



U. S. Department
of Transportation

PROGRAM SOLICITATION

Small Business Innovation Research Program (SBIR)

Issue Date: October 11, 2011

Closing Date: December 12, 2011

**Small Business Innovation Research (SBIR) Program Office, RVT-91
John A. Volpe National Transportation Systems Center (Volpe Center)
U.S. Department of Transportation (DOT)
Research and Innovative Technology Administration (RITA)
55 Broadway
Cambridge, MA 02142-1093**

TECHNICAL QUESTIONS

Technical questions pertaining to the FY12.1 DOT SBIR solicitation research topics must be submitted to the SBIR Program Office by email to Linda.Duck@dot.gov. All questions will be submitted to the research topic authors for a response. Answers will be posted on the DOT SBIR Program website, <http://www.volpe.dot.gov/sbir/current.html> - under Technical Questions and Answers for 12.1 Solicitation.

Technical questions submitted after December 1, 2011 may not be answered before the solicitation closing date.

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U. S. DOT PROGRAM SOLICITATION FOR SMALL BUSINESS INNOVATION RESEARCH

I. PROGRAM DESCRIPTION

A. Introduction

This solicitation for research proposals is issued by the U.S. Department of Transportation (DOT) pursuant to the Small Business Innovation Development Act of 1982, P.L. 97-219 (codified at 15 U.S.C. 638) as amended by the Small Business Innovation Research (SBIR) Program, Extension, P.L. 99-443 which extended the program through September 30, 1993. On October 28, 1992, through the Small Business Innovation Research and Development Act of 1992 (P.L. 102-564), Congress reauthorized and extended the SBIR program for another seven years (2000). Subsequently, on December 21, 2000, through the Small Business Reauthorization Act of 2000 (P.L. 106-554) Congress again reauthorized the SBIR program. With the approval of H.R. 2608 Continuing Appropriations Act, 2012 the SBIR Program is authorized through November 18, 2011.

The SBIR Program encourages small businesses to engage in research or research and development (R/R&D) that has the potential for commercialization and meets Federal research or research and development objectives.

The goals and objectives of the SBIR Program are:

- (1) Stimulate technological innovation;
- (2) Meet Federal research and development needs;
- (3) Foster and encourage participation in innovation and entrepreneurship by socially and economically disadvantaged persons.
- (4) Increase private sector commercialization of innovations derived from Federal research and development funding.

In consonance with the statutory obligations of the Act, the DOT has established a Small Business Innovation Research Program (DOT SBIR Program).

The purpose of this solicitation is to invite small businesses with their valuable resources and creative

capabilities to submit innovative research proposals that address high priority requirements of the DOT.

B. Three Phase Program

The DOT SBIR Program is generally a three phase process.

THIS SOLICITATION IS FOR PHASE I PROPOSALS ONLY. The DOT SBIR Program does not accept unsolicited proposals.

Phase I. Phase I provides support for the conduct of feasibility-related experimental or theoretical research or R/R&D efforts on research topics as described herein. The dollar value of the proposal may be up to \$150,000 unless otherwise noted and is subject to the availability of funding. The period of performance is six months. The basis for award will be the scientific and technical merit of the proposal and its relevance to DOT requirements and current research priorities. **Only awardees in Phase I will be eligible to participate in Phase II which is by invitation only and subject to the availability of funding.**

Phase II. The objective of Phase II is to continue the R/R&D effort from the completed Phase I. Funding of a Phase II is based upon the results of Phase I and the scientific and technical merit and commercial potential of the Phase II proposal. Commercial potential includes the potential to transition the technology to private sector applications, Government applications, or Government contractor applications.

DOT SBIR Phase II invitations are issued to firms which have previously received a DOT Phase I award. Phase II proposals may be funded up to \$1,000,000 (except where a lower ceiling is specifically identified) and have a period of performance up to 24 months. Special consideration may be given to proposals that have obtained commitments for follow-on funding from non-Federal sources for Phase III.

The Government is neither obligated to issue a Phase II invitation to a Phase I awardee nor is it obligated to fund any specific Phase II proposal.

Phase II B Program. In FY 2011, the DOT SBIR Program established a Phase II B Enhancement Program. DOT agencies interested in participating in the Phase II B Program will reserve a portion of their SBIR budget to fund Phase II B projects. The intent of the Phase II B Program is to advance and/or accelerate current active Phase II SBIR-funded technologies towards commercialization. The contracts will be a one-time bridge award to the most promising Phase II project(s) and are subject to the availability of funding of up to \$1,000,000 resulting in a maximum Phase II contract award of \$2,000,000. This will be an invitation only process. Candidate project(s) will be identified by DOT agency SBIR COTRs. Selected candidate project(s) will be identified and small businesses will be invited to submit a Phase II B technical proposal. Evaluation criteria will focus on commercialization potential.

Phase III. SBIR Phase III refers to work that derives from, extends, or logically concludes effort(s) performed under a DOT or another Department's Phase I and/or Phase II funding agreement. Phase III is funded by sources other than the set-aside funds dedicated to the SBIR Program. Phase III work is typically oriented towards commercialization of SBIR research or technology and may be for products, production, services, R/R&D or a combination thereof. Each of the following types of activity constitutes SBIR Phase III work.

- (i) commercial application of SBIR-funded R/R&D financed by non-Federal sources of capital. (Note: this pertains to any non-SBIR Federally-funded work described in (ii) and (iii) below.
- (ii) SBIR-derived products or services intended for use by the Federal Government, funded by non-SBIR sources of Federal funding
- (iii) continuation of R/R&D that has been competitively selected using peer review or scientific review criteria, funded by non-SBIR Federal funding sources.

A Phase III award is by its nature an SBIR award and is accorded SBIR data rights. The requirements of the Federal Property and Administrative Services Act Of 1949,[as amended through P.L. 106-580, Dec. 29, 2000]and the Competition in Contracting Act is satisfied by the competition of the Phase I, Phase II and Phase II B awards. There is no limit on the number, duration, type, or dollar value of Phase III awards made to a small business concern. There is no limit on the time that may elapse between a Phase I, Phase II, Phase II B award and Phase III award, or between a Phase III award and any subsequent Phase III award. The small business size limits for Phase I, Phase II, and Phase II B awards do not apply to Phase III awards.

C. Manufacturing-related Priority Executive Order (EO) 13329

"Encouraging Innovation in Manufacturing" requires SBIR agencies, to the extent permitted by law and in a manner consistent with the mission of that department or agency, to give high priority within the SBIR Programs to manufacturing-related research and development (R&D). "Manufacturing-related" is defined as "relating to manufacturing processes, equipment and systems; or manufacturing workforce skills and protection."

The DOT SBIR Program solicits manufacturing-related projects through the call for topics distributed twice annually to each of the Department's SBIR participating agencies.

D. Energy Efficiency and Renewable Energy Priority

The Energy Independence and Security Act of 2007 (P.L. 110-140) directs SBIR Programs to give high priority to small business concerns that participate in or conduct energy efficiency or renewable energy system R&D projects.

The DOT SBIR Program solicits energy efficiency or renewable energy system R&D projects through the call for topics distributed twice annually to each of the Department's SBIR participating agencies.

E. Eligibility

Each small business concern submitting a proposal must qualify as a small business at the time of award of Phase I, Phase II and IIB contracts. In addition, **the primary employment of the principal investigator must be with the small business firm at the time of contract award and during the conduct of the proposed research.**

Primary employment means that more than one-half of the principal investigator's time is spent with the small business. Additionally, Phase I, Phase II and II B, the R/R&D work must be performed in the United States. "United States" means the 50 states, the Territories and possessions of the United States, the Commonwealth of Puerto Rico, and the Commonwealth of the Northern Mariana Islands, the Trust Territory of the Pacific Islands, and the District of Columbia.

All types of small business organizations may submit proposals, including high technology, R&D, manufacturing, and service firms. Companies with outstanding scientific or engineering competence in highly specialized product, process or service areas may wish to apply their expertise to the research topics in this solicitation through a laboratory prototype. Ideally, the research should make a significant contribution to the solution of an important transportation problem and provide the small business concern with the basis for new products, processes, or services.

F. General Information

This is a solicitation for Phase I R/R&D proposals on advanced, innovative concepts from small business firms having strong capabilities in applied science or engineering.

The Phase I R/R&D proposals shall demonstrate a sound approach to the investigation of an important transportation related scientific or engineering problem categorized under one of the research topics listed in Section VI.

A proposal may respond to any of the research topics listed in Section VI, but must be limited to one topic. The same proposal may not be submitted under more than one topic. A small business may, however, submit separate proposals on different topics, or different proposals on the same topic, under this solicitation. Where similar research is discussed under more than one topic, the offeror shall choose that topic which appears to be most relevant to the offeror's technical concept.

The proposed research must have relevance to the improvement of some aspect of the national transportation system or to the enhancement of the ability of an operating element of the DOT to perform its mission.

Proposals shall be confined principally to scientific or engineering research, which may be carried out through construction and evaluation. **Proposals must be for R/R&D, particularly on advanced or innovative concepts. Proposals shall not be for incremental or scaled up versions of existing equipment or the development of technically proven ideas. Proposals for the development of already proven concepts toward commercialization, or which offer approaches already developed to an advanced prototype stage or for market research shall not be submitted.**

The proposal shall be self-contained and checked carefully by the offeror to ensure that all preparation instructions have been followed (see Proposal Checklist, Appendix D).

Please address **general inquiries, not pertaining to this solicitation** on the U.S. DOT SBIR Program to:

DOT SBIR Program Office, RVT-91
John A. Volpe National Transportation Systems Center
(Volpe Center)
U.S. Department of Transportation (DOT)
Research and Innovative Technology Administration
(RITA)
55 Broadway
Cambridge, MA 02142-1093
Telephone: (617) 494-2051
Fax: (617) 494-2370

Volpe Center Website: <http://www.volpe.dot.gov/sbir>

II. DEFINITIONS

A. Research or Research and Development (R/R&D)

R/R&D means any activity which is:

- (1) A systematic, intensive study directed toward greater knowledge or understanding of the subject studied;
- (2) A systematic study directed specifically toward applying new knowledge to meet a recognized need; or
- (3) A systematic application of knowledge toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.

B. Small Business Concern

A small business concern is one that at the time of award of Phase I, Phase II and Phase II B contracts meets all of the following criteria:

- (1) Is organized for profit, with a place of business located in the United States, which operates primarily within the United States or which makes a significant contribution to the United States economy through payment of taxes or use of American products, materials or labor;
- (2) Is in the legal form of an individual proprietorship, partnership, limited liability company, corporation, joint venture, association, trust or cooperative, except that where the form is a joint venture, there can be no more than 49 percent participation by large business entities in the joint venture;
- (3) Is (i) at least 51% owned and controlled by one or more individuals who are citizens of the United States or permanent resident aliens in the United States, (ii) at least 51% owned and controlled by another business concern that is itself at least 51% owned and controlled by individuals who are citizens of, or permanent resident aliens in the United States; or (iii) a joint venture in which each entity to the venture must meet the requirements of either (i) or (ii) of this section;
- (4) Has, including its affiliates, not more than 500 employees.

