 400 to 600 feet across all locations, as well as east/westbound traffic on Tropicana and Swenson northbound from 100 to 300 feet. Overall, CSL projects only 22 percent of the marquee and billboard value is maintained due to the obstruction caused by the new elevated roadway.

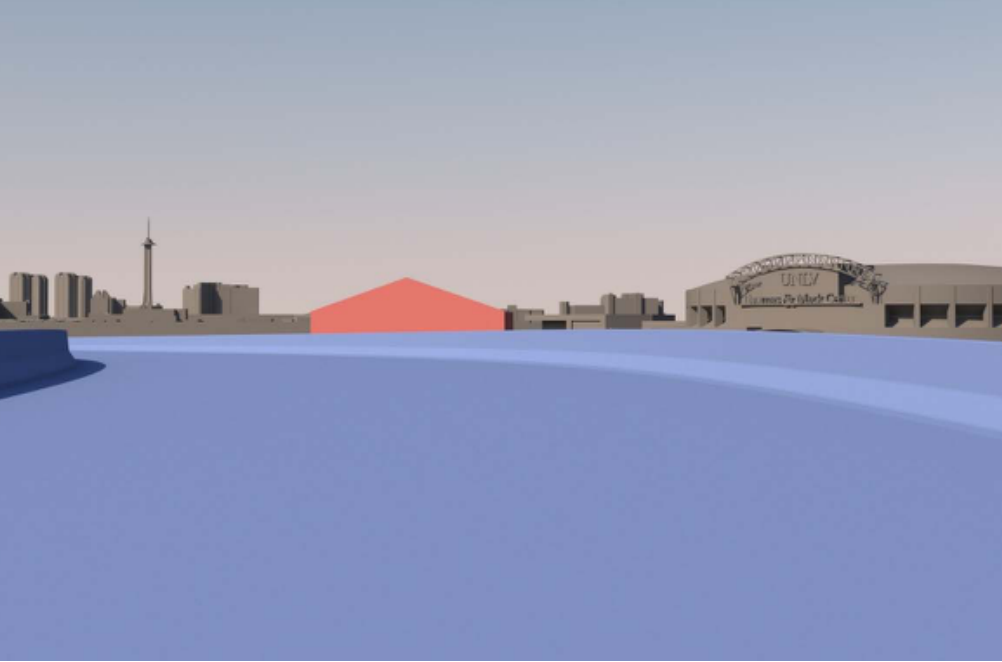
VISIBILITY BY LOCATION

Distance	Swenson Northbound Ramp to Tropicana Westbound	Swenson Northbound Ramp	Tropicana Westbound	Tropicana Eastbound	Swenson Northbound	Average
1,000	40%	40%	0%	90%	35%	41%
900	40%	40%	20%	85%	35%	44%
800	15%	15%	20%	80%	35%	33%
700	10%	10%	20%	75%	35%	30%
600	5%	5%	20%	60%	20%	22%
500	5%	5%	20%	50%	15%	19%
400	10%	10%	20%	25%	40%	21%
300	70%	30%	0%	0%	0%	20%
200	40%	50%	0%	0%	0%	18%
100	90%	20%	0%	0%	0%	22%

