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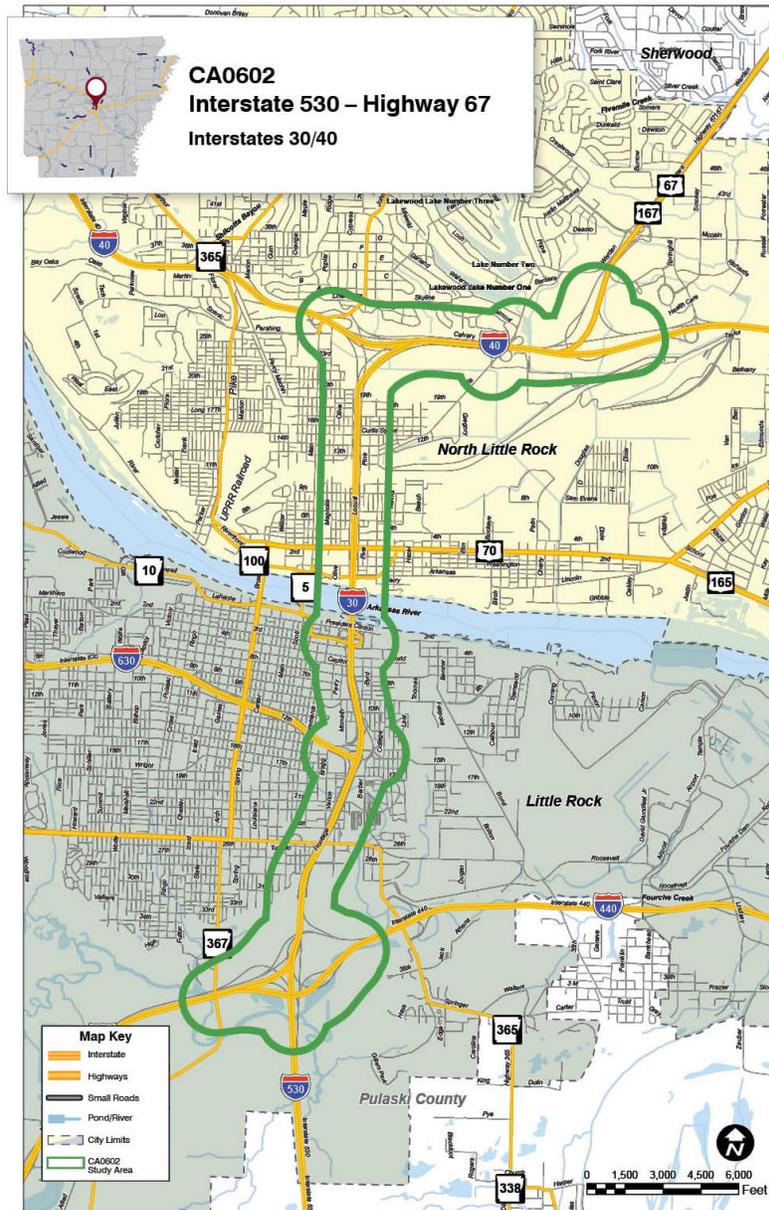


**CARTS FREEWAY SYSTEMS ANALYSIS  
And  
LRMTP IMPACT  
Of the  
CA0602 I-30 CORRIDOR CAP IMPROVEMENTS**

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September 2015  
Version 1**

## Introduction

The Arkansas State Highway and Transportation Department is proposing to reconstruct and widen I-30 and I-40 within Little Rock and North Little Rock between I-530 and US Hwy 67/167, including replacing the I-30 Bridge over the Arkansas River. A Planning and Environmental Linkages study was recently completed to determine alternative(s) to carry forward into NEPA. The study area is shown below.



Metroplan recommended that the PEL study scope and study area be expanded to include: a regional systems analysis, consideration of the findings from the systems analysis on financial constraint for both the long-range plan and TIP, and the project's broader impacts on local travel patterns and circulation.

## **Project Cost/Financing**

Before the project can be considered for the Long-Range Metropolitan Transportation Plan (LRMTP) or the Transportation Improvement Program its full cost and funding sources must be known. Funding for the project is partially provided by the Connect Arkansas Program (CAP) in the amount of \$427 million (\$300 million for construction). In addition, \$22.7 million in Interstate Reconstruction funding is allocated for the reconstruction of the existing travel lanes on I-40 between US 67/167 and I-30. Federal Bridge Replacement funds are expected to be applied to the replacement of the I-30 Bridge while the department requested \$200 Million in TIGER funds to complete the project. The Arkansas State Highway and Transportation Department has received approval to seek contracts for Design-Build and Finance for the project to provide the gap financing for any unfunded improvements as part of the project. Funds to repay the gap financing will be pledged from future state and federal revenue sources

Metroplan will utilize a cost estimate of \$750 Million for the project until an estimate and funding sources is provided by the project sponsor – this estimate is comprised of the \$427 Million in CAP funds, \$22.7 Million in Interstate Reconstruction, \$100 Million in Bridge Replacement, and \$200 Million in TIGER Grant Request/Gap Financing.

Construction is scheduled to begin in 2017 or 2018 and finish in 2022.

## **Planning and Environmental Linkages Study (2014-2015)**

Garver Engineers, on behalf of the Arkansas State Highway and Transportation Department, conducted a Planning and Environmental Linkages (PEL) Study for the I-30 corridor beginning in April 2014. This study links the planning and environmental phases of the project by identifying the project purpose and need, an initial alternatives list, and recommending reasonable alternative(s) to carry forward into the National Environmental Policy Act (NEPA) studies.

### **PEL Recommendation**

The PEL Recommended Alternative is for a ten-lane cross-section along I-30 and I-40 from I-530 to Hwy 67 and includes a collector/distributor network consisting of twelve total lanes across the Arkansas River.