C. Socially and Economically Disadvantaged Small Business Concern

A Socially and Economically Disadvantaged Small Business Concern is one that is at least 51% owned and controlled by one or more socially and economically disadvantaged individuals, or an Indian tribe, including Alaska Native Corporations (ANCs), a Native Hawaiian Organization (NHO), or a Community Development Corporation (CDC). Control includes both strategic planning (as that exercised by boards of directors) and the day-to-day management and administration of business operations. See 13 CFR 124.109, 124.110, and 124.111 for special rules pertaining to concerns owned by Indian Tribes (including ANCs), NHOs, or CDCs, respectively.

D. Women-Owned Small Business Concern

A Woman-Owned Small Business Concern is one that is at least 51% owned and controlled by a woman or women. Control includes both the strategic planning (as that exercised by boards of directors) and the day-to-day management and administration of business operations.

E. Veteran-Owned Small Business

A Veteran-Owned Small Business Concern is one that is at least 51% owned and controlled by one or more veterans (as defined at 38 U.S.C. 101(2)) or, in the case of any publicly owned business, not less than 51% of the stock of which is owned by one or more veterans, and the management and daily business operations of which are controlled by one or more veterans.

F. Subcontract

Subcontract means any agreement, other than one involving an employer employee relationship, entered into by a Federal Government funding agreement awardee calling for supplies or services required solely for the performance of the original funding agreement.

G. Historically Underutilized Business Zone (HUB Zone)

A HUB Zone Small Business Concern is one that meets the following criteria:

1. Located in “historically underutilized business zone” or HUB Zone area located in one or more of the following:

A qualified census tract (as defined in Section 42(d)(5)(i)(I) of the Internal Revenue Code of 1986);

A qualified “non–metropolitan county” (as defined in Section 143(k)(2)(B) of the Internal Revenue Code of 1986) with a median household income of less than 80% of the state median household income or with an unemployment of not less than 140% of the statewide average based on U.S. Department of Labor recent data; or

Lands within the boundaries of Federally recognized Indian reservations.

2. Owned and controlled by one or more U.S. citizen(s).
3. At least 35% of its employees must reside in a HUBZone.

H. Service Disabled Veteran-Owned Concern

A Service Disabled Veteran-Owned Small Business Concerns is one that is at 51% unconditionally and directly owned by one or more service-disabled veterans defined in 13 C.F.R 125.29. In the case of a concern which is a corporation, at least 51% of the aggregate of all stock outstanding and at least 51% of each class of voting stock outstanding must be unconditionally owned by one or more service-disabled veterans.

III. PROPOSAL PREPARATION INSTRUCTIONS AND REQUIREMENTS

A. Proposal Submission Requirements

- Each proposal shall not exceed 25 pages (regular size type – no smaller than 10 point font size – single or double spaced, standard 8 ½” by 11” pages) including proposal cover sheet, contract pricing proposal, and all enclosures or attachments.
- Proposals must be a PDF file and submitted online. **Proposals will not be accepted via email.**
- No duplicate proposals shall be sent by any other means.
- Proposals may only be submitted online, a link to the web page can found here: <http://www.volpe.dot.gov/sbir/current.html>
Instructions are included on the submission page.
- Proposals must be received no later than 11:59 P.M. EST on December 12, 2011. Proposals received after that time will be automatically rejected, no exception will be permitted.
- The proposal file name shall contain eight (8) characters; the first three shall be the topic number you are proposing to (i.e., FH3), and the remaining five characters shall be a unique abbreviation of your company’s name.

Proposals will be available to only the team of DOT engineers and/or scientists responsible for evaluating your proposal.

B. Proposal Cover Sheet

Complete the Proposal Cover Sheet in Appendix A as Pages 1 and 2 of your proposal. All pages shall be numbered consecutively, beginning with the Proposal Cover Sheet.

C. Project Summary

Complete the Project Summary Sheet in Appendix B as Page 3 of your proposal. The Project Summary shall include a technical abstract with a brief statement of the problem or opportunity, project objectives, and description of the effort. Anticipated results and potential applications of the proposed research shall also be summarized in the space provided. The Project Summary of successful proposals may be published by the DOT and, therefore, shall not contain classified or proprietary information. The technical abstract

must be limited to 200 words in the space provided on the Project Summary sheet.

D. Technical Content

Submitted proposals must include the following:

- (1) **Identification and Significance of the Problem or Opportunity.** The specific technical problem or innovative research opportunity addressed and its potential benefit to the national transportation system shall be clearly stated.
- (2) **Phase I Technical Objectives.** State the specific objectives of the Phase I R/R&D effort, including the technical questions it will try to answer to determine the feasibility of the proposed approach.
- (3) **Phase I Work Plan.** Describe the Phase I R/R&D plan. The plan shall indicate what will be done, where it will be done, and how the R/R&D will be managed or directed and carried out. Phase I R/R&D shall address the objectives and the questions cited in (2) above. The methods planned to achieve each objective or task shall be discussed in detail, including the level of effort associated with each task.
- (4) **Related Research or R&D.** Describe significant R/R&D that is directly related to the proposal including any conducted by the Project Manager/Principal Investigator or by the proposing firm. Describe how it relates to the proposed effort, and any planned coordination with outside sources. The offeror must persuade reviewers of their awareness of key recent R/R&D conducted by others in the specific topic area.
- (5) **Key Personnel and Bibliography of Directly Related Work.** Identify key personnel involved in Phase I including their directly related education, experience, and bibliographic information. Where vitae are extensive, summaries that focus on the most relevant experience or publications are desired and may be necessary to meet proposal page limitations.

(6) **Relationship with Future Research and Development.**

- (a) State the anticipated results of the proposed approach if the project is successful (Phase I and Phase II).
- (b) Discuss the significance of the Phase I effort in providing a foundation for Phase II R/R&D effort.

(7) **Facilities.** Provide a detailed description, availability and location of instrumentation and physical facilities proposed for Phase I.

(8) **Consultants.** Involvement of consultants in the planning and research stages of the project is permitted. If such involvement is intended, it shall be described in detail within the proposal. **Consultants are only permitted to conduct no more than 1/3 of the work.**

(9) **Potential Applications.** Briefly describe:

- (a) Whether and by what means the proposed project appears to have potential commercial application.
- (b) Whether and by what means the proposed project appears to have potential use by the Federal Government.

(10) **Similar Proposals or Awards.**— While it is permissible, with proposal notification, to submit identical proposals or proposals containing a significant amount of essentially equivalent work for consideration under numerous Federal program solicitations, It is unlawful to enter into contracts or grants requiring essentially equivalent effort. If there is any question concerning this, it must be disclosed to the soliciting agency or agencies before award.

If a firm elects to submit similar or identical proposals or proposals containing equivalent work under other Federal program solicitations, a statement must be included in each such proposal indicating:

- (a) The name and address of the agencies to which proposals were submitted or from which awards were received;
- (b) Date of proposal submission or date of award;
- (c) Title, number, and date of SBIR Program solicitations under which proposals were submitted or awards received;

- (d) The applicable research topics for each SBIR proposal submitted or award received;
- (e) Titles of research projects; and
- (f) Name and title of Project Manager or Principal Investigator for each proposal submitted or award received.

(11) **Fraudulent Information**

Submitting plagiarized information and/or false proposal information pertaining to the company, the Principal Investigator (PI), and/or work to be performed may result in:

- the cancellation of the topic within a solicitation,
- a proposal being deemed non-responsive,
- a recommendation for Phase I award being rescinded,
- an invitation for a Phase II/II B project being rescinded
- or the termination of an award.

E. Contract Pricing Proposal

A firm fixed price Phase I Contract Pricing Proposal (Schedule 1) must be submitted in detail as shown in Appendix C. Note: firm fixed price is the type of contract to be used for Phase I SBIR awards. Some cost breakdown items of Appendix C **may not apply** to the proposed project. If such is the case, there is no need to provide information for each and every item. It is important, however, to provide enough information to allow the DOT to understand how the offeror plans to use the requested funds if the contract is awarded. Phase I contract awards may include profit.

F. Central Contracting Registration (CCR) and Data Universal Numbering System (DUNS) Identification Number

Since October 1, 2003, it is federally mandated that any business wishing to do business with the Federal Government under a Federal Acquisition Regulation (FAR)-based contract **must be registered in CCR before being awarded a contract.** You can find more information on CCR and the registration process in their handbook, <http://www.ccr.gov/handbook.asp>. You can register online at <http://www.ccr.gov> by clicking on “Start New Registration” if you already have a DUNS number. If you need a DUNS number, you can find instructions at <http://fedgov.dnb.com/webform/displayHomePage.do>

A firm must note its DUNS identification number on Appendix C, Contract Pricing Proposal, Schedule 1. This number is assigned by Dun & Bradstreet, Inc.

G. Prior SBIR Phase II Awards

If the small business concern has received more than 15 Phase II and Phase II B awards in the prior five fiscal years, submit name of awarding agency, date of award, funding agreement number, amount, topic or subtopic title, follow-on agreement amount, source and date of commitment, and current commercialization status for each Phase II.

(This required proposal information shall not be counted towards the page count limitation.)

IV. METHOD OF SELECTION AND EVALUATION CRITERIA

A. General

All Phase I proposals will be evaluated and judged on a competitive basis. Initially, all proposals will be screened to determine responsiveness to the solicitation. Proposals that meet the solicitation requirements will be evaluated to determine the most promising technical and scientific approaches. Each proposal will be judged on its own merit. **The DOT is under no obligation to fund any proposal or any specific number of proposals on a given topic. For any given topic DOT may elect to award more or less than the anticipated quantity of awards stated in Section VI. Research Topics.**

A Phase II award will be made to the responsive and responsible Offerors whose offers provide the best value to the Government, based on the Technical Proposal and Cost Proposal. While it is the Government's intent to make Phase II awards based upon initial offers, the Government may, nevertheless, determine during the evaluation period that it is necessary to conduct discussions. In that case, the Contracting Officer will proceed to establish a competitive range and conduct negotiations with the firms in that range. Phase II and II B awards will be made to those offerors with the greatest commercialization potential and will be subject to the availability of funding.

B. Evaluation Criteria

The evaluation process involves the following factors:

- (1) Scientific and technical merit and the feasibility of the proposal's commercial potential, as evidenced by:
 - a) Past record of successful commercialization of SBIR or other research;
 - b) Existence of Phase III funding commitments from private sector or non-SBIR funding sources; and
 - c) Presence of other indicators of the commercial potential of the idea.
- (2) The adequacy of the work plan and approach to achieve specified work tasks and stated objectives of the proposed effort within budgetary constraints and on a timely schedule.
- (3) Qualifications of the proposed principal/key investigator(s) including demonstrated expertise in a disciplinary field related to the particular R/R&D topic that is proposed for investigation.

- (4) Adequacy of supporting staff and facilities, equipment, and data for the successful completion of the proposed R/R&D.
- (5) The commercialization potential of the innovation will be a factor for both Phase II and II B proposals.

