

WEDNESDAY REPORT-OUT :

ALASKAN WAY CONSTRUCTION STRATEGIES WORKSHOP

Monday March 9<sup>th</sup> –Wednesday March 11<sup>th</sup> <sup>1</sup> ,

Alaskan Way Offices

INDUSTRY PANEL

| Name                  | Expertise, inputs   |
|-----------------------|---|
| 1. Brenda Bohlke      | CHAIR. PhD. Geological engineering, Tunnels, Management, Current UCA President, Specified EPBM in clay and flowing sands<br>SR520 Tunnel Panel member |
| 2. Jan Keiser         | Engineer, Attorney, former Construction Counsel for Sound Transit, SR520 Panel member (contracting)   |
| 3. Ed Plotkin         | Former Engineer, Contractor, Owner – consulting on underground construction & contracting, NY, Toronto  |
| 4. Jo Bhore           | Extensive construction experience across US; presently consultant on SF Central Subway for Construction Strategies and DRB in New York                |
| 5. Walter Mergelsberg | Former Director of Construction, Washington Metro system (26 years) now with Dr-Sauer Corporation   |
| 6. Otto Braach        | Former Hochief + Weiss and Freitag chief tunnel engineer, TBM Expert, Consultant to Lake Mead tunnel project  |
| 7. Gianni Arrigoni    | Extensive construction + international tunneling experience, author re contracting and delivery (See Annex, Mechanized Tunneling Book)                |
| 8. Dick Sage          | SoundTransit, Construction Manager, PE 26 yr Construction; 10 w/Sound Transit, TRB Tunnels and Underground Structures, DRBF, CMAA                     |

Each panelist had over 30 years experience in tunneling, particularly in urban environments including in Seattle and worldwide.

WORKSHOP OBJECTIVES

Given the nature of the program, considering schedule and budget goals, Panel members will identify, evaluate and recommend delivery strategies to meet these goals, considering:

- o Alternatives for project delivery and contracting methods.
- o Scope, size and complexity of potential contract packages
- o Risk identification and risk management strategies
- o Other strategies and actions that will be necessary to meet program goals.

The workshop will review all relevant contracting and packaging strategies, consider pros & cons and recommend the range of alternatives for further consideration or evaluation.

<sup>1</sup> Some issues may continue to be worked the following days, if and as necessary, consistent with travel arrangements and who is available

## CONSTRUCTION STRATEGIES WORKSHOP REPORT OUT SUMMARY

Wednesday, March 11, 2009

### Approach:

The deliberations were based on the collective experience and consensus of opinion among the panelists. The panel set out to define different alternatives available, the strategies for packaging, sequencing and delivery system. The panel members experiences included design, contractor, construction, legal, planning, owner, and construction management, use of pressurized boring machines. The alternatives considered include: Design Bid Build; Design-Build, GCCM, and some discussion of a hybrid DB. We tested these alternatives against the schedule provided in our advance materials, and information provided in our Monday morning and afternoon briefings by WSDOT. We also learned that the geological profile is based on borings taken far off the proposed alignment and that the area of the port and waterfront has been backfilled and modified significantly in the last 100 years. These discoveries reinforced our recommendations for acceleration of the geotechnical site investigation and re-evaluation of the profile and locations of the portals.

The panel had reviewed the concepts and layout of the project prior to arriving in Seattle for the workshop, so called out a number of concepts they felt warranted further evaluation so that the interface could be better defined, or design would improve the performance and risks to the TBM and tunneling performance.

A couple of the most important early actions and considerations recommended are:

- Definition of system requirements and criteria
- Accelerate geotechnical site investigation
- Accelerate environmental process to the extent possible.
- Reconsideration of the tunnel profile to reduce the hydraulic pressures for operating and maintaining the TBM
- Evaluation of the mucking alternatives, including contractor use of Pier 48 for movement and temporary storage of much, segments and the machine
- Evaluation of the south portal constructability, packaging and interface with the projects to the south.
- Optimize tunnel configuration and ultimate size

The panel set about evaluating the appropriate construction procurement and overall strategy for launching the Alaska Way Viaduct Replacement Program, in light of the selection of a large bore tunnel for the downtown portion of the project. Our analysis was based on a conceptual design that has been put forward, showing a deep open cut portal at the southern and northern ends of the tunnel, each providing portal for launching and extraction of the TBM. The schedule overlay for the project concepts is a date of December 31, 2015 for the project to be open for traffic.

