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Review of Louisville-Southern Indiana Ohio River Bridges Project SDEIS

Norm Marshall, Principal
Prepared for River Fields, Inc.
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Executive Summary

We find very significant deficiencies in the traffic modeling for the Louisville-Southern Indiana Ohio River Bridges Project Supplemental Draft Environmental Impact Statement (SDEIS) including:

- 1) The SDEIS uses an incorrect definition of roadway capacity which causes volume-to-capacity problems for the 2030 No Action scenario to be overstated.
- 2) The so called “No Action” land use scenario was developed by economic development officials who certainly were assuming that the bridge would be constructed.
- 3) The SDEIS fails to adequately describe whether separate No Action and Build land use scenarios were used in the traffic modeling (as should have been done), and if separate scenarios were used, the SDEIS fails to describe how the scenarios were developed. The information provided about the scenarios is inconsistent with economic and modeling theory.
- 4) The SDEIS assumes much more regional employment growth than is consistent with projected population growth.
- 5) There are at least ten factors that are limiting traffic growth that are not considered in the transportation modeling, and that cause future bridge crossings to be overestimated.
- 6) The model appears to be too insensitive to tolls.
- 7) Future toll revenue is overestimated.
- 8) Vehicle Hours of Delay (VHD) is a very poor performance indicator that has been abandoned by FHWA and that amplifies the errors in the modeling into much larger errors.

These deficiencies invalidate the future traffic volumes and revenue forecasts. Any benefits of the project are greatly overstated in the SDEIS.

B.10

Traffic problems overstated due to incorrect capacity assumptions

In our February 25, 2002 comments on the DEIS, we documented how the DEIS assumed too low of capacity values when calculating volume-to-capacity ratios:

The “design capacity” assumed in the DEIS for the Kennedy Bridge is about 1,600 vehicles per lane per hour. In contrast, as shown below, the ultimate capacity for freeway segments is 2,200 – 2,400 vehicles per lane per hour, or 38% to 50% percent greater. (p. 2-4)

The SDEIS repeats this error. If this assumption were corrected, all but one of the apparently over capacity conditions shown in Table 3.3-3 in the 2030 No Action scenario would be eliminated. Using the midpoint ultimate capacity value of 2,300 vehicles per lane per hour (and 1,200 vehicles per lane per hour for the Clark Memorial Bridge), the correct volume-to-capacity ratios for the 2030 No Action scenario are shown in the table below

Corrected 2030 No Action Scenario Bridge Volume-to-Capacity Ratios

Kennedy		Sherman Minton		Clark Memorial	
NB	SB	NB	SB	NB	SB
47%	107%	43%	85%	13%	48%
51%	75%	48%	49%	19%	37%
91%	93%	91%	60%	59%	41%
22%	28%	18%	15%	13%	8%

Furthermore, as discussed below, the 2030 No Action bridge crossing values are overestimated so the true volume-to-capacity ratios will be even lower.

Invalid and biased land use assumptions

No Action employment forecast assumes construction of eastern bridge

Introducing a new bridge crossing would not only change travel patterns; it also would change the locations of future housing and employment. Areas on both sides of the new bridge would become more accessible to the region’s population, and these areas would become more attractive for development. In the SDEIS, the “No Action” forecast assumes that especially high rates of development would occur on both sides of the river in the proximity of the proposed east end bridge even if the east end bridge were not constructed:

The socioeconomic forecasts for 2007–2030 also show that rapid population and employment growth is occurring, and will continue to occur, in the eastern portion of the LMPA. In Indiana, such growth is apparent in the area of southeastern Clark County between I-65 and the Ohio River (extending north to about Charlestown, Indiana). As indicated by the dark red shaded areas on Figure 2.2-3, large employment gains are predicted in the vicinity of the Port of Indiana-Jeffersonville (formally Clark Maritime Center) and the River Ridge Commerce Center (formerly the Indiana Army Ammunition

Plant [INAAP]). Major growth in population is also anticipated in this area of southeastern Clark County, including the areas near S.R. 265, as well as the area just to the west of S.R. 62 across from the River Ridge Commerce Center. Areas of dark red shading on Figure 2.2-2 indicate high rates of population growth in southeastern Clark County, between I-65 and the Ohio River. (SDEIS, p. 2-14)

No methodology is given in the main body of the SDEIS as to how these forecasts were developed. Appendix H.3 describing the transportation modeling attributes the future land use forecasts to KIPDA:

Socio-economic data were obtained from the Kentuckiana Regional Planning & Development Agency based on the 10PlanA data. Table 6.2 shows the growth in 10PlanA socio-economic data between year 2007 and 2030. (SDEIS, Appendix H.3, p. 92)

KIPDA's forecasting methodology is described in Chapter 3 of *Horizon 2030* (adopted in October 2010). The process is described as one strongly influenced by the aspirations of economic development officials:

Prepared 2030 forecasts of socioeconomic characteristics from local comprehensive planning efforts and municipal and economic development entities were utilized when available. For areas without such prepared information, the 2030 socioeconomic forecasts from *Horizon 2030* (2005) provided a starting point for review and update activities with local partners and agencies...

