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EXPERTS SAY TUNNEL COSTS FOR REPLACING VIADUCT A MYTH

Tunnel Pros Urge State, County, City to Weigh Real Costs as Decision Nears

SEATTLE, WASH. (Dec. 10, 2008)—As regional leaders approach the end of year deadline for finalizing replacement options for the Alaskan Way Viaduct, tunnel experts say cost estimates for a deep-bored tunnel are inflated, inaccurate and more myth than reality.

Experts say that the figures being reported for a deep-bored tunnel include costs—such as $900 million for surface streets and $350 million for a seawall—that shouldn't be part of the cost equation. According to a letter from a group of five experts and sent to Washington's deputy transportation secretary, David Dye, a tunnel "could be completed in the 60 months period with a price of $2B or less." That's years and at least one billion dollars less than a state analysis concluded. And that cost puts the tunnel option well within range of other options.

The latest evidence to backup the experts' argument that costs are overestimated came this morning, when The Seattle Times reported that the final and accepted bid for the University Link Tunnel "was 34 percent below the agency's (Sound Transit) estimate of $29.6 million."

"Contrary to what some are saying, these experts are doing an apples-to-apples comparison," says Bruce Agnew, director of Cascadia Center of Discovery Institute, sponsor of a recent tunnel comparison study. "This morning's news about the University Link Tunnel reaffirms their contention that costs for tunnels are reasonable and often lower than expected. We strongly hope the state, county and city will sit down with this respected group of deep-bored tunneling experts before the end of the year. We'd be happy to facilitate and host that discussion."

The five experts who signed the letter to Deputy Secretary Dye—Richard Prust, Vladimir Khazak, Dick Robbins, Kern Jacobson and Gerhard Sauer—all have extensive experience with tunnels. Mr. Khazak helped lead the development of the downtown transit tunnel which was completed in 1986. Mr. Prust's company, global engineering firm, Arup, has completed a Cascadia Center-sponsored tunnel cost comparison estimate that shows clearly that tunnels are being built around the world, at a faster pace, at less cost and disruption, and using highly advanced technology. Seattle itself uses tunnels, including the recently completed Beacon Hill tunnel, which came in at $300 million.

The group of five experts says that the estimates being reported peg labor and material costs much higher than necessary or realistic for Seattle. Their tunnel estimates "include portals, tunnels and all associated safety requirements," and "the data falls in the range $100M to $350M per mile of single tunnel, which would equate to $400M to $1.4B for a twin bore two mile tunnel in Seattle."

Many cities have embraced the advances in deep-bored tunneling technology to help alleviate congestion and facilitiate the movement of people and goods. There is a proposed 1.5 miles long tunnel ($677 million/mile) project for the Port of Miami (Fla.), and a 58 feet diameter bored tunnel is being considered for a 4.5 miles long project in Los Angeles for I-710 (under $300 million/mile). Paris, Madrid, Moscow and Shanghai all have tunnels.

"The benefits of a deep-bored tunnel are too compelling to ignore," says Cascadia's Agnew. "The waterfront wouldn't be disrupted during construction, which would allow commerce and commuting to continue. Tunnels last 100-150 years—twice as long as anything else on the table, which makes the full life cycle cost competitive. It is really the only choice that meets the economic, environmental and sustainability needs of the region, including costs."

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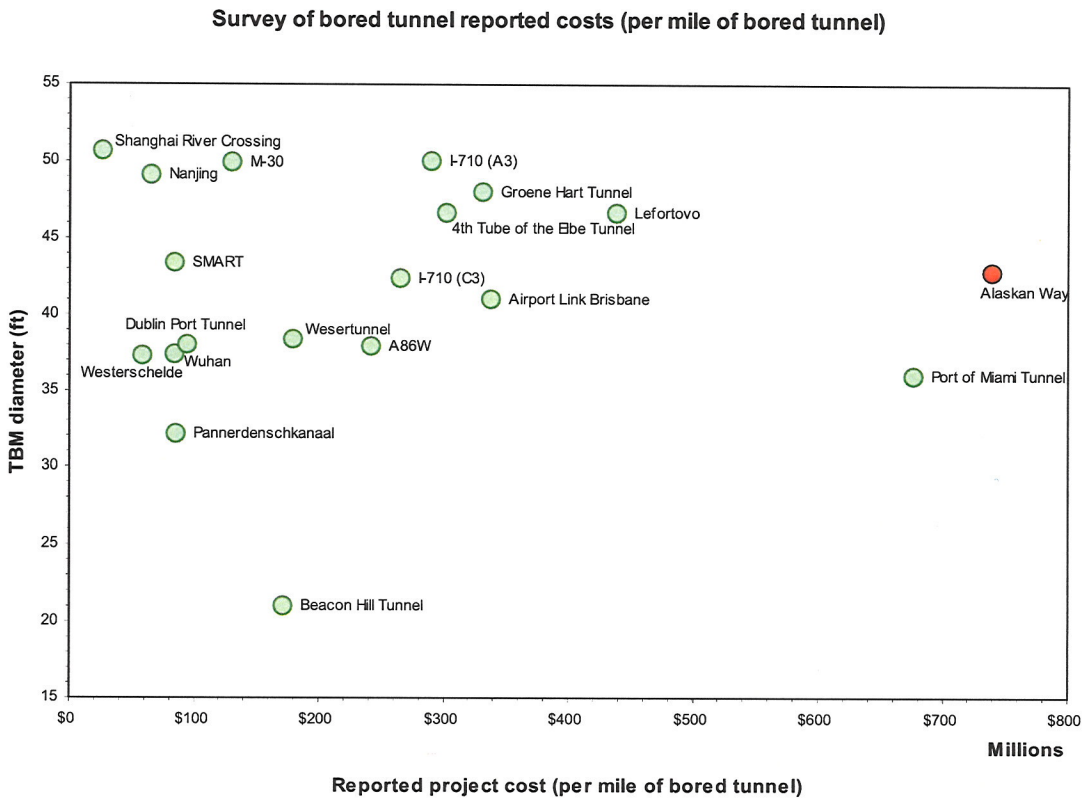
Survey of reported costs

