AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE	OF	PAGES
	1		2

2. AMENDMENT/MODIFICATION NUMBER	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQUISITION NUMBER	5. PROJECT NUMBER *(If applicable)*
0001	03/05/2019		

6. ISSUED BY	CODE	7. ADMINISTERED BY *(If other than Item 6)*	CODE
VOLPE NAT'L TRANSPORTATION SYS CNTR 55 Broadway Cambridge MA 02142-1001	6913G6		

8. NAME AND ADDRESS OF CONTRACTOR *(Number, street, county, State and ZIP Code)*	(X)	9A. AMENDMENT OF SOLICITATION NUMBER
	☒	6913G619QSBIR1
		9B. DATED *(SEE ITEM 11)*
		02/19/2019
	☐	10A. MODIFICATION OF CONTRACT/ORDER NUMBER
		10B. DATED *(SEE ITEM 13)*
CODE / FACILITY CODE		

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☒ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended. ☒ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing items 8 and 15, and returning 1 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or electronic communication which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by letter or electronic communication, provided each letter or electronic communication makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA *(If required)*

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NUMBER AS DESCRIBED IN ITEM 14.

CHECK ONE	
☐	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: *(Specify authority)* THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NUMBER IN ITEM 10A.
☐	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES *(such as changes in paying office, appropriation data, etc.)* SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
☐	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
☐	D. OTHER *(Specify type of modification and authority)*

E. IMPORTANT: Contractor ☐ is not ☐ is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (*Organized by UCF section headings, including solicitation/contract subject matter where feasible.*)

This solicitation is amended to make the administrative and technical changes as described on page 2 herein. The noted changes are the ONLY ones made to the solicitation. A copy of this amendment will be present on the FedBizOpps and U.S. DOT SBIR websites and, as described in block 11 of this form, shall be included with any offer submitted against the solicitation.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER *(Type or print)*		16A. NAME AND TITLE OF CONTRACTING OFFICER *(Type or print)*	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
(Signature of person authorized to sign)		*(Signature of Contracting Officer)*	

Previous edition unusable

STANDARD FORM 30 (REV. 11/2016)
Prescribed by GSA FAR (48 CFR) 53.243

The Government is making the following changes to the solicitation document:

1. At both **Section II Offer Preparation Instructions and Requirements**, paragraph B.2.c (page 11) , AND Section V Submission of Offers, paragraph B.1.c (page 29) the following is ADDED after the existing sentence:

   "Additionally, any solicitation amendments shall be acknowledged by the offeror by completing items 8 and 15 of the amendment, by acknowledging receipt of the amendment on each copy of the submitted offer, or by separate letter/communication, which includes a reference to the solicitation and amendment number(s). Amendment acknowledgements should be included within the Appendix A and B PDF file still as one single file so to be uploaded to the U.S. DOT's SBIR online submittal page."

2. At Section VIII Research Topics, Pipeline and Hazardous Materials Safety Administration (PHMSA) Topic 190-PH1 titled Inline-Inspection (ILI) Tool for Detecting Coating Defects/Disbondment of Coating is DELETED in its entirety. The Government is cancelling this topic and will not be accepting offers against it. Therefore, the topic description found on page 57 of the solicitation is also DELETED in its entirety. The references to this topic found in the contents page of the solicitation and Section VI Scientific and Technical Information Sources (page 32) are also removed. It is noted that there were no references noted for this topic in Section VI.

U.S. Department of Transportation

6913G619QSBIR1
FY 2019

Small Business Innovation Research (SBIR) Program

PHASE I PROGRAM SOLICITATION

NAICS CODE: 541715

Issue Date: February 19, 2019

Closing Date: April 22, 2019, 5:00 PM ET

Small Business Innovation Research (SBIR) Program Office, V-330A
U.S. Department of Transportation (U.S. DOT)
Office of the Assistant Secretary for Research and Technology
John A. Volpe National Transportation Systems Center (Volpe Center)
55 Broadway
Cambridge, MA 02142-1093

IMPORTANT DATES

Date	Description
February 19, 2019	Solicitation Open Date
February 27, 2019	Pre-Offer Webinar (see below for details)
April 3, 2019	Technical and Administrative Questions Due (See Section V.A for details)
April 15, 2019	Contract Pricing Worksheet (Appendix C) Questions Due (See Section V.A for details)
April 22, 2019	Solicitation Closing Date (see below for details)

Pre-Offer Webinar

A pre-offer webinar for small business concerns (SBCs) interested in submitting an offer to the FY 2019 U.S. DOT SBIR solicitation will be held on **Wednesday, February 27, 2019 at 1:30 PM ET**. This webinar will provide information on the SBIR process and featured solicitation topics. SBCs may attend this webinar only virtually via a webinar conference. All SBCs interested in submitting an offer are urged to attend this webinar. No questions from attendees are permitted during the pre-offer webinar.

Each SBC interested in attending the webinar shall register at: https://volpe-events.webex.com/volpe-events/onstage/g.php?MTID=ef620f891f4e1b808e00e98c63190e0de.

You may register at any time prior to noon (12:00 PM ET) on the day of the webinar. Upon receipt of your registration, you will receive information for connecting to the webinar.

The webinar recording will be posted to the Solicitations section of the U.S. DOT SBIR Program website (https://www.volpe.dot.gov/work-with-us/small-business-innovation-research/solicitations).