C. Prescreening

Each proposal submission will be examined to determine if it is complete and contains adequate technical and pricing data. **Proposals that do not meet the basic requirements of the solicitation will be excluded from evaluation and will receive an email notifying them of the rejection.** Each offeror will be notified promptly by email of such action.

D. Schedule

All DOT evaluations shall be completed and recommendations for award will be submitted to the U.S. DOT SBIR Program Office within ten weeks of the closing date for Phase I proposals.

E. Program Selection

Each of the Department's Operating Administrations will establish technical evaluation teams comprised of federal staff, including engineers and/or scientists and provide written evaluations and recommendations for award to the DOT SBIR Program Director. The DOT SBIR Program Office will post a listing of awards on the webpage: <http://www.volpe.dot.gov/sbir>.

F. Contact with DOT

In order to ensure "Full and Open Competition", contact with DOT relative to this solicitation during the Phase I proposal preparation and evaluation period is restricted to the officials stated in this solicitation.

Technical questions **pertaining only to the FY12.1 DOT SBIR solicitation research topics** must be submitted by December 1, 2011. Questions shall be submitted by e-mail to the DOT SBIR Program Office. The DOT SBIR Program Office point of contact for technical questions is Linda Duck, Linda.Duck@dot.gov. **All questions will be submitted to the research topic authors for a response. Answers will be posted on the DOT SBIR Program website, <http://www.volpe.dot.gov/sbir/current.html> - under Technical Questions and Answers for 12.1 Solicitation.**

Technical questions submitted after December 1, 2011 might not be answered before the solicitation closing date.

No information on proposal status will be available until the complete list of FY12.1 Phase I Award Recommendations is posted on the DOT SBIR Program Webpage: <http://www.volpe.dot.gov/sbir>. For planning purposes the FY12.1 Phase I Award Recommendations are expected to be posted on the DOT SBIR Program webpage by 5 PM Eastern Time, **on/or about February 24, 2012**. **Phase I proposals which are not included in the list of FY12.1 Phase I Award Recommendations will not receive an award.** Upon the posting of the recommended proposals, contact with DOT remains restricted to the SBIR Program Office and the SBIR Program Contracting Officer.

Contact with DOT officials, other than those identified above, relative to this solicitation during any of the restricted times may result in the rejection of the proposal.

NO WRITTEN CORRESPONDENCE REGARDING PROPOSAL STATUS WILL BE ANSWERED.

After the FY12.1 Phase I Award Recommendations are posted on the DOT SBIR Program webpage, a debriefing comprised of the overall comments on the proposal may be provided to the offeror upon request.

G. Debriefing Requests:

Debriefing requests should be submitted to the SBIR Program Contracting Officer by e-mail to: Donald.MacGee@dot.gov, and must include the offeror's name, address, research topic number, and the proposal identification number assigned and provided through an automated email notification sent to you upon receipt of your proposal. The identity of the evaluators will not be disclosed.

V. CONSIDERATIONS

A. Awards

The Government anticipates awarding approximately 13 Phase I contracts with the possibility for additional or fewer awards. The actual number of contract awards, is subject to the availability of funding and the responses from small business firms to the solicited research topics described in Section VI.

Phase I contract awards: All Phase I awards will be firm fixed price contracts and **may be** funded up to \$150,000. Funding levels for each topic are determined by the agency sponsoring the research and are provided in Section VI. Research Topics.

Phase II contract awards: Phase II contracts can be funded up to \$1,000,000 and are determined by the agency sponsoring the research. Phase II funding estimates are provided in Section VI., Research Topics. Phase II and Phase II B awards will be either cost-plus-fixed-fee or fixed fee contracts or some combination of the two.

Phase II B contract awards: Phase II B awards of up to \$250,000 extend the period of performance to 1 year. Phase II B awards with a period of performance of more than 1 year may exceed \$250,000. A multi-year award may be funded up to \$1,000,000 and has a period of performance of no more than 2 years.

The maximum funding level for Phase II and Phase II B contract award is \$2,000,000. The funding level and period of performance are determined by the agency sponsoring the research.

The number of awards and the amount of each award is subject to the availability of funds.

Accounting System Audits:

Phase II awardees will be required to have an **acceptable accounting system** in place to receive a cost-plus-fixed-fee contract. **If a small business has not had an audit of their accounting system, DCAA will conduct an on-site pre-award audit prior to contract award.** This process can take up to three to four months in addition to the time for processing an award. For information pertaining to DCAA accounting system requirements and audits, please go to the DCAA webpage at <http://www.dcaa.mil>

Only recipients of Phase I contracts will be eligible to receive a Phase II invitation. Only recipients' of Phase II contracts will be eligible for a Phase II B invitation.

DOT's Operating Administrations contribute to 2.5% of their Extramural Research Budget for SBIR funding. Each

Operating Administration's contribution may be used only to support research of concern to that Operating Administration. For example, funds furnished by the Federal Highway Administration (FHWA) may not support research solely of concern to the National Highway Traffic Safety Administration (NHTSA). Based on anticipated funding levels, there may not be adequate funding within the DOT SBIR Program to support Phase I and/or Phase II awards for research which is solely of concern to the following Operating Administrations: , Federal Highway Administration (FHWA), Federal Motor Carrier Safety Administration (FMCSA), Federal Railroad Administration (FRA), Federal Transit Administration (FTA), National Highway Traffic Safety Administration (NHTSA), Research and Innovative Technology Administration (RITA), and Pipeline Hazardous Materials Safety Administration (PHMSA). Phase I and Phase II awards for such research will be subject to the availability of funding.

B. Reports

1. Under Phase I SBIR contracts, 3 reports will be required, consisting of 2 interim letter reports, and a comprehensive final report.
2. Under Phase II, Phase II B and Phase III SBIR contracts, monthly progress reports, monthly cost reports, commercialization reports(due every six months), and a summary of results will be required.

C. Payment Schedule

Payments for Phase I contracts will be made in 3 equal installments upon submission of invoices by the contractor in conjunction with the submission of acceptable reports as described in Paragraph B above.

Payments for Phase II, Phase II B, and Phase III contracts will be made upon submission of acceptable reports as described in Paragraph B above. The amount and schedule of payments will be negotiated prior to award.

D. Innovations, Inventions, and Patents

1. **Proprietary Information.** Information contained in the proposals will remain the property of the offeror. The Government may, however, retain copies of all proposals. Public release of information in any proposal submitted will be subject to existing statutory and regulatory requirements.

If proprietary information is provided by a offeror in a proposal which constitutes a trade secret, proprietary commercial or financial information, confidential personal

information or information effecting national security, it will be treated in confidence, to the extent permitted by law, provided this information is clearly marked by the offeror with the terms "confidential proprietary information" and provided the following legend appears on the title page of the proposal:

"For any purpose other than to evaluate the proposal, this proprietary information shall not be disclosed outside the Government and shall not be duplicated, used, or disclosed in whole or in part, provided that if a contract is awarded to this offeror as a result of or in connection with the submission of this information, the Government shall have the right to duplicate, use, or disclose the information to the extent provided in the contract. This restriction does not limit the Government's right to use information contained in the document if obtained from another source without restriction. The information subject to this restriction is contained in pages _____ of this proposal."

Any other legend may be unacceptable to the Government and may constitute grounds for return of the proposal without further consideration and without assuming any liability for inadvertent disclosure. The Government will limit dissemination of such information to within official channels.

DOT prefers that offerors avoid inclusion of proprietary data in their proposals. If the inclusion of proprietary data is considered essential for meaningful evaluation of a proposal submission, then such data should be provided on a separate page with a numbering system to key it to the appropriate place in the proposal.

2. **Rights in Data Developed under SBIR**

Contracts. Rights in technical data, including software developed under any contract resulting from this solicitation, shall remain with the contractor except that the Government shall have the limited right to use such data for Government purposes and shall not release such data outside the Government without permission of the contractor for a period of four years from completion of the project from which the data were generated. However, effective at the conclusion of the four-year period, the Government shall retain a royalty free license for Federal Government use of any technical data delivered under an SBIR contract whether patented or not.

3. **Copyrights.** With prior written permission of the Contracting Officer, the contractor normally may copyright and publish (consistent with appropriate national security considerations, if any) material developed with DOT support. The DOT receives a royalty free license for the Federal Government and requires that each publication contain an

appropriate acknowledgement and disclaimer statement.

4. **Patents/Invention Reporting.** Small business firms normally may retain the principal worldwide patent rights to any invention developed with Government support. The Government receives a royalty free license for Federal Government use, reserves the right to require the patent holder to license others in certain circumstances, and requires that anyone exclusively licensed to sell the invention in the United States must normally manufacture it domestically. To the extent authorized by 35 U.S.C. 205, the Government will not make public any information disclosing a Government-supported invention for a two-year period to allow the contractor a reasonable time to pursue a patent.

Invention Reporting Process:

Awardees shall report inventions to the DOT through the iEdison Invention Reporting System, <http://www.iedison.gov>. Use of the iEdison System satisfies all invention reporting requirements mandated by any award.

E. Cost Sharing

Cost sharing is permitted for Phase II and Phase II B proposals under the topic areas identified in this solicitation; however, cost sharing is not required nor will it be a factor in proposal evaluations.

F. Profit or Fee

A profit is allowed on firm fixed price awards to small business concerns under the DOT SBIR Program.

A fee is allowed on cost plus fixed fee (Phase II and Phase II B only) awards to small business concerns under the DOT SBIR Program.

G. Joint Ventures or Limited Partnerships

Joint ventures and limited partnerships are permitted provided the entity created qualifies as a small business concern in accordance with the Small Business Act, 15 U.S.C. 631, and the definition included in this solicitation.

H. Research and Analytical Work

1. **For Phase I, a minimum of two thirds of the research and/or analytical effort must be performed by the proposing firm** unless otherwise approved in writing by the Contracting Officer.
2. **For Phase II and Phase II B, a minimum of one-half of the research and/or analytical effort must be performed by the proposing firm** unless

otherwise approved in writing by the Contracting Officer.

I. Contractual Commitments

Upon award of a contract, the awardee will be required to make certain legal commitments through acceptance of numerous Federal Acquisition Regulation (FAR) and Transportation Acquisition Regulation (TAR) contract clauses. The outline that follows is illustrative of the types of clauses to which the contractor would be committed. This list shall not be understood to represent a complete list of clauses to be included in Phase I contracts, nor to be the specific wording of such clauses. A complete copy of the terms and conditions will be provided upon issuance of the model contract for signature prior to award.