Majority of projects indicate a cost per mile of single tunnel of less than $350M. This equates, for two tunnels 10,000 ft long, to $1.3Bn.



Notes:

- Costs are reported project costs, and have been normalized to indicate the cost of a mile of single tunnel
- No price escalation has been incorporated
- Costs for I-710 project in Los Angeles are from feasibility study – project is not built
- Alaskan Way figures based on $2.8bn for twin 10,000ft long tunnels

December 8, 2008

Dear Stakeholders and Project Team:

We are a group of tunneling professionals writing to urge you to carry forth the Deep-Bored Tunnel option for further analysis as a viable solution for the Alaskan Way Viaduct replacement project. We have broad collective experience, having built machines for and designed or built scores of deep bore tunnels around the world. Although we work for different firms and compete against each other to design and build these tunnels, we have come to the same conclusion: The Deep Bored Tunnel provides a reliable, cost effective and socially responsible solution for the replacement of the Viaduct and the development of the downtown waterfront. We universally applaud your efforts to consider the investment in a solution for the Viaduct that includes a deep-bored tunnel.

The Deep-Bored alternatives offer significant short and long-term economic and regional benefits in terms of increased greater public amenity, reduced congestion, increased property values, greater seismic resilience, reduced downtown disruption, and the ability to keep the existing Viaduct in operation during construction. While we believe that these benefits outweigh any cost differential, we would also like to offer additional cost data that we believe indicates that the Bored Tunnel solution would cost less than the $3.5 billion currently proposed—a price tag we believe diminishes the chance that the deep-bored option will get a fair evaluation.

The attached chart provides project costs from tunnel projects around the world, normalized to cost per mile of single tunnel. While these costs have not been updated for construction inflation, the current prediction for the Seattle tunnel is higher by a significant margin than any similar tunnel project built anywhere in the world. While we are not in a position to analyze the detail of the estimate, we question several aspects of the cost estimate:

1. **Twenty-five percent of total cost is added for "design fee."** Our experience indicates that the design fee could be much smaller, perhaps even half that amount.

2. **Assumption of 10-year construction period inflates costs and results in excessive inflation premium costs.** The assumption of twin bores using a single boring machine causes the time to construct to be extended, penalizing it with additional risk, contingency and inflation costs.

3. **Inflated risk premium.** Our experience in designing and managing construction of the 3rd Avenue bus tunnel in Seattle tells us that ground risk can be minimized since most of the downtown is already surveyed and conditions are widely understood. Locating tunnels in the public right of way where they are visible, placing tunnels as far from the shoreline as possible, and selecting routes with wider public right of way are just a few items that could reduce risk and cost of construction. This risk is further reduced as a result of developments in tunneling technology in recent years, along with experience gained on local tunnel projects.

4. **There are other opportunities to reduce costs and increase benefits by considering other innovative approaches such as** use of a single large diameter tunnel rather than twin bores.

Once again, we commend the Stakeholders Committee and the technical team for their fair consideration of all solutions, including the Deep-Bored Tunnel option. We understand and respect your need to carefully weigh all the options before you.

The actions you take will influence the shape of our city and region for many decades to come. Based on our extensive experience, we believe there is ample justification to carry the Deep-Bored option forward for further analysis. This presents the ultimate opportunity to create a legacy that reclaims our waterfront, sustains regional mobility, preserves urban neighborhoods, protects the flow of freight and goods, and is ultimately the most affordable option in front of you.

