

Turnberry's Town Square, Las Vegas: Elevated Left Turn Access

Ken Ackeret
Kimley-Horn and Associates, Inc.
2080 East Flamingo Road, Suite 210
Las Vegas, NV 89119
Ken.ackeret@kimley-horn.com

Khalil Amrikani
Kimley-Horn and Associates, Inc.
2080 East Flamingo Road, Suite 210
Las Vegas, NV 89119
Khalil.amrikani@kimley-horn.com

Molly O'Brien
Kimley-Horn and Associates, Inc.
2080 East Flamingo Road, Suite 210
Las Vegas, NV 89119
Molly.obrien@kimley-horn.com

ABSTRACT

The Las Vegas Resort Corridor is the economic center of the Las Vegas Valley. As resident and tourist populations of the Valley increase, traffic to and from the Resort Corridor is also expected to increase. To minimize traffic conflicts and optimize signal operations between Sunset Road and the I-215 interchange on Las Vegas Boulevard, Kimley-Horn and Associates, Inc. proposed and designed a grade-separated left turn to serve the new Town Square regional retail development.

Key words: elevated—flyover—grade—left turn—separation

PROJECT LOCATION

The proposed Town Square development is located west of Las Vegas Boulevard, east of I-15, north of the 215 Beltway, and south of Sunset Road on approximately 97 acres within Clark County, Nevada. The proposed development is expected to contain approximately 1.5 million square feet of commercial uses. The \$750 million retail/commercial center is expected to contain an open air mall and entertainment center along Las Vegas Boulevard, “the Strip.” Since the development’s location is within the northeast quadrant of a system-to-system interchange, access to the site is primarily limited to two arterial streets, Las Vegas Boulevard and Sunset Road.

ENGINEERING PRINCIPLES

The Town Square elevated left turn access project utilized engineering ingenuity to solve the unique challenges associated with providing access to the development site while maintaining critical traffic progression along Las Vegas Boulevard.

When the project was in the development phase, access concerns were raised due to the project’s location on Las Vegas Boulevard just north of the 215 Beltway interchange. Existing traffic volumes in the vicinity of the project were expected to increase significantly prior to completion. As the project was being conceptualized by the owner and the consulting team, there were plans for three new signals along the project’s Las Vegas Boulevard frontage. With the development of Synchro simulation models by Kimley-Horn and Associates, Inc., it was quickly shown to the developers of the project that the installation of the three signals could not adequately move traffic along Las Vegas Boulevard as well as into and out of the site. In consultation with the multiple agencies involved with the project (Clark County, Nevada Department of Transportation, and Regional Transportation Commission), three different access alternatives were considered for the southern access into the property: full signalization, a half-signal, and a grade separation (over or under Las Vegas Boulevard). After review of the three alternatives, a grade-separated access into the site was agreed upon by both the developer and reviewing agencies.

The application of grade separation on arterial streets is not necessarily a new concept. In other major cities, grade-separated accesses exist; however, these accesses typically occur below grade. The Town Square elevated left turn concept is unique because the overhead bridge structure elevates out of the left-turn pocket and travels over a major arterial. This is the first of its kind in Nevada and provides a unique alternative to half-signal design (as right-in/right-out movements are allowed below the structure). This concept can be added to the traffic engineering toolbox to aid in direct site access over busy arterial corridors.

SOCIAL SIGNIFICANCE

The Town Square elevated left turn access is taking an existing level of service (LOS) F left-turn movement into an existing Fry’s Electronics Store, adding traffic from a major retail/entertainment district, and creating an unobstructed LOS A left-turn movement into a major regional shopping and entertainment facility. The addition of the elevated left turn is expected to ease existing driver frustration and aggression by minimizing delay on Las Vegas Boulevard. The decrease in delay is also expected to reduce air quality impacts. Overall, the elevated left turn facility will provide improved access into a major traffic generator of a retail/entertainment district.