### **Associated Widening**

During the analysis of alternatives in the PEL, it was determined that additional widening of I-630 west to University Avenue and I-30 west to 65<sup>th</sup> Street, both outside the study area, would be necessary to avoid vehicles queuing into the corridor and affecting traffic operations. Studies are planned for both of these corridors; however, there is no financial commitment or budget allocation by the Arkansas State Highway and Transportation Department to construct, nor, as yet, a timetable for constructing those additional improvements. While not part of the official “PEL Recommended Alternative” or scheduled construction project, these improvements were assumed as part of the project’s justification and as such will be considered “Associated Widening” within the systems analysis.

\*Full documentation of the PEL Study and Recommended Alternative can be found at <http://connectingarkansasprogram.com/interstate-30-pel-report>

## Report Purpose - CA0602 System Analysis

It is anticipated that this project will require an amendment to the LRMTTP prior to a Finding of No Significant Impact or its inclusion on the TIP. This report is intended (1) to inform the NEPA process for the project and (2) for use by MPO Committees and Board in considering the impact on the LRMTTP of any plan amendment that may be proposed by the Arkansas State Highway and Transportation Department. Specific objectives are to:

1. Gauge the regional mobility impacts of various improvement alternatives considered within the I-30 Central Corridor,
2. Identify freeway system bottlenecks resulting from or worsening as a result of the project,
3. Determine financial implications of the proposed improvements and any policy changes to the Long-Range Metropolitan Transportation Plan that will be required to accommodate the project and the other system improvements that will logically result from it, and
4. Identify needs for additional systems analysis or unanswered questions.

## Long-Range Metropolitan Transportation Plan – Imagine Central Arkansas

Metroplan is the designated Metropolitan Planning Organization responsible for the development of the Long-Range Metropolitan Transportation Plan (LRMTTP) for central Arkansas. The LRMTTP establishes transportation policies and strategies for meeting the mobility needs of the region while defining a set of financially constrained projects for the next 25 years (projects that can be built with reasonably expected revenue).

*Imagine Central Arkansas* was adopted by the Metroplan Board on December 17, 2014 as the official LRMTTP for central Arkansas. *Imagine Central Arkansas* and its predecessors (*Metro 2030.2*, *Metro 2030*, *Metro 2025*, and *Metro 2020*) all envisioned creating a balanced transportation system for the region in which the freeways are initially constructed to 6 through lanes for safety and capacity purposes, and then additional travel demand beyond those capacity improvements being met through development of a robust, regional arterial network system, and regional transit system. Funding and project emphasis is first placed on first maintaining current infrastructure and promoting deployment of new technologies that optimize traffic operations; thus providing the most cost-effective and sustainable method of meeting regional mobility needs. As the region realizes the completion of that multi-modal and balanced transportation network, the need for additional freeway lane capacity beyond the 6-lanes would then be revisited.

The Regional Planning Context as described in the PEL Study (Purpose and Need):

### 2.3 Regional Planning Context

The MPO policy on freeway system capacity improvements, as reflected in the LRMTTP and other policy documents is to build the regional freeway system to six through lanes and to meet demand over that capacity with a robust regional arterial network and public transit. The strategy behind the policy is to use finite resources to achieve transportation system balance once the regional freeway network is built out to six through lanes.

#### **Metroplan Policy and Plan Statements on Freeway Capacity**

##### **1) Metroplan Policy on Freeways and Expressways**

The below text was taken directly from the *CARTS Study Area Roadway Design Standards and Implementation Procedures*:

*“The Metroplan Board has adopted the following policy with regard to Freeways and Expressways in the CARTS area:*

*The metropolitan freeway system should be built to six through lanes. It is the Metroplan Board’s intent that demand over that capacity be met with a robust regional arterial network and public transit.*

*If the Arkansas State Highway and Transportation Department sees the need to widen metropolitan freeways beyond six through lanes, it should consult with the Metroplan Board for its concurrence. Prior to planning for widening beyond six through lanes, the Department is expected to do a thorough analysis of alternative methods of meeting travel demand in the corridor with improved arterials and public transit. A thorough analysis of the impact of the induced traffic demand on local roadways as a result of the widening beyond six through lanes would also be required. The Metroplan Board may also consider conducting an independent analysis of widening proposals over six through lanes for its use and benefit.”*

##### **2) METRO 2030.2: Metropolitan Freeway System-Capacity Improvements**

The below text was taken directly from *METRO 2030.2*, Chapter 17: Vision Plan:

*“The freeway network within the metropolitan area should be completed and expanded to six through travel lanes by 2030. That means completing the Northbelt Freeway. It also means widening I-40 to six lanes between I-430 and Conway at Hwy. 65 and eastward into Lonoke County. It calls for extending the widening of Hwy. 67/167 beyond its planned terminus at Redmond Road in Jacksonville to the Vandenberg/LRAFB exit in the short-term and then on to Cabot and Hwy. 89 by the end of the plan period, plus extending the widening of I-30 southwest from Sevier Street in Benton to at least Hwy. 67.*

*Nearly all the freeway-to-freeway interchanges in the metropolitan area need some level of reconstruction to increase capacity and safety. The I-630/I-430 Interchange is one of the highest needs, but the I- 630/I-30, I-40/Hwy. 67/167, I-430/I-40, I-30/I-40 (North*

*Terminal) and the I-30/I-530/I-440 (South Terminal) also need attention.*

*The recently completed Areawide Freeway Study also indicated that additional capacity may be needed at some point in the future on a) I-30 between the North and South Terminals where five interstate highways merge and diverge within five miles, b) I-430 south of I-40 to I-630, c) I-630 from I-430 to University Avenue, d) I-30 from South Terminal to 65th Street and e) I-440 from South Terminal to Lindsey Road (Map 17-2). At an appropriate time, these freeway segments should be studied consistent with the regional policy on freeway capacity.”*

The project is listed within *Imagine Central Arkansas* as described from the PEL Questionnaire.