KIPDA staff provided basic information and technical assistance to the forecast participants as necessary. The local land use and economic development entities, in turn, provided completed forecasts or additional information to be used in the forecast update process. (*Horizon 2030*, Chapter 3 Land Use, p. 14)

There is no discussion in *Horizon 2030* of whether or not the east bridge or other new transportation infrastructure was assumed when developing the land use forecasts. However, as the east end bridge is in the adopted regional transportation plan, it is virtually certain that the construction of the east end bridge was assumed in the development of the land use forecasts. It is even more probable that the "local land use and economic development entities" representing the areas proximate to the east end bridge would have assumed the bridge would be built when making their forecasts. Therefore, the KIPDA 2030 forecast is a "Build" forecast and not a "No Action" forecast.

The FEIS used separate No Build and Build land use forecasts. This is appropriate. In contrast, the SDEIS is ambiguous as to whether separate No Build and Build land use forecasts were done or not. This is a critical issue that was central in the FEIS so it is inexcusable that greater clarity on this issue is not provided.

None of the modeling appendices – H1, H2, or H3 describe multiple 2030 land use scenarios. This suggests that only a single land use scenario was modeled. Appendix H-3 presents a single forecast in Table 6.2. If only a single future land use forecast was modeling, the alternatives analyses are invalid.

On the other hand, SDEIS Chapter 5 includes figures and tables that show differences between 2030 No Action and Build scenarios for population and employment. The methodology for developing these numbers is never described, and the SDEIS also does not say whether these numbers were used in the transportation modeling. It is very important that the methodology be disclosed. In our February 25, 2011 comments on the DEIS (p. 3-4 – 3-7), we documented how the methodology employed at that time was deeply flawed and resulted in invalid results. If the same methodology was employed again, it is still invalid and invalidates the alternative analyses.

In any case, the numbers shown don't make sense. In order to explain this, we will first consider the issue of transportation capacity and land use changes more generally. The National Cooperative Highway Research Program (NCHRP) has published a *Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects* (Special Report 466, 2002). This reference describes several methods for evaluating land use changes from a major transportation project. The most sophisticated of these methods is integration transportation and land use modeling. When the Portland, Oregon Metropolitan Planning Organization, Metro, does integrated land use/transportation modeling, the modelers report:

Under conditions of increasing congestion, nonresidential land uses increase their decentralization in order to take advantage of attracting labor and customers traveling in the off-peak direction. Over a period of time, this leads to equivalent travel times over a link in both directions of travel. As a result, the capacity of the transportation system is much greater than traditional modeling procedures indicate.¹

They report that under congested conditions such as those forecast in the SDEIS in the No Action scenario, the degree of directional traffic decreases as jobs and housing become more balanced at a subregional level. This would be accomplished by stronger job growth on the Indiana side of the river which would be attraction to Indiana residents that could avoid the congested river crossing and stronger housing growth on the Kentucky side of the river so people could live on the same side of the river as their jobs. These forecasts would improve the jobs/housing balance on both sides of the river and the traffic flow would become more balanced. In contrast, the DFEIS shows both jobs and housing shifting to Indiana from Kentucky in the Build scenario relative to the No Action scenario. (SDEIS, Figures 5.1.1 and 5.1.2, p. 5.4) This doesn't make sense and is not supported by any evidence or description of methodology. The numbers are simply attributed to the developer of the SDEIS.

Too much employment growth assumed

The SDEIS states: "The 2030 regional forecasts indicate the changes that are expected to take place on an LMPA-wide basis. Population is now predicted to increase by 15% between 2007 and 2030, while employment is predicted to increase by 42% in the same period." (p. 2-6) This is nonsense, as people are needed to fill the jobs. Employment cannot increase by almost three times as much as population

¹ Conder, Sonny and Keith Lawton. Alternative Futures for Transportation and Land Use – Integrated Models Contrasted with "Trend-Delphi" Methods: The Portland Metro Results. Metro: Portland, OR, July 2001.

without massive increases in in-commuting from outside the region, a massive increase in the labor force participation rate, or both. The population forecast is real in that it is based on demographic analysis. The employment forecast is a fantasy designed to satisfy the economic development officials discussed in the previous section. It allows them to pretend that there can be strong job growth in both existing downtown areas and planned suburban areas. This cannot happen in a relatively low-growth region.

The reality is that the labor force participation rate (the percentage of population employed) has been falling with the aging population and will continue to fall. For the U.S. as a whole, the labor force participation rate peaked in the late 1990s at 67.1 percent of the population and had declined to 64.7 percent in 2010. (This is not because of the poor employment situation in 2010 which is a separate indicator; the employed population in 2010 was only 58.5 percent.) The U.S. Bureau of Labor Statistics projects that the labor force participation rate will decline to 64.5 percent in 2018.² By 2030, everyone born in the “baby boom” period between 1945 and 1955 will be at least 75, and the great majority of these people will be out of the labor market.

