JOHN REILLY'S practice has included consulting for complex infrastructure programs in the areas of management, strategy, organization, technical review/oversight, expert panel management, team alignment, partnering, contacting/delivery methods, risk management, and probabilistic cost/schedule analysis using the Washington State Department of Transportation's (WSDOT) CEVP® process[1].

John graduated in Civil/Structural Engineering from the University of Sydney (B.E. Hons., 1963) and University of California Berkeley (M.Sc., 1964). First Registered in BC, Canada, he is a Registered Professional Engineer in the US and Australia with 50 years experience working in the US, Australia, Canada, UK, Europe and the Middle East. He was President of the American Underground Construction Association (1999–2001), has been active for 20 years in the International Tunneling Association (ITA) and has Chaired two ITA Working Groups (Nos. 13 and 20).

Relevant practice areas include:

- Management: organization, technical reviews, expert panels, reports, contracting methods, cost & risk (WSDOT 2001–2013, London Underground 2003, Toronto 1993 & 2006, LA 1991–97, Dubai 2008)
- Transit programs: underground design, construction, technical reviews and management oversight (Washington DC 1968–1972, Boston MBTA 1978–85, Los Angeles Metro 1991–1997, San Francisco BART 1995–1998, Philadelphia SEPTA 1997–99, Atlanta MARTA 2003, Los Angeles Metro 2011–12)
- Management tools: advanced contracting and delivery, risk, risk mitigation, probabilistic cost estimating
- Underground tunnels/structures: (Washington 1969, Boston 1978, Los Angeles 1991–97, Seattle 2001–)
- Advanced highway bridge design and aesthetics (Sydney 1967, Massachusetts 1986, Los Angeles 1995)
- Building structural design/historic restoration (Vancouver BC 1964–65, Washington DC 1972–78)
- Partnering / team alignment, (San Francisco, LA, London, Boston, Philadelphia, Toronto, Seattle etc.)
- Transit vehicle manufacturing, systems design, integration (San Francisco 1995, Philadelphia 1997)

PROFESSIONAL

Past-President, American Underground Construction Association (1999–2001)
Chair, ITA Working Group 20, "Urban Problems—Underground Solutions" (2002–2004)
Chair, ITA Working Group 13, "Direct and Indirect Advantages of Underground Structures" (1999–2002)
Chair, North American Tunneling Conference, NAT2000, Boston (June 2000)
Chair, ITA Conference Track, "Management/Contracting for Underground Construction" (DC, April 1996)
Life Member, American Society of Civil Engineers (ASCE)
Life Member, Institution of Engineers Australia (IEA)
Corporate Member, International Tunneling Association (ITA)
Member, US Underground Construction Association (UCA)
Member, British Tunnelling Society (BTS)
Member, Australasian Tunnelling Society (ATS)

[1] *John Reilly was the principal developer of the cost-risk CEVP® process with colleagues and WSDOT.*

PARTIAL LISTING OF MAJOR PROGRAMS / PROJECTS / ASSIGNMENTS

ALTERNATIVE, CONTRACTING & INNOVATIVE PROJECT DELIVERY

Working with the Washington State Department of Transportation (WSDOT) on mega-project delivery options, John was the Principal Investigator and consultant for a report to the State Legislature and Secretary of Transportation on "Alternative Contracting and Innovative Project Management". This report considered traditional delivery systems including Design-Bid-Build (DBB), Design-Build (DB), Design-Build-Operate-Maintain (DBOM), and other similar methods. It contrasted these with other promising methods such as General Contractor/Construction Manager (aka GCCM, CM/GC, or Contractor at risk), incentive options (A+B bidding), and Alliancing (Australia, New Zealand, UK). (2005–2008)

HIGH-LEVEL EXPERT PANELS / STRATEGIC ADVISORY TEAMS

John has been responsible for the initiation of, input to, participation in, and management of several Expert Review Panels (ERP) and Strategic / Technical Advisory Teams. These are formed to advise agencies and political stakeholders regarding key issues and strategies for major, complex infrastructure programs. Management, political and technical elements are usually involved and the task results can be sensitive and determinative for these programs. See John's website www.JohnReilly.us for specifics. Examples include:

- Executive review & report, WSDOT internal decisions, SR520 Floating Bridge Program, 2013
- Chair, Strategic & Technical Advisory Team, SR520 Floating Bridge Project, 2011-12
- Assistance, Washington State Legislature's Expert Review Panel, Alaskan Way Project, 2011-12,
- Initiator & Co-Chair, Strategic & Technical Advisory Team, Alaskan Way Tunnel Design. 2009-12
- Chair, SR520 Expert Review Panel, Tunnel alternatives, Westside/Montlake Cut, 2008
- Expert Review Panel coordination, Alaskan Way Tunnel & SR520 Floating Bridge Projects, 2006
- Prime consultant, Project Management Oversight and Project Management Assistance, Los Angeles Metro Heavy and Light Rail Programs, 1991-97
- Report, U.S. Department of Energy, High-Level Nuclear Waste Technical Review Board, 1995
- Secretary to the Board of Engineering Consultants, Washington DC Metro System 1970-72;

ALASKAN WAY TUNNEL, STRATEGIC & TECHNICAL ADVISORY TEAM, 2009-2012

John was co-chair with the WSDOT Program Director, of a high-level strategic and technical review expert panel to assist WSDOT with planning, design and contract documents for the large-diameter bored tunnel alternative for the Alaskan Way Replacement project in Seattle. The Strategic/Technical Advisory Team (STAT) advised WSDOT regarding design and construction management, geotechnical issues, TBM technology, contracting methodologies, construction contract packaging and interface requirements, cost and risk, CEVP, risk management and mitigation, value engineering, instrumentation/data reporting, plus input to and briefings of political and community stakeholders. Subsequently, a new panel was constituted to assist WSDOT in the construction phase.

ALASKAN WAY TUNNEL, INITIAL PLANNING, 2001

In July of 2001 John was tasked by WSDOT, at short notice, to present, to State and City management, world-class options for replacement of the Alaskan Way Viaduct—a 50-year-old elevated highway structure that was damaged by an earthquake in early 2001. Options included development of above-ground and underground alternatives considering design, current and available technology, cost, risk and, required service levels. Presentations were made to the City, State Transportation Commission, and the Program's Leadership Group, which included the Mayor of Seattle and the State Secretary of Transportation.

WSDOT URBAN CORRIDORS PROGRAM - MANAGEMENT AND TECHNICAL ASSISTANCE

John provided strategic organization and implementation assistance to WSDOT's Seattle-region mega-projects program including organization, strategy, team alignment, technical studies, and recommendations for contracting and delivery of the large, complex transportation projects of the Puget Sound Region (approx. $8 billion), assisting the WSDOT Deputy Secretary of Transportation and Program Directors.

He chaired a strategic and technical advisory team for the SR520 Lake Washington Floating Bridge replacement (2011-2012) and the Alaskan Way Tunnel (2009-2012) and provided Team Alignment services for these programs and the Columbia River Crossing project.

Other tasks included reports and recommendations for organizational alignment of the Seattle Programs with the WSDOT executive and functional Managers; executive team work sessions; alternatives for a 2nd Sound Transit tunnel under 5th Avenue; project delivery recommendations; expert review panel for a proposed SR520 tunnel option; CEVP cost-risk development, guidelines and workshops (2001–2013).

BOSTON—MBTA, SOUTHWEST CORRIDOR TRANSIT PROGRAM

John was the Consultant Program Director for program management, final design, and construction management assistance to MBTA for Boston's $1 billion (1980) Southwest Corridor transit, high-speed and commuter rail, highway and urban design project. Delivered under budget, close to schedule. Winner of the President's Design Award and ASCE Outstanding Civil Engineering Achievement of 1987 (1978–1987).

LOS ANGELES METRO

Project management oversight and technical assistance for the Los Angeles Metro heavy and light rail projects—tunnels, underground stations, at-grade sections, and bridges. Management oversight, cost-to-complete, design reviews, technical reports, agency and consultant costs, risk workshops (1991–1997). Readiness review and management oversight, LACMTA Crenshaw/LAX light Rail Program. (2011). Contracting and delivery options, LACMTA Westside Extension Program (2012).

TORONTO RAPID TRANSIT EXPANSION PROGRAM

Management, organization, delivery procedures and implementation of full team alignment for the integrated TTC/consultant team on the CN$3 billion Rapid Transit Expansion Program. Assistance with value engineering, configuration management, design, and construction interfacing (1994–1996).

