Transport Canada Transports Canada

Solicitation No. T8080-210019
Advance Contract Award Notice

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.

1. TITLE

Technical Review of Combined Air Flow for Distributive Power Operations

2. DEFINITION OF THE REQUIREMENT

The Department of Transport Canada has a requirement to conduct an assessment of CN's (Canadian National Railway) work and proposed change to air brake operating practices as it relates to sections 7.11 and 7.12 of the Railway Freight and Passenger Train Brake Inspection and Safety Rules (Train Brake Rules), in order to identify any safety or performance concerns which may exist with the technology and approach used.

OBJECTIVE

The assessment of CN's work would essentially provide assurance to TC that the proposed operating procedures would demonstrate equivalency of safety compared to the baseline defined in the Safety Rules.

While industry continues to pursue an interest in altering the current operating practices as it relates to sections 7.11 and 7.12 of the Railway Freight and Passenger Train Brake Inspection and Safety Rules (Train Brake Rules), TC anticipates a future network wide permanent rule change, which would permit a combined air flow to the brake pipe above ninety (90) cubic feet per minute (CFM) with no individual sources of air having a flow greater than sixty (60) CFM or fifteen (15 (psi) gradient) with possible total combined air flow limits depending on the number of sources of air. In anticipation of a proposed change to the rules, TC requires assurance that the proposed operating procedure would demonstrate equivalency of safety compared to the baseline currently defined in the Rules, by conducting a technical assessment of the data provided in order to identify any safety or performance concerns which may exist with the technology and approach used.

All testing data collected by CN under these conditions, as well as their methodology, lab testing, modeling, research and risk assessments supporting CN's initial exemption request, would be considered in the technical assessment / analysis for this project.

TASKS

1. REVIEW ALL BACKGROUND DOCUMENTATION

Review and analyze all relevant documentation provided by CN, in particular:

- CN's proposed methodology to operate with a combined air flow to the brake pipe above ninety (90) cubic feet per minute (CFM) with multiple air sources, where no individual source of air would have a flow greater than sixty (60) CFM or fifteen (15 per square inch (psi) gradient) a total limit of 160 CFM for up to four sources of air and 200 CFM for five sources of air.
- CN's short duration exemption requests for testing purposes, and all supporting documentation (risk assessment, lab testing, static tests and modeling).
- The testing data and results collected by CN during the first exemption period (February 2020 - April 2020).
- Annex A -Report on Testing Results (Air Flow Exemption Request 2019/20 – Requested by CN)
- The testing data and results collected by CN during the second exemption period (October 2020 - April 2021).
- Review of the test plan submitted by CN to determine if the test scenarios address all potential issues and recommend addition to the test activities for such scenarios.

The anticipated outcomes of Task 1 are to identify:

- Any gaps which may exist in the methodologies, analysis and testing conducted.
- Concerns or safety risks associated with CN's operating procedure, braking performance and train handling.
- Potential issues not addressed in the proposal.
- Any gaps or emerging safety risks which were not addressed in the testing conducted, and are critical to validating the technology and approach.
- Outstanding data or analysis that should be undertaken to gain further confidence.
- Further work required to assess the safety performance of the technology and approach.

2. ANALYTICAL SIMULATION EFFORT

Conduct analyses/simulations of train brake performance and train dynamics to identify conditions that need evaluation, to quantify safety, and to augment the results of the planned testing for objective evaluation of the potential proposed rule changes. These will likely include but may not be limited to:

a) Simulations of service and emergency stops from key speeds for a set of dynamic brake configurations, and leakage configurations

b) Simulations of issues where high leakage scenarios are coupled with communication loss conditions

c) Simulations of unintended release scenarios

d) Simulations of other potential failure/non-ideal conditions

e) Based on reported test data and simulation data, simulations/analyses of various configurations of train length and air sources to determine limits of:

- total air flow,
- air flow per air source (loco or dynamic brake consist),

- number of cars (or brake pipe length or number of control valves) per air source

The anticipated outcomes of Task 2 are to:

- quantify equivalent safety and safety margins from any proposed rule changes
- identify potential operating conditions under which the proposed rule changes could lead to sub-optimal safety

3. FINAL DELIVERABLE ON REPORTING

Based on work undertaken in Tasks 1 and 2, the project team will summarize the methodology and findings of the analysis of the test and simulation results performed in a report, and identify any outstanding issues or concerns which were not addressed in CN's testing and research, as well as any recommendations, conditions or restrictions that should be made to address existing or potential safety and operating concerns.

