

Memo to: Board of Directors

From: Staff

Subject: Information for Discussion on New Mississippi River Bridge

Date: February 15, 2007

During the discussion of the Mississippi River Bridge project at the January Board meeting, members raised several important issues. This memo provides additional information to address those concerns. Also, following the meeting and the release of our draft reports on the project, we met with MoDOT and IDOT to seek their input and suggestions. We thought that the outcome of that meeting would be useful in the discussion to take place at the February 21 special Board meeting, so we report on it here.

Issues Raised at the January 30 meeting of the Board of Directors.

1. Coordination with other agencies. Suggestions were made that the staff did not adequately coordinate with MoDOT, IDOT and other affected organizations and agencies. Attachment A is a listing of all relevant meetings with organizations and individuals that had previously demonstrated interest in the new bridge. At our initiative, we reached out to a wide variety of stakeholders during work on the bridge reports, some of them multiple times. We wanted our consultants to develop a good understanding of the issues and varied opinions surrounding the Mississippi River bridge issue. We also asked MoDOT and IDOT to provide us with any information that they considered relevant to a better understanding of the bridge situation.
2. Reliability of travel demand forecasts. Questions were raised about the reliability and accuracy of our traffic forecasts, particularly in comparison to those included in the material in the amended Environmental Impact Statement submitted by the two states to the Federal Highway Administration. It has been asserted that by presenting a new forecast, that we were repudiating the earlier forecast that had been prepared with the EWG model.

East-West Gateway, as the Metropolitan Planning Organization for the region, is responsible for maintaining the travel demand model for the region. A travel demand model is a mathematical tool that helps predict motorist behavior. These predictions are essential to making decisions about transportation investments. Such models are complex and are very costly and time-consuming to develop. The previous model (and the one used in the EIS) was developed in the 1970's based on a large travel survey done in the 1960's. It was later modified in the 1980's and then updated using census data and a small telephone survey done in 1990. Our new travel demand forecasting model has been developed over the last several years, beginning with an extensive travel survey done in 2002. We have spent nearly \$1.8 million on the survey and model development since 2002, not

accounting for staff costs. The model has been recently peer reviewed by a national panel of experts sponsored by the U.S. Department of Transportation Travel Model Improvement Program and validated against 2002 traffic counts. The new model is vastly more sophisticated than those previously in use here. This model was still in development and was not available to the states in 2005 when the work was done on the bridge EIS. We judged the new travel demand model ready for use in late December 2007, shortly after the peer review, so it was made available for the bridge study.

While the traffic forecasting model used by MoDOT and IDOT was indeed our older model, it was reworked and recalibrated by their consultants. Networks were recoded for the purposes of the project. Different software was used to implement the model. While the core mathematical algorithms are “our model,” that in no way should imply that we endorse the outcome of their use by others, or that we could even replicate their results. Project sponsors often modify inputs and assumptions to serve their own purposes and come up with different results. In the case of the traffic forecasts done for the bridge EIS, we have noted a number of specific results that are “red flags” that lead us, our consultants and the expert panel, to conclude that there is some cause for concern. Our concerns are not new; we have addressed them in the past. The results produced by the recently developed models certainly appear to yield more reasonable and believable results.

Attachment B is a more detailed review of the development of the models and an explanation of key differences between the traffic forecasts in the EIS and our latest modeling results.

Issues raised by MoDOT and IDOT in a February 14 meeting with EWG staff.

1. MoDOT indicated that they do not agree with the latest traffic forecasts done for the bridge reports. They did not offer any data or analysis to support their conclusion – only a general conclusion that they questioned the departure from the forecasts done for the EIS. MoDOT suggested that the new model might be forecasting poorly because the travel survey and traffic volumes used to develop and validate the model was done in 2002, a year in which traffic volumes might have been diminished because of lingering effects of the events of September 11, 2001. In fact, according to statistics provided by FHWA, urban vehicle-miles traveled (a measure of traffic volume) were up by 2.4% in 2002. By comparison, VMT was up by only 0.9 % in 2004, 0.1% in 2005 and 0.2% in 2006.
2. IDOT indicated their concern about how the new traffic forecasts would affect the consideration of the revised EIS by the Federal Highway Administration. FHWA representatives attended the expert panel sessions and reviewed our reports and have now asked IDOT to reconcile the differences in forecasts. We explored the differences between the forecasts and the possible reasons for those differences. We agreed that the changes in travel forecasts would not change the outcome of

the EIS nor our reports. The fundamental problem now is a funding shortfall, a problem that exists with either forecast.