LONDON UNDERGROUND (METRO)

Organization, partnering/team alignment/management/implementation planning; new signal systems for Bakerloo, Central, Victoria, District, Circle, and Metropolitan lines. London Underground (2005–2006).

RISK MANAGEMENT & COST-RISK ESTIMATING, COST VALIDATION PROCESS—CEVP®

In 2002, with a colleague, John developed the Washington State Department of Transportation's (WSDOT) Cost Estimate Validation Process (CEVP®), a structured approach to cost estimating which combines base cost with defined risk and opportunity events to estimate the "range of probable cost and schedule." The defined risks are then managed using explicit risk management plans. CEVP has been implemented as a normal business process by WSDOT and is being used by FHWA and other US and Canadian transportation and infrastructure agencies (2002–Present). For details see www.JohnReilly.us and http://www.wsdot.wa.gov/Projects/ProjectMgmt/RiskAssessment/default.htm.

RISK MANAGEMENT—PROCESS, WORKSHOPS, OVERSIGHT

Risk identification, response and mitigation procedures have been developed and applied to many projects, including use of the CEVP® process, WSDOT's probabilistic cost-risk system. Examples include:

- Author of Chapter 4, Risk Management, in "Recommended Contract Practices for Underground Construction," Society for Mining, Metallurgy, and Exploration, Inc. Denver, 2008.
- Lake Mead Water Intake #3 tunnel and shaft—risk process compliance reports, risk workshops.
- Alaskan Way Viaduct replacement program—annual workshops from 2001–2009 including use of cost, risk, value engineering, and scope changes to manage to the Legislature's defined budget.

- SR520 Floating Bridge replacement, Seattle. CEVP® and cost-risk workshops, 2001–2010.
- Los Angeles Metro Green Line risk workshop—readiness for operations, 1994.
- Sir Adam Beck Niagara Falls hydro tunnel—risk workshop, 1998.
- Brightwater program, King County WA—risk process and workshops to narrow alternatives, 2003.
- Pittsburgh PA—Light Rail extension program, risk/CEVP® workshop demonstration for FTA, 2003.
- Pennsylvania Maglev program—cost-risk workshop, 2003.
- Dallas Airport—people mover operational readiness risk workshop, 2004.
- Alaska Railroad extension—risk workshop followed by CEVP® cost-risk workshop, 2005.
- Alaska Railroad Fairbanks—re-alignment and risk workshop, 2005.
- Utah Dept. of Transportation—risk demonstration/CEVP® workshop, Salt Lake City, 2006.
- Omaha CSO program – risk workshop, 2007.

UNDERGROUND CONSTRUCTION/TUNNELS

Perhaps more than any other field, underground projects involve an unusual mixture of art and the science of engineering. John Reilly's consulting involves management, strategic planning, contracting, partnering, value engineering, and risk mitigation for complex infrastructure, systems, and underground programs.

John was the US representative and Animateur for the International Tunneling Association (ITA) Working Group (WG) 13 that examined the direct and indirect benefits of underground projects. Subsequently he integrated the goals of WG 4 (Planning) and WG 15 (Environmental) to form and chair a new Working Group, No. 20 “Urban Problems, Underground Solutions.”

In 2000, John conducted a world-wide review of underground projects in order to better understand what makes one project successful while another has major problems. This lead to management and strategic recommendations for the benefit of clients—as documented in papers and presentations (see website).

Types of underground projects include large complex infrastructure and transportation programs:

- Tunnel Boring Machines (TBMs) including open digger shields, slurry shields, earth-pressure balanced machines, convertible machines (mix-shields), and hard rock machines
- Cut-and-cover line and station structures for transit systems
- Soft earth tunnels using steel, cast-iron, and concrete liners
- Single and double-track rock tunnels using NATM or ribs and concrete
- Mined rock station construction using rock-bolts, shotcrete, and steel sets
- Large-scale jacked-pipe medium-diameter tunnel systems
- Underpinning construction including slurry-wall earth retaining and underpinning systems

WASHINGTON DC—METRO RAIL PROGRAM

John was responsible for project engineering and technical management of 14 Washington DC Metro Rapid Transit design contracts. Work included coordination of technical designs; liaison and coordination between section designers and the Transit Authority; and the definition, management and monitoring of scopes of work and design fees. He was Secretary to the Board of Engineering Consultants which reviewed all designs, and was responsible for the overview of all underground engineering, providing high-level direction, and recommending policy for all underground construction. Types of construction and work included:

- Soft-earth TBM tunnels using steel, cast-iron, and concrete liners; engineering for long tunnel drives
- Dupont Circle station construction using SEM with rock-bolts, shotcrete, and steel sets
- Cut-and-cover line and station structures, including vaulted, intersecting arch stations
- Earth and rock tunnels, cut-and-cover line and station sections, bridges, and aerial structures
- Underpinning design definition—major federal buildings
- First slurry-wall earth retaining and underpinning—Federal Center SW Station (now Archives Station)

TUNNEL BORING MACHINES

John Reilly researched the question "How much should an owner be responsible for the definition of Tunnel Boring Machines (TBMs) including the degree to which their configuration and operating characteristics are specified?" This question, and the related issue of the balance between, or choice of, prescriptive or performance specifications, has been applied to several of John's projects, including:

- LA Metro, Segments 2 and 3 and the East Side Extension
- Toronto Rapid Transit Expansion Program
- Sir Adam Beck Hydro project, Niagara Falls

This topic has been extensively discussed by John with Associations in Austria, Switzerland, Holland, UK, Germany, Australia, China, Italy, Mexico, Sweden, Norway and Korea. See John's paper "Owner responsibilities in the selection of tunnel boring machines with reference to contractual requirements and construction conditions," ITA WTC conference "Tunnels for People," Vienna, April 1996.

TUNNEL BORING MACHINE APPLICATIONS, CHINA

- In 2000 John presented a Keynote Address at the Tunnels & Tunneling Symposium in Beijing titled "Management of Complex Underground Projects." The lecture covered management, strategic planning, cost and risk procedures to improve the performance of major, complex tunneling and underground construction projects. The article was printed by Tunnels & Tunneling, International, Chinese Edition, pp. 3–9 (in Chinese).
- In 2001 John, with colleagues from Geodata Torino, authored a paper titled "High Level Report, TBM Development for China, Joint Cooperation—Technology Development, Chinese Tunnel & Hydro Projects," which covered implementation of TBM technologies for application to the long water and transportation tunnels planned for China in the upcoming decade.
- In September 2001 John, with Professor Fu of ISRM, convened a special workshop of key Chinese professionals and International TBM experts to discuss TBM development and joint-manufacture in China, held in Beijing. Reported in China Construction Journal, No. 5, June 2002 (in Chinese).

SELECTED UNDERGROUND PROJECTS

- Engineering coordination and technical management of underground cut-and-cover and SEM rock stations; cut-and-cover, earth, and SEM rock tunnel line sections; underpinning of buildings by jacked-piles and permanent slurry walls. Planning for machine-bored line tunnels in rock. Washington DC Metro System, 1968–1972.
- Secretary, Board of Engineering Consultants, Washington DC Metro System, 1969–1972.
- Advisory services, Federal US buildings, Washington DC. Impact, cost reduction, and mitigation of effects caused by tunnels adjacent to historic buildings. General Services Administration 1974–1978.
- Project and design management for a permanent slurry wall system acting as underpinning and final tunnel wall. MBTA, Southwest Corridor Project, Boston, 1982–1985.
- Evaluation of advanced European underground engineering and construction technologies for the US market. Focus on technologies, value, and cost competition and new capabilities. Systems included earth pressure-balanced shields in soft ground, with extruded concrete lining, soft ground SEM construction, diaphragm, and cut-off walls. Hochtief AG with Dames and Moore, 1987–1988.
- Engineering alternatives including cost for large underground interaction chambers, 54 miles of tunnels and ventilation shafts. US Superconducting Supercollider, State of Florida proposal 1987.
- Engineering and construction alternatives, impact analysis—proposal to tunnel Route 1 under historic Old Town, Alexandria Virginia, 1987.
- Construction management, underpinning historic buildings, Back Bay, Boston, 1987–1989, 1999.