PROJECT COMPLEXITY

Traffic Volumes

In 2005, the annual average daily traffic (AADT) volumes on Las Vegas Boulevard were 42,000 vehicles per day. Without the project, Las Vegas Boulevard is anticipated to have approximately 57,000 vehicles per day. The project is estimated to generate approximately 63,000 daily trips, of which 2,250 are anticipated to occur in the a.m. peak hour and 6,000 are anticipated to occur in the p.m. peak hour, in addition to the existing Fry's Electronics Store trips. The combined Town Square and Fry's Electronics Store left-turn access through the grade-separated left turn is expected to be approximately 575 a.m. peak hour trips and 950 p.m. peak hour trips. This elevated left turn is expected to carry these left-turn movements out of conflict with 1,000 a.m. and 2,500 p.m. peak hour trips traveling southbound along Las Vegas Boulevard.

Structure

The elevated left turn is being constructed as a three-span structure with retaining walls on both sides. The three-span structure was chosen for structural efficiency due to the horizontal curvature ($R=205$ ft.), stability, and superelevation of the left turn (4%) for a 25 miles per hour (mph) design speed. The structure was designed as a post-tensioned concrete box girder as opposed to steel girders or precast girders. The span for the structure over the southbound lanes on Las Vegas Boulevard is 200 ft. to accommodate a future regional fixed guideway system proposed within the Las Vegas Boulevard center median.

Design Considerations

The design speed for the elevated left turn was a topic of concern for the parties involved. Several different design speeds were explored; however, a final design speed of 25 mph was used for vertical and horizontal design. The design speed was based on the idea that vehicles are entering a left-turn pocket, and if a signal were present the vehicles would travel at a slow speed. Also, the elevated left turn structure terminates in a shopping center ring road. Designing the structure to a high design speed would cause vehicles to enter the site at significantly faster speeds than desired, thus requiring additional onsite traffic calming measures.

The main challenge in the design of the elevated left turn was to allow sufficient space in the left-turn bay for vehicles to slow down before entering the elevated left turn structure while still providing a traversable grade on the approach to achieve a 17 ft. vertical clearance over Las Vegas Boulevard. Rumble strips will be located within the left-turn bay to encourage the slowing of vehicles prior to the approach of the elevated left turn. The maximum grade on the approaches is 8%, with a left-turn bay of approximately 250 ft.

Construction

Throughout construction of the elevated left turn, the developer was required to maintain two lanes of travel in each direction along Las Vegas Boulevard, as well as continue to provide left-turn access for the Fry's Electronic Store customers. At the time this summary was prepared, construction of the elevated left turn was underway (construction started in January 2007), and the travel lanes were being maintained. The construction period is compressed to four months, with a scheduled completion of June 2007. This date is months ahead of the opening of Town Square, which is scheduled to open in October 2007. The

advance completion is to aid in reducing the existing Fry' Electronic Store traffic access congestion. The following figures show progress of the construction of the elevated left turn.



Figure 1. View looking at abutment #1 from top of falsework



Figure 2. Aerial view of elevated left turn



Figure 3. Aerial view of elevated left turn looking northbound on Las Vegas Boulevard



Figure 4. Looking east at the elevated left turn

SUMMARY

A first of its kind in Nevada, this proposed median structure is replacing the existing at-grade left turn at Fry's Electronics Store and eliminates the conflict with southbound traffic on Las Vegas Boulevard. The project clearly demonstrates sound engineering principles by using engineering ingenuity to solve the unique challenges associated with providing access to the development site while maintaining vehicle progression along Las Vegas Boulevard. The addition of the elevated left turn is expected to ease existing driver frustration and aggression by minimizing delay on Las Vegas Boulevard while maintaining a free-flow access into a new regional shopping and entertainment district. Since this concept is the first of its kind in Nevada, special consideration had to be used in designing the design speeds, slopes, and construction traffic plans. In the future, this concept can be included in the traffic engineering toolbox to aid future designs in providing direct site access over busy arterial corridors.