I-30 Alternatives Analysis

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Executive Summary

In our Phase 1 report, we documented how transportation engineers have consistently overestimated the benefits of widening urban freeways for 80 years, because they have failed to account for induced travel. We reported on recent statistical analysis of congestion across 74 regions, which found that expanding freeway capacity does not relieve regional congestion. In sharp contrast, enhancing local street capacity strongly reduces regional congestion.

In our Phase 1 report, we also documented how the methodology used by the Arkansas Highway and Transportation Department's (AHTD fails to account completely for:

- The shift in auto and truck traffic from I-440 and other routes to I-30;
- The shift in number of trips from off-peak times to peak travel;
- The increase in congestion and resulting bottlenecks in downtown ramp areas.

In this Phase 2 report, we present results from modeling that does account for these factors. This modeling compares three 2040 alternatives to baseline 2010 conditions:

- No Build
- AHTD 12-Lane Bridge alternative
- Boulevard + Chester Street Bridge alternative

The City of Little Rock should be pursuing two general desired traffic outcomes as it considers I-30 Crossing alternatives:

1) To the extent possible, traffic not headed to central Little Rock should be using I-430 and I-440; and

2) Downtown traffic should be spread across the street grid to avoid bottlenecks.

Based on these two objectives, the AHTD 12-Lane Bridge alternative would move the City in the wrong direction. It would divert additional traffic to central Little Rock, and create new bottlenecks downtown. The Boulevard + Chester Street Bridge would move the City in the right direction. It would result in non-downtown traffic mostly using the I-430 and I-440 bridges. The four downtown bridges would better distribute traffic across the street grid.

The City of Little Rock should be pursuing two general desired economic outcomes as it considers I-30 Crossing alternatives:

1) Sufficient funding for AHTD to maintain state-owned city streets and reconstruct them when needed; and

2) Increasing tax base and jobs in the corridor.

Again, the AHTD 12-Lane Bridge alternative would move the City in the wrong direction relative to both objectives. It would suck up so much money that it is likely that other Little Rock projects would not be funded, included needed maintenance. It would lock up a huge amount of land off the tax rolls, and suppress the value of adjacent land. The Boulevard + Chester Street Bridge would move the City in the right direction. It would be cheaper, have lower maintenance costs, and help launch large increases in tax base and downtown employment.

Lane Bridge Alternative: Build It and They Will Come

As documented in the Phase 1 report, Highway builders have been promising that the next round of urban freeway expansion will solve urban freeway congestion since the beginning of urban freeway construction in the United States 80 years ago. This has never been successful. Urban freeway congestion cannot be solved through expansion because ***induced travel always follows roadway expansion***. The larger roads just fill up with traffic again. Induced travel is sometimes described by the phrase: “Build it and they will come.”

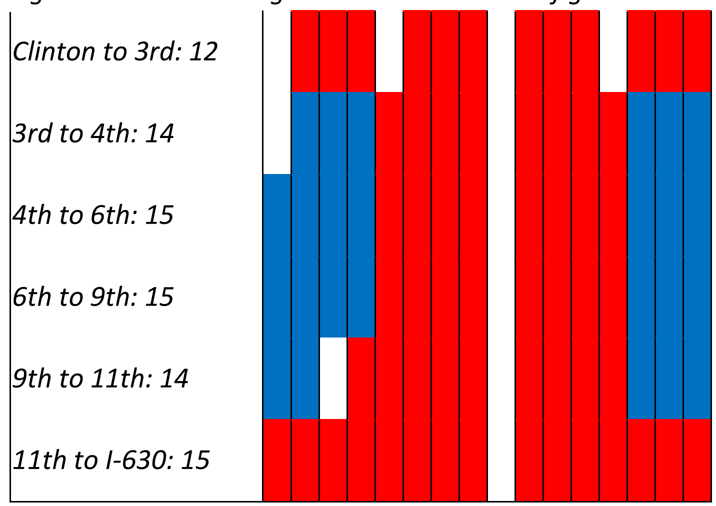
AHTD is proposing that the existing I-30 bridge be replaced with a 12-lane bridge, divided into 3 mainline freeway lanes and 3 collector/distribution lanes in each direction (Figure 1).[i]

As shown in Figure 2, the alternative has a cross section of from 12 to 15 lanes in the City of Little Rock. [ii] AHTD describes the alternative this way:

> The 6-Lane with Collector/Distributor Lanes alternative (previously called the PEL Recommendation 10-Lane with Downtown C/D) has been renamed to better clarify the scope of the alternative and reduce misconception. This alternative has three through lanes in each direction with two additional lanes serving as decision lanes that feed into Collector/Distributor lanes across the River Bridge in the downtown area.[iii]

Figure 1: AHTD Illustration of Proposed 12-Lane Bridge

Figure 2: 12-Lane Bridge Alternative Lane Configuration



Key: RED=freeway lanes, BLUE=frontage roads

In fact, the 12-Lane Bridge Alternative has no segments with as few as 10 lanes in the City of Little Rock. It is not the same as the 10-Lane C/D alternative described in the PEL Report (see Figure 3). The renaming has not reduced misconception; it has increased misconception.

Figure 3: 10 Lane C/D alternative from PEL Report[iv]

Traffic congestion in the Little Rock region is primarily an issue only in the morning and afternoon peak hour in the peak direction, i.e. southbound on the bridges in the morning peak hour, and northbound in the afternoon peak hour. We modeled the performance of the 2040 12-Lane Bridge alternative and a 2040 No Build alternative using an enhanced version of the Metroplan travel demand model that models peak hour, peak direction travel, and also better accounts for freeway congestion and induced travel.[v] The No Build alternative has the same I-30 configuration as today. Inclusion of a No Build alternative is standard practice in transportation alternatives analyses as a way of measuring benefits compared to doing nothing.

