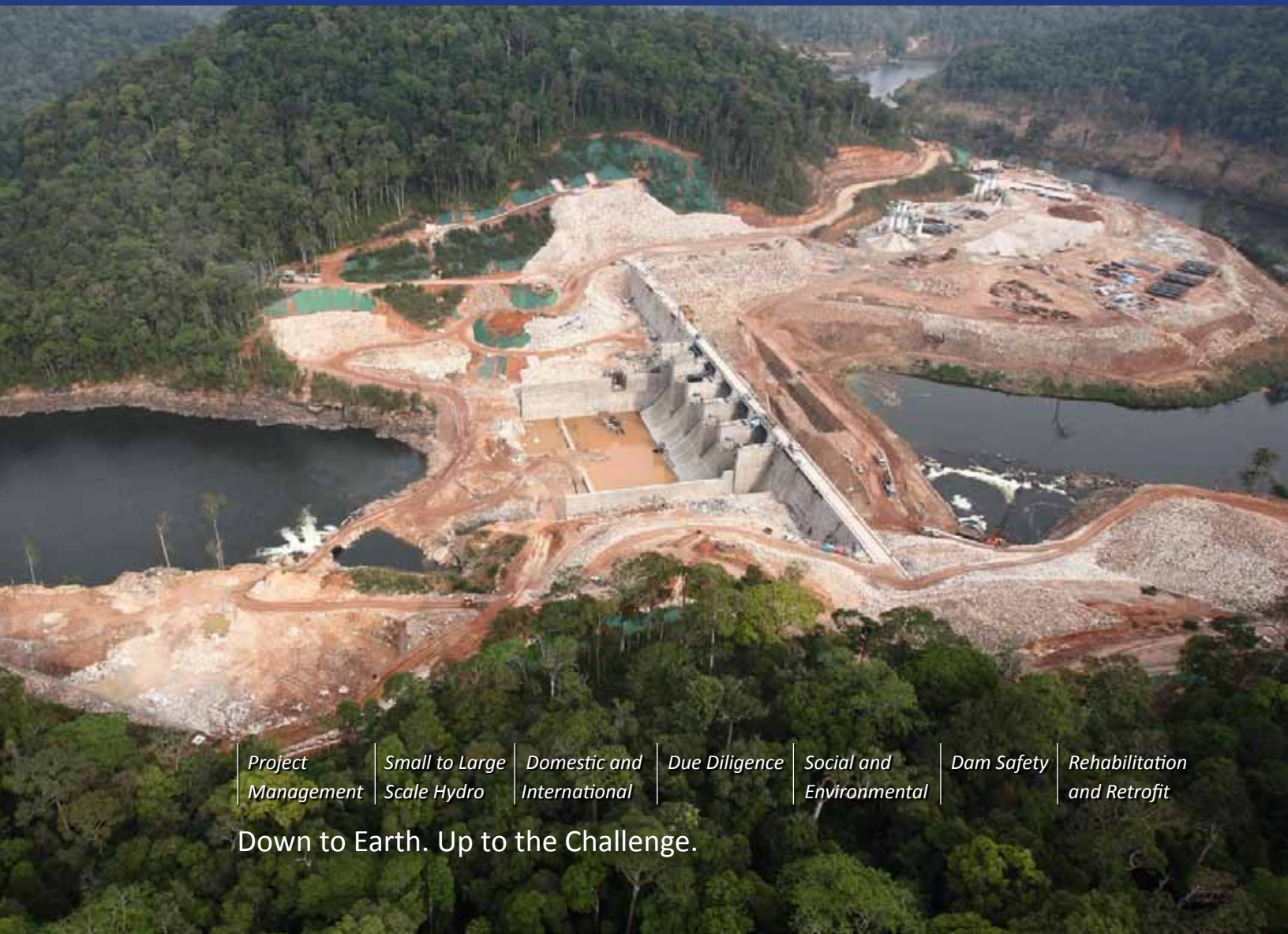




Hydroelectric Development

ENGINEERING AND ENVIRONMENTAL SERVICES



*Project
Management*

*Small to Large
Scale Hydro*

*Domestic and
International*

Due Diligence

*Social and
Environmental*

Dam Safety

*Rehabilitation
and Retrofit*

Down to Earth. Up to the Challenge.