3. MoDOT did not agree with the “diversion” rates that were used to determine usage of a toll bridge. They suggested that there was no other situation where so much traffic was diverted from a toll facility, although they did not provide specific examples or data to support that conclusion. Further, they felt that the high volume/capacity ratios that were being reported by our models suggested that traffic would not divert to such congested facilities. We cited the findings of the expert panel and consultant that there was no comparable situation in the nation with the combination of conditions that we have here, i.e. four free alternative nearby facilities, lack of extreme congestion, and relatively modest income of the average commuter. We also noted the lack of congestion during off-peak periods, where diversion would clearly be high, since there would be no significant time savings from using a toll bridge. MoDOT suggested that the consultants faulted our toll diversion model. We responded that we asked the consultants not to rely on the model. Rather, we asked them to use their knowledge in planning toll facilities to modify the model results to fit their expectations (which resulted in a slightly lower diversion rate), and those are the diversion rates used in the analysis (see Section 5.3.4 of the January 31, 2007 report by InfraConsult LLC). We also pointed out that the expert panel (many of whom are toll advocates) came to their conclusions based on their own experience, rather than reliance on any models.
4. IDOT provided revised capital cost estimates that eliminated most of the I-55/70/64 “tri-level” interchange from the project, since, in their judgment, it is not essential for the I-64 connection to the new bridge. Although important to improving traffic flow at the merge of I-55/70 and I-64 in Illinois, IDOT believes that completion of the tri-level interchange is not critical to the new Mississippi River Bridge and that the project could be deferred until a later date. The net effect would be to reduce the cost of the project from \$1.56 billion to \$1.24 billion. We indicated that we would review their revised cost estimate, and, if we were in agreement, modify the reports accordingly. While this re-estimate of costs reduces the funding shortfall projected in the reports, massive shortfalls would remain, leaving the conclusions unchanged.

Staff and the consultants will be available at the upcoming special Board meeting to respond to questions. If you would like us to address any other issues prior to the meeting please call either Les Serman or Jerry Blair.

Attachment A

Interagency Coordination in the Development of: *Mississippi River Bridge: Assessment of Alternatives* and *Mississippi River Bridge Expert Panel Report*

September 27, 2006 10:00 am- Board of Directors authorized staff to seek consultants to provide and analysis and expert review of the data, assumptions and conclusions of prior plans for the new Mississippi River Bridge.

October 11, 2006 3:00 pm – Meeting with Ed Hassinger (MoDOT), Mary Lamie (IDOT), Les Sterman (EWG) and Jerry Blair (EWG) at EWG to discuss the RFP and to request all relevant information from both states.

October 20, 2006 – Proposals for Mississippi River Analysis and Expert Panel received by EWG

October 25, 2006 – Board of Directors authorized staff to enter into contract with InfraConsult, LLC and Aldaron, Inc. to perform subject work.

November 7, 2006 10:00 am - Meeting with Ed Hassinger (MoDOT) , Mike Schneider (InfraConsult) and Terry Gruver (InfraConsult)

November 7, 2006 11:00 am – Meeting with Susan Stauder (RCGA), Mike Schneider (InfraConsult) and Terry Gruver (InfraConsult)

November 7, 2006 1:30 pm – Meeting with Mayor Slay, Kathy Hale (City of St. Louis), Joe Schlafly (Stifel Nicolaus), Mike Schneider (InfraConsult) and Terry Gruver (InfraConsult), and Les Sterman (EWG)