The anticipated outcome of Task 3 is a report outlining the methodology and the analysis undertaken, as well as findings, conclusions and recommendations concerning the proposed operating procedures, and limitations, conditions, restrictions and ongoing reporting requirements which should be imposed in the event that a permanent exemption request or rule change is received from industry following the winter testing period.

Elements to be considered should include but are not limited to:

- Is the technology and operating procedure working/functioning as intended?
- Does TC have assurance that the proposed operating procedures would ensure equivalency of safety compared to the baseline defined in the Rules?
- Has sufficient testing been conducted to validate, or ensure that operating procedures are sound and do not compromise safe railway operations?
- How would RS monitor safety performance in the future (inspection etc.)?
- What procedures, instructions and training should be in place for crews/trains operating under this exemption?
- Are there any risks associated with braking performance during testing?
- Have the results been statistically consistent in validating the expected braking response under these conditions?
- Any controls to be put in place?
- Identify potential risks/ concerns regarding safety
- Issues or gaps where research and data does not provide enough confidence in the proposed approach (areas where further testing is required and setting conditions would address or mitigate these concerns)
- Recommendations (data to be collected on an ongoing basis, monitoring, conditions, restrictions and reporting requirements associated with a permanent exemption)

The final report which must be produced in accordance with Transport Canada's TCP929 standards, will contain and document all tasks undertaken in this project.TCP929 will be included as an Appendix to this ACAN.

An annotated PowerPoint presentation that will be used for general project dissemination will accompany the final report.

To enable the report to be fully accessible, a document describing in text, each of the graphics in the report must be produced following the instruction in "IC Accessibility Reporting Requirements"

3. CRITERIA FOR ASSESSMENT OF THE STATEMENT OF CAPABILITIES (MINIMUM ESSENTIAL REQUIREMENTS)

Any interested supplier must demonstrate by way of a statement of capabilities that it meets the following requirements by expanding on its capabilities with concrete engineering projects undertaken by the Contractor detailing the company for which the work was completed, date, tasks and deliverables.:

a) Experience :

Must have at least 10 years of experience of providing engineering consultations on railway matters to federal regulators.

Must have at least 10 years of experience analysing Exemption/waiver documentation to make recommendations to regulators.

Must have at least 10 years of experience simulating and analysing train brake performance and train dynamics.

Must demonstrate experience leading/developing at least 5 projects related to the simulation of train braking system performance to identify unsafe train performance conditions

b) Knowledge and understanding :

Must have knowledge and understanding of the real world operating environments of braking dynamics on railway equipment.

Must have knowledge and understanding of train simulation software to measure train braking and handling performance under various operating circumstances.

Must have knowledge and understanding of train brake modeling and simulation in the North American environment

c) Academic qualifications :

Contractor must possess a project team with advanced degrees in the field of engineering, particularly in Mechanical Engineering.

d) Professional designation, accreditation, and/or certification:

Contractor must possess a professional engineering designation from a recognized engineers' association.

4. APPLICABILITY OF THE TRADE AGREEMENT(S) TO THE PROCUREMENT

This procurement is subject to the following trade agreements:

- Canada-Chile Free trade Agreement
- Canadian Free Trade Agreement
- Canada-Columbia Free Trade Agreement
- Canada-Panama Free Trade Agreement
- Canada-Honduras Free Trade Agreement
- Canada-Korea Free Trade Agreement
- Canada-Peru Free Trade Agreement

5. JUSTIFICATION FOR THE PRE-IDENTIFIED SUPPLIER

Sharma & Associates, Inc. (SA) has over 25 years of experience providing engineering consultations on railway matters to federal regulators. Established in 1995, Sharma & Associates, Inc. (SA) has a well-documented history of providing specialised research and engineering consulting services, with a specific focus on railroad engineering. Over this period, SA has successfully delivered a wide range of projects related to railroading, providing solutions that have completely satisfied the expectations their customers, including the Federal Railroad Administration (FRA), Transport Canada, the Volpe Center, Amtrak, Transportation Technology Center, Inc. (TTCI), railroads, transit agencies, locomotive builders, tank car builders, passenger car builders, freight car builders, and railcar component manufacturers.

For Transport Canada, SA has reviewed train securement and brake system performance over heavy descending grades, especially under cold weather conditions, following the train accident in Field, BC (February2019). This effort included review of proposed industry guidelines for brake system operation under such conditions. SA is currently working with the USDOT/FRA to quantify train braking performance as measured by wayside detectors (Automated Train Brake Effectiveness/ATBE, measured through hot/cold wheel detector systems), including the development of algorithms and correlation with inspection/maintenance data. These include review of waiver data from American railway operators (UP and BNSF) waivers on ATBE systems.