About us

Klohn Crippen Berger Ltd. (KCB) is an international engineering and environmental consulting firm with its head office in Vancouver and nine offices in strategic locations in Canada, Peru and Australia. We have a strong reputation for quality service and technical excellence in a range of services including: Mining, Environmental, Water, Power, Transportation, and Oil and Gas. Since forming in 1951, we have a long history of participation in local projects, as well as a strong international reputation. We are working on some of the largest, most challenging engineering projects, both nationally and internationally.

"In business for 60 years, its [KCB's] quality of engineering gives it a stellar reputation."

National Post

Hydro Team leaders

Shane Johnson Vice President, has 32 years of project management, design, construction and commissioning experience on hydroelectric, irrigation, highways, rapid transit, pump storage, drainage, flood protection, water supply and environmental projects.

Dan Campbell Manager Hydro Projects, has 32 years of varied experience relating to hydroelectric projects domestically and internationally, movable bridges, ports and drydock projects.

Neil Heidstra has 35 years of civil and structural engineering experience in the electrical power-generating field. He has extensive experience with hydropower civil/structural analysis and design, dam safety and finite element analysis, as well as the analysis and design of structures for nuclear and coal-fired generating stations.

Garry Stevenson has 35 years of experience in a variety of soil and rock projects. His geotechnical experience includes conducting site investigations, designs, construction supervision and project management for dams, tunnels, bridges, highways and rapid transit projects.

John Nunn has 37 years of domestic and international experience in the development, rehabilitation and assessment of hydroelectric and water storage projects.

Bruno Bagneres has more than 27 years of international experience relating to hydroelectric projects. His area of expertise is in feasibility and detailed design engineering, including several resident engineering assignments in Kenya, Africa, the US and Indonesia.

Phil Porter has 33 years of mechanical engineering experience. His experience includes project management, investigation, planning, hydroelectric design, bid documents, turbine model tests, contract administration and the inspection of mechanical/ electrical equipment.

Ryan Douglas has 16 years of experience in civil, hydrotechnical and geotechnical engineering related to hydroelectric and other heavy civil projects.

Scott Crozier has more than 15 years of experience in the design, construction and commissioning of mechanical-electrical equipment for heavy civil projects in transportation and hydroelectric power.

Simon Douglas has a broad-based civil engineering background with more than twelve years of experience in the fields of civil and hydrotechnical engineering and water resource infrastructure.

Andrew Mack has 14 years of diverse multi-disciplinary experience from a variety of power generation, electrical systems, pumping, building services systems, and structural and civil engineering projects.

John Woodcock has more than 35 years of experience in project management and design of electrical power transmission and distribution systems, hydroelectric generating plants, wind turbine generating plants, substations and electrical control systems for the utilities, base metals, transportation, steel, shipbuilding, pulp and paper, and oil industries.





Power Group

KCB has been designing and constructing hydroelectric and water supply projects for 60 years. We provide a complete range of multi-disciplinary services from environmental and permitting, geotechnical, through conceptual and detailed engineering, to maintenance and rehabilitation design of hydroelectric facilities. Many of our clients are in Western Canada, however we have also carried out major hydroelectric projects in Thailand, Laos, Vietnam, Philippines, Indonesia, Papua New Guinea and the United States, with specialist consulting roles on many projects worldwide. Our Nam Theun 2 Hydro project received a 2010 CEBC Award of Merit and the 2010 CCE Award.



PSMJ Resources Inc.



ISO 9001:2008 Registered

Our Values

- People first
- Ethics, integrity, honesty
- Professionalism
- Innovation
- Quality
- Technical excellence
- Recognition of individual contributions
- Teamwork
- Sustainability
- A satisfying and fun workplace

Our Vision

Excellence, teamwork, and innovation building a better world.