Modeled bridge crossings for the morning and afternoon peak hours are shown in Figures 4 and 5.

Figure 4: Southbound Morning Peak Hour Bridge Crossings

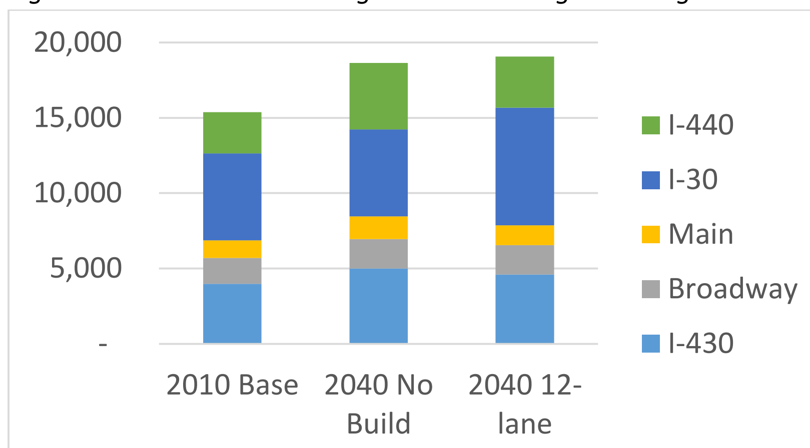
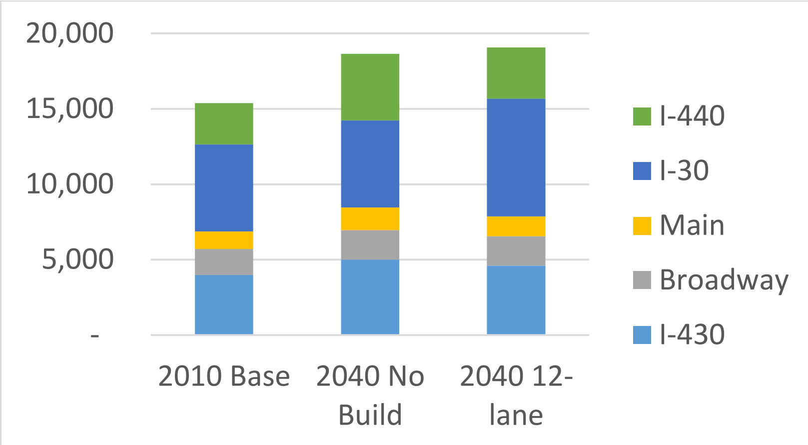


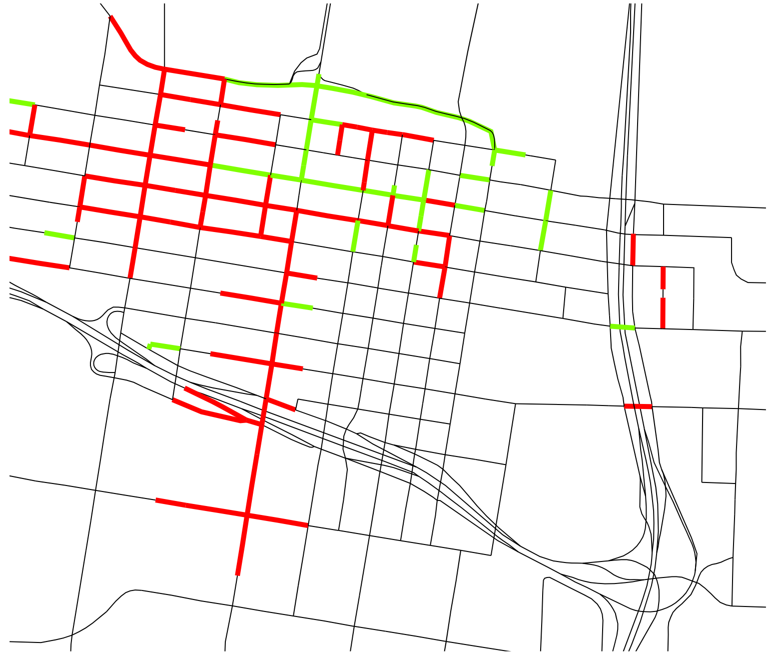
Figure 5: Northbound Afternoon Peak Hour Bridge Crossings



As shown in Figures 4 and 5, in the 2040 No Build alternative, most of the increased peak hour, peak direction bridge crossings (relative to the 2010 base year) are on I-430 and I-440 (82% and 97%, respectively). Construction of the 12-Lane Bridge alternative would increase total bridge crossings and shift more of them downtown. In the 12-Lane Bridge alternative, 55% and 67% of the increase is on the I-30 bridge.

Increasing I-30 traffic would have serious impacts on downtown Little Rock traffic. In particular, during the afternoon peak hour, the model shows that two large streams of traffic would converge: 1) traffic heading for the 4th street ramp onto I-30, and 2) traffic heading for the Broadway Street Bridge. These streams would intersect at the Broadway and 4th Street intersection and cause long traffic backups to the west and south (see Figure 6).