We used scheduling as the tool to test various assumptions, and ideas that we had heard from the WSDOT staff during the first day, including environmental process and its expected time line to obtain a Record of Decision (ROD), institution constraints (such as legal, procedural), and design and packaging concepts developed to date.

### **Contract packaging:**

The panel recommended separate contracts for the following:

- The tunnel bore
- South Portal
- North Portal,
- Ventilation buildings and connections
- Restoration work

Normally these could be contracted with DBB but the schedule constraints would require the design build contract for the south portal to eliminate the schedule delays and conflicts for the tunnel contractor. Further evaluation and reconfiguration of the limits and interfaces of the southern end will determine the means of contracting. Given the significance of the south portal and complex ground conditions, and depending on how the south portal is reconfigured and designed, either DB or DBB. However, the schedule demands favor the DB approach.

Tunnel Contract: Design Build contract for the tunnel with well defined system requirements, provides the fastest schedule. The tunnel contract size exceeds the bonding capacity/authority and exception will require legislative action in 2010.

### **Schedule:**

A Design Build strategy is the only workable solution, however, this also requires significant acceleration and compression of the schedule activities including as mentioned previously: the environmental process and record of design; geotechnical site investigation; early final design (pre ROD) reconfiguration of the southern portal and approaches, including geotechnical baseline report to provide clear access for the tunnel contractor.

**2015 Achievability:** The open date of 2015 was not achievable with realistic schedule and normal progression and durations. In order to achieve the 2015 completion date, we had to violate the environmental process by advancing the final design prior to the record of decision. Only the most aggressive assumptions including early environmental Record of Decision, compressed schedules for the geotechnical investigation, and early preliminary and final design activities achieved a completion date of 2015.

The panel was working on an aggressive but unconstrained schedule, developed using the 'experienced based' judgment of activity durations, but the results were not ready for our Wednesday afternoon report-out. The panel will continue to review the schedule and it's implications with respect to the construction procurement and implementation strategies)

Our overall preliminary findings and observations included:

- Identification of key early action items
- Recommended construction packaging
- Identified key pricing terms
- Identified key risks and need for early risk assessment and management programs
- Identified key design issues requiring immediate attention and resolution

WSDOT ALASKA WAY VIADUCT REPLACEMENT PROGRAM  
LARGE BORE CONSTRUCTION STRATEGIES WORKSHOP

Outline: Final Report

Seattle, Washington  
March 9-11, 2009

Executive Summary

Objectives

Approach :

Consensus among panelist derived from collective experience  
Evaluation and fatal flaws  
Constraints  
Workshop schedule  
Report Out : Preliminary findings

**Findings:**

Procurement strategies: DB, DBB, other  
Schedule framework and test  
Three frame and tested: DBB, DB, GCCM  
Construction Packaging and sequencing

**Recommended Action Items (described, prioritized, sorted and assigned)**

(Derived from critical issues and risks identify through the process)

- (0) Optimize Tunnel Size (per requirements)
- (1) Fast Track Environmental Strategy
- (2) Fast track Geotechnical Program Plan
- (3) Early Value Engineering/Constructibility Southern end
- (4) Comprehensive Interactive Program Schedule with single point of responsibility
- (5) Industry outreach and engagement plan
- (6) Early community engagement program
- (7) Risk Assessment and Management strategy
- (8) Evaluate project organization to implement large bore tunnel and approaches with interfaces with other AWVRP projects
- (9) Evaluate muck removal and disposal, including
- (10) Evaluate the use of Pier 48 by contractor for muck removal, pc segments transport and storage, and TBM transport to site.
- (11) Evaluate local fabrication of concrete elements
- (12) Evaluate alternative design and packaging strategies for the south end/portal
- (13) Accelerated utility relocation plan
- (14) Evaluate ventilation alternatives and tunnel sizing
- (15) Develop plan and schedule for DB contract procurement
- (16) Evaluate first avenue access and permitting, building stabilization plan
- (17) Independent building survey and ground stabilization plan
- (18) Define project functional requirements and design criteria

