Date of Submission	11 August 2015

IPL Project Proposal Form 2016

1. **Project Title:**
   RIPLEY LANDSLIDE MONITORING PROJECT (ASHCROFT, BC, CANADA)
2. **Main Project Fields**
   Technology Development - Monitoring and Early Warning
3. **Name of Project leader: Dr. Peter Bobrowsky**
   Affiliation: Senior Scientist, Geological Survey of Canada
   Contact: 9860 West Saanich Road, PO Box 6000, Sidney, BC, Canada, V8L4BA
   Core members of the Project: GSC, University of Alberta, Canadian National Railway, Canadian Pacific Railway
   Names/Affiliations:
   David Huntley (GSC), Michael Hendry (U of A), Chris Bunce (CP), Tom Edwards (CN)
4. **Objectives: The aim of this project is two-fold. First to identify the nature and mechanism of movement on this small but active landslide which poses an ongoing threat to the safety and integrity of the rail infrastructure at the site. Second, this project will involve the application, testing and comparison of results from multiple methods of monitoring; including traditional and innovative technologies.**
5. **Background Justification: As Canada's economy continues to grow, there will be an increasing demand for safe and secure transportation of natural resources, agricultural products, manufactured goods, people and other cargo using the national network of railways. In the Cordillera of southern British Columbia, landslides are costly geological hazards that have challenged the major rail companies since the late 19th Century. Today and in the near future, pronounced economic and environmental repercussions are anticipated if railways are severed and infrastructure damaged by landslide activity in mountainous western Canada. In southern BC, both Canadian Pacific (CPR) and Canadian National (CNR) railways run along the lower valley slopes of Thompson and Fraser rivers. Up to 80 trains per day, with lengths up to 4 km, run through these valleys. Landslides in this transportation corridor have the potential to stop the flow of exports and imports to, and from the Port of Vancouver, resulting in economic losses that grow exponentially with the duration of the interruption of services. One very susceptible area occurs at the Ripley Landslide where both CN and CPR tracks run side-by-side and are being impacted by this slow moving landslide. Understanding the nature and mechanism of movement at this site is critical to properly mitigate the slope from further movement. The resultant knowledge will be readily applied elsewhere to similar sites across Canada.**

6. **Study Area: The landslide is located along the Thompson River, some 10 km south of the village of Ashcroft, British Columbia, Canada.**
7. **Project Duration: 5 years (2013-2018)**
8. **Resources necessary for the Project and their mobilization:**

   The project requires geological and engineering technical expertise at multiple levels. Experts in the rail industry are involved (engineers), as are several geotechnical engineers (Professors and graduate students) from the University of Alberta; geological and remote sensing expertise is being provided by Natural Resources Canada. Facilities from each of these institutes and organizations are at the disposal of the project. Funding is being provided through Transport Canada and the Geological Survey of Canada, as well as directly from industry and research grants to the university personnel. Approximately $250,000 per year has been spent during the first two years of the activity.
9. **Project Description: As Canada's economy grows, an increasing volume of imports and exports is expected to be transported by rail across the country. Vital infrastructure and operations are at risk from landslides in the section of the Canadian National (CN) and Canadian Pacific (CP) railway corridor that runs through the Thompson River valley between Ashcroft and Spence's Bridge in southern British Columbia. A suite of methods are being applied, tested and compared at the site including fiber optic measurements, terrain mapping, permanent global positioning stations, corner reflectors for radar satellite imagery (interferometry), lidar, geophysical surveys, piezometers, inclinometers, ShapeAccelArray, borehole/drilling, weather stations, moisture probes, etc. Additional techniques are being applied annually to the site for long term monitoring goals.**
10. **Work Plan/Expected Results: Project team participates monthly in teleconference call to review and discuss progress and plans for the project. Project team meets annually in the fall for a workshop to review annual progress with stake holders and interested parties. Fieldwork in ongoing annually with multiple visits to the site by all participants. Collaborators plan cost effective deployment of equipment. Data are collected remotely and routinely as necessary from the site. Presentations are given at national and international venues. A number of publications have already resulted and will continue to be produced during the history of the project.**
11. **Deliverables/Time Frame: Several publications have already been produced. Expectation is to continue publishing papers annually as well as present progress and results at meetings across the globe annually. Project is expected to run 5 years (3 years remaining).**
12. **Project Beneficiaries: Primarily the rail industry, secondary professional practitioners who will apply methods elsewhere across Canada and abroad, finally the general public given enhanced security and safety involving rail transport and general landslide**

monitoring and mitigation practices.

13. **References:**

Bobrowsky, P. et al. (2014) Multi-parameter monitoring of a slow-moving landslide: Ripley Landslide, British Columbia, Canada. *In* Proceedings Volume, *International Association of Engineering Geologists*, 5 p., Turin, Italy

Huntley, D. and Bobrowsky, P. (2014) Surficial geology and monitoring of the Ripley Slide, near Ashcroft, British Columbia, Canada; *Geological Survey of Canada*, Open File 7531.

Huntley, D., et al. (2014) Fiber optic strain monitoring and evaluation of a slow-moving landslide near Ashcroft, British Columbia, Canada; Proceedings Volume, 3rd *World Landslide Forum 3*, 6 p. Beijing, China

Macciotta, R., et al. (2014) Monitoring of the Ripley Slide in the Thompson River Valley, B.C. Proceedings Volume, *Geohazards 6 Symposium*, Kingston, Ontario, Canada

Note: Please fill and submit this form by 15 November 2015 to ICL network <ICL-network@iclhq.org>