Tunneling discussion

ARUP

Peter Chamley

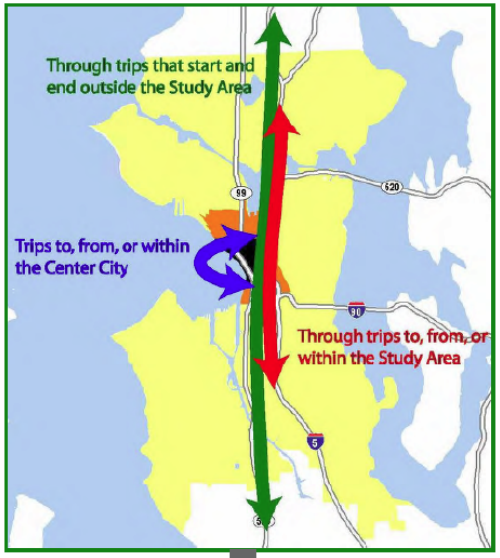

3104
eurostar

Current Arup tunneling projects

North America	2nd Avenue Subway 7 line extension Lake Mead intake tunnel Port of Miami tunnel Trans-Hudson Express
International	Cross Rail (London, UK) Airport Link (Brisbane, Australia) Express Rail (Hong Kong) Downtown Line Extension (Singapore)

Corridors for through trips

SR-99 carries a significant proportion of total through trips



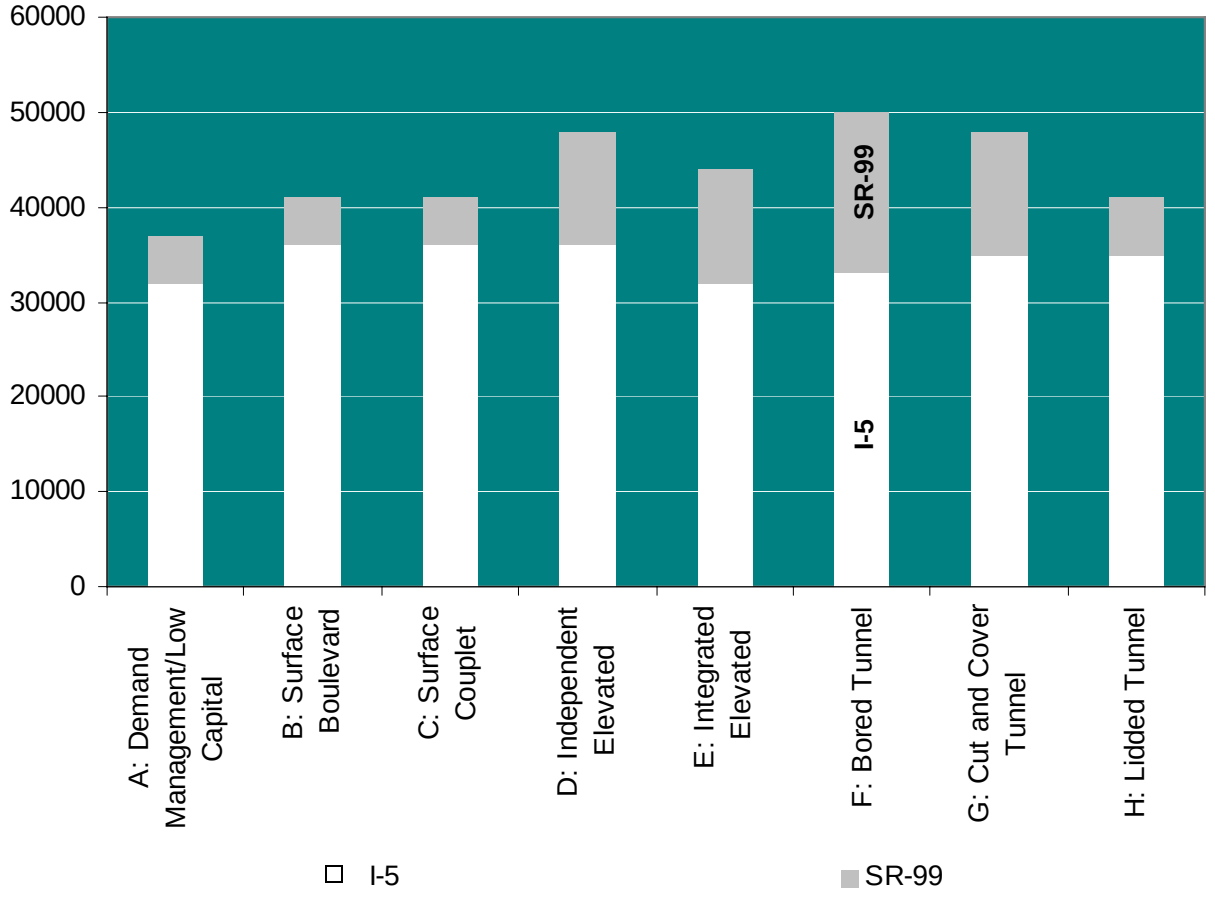
SR-99 corridor | **I-5 corridor** | **Surface Streets**

