

Summary of the Tunnel Workshop

T6 Working Group
Environmental Control

July 9th & 10th
Snowmass 2001

Tunnel Workshop

Invited Professionals

- “Tunneling Professionals,” combined experience in excess of 200 years
- Geologists familiar with California and Illinois Geology
 - Bauer, Frame, Neil
- Tunnel Designers and Builders
 - Babendererde, Hilton, Lachel, Wightman

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Agenda Items

- Technical Requirements for the Underground Facilities
- Subsurface Ground Conditions
- Construction Issues
- Tunneling Research and Development
- Close-Out Recommendations

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Technical Requirements

- Similar to a Rail or Metro Tunnel, except for possibly the needs for:
 - Watertightness, and
 - Stability.
- Need to raise the awareness of conventional and technical designers relative to the possible criticality of these issues.

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Ground Conditions

- No site-specific investigations have been performed.
- Some ground units, geo-structural, and geo-hydrological regimes encountered along the proposed alignments have not been extensively investigated or “worked” before (foundation, excavation, tunnel).
- In particular, there are significant uncertainties relative to the ground behavior of excavations in:
 - Expansive shales in California and Illinois
 - Saturated, weak and abrasive sandstone in Illinois, and
 - Overstressing of rock excavations in Illinois.

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Construction Issues

- Site conditions vary widely
 - Construction methods and means change
 - Soft ground and hard rock TBMs and drill and blast
 - Multiple layout options considered
 - Cut and Cover, Tunnel (side-by-side and vertically offset) and Combinations
- Layouts and construction assumptions have not been subjected to review for:
 - Constructability - do layouts allow for standard practice?
 - Value Engineering - can needs be met more cheaply?

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Research and Development

- In the tunneling industry R&D products gain acceptance very slowly (expect a time lag of 10+ years).
- The harsh underground environment can be unfavorable to innovation - takes time to “iron-out” the problems.
- Some on-going R&D projects might provide cost-saving products (equipment or materials) in the future. Continue to monitor R&D programs world-wide.
- Know where R&D products are and go see them in action.
- Show contractors that it works before they bid a job.

Tunnel Workshop Recommendations

- Site Investigation to address key geo-technical questions.
- Site Selection Criteria - to help select preferred sites and give added focus to further investigation and design work.
- Constructability and Value Engineering Reviews - to integrate in to the design process for cost-savings.
- Research and Development - to continue to monitor.
- An Underground Technology Advisory Panel - to help guide project planning for site investigation, design, construction, R&D and other related efforts.