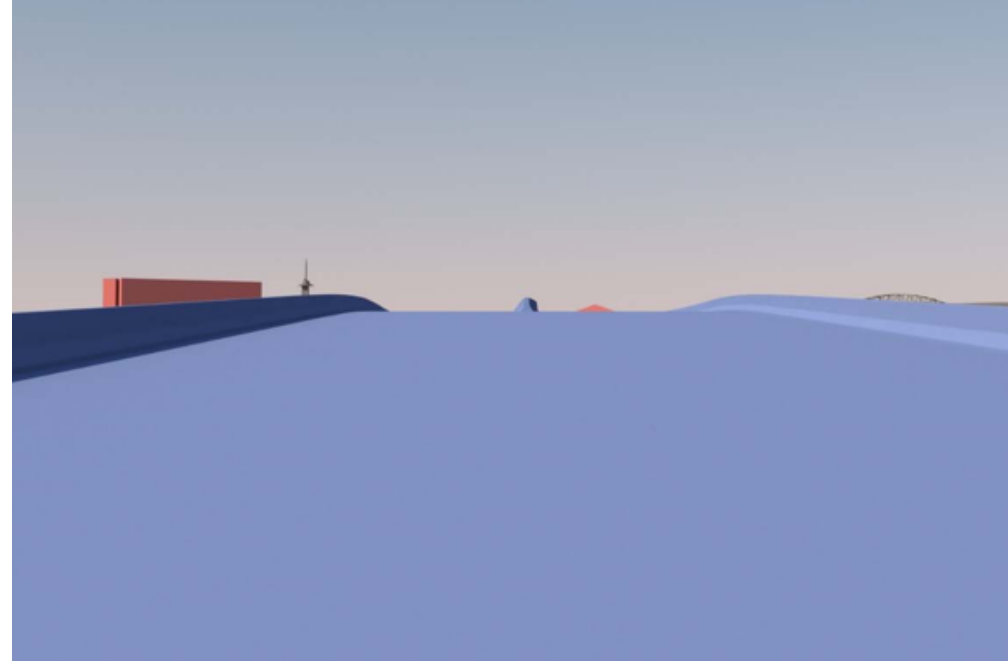
SIGNAGE VALUATION

MARQUEE & BILLBOARD VISIBILITY

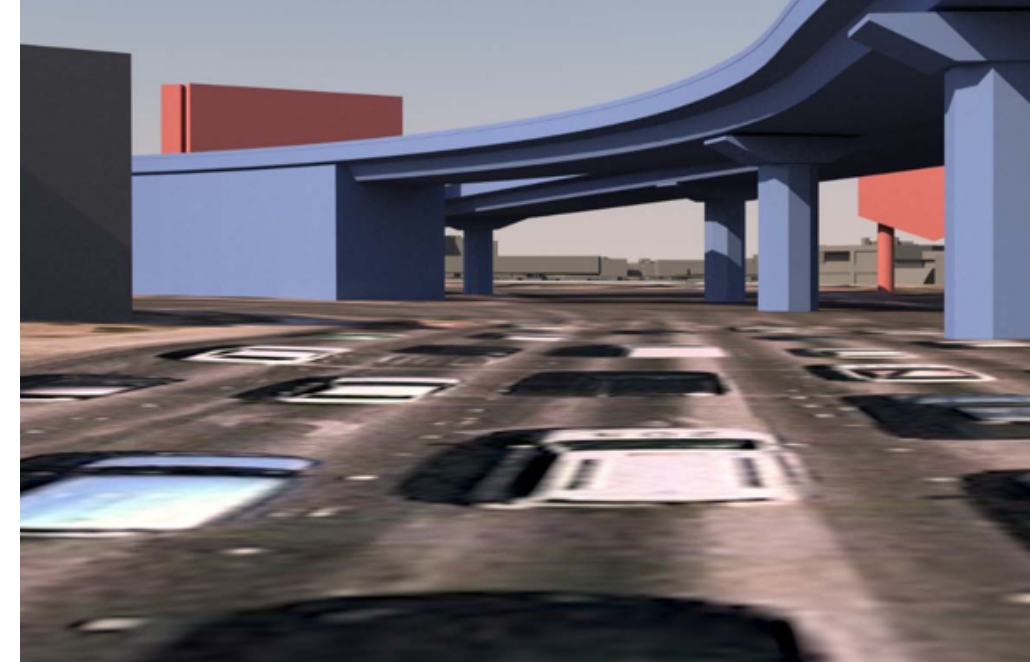
Swenson Northbound Ramp - 200 ft



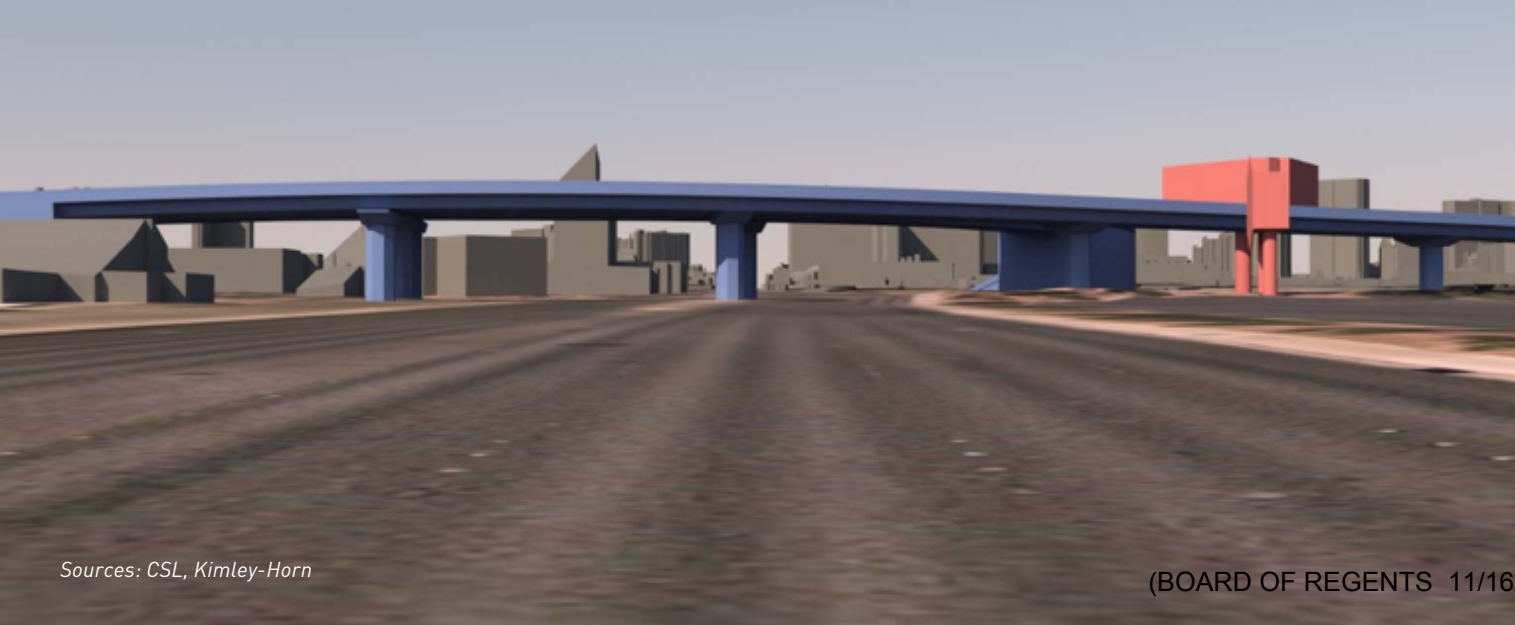
Swenson Northbound to Tropicana Westbound Ramp - 600 ft



Swenson Northbound - 400 ft



Tropicana Westbound - 600 ft



Tropicana Westbound - 600 ft



SIGNAGE VALUATION

UNLV BRANDING VISIBILITY

In addition to the marquee and three-sided billboard, UNLV receives exposure via the UNLV entrance sign, exposure from the Thomas & Mack Center, Cox Pavilion, Mendenhall Center and from the Marquee Static. The following chart outlines the impact at each 100 foot viewing distance from 1,000 feet to 100 feet based on the percent of UNLV branding that is visible.

Visibility is significantly impacted by the new elevated roadway, especially from Tropicana and Swenson. Overall, CSL projects 16 percent of the UNLV branding value is maintained from the obstruction caused by the new elevated roadway.