Respectfully,

Richard Prust
Associate Principal, Arup

Vladimir Khazak
Vice President, HNTB

Dick Robbins
Founder, Robbins Company

Kern Jacobson
Independent Transportation Engineering Consultant

Gerhard Sauer
President, Sauer Corporation

Attachments:

A) High Level Summary of Long-term Benefits of Deep-Bored Option
B) Summary of ARUP cost analyses
C) Comparison of Tunnel Costs (p. 11 in attachment)

Attachment A
High Level Summary of Benefits of Deep-Bored Tunnel Approach

- Diverts the 66% of bypass traffic on the Viaduct from the city grid, allowing the cityscape to be used for more noble purposes
- Can be built with the least construction disruption and lowest mitigation costs of any alternative, thereby protecting Seattle's downtown neighborhoods
- Allows continued use of the Alaskan Way Viaduct during construction
- Potential to eliminate the Battery Tunnel turn, and eliminate the barrier of Aurora Avenue north of Battery Street to knit Uptown and S. Lake Union neighborhoods back together
- Creates a mechanism to collect water runoff and particulate air pollution
- Eliminates noise impacts
- Has the lowest life cycle cost and can be expected to last longer than any other scenario (the BN tunnel under Seattle is more than 100 years old)
- Can reduce freight traffic through downtown, making pedestrian and biking safer and more attractive
- Enhances and protects throughput capacity for freight, maritime and industrial uses, the Port, Boeing, and even transit
- Tunnels and underground space generally have a very long life:
  - Some tunnels have been in continuous use contributing to the environment and sustainable development for centuries.
  - Tunnels have been demonstrated to behave very well during earthquakes—in fact, better than surface structures. A tunnel would provide an important north-south corridor in a seismic event.
- Despite potential initial cost, the Life-Cycle Cost of deep bored tunnels can be competitive or even lower than Surface Alternatives, ultimately resulting in far lower replacement costs.
- Can be funded through tolls and allows the easiest mechanism to manage traffic through tolls

December 9, 2008

David Dye
Deputy Secretary
Washington State Department of Transportation
P. O. Box 47300
Olympia, WA 98504-7300

RE: Deep Bore Tunnel Cost Estimates

Dear Mr. Dye:

Thank you for your very relevant comments and questions regarding our perspectives on the cost of a deep bore tunnel option. We welcome this opportunity to share our thinking about why we believe that the deep bore estimates and design and construction time provided to the team is more conservative than may be appropriate. While we are not privileged to know the basis and assumptions of the detailed schedules and estimates developed to date, it is our observation from the professional prospective based on the global experience that such project could be completed in the 60 months period with a price of $2B or less.

Cost Estimation Sources/Methodology
We have based our analysis on an inventory of reported tunnel project costs for a range of projects across the world that are either completed, under construction or in planning. The majority of the projects we reviewed are either in design or construction or were complete in the last 2 years, although some are up to 7 years old.

What is included in the cost estimates?
Unfortunately, these reported costs do not permit a direct comparison. They do, however, allow a project to be placed within the context of other similar projects. Although the available literature rarely details the specific cost breakdown, we can say with certainty that these project costs typically include portals, tunnels and all associated safety requirements, all systems including but not limited to the ventilation structures where required, all building protections, ground modification, utilities, etc.. The majority of the data falls in the range of $100M to $350M per mile of single tunnel, which would equate to $400M to $1.4B for a twin bore two-mile tunnel in Seattle.

As reported project costs, these figures would be expected to include design and construction risk.

The Inflation Factor
As we noted in our letter, the costs presented have not been escalated because escalation rates can vary significantly from country to country and city to city, along with fluctuating currency exchange rates. While it is true that there have been high escalation rates over the last 10 to 15 years, these costs have stabilized recently in the last 2 months, with materials prices reducing and labor prices leveling over the last two months. The BCI (building projects) and CCI (Infrastructure projects) indices for Seattle over the last 12 months were 6% and 2.0% per annum respectively. Our best estimate over the coming years, given the recent reduction in materials prices, is an escalation rate of the order of 3.0 to 3.5%. The long term trend of the CCI index indicates an escalation of 4.5 If we apply this latter figure to the costs of projects either under

construction or completed in the last 2 years, we can project an upper bound cost of $500M per mile of tunnel (i.e. $2B for a twin bored 2 mile long tunnel in Seattle) with the majority of data falling within the original range quoted above, assuming a mid-point of construction of 2015.

We fully recognize that this analysis is not a substitute for a rigorous cost analysis. Nevertheless, there is no question that the current cost estimates presented to the project team and stakeholders put the deep bore tunnel option at the very high range of real costs for real projects elsewhere on the globe. As individuals with extensive tunneling experience, we do not understand why those costs should be so high.

Thank you, once again for your prompt and thoughtful response to our input. We reiterate our interest in being available to the project team and stakeholders to provide the benefit of our direct and global experience in tunneling technology and project management.

Sincerely,

Richard Prust
Associate Principal, Arup

Vladimir Khazak
Vice President, HNTB

Dick Robbins
Founder, Robbins Company

Kern Jacobson
Independent Transportation Engineering Consultant

Gerhard Sauer
President, Sauer Corporation