



**U. S. Department  
of Transportation**

Office of the Secretary  
of Transportation

## **PROGRAM SOLICITATION**

### **Small Business Innovation Research Program (SBIR)**

**Issue Date: October 8, 2010**

**Closing Date: December 13, 2010**

**Small Business Innovation Research (SBIR) Program Office, RVA-20  
John A. Volpe National Transportation Systems Center  
U.S. Department of Transportation  
Research and Innovative Technology Administration  
55 Broadway  
Cambridge, MA 02142-1093**

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Technical questions pertaining to the FY11.1 DOT SBIR solicitation research topics must be submitted to the SBIR Program Office by email to Linda.Duck@dot.gov

Technical questions submitted after the December 8, 2010 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. The Program is currently operating under a continuing resolution.

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) To stimulate technological innovation;
- (2) To use small business to meet Federal R/R&D needs;
- (3) To increase private sector commercialization of innovations derived from Federal R/R&D; and
- (4) To foster and encourage participation by minority and disadvantaged persons in technological innovation.

In consonance with the statutory obligations of the Act, the DOT has established a Small Business Innovation Research Program which will be referred to as the 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 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 generally 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 are eligible to participate in Phase II which is by invitation only and subject to the availability of funding.**

**Phase II.** Phase II is the principal R/R&D effort having a period of performance of approximately two years with a dollar value of up to \$1,000,000 unless otherwise noted. DOT will accept Phase II proposals only from firms which have previously received a DOT Phase I award. Phase II proposals must be prepared in accordance with guidelines provided by DOT to Phase I awardees receiving an invitation to submit a Phase II proposal. Phase II awards will be based on the results of Phase I efforts, technical merit, agency priority, commercialization potential, and the availability of appropriated funds to support the Phase II effort. Special consideration may be given to proposals that have obtained commitments for follow-on funding from non-Federal sources for Phase III.

**Phase IIB.** In FY 2011, the DOT SBIR Program will pilot a Phase IIB Enhancement Program. DOT agencies interested in participating in the pilot will reserve a portion of their SBIR budget to fund Phase IIB contracts. The intent of the Program is to advance and/or accelerate current active Phase II SBIR-funded technologies towards commercialization. These contracts will be a one time bridge award to the most promising Phase II project(s) and are subject to the availability of funding. 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 IIB technical proposal. Evaluation criteria will focus on commercialization potential.

**Phase III.** SBIR Phase III award logically follows SBIR Phase II and may be a continuation of the work under Phase II or commercialization of the research under the previous SBIR phases. Like SBIR Phase II, the award process is exempted from FAR subpart 5.2 requirements. Only those small businesses that were awarded both a SBIR Phase I and Phase II may receive a SBIR Phase III award. There is no limit on the period of performance or dollar value of a SBIR Phase III, and the small business size limits for Phase I and Phase II awards do not apply to SBIR Phase III awards.

Phase III is to be conducted by the small business with either:

- non-Federal funds to pursue commercial applications of R/R&D funded in Phases I and II, or
- non-SBIR Government funded contracts for continued research or products or processes intended for use by the U.S. Government.

### C. Eligibility

Each 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** unless otherwise approved by the Contracting Officer. Primary employment means that more than one-half of the principal investigator's time is spent with the small business. Also for both Phase I, Phase II and IIB, 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, 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.

### D. 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. An organization 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, and 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.**

Commercialization is the objective of Phase III, in which private capital or non-SBIR funds are to be used to continue the innovative research supported by DOT under Phase I, Phase II and IIB.

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 , RVA-20  
John A. Volpe National Transportation Systems Center  
U.S. Department of Transportation  
Research and Innovative Technology Administration  
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 and Phase II 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 business entities in the joint venture;
- (3) Is (i) at least 51 percent 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 concerns is one that is at least 51 percent 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 percent 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 (HUBZone)**

A HUBZone small business concern is one that meets the following criteria:

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

- a) A qualified census tract (as defined in Section 42(d)(5)(i)(I) of the Internal Revenue Code of 1986);
- b) 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
- c) 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 HUB Zone.

