DRAFT 04-19-2007

Executive Summary

This paper presents a preliminary overview of the estimated cost of the managed lane alternative in Honolulu. It does not examine in detail the cost build-up and underlying assumptions presented in the Honolulu Cost Memorandum.

The Honolulu Alternatives Analysis (AA) has been criticized for, among other things, a perception among some constituents that it overestimates the cost to construct managed lanes (Alternative 3). The basis for this criticism in Honolulu is derived from the comparison of recent construction of a partially-elevated, privately-financed toll road in Tampa, Florida, that was built at a cost that is significantly less than the estimated cost for elevated managed lanes in Honolulu.

Our preliminary review indicates that there are substantial differences in context between the proposed Honolulu managed lanes and the completed Tampa toll road. After attempting to adjust for some of these differences, the cost estimates for Honolulu, under some scenarios, appear reasonable. That said, the bottom line at this point is that there is no definitive industry standard, nor statistical basis, for comparing the estimated costs of elevated expressways. This is due to the relatively scarce recent experience constructing such facilities and the unique context of each project.

The factors for which this comparison tries to account for include inflation, elevated bridge deck width, normalization of costs to a "cost per mile" basis rather than cost per lane-mile, and a cost adjustment to account for the difference in construction costs among states. Differences not accounted for in this memo include:

- Additional construction costs in Hawaii due to seismic requirements
- Differences in design criteria used by the private developer versus those assumed by PB for Honolulu
- Possible differences in the design, construction, and/or bidding methodologies used by the private developer of the Tampa facility to minimize up-front costs

Since the Honolulu Cost Memorandum includes detailed estimates of the costs (cost build-up) for Alternative 3 to support its cost estimates, we will take a detailed look at the cost build-up over the next few weeks and discuss the underlying assumptions with the grantee and Parsons Brinckerhoff (PB) in early May, at that time we may be able to give you a more definitive answer.

The Criticism

The Alternatives Analysis (AA) performed for Honolulu's high capacity transit corridor has recently been criticized by several stakeholders who disagree with cost assumptions for the managed-lanes alternative (Alternative 3). The following specific objections have been raised:

- Mr. Cliff Slater believes the AA unfairly favors the rail alternative. In particular, Mr. Slater wrote in the *Honolulu Advertiser* on August 3, 2006 that a "three-lane, reversible tollway" was recently constructed in Tampa, Florida, "for a net cost of $300 million, or $10 million a lane-mile," a cost which he believes is more appropriate than the cost assumed for the managed lanes alternative in the AA. Mr. Slater also criticized the inclusion of elevated transit stations along the managed lanes corridor.
- Mr. David Rolf referenced the Tampa toll lanes in the *Honolulu Star Bulletin* on October 1, 2006. Mr. Rolf quoted Brian Taylor, director of UCLA's Institute of Transportation Studies as saying, "If you're going to make rail work in Honolulu, you will have to make the city look like New York, Tokyo or Mexico City."
- Dr. Marty Stone, planning director for the Tampa-Hillsborough County Expressway Authority, wrote a lengthy defense of the construction of his agency's reversible, elevated toll lanes in Tampa for *HawaiiReporter.com* on November 21, 2006. Dr. Stone criticized rail proponents in Honolulu for what he perceived as misrepresentation of the Tampa project in order to discredit the managed-lanes alternative in Honolulu.

Facts About The Honolulu Alternatives Analysis

The Honolulu AA presented many detailed assumptions for various capital cost categories and sub-categories in order to arrive at total capital costs for the managed-lane alternative (Alternative 3). Following is a summary of the assumptions and findings of Parsons Brinckerhoff (PB).

Under Alternative 3, PB developed estimates for two distinct configurations of high-occupancy/toll (or "HOT") lanes. HOT lanes are a type of managed lane in which high-occupant vehicles (e.g., 2+ or 3+) and transit vehicles travel for free, while single-occupant vehicles must pay a fee to access the facility.

- The first configuration of managed lanes under Alternative 3 in the AA calls for a bidirectional, two-lane, elevated roadway (one lane in each direction) with a total capital cost of $4.727 billion of which $3.77 billion (or 80%) are for *major investment facility capital costs*. Costs are reported in 2006 dollars.

- The second configuration of managed lanes under Alternative 3 calls for a reversible, two-lane, elevated roadway. Total capital costs for this option are $3.601 billion, of which $2.57 billion (or 71%) are for *major investment facility capital costs*. Costs are reported in 2006 dollars.