Closing Date

Offers must be received no later than **5:00 P.M. ET on Monday, April 22, 2019** through the U.S. DOT's automated proposal website at: https://hostedsites.volpe.dot.gov/SBIR/SubmitProposal.aspx. Offers received after that time will be automatically rejected; no exceptions will be permitted. Please be aware that the submittal process may take several minutes to complete before it is received by the Government due to a multi-step process. Offers will not be considered received by the Government until this multi-step process is complete. Offerors are encouraged to submit their offers as early as possible.

CONTENTS

I. PROGRAM DESCRIPTION

A. Introduction

The United States Department of Transportation (U.S. DOT) welcomes small businesses to participate in the U.S. DOT's Small Business Innovation Research (SBIR) program. The purpose of this solicitation is to invite small businesses, with their valuable resources and creative capabilities, to submit innovative research ideas and solutions in response to the topics identified by the U.S. DOT as described in Section VIII. Under the SBIR Program, the U.S. DOT will not accept unsolicited proposals.

The goals and objectives of the SBIR Program are to:

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

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 R/R&D objectives. The Small Business Innovation Development Act of 1982 (Public Law (P.L.) 97-219 codified at 15 U.S.C. 638) established the SBIR Program. In October 1986, through Public Law 99-443, Congress amended the Small Business Act, 15 U.S.C. 638 and extended the SBIR program through September 30, 1993. The Small Business R&D Enhancement Act of 1992 (P.L. 102-564), repealed the SBIR Program under the Small Business Innovation Development Act of 1982 and extended the SBIR Program under the Small Business Act through September 30, 2000. The Small Business Reauthorization Act of 2000 (P.L. 106-554) extended the SBIR Program through September 30, 2008. After a series of continuing resolutions, the SBIR/Small Business Technology Transfer (STTR) Reauthorization Act of 2011 (P.L. 112-81, Section E) extended the SBIR Program through September 30, 2017. On December 23, 2016, the President signed into law the National Defense Authorization Act (NDAA) for Fiscal Year 2017. Section 1834 extended the SBIR and STTR programs through September 30, 2022. On August 13, 2018, the President signed into law the NDAA for Fiscal Year 2019 (P.L. 115-232). Section 854 contains amendments to the SBIR and STTR programs.

More information is available at https://www.sbir.gov/about/about-sbir.

B. Three Phase Program

The U.S. DOT SBIR Program is a three phase program.

THIS SOLICITATION IS FOR PHASE I OFFERS ONLY.

Phase I. Phase I is the conduct of feasibility-related experimental or theoretical research or R/R&D efforts on research topics described herein. For the U.S. DOT SBIR Program, the dollar value of the offer may be up to $150,000 unless otherwise noted in Section VIII. The period of performance shall be six months. The basis for award is the scientific and technical merit of the offer, its commercial potential, and its relevance to U.S. DOT requirements and current research priorities. The U.S. DOT will award a Firm-Fixed-Price (FFP) contract or bilateral purchase order for Phase I efforts utilizing Federal Acquisition Regulation (FAR) Part 13 Simplified Acquisition Procedures. A bilateral purchase order is an offer by the Government to buy supplies or services, including research and development, upon specified terms and conditions (in this instance, the contractor's offer), using simplified acquisition procedures. The purchase order is signed by the Contractor and the Government contracting officer. Award, whether a contract or bilateral purchase order, is subject to the availability of funding.

All U.S. DOT SBIR Phase I awardees are eligible to submit a Phase II proposal for evaluation and possible selection after successful completion of the Phase I effort.

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 on the results of Phase I and the scientific and technical merit and commercial potential of the project proposed in Phase II. Commercial potential includes the potential to transition the technology to private sector applications, Government applications, or Government contractor applications. For the U.S. DOT SBIR Program, 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 of up to 24 months.

The U.S. DOT typically awards Firm-Fixed-Price (FFP), FFP-Level-of-Effort (FFPLOE), or Cost-Plus-Fixed-Fee (CPFF) negotiated contracts for Phase II efforts utilizing FAR Part 15 Contracting by Negotiation procedures. The Government is not obligated to fund any specific Phase II proposal. The U.S. DOT SBIR Program Office will provide Phase I awardees details on the due date, content, submission requirements, and evaluation criteria for Phase II proposals approximately 30 days prior to the end of Phase I efforts. A summary of Phase II submission requirements can be found on the U.S. DOT's SBIR website at: https://www.volpe.dot.gov/work-with-us/small-business-innovation-research/submit-proposal.

Sequential Phase II awards. The SBIR Program Policy Directive permits agencies to issue one additional sequential Phase II award to supplement or extend the work of an initial Phase II

award. These awards are referred to as Phase IIB awards and can be awarded for a period up to 24 months. The funding ceiling typically does not exceed the amount of the previous Phase II award. A small business may receive no more than two SBIR Phase II awards (the initial Phase II award and a sequential Phase IIB award) for the same R/R&D project, and the awards must be made sequentially. SBIR Awardees must be invited by the U.S. DOT to submit Phase IIB proposals. The U.S. DOT typically awards FFP, FFPLOE or CPFF negotiated contracts for Phase IIB efforts. The same requirements for a Phase II proposal apply here.

Phase III. SBIR Phase III refers to work that derives from, extends, or logically concludes effort(s) performed under a U.S. 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 toward commercialization of SBIR research or technology and may be for products, production, services, R/R&D, or a combination. The following activities are types of SBIR Phase III work:

- Commercial application of SBIR-funded R/R&D financed by non-Federal sources of capital.
- SBIR-derived products or services intended for use by the Federal Government, funded by non-SBIR sources of funding.
- Continuation of R/R&D that has been competitively selected using peer review or scientific review criteria, supported by non-SBIR funding.