*Long Range Metropolitan Transportation Plan (LRMTP), Financially Constrained Plan (10-year commitment): In the LRMTP, the facility name is listed as “Interstate 30”, the limits are described as “Central Corridor”, and the improvements are categorized as “Operation Improvements”. Improvements to I-40 are described as “Interstate 40”, the limits are described from “I-30/I-40 Interchange” to “Hwy. 67”, and the improvements are categorized as “Rehabilitation”. The financially constrained LRMTP notes that an amendment may be required upon completion of the PEL Study once the number of through lanes has been determined.*

\*The *Imagine Central Arkansas* Document can be found at

<http://www.metroplan.temp1000.com/files/53/2014-12LongRangePlan.pdf>

## **Inconsistency**

The PEL Recommended Alternative is not currently consistent with the policies, language, assumptions and financial constraint of the Long-Range Metropolitan Transportation Plan and CARTS Design Standards. As adopted, *Imagine Central Arkansas* supports the reconstruction of the I-30 Arkansas River Bridge, the reconstruction of I-40 between US 67/167 and I-30 and “operational improvements” within the corridor. The widening of I-30 from six to 10 lanes and the associated widenings of I-30 west to 65<sup>th</sup> Street and I-630 west to University Avenue are inconsistent with the adopted plan and will require a plan amendment if construction is anticipated within the plan period.

Metroplan is specifically concerned about (1) the impact that adding significant new capacity to a critical freeway segment will have on the overall network in terms of induced travel, (2) the potential for the project to negatively impact existing system bottlenecks or create new ones and (3) the additional widenings in the freeway network likely to occur under current AHTD standards and practice in order to address those worsening points of congestion. Finally, the financial implications that the full cost of the project and the suggested and implied additional freeway widenings will have on the constrained LRMTP and the broader transportation vision for central Arkansas.

## Analysis Tool

### CARTS Travel Demand Model

The primary tool used for system analysis is the CARTS Travel Demand Model. This model is a traditional four-step daily travel demand model and is the official traffic forecast model for central Arkansas. The model was originally developed in 2004 and partially updated in 2012 and 2014. The model produces a 24 hour traffic forecast along with other system performance measures that include vehicle miles traveled, vehicle hours traveled, and delay (in hours). The CARTS Travel Demand model and its embedded assumptions provided the base from which the PEL consultants developed the more detailed, corridor-specific VISSIM models for the project.

\*Documentation for the CARTS Travel Demand Model is available from Metroplan upon request

### Land Use/Population Assumptions - 2040

The Emerging Trend (land development and population forecast) Scenario from *Imagine Central Arkansas* was used for all travel demand model runs. Under this scenario, most forecasted residential growth continues to be low to moderate density suburban development, with commercial growth oriented toward highways. A limited amount of new mixed-use and more walkable, residential neighborhoods is forecast representing a more recent “emerging” development trend within central Arkansas. This scenario is directly linked to and reinforces the freeway build out to six through lanes policy.

\*Additional information on the Emerging Trend Scenario can be found in Chapter 6 of *Imagine Central Arkansas*

Land development and forecast population scenarios that incorporate the impacts of substantial freeway widening beyond the six through lanes were not developed since such a policy would encourage additional urban sprawl, resulting in increased VMT and delay, which are inconsistent with the plan. If the current limited freeway expansion policy were replaced with an expansive freeway building policy, the land use/development/population assumptions used in *Imagine Central Arkansas* would no longer be valid and would need to be redeveloped for the CARTS model results and any corridor specific VISSIM model results to have validity.

### Transit Network

The current bus system as “status quo” is assumed for the transit network.

### Highway Scenarios Modeled

#### Alt 1 - 2010 Base Model

The base scenario assumes the functionally classified highway network as of 2010 (partial 6 lane build out)

### **Alt 2 - 2040 No Build**

The No-Build scenario assumes that no capacity improvements are made within the I-30 corridor. Projects from the 2013-2016 TIP and the Connect Arkansas Program (completion of widening of I-40 from North Little Rock to Conway, I-30 from Benton to Hwy 70, Hwy 67 from Jacksonville to Cabot, and I-630 from Baptist to University) are included in this scenario.

### **Alt 3 - 2040 8 Lane Central Corridor**

The 8 Lane Central Corridor alternative assumes that I-30 is widened to 8 lanes between I-530 and I-40 and the I-30 Arkansas River Bridge is replaced. Projects in the 2013-2016 TIP and Connect Arkansas Program are included in this scenario.

### **Alt 4 - 2040 PEL Recommendation**

The PEL Recommendation alternative assumes that I-30 and I-40 are widened to 10 lanes between I-530 and Hwy 67, the Arkansas River Bridge is replaced, and new flyover ramps constructed at the I-40/I-30 and at the I-40/Hwy 67 interchanges. This model does not differentiate between 10 general purpose lanes and the 10 lane downtown CD as recommended in the PEL or specific arterial interchange improvements. Projects in the 2013-2016 TIP and Connect Arkansas Program are included in this scenario.

### **Alt 5 - 2040 PEL Recommendation + Associated Widening**

The PEL Recommendation plus Associated Widening alternative assumes the same improvements as the PEL Recommendation but adds the widening of the full length of I-630 and I-30 from I-530 to 65<sup>th</sup> Street to 8 lanes. Projects in the 2013-2016 TIP and Connect Arkansas Program are included in this scenario.

### **Alt 6 - 2040 PEL Recommendation + 8 Lane Freeway Network**

The PEL Recommendation + 8 Lane Freeway Network alternative includes improvements from the PEL Recommended alternatives and also assumes that I-630, I-430, I-30 to Benton, I-40 to Conway, and Hwy 67 to Jacksonville are all widened to 8 lanes. I-40 east of Hwy 67, Hwy 67 from Hwy 5 to North Cabot, and I-530 to Dixon Road are all assumed to be widened to 6 lanes.