November 8, 2006 9:00 am – Meeting with Marie Lamie (IDOT), Mike Schneider (InfraConsult) and Terry Gruver (InfraConsult)

November 21, 2006 10:00 am – Meeting with Rep. Jerry Costello, Mike Schneider (InfraConsult), Sharon Greene (Sharon Greene Assoc.) and Les Sterman (EWG)

November 21, 2006 11:00 am – Meeting with John Baricevic, Mike Schneider (InfraConsult), Sharon Greene (Sharon Greene Assoc.) and Les Sterman (EWG)

November 21, 2006 11:30 am – Meeting with Mark Kern (St. Clair County), Mike Schneider (InfraConsult), Sharon Greene (Sharon Greene Assoc.) and Les Sterman (EWG)

November 21, 2006 2:00 pm – Meeting with Joe Schlafly (Stifel Nicolaus), Mike Schneider (InfraConsult), Sharon Greene (Sharon Greene Assoc.)

November 22, 2006 10:00 am – Meeting with MoDOT (St. Louis and Jefferson City staff), Mike Schneider (InfraConsult), Sharon Greene (Sharon Greene Assoc.)

November 22, 2006 1:00 pm – Meeting with Mike DeCola (Regional Business Council), Bruce Holland (Regional Business Council), Mike Schneider (InfraConsult), Sharon Greene (Sharon Greene Assoc.), Les Serman (EWG)

December 11, 2006 11:00 am – Meeting with University of Illinois LEAM group, Les Serman (EWG), Steve Nagle (EWG), Jerry Blair (EWG)

January 8 10:00 am to January 9, 2007 4:00 pm – Expert Panel meeting at EWG offices. This was a public meeting with attendance by media, elected official staff, and citizens. Board members were invited to attend. Organizations or individuals with an interest in the project were invited to meet with the panel

January 8, 2007 1:00 pm – Expert Panel meeting with Mayor Slay (City of St. Louis)

January 8, 2007 2:00 pm – Expert Panel meeting with Dick Fleming (RCGA), Susan Stauder (RCGA)

January 8, 2007 3:00 pm – Expert Panel meeting with Mary Lamie (IDOT)

January 9, 2007 10:00 am – Expert Panel meeting with Pete Rahn (MoDOT)

January 29, 2007 8:30 am – Meeting with Leadership Council Southwestern Illinois members, Les Serman (EWG)

January 29, 2007 2:00 pm – Meeting with Mary Lamie (IDOT), Les Serman (EWG)

January 30, 2007 9:00 am – Meeting with Mayor Slay, Jeff Rainford (City of St. Louis), Kathy Hale (City of St. Louis), Mike Schneider (InfraConsult), Don Camph (Aldaron), Les Serman (EWG) (provided copy of Executive Summary of report)

January 30, 2007 11:00 am – Meeting with Mark Kern (St. Clair County), Alan Dunstan (Madison County), Mike Schneider (InfraConsult), Don Camph (Aldaron), Les Serman (EWG) (provided copy of Executive Summary of report)

January 30, 2007 2:00 pm – Meeting with Dick Fleming (RCGA), Susan Stauder, (RCGA), Kevin Riggs (RCGA), Brian Bezold (RCGA),

January 30, 2007 3:00 pm – Meeting with Kathy Osborn (RBC), Bruce Holland (RBC), Mike DeCola (RBC), Mike Schneider (InfraConsult), Don Camph (Aldaron), Les Serman (EWG)

February 14, 2007 3:00 pm – Meeting with Mary Lamie (IDOT), Brooks Brestal (IDOT), Ed Hassinger (MoDOT), Greg Horn (MoDOT), Deanna Venker (MoDOT), Les Sterman (EWG), Maggie Hales (EWG), Jerry Blair (EWG)

Attachment B

Review of Travel Demand Forecasts for a New Mississippi River Bridge¹

Three sets of traffic forecasts are pertinent to discussions about the new Mississippi River bridge project:

1. HNTB forecasts prepared for the design and environmental review of changes to the Relocated I-70 bridge and approaches (2005/2006).
2. Wilbur Smith & Associates forecasts used to estimate the revenue potential of tolling (2005).
3. East-West Gateway Council of Governments forecasts used in a technical review of alternative bridge proposals (2006).