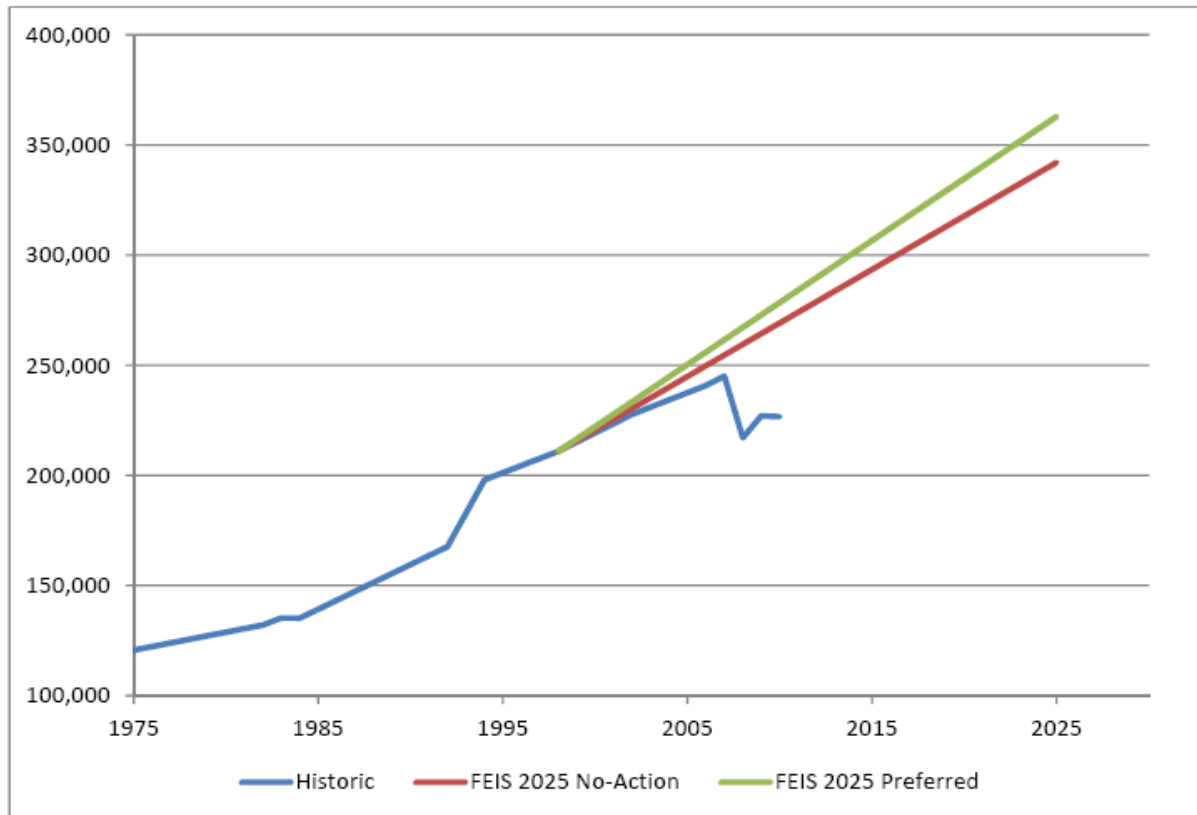
Actual employment growth between now and 2030 in the region will be lower than the rate of population growth – not higher. Assuming otherwise leads to overestimated traffic growth, particularly for the proposed east end bridge where a large share of the modeled traffic is to and from hypothetical and speculative jobs that do not exist today.

² *Statistical Abstract of the United States 2012*, Tables 586 and 587.

Too Much Traffic Growth Forecast

The SDEIS documents how badly the FEIS estimated traffic growth.

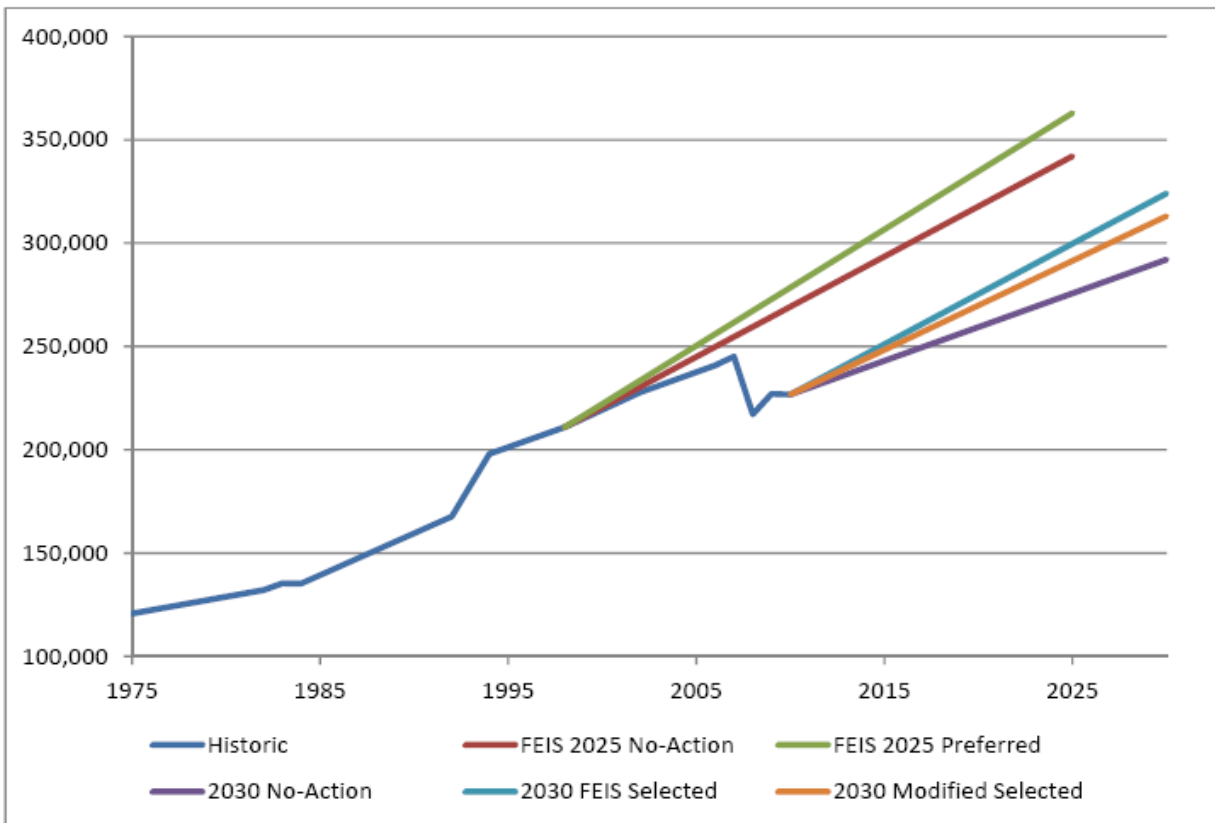
Figure 3-2: Original FEIS Daily Traffic Volumes on Ohio River Bridges



