

Geotechnical Services Overview

- Site Reconnaissance and Geological Mapping
- Terrain Mapping and Terrain Stability Assessment
- Trenchless Geotechnical Feasibility Assessment
- Hydrotechnical Engineering
- In-House Drilling Services
- Laboratory Services
- Mainline Geotechnical Investigation
- Geophysical Investigation
- Metal Leaching and Acid Rock Drainage Potential Assessment
- Installation of Instrumentation (Settlement/Displacement or Slope Stability Monitoring)
- Facility Foundation Investigations
- Geohazard Identification, Assessment and Reporting

For over 20 years, CCI's Geotechnical group has provided extensive services for use in the design of municipal, forestry and pipeline projects. The gathering of subsurface information during the geotechnical investigation phase is the "foundation" for proper design.

The geological model developed from the **desktop study and field investigation** allows the designer to have confidence in their work and can reduce a large amount of risk associated with cost and schedule. CCI's geotechnical team leverages the expertise from our designers and construction experts to plan and execute our field programs specific to the needs of the design team. The close communication between design and geotechnical teams allows us to efficiently make changes as required to effectively mitigate any gaps that may otherwise persist.

Our Geotechnical team has registered professionals across Canada and the USA and are capable of performing a variety of scopes throughout North America.

Hydrotechnical Engineering

River engineering is a very important aspect of crossings design, especially when considering open-cut methodologies. Vertical and Lateral scour, avulsion and flooding can all be hazardous to infrastructure in for the design life of the pipeline.

CCI can conduct Phase I Hydrotechnical Hazards Assessments intended to identify watercourses that could constitute a potential



hazard for the proposed pipeline. The sites often include stream crossings or streams located adjacent to the alignment with potential encroachment.

Utilizing GIS mapping and satellite imagery, LiDAR, aerial orthophotos and/or other data sources available identification and risk assessment can be completed for the following hazards at a minimum:

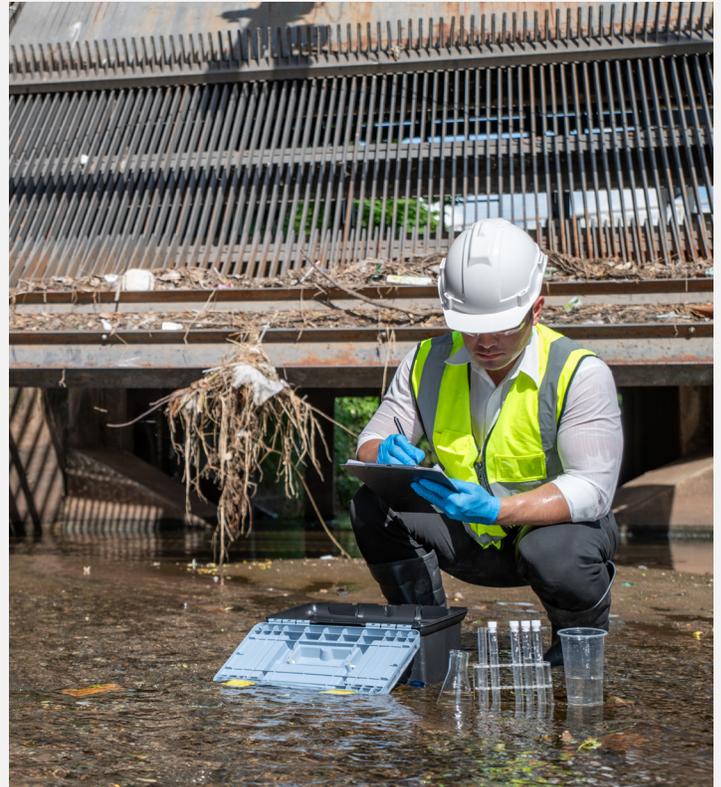
- Scour,
- Channel lateral stability including migration and avulsion,
- Encroachment,
- Bank Erosion and Channel Degradation

The preliminary hydrotechnical hazard assessment typically include:

- Assessment of major and minor watercourse crossings,
- Type of watercourse,
- Type of hazard,
- Description of the geomorphological, hydrotechnical or geotechnical properties that may influence the severity of the hazard and any additional information pertinent to the crossing,
- Recommendations for sites requiring a site-specific (Phase II) hydrotechnical study and recommended scope of work for such study,

- Recommendations for sites where Company standard design drawing and minimum depth of cover would be applicable.

Phase II Hydrotechnical Assessments for pipeline crossings include completion of more detailed assessments comprising hydrological and hydraulic assessments. Our modeling software, such as GIS and HEC-RAS assists our team with detailed hydrotechnical assessments.



CCI Group of Companies



Since 2004, CCI has steadily grown to meet our client's needs. A key component to our growth has been through a strategy of acquisitions, evolving our company from CCI Inc. to CCI, the Group of Companies. This growth has included the acquisition of Geoterra, Horizontal Technology, Ridgeline Archaeology, the creation of Progress Drilling and CCI & Associates, and the conglomeration of EPiC between CCI Inc. and Midwest.

Highlighted CCI Services: Construction Management, Environmental Services, Geotechnical Engineering, HDD Services & Tools, Pipeline & Facilities Engineering, Shore Approach Engineering, Archaeology, Regulatory, Trenchless Design

Office Locations: **Canada:** Fort Nelson, Fort St. John, Kimberley, & Prince George, BC · Calgary, Cochrane, Edmonton, & Spruce Grove, AB **USA:** Hockley & Houston, TX · St. Louis, MO



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