Our Mission

To attract, develop, and retain talented staff and quality clients who thrive and excel as a team while undertaking exciting projects.



Hydropower from conceptual to detailed design

KCB offers full engineering and environmental services for hydro projects. Our project design experience ranges from a 7 MW single-unit project in Canada to a large 1074 MW multi-unit project in Laos. Professional staff including environmental scientists, and geotechnical, hydrotechnical, civil, structural, mechanical and electrical engineers, deliver total facilities design on small to large hydro projects, both domestically and internationally.

Engineering, Environmental and Permitting Studies: Constructing a new hydro facility or rehabilitating an existing hydro facility requires appropriate studies. KCB staff is experienced in hydrological studies (flow determination, flood studies, geotechnical investigations), environmental and permitting studies, energy calculations and power studies, and equipment optimization studies.

Dams and Intakes: Whether the project is run-of-river with a low coanda weir and minimal storage or a world class roller-compacted concrete (RCC) dam for flood control, our engineers and environmental scientists understand how to permit, design and build economic structures to store, divert and control water.

Geotechnical Design: Geotechnical risk can be one of the most significant risk issues associated with hydro developments. Our extensive geotechnical experience with tunnels (both drill-and-blast and tunnel boring machine, excavated), other underground works and open-cut excavations for powerhouses, tunnel portals, and canals is known throughout the world.

Water Conveyance System: KCB's sound technical design ensures water conveyance components are practical and economically arranged, providing appropriate hydraulic performance.

Powerhouses: KCB has extensive experience with civil-structural and equipment layout design for powerhouses utilizing Francis, Pelton and Kaplan turbines. Our staff is experienced with the mechanical and electrical equipment design for entire water-to-wire and balance of plant equipment packages.

Project Services: KCB also offers project management and construction supervision services in roles as diverse as Lender's Engineer, Owner's Engineer and Buyer's Due Diligence.

*Klohn
Crippen Berger
delivers total
design for hydro
projects.*





Project Management

KCB provides project management as a core part of our hydroelectric and construction service. In recent years, this side of our business has been increasing as more hydro project developments are being implemented by Independent Power Producers (IPP's) and other private sponsor owners who depend on an Owner's Engineer to work on their behalf to ensure that the project constructor delivers the project in accordance with the technical and commercial terms of the contract.

KCB has been successful in assimilating our technical engineering and construction services with a diverse capability in soft services in providing our clients with a comprehensive Owner's Engineer capability. KCB recognizes that owners today require consultants with more than just technical engineering design skills if they are to be successful in implementing their hydro project development. KCB has assembled a team of professionals with the necessary skills to address the full range of engineering, commercial, environmental and structural issues that are encountered in the hydro project development process.

As project manager, KCB ensures that all objectives are fully realized during all phases of project implementation from design through construction and into operations.

KCB Project Management Services:

- Contract administration and monitoring
- Technical design review and compliance monitoring
- Technical engineering design
- Project implementation scheduling
- Complete power and energy analysis
- Full environmental impact assessment
- Risk identification and evaluation
- Equity investor selection

ISO Quality Management System:

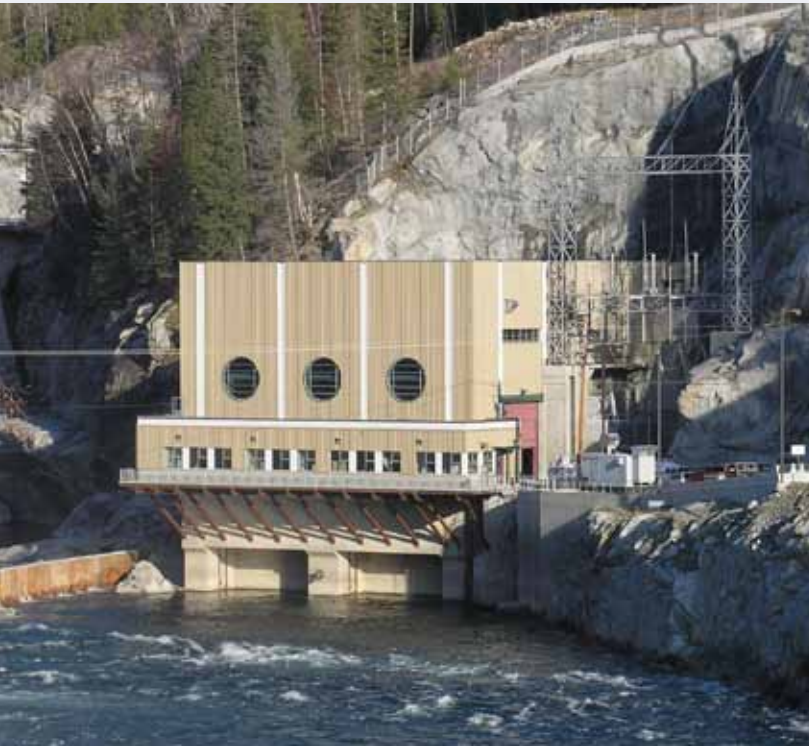
KCB uses a Quality Management System (QMS) to manage our business. The QMS is a series of procedures and policies used by the company to provide a consistent and disciplined approach to our engineering and environmental consulting services. It is registered to the ISO 9001:2008 standard by BSi Management Systems.

A particular emphasis of the QMS is our review and checking procedures for calculation, design, drafting, tender documents and cost estimating.

This helps us to:

- Satisfy clients' requirements consistently.
- Meet the appropriate codes and standards.
- Check that technical input is complete and reliable.
- Determine that all work is carried out by staff who are adequately trained.
- Check our work is reviewed.
- Maintain adequate project records.





Small to Large Scale Hydro

KCB designs hydro projects of all sizes. Our experience includes Pelton, Turgo, Francis, and Kaplan units plus Francis pump-turbines.

Our experience includes:

Fish Lake Hydro, Yukon, Canada: the 0.8 MW Turgo unit built in 1956 had a catastrophic failure. We were retained to assist the owner in upgrading and returning the unit to service. Our work included evaluation of the existing equipment, recommendations regarding components for reuse, and assistance during the reconstruction.

Irrican Project, Alberta, Canada: is a 7 MW run-of-canal project. Three existing irrigation canal drops were by-passed and the water channeled through an S-type turbine. KCB designed the intake, penstock, powerhouse, and all associated mechanical and electrical works.

Zeballos Hydro Project, BC, Canada: a 22 MW ECOLogo certified green power private hydro power project. KCB designed the tunnel, intake gate, penstock and powerhouses. The project was placed into service in 2009.

Waneta Hydro Project, BC, Canada: a 330 MW powerhouse addition to an existing development. KCB has provided Owner's Engineer services from the project development phase through to construction scheduled for completion in 2014.

Site C Project, BC, Canada: The project will consist of an earthfill dam, a gated chute spillway with a baffled stilling basin and a six unit generating facility with a total installed capacity of 900 MW. Two tunnels will be required for diversion of the river during construction. In addition to the primary GIS and geotechnical support, KCB has assisted BC Hydro to: acquire permits and approvals

to conduct geotechnical field investigations; prepare environmental management plans for the execution of geotechnical field work; complete tenure and tenure conflict analysis; and develop conceptual design and cost estimates.

*Making a
difference
one project
at a time*



Domestic and International

KCB has a long history of working on hydro projects domestically and internationally. Our scope of work has included the traditional design-engineer role for design-bid-build projects as well as Owners Engineer roles on design-build projects and design engineer working for the design-build contractor as shown by the following four projects:

Brilliant Powerplant Expansion Project, BC, Canada: is a 120 MW expansion of the Brilliant Dam on the Kootenay River. KCB provided Owner's Engineer services from the project identification phase through to commercial operation.