SDEIS, Appendix H.1, p. 7

Despite the complete failure of the old way of thinking in understanding what is going on today regarding traffic volumes, the SDEIS simply resets the base downward and repeats the same prediction.

Figure 6-1: Projected Daily Traffic Volumes on Ohio River Bridges in Louisville Metropolitan Area

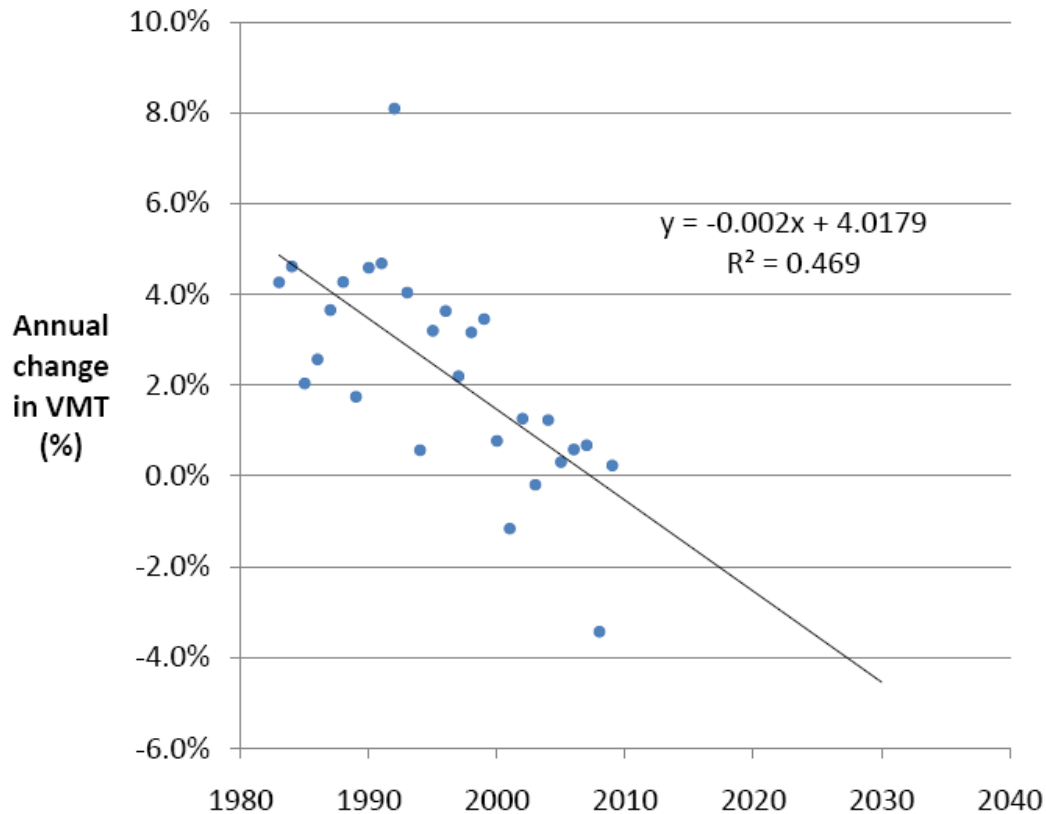


SDEIS, Appendix H.1, p. 14

This graph is not so much a set of forecasts as it is an admission that the preparers of the SDEIS do not know how to model the recent past, and certainly not to model the future. The difference between the two sets of lines is almost as much traffic as the eastern bridge is forecast to carry in 2030 and this was achieved without any cost at all. It is very important to understand how this occurred and to incorporate these forces into the modeling the future.

The SDEIS apparently attributes the recent decline solely to current economic issues (Appendix H.1, p. 6), but the actual story is much richer and longer lasting than that. As shown in the figure below created by Michael Bomford, PhD of Kentucky State University, the rate of VMT growth in Kentucky has been dropping for at least 20 years now.

Annual change in KY VMT (1983-2009), with linear regression projected to 2030 (used to calculate 'business as usual' scenario #4)



Source: Michael Bomford, Ph.D., Kentucky State University, "A range of 'business as usual' projections for KY Vehicle Miles Traveled to 2030"³

The trend line suggests that VMT growth in Kentucky will actually be negative between now and 2030. Future growth may or may not be negative, but certainly will be considerably lower than that forecast in the SDEIS. The SDEIS overestimates future growth in bridge crossings in the 2030 No Action scenario for at ten least different reasons. Some of these have been introduced already above. These include:

- 1) The decentralized land use growth assumed in the east will not be fully realized without the construction of the east end bridge
- 2) The employment forecast fails to consider that congestion on river crossings will lead to better a better balance of jobs and housing on both sides of the river.