Figure 6: Downtown Afternoon Bottleneck in Downtown Little Rock Created by 12-Lane Bridge alternative

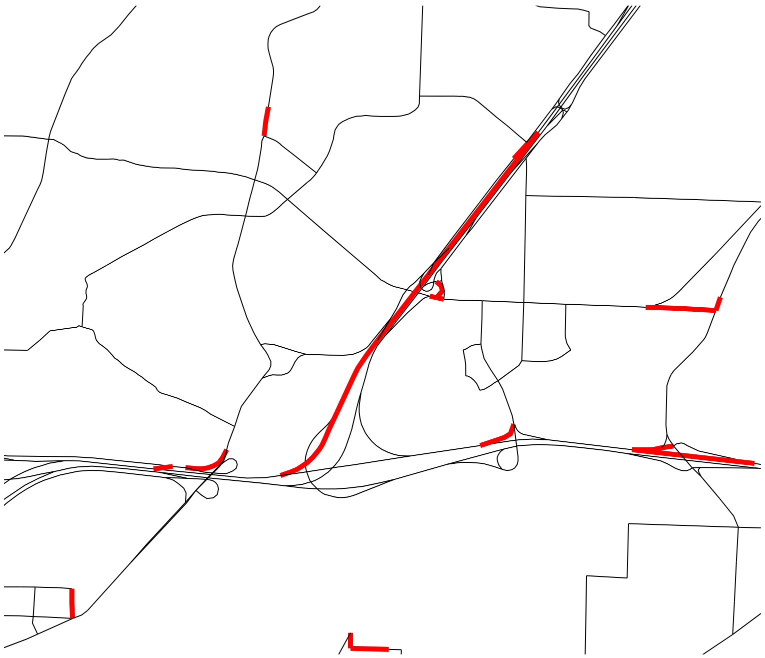


Key: Red = more congestion than No Build alternative; Green = less congestion than No Build alternative

This is a serious traffic issue that AHTD has not identified, has not disclosed, and certainly has not mitigated. In fact, any mitigation possible would involve undesirable widening of City streets.

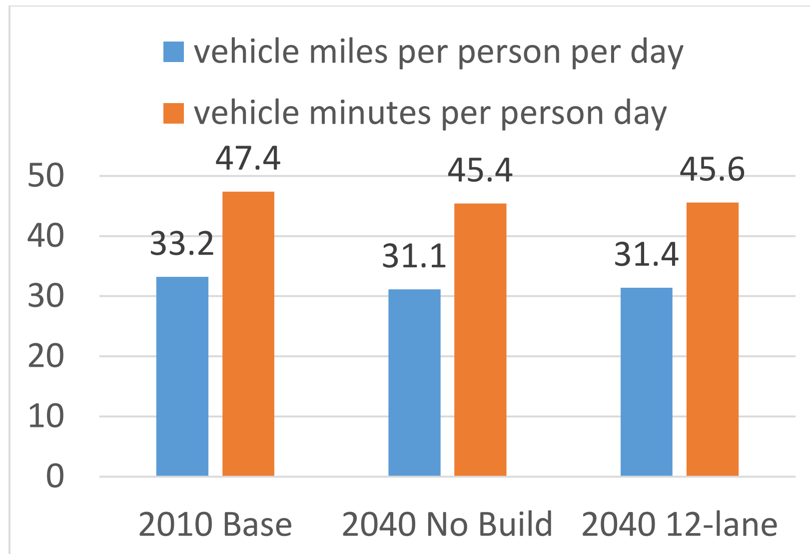
The PEL traffic study assumes that freeway widening will cause induced travel and higher traffic volumes on the widened sections, but fails to account for the other end of these trips, i.e. that there also would be higher traffic volumes beyond the boundaries of the study area. In the morning peak hour, the 12-Lane Bridge alternative would increase traffic bottlenecks on the outside edges of the study area. An example is illustrated in Figure 7 showing increased congestion on both Route 167 and I-40 inbound in the morning peak hour.

Figure 7: Morning Peak Hour Bottlenecks on Route 167 and I-40 Beyond the Boundaries of the Study Area



Relative to the No Build alternative, the 12-Lane Bridge alternative would increase traffic volumes on I-30 through the heart of the City of Little Rock, create new bottlenecks, and exacerbate others. The net result, as shown in Figure 8 is that the 12-Lane Bridge alternative would increase both regional vehicle miles traveled (VMT) and regional vehicle hours traveled (VHT) relative to the No Build alternative in 2040. There would be no improvement in regional congestion over doing nothing at all.

Figure 8: Regional Performance



Boulevard + Chester Street Bridge alternative

The City of Little Rock should be pursuing two general desired outcomes as it considers I-30 Crossing alternatives:

1) To the extent possible, traffic not headed to central Little Rock should be using I-430 and I-440; and
2) Downtown traffic should be spread across the street grid to avoid bottlenecks.

The 12-Lane Bridge alternative fails on both accounts. Without any changes, growth in bridge crossings would mostly use I-430 and I-440. Widening I-30 would have the opposite effect – concentrating traffic on the I-30 Bridge. Instead of spreading traffic across the bridge, the 12-Lane Bridge alternative would concentrate traffic in downtown Little Rock and create new bottlenecks.

Converting I-30 to a slower-speed boulevard would encourage through traffic to go around the downtown and use I-430 and I-440. A new Chester Street Bridge would further spread downtown traffic across the street grid.

