



Memo

Date: Thursday, September 18, 2014

Project: Laughlin-Bullhead City Bridge Project

To: Roy Davis, PE, CCPW Project Manager

From: Michael LaBianca, Faisal Chowdhury

Subject: Existing and Future Conditions Reporting

This document identifies the existing and future conditions for the Laughlin-Bullhead City Bridge Project. The assumptions inherent in modeling were discussed at the July 16, 2014, Traffic Modeling Workshop, and included in the notes distributed to all invited to participate in that workshop.

Background

A potential bridge location across the Colorado River is identified at Bullhead Parkway South (Parkway Bridge). To advance the Laughlin-Bullhead City Bridge Project, the team is considering phasing the Parkway Bridge; first by constructing a 2-lane roadway bridge, and then, widening the roadway and bridge to ultimate 4-lane facility as the traffic volume warrants in the future. This phasing requires analyzing the future traffic demand to determine if a 2-lane facility will be viable and if so for how many years of the project life. This analysis will begin by updating the 2009 Bullhead City Transportation Plan travel demand model and the assumptions on socioeconomics and roadway networks that went into the model. Necessary changes to update it are discussed. For the purposes of this exercise, the base year is considered to be 2013, and the build year is considered to be 2017.

The effects of the economic downturn of the “Great Recession” (as the global economic decline during 2008-09 is referred) continue to influence the nation into 2014. As reported in the Associated Press earlier in July of 2014, Nevada has 6 percent fewer jobs than it did in December 2007; Arizona is 5 percent short of their December 2007 jobs numbers.

Existing Conditions

Traffic Counts

Traffic counts were taken at 20 locations on the week of July 20, 2014 by the United Civil Group. These traffic counts augment the traffic counts available on both the Arizona and Nevada Department of Transportation websites. To account for the seasonal variation in traffic counts that can be expected in late July, counts were adjusted upwards approximately 5 percent. This adjustment addresses the lower traffic observed in the corridor during this period and assisted in the model validation. The model validation was done to ensure that the model was reasonably reflecting the current traffic conditions in the area. Information on model validation is included in Appendix A. The traffic counts collected in July 2014, are shown in Figure 1.

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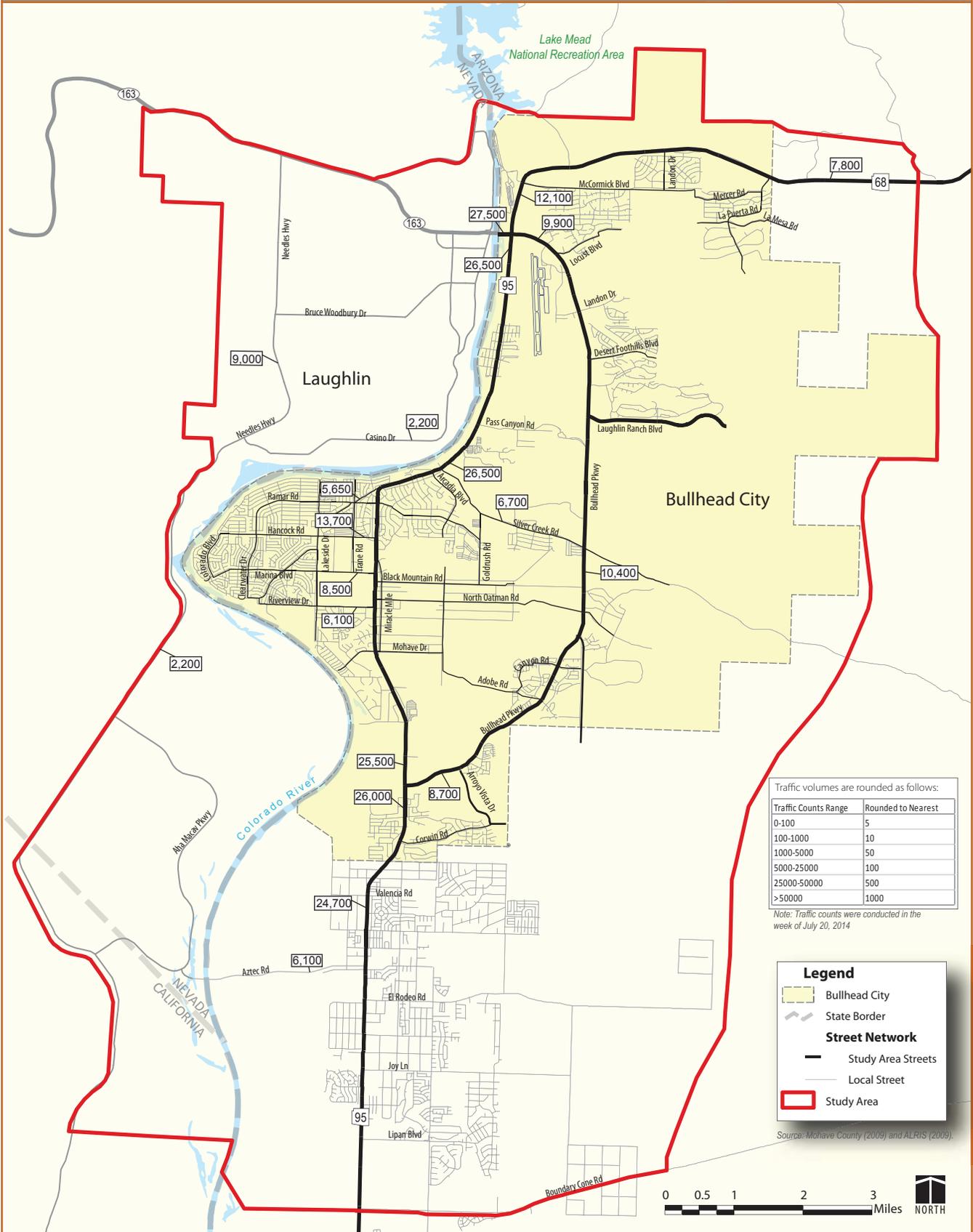


