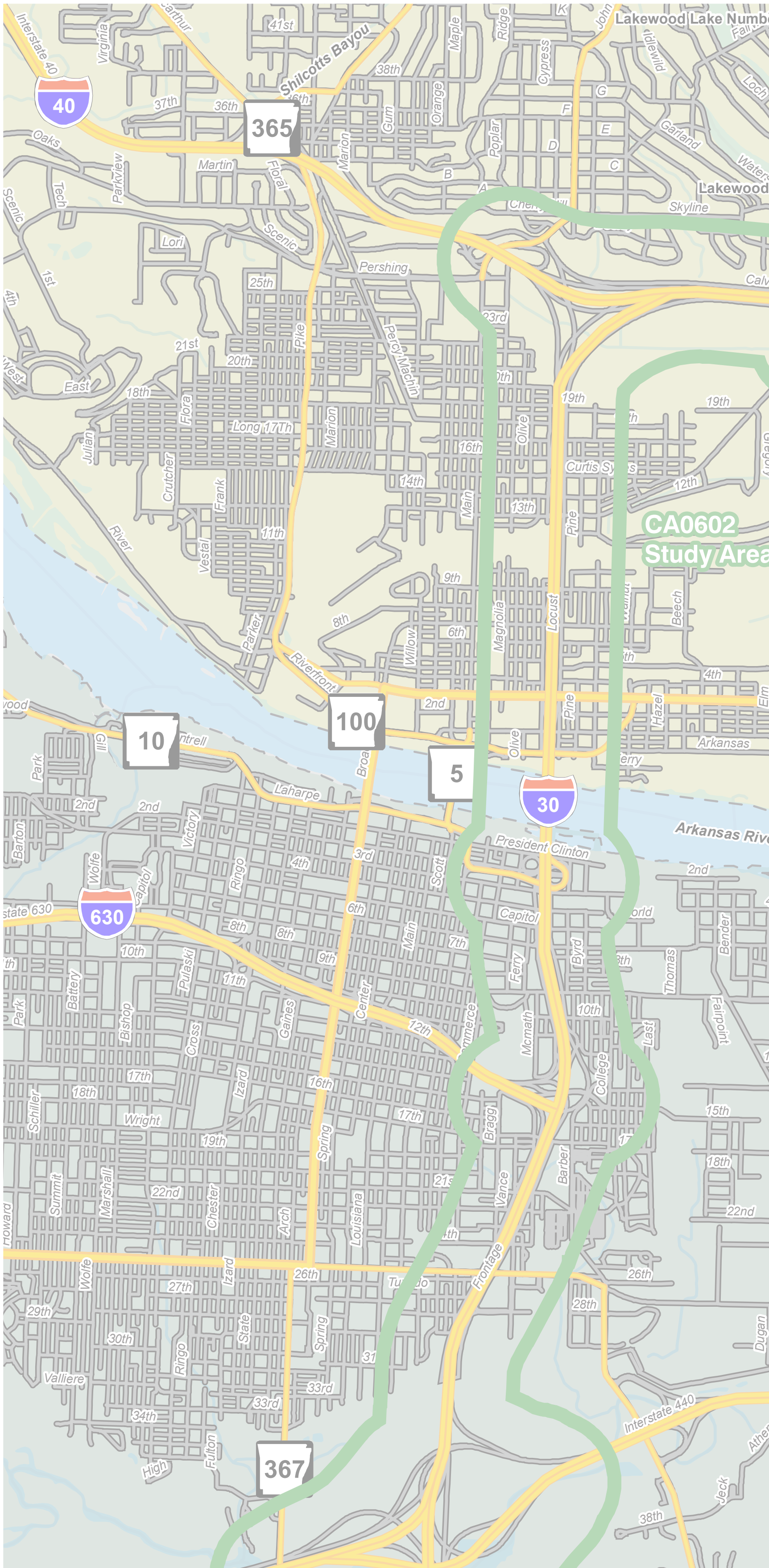

PLANNING AND ENVIRONMENTAL LINKAGES LEVEL 2 SCREENING METHODOLOGY AND RESULTS MEMORANDUM

INTERSTATE 30

CA0602

Interstate 530 – Highway 67

January 2015

CONNECTING ARKANSAS PROGRAM
CAP

Arkansas State Highway & Transportation Department

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1.0 INTRODUCTION

The Arkansas Highway and Transportation Department is conducting the Interstate 30 (I-30) Planning and Environmental Linkages (PEL) Study to identify the purpose and need for improvements within the I-30 PEL study area, determine possible viable alternatives for a long-term solution, and recommend alternatives for further evaluation. The study team, with public and agency input, developed the *I-30 PEL Study Purpose and Need Report* (**Appendix A**), which identified the purpose and need for the project, along with the goals of the study. The team then developed the *I-30 PEL Universe of Alternatives* (**Appendix D-1**), which contains a wide range of possible solutions to the issues in the study corridor identified in the purpose and need and the study goals.

The *I-30 PEL Study Alternative Screening Methodology (ASM)* (**Appendix D-2**) describes the measures and the scoring system utilized to evaluate the alternatives in a tiered screening process as described below:

- **Level 1** is a qualitative screening of the Universe of Alternatives based on the purpose and need. Those alternatives that passed Level 1 Screening were advanced to Level 2 as Preliminary Alternatives. Details of Level 1 Screening are documented in the *I-30 PEL Level One Screening Methodology and Results Memorandum* (**Appendix D-3**)*.*
- **Level 2** is primarily a qualitative screening (with some quantitative analysis) of the Preliminary Alternatives based on the study goals, which produced the Reasonable Alternatives.
- **Level 3** is a quantitative screening of the Reasonable Alternatives based on the study goals. Level 3 Screening will result in a recommended solution(s) which will be advanced for further development/study during the subsequent National Environmental Policy Act (NEPA) study.

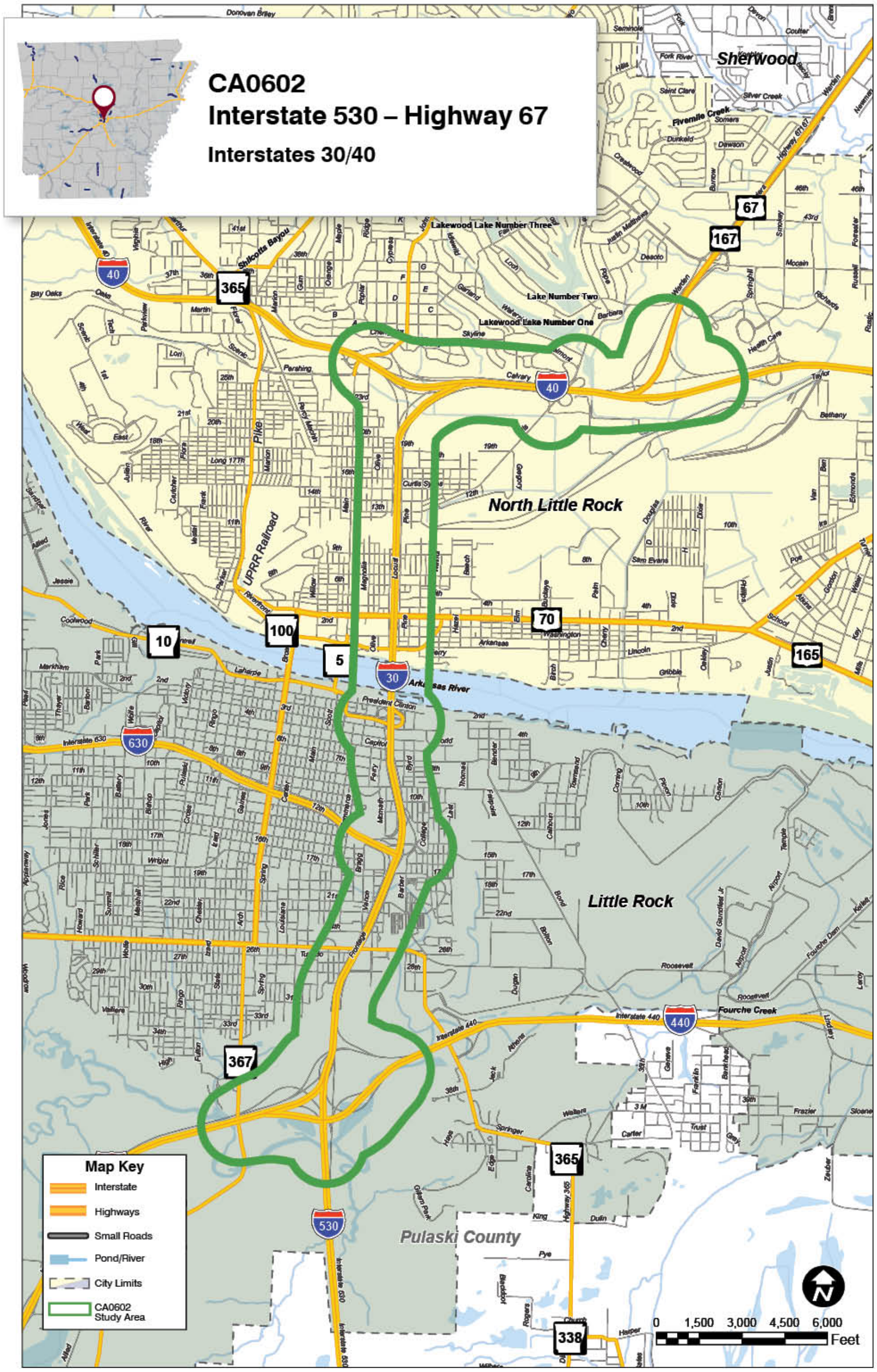
The documents and analysis previously produced that were relied upon for the development of the Level 2 Screening include:

- *I-30 PEL Purpose and Need Report* (**Appendix A**)*;*
- *I-30 PEL Universe of Alternatives* (**Appendix D-1**) *;*
- *I-30 PEL Alternative Screening Methodology* (**Appendix D-2**)*; and*
- *I-30 PEL Level 1 Screening Methodology and Results Memorandum* (**Appendix D-3**).

This document presents the results of the Level 2 Screening process.

The proposed I-30 PEL study area is located in central Arkansas and stretches approximately 6.7 miles through Little Rock and North Little Rock. The study area begins at Interstate 530 (I-530) in the south and extends to Interstate 40 (I-40) in the north, and along I-40 eastwardly to its interchange with United States Highway 67 (Hwy. 67) in North Little Rock as shown in **Figure 1**.

Figure 1. I-30 PEL Study Area



2.0 LEVEL 2 ALTERNATIVE SCREENING METHODOLOGY AND RESULTS

Level 2 Screening analyzed the Preliminary Alternatives, which passed the fatal flaw screening based on the purpose and need in Level 1. In Level 2, qualitative (and some quantitative) criteria were utilized to evaluate and screen the Preliminary Alternatives against the study goals in a two-step process. In Level 2A, the Preliminary Alternatives were screened individually against the study goals. In Level 2B, the remaining Preliminary Alternatives were grouped and screened as multimodal *Basic Scenarios.*

For most measures, alternatives were rated on how well they were able to achieve the study goals using the scale presented in **Table 1**.

Table 1. Qualitative Rating System

Rating	Evaluation
+ +	Substantial positive effects
+	Some positive effects
O	Neutral effects
–	Some negative effects
– –	Substantial negative effects

After ratings were assigned for each measure, scores for each alternative were tallied according to the values in **Table 2**.

Table 2. Scoring System

Rating	Score
+ +	2
+	1
O	0
–	-1
– –	-2

One variation from the above methodology relates to the assessment of potential direct impacts to Environmental Justice/Limited English Proficiency (EJ/LEP) populations. For this measure, the following questions were asked for each alternative:

- **Question 1:** Are EJ/LEP populations present in the study area?
- **Question 2:** Is there a potential for adverse direct impacts to EJ/LEP populations?
- **Question 3:** Is there a potential for beneficial impacts and/or mitigation to offset direct adverse impacts to EJ/LEP populations?

“Yes” or “No” answers were determined for each question; and scores associated with the “Yes” and “No” answers were dependent on the anticipated degree of potential impacts. For example, a response of “Yes” to Question 2 would receive a negative rating and the score would be dependent on the number of potential displacements in census areas reporting EJ/LEP populations. Additional explanation about the methodology, rating and scoring system for the EJ/LEP measure, as well as other environmental measures, is included in **Attachment D**.

2.1 Level 2A Screening

In Level 2A, Preliminary Alternatives were evaluated individually to determine those most capable of meeting the study goals.

Because Level 2A was mostly a qualitative screening process, the ratings given were based on assumptions. Assumptions used in the analysis are presented in **Table 3** below. These assumptions drive the results of the analysis, so any changes could affect the results.

After evaluating each alternative against the screening criteria, the scores were totaled and compared to other alternatives within the respective groupings identified in **Table 4** (Highway Build, Bridge, Other Modes, Congestion Management, and Non-Recurring Congestion) in order to allow the best in each group to emerge. The matrix presented in **Table 4** shows the ratings for each alternative against each of the Level 2A Screening criteria, based on the study goals. For the Level 2A Screening, the No Action Alternative was considered to be the baseline condition and all Preliminary Alternatives were scored in comparison to the No Action Alternative.

Table 3. Level 2A Screening Assumptions

<table>
<tr><th colspan="2">Alternatives</th><th>Mobility</th><th>Safety</th><th>Cost</th><th>Environmental [1]</th></tr>
<tr><td rowspan="5">Action Alternatives</td><td>Highway</td><td colspan="2" rowspan="5">• Impacts analyzed in the PEL study area.
• Only peak hour benefits were analyzed.
• Used Metroplan’s Travel Demand Model to determine the change in travel demand with varying number of through lanes.
• Bypass was assumed to be at Chester Street.
• CATA 10-Year Strategic Plan was used.
• I-30 PEL Transit Analysis was used (see Attachment B).
• Arterial bus lane and Bus Rapid Transit would remove a general purpose lane during peak hours as a starting point to maximize their benefits. Buses could use a shared lane but benefits would be compromised.
• Managed lane was assumed to be barrier separated and tolled.
• Ramp meter assumed to include a queue bypass lane for buses.
• Non-recurring congestion assumed off-peak hour benefits.
• Either of the Arkansas River Bridge alternatives, replacement or rehabilitation, would require complete reconstruction of the approaches. Therefore, either option would offer the opportunity for better east-west connectivity near the river.</td><td rowspan="2">• Conceptual ROW and utility costs to AHTD were assumed to increase as the roadway/bridge width increased.</td><td rowspan="5">• The qualitative rating system described in Tables 1 and 2 were utilized for all the environmental measures, except EJ/LEP, which utilized the qualitative scale described in Attachment D, Table D-2.
• Because potential direct impacts to environmental resources were evaluated based on the anticipated footprints of the Preliminary Alternatives, impacts were generally assumed to be neutral (“0”) if additional ROW was not anticipated for all environmental measures.
• If additional ROW was anticipated, potential for displacements was assumed.
• If added capacity is anticipated, noise impacts were assumed.
• EJ/LEP rated based on the anticipated level of potential impacts to the following three questions:
1. Are EJ/LEP populations present within the study area?
2. Is there a potential for adverse direct impacts to EJ/LEP populations? Note: If additional ROW was anticipated and EJ/LEP populations were determined present in the study area, then the potential for displacements (adverse impacts) was assumed.
3. Is there a potential for beneficial impacts and/or mitigation to offset any potential adverse impacts to EJ/LEP populations (e.g., improved mobility, safety, community cohesion, etc.)? Note: Given that all of the Preliminary Alternatives would be designed to either improve mobility, safety, other transportation modes, community cohesion, etc., all of which would be beneficial to all populations, including EJ/LEP, then the potential for beneficial impacts or the ability to mitigate for adverse direct impacts to EJ/LEP populations was assumed.
Attachment D provides details related to the EJ/LEP screening methodology.
• For alternatives without a general footprint or potential location, one of the following was assumed when assessing impacts to environmental measures only:
1. Alternative has not yet been designed to a level of detail allowing for the assessment of potential environmental impacts (e.g., interchange improvements) – more detailed design to occur in Level 3; or
2. Alternative is likely to be designed and implemented by others (e.g., improvements to detour routes); and the location will likely be determined by the implementing agency.
For both categories, it is difficult to determine the nature (beneficial or adverse) and level/severity of potential environmental impacts, thus impact to environmental measures scored neutral (“0”).</td></tr>
<tr><td>I-30 Arkansas River Bridge</td></tr>
<tr><td>Other Modes</td><td>• Other mode costs were based on similar projects.</td></tr>
<tr><td>Congestion Management</td><td>• Costs for alternatives that increased roadway width were considered more substantial than those that were technology based.</td></tr>
<tr><td>Non-recurring Congestion</td><td>• Costs for alternatives requiring some roadway construction were considered moderate.</td></tr>
</table>

[1] *See **Attachment D** for additional details on the screening of environmental measures, including EJ/LEP.*