³ <http://www.postcarbon.org/blog-post/104360-from-growth-to-decline-vehicle-miles>

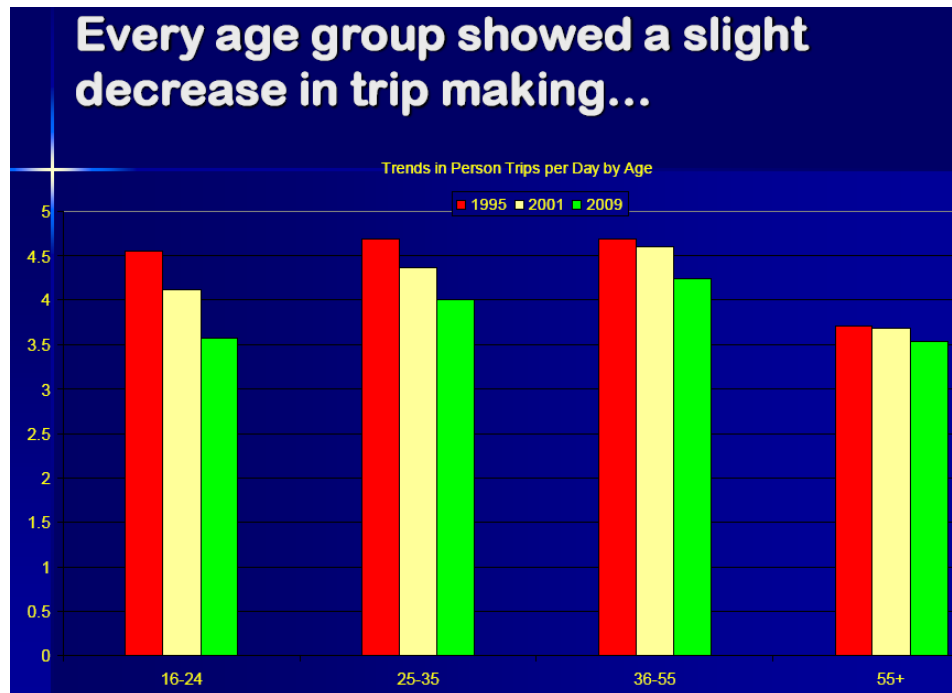
- 3) Future employment is overestimated.
- 4) The aging population leads to fewer workers per capita.

The other reasons are:

- 5) The aging population also causes less travel per capita, particularly for peak period/peak direction travel which is the important issue for bridge capacity.
- 6) Other demographic changes are reducing traffic growth. In 2006 (before the economic downturn) in work done for U.S. D.O.T., Dr. Steven Polzin identified four other demographic shifts:
 - a. stabilizing average household size following decades of declines,
 - b. stabilizing female labor force participation rates following decades of increases,
 - c. stabilizing female share of licensed drivers following decades of increases, and
 - d. stabilizing share of zero-vehicle households following decades of decreases.⁴
- 7) Dr. Polzin also identified a simultaneous shift in trends in the transportation sector:
 - a. stabilizing or declining average travel speed following years of increases,
 - b. a change from declining to modest increases in vehicle travel cost,
 - c. stabilizing public transit mode shares following decades of declines, and
 - d. stabilizing auto occupancies following decades of declines.
- 8) Trip making is down since 1995, especially by young adults, as documented in the National Household Travel Survey (NHTS)⁵

⁴ Polzin, Steven E. "The Case for Moderate Growth in Vehicle Miles of Travel: A Critical Juncture in U.S. Travel Behavior Trends, p. vii. University of South Florida, Center for Urban Transportation Research for U.S. Department of Transportation, April 2006.

⁵ Nancy McGuckin, Travel Behavior Analyst, Transportation Research Board. "Sustainable Mobility: New Findings from the NHTS.



- 9) New technology is supporting more telecommuting, internet shopping, and other changes that are eliminating trips.
- 10) Real estate trends for a number of years now have favored downtown infill locations over suburban jobs sites, and the apartment market also is much stronger than the single family housing market (responding to demographic changes and not just to the housing bubble). These development types result in less VMT growth than the suburban types. The Urban Land Institute/PwC *Emerging Real Estate Trends 2012*⁶ found:

Among property sectors for 2012, the survey finds that investment and development prospects continue to advance across all major property sectors, led by apartments. Besides apartments, interviewees prefer downtown office buildings in 24-hour cities, warehouse properties producing cash flow in prominent port and airport gateways; full-service hotels in the major markets; limited-service hotels without food and beverage; and neighborhood shopping centers serving stable infill suburban communities. Sentiment diminishes for power centers and malls: owners will not sell the best fortress, and most other regional centers face a shaky future. Suburban offices score the lowest investment marks; commodity buildings in campus settings isolated from urban amenities receive a big thumbs down.

The traffic forecasts are based on assumptions in the socioeconomic forecasts and assumptions in the travel demand model. The socioeconomic forecasts and the travel demand model do not account for

⁶ <http://www.uli.org/News/PressReleases/Archives/2011/2011PressReleases/EmergingTrendsUS.aspx>

any of the ten factors described above. Therefore, the model is very simplistic and significantly overestimates growth in bridge crossings.

The road building community including consultants, engineers, Department of Transportation employees, economic development officials, real estate developers and the construction industry are all highly invested in the historic approach of always forecasting the need for more capacity and then building that capacity. They all are having trouble recognizing that this approach is outdated.