DETAILED AGENDA

DAY #1 – Monday, March 9, 2009 – 8:30 am (gathering) to 6 pm (Closing)  
 Project Overview/Experience/Context/Objectives/Key issues/Identify Alternatives  
 23 fl Training room (morning), 32<sup>nd</sup> Floor conference area (afternoon)

| Time  | Topic  | Presenting/who  | In attendance  |
|-------|--|---|--|
| 8:30  | Welcome and introductions <ul style="list-style-type: none"> <li>• Introductions</li> <li>• Review workshop objectives</li> <li>• Agenda overview – adjustments and modifications</li> </ul>   | Paananen / Dye<br>Panel<br>White + Bohlke<br>Bohlke   | Groups 1 & 2   |
| 9:00  | Project overview & understanding <ul style="list-style-type: none"> <li>• Project background, Tunnel Decision</li> <li>• Project Organization - Review</li> <li>• Project Configuration, Interrelationships</li> <li>• Environmental process, Record-of-Decision</li> <li>• Alignment alternatives, affected facilities</li> <li>• Fire Life Safety, Ventilation</li> <li>• Geologic-hydrology</li> <li>• Proposed project schedule &amp; cost</li> <li>• Construction Logic related to schedule &amp; cost</li> </ul> | Paananen<br>White<br>Preedy<br>Greco<br>Williamson<br>Clark<br>Robinson<br>Williamson + Morrison<br>Vic Oblas | Groups 1 & 2   |
| 12:00 | Working Lunch:<br>Seattle TBM Tunneling History  | Parker  | White, Preedy, Greco, Reilly   |
| 12:30 | Project Site tour, questions, discussion   | Panel + Guides (Preedy, Rigsby, Williamson)   |  |
| 2:15  | WSDOT Contracting / previous recommendations<br>History, recent experience, achievements<br>Methods used / considered, A+B, Value determination,<br>Bonding/Insurance/Alternative Delivery, recent Design-Build experience<br>SR520 panel recommendations  | Linea Laird<br>Bob Dyer<br>John Reilly  | Group 1  |
| 3:00  | Panelist Presentations: Lesson Learned & issues related to this task (approximately 20 mins each)<br>Washington DC Metro tunnels - lessons learned<br>Toronto and New York – lessons learned<br>TBM applications, related to contract strategies<br>SF Central Subway construction strategies<br>Sound Transit procurement experience:<br>International contracting and delivery - overview<br>Washington State - contracting possibilities  | Mergelsberg<br>Plotkin<br>Braach<br>Bhore<br>Sage<br>Arrigoni<br>Keiser                                       | Group 1 +<br><br>White, Greco, Preedy, Reilly, Parker, Oblas, Rigsby |

|      |   |       |                      |
|------|---|-------|----------------------|
| 5:00 | Break & Discussion  |       |                      |
| 5:15 | Panel Discussion: alternatives to be considered:<br>Pros & cons, key issues, initially preferred alternatives, gaps, data required (action items) | Panel | Group 1 <sup>2</sup> |
| 6:00 | Adjourn   |       |                      |

DAY 2 –Tuesday March 10, 2009

Develop and characterize alternatives, compare to objectives, identify issues affecting construction strategies (Panel with specific persons attending or called as necessary)