Table 4. Level 2A Screening Matrix

Goals	Enhance Mobility			Access to Downtown		East -West Connectivity		Bicycle/ Pedestrian	Accommodate Transit	System Reliability		Minimize Roadway Disruptions	Minimize River Disruptions		Improve Safety					Opportunity for Economic Development	Optimize Cost				Community Impacts[1,2]					Cultural Resource Impacts[1,2]		Biological Resource Impacts[1,2]			Other Impacts[1,2]		Commitment to Voters	Public / Agency Input	
Measures[3] / Alternatives	Mobility in PEL Study Area	Total travel time savings	Average peak hour travel speed through corridor	Mobility of key intersections within PEL Study Area	Travel time to key destinations in PEL Study Area	Locations allowing for local street connectivity	Designs allowing for open spaces across I-30	Grade separated bike / ped accommodations across I-30	Transit ridership in the PEL Study Area	Potential accident reductions	Emergency Vehicle Travel Time	Severity of I-30 lane closures, detours during construction	Severity of river closures during construction	Location of navigational impediments (Bridge Piers)	I-30 mainline conflict points in weaving / merge / diverge areas	Number of ramps per mile on I-30 in the study area	Ramp acceleration and deceleration lengths	I-30 Roadway and bridge structural conditions	Arterial connection conflict points	Access to existing / potential business sites within the PEL Study Area	Total conceptual cost to AHTD	Total cost of ROW acquisition	Impact to major utilities and infrastructure	Total investment required by others	ROW / parcels / structures potentially directly impacted	Potential Displacements	Are EJ/LEP populations present in the study area?	Is there a potential for adverse direct impacts (displacements) to EJ/LEP populations?[6]	Is there potential for beneficial impacts and/or mitigation to offset any potential adverse effects to EJ/LEP populations (e.g., improved mobility, safety, community cohesion, etc.)?[6]	Recorded archaeological sites potentially directly impacted	NRHP or NRHP-eligible sites potentially directly impacted	Potential direct park impacts	Potential direct surface water crossings, wetlands impacts	Potential direct impacts to listed and non-listed species and/or habitat, and rare locally important species	High risk hazardous material sites potentially directly impacted	Potential noise impacts	Mobility on I-30 Main Lane	Meeting comments and local resolutions	SCORE
Highway - Build																																							
Main Lane Widening	++	++	++	-	++	0	0	0	-	0	++	-	0	0	0	0	0	+	0	+	- -	-	-	0	-	-	yes	yes	yes	0*	0*	0*	-	-	0*	-	++	+	3
Main Lane Pavement Rehabilitation	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	++	0	0	0	0	0	0	0	0	yes	no	yes	0	0	0	0	0	0	0	+	+	5
Collector/Distributor (C/D) Roads	+	+	+	-	+	0	0	0	0	+	+	+	0	0	++	0	+	0	0	+	-	-	-	0	-	-	yes	yes	yes	0*	0*	-	-	-	0*	-	+	+	3
Auxiliary Lanes	+	+	+	0	+	0	0	0	0	+	+	0	0	0	+	0	++	0	0	+	-	0	0	0	0	0	yes	no	yes	0	0	0	0	0	0	0	+	+	13
Frontage Road Improvements	+	+	+	+	+	0	0	0	0	+	+	+	0	0	0	0	0	0	+	+	-	-	0	0	-	-	yes	yes	yes	0*	0*	0*	0*	0*	0*	-	+	+	7
Intersection Improvements	+	+	+	++	+	+	+	0	0	+	+	0	0	0	0	0	0	0	+	+	-	-	-	0	-	-	yes	yes	yes	0*	0*	0*	0*	0*	0*	-	+	+	8
Interchange Improvements	++	+	+	++	+	+	+	+	-	++	+	-	0	0	0	0	0	+	+	+	-	-	-	0	-	-	yes	yes	yes	0*	0*	0*	-	-	0*	-	++	+	9
Ramp Consolidation / Elimination	+	+	+	0	+	+	+	0	0	++	+	0	0	0	++	++	+	0	++	- -	-	0	0	0	0	0	yes	yes	yes	0*	0*	0*	0*	0*	0*	0*	+	++	16
Roadway Shoulder Improvements	+	+	+	0	+	0	0	0	0	+	+	-	0	0	0	0	+	0	0	0	-	0	0	0	0	0	yes	no	yes	0	0	0	0	0	0	0	+	+	9
Horizontal / Vertical Curve Improvements	+	+	+	0	+	0	0	0	0	+	+	- -	0	0	0	0	0	0	0	0	-	0	0	0	0	0	yes	no	yes	0	0	0	0	0	0	0	+	+	7
Bottleneck Removal	+	+	+	0	+	0	0	0	0	+	+	-	0	0	0	0	0	0	0	+	-	0	0	0	0	0	yes	no	yes	0	0	0	0	0	0	0	+	+	9
Bypass Route	+	+	+	-	+	0	0	0	0	0	+	+	-	0	0	0	0	0	0	0	0	-	-	- -	-	-	yes	yes	yes	0*	0*	-	-	-	0*	-	0	+	-5
I-30 Arkansas River Bridge																																							
Rehabilitation	++	++	++	0	++	+	+	+	-	0	+	-	- -	- -	0	0	+	+	0	+	- -	- -	- -	0	- -	-	yes	yes	yes	0*	0*	-	-	-	0*	-	++	- -	-4
Replacement	++	++	++	0	++	+	+	+	-	0	++	-	-	++	0	0	+	++	0	+	- -	- -	- -	0	- -	-	yes	yes	yes	0*	0*	-	-	-	0*	-	++	++	7
Other Modes																																							
Arterial Bus Transit	+	0	0	+	0	0	0	0	+	0	0	0	0	0	0	0	0	0	0	+	0	0	0	-	0	0	yes	no	yes	0	0	0	0	0	0	0	0	++	7
I-30 Express Bus Transit	+	+	+	+	+	0	0	0	++	+	+	0	0	0	0	0	0	0	0	+	0	0	0	-	0	0	yes	no	yes	0	0	0	0	0	0	0	0	++	13
Bus on Shoulder	+	+	+	+	+	0	0	0	++	0	+	0	0	0	0	0	0	0	0	+	-	0	0	0	0	0	yes	no	yes	0	0	0	0	0	0	0	0	++	12
Arterial Bus Lanes	+	0	0	+	+	0	0	0	+	0	+	0	0	0	0	0	0	0	0	+	0	0	0	-	0	0	yes	no	yes	0	0	0	0	0	0	0	0	0	7
Arterial Bus Rapid Transit	+	0	0	+	+	0	0	0	+	0	+	0	0	0	0	0	0	0	0	+	0	0	0	-	0	0	yes	no	yes	0	0	0	0	0	0	0	0	+	8
Light Rail (Street Car)	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0	0	0	0	+	0	-	-	- -	-	-	yes	yes	yes	0*	0*	0*	0*	0*	0*	-	0	+	-4
Commuter Rail	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	- -	0	0	yes	yes	yes	0	0	0	0	0	0	0	0	0	-3
Bicycle / Pedestrian	+	0	0	0	0	0	0	++	+	+	0	0	0	0	0	0	0	0	++	+	-	0	0	-	0	0	yes	no	yes	0	0	0	0	0	0	0	0	++	10
Congestion Management																																							
Information Systems / Advanced Traveler Information	+	+	+	+	+	0	0	0	+	+	+	0	0	0	0	0	0	0	0	+	-	0	0	0	0	0	yes	no	yes	0	0	0	0	0	0	0	+	+	12
Managed Lanes	+	+	+	-	+	0	0	0	+	0	+	-	0	0	-	0	0	0	0	+	- -	-	-	0	-	-	yes	yes	yes	0*	0*	0*	-	-	0*	-	+	0	-4
Reversible Lanes	+	+	+	0	+	0	0	0	-	0	+	-	0	0	-	0	0	0	0	+	- -	-	-	0	-	-	yes	yes	yes	0*	0*	0*	-	-	0*	-	+	+	-4
Ramp Metering	+	+	+	0	+	0	0	0	+	+	+	0	0	0	0	0	0	0	0	+	-	0	0	0	0	0	yes	no	yes	0	0	0	0	0	0	0	+	+	11
Hard Shoulder Running	+	+	+	0	+	0	0	0	-	-	- -	-	0	0	-	0	+	0	0	+	-	0	0	0	-	-	yes	no	yes	0*	0*	0*	0*	0*	0*	-	+	0	-1
Travel Demand Management (TDM)	+	+	+	+	+	0	0	0	+	+	+	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	yes	no	yes	0	0	0	0	0	0	0	+	+	13
Transportation System Management (TSM)	+	+	+	+	+	0	0	0	0	+	++	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	yes	no	yes	0	0	0	0	0	0	0	+	+	13
Wayfinding / Signage	+	+	+	+	+	0	0	0	0	+	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	yes	no	yes	0	0	0	0	0	0	0	+	+	11
Arterial Improvements	+	0	0	+	+	+	0	0	0	+	+	0	0	0	0	0	0	0	++	+	0	-	-	-	-	-	yes	yes	yes	0*	0*	0*	0*	0*	0*	-	0	+	4
Land Use Policy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	- -	0	0	yes	yes	yes	0	0	0	0	0	0	0	- -	0	-4
Non-Recurring Congestion																																							
Crash Investigation Sites	+	+	+	+	+	0	0	0	0	+	+	0	0	0	-	0	0	0	0	+	-	0	0	0	0	0	yes	no	yes	0	0	0	0	0	0	0	+	+	10
Roadside / Motorist Assist Enhancements	+	+	+	+	+	0	0	0	0	+	+	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	yes	no	yes	0	0	0	0	0	0	0	+	+	12
Improvements to Detour Routes	+	+	+	+	+	0	0	0	0	+	+	+	0	0	0	0	0	0	+	+	-	-	-	-	-	-	yes	yes	yes	0*	0*	0*	0*	0*	0*	-	+	+	5
Variable Speed Limits (Speed Harmonization)	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	yes	no	yes	0	0	0	0	0	0	0	+	+	5
Queue Warning	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	yes	no	yes	0	0	0	0	0	0	0	+	+	5

Legends:

Shaded alternatives were eliminated in Level 2A

Color Codes for Measures	
(blue)	Mobility
(pink)	Safety
(peach)	Cost
(green)	Environmental

Scoring Legend	
++	Substantial Positive Effects
+	Some Positive Effects
0	Neutral Effects
-	Some Negative Effects
- -	Substantial Negative Effects

[1]Potential direct impacts to environmental resources evaluated based on anticipated footprints of the alternatives.

*[2] See **Attachment D** for additional details on the environmental screening scoring and methodology for environmental measures, including EJ/LEP.*

[3] Measures used to evaluate alternatives in Level 2 screening are defined in the accompanying document CA0602 PEL Alternative Screening Methodology.

**Score of neutral "0" assigned because at this level of screening, the nature (beneficial or adverse) and level/severity of potential direct environmental impacts is difficult to determine due to 1) the alternative has not yet been designed to a level of detail allowing for assessment of potential direct environmental impacts (e.g., intersection improvements) and more detailed design will occur during the Level 3 analysis; OR 2) the alternative will likely be designed and implemented by others (e.g., improvements to detour routes) and the location/alternative footprint will be determined by the implementing agency. Applies to environmental measures only.*

2.2 Level 2A Screening Results

2.2.1 Level 2A Categories

The Level 2A Screening resulted in the alternatives being grouped into three categories:

1. **Alternatives Screened Out from Further Study -** Defined as those alternatives that did not adequately address the goals of the study due to negative environmental impacts, costs, difficulties from an engineering standpoint such as geometric issues or constructability, and not meeting the mobility or safety goals. Alternatives that scored zero (0) or less in Level 2A were screened out from further consideration.

2. **Primary Alternatives -** Defined as those alternatives considered to have the potential to substantially address the study goals as stand-alone alternatives. The Primary Alternatives were the Highway Build main lane widening, C/D roads, interchange improvements and Arkansas River Bridge replacement.

3. **Complementary Alternatives -** Defined as those alternatives that when combined with the Primary Alternatives address the study goals. The Complementary Alternatives were the Highway Build (other than main lane widening and interchange improvements), Other Modes, Congestion Management, and Non-Recurring Congestion alternatives.

2.2.2 Alternatives Screened Out From Further Study

The following alternatives were screened out from further consideration.

Highway Build

- **Bypass Route** – Metroplan’s Travel Demand Model runs showed that the addition of a bypass route would reduce peak hour traffic on I-30 by approximately 3.5%. This alternative was screened out due to the moderate reduction in I-30 traffic, environmental impacts (e.g., anticipated ROW impacts; potential displacements; and potential park, surface waters, and habitat impacts associated with a new Arkansas River Bridge crossing), and lack of a dedicated funding source identified in the Metroplan Long Range Metropolitan Transportation Plan (LRMTP).

I-30 Arkansas River Bridge

- **Rehabilitation** – As shown in **Table 4**, poor scoring in categories related to structural condition, project cost, and navigational impediments resulted in the elimination of the Arkansas River Bridge rehabilitation alternative from further consideration.

With the rehabilitation alternative, necessary repairs to the existing main river pier foundations would be costly and would result in further restriction of the navigation span and frequent closure to navigation traffic during construction. Because of the extent of existing and anticipated fatigue cracking, replacing all of the existing approach bridge spans and supports in their entirety would be necessary, further adding significant cost. Cracking and spalling present in the existing bridge deck may be indicators that the deck concrete is near the limits of its useful life, therefore, it would be prudent to consider future replacement of the deck, further adding to life-cycle costs. Implementing other repairs or measures to eliminate the fracture critical status[1], to retrofit for increased seismic resistance, and to increase the navigational clearance are neither cost effective nor feasible.

The anticipated service life of a typical bridge, when designed, is between 50 and 75 years. If all feasible repair and modifications were made to the existing I-30 Bridge, it can be assumed that the bridge would perform adequately for its remaining service life – approximately 20 to 25 years. However, concerns regarding the lack of redundancy[1] inherent in a two-girder and pin-and-hanger system, the poor functionality resulting from narrow shoulder widths, and the inadequate seismic capacity and navigational clearance would remain.

In response to letters from AHTD (letter date December 3, 2013) notifying the United States Army Corps of Engineers (USACE) and the United States Coast Guard (USCG) that either widening or replacement of the I-30 Bridge were planned as part of the overall I-30 project, and seeking their respective input on these construction options, the USACE (letter date January 10, 2014) noted their concern that the existing pier bisecting the channel creates a problem aligning tow barges; and the USCG (letter date January 29, 2014) recommended replacing the existing bridge with a new structure that provides a minimum horizontal navigation opening of at least 320.0 feet and minimum vertical clearance of 63.0 feet (above normal pool stage). The USCG also noted that any reduction of the existing horizontal clearance of the left descending channel (preferred navigation span) would be unacceptable unless otherwise approved by the USCG. As mentioned above, the rehabilitation option would result in further restriction of the navigation span. Additionally, in an August 21, 2014 letter to AHTD, the Arkansas Waterways Commission recommended similar horizontal and vertical clearances as the USCG and removal of the existing pier dividing the navigation channel. Bridge rehabilitation would not address the cited concerns of the USACE, USCG and Arkansas Waterways Commission.

[1] The two girder system in the main river span, the pin-and-hangers at the ends of the suspended spans, and the steel bent caps in the approach spans of the I-30 Arkansas River Bridge have been designated as “fracture critical” elements in accordance with the National Bridge Inspection Standards. A fracture critical element is defined as any element whose failure would cause whole or partial collapse. Collapse following fracture of these elements is possible because of the inability to transfer load to other supporting elements, also known as a lack of redundancy.

Attachment A-1 provides a detailed summary of the condition of the existing I-30 Bridge and further discussion regarding the disadvantages of a rehabilitation option. The referenced AHTD, USACE, USCG and Arkansas Waterways Commission correspondence letters are provided in **Attachment A-2**.

Other Modes

- **Light Rail (Street Car)** – The Central Arkansas Transit Authority (CATA) Strategic Plan (10-year plan) does not include light rail improvements. Light Rail is part of CATA's long range plan; however, CATA has indicated that they would implement Bus Rapid Transit (BRT) before implementing Light Rail along future Light Rail corridors. This alternative was screened out as a result of CATA not including light rail in their 10-year Strategic Plan and the lack of a dedicated funding source identified in the Metroplan LRMTP. Metroplan modeled Light Rail under the category of Fixed Guideway which included both Light Rail and Commuter Rail and found that together under the most aggressive "Supportive" land use policy, fixed guideway attracts approximately 6,400 person trips.

- **Commuter Rail** – The CATA Strategic Plan (10-year plan) does not include commuter rail, nor is it included in CATA's long range plan. This alternative was screened out as a result of CATA not including commuter rail in any of their future planning documents and the lack of a dedicated funding source identified in the Metroplan LRMTP. Metroplan modeled Light Rail under the category of fixed guideway which included both Light Rail and Commuter Rail and found that together under the most aggressive "Supportive" land use policy, fixed guideway attracts approximately 6,400 person trips.

Congestion Management

- **Managed Lanes** – This alternative was screened out due to the increase in conflict points in weaving areas, the high initial cost given the lack of an existing managed lane system, the continued operational costs, and potential negative impact to low-income populations given the added monetary cost for use of these lanes.

- **Reversible Lanes** – This alternative was screened out due to high initial cost, continued operational cost, increased conflict points in the weaving areas, and ROW requirements.

- **Hard Shoulder Running** – This alternative was screened out due to potential safety impacts resulting from interference with emergency vehicles and conflict with the Bus on Shoulder transit option, which CATA identified as a preferential congestion management alternative for possible future implementation.

- **Land Use Policy** – The region's adopted land use policies are incorporated into the Metroplan regional transportation models and are represented as the

"Emerging Trend", also considered the *Base* land use condition. Metroplan also modeled a "Supportive" land use trend which represents substantial land use policy changes that would support increased transit such as commuter rail, light rail, and local bus transit service. This alternative would not result in near-term benefits to the I-30/I-40 facility, nor does it meet a study goal to "follow through on commitment to voters to improve I-30 as part of the CAP." Elimination of this alternative does not mean that land use is not important to the corridor or region, but that it is not considered to be a main solution for addressing safety, mobility and associated roadway deficiencies along I-30/I-40. Land use has been and will continue to be a component of the stakeholder led visioning workshops throughout the PEL and NEPA phases of project development. Future plans through the visioning workshops, such as providing connectivity across I-30 and ensuring access and mobility to support existing and planned development, will be coordinated with city planners.

2.2.3 Primary Alternatives

The following were advanced as Primary Alternatives due to their potential to substantially address the study goals as stand-alone alternatives.

Highway-Build

- **Main Lane Widening** – This alternative includes the addition of lanes to the existing interstate main lanes, which is one of the most common methods used to increase roadway capacity.

- **Collector/Distributor (C/D) Roads** – This alternative includes the addition of lanes, separated from the main lanes by a barrier, to facilitate efficient traffic movement into and out of the downtown areas with minimal disruption to through traffic.

- **Interchange Improvements** – This alternative includes improvements to highway connections that allow travelers to move from one route to another without directly crossing any other traffic stream.

I-30 Arkansas River Bridge

- **Replacement** - This alternative includes construction of a new I-30 Bridge. The design and construction of a full replacement structure would adhere to current standards and codes and structural and functional deficiencies would not be present in the new structure. The navigation clearances and alignment would meet current Coast Guard standards and barge operator preferences, and the "design life" of the structure would be equal to or in excess of 75 years. The seismic resistance would meet current code and the bridge would provide preferred levels of redundancy eliminating the fracture critical classification present in a rehabilitation option. With full replacement there would be a new wider deck with safer barriers providing the maximum desired functionality.

Main lane widening and bridge replacement were included in the Basic Scenarios and further evaluated in Level 2B Screening. Specific interchange improvements will be reflected in each reasonable alternative that will be evaluated in Level 3 after interchange locations and configurations have been identified.

2.2.4 Complementary Alternatives

The following were advanced to Level 2B Screening as Complementary Alternatives.

Highway – Build - These alternatives will be incorporated as needed into the new I-30 facility designs to improve mobility and meet current design standards.

- Main Lane Pavement Rehabilitation
- Auxiliary Lanes
- Frontage Road Improvements
- Intersection Improvements
- Ramp Consolidation/Elimination
- Roadway Shoulder Improvements
- Horizontal/Vertical Curve Improvements
- Bottleneck Removal

Other Modes – These alternatives were advanced and evaluated separately to determine the amount of traffic that would be diverted or attracted from/to I-30 by other modes. Then the group of alternatives were evaluated to determine the total improvement in peak hour mobility that could be expected from their implementation.

- Arterial Bus Transit
- I-30 Express Bus Transit
- Bus on Shoulder
- Arterial Bus Lanes
- Arterial Bus Rapid Transit
- Bicycle/Pedestrian

Congestion Management – These alternatives were advanced and evaluated as a group to determine the total improvement in peak hour mobility that could be expected from their implementation.

- Information Systems/Advanced Traveler Information
- Ramp Metering
- Travel Demand Management (TDM)
- Transportation System Management (TSM)
- Wayfinding/signage
- Arterial Improvements

Non-Recurring Congestion – These alternatives were advanced and evaluated as a group to determine the total improvement in mobility that could be expected from their implementation.

- Crash Investigation Sites
- Roadside/Motorist Assist Enhancements
- Improvements to Detour Routes
- Variable Speed Limits (Speed Harmonization)
- Queue Warning

2.3 Level 2B Screening

In Level 2B, the remaining alternatives were grouped to form Basic Scenarios for further evaluation.

2.3.1 Basic Scenarios

The Basic Scenarios were developed to evaluate a reasonable range of combinations of Primary and Complementary Alternatives. The Primary Alternatives by definition have the most direct ability to meet the goals and objectives of the project, so varying the specifics of the Primary Alternatives in the Basic Scenarios provides the most insight into that scenario's overall performance. Thus, Basic Scenarios were developed based upon the number of lanes throughout the I-30 corridor, including 6, 8, 10, and 12-lane options. Because I-30 is a 6-lane facility currently, the 6-Lane Basic Scenario would not add any additional main lane capacity.[2] The 8-lane Basic Scenario adds one additional lane in each direction, the 10-lane Basic Scenario adds two additional lanes in each direction, and the 12-lane Basic Scenario adds 3 lanes in each direction. In addition, the I-30 Bridge Replacement was included in all Basic Scenarios, with the overall width of the bridge replacement driven by the number of main lanes in the scenario. Interchange Improvements were also identified as a Primary Alternative. However, to focus the analysis on the number of main lanes and the bridge replacement across the Arkansas River, interchange improvements were not evaluated in Level 2. Interchange improvements and options will be further developed and evaluated as part of Level 3.

The Basic Scenarios as described above were further defined for analysis by adding the remaining Complementary Alternatives. The Basic Scenarios represent complete transportation solutions that incorporate other modes and the latest technologies with highway build improvements to develop comprehensive transportation scenarios for analysis. The compilation of these Basic Scenarios is illustrated in **Figure 2** and further described below.

[2] Assumed that the 6-lane facility would occur within the existing project footprint and that bridge replacement would occur on the existing project centerline. However, should it be determined that the bridge replacement needs to be constructed to the east or west of the existing centerline to maintain traffic flow resulting in a change to the project footprint, adverse direct impacts to environmental measures would be anticipated.