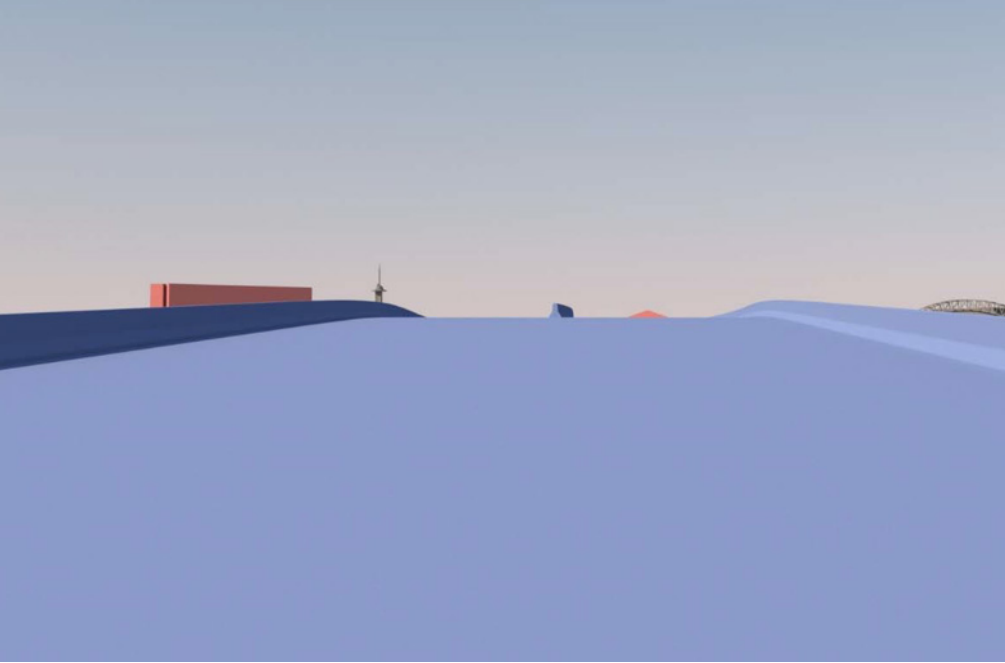
VISIBILITY BY LOCATION

Distance	Swenson Northbound Ramp to Tropicana Westbound	Swenson Northbound Ramp	Tropicana Westbound	Tropicana Eastbound	Swenson Northbound	Average
1,500	0%	0%	0%	0%	0%	0%
1,000	100%	100%	0%	0%	0%	40%
900	90%	90%	0%	0%	0%	36%
800	0%	0%	0%	0%	0%	0%
700	0%	0%	0%	0%	0%	0%
600	0%	0%	0%	0%	0%	0%
500	0%	0%	0%	0%	0%	0%
400	50%	50%	0%	0%	0%	20%
300	100%	100%	0%	0%	40%	48%
200	0%	25%	0%	0%	60%	17%
100	0%	0%	0%	0%	20%	4%