| Time  | Topic   | Presenting/who | In attendance  |
|-------|---|----------------|--|
| 8:00  | <ul style="list-style-type: none"> <li>Re—Cap Day 1</li> <li>Agenda review – adjustments and modifications</li> </ul>   | Bohlke         | White, Preedy, Greco, Reilly   |
| 9:30  | Evaluate Issues Affecting Construction & Contracting Strategies, Packaging, Sequence <ul style="list-style-type: none"> <li>Key risks, Risk Management Strategies</li> <li>Cost Estimating/Project Budgeting/Cashflow</li> <li>Project Schedule: Critical Milestones</li> <li>TBM manufacture, delivery, setup, tunneling</li> <li>Portal construction, key issues, opportunities</li> <li>Site characteristics, adjacent structures, access points, construction logistics</li> <li>Industry Capacity/Competition/Participation</li> <li>Other considerations: Contract interface nodes</li> <li>Summary and afternoon agenda</li> </ul> | Panel          | Group 1 +<br><br>Project staff as needed and called for depending on the topic |
| 12:00 | Working Lunch & Discussion  | Panel          | White, Preedy, Greco, Reilly   |
| 12:30 | Identify Preferred Project Delivery Alternatives for consideration in this workshop<br>Identify Fatal Flaws or Constraints or Institutional Barriers/EIS process and schedule   | Panel          | Group 1 +<br><br>Project staff as needed and called for depending on the topic |
| 1:15  | Evaluation of Contracting & Delivery Alternatives and related issues <ul style="list-style-type: none"> <li>TBM Procurement Strategies/requirements</li> <li>Tunnel construction, internal facility, systems installation, site logistics, schedule compression</li> <li>Bid Process: Early Contractor Involvement; Competition; Capacity, Bonding, Insurance</li> <li>Partnering &amp; collaborative processes; Risk Management / Risk Allocation Incentives (pain-gain)/</li> <li>Outline Contract Packages + Bid and Selection Processes related to above</li> </ul>   | Panel          | Group 1 +<br><br>Project staff as needed and called for depending on the topic |

<sup>2</sup> Depending on Panel’s need for input – to be determined by Chair.

|      |   |       |  |
|------|---|-------|--|
| 3:15 | Break   |       |  |
| 3:30 | Identify & narrow recommendation set for further consideration                          | Panel |  |
| 5:30 | Review Day 2 and Plan for Day 3<br>–Draft Outline for Report, discussion, actions req'd | Panel |  |
| 6:00 | Adjourn   |       |  |

DAY 3- Wednesday March 11, 2009  
 Recommendations and Reporting

| Time  | Topic   | Presenting/who                        | In attendance  |
|-------|---|---------------------------------------|--|
| 8:00  | Recap Day 1 and 2 –considerations for Day 3 <ul style="list-style-type: none"> <li>Agenda review – adjustments and modifications</li> </ul>   | Bohlke,<br>Panel                      | White, Preedy,<br>Greco, Reilly  |
| 8:30  | Review Project Organization and implementation planning - with respect to potential or recommended Project Delivery Strategies  | Panel                                 | White, Preedy,<br>Greco, Reilly  |
| 9:30  | Discuss and agree on contracting strategies to be addressed in report. <ul style="list-style-type: none"> <li>Discuss / outline of report (v.1) with recommendations</li> <li>ID key issues and concerns, opportunities, specifics of contracting strategies, considerations and cautions</li> <li>Develop recommendations finalize key issues, barriers, implementation</li> </ul> | Panel                                 | Group 1 +<br><br>Project staff as needed and called for depending on the topic |
| 12:00 | Working Lunch & Discussion  | Panel                                 | White, Preedy,<br>Greco, Reilly  |
| 12:30 | Continue to detail recommendations with <ul style="list-style-type: none"> <li>Outline Report (v.2)</li> <li>Elements of report, outcomes and actions required</li> <li>Preparation for the Report out/Briefing</li> </ul>  | Panel                                 | Group 1 +<br><br>Project staff as needed and called for depending on the topic |
| 2:30  | <ul style="list-style-type: none"> <li>Report out / Briefing to WSDOT Exec and Staff:</li> <li>Review workshop deliberations, contracting strategies, recommendations and report content</li> <li>Questions &amp; discussion</li> </ul>   | Panel                                 | Group 1 +<br>Group 2   |
| 4:30  | <ul style="list-style-type: none"> <li>Next Steps</li> <li>Assignments for completion of report</li> <li>Schedule for completion, production requirements</li> <li>Other considerations to be communicated to the project</li> </ul>  | Panel<br><br>(could be smaller group) | White, Preedy,<br>Greco, Reilly  |
| 5:00+ | <ul style="list-style-type: none"> <li>Adjourn</li> </ul>   |                                       |  |

Note, on Thursday Panel members who are available will present technical details and considerations in their specialty to the Project Team, with discussion related to the project. An informal lunch presentation, with questions and discussion is planned as a “brown-bag” lunch for interested staff.



