

**Invitation for Proposals**

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**OVERHEAD LINE DESIGN ISSUES & WIND AND ICE STORM MITIGATION  
INTEREST GROUP (WISMIG)**

**CEATI PROJECT No. T103700-3376**

**TECHNOLOGY WATCH ON TRANSMISSION LINE LIDAR SURVEYS AND  
DEVELOPMENT OF GUIDE SPECIFICATIONS**

CEATI International Inc. (CEATI) invites the submission of proposals to perform research work on the following topic:

**TITLE**

***Technology Watch on Transmission Line LiDAR Surveys: Development of Guide Specifications***

**INTRODUCTION**

LiDAR (Light Detection and Ranging) survey technology employs Global Positioning System (GPS) satellites and an inertial navigation system to accurately and continuously record the position of a helicopter or fixed wing aircraft while it flies along a transmission line right of way (ROW) with an on-board scanning laser. The laser fires a number of pulses towards the ROW and their reflections off the objects in the ROW are accurately recorded by onboard equipment. The laser point data set is later used to develop terrain models and to identify objects on or near the ROW. This method of surveying is gaining popularity with electric utilities for transmission line design and maintenance as it enables the collection of survey data for large areas in a short time frame with high accuracy and without access restriction problems or personnel safety issues. WISMIG utilities use LiDAR survey services provided by various vendors. Some utilities prepare their own specifications and some heavily rely on the guidance from vendors. However, at the present time, there are no standards that specify the various important parameters for information collected and data analysis and output requirements. As a result, vendors deliver the output in different formats, and as a consequence, it is difficult to compare the results delivered from different vendors.

The intent of this project is to review the LiDAR survey technology, its key components and the equipment used by different vendors, as well as its applicability for transmission line surveys and data collection, data analysis and their influence on the results and deliverables, with a view to preparing a state of the art report including guide specifications.

**PROJECT OBJECTIVES**

The objective of this project is to prepare a state of the art report on use of LiDAR survey technology for transmission line design, construction, and maintenance, containing recommended guide specifications to be used by utilities for service contracts.

**SCOPE OF THE STUDY**

The successful proponent will conduct a review of LiDAR survey technology, its use for electric utilities and in other industries, the equipment used by different vendors, and the data collection and analysis techniques used by different vendors, as well as utility specifications, output formats, and required deliverables, with a view to preparing a state of the art report and developing guide specifications for use by transmission utilities. The scope of the project will include all possible applications of LiDAR surveys for new and existing transmission lines (such as mapping of new build lines, infringement studies, vegetation management, proximity of

objects to transmission lines, line refurbishment, as-built surveys, thermal up-rating, route selection for new lines, etc.) including requirements such as:

- Collection of data to produce conventional survey grade results that can be used to develop engineering drawings using engineering software (e.g. PLSCADD, TL-CADD etc.) and eventually computer models, plans, and profiles.
- Collection of data showing all terrain features, elevations, wires in the air, structure location and number, etc.
- Collection of data for twice the ROW width with information on danger trees and other objects with issues relative to line blow out.
- Production of a vegetation report.
- Production of a thermal rating report, if requested, to identify locations for thermal restrictions.
- Identification of access points for construction of new transmission lines.

The general scope of the work will include, but may not be limited to, the following tasks:

- Conduct a literature review to gather information on the LiDAR survey technology: its application for electric utilities and in other industries, the equipment used, data collection and analysis techniques, specifications, typical deliverables, differences in output, etc.
- Review transmission utility specifications for LiDAR surveys and their requirements for deliverables.
- Conduct a review of the equipment used by five (5) different LiDAR service providers and their data collection techniques.
- Prepare a guide specification for LiDAR surveys of transmission lines.
- Invite comments and suggestions on the guide specification from utilities and vendors.
- Finalize the guide specification to incorporate the utility and vendor comments.
- Prepare a comprehensive state of the art report including the recommended guide specifications.

Some work has been done previously by CEATI on use of LiDAR surveys by WISMIG utilities, and one copy of the applicable Technical Note will be furnished to successful proponent for use during the execution of this project. No copies may be made of the document, which must be returned to CEATI at the conclusion of the project.