#### **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 13, 2010.
- 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 U.S. DOT engineers and/or scientists responsible for evaluating your proposal.

#### B. **Proposal Cover Sheet**

Complete the Proposal Cover Sheet in Appendix A as Page one of your proposal. All pages shall be numbered consecutively, beginning with the Proposal Cover Sheet.

#### C. **Project Summary**

Complete the form in Appendix B as Page 2 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 form.

#### 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 his or her 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.
- (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. Warning — 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 identical proposals or proposals containing a significant amount of 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.

#### 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 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 toward the proposal 25-page count limitation.)



## IV. METHOD OF SELECTION AND EVALUATION CRITERIA

### A. General

All Phase I and Phase II 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 and may elect to fund several or none of the proposed approaches to the same topic.**

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 IIB 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) Commercialization potential will be factors for both Phase II and IIB.

### 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 further consideration.** 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 eight to 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

**Contact with DOT relative to this solicitation during the Phase I proposal preparation and evaluation period is restricted for reasons of competitive fairness. Technical questions pertaining to the FY11.1 DOT SBIR solicitation research topics must be submitted to the DOT SBIR Program Office by e-mail to: [Linda.Duck@dot.gov](mailto:Linda.Duck@dot.gov). Technical questions submitted after December 8, 2010 may not be answered before the solicitation closing date.**

No information on proposal status will be available until the complete list of FY11.1 Phase I Award Recommendations is posted on the DOT SBIR Program Webpage: <http://www.volpe.dot.gov/sbir>. For planning purposes the notification of FY11.1 Phase I Award Recommendations are expected to be posted on the DOT SBIR Program web page by 5 PM Eastern Time, on/or about Friday, February 15, 2011. **Phase I proposals which are not included in the list of FY11.1 Phase I Award Recommendations will not**

**receive an award. NO WRITTEN  
CORRESPONDENCE REGARDING PROPOSAL  
STATUS WILL BE ANSWERED.**

After the FY11.1Phase 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.

Debriefing requests should be submitted to the SBIR  
Program Contracting Officer by e-mail to:  
[Darren.Shaffer@dot.gov](mailto:Darren.Shaffer@dot.gov), and must include the offeror's  
name, address, research topic number, and the proposal  
identification number assigned on the acknowledgement of  
receipt card. The identity of the evaluators will not be  
disclosed.

## V. CONSIDERATIONS

### A. Awards

The Government anticipates awarding approximately **8** Phase I contracts with the potential for additional 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 in Section VI.

All Phase I awards will be firm fixed price contracts and may be funded up to \$150,000 each unless otherwise noted. Phase II and Phase IIB awards will be either cost-plus-fixed-fee or fixed fee contracts or some combination of the two. Phase II contracts can be funded up to \$1,000,000 each unless otherwise noted. Phase IIB awards of up to \$250,000 extend the period of performance to 1 year. Phase IIB awards over \$250,000 extend the period of performance to 2 years. All Phase IIB awards will be subject to availability of funding.

#### **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 IIB 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 Aviation Administration (FAA), 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

Under Phase I SBIR contracts, 3 reports will be required, consisting of 2 interim letter reports, and a comprehensive final report.

### 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.

### 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 term "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 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 Department of Transportation (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 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 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 IIB, 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. Contractor Commitments**

Upon award of a contract, the awardee will be required to make certain legal commitments through acceptance of numerous 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 perform the work contracted.
  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 Federal Acquisition Regulation 52.245-1 Government Property (June 2007) clause (and Small Business Innovation Research (SBIR) Program Policy Directive, Section 8 (c).  
  
FAR: <https://www.acquisition.gov/far/index.html>  
  
SBIR Policy Directive:  
<http://www.sba.gov/aboutsba/sbaprograms/sbir/sbirstir/index.html>
  18. **Contractor Policy to Ban Text Messaging While Driving:**
    - a) *Definitions.* The following definitions are intended to be consistent with the definitions in DOT Order 3902.10 and the Executive Order (EO). For clarification purposes, they may expand upon the definitions in the E.O.  
  
"Driving"----  
(1) Means operating a motor vehicle on a roadway, including while temporarily stationary because of traffic, a traffic light, stop sign, or otherwise.