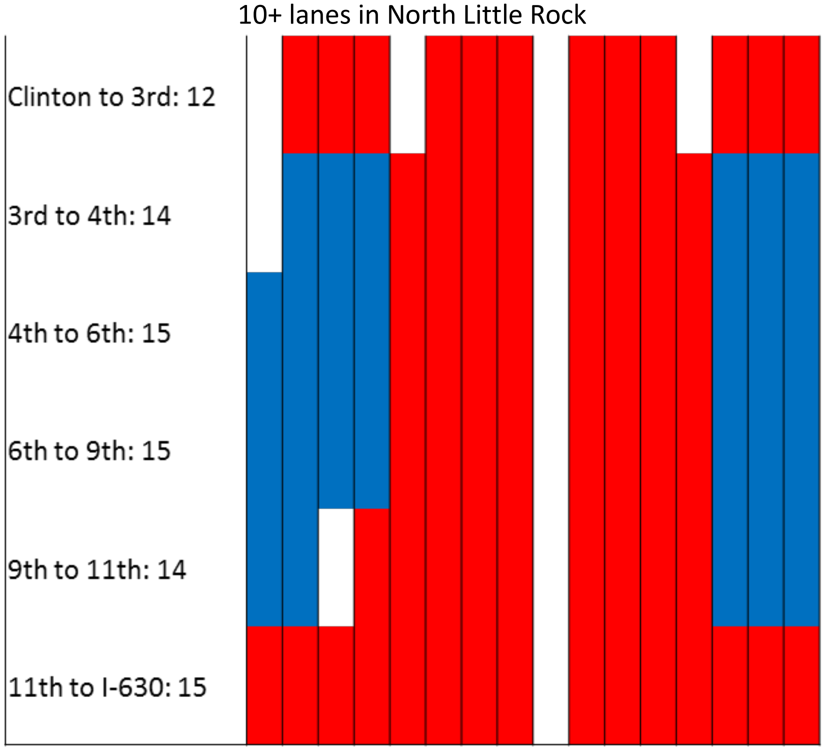
We modeled a simple boulevard that is based on the 12-Lane Bridge alternative but where the freeway is removed (Figure 9).

While Figure 9 makes it look like the Boulevard alternative would have about half as much pavement as the 12-Lane Bridge alternative, it likely would have less than a third as much payment in the City of Little Rock. The Boulevard lanes would be 11 feet wide vs. 12-13 feet for the 12-Lane Bridge alternative. There would be no large shoulders.

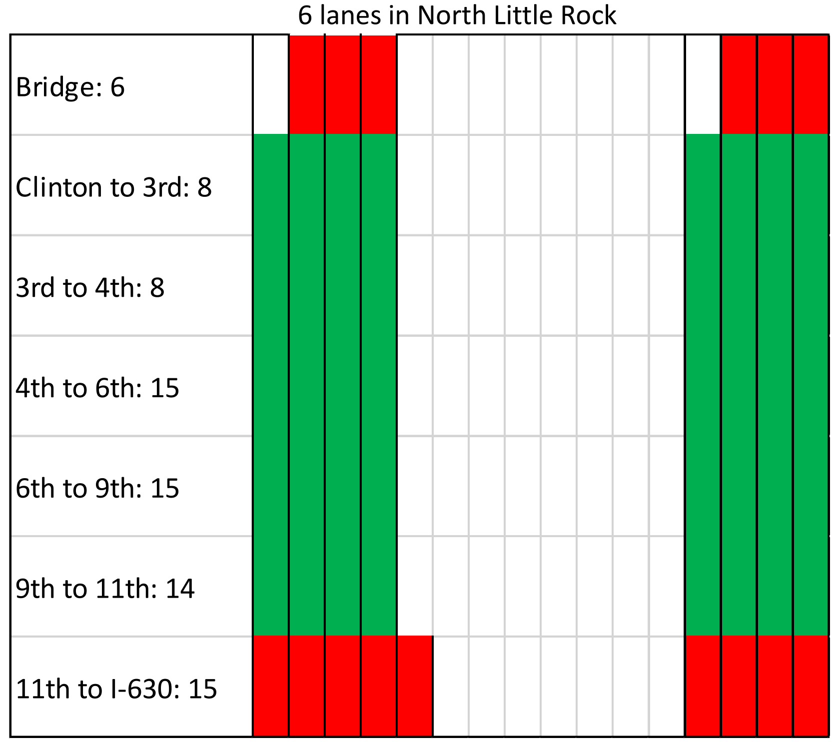
This simple Boulevard alternative was chosen to avoid detailed design issues with AHTD concerning vertical slope etc. that have come up in previous boulevard discussions. All design features in this Boulevard alternative are also in the 12-Lane Bridge alternative. Therefore, they must be acceptable to AHTD.

If the Boulevard alternative was selected, it certainly would be more carefully designed to maximize its benefit to the City of Little Rock. In particular, attention would be given to the optimal spacing between the northbound and southbound travel lanes to maximize economic development while providing good traffic operations.

Figure 9: Simple Boulevard Proposal – Just Remove the Freeway Lanes



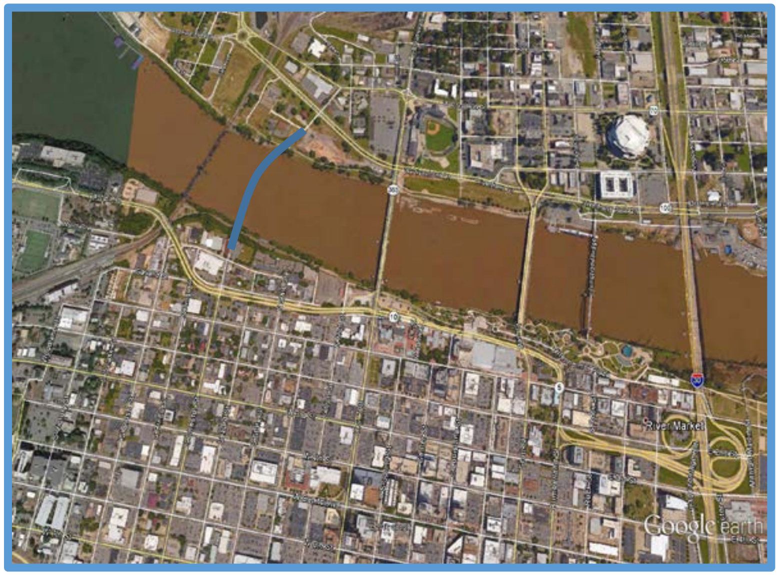
Key: RED=freeway lanes, BLUE=frontage roads



