

WEST HAYDEN ISLAND ADVISORY COMMITTEE
TRANSPORTATION WORK SESSION
SEPTEMBER 7, 2012
OXFORD SUITES

Attendees

Facilitator: Sam Imperati

Staff: Eric Engstrom, John Gilliam, Rachael Hoy, Barry Manning, Phil Nameny – BPS
Bob Hillier, Eva Huntsinger, Paul Smith – PBOT
Jonna Papaefthimiou – Mayors Office

Port Representatives: Phil Healy, Kathryn Williams

Presenters: Casey Liles, Heather Wills – CRC

Advisory Committee: Andy Cotugno, Tom Dana, Chris Hathaway, Scott King
(representing Sam Ruda), Brian Owendoff, Bob Tackett, Victor Viets

Public Attending: Richard Carhart, Mike Connors, Jeff Geisler, Timme Helzer, Mary
Leviner, Ryan Orth – CRC, Brad Perkins, Carly Riter, Bob, Sallinger, Ron
Schmidt, Martin Slapikas, Walter Valenta

Notes

North Hayden Island Drive

- ROW concerns – cost/range of costs; sufficient ROW for the whole NHID, especially mall
- Design – how to accommodate commercial and residential uses along with recreation being planned?
- Seeing agreement on what the mile looks like – but when does this conversation happen? At annexation (typically have idea of costs and general idea of what's being built) or after (design phase typically happens at this stage)
- Balance between costs and desirability of fixing NHID and new bridge – City needs higher confidence level of cost estimates. The follow-up work is all designed to see if how we can find the lowest cost.
- Projected costs for NHID may go down, but estimates are still being refined, based on testing. Will be completed for Council.
- AC concern about the timing of refined cost estimates. It won't allow AC to make an educated recommendation.
- Traffic volume – projected increases; building appropriate facilities to handle it;
- When considering “what's important,” the daily total or peak hour traffic volume – you design for peak hour; (figure 1 of DKS; page 7)
Peak is 300 currently – projected is 1300 (w/o terminal) or (1600 w/terminal)

Truck Trips Impact Management

Question to discuss (per Phil): is this a good way to cap truck impacts, by determining a number and then if surpassed, requiring the Plan District be re-examined?

The City stopped planning for worst case scenario by lowering cap; emphasizing non-truck oriented nature of the likely development (2 bulk & auto), it is a rail-to-ship facility

- Clarification from Port – there is no truck cap as part of Airport Futures
- Community would like lower cap and bridge; community puts a bridge before truck trips. Does not want more trucks on NHID, so bridge is better choice.
- If it stays on Hayden Island, they would support a lower cap
- Victor is opposed to capping use. Why limit several hundred million of investment with a cap? 175 trips limits to 87 in-and-out truck trips a day. This significantly handicaps the future of Port; this is a disaster for the community, meaning it's a pass-through Port; we are helping others financially benefit, but not us, without trucks. Thus, he prefers a bridge with no truck limit – best case scenario.
- Port proposed cap number based on WP concept, which also included marine manufacturing , is 260; and if exceeded, do further analysis to see if there are operational changes or other mitigations; also, what is the citizen mechanism for input?
- Port would do quasi-judicial decision-making process, and then either live with it or appeal
- City wrote IGA as hard & fast cap of 175 (page 61)

CRC Status/Timing Considerations

Heather Wills and Casey Liles, CRC City staff

- Concerns about CRC interface with mall and their current development plans
- Concerns about timing – improvements for safety & ops
- Bridge height proposal – latest submittal date is January 30 in application to Coast Guard; so, between November 2 and December 30 proposal will be under public review, in conjunction with NEPA re-evaluation
- Concern about Tomahawk Island Drive – why not coordinate building this street with bridge? If leave until later, will be more expensive. (And you'll have to dig up the freeway just built for CRC)
- Next step it so re-evaluate local traffic impacts with phased intersection, and determine alternate improvements.