PB used FTA's standard cost categories to organize its project cost estimates. The "driving" cost category within the major investment facility capital cost estimates is *10.04: aerial guideway*. Note that cost category 10.04 reflects only the cost to construct the elevated facility. It does not include ITS, guideway elements, planning, engineering, design, contingencies, or other soft costs. However, many of these other costs, such as soft costs and contingencies, are functions of the value of 10.04.

PB assumed a range of costs for 10.04 (aerial guideway construction) from approximately **$8,000 to $30,000 per route foot** depending on the width of the guideway. The cost buildup used to arrive at these values are shown in the appendix.

Facts about Tampa's Reversible Express Lanes

Honolulu's critics have referenced the Lee Roy Selmon Crosstown Expressway in Tampa, FL ("Selmon Expressway"). Following are facts about the Selmon Expressway.

The Selmon Expressway is a 15-mile highway in Tampa, Florida. The facility was originally a two-way, two-lane, limited-access facility with a median, built and operated by the Tampa-Hillsborough County Expressway Authority (THCEA) between the 1960's and 1980's. THCEA financed the highway's construction and operation through revenue bonding, repaid over time through collection of tolls along the length of the facility.

In July 2006, 10 miles of Reversible Express Lanes opened in the median of the Selmon Expressway, extending from its eastern terminus to downtown Tampa. Only 5.5 miles of the new lanes are on an elevated, segmented bridge; the other 4.5 miles are at-grade. There are 3 Reversible Express Lanes in all, with a total deck width of approximately 59 feet on elevated portions. The entire facility (all 3 lanes) is reversible, with traffic flowing toward the downtown Tampa during the AM, and away from downtown during the PM.

The Reversible Express Lanes are not HOT lanes. HOT, or high-occupancy/toll, refers to a tolled facility in which high-occupancy vehicles and transit vehicles travel for free, while single-occupants pay a fee for access. On Tampa's Reversible Express Lanes, all private autos pay a toll, regardless of occupancy, provided they are equipped with electronic toll payment devices (vehicles without electronic toll tags are monitored and fined for violating the facility access rules). Transit vehicles are permitted on the facility at no cost.

- The entire 10-mile Reversible Express Lanes project cost $420 million Approximately $120 million of this cost was due to the failure of some support columns along the elevated portion which collapsed during construction in 2004. All costs are reported in 2006 dollars.
- The 5.5-mile bridge structure cost $120 million, equivalent to about $22 million per mile, or $7.3 million per lane mile. This cost is exclusive of ROW (which was already owned by the Expressway Authority), ITS, and other operational elements. In this sense, the cost is somewhat comparable to the costs estimated by PB for the Honolulu Option 3; however, there is no detailed cost breakdown available.
- If the cost of reconstructing collapsed columns (which occurred on the elevated segment) is included in the cost estimates, then the total cost for the 5.5-mile bridge structure doubles to $240 million, or $44 million per mile and $14.6 per lane mile.

Comparing Honolulu and Tampa

Exhibit 1 summarizes the ***first pass look*** at the cost per route foot and cost per mile for both Honolulu managed-lanes configurations and the elevated portion of the Tampa Reversible Express Lanes. ***Note that the Honolulu values are only those costs reported under FTA cost category 10.04, while the Tampa costs are not as specific.***

Exhibit 1: Comparative construction costs for aerial guideway (2006 dollars)

Project	Width of aerial structure	Cost per route foot	Length (route feet)	Total Cost	Cost per mile
Honolulu AA Proposed Managed Lanes	36'	$ 15,597	60,102	$ 937,410,894	$ 82,352,160
	24'	$ 8,064	12,478	$ 100,622,592	$ 42,577,920
	46'	$ 25,027	1,308	$ 32,735,316	$ 132,142,560
	58'	$ 30,361	1,130	$ 34,307,930	$ 160,306,080
Tampa's Selmon Reversible Express Lanes	59'	$ 8,264	29,040	$ 240,000,000	$ 43,636,364