1. **Standards of Work.** Work performed under the contract must conform to high professional standards.
2. **Inspection.** Work performed under the contract is subject to Government inspection and evaluation at all times.
3. **Examination of Records.** The Comptroller General (or a duly authorized representative) shall have the right to examine any directly pertinent records of the contractor involving transactions related to this contract.
4. **Default.** The Government may terminate the contract if the contractor fails to adhere to the terms of the contract.
5. **Termination for Convenience.** The contract may be terminated at any time by the Government if it deems termination to be in its best interest, in which case the contractor will be compensated for work performed and for reasonable termination costs.
6. **Disputes.** Any dispute concerning the contract which cannot be resolved by agreement shall be decided by the Contracting Officer with right of appeal.
7. **Contract Work Hours.** The contractor may not require an employee to work more than eight hours a day or 40 hours a week unless the employee is compensated accordingly (i.e., overtime pay).
8. **Equal Opportunity.** The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin.
9. **Affirmative Action for Veterans.** The contractor will not discriminate against any employee or applicant for employment because he or she is a disabled veteran or veteran of the Vietnam era.
10. **Affirmative Action for Handicapped.** The contractor will not discriminate against any employee or applicant for employment because he or she is physically or mentally handicapped.
11. **Officials Not to Benefit.** No member of or delegate to Congress shall benefit from the contract.
12. **Covenant Against Contingent Fees.** No person or agency has been employed to solicit or secure the contract upon an understanding for compensation except bonafide employees or commercial agencies maintained by the contractor for the purpose of securing business.
13. **Gratuities.** The contract may be terminated by the Government if any gratuities have been offered to any representative of the Government to secure the contract.
14. **Patent Infringement.** The contractor shall report each notice or claim of patent infringement based on the performance of the contract to the SBIR Program Contracting Officer.
15. **Procurement Integrity.** Submission of a proposal under this solicitation subjects the offeror to the procurement integrity provision (§27) of the Office of Federal Procurement Policy Act (41 U.S.C. 423). This statute, as implemented by Federal Acquisition Regulation (FAR, 48 CFR) §3.104, prescribes the following conduct by competing contractors during an agency procurement: offering or discussing future employment or business opportunities with an agency procurement official; promising or offering a gratuity to an agency procurement official; and/or soliciting or obtaining proprietary or source selection information regarding the procurement. Violations of the statute may result in criminal and/or civil penalties, disqualification of an offeror, cancellation of the procurement, or other appropriate remedy.
16. **Section 508 Access Board Standards.** All electronic and information technology deliverables rendered must comply with Section 508 of the Rehabilitation Act and the Access Board Standards available for viewing at <http://www.section508.gov>. Unless otherwise indicated, the contractor represents by signature on a contract that all deliverables will comply with the Access Board Standards.
17. **Government Property.** Equipment either furnished or acquired under this contract is subject to FAR 52.245-1 Government Property (June

2007) clause (and SBIR Program Policy Directive, Section 8 (c)).

FAR: <https://www.acquisition.gov/far/index.html>

TAR: <https://www.dot.gov/ost/m60/tamtar/tar.htm>

SBIR Policy Directive:
<http://www.sbir.gov/about/aboutsbir>

J SBIR Program Contractor Requirements

Upon contract award and for the duration of the contract the awardee will be required to adhere to SBIR Program Requirements. The following list is illustrative of the requirements to which the contractor will be committed. A complete copy of the terms and conditions will be provided upon issuance of the Phase I contract for signature prior to award.

1. The company must meet the Small Business Administration's (SBA) requirements for a small business, including being majority American owned and have 500 employees or fewer (see Section II, Definitions, and Items B-H).
2. The Principal Investigators primary employment must be with the company during the contract period. The Principal Investigator may not be employed full time elsewhere (see Section I, Program Description, Item D. Eligibility).
3. For Phase I, a minimum of two thirds of the research effort must be performed by the contract awardee. For Phase II a minimum of one-half of the research must be performed by the contract awardee.

Work performed by a subcontractor or university research lab is NOT work completed by the contract awardee (see Section V, Considerations, Item H. Research and Analytical Work).

4. Disclosures
Duplicate or overlapping work previously submitted to other agencies may not be submitted without full disclosure to all agencies. See Section III, Proposal Preparation, Item 10, Similar Proposals or Awards.

University employees participating on a SBIR award shall disclose their involvement and the use of university facilities to the Government. Disclosure should be provided to the university as well as their use of university facilities.

K. Corrective Actions

Fraudulent reports or other deliverables knowingly submitted under an awarded contract may result in termination of an active award. If the contract is terminated for fraud or any other illegal or improper activity the Government is entitled to recover, in addition to any penalty prescribed by law, the amount expended under the contract.

For any questions pertaining to your proposal or award, contact the DOT SBIR Program Director and/or SBIR Program Contracting Officer.

L. Additional Information

1. This solicitation is intended for informational purposes and reflects current planning. Although not expected there may be inconsistencies between the information contained in the 12.1 solicitation and the terms and conditions of any resulting SBIR contract. The terms of the contract once executed are controlling.
2. Before award of an SBIR contract, the offeror shall complete Online Representations and Certifications Application: <https://orca.bpn.gov>
3. The Government may request the offeror to submit additional management, personnel, and financial information to assure responsibility of the offeror.
4. The Government is not responsible for any monies expended by the offeror before award of any contract.
5. This solicitation is not an offer by the Government and does not obligate the Government to make any specific number of awards. Also, awards under this program are contingent upon the availability of funds.
6. The DOT SBIR Program is not a substitute for existing unsolicited proposal mechanisms. Unsolicited proposals shall not be accepted under the DOT SBIR Program in either Phase I or Phase II. For information pertaining to submission requirements for unsolicited proposals please go to the following web page: <http://www.volpe.dot.gov/procure/unsolguide.html>.
7. If an award is made pursuant to a proposal submitted under this solicitation, the contractor will be required to certify that they have not previously been, nor are currently being paid for essentially equivalent work by any agency of the Federal Government.
8. When purchasing equipment or a product with funds provided under the DOT SBIR Program, purchase only American made equipment and

products, to the extent possible in keeping with the overall purposes of the program.

9. In accordance with FAR 52.233-2, Service of Protest, the following Service of Protest procedures the Government Accountability Office (GAO), shall be served on the Contracting Officer (addressed as follows) by obtaining written and dated acknowledgement of receipt from:
Donald MacGee, DOT/RITA/Volpe Center,
55 Broadway, RVP-31, Cambridge, MA 02142-1093

VI. RESEARCH TOPICS

Phase I research topics for DOT Operating Administrations are listed below. These topics indicate the specific areas for which proposals are to be considered for acceptance by DOT. The topics are not listed in any order of priority. Each proposal submitted must respond to one (and only one) topic and/or focus area as described in this section. A proposal may, however, indicate and describe its relevance to other topics.

Topic number & Title	Maximum Number of Anticipated Awards	Estimated Award Amount Phase I	Estimated Award Amount Phase II*
<u>Federal Highway Administration</u>			
12.1-FH1 Coating Existing Concrete Barriers to Reduce Rollover Potential	2	\$150K	\$1M
<u>Federal Highway Administration</u>			
12.1-FH2 Fast Real Time Positioning using GNSS	1	\$150K	\$750K
<u>Federal Motor Carrier Safety Administration</u>			
12.1-FM1 Communicating Towed unit (Trailer) Vehicle Identification Number(s) (VIN) to the Powered Unit	1	\$150K	\$600K
<u>Federal Motor Carrier Safety Administration</u>			
12.1-FM2 Innovative Solutions to Effectively Enforce Anti-texting Rules on Commercial Motor Vehicle (CMV) Drivers	1	\$150K	\$600K
<u>Federal Railroad Administration</u>			
12.1-FR1 Locomotive Engine Exhaust Emissions Reduction Technology	1	\$150K	\$700K
<u>Federal Railroad Administration</u>			
12.1-FR2 Electronically Controlled Pneumatic Brake System Adaptor Development	1	\$150K	\$700K
<u>Federal Railroad Administration</u>			
12.1-FR3 Advanced Locomotive Energy Storage System	1	\$150K	\$700K
<u>Federal Transit Administration/Research and Innovative Technology Administration</u>			
12.1-FT1 Improved Transit Rider Experience	2	\$103K	\$750K
<u>Pipeline and Hazardous Materials Safety Administration</u> – one topic – three focus areas			
<p>Note: Small business concerns may submit a proposal for all three focus areas. Proposals addressing multiple focus areas for this topic <u>must be submitted separately</u>.</p> <ul style="list-style-type: none"> • <u>Focus area 1</u> 12.1-PH1 Seal Sensor Network for Point-of-Source Leak Detection • <u>Focus area 2</u> 12.1-PH2 Pipeline Systems with Integrated Health Monitoring • <u>Focus area 3</u> 12.1-PH3 Study, Develop and Demonstrate a Multi-channel Insert and Assembly for Cased Pipelines 			

*The Phase II funding level noted above is an estimate only, is subject to the availability of funds and/or the technical requirements to accelerate the development of a commercial product and/or innovation. Any changes to the Phase II estimated funding level listed above will be communicated to the small business after the completion of the Phase I project.

Federal Highway Administration (FHWA)

12.1-FH1 Coating Existing Concrete Barriers to Reduce Rollover Potential

There are thousands of miles of concrete barrier in place on the highways across the United States and many more miles used as temporary barriers in work zones. There are 5 typical concrete barrier shapes which have been used for years that generally have performed acceptably. The different shapes with their different design characteristics provide some tradeoffs with crash performance. It is well understood that the safety shape design incorporated to a varying degree in 4 of the designs cause the vehicle to ride-up the barrier face which dissipate kinetic energy. This can also be a contributing factor to vehicle rollover for lower angle crashes. The vertical wall that does not incorporate this safety shape (sloped faced) also performs acceptably but it increases the forces on occupants, lateral forces on the wall and under some conditions result in a high risk crash called head slap, where the occupants head makes contact with the wall which is usually fatal.

Recent research has identified there is a need to improve concrete barrier performance since the more commonly used safety shape designs have a tendency to induce vehicle rollover which can also be a very severe crash. The Midwest Roadside Safety Facility (located at the University of Nebraska) developed a better performing barrier that addressed the issues but to incorporate the features from this design would require reconstruction of the many thousands of miles of barrier. Other research performed by Texas Transportation Institute and published in NCHRP 554 showed that increased surface friction along the barrier face enhanced the rollover problem and warns exceeding a threshold. Subsequent unpublished barrier simulation by NCAC for FHWA showed that reducing the friction along the sloped surface reduces the rollover tendencies of TL-3 vehicles. Some limited testing was performed at the Texas Transportation Institute by impacting a bogie vehicle into portable concrete barriers coated with epoxy sealant (epoxy has extremely low friction properties and sometimes used to simulate ice for skid test). The coatings were not tough enough to withstand the impact and the results showed no benefits.

Therefore, to improve the performance of existing barriers and reduce vehicle rollover crashes, a coating, or other surface treatment for existing, in-place concrete barriers is sought that would provide a durable low friction material and, thereby, reduce the rollover potential of vehicles striking barriers. To be successful, the coating (or other surface treatment) should be:

1. The product should be low cost and easily installed in a traffic environment
2. Durable in an impact so performance is not reduced
3. Resist sunlight degradation

Expected Phase I Outcomes:

Outcomes expected from Phase I include a detailed concept that demonstrates the viability of creating a prototype that satisfies the issues identified above. Also a marketing strategy that anticipates the crashes that could be reduced and a possible deployment strategy based on a cost benefit approach.