The City is looking over the next two months to get ideas about how far development will go on NHID. CRC has some funding for NHID; a reduction of things included in the

Locally Preferred Alternative (LPA). City cost estimate goes to Main Street – trying to resolve the responsibility piece between the projects (WHI and CRC). The mall has some responsibility which they are building now; Target dedicated 7 ft of ROW; etc.; no car cap and overall square footage of mall is being reduced.

- Brian O –wants to be sure folks are taking responsibility and there are no gaps in the street network, or at the very minimum they are identified (3.1.4 of IGA – establishes what happens if there is no CRC)
- Relationship between NEPA and Interstate system – need a federal permit for local bridge off HI; thus NEPA would apply
- Improvements to mainline in order for Interstate system to work – a combo of state and federal funding; if state doesn't fund, it would be a do-over

Transportation Policy Implementation

There will be some TSP amendments; including an increase of truck classification to major truck street. This is not the highest classification, but is above existing classification as truck access street.

Amend the North Transportation District Policy Objective as follows to add the following new objectives T and U.

Add Objective T as follows:

- T. Identify appropriate improvements to implement North Hayden Island Drive as an industrial access facility to the West Hayden Island while responding to other modal functions consistent with street classifications.

Add Objective U as follows:

- U. A new bridge connecting the West Hayden Island industrial area to North Marine Drive shall be considered a replacement industrial access facility alternative in the event that North Hayden Island Drive is not improved for this purpose.

Amending current HI plan? Yes, these amendments do have the effect of amending, since the Comp Plan controls all plan objectives that were added in the HI plan, and some of these are being amended.

Victor: *"In the event that North Hayden Island Drive cannot be improved as envisioned"* – wonders why we are making a decision now on the bridge, given it will be at least 5-10 years before we know what's going to be there? Why not keep both projects?

Eric: w/annexation, we need to understand financial implications; also, fiscal reality of whether we can keep both projects on the TSP; if a new development comes in, it will receive direction re: improvements based upon what comes out of this plan

Scott King: Potential changes to TSP (pgs 30-34); if they go through City Council, they are just added into TSP

Street classification is part of Comp Plan; other issues are not

Chris: confirming that you are taking the bridge off TSP list and putting HID on (yes); and that you can switch that later (yes)

Biggest issue is the IGA between the City and the Port; not so much the RTP list

Objectives:

- A. Support multimodal freight transportation improvements to provide competitive regional access to global markets and facilitate the efficient movement of goods and services in and out of Portland's major industrial and commercial districts. Ensure access to intermodal terminals and related distribution facilities to facilitate the local, national, and international distribution of goods and services.
- B. Use transportation system improvements as a catalyst for attracting industrial and employment development.
- C. Work closely with public agencies, such as Tri-Met, and the private sector to deliver an efficient and effective transportation system and network. Improve transit connections between residential communities and work sites.
- D. Support transit-supportive development and redevelopment along designated transit streets and in the vicinity of transit stations.
- E. Promote safe and pleasant bicycle and pedestrian access to and circulation within commercial areas. Provide convenient, secure bicycle parking for employees and shoppers.
- F. Encourage a wide range of goods and services in each commercial area in order to promote air quality and energy conservation.
- G. Pursue special opportunities for alternative modes of transportation to serve as attractors themselves. Such projects include water taxis, streetcars and bicycle/pedestrian facilities and amenities.
- H. Pursue transportation and parking improvements that reinforce commercial, industrial and residential districts and promote development of new districts.
- I. Encourage opportunities to provide multimodal access to the publicly maintained Columbia River Shipping Channel to maintain Portland's role as a maritime and multimodal hub for sustainable global and regional freight movement.

Discussion: re: above, I seems contained in A – not needed?

Staff can consider if the AC feels strongly about this.

Public Comment

Brad Perkins, cascadiahighspeedrail.org; You have not discussed rail; need for future rail; industry needs freight movement; how to integrate new system into current plan

West Hayden Island Bridge

Doug Johnson, David Evans Associates, August 29, 2012 memo

Responded to AC questions – memo provides broad overview

Victor – thinks the lead based paint has been removed already on N-bound (the older bridge); he has questions about cost savings for moving spans, thought they were maybe low

Response – The net price for moving the bridge considers the loss in salvage value of the bridge.