(2) It does not include being in your vehicle (with or without the motor running) in a location off the roadway where it is safe and legal to remain stationary.

"Text messaging" means reading from or entering data into any handheld or other electronic device, including for the purpose of short message service texting, e-mailing, instant messaging, obtaining navigational information, or engaging in any other form of electronic data retrieval or electronic data communication. (See definition in DOT Order 3902.10)

b) In accordance with Executive Order 13513, Federal Leadership on Reducing Text Messaging While Driving, October 1, 2009, and DOT Order 3902.10, Text Messaging While Driving, December 30, 2009, contractors and subcontractors are encouraged to:

(1) Adopt and enforce workplace safety policies to decrease crashes caused by distracted drivers including policies to ban text messaging while driving—

(i) Company-owned or -rented vehicles or Government-owned, leased or rented vehicles; or

(ii) Privately-owned vehicles when on official Government business or when performing any work for or on behalf of the Government.

(2) Conduct workplace safety initiatives in a manner commensurate with the size of the business, such as---

(i) Establishment of new rules and programs or re-evaluation of existing programs to prohibit text messaging while driving; and

(ii) Education, awareness, and other outreach to employees about the safety risks associated with texting while driving.

(c) *Subcontracts*. The Contractor shall insert the substance of this clause, including this paragraph (c), in all subcontracts that exceed the micro-purchase threshold, other than subcontracts for the acquisition of commercially available off-the-shelf items.

**J. Additional Information**

1. This solicitation is intended for informational

purposes and reflects current planning. If there is any inconsistency between the information contained herein and the terms of any resulting SBIR contract, the terms of the contract 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 he or she has not previously been, nor is 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 shall be followed. Protests, as defined in Section 33.101 of the FAR that are filed directly with an agency, and copies of any protests that are filed with the Government Accountability Office (GAO), shall be served on the Contracting Officer (addressed as follows) by obtaining written and dated acknowledgement of receipt from: Darren Shaffer, 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 as described in this section. A proposal may, however, indicate and describe its relevance to other topics.

### **DOT OPERATING ADMINISTRATION/TOPIC**

### **MAXIMUM PHASE I AWARDS**

#### **FEDERAL AVIATION ADMINISTRATION**

**2 AWARDS**

11.1-FA1 Studies in Habitability of Extended Human Spaceflight

11.1-FA2 Law, Policy and Practices That May Impede the Emerging Commercial Space Industry

#### **FEDERAL HIGHWAY ADMINISTRATION**

**4 AWARDS**

<sup>1</sup>11.1-FH1 Smartphone Signal Alert Status

<sup>1</sup>11.1-FH2 Augmenting Inductive Loop Vehicle Sensor Data with SPAT and GrID (MAP) via Data Fusion

<sup>1</sup>11.1-FH3 Oversize Vehicle Detection and Warning System

<sup>1</sup>11.1-FH4 Intelligent Ridesharing in Real-Time

#### **PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION**

**2 AWARDS**

11.1-PH1 Study, develop and demonstrate advanced deformation measurement tools for transmission and or distribution pipelines

11.1-PH2 Development of a non-destructive, quantitative residual stress assessment tool

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<sup>1</sup> Phase I may be up to \$100,000 and Phase II \$750,000

## **Federal Aviation Administration (FAA)**

### **11.1-FA 1 Studies in Habitability of Extended Human Spaceflight**

The emerging commercial space industry is progressing along many market segments, including suborbital flight vehicles, orbital launch vehicles, and human-carrying transportation vessels (e.g. capsules, space planes, etc.). The traditional processes and procedures that have been pioneered by government space agencies (in the U.S. and abroad) have been evolving over time mainly through internally-suggested improvements and efficiencies. Now that the realization of commercial orbital transportation of private citizens and paying customers seems to be nearing, new processes and procedures should be explored to maximize flexibility and options for both the launch providers as well as the people being transported. This task is intended to (a) baseline the current processes and procedures as employed by all space-faring nations that have transported humans (i.e., United States, Russia, China), and (b) identify possible areas of modification or increased efficiencies that do not reduce the safety of the operations or to any of the personnel, crew, or spaceflight participants involved.