- Los Angeles Mined Transit Stations. Management of a technically focused team to evaluate options and technical implications of using alternative construction methods—including full underground mining—for the heavy rail transit stations of Red Line, Segment 2. Los Angeles Metro, 1991.
- Opinion, technical merit, and value, related to elimination of reinforcement for the final tunnel liner, Los Angeles Metro System. Scope included soil-structure interaction, concrete integrity, durability, dynamic analysis, and earthquake forces in real time. 1992.
- See also papers and publications (following) and at www.JohnReilly.us

SELECTED PUBLICATIONS

Over 80 papers and presentation covering planning, management, design, and construction for infrastructure—Management, Oversight, Partnering, Team Alignment, Contracting and Delivery, Tunnels, Bridge Design, Risk Management, Probabilistic Cost and Risk evaluation, and Life-Cycle costs. Presentations in over 20 countries. **Selected/recent examples include:**

- Reilly, J.J. 2014 "Megaprojects Management and Delivery", Paper and presentation to the Italian Tunneling Society conference, Bologna, October.
- Reilly, J.J. 2013c "Alternative Contracting and Procurement for Megaprojects", UCA/Tunneling Journal Cutting Edge Megaprojects Conference, Seattle, November.
- Reilly, J.J., Author of the Foreword and co-author of Chapters on Risk and Cost + Schedule management in "Managing Gigaprojects", ASCE press, Ed Galloway, Nielsen and Dignum, 2013.
- Reilly, J.J. 2010c, "Cost and Schedule Control," Chapter 5 "Megaprojects: Challenges and Recommended Practices" Spring Reilly, J.J., Laird, L., Sangrey, D. and Gabel, M.
- 2011a "Use of Probabilistic Cost Estimating CEVP® - Management of Complex Projects to Defined Budgets" International Tunnelling Association Conference, Helsinki, May.
- Reilly, J.J. 2011c "Alternative Contracting and Delivery Methods," TunnelTalk Viewpoint, September.
- Reilly, J.J., Sangrey, D. and Warhoe, S. 2010a "Management of Cost and Risk to meet Budget and Schedule," International Tunneling Association, World Tunneling Conference, Vancouver, May.
- Reilly, J.J. 2010c, "Cost and Schedule Control," Chapter 5 "Megaprojects: Challenges and Recommended Practices" Spring.
- Reilly, J.J. 2009a "Probable Cost Estimating and Risk Management," Proc. International Tunneling Association, World Tunnel Conference, Budapest, May.
- Reilly, J.J. 2008e, "Chapter 4, Risk Management" in "Recommended Contract Practices for Underground Construction," Society for Mining, Metallurgy, and Exploration, Inc. Denver.
- Reilly, J.J. 2008a, "Alternative Contracting Methods – Part II," Proc. North American Tunneling Conference 08, San Francisco, June.
- Reilly, J.J. and Smith, R., 2008c, "Alternative Contracting and Innovative Project Management" Report to the Washington State Legislature, WSDOT, July - edited and transmitted by Dyer, B.
- Reilly, J.J. 2007a, "Alternative Contracting and Innovative Project Management," Proc. American Transit Association Rail Conference, Toronto, June.
- Reilly, J.J. and Parker, H., 2007b, "Management, Technical and Contracting considerations for Major, Complex Tunneling Projects" Presentation to the NY Port Authority and New Jersey Transit in consideration of the Trans-Hudson Tunnel Project, Newark New Jersey, October 2007.
- Reilly, J.J. 2006b, "Cost Estimating, Probable Cost, Risk Identification and Risk Management for Infrastructure/Rail Projects," Proc. APTA Rail Conference, NY, June.
- Reilly, J.J. 2005c "Cost Estimating and Risk Management for Underground Projects," Trenchless Engineering, Magazine, Krakow, Vol, No. 2-2005 (in Polish).
- Reilly, J.J. 2005b "Key Problems and TBM Application in the West Line of the Mega South to North Water Diversion Project in China," (TBMSN-2005) Symposium Proc, Beijing, September 12, (in Chinese).
- Reilly, J.J. 2004d "Alliancing for Underground Construction Projects," TBM Magazine, June.
- Reilly, J.J. 2004c w. McBride, M, Sangrey, D, MacDonald, D and Brown, J. "The development OF CEVP® - WSDOT's Cost-Risk Estimating Process" Proceedings, Boston Society of Civil Engineers, Fall/Winter 2004.
- Reilly, J.J. 2003c "The Relationship of Risk Mitigation to Management and Probable Cost," Proc. International Tunneling Association, World Tunnelling Congress, Geldermalsen, Netherlands, April.
- Reilly, J.J., Shulin, X., Arrigoni, G., 2000g "High Level Report, TBM Development for China, Joint Cooperation & Technology Development, Chinese Tunnel/Hydro Projects," 5th Beijing Tunneling Conference, November 9.