"It is difficult to get a man to understand something, when his salary depends upon his not understanding it." Upton Sinclair

The Modeling Appears to be Too Insensitive to Tolls

In the 2003 FEIS process, tolling the east end bridge was rejected, in part, because a \$1 toll would divert a large amount of traffic from the proposed bridge and a \$3 toll would divert virtually all of the traffic. It was an odd finding that the bridge was critically important yet users would not be willing to pay tolls.

In the new SDEIS, the analysis has completely flipped. Now the model is highly insensitive to tolls in the \$1-\$2 range. SDEIS Table 3.3-6 (p. 3-30) shows 61,000 trips between Eastern Clark County and Eastern Jefferson County/Oldham County for both the FEIS Selected and Modified Selected alternatives, i.e. the presence of the \$1.50 toll makes no difference at all.

We have extensive experience in modeling toll roads, and the 2003 FEIS modeling appeared to us too sensitive to tolls and the SDEIS modeling appears to be too insensitive. It is difficult to know why this might be without examining the model files (which we are requesting).

The model documentation (Appendix H.3) indicates that tolls are converted to equivalent minutes (p. 25). For cars, the conversion rate is \$0.21 per minute (p. 26). Therefore, a \$1.50 toll is equivalent to 7.1 minutes. This is a fairly large number compared to the time savings provided by the east end bridge for most trips. In our February 2002 comments on the DEIS, we analyzed the 2000 KIPDA household survey data. We found that of trips actually made in 2000 by residents, only 0.36 percent of trips made would save time with the east end bridge. (Table 2-3, p. 2-7) The average time saved would be only 3.7 minutes. (Table 2-4, p. 2-8) This average time savings is only about half the time value of the \$1.50 toll so the toll certainly should be large enough to have a greater effect on the number of river crossings than indicated in the SDEIS, particularly for potential trips where the east end bridge is the only reasonable alternative.

If the model is too insensitive to tolls, it is yet another reason why the model would overestimate bridge crossings in the toll scenarios.

Too Revenue Is Overestimated

If bridge crossings are overestimated, then toll revenue is overestimated. Furthermore, the toll revenue shortfall will be greater than the reduction in bridge crossings because more traffic would divert to free bridges if there is less congestion. In addition, if the model is not sensitive enough to tolls, the revenue

problems will be even worse. Several prominent new toll roads in the U.S. are in dire financial condition due to overly optimistic revenue forecasts. This is a major risk factor in the financial plan.

Vehicle Hours of Delay (VHD) - Very poor performance indicator

In our February 25, 2002 comments on the DEIS, we documented how beginning with the 2000 performance plan, FHWA abandoned VHD as a meaningful measure of performance because: "... as a system-wide measure ... it does not effectively reflect actual performance of the highway system in places where congestion regularly happens ... and the measure is difficult to interpret by the general public.

VHD compounds all of the other errors

Even if VHD were an effective measure, the SDEIS calculations of VHD cannot avoid compounding errors into exaggerated differences between the scenarios. In our February 25, 2002 comments on the DEIS, we documented how large and spurious VHD differences resulted from placing large amounts of employment in areas without adequate roadway infrastructure in the No Action scenario and then moving them out in the Build scenario. The apparent VHD had nothing to do with the absence or presence of any bridges. Here is an excerpt from our February 25, 2002 comments:

As an illustration of the total unreliability of the VHD approach consider the area of greatest VHD reduction in the DEIS. The DEIS assumes that a 0.35 mile stretch of Old Floydsburg Road in Oldham County will have 27,654 vehicles per day using the 2-lane road at an average speed of 2.9 m.p.h.

This 0.35 mile link alone accounts for a difference of 1,722 VHD reduction per day between the downtown bridge and the two-bridge build scenario, or 6.6% of the total differences between the two scenarios, the majority of the "credit" given in the DEIS to the traffic improvements result only from movement of assumed jobs to another area for the two-bridge scenario.

At least half of the improvements in the vehicle hours of travel (VHT) in the DEIS are attributable to the differences in the Oldham County employment inputs while more than half of VHD are attributable to those differences. (p. 13)

If the same process was followed this time, it is probable that similar errors are present which could not be detected without examining the model files (which we are requesting).

The other problems described above have outsized effects on the VHD calculations because VHD increases exponentially with VMT. That's why the SDEIS shows that a 26 percent increase in VMT between 2007 and 2030 would result in a 161% increase in VHD. (Table 2.2-1, p. 2-6) The problems discussed above result in overestimated VMT, which translate into much bigger increases in VHD. Given all of the problems in the model, and the inherent uncertainty in making 2030 traffic volumes even if the model were more complete and accurate, it is misleading to focus on an indicator that amplifies small errors into bigger errors – which is what VHD does.

Resume

NORMAN L. MARSHALL, Principal

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EDUCATION:

Master of Science in Engineering Sciences, Dartmouth College, Hanover, NH, 1982

Bachelor of Science in Mathematics, Worcester Polytechnic Institute, Worcester, MA, 1977

PROFESSIONAL EXPERIENCE:

Norm Marshall helped found Smart Mobility, Inc. in 2001. Prior to this, he was at Resource Systems Group, Inc. for 14 years where he developed a national practice in travel demand modeling. He specializes in analyzing the relationships between the built environment and travel behavior, and doing planning that coordinates multi-modal transportation with land use and community needs.