### **11.1-FA2 Law, Policy and Practices That May Impede the Emerging Commercial Space Industry**

Whether through statute, regulations, or business practice, some government laws and policies have the effect of hampering competition. This task would (a) identify the laws and regulations that affect the domain of the emerging commercial space industry, (b) research these laws and regulations to determine what effects they have on encouraging the emerging commercial spaceflight industry, and (c) determine whether and what changes should be advocated as envisioned under the original Executive Order signed by President Reagan.

## **Federal Highway Administration (FHWA)**

### **11.1-FH1 Smartphone Signal Alert Status**

Pedestrian and bicyclists have high exposure to vehicle crashes - on average, a pedestrian is killed in a traffic crash every 120 minutes and injured in a traffic crash every 8 minutes (NHTSA, 2008 Traffic Safety Facts). Providing information and/or alerts to pedestrians and cyclists can mitigate such risks. The purpose of this research shall be to develop Smartphone applications that can operate on the iPhone, Android, and Blackberry platforms enabling pedestrians and cyclists to receive information about traffic signal status for intersections that the user is anticipated to enter.

This research will build upon available commercial technology that is capable of detecting the traffic signal status and placing that information on the Internet. The Smartphone application shall be capable of determining the user's position, the intersections that user will enter, and the signal phase that the user will encounter upon reaching the intersection.

The approach could incorporate local (e.g., at the intersection) detection of the traffic signal status, centralized knowledge of the traffic signal status, or some combination of both. The "traffic signal status" of the intersection shall include both the status of the traffic signal heads and the status of any pedestrian walk signals. The data required for this application may include the timing plans and current status of the traffic signals and pedestrian walk signals as well as any geometric/geospatial intersection description data necessary to map the user to the intersection.

The application shall be capable of providing an audible and haptic alert to the user to inform the user about the potential for a crash risk upon entering the intersection when the user may not have a safe crossing phase. The application shall be capable of providing other forms of alerts to people with hearing or vision impairments and special needs; including specialized alerts for users who rely on mobility supportive devices (e.g. walkers, wheelchairs).



Phase I funding will be directed towards the development of a concept of operations and also a set of detailed requirements. Phase II funding will be directed towards the build of the application, user testing, and submittal for approval in the stores available for iPhone, Android, and Blackberry platforms.

### **11.1-FH2 Augmenting inductive loop vehicle sensor data with SPAT and GrID (MAP) via data fusion.**

The purpose of this project is to develop an IntelliDrive(SM)<sup>1</sup> (see <http://www.intelldrivemusa.org/>) application having practical utility in the real world to demonstrate the advantages of fusing enhanced transportation communications data with infrastructure based in-pavement sensing systems for improving traffic flow. This project will develop an IntelliDrive software application which will augment inductive loop vehicle sensor data with Signal Phasing and Timing (SPAT) and Geographic reference Information Data (GrID) data via data fusion thus improving the quality of queue length measurement and traffic flow data. This will result in better performance of traffic control algorithms that rely on queue length for traffic actuated intersection control and for adaptive arterial and network traffic control. The tool would fuse information collected via DSRC from vehicles with the inductive loop data via the same communications channels used by SPAT and GrID data and pass it on to advanced signal control software.

*For the purposes of this project, SPAT and GrID includes both Vehicle to Infrastructure (V2I) and Infrastructure to Vehicle data flow involving IntelliDrive, DSRC(Digital Short Range Communications), and their related standards such as J2735. GrID is also referred to as GID (Geometric Intersection Description) or MAP (from the proper noun map) data.*

[http://www.its.dot.gov/presentations/Fok\\_SPaT.pptx](http://www.its.dot.gov/presentations/Fok_SPaT.pptx).

A variety of enhanced system control techniques and system performance measurement tools have been developed in NCHRP 3-66 Signal Transition Logic and NCHRP 3-79 Arterial Performance Measures.

(see <http://ops.fhwa.dot.gov/publications/fhwahop09008/chapter1.htm>) Augmented loop and sensor data may make implementation of these tools practical.