Expected Phase II Outcomes:

Phase II outcomes may include identifying or developing a product and crash testing to verify product performance and durability. A field application under controlled conditions would be necessary to demonstrate ease of installation and test sections applied in real world conditions to demonstrate to the market the viability of this approach.

12.1-FH2 Fast Real Time Positioning using GNSS

Many developments in surface transportation are dependent on greater positioning accuracy as well as position integrity for improvements in safety, performance, and efficiency. Examples include:

- Construction (grading, paving, infrastructure mapping),
- Maintenance (line striping),
- Non-barrier separated toll or HOV lanes,
- Lane keeping,
- Infrastructure mapping, etc.

While some applications are available today using GPS, significant time is required for units to establish the accurate and trustworthy solutions needed to support them. New products that provide these capabilities at reasonable cost are needed if these capabilities are to become standard in vehicles.

It can also be said that radio navigation, as this area of technology is known, is a very quickly changing field that has shown and continues to show how innovative developers can be. Currently, there are some 40 + Global Navigation Satellite System (GNSS) satellites (Global Positioning System (GPS), Wide Area Augmentation System (WAAS), Global Navigation Satellite System (GLONASS), etc) available. In addition, a ground based infrastructure, with nearly 1500 reference stations, is providing GPS observables to the National Geodetic Survey's (NGS) Continuously Operating Reference Station (CORS) service on 1, 5, or 15 second intervals (see <http://beta.ngs.noaa.gov/CORS/NGSRealtimeGNSS/index.shtml>) is available. Other data, such as accurate ephemeris and atmospheric delay models, are available from other sources. Couple this with the development of nationwide broadband data networks and an entire new arena of applications can now be inexpensively and reliably implemented. Unfortunately, the industry is still focused on two markets: high accuracy survey applications using high end, expensive equipment and low accuracy, recreational grade inexpensive user equipment. Transportation applications that support safety, performance, and efficiency fall into a middle area that is not being exploited but is a large potential market.

This combination of data and availability has been used to a limited extent but has not been fully exploited. **The missing part of this is the availability of software to use this data to achieve fast resolution (less than 3 seconds) and achieve high accuracy (better than 1 decimeter) with high integrity (greater 99.9%).** This was recognized as a shortcoming in the recently completed National Position, Navigation, and Timing Architecture study undertaken by the Departments of Transportation and Defense (see <http://www.acq.osd.mil/nss/pnt/pnt.htm> for details).

While some theoretical work has been done to develop this concept, a marketable solution that could achieve a very accurate resolution with a high level of integrity in a short time period has not been proposed.

Expected Phase I Outcomes:

The first goal of this phase is to develop a theoretical algorithm for generating a sub-decimeter solution in 3 seconds using GPS satellite data and data collected from standard GNSS reference stations. This can be data provided by NGS or another source, but it must be publicly available data. The second goal is to implement this algorithm such that it can make use of live satellite data and data either streamed over an internet link or broadcast from one of the several low/medium frequency broadcast stations around the country.

Expected Phase II Outcomes:

Phase II will focus on developing a stand-alone product that provides the user community with integrity, accuracy, and fast solutions implemented in a finished cost effective product.

Federal Motor Carrier Safety Administration (FMCSA)

12.1-FM1 Communicating Towed unit (Trailer) Vehicle Identification Number(s) (VIN) to the Powered unit.

The primary mission of Federal Motor Carrier Safety Administration (FMCSA) is to reduce crashes, injuries and fatalities involving large truck and buses. One of the strategies employed to accomplish this goal is to foster innovative research in new or augmenting safety enhancing technologies and to facilitate faster deployment of proven systems. In collaboration with our industry partners and stakeholders, we continuously identify new opportunities of emphasis that can serve our agency goals and objectives towards improving highway safety. The opportunity outlined in this solicitation refers to a challenge that, if addressed robustly and cost-effectively, has the potential to further aid many ongoing USDOT safety, security, mobility and efficiency initiatives.

Background:

The Commercial Motor Vehicle freight movement in North America involves powered units (tractors, trucks, buses) that haul a variety of towed units (trailers) in often changing configurations. A sample overview of possible tractor-trailer configurations is outlined in Reference [1]. And due to the fact that the lifetime of a trailer is often much longer than tractors, tractors must work with a variety and age of trailers over the course of their use. To address various roadside, border crossing, smart parking, connected vehicle initiatives, FMCSA would like to explore robust and very cost effective mechanisms to communicate the trailer(s)' VIN(s) to the powered unit for some unique opportunities. The composition of the trailer VIN includes a number of trailer characteristics that are defined by NHTSA that can be decoded and used for a variety of reasons. (More details on Trailer VIN can be found on pages 15-20 in [2].)

Motivation:

FMCSA envisions that trailer VIN information, if transmitted to the tractor can be used in a number of ways to support various ongoing and future initiatives. For instance, by robustly identifying the accurate number of and characteristics of the attached Trailers, on-board safety systems resident on the tractor can be further optimized for performance.

FMCSA's Wireless Roadside Inspection (WRI) program can use trailer VIN information in the set of data wirelessly exchanged between a roadside unit and the tractor hauling the subject trailer(s). With this mechanism, tractor-trailer configuration at WRI nodes can be properly identified.

Wireless initiatives streamlining Border Crossing processes can use trailer VIN data in their exchange protocols and automatically determine if the attached trailers match the dispatch documentation.

USDOT's Connected Vehicle Program can use the trailer VIN information to determine the accurate number of hauled trailer units, total combination vehicle length, axle configurations, trailer body types, etc which would aid articulated vehicle handling within the Basic Safety Message (BSM) definitions.

Similarly, decoded trailer VIN information would aid Smart-Park initiatives with the knowledge of the tractor-trailer configuration and total length.

Research Objectives:

The purpose of this topic is to develop cost-effective solutions in the form of devices that can communicate trailer VIN(s) to the powered unit they are connected to. It is foreseen, but not required, that the high level architecture would be composed of a trailer based VIN transmitter and a tractor based VIN receiver and interpreter.

In general, there is little challenge in communicating a trailer's VIN to the tractor as a technical objective. It can be done wirelessly (Wi-Fi, Dedicated Short Range Communications (DSRC), etc) or over the power line using Power Line Carrier (PLC) protocol (solutions are not limited to these options). The challenge posed in this topic goes beyond the rather trivial ability to communicate a VIN from a trailer unit to a tractor and the Offerors must address these aspects listed below, among others, of the design challenge in their proposals.

The following are the general objectives, requirements and constraints:

1. Trailer transmitter unit shall be very cost effective. If this project is successful, vision is to support a decision to retrofit every single trailer in the field with a trailer transmitter.
2. The trailer transmitter units shall be programmed once when placed on the trailer. The tractor receiver unit shall not assume to have any a priori knowledge of the trailers attached to the tractor or how the trailer transmitter units may have been configured.
3. The driver/operator shall have no input to the proposed system. It shall be entirely automatic.
4. The primary purpose of the tractor receiver unit is to receive VINs, establish a valid number of VIN stack for the attached trailers to the powered unit and put this information on a databus where other devices can use it (such as the J1939 CAN bus). The Offeror's shall not spend any time on
 - a. Any display units for purposes of displaying such info to the driver,
 - b. Any ideas on how such trailer VIN information may be used.
 - c. How to decode VINs for meaningful interpretations.
5. The transmitter/receiver solution shall be able to accommodate the communication of –a minimum of- five (5) unique VINs during a given power cycle (triple trailer combination with two dollies).
6. It is highly desired (but not required) that the solution have a smart logic to be able to sort the VINs by their proximity to the tractor.
7. The bandwidth should be smartly used; during the course of the vehicle's operation VIN communication should not be needed continuously. The Offeror shall propose how to structure the use of bandwidth for this purpose. The general idea is to identify the events when the trailer configuration may be changed after first determination and engage re-communication at those instances.
8. Particularly if an over the air transmission based solutions (wireless) is proposed, the Offerors shall address
 - a. How to mitigate the privacy concerns associated with transmitting VINs.
 - b. How to prevent cross talk between surrounding units.

In addition to the above technical objectives, the Offerors are asked to discuss the logistics and governance structure that may be needed to implement their proposed solutions in a large scale deployment scenario. For this purpose, consider the hypothetical scenario where every trailer unit in the field will be retrofitted and every new trailer will be built with this device in the future. The particular segment of interest that needs the Offeror's attention is the Trailers that are already in service (not new builds). Offeror shall elaborate how their

proposed solution can be streamlined in a way that such a hypothetical mandate can be streamlined and carried out cost effectively and in a timely manner. Please discuss the additional devices, tools, governance structure that may be needed to make this a possibility with the proposed approach.

General concepts that need attention shall include the installation ease and costs; the process of programming the trailer VIN transmitter units (where, when, how, by whom); susceptibility of the units for tampering and/or failure in service; self diagnostics needs and solutions; governance structure that may be needed.

References:

- 1- Trucking 101, December 2010, <http://onlinepubs.trb.org/onlinepubs/circulars/ec146.pdf>
- 2- <http://www.nhtsa.gov/cars/rules/maninfo/newManf.pdf>

Expected Phase I Outcomes:

Outcomes expected from the Phase 1 include a detailed concept that demonstrates the viability of creating a prototype of the Contractor’s approach that satisfies the attributes described above for Trailer VIN transmission to the Tractor. In addition to the above technical objectives, the Contractor will need to discuss cost-benefit trade-offs, logistics and governance structures that may be needed to implement their proposed solutions in a large scale deployment scenario.

Expected Phase II Outcomes:

Phase 2 efforts include manufacturing and demonstration of a working prototype of the Contractor’s approach of transmitting Trailer VINs to the tractor in a number of combination vehicle configurations including multi-unit cases. Furthermore, a detailed experimental plan for assessing the robustness and accuracy levels of the solutions shall be developed and the process for implementing a retrofit concept shall be demonstrated for ease of installation, programming, verification, deployment, scalability etc. Finally, a scenario based preliminary cost-benefit analysis and/or projections shall be conducted in collaboration with USDOT.

12.1-FM2 Innovative Solutions to Effectively Enforce Anti-texting Rules on Commercial Motor Vehicle (CMV) Drivers

The primary mission of Federal Motor Carrier Safety Administration (FMCSA) is to reduce crashes, injuries and fatalities involving large truck and buses. One of the strategies employed to accomplish this goal is to foster innovative research in new or augmenting safety enhancing technologies, novel safety enforcement techniques and aides, as well as to facilitate faster deployment of proven systems. In collaboration with our industry partners and stakeholders, we continuously identify new opportunities of emphasis that can serve our agency goals and objectives towards improving highway safety. The opportunity outlined in this solicitation refers to a challenge that, if addressed robustly and cost-effectively, has the high potential to better enforce anti-texting rules dictated by FMCSA and help eliminate or substantially reduce a serious safety violation committed while driving.

Background:

“Texting while driving” is proven to be among the most dangerous acts a driver can commit. Based on the supporting research findings, FMCSA has issued a comprehensive anti-texting rule for majority of Commercial Driver’s License (CDL) holders yet robust, objective methods to enforce these rules on CMV drivers do not exist.