This memorandum briefly describes the context and history of traffic forecasting model development in recent years and reviews the results and reasonableness of the various forecasts.

Sophisticated travel demand models are used to forecast traffic volumes. These models employ complex mathematical algorithms that estimate future travel based on surveys of travel behavior and on demographic, land use, and transportation system variables. The travel demand model for the St. Louis region is developed and maintained by East-West Gateway (EWG). Over the past several years, the Council has been in the process of developing a new transportation model for the region. While the model is still being refined, it is sufficient to provide reasonable estimates of future traffic. This new model only recently became operational; it was not available to HNTB and Wilbur Smith at the time they were preparing their bridge forecasts.

The Council's efforts to develop a new travel demand model date back to the Board of Director's adoption of the FY 2000 Unified Planning Work Program (UPWP), which called for preparing a multi-year model development program and replacing the model's MINUTP platform. The first major step in the program was a regional travel survey, a project included in both the FY 2002 and 2003 UPWP. A statistically-significant survey was needed to provide the detailed data on travel behavior in the region necessary to create a new demand model. In December 2001, the Board authorized a contract with NuStats of Austin, Texas to conduct both a regional household survey and an on-board transit survey. Cost of the contract was \$1.26 million. Surveys were conducted during the spring and fall of 2002. The household survey consisted of a 24-hour travel diary kept for all members of nearly 5,100 households in the region. It was augmented by providing GPS mobile units to over 300 households to check for the incidence of trips underreported in the travel diaries. The on-board transit passenger survey involved handing out questionnaires to bus and MetroLink riders on both the Metro and Madison County Transit District system. Over 15,300 valid questionnaires were collected.

¹ Portions excerpted from *InfraConsult LLC, Mississippi River Bridge: Assessment of Alternative, January 31, 2007*

Soon after completion of the survey process, the Council, after a lengthy review of alternatives, selected the CUBE platform to replace MINUTP as the framework for developing a new regional model. The Council began the transition to CUBE in October 2002.

The adopted FY 2003 UPWP included a work element for obtaining consulting assistance for model development. In October 2003, the Board authorized a contract with PB Consult not to exceed \$500,000. A contract was executed with the firm in February 2004, and work began shortly thereafter. After a nearly five-year development effort and expenditures approaching \$1.8 million, the model is in its final stage of development.

The new state-of-the-art model is a trip-based, four-step multimodal travel demand forecasting tool for both highways and transit. The trip generation module uses a cross-classification technique to estimate trip productions and a linear equation to estimate attractions. The model encompasses 17 trip purposes. A joint mode and destination choice model estimates modal split and trip distribution by trip purpose using a singly-constrained choice model and applying mode choice logsum values. A static user equilibrium traffic assignment procedure is applied to estimate travel demand during four time periods (a.m. peak hours, mid-day, p.m. peak hours, night), and the highway assignment module uses conical delay functions to estimate travel times and traffic volumes. Model assignments run through a feedback process until defined convergence criteria are met.

The new model was the subject of a national peer review in December 2006. The review, conducted under the federally-sponsored Travel Model Improvement Program, was held over a two-day period in St. Louis. Six travel demand model experts, both academic and practitioners, participated in the review:

- Dr. Chandra Bhat – University of Texas at Austin
- Dr. David Boyce – University of Illinois at Chicago
- Ken Cervenka – North Central Texas Council of Governments (Dallas)
- Guy Rousseau – Atlanta Regional Commission
- Ann Steffes – Volpe National Transportation Systems Center (Cambridge, MA)
- Frank Spielberg – Vanasse Hangen Brustlin (Vienna, VA)

Although the review panel report is not final, there were no negative findings.