### **POTENTIAL BENEFITS**

The completion of this project will provide utilities with a state of the art report on the LiDAR survey technology and a guide specification to enable utilities to procure consistent LiDAR survey results. This will assist utilities in obtaining information for the management and design of their transmission lines in most cost effective manner.

### **DELIVERABLES**

The primary deliverable shall be a detailed report comprising a comprehensive discussion and compilation of the results of the investigation and including a bibliography and copies of any papers and other information used to reach the conclusions and recommendations stated in the

report. The proponent should be prepared to present the results of the work in person at one of the biannual WISMIG meetings.

The successful proponent is expected to prepare a ready-to-publish report on the results of the investigation and present the results to funding consortium members. The completed report must be submitted for CEATI approval in editable, electronic format (Microsoft Word).

Progress reports will also be required on either a quarterly or milestone basis - normally these are scheduled to coincide with the completion of the identified tasks. Progress reports must make reference to the tasks identified in the proposal stating the percentage completed to date for each task.

The successful proponent is also expected to provide the following:

- A ten to fifteen (10-15) slide Power Point Presentation. This should be composed of three main sections:

1. The factors motivating the initiation of the work;
2. A description of the main findings;
3. Summary of the conclusions and recommendations for future research.

- Contents for the Project's Technical Brief. This is a summary of the report (between 1,000 and 1,500 words), which is published separately by CEATI. Proponents are not responsible for the preparation of a ready-to-print Technical Brief, but solely to provide the contents for the following 4 sections: Background, Summary, Conclusions and Recommendations.

1. The Report Background section should be short (approximately 200 words) and should detail the reasons the work was conducted.
2. The Summary section should be approximately 700 words. It must provide a general description of the work program.
3. The Conclusions section should be about 150 words and should provide a general outline of the key results (do not include specifics).
4. The Recommendations section should be about 200 words and should include a description of the potential applications of the results.

Please note that all reporting must be submitted in English. If written English is not the author's strong suit, it is recommended that a technical writer be hired to review the document prior to submission.

## **BUDGET AND SCHEDULE**

The proposal must contain a schedule and a quote of required remuneration for the work in US or Canadian dollars. All prices shall be presumed to be in Canadian dollars (CAD) unless explicitly specified otherwise in the proposal. Proponents' responses to this section must include a full breakdown of the budget and schedule, including an indication of rates and hours and the task allocation for the key personnel by task and must correspond to any phases or milestones outlined above. (Please refer to the Proposal Template for more information).

It is expected that this project can be completed (draft final report submitted for review and approval) within twelve (12) months of initiation.

The proposal must include the names and qualifications of the key individuals who will be involved, as well as the name of the accountable manager.

**CEATI is not bound to accept any proposal but any selection will take into account technical merit, qualifications, price and schedule. A proposal may be accepted in whole or in part. A commitment to proceed with the first phase of a multi-phase project does not automatically imply that the work of the subsequent phases will be undertaken.**

### **ALTERNATIVE WORKS**

Proponents shall generally follow the above description of work, but are encouraged to offer alternative works if these alternatives will meet the objectives and provide a better end product to the utilities sponsoring this work. Alternatives shall be fully described including logistics explaining why the alternate works are being offered and the benefits to be realized by the funding utilities. Where alternatives are proposed, separate budgets shall be calculated for each alternative.

### **SUBMISSION OF PROPOSALS**

The proposal shall include a clear and detailed description of the tasks to be completed including the methodology for completing the tasks.

The consideration of proposals received will be limited to those who indicate their intent to employ a suitable experienced project team and who possess proper facilities to perform the work. Receipt of this "IFP" does not necessarily constitute a prior determination by CEATI that your organization has the requisite experience and facilities.

The proposal must be properly completed and executed in accordance with the CEATI guidelines available at <http://www.ceati.com/guidelines.php>, and shall be submitted to CEATI as an attachment in Microsoft Word at the following website: [www.ceati.com/private/submissions](http://www.ceati.com/private/submissions). Be sure to indicate project number "T103700-3376" on the submission form. For assistance, please contact us at 514-866-5377 x 236.

### **CLOSING DATE FOR RECEIPT OF PROPOSALS**

**Thursday, April 1, 2010, 4:00 pm EDT**