### **Alt 7 - 2040 PEL Recommended + 8-10 Lane Freeway Network**

The PEL Recommendation + 8-10 Lane Freeway Network alternative includes improvements from the PEL Recommended alternatives, the eight lane freeway network, and assumes that I-30 from I-430 to Alexander, I-40 from I-430 to Morgan, Hwy 67 from Hwy 440 to Jacksonville, and I-630 from I-430 to University are all widened to 10 lanes.

Alternative 3 (8 lane) was modeled under the assumption that it is still a reasonable alternative. Alternatives 6 and 7 were added to test what additional improvements would be needed to approach current levels of mobility in the region, although these improvements still do not achieve AHTDs stated LOS D standard for urban freeways and are beyond currently foreseeable financial resources.

**Alternatives are illustrated in Appendix A.**

## System Performance

The following regional statistics are used for determination of system and mobility impacts.

### Vehicle Miles Traveled

Direct output from the Travel Demand Model.

### Vehicle Hours Traveled

Direct output from the Travel Demand Model.

### Average Speed (MPH)

Calculated from the vehicle miles traveled and vehicle hours traveled

$$\text{Vehicle Miles Traveled} / \text{Vehicle Hours Traveled}$$

### Delay (Hours)

Calculated from Vehicle Hours Traveled, Free Flow Travel Time (ADT \* Free Flow Link Time)

$$\text{Vehicle Hours Traveled} \text{ minus } \text{Free Flow Travel Time}$$

### Delay per Driver (minutes)

Calculated from Delay and Population

$$(\text{Delay} * 60) / (\text{Population} * .7)$$

### % of Travel attributed to Delay

Calculated from Delay and Vehicle Hours Traveled

$$\text{Delay} / \text{Vehicle Hours Traveled}$$

### Delay per Mile of Travel (seconds)

Calculated from Delay and Vehicle Miles Traveled

$$(\text{Delay} * 3600) / \text{Free Flow Travel}$$

## Results

The following system results represent all roadways within central Arkansas (Faulkner, Lonoke, Pulaski, Saline Counties).

			System Performance (Excludes Local Roads)						
Year	Alt	Description	VMT	VHT	Avg Speed (MPH)	Vehicle Delay (hours)	Daily Delay Per Driver (Minutes)	Delay % of Total Travel	Delay Seconds per Mile Traveled
2010	1	2010	20,484,764	560,657	36.5	132,495	16.9	23.6%	23.3
2040	2	2040 No Build	26,980,886	796,345	33.9	228,116	20.8	28.6%	30.4
2040	3	8 Lane Central Corridor Only	27,015,556	795,210	34.0	226,662	20.7	28.5%	30.2
2040	4	PEL Recommended Alt	27,079,481	793,671	34.1	224,426	20.5	28.3%	29.8
2040	5	PEL Recommended Alt + Associated Widening	27,147,994	792,476	34.3	222,298	20.3	28.1%	29.5
2040	6	Rec Alt + 8 Lane Freeway Net	27,985,561	780,963	35.8	201,956	18.4	25.9%	26.0
2040	7	Rec Alt + 8-10 Lane Freeway Net	27,992,418	779,830	35.9	199,613	18.2	25.6%	25.7

The following results are only for freeways within central Arkansas (Faulkner, Lonoke, Pulaski, Saline Counties).

			System Performance (Freeways Only)						
Year	Alt	Description	VMT	VHT	Avg Speed	Vehicle Delay (hours)	Daily Delay Per Driver (Minutes)	Delay % of Total Travel	Delay Seconds per Mile Traveled
2010	1	2010	9,275,886	205,126	45.2	61,510	7.9	30.0%	23.9
2040	2	2040 No Build	12,223,469	296,372	41.2	105,702	9.6	35.7%	31.1
2040	3	8 Lane Central Corridor Only	12,280,506	296,214	41.5	104,634	9.6	35.3%	30.7
2040	4	PEL Recommended Alt	12,374,798	296,059	41.8	102,972	9.4	34.8%	30.0
2040	5	PEL Recommended Alt + Associated Widening	12,478,068	296,231	42.1	101,058	9.2	34.1%	29.2
2040	6	Rec Alt + 8 Lane Freeway Net	13,528,446	294,094	46.0	82,952	7.6	28.2%	22.1
2040	7	Rec Alt + 8-10 Lane Freeway Net	13,659,399	293,535	46.5	80,335	7.3	27.4%	21.2

## Observations

- The 8 lane, PEL Recommendation, and PEL Recommendation plus Associated Widening alternatives have little impact on overall freeway system performance. This is the result of the project (a) carrying a small portion of the overall regional traffic, (b) downstream and upstream congestion that contribute to overall trip delay, and (c) induced demand within the project corridor.
- None of the alternatives considered provide overall roadway network performance equivalent to 2010. This is partially the result of an increase in traffic off the freeway network and a lack of investment on non-freeway routes.
- Improving system performance requires a comprehensive approach that looks at the entire roadway network (both on and off the freeways) as well as alternative transportation modes.
- Alternatives 6 and 7 that widen much of the freeway network to 8 or 10 lanes would result in an increase in regional VMT by as much as 4% or 1 Million vehicle miles per day in induced demand.

## Freeway Network Level of Service

The CARTS Travel Demand Model was used to rate each freeway segment as no congestion, near capacity, minor congestion, moderate congestion, or severe congestion. The congestion rating was based upon the traffic forecast and daily capacity and may not reflect the impact of heavy merging and diverging traffic. Definitions for each congestion rating are provided below. For the purposes of comparing to speed profiles from VISSIM runs, an estimated average speed for each congestion category is provided.

### ***No Congestion (Peak Hour LOS A-D)***

Traffic volume under capacity. High speeds maintained during peak hours unless traffic incidents occur.