Key: RED=freeway lanes, GREEN=boulevard lanes

The general location of the new Chester Street Bridge is shown in Figure 10. It would be similar to the replacement Broadway Bridge in that it both would have 11-foot travel lanes. However, it likely would be somewhat narrower in total width because the Broadway Bridge will be wider than 4 lanes in some sections.

Figure 10: Chester Street Bridge Location



The Chester Street Bridge will be more effective if a short 2-lane stretch of Route 365 is widened to 4 lanes (Figure 11). Metroplan has assumed this widening would occur in scenarios that include a Chester Street Bridge.

Figure 11: Route 365 Widening

In our 2040 modeling, the Boulevard + Chester Street Bridge alternative fulfills the two general desired outcomes for the City of Little Rock discussed above:

1) Traffic not headed to central Little Rock is mostly using I-430 and I-440; and

2) Downtown traffic is spread across the street grid to avoid bottlenecks.

Figures 12 and 13 show morning and afternoon peak hour bridge crossings. The Boulevard + Chester Street Bridge alternative generally distributes the 2010 level of bridge crossings across the four 2040 bridges, while the increase between 2010 and 2040 is carried on the I-430 and I-440 bridges. Figure 14 shows regional performance. The Boulevard + Chester Street Bridge alternative outperforms the 12-Lane Bridge alternative for both VMT and VHT.

Figure 12: Southbound Morning Peak Hour Bridge Crossings

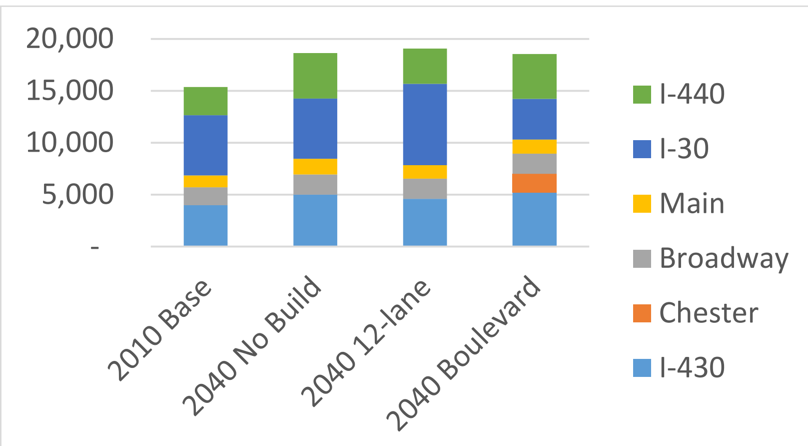


Figure 13: Northbound Afternoon Peak Hour Bridge Crossings

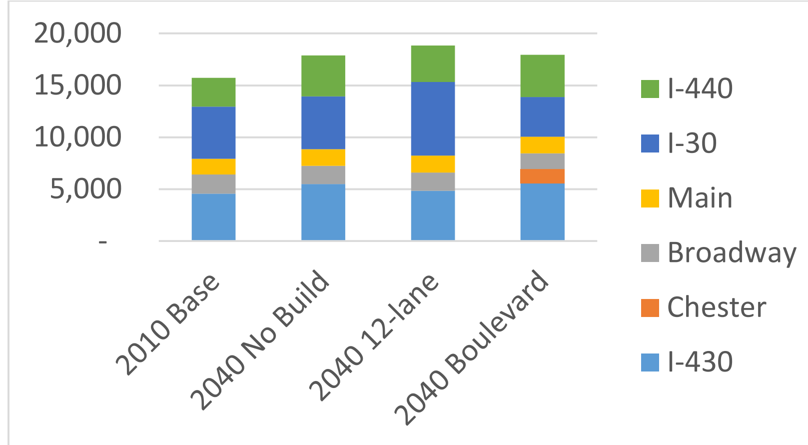
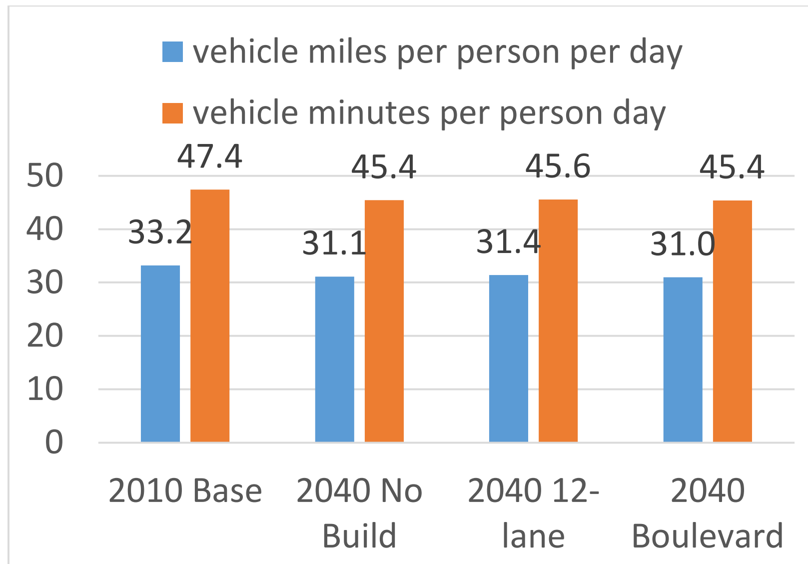