Figure 2. Level 2B Basic Scenarios

Basic Scenarios

Primary

Basic Scenarios*									
6-Lane Scenario	8-Lane Scenario				10-Lane Scenario			12-Lane Scenario	
6-Lane Scenario (No-Main Lane Widening	3 GP Lanes + 1 Main Lane Widening (each direction)		3 Main Lanes + 1 C/D Lane Widening (each direction)		3 Main Lanes + 2 Lane Widening (each direction)		3 Main Lanes + 2 C/D Lane Widening (each direction)	3 Main Lanes + 3 Main Lanes (each direction)	
	West	East	West	East	West	East		West	East
No additional lanes	Main Lane Widening		Collector/Distributor (C/D) Roads		Main Lane Widening		Collector/Distributor (C/D) Roads	Main Lane Widening	

* All complementary alternatives were evaluated as a group within each scenario, with the exception of Main Lane Widening and C/D Roads. Main lane and C/D Roads were evaluated as either/or scenarios due to their substantial differences in ROW requirements and ability to affect mobility. Interchange improvements and I-30 Bridge Replacement are part of each scenario.

Complementary

Highway Build

- Ramp consolidation/elimination
- Intersection improvements
- Bottleneck removal
- Auxiliary lanes
- Roadway shoulder improvements
- Frontage road improvements
- Mainline pavement rehabilitation
- Horizontal/vertical curve improvements

Congestion Management

- Travel demand management
- Information systems/advanced traveler information
- Transportation system management (TSM)
- Wayfinding/signage
- Arterial improvements
- Ramp metering

Other Modes

- I-30 express bus transit
- Bus on shoulder
- Bicycle/pedestrian
- Arterial bus transit
- Arterial bus rapid transit
- Arterial bus lanes

Congestion Management

- Crash investigation sites
- Roadside/motorist assist enhancements
- Improvements to detour routes
- Variable speed limits (speed harmonization)
- Queue warning

As shown in **Figure 2**, the 6-Lane Basic Scenario (no main lane widening) was developed with the I-30 Arkansas River Bridge Replacement and remaining Complementary Alternatives (those that passed Level 2A Screening) in an effort to achieve the study goals without adding lanes to the existing roadway.

Also shown in **Figure 2**, the 8, 10, and 12-lane Basic Scenarios were developed with the I-30 Arkansas River Bridge Replacement and the remaining Complementary Alternatives. However, given the agency and public input regarding C/D lanes in lieu of main lanes, the team developed scenarios for each type of capacity addition. A C/D system is a freeway main lane that is separated from the through traffic main lanes. The C/D system provides access to the local service interchanges, thereby eliminating most of the weaving areas from the I-30 main lanes.

In addition, the team tested the same set of Complementary Alternatives with each main lane or C/D scenario. The dependence and relative importance of the Complementary Alternatives is more significant with a fewer number of added main lanes or C/D roads. The ultimate goal is to find the optimal combination of lane widening and Complementary Alternatives to meet the study goals.

For evaluation purposes, the C/D roads were located in the sections of the I-30 facility with heavy traffic moving into and out of the downtown areas. The C/D road for the southbound 10-lane scenario was assumed to begin north of 15th Street in North Little Rock and terminate just south of 6th Street in Little Rock. The C/D road for the northbound 10-lane scenario was assumed to begin south of 6th Street in Little Rock and terminate north of 9th Street in North Little Rock. C/D roads for the 8-lane scenario were assumed to begin near Broadway Street in North Little Rock and terminate south of 6th Street in Little Rock. The addition of C/D roads results in Basic Scenarios with wider footprints than the main lane widening Basic Scenarios (190 feet for the 8-lane C/D compared to 142 feet for the 8-lane with main lane widening, and 214 feet for the 10-lane C/D compared to 166 feet for the 10-lane with main lane widening). Outside the beginning and end points of the C/D system, the roadway would narrow to the same width as the main lane options (142 feet for 8-lanes with main lane widening and 166 feet for 10-lanes with main lane widening). As a result of the beginning and end points of the C/D road, 2 C/D lanes plus auxiliary lanes between interchanges would be required in each direction to serve the demand.

Each widening Basic Scenario, with the exception of the 10-lane C/D Basic Scenario, also has an east and a west option. This represents the location of the bridge replacement, with staged construction of the new bridge beginning to the east or west of the existing bridge. The first stage will include construction of a new structure wide enough to carry at least 6 lanes of traffic, built as closely as possible to the existing bridge while the old bridge is still open to traffic. Once the first stage of the new bridge construction is completed, traffic will be diverted to the new structure and the old bridge will be removed. The remaining portion of the new bridge will then be constructed while traffic remains open on the recently completed section. In this way, the bridge is constructed taking as little ROW as possible, while keeping at least 6 lanes of traffic open at all times. Separate Basic Scenarios (east and west) were created for each lane option due to the different environmental impacts on either side of the bridge. The 10-lane C/D Basic Scenario widens to both sides of the existing bridge location, and therefore does not have an east/west option.

2.3.2 Level 2B Process

Historical growth rates and the CARTS travel demand model were used to estimate 2040 traffic volumes in the study area (existing and forecasted traffic volumes are presented in the *CA0602 Traffic and Forecast Plan*, December 2014, included as part of the project file with AHTD). Analysis was performed to quantify the volume of traffic that could be attracted to or diverted away from I-30 as a result of changes in corridor capacity and Complementary Alternative improvements, such as transit in the study area. These volumes were then added to or subtracted from the projected 2040 volumes to produce modified I-30 traffic demand. The resulting volumes were then used as the basis for a high level evaluation of the various lane scenarios and the impact that C/D roads could provide compared to main lane analysis only. This analysis is only a snapshot at three locations along the corridor and does not take into account downstream queuing or main lane merge, diverge or weaving. The target Level-of-Service (LOS) of D is AHTD's standard for an urban corridor during the peak hour of travel. Additional analyses were completed to measure the Basic Scenarios performance against the alternate performance standard of LOS E as shown on **Attachment C**. Should that standard be adopted by AHTD for this project, the congestion relief related evaluation scoring for the Basic Scenarios will be reconsidered.

The Level 2B Transportation Analysis described above is provided in **Attachment C**.

Impacts to environmental resources were assessed using the general footprint for each Basic Scenario. Utilizing ArcGIS, each footprint was overlaid with the identified environmental constraints of the I-30 PEL study area. Given that many of the Complementary Alternatives would either be implemented by other agencies in the future (e.g., arterial improvements, express bus transit, etc.) or the design has not been fully developed at this level of screening (e.g., intersection improvements, ramp consolidation/elimination, etc.) the footprint and location of many Complementary Alternatives remain unknown. Accordingly, at the Level 2B Screening, all environmental impacts were assessed within the known footprints of the 6-lane, 8-lane, 8-lane C/D, 10-lane, 10-lane C/D, and 12-lane Basic Scenarios, exclusive of interchanges.

Costs for construction, ROW and utilities were assumed to vary proportionately to the width of the typical sections for the alternatives. More detailed cost estimates will be developed in Level 3 when interchange locations, ramp configurations, and cross street layouts are known.

2.3.3 Level 2B Scoring

In Level 2B, the qualitative rating system shown in **Table 1** was used to score each Basic Scenario against the measures established based on the study goals. The measures utilized to evaluate the Basic Scenarios fall into the following 4 groups:

Mobility

1. Mobility in the PEL study area
2. Total travel time savings
3. Average peak hour travel speed through corridor
4. Mobility of key intersections within PEL study area
5. Travel time to key destinations in PEL study area
6. Locations allowing for local street connectivity
7. Designs that allow for open spaces across I-30
8. Grade separated bicycle/pedestrian accommodations across I-30
9. Transit ridership in the PEL study area
10. Severity of I-30 lane closures, detours during construction
11. Severity of river closures during construction
12. Location of navigational impediments (Bridge Piers)
13. Access to existing/potential business sites within the PEL study area
14. Mobility on I-30 main lane

Safety

1. Potential accident reductions
2. Emergency vehicle travel time
3. I-30 main lane conflict points in weaving/merge/diverge areas
4. Number of ramps per mile on I-30 in the study area
5. Ramp acceleration and deceleration lengths
6. I-30 roadway and bridge structural conditions
7. Arterial connection conflict points

Cost

1. Total conceptual cost to AHTD
2. Total cost of ROW acquisition
3. Impact to major utilities and infrastructure
4. Total investment required by others

Environmental

1. Potential direct impacts to ROW/parcels/structures
2. Potential displacements
3. Are EJ/LEP populations present in the study area?
4. Is there potential for adverse impacts to EJ/LEP populations?
5. Is there potential for beneficial impacts and/or reasonable mitigation to offset any potential adverse impacts to EJ/LEP populations?
6. Potential direct impacts to recorded archaeological sites
7. Potential direct impacts to National Register of Historic Places (NRHP) or NRHP-eligible sites
8. Potential direct impacts to parks
9. Potential direct impacts to surface water crossings, wetlands
10. Potential direct impacts to listed and non-listed species and/or habitat, and rare locally important species
11. Potential direct impacts to high risk hazardous material sites

12. Potential noise impacts
13. Meeting comments and local resolutions

The study team's goal was to ensure an equitable scoring system in Level 2B that gave equal proportionate weighting to the four groups of project measures. However, if the scores for each of the measures were simply added for each alternative, the Safety and Cost groups would have been undervalued due to their low number of measures (7 for Safety and 4 for Cost compared to 14 for Mobility and 13 for Environmental).

In order to give the four groups equal weight, the scores were averaged within each group and then summed for each scenario so that each group provided 25% of the scoring. The resulting scores were then multiplied by 38, the number of measures in the Level 2B analysis.

The scoring process for the 10-Lane C/D scenario is provided below in **Tables 5 – 9** as an example.

Table 5. Example Scoring for Mobility – 10-lane C/D Scenario

	Mobility Measures	**Rating**	**Score**
1	Mobility in PEL Study Area	++	2
2	Total travel time savings	++	2
3	Average peak hour travel speed through corridor	++	2
4	Mobility of key intersections within PEL Study Area	+	1
5	Travel time to key destinations in PEL Study Area	++	2
6	Locations allowing for local street connectivity	+	1
7	Designs that allow for open spaces across I-30	+	1
8	Grade separated bike / pedestrian accommodations across I-30	+	1
9	Transit ridership in the PEL Study Area	+	1
10	Severity of I-30 lane closures, detours during construction	-	-1
11	Severity of river closures during construction	-	-1
12	Location of navigational impediments (Bridge Piers)	++	2
13	Access to existing / potential business sites within the PEL Study Area	++	2
14	Mobility on I-30 main lanes	++	2
	Total		17

Table 6. Example Scoring for Safety – 10-lane C/D Scenario

	Safety Measures	**Rating**	**Score**
1	Potential accident reductions	++	2
2	Emergency vehicle travel time	++	2
3	I-30 main lane conflict points in weaving / merge / diverge areas	+	1
4	Number of ramps per mile on I-30 in the study area	+	1
5	Ramp acceleration and deceleration lengths	++	2
6	I-30 roadway and bridge structural conditions	++	2
7	Arterial connection conflict points	+	1
	Total		11

Table 7. Example Scoring for Cost – 10-lane C/D Scenario

	Cost Measures	Rating	Score
1	Total conceptual cost to AHTD	--	-2
2	Total cost of ROW acquisition	--	-2
3	Impact to major utilities and infrastructure	--	-2
4	Total investment required by others	-	-1
	Total		-7

Table 8. Example Scoring for Environmental – 10-lane C/D Scenario

	Environmental Measures	Rating	Score
1	ROW / parcels / structures impacted	-	-1
2	Displacements	-	-1
3	Are EJ populations present within the I-30 PEL study area?	yes	0
4	Is there a potential for adverse impacts to EJ/LEP populations (e.g., displacements within EJ/LEP areas)?	yes	-1
5	Is there potential for beneficial impacts and/or mitigation to offset any potential adverse effects to EJ/LEP populations (e.g., improved mobility, safety, community cohesion, etc.)?	yes	1
6	Recorded archaeological sites potentially impacted	O	0
7	NRHP or NRHP-eligible sites potentially impacted	O	0
8	Park impacts	--	-2
9	Surface water crossings, wetlands	--	-2
10	Potential impacts to listed and non-listed species and/or habitat, and rare locally important species	--	-2
11	High risk hazardous material sites impacted	-	-1
12	Noise receivers directly adjacent	-	-1
13	Meeting comments and local resolutions	O	0
	Total		-10

The scores within each group were averaged, and then summed to give a total score for the scenario, as shown below.

Table 9. Example Scoring for all Groups – 10-lane C/D Scenario

Group	Score/Number of Measures	Average
Mobility	17 / 14	1.214
Safety	11 / 7	1.571
Cost	-7 / 4	-1.750
Environmental	-10 / 13	-0.769
	Total	0.266

The total was then divided by 4 to give the average for all 4 measures.

0.266 / 4 = 0.0665

This number was then multiplied by 38, the number of measures, to give the final score.

0.0665 x 38 = 2.53

Each scenario was scored in this manner.

Assumptions used in the Level 2B Screening analysis are presented in **Table 10** below. Supporting qualitative data is included in **Attachmen**ts **B**, **C and D**. The matrix presented in **Table 11** shows the ratings for the Basic Scenarios against each of the Level 2B Screening measures, based on the study goals. For the Level 2B Screening, the No Action Alternative was scored in the same manner and against the same mobility, safety, cost and environmental measures as the Basic Scenarios. Evaluating the No Action Alternative in this manner gave a quantifiable score that was compared to the various Basic Scenarios and which provided a better understanding of the performance and impacts resulting from the No Action Alternative.

Table 10. Level 2B Screening Assumptions

Alternatives			Mobility	Safety	Cost	Environmental [1]
No Action			• Normal operations and maintenance only. • Other regional projects identified in the Metroplan Long Range Plan would be implemented. • No Action Alternative scored against same measures for Mobility and Safety as other Action Alternatives for baseline comparison.		• No capital improvements would be made to I-30 or I-40. • Other regional projects identified in the Metroplan Long Range Plan would be implemented. • No Action Alternative scored against the same measures for Cost as other Action Alternatives for baseline comparison.	• No additional ROW required. No Action Alternative scored against the same criteria for Environmental Impacts as other Action Alternatives for baseline comparison.
Action Alternatives	**Scenario**	**Description**				
	6-lane Basic Scenario [2]	**No Main Lane Widening**	• Impacts located in the PEL study area. • Only peak hour benefits were analyzed. • Used Metroplan's Travel Demand Model results to determine the change in travel demand with varying number of through lanes. • Bypass was assumed to be at Chester Street. • Transportation assessment of Complementary Alternatives (except for the 12-lane Scenario, which used Metroplan model results)(**Attachment C**) • I-30 PEL Transit Analysis was used (**Attachment B**) • CATA 10-Year Strategic Plan was used. • 8-lane Basic Scenario – C/D lanes would run from approximately Broadway Street in North Little Rock to south of 6th Street in Little Rock. For this C/D system, a 1-lane plus auxiliary lane C/D system would be needed. • 10-lane Basic Scenario – The southbound C/D lanes would run from near 15th Street in North Little Rock to south of 6th Street in Little Rock. The northbound C/D lanes would begin south of 6th Street in Little Rock and terminate north of 9th Street in North Little Rock. For this C/D system, a 2-lane plus auxiliary lane C/D system would be needed. • Adding 1-lane C/D would operate better than adding 1 main lane.		• Conceptual ROW and utility costs to AHTD were assumed to increase as the roadway/bridge width increased.	• Impacts to environmental resources assessed using the general footprint for each Basic Scenario. • Footprints overlaid with environmental constraints. • Because footprint/location of many Complementary Alternatives is unknown, all environmental impacts were assessed within the known footprints of the 6-lane, 8-lane, 8-lane C/D, 10-lane, 10-lane C/D and 12-lane Basic Scenarios. • Assumptions for environmental measures: o *ROW/parcels/structures:* rated based on the number of parcels where new ROW would potentially be required. o *Potential displacements:* rated based on the number of structures potentially affected by new required ROW. o *EJ/LEP:* rated based on the anticipated level of potential impact to the following three questions: 1. Are EJ/LEP populations present within the study area? 2. Is there a potential for adverse direct impacts (displacements) to EJ/LEP populations? 3. Is there a potential for beneficial impacts and/or mitigation to offset any potential adverse impacts to EJ/LEP populations (e.g., improved mobility, safety, community cohesion, etc.)? o *Potential direct impacts to recorded archaeological sites and NRHP or NRHP-Eligible Sites:* rated based on the number of sites potentially directly impacted within the proposed alternative footprint. o *Potential direct impacts to parks:* rated based on the number of parks potentially impacted multiplied by the typical section width at the Arkansas River Bridge crossing (all potential park impacts to occur near the river crossing). The wider the typical section, the greater anticipated impacts. o *Potential direct impacts to surface water crossings:* rated based on the typical section width at the Arkansas River Bridge crossing, with the wider the typical section, the greater anticipated impacts. o *Potential direct impacts to listed and non-listed species and/or habitat, and rare locally important species:* rated based on the number of new habitat areas potentially crossed. o *Potential direct impact to high risk hazardous material sites:* rated based on the number of encroachments on hazardous material sites and potential impacts to sites. o *Potential noise impacts:* rated based on the potential impact to parcels containing sensitive receptors and the likelihood of feasible and reasonable noise mitigation.
	8-lane Basic Scenario	**3 Main Lanes + 1 Main Lane Widening (each direction)**				
		3 Main Lanes + 1 C/D Lane Widening (each direction)				
	10-lane Basic Scenario	**3 Main Lanes + 2 Main Lane Widening (each direction)**				
		3 Main Lanes + 2 C/D Lane Widening (each direction)				
	12-lane Basic Scenario	**3 Main Lanes + 3 Main Lane Widening (each direction)**				

[1] *See **Attachment D** for additional details on the screening methodology for environmental measures, including EJ/LEP.*

[2] *Assumed that the 6-lane Basic Scenario would occur within the existing project footprint and that bridge replacement would occur on the existing project centerline. However, should it be determined that the bridge replacement need to be constructed to the east or west of the existing centerline to maintain traffic flow resulting in a change to the project footprint, additional adverse direct impacts to environmental measures would be anticipated.*

Table 11. Level 2B Screening Matrix

Color Codes for Measures: Mobility (blue); Safety (pink); Cost (peach); Environmental (green)