“Texting while driving” is the act of composing, reading or sending text messages or emails on a mobile device while operating a vehicle. “Texting on the wheel” diverts the full attention a truck driver must dedicate to navigating his/her vehicle away from this core task increasing the Odds Ratio of being involved in a Safety Critical event. Commercial Vehicle Driver Distraction studies showed that the Odds Ratio associated with Texting on a cell phone –while driving- is more than 20, as confirmed in 2 separate studies analyzing naturalistic driving data in 2009 and 2010 (See references [1], [2]). This ratio indicates that the risk factors

associated with being involved in a safety critical event while texting is at least 20-fold higher than during normal attentive driving.

Currently, 19 states and the District of Columbia have comprehensive laws prohibiting texting behind the wheel, [3], effects of which extend beyond the CMV drivers.

On the same subject area, the FMCSA has issued a final rule, effective October 27, 2010, banning texting by operators of commercial vehicles covering as many vehicle drivers as possible, within its statutory authority. It also narrowed an exception to the texting ban to prohibit texting—but not other functions—on a dispatching device or a device that is part of a fleet management system. Substantial CDL suspension and civil penalties are proposed for repeat violators of the anti-texting rules and for carriers who allow or require texting.

Purpose:

Despite the strictly scripted Anti-texting rules for CMV drivers, there are no robust means to enforce them without involving subjective observations or assessments by the enforcement officers. It is often presumed that the implied civil and suspension penalties are severe enough to act as a preventive measure. However, there have been no studies or experiments conducted to verify this assumption. Since the inception of the final rule, there have been only a few cases of cited violations. At the time of writing, there have been no recorded cases of CDL suspensions, nor has there been any civil penalties imposed on CDL drivers due to this rule. These statistics could suggest that anti-texting rule enforcement efficacy can be substantially improved.

A recent Highway Loss Data Institute (HLDI) study finds that there has not been observed benefits from anti-texting rules and hypothesizes two possible reasons for this observation: "texters may realize that texting bans are difficult to enforce, so they may have little incentive to reduce texting for fear of being detected and fined," or, texters may have responded to the ban by "hiding their phones from view, potentially increasing their distractive effects by requiring longer glances away from the road.", [4].

Today, most of the anti-cell phone and anti-texting laws are subjectively enforced based on suspicion or observation of violation by the enforcement officers. To make matters even more challenging, on a CMV truck cabs are often positioned higher than light vehicle compartments and visual based detection techniques for identification of texting violations are considered more difficult and rare.

Sample Solutions:

Historically, anti-texting and anti-cell phone use have been approached in two ways. (1) By preventing the use of all or certain functions of a cell phone (for texting, web surfing, making calls etc) when the vehicle is in operation [preventive measures via on-board safety system integration] (2) By identifying instances of texting-when-in-motion in the aftermath [detection based solutions after the act of violation].

Currently there are many companies that provide cell-phone use restricting solutions in the form of applications for smart phones. They often use the on-board GPS data or a link to vehicle databus to determine when the vehicle is in motion and disable cell-phone use while at speed with the exception of making emergency calls. These methods do not provide all encompassing solution, can often be overridden, and primarily depend on the choice to install, and the use of an application on the cell phone. Furthermore, it does not prevent the use of another cell phone which may not feature similar applications. NHTSA is currently carrying out an experiment assessing the efficacy of such systems in a light vehicle fleet environment based on the concept of voluntary participation. These solutions are seen as less feasible for a CMV operating environment due to longer driving periods. Some additional options are studied in the World Health Organization's (WHO) Distracted Driving report in [6].

Detection and enforcement of “texting that may have taken place while operating a vehicle” after the action takes place has not been researched deeply. Theoretically, there are databases that can be cross-checked to identify such instances. For instance, an Electronic On-Board Recorder (EOBR) has the ability to record the vehicle motion history and cell phone records that contain “texting” event records. Both of these databases can be synched with respect to a Universal coordinated time and could be cross-checked for violations. However, there are numerous existing privacy and data ownership rights issues that need to be researched. Furthermore, it should be understood that the proposed recommended solution may or may not fall within the legislative authority of FMCSA.

Objectives:

The primary research objective is to research existing and upcoming technologies that could be used to better enforce anti-texting laws for CDL holders operating CMVs. The relevant research should include but not be limited to the inventory of existing, foreseeable, feasible, and possible methods in North America and abroad:

- Cell-phone use blocking technologies and applications,
- Leveraging insurance company initiatives and potential future practices to access the insured individual’s cell phone records to determine their insurance premiums,
- Enforcement/promotion of applications that enable hands-free and voice-activated interactions of cell-phone operation,
- Possibilities of requiring or recommending wireless service providers
 - to log GPS speed with text message read/write date and timestamps
 - to broadcast a Bluetooth message every time texting is performed such that the event could be captured by a device such as an Electronic On-board Recorder (EOBR).

The general research objective is to formulate existing and possible options, their feasibility, risks, and costs and benefits of such options. It shall document the limitations (what it can and it cannot detect), capabilities, potential unintended consequences, misdetection sources and whether or not they can become feasible methods, tools or practices to enforce anti-texting rules. The approach can involve an on-board safety system dedicated to the objective, a handheld-tool for enforcement officers to detect violations in the field, and/or other creative methods that can near eliminate anti-texting law violations either in the form of preventive measures or corrective measures that rely on objective detection of committed violations.

Some constraints/objectives/notes for the research:

- Note that there may be other devices than cell phones on a given CMV that leverage cell-tower links and hence, proposed solutions shall not interfere with their operations (e.g. cellular signal jamming techniques may not be feasible).
- The Offerors must address how to make their proposed solutions robust. For example, if the proposed recommended solution is an application to run on a cell-phone which blocks its use when the vehicle is in motion, the Proposer must at least address 1) how to make the proposed application available on all legacy and future phone platforms including but not limited to smart phones, 2) how to assure applications would be loaded and used 3) how to overcome possibility of the driver bringing other phones on the vehicle that may not feature the said application.
- It is desired that the driver shall have access to his phone when stopped and interference from other vehicles operating around it shall not prevent its functions when stopped.

- The proposed solutions shall take into account the possibility of the operator bringing another cell phone on the vehicle than the one that may be provided by the carrier.
- FMCSA has a regulation, 392.60 [7], prohibiting the transportation of unauthorized persons on CMVs other than a bus.

To be considered responsive to this SBIR topic, it is not sufficient to propose a trade study and attach a capability statement. The Offerors are asked to describe outlines of novel options and think through the feasibility of a large scale deployed solutions. Please also consider and address costs, governance, privacy, robustness concerns in the project outline and approach.

References:

- 1- <http://www.fmcsa.dot.gov/facts-research/research-technology/tech/Distracted-in-Commercial-Trucks-and-Buses.pdf>
- 2- http://www.vtti.vt.edu/PDFs/FINAL%20VTTI%20press%20release_commercial%20trucks_10_28_10.pdf
- 3- <http://www.iihs.org/laws/cellphonelaws.aspx#IL>
- 4- <http://www.iihs.org/externaldata/srdata/docs/sr4510.pdf>
- 5- http://www.iihs.org/research/topics/pdf/HLDI_Bulletin_27_11.pdf
- 6- http://www.who.int/violence_injury_prevention/publications/road_traffic/distracted_driving_en.pdf
- 7- <http://www.fmcsa.dot.gov/rules-regulations/administration/fmcsr/fmcsrruletext.aspx?reg=392.60>

Expected Phase I Outcomes:

Outcomes expected from the Phase 1 include a detailed concept that demonstrates the viability of creating a prototype of the Contractor’s approach that satisfies the attributes described above. In addition, a high level cost-benefit analysis will be needed to assess the concept’s large scale deployment feasibility.

Expected Phase II Outcomes:

Phase 2 efforts include manufacturing and demonstration of a working prototype of the Contractor’s approach to validate its Anti-texting law enforcement improvements for commercial motor vehicle drivers. Furthermore, a detailed experimental plan for assessing the efficacy of the solution should be formulated along with updated cost-benefit projections based on Phase II activities and learnings.

Federal Railroad Administration (FRA)

12.1-FR1 Locomotive Engine Exhaust Emissions Reduction Technology

Rail transportation is one of the most environmentally friendly and energy efficient means of transportation for both passengers and freight. However, there are opportunities to improve upon these benefits and to extend their impact by further improving the efficiency and reducing the emissions associated with rail transportation and by increasing the proportion of our freight and passenger traffic which is moved by rail. The Federal Railroad Administration (FRA) is interested developing and demonstrating new and emerging technologies which support these goals. Successful proposals will need to include a limited lifecycle cost/benefit analysis to demonstrate the likelihood of a positive return on investment for implementation once commercialized. New locomotives will be required to achieve substantial reductions in nitrogen oxide (NOx) and particulate matter (PM) exhaust emissions by 2012 and 2015. Non-Urea solutions for engine emissions reduction are sought for the railroad applications which will have positive ROI when compared to UREA based solutions, and will

maintain or improve the efficiency of the locomotive engine. The development, adaptation, refinement of systems and/or subsystems which are likely to lead to the earliest and greatest real-world impact are sought.

Expected Phase I Outcomes:

Outcomes expected from the Phase I include a detailed concept that demonstrates the feasibility of developing a prototype that satisfies the attributes described above.

Expected Phase II Outcomes:

Phase 2 efforts include the manufacturing, demonstration and/or integration of the prototype system into a locomotive for real world testing.

12.1-FR2 Electronically Controlled Pneumatic Brake System Adaptor Development

Rail transportation is one of the most environmentally friendly and energy efficient means of transportation for both passengers and freight. However, there are opportunities to improve upon these benefits and to extend their impact by further improving the efficiency and reducing the emissions associated with rail transportation and by increasing the proportion of our freight and passenger traffic which is moved by rail. Electronically Controlled Pneumatic (ECP) Brake Systems show great promise for improving the operating efficiency and capacity of the railroad network. However these benefits cannot be realized unless entire trains, including locomotives, are equipped with ECP brakes. ECP brakes are currently incompatible with conventional brakes. There is a need for the development and application of cost effective adapters or emulators which will enable ECP equipped and conventional equipment to operate in the same train. The Federal Railroad Administration (FRA) is interested developing and demonstrating new and emerging technologies which support these goals. Successful proposals will need to include a limited lifecycle cost/benefit analysis to demonstrate the likelihood of a positive return on investment for implementation once commercialized.

Expected Phase I Outcomes:

Outcomes expected from the Phase I include a detail concept that demonstrates the feasibility of developing a prototype that satisfies the attributes described above.

Expected Phase II Outcomes:

Phase 2 efforts include the manufacturing, demonstration and/or integration of the prototype system into a locomotive for real world testing.