The open source software would have to be licensed such that commercial vendors could adapt it for use in their proprietary traffic signal control systems as well as allowing university researchers to continue researching it. This project is intended to build on research done by PATH (California Partners for Advanced Transit and Highways) and other IntelliDrive and SPAT and GrID researchers and loop detector technology to fuse data rather than building new sensors. The goal is to develop software rather than a hardware product. although the exact structuring is up to the offeror. The successful offeror would make profits by offering services in the installation, customization and enhancement of the data fusion application for individual customers in a manner similar to Apache, Red Hat and IBM.

For discussion purposes, call the product output SGFusion (for SPAT and GrID Fusion of data). SGFusion would utilize advanced techniques (i.e. Signal processing technologies, artificial intelligence techniques, pattern recognition, etc.) to develop real time recognition of sensor data and data fusion that could enhance traffic controller logic performance and yield more accurate intersection and arterial performance measures. SGFusion would enable new research studies of driver behavior during the yellow change interval, lane change behavior and responses to oversaturated conditions. It is noted that in the near term, only a modest portion of the vehicle fleet will be equipped with DSRC On Board Units (OBUs) to communicate with Road Side Equipment (RSEs) and thus data fusion is the optimal approach and the offeror should explain how this will be dealt with.

A major issue will be to define what data can be collected from vehicles due to the privacy restrictions imposed by various communications standards (for example vehicle position and speed), what sensor data is appropriate for fusion (for example queue length) and how it should be gathered and fused to enhance the overall quality of information. Knowing the position of all DSRC equipped vehicles might provide improved estimation of queue lengths from the probe like DSRC data so that actuated control and adaptive signal control systems can perform

better. Which measures of effectiveness (MOEs) are suitable for fusion and how they could be utilized by either existing or future generation control logic to make the final result a marketable project are issues to be discussed under Phase I.

Phase I would devise the type of data available from different sensors and how it might be successfully fused. Phase I would develop and demonstrate prototype software and possibly hardware which would embody a simplified version of the IntelliDrive-DSRC-SPAT and GrID data fusion software/hardware. Phase I would conclude with a demonstration of how the prototype SGFusion could be used with OBU's, RSE's and Linux based ATC software. Phase I would determine what the "real time" needs and accuracies are for SGFusion and what outputs from SGFusion would be suitable for traffic control or applications. The software and hardware would use an ATC signal controller software package.

Phase II would enhance SGFusion to communicate with ATC devices. Phase II should be staged to produce interim demonstratable results. The Turner Fairbank Highway Research Center has a research intersection that can be used as a mini-test site for a ConOp demo of the product at the end of Phase II.

(<http://www.fhwa.dot.gov/publications/research/operations/06102/index.cfm>)

Relationship to FHWA Strategic Objectives.

**Safety:** *Continually improve highway safety.* This project will allow engineers to better develop applications to utilize IntelliDrive and its features such as DSRC, SPAT and GrID and their enhanced capabilities for controlling intersections and for red light running prevention to reduce the possibility of collisions. Additional information about the speed of vehicles in the go-no go decision/dilemma zone will enable better operation of red light running reduction systems such as Bonneson's.

**Mobility:** *Continually improve the public's access through ...enhancement of its operations, efficiency, and intermodal connections.* SGFusion will facilitate concurrent operations of traffic signal and traffic information systems for both enhanced safety and enhanced operations. Additional information about traffic flow and queue length from fused data will enhance the performance of traffic adaptive systems such as ACS-Lite.

### **11.1-FH3 Oversize Vehicle Detection and Warning System**

Incidents in which commercial motor vehicles hit overpasses and bridges can result in significant infrastructure damage, often reducing the useful life of the structure. Most bridge strike incidents occur due to vehicles that are too high, vehicles with improperly loaded loads, or vehicles operating on roads not appropriate for CMV's. Historically, in the United States, roadways and bridge approaches will be signed to provide notification to drivers regarding low bridges or other restrictions with regard to vehicle size. In addition, regular CMV inspection activity may help to identify vehicles with size concerns that may endanger bridges. However, even such inspections are seldom able to accurately assess when the difference between a bridge hit and a bridge miss may be measured in inches. This project supports the 2011 FHWA Strategic Implementation Plan's System Performance Goal: "Safety" promoting a technology based approach for protecting highway assets (SP-5) reducing the risk of infrastructure failure.