Goals	Measures[4]	No Action	6-lane Scenario: 6-lane Scenario[7] (No-Main Lane Widening)	8-lane Scenario: 3 Main Lanes + 1 Main Lane Widening (each direction)		8-lane Scenario: 3 Main Lanes + 1 C/D Lane[2] Widening (each direction)		10-lane Scenario: 3 Main Lanes + 2 Main Lane Widening (each direction)		10-lane Scenario: 3 Main Lanes + 2 C/D Lane[3] Widening (each direction)	12-lane Scenario: 3 Main Lanes + 3 Main Lane Widening (each direction)	
	Maximum Main Lane Width[1] (Sq. Ft. of Pavement)	102	118	142 (3.55M)		190 (3.85M)		166(4.15M)		214(4.58M)	190(4.75M)	
	Bridge Location			West	East	West	East	West	East		West	East
Enhance Mobility	Mobility in PEL Study Area	- -	- -	0	0	0	0	+	+	++	++	++
	Total travel time savings	- -	- -	0	0	0	0	+	+	++	++	++
	Average peak hour travel speed through corridor	- -	- -	0	0	0	0	+	+	++	++	++
Access to Downtown	Mobility of key intersections within PEL Study Area	- -	+	+	+	+	+	+	+	+	+	+
	Travel time to key destinations in PEL Study Area	- -	- -	0	0	0	0	+	+	++	++	++
East-West Connectivity	Locations allowing for local street connectivity	- -	-	+	+	+	+	+	+	+	+	+
	Designs that allow for open spaces across I-30	- -	-	+	+	+	+	+	+	+	+	+
Connect Bicycle/Pedestrian Friendly Facilities	Grade separated bike / ped accommodations across I-30	0	+	+	+	+	+	+	+	+	+	+
Accommodate Existing Transit and Future Transit	Transit ridership in the PEL Study Area	+	++	++	++	++	++	+	+	+	+	+
System Reliability	Potential accident reductions	- -	-	0	0	+	+	++	++	++	++	++
	Emergency Vehicle Travel Time	- -	-	0	0	+	+	++	++	++	++	++
Minimize Roadway Disruptions	Severity of I-30 lane closures, detours during construction	++	- -	- -	- -	-	-	-	-	-	-	-
Minimize River Disruptions	Severity of river closures during construction	++	0	-	-	-	-	-	-	-	-	-
	Location of navigational impediments (Bridge Piers)	- -	++	++	++	++	++	++	++	++	++	++
Improve Safety	I-30 main lane conflict points in weaving / merge / diverge areas	- -	+	+	+	+	+	+	+	+	+	+
	Number of ramps per mile on I-30 in the study area	- -	+	+	+	+	+	+	+	+	+	+
	Ramp acceleration and deceleration lengths	- -	++	++	++	++	++	++	++	++	++	++
	I-30 Roadway and bridge structural conditions	- -	++	++	++	++	++	++	++	++	++	++
	Arterial connection conflict points	- -	+	+	+	+	+	+	+	+	+	+
Opportunity for Economic Development	Access to existing / potential business sites within the PEL Study Area	- -	- -	-	-	0	0	+	+	++	++	++
Optimize Cost	Total conceptual cost to AHTD	++	0	-	-	-	-	-	-	- -	- -	- -
	Total cost of ROW acquisition	++	0	-	-	-	-	-	-	- -	- -	- -
	Impact to major utilities and infrastructure	++	0	-	-	-	-	-	-	- -	- -	- -
	Total investment required by others	0	-	-	-	-	-	-	-	-	-	-
Community Impacts[5]	ROW / parcels / structures potentially directly impacted	0	0	-	-	-	-	-	-	-	- -	- -
	Potential displacements	0	0	-	-	-	-	-	-	-	- -	- -
	Are EJ populations present within the I-30 PEL study area?[6]	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
	Is there a potential for adverse direct impacts (displacements) to EJ/LEP populations ?[6]	no	no	yes	yes	yes	yes	yes	yes	yes	YES	YES
	Is there potential for beneficial impacts and/or mitigation to offset any potential adverse effects to EJ/LEP populations (e.g., improved mobility, safety, community cohesion, etc.)?[6]	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Cultural Resource Impacts[5]	Recorded archaeological sites potentially directly impacted	0	0	0	0	0	0	0	0	0	0	0
	NRHP or NRHP-eligible sites potentially directly impacted	0	0	0	0	0	0	0	0	0	- -	- -
Natural Resource Impacts[5]	Potential direct park impacts	0	0	-	-	- -	- -	-	-	- -	- -	- -
	Potential direct surface water crossings, wetlands impacts	0	0	-	-	- -	- -	-	-	- -	- -	- -
	Potential direct impacts to listed and non-listed species and/or habitat, and rare locally important species	0	0	-	-	- -	- -	- -	- -	- -	- -	- -
Other Impacts[5]	High risk hazardous material sites potentially directly impacted	0	0	-	-	-	-	-	-	-	- -	- -
	Potential noise impacts	0	0	-	-	-	-	-	-	-	-	-
Commitment to Voters	Mobility on I-30 Main Lanes	- -	-	+	+	+	+	++	++	++	+	+
Public / Agency Input	Meeting comments and local resolutions	- -	-	+	+	+	+	+	+	0	0	0
	SCORE	-25	-4	2	2	3	3	12	12	11	4	4
	Weighted Score	-16.39	-0.97	-0.99	-0.99	0.89	0.89	8.46	8.46	2.53	-10.13	-10.13
	Mobility 14	-1.071	-0.643	0.357	0.357	0.500	0.500	0.857	0.857	1.214	1.143	1.143
	Safety 7	-2.000	0.714	1.000	1.000	1.286	1.286	1.571	1.571	1.571	1.571	1.571
	Cost 4	1.500	-0.250	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.750	-1.750	-1.750
	Environmental 13	-0.154	0.077	-0.462	-0.462	-0.692	-0.692	-0.538	-0.538	-0.769	-1.231	-1.231

Scoring Legend	
++	Substantial Positive Effects
+	Some Positive Effects
0	Neutral Effects
-	Some Negative Effects
- -	Substantial Negative Effects

[1]Maximum roadway and bridge width does not include interchanges, cross streets and ramps in Level 2.
[2]8-lane C/D extends from near Broadway Street in North Little Rock to just south of 6th Street in Little Rock (Approximately 20% of the study corridor.)

[3]10-lane Southbound C/D extends from near 15th Street in North Little Rock to south of 6th Street in Little Rock. 10-Lane northbound C/D begins south of 6th Street in Little Rock and terminates north of 9th Street in North Little Rock. (Approximately 40% of the study corridor.)
[4]Measures used to evaluate alternatives in Level 2 Screening are defined in the accompanying document CA0602 PEL Alternative Screening Methodology.
[5]Potential direct impacts to environmental resources evaluated based on anticipated footprints of the alternatives.

*[6] See **Attachment D** for additional detail on the screening methodology for environmental measures, including EJ/LEP.*
[7] Assumed that the 6-lane Basic Scenario would occur within the existing project footprint and that bridge replacement would occur on the existing project centerline. However, should it be determined that the bridge replacement needs to be constructed to the east or west of the existing centerline to maintain traffic flow resulting in a change to the project footprint, additional adverse direct impacts to environmental measures would be anticipated.

2.3.4 Level 2B Screening Results

In summary, the Cost and Environmental category evaluation results are mostly tied directly to the footprint size of the Basic Scenario. In other words, the wider the typical section and ROW needs, generally the greater the Cost and Environmental evaluation impacts. Mobility and Safety categories do not necessarily correlate to the footprint size the same way as Cost and Environmental. Based on the future traffic demand in the 2040 design year, a wider typical section than existing conditions would better accommodate mobility. There is a point where additional lanes would not have an incremental benefit to mobility. Also, because there is a significant amount of traffic destined to either downtown North Little Rock or Little Rock, separation of the through traffic and local traffic with a C/D system would be beneficial from a mobility stand point. Other Cost and Environmental impacts are introduced with a C/D system as described above. Finally, both additional lanes and a C/D system can provide solutions to existing safety problems. However, a typical section with additional lanes does increase weaving and the potential for crashes. A C/D system can help reduce crashes by separating local traffic from through traffic, but Cost and Environmental impacts are introduced with a C/D system as described above, due to the increased typical section.

As mentioned in **Section 3.0**, east and west Basic Scenarios were created for each lane option (except the 10-lane C/D) because different environmental impacts are anticipated depending on the location of the bridge replacement. However, as shown in **Table 11**, the east and west options of each respective Basic Scenario showed no differentiation between the ratings of potential direct impacts for the environmental measures. This is because at the Level 2B Screening stage, scoring was based on threshold ranges associated with each specific environmental measure. For example, the threshold range for potential direct impacts to parcels was 1-40 parcels potentially impacted = single negative (-) with a score of -1; and 40 or more parcels potentially impacted = double negative (--) with a score of -2. Although there are differences between the potential impacts to the respective environmental measures resulting from the east and west options, these differences were not large enough to differentiate the ratings at this high level of screening. For those Basic Scenarios moving forward, the detailed and highly specific nature of the Level 3 Screening will quantify the differences in potential impacts between east and west options.

The following section summarizes the Basic Scenarios that were screened out from Level 2B and the Basic Scenarios that are proposed to move forward to Level 3.

2.3.5 Screened Out Scenarios

The following Basic Scenarios were screened out from further consideration due to their low scores in the Level 2B qualitative screening.

- **6 Main Lanes** (3 main lanes in each direction) – This Basic Scenario was screened out because it failed to substantially improve mobility and safety in the study area, and as traffic volumes continue to increase, the conditions will grow progressively worse over the next 20 years. Because traffic volumes are expected to increase approximately 1% annually, congestion in the corridor is expected to be significantly worse than today. As a result, peak hour ease of travel, travel time and travel speed, as well as the other 11 mobility measures, are expected to worsen whereas the duration of congestion would increase substantially. The increased congestion would have an impact on access to existing and potential business sites within the PEL study area. Furthermore, increased congestion is expected to have a negative effect on safety by having an adverse impact on emergency vehicle travel time.

- **8 Main Lanes** (4 main lanes in each direction) East and West Basic Scenarios – These scenarios were screened out because they incurred costs and environmental impacts while not adequately addressing mobility and safety in the study area.

  Because traffic volumes are expected to increase approximately 1% annually, congestion in the corridor is expected to be significantly worse than today. With added capacity of a general purpose lane in each direction, portions of the corridor are expected to have traffic volumes that exceed 8 Main Lanes of capacity. As a result, peak hour ease of travel, travel time and travel speed are expected to be unacceptable, in addition to 11 other mobility measures, whereas the duration of congestion would be worse than today in the design year. The increased congestion would have a substantial impact on access to existing and potential business sites within the PEL study area. Furthermore, increased congestion is expected to have a negative effect on safety by having an adverse impact on emergency vehicle travel time. One of the primary issues associated with the I-30/I-40 facility in the PEL study area are the closely spaced interchanges. The 8 Main Lanes Basic Scenario does not address the closely spaced interchanges and the high weaving volume between Broadway Street and Cantrell Road.

  Although this scenario would require additional ROW, particularly near the I-30 Bridge over the Arkansas River, which resulted in impacts to parks, water crossings, endangered species, and hazardous material sites, this scenario had fewer environmental impacts than all other scenarios except the No Action and 6-lane Basic Scenario.

- **12 Main Lanes** (6 main lanes in each direction) East and West Basic Scenarios – These scenarios were screened out because forecasted design year traffic levels indicate that the 10-lane alternatives were capable of addressing mobility and safety along the study corridor, and therefore the extra lanes were not needed. These scenarios also had high construction, ROW and utility costs, along with the most serious impacts to parks, water crossings, endangered species, hazardous material sites, and parcels, many of which resulted in displacements, as compared to all other main lane widening and C/D scenarios.

2.3.6 Scenarios Moving Forward To Level 3 Screening

The following Basic Scenarios received the highest scores in the Level 2B Screening process, and therefore will be advanced as *Reasonable Alternatives*, along with the No Action alternative.

- **No Action –** Although the No Action has few environmental impacts and costs are low, mobility and safety were rated poorly as a result of the No Action not meeting the study's goals. **(Level 2B Score = -16.39)**

- **8-lane C/D** (3 main lanes + 1 C/D lane in each direction) East and West Scenarios – This scenario included adding 1 C/D lane in each direction from near 7th Street in North Little Rock to just south of Broadway Street in North Little Rock. Outside the location of the C/D road, the new facility included 4 main lanes in each direction, with the same footprint as the 8 Main Lane Basic Scenarios. This scenario will also include replacement of the I-30 Bridge over the Arkansas River, with the new bridge width extending to the east or to the west of the existing bridge location. These scenarios were advanced because the scenarios work toward minimizing the cost and environmental impacts to parks, water crossings, endangered species, hazardous material sites, and parcels.

  While this scenario received neutral or positive ratings on the 14 mobility measures, the cost and environmental impacts of the footprint required to incorporate the C/D roads (wider than the 8 Main Lane Scenarios) caused some negative impact on the score. Both east and west options are being carried forward because environmental impacts vary based upon the location of the proposed bridge, which will be differentiated during the Level 3 Screening analysis.

  High level analysis indicates that a 2-lane C/D would be needed to meet the demand for the assumed C/D beginning and end points near 7th Street in North Little Rock to just south of 6th Street in Little Rock. In order for a 1-lane C/D to operate at a desirable level of mobility, the beginning and end points would have to be modified to near 7th Street in North Little Rock to just south Broadway in North Little Rock. **(Level 2B Score = 0.89)**

- **10 Main Lanes** (5 main lanes in each direction) East and West Basic Scenarios – These scenarios included widening on both sides of the current 6-lane facility to 10 Main Lanes throughout the corridor, 5 lanes in each direction, with the new I-30 Bridge over the Arkansas River being constructed to the east or to the west of the existing bridge. Most of the widening will occur within the existing ROW, except for at the Arkansas River Bridge, the proposed frontage road extension over the Union Pacific Railroad to the west of I-30, and a few smaller parcels. Other areas may be impacted depending on the location of interchanges, which will be determined in Level 3. These scenarios scored high due to improvements expected to the 14 mobility and 7 safety measures, and the relatively smaller footprint than the scenarios with C/D roads. Both east and west options are being carried forward because environmental impacts vary based upon the location of the proposed bridge, which will be differentiated during the Level 3 Screening analysis. **(Level 2B Score = 8.46)**

- **10-lane C/D** (3 Main Lanes + 2 C/D lane in each direction) – This scenario included adding 2 C/D lanes in each direction from near 7th Street in North Little Rock to just south of 6th Street in Little Rock. Outside the location of the C/D roads, the new facility included 5 main lanes in each direction, with the same footprint as the 10 Main Lane Basic Scenarios. This scenario will also include replacement of the I-30 Bridge over the Arkansas River, with the new bridge width extending to the east and west of the existing bridge location. This scenario received high scores for the 14 mobility and access measures and 7 safety measures, but had lower environmental and cost scores due to the larger footprint of the C/D roads. The total score was still higher than all other scenarios other than the 10 Main Lane Basic Scenarios. **(Level 2B Score = 2.53)**

The Basic Scenarios moving forward to Level 3 Screening will be refined to include intersection and interchange improvements in order to evaluate the connections to the local street grid and to other modes. In Level 3, a micro-simulation model will be used to perform a comprehensive quantitative mobility assessment within the I-30 PEL study area. The No Action will also be analyzed in the Level 3 Screening.

Attachment A: I-30 Arkansas River Bridge

Attachment A-1: Evaluation of Existing Conditions and Improvement Alternatives for Level 2 Screening

Attachment A-2: Agency Correspondence Letters

THE EXISTING I-30 BRIDGE OVER THE ARKANSAS RIVER: EVALUATION OF EXISTING CONDITIONS AND OF IMPROVEMENT ALTERNATIVES FOR LEVEL 2 SCREENING

THE I-30 BRIDGE OVER THE ARKANSAS RIVER

The I-30 Bridge crossing the Arkansas River is a critical component of the study corridor. It carries almost three times the number of vehicles as the other bridges in the Little Rock/North Little Rock downtown area combined. Not only does it provide local access between the Little Rock and North Little Rock business districts, it also serves longer distance commuter trips and through traffic.

Any river bridge improvements considered for evaluation during this study will likely be the greatest single contributor to project cost. The Bridge's selected configuration, alignment, typical section, and construction phasing will have significant impacts on the surroundings and will be crucial to identifying, selecting, and evaluating preferred transportation improvements. Therefore, as part of the I-30 PEL process, the existing Arkansas River Bridge will be evaluated to assist in determining the most effective approach, rehabilitation or replacement, that should be consider during further project development. The following is a summary of the existing bridge condition and recommendations for rehabilitation or replacement. The information presented will be considered while evaluating improvement alternatives in the Level 2 screening process that has been implemented as part of the I-30 PEL study.

EXISTING BRIDGE CONFIGURATION

Construction of the I-30 Bridge over the Arkansas River (AHTD Bridge No. 02768) began in 1958. Because of its magnitude, the project was built under different contracts over several years with the river piers being constructed separate from the main span superstructure and the south and north approaches.

The total bridge length is 3040 feet. The main plate girder units over the river consist of a continuous 858-foot south unit, a continuous 597-foot north unit, and a simply supported 126-foot suspended segment between the longer south and north units. Starting from the southern end, the 858-foot unit has a 196-foot span, two 210-foot spans, a 205-foot span, and a 37-foot cantilevered span at the north end. The adjacent 210-foot and 205-foot spans serve as the navigation spans. The 597-foot unit consists of a 37-foot cantilevered span at the south end, two 200-foot spans, and a 160-foot span at the north end.

The south approach structure extends from just south of 3rd Street to a concrete cellular support at the south end of the main unit. The south approach structure consists of thirteen w-beam simple spans of varying length. The northern approach structure extends from another concrete cellular support at the north end of the main unit to just north of Riverfront Drive (State Hwy. 100). The north approach structure consists of seven w-beam simple spans ranging in length from 47 to 64.5 feet.

Currently, the I-30 Bridge carries six 12-foot through lanes, three in each direction, and the typical shoulder widths are 2 feet adjacent to the median barrier and 3 feet to the outside. There is a “modified trumpet” interchange at the south end of the bridge providing access to and from the Little Rock River Market area and the I-30 Frontage roads. There are diagonal ramps at the north end of the bridge providing access to and from the Downtown North Little Rock area. These interchanges do require additional outside lanes at the north and south approach, varying the total bridge and outside shoulder width at the bridge ends.

Main River Spans

The main plate girder structure over the river is a riveted two-girder system with stringers, intermediate and end floorbeams, diaphragms, horizontal lateral bracing, and a concrete deck. The spacing between the two main girders is 50 feet with the remaining deck width cantilevering to the outside of the main girders and fully supported by the floorbeam cantilever and the stringers spanning between them. Large finger joints exist at the south and north ends of the main plate girder structure as well as at the south end of the suspended span. Pin and hanger mechanisms are located at both ends of the suspended span. Steel rocker bearings support the main girders and are located directly over the support columns.

The main plate girder structure is supported at the ends by cast-in-place concrete cellular structures placed on the riverbank. The south cellular structure varies in width to accommodate a northbound on-ramp and it includes a support at mid-span effectively dividing the overall cell span length in two simply supported w-beams with a concrete deck span between the end and internal supports of the cellular structures. Supports 18 through 24, the main river piers, are a cast-in-place, two column configuration, with web walls and spread footings. According to the construction plans, the footings were founded a minimum of 3 feet into sound rock. The web walls extend 2 feet above anticipated high water and provide addition structural capacity against accidental vessel collision. To help prevent the possibility of a direct barge strike on the piers, 40-foot diameter pier protection cells are located at each upstream and downstream end of piers 19, 20, and 21.

Approaches

Generally, the south and north approaches are simply supported, composite, 33” or 36” w-beam spans spanning between steel bent caps. The concrete deck span between the beams varies from 5’-8” to 8’-4” with some beams flared to accommodate varying deck widths and entrance and exit ramps. Steel diaphragms are included to assist in lateral support and distribution of load and additional 30” stringers frame into the exterior beams at the entrance and exit ramp locations at the south approach. One inch joints and small steel rocker bearings exist at the expansion ends; whereas, the beams frame into the steel bent caps at the fixed ends of the spans.

The south and north approaches are supported at the bridge ends by cast-in-place spill-through type abutments. The other ends of the approach units are supported by the cast-in-place cellular structures. The steel bent caps at bents 2 through 13 and 28 through 33 are supported by two or three steel columns founded on pile footings. The ramps framing into the approach spans are supported by single steel columns with steel bent caps. All bents on the south approach are founded on steel H-Piles whereas on the north approach all foundations consist of concrete bearing piles.

Vertical and Horizontal Clearances

The planned vertical clearances shown on the construction plans are a minimum of 14'-6" for all roadways. The latest inspection reports indicate a minimum vertical clearance of 14.3 feet and a minimum horizontal clearance of 4.3 feet.

The vertical navigation clearance provided on the plans is shown as 60 feet above elevation 233.0 and the planned horizontal clearance is shown as a minimum of 180 feet between the protection cells. The latest inspection reports indicate a minimum vertical clearance of 59.7 feet and a minimum horizontal clearance of 179.8 feet. The US Army Corps of Engineer's navigation charts show a vertical clearance of 56 feet above the 2% flow line and 65.6 feet above navigation pool. The horizontal clearance shown in the charts is 174.5 feet in the main navigation span and 168.5 feet in the alternate span.

SUMMARY OF EXISTING BRIDGE CONDITION

Structural and Functional Bridge Deficiencies

The National Bridge Inspection Standards (NBIS) require each state transportation department to inspect and evaluate all highway bridges located on all public roads on a bi-annual basis. Obviously, the I-30 Bridge over the Arkansas River (AHTD Bridge No. 02768) is included in the list of affected bridges. In accordance with the NBIS regulations, AHTD has and continues to perform regularly scheduled routine inspections on this bridge to ensure the safety of the traveling public. Because of its complexity and importance, other more in-depth special inspections are also performed on a more frequent and as-needed basis.