12.1-FR3 Advanced Locomotive Energy Storage System

Rail transportation is one of the most environmentally friendly and energy efficient means of transportation for both passengers and freight. However, there are opportunities to improve upon these benefits and to extend their impact by further improving the efficiency and reducing the emissions associated with rail transportation and by increasing the proportion of our freight and passenger traffic which is moved by rail. Opportunities exist for both freight and passenger operations to recover and store energy associated with braking operations. Additionally, advances in locomotive hybrid technologies enable locomotives to operate from battery power being charged from the locomotive's diesel engine, fuel cell system or shore power. For the most part, the enabling technologies already exist to create successful wayside and on-board energy storage systems; however, such systems have not been fully adapted to the railroad environment or require further development and refinement to create designs which are likely to yield a positive return on investment for implementation. The

development, adaptation, refinement of systems and/or subsystems which are likely to lead to the earliest and greatest real-world impact are sought. The Federal Railroad Administration (FRA) is interested in developing and demonstrating new and emerging technologies which support these goals. Successful proposals will need to include a limited lifecycle cost/benefit analysis to demonstrate to likelihood of a positive return on investment for implementation once commercialized. The following describes some of the general areas of potential interest.

Expected Phase I Outcomes:

Outcomes expected from the Phase I include a detailed concept that demonstrates the feasibility of developing a prototype energy storage system that is easily integrated into the locomotive power system, and can handle the harsh railroad environment and duty cycle; as well as satisfy the attributes described above.

Expected Phase II Outcomes:

Phase 2 efforts include the manufacturing, demonstration and/or integration of the prototype system into a locomotive for real world testing.

Federal Transit Administration (FTA) and Research and Innovative Technology Administration (RITA)

12.1-FT1 Improved Transit Rider Experience

Innovative, economical and durable technologies and devices or solutions that will improve and revolutionize the transit experience for the riding public. The innovations must be adaptable to existing bus and rail transit vehicles and systems. Project proposals must include a methodology on how it will use data to quantitatively demonstrate that their recommended technology innovations can truly improve rider experience or provide safer/greener transit. The subtopics could range from improved service reliability to information to on-time performance.

Sub-topic examples:

- Mobile technologies – mobile payment systems, real time traveler information Broadband communications - Multimedia experience
- Rail Transit Platform Barriers - rail transit systems suffer delays and expenses when persons or foreign objects fall from, are thrown from or blow off of rail transit platforms onto the tracks.
- Rail Transit Right of Way Barriers - simple, inexpensive and environmentally friendly barriers to keep people from entering the rail transit right of way.
- Fare Collection - how to verify fare payment in honor barrier-free systems using smart cards.
- Vertical Transportation - innovative ways to move people other than escalators
- Preserving transfers between bus and rail - how to keep transit passengers from missing their connections.

Expected Phase I Outcomes:

- a. A viable concept that demonstrates the practicability and interoperability of technology or solution in a vehicle, facility or operation in a transit environment to improve transit passenger experience
- b. Efficient and low cost technology
- c. Modular, plug and play and open source (if applicable) device
- d. Technology assessment with respect to industry best practices

- e. Feasibility analysis (data proven) for success in developing a working prototype

Expected Phase II Outcomes:

Phase II efforts include manufacturing and demonstrating a working prototype of the technology and device or solution with all of the above listed Phase I outcomes.

Pipeline and Hazardous Materials Safety Administration (PHMSA)

- **Note: Small Business Concerns may submit a proposal for all three focus areas. Proposals addressing multiple focus areas for this topic must be submitted separately.**

The biggest source of energy in the United States of America is petroleum, including oil and natural gas. Together, they supply 65 percent of the energy we use. According to the U.S. Energy Information Administration, oil furnishes 40 percent of our energy, natural gas 25 percent, coal 22 percent, nuclear 8 percent, and renewables make up 4 percent.

The nation's more than two million miles of pipelines safely deliver trillions of cubic feet of natural gas and hundreds of billions of ton/miles of liquid petroleum products each year. They are essential: the volumes of energy products they move are well beyond the capacity of other forms of transportation. It would take a constant line of tanker trucks, about 750 per day, loading up and moving out every two minutes, 24 hours a day, seven days a week, to move the volume of even a modest pipeline. The railroad-equivalent of this single pipeline would be a train of 75 2,000-barrel tank rail cars every day. These alternatives would require many times the people, clog the air with engine pollutants, be prohibitively expensive and -- with many more vehicles on roads and rails carrying hazardous materials -- unacceptably dangerous.

Pipeline systems are the safest means to move these products. The federal government rededicated itself to pipeline safety in 2006 when the PIPES Act was signed. It mandates new methods and makes commitments for new technologies to manage the integrity of the nation's pipelines and raise the bar on pipeline safety.

PHMSA safety jurisdiction over pipelines covers more than 3,000 gathering, transmission, and distribution operators as well as some 52,000 master meter and liquefied natural gas (LNG) operators who own and/or operate approximately 1.6 million miles of gas pipelines, in addition to over 200 operators and an estimated 155,000 miles of hazardous liquid pipelines. This supply of energy has too often been disrupted by pipeline leaks that can pose a threat to public safety. In addition, damage from excavation is the leading cause for in-field utilities disruption.

For Pipeline Safety, research is sought toward the development of the following innovative technologies and methods in both hazardous liquid and or natural gas pipelines.

Areas of interest include but are not limited to:

Focus Area 1. 12.1-PH1 Seal Sensor Network for Point-of-Source Leak Detection

'Advanced seals', 'gaskets', and 'repair patches' having integrated leak detection sensors are desired to provide capability for point-of-source leak detection across sealed fastened fittings having seals and gaskets, as well as across composite repair patches. Example uses of advanced seals and gaskets include flanged fittings sealed having o-ring seals, matting surfaces sealed using gaskets, threaded fittings having compression fittings, and valve stem seals. There is a need for advanced seal sensor networks to detect leaks and monitor seal health in pipeline pumping stations, pipeline valves, and pipeline repairs. The seal sensor network could be made-up of seals having integrated sensors that are networked with the capability to communicate state-of-the-system status to distributed intelligent controllers that are placed in both populated and remote locations. A distributed control architecture using localized control agents is envisioned to provide a robust system topography that does

not have the single-point-of-failure vulnerability associated and linkage with centralized supervisory control systems.

Proposals are sought to study, develop and demonstrate new point-of-source leak detection techniques and seal sensor networks for use in hazardous material and gas transmission/distribution pipeline systems.

Expected Phase I outcomes:

Phase I activities may include research into micro sensing technology capable of being integrated within seals, the development of conceptual designs for seal sensors, the definition of the supporting network topography, and a proof-of-concept prototype to demonstrate the feasibility of a select smart seal concept.

Additional activities in the Phase I report could include establishing whole solution costs, value calculations, detailed technical and market analysis of target applications, market research and analysis of additional potential applications. These activities are designed to provide justification towards a carry-on Phase II effort.

Expected Phase II outcomes:

Phase II outcomes may include product prototyping, testing then designing and building deployable systems followed by analysis/testing in field environments.

Focus Area 2. 12.1-PH2 Pipeline Systems with Integrated Health Monitoring

Advanced pipeline technology is envisioned that provides point-of-source leak detection and health monitoring of pipeline containment structures including cased pipes, and surge tanks. There is a need for advanced monitoring systems that have integrated sensor functionality to detect leak progression through containment walls, thinning of walls due to corrosion and erosion, as well as the breakdown and leakage of containment structure. The sensor laden containment structures are envisioned as being networked with the capability to communicate state-of-the-system status to distributed intelligent controllers that are themselves networked using a topography that does not rely upon a centralized supervisory controller having a single-point-of-failure vulnerability.

Proposals are sought to study, develop and demonstrate new point-of-source leak detection techniques and sensor networks for use in containment structures of hazardous material and gas transmission/distribution pipeline systems.

Expected Phase I outcomes:

Phase I activities may include research into micro sensing technology capable of being integrated at various locations within the pipeline transmission/distribution infrastructure; development of conceptual designs; definition of supporting network topography; and a proof-of-concept prototype to demonstrate the feasibility of a selected components within the integrated health monitoring pipeline system..

Additional activities in the Phase I report could include establishing whole solution costs, value calculations, detailed technical and market analysis of target applications, market research and analysis of additional potential applications. These activities are designed to provide justification towards a carry-on Phase II effort.

Expected Phase II outcomes:

Phase II efforts may include product prototyping, testing then designing and building deployable systems followed by analysis/testing in field environments.

Focus Area 3. 12.1-PH3 Study, Develop and Demonstrate a Multi-Channel Insert and Assembly for Cased Pipelines

Currently, inspection and assessment of pipe condition in cased pipelines is mostly limited to direct and in-line assessment methods such as ILI tools, open-cuts, ultrasonic's inspection and External Corrosion Direct Assessment (ECDA) practices. These methods are expensive, time consuming, and do not fully prevent leaks, failures and damage to life, property and the environment. Corrosion and integrity issues continue to jeopardize public safety and leak detection continues to present a significant challenge, especially for small leaks. While pipelines remain inherently vulnerable to both accidents and deliberate disruption due to their number and dispersion, making pipeline safety and security closely intertwined.

Recent technological innovations offer potential enhancements to pipeline safety, security and reliability with new assessment techniques, including an improved ability to find and eliminate problems before they become hazardous. While new pipeline monitoring technologies, such as continuous leak detection, corrosion monitoring, and motion sensing continue to emerge and improve, the difficulty remains of how to apply such advances to the existing infrastructure of cased pipelines.

While cased containment systems eliminate the need for external cathodic protection and also provide leak containment, traditional designs can only provide a limited capability for leveraging continuous-run monitoring technologies, especially once the pipeline is buried underground, as the internal support structure (sometimes referred to as "spacers", "spiders", or "doughnuts") impede utilization of the available interior space between the carrier and containment pipes.

Subsequently, a gap in technology available is evident. An envisioned solution could comprise an improvement on the existing casement configuration that will enable best in class problem detection and containment over the life of the pipeline by maximizing the utilization of double casing interior space for multiple monitoring technologies in such a way that it is easily accessed once the pipeline is buried.

In this focus area, applications are sought to study, develop and demonstrate new concepts of multi-channel insert and assembly for cased pipelines.

The applicant will study, develop and test a novel pipeline insert and assembly that creates multiple separate and independent linear compartments within the interior space of a cased piping system and that will support the carrier pipe within the containment pipe. Anticipated results will include enabling the use of multiple monitoring technologies, such as leak detection, motion sensing, wall thickness measurement and corrosion monitoring in the same pipeline. Besides facilitating initial installation and ongoing operation of multiple technologies, it should enable forward compatibility of the cased pipeline with future monitoring technologies yet to be developed, as new monitoring systems should be able to be easily run through the annular chambers along the length of the pipe.

Expected Phase I outcomes:

Phase I activities may include a complete feasibility study, including analysis of product and whole solution costs, value calculations, detailed technical and market analysis of target applications, market research and analysis of additional potential applications.

Expected Phase II outcomes:

Phase II activities may include product prototyping, testing then designing and building deployable systems followed by analysis/testing in field environments.