Several recent technological developments suggest that bridge/overpass hits may be reduced or even eliminated through a combination of automated screening of vehicles before they reach a bridge/overpass and direct communication to the driver of the vehicle. FHWA has a strong interest in development of new technology for screening CMV's for appropriate size before they pass under an overpass they would hit and for reporting that accident threat to the driver in real time and with sufficient warning to enable the vehicle to safely exit the road or to come to a roadside stop before the overpass.

Key performance objectives for this system include the following:

- Capable of operating at highway speeds on interstate highways
- Capable of operating under all weather and lighting conditions
- Capable of automated classification of vehicles
- Capable of measuring critical dimensions of each vehicle accurately enough to assess the threat to the bridge/overpass with few, if any false alarms.
- Capable of identifying specific vehicles with size concerns
- Capable of operating on multiple lanes of traffic
- Capable of integrating with emerging Intellidrive<sup>SM</sup> technology to allow communication to a specific vehicle
- Capable of use in conjunction with other emerging roadside inspection technologies
- Based on use of low-cost components and able to be installed and made operational easily

Phase I work should include assessment of appropriate technologies for performing the vehicle dimensions, selection of a method for vehicle classification and identification, and consideration of integration with Intellidrive<sup>SM</sup> for vehicle communication.

The Phase I work effort should result in a proof of concept for the Oversize Vehicle Detection and Warning System.

During Phase II, the system will be developed at a scale sufficient to demonstrate that the system meets all performance objectives.

Collaboration with FMCSA's Technology Branch will be undertaken at the point when this project moves into Phase II due to the anticipated benefits the project will generate.

#### **11.1-FH4 Intelligent Ridesharing in Real-Time**

Ridesharing (carpooling) is an inexpensive, efficient, and highly desirable transportation mode. At any given moment hundreds of thousands of empty seats are traveling our nation's roadways and currently there is no way to easily connect empty seats with the individuals who might use them. The logistical constraints of traditional carpooling, such as long-term commitments, fixed schedules, and communication difficulties, have prevented ridesharing from realizing its full potential. Technology, both in-vehicle and handheld (smart phones, etc), is an important part of the answer to those constraints. It can provide secure, personally identifying technology, precise GPS locations, and real-time matching for trip by trip carpooling without the hassle or unnecessary commitment of traditional carpooling. Further, this in-vehicle technology enables other useful tasks such as the accurate reporting of HOV status for HOV and HOT restricted lanes. Dynamic ride matching technology already exists for hand-held mobile applications (iPhone, SMS text enabled phones, etc) but that technology has yet to find widespread use. Using a hand-held device for communicating one's ridesharing needs is fine for passengers but is not ideal for drivers due to the devices' hands-on nature that can lead to distracted driving. By integrating carpooling functions into a vehicle computer, voice activated ridesharing technology can be built into the vehicle's interface enabling the driver to find and accept potential ride matches along his route without having to divert his concentration from the roadway. Variations on this technology can be used to verify vehicle occupancy and report it wirelessly to HOV/HOT enforcement bodies. Tolling can become more evolved with a toll reduction offered per passenger in the vehicle instead of a single-preset discount whether the vehicle is carrying two, three, or more passengers.

Therefore, to help facilitate more ridesharing, a new intelligent, in-car computer software platform is needed that has the following attributes:

1. Wireless communication enabled
2. Integrated GPS
3. Compatible with SMS texting
4. Can communicate with tolling gantries/intelli-drive infrastructure via RF
5. Vehicle is able to accurately detect the number of passengers it is carrying
6. # of passengers can be communicated to tolling/HOV infrastructure

The product described above will strongly support two key transportation priority areas: investing for the future and promoting livable communities. It also supports the DOT FY2010-11 high priority performance goal of reducing highway fatalities by enabling hands-free, non-distracting dynamic ride matching. Further this application supports the Small Business Administration (SBA) goal of energy efficiency as set forth in (P.L. 110-140).