C. Eligibility

Size Rule

On December 27, 2012, SBA amended its regulations governing size and eligibility requirements for the SBIR program. The rule implemented provisions of the NDAA for Fiscal Year 2012 by revising elements of 13 C.F.R. Part 121 that addresses ownership, control, and affiliation for participants in the SBIR program. A summary and explanation of the size rule and changes to program eligibility can be found in the Federal Register, 77 Fed. Reg. 248 (December 27, 2012) pp. 72215-76227 at http://www.sbir.gov/sites/default/files/2012-30809.pdf and SBA's Guide to SBIR/STTR Program Eligibility at http://sbir.gov/sites/default/files/elig_size_compliance_guide.pdf.

The rule includes a provision regarding an agency's option to allow participation by firms that are majority-owned by multiple venture capital operating companies, private equity firms or hedge funds. **The U.S. DOT elects at this time not to use the authority that would allow venture capital operating companies (VCOCs), hedge funds or private equity firms to participate in the SBIR Program.** Offers submitted by these parties will not be considered for award.

Each SBC submitting an offer must qualify as a SBC at the time of award of Phase I, Phase II and IIB contracts (see Section I. E. for the definition of a SBC). A SBC, together with its affiliates, must not have more than 500 employees. In addition, the following requirements must be met:

- 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 working for the small business. This typically precludes full-time employment with another organization.
- For Phase I, a minimum of two-thirds of the research or analytical effort, measured in total contract dollars using simple math, must be performed by the awardee (i.e., 66.7% of total contract cost must be for other than subcontractor/consultant costs).
- For Phase II, a minimum of one-half of the research or analytical effort, measured in total contract dollars on costs incurred for personnel must be performed by the awardee (i.e., labor and indirect rates minus costs such as material, travel, and subcontractor/consultant).
- For 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 Federal Government, the Commonwealth of Puerto Rico, the Republic of the Marshall Islands, the Federated States of Micronesia, the Republic of Palau, and the District of Columbia.

Performance Benchmark Requirements for Phase I Eligibility

Section 4(a)(3) of the SBIR Policy Directive calls for each Federal agency participating in SBIR to set a Phase II transition rate benchmark in response to Section 5165 of the SBIR/STTR Reauthorization Act of 2011.

Before responding to this solicitation, all potential offerors should verify their Transition Rate eligibility for Phase I awards on SBA's SBIR website at https://www.sbir.gov/. On June 1st of each year, Phase I applicants that meet the Phase I to Phase II transition rate identified below are eligible to submit an offer for a new Phase I award. General information on the Performance Benchmark requirements is available at https://www.sbir.gov/faqs/performance-benchmarks.

Phase I to Phase II Transition Rate: The U.S. DOT's Phase I to Phase II Transition Rate uses a five-year period and counts an offeror's total number of Phase I awards over the last five fiscal years, excluding the most recently completed fiscal year; and the total number of Phase II awards over the last five fiscal years, including the most recently completed year. The U.S. DOT SBIR Phase I to II Transition Benchmark is:

Effective July 25, 2013, for all U.S. DOT SBIR Program Phase I offerors that have received 20 or more Phase I awards over the 5-year period, the ratio of Phase II awards received to Phase I awards received must be at least 0.25.

Commercialization Rate: The Commercialization Rate is not a requirement for this Solicitation.

D. Contact Information

If you have any questions not listed on our website FAQs (https://www.volpe.dot.gov/work-with-us/small-business-innovation-research/frequently-asked-questions), or any technical or administrative questions pertaining to the FY 2019 U.S. DOT SBIR solicitation or research topics, please submit such questions by April 3, 2019 at 5:00 PM ET via email to:

U.S. DOT SBIR Program Office
dotsbir@dot.gov

All technical and administrative questions must be submitted via email. Questions received after 5:00 PM ET on April 3, 2019 may not be answered.

NOTE: Inquiries regarding offer status will not be answered.

For general SBIR Program inquiries not pertaining to this solicitation, please contact:

U.S. DOT's SBIR Hotline
(617) 494 2051
dotsbir@dot.gov

In order to ensure full and open competition and comply with the Procurement Integrity Act, 41 U.S.C. Sections 2101-2107 requirements, during the Phase I submittal and evaluation period, offeror or potential offeror contact with U.S. DOT relative to this solicitation is restricted to the officials stated in this solicitation. Contact with U.S. DOT officials from any U.S. DOT agency, other than those identified in this solicitation, during the period of this solicitation particularly when the solicitation is open for offers, may result in rejection of the offer.

E. Definitions

1. Funding Agreement

Any contract, or grant, or cooperative agreement entered into between any Federal Agency and any small business concern for the performance of experimental, developmental, or research work, including products or services, funded in whole or in part by the Federal Government.

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

Any activity that is:

- A systematic, intensive study directed toward greater knowledge or understanding of the subject studied;

- A systematic study directed specifically toward applying new knowledge to meet a recognized need; or

- 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.

3. Subcontract

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

4. SBIR Technical Data

All data generated during the performance of an SBIR award.

5. SBIR Technical Data Rights

The rights an SBIR awardee obtains to data generated during the performance of any SBIR Phase I, Phase II, or Phase III award that an awardee delivers to the Government during or upon completion of a Federally-funded project, and to which the Government receives a license.

