Satellite Monitoring of Highway Bridges for Disaster Management under Extreme Weather # 17-22085

1. Advance Contract Award Notice (ACAN)

An ACAN is a public notice indicating to the supplier community that a department or agency intends to award a contract for goods, services or construction to a pre-identified supplier, thereby allowing other suppliers to signal their interest in bidding, by submitting a statement of capabilities. If no supplier submits a statement of capabilities that meets the requirements set out in the ACAN, on or before the closing date stated in the ACAN, the contracting officer may then proceed with the award to the pre-identified supplier.

2. Definition of the requirement

The National Research Council under a current research project entitled “Climate-Resilient Buildings and Core Public Infrastructure” requires the professional services to conduct a project entitled “Satellite Monitoring of Highway Bridges for Disaster Management under Extreme Weather”. The improvement/validation of the satellite-based monitoring technology deployed at the Seaway International Bridge in Cornwall (Ontario) will be evaluated and technical reports presented with methodology, analysis of data, observations and limitations.

3. Criteria for assessment of the Statement of Capabilities (Minimum Essential Requirements)

- Must have background IP for monitoring bridge superstructures using synthetic aperture radar (SAR) data acquired from RadarSat-2 Satellite in order to detect small movements of monitored bridges and their supporting foundations.
- Must have experience in processing InSAR data stacks over the Seaway International Bridge in Cornwall, Ontario. Previous results should be leveraged to improve current data analysis.
- Must have advanced height error modelling capability: Typical InSAR applications require digital elevation models to eliminate the elevation related phase contributions. Most bridges, including the Cornwall Bridge where the application is to be validated, do not have elevation models that are suitable for the analysis.
- Must have target density algorithms that are capable of identifying increased density of measurable elevation targets on bridges. High target density is essential for getting a better understanding of whether the bridge is moving or stable. The background IP specifically increases the number of targets on smooth surfaces (like the road surface) and areas where targets are present only temporarily or seasonally due to ice or snow cover.
- Must have thermal modeling capability: IP includes modelling of thermal movements to isolate non-thermal movement using nearby weather data or

in-situ bridge temperature data. This is important to focus the attention on the mechanical component of the movement, which is directly related to a change in the physical condition of the bridge or its foundation.

- Must have signal phase unwrapping capability: IP includes optimizations such as 30x grid densification to allow aforementioned height and thermal modeling on redundant grid paths for accurate phase unwrapping. This helps to understand movement on complex dynamic structures like bridges.
- Must have graphical user interface in the form of a web-based distribution platform that must be capable for sharing data to multiple users in an intuitive and practical way. The platform should allow fast interactive rendering of tens of millions of data points with full displacement histories over an urban centre containing bridges.
- Must have bridge data integration experience: Bridges are routinely monitored using *in situ* sensors, and finite element modelling (FEM) techniques are used to improve understanding of the bridge dynamics. Experience with integrating auxiliary bridge data with InSAR is required.
- Must have experience with climate change adaptation projects: The impacts of climate change on terrain and infrastructure have been extensively studied with InSAR. This experience is necessary to characterize the seasonal and secular components of displacement affecting bridges.

4. Justification for the Pre-Identified Supplier

3vG is unique, as there are no alternative sources of supply for the same or equivalent service fulfilling all the requirements listed above. 3vG has bridge-specific data processing tools, expertise and IP combined with unique processing facilities to meet the above requirements.

5 This ACAN contract serves for an immediate contract for $55,370.00 and for future requirements of similar value and scope up to 2 years, then a fourth option year in the amount of 110,740.00 and/or up to $500,000.00 in total value.

6. Suppliers' right to submit a statement of capabilities

Suppliers who consider themselves fully qualified and available to provide the goods, services or construction services described in the ACAN may submit a statement of capabilities in writing to the contact person identified in this notice on or before the closing date of this notice. The statement of capabilities must clearly demonstrate how the supplier meets the advertised requirements.

7. Name and address of the proposed contractor identified in the ACAN.

3V Geomatics Inc, 4350 Arbutus Street, Vancouver, BC, V6J 4A2

8. Closing date for a submission of a statement of capabilities

The closing date and time for accepting statements of capabilities is Nov 9, 2017.

9. Inquiries and submission of statements of capabilities

Directed to: Steve Cassidy

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