Environmental information from Mindy; a bridge has permitting challenges

Victor – It would help to have a better correlation between the bridge costs and the CRC costs and savings with moving bridge

Public Comment

Tim Helzer, resident of Hayden Island. Moving WHI bridge out of serious consideration is a big concern; the impetus for health assessment...how does it make sense to take bridge out of discussion when the HIA isn't complete or reported to this group?

Eric: all pieces will be in place by the time the annexation decision is made

Brian: traffic; based on assumptions for 2025; cannot justify cost based on traffic; also curious about how HIA handled at Conway – wants to know what City did in that case

Bob Sallinger, Audubon Society, great info, but it is also late in game; timeline – health analysis and funding discussion done after the fact, challenging for overall process and a bummer to have it so late in game. Have had good consultants, but should have answered questions earlier. Not arguing for extension, but encourages City to think about sequencing and all info needed to pull it together in a logical sequence.

Marty Slapikas, resident of Hayden Island, HiNOON, and PDX CAC.

Appreciates CRC here today, showing there has been some attempt to integrate the two projects. If you take east end of Port's property, it cuts island in half. Take CRC,

cuts remaining portion of island almost in half. How will remaining neighborhood be effected? He has not heard much about livability. There are a phenomenal amount of issues impacting the island. Page B37, interested in long-term regional demand for marine terminals. He wants WHI to be last resort for expansion. Also, what about joint Port Authority or merger? It should be done to protect the natural resources.

Brian Owendoff Comments
WHI Transportation Work Session
September 7, 2012

The overall intent of my points is to ensure that costs associated with traffic impact are based on reasonable analysis and market need. The marine terminal development traffic impacts should guide the improvements needed, not unfunded capital improvement project lists and existing unmet needs.

North Hayden Drive Construction Costs

The City of Portland does not have money in its capital improvement budget for repair and/or replacement of the deficient existing condition of NHI Drive. The CRC does not have money budgeted for NHI Drive either.

It appears ALL costs associated with NHI Drive are extracted from the West Hayden Island Development. If development does not happen on WHI, how would the City fund these needed improvements otherwise?

While I appreciate that the city is doing everything it can to minimize costs for the rebuilding of NH Drive, it should be acknowledged that NH Drive is already in poor condition. While it is important to improve this road, we urge the city to keep costs as low as possible because WHI terminal development should not be the “de facto” funding agent for NH Drive improvements.

Existing Condition of NH Drive

Current condition of the road is substandard with “alligatoring” of surface. Most of the current traffic is from the existing retail tenants and their customers. Did the current expansion of the mall by Edens & Avant did not require any funding by owner or impose any trip caps for autos? The point here is that all users of the road should be paying in to the improvement of NH Drive. We urge the city to be equitable in its approach

Truck Management

The most likely WHI development scenario assumes one auto processing center & two bulk terminals. The 2035 daily averages assumes traffic at site A of 11,715 trips, with 10,300 being island related (88%) and 1,415 Port related (12%). Only 205 are heavy truck (1.75%).

At traffic site B for most likely, overall traffic is 19,095 with island traffic at 17,680 (93%). The Port traffic is 1,415 which are 7% of overall traffic.

Why is the City proposing a 175 heavy truck cap? This is 15% below the most likely scenario assumption for heavy trucks. The cap should reflect a reasonable balance between the “most likely” and “least likely” traffic scenario, and the city should work that reasonable cap out with the port. For example, a cap of **250** heavy trucks with a reasonable penalty if exceed and no ability to trigger a re-opening of legislative process could be an option.

A reasonable interpretation of the traffic impact analysis, balanced with market need is the approach the city and port need to take.