6. Small Business Concern (SBC)

A concern that meets the requirements set forth in 13 CFR § 121.702, which can be found here: https://www.law.cornell.edu/cfr/text/13/121.702.

7. Women-Owned SBC (WOSB)

A WOSB is an SBC that is at least 51% owned by one or more women; or, in the case of any publicly owned business, at least 51% of the stock is owned by women; and women control the management and daily business operations.

8. Veteran-Owned SBC

A Veteran-Owned SBC is one that is at least 51% owned 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.

9. Socially and Economically Disadvantaged SBC (SDB)

See 13 CFR § 124, Subpart B at: https://www.law.cornell.edu/cfr/text/13/part-124/subpart-B.

10. Historically Underutilized Business Zone (HUBZone)

The criteria to be a HUBZone SBC can be found in 13 CFR § 126 at: https://www.law.cornell.edu/cfr/text/13/part-126.

11. Service-Disabled Veteran-Owned SBC

A Service Disabled Veteran-Owned SBC is not less than 51% owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51% of the stock of which is owned by one or more service-disabled veterans; and the management and daily business operations are controlled by one or more service-disabled veterans or, in the case of a service-disabled veteran with permanent and severe disability the spouse or permanent caregiver of such veteran. Service-disabled veteran means a veteran, as defined in 38 U.S.C.101(2), with a disability that is service-connected, as defined in 38 U.S.C. 101(16).

12. Economically Disadvantaged Women-Owned Small Business (EDWOSB)

An EDWOSB is at least 51% directly and unconditionally owned by, and the management and daily business operations of which are controlled by, one or more women who are citizens of the United States and who are economically disadvantaged in accordance with 13 CFR § 127.

F. Report SBIR Fraud, Waste, and Abuse

The U.S. DOT Office of Inspector General Hotline (Phone: 800-424-9071, Email: hotline@oig.dot.gov) accepts tips from all sources about potential fraud, waste, abuse, and mismanagement in U.S. DOT programs. If the potential fraud, waste, abuse or mismanagement pertain to the SBIR Program, then the reporting individual should indicate that the fraud, waste and/or abuse pertains to an SBIR solicitation or contract. Additionally, the U.S. DOT SBIR Program website contains information and links to report potential fraud, waste, and abuse: https://www.volpe.dot.gov/work-with-us/small-business-innovation-research/report-fraud-waste-and-abuse.

G. Other Information

Executive Order (EO) 13329, Encouraging Innovation in Manufacturing, February 26, 2004

"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 R&D. "Manufacturing-related" is defined as "relating to manufacturing processes, equipment and systems; or manufacturing workforce skills and protection."

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

Additionally, the SBA requires each agency with an SBIR program to develop a written policy on the implementation of EO 13329 and publish an annual report. More information about the U.S. DOT SBIR Program Office Implementation Plan and Annual Report is posted on the Program website: https://www.volpe.dot.gov/work-with-us/small-business-innovation-research/frequently-asked-questions.

Energy Independence and Security Act of 2007, December 19, 2007

The Energy Independence and Security Act of 2007 (P.L. 110-140) amends the Small Business Act (15 U.S.C. Section 636(a)) to instruct the SBA Administrator to ensure that certain Federal Departments and agencies give high priority to small business concerns that participate in or conduct energy efficiency or renewable energy system research and development projects.

The U.S. DOT SBIR Program Office solicits energy efficiency or renewable energy system R/R&D projects through the call for SBIR research topics distributed twice annually to each of the Department's SBIR participating agencies. U.S. DOT SBIR projects that focus on conducting R/R&D in energy efficiency and/or renewable energy are reported annually to SBA.

Federal Leadership on Climate Change and Environmental Sustainability: EO 13693 – Planning for Federal Sustainability in the Next Decade

EO 13693 updated and replaced EO 13514 and requires Federal agencies to give high priority to including sustainability requirements in all federal contracts. DOT strongly encourages all SBIR applicants to include sustainability in their research and development offers. To learn more visit: https://www.energy.gov/sites/prod/files/2015/09/f26/EO13693.pdf.

II. OFFER PREPARATION INSTRUCTIONS AND REQUIREMENTS

A. Overview

This is a solicitation for Phase I R/R&D offers on advanced, innovative concepts from small business concerns (SBCs) having strong capabilities in applied science or engineering. The Phase I R/R&D offers 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 VIII.

An offer may respond to any of the research topics listed in Section VIII herein, but must be limited to one topic. No one offer may be accepted under more than one topic. A small business may, however, submit separate offers on different topics, or different offers on the same topic under this solicitation. Where similar research is discussed under more than one topic, the SBC shall choose that topic which appears to be most relevant to the SBC'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 Administration of the U.S. DOT to perform its mission. Offers shall be confined principally to scientific or engineering research, which may be carried out through construction and evaluation. Offers must be for R/R&D, particularly on advanced or innovative concepts.

Each offer shall be self-contained and checked carefully by the Offeror to ensure that all preparation instructions were followed (see Appendix D, Offer Submission Checklist).

All offers must be submitted using the U.S. DOT's SBIR online submittal page: https://hostedsites.volpe.dot.gov/SBIR/SubmitProposal.aspx. An automated notice will be sent via email when the offer is received through the SBIR Program's electronic submission process.