Regional Land Use/Transportation Scenario Planning

Climate Plan (California statewide) – Assisted large coalition of groups in reviewing and participating in the target setting process required by Senate Bill 375 and administered by the California Air Resources Board to reduce future greenhouse gas emissions through land use measures and other regional initiatives. This work including reviewing the transportation models of the four largest Metropolitan Planning Organizations (MPOs) and less detailed analyses of the planning efforts of the smaller MPOs.

Chicago Metropolis Plan and Chicago Metropolis Freight Plan (6-county region)— developed alternative transportation scenarios, made enhancements in the regional travel demand model, and used the enhanced model to evaluate alternative scenarios including development of alternative regional transit concepts. Developed multi-class assignment model and used it to analyze freight alternatives including congestion pricing and other peak shifting strategies. Chicago Metropolis 2020 was awarded the Daniel Burnham Award for regional planning in 2004 by the American Planning Association, based in part on this work.

Envision Central Texas Vision (5-county region)—implemented many enhancements in regional model including multiple time periods, feedback from congestion to trip distribution and mode choice, new life style trip production rates, auto availability model sensitive to urban design variables, non-motorized trip model sensitive to urban design variables, and mode choice model sensitive to urban design variables and with higher values of time (more accurate for “choice” riders). Analyzed set land use/transportation scenarios including developing transit concepts to match the different land use scenarios.

Mid-Ohio Regional Planning Commission Regional Growth Strategy (7-county Columbus region)— developed alternative future land use scenarios and calculated performance measures for use in a large public regional visioning project.

Baltimore Vision 2030—working with the Baltimore Metropolitan Council and the Baltimore Regional Partnership, increased regional travel demand model’s sensitivity to land use and transportation infrastructure. Enhanced model was used to test alternative land use and transportation scenarios including different levels of public transit.

Chittenden County (2060 Land use and Transportation Vision Burlington Vermont region) – leading extensive public visioning project as part of MPO’s long-range transportation plan update.

Burlington (Vermont) Transportation Plan – Leading team developing Transportation Plan focused on supporting increased population and employment without increases in traffic by focusing investments and policies on transit, walking, biking and Transportation Demand Management.

Transit Planning

Regional Transportation Authority (Chicago) and Chicago Metropolis 2020 – evaluating alternative 2020 and 2030 system-wide transit scenarios including deterioration and enhance/expand under alternative land use and energy pricing assumptions in support of initiatives for increased public funding.

Capital Metropolitan Transportation Authority (Austin, TX) Transit Vision – analyzed the regional effects of implementing the transit vision in concert with an aggressive transit-oriented development plan developed by Calthorpe Associates. Transit vision includes commuter rail and BRT.

Bus Rapid Transit for Northern Virginia HOT Lanes (Breakthrough Technologies, Inc and Environmental Defense.) – analyzed alternative Bus Rapid Transit (BRT) strategies for proposed privately-developing High Occupancy Toll lanes on I-95 and I-495 (Capital Beltway) including different service alternatives (point-to-point services, trunk lines intersecting connecting routes at in-line stations, and hybrid).

Central Ohio Transportation Authority (Columbus) – analyzed the regional effects of implementing a rail vision plan on transit-oriented development potential and possible regional benefits that would result.

Essex (VT) Commuter Rail Environmental Assessment (Vermont Agency of Transportation and Chittenden County Metropolitan Planning Organization)—estimated transit ridership for commuter rail and enhanced bus scenarios, as well as traffic volumes.

Georgia Intercity Rail Plan (Georgia DOT)—developed statewide travel demand model for the Georgia Department of Transportation including auto, air, bus and rail modes. Work included estimating travel demand and mode split models, and building the Departments ARC/INFO database for a model running with a GIS user interface.

Roadway Corridor Planning

Hudson River Crossing Study (Capital District Transportation Committee and NYSDOT) – Analyzing long term capacity needs for Hudson River bridges which a special focus on the I-90 Patroon Island Bridge where a microsimulation VISSIM model was developed and applied.

State Routes 5 & 92 Scoping Phase (NYSDOT) —evaluated TSM, TDM, transit and highway widening alternatives for the New York State Department of Transportation using local and national data, and a linkage between a regional network model and a detailed subarea CORSIM model.

Twin Cities Minnesota Area and Corridor Studies (MinnDOT)—improved regional demand model to better match observed traffic volumes, particularly in suburban growth areas. Applied enhanced model in a series of subarea and corridor studies.

Developing Regional Transportation Model

Pease Area Transportation and Air Quality Planning (New Hampshire DOT)—developed an integrated land use allocation, transportation, and air quality model for a three-county New Hampshire and Maine seacoast region that covers two New Hampshire MPOs, the Seacoast MPO and the Salem-Plaistow MPO.

Syracuse Intermodal Model (Syracuse Metropolitan Transportation Council)—developed custom trip generation, trip distribution, and mode split models for the Syracuse Metropolitan Transportation Council. All of the new models were developed on a person-trip basis, with the trip distribution model and mode split models based on one estimated logit model formulation.

Portland Area Comprehensive Travel Study (Portland Area Comprehensive Transportation Study)—Travel Demand Model Upgrade—enhanced the Portland Maine regional model (TRIPS software). Estimated person-based trip generation and distribution, and a mode split model including drive alone, shared ride, bus, and walk/bike modes.

Research

Obesity and the Built Environment (National Institutes of Health and Robert Wood Johnson Foundation) – Working with the Dartmouth Medical School to study the influence of local land use on middle school students in Vermont and New Hampshire, with a focus on physical activity and obesity.