*CARTS TDM Daily V/C < .70*

*ADT Per Lane Thresholds < 12,635 Urban, < 10,675 Suburban*

*VISSIM Comparison - 60-70 MPH Average Speed (Dark Green)*

### ***Near Capacity (Peak Hour LOS E)***

Traffic volume near capacity during peak hour. Limited maneuverability in traffic stream but overall speed remains high. Some slowing around interchanges may occur. Any traffic incident or disruption is expected to result in significant traffic queuing. Traffic and speed variations noticeable from day to day.

*CARTS TDM Daily V/C = .70-.90*

*ADT Per Lane Thresholds 12,635-16,245 Urban, 10,676-13,725 Suburban*

*VISSIM Comparison - 40-60 MPH Average Speed (Light Green/Light Orange)*

#### ***Minor Congestion (Peak Hour LOS F+)***

Traffic volume at or slightly exceeds peak hour capacity. Slower travel speeds observed during peak hours but stop and go conditions minimized and typically associated with ramp merges and diverges. Traffic flow is unstable and can vary significantly from day to day, with stop and go conditions one day and few slowdowns the next.

*CARTS TDM Daily V/C = .90-1.00*

*ADT Per Lane Thresholds 16,245-18,050 Urban, 13,725-15,250 Suburban*

*VISSIM Comparison - 30-50 MPH Average Speed (Light Orange/Dark Orange)*

#### ***Moderate Congestion (Peak Hour LOS F)***

Traffic volume exceeds peak hour capacity. Stop and go conditions observed throughout the peak hour with significant queuing or bottlenecks forming. Forced flow conditions observed within the corridor with slower but constant speeds. Congestion is recurring from day-to-day. Incidents at any point during the day are likely to result in congestion.

*CARTS TDM Daily V/C = 1.00-1.10*

*ADT Per Lane Thresholds 18,050-19,855 Urban, 15,250-16,775 Suburban*

*VISSIM Comparison - 20-40 MPH Average Speed (Dark Orange/Red)*

#### ***Severe Congestion (LOS F-)***

Traffic volume exceeds peak hour capacity for multiple hours a day. Stop and go conditions experienced throughout the congested segment with lengthy queues possible. Incidents at any point during the day are likely to result in significant congestion.

*CARTS TDM Daily V/C > 1.10*

*ADT Per Lane Thresholds >19,855 Urban, > 16,775 Suburban*

*VISSIM Comparison - 0-30 MPH Average Speed (Red/Burgundy)*

Congestion ratings were smoothed over adjacent freeway segments to result in a single congestion rating (i.e. through interchanges). Where necessary, manual adjustments to traffic volumes were included in the 2010 model and then applied to 2040 model runs.

## Results

Level of Service forecast for each alternative is shown in Appendix B. The following indicates the number of freeway miles per congestion category. Level of Service mileage totals are shown by direction and also includes freeway to freeway ramps.

Year	Alt	Description	Freeway Network									
			Freeway Miles LOS A-D Miles/%		Freeway Miles LOS E Miles/%		Freeway Miles LOS F+ Miles/%		Freeway Miles LOS F Miles/%		Freeway Miles LOS F- Miles/%*	
2010	1	2010	168	44%	128	34%	61	16%	18	5%	3	1%
2040	2	2040 No Build	70	18%	155	41%	99	26%	45	12%	10	3%
2040	3	8 Lane Central Corridor Only	76	20%	154	41%	99	26%	46	12%	4	1%
2040	4	PEL Recommended Alt	78	21%	151	40%	103	27%	45	12%	2	1%
2040	5	PEL Recommended Alt + Associated Widening	75	20%	149	39%	112	30%	42	11%	1	0%
2040	6	Rec Alt + 8 Lane Freeway Net	158	42%	175	46%	43	11%	3	1%	0	0%
2040	7	Rec Alt + 8-10 Lane Freeway Net	158	42%	195	51%	23	6%	3	1%	0	0%

\*By 2040 LOS F- conditions are expected on I-30 from the Arkansas River to I-40, at the I-430/I-40 Interchange, and on I-630 near University/Fair Park

## Observations

- Congested freeway miles are expected to double by 2040 under the No Build Scenario, with the most severe (LOS F and F-) increasing by 150%.
- The Eight Lane Central Corridor alternative would improve traffic flow within the corridor over the No Build Alternative. Level of Service F conditions would be expected to reemerge north of the Arkansas River by 2040, similar to what is experienced today. The eight lane alternative restricts the exiting traffic volume from the corridor and, therefore, is expected to have less of an impact on out of corridor bottlenecks. The eight general lane modeling done by HNTB reflects this on I-30 west of the corridor where the congestion is shown less in the eight lane alternative than ten lane alternatives. The net effect on travel time throughout the full I-30 corridor cannot be accurately estimated without an extension of the micro-simulation model.
- Choke points (bottlenecks) outside the project corridor will regulate the amount of traffic that enters the corridor. If these choke points were removed under the major system widenings described in Alternatives 6 & 7, minor congestion (LOS F+) within the I-30 Central Corridor is likely to return even with the PEL Recommended Alternative.

- Choke points (bottlenecks) outside the project corridor will impact traffic as it leaves the corridor. The most severe of these choke points are expected to be I-40 west of I-430, I-30 west of I-430, I-630 near the State Capital and University, and Hwy 67 north of Hwy 440. Improved travel time within the corridor will be partially negated as increased traffic reaches these choke points sooner and in greater volume. An extension of the micro-simulation model would be required to accurately gage the impact of each alternative on these bottlenecks.
- Build alternatives are likely to improvement travel time reliability within the project area. It is less certain how the project would impact travel time reliability at a systems level (throughout the region) due to downstream and upstream bottlenecks.

#### *CARTS Travel Demand Model and VISSIM Comparison*

Congestion levels of the CARTS Travel Demand Model and VISSIM runs were compared for the corridor and found to be similar for all but the following.