Figure 14: Regional Performance



Why Our Modeling Is Credible

We did not introduce modeling into this discussion. When AHTD said that an 8-lane bridge alternative would be inadequate, it was basing its conclusion on modeling. When AHTD said that 10 general purpose lanes would be inadequate, it was basing its conclusion on modeling. As the 10-lane C/D plan has morphed into a 12+ lane alternative (which AHTD has not disclosed properly), it has based its proposal on modeling. If AHTD challenges our work, it will be relying on its models.

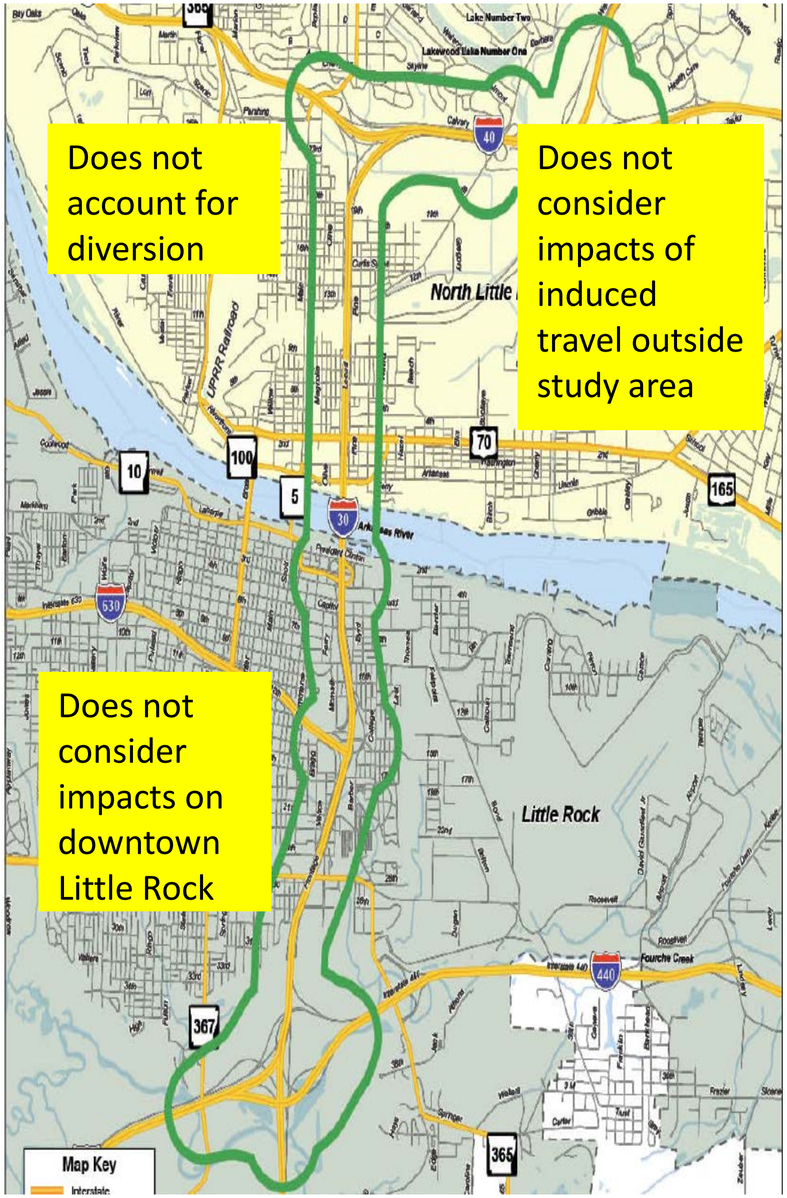
The question is not whether modeling should be used or not, but whether the modeling is credible. As discussed in our Phase 1 report, AHTD's computer modeling fails to account completely for:

- The shift in auto and truck traffic from I-440 and other routes to I-30;
- The shift in number of trips from off-peak times to peak travel;
- The increase in congestion and resulting bottlenecks in downtown ramp areas.

In addition, the AHTD modeling is myopic as is illustrated in Figure 15. It does not account for shifts among the bridges. It does not consider the impacts of induced travel outside the narrow study area. It does not consider traffic impacts in downtown Little Rock outside the narrow study area.

Our modeling accounts for induced travel, shifts among the bridges, and traffic impacts outside the study area.

Figure 15: AHTD Modeling Fails to Account for Critical Impacts



Lessons from Other Freeway to Boulevard Conversions

In the Phase 1 report, we documented how engineers have consistently failed to properly account for induced travel for 80 years, and therefore have overestimated the congestion benefits of widening urban freeways. In the Phase 1 report, we also reported on statistical analysis showing that urban freeway congestion is unrelated to the level of regional congestion. Instead, providing a rich street grid – as is embodied in the Boulevard + Chester Street Bridge alternative – is strongly related to reduced congestion.

Researchers have found that induced travel works in the other direction too. When freeway capacity is removed, travel is <u>reduced</u>. As well-known engineer Sam Schwartz puts it in the excerpt in the box on the following page, “Unbuild it, they will go away.”