The Future of Transportation Modeling (New Jersey DOT)—Member of Advisory Board on project for State of New Jersey researching trends and directions and making recommendations for future practice.

Trip Generation Characteristics of Multi-Use Development (Florida DOT)—estimated internal vehicle trips, internal pedestrian trips, and trip-making characteristics of residents at large multi-use developments in Fort Lauderdale, Florida.

Improved Transportation Models for the Future—assisted Sandia National Laboratories in developing a prototype model of the future linking ARC/INFO to the EMME/2 Albuquerque model and adding a land use allocation model and auto ownership model including alternative vehicle types.

Critiques

C-470 (Denver region) – Reviewed express toll lane proposal for Douglas County, Colorado and prepared reports on operations, safety, finances, and alternatives.

Intercounty Connector (Maryland) – Reviewed proposed toll road and modeled alternatives with different combinations of roadway capacity, transit capacity (both on and off Intercounty Connector) and pricing.

Foothills South Toll Road (Orange County, CA) – Reviewed modeling of proposed toll road.

I-93 Widening (New Hampshire) – Reviewed Environment Impact Statement and modeling, with a particular focus on induced travel and secondary impacts, and also a detailed look at transit potential in the corridor.

Stillwater Bridge – Participated in 4-person expert panel assembled by Minnesota DOT to review modeling of proposed replacement bridge in Stillwater, with special attention to land use, induced travel, pricing, and transit use.

Ohio River Bridges Projects– Reviewed Environmental Impact Statement for proposed new freeway bridge east of Louisville Kentucky for River Fields, a local land trust and historic preservation not-for-profit organization.

PUBLICATIONS AND PRESENTATIONS (partial list)

Understanding the Transportation Models and Asking the Right Questions. Lead presenter on national Webinar put on by the Surface Policy Planning Partnership (STPP) and the Center for Neighborhood Technologies (CNT) with partial funding by the Federal Transit Administration, 2007.

Sketch Transit Modeling Based on 2000 Census Data with Brian Grady. Presented at the Annual Meeting of the Transportation Research Board, Washington DC, January 2006, and *Transportation Research Record*, No. 1986, “Transit Management, Maintenance, Technology and Planning”, p. 182-189, 2006.

Travel Demand Modeling for Regional Visioning and Scenario Analysis with Brian Grady. Presented at the Annual Meeting of the Transportation Research Board, Washington DC, January 2005, and *Transportation Research Record*, No. 1921, “Travel Demand 2005”, p. 55-63, 2006.

Chicago Metropolis 2020: the Business Community Develops an Integrated Land Use/Transportation Plan with Brian Grady, Frank Beal and John Fregonese, presented at the Transportation Research Board’s Conference on Planning Applications, Baton Rouge LA, April 2003.

Chicago Metropolis 2020: the Business Community Develops an Integrated Land Use/Transportation Plan with Lucinda Gibson, P.E., Frank Beal and John Fregonese, presented at the Institute of Transportation Engineers Technical Conference on Transportation’s Role in Successful Communities, Fort Lauderdale FL, March 2003.

Evidence of Induced Travel with Bill Cowart, presented in association with the Ninth Session of the Commission on Sustainable Development, United Nations, New York City, April 2001.

Induced Demand at the Metropolitan Level – Regulatory Disputes in Conformity Determinations and Environmental Impact Statement Approvals, Transportation Research Forum, Annapolis MD, November 2000.

Evidence of Induced Demand in the Texas Transportation Institute’s Urban Roadway Congestion Study Data Set, Transportation Research Board Annual Meeting, Washington DC: January 2000.

Subarea Modeling with a Regional Model and CORSIM” with K. Kaliski, presented at Seventh National Transportation Research Board Conference on the Application of Transportation Planning Methods, Boston MA, May 1999.

New Distribution and Mode Choice Models for Chicago with K. Ballard, Transportation Research Board Annual Meeting, Washington DC: January 1998.

“Land Use Allocation Modeling in Uni-Centric and Multi-Centric Regions” with S. Lawe, Transportation Research Board Annual Meeting, Washington DC: January 1996.

Multimodal Statewide Travel Demand Modeling Within a GIS with S. Lawe, Transportation Research Board Annual Meeting, Washington DC: January 1996.

Linking a GIS and a Statewide Transportation Planning Model, with L. Barbour and Judith LaFavor, Urban and Regional Information Systems Association (URISA) Annual Conference, San Antonio, TX, July 1995.

Land Use, Transportation, and Air Quality Models Linked With ARC/INFO. with C. Hanley, C. Blewitt, and M. Lewis, Urban and Regional Information Systems Association (URISA) Annual Conference, San Antonio, TX, July 1995.

Forecasting Land Use Changes for Transportation Alternative with S. Lawe, Fifth National Conference on the Application of Transportation Planning Methods, Seattle WA, April 1995.

Forecasting Land Use Changes for Transportation Alternatives, with S. Lawe, Fifth National Conference on the Application of Transportation Planning Methods (Transportation Research Board), Seattle WA, April 1995.

Integrated Transportation, Land Use, and Air Quality Modeling Environment with C. Hanley and M. Lewis Fifth National Conference on the Application of Transportation Planning Methods (Transportation Research Board), Seattle WA, April 1995.

MEMBERSHIPS/AFFILIATIONS

Member, Institute of Transportation Engineers

Member, American Planning Association

Member, Congress for the New Urbanism