B. Solicitation Requirements

The following requirements must be met for the offer to be evaluated for award:

1. SBA Company Registry Database – Each SBC applying to the program is required to complete its registration in SBA's Company Registry (http://sbir.gov/registration) prior to submitting its application. Registration requires at least a Data Universal Numbering System (DUNS) identification number or Tax Identification Number (TIN). Completed registrations will receive a unique SBC Control ID and PDF file, which may be submitted as the first page in the Technical Section of the Offer.

2. Offer Layout – Offers must be submitted using the SBIR Program's electronic submission process during open solicitation periods only. Offers must be submitted as three separate files:

   a. **Technical** – The technical section must be submitted in PDF format in accordance with the following requirements:

      i. It shall not exceed 25 pages; the Prior Phase II Awards and SBA Company registry Confirmation do not count towards the 25 pages.
      ii. Font size shall be no smaller than 10 point.
      iii. Offers shall be on standard letter size pages (8.5" by 11").
      iv. All pages should be numbered consecutively.

   b. **Contract Pricing Worksheet (Appendix C)** – The Contract Pricing Worksheet (Appendix C) may be submitted as an Excel document or PDF and must contain the required supporting information described in the table below. This section does not count towards the 25-page limit for the technical section. There is no limit on the number of pages for Appendix C and its supporting data. SBCs **must** use the template provided by the U.S. DOT SBIR Program Office.

   c. **Appendices A and B** – Appendix A, Offer Signature Page, and Appendix B, Project Summary, must be saved as one single PDF file, which does not count toward the 25-page limit for the technical section.

3. File Names – Offer file names shall include the following:

   a. The first three characters shall be the topic number the offer is associated with (e.g., FH2).
   b. The remaining characters must include an abbreviation of the company's name and a distinct character to designate each file (e.g., 1, 2, 3).

4. Submission – All offers must be submitted using the U.S. DOT's SBIR online submittal page: https://hostedsites.volpe.dot.gov/SBIR/SubmitProposal.aspx. An automated notice will be sent via email when the offer is received through the SBIR Program's electronic submission process. Offers received after the specified due date and time will be automatically rejected; no exceptions will be permitted. **Please be aware that the submittal process may take several minutes to complete due to a multi-step process. Offers will not be considered received by the Government until this multi-step process is complete. Applicants are encouraged to submit their offers as early as possible.**

Required Sections

Technical (PDF file)
Includes SBA Registry Confirmation, Technical Portion, and Prior Phase II Awards.

SBA Company Registry Confirmation (does not count toward the 25-page limit)	All SBIR applicants are required to be registered in SBA's company registry database. The confirmation from registering in the database should be included as the first page of the PDF document. It does not count towards the 25-page limit. See https://www.sbir.gov/registration to register or print your registration confirmation.
Technical section (not to exceed 25 pages)	Submitted offers must include the following headings in bold (in cases where a section does not apply, please state "Not Applicable"): 1. **Identification and Significance of the Problem or Opportunity.** State the specific technical problem or innovative research opportunity addressed and its potential benefit to the national transportation system. 2. **Phase I Technical Objectives.** State the specific objectives of the Phase I R/R&D effort; including the technical question(s) the research seeks 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, when 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 question(s) cited above in No. 2. Discuss in detail the methods planned to achieve each objective or task, 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 offer including any R/R&D conducted by the project manager/principal investigator or by the proposing firm. Describe how related research affects the proposed effort, and any planned coordination with outside sources. The SBC must persuade reviewers of its awareness of recent, key 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 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 page limitation. 6. **Relationship with Future Research and Development.** State the anticipated results of the proposed approach if the project is successful (Phase I and Phase II). Discuss the significance of the Phase I effort in

	providing a foundation for a Phase II R/R&D effort. 7. **Facilities.** Provide a detailed description of the availability and location of instrumentation and physical facilities proposed for Phase I. 8. **Subcontractors/Consultants.** Involvement of consultants in the planning and research stages of the project is permitted. Describe any intended involvement in detail. For Phase I, a maximum of one-third of the research or analytical effort, measured in total contract dollars using simple math, may be performed by subcontractors/consultants. 9. **Potential Post Applications.** Briefly describe whether and how the proposed project appears to have (1) potential commercial application; and (2) potential use by the Federal Government. 10. **Similar Offers and/or Awards.** While it is allowed, with notification, to submit identical offers or offers containing a significant amount of essentially equivalent work for consideration under numerous federal program solicitations, **it is unlawful to enter into funding agreements requiring essentially equivalent effort**. If there is any question concerning this, it must be disclosed to the soliciting agency or agencies before award. If an SBC elects to submit similar or identical offers containing equivalent work under other Federal program solicitations, a statement must be included in each offer indicating: • The name and address of the agencies to which offers were submitted or from which awards were received; • Date of offer submission or date of award; • Title, number, and date of SBIR Program solicitations under which offers were submitted or awards received; • The applicable research topics for each SBIR offer submitted or award received; • Titles of research projects; • Name and Title of Principal Investigator or Program Manager for each offer submitted or award received. 11. **Human Factors**. Research that involves human subjects may be subject to additional regulations found in 49 C.F.R. Part 11 (Part 11) as well as other applicable federal and state laws and regulations. Research will be considered to involve human subjects under Part 11 if the research obtains (1) data through intervention or interaction with an individual(s), and/or (2) identifiable private information. Unless exempt under 49 C.F.R. §11.101(b) or §11.101(i), human subject research must adhere to the regulations of Part 11, which includes review and approval of the research by a federally approved Institutional Review Board (IRB). Due to the short timeframe associated with Phase I of the SBIR

process, the DOT does not recommend the submission of Phase I offers that require the use of Human Subjects Testing. For example, the ability to obtain IRB approval for offers that involve human subjects can take 6-12 months, and that lengthy process can be at odds with the Phase I goal for time to award. Before the DOT makes any award that involves an IRB or similar approval requirement, the offeror must demonstrate compliance with relevant regulatory approval requirements that pertain to offers involving human protocols. It will not impact the DOT's evaluation, but requiring IRB approval may delay the start time of the Phase I award and if approvals are not obtained within two months of notification of selection, the decision to award may be rescinded.