Later in his career Sam Schwartz became New York City’s traffic commissioner and the New York City Department of Transportation’s chief engineer, and finally the well-known writer “Gridlock Sam.” However, in his first job assignment, he was tasked with finding out where the missing traffic went after New York City’s Westside Highway collapsed. Where there had been 80,000 vehicles per day traveling the roadway, then there were none. Schwartz was unable to find any evidence of these 80,000 vehicles on other roadways!

This same pattern played out when San Francisco’s Central Freeway was removed in 1996. As reported in the San Francisco Examiner at the time, Caltrans had warned of the “traffic nightmare of the decade.” Instead there were “virtually no traffic jams” and Caltrans could only find 20,000 of the 80,000 vehicles per day that previously used the freeway.

Although there are few examples of freeways that previously carried large volumes of traffic being converted to boulevards, every such conversion has been highly successful.

In addition to the West Side Freeway in New York City and the Central Freeway in San Francisco, other notable examples include:

- Embarcadero Freeway, San Francisco 1991, previously 70,000 vehicles per day
- Cheonggyechon Freeway, Seoul South Korea 2005, previously 120,000 vehicles per day.

The Seoul project was pushed by the Mayor over objections of engineers. It has been so successful, and Mayor Lee became so popular, that he later became elected President of South Korea.

Here are before and after pictures of the Embarcadero:

Figure 16: Embarcadero, San Francisco – Before and After Teardown

Unbuild It, They Will Go Away (Sam Schwartz)

On Saturday morning, December 15, 1973, the forty-year-old West Side Highway, which runs along the Hudson River and connects the Brooklyn-Battery Tunnel with the Henry Hudson Parkway— both built by the unstoppable Robert Moses— collapsed under the weight of a truck carrying more than thirty tons of asphalt. ... The immediate problem— What to do with eighty thousand cars a day that would have to find an alternate route?— fell to me.

I would love to take credit for coming up with a brilliant solution that saved the city, but the truth is both more mundane and a lot more interesting. The predicted traffic disaster never appeared. Somehow, those eighty thousand cars went somewhere, but to this day we have no idea where. Or how, two years later, twenty-five thousand more people were getting into Manhattan's Central Business District.

What made this interesting is that it was a nearly perfect example of what the economist Anthony Downs named the Law of Peak-Hour Expressway Congestion and which another economist, Gilles Duranton, called induced demand. Boiled down to the basics, induced demand is what happens when the supply of a good increases and more of that supply then gets consumed: when a host puts out more cheese and crackers, her guests eat more cheese and crackers…

When a road's capacity is reduced, congestion doesn't necessarily increase. In fact, the biggest and best study of reduction in road capacity shows that lane closures not only cause traffic to decrease on the road's remaining lanes, but only half the decrease reappears anywhere else. This means that if two lanes are closed on a four-lane boulevard, it might carry only 60 percent of the cars it did before the closure; but if you look at every alternate route, you'll be able to account for only half of the "missing" drivers. In an urban setting, with alternate routes or public transit options— that is, one with at least some commitment to smart street design— 20 percent of the boulevard's traffic will just disappear. "If you unbuild it, they will go away."

This wasn't obvious at the time, but unbuilding a replacement for the West Side Highway was a huge financial boon to the cash-strapped city, and not just because we avoided spending tens of millions of dollars in construction costs. The usual rule of thumb is that for every dollar spent on capital investments like bridges, roads, and highways, another 3 percent will be incurred on annual maintenance (or, at least, it should be). Moreover, well within their predicted lifespans, those bridges, roads, and highways need replacing; a highway deck lasts no more than forty years, twenty in regions with severe winter weather. Roads may last forever, but that also means that they consume resources forever, too.

Schwartz, Samuel I. (2015-08-18). Street Smart: The Rise of Cities and the Fall of Cars (pp. 45-47). PublicAffairs. Kindle Edition.

Economics

The City of Little Rock should be pursuing two general desired economic outcomes as it considers I-30 Crossing alternatives:

1) Sufficient funding for AHTD to maintain state-owned city streets and reconstruct them when needed; and
2) Increasing tax base and jobs in the corridor.

The capital cost for the 12-Lane Bridge alternative is very high and unknown. As discussed above, the current proposal is significantly enlarged over the earlier PEL 10-Lane C/D alternative. The Big Rock Interchange was initially budgeted at $70 million in 2006. Expenditures to date of $125 million and $150 million have been reported in the local media. Now KARK has reported that more widening will cost an additional $30-40 million. AHTD intends to include cost containment in its 12-Lane Bridge alternative contracts, but the price will not be known until the contracts are signed.

Metroplan in its 2014 Metropolitan Transportation Plan *Imagine Central Arkansas* reports a $13.1 billion shortfall in transportation revenue relative to need for the period 2014 to 2040. The biggest shortfall is for the category “Road Maintenance and Repair”.

Inadequate funding is a national problem. Other state transportation departments are working to downsize expensive urban grade-separated infrastructure in order to save money over the long term. In the excerpt above, Sam Schwartz says that 3% of capital cost should be budgeted annually for maintenance. If the 12-Lane Bridge alternative is constructed, Arkansas will pay the entire construction cost again for maintenance by around 2050.