VII. SUBMISSION FORMS AND CERTIFICATIONS

1. PROPOSAL COVER SHEET Appendix A
2. PROJECT SUMMARY Appendix B
3. CONTRACT PRICING PROPOSAL Appendix C
4. PROPOSAL CHECKLIST Appendix D
(Do not include with your proposal – for your use only)

**U.S. DEPARTMENT OF TRANSPORTATION
SMALL BUSINESS INNOVATION RESEARCH PROGRAM
SOLICITATION NO. DTRT57-12-R-SBIR1
FY12.1**

PROPOSAL COVER SHEET

Project Title	
Research Topic No.	
Research Topic Title	
Submitted by:	Company Name
	Address
	City, State, Zip
Representations & Certifications	Central Contractor Registration Valid Until _____(Date) www.ccr.gov
	Online Representations and Certifications Valid Until _____(Date) https://orca.bpn.gov/login.aspx
Amount Requested \$ (May be up to \$150, 000 unless otherwise indicated)	
Proposed Duration (in months) (Not to exceed 6 months)	

By signing and submitting this coversheet under Solicitation No. DTRT57-12-R-SBIR1, Topic No. _____, certifies that:

1. The above firm, together with its affiliate's _____ is _____ is not a small business firm and meets the definition stated in Section II.B; and that it meets the eligibility requirement in Section I.C.
2. The SBIR Applicant is (check one):
 - a. at least 51% owned and controlled by one or more individuals who are citizens of the United States, or permanent resident aliens in the United States; or
 - b. at least 51% owned and controlled by another business concern that is itself at least 51% owned and controlled by individuals who are citizens of, or permanent resident aliens in the United States; or
 - c. a joint venture in which each entity to the venture meets the requirements set forth in 2.a or 2.b above.
3. The above firm, _____ will _____ will not primarily employ the Principal Investigator at the time of award and during the conduct of research.
4. The above firm _____ does _____ does not qualify as a socially or economically disadvantaged small business as defined in Section II.C. (For statistical purposes only.)
5. The above firm _____ does _____ does not qualify as a women-owned small business as defined in Section II.D. (For statistical purposes only.)
6. The above firm _____ does _____ does not qualify as a HUB Zone-owned small business and meet the definition as stated in this Section II. F
7. The above firm and/or Principal Investigator _____ has, _____ has not submitted proposals containing the same, or a significant portion of equivalent or overlapping work to other Federal agencies. (If yes, identify proposals in the Section III. D.10. "Similar Proposals".)
8. The above firm and/or Principal Investigator _____ has, _____ has not been funded under any other Federal grant, contract or subcontract program solicitations, or has received other Federal awards to conduct essentially equivalent work or overlapping work. (If yes, identify proposals in the Section III. D.10. "Awards".)
9. The Principal Investigator's primary employment _____ is, _____ is not with the above firm.
10. The above firm _____ will, _____ will not permit the Government to disclose the title and technical abstract of your proposed project, plus the name, address, and telephone number of the Corporate/Business Official and Principal Investigator of your firm, if your proposal is recommended for award, to any party that may be interested in contacting you for further information?

By signing and submitting this proposal in response to Solicitation No. DTRT57-12-R-SBIR1, Topic No. _____, I am representing on my own behalf, and on behalf of the SBIR applicant, that the information provided in this certification, the application, and all other information submitted in connection with this application, is true and correct as the date of the submission. I acknowledge that any intentional or negligent misrepresentation of the information contained in this certification may result in criminal, civil or administrative sanctions, including but not limited to: (1) fines, restitution and/or imprisonment under 18 U.S.C. § 1001; (2) treble damages and civil penalties under the False Claims Act (31 U.S.C. § 3729 *et seq.*); (3) double damages and civil penalties under the Program Fraud Civil Remedies Act (31 U.S.C. § 3801 *et seq.*); (4) civil recovery of award funds, (5) suspension and/or debarment from all Federal procurement and non-procurement transactions (FAR Subpart 9.4 or 2 C.F.R. part 180); and (5) other administrative penalties including termination of SBIR awards.

Principal Investigator

Name _____

Title _____

Signature _____ Date _____

Telephone No. _____

E-mail _____

Corporate/Business Official

Name _____

Title _____

Signature _____ Date _____

Telephone No. _____

E-mail _____

PROPRIETARY NOTICE (IF APPLICABLE, SEE SECTION V.D.1)

**U.S. DEPARTMENT OF TRANSPORTATION
 SMALL BUSINESS INNOVATION RESEARCH PROGRAM
 SOLICITATION NO. DTRT57-12-R-SBIR1
 FY12.1
 PROJECT SUMMARY**

Name and Address of Offeror	
	Proposal No.

Name and Title of Principal Investigator

Project Title

Research Topic No.	Research Topic Title
--------------------	----------------------

Technical Abstract (Limited to two hundred words in this space only with no classified or proprietary information/data).

Anticipated Results/Potential Commercial Applications of Results.

Provide key word (eight maximum) description of the project useful in identifying the technology, research thrust, and/or potential commercial application.

**U.S. DEPARTMENT OF TRANSPORTATION
SMALL BUSINESS INNOVATION RESEARCH PROGRAM
CONTRACT PRICING PROPOSAL
FY12.1**

Topic No:				
Offerors Project Title:				
Name of Offeror:				
Address:				
City, State, Zip:				
Offerors Point of Contact:				
Title of Offerors Point of Contact:				
Telephone:				
E-mail:				
DUNS No. If available:				
Tax Identification No. If available:				
To best of my knowledge and belief, cost and pricing data are true and complete, and current as of the date of signature below. I understand that the willful provision of false information or concealing a material fact in this report or any other communication submitted to DOT is a criminal offense (U.S. Code, Title 18, Section 1001).				
THE COST PROPOSAL MUST BE SIGNED BY A RESPONSIBLE OFFICIAL OF THE FIRM. Authorized Company Officer: Printed Nme _____ Title _____ Signature _____ Date _____				
1	Total Firm Fixed Price Proposal Amount			\$ _____
2.	Direct Material Costs			
	a. Purchased Parts & Subcontracted Items			\$ _____
	Description	Unit Price	Qty	Total
	b. Raw Materials			\$ _____
	Description	Unit Price	Qty	Total
	c. Standard Commercial Items			\$ _____
	Description	Unit Price	Qty	Total
	Total Direct Materials (TDM)			\$ _____
3	Materials Overhead			
			Rate	Amount
	Total Material Overhead (TMO)			\$ _____ %
4	Total Materials (TDM + TMO)			\$ _____
5	Direct Labor			

Topic No:				
Offerors Project Title:				
Name of Offeror:				
	Type / Personnel	Hours	Rate (\$ / Hr)	Cost
				\$
				\$
				\$
	Total Direct Labor (TDL)			\$
6	Labor Overhead (TDL x Overhead Rate)			
		Rate	Amount	
	Total Labor Overhead (TLO)		%	\$
7	Labor: Fringe Benefits (TDL x Benefit Rate)			
		Rate (% or \$ / Hr)	Amount	
	Fringe Benefits			\$
8	Total Labor (TDL + TLO + Fringe)			Amount \$
9	Direct Costs: Special Testing (Include field work at Government installations)			
	Item and Anticipated Use	Unit Cost	Estimated Cost	
			\$	
			\$	
			\$	
			\$	
	Estimated Total Special Testing			\$
10	Direct Costs: Special Equipment			
	Item and Anticipated Use	Unit Cost	Amount	
			\$	
			\$	
			\$	
	Estimated Total Special Equipment			\$
11	Direct Costs: Travel			
	Travel Location	Mode of Travel	Number of Trips	Per Diem
				Amount
				\$
				\$
	Travel			\$
12	Direct Costs: Consultant Services			
	Description of Service			Amount
				\$
				\$
	Total Consultant Services			\$
13	Direct Costs: Other Direct Costs (ODC)			
	Item & Anticipated Use	Unit Cost if applicable	Amount	
			\$	
			\$	
			\$	
	Total ODCs			\$
14	Total Direct Costs (TDC) (Sums of Line No. 9 – 13)			Amount \$

15	General & Administrative Expense (Total Materials + Total Labor + Total ODC) x Rate)	
		Rate % \$
16	Royalties	
	Description	Amount
	Total	\$
17	Total Cost (Sums of lines 4, 8, 14, 15 & 16)	Amount \$
18	Profit (Total Cost x Profit Rate)	Calculated Amount \$
19	Total Firm Fixed Price Amount (Total Cost + Profit)	\$
20	An executive agency of the United States Government ____ has ____ has not performed any review of your accounts or records in connection with any other Government prime contract or subcontract within the past twelve months? If one has, then provide a copy of the audit report and the name and address of the reviewing office, name of the individual and telephone/extension below _____ _____	
21	Government property ____ is ____ is not required in the performance of this proposal? If yes, identify. _____ _____	
22	Government contract financing ____ is, ____ is not required to perform this proposed contract? If yes, specify type as advanced payments or progress payments.	

**U.S. DEPARTMENT OF TRANSPORTATION
SMALL BUSINESS INNOVATION RESEARCH PROGRAM
SOLICITATION NO. DTRT57-12-R-SBIR1
FY12.1
PROPOSAL CHECKLIST**

This is a CHECKLIST OF REQUIREMENTS for your proposal. Please review the checklist carefully to assure that your proposal meets the DOT SBIR requirements. Failure to meet these requirements may result in your proposal being returned without consideration. (See Sections III of this Solicitation). **Do not include this checklist with your proposal.**

- ___ 1. The proposal reflects the fact that for Phase I a minimum of two-thirds (and for Phase II a minimum of one-half) of the research and/or analytical effort will be performed by the proposing firm as required (see Sections V.H.1 and V.H.2) and the primary employment of the principal investigator (for both Phase I and Phase II) must be with the small business firm at the time of award and during the conduct of the proposed research as required (see Section I.C).
- ___ 2. The proposal is 25 PAGES OR LESS in length. This limitation does not apply to the additional information required by Section III.G.
- ___ 3. The proposal is limited to only ONE of the research topics in Section VI.
- ___ 4. The proposal budget **may be up to \$150,000 unless otherwise indicated in the solicitation** and duration does not exceed six months.
- ___ 5. The technical abstract contains no proprietary information, does not exceed 200 words, and is limited to the space provided on the Project Summary sheet (Appendix B).
- ___ 6. The proposal contains no type smaller than ten point font size.
- ___ 7. The COVER SHEET (Appendix A) has been completed and is PAGE one and two of the proposal.
- ___ 8. The PROJECT SUMMARY (Appendix B) has been completed and is PAGE three of the proposal.
- ___ 9. The TECHNICAL CONTENT of the proposal begins on PAGE four and includes the items identified in SECTION III.D of the Solicitation.
- ___ 10. The Contract Pricing Proposal (Appendix C) has been signed included as the last section of the proposal.
- ___ 11. The additional information on prior Phase II awards, if required, in accordance with Section III.G.
- ___ 12. The proposal must be a PDF file and submitted online by 11:59 p.m., December 12, 2011. **Proposals may only be submitted online, a link to the web form can be found here: <http://www.volpe.dot.gov/sbir/current.html>. Proposals received via email will not be accepted. Do not send duplicate proposals via email.** Instructions for online submission are included on the submission page.