	SR-99	I-5	Surface
PM Peak Period Vehicle Trips	30,000	57,000	26,000
Percent through trips	60%	56%	not reported
Through trips	18,000	32,000	not reported

Figures based on Stakeholder Advisory Committee Nov 13 2008 Guiding Principle #2 Briefing

SR-99 and I-5 peak period corridor through trips

Of the proposed options the bored tunnel best maintains the % of through traffic



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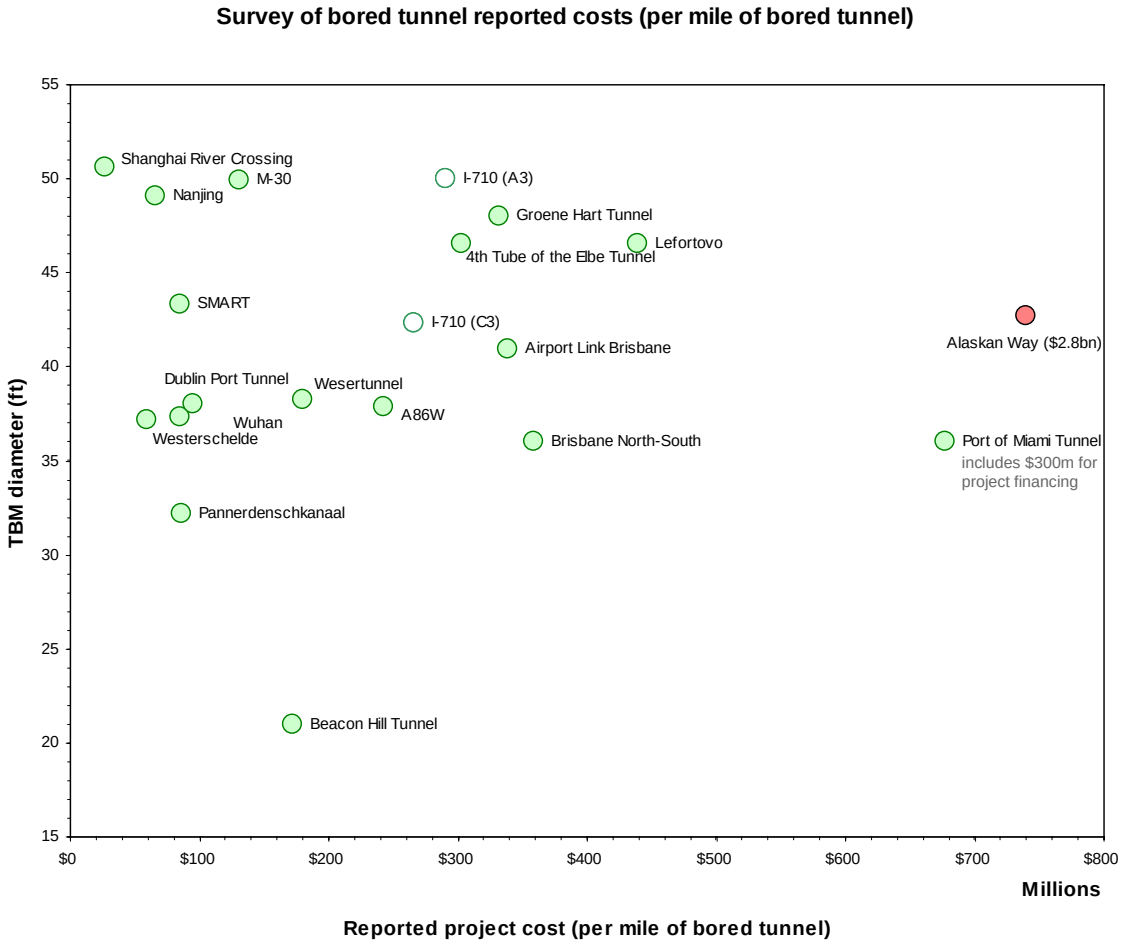
Survey of reported costs