Laughlin-Bullhead City Bridge Project

Figure 1 Daily Traffic Volumes

August 25, 2014

Laughlin-Bullhead City
Bridge Project



Socioeconomics

The most recent Arizona Department of Administration (ADOA) projections were prepared in August 2013. In Nevada, annual estimates are developed and published by the Nevada State Demographer's Office. Population, employment, and housing unit estimates for the study area are shown in Table 1.

Table 1. Study Area Population Estimates for Laughlin, Nevada; Bullhead City, Arizona; and unincorporated Mohave County.

Model Area	Population	Housing Units	Employment
Bullhead City	41,911 ^a	22,951	11,550
Laughlin	8,835 ^b	4,227	13,161
Mohave County	12,123	6,230	2,750
TOTAL	62,869	33,408	27,923

Source:

a. Arizona Department of Administration. 2014.

b. Nevada State Demographer's Office. 2013. *Laughlin Population, NV demographer* (see <http://nvdemography.org/data-and-publications/estimates/estimates-by-county-city-and-unincorporated-towns/>)

The current estimates were compared to the projections derived for the Laughlin Bridge Environmental Assessment and Bullhead City Transportation Plan (Bullhead City, 2011). It was observed that the 2013 estimates of population for the study area in Bullhead City and unincorporated Mohave County are relatively close to what was estimated for 2009. Traffic counts also show that the traffic for the study area in 2014 is comparable to that experienced in 2009. Laughlin's 2013 population estimate of 8,835 is 5 percent below what was reported in previous documents as an estimate for 2009. In the case of Laughlin, the 2009 estimates of population and employment were reduced commensurately to arrive at a baseline population estimate consistent with the Nevada State Demographer. These adjustments were made to arrive at the baseline estimates shown in Table 1.

Future Conditions

Socioeconomic Projections

The Arizona Department of Administration (ADOA) produces sub-county projections consistent with the official county population projections. The most recent ADOA projections were prepared in August 2013, and extend through 2050. Annual projections are available for all incorporated places in Arizona. The ADOA projections for Bullhead City were used for the planning horizon years of 2017 (identified as "build year"), 2020, 2025, and 2040. These projections were used as control values for the Bullhead City area, and the growth rate for each of these planning horizons was then used to calculate the growth of the adjacent areas of unincorporated Mohave County.