Under the least likely scenario, 2,040 trips are associated with the Port Development. This is less traffic than generated by a Walgreens and does not warrant the cost of a WHI bridge. The majority of traffic problems are generated by existing East Hayden Island retail. The retail owners should have a responsibility to fund future improvements to improve traffic flow. They are the main source of traffic.

How did the City balance health issues with traffic on the Con-way master plan development? This should be looked at as a guiding approach to West Hayden Island.



DAVID EVANS
AND ASSOCIATES INC.

MEMORANDUM

DATE: August 29, 2012
TO: Rachael Hoy
City of Portland
Community Outreach & Information
Bureau of Planning & Sustainability
FROM: Doug Johnson, PE
Senior Bridge Engineer
David Evans and Associates
SUBJECT: **West Hayden Island Bridge Cost Investigation**

Dear Ms. Hoy,

As requested by the Bureau of Planning and Sustainability, David Evans and Associates (DEA) has performed a review of background information on the West Hayden Island bridge design and conducted a limited analysis of factors influencing the cost of the bridge as well as the feasibility of reducing the bridge width.

Background

The City of Portland has been developing conceptual plans for a marine terminal on approximately 800 acres on the portion of Hayden Island west of the existing railway that bisects the Island. This proposed development would occupy no more than 300 acres of the 800 acre site, which is currently undeveloped. The only vehicular access to the island currently is provided from the I-5 interchange located east of the railway tracks on the eastern portion of the island. A new bridge spanning the North Portland Harbor (Oregon Slough) has been proposed to provide direct access to the terminal development from Marine Drive. Several previous reports have been produced dealing with the proposed bridge connection.

The following documents were reviewed for information pertaining to the bridge design and associated costs:

1993: W&H Pacific, Conceptual Analysis of Hayden Island Bridge Connection to North Marine Drive

This is a planning-level study of the crossing that evaluates three alignment alternatives and discusses issues such as traffic, geometrics, structure types, geotechnical and other issues. The report includes a cost estimate of \$16.0M - \$19.2M for the bridge and associated roadway and traffic signal work, as well as engineering and contingencies.

1998: David Evans and Associates, Hayden Island North Portland Harbor Vehicular Bridge, Draft Type Size and Location Report

This is a comprehensive preliminary engineering design report for the crossing that evaluates alignment and geometric alternatives, bridge structure alternatives, traffic forecasts, utilities, right-of-way, effect on cultural and natural resources, permitting, hydraulics, drainage, foundation types and construction schedule. Design of the recommended alternative was completed to approximately the 30% level of completion. The cost estimate in the report for the recommended alternative is \$44M, including engineering and contingencies. This number includes \$30.2M for the North Portland Harbor Bridge alone; \$12.6M for associated roadways, retaining walls, signals, drainage and illumination; and \$1.0M for widening the North Marine Drive Railroad Bridge.

1999: Parametrix, Draft West Hayden Island Planning Document, Vol. 4, Transportation Analysis

This report is a detailed analysis of the highway transportation and access issues associated with the development of a marine terminal facility on West Hayden Island. The report examines forecast traffic demands on the island for several development alternatives, both with and without construction of the bridge described in the 1998 David Evans and Associates report. The discussion in the report related to the bridge is limited to traffic issues and no cost estimates are presented.

2012: Worley Parsons, West Hayden Island Final Report

The purpose of this report is to create a Base Concept Plan for the marine terminal, bringing together economic, environmental and recreational considerations. The report includes the bridge as an option in the plan, but notes that based on traffic analysis existing roads in East Hayden Island are sufficient to handle the anticipated traffic generated by the proposed development. The report lists the estimated cost of the bridge as \$50M - \$100M, which is attributed to the cost estimates in the 1993 W & H Pacific report escalated by the rate of Consumer Price Inflation (CPI) over the intervening years.

Discussion of Previous Cost Estimates

The 1993 W&H Pacific cost estimate appears to be based on a very basic level of design, perhaps at a 5% level of engineering. The 1998 DEA cost estimate is based on a more developed 30% level of engineering and thus is expected to be inherently more accurate. Each of these two estimates is based on the prevailing prices in the construction industry at the time they were developed. Both of the estimates include factors for contingencies, engineering and administration for both the final design and construction phases of the project.