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

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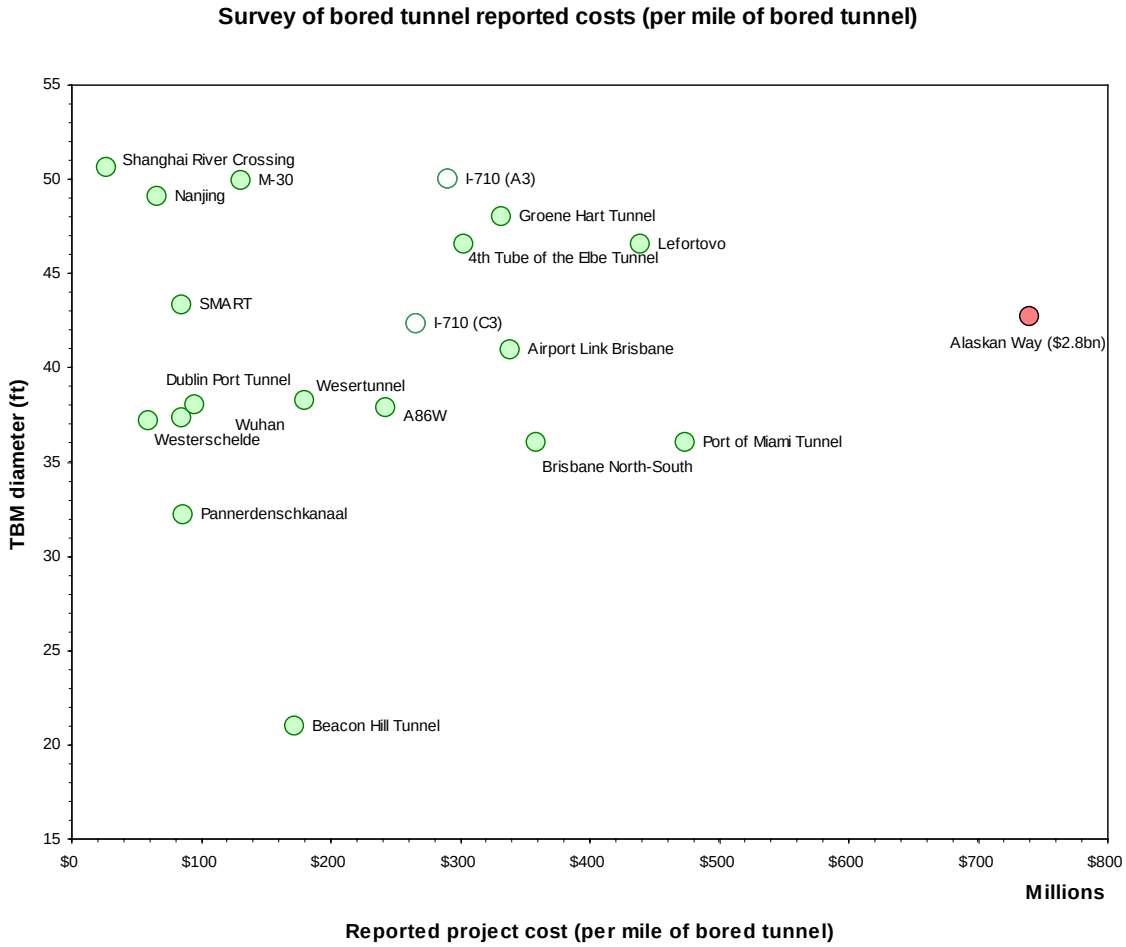

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Urban construction risks

- Utility diversions
- Unforeseen obstructions
- Third-parties
- Traffic disruption
- Business disruption
- Public perception

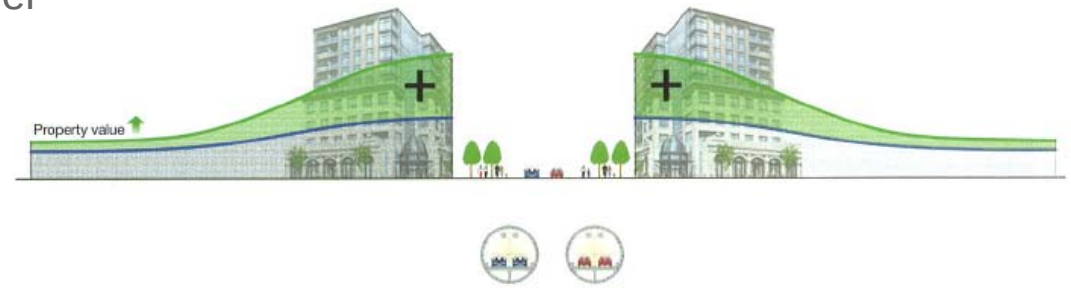
Value / investment

Data from OpEd in Tunnels and Tunneling magazine indicating economic impact of various project alternatives

Urban street

Elevated urban highway
Local access road

Urban street with traffic calming measures
Urban highway tunnel



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Towards a solution

Need

- Through traffic on the SR-99 is significant. The economic impact of reducing the SR-99 corridor could be significant both during construction and long-term.
- A bored tunnel retains the existing proportion of through traffic.

Feasibility

- Large bore highway tunnels are feasible and common throughout the world
- Likely project risks for a Seattle tunnel are understood and not unusual.

Cost / Value

- Major transportation projects must recognize the wider impact to the community
- Major infrastructure projects are an investment. Cost must be weighed against value against total life-time cost.