Currently, the bridge is on the same 24 month cycle for the "Routine," "Element," and "Underwater" type inspections, with the last inspections being performed on 10/28/13. "Fracture-Critical" and "Special" inspections are also performed on a more frequent 12 month schedule, with these inspections last being performed on 10/28/13 as well. The presence of fracture critical members, whose failure would most likely cause a portion of or the entire bridge to collapse, warrant these special, more frequent inspections. The main girders and hangers in the river spans and the steel bent caps in the approaches fall into this category of member type.

The following is a summary list of structural deficiencies that are noted in the most recent inspection reports for Bridge No. 02768 (I-30 over Arkansas River):

- General
    - The reinforced concrete deck has moderate scale throughout with transverse sealable cracks in all spans. There are numerous shallow spalls throughout with exposed rebar at some locations.

- The metal bridge railing and approach guardrail has collision damage and needs repair and/or replacement at several locations.
- Most bearings are rusting and are exhibiting active corrosion. Broken anchor bolts and “floating bearings” exist at several locations.
- The original drains have been filled with concrete. During heavy rain events, large amounts of water are pouring into and through the failed joint openings.
- The vessel collision protection cells have 3 broken cables and are in need of minor repair.
- Minor repair is needed to utility conduit and light pole bases at several locations.

- Main Spans
  - Substructure (Piers 18 thru 24)
    - During the latest underwater inspection it was reported that the channel and banks are stable. Local scour holes are present at Piers 19 thru 23 and it was noted that several footings and seals are partially or fully exposed. The channel bottom is 20’ lower than at date of original construction.
    - Vertical and horizontal hairline cracks with efflorescence and map cracking are visible in all columns and web walls (Piers 18 thru 24).The web wall for Pier 19 is heavily cracked at the top near the centerline of the pier. Cracks range from ¼” to ½” in width.
    - The footing for Pier 20 has documented problems. The footing is fully exposed due to a large diameter scour hole. The top of footing was constructed at nearly 10’ higher elevation than shown in the original plans. There is a large horizontal crack that passes through the entire footing and is visible on all four sides. The crack has been monitored and a recent underwater inspection indicates that the crack is not stable and has become active (moving or widening) with a maximum opening of 1”. There is a 1.5’ X 4’ spall at the northwest corner of the footing.
    - The footing at Pier 21 is fully exposed and the seal is partially exposed due to a large diameter scour hole. The top of footing was constructed at nearly 16’ higher elevation than shown in the original plans. There are cracks visible on the upstream and downstream nose of the footing. These cracks vary from 1/16” to 1/4” in width.
    - Cracking and spalling has occurred at beam seats throughout the main spans.
  - Superstructure
    - Active corrosion has set in at the top flanges with minor section loss. Pack rust is beginning to deform the web stiffeners.
    - Corrosion has been identified at the fracture critical pin and hanger assemblies. These pin and hangers support the 126 foot suspended span over the river. Regular ultrasonic testing is necessary to ensure adequate material remains.

        - Section loss of 1/16” to 3/16” has occurred to the wind lock plates and the rivet heads show approximately 50% section loss. Area has been cleaned and painted but corrosion is still active.
        - The finger joint at Pier 14 is ¾” high on the back side.
        - None of the navigation lights are working on Span 20. On the upstream side of Span 19 the white channel marker lights are not working.
- Approach Spans
    - Substructure
        - Fatigue cracks and section loss from corrosion are present in the fracture critical steel bent caps for the north and south approach spans. Also, there is section loss from corrosion in the steel columns at the top of the concrete encasement and repairs have been made in an effort to stop further corrosion.
        - The beam seats inside the cellular units continue to degrade. Many beam seats are cracked and spalled.
        - Vertical cracks are evident in the caps in the south abutment and the backwall is cracked and broken at the centerline.
        - Approach slabs at each end of the bridge have experienced on-going settlement and have cracked.
    - Superstructure
        - Recent inspections have identified over 200 fatigue cracks, up to 7” in length, at 41 different diaphragm connection plate locations in the approach spans. Some of these cracks have progressed from welds into the web of the w-beams or have originated in the web itself. Repairs have been attempted at some locations with very limited success. Cracks continue to propagate and other new cracks are identified with each inspection cycle.
        - Paint loss, rust, and corrosion of the bottom flanges and up to 40% section loss is present at most bearing locations.
        - Recent inspections identified holes due to corrosion in the diaphragm webs at 11 locations near the cast-in-place concrete support cells.
        - All joint material in the approach spans has failed and the joints are leaking.

Following every routine inspection, the standard Structure Inventory and Appraisal (SI&A) form that is associated with each bridge in the State’s inventory is updated to reflect findings in the field. The condition ratings provided in items 58 through 62 on the SI&A form describe each major bridge component’s current condition as compared to the original, as-built condition. Item 67 is the appraisal rating value used to reflect the structural evaluation of the bridge in relation to the level of service which it provides. The condition and appraisal ratings for the I-30 Bridge over the Arkansas River (AHTD Bridge No. 02768), as reported after the most recent inspections (10/28/13), are as follows:

- Item No. 58 – Deck: 5 (Fair Condition)

- Item No. 59 – Superstructure: 5 (Fair Condition)
- Item No. 60 – Substructure: 4 (**Poor Condition**)
- Item No. 61 - Channel/Channel Protection: 7 (Good Condition)
- Item No. 67 – Structural Evaluation: 4 (Meets **Minimum Tolerable Standards**)

The Structural Evaluation appraisal rating of 4 for the bridge qualifies the bridge as "Structurally Deficient," as noted at the top of the most current SI&A form. A Structurally Deficient (SD) classification means that the condition of the bridge includes one or more significant defects that require action. Structurally Deficient classifications can often lead to the implementation of speed or weight limitations to ensure the public's safety.

The current poor and substandard condition and appraisal ratings noted above (Item No. 60 & 67) are the result of the large crack in the footing of Pier No. 20 that has been identified during underwater inspections. As noted above, this 1" wide horizontal crack passes through the entire footing and is visible on all four sides. Recent underwater inspections indicate that the crack is not stable and has become active (moving or widening). AHTD engineers and underwater inspection personnel expect that future inspections will show further widening or propagation of foundation cracking.

It should also be mentioned that between the September 2009 and October 2010 routine inspections, the superstructure condition rating (Item No. 59) was recorded as 4, again warranting a Structurally Deficient classification. This poor condition rating was the result of over 200 fatigue cracks identified in the approach span beam webs as noted in the 2009 inspection. Following subsequent and lengthy repairs by AHTD heavy bridge maintenance personnel, the superstructure condition rating was upgraded to 6 after the 2010 inspection. However, the most recent inspection (October 2013) has noted failed fatigue repairs and additional fatigue cracking at new locations.
As a result, the current superstructure condition rating has once again been downgraded, this time to a 5. AHTD heavy bridge maintenance engineers report that this has been an on-going cycle; inspection-downgrade-repair-upgrade-inspection-downgrade-etc.

It is expected that the next round of inspections will reveal additional fatigue cracking and other deficiencies with a possible reduction in superstructure condition rating to a 4 or less.

The structural deficiencies noted above have not had a significant effect on the load rating of the bridge. As reported in items 66 & 64 on the SI&A form, the current load rating values are HS20 (inventory) and HS33 (operating). Item 70 is a value 5, therefore structural analysis results must indicate calculated capacities in excess of current legal loads and hence restricted load posting is not necessary. However, the load rating method used for this bridge is the load factor method and this method does not consider fatigue loading and fatigue prone details and their impact on the rating. A more rigorous fatigue analysis may produce reduced capacity values or may even indicate the necessity for posting. However, visible cracks in the steel beam webs, continued propagation of those cracks, and evidence of new cracks suggest that the fatigue life has already been exceeded and that a rigorous fatigue or fracture mechanics evaluation is not warranted.

There are several other structural deficiencies that should be noted but that are not specifically addressed during the normal bridge inspection and evaluation cycle. The I-30 Bridge over the Arkansas River was designed and constructed long before seismic criteria was implemented in the AASHTO bridge design code and therefore does not include design details that would resist or prevent collapse during a significant seismic event. Short bearing lengths at expansion joints, minimal anchorage of the superstructure to the substructure, lack of ductility in concrete columns, and modest foundation size are just a few of the elements that make the existing bridge deficient in its ability to perform adequately during such an event.

The lack of redundancy in the main river spans should also be mentioned. As discussed previously, the girders in the main river spans are fracture critical. With the main spans being a two-girder system it is critical that failure does not occur at any location along a main longitudinal girder line. In systems with three or more girders, loads can be redistributed to other girder lines in the case of a localized failure in any one girder line. In a two girder system, redistribution is not likely and collapse is probable if a fracture develops in a main girder. The hangers that support the suspended span are also fracture critical. With no possibility for load transfer if failure occurs, collapse of the suspended span is inevitable if a hanger were to fracture or if a pin were to shear. Any evidence of fatigue cracking in the I-30 Bridge over the Arkansas River compounds the concern for lack of redundancy as fatigue prone details are prime locations for the initiation of a fracture that would cause collapse.

Even though AHTD no longer uses the “Functionally Obsolete” classification as previously defined in FHWA’s *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation’s Bridges*, it is still prudent to consider functional deficiencies when evaluating an existing bridge. In addition to the structural deficiencies of the I-30 Bridge highlighted above, the width of the existing bridge is less than desirable. Although the bridge meets the minimum width requirements, the capacity provided by the three lanes in each direction is less than the current traffic demand and the shoulders on the bridge are below current standards for new construction.

Navigational Safety

The I-30 Bridge is one of six bridge structures that cross the McClellan-Kerr Arkansas River Navigation System (MKARNS) within a 1.4 mile stretch of the Arkansas River in the downtown areas of Little Rock and North Little Rock. Having a total length of 445 miles, the MKARNS provides a means for the transportation of commodities from Oklahoma through Arkansas to the Mississippi River. On average, 12 million tons of commodities, valued at $2-3 billion, are transported annually via this economically vital navigation system.

For bridges crossing a navigation channel, the two most important features are the vertical clearance provided from the water surface to the bottom of the bridge and the horizontal clearance between the bridge piers. The latest SI&A indicates a minimum vertical clearance of 59.7 feet and a minimum horizontal clearance of 179.8 feet for the I-30 Bridge over the Arkansas River. The US Army Corps of Engineer's navigation charts show a vertical clearance of 56 feet above the 2% flow line and 65.6 feet above navigation pool. The horizontal clearance shown in the charts is 174.5 feet in the main navigation span and 168.5 feet in the alternate span. The United States Coast Guard (USCG) typically requires vertical and horizontal clearances of 52 feet and 300 feet, respectively for the section of the MKARNS within the study area. Of the six bridges in the downtown Little Rock/North Little Rock stretch of the river, only the I-30 Bridge fails to meet the typically prescribed 300-foot minimum horizontal clearance for the MKARNS within the study area.

In addition to the substandard horizontal navigation clearance, the pier configuration of the I-30 Bridge poses an obstruction to river navigation. The five other bridge structures have an open span across the entire navigation channel. However, the I-30 Bridge has a pier within the middle of the channel which divides the channel into two navigation spans. The reduced horizontal clearance and pier obstruction is cumbersome to navigate and restricts the operational speeds of the barges. Barge collision data, provided by the USCG, indicates that a total of five barge strikes have occurred at the I-30 Bridge site since 2001, with the two most recent of these strikes having occurred since August 2013.

<u>REHABILITATION AND REPLACEMENT ALTERNATIVES</u>

Rehabilitation

Several alternatives for improvements to the I-30 crossing of the Arkansas River have been considered for the PEL study. Options have been contemplated that incorporate use of the existing bridge into the final crossing configuration. One option is to widen both sides of the existing bridge to accommodate additional lanes. Another option is to use the existing bridge structure to accommodate the future lanes for one direction of traffic and to build an adjacent and parallel new structure to accommodate future lanes in the other direction.

Before consideration is given to any option incorporating the use of the existing bridge structure, the cost-effectiveness of such a solution should be considered. An in-depth cost analysis is not included in the PEL scope of work. However, the following summary of recommended repairs and/or modifications can be considered in any future analysis or comparison between bridge alternatives.

Possible repairs and modifications to the existing bridge generally fall into two categories. The first category includes those that can reasonably be considered to be prudent and economically feasible. Those that fall into the "feasible" category can also be separated into two different groups relative to timing – those repairs needs that are urgent and immediate and those that should be considered ongoing or that could be performed at a later date.

Feasible Repairs - Immediate Needs: Repairs that would need to be implemented immediately would be those that are the cause for the low condition ratings noted in the inspection reports. Obvious immediate repair needs are the foundations of the main piers and the steel beams and caps in the approach spans.

As noted above, the current poor and substandard condition and appraisal ratings are the result of the large crack in the footing of Pier No. 20. A 1" wide horizontal crack passes through the entire footing and is visible on all four sides. Recent underwater inspections indicate that the crack is moving or widening. Stabilizing the foundation at Pier No. 20 would be of highest priority under any rehabilitation plan. Continued shifting in the footing resulting from settlement or lateral wind, collision, or seismic forces could result in serious stability issues and possible bridge closure or even collapse. Different repair options have been considered but the consensus to date is that the most likely effective attempt at a repair would be to encapsulate the entire footing in mass and/or reinforced concrete and to introduce measures to reduce crack width or eliminate it altogether.

Also a high priority item, the fatigue cracks in the approach spans and the steel cap beams pose another serious issue that would need to be addressed in any rehabilitation alternative. Fatigue cracks can continue to propagate and eventually lead to fracture and collapse if not addressed. History has shown that the fatigue cracks that exist in the I-30 Bridge have propagated and will continue to do so if effective remedial measures are not performed. Also, new fatigue cracks will continue to develop if improvements to the current details are not implemented. However, past reports have noted over 220 locations where fatigue cracking has been identified and it is anticipated that these locations and all locations with similar details would require attention. Therefore, because of the extent of existing and anticipated fatigue cracking and because past history shows that repairs have been ineffective, it is likely that subsequent analysis would show that replacing all of the approach bridge spans and supports in their entirety is the only cost effective and safe solution.

Feasible Repairs - Future or Ongoing Needs: Repairs that would not need to be implemented immediately but that would need to be addressed through ongoing maintenance or future repair/rehabilitation projects would be those are not critical to the safety of the bridge from the standpoint of failure of a main component. These less serious issues that are listed in the inspection report include cracking and spalling in the concrete deck, clogged deck drains and rail damage, failing joints, corrosion in steel beams, girders, and diaphragms, scour holes, broken anchor bolts, cracking in the abutments, and scour holes at the river piers.

Before repairs to the concrete deck and joints are implemented, it would be prudent to consider full replacement of the deck. The cracking and spalling that is noted in the inspection reports are indicators that the deck may be near the limits of its useful life. It can be expected that the rate and frequency of patching and other repairs will only accelerate in the next few years. A full deck replacement will not only alleviate these maintenance and repair items but may also facilitate limited widening of the roadway along with joint, drain, and barrier replacement thus improving the functionality of the bridge.

Other suggested repair or maintenance actions include but should not necessarily be limited to: 1. Install engineered riprap at Piers 19, 20, & 21 to prevent additional local scour, 2. Paint existing girders and bracing to prevent further corrosion, 3. Replace corroded diaphragms in approach spans, 4. Replace broken anchor bolts, and 5. Repair broken/cracked abutments. Of course, without full bridge replacement, it is recommended that the current, more frequent inspection cycles be maintained.

<u>Unfeasible/Not Cost Effective Repairs</u>: Given the existing bridge configuration, several of the deficiencies listed above cannot be easily eliminated using practical means and therefore efforts to do so should be considered neither cost-effective nor prudent.

The fracture critical status of the main rivers spans cannot be changed unless one or more girder lines are added and the pin and hangers are removed from the ends of the suspended span. Adding girder lines would be required if the chosen rehabilitation option was to widen both sides of the existing bridge to accommodate additional lanes. However, this method of adding additional bridge width and travel lanes may not be the preferred option and adding a girder line to the existing bridge width just for the sake of providing redundancy is not justified. Also, for either option - widening the existing bridge or providing a parallel new structure - modifications to the existing girder would be very extensive if accommodations were to be made for the elimination of the pin and hangers.

None of the interstate bridges crossing the Arkansas River in Central Arkansas were originally designed for a significant seismic event nor have any of these bridges been retrofitted to perform adequately during such an event. All three of these bridges are on the national highway system and part of strategic highway network. Therefore, it would be very desirable to incorporate the necessary seismic performance capabilities into any improvement alternative at the I-30 crossing. However, because of its current configuration, the I-30 Bridge would need extensive retrofits to bring it up to this desired standard. Significant deficiencies that would need to be addressed include short bearing lengths at expansion joints, minimal anchorage of the superstructure to the substructure, lack of ductility in concrete columns, and modest foundation size. All of these, particularly improvements to the main river piers and foundations, would be very costly.

The horizontal clearance provided by and the position and alignment of the navigation span cannot be changed unless the pier locations are moved. Obviously, this extreme tactic for providing additional navigational clearance is not feasible. It should also be noted that any widening of the existing bridge and seismic retrofit of the river piers may further reduce the width of the navigation channel.

<u>Possible scenarios - Bridge type(s) and configuration(s):</u> Two options for rehabilitation have been considered. One option is to widen both sides of the existing bridge to

accommodate additional lanes. Another option is to use the existing bridge structure to accommodate the future lanes for one direction of traffic and to build an adjacent and parallel new structure to accommodate future lanes in the other direction. Assuming all feasible repair and modifications were made to the existing bridge, the bridge would perform adequately for a relatively short period of time. The immediate concerns regarding structural capacity would have been relieved and the condition ratings would most likely be elevated. However, concerns regarding lack of redundancy, seismic capacity, navigational clearance, and preferred functionality would remain.

Replacement

Any full replacement alternative would likely incorporate the use of the existing bridge during phased construction but the bridge would be demolished once it was no longer needed. The design and construction of a full replacement structure would adhere to current standards and codes and the deficiencies listed above would not be present in the new structure. The structural and functional capacity would be greatly improved, the navigation clearances and alignment would meet current coast guard standards and barge operator preferences, and the “design life” of the structure would be equal to or in excess of 75 years. The seismic resistance would meet current code and the bridge would provide preferred levels of redundancy eliminating the fracture critical classification. With full replacement there would be a new wider deck with improved barriers providing the maximum desired functionality.

ARKANSAS STATE HIGHWAY
AND
TRANSPORTATION DEPARTMENT

Scott E. Bennett
Director
Telephone (501) 569-2000
Voice/TTY 711

P.O. Box 2261
Little Rock, Arkansas 72203-2261
Telefax (501) 569-2400
www.arkansashighways.com

December 3, 2013

Mr. John Balgavy
Chief of Operations Division
U.S. Army Corps of Engineers
700 West Capitol Avenue
Little Rock, AR 72203

Arkansas Job CA0602
I-530 – Hwy. 67 (Widening & Reconst.)
(I-30 & I-40) (F)
Interstate 30, Pulaski County, Arkansas

Dear Mr. Balgavy:

The Arkansas Highway and Transportation Department has a project programmed to increase the number of lanes on Interstate 30 in Little Rock/North Little Rock, Arkansas. As part of this project, the existing Interstate 30 bridge over the Arkansas River, River Mile 118.5, will either be widened or replaced by a new structure.

Enclosed for your information is a copy of the letter sent by my office to the U.S. Coast Guard office in St. Louis, Missouri requesting information regarding navigational clearances. Also enclosed is the General Plan and Elevation of the existing bridge. Please call my office at (501) 569-2361 if you have any questions.

Yours truly,

Carl Fuselier

Carl Fuselier
Bridge Engineer

Enclosures
bc: Environmental Division
Keli Wylie
Garver Engineers, Inc.

ARKANSAS STATE HIGHWAY
AND
TRANSPORTATION DEPARTMENT

Scott E. Bennett
Director
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December 3, 2013

Mr. Eric Washburn
Bridge Administrator
Eighth Coast Guard District
1222 Spruce Street
St. Louis, MO 63103-2832

Arkansas Job CA0602
I-530 – Hwy. 67 (Widening & Reconst.)
(I-30 & I-40) (F)
Interstate 30, Pulaski County, Arkansas

Dear Mr. Washburn:

The Arkansas Highway and Transportation Department has a project programmed to increase the number of lanes on Interstate 30 in Little Rock/North Little Rock, Arkansas. As part of this project, the existing Interstate 30 bridge over the Arkansas River, River Mile 118.5, will either be widened or replaced by a new structure.