Projections for the Laughlin area were developed by calculating the annual compounded growth between the 2010 Census population for Laughlin and the 2013 Nevada State Demographer's estimate of population. This growth rate (1.7 percent) was then applied through the planning horizon to forecast growth for the Clark County portion of the study area (note: the annual growth rate from 2000 through 2009 was only 0.3 percent, hence the more recent growth trend was used for this study). The population projections for the planning horizons are shown in Table 2.

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Table 2. Study Area Population Projections for Laughlin, Nevada; Bullhead City, Arizona; and unincorporated Mohave County.

Model Area	2014			2017			2020		
	Pop	HH	Emp	Pop	HH	Emp	Pop	HH	Emp
Bullhead City	41,911	22,951	11,550	46,536	23,729	12,764	50,004	24,313	13,675
Laughlin	8,835	4,227	13,161	9,460	4,526	14,091	9,957	4,764	14,832
Mohave County	12,123	6,230	2,750	13,999	6,897	3,332	15,406	7,397	3,768
TOTAL	62,869	33,408	27,923	69,995	35,152	30,015	75,367	36,474	31,733
				2025			2040		
				Pop	HH	Emp	Pop	HH	Emp
Bullhead City				54,629	26,562	14,681	66,979	32,568	17,216
Laughlin				10,845	5,189	16,154	14,011	6,704	20,870
Mohave County				17,238	8,277	4,197	22,367	10,742	5,391
TOTAL				80,529	40,028	33,906	103,357	50,014	43,477

Note: Pop-Population; HH- Housing Units; Emp- Employment

Roadway Network

During the July 16, 2014 Traffic Modeling Workshop, HDR reviewed the planned and programmed roadway network from the Bullhead City Transportation Plan. Based on input from the agency stakeholders representing Bullhead City, Town of Laughlin, and Clark County, the planned improvements for the region were modified to reflect (1) work completed or planned to date, and (2) anticipated changes for the horizon years. The Bullhead City Transportation Plan accurately reflects planned roadway improvements for the area. Estimated completion dates for improvements have been adjusted based on discussions with Bullhead City personnel. For the Town of Laughlin, the existing roadway system is anticipated to provide access to new developments and address the areas needs through the planning horizon.

Figure 2 shows the transportation network improvements anticipated through the various planning horizons.