- Congestion on I-30 west of the corridor is less severe in the CARTS Travel Demand Model – slower traffic growth.
- In the No-Build scenario severe congestion is predicted for the corridor in both the CARTS Travel Demand Model and VISSIM; however, the travel demand model diverts more traffic to parallel routes.
- In the PEL Recommended Alternative, operations on I-30 north of the Arkansas River are borderline LOS D/E, the CARTS Travel Demand Model predicts LOS E. LOS F+ conditions are predicted in the corridor by the CARTS Travel Demand Model when an 8 lane freeway network is assumed due to induced demand.

### **Financial Implications**

Federal regulations require that MPOs develop multi-modal transportation plans that balance needs with revenue (financially constrained). It is insufficient to put a list of projects together or strategies that do not consider their financial feasibility. Rational use of limited funding provides part of the basis of the region’s policy of widening all freeways to 6 through lanes and then focusing resources on the regional arterial network and transit before adding additional freeway capacity. This focuses the limited federal and state highway funds on maintenance, widening freeways to 6 lanes, and constructing a regional arterial network (70% of which are state highways) that serves as a viable alternative to the freeway for intraregional traffic.

§ 450.322 (f) (10) A financial plan that demonstrates how the adopted transportation plan can be implemented.

*(i) For purposes of transportation system operations and maintenance, the financial plan shall contain system-level estimates of costs and revenue sources that are reasonably expected to be available to adequately operate and maintain Federal-aid highways (as defined by 23 U.S.C. 101(a)(5)) and public transportation (as defined by title 49 U.S.C. Chapter 53).*

*(ii) For the purpose of developing the metropolitan transportation plan, the MPO, public transportation operator(s), and State shall cooperatively develop estimates of funds that will be available to support metropolitan transportation plan implementation, as required under §450.314(a). All necessary financial resources from public and private sources that are reasonably expected to be made available to carry out the transportation plan shall be identified.*

*(iii) The financial plan shall include recommendations on any additional financing strategies to fund projects and programs included in the metropolitan transportation plan. In the case of new funding sources, strategies for ensuring their availability shall be identified.*

*(iv) In developing the financial plan, the MPO shall take into account all projects and strategies proposed for funding under title 23 U.S.C., title 49 U.S.C. Chapter 53 or with other Federal funds; State assistance; local sources; and private participation. Starting December 11, 2007, revenue and cost estimates that support the metropolitan transportation plan must use an inflation rate(s) to reflect "year of expenditure dollars," based on reasonable financial principles and information, developed cooperatively by the MPO, State(s), and public transportation operator(s).*

*(v) For the outer years of the metropolitan transportation plan (i.e., beyond the first 10 years), the financial plan may reflect aggregate cost ranges/cost bands, as long as the future funding source(s) is reasonably expected to be available to support the projected cost ranges/cost bands.*

*(vi) For nonattainment and maintenance areas, the financial plan shall address the specific financial strategies required to ensure the implementation of TCMs in the applicable SIP.*

*(vii) For illustrative purposes, the financial plan may (but is not required to) include additional projects that would be included in the adopted transportation plan if additional resources beyond those identified in the financial plan were to become available.*

*(viii) In cases that the FHWA and the FTA find a metropolitan transportation plan to be fiscally constrained and a revenue source is subsequently removed or substantially reduced (i.e., by legislative or administrative actions), the FHWA and the FTA will not withdraw the original determination of fiscal constraint; however, in such cases, the FHWA and the FTA will not act on an updated or amended metropolitan transportation plan that does not reflect the changed revenue situation.*

## **Revenue Forecast**

Imagine Central Arkansas estimates that \$3.5 Billion in Federal and State funding will be available for highways from 2014-2040 in the CARTS Area. \$1.4 Billion of this is either currently allocated to projects in the 2014-2016 TIP, Interstate Rehab Program projects, or Connect Arkansas Program projects, or other projects funded through sub-allocation to the MPO, safety projects, or transportation alternatives. This leaves \$2.1 billion to cover routine system maintenance, all new system capacity improvements,

and any gap funding to complete the I-30 Central Corridor project (beyond the available CAP funding). System maintenance costs alone are estimated to be 3-4 times this amount.

In addition, federal regulations require the MPO to estimate Year-of-Expenditure costs versus revenues for projects specified in the LRMTTP. This requires inflating costs estimated in today's dollars by the projected construction cost inflation rate for the year in which the project goes to construction.

It should be noted that projected available funding is based off funding marks provided the MPO by AHTD. Increased revenues could be assumed in the plan by (a) increasing the percentage of existing state and federal revenue allocated by AHTD to central Arkansas, (b) receipt of substantially increased state and/or federal revenues, (c) the development of a new and substantial local/regional funding source, (d) the use of tolling to fund capacity improvements, or (e) all of the above.

### **Project Cost (Central Corridor)**

CA0602 is planned as a Design-Build-Finance project. The Design Build contractor is incentivized to be innovative in delivering the project as economically as possible. Because the Financing option is being added to the project, it is assumed that the entire project will be built within the planned construction period with the financed portion repaid with interest and profit from future revenues. Building the entire project at once will reduce the impact of construction cost inflation on the final project cost. The nature of the Design-Build concept will mean that a refined estimate of project costs will not be available at the time the MPO must make its determination on amending the financially constrained LRMTTP. Consequently, for that purpose, the following cost assumptions will be made for this analysis:

Total CAP Funding = \$427M

IRR Funding for I-40 Reconstruction = \$22.7M

Bridge Replacement Funds = \$100M

Cost to Complete Project Above Other Funding = \$200M

### **Alternatives Costs**

To estimate the construction costs of the various alternatives considered, Metroplan utilized the cost for CAP projects to estimate a cost per mile of construction. Metroplan estimates that on average each additional freeway lane will cost \$20 Million per mile (bi-directional) or \$10 Million per lane mile. This includes the cost of construction, engineering, ROW, Utilities, and construction engineering.