SA has over 25 years of experience in the application of train simulation tools in conducting studies related to train handling, train make-up, and brake system performance and has carried out numerous simulations to support FRA and National Transportation Safety Board (NTSB) in train derailment studies under previous efforts. SA has developed TEDS simulator for FRA and has a comprehensive understanding of the theoretical and technical background of train braking systems (Conventional, DP and ECP systems). TEDS will be used as the primary simulation tool through this project, supplemented by other analytical studies, as needed.

In addition, SA is actively working with the USDOT/FRA to review brake system performance for very long trains, including the potential for system depletion and train runaways, which are extremely similar to TC's concerns about brake system performance.

The list below summarizes some of the projects, and research development related to train dynamic simulations, derailment investigations, and air brake system design and testing that SA has successfully completed:

1. Analyzed different train configurations (size, weight, type and power consists) to compare very long trains with DP configurations vs. conventional trains with only front end locomotives, in terms of brake performance, train handling, dynamic behavior and operating requirements

2. Conducted numerous derailment investigations using TEDS

3. Conducted several derailment investigations using Vampire™

4. Analyzed the impact of advanced train control systems (PTC, ECP and DP systems) on the network capacity and network safety aspects of operations

5. Evaluated the safety benefits of ECP brakes on hazardous material carrying tank cars under emergency/derailment conditions

6. Designed an advanced freight truck for high-speed (150 mph) operation

7. Studied interaction between rail wheels and turnout geometry

8. Evaluated the dynamic performance of commuter locomotives

9. Evaluated the safety of proposed Next Generation Passenger Cars using LS-DYNA

Successful execution of this project entails assembling a team with relevant expertise, experience, and understanding of the railroad operating environment, train air brake system, train dynamics, rail cars and locomotive specifications, crew management, and railroad standards/regulations. The SA team has an excellent combination of expertise and experience in these areas.

The SA project team members will bring over 40 years of professional experience in the railway industry with extensive expertise in computer-based rail simulations, modeling and simulation of fluid flow/dynamics and braking systems; rail simulations for train operation analysis and engineer training; design and implementation of physical system models for domestic and foreign railroads in the areas of braking, longitudinal train dynamics, locomotive suspension and traction motor performance.

Members of the SA team have also developed the TEDS train simulation software tool to model train forces including braking systems performance.

The SA staff is comprised of personnel who have a deep and wide experience in the railroad industry and includes personnel with advanced engineering and management degrees. SA is recognized as providing world-class engineering solutions to railway, infrastructure and automotive industries.

<u>Additional Justifications:</u>

- SA developed TEDS (Train Energy and Dynamics Simulator) under contract to the US Department of Transportation/Federal Railroad Administration (USDOT/FRA) over the last many years, and is therefore intimately familiar with the internals and operations of this software tool
- SA is currently the only authorized provider of access to TEDS, and does this under an existing contract with the USDOT/FRA
- SA is also the only entity that maintains and extends TEDS, including the addition of updated features; this effort is also conducted under an exclusive agreement with the USDOT/FRA

- While SA licenses the tool to other users (again, with exclusive permission from the USDOT/FRA), no other entity has access to any of the related Intellectual Property (IP).

6. OWNERSHIP OF INTELLECTUAL PROPERTY

Ownership of any Foreground Intellectual Property arising out of the proposed contract will vest in the Contractor.

7. PERIOD OF THE PROPOSED CONTRACT

The period of the proposed Contract is one (1) year from the date of Contract.

8. COST ESTIMATE OF THE PROPOSED CONTRACT

The total estimated value of the contract is $195,046.00 CDN, including all applicable taxes.

9. TRAVEL REQUIREMENTS

There will be no travel required for this contract.

10. NAME AND ADDRESS OF THE PRE-IDENTIFIED SUPPLIER

Sharma & Associates Inc.

5810 S Grant St., Hinsdale, IL

60521 USA

11. SUPPLIERS' RIGHT TO SUBMIT A STATEMENT OF CAPABILITIES

Suppliers who consider themselves fully qualified and available to provide the 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.

12. DEADLINE FOR SUBMISSION OF THE STATEMENT OF CAPABILITIES

The closing date and time for accepting statements of capabilities is 08/24/21 at 02:00 p.m. PDT.

13. INQUIRIES AND STATEMENTS OF CAPABILITIES ARE TO BE DIRECTED BY EMAIL TO:

Name: James Morgan

Title: A/Team Leader Procurement

Transport Canada

E-mail address: James.Morgan@tc.gc.ca