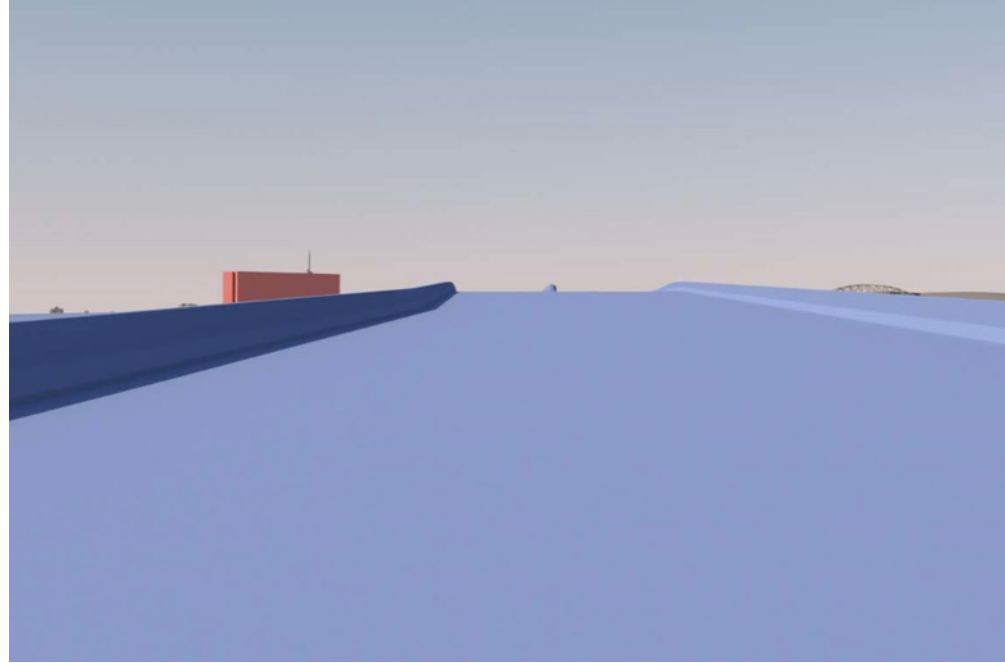
SIGNAGE VALUATION

UNLV BRANDING VISIBILITY

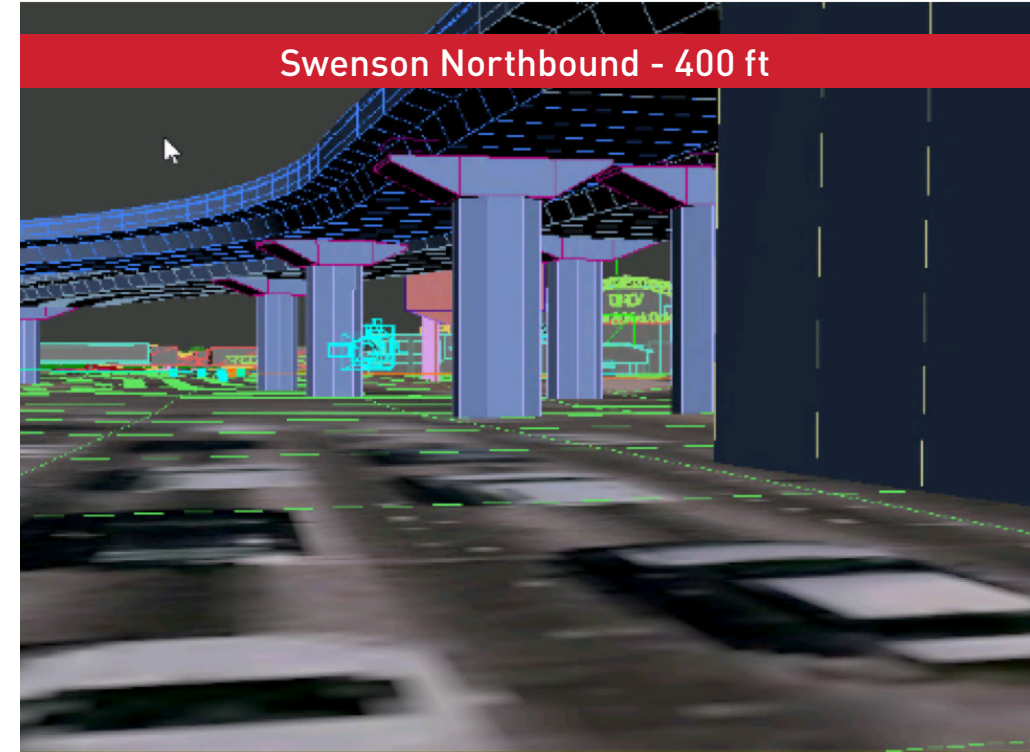
Swenson Northbound Ramp - 600 ft



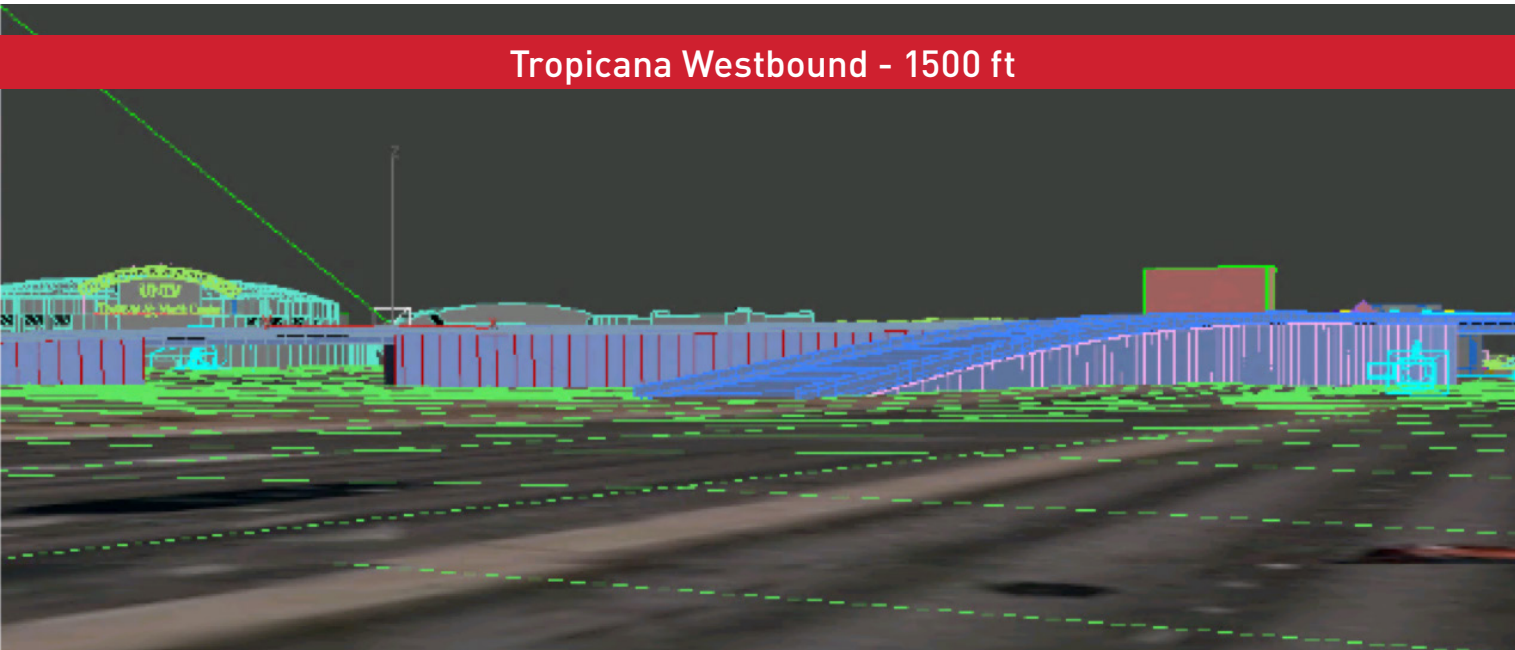
Swenson Northbound to Tropicana Westbound Ramp - 800 ft