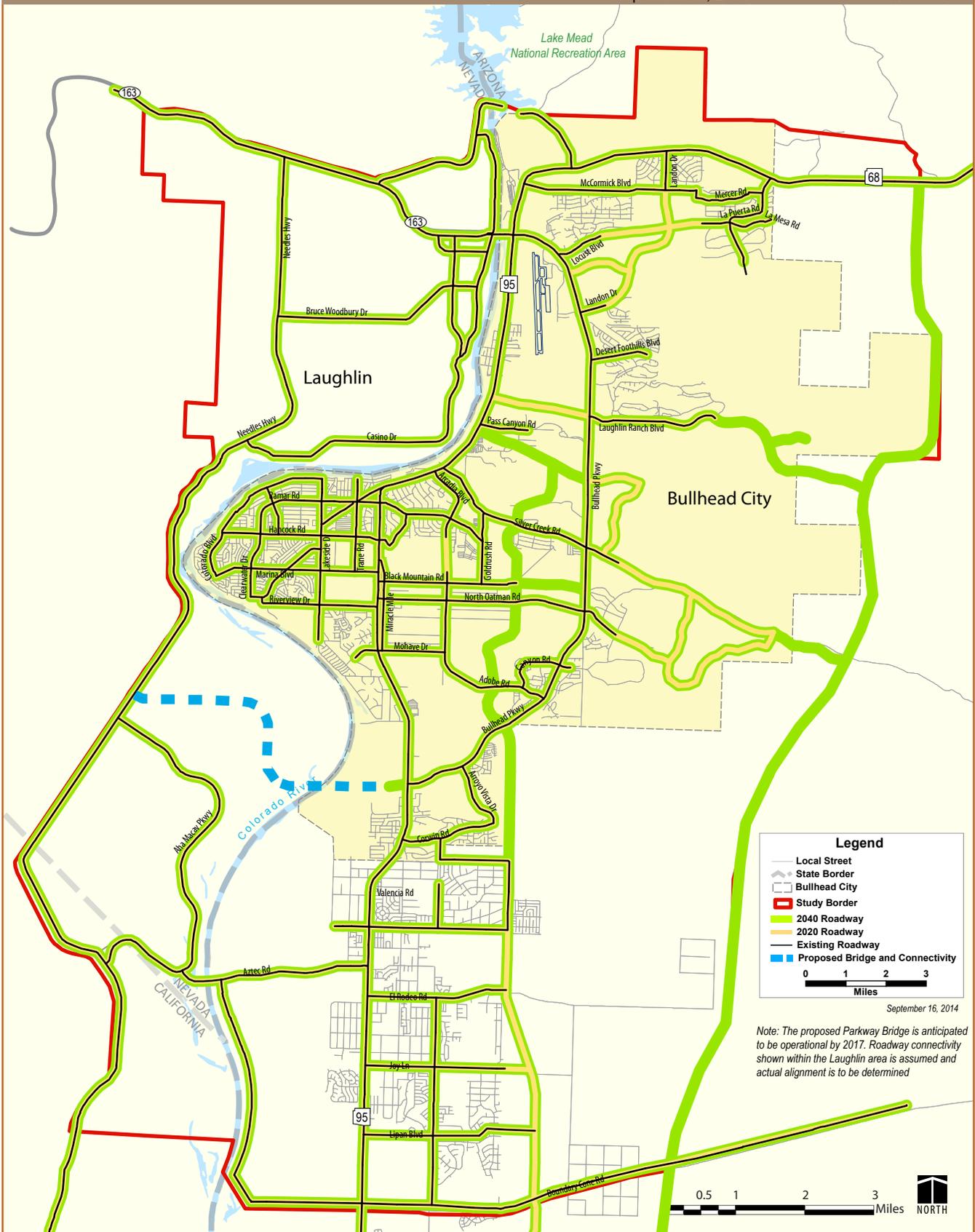
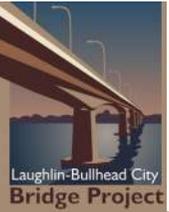
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Figure 2 Existing and Future Roadway Network

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Travel Demand Model

The adjustments discussed previously to both the socioeconomic projections and the future roadway network were used with the travel demand model developed for the Laughlin Bullhead City Bridge Project and the 2011 Bullhead City Transportation Plan. Model output with the refined data produced reasonable results, indicating the model is accurately modeling existing traffic counts and traffic flow pattern. Future land use, socioeconomic data and roadway network were used to run models for each horizon year- without and with the proposed Parkway Bridge. Additional analysis was conducted assuming Parkway Bridge as a 4-lane facility to evaluate the trip diversion pattern.

Results

The focus of this modeling effort is to determine additional information to ascertain if, from a demand perspective, a 2-lane facility and bridge will be viable for the Laughlin-Bullhead City area, and if so, for how many years of the project life.

Level of service (LOS) is a commonly used measure of congestion. LOS A, B, and C are generally considered to be satisfactory service levels, while the influence of congestion becomes more noticeable at LOS D. LOS E is undesirable and is considered by most agencies to be the limit of acceptable delay, and LOS F conditions are considered to be unacceptable to most drivers. Most jurisdictions strive to attain a LOS of at least D or better on all roads and signalized intersections in urban areas, and LOS C is targeted for rural conditions.

The threshold used for this determination was level of service D, based on the volume over capacity calculation used in the Bullhead City Transportation Plan. In other words, if a 2-lane bridge is constructed at the Bullhead Parkway alignment, how long will it operate at an acceptable LOS D or better. Table 3 provides the LOS information for the Bullhead City area Colorado River crossings for the planning horizons.

Table 3 summarizes the results of this modeling effort.

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Table 3. Level of Service for Existing Bridges and Proposed Parkway Crossing of the Colorado River.