By this letter we are requesting the following:

1. New structure
   a. Minimum horizontal and vertical navigational clearances.
   b. Minimum horizontal navigational clearances during construction.

2. Existing structure
   a. A statement that the existing structure can be widened while retaining its existing pier placement and span lengths. The General Plan and Elevation of the existing bridge is enclosed. Please note that the existing pier columns may require a nominal size increase if a seismic retrofit is required.
   b. Minimum vertical navigational clearance.

The General Plan and Elevation of the proposed bridge will be submitted to your office for review and approval of the span lengths, pier placement, and vertical clearance during preliminary plan development.

Yours truly,

Carl Fuselier

Carl Fuselier
Bridge Engineer

Enclosure
bc: Environmental Division
Keli Wylie
Garver Engineers, Inc.

CA0602

o Job File
o Design File

DEPARTMENT OF THE ARMY
LITTLE ROCK DISTRICT CORPS OF ENGINEERS
POST OFFICE BOX 867
LITTLE ROCK, ARKANSAS 72203-0867

REPLY TO
ATTENTION OF

Operations Division

JAN 10 2014

Mr. Carl Fuselier
Bridge Engineer
Arkansas State Highway and Transportation Department
P.O. Box 2261
Little Rock, Arkansas 72203

Dear Mr. Fuselier:

Thank you for your letter on December 3, 2013, regarding efforts to expand or replace the Interstate 30 Bridge in Little Rock/North Little Rock, Arkansas.

Our most important concern initially is that the existing pier bisecting the channel creates a challenge for aligning tows, some over 1200 feet long, through this and the other five nearby bridges. As options for replacement or renovation of the bridge are evaluated, we would appreciate discussions of features that would improve navigability of this reach of the system.

The point of contacts for coordinating design reviews and other correspondence are Mr. Johnny Mclean, 501-340-1382, johnny.l.mclean@usace.army.mil, Regulatory Division and Mr. Rod Gaines, 501-324-5563, roderick.s.gaines@usace.army.mil, Operations Division. Please feel free to contact either of them if you have any questions.

Sincerely,

John A. Balgavy, .P.E.
Chief, Operation Division

ARKANSAS STATE HIGHWAY
AND TRANSPORTATION
DEPARTMENT

JAN 16 2014

RECEIVED
BRIDGE DIVISION

U.S. Department of Homeland Security

United States Coast Guard

Commander
Eighth Coast Guard District

1222 Spruce Street, Room 2.102D
St. Louis, MO 63103-2832
Staff Symbol: dwb
Phone: (314) 269-2382
Fax: (314) 269-2737
Email: david.a.orzechowski@uscg.mil
www.uscg.mil/d8/westernriversbridges

16593.22/118.5 ARW
January 29, 2014

Mr. Carl J. Fuselier, P.E.
Assistant Division Head
Bridge Division, Arkansas Highway
and Transportation Department
10324 Interstate 30
Little Rock, AR 72209

Subj: I-30 BRIDGE, MILE 118.5, ARKANSAS WATERWAY

Dear Mr. Fuselier:

This is in response to your letter dated December 3, 2013, concerning widening or replacing the subject bridge.

As the existing I-30 Bridge is the most restrictive bridge in Little Rock Harbor in regards to horizontal clearance, from a navigation standpoint the Coast Guard recommends replacing the existing bridge with a new structure that provides a minimum horizontal navigation opening of at least 320.0 feet and a minimum vertical clearance of 63.0 feet above normal pool stage. These clearances are consistent with contemporary bridges permitted and built over the Arkansas Waterway in the past few years. We understand during the construction phase of a new bridge, one half of the existing structure will be retained for diverted vehicular traffic while the new structure is being built. During this phase the current left descending channel shall remain clear at all times. The right descending channel would be blocked by a new pier and associated equipment. In addition, we would like to address placement of the new piers so that the navigation line through the harbor is not adversely affected.

If widening the existing structure is your preferred alternative, a Coast Guard Bridge Permit Amendment will be required. The left descending channel of 169.5 feet is measured between the upstream left descending pier protection cell and the downstream center pier protection cell. This channel is the most preferred by navigation and most restrictive of the two channels, and shall remain unobstructive at all times during the widening sequence. If a containment system is used during the modification, a three foot maximum reduction in the vertical clearance would be allowed. A permanent reduction of two feet of vertical clearance would be acceptable. This bridge is the narrowest of all bridges currently in the Little Rock Harbor and, therefore, any proposed reduction of the existing horizontal clearance in the left descending channel would be unacceptable between the left descending and center pier protection cells unless otherwise approved by this office. Another alternative that could be discussed would be the widening of the bridge on the existing piers (strengthened) along with the removal of the existing center pier and center protection cells.

I appreciate the opportunity to comment on the proposed bridge project and look forward to discussing these alternatives as well as other alternatives that you may bring forth. Should you have any questions, please contact Mr. David Orzechowski at (314) 269-2382.

Sincerely,

ERIC A. WASHBURN
Bridge Administrator, Western Rivers
By direction of the District Commander

C: RALPH - REPLY FOR MY SIG.
LORIE
MIKE
KELI

RECEIVED
AUG 2? 2014
DIRECTOR'S OFFICE
ARKANSAS STATE HIGHWAY AND
TRANSPORTATION DEPARTMENT

Arkansas Waterways Commission

Mike Beebe, Governor

Gene Higginbotham, Executive Director

August 21, 2014

Mr. Scott Bennett
Director
Arkansas State Highway and Transportation Department
P.O. Box 2261
Little Rock, Arkansas 72203

RE: Proposed Interstate 30 Bridge, Arkansas River

Dear Mr. Bennett,

On behalf of the Arkansas Waterways Commission, I write to comment on the Proposed Interstate 30 Bridge Expansion (Arkansas Waterway, Mile 118.5, Little Rock, Pulaski County, Arkansas).

The Interstate 30 Bridge carries the highest amount of vehicular traffic across the Arkansas River in Metropolitan Little Rock area. To make this bridge safer for both navigation and the vehicular traffic moving across it, we would recommend the bridge pier that divides the navigation channel be removed and a navigation channel of 332 feet (horizontal width) be established. This horizontal width is the navigation channel width at the Junction Bridge (mile 118.7), which is the closest adjacent bridge. We would also recommend that the deck of the proposed Interstate 30 Bridge be no lower than that of the soon-to-be constructed Broadway Bridge (mile 119.1), which has a proposed vertical clearance of 62.4 feet above pool. Currently the Interstate 30 Bridge does not meet current AASHTO Standards and while the current pier protection system offers optimal protection for frontal collision, there remains a great potential for damage from a vessel collision from the side which is unprotected. Any design plans that would call for reinforcement to the existing pier in the navigation channel would reduce the width of the navigation channel and could possibly lead to more incidents as traffic continues to grow on the McClellan–Kerr Arkansas River Navigation System.

As construction is approved on the Interstate 30 bridge, we would request that the left descending channel remain open at all times. We would also request that any construction done to piers or the deck should be scheduled to minimize the impact to navigation.

Thank you for the opportunity to comment on this issue. If you have any questions regarding my comments, I can be reached at (501) 682-1173.

Sincerely,

Gene Higginbotham

RECEIVED
AUG 22 2014
DEPUTY DIRECTOR AND
CHIEF ENGINEER'S
OFFICE

cc: Governor Mike Beebe
Ms. Sandra L. Otto, FHWA Arkansas Division
Mr. Eric Washburn, USCG Eighth Coast Guard District (dwb)

101 East Capitol Avenue, Suite 370 Little Rock, Arkansas 72201

Attachment B: Transit Analysis

CA0602 I-30 PEL

Transit Analysis

Introduction

Transit demand in the Central Arkansas I-30 corridor was analyzed at a high-level as part of the I-30 Planning and Environmental Linkages (PEL) project. Would an investment in commuter-oriented express transit service during the peak hours of travel reduce the demand on I-30 to lessen the need for adding roadway capacity? The transit benefits to I-30 were analyzed by answering the following two questions:

1. Using available Metroplan information on travel patterns, commuter patterns, and land use, what is the estimated mode shift under the most ideal reasonable transit scenario?

2. What mode shift is required, in terms of auto trips diverted to transit, to achieve a material positive effect on traffic volumes and volume/capacity relationship on I-30?

In addition to transit, transportation demand management (TDM) strategies can complement the transit strategy and generally improve the landscape of transportation in Central Arkansas. TDM strategies are most effective when multiple strategies are used to complement each other. TDM strategies will also be explored in this analysis.

Previous Public Transit Study

As part of the Central Arkansas Regional Transportation Study (CARTS) *Areawide Freeway Study, Phase I, 2003*, a transit study was conducted to evaluate the feasibility of light rail along four corridors in the Central Arkansas region: I-30 SW, I-40 NW, Route 67 NE and I-630 east. The study covered up to 25 miles from the central business district (CBD) and used Portland, Oregon as a basis for mode split. The study also based the evaluation on daily ridership projections. The study concluded that light rail transit in two of the four corridors would result in up to a three percent decrease in daily vehicular bridge crossings, which would not have a significant effect on the future bridge level of service (LOS) and operational characteristics. The Areawide Freeway Study was used in this analysis for informational and comparative purposes only. Comparison to this study can be found in the conclusion.

Methodology

The following section describes the methodology used in the I-30 PEL transit analysis. **Figure 1** provides a graphical representation of destinations, catchment areas, other origins, and screen lines. An express bus transit service is best suited for commuters who follow consistent work trip patterns. Therefore, while it is possible for transit users to have other trip purposes, this analysis will solely consider home-based-work (HBW) trips.

Destinations

For the purpose of this analysis, the "destination" is defined as the area where higher-density employment is likely to attract commuters using I-30. Four key work destinations were identified based on the 2040 Metroplan CARTS Model prediction for the CBD. They are:

A. Downtown Little Rock
B. Downtown North Little Rock
C. Arkansas State Hospital area
D. University of Arkansas at Little Rock campus

Origins

For the purpose of this analysis, the "origin" is defined as the area where a commuter lives. Ten primary origin areas were identified and divided into two categories: catchment areas and other origins.

Catchment Areas

In this analysis, the term "catchment area" defines an area with relatively high population density that can be served by a single park-and-ride lot. Catchment areas are conical in shape with a 3-5 mile radius. Commuters who live between the bus stop and CBD are likely to drive to their destination instead of taking the bus. Park-and-ride lots are most effective when located 10 to 20 miles from key destinations.

These catchment areas would be part of an express bus service network rather than a traditional route network which relies primarily on walk access. In the morning, the bus would stop at a limited number of locations, operate non-stop service to the CBD, and follow a route through the CBD to drop off commuters. The reverse would occur in the evening.

Key locations for catchment areas were identified using the CARTS Model, which divides the region into traffic analysis zones (TAZs). Clusters of TAZs with a population density of 3,000+ people per square mile were considered suitable locations.

Six suitable park-and-ride catchment areas were identified for this analysis:

- North of North Little Rock
    1. Cabot
    2. Jacksonville
    3. Maumelle
- South of Little Rock
    4. West side of Little Rock
    5. Bryant
    6. Benton

Other Origins

Several origins of interest exist within the 10-mile radius around the Little Rock CBD. Like the catchment areas, these regions have a population density of at least 3,000 people per square mile.

However, unlike the catchment areas, their proximity to the destinations may make park-and-ride access less effective. These regions include:

7. Pulaski Tech South Campus
8. Shannon Hills
9. Mabelvale
10. North Little Rock just southwest of I-40/I-30 interchange extending up to the Sherwood area

These regions would likely be served by traditional transit routes instead of express services.

Origin/Destination Pairing

The fundamental data source for the analysis was Metroplan's CARTS model data for the year 2040. Metroplan developed 15 different future scenarios for travel between individual traffic analysis zones (TAZs). The future model scenario that was identified for this analysis was Scenario 12. This scenario represents increased transit land use, 6-lane I-30 Bridge, and a new Chester Street Bridge crossing the Arkansas River. This scenario was chosen as the most aggressive transit scenario to test the attractiveness of transit in the I-30 corridor.

The CARTS model included an origin/destination matrix for each TAZ in the metropolitan region. Each origin and destination cluster of TAZs was grouped together. The volume of HBW trips for each origin/destination pair was calculated as the sum of all trips from each group of origin TAZs to each group of destination TAZs. **Table 1** shows the daily volume from home to work. The study team assumed that weekday commuters will drive to work and then drive home from work. Therefore, it is assumed that all origin-destination trips will reverse in the evening. In other words, 1,715 commuters travel from 1 to A in the morning. In the evening, 1,715 commuters will travel from A to 1.

Table 1. Daily 2040 Volume Home to Work Trips

Daily Volume From Home to Work						
		Destination				
		A	B	C	D	Total
Origin	1	1,715	328	152	121	2,316
	2	1,472	297	120	93	1,983
	3	1,980	401	254	180	2,814
	4	3,008	148	656	384	4,197
	5	3,414	216	437	439	4,506
	6	3,434	175	426	372	4,406
	7	1,245	69	193	202	1,710
	8	546	30	65	73	715
	9	6,327	316	757	969	8,369
	10	8,121	1,894	506	335	10,856
	Tot	31,263	3,874	3,567	3,168	**41,872**

Source: Metroplan CARTS Model.
See Figure 1 for graphical representation of origins and destinations.

As previously stated, this analysis will only consider HBW trips as projected in the 2040 Metroplan CARTS model. Based on work trip distributions from other metropolitan areas, 50% of all HBW trips to the CBD occur during the AM peak hour, and 50% of all HBW trips from the CBD occur during the PM Peak hour. Therefore, the AM and PM peak hour matrices will be mirrored. **Table 2** shows peak hour HBW trips, which are 50% of the daily HBW trips.

Table 2. Peak Hour 2040 Volume Home to Work Trips

From Daily to Peak Hour Volume (50%)						
		Destination				
		A	B	C	D	Total
Origin	1	857	164	76	61	1,158
	2	736	149	60	47	991
	3	990	200	127	90	1,407
	4	1,504	74	328	192	2,098
	5	1,707	108	218	219	2,253
	6	1,717	87	213	186	2,203
	7	623	35	97	101	855
	8	273	15	33	36	357
	9	3,164	158	379	484	4,185
	10	4,061	947	253	168	5,428
	Tot	15,632	1,937	1,783	1,584	**20,936**

Source: Metroplan CARTS Model
See Figure 1 for graphical representation of origins and destinations.

Transit Service Concept for I-30

To estimate the number of commuters who might reasonably shift from auto to transit, it was necessary to conceptually define the transit system that would serve the origin areas previously identified. Given this concept, it would then be possible to estimate the percentage of diverted trips.

The Central Arkansas Transit Authority (CATA) currently operates local transit services throughout the residential areas of Central Arkansas, providing good coverage for a metropolitan area the size of Little Rock. CATA serves approximately 10,000 daily trips with a fleet of about 60 buses. CATA does not, however, operate many express routes dedicated to work trips from outlying residential areas to the CBD and other high density employment areas. CATA's operation is, however, comparable to other transit agencies in the Midwest. **Table 3** compares CATA with other transit agencies in the Midwest.

Table 3
Midwest Transit Agency Comparison

Metropolitan Area	Transit Agency	Bus Fleet	Weekday Ridership
Little Rock	**CATA**	**60 buses**	**9,980**
Oklahoma City	COTPA	69 buses	10,240
Tulsa	MTTA	79 buses	10,600
Des Moines	DART	113 buses	16,700
Omaha	Metro	142 buses	15,200
Kansas City	KCATA and JCT	318 buses	57,100

Source: 2012 National Transit Data Base, FTA

The proposed transit concept needed to divert auto trips to transit on I-30 in the 2040 no-build condition would have multiple express routes operating on I-30 and other parts of the freeway system. These routes would be based on park-and-ride lots in the origin areas, which would allow commuters the option to access express transit routes by driving to the park-and-ride lots. The express buses would then operate directly to the CBD or other destination areas, providing a transit trip similar to auto trips in terms of travel time and convenience. This type of express service has been shown to be effective in attracting commuter trips from lower density outlying residential areas. The frequency of service, or headways, would be 30 minutes or better. More frequent service would add transit capacity and convenience, and result in more transit riders.

Transit Mode Shift Estimation

Because Central Arkansas does not currently have this type of premium express service, Kansas City was selected as an analogy from which to "borrow" mode split data. Although a larger metropolitan area, Kansas City is a Midwestern city with demographics and travel patterns similar to Central Arkansas. Three Kansas City commuter corridors were selected as analogies to the I-30 corridor, all of which are 10 to 20 miles in length and connect with the Kansas City CBD. They are: I-35 Olathe, Kansas; I-70 Blue Springs, Missouri; and I-435/470 Lee's Summit, Missouri. These corridors have express transit service with large park-and-ride lots and service frequencies of 20 to 30 minutes. Data available from the transit agency and the 2000 Census CTTP was used to estimate the transit share of the CBD commuter market. Each of the three corridors has a mode split of approximately 10 percent transit during the peak hour. Based on this experience, a mode split of 10 percent was used as the base mode split assumption for the potential Central Arkansas express bus service.

To provide a range for the estimated potential mode shift, two service concepts were defined representing a reasonable range of service applications. The first, referred to as the "Baseline" concept, assumes seven express routes would operate with 30 minute frequency during the peak periods. The second concept, referred to as the "Enhanced" concept, assumes the seven routes would operate with more frequent service between 10 and 15 minutes.

Conceptual Ridership Estimates

Service frequency is one of the most important attributes commuters consider in making decisions regarding the use of transit, and increasing frequency is a proven way to increase transit usage. Transit researchers use service elasticity to predict the change in ridership likely to result from a change in service level. Research has determined a service elasticity of -0.4 for changes in headway. That is, a 40 percent increase in ridership can be expected given a 100 percent reduction in headway. With a change in headway from 30 minutes to 10 minutes (67 percent) an increase in ridership of 27 percent can be expected.

Table 4 shows the potential AM peak hour ridership for each O/D pair given a 30-minute headway.

Table 4. Potential Peak Hour Ridership: Baseline Service (30 Minute Service Frequency)

Potential Ridership: 30-minute Headway					
	A	**B**	**C**	**D**	**Total**
1	86	16	8	6	116
2	74	15	6	5	99
3	99	20	13	9	141
4	150	7	33	19	210
5	171	11	22	22	225
6	172	9	21	19	220
7	62	3	10	10	85
8	27	2	3	4	36
9	316	16	38	48	418
10	406	95	25	17	543
Tot	1,563	194	178	158	**2,094**

Source: HNTB
See Figure 1 for graphical representation of origins and destinations.

Enhanced Service Mode Shift Estimates

Table 5 shows the potential AM peak hour ridership for each O/D pair given more frequent headways of 10 to 15 minutes.

Table 5. Potential Peak Hour Ridership: Enhanced Service (10-15 Minute Service Frequency)

Peak Hour Transit: 10-Minute Headway						
		Destination				
		A	B	C	D	Total
Origin	1	109	21	10	8	147
	2	93	19	8	6	126
	3	125	25	16	11	178
	4	191	9	42	24	266
	5	216	14	28	28	285
	6	217	11	27	24	279
	7	79	4	12	13	108
	8	35	2	4	5	45
	9	401	20	48	61	530
	10	514	120	32	21	688
	Tot	1,980	245	226	201	**2,652**

Source: HNTB
See Figure 1 for graphical representation of origins and destinations.

Transit Bus-on-Shoulder Operation

Further enhancements such as transit priority measures would make the service even more attractive, and possibly attract a higher number of commuters than the baseline or enhanced service described above. Bus-on-shoulder operation, which allows buses to use the freeway shoulder to bypass congested traffic, is a proven approach to making express transit service more effective and attractive. Bus-on-shoulder operation offers many of the same benefits of rail transit, but is less costly to implement. This priority measure would allow buses to use the shoulder when general purpose lane speeds drop below approximately 35 miles per hour, and requires highway shoulders that are 10 to 11 feet wide. Bus-on-shoulder operations are proven to be safe, requiring driver training and discretion on the appropriate uses of the shoulder. Additionally, the speed differential between the freeway general purpose lanes and the bus-on-shoulder does not exceed 10 miles per hour. In Kansas City, a six percent ridership increase was noted in the first year of bus-on-shoulder implementation, and users experienced a 2-7 minute travel time savings, on average. Bus-on-shoulder is not a new concept for Midwestern cities. Other cities such as Minneapolis, MN and Chicago, IL utilize bus-on-shoulder as well. With proper implementation procedures, bus-on-shoulder can be an effective means of increasing ridership.