Outcomes expected from Phase I include a detailed concept that demonstrates the viability and interoperability of in-vehicle, automated ride matching software with portable, smart-phone based applications.

Phase II includes manufacturing and demonstrating a working prototype of the software and application with all of the above listed attributes.

## **Pipeline and Hazardous Materials Safety Administration (PHMSA)**

### **11.1-PH1 Study, develop and demonstrate advanced deformation measurement tools for transmission and or distribution pipelines.**

Currently, deformations in pipelines from mechanical damage are measured in the ditch using standard pit gauges. This allows the measurement of a maximum deflection only. The deformation extent is then measured using a ruler or a straight edge. Such measurement does not provide enough details to perform detailed assessment of the damage severity as it cannot provide the pipeline operator with an accurate representation of the shape of the dent. Recent developments in assessment techniques and understanding mechanical damage behaviors have shown conclusively that the severity is closely tied to its shape. Mechanical damage (typically from third party excavations) is the most frequent source of leaks and ruptures in pipelines. Current techniques for assessing mechanical damage are not accurate enough for reliable determination of fitness for service.

In addition, the relatively high cost of specialized tools needed to perform such measurements and the need for highly trained operators has been a deterrent towards widespread use of existing technology in the field. Subsequently, a gap in technology available is evident. The solution should comprise a low-cost, time efficient, simple to use, and reliable tool with validated and established performance.

In this topic applications are sought to study, develop and demonstrate advanced deformation measurement tools for transmission and or distribution pipelines.

The applicant will develop and test a novel surface-profiling tool for mechanical damage evaluation based on the real-time processing of a single digital image. This inexpensive, full-field approach provides the full shape of the damaged region with high accuracy, and overcomes current limitations in the assessment process.

Anticipated results will include a low-cost, time efficient, simple to use, and reliable tool with validated and established performance.

### **11.1-PH2 Development of a non-destructive, quantitative residual stress assessment tool**

Currently there does not exist a noncontact in-field cost effective tool that can detect and characterize pipeline residual stress anomalies from the outside the pipe. Mechanical damage puts residual stress into pipelines that can accelerate corrosion which is the leading source for pipeline integrity degradation and failure. There is an immediate need to fill a technical gap concerning material integrity assurance of pipeline anomalies in order to protect these assets from unintentional failures.

This topic is focused on the development of a non-destructive, quantitative residual stress assessment tool able to completely characterize anomalies associated with mechanical damage and corrosion. The new tool could utilize low frequency impedance measurements to quantify the residual stresses associated with each type of anomaly to assess the need for pipeline repair or removal. The low frequency impedance detection system must operate outside of the pipeline with a hand-held, probe. The time to complete a full inspection of the mechanical damage will be on the order of tens of seconds or minutes, depending upon probe design and other variables.

Future work may include establishing a database of residual stress measurements on selected steels and utilized to determine the residual stress during measurements. The hand-held tool should include wireless data transmission or other communications methods to enable accurate pipeline operator analysis.

Anticipated results should include a prototype measurement system that is validated, and will offer an economical alternative to existing technologies while also offering superior performance.

Future work may include but not limited to a design and construction of a residual stress assessment tool which offers a more complete quantitative characterization of anomalies such as dents, wrinkles, bends, weld, and other defects.

## 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<br>(Do not include with your proposal – for your use only) | Appendix D |

**U.S. DEPARTMENT OF TRANSPORTATION  
SMALL BUSINESS INNOVATION RESEARCH PROGRAM  
SOLICITATION NO. DTRT57-11-R-SBIR1  
FY11.1**

**PROPOSAL COVER SHEET**

Project Title \_\_\_\_\_  
 Research Topic No. \_\_\_\_\_ Research Topic Title \_\_\_\_\_  
 Submitted by: Name \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_ Zip + \_\_\_\_\_

Amount Requested (Phase I) \$ \_\_\_\_\_ Proposed Duration \_\_\_\_\_  
 (May be up to \$150,000 unless otherwise indicated) (in months) (Not to exceed six months)

By signing and submitting this coversheet under Solicitation No. DTRT57-11-R-SBIR.1, Topic No. \_\_\_\_\_, certifies that:

1. The above firm, together with its affiliate's \_\_\_\_\_ 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 3.a or 3.b above; or,  none of the 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 and meet the definition as stated in this Section II. F (For statistical purposes only)
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 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. DTRT57-11-R-SBIR.1, 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. DTRT57-11-R-SBIR1  
 FY11.1  
 PROJECT SUMMARY**

Name and Address of Offeror	
	Proposal No.