Snoqualmie Falls Redevelopment, Washington, USA: consists of upgrades of two power plants and a weir to increase the installed capacity from 42 to 52 MW. Our services for this project include preliminary design, detailed design and construction services in a traditional design-bid-build arrangement

Bhumibol Unit 8 Pump Storage Project, Thailand: is a 175 MW reversible Francis pump-turbine unit added to an existing 7-unit 535 MW powerhouse for a total capacity of 720 MW. At the time of completion, the Unit 8 reversible pump-turbine was the largest installed capacity unit in the world. The original powerhouse structure for Unit 8 was demolished and a new unit bay and service bay constructed. KCB provided site investigations, feasibility and project definition studies, detailed design, construction supervision and project management as the Owner's Engineer.

Arrow Lakes Generating Station, BC, Canada: is a 170 MW project on the Columbia River. KCB was the Owner's Engineer for this project, responsible for conceptual design, reviewing the EPC contractor's design and monitoring the work of the EPC contractor during construction and commissioning. This project received the prestigious Blue Planet prize in 2005.

Nam Theun 2 Hydroelectric Project, Laos: is the most important project in a long-term collaborative effort between the Lao People's Democratic Republic (Laos) and Thailand to develop hydropower energy in Laos for export to Thailand. We provided bid design, final design and construction engineering services to the design-build contractor for the two main civil works packages of this 1074 MW project. This project received a 2010 CEBC Award of Merit and the 2010 CCE Award.



Due Diligence for Owners, Lenders and Buyers

KCB has provided buy-side and sell-side due diligence services for IPP's, lenders, owners and third party stakeholders.

We work closely with an owner in implementing a due diligence investigation to ensure that the content of the study carefully addresses their main concerns. Consequently, the perspective of due diligence must be that of the intended audience and the content of the report must focus on describing risks, their attendant costs and how they will be mitigated. The report is a fundamental document to be scrutinized by not only the owner but prospective lenders and possible project participants. An ineffective or incomplete due diligence study can result in the Owner/Proponent not having necessary information and understanding of project risks to make an informed and appropriate development decision.

KCB has the experience required to conduct an effective due diligence study and prepare a report document that best serves our client's principal objectives related to the project transaction.

Some of the key due diligence services that KCB has provided to owners and proponents:

- Comprehensive civil, structural and geotechnical evaluations of hydro facilities
- Energy calculations and potential upgrade evaluations
- Evaluation of technical design, layout and general arrangements of facilities
- Capital and operating budget review
- Project budget and costs evaluation
- General operations evaluation
- Identification of project risks requiring legal team review
- Power purchase agreement review
- Contract document technical review

KCB provides due diligence services as an integral part of our hydroelectric design and construction services





Social and Environmental

KCB offers sustainable, effective environmental services. We have extensive experience in all types of geographic, environmental, and social settings. We are active in the power, infrastructure, mining, and oil and gas industries. As a multi-disciplinary consulting firm, KCB can integrate disciplines to meet your project requirements.

Environmental Assessments: Investigations have been conducted for development, divestiture, pre-acquisition, liability or reclamation purposes. KCB can assess baseline conditions and impacts to local communities, habitat soil, surface water, groundwater, air and sediments using both intrusive and non-intrusive methods.

Remediation and Monitoring: We have successfully remediated and monitored environmental impacts identified during environmental assessments. Site specific remedial options involving modelling, design, in-situ/ex-situ remediation strategies

and risk assessments may be developed. We are familiar with design, implementation and analysis of monitoring plans.

Environmental Systems Development: KCB has developed environmental management systems for bedding management, greenhouse gas management, pollution prevention, waste systems development and groundwell geothermal development.

Water: Hydrology, hydrogeology, and geochemistry baseline and impact assessment as well as surface and ground water modelling.

Aquatic Biology: Fisheries and fish habitat assessment including inventory, impact assessment, mitigation and compensation planning.