I-30 Impacts

Not all commuter travel between O/D pairs in this analysis would realistically use I-30 to get from their origin to their destination. To determine the actual vehicle reduction volume on I-30, three screens were used, as shown on **Figure 1**.

- Screen 1: South of the I-30/I-40 interchange (north end of corridor)
- Screen 2: I-30 Arkansas River Bridge (middle of corridor)
- Screen 3: North of the I-30/I-440/I-530 (south end of corridor)

By evaluating trip patterns and the roadway network, it was possible to determine the O/D pairs that would contribute commuter trips crossing each of the screen lines. In some cases, it was determined that no vehicles from an O/D pair would pass over a screen line. In other cases, it was determined that a portion of vehicles from the O/D pair would pass over a screen line. Results are shown in **Tables 6** and **7** in the "Total O/D Pair Trips" column. The 10 percent transit mode split factor was then applied to each of the O/D pair trip volumes to determine the potential diversion to transit. To this point, person trips have been used. To estimate the reduction in the number of auto trips, the transit trips were factored by the auto occupancy rate. The peak period auto occupancy for I-30 is estimated by Metroplan at 1.10. **Tables 6** and **7** show the results of the analysis. The AM/PM mainline volumes are taken from 24-hour traffic counts conducted in 2014 and grown at a 1% growth rate up to projected 2040 volumes.

Table 6. 2040 I-30 AM Peak Hour Work Trips and Transit Trips

Location on I-30	**2040 AM Mainline Volume**	**Total O/D Pair Trips**	**Total Transit Trips**		**Total Auto Trips Diverted**	
			Baseline Scenario (30 min headway)	**Enhanced Service** (10 min headway)	**Baseline Scenario** (30 min headway)	**Enhanced Service** (10 min headway)
Screen 1 - North Little Rock WB	7,545	6,450	640	820	580	750
Screen 1 - North Little Rock EB	4,427	No O/D Pair trips passing the screen in this direction				
Screen 2 - I-30 River Bridge WB	7,565	5,569	560	710	510	650
Screen 2 - I-30 River Bridge EB	4,915	403	40	50	40	50
Screen 3 - South of CBD WB	3,263	No O/D Pair trips passing the screen in this direction				
Screen 3 - South of CBD EB	5,255	4,893	490	620	450	560

Source: HNTB

Table 7. 2040 I-30 PM Peak Hour Work Trips and Transit Trips

Location on I-30	**2040 PM Mainline Volume**	**Total O/D Pair Trips**	**Total Transit Trips**		**Total Auto Trips Diverted**	
			Baseline Scenario (30 min headway)	**Enhanced Service** (10 min headway)	**Baseline Scenario** (30 min headway)	**Enhanced Service** (10 min headway)
Screen 1 - North Little Rock WB	5,602	No O/D Pair trips passing the screen in this direction				
Screen 1 - North Little Rock EB	6,563	6,450	640	820	580	750
Screen 2 - I-30 River Bridge WB	5,478	403	40	50	40	50
Screen 2 - I-30 River Bridge EB	6,914	5,569	560	710	510	650
Screen 3 - South of CBD WB	7,246	4,893	490	620	450	560
Screen 3 - South of CBD EB	3,006	No O/D Pair trips passing the screen in this direction				

Source: HNTB

As shown in **Tables 6 and 7,** the baseline express service can divert 450 to 580 autos over the different screen lines in the peak direction, which is a 6-9% decrease in autos. By reducing the headway from 30 minutes to 10 minutes, 560 to 750 autos can be diverted over the different screen lines in the AM and PM peak directions. That equates to an 8-11% decrease in total mainline auto volume across the three screen lines.

In terms of daily mode shift, the baseline service would provide a 1.33% reduction in vehicles, while the enhanced service would provide a 1.7% reduction in vehicles. While this value seems low in a daily perspective, the service focuses on the peak hours when congestion is most likely to occur. Therefore, the impacts are much larger during the peak hours as illustrated in the preceding paragraph.

Level of Service Impacts

The goal of the I-30 PEL is to achieve LOS D or E during the 2040 peak hour. The following analysis calculates the number of auto users in the I-30 corridor that would need to shift their mode to public transit during the peak hour in order to achieve LOS D or E.

Existing (2014) traffic data was gathered across the I-30 Bridge (screenline 2), which serves as a bottleneck for congestion in existing conditions. The 2040 volume was calculated using a high-level forecast growth rate of 1% per year. LOS thresholds were determined using 2010 Highway Capacity Software (HCS) assuming no-build on I-30, which would be 3 lanes in each direction. Vehicle volumes were then converted to person trips using a 1.10 persons/vehicle auto occupancy factor described above. **Table 8** shows the number of person trips that would need to be diverted in order to reach a level of service E and D for the peak direction. The “threshold” is the maximum number of vehicles per hour for the given level of service. The needed vehicle reduction is the difference between the 2040 volume and the threshold, and the needed person trip reduction is the needed vehicle reduction with the occupancy factor applied. Only the peak direction of travel, AM westbound/PM eastbound, was analyzed.

Table 8. 2040 I-30 Required Number of Diverted Person Trips in the Peak Direction of Travel at Arkansas River Bridge (6-Lane Facility)[1] to Achieve the Desired LOS

			LOS E			LOS D		
Peak Hour Volumes By Direction (Screenline 2)	**2014[2] Volume**	**2040 Volume**	**Threshold**	**Needed Vehicle Reduction**	**Needed Person Trip Reduction**	**Threshold**	**Needed Vehicle Reduction**	**Needed Person Trip Reduction**
AM WB	5,841	7,565	6,770	795	874	5,961	1,604	1,764
PM EB	5,338	6,914	6,633	281	309	5,840	1,074	1,181

Source: HNTB

[1] This analysis is a high level spot analysis at the Arkansas River Bridge and is not a system-wide analysis.
[1] A 0.075 k factor indicates that a higher percent of traffic is occurring outside of the traditional peak hour than normal conditions of 0.08 – 0.12
[2] The traffic volumes represent existing throughput and not demand.

As shown in the table, the AM peak hour would require a larger vehicle and person trip reduction to achieve a desired level of service than the PM peak hour. This is due to the fact that the measured traffic characteristics are different in the AM and PM peak hours, and also differ by direction.

To effectively improve the level of service from F to E with public transit alone, over 870 people (800 vehicles) would need to shift from a personal auto to transit during the morning peak hour in 2040. To improve the level of service from F to D, over 1,750 people (1,600 vehicles) would need to shift form a personal auto to transit during the morning peak hour in 2040.

Table 9 is a summary of the projected and required shift in autos on I-30. The projected auto trip diversions come from **Table 6** across screen line 2. The required auto trip diversions come from **Table 8** during the AM Peak because it shows the largest required vehicle reduction.

Table 9. 2040 I-30 No-build Comparison of Feasible and Required Mode Shifts

Feasible Auto Trips (Screenline 2)		**Required Mode Shift to Achieve Desired LOS**			
		LOS E	**Deficit**	**LOS D**	**Deficit**
Baseline (30 min. headways)	510	795	**-285**	1,604	**-1,094**
Enhanced (10 - 15 min. headways)	650		**-145**		**-954**

Source: HNTB

As the table shows, a minimum of 795 vehicles would need to be diverted in 2040 to improve to LOS E. However, the maximum feasible number of vehicles that can be diverted is 650, assuming route headways of 10 minutes. Therefore, even under the best case transit-only scenario, there is an overflow of nearly 150 vehicles during the peak hour. This does not take into account other TDM strategies that can be used to complement the transit system. While the proposed express service cannot feasibly eliminate the need for capacity improvements on I-30, it can still help to reduce the magnitude of said improvements.

Transit System Concept – System Elements and Costs

This section describes the transit system that could achieve the mode shift and trip diversion described in the previous sections. Although the transit system description is at a very high conceptual level, it is sufficiently developed to prepare an order-of-magnitude estimate of capital and operating costs to evaluate the feasibility of the approach. Both the Baseline Transit Option (30 minute headways) and the Enhanced Transit Service Option (10 minute headways) are described.

The transit system would be comprised of multiple express routes using standard transit buses similar to those currently operated by CATA. A key component of the transit system is a series of park-and-ride lots located in the origin areas. The vast majority of transit commuters from suburban areas use auto access due to the configuration of the transit service and the convenience. The ability of transit to provide travel times similar to auto times is critical to attracting suburban commuters. Thus, express service using the freeway system with limited stops is a requirement.

Transit Service Plan Development

Table 10 shows the estimated ridership over screen 2 for seven hypothetical express bus transit routes that would use I-30 to link the defined origin zones with central employment areas in Central Arkansas. This portion of the analysis considers the cost to implement a transit system that will reduce traffic on I-30. Therefore, the ridership shown below is the number of passengers passing over screen 2. Since the O/D matrix used for this high level analysis is mirrored between the AM and PM peaks, the following ridership applies to either the AM or the PM peak. It is assumed that all AM passengers travel from home to work and all PM passengers travel from work to home. **Attachment 1** shows the defined origin and destination zones.

Table 10: Estimated Ridership by Origin Zone – Daily One-way Person Trips

Origin Zone	Baseline	Enhanced	Route
Area 1	116	147	1
Area 2	99	126	2
Area 3	99	125	3
Area 4	0	0	
Area 5	182	230	57
Area 6	180	229	6
Area 7	66	83	57
Area 8	29	37	89
Area 9	332	421	89
Area 10	543	688	10
Totals	1,645	2,084	

Source: HNTB

Note that trips to and from area 4 did not have an impact on I-30. Therefore, it was not considered in the cost analysis.

Tables 11a and **11b** show elements of the service plan for these routes. It was necessary to create a conceptual service plan for the basis of estimating capital and operating costs.

Table 11a: Service Plan Elements and Required Buses – Baseline Scenario

Routes	1-way Distance (miles)	Average Speed (MPH)	Round Trip Time (minutes)	Headway (minutes)	Trips Per Peak Period	Buses
1	20	20	125	30	6	4.2
2	16	20	101	30	6	3.4
3	13	20	83	30	6	2.8
57	15	17	111	20	9	5.5
6	20	20	125	20	9	6.3
89	12	17	90	15	12	6.0
10	10	15	85	10	18	8.5
Total						37

Source: HNTB

Table 11b: Service Plan Elements and Required Buses – Enhanced Scenario

Routes	1-way Distance (miles)	Average Speed (MPH)	Round Trip Time (minutes)	Headway (minutes)	Trips Per Peak Period	Buses
1	20	20	125	15	12	8.3
2	16	20	101	15	12	6.7
3	13	20	83	15	12	5.5
57	15	17	111	15	12	7.4
6	20	20	125	15	12	8.3
89	12	17	90	10	18	9.0
10	10	15	85	10	18	8.5
Total						54

Source: HNTB

Capital Cost Estimation

Capital costs were estimated for both scenarios for three elements: buses, park and ride lots and maintenance and operating facilities. CATA's current fixed bus fleet is about 60 vehicles. It was assumed that a substantial increase in fleet size would require a new facility or a major expansion of the existing facility. Capital costs were based on the following assumptions:

- All costs are in 2014 dollars.
- Buses - $450,000 per unit with 20 percent spare vehicles.
- Park and ride lots – each of the seven routes would have at least one lot, sized based on the estimated ridership. Costs were based on a unit cost of $10,000 per space to cover items including passenger amenities, landscaping, lighting, drainage and property acquisition, as well as constructing the lot itself.
- Facility costs were estimated as a range from $7 million to $13 million.

Tables 12a and **12b** show the capital cost estimates.

Table 12a: Capital Cost Estimates - Baseline Scenario

Routes	Bus cost (inc. spares)	Park & Ride Spaces	P&R Lot Cost	Facility	Total
1	$2,250,000	127	$1,273,656		
2	$1,818,000	109	$1,090,555		
3	$1,494,000	109	$1,088,848		
57	$2,993,824	272	$2,719,571		
6	$3,375,000	198	$1,984,776		
89	$3,229,412	397	$1,985,412		
10	$4,590,000	299	$2,985,451		
Total	$19,750,235	1,511	$13,128,268	$7,000,000	$39,880,000

Source: HNTB

Table 12b: Capital Cost Estimates - Enhanced Scenario

Routes	Bus cost (inc. spares)	Park & Ride Spaces	P&R Lot Cost	Facility	Total
1	$4,500,000	161	$1,613,298		
2	$3,636,000	138	$1,381,369		
3	$2,988,000	138	$1,379,207		
57	$3,991,765	344	$3,444,790		
6	$4,500,000	251	$2,514,049		
89	$4,844,118	503	$2,514,855		
10	$4,590,000	378	$3,781,572		
Total	$29,049,882	1,914	$16,629,140	$13,000,000	$58,681,000

Source: HNTB

Operating Cost Estimation

Operating costs were estimated by applying an hourly unit cost to estimated revenue hours taken from the conceptual service plans. The unit cost was taken from CATA's 2012 National Transit Database (NTD) submittal, and escalated by 3 percent per year to 2014. Fully allocated costs were used, which is appropriate for this magnitude of service increase.

Tables 13a and **13b** show the estimated annual operating costs.

Table 13a: Operating Cost Estimates - Baseline Scenario

Routes	Revenue Hours	Operating Cost	Passenger Revenue	Net Cost
1	8,925	$741,000	$118,000	$623,000
2	7,701	$639,000	$101,000	$538,000
3	6,783	$563,000	$101,000	$462,000
57	11,033	$916,000	$252,000	$664,000
6	12,113	$1,005,000	$184,000	$821,000
89	11,700	$971,000	$368,000	$603,000
10	15,555	$1,291,000	$554,000	$737,000
Total	73,809	$6,126,000	$1,678,000	$4,448,000

Source: HNTB

Table 13b: Operating Cost Estimates - Enhanced Scenario

Routes	Revenue Hours	Operating Cost	Passenger Revenue	Net Cost
1	15,300	$1,270,000	$150,000	$1,120,000
2	12,852	$1,067,000	$128,000	$939,000
3	11,016	$914,000	$128,000	$786,000
57	13,860	$1,150,000	$319,000	$831,000
6	15,300	$1,270,000	$233,000	$1,037,000
89	16,275	$1,351,000	$466,000	$885,000
10	15,555	$1,291,000	$701,000	$590,000
Total	100,158	$8,313,000	$2,125,000	$6,188,000

Source: HNTB

Cost Summary

Table 14 shows the capital and operating costs (in millions) for both scenarios.

Table 14: Cost Summary

Scenario	Capital Cost	Annual Operating Cost
Baseline Scenario	$39.9	$4.4
Enhanced Scenario	$58.7	$6.2

Source: HNTB

Transportation Demand Management (TDM)

There are a number of transportation demand management (TDM) strategies that can be utilized to complement the transit system and generally improve the landscape of transportation in Central Arkansas. TDM strategies are most effective when multiple strategies are used to complement each other. For instance: enhancing transit services and improving sidewalks from bus stops to the final destination. A comprehensive assessment of the benefits of Transportation Demand Management is discussed in a separate report.

Comparison to Areawide Freeway Study (2003)

The Central Arkansas Regional Transportation Study (CARTS) Areawide Freeway Study, Phase I, 2003 included a transit study to evaluate the feasibility of light rail along four corridors in the Central Arkansas region: I-30 SW, I-40 NW, Route 67 NE and I-630 east. In comparison, this transit analysis evaluates the feasibility of a limited express commuter bus service in the 2040 no-build condition in order to determine possible benefits to the I-30 PEL study area.

The Areawide Freeway Study covered up to 25 miles from the central business district (CBD) and used Portland, Oregon as a basis for mode split, while this transit analysis investigates commuter patterns up to approximately 20 miles from the Little Rock CBD and uses three comparable bus routes in the Kansas City area as a basis for mode split. Conclusions for the Areawide Freeway Study were based on daily ridership projections, and concluded that light rail transit in two of the four corridors would result in up to a 3% decrease in daily vehicular bridge crossings, which would not have a significant effect on the future bridge level of service (LOS) and operational characteristics. Comparatively, this analysis evaluated the AM and PM peak hours transit benefits to the I-30 PEL Study area. Peak hour mode shift is thought to be more relevant when considering the potential effect that transit can have on I-30 capacity than the daily mode shift provided in the 2003 study.

Table 15 shows the comparison between the results of the Areawide Freeway Study (2003) and I-30 PEL transit analysis.

Table 15. Mode Shift Comparisons

	Areawide Freeway Study (2003)	I-30 PEL	
	Proposed Condition	Baseline Service	Enhanced Service
Peak Hour Mode Shift	--	6-9%	8-11%
Daily Mode Shift	up to 3%	1.33%	1.70%

This study predicts approximately half the daily mode shift that the Areawide Freeway Study predicts. However, the peak hour mode shift illustrates the potential usefulness of a commuter bus system.

Conclusions

Transit in the Central Arkansas I-30 corridor was analyzed at a high-level as part of the CA0602 I-30 Planning and Environmental Linkages (PEL) project. The transit analysis answered the following questions.

1. **Using available Metroplan information on travel patterns, commuter patterns, and land use, what is the estimated mode shift under the most ideal reasonable transit scenario?**

   The transit analysis concluded that the baseline express service, with a 30 minute headway, can divert 450 to 580 autos in the peak direction, which represents a 6% - 9% decrease in autos on I-30. By increasing transit service frequency from 30 minutes to 10 minutes, 560 to 760 autos can be diverted in the peak directions. That equates to an 8% - 11% decrease in total mainline auto volume across the three screen lines.

2. **What mode shift is required, in terms of auto trips diverted to transit, to achieve a material positive effect on traffic volumes and volume/capacity relationship on I-30?**

   The transit analysis concluded that a minimum of 795 vehicles passing over screenline 2 (I-30 Arkansas River Bridge) would need to be diverted from auto to transit on I-30 in 2040 to improve from LOS F to LOS E with the existing 6-lane facility. However, the maximum feasible number of vehicles that can be diverted over screenline 2 is 650, assuming route headways of 10 minutes. Therefore, even under the best case transit-only scenario, there is a deficit of nearly 150 vehicles during the 2040 no-build peak hour to achieve LOS E. Bus on shoulder does provide an additional 6 percent ridership increase over the baseline condition based on empirical Kansas City data. Other communities where bus on shoulder exists may have an even greater ridership increase. **Table 16** summarizes these results.

Table 16. 2040 No-build (6-lane I-30) Comparison of Feasible and Required Mode Shifts

Feasible Auto Trips (Screenline 2)		**Required Mode Shift to Achieve Desired LOS**			
		LOS E	**Deficit**	**LOS D**	**Deficit**
Baseline (30 min. headways)	510	795	**-285**	1,604	**-1,094**
Enhanced (10 - 15 min. headways)	650		**-145**		**-954**

Source: HNTB

The transit enhancements of this type have both capital and operating cost components. A key element of the transit system is a series of park-and-ride lots. **Table 17** shows the estimated capital and operating costs for new buses, park-and-ride lots, and facilities.

Table 17. Transit System Costs (Millions of 2014 Dollars)[1]

Scenario	**Capital Cost**	**Annual Operating Cost**
Baseline Scenario	$39.9	$4.4
Enhanced Scenario	$58.7	$6.2

Source: HNTB

[1] Does not include Bus on Shoulder improvements.

While neither of the proposed express transit systems alone can eliminate the need for I-30 infrastructure improvements, transit enhancements can reduce the magnitude of improvements needed. Other transit enhancements such as Bus on Shoulder or Transportation Demand Management strategies can also be used to complement the transit system and the overall I-30 solution.