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Name and Title of Principal Investigator

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Project Title

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

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Anticipated Results/Potential Commercial Applications of Results.

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

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**U.S. DEPARTMENT OF TRANSPORTATION  
SMALL BUSINESS INNOVATION RESEARCH PROGRAM  
CONTRACT PRICING PROPOSAL  
FY11.1**

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 accurate, complete, and current as of the date of signature below.			
THE COST PROPOSAL MUST BE SIGNED BY A RESPONSIBLE OFFICIAL OF THE FIRM.			
Printed Nme _____			
Title _____			
Signature _____ Date _____			
1	<b>Total Firm Fixed Price Proposal Amount</b>		
2.	<b>Direct Material Costs</b>		
	a. Purchased Parts		
	b. Subcontracted Items		
	c. Other		
	(1) Raw Materials		
	(2) Standard Commercial Items		
	<b>Total Direct Materials (TDM)</b>		
3	<b>Material Overhead (TDM x Rate %)</b>		
		Rate	Amount
	<b>Total Material Overhead (TMO)</b>		
4	<b>Total Materials (TDM + TMO)</b>		
5	<b>Direct Labor</b>		
	Type / Personnel	Hours	Rate (\$ / Hr)
	<b>Total Direct Labor (TDL)</b>		
6	<b>Labor Overhead (TDL x Overhead Rate)</b>		
		Rate	Amount
	<b>Total Labor Overhead (TLO)</b>		
7	<b>Labor: Fringe Benefits (TDL x Benefit Rate)</b>		

Topic No:				
Offerors Project Title:				
Name of Offeror:				
		Rate (% or \$ / Hr)		Amount
	<b>Fringe Benefits</b>			
8	<b>Total Labor (TDL + TLO + Fringe)</b>			Amount
9	<b>Direct Costs: Special Testing (Include field work at Government installations)</b>			
	Item & Anticipated Use		Unit Cost	Estimated Cost
	<b>Estimated Total Special Testing</b>			
10	<b>Direct Costs: Special Equipment</b>			
	Item & Anticipated Use		Unit Cost	Amount
	<b>Estimated Total Special Equipment</b>			
11	<b>Direct Costs: Travel</b>			
	Travel Location	Mode of Travel	# of Trips	Per Diem
				Amount
	<b>Travel</b>			
12	<b>Direct Costs: Consultant Services</b>			
	Description of Service			Amount
	<b>Total Consultant Services</b>			
13	<b>Direct Costs: Other Direct Costs (ODC) not previously accounted for.</b>			
	Item & Anticipated Use		Unit Cost if applicable	Amount
	<b>Total Other Direct Costs</b>			
14	<b>Total Direct Costs (TDC) (Sums of Line No. 9 – 13)</b>			Amount
15	<b>General &amp; Administrative Expense ((Total Materials + Total Labor + Total ODC) x Rate)</b>			
		Rate %		Amount
16	<b>Royalties</b>			
	Description			Amount
	<b>Total</b>			
17	<b>Total Cost (Sums of lines 4, 8, 14, 15 &amp; 16)</b>			Amount
18	<b>Profit (Total Cost x Profit Rate)</b>			
		Rate %		Calculated Amount
19	<b>Total Firm Fixed Price Amount (Total Cost + Profit)</b>			

Topic No:	
Offerors Project Title:	
Name of Offeror:	
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. DTRT57-11-R-SBIR1  
FY11.1  
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 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 of the proposal.
- \_\_\_ 8. The PROJECT SUMMARY (Appendix B) has been completed and is PAGE two of the proposal.
- \_\_\_ 9. The TECHNICAL CONTENT of the proposal begins on PAGE three 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 13, 2010. **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.