<b>Central Arkansas – Connect Arkansas Projects</b>	Miles	Construction (Millions) <sup>2</sup>	Cost Per Mile (construction only) (Millions)
I-30 Saline (Sevier to Hwy 70)	5.2	\$75	\$14.4
I-40 (Morgan to I-430) <sup>1</sup>	5.6	\$38	\$6.8
Hwy 67 (Main to Hwy 5)	6.8	\$120	\$17.6
I-630 (Baptist to University)	2.5	\$50	\$20.0
<b>Total</b>	<b>20.1</b>	<b>283.3</b>	<b>\$14.1</b>

<sup>1</sup>I-40 project includes freeway widening and improvements at the I-430 Interchange, mainline bridges on I-40 had previously been widened. Contractor from previous I-40 widening project was low bid.

<sup>2</sup>Cost from 2012 CAP advertised allocation or construction bid (projects under construction).

The following is the cost estimated to complete the PEL Recommended Alternative as well as additional freeway widening to six, eight, and ten lanes. All costs are current estimates and have not been inflated for year-of-expenditure.

<b>PEL Recommendation</b>	Miles
I-630 (I-30 to University)+	4.7
I-30 (I-440 to 65 <sup>th</sup> )	2.5
Central Corridor = \$750 Million	
<b>Total Cost = \$900 Million +</b>	

+Additional costs include funding to complete corridor and environmental justice mitigation on I-630

<b>Widening to 6 Lanes</b>	Miles
I-40 (Hwy 67 to Prairie County) <sup>1</sup>	30.9
I-530 (Dixon to I-30)	2.5
Hwy 67 (Hwy 5 North) <sup>2</sup>	4.8/9.7
I-430 NB Only (Hwy 5 to I-430)	1.2
<b>Total Cost = \$800 Million</b>	

<sup>1</sup> Includes segment outside CARTS

<sup>2</sup> North Cabot Interchange/White County

<b>Widening to 8 Lanes</b>	Miles
I-430 (I-30 to I-40) <sup>1</sup>	12.9
I-40 (I-30 to Dave Ward Drive)	24.0
I-30 (65 <sup>th</sup> to Bryant/Springhill)	13.5
Hwy 67 (I-40 to Jacksonville)	8.0
<b>Total Cost = \$1,200 Million +</b>	

<sup>1</sup> Additional costs may be associated with I-430 Arkansas River Crossing

<b>Widening to 10 Lanes</b>	Miles
I-630 (Baptist to University)	2.0
I-30 (I-430 to Alexander)	2.4
I-40 (I-430 to Morgan)	4.8
<b>Total Cost = \$200 Million</b>	

The following is the estimated cost for each of the alternatives considered as well as the year of expenditure cost.

<b>Alternative</b>	<b>Current Cost</b>	<b>Year of Expenditure Cost*</b>
Alt 2 - 2040 No Build	Bridge Rehab Cost	
Alt 3 - 8 Lane Central Corridor Only	\$500 Million	\$600 Million
Alt 4 - 10 Lane Central Corridor Only	\$750 Million	\$900 Million
Alt 5 - PEL Recommended Alt	\$900 Million	\$1.1 Billion
Alt 6 - Rec Alt + 8 Lane Freeway Net	\$2.9 Billion	\$4.2 Billion
Alt 7 - Rec Alt + 8-10 Lane Freeway Net	\$3.1 Billion	\$4.5 Billion

\*Central Corridor 2018-2022, I-30 and I-630 project associated widenings 2025-2030, All other widening 2020-2040

Development of the year of expenditure cost factor is documented within *Imagine Central Arkansas and* is based upon the forecast of diesel fuel prices by the US Energy Information Agency. An average multiplication factor of 1.55 was used for the 2025-2030 timeframe while an average multiplication factor of 1.71 was used for the 2020-2040 timeframe.

## Observations on Financial Implications to the LRMTTP

- Available CAP and IRP funds are inadequate to complete the project. Reasonable assumptions, cost estimates, and identification of funding sources will need to be provided by the project sponsor prior to an amendment of the LRMTTP. It is also unclear at this time if and how much federal Bridge Replacement funds will be used on this project for replacing the I-30 Bridge. It is expected that the proposed FY2016-2019 STIP projects for the metro area will define the amount of Bridge Replacement funds available for this project.
- The scope of the project that can be completed within the available funding is uncertain; therefore, the amount of the project that will need to be financed is uncertain, and, therefore, its impact on future projects in the LRMTTP is uncertain. A reasonable assumption is that funds to complete the I-30 Central Corridor will reduce the available funds for system maintenance and any capacity improvements to state routes on the regional arterial network.
- There are no identified funds available in the LRMTTP for suggested additional widenings to I-30 west and I-630 west. If those improvements are needed during the plan period and are assumed as part of the project justification, i.e. through 2040, new funds will need to be identified in the range of \$150M inflated to the estimated year of expenditure and a commitment to fund from the Arkansas Highway Commission will need to be provided.
- It is assumed that the financed cost to complete will be repaid from existing flow of future state and federal revenues. In order to amend the financial portion of the LRMTTP, the project sponsor will need to be explicit about the source of those revenues in terms of the projects that will be postponed in order to find room in the financially constrained budget.

## Summary of Findings

### Objectives

#### **1. Gage the regional mobility impacts of various improvement alternatives considered within the I-30 Central Corridor.**

The I-30 project itself has little impact on improving overall regional mobility. The average network speed increases only ½ mph for the full roadway network and 1 mph on freeways for the recommended alternative. While the impact of the project will vary by individual, the average delay per person would be reduced by less than ½ minute. To influence regional mobility significantly, a systems wide approach and improvement strategy is required.