Engineering Design: Engineering design and construction management of sustainable facilities such as hydroelectric projects, cogeneration facilities, and natural gas infrastructure.

Socio-environmental: Inclusion of communities of interest in project planning, execution and closure is carried out with consultations, communication plans, and integration with project design. Our socio-environmental professionals have extensive experience in working with our engineers for the successful integration of social and environmental services for power, water resources, transportation, mining, oil sands, and oil and gas projects.



Dam Safety

Comprehensive Inspection and Review:

Our multi-disciplinary team of professionals perform comprehensive inspection and reviews of all aspects of design, operation, maintenance, condition and performance of earth fill, rock fill, concrete and roller compacted concrete (RCC) dams.

Flood Assessment and Inundation Mapping:

Our professionals are experienced hydrologists and hydrotechnical engineers in all areas of water management. Our background includes a diverse range of projects from small tropical irrigation schemes to major flood control systems.

Earthquake Assessment:

We use the latest technology to provide innovative solutions to a variety of seismic design problems. We offer you extensive experience in seismic assessment through our involvement in the design of numerous concrete, earthfill and rockfill dams in high hazard seismic regions of the world.

Structural and Mechanical:

KCB engineers perform inspections of concrete dams for deterioration and stability and have been involved in all mechanical aspects of dams from gates to emergency power supplies.

Geotechnical:

We have extensive experience in geologic investigations of abutments and foundations, rock mechanics for foundations and tunnels, geotechnical design for foundation and earthfill structures, material evaluation for construction sources and for in situ testing, stability analysis and seepage assessments.

Instrumentation and Monitoring Schemes:

We design monitoring schemes for settlement, slope movement, pore pressures and groundwater levels at major dams.

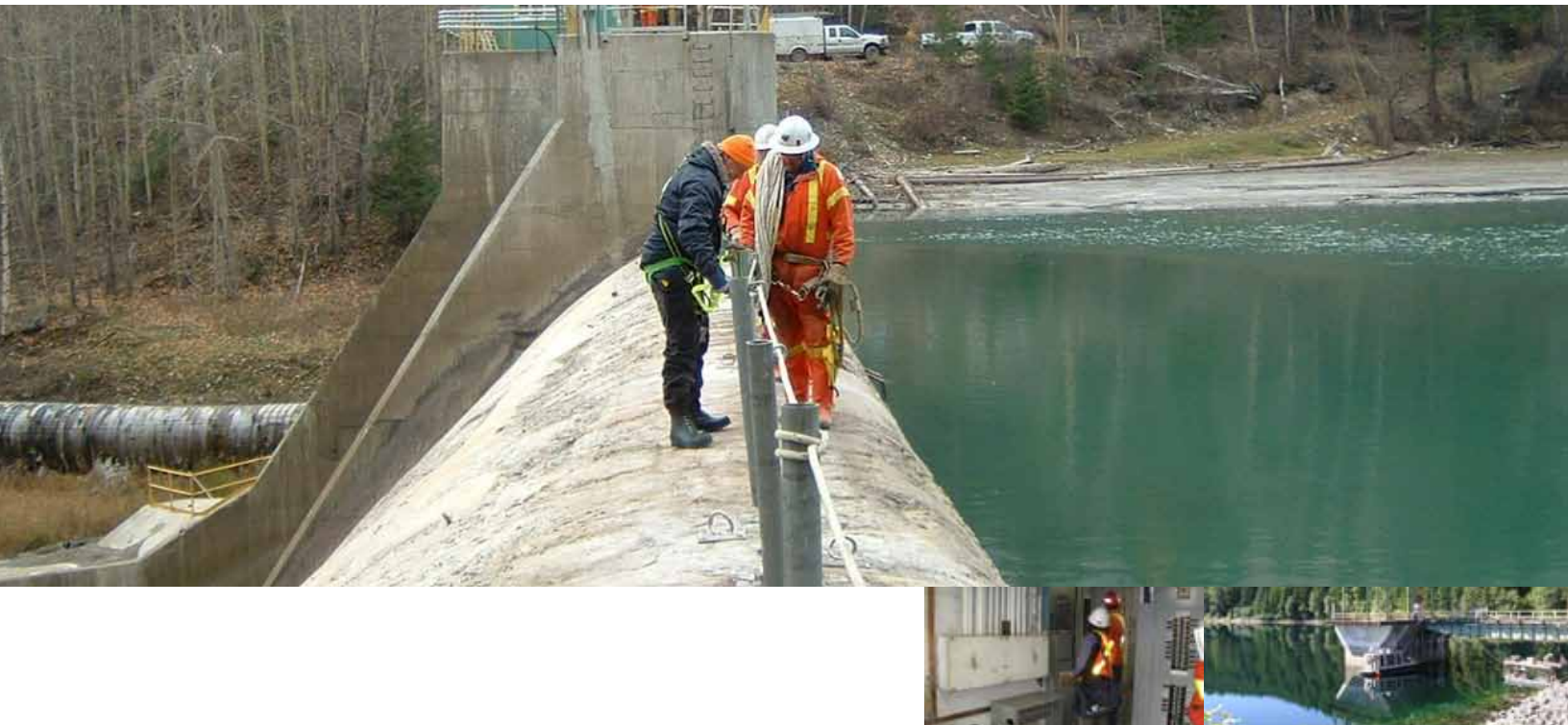
Remedial Design and Construction:

Our experience allows us to design the most cost effective remediation or replacement solution. We also prepare contract documents, and provide construction management and supervision to implement designs.

Operations and Maintenance Training:

We have a professional team with diversified backgrounds in all aspects of dam design, assessment, construction, rehabilitation and operation. We prepare your operation and maintenance manuals and train your operations staff. In addition, through our work overseas, we are well experienced in the use of local staff, training and technology transfer.

*Challenge us
to take on your
toughest
projects*





Rehabilitation and Retrofit

KCB has developed considerable experience in all aspects of the rehabilitation of dams and powerhouses. We provide project management services, and planning and design and construction management services for individual projects.

Planning services include power and energy studies, prefeasibility and feasibility studies, cost estimates, coordination of environmental studies and permitting, and concrete coring and lab testing for diagnostic purposes.

Final design includes civil, mechanical and electrical design for the redevelopment of generating stations, and structural and mechanical designs for the rehabilitation of dams, spillways and intake works.

Remedial Design and Construction Services

- Deficiency Investigations
- Remediation and Replacement
- Contract Documents
- Construction Management and Supervision

Earthquake Assessment Services

- Maximum Credible Earthquake (MCE)
- Operating Basis Earthquake (OBE)
- Dynamic Stability Analysis
- Deformation Analysis

Structural and Mechanical Services

- Concrete Gravity Dams
- Concrete Arch Dams
- Spillways
- Powerhouses
- Outlet Works
- Intakes
- Gates
- Operation
- Single Device Isolation Certification

Geotechnical Services

- Geological Investigations
- Rock Mechanics
- Material Evaluation
- Stability Analysis
- Seepage Assessments
- Instrumentation

Instrumentation and Monitoring services

- Monitoring Scheme Design
- Instrumentation Design
- Performance Assessment
- In Situ Rehabilitation
- Operation and Maintenance
- Manuals
- Training





Through our association with the Louis Berger Group, Inc., a leading infrastructure engineering, environmental science, and economic development consultant, we have access to over 100 offices worldwide.

500-2955 Virtual Way, Vancouver BC V5M 4X6, Canada
T 604.669.3800 | F 604.669.3835 | E info@klohn.com | www.klohn.com



OFFICE LOCATIONS

CANADA Vancouver | Calgary | Edmonton | Saskatoon | Sudbury | Lloydminster | Inuvik | Castlegar

INTERNATIONAL Brisbane | Perth | Lima | London