12. **Sustainable Acquisition Requirement.** SBC's technical section will be used as the Statement of Work (SOW) for any award resulting from this solicitation under SBIR Phase I or II. Consistent with FAR Part 23, each SBC is expected to include and abide by the following in its technical offer:

    "**Sustainable Acquisition Requirement:** To the maximum extent possible and consistent with the Federal Acquisition Regulations Part 23, the Government requires during the performance of the work under this Statement of Work (SOW) the Contractor to provide or use products that are: energy efficient (ENERGY STAR® or Federal Energy Management Program (FEMA)-designated); water-efficient; biobased; environmentally preferable (e.g., EPEAT-registered, or non-toxic or less toxic alternatives); made with recovered materials; or non-ozone depleting that minimize or eliminate, when feasible, the use, release, or emission of high global warming potential hydrofluorocarbons, such as by using reclaimed instead of virgin hydrofluorocarbons. Unless otherwise identified in this SOW, each recovered materials or biobased product provided and delivered must meet, but may exceed, the minimum recovered materials or biobased content of an EPA- or USDA-designated product. The sustainable acquisition requirements specified herein apply only to products that are required to be: (1) delivered to the Government during contract performance; (2) acquired by the contractor for use in performing services (including construction) at a Federally-controlled facility; (3) furnished by the contractor for use by the Government; or (4) specified in the design of a building or work, or incorporated during its construction, renovation, or maintenance."

    Inclusion of this general requirement does not relieve the SBC from

	including in its technical section explicit sustainability requirements applicable to the R/R&D being offered (see the BioPreferred website at https://www.biopreferred.gov/BioPreferred/).
Prior SBIR Phase II Awards (does not count toward the 25-page limit)	If the SBC has received more than a total of 15 Phase II awards in the prior five fiscal years, submit the name of the awarding agency, date of award, funding agreement number, dollar amount, topic or subtopic title, follow-on agreement dollar amount, source and date of commitment, and current commercialization status for each Phase II. Provide the name and title of the project manager or principal investigator for each offer submitted or award received.

Contract Pricing Worksheet (Appendix C) (Excel or PDF)

Appendix C is available on our website here in Microsoft Excel 2013 format. *Specific instructions for filling out Appendix C are located here.* *See a sample worksheet here.*	A Phase I Contract Pricing Worksheet must be submitted in detail using the template provided in Appendix C. SBCs **must** use the template provided by DOT. 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. When completing your cost offer, please consider the following: • It is important to provide enough information to allow the U.S. DOT to understand how the SBC plans to use the requested funds if an award is made. • Phase I contract awards may include profit. Note: FFP contract or bilateral small purchase order are the types used for Phase I SBIR awards. • Travel is allowable, however unusual, for Phase I projects. • The SBC must note its TIN and DUNS identification number in Appendix C, in the Contract Pricing Worksheet Coversheet. The DUNS number is assigned by Dun & Bradstreet, Inc. (See III (D) below). If you are not able to receive a DUNS number before the solicitation deadline, please indicate "Pending" in the DUNS field of Appendix C. An Offeror must have a DUNS number before a funding agreement can be awarded. Please fill out the spreadsheets as directed. If an Offeror is submitting supporting information (e.g., price quotes or subcontractor commitments) then save the entire workbook as a PDF. To do this, click on the 'Acrobat' tab in the main ribbon of Excel, then choose "entire Workbook" from the Conversion Range option at the top of window.) If you have any trouble

	accessing the Appendix C spreadsheet or saving it as a PDF please contact the U.S. DOT SBIR Program Office at 617-494-2051 between the hours of 9:00 am and 5:00 pm ET no later than April 15, 2019. Offers that exceed the Phase I Estimated Award Amount listed in Section VIII will not be considered for award.

Appendices A and B (PDF)

Signature Page (Appendix A) *Page 1 of PDF*	Complete the signature page in Appendix A. All pages should be numbered consecutively beginning with the signature page.
Project Summary (Appendix B) *Page 2 of PDF*	Complete the Project Summary Sheet in Appendix B as Page 2 of the offer. The Project Summary of successful offers may be published by the U.S. DOT and, therefore, shall not contain classified or proprietary information. The Project Summary must include at a minimum: 1. A technical abstract with a brief statement of the problem or opportunity, project objectives, and description of the effort. a. The technical abstract shall be prepared in accordance with the instructions on the Appendix B Project Summary sheet, e.g., word limit using space on form, no proprietary/classified information. 2. Anticipated results and potential applications of the proposed research.