#### **2. Congestion from freeway system bottlenecks is due to or worsens as a result of the project.**

At least fifteen percent of the freeway network is expected to experience moderate to severe congestion by 2040, up from six percent in 2010. The PEL recommended alternative partially works

because of this congestion. Traffic exiting the central corridor will reach bottlenecks at I-30 and I-430, I-40 and I-430, and Hwy 67 at Hwy 440 quicker and in higher volumes and increase delays there; however, expansion of the micro-simulation model would be required to more precisely assess these system differences.

### **3. Determine financial implications of the proposed improvements and any policy change on the Long-Range Metropolitan Transportation Plan.**

At a minimum, the PEL recommendation will require an amendment to the LRMTMP as an exception to the Freeway Policy and CARTS Design Standards establishing a six lane cap and to reflect the final project cost and funding sources. The financial implications are of two kinds: (1) the bulk of the project will be paid for with CAP, IRP and Bridge Replacement funds and thus have minimal financial implications to the plan, (2) the remainder of the project, it is assumed, will be financed and repaid with future state and federal revenue. Assuming that those funds are not transferred into central Arkansas from other parts of the state, then funding for future central Arkansas projects will be reduced, delayed or eliminated. Those projects or project categories will have to be identified in a plan amendment.

Beyond that lies a slippery slope if the associated widenings recommended in the PEL (I-630 west to University and I-30 west to 65<sup>th</sup> Street) are required to be built in the plan period (prior to 2040) in order to make the CA-0602 project operate without peak hour congestion. Those widenings would also require an exception to the Plan policy on Freeways, and would require significant additional financial commitments and a commitment by the Arkansas Highway Commission to construct. The greater impact for the LRMTMP is what those additional widenings imply about AHTD policy on freeways in the metropolitan area.

Without a specific policy statement to the contrary from the Highway Commission, it is reasonable to assume that AHTD will apply its stated Urban Freeway Level of Service D policy to the projected congestion on the central Arkansas freeway system resulting in widening the freeway system to an 8 lane standard with key sections widened to 10 lanes as funding permits. The LRMTMP would have to fundamentally change its underlying strategy and investment policy to accommodate such an additional freeway construction program. For this scenario the financial implications are so extensive that it is reasonable to assume many of the widenings could not be completely accommodated in a financially constrained plan, but would have to be reflected in the unconstrained Vision Plan. The differences in the vision and strategies in the adopted LRMTMP and this alternative freeway vision are so fundamental that it would require the entire plan to be revisited and open to extensive public comment. Those alternative visions should be openly discussed prior to a plan amendment for this project and the Highway Commission and Metroplan Board should agree on a single vision for transportation improvements in the metropolitan area.

There may, however, be an alternative that could allow AHTD to meet the demand to relieve projected freeway congestion and also be consistent with the currently adopted LRMTMP. For example, if worsening freeway congestion was dealt with by adding High Occupancy Toll lanes in appropriate corridors rather than general purpose lanes, then those HOT lanes could be used to provide regional bus rapid transit

services in the future and that approach could be considered consistent with the adopted plan. It would also be beneficial if the Commission affirmatively supported systematic improvement and maintenance of state routes on the Regional Arterial Network in support of the LRMTTP. A statement of policy in the State Long-Range Transportation Plan, a policy document, now under development might prove adequate until more detailed feasibility studies provided more details for the next LRMTTP update.

#### **4. Identify needs for additional systems analysis or unanswered questions.**

This report is the most complete review of the regional systems impacts to date of the improvements proposed for the I-30 corridor - CA0602; nonetheless, limitations of the available analysis tools, budget, and staff time means that some questions remain. A specific limitation of the analysis relates to the daily structure of the CARTS travel demand model and its inability to produce hourly volumes.

##### ***Peak Hour Travel Demand Model***

The CARTS Travel Demand Model lacks the peak hour inputs and outputs to allow it to be seamlessly used for micro-simulation model input. Development of an hourly model would assist in the development of regional micro-simulation model, improve the accuracy of the model in estimating speed, and allow for the estimation of congestion timeframes. Metroplan is considering adding this capability to the model; however, its cost of \$.75 Million-\$1.25 Million and two years to complete means that it will be unavailable for this analysis. A model upgrade could also be used to review accessibility and other non-highway system performance measures when comparing multi-modal alternatives.

##### ***Micro-simulation***

A system wide freeway network micro-simulation is required to precisely estimate the impact of various improvement scenarios on upstream and downstream bottlenecks. It is recommended that a regional micro or macro simulation model be developed that can be used for the various corridor planning studies underway or planned. A simulation model could be incorporated into a Travel Demand Model update and housed at both Metroplan and the Arkansas State Highway and Transportation Department.

##### ***Financially Constrained Plan – Project Timeframes***

During NEPA an estimate of the timeframe for making out-of-corridor improvements associated with the project is anticipated. A full analysis of system impacts and the timeframe that additional widenings may be warranted are needed to accurately assess financial impacts to the LRMTTP. Metroplan is in the process of developing 2020 and 2030 models that it hopes to have available later this fall to help answer this question.

## CONCLUSIONS

The CARTS Long-Range Metropolitan Transportation Plan, its policies, and project prioritization strategy is based upon 20 years of community support, sound analysis, and consideration of financial realities. When this strategy of a balanced transportation system was first adopted in METRO 2020 in 1995, it was in many ways prescient. It foresaw the need for Complete Streets, for more compact urban development, for walkable urban places and for a move away from a completely auto dominated culture -- trends that are driving leading edge urban development in the second decade of the 21<sup>st</sup> century. A reversal of that strategy and those principles embedded in Imagine Central Arkansas, while certainly possible, should not be entered into casually or in a piecemeal fashion, but deliberately and comprehensively with the full involvement of the public.

The end product must be a single vision of the future of central Arkansas that is supported and actively pursued by Metroplan and its local jurisdictions, the Arkansas State Highway and Transportation Department, and Rock Region Metro.