Swenson Northbound - 400 ft



Tropicana Westbound - 1500 ft



Tropicana Westbound - 1000 ft



SIGNAGE VALUATION

FINDINGS

The current value of the UNLV marquee and three-sided billboard is \$1,427,400, including \$520,000 from the marquee and \$907,400 from the billboard. The addition of the new elevated roadway will drastically impact the value of billboards, providing an adjusted value of 295,912, which is a \$1,131,488 decrease (79 percent loss) from the current value.

The current value of the UNLV Branding is \$334,100, including \$158,600 from the Thomas & Mack | Cox Pavilion | Mendenhall Center, \$97,500 from the UNLV Entrance Sign and \$78,000 from the Marquee Static. The addition of the new elevated roadway provides an adjusted value of \$63,999, which is a \$270,101 decrease (81 percent loss) from the current UNLV Branding value.

BILLBOARDS	CURRENT VALUE	ADJUSTED VALUE	VARIANCE	PERCENT VALUE LOSS
Marquee (Digital)	\$520,000	\$116,272	(\$403,728)	-78%
Static Board	\$907,400	\$179,640	(\$727,760)	-80%
TOTAL	\$1,427,400	\$295,912	(\$1,131,488)	-79%

UNLV BRANDING	CURRENT VALUE	ADJUSTED VALUE	VARIANCE	PERCENT VALUE LOSS
Thomas & Mack Cox Pavilion Mendenhall Center	\$158,600	\$24,757	(\$133,843)	-84%
UNLV Entrance Sign	\$97,500	\$21,801	(\$75,699)	-78%
Marquee (UNLV static)	\$78,000	\$17,441	(\$60,559)	-78%
TOTAL	\$334,100	\$63,999	(\$270,101)	-81%

SIGNAGE VALUATION

OPTIMAL HEIGHT

In addition to understanding the visibility and value impact associated with the proposed elevated roadway, CSL was tasked with developing a height recommendation for a new potential marquee and billboard at the existing site locations. Currently, the digital marquee has an estimated height of 18 feet, while the three sided billboard has a height of 33 feet. (Distance is measured from grade to bottom of sign.) After reviewing elevation models with Kimley-Horn, CSL does not feel there is an optimal height for the marquee as the new ramp causes visibility to be severely impacted across valuable site lines. Conversely, the three-sided billboard’s height is optimal at 47 feet, providing much less obstruction to vehicular visibility along Swenson Northbound, Swenson Northbound Ramp and Tropicana Eastbound. Nevertheless, the current value decreases by 21 percent due to new obstruction from the elevated roadway from 100 to 300 feet at most locations along the path of travel.

BILLBOARDS	CURRENT HEIGHT	OPTIMAL HEIGHT	CURRENT VALUE	ADJUSTED VALUE	VARIANCE	PERCENT VALUE LOSS
Marquee (Digital)	18 feet	N/A	\$520,000	N/A	(\$520,000)	N/A
Three Sided Board	33 feet	47 feet	\$907,400	\$716,846	(\$190,554)	-21%

Note: This does not account for any height restrictions that may apply to signage associated with McCarran International Airport.