C. Other Information

1. **Offer Control.** Offers will be available only to the U.S. DOT team of engineers and/or scientists responsible for evaluating the offer, the U.S. DOT SBIR Program Office, and Volpe Center staff pertinent to the SBIR program.
2. **Fraudulent Information**. Submitting plagiarized information and/or false information pertaining to the company, the principal investigator and/or work to be performed may result in:
   a. An offer being deemed non-responsive;
   b. A recommendation for Phase I award being rescinded; or
   c. Termination of an award.
3. **Technical and Business Assistance (TABA)**. The SBIR Program Policy Directive permits an agency to provide technical assistance to an SBIR awardee in an amount not more than $5,000 per year. This amount is in addition to the award amount.

The purpose of TABA, as defined by the SBA Policy Directive, is to assist SBIR awardees in: (1) making better technical decisions on SBIR projects; (2) solving technical problems that arise during SBIR projects; (3) minimizing technical risks associated with SBIR projects; and (4) commercializing the SBIR products or processes. **The U.S. DOT SBIR Program will provide assistance to Phase I awardees in the area of commercialization planning and strategy. The program shall be referred to as the DOT SBIR Commercialization Assistance Program (CAP).**

A U.S. DOT SBIR awardee can receive support through the CAP in one of two ways:

a. The U.S. DOT SBIR Program Office has a Blanket Purchase Agreement (BPA) with Dawnbreaker Incorporated (2117 Buffalo Road, Rochester, NY) that can provide support to Phase I and Phase II awardees. Once an offer is recommended for award, the prospective awardee will receive notification from the U.S. DOT SBIR Program Office identifying the services available and guidance on how to obtain these services at no cost to the small business.

   These services for Phase I include a kick-off meeting with the CAP vendor and an individualized Commercialization Readiness Assessment to support the development of the Phase II proposal's commercialization strategy, OR

b. Awardees can receive assistance in an amount not to exceed $5000 not using the BPA of the SBIR Program Office; however, this assistance must be focused on commercialization. To do so, Offerors must, through its own efforts, obtain a Contractor to provide commercialization assistance. If recommended for award, the awardee must provide at that time an outline of the specific services its proposed Contractor will provide in the area of commercialization planning and strategy, and the detailed qualifications and experience of the proposed Contractor in these areas.

4. **National Institute of Standards and Technology (NIST)/Hollings Manufacturing Extension Partnership (MEP).** An SBC may wish to contact its local NIST Hollings MEP for manufacturing and other business-related support services. The MEP works with small and mid-sized companies to help them create and retain jobs, increase profits, and save time and money. The nationwide network provides a variety of services, from business development assistance to innovation strategies to process improvements and the identification of commercialization opportunities. MEP is a nationwide network of locally managed extension centers with over 1,400 technical experts, located in every state. To contact an MEP center, call 1-800-MEP-4-MFG (1-800-637-4634) or visit MEP's website at http://www.nist.gov/mep.

D. System for Award Management (SAM) and Data Universal Numbering System (DUNS) Identification Number

Any business that would like to work with the Federal Government under a FAR-based contract is mandated to be registered in SAM before being awarded a contract. Additional information on SAM and the registration process is provided on the SAM website at: https://sam.gov/SAM/. Businesses that already have a DUNS number can register on the SAM website by following the prompts. Instructions for obtaining a DUNS number can be found at: http://fedgov.dnb.com/webform/displayHomePage.do.

III. METHOD OF SELECTION AND EVALUATION CRITERIA

A. General

All Phase I offers will be evaluated and judged on a competitive basis. Initially, all offers will be screened to determine responsiveness to the solicitation. Offers that are responsive to the solicitation requirements will be evaluated by topic experts to determine whether the offer has scientific/technical merit and feasibility (reference B.1 below). Offers that are determined to have merit will be further evaluated for items B.2 – B.4 below.

Each offer will be judged on its own merit. A Phase I award will be made to the responsive and responsible SBC(s) whose offer provides the best value to the Government, based on the technical and scientific merit of the offer. **The U.S. DOT is under no obligation to fund any offer or any specific number of offers on a given topic. For any given topic, U.S. DOT may elect to award more or less than the anticipated quantity of awards stated in Section VIII, or may elect to make no awards under a given topic**.

B. Phase I Evaluation Criteria

The objective of Phase I is to determine the scientific and technical merit and feasibility of the proposed effort and the quality of performance of the SBC. Offers will be evaluated utilizing the following factors:

1. **Scientific/Technical Merit and Feasibility*:** Offer shall be evaluated on the relevance and innovation of the proposed effort in response to the specific DOT topical interest area and the overall technical feasibility of the proposed technology/capability.

2. **Effectiveness of the Proposed Work Plan:** The proposed work plan shall be evaluated for its comprehensiveness, effective use of resources, and schedule to meet stated objectives.

3. **Experience, Qualifications, and Facilities:** Qualifications of Proposed Principal Investigator(s) (PI) and other staff, including any subcontractors, shall be evaluated for consistency with the research effort. Instrumentation and/or proposed facilities shall be evaluated for adequacy to conduct research as proposed.

4. **Commercial Potential and Feasibility:** Offer shall be evaluated for the commercial potential and feasibility of the proposed solution and associated products/services.

*NOTE: Each responsive offer will be evaluated to determine it has Scientific/Technical Merit and Feasibility. Only offers rated acceptable on Scientific/Technical Merit and Feasibility will be

evaluated in the other three factors. An offer found to be unacceptable on Scientific/Technical Merit and Feasibility will not be evaluated in the other three factors and will not be considered for award.