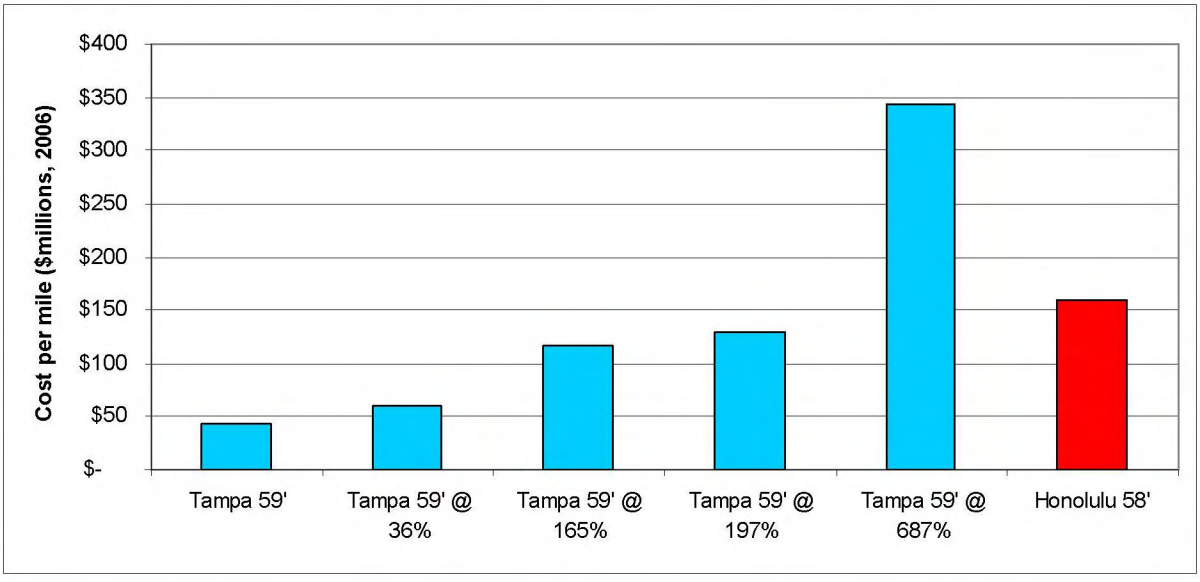
Clearly, on the surface, the costs estimated for Honolulu are much higher than the actual construction costs for Tampa on a per-mile basis. The cost per lane-mile in Honolulu is also much larger than the cost per lane-mile in Tampa. However, because the cost estimates in Honolulu were for a 2-lane facility, cost per mile is a more appropriate measure to compare. Perhaps the most appropriate comparison is the following: the Honolulu cost estimate for a 58-foot-wide aerial structure is $160 million per mile, while the Tampa cost for a 59-feet-wide aerial structure was $44 million per mile. Both values are in 2006 dollars.

There are several caveats that need to be made when trying to compare the costs of these two projects. First, construction costs vary from place to place. Perhaps most obviously, construction costs in Oahu are much greater than in Tampa, Florida. Mr. Slater offers that costs in Hawaii are *36* ***percent*** higher than in Florida based on the U.S. Army Corps of Engineers (COE) Civil Works Construction Cost Index System (CWCCIS). However, "road, railroad, and bridge" construction costs account for only 10% of the total when comparing project costs across states. The remaining 90% of the index is related to water projects, including cost indices for such projects as seawalls, reservoirs, dams, fisheries, locks, canals, channels, power plants, ports, harbors, bank stabilization, beach replenishment, levees, and relocations. The following state cost indices are more closely related to highway construction:

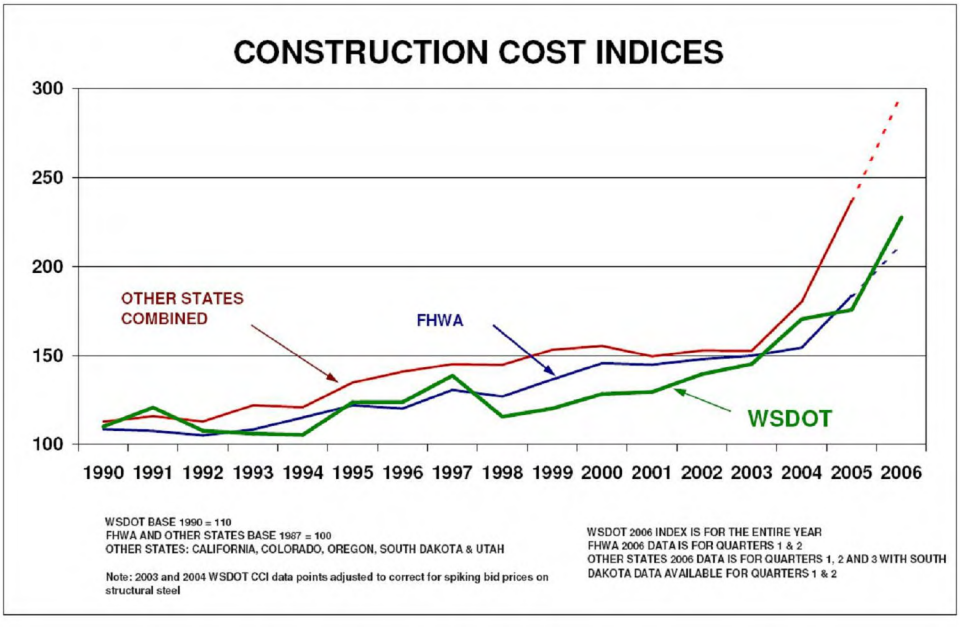
- The Washington State DOT (WSDOT) Highway Construction Cost Comparison Survey (2002) determined that the cost of constructing a highway diamond interchange is *197* ***percent*** higher in Hawaii as compared to the national average and *165* ***percent*** higher as compared to California (Florida was not included in this study). WSDOT also determined that the cost of constructing a single lane-mile is nearly 155 percent higher in Hawaii as compared to the national average.
- FHWA determined that the cost of constructing an *average mile of highway* in Hawaii over the period 1994 to 2002 was close to nine times that of the national average and *687* ***percent*** higher than costs experienced in Florida over the same time period.
- Based on construction indices in the RS Means Heavy Construction manual, labor and materials costs related to concrete are 72% higher in Honolulu than Tampa, while site construction costs are approximately 23% higher. Hawaii may also face higher transportation-related costs simply to acquire certain construction materials that are not locally available.

Blue columns in Exhibit 2 below reflect the per-mile cost to construct the Tampa project, had it been built in Hawaii, under these varying assumptions. The red column reflects the estimate to construct the 58'-wide portion of the Honolulu managed lanes.

Exhibit 2: Comparison of costs for Tampa Express Lanes under various cost index assumptions to the estimated cost of Honolulu managed lanes alternative 3



In addition to the significantly higher cost of construction in Hawaii as compared to mainland states, highway construction costs have escalated considerably in *all* states over just the past 3 years. The majority of the construction costs in Tampa were incurred before the recent spike in materials and labor costs for construction. Specifically, according to one source, approximately "two-thirds" of construction in Tampa was complete in April 2004, although the collapse of a support column occurred that month, causing delay and additional expense between 2004 and 2006. The graphic below prepared by WSDOT shows that construction costs increased nearly 50% between 2004 and 2006.



Another difference between Honolulu and Tampa is that the Reversible Express Lanes were privately built. The project was financed, designed, and constructed entirely by a private entity, the Tampa-Hillsborough County Expressway Authority, with revenue bond financing backed by expected future toll receipts. The financial decisions made under this arrangements are not known (e.g., whether lowest-cost construction bids were selected in order to maximize profits). Furthermore, the physical project context in Tampa was unique in that the entire alignment of the Reversible Express Lanes was inside an existing right-of-way owned by the Authority, and largely inside the median of an existing expressway facility. On the other hand, construction staging costs are expected to be considerable in Honolulu since the project right-of-way borders developed property.

Lastly, Hawaii is in a seismic zone. Engineering standards call for stronger supports on elevated facilities, which increases the material quantities required, and thus increases construction costs. Specifically, Honolulu is in seismic zone 2a, while the entire state of Florida is in seismic zone 0.

Conclusions

The construction cost assumptions for the Honolulu managed lanes alternative—when considering only cost category 10.04, accounting for deck width, adjusting for inflation, normalizing costs to a per-mile basis, and accounting for construction cost differences in Hawaii as compared to mainland states by using several index values—are, under some scenarios, comparable to the Tampa Elevated Reversible Lanes.

A case can be made that the cost estimates under 10.04 of the managed lanes alternative in the Honolulu Cost Memorandum are reasonable. However, the findings to support that case are not statistically founded. . In this preliminary review, we did not find enough comparable projects nor any cost estimating standards in order to state definitively whether or not the Honolulu cost estimates are "reasonable" or 'unreasonable'. We will take a more detailed look at the cost build-up for Alternative 3 over the next few weeks and discuss the underlying assumptions with the grantee and PB in early May.