City downtowns, including downtown Little Rock, are experiencing strong economic growth. In 2015, Price Waterhouse Coopers identified “The 18-hour city comes of age” as its top emerging trend:

> The urbanization of America has given life to cities that had been historically nine-to-five. According to interviewees, no longer is it accepted that only the great coastal cities can be alive around the clock and on weekends. Downtown transformations have combined the key ingredients of housing, retail, dining, and walk-to-work offices to generate urban cores, spurring investment and development and raising the quality of life for a roster of cities. Buyers have more markets to consider now that the 18-hour centers are putting the elements in place to ratchet up their investment capital flows.[vi]

The Boulevard + Chester Street Bridge alternative would provide great opportunities to ride this wave – expanding downtown development and helping to attract and retain the workforce of the future. In contrast, the 12-Lane Bridge alternative would keep a huge amount of land in the City’s core off the tax roll, suppress adjacent property values, and generally make development east of I-30 less desirable.

The Boulevard + Chester Street alternative also is much more consistent with U.S. Transportation Secretary Anthony Foxx’s Reconnecting Community initiative. His three principles are:

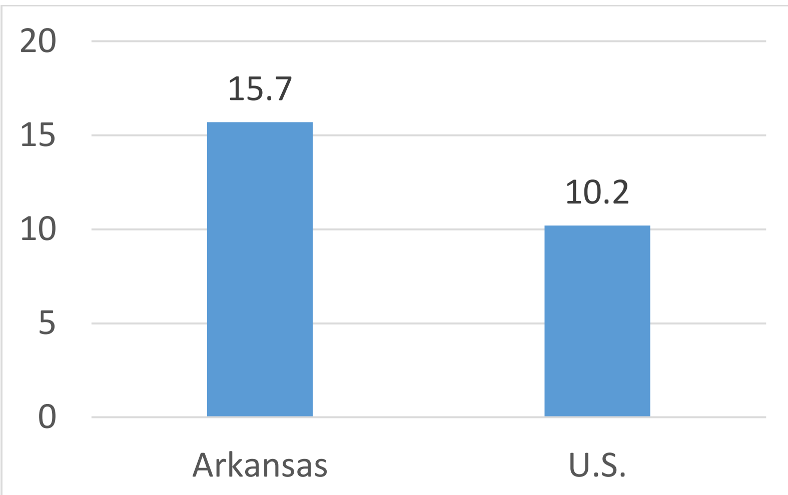
1) Transportation should invigorate opportunities within communities.
2) Projects need to take into account communities that have been on the wrong side of transportation decisions.
3) The projects should be built for and by the communities they go through.[vii]

Safety

AHTD claims major safety benefits from constructing the 12-Lane Bridge alternative as compared to the current situation. In fact, the impacts of the proposal on safety are highly uncertain. Here are some contrary indicators that should be kept in mind.

First, not all traffic accidents are the same. Fatality and injury accidents are much more important that property-damage-only accidents. As shown in Figure 17, Arkansas has a significant problem with fatal traffic accidents. If the Arkansas rate was equal to the U.S. rate, there would have been 163 fewer deaths in Arkansas in 2014.

Figure 17: 2014 Traffic Fatalities per 100,000 Population[viii]



Traffic fatalities are highly correlated with speed. National traffic fatality rates are about 2 ½ times as great in rural areas as compared to urban areas (1.88 per 100 million rural vehicle miles vs. 0.73 per 100 million urban vehicle miles in 2013).[ix]

We can be fairly certain that the 12-Lane Bridge alternative would result in more travel and higher average speeds. Both of these effects are positively correlated with traffic fatalities. In contrast, the purported benefits of reconfiguration are highly uncertain.

Despite the separation of freeway and C/D lanes there are still multiple high-speed merge areas over short distances. Vehicles traveling at different speeds on freeways are a frequent contributing factor in freeway crashes. The proposed interchange configuration at I-630 looks very challenging for drivers. For vehicles traveling southbound on I-30 and then westbound on I-630, here is the sequence of merges and diverges that occur between 11th Street and Commerce Street, a distance of about a half mile:

- 1 C/D lane merges with 3 freeway lanes
- 4 lanes narrow to 3 lanes
- These 3 lanes merge with 2 lanes on left from I-30 northbound
- A 6th lane merges from the left from Hanger Hill
- 6 lanes narrow to 5 lanes
- The right lane exits I-630 for Cumberland

This is an incredible number of changes for drivers to deal with at high speeds – particular if travelers from the south and east cross the other lanes to exit at Cumberland. This configuration is similar to what is there today, but the 12-Lane Bridge alternative is designed to carry higher traffic volumes through this area, making weaving more challenging. The accident rate for the proposed interchange configuration is highly uncertain.

Endnotes

[i] This review is focused on the AHTD split diamond option rather than the SPUI alternative because the split diamond option appears to have much more support from the City and the downtown business community. The SPUI alternative would have similar impacts overall, and would likely cause more congestion downtown because the on and off-ramps would be in the same place.

[ii] Lanes counted from material from the April 26, 2016 public meeting.

[iii] https://connectingarkansasprogram.com/corridors/9/i-30-pulaski-county/

[iv] Reproduced from AHTD, *Planning and Environmental Linkages Traffic and Safety Report*, Figure 19, p. 43, June 2005.

[v] The enhanced model is described in general terms in the Phase 1 report, and in a technical report: *CARTS Travel Demand Model Dynamic Traffic Assignment Version* (Version 1), May 2016.

[vi] http://www.pwc.com/us/en/asset-management/real-estate/publications/emerging-trends-in-real-estate-2014.html

[vii] http://www.theatlantic.com/business/archive/2016/03/the-transportation-secretary-speaks-out-against-highways/475749/

[viii] Insurance Institute for Highway Safety

[ix] U.S. D.O.T. National Highway Traffic Safety Administration