C. Offer Responsiveness Review

Each offer will be examined to determine if it is complete and contains adequate technical data. **An offer that does not meet the requirements of the solicitation as described in Section II.B may be excluded from consideration. The SBIR Program Office will send the SBC an email notifying the SBC of its offer's ineligibility for consideration.**

D. Selection of Awardees

The U.S. DOT SBIR Program Office intends to notify each applicant whether it has been selected for an SBIR Phase I award no later than 90 days after the closing date of this solicitation. At this time, the U.S. DOT SBIR Program Office will also post a listing of Phase I offers recommended for award on the U.S. DOT SBIR Program webpage: http://www.volpe.dot.gov/sbir. If circumstances are such that notification to each applicant cannot be met within 90 days after the solicitation closing date, the U.S. DOT SBIR Program shall notify each applicant as soon as practicable.

E. Time to Award Requirements

The SBIR Program Policy Directive requires all SBIR agencies to make Phase I awards within 180 days after the close of the solicitation. The purpose of this requirement is to reduce the gap in time between offer submission and time of award.

F. Debriefing Requests

Debriefing requests must be submitted by e-mail to the SBIR Program Contracting Officer, Tammy Taylor, at tammy.taylor@dot.gov within 30 days of notification from the Government of rejection or acceptance of offer. Late requests may be considered on an individual basis. All requests must include: the SBC's name, address, research topic number, and the offer identification number assigned and provided through an automated email notification sent to the SBC upon receipt of its offer. The identity of the evaluators will not be disclosed. Debriefings will be provided by the SBIR Program Contracting Officer who will share a written summary of overall comments received from the Government evaluators. Individual evaluator comments will not be shared. After receiving the debriefing, the SBC shall have three (3) business days to respond to the debriefing if the SBC so chooses. If there is no response from the SBC within these three (3) business days, the debriefing shall close without further notice.

IV. CONSIDERATIONS

A. Awards

The Government anticipates awarding a total of twelve Phase I awards among the topics identified in this solicitation, but reserves the right to make fewer, more, or no awards if it is in the best interest of the Government. 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 VIII.

1. **Dollar Value of Awards**. The U.S. DOT SBIR Program has set the maximum thresholds for Phase I and Phase II awards at $150,000 and $1,000,000, respectively.

    a. **Phase I Awards**. Phase I awards will utilize FAR Part 13 Simplified Acquisition Procedures. Awards will be FFP contracts or bilateral small purchase orders and may be funded up to $150,000. The period of performance for a Phase I effort is 6 months. Funding levels for each topic are determined by the agency sponsoring the research and are provided in Section VIII. Offers that exceed the Phase I Estimated Award Amount listed in Section VIII will not be considered for award.

    b. **Phase II Awards**. Phase II awards will utilize FAR Part 15 Contracting by Negotiation procedures. Phase II awards may be funded up to $1,000,000. Funding estimates are determined by the agency sponsoring the research. The period of performance for a Phase II effort is up to 24 months and is based on both the funding limit and work to be performed. Phase II funding estimates are provided in Section VIII. Phase II awards are likely to be either FFPLOE or CPFF type contracts, however, each Phase II award contract type will be determined individually.

    c. **Sequential Phase II Awards**. The SBIR Program Policy Directive permits agencies to issue one additional, sequential Phase II award to continue the work of an initial Phase II award. These awards will also be issued under FAR Part 15 and are referred to as Phase IIB awards and can be awarded for a period up to 24 months. A small business may receive no more than two SBIR Phase II awards for the same R&D project, and the awards must be made sequentially.

2. **Phase II Contract Type and Accounting System Audits**. The Contracting Officer will consider whether a FFPLOE, CPFF, or other contract type is appropriate for each Phase II award. Phase II awardees MUST have an acceptable accounting system in place to receive a cost type contract.

B. Reports

Under Phase I SBIR efforts, three (3) reports will be required, consisting of two (2) interim narrative reports, and a comprehensive final report. These reports are spaced at two-month intervals starting at the end of month two. An acceptable report is one that is comprehensive and describes all efforts and progression made on the R&D from the start of the funding agreement through the report submitted time.

C. Payment Schedule

Payments for Phase I awards will be made in three (3) equal installments upon submission by the SBC of invoice(s) in accordance with instructions in the award document, in conjunction with or after the submission by the SBC of acceptable report(s) as described in above Paragraph B.

Contracts for Phase II, IIB, and/or III contracts will allow for incremental payments to the successful SBC as work progresses dependent on the negotiated contract type and/or payment schedule.

D. Innovations, Inventions, and Patents

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

   If proprietary information is provided by a SBC in an offer that 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 such information is clearly marked by the SBC with the terms "confidential proprietary information" and provided the following legend appears on the title page of the offer:

   > "For any purpose other than to evaluate the offer, 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 page(s) [INSERT] of this offer."

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

The U.S. DOT prefers that SBC offers avoid the inclusion of proprietary data. If the inclusion of proprietary data is considered essential for meaningful evaluation of an offer, such data should be provided on a separate page with a numbering system to key it to the appropriate place in the offer.

2. **Rights in Data Developed under SBIR Funding Agreements.** Rights in technical data, including software developed under any award resulting from this solicitation, shall remain with the SBC 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 SBC for a period of four years from completion of the project from which the data was 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 SBC normally may copyright and publish (consistent with appropriate national security considerations, if any) material developed with U.S. DOT support. The U.S. 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**. SBCs 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 SBC a reasonable time to pursue a patent.

5. **Invention Reporting Process**. Awardees shall report SBIR inventions to the U.S. 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

The U.S. DOT