Year	Crossing Attributes	Laughlin	Parkway	Aztec	
	# of Lanes	4	2	2	
	Daily Capacity	LOS	LOS	LOS	43,200 15,500 15,500
2013	Existing	C	N/A	B	All crossings are operating at acceptable LOS
2017	No Bridge	D	N/A	C	All crossings are operating at acceptable LOS
	Bridge	C	B	B	All crossings are operating at acceptable LOS
2020	No Bridge	F	N/A	C	Laughlin Bridge is operating at an unacceptable LOS under "No Parkway Bridge" scenario
	Bridge	D	B	B	All crossings are operating at acceptable LOS
2025	No Bridge	F	N/A	D	Laughlin Bridge is operating at an unacceptable LOS F under "No Bridge" scenario.
	Bridge- 2L	D	B	C	Parkway Bridge is operating at LOS B with 2-lane.
	Bridge- 4L	D	A	C	Sensitivity testing was done to evaluate construction of a 4-lane bridge as opposed to a 2-lane bridge. In the case of a 4-lane bridge, With 4-lane Parkway bridge, level of service improves due to the added capacity. However, model shows very little traffic diversion from Laughlin Bridge. Traffic flow pattern remains unchanged.
2040	No Bridge	F	N/A	F	Laughlin Bridge is operating at an unacceptable LOS F without or with the Parkway Bridge. Due to the congestion at the Laughlin bridge, some traffic may divert to the Parkway bridge which may trigger the need for widening the Parkway Bridge at or beyond 2040.
	Bridge- 2L	F	D	C	
	Bridge- 4L	F	B	C	With a 4-lane Parkway Bridge, LOS improves to LOS B on Parkway Bridge due to the added capacity; however, the model shows very little traffic diversion from the Laughlin Bridge (which remains congested).

It is important to point out that traffic demand for a bridge facility is only one of several important factors being considered in the 2nd bridge discussion. The proposed Parkway Bridge will provide emergency access, alternative traffic route as well as contribute to the region’s economic vitality.

Table 3 shows that with no Parkway Bridge, Laughlin Bridge will operate at an unacceptable LOS F as soon as 2020. With a 2-lane Parkway Bridge, the Laughlin Bridge would reach an unacceptable LOS sometime after 2025 (interpolation of the results indicates that the LOS E is experienced sometime around 2035). With a 4-lane Parkway Bridge, the LOS for the Laughlin Bridge is improved, but still below acceptable levels by 2040 (interpolation of the results indicates that the LOS D is exceeded sometime around 2035).

The convenience of using the Laughlin Bridge and trip interaction between origin and destinations within the northern part of Bullhead City and the Town of Laughlin keeps the model from diverting trips to the proposed Parkway Bridge crossing (i.e., the model is not sensitive enough to show the traffic diversion pattern from the existing Laughlin Bridge to the proposed Parkway Bridge).

Sensitivity testing was done to evaluate construction of a 4-lane bridge as opposed to a 2-lane bridge. In the case of a 4-lane Parkway Bridge, LOS improves due to the added capacity. However, the model

shows very little traffic diversion from the existing Laughlin Bridge and the traffic flow pattern in the north remains largely unchanged.

In the 2040 horizon year the Laughlin Bridge is operating at an unacceptable LOS F without or with the Parkway Bridge. The Parkway Bridge is operating at LOS D at 2-lane. Due to the congestion at the existing northern Laughlin Bridge, some traffic may divert to the Parkway bridge which may trigger the need for widening the Parkway Bridge at or beyond 2040. With a 4-lane Parkway Bridge, LOS improves to LOS B due to the added capacity on the Parkway Bridge; however, the model shows very little traffic diversion from the Laughlin Bridge and the traffic flow pattern is unchanged.

Summary

In conclusion, the proposed 2-lane Parkway Bridge would operate at acceptable LOS through the 2040 planning horizon. Consideration of expanding the Parkway Bridge to 4-lanes is necessary sometime around or shortly after 2040. The analysis and conclusions are based on the current socioeconomic growth rates. If the growth occurs at a faster pace than anticipated, the need for 4-lane Parkway Bridge may be warranted sooner than 2040.

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References:

Arizona Department of Administration. 2013. Employment and Population Statistics: Arizona Population.

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<<http://nvdemography.org/data-and-publications/estimates/estimates-by-county-city-and-unincorporated-towns/>>

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Appendix A – Model Validation

[Model Validation documentation in progress]

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