Attachment C: Level 2B Transportation Analysis

Traffic Analysis to Support Level 2B Assessment	Source	Notes	AM Peak Direction Only	6-Lane	8-Lane	10-Lane	12-Lane	AM Peak Direction Only	6-Lane		8-Lane		10-Lane		12-Lane		PM Peak Direction Only	6-Lane		8-Lane		10-Lane		12-Lane		PM Peak Direction Only	6-Lane	8-Lane	10-Lane	12-Lane
				A3	A3	A3	A3		A1	A2	A1	A2	A1	A2	A1	A2		A1	A2	A1	A2	A1	A2	A1	A2		A3	A3	A3	A3
				NB	NB	NB	NB		SB	SB	SB	SB	SB	SB	SB	SB		NB	NB	NB	NB	NB	NB	NB	NB		SB	SB	SB	SB
2041 Base Forecast Demand	CA0602 Traffic Count and Forecast Plan	2041 HNTB forecast. Based on 8-lane metroplan forecast. This forecast represents the **Base** condition. The Base condition is highlighted.		8,800	8,800	8,800	8,800		6,100	7,600	6,700	7,800	6,100	7,600	6,100	7,600		7,400	7,400	7,400	7,400	7,400	7,400	7,400	7,400		8,500	8,200	8,500	8,500
Highway - Build																														
Interchange Improvements																														
Mainline Widening	Metroplan - \\kcow00\jobs4\59984\TransPlan\Traffic_Counts\20140708_AHTD_CA0602_Traffic.xlsx	Run 3 = 6-lane, Run 5 = Base, Run 7 = 10-lane. Look at raw data from AHTD to determine percent vehicles traveling in peak hour. Percent change in model volumes was applied to base condition.		-415		239	477		-255	-929			101	492	203	984		-310	-905			123	479	246	958		-401		230	461
I-30 Arkansas River Bridge																														
Replacement		No Impact on I-30 demand																												
Rehabilitation																														
Complimentary Strategies																														
Highway - Build																														
Ramp Consolidation / Elimination		No Impact on I-30 demand																												
Intersection Improvements		No Impact on I-30 demand																												
Bottleneck Removal		No Impact on I-30 demand																												
Auxiliary Lanes		No Impact on I-30 demand																												
Roadway Shoulder Improvements		No Impact on I-30 demand																												
Horizontal / Vertical Curve Improvements		No Impact on I-30 demand																												
Frontage Road Improvements		No Impact on I-30 demand																												
Collector/Distributor (C/D) Roads	Assumption	Assumes GP lanes plus CD (ie. 8-Lane = 8 GP plus 1 CD). No volume change as it is eather GP lanes or C/D road.			0	0	0				0	0	0	0	0	0				0	0	0	0	0	0			0	0	0
Mainline Pavement Rehabilitation		No Impact on I-30 demand																												
Bypass Route	Metroplan	Run 4 = 6-lane, Run 6 = 8 lane (base), Run 9 = 10 lane. How much traffic came off mainline comparing run 4 to run 3, etc.																												
Other Modes																														
I-30 Express Bus Transit	I-30 PEL Transit Analysis	450 - 580 autos reduced (1.1 occupancy). Used graduated scale.		-534	-497	-459	-422		-704	-608	-655	-565	-605	-523	-556	-480		-704	-608	-655	-565	-605	-523	-556	-480		-534	-497	-459	-422
Bus on Shoulder	I-30 PEL Transit Analysis	6% ridership increase		-32	-30	-28	-25		-42	-36	-39	-34	-36	-31	-33	-29		-42	-36	-39	-34	-36	-31	-33	-29		-32	-30	-28	-25
Bicycle / Pedestrian		No Impact on I-30 demand																												
Arterial Bus Transit		No Impact on I-30 demand																												
Commuter Rail	Metroplan	Commuter Rail and light rail was combined. Under fixed guideway. Compare run 5 to run 13 for eight lane, compare run 3 to run 11 for six-lane, for 10 and 12 lane we will have to make some assumptions. Assumes the same outcome for 10 and 12 lane since no scenario for fixed guideway was analyzed for 10 and 12 lane.																												
Light Rail (Street Car)	Metroplan	Leave as zero's, because fixed guideway includes both commuter rail and light rail.																												
Arterial Bus Rapid Transit		No Impact on I-30 demand																												
Arterial Bus Lanes		No Impact on I-30 demand																												
Congestion Management																														
Travel Demand Management	http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_95c19.pdf	TRB Publication. Page 19-15. Using a 2% reduction.		-168	-176	-181	-186		-117	-133	-134	-156	-124	-162	-126	-172		-142	-130	-148	-148	-150	-158	-153	-167		-162	-164	-175	-179
Information Systems / Advanced Traveler Information	Research	Insufficient data available		0	0	0	0		0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0		0	0	0	0
Transportation System Management (TSM)	Research	http://www.its.berkeley.edu/publications/UCB/2011/RR/UCB-ITS-RR-2011-2.pdf. The present findings unveil a mechanism of periodic flow recovery through a freeway bottleneck. Repeated experiments indicate that this mechanism can be modulated to favorable ends. The resulting 3% average gain in long-run discharge flow. Data is zero because of Arterial only benefits.		0	0	0	0		0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0		0	0	0	0
Wayfinding / Signage																														
Ramp Metering	http://www.dot.state.mn.us/rampmeter/study.html	9% increase in vol. w/ ramp meters due to increased throughput		755	704	633	557		526	600	536	624	434	566	378	515		638	585	592	592	527	552	459	501		729	656	611	538
Arterial Improvements		No Impact on I-30 demand																												
Reversible Lanes																														
Hard Shoulder Running																														
Land Use Policy																														
Managed Lanes																														
Non-Recurring Congestion																														
Crash Investigation Sites																														
Roadside / Motorist Assist Enhancements																														
Improvements to Detour Routes																														
Variable Speed Limits (Speed Harmonization)																														
Queue Warning																														
Adjusted Base Forecast				8,406	8,801	9,004	9,201		5,507	6,493	6,408	7,669	5,870	7,942	5,965	8,418		6,840	6,306	7,150	7,245	7,258	7,719	7,362	8,184		8,100	8,165	8,680	8,872
Change in Volume				-394	1	204	401		-593	-1,107	-292	-131	-230	342	-135	818		-560	-1,094	-250	-155	-142	319	-38	784		-400	-35	180	372
Change in Percent				-5%	0%	2%	4%		-10%	-15%	-4%	-2%	-4%	5%	-2%	11%		-8%	-15%	-3%	-2%	-2%	4%	-1%	11%		-5%	0%	2%	4%
Overall HCM LOS Result				F	F	D	C		D	E	D	E	C	D	B	C		F	E	D	D	C	C	C	C		F	E	D	C
				6-Lane	8-Lane	10-Lane	12-Lane		6-Lane		8-Lane		10-Lane		12-Lane			6-Lane		8-Lane		10-Lane		12-Lane			6-Lane	8-Lane	10-Lane	12-Lane
				A3	A3	A3	A3		A1	A2	A1	A2	A1	A2	A1	A2		A1	A2	A1	A2	A1	A2	A1	A2		A3	A3	A3	A3
			AM	NB	NB	NB	NB	AM	SB	SB	SB	SB	SB	SB	SB	SB	PM	NB	NB	NB	NB	NB	NB	NB	NB	PM	SB	SB	SB	SB

Alternative being eliminated from 2A

2041 Peak Direction AM		A-D	E	F	2041 Peak Direction PM		A-D	E	F
6					6				
A1 I-40	A1, SB	1			I-40	A1, NB			1
A2 I-30 N. Bridge	A2, SB		1		I-30 N. Bridge	A2, NB		1	
A3 I-30 South	A3, NB			1	I-30 South	A3, SB			1
8					8				
A1 I-40	A1, SB	1			I-40	A1, NB	1		
A2 I-30 N. Bridge	A2, SB		1		I-30 N. Bridge	A2, NB	1		
A3 I-30 South	A3, NB			1	I-30 South	A3, SB		1	
10					10				
A1 I-40	A1, SB	1			I-40	A1, NB	1		
A2 I-30 N. Bridge	A2, SB	1			I-30 N. Bridge	A2, NB	1		
A3 I-30 South	A3, NB	1			I-30 South	A3, SB	1		
12					12				
A1 I-40	A1, SB	1			I-40	A1, NB	1		
A2 I-30 N. Bridge	A2, SB	1			I-30 N. Bridge	A2, NB	1		
A3 I-30 South	A3, NB	1			I-30 South	A3, SB	1		

HCM Basic Mainline Analysis

Notes:

1. Analysis performed in the peak direction only.
2. High level traffic analysis at 3 locations along the study corridor defined as A1, A2 and A3 as shown on the map.
3. Analysis would not include traffic operations as a result of weaving, merging, diverging, or downsteam congestion.
4. Base traffic demand developed in the *CA0602 Traffic and Forecast Plan submitted to AHTD, December, 2014.*
5. *LOS was calculated based on the following table based on HCM 2010 information.*

HCS 2010 LOS Thresholds	A	B	C	D	E	F
6-Lane	0	2090	3416	4701	5729	6507
8-Lane	0	2786	4554	6268	7638	8676
10-Lane	0	3483	5692	7835	9547	10844
12-Lane	0	4179	6831	9401	11457	13013

Attachment D: Environmental Screening

<u>**Environmental Screening**</u>

Level 2A – General Methodology

Potential direct impacts to the environmental measures were evaluated based on the anticipated footprints of the Preliminary Alternatives. For some of the Preliminary Alternatives such as main lane widening, Collector/Distributor (C/D) roads, and frontage roads, a generalized project footprint was known and potential direct environmental impacts assessed qualitatively. The qualitative rating system was based on a gradient scale, with potential beneficial direct impacts receiving positive ratings, no impacts receiving a neutral rating, and potential adverse direct impacts receiving negative ratings. This gradient rating system is shown in **Table D-1** below, along with the corresponding scores.

Table D-1. Qualitative Rating System

Rating	Score	Evaluation
+ +	2	Substantial positive effects
+	1	Some positive effects
O	0	Neutral effects
–	-1	Some negative effects
– –	-2	Substantial negative effects

For other Preliminary Alternatives, however, the general project footprint has either not been designed at this stage of screening (such as interchange improvements) or would likely be implemented by others (such as improvements to arterial and detour routes) who would determine the size and location of the project footprint. For Preliminary Alternatives matching either of these descriptions, it is difficult to determine the nature (beneficial or adverse) and level/severity of potential environmental impacts, and accordingly, impacts to environmental resources were scored as neutral (“0”).

Level 2A - EJ/LEP Screening

For the Level 2A Screening, potential direct impacts to Environmental Justice/Limited English Proficiency (EJ/LEP) populations were assessed by a series of three Yes or No questions:

- *Question 1:* Are EJ/LEP populations present in the study area?
- *Question 2:* Is there a potential for adverse direct impacts to EJ/LEP populations?
- *Question 3:* Is there a potential for beneficial impacts and/or mitigation to offset adverse impacts to EJ/LEP populations?

Question 1 set the stage for the EJ/LEP evaluation, such that if EJ/LEP populations were determined present, then the evaluation of potential impacts to those EJ/LEP populations continued to Questions 2 and 3. As Question 1 determined presence or non-presence only, a neutral rating (“0”) was given for both Yes (EJ/LEP populations present) and No (EJ/LEP populations not present) ratings.

Question 2, the potential for adverse impacts to EJ/LEP populations, was based on the following conditions: If additional ROW is anticipated and EJ/LEP populations are present in the study area, then the potential for displacements (i.e., adverse impacts) to EJ/LEP populations was assumed.

Question 3 evaluated an alternative's ability to provide beneficial impacts and/or offset adverse direct impacts resulting from potential displacements to EJ/LEP populations. Given that all of the Preliminary Alternatives would be designed to either improve mobility, safety, other transportation modes, community cohesion, etc., all of which would be beneficial to all populations, including EJ/LEP populations, then the potential for beneficial impacts or the ability to mitigate for adverse direct impacts to EJ/LEP populations was assumed.

The EJ/LEP rating system for Level 2A is presented in **Table D-2**.

Table D-2. Level 2A EJ/LEP Rating System

Question	Evaluation	Rating	Score	Evaluation	Rating	Score
Question 2: Is there a potential for adverse impacts to EJ/LEP populations?	Additional ROW and EJ populations present = potential for EJ/LEP displacements assumed	yes	-1	No Additional ROW, thus the potential for displacements to EJ/LEP populations not anticipated	no	1
Question 3: Is there a potential for beneficial impacts and/or mitigation to offset adverse direct impacts to EJ/LEP populations?	Anticipated potential to improve mobility, safety, alternative transportation modes, cohesion, etc.	yes	1	No anticipated potential to improve mobility, safety, alternative transportation modes, cohesion, etc.	no	-1

Note: Question 1 determined presence or non-presence of EJ/LEP populations in the study area. If yes, then analysis continued to Questions 2 and 3. Because Question 1 was an analysis of presence or non-presence only, a neutral rating ("0") was given for both Yes (EJ/LEP populations present) and No (EJ/LEP populations not present) ratings.

Level 2A – Other Assumptions

Other assumptions utilized in the assessment of potential direct impacts to environmental measures in the Level 2A Screening include:

- The qualitative rating system described in **Table D-1** was utilized for all environmental measures, except EJ/LEP, which utilized the qualitative scale in **Table D-2**.

- Because potential direct impacts to environmental resources were evaluated based on the anticipated footprints of the Preliminary Alternatives, impacts were generally assumed to be neutral if additional ROW was not anticipated for all environmental measures.
- If additional ROW was anticipated, the potential for displacements was assumed.
- If added capacity was anticipated, the potential for noise impacts was assumed.

The Level 2A Screening matrix in which all environmental measures are scored for each Preliminary Alternative according to the above methodology and assumptions is presented in **Section 2.1** of the main document.

Level 2B – General Methodology

For the Level 2B Screening, impacts to environmental measures were assessed using the general footprint for each Basic Scenario. Utilizing ArcGIS, these footprints were overlaid with the identified environmental constraints of the I-30 PEL study area. Given that many of the Complimentary Alternatives would either be implemented by other agencies in the future or the design has not been fully developed at this level of screening, the footprint and location of many complimentary alternatives remains unknown. Accordingly, at the Level 2B screening, all environmental impacts were assessed within the known footprints of the 6-Lane, 8-Lane, 8-Lane C/D, 10-Lane, 10-Lane C/D, and 12-Lane Basic Scenarios, exclusive of interchanges. The same qualitative rating system (**Table D-2**) used for the Level 2A Screening was also used for Level 2B, except for the EJ/LEP measure. **Table D-3** presents the Level 2B scoring thresholds and methodology by environmental measure. **Table D-4** presents the Level 2B qualitative rating system for EJ/LEP.

Table D-3. Level 2B Screening Scoring and Methodology

<table>
<tr><th>Category</th><th colspan="2">Environmental Measures</th><th>Scoring Thresholds and Additional Information[1]</th></tr>
<tr><td rowspan="5">Community Impacts</td><td colspan="2">Potential direct impacts to ROW/parcels/structures</td><td>Rating based on number of parcels potentially directly impacted.
• No parcel impacts anticipated = “0”;
• 1 - 40 parcels potentially directly impacted = “-“;
• More than 40 parcels potentially directly impacted = “- -"</td></tr>
<tr><td colspan="2">Potential displacements / structures impacted (billboards)</td><td>Rating based on number of potential displacements / structures impacted.
• No displacements / structures impacts anticipated = “0”;
• 1 - 15 properties potentially displaced / structures impacted = “-“;
• More than 15 properties potentially displaced / structures impacted = “- -“</td></tr>
<tr><td rowspan="3">EJ/LEP</td><td>Question 1: EJ/LEP populations present?</td><td rowspan="3">See Tables D-2 and D-4.</td></tr>
<tr><td>Question 2: Potential for adverse impacts?</td></tr>
<tr><td>Question 3: Potential for beneficial impacts and/or reasonable mitigation?</td></tr>
</table>

Category	Environmental Measures	Scoring Thresholds and Additional Information[1]
Cultural Resource Impacts	Potential impacts to recorded archaeological sites	Rating based on the number of recorded archaeological sites potentially impacted. Note: Only one recorded site is located within existing ROW, but the site would not be directly impacted by any of the proposed Basic Scenarios. Accordingly, all Basic Scenarios scored “0”.
	Potential impacts to NRHP or NRHP-eligible sites	Rating based on the number of NRHP or NRHP-eligible sites potentially impacted. No impacts anticipated = “0” Note: Only the 12-Lane East and West Basic Scenarios would impact the MacArthur Park Historic District; no other NRHP or NRHP eligible sites potentially impacted by any other Basic Scenarios. Accordingly, the 12-Lane East and West Scenarios scored “- -".
Natural Resource Impacts	Potential impacts to parks	All main lane widening and C/D Basic Scenarios potentially directly impact parks adjacent to/nearby the Arkansas River (Riverfront Park, Riverfront Park East & West, and Clinton City Park). Accordingly, potential direct impacts to parks rated based on the width of anticipated typical section of the Basic Scenarios at the I-30 Arkansas River Bridge: the wider the typical section, the greater the anticipated impacts. • No impacts anticipated = "0"; • Typical Section width below 190 feet = “-“; • Typical section width190 foot or greater = "- -"
	Potential impacts to surface water crossings, wetlands	Metric utilized to rate potential impacts was the typical section width of the proposed new Arkansas River Bridge crossing, with the wider the typical section, the greater anticipated impacts to surface water crossings and wetlands. At this stage of the analysis, the scenarios have not been designed to a degree where a quantification of potential impacts to other water crossings throughout the study area is possible; this will be completed as part of the Level 3 analysis. • No new impacts to surface water crossings at the Arkansas River= "0" • Typical Section width at the Arkansas River Bridge below 190 feet = “-“ • Typical section width at the Arkansas River Bridge 190 foot or greater = "- -"
	Potential impacts to listed and non-listed species and/or habitat, and rare locally important species	Ratings based on the number of new habitat areas potentially directly impacted. • Only maintained herbaceous ROW impacted = "0"; • 1 – 6 new areas impacted = “-“; • 6 or more new areas impacted = "- -"
Other Impacts	Potential impacts to high risk hazardous material sites	Ratings based on the number of encroachments and potential impacts to a high risk hazardous material site. • No encroachment on sites and pavement edge within existing ROW = "0"; • 1-2 encroachments and potential impacts to site(s) = "-"; • 3+ encroachments and potential impacts = "- -"

Category	Environmental Measures	Scoring Thresholds and Additional Information[1]
Other Impacts	Potential noise impacts	Ratings based on the potential impact to parcels containing sensitive receivers (i.e., residences, schools, churches, daycares, or parks) and the likely ability to mitigate for noise impacts (via noise walls if voted on by affected property owners). • No impacts anticipated = "0"; • Potential impacts anticipated, but based on the number and location of receivers, noise mitigation anticipated to be feasible and reasonable (mitigation likely) = "-"; • Potential impacts anticipated, and noise mitigation unlikely to be feasible and reasonable = "- -"

*Note: [1] The qualitative rating system described in **Table D-1** was utilized for all environmental measures, except EJ/LEP, which utilized the qualitative scale in **Table D-4** below.*

Level 2B – EJ/LEP Screening

For Level 2B Screening, the same series of three questions were used to assess potential direct impacts to EJ/LEP populations.

- *Question 1:* Are EJ/LEP populations present in the study area?
- *Question 2:* Is there a potential for adverse direct impacts to EJ/LEP populations?
- *Question 3:* Is there a potential for beneficial impacts and/or mitigation to offset adverse impacts to EJ/LEP populations?

The methodology and scoring for Questions 1 and 3 were identical to that of Level 2A (see **Table D-2**). Utilizing the known footprints of the Basic Scenarios, the potential for adverse impacts to EJ/LEP populations (Question 2), was determined based on the anticipated number of displacements located in a census area with high minority populations, low-income populations, and/or LEP populations. The Level 2B Screening EJ/LEP rating system is presented in **Table D-4**.

Table D-4. Level 2B EJ/LEP Rating System

Question [1]	Evaluation	Rating	Score
Question 2: Is there a potential for adverse impacts to EJ/LEP populations?	1- 5 potentially displaced residences in EJ/LEP census area	yes	-1
	More than 5 potentially displaced residences in EJ/LEP census area	YES	-2
	Residential displacements within EJ/LEP census areas not anticipated	no	1

*Note: [1] The methodology and scoring for Questions 1 and 3 were identical to that of Level 2A (see **Table D-2**).*