In reviewing the various forecasts, it is important to recognize that there is a fundamental difference between the model used by HNTB and Wilbur Smith and the new model used by the Council. The model employed by HNTB was converted from EWG's old travel demand model, originally developed in the 1970s, modified in the 1980s, and updated in the 1990s to reflect a 1990 household survey and 1990 census data. HNTB modified the model, translated it into a different software package (TransCad), and validated it using 2004 traffic data. Wilbur Smith, in conducting the toll analysis, adapted the HNTB

model for its own use. Thus, both the HNTB and Wilbur Smith forecasts are modifications of an out-dated EWG travel demand model.

The validation runs conducted by HNTB and EWG for the bridge studies are shown in Table A. In this exercise, validation represents an attempt to match, in a common year, observed traffic volumes and volumes predicted by the model. The closer the match, the better the presumed predictive value of the model. HNTB's model validation overestimates total Mississippi River volumes by 82,000 vehicles a day, an error of 28 percent. EWG's model overestimates total crossings by 41,000 vehicles, an error of 14 percent. Generally, a validation error of 10-15 percent is acceptable. What these errors suggest is that both models will over predict future traffic levels, with the HNTB model producing the largest overestimates.

Table A
HNTB and EWG Validation Runs
Average Daily Traffic Volumes – All Mississippi River bridges

Bridge	HNTB			EWG		
	2004 Observed	2004 Modeled	Variance	2002 Observed	2002 Modeled	Variance
Clark	26,400	43,100	16,700	27,200	41,300	14,100
I-270	58,500	81,100	22,600	55,600	65,500	9,900
McKinley	Closed	Closed	---	Closed	Closed	---
MLK	33,700	29,200	(4,500)	32,700	43,300	10,600
Eads	7,100	12,300	5,200	Closed	Closed	---
Poplar	120,200	135,900	15,700	120,600	131,200	10,600
I-255	52,100	78,600	26,500	54,100	50,300	(3,800)
Total	298,000	380,200	82,200	290,200	331,600	41,400

Note: observed values are IDOT average daily traffic counts.

Tables B and C compare HNTB and EWG bridge volume forecasts for the year 2030 no-build scenario, and Table C shows the growth rates associated with those forecasts. In the 2030 forecasts, HNTB volumes on all Mississippi River bridges exceed EWG volumes by 73,000, although total volume for the four downtown bridges is roughly comparable between the two forecasts. Between 1995 and 2005, traffic volumes on all river bridges increased by an annual rate of 0.8 percent, while the annual growth rate for the downtown bridges was 0.5 percent. Annual growth rates associated with the HNTB forecasts, using 2005 traffic as the baseline, are 1.7 percent for all bridges and 1.0 percent for the downtown bridges. The comparable figures for EWG's forecasts are 1.0 percent and 1.1 percent. These growth rates are two or three times the rates experienced over the past decade. (While Wilbur Smith did not include a no build traffic forecast in their financial analysis, a comparison of Tables D and F show that their river crossing estimates for the full build scenario are 20-30,000 higher than HNTB or EWG volumes.) Again, these data indicate an over prediction of future traffic levels. They also suggest

that the lower rate associated with the EWG volumes for all river crossings are probably more consistent with future traffic growth.

Table B
Comparison of HNTB and EWG 2030 Forecasts – No Build Scenario
Average Daily Traffic Volumes – All Mississippi River bridges

Bridge	HNTB	EWG	Difference
Clark	51,500	40,400	(11,100)
I-270	95,400	68,500	(26,900)
McKinley	20,000	18,500	(1,500)
MLK	31,800	44,000	12,200
Eads	15,100	13,700	(1,400)
Poplar	148,600	140,800	(7,800)
I-255	94,500	57,600	(36,900)
Total	456,900	383,500	(73,400)

Table C
Annual Growth Rates for Mississippi River Bridges: Historic and Forecast

Period	CBD Bridges	All Bridges
1995-2005	0.5%	0.8%
2005-2030: HNTB	1.0%	1.7%
2005-2030: EWG	1.1%	1.0%

Note: future growth rates use 2005 traffic counts as the baseline.