The cost estimate cited in the 2012 Worley Parsons report is based on the earlier 1993 W&H Pacific cost estimate, factored up by the rate of CPI. There are several problems with the approach used to generate this estimate. The 1993 W&H Pacific estimate was inherently less accurate than the 1998 DEA estimate because it was based on a more rudimentary level of engineering. In addition, the general rate of inflation in the CPI does not necessarily correspond to the rate of inflation in the construction industry, nor to the specific labor and material inputs that go into bridge and roadway construction. The effects of these discrepancies are likely to be compounded over time and could be significant given the 19-year interval from the 1993 estimate to the 2012 estimate.

Update of the 1998 DEA Cost Estimate

The 1998 DEA cost estimate contains a detailed breakdown of construction items for the project, with pricing in 1998 dollars for each item. The 1998 design estimate includes:

- the 1,880-ft bridge crossing the North Portland Harbor channel
- widening of Marine Drive, including the Marine Drive bridge over the railroad, to provide turning lanes at the intersection with the new crossing
- traffic signals at Marine Drive
- approximately 300 feet of approach roadway south of the bridge
- approximately 1,250 feet of approach roadway north of the bridge
- roadway illumination system
- retaining walls to limit fill in sensitive areas on the island

This itemized breakdown has been updated based on current prevailing construction prices. This updated estimate provides a cost view of the 1998 design in 2012 dollars, using the same methodology as the 1998 report. The updated cost estimate in 2012 dollars is \$42M, which includes \$31M for the main bridge and \$11M for the other items. Contingencies at 25% add \$11M, plus final engineering and construction administration add an additional \$13M, for a grand total updated 2012 estimate of \$66M.

Opportunities for Cost Savings on the Bridge

The 1998 DEA report examined six different bridge types and investigated the costs for each. The recommended alternative, a precast concrete girder viaduct, was the least expensive of the group, and it likely remains as the most economical choice.

The effect of a reduction in bridge width would be to reduce the concrete deck area, reduce the number of girders, which in turn would reduce the loads on the columns and foundations. With this type of bridge, it is reasonable to assume that the reduction in cost would be approximately proportional to the reduction in width. The bridge was designed with a total width of 74 feet, which includes four travel lanes @12', two shoulder/bike lanes @ 6', two sidewalks @6', and two outside bridge rails @1'. Assuming only two travel lanes @12' and everything else remaining the same, the total bridge width would decrease to 50 feet. The cost estimate for a reduced width bridge in 2012 dollars is \$32M, which includes \$21M for the main bridge and \$11M for the other items. This assumes no change to the "non-bridge" items included in the estimate. Contingencies at 25% add \$8M, plus final engineering and construction administration add an additional \$10M, for a grand total updated 2012 estimate of \$50M.

The bridge was designed for a navigational clearance of 75 feet, which was determined in coordination with the United States Coast Guard and river users. Although reducing this clearance would likely be very difficult to permit, a reduction in clearance to approximately 50 feet could lead to approximately 5% savings in bridge costs, for a total reduction of approximately \$2M.

Effect of Increasing Vertical Clearance

If a substantial increase in vertical clearance became necessary there would be a substantial increase in bridge cost. Assuming the maximum 5% grades were maintained, an increase in the vertical navigational clearance to 95 feet would require at minimum an additional 400-foot length of bridge on each side of the channel to reach the same “touch-down” elevation at the bridge ends. The additional height would also create additional demands on the supporting bents and foundations. Because of space limitations on the south side, the bridge would need to cross over Marine Drive before touching down, which could result in additional structure costs. Overall, it is estimated that for a 95-foot vertical navigation clearance the structure costs alone would increase 60% -70% above those noted above. There may be a need to acquire additional right of way and additional roadway needs as well, but consideration of these factors are beyond the scope of this memorandum.

