

I-15 Dry Lakes Design Exception - Safety Evaluation

Project No.:	IM-015-2(042)	Project Name:	I-15 Dry Lakes	District:	1
Project Location: (Length)	Logandale Interchange NB	County:	Clark	Design Stage:	Final Design
Type of Analysis:	Pred. - IHSDM	Type of Facility:	Freeway	Analysis years:	2013-2033

SUMMARY

1.1 Project

A truck climbing lane to pass under the Logandale Traffic Interchange as a part of the pavement rehabilitation project is proposed. Standard outside shoulders (10') are not met with the new climbing lane because the bridge piers are too narrow with the current lane configuration. NDOT has proposed narrowing the right shoulder for a short segment as a design variance to the FHWA as a cost effective solution. The AADT for I-15 at this point in 2011 was 18,000 vpd. Improvements are only happening on the northbound side of I-15.

1.2 Alternatives

The proposed alternatives consist of measures to meet the 10 foot shoulder requirement except for Alternative 3, the design exception. Geometry is considered in this analysis and no reflective taping or shoulder narrowing signs are accounted for.

- Alternative 1 – Replace the existing bridge with a new bridge and piers outside the clear zone.
- Alternative 2 – Narrow the median and shift the lanes more to the inside. This will cause the need for a 2000 foot long retaining wall to be constructed and barrier to be added to the inside of the NB lanes in the median.
- Alternative 3 – Narrow the right shoulder to 2 feet for a distance of 30 feet with a taper length of 176 feet narrowing from the existing 10 feet.

Below is the summary of the geometric variations of the three alternatives and the existing condition. All other data is assumed to remain constant.

	Analysis Variables			
	Existing Conditions	Alt. 1	Alt. 2	Alt. 3
		New Bridge	Median Narrowing	Shoulder Narrowing
<i>Left Shoulder Width</i>	4'	4'	4'	4'
<i>Right Shoulder Width</i>	8'	10'	10'	2' for 30 feet and 176' taper
<i>Median</i>	Traversable	Traversable	Non-Traversable	Traversable
<i>Median Width</i>	28'	28'	20'	28'
<i>Median Barrier</i>	SB Only	SB Only	NB and SB	SB Only
<i>Outside Barrier Rt</i>	16' Rt	N/A	10'Rt	2' (Follows Shoulder)
<i>12' Climbing Lane</i>	No	Yes	Yes	Yes

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1.3 Crash Prediction, Reduction and Benefit Cost Ratio

I-15 is considered a freeway facility for the analysis. HSM Freeway Segment chapters were used to predict crashes over a 20 year horizon period. No observed crashes were used in the analysis. A summary of the analysis is seen below.

	2013-2033 Predicted Total Number of Crashes			
	Existing Conditions	Alt. 1	Alt. 2	Alt. 3
		New Bridge	Median Narrowing	Shoulder Narrowing
<i>Total</i>	90.1	85.5	89.5	86.9
<i>Reduction in Total Crashes over Existing Conditions</i>	N/A	4.6	0.6	3.1
<i>Crash Reduction Factor (CRF)</i>	N/A	5.1%	0.7%	3.5%
<i>Total Alternative Cost</i>	N/A	\$2,750,000	\$1,500,000	\$100,000
<i>Total Annual Benefit including 2% Growth per year</i>	N/A	\$25,884	\$3,406	\$17,653
<i>Total Annualized Cost</i>	N/A	\$199,142	\$113,168	\$16,878
<i>Benefit-Cost Ratio</i>	N/A	0.13	0.03	1.05
<i>Average Annual Net Return</i>	N/A	(\$173,258)	(\$109,763)	\$775

1.4 Results

Since the section of roadway for Alternative 3 is so short, the impact over the section of analysis is reduced. The cost of implementing the new barrier and shoulder are estimated at \$100K. At this rate the shoulder improvement is considered to be a cost effective variance to the design standard. The safest alternative is to build a new bridge with no impact to the clear zone, but the Benefit-Cost Ratio at 0.13 is not cost effective due to the high cost of the bridge.