Tables D and E contain HNTB and EWG traffic forecasts for two of the non-toll bridge scenarios: full build and limited build. The full build includes the new Mississippi River bridge, the I-64 connector, and the IL 3 relocation and connection; the limited build includes only the new bridge. The model results are comparable. Although HNTB's model produces 12,000 more daily trips across the downtown bridges, the variation between the two models is less than five percent. EWG's model envisions more trips crossing the new bridge than the Poplar, while HNTB's model has the highest traffic demand remaining on the Poplar. The differences are not, however, significant.

Table D
Comparison of HNTB and EWG 2030 Forecasts: New Bridge, Full Build, No Tolls
Average Daily Traffic Volumes – Downtown Mississippi River bridges

Bridge	HNTB	EWG	Difference
McKinley	20,000	12,900	(7,100)
New MRB	98,400	109,100	10,700
MLK	24,900	17,800	(7,100)
Eads	10,000	8,000	(2,000)
Poplar	113,100	106,400	(6,700)
Total	266,400	254,200	(12,200)

Note: Full build includes the I-64 connector and the IL 3 relocation

Significant differences in model results do occur when the I-64 connector is removed from the scenario. Table E shows that removing I-64 has only a marginal effect on new bridge traffic in the HNTB model. Volumes on the new bridge decline by only 6,000 vehicles a day. In contrast, EWG volumes on the bridge drop by over 40,000 when the I-64 connector is removed. Year 2005 traffic counts show that I-64 traffic accounts for nearly one-half the vehicles entering or exiting the I-55/70-/I-64 merge, which leads directly to the downtown bridges. Eliminating a direct I-64 movement onto a new bridge should have a major impact on traffic levels. The EWG model captures that impact; the HNTB model does not.

Table E
Comparison of HNTB and EWG 2030 Forecasts: New Bridge, Limited Build, No Tolls
Average Daily Traffic Volumes – Downtown Mississippi River bridges

Bridge	HNTB	EWG	Difference
McKinley	20,000	16,600	(3,400)
New MRB	92,400	68,300	(24,100)
MLK	25,400	36,600	11,200
Eads	11,200	11,200	0
Poplar	116,400	117,100	700
Total	265,400	249,800	(15,600)

Note: Limited build does not include the I-64 connector or the IL 3 relocation

Table F shows Wilbur Smith (WS) and EWG travel demand estimates for a new Mississippi River bridge with a \$1 toll. Both the WS and EWG toll models are handicapped by the region's limited experience with tolling, thereby providing no verifiable benchmark for evaluating how regional travelers would react to a toll. Any judgments about the adequacy of toll model outputs, therefore, are purely subjective. Total downtown bridge volumes for the WS model run are 37,000 higher than EWG volumes. This clearly has an impact on the results of the toll runs. WS estimates that

66,000 trips a day would use the toll bridge, representing a loss of less than 30 percent of trips that would use the bridge without a toll. EWG estimates that 26,500 trips would use the toll bridge, representing a 75 percent decline in traffic compared to a free bridge. It is likely that the EWG number underestimates the number of travelers willing to pay a toll. It is equally likely that WS overestimates the number willing to pay a toll, especially in light of the higher volumes that WS estimates for all downtown bridge crossings.

Table F:
Comparison of Wilbur Smith and EWG 2030 Forecasts:
New Bridge, Full Build, \$1 Toll
Average Daily Traffic Volumes – Downtown Mississippi River bridges

Bridge	Ws No-Toll	WS Toll	EWG Toll	Difference
McKinley	27,000	20,000	18,000	(2,000)
<i>New MRB</i>	93,000	66,000	26,500	(39,500)
MLK	32,000	39,500	43,600	4,100
Eads	6,500	8,500	15,000	6,500
Poplar	125,500	144,500	138,200	(6,300)
Total	284,000	278,500	241,300	(37,200)

Note: Wilbur Smith volumes in the toll report were given as a range. These volume data reflect the mid-point of that range. For example, the volume range for a new bridge with a toll was 59,000-73,000 vehicles a day. The mid-point of that range is 66,000.