Potential Re-use of Spans from I-5 Columbia River Crossing

The I-5 Columbia River Crossing (CRC) project will replace the existing I-5 bridge spans over the Columbia River, potentially making them available for re-use. The existing northbound structure was built in 1916, while the southbound structure was built in 1958. The southbound bridge is comprised of 4 reinforced concrete deck girder spans, 10 steel through truss spans, one steel vertical lift span and one steel deck girder span. The structure carries 3 traffic lanes, with a total clear width of 38.3’ plus one sidewalk with a width of 5.6 feet.

The steel truss bridge width is adequate for the reduced width option discussed above with two traffic lanes plus two 6-foot shoulders. The steel through truss spans from the southbound bridge are the most likely candidates for re-use on the West Hayden Island Bridge. The truss spans could not be used on the curved portions of the proposed bridge, but could be used for the straight portion, which is 1,369’ long. Four 266’ steel truss spans and one 279’ steel truss span could be used in this section, replacing 9 precast concrete girder spans. The number of bents in the water would be reduced by four; however the size of these bents would need to be substantially increased to carry the increased loads from the longer spans.

According to the most recent bridge inspection report (2011), the concrete deck is in satisfactory condition, with some spalling and cracking noted. The steel superstructure is in fair condition, with areas of minor section loss, nicked, gouged, bowed and twisted members, and substantial areas of pack rust, surface rust, and failing paint. The existing truss spans would require rehabilitation in order to be suitable for reuse. The rehabilitation would include complete removal of the existing lead-based paint, repair of minor defects and coating with a new paint system. All residues from the existing paint would need to be contained and disposed of as hazardous material.

Disassembly of the existing trusses into smaller individual pieces and subsequent reassembly would likely not be cost effective. A more likely scenario would be to jack up each truss as a unit from their existing supports. Jacking in this manner would require a careful analysis of the structure to avoid damage. Reinforcement of the lifting points may be required. It is not clear whether it would be feasible to allow the concrete deck to remain in place or whether it would need to be removed to reduce weight. Special lifting frames would need to be constructed and placed on a series of interconnected barges to allow for a synchronized lifting operation. The barges would then need to be towed to the new bridge location where the trusses would be lifted into place.

The cost of rehabilitating the five truss spans noted above is estimated at approximately \$11.5M, without engineering or contingencies. This does not include the cost of moving the trusses to the new bridge site nor the cost of a new concrete deck if necessary. These costs are difficult to estimate without more detailed study, but are likely to be in the range of an additional \$2M-\$5M. There would be an estimated savings to the CRC project of approximately \$1.5M in not paying for removal of these spans. The estimated cost of the precast concrete girder superstructure (precast girders and deck) that the truss spans would replace is approximately \$6.5M. The substructure cost is expected to be roughly the same for either the truss or precast girder options, since the increased size of the bents for the trusses will offset the reduced number of bents.

There would also be additional maintenance costs for the truss spans compared to the precast concrete girder superstructure. The truss spans will need to be re-painted every 20-30 years. There would also be a need for more frequent detailed inspections because of the fracture critical components of the trusses.

Potential Reduction in Number of Piers in the Water

The precast girder bridge as currently designed includes 6 piers within the boundaries of normal water elevation. Reducing the number of piers in the water would require a different structure type. Several alternative structure types with reduced numbers of piers in the water were evaluated in the 1998 DEA report. These alternatives are summarized in the table below:

Alternative	No. of Piers within normal water elevation	Estimated Cost – Bridge Only (\$1998)
Long Span Steel Arch	0	\$81M
Long Span Concrete Segmental	2	\$37M
Short Span Concrete Segmental	4	\$32M
Cable-Stayed	1	\$50M
Steel Plate Girder or Box	6	\$33M
Precast Concrete Girder	6	\$30M

Although the estimated costs for these alternatives are given in 1998 dollars, it is expected that if all of the estimates were updated to 2012 dollars the percentage differences would remain similar. Thus a reduction of two piers within normal water elevation would increase the bridge costs by approximately 7%, while further reductions would produce significantly greater cost increases.

Moyano Leadership Group Estimate Comparison

In a memorandum dated July 13, 2012, Moyano Leadership Group (MLG) provided a cost estimate of \$81M for a two-lane bridge and \$84M for a four lane bridge. There are a number of different assumptions used in the analysis by MLG that account for the difference from the DEA estimates described above in this memorandum. The MLG analysis is based in part on an earlier MLG analysis described in a memorandum dated April 19, 2010 that was used to update costs for the project in terms of 2010 dollars. As in the DEA analysis, the MLG analysis used the cost estimate contained in the 1998 DEA Report for the 4-lane precast concrete girder bridge as a starting point.

The MLG applied a uniform factor for general construction pricing escalation to all of the items included in the original cost estimate. The 2010 MLG memorandum noted that general construction pricing increased to a peak level in 2008, at which point it was 88% above 1998 pricing. Subsequently, during the recessionary period that followed, construction pricing fell dramatically so that in 2010 it was only 47% above 1998 pricing. Because of concern that future pricing trends could reverse the dramatic declines of 2008-2010, MLG applied a compromise escalation factor of 67% to the 1998 pricing to produce their 2010 estimate. In the 2012 memorandum MLG added an additional 8% to account for pricing escalation from 2010 to 2012, for a total escalation factor of 75% applied to the 1998 pricing.

In the DEA analysis, pricing of each item was individually escalated to bring them in line with current 2012 pricing. In aggregate, this approach resulted in an overall escalation factor of 50% applied to the 1998 pricing. In comparison with the MLG estimate, the primary difference is the 20% premium MLG added in 2010 to account for the potential future reversal of the 2008-2010 price declines. Without this premium, the MLG 2012 escalation factor would be 55%, which is reasonably close to the 50% DEA factor.

Current construction pricing has not returned to the peak level of 2008. While it is difficult to predict future price trends it is prudent to account for some degree of price escalation when planning for projects some distance in the future. When comparing alternatives, it is important that all alternatives be priced on the same basis. This can be done by either pricing all alternatives in current dollars or by applying the same escalation factor for future price increases to all alternatives.

The MLG cost estimate also applied a 10% increase factor to substructure costs to account for seismic design code changes and an additional 15% increase factor to account for environmental regulatory changes since 1998. The DEA analysis did not include either of these factors. While seismic design codes have changed since 1998, it is our opinion that these changes are not likely to result in an increase in construction costs for this bridge. Similarly, while environmental requirements are constantly evolving, there are no specific restrictions affecting this project we are aware of that would lead to significant increase in construction costs. Environmental mitigation costs are not included in the cost estimates in this memorandum.

In the DEA analysis, it was assumed that the reduction in bridge width for a 2-lane bridge would result in a uniform level of cost reduction for both superstructure and substructure elements. This is an assumption that is

commonly used for planning level estimates. The MLG analysis assumes a similar level of cost reduction for superstructure elements but very little reduction in substructure costs. This assumption is based on the view that the specific characteristics of the site, the nature of the in-water work and the structural requirements of the drilled shafts will not allow significant cost savings to be achieved for the reduced bridge width. A comprehensive structural analysis of the drilled shafts for the 2-lane bridge has not been done, so it is difficult to resolve this difference in assumptions. Substructure costs are approximately half of the total bridge costs. If the DEA estimate was revised to eliminate any substructure cost savings for a reduced width bridge, the total cost estimate for a two lane bridge would increase from approximately \$50M to \$58M.

Limitations

This memorandum is based on information contained in the references cited and no attempt has been made to independently verify this material. Some of the information in these references may be dated due to updated engineering codes, permitting requirements or other factors. All of the information presented is preliminary in nature and subject to change upon further design development. In providing opinions of probable cost, DEA provides no warranty that actual project costs will not vary from DEA's opinions due to many factors beyond DEA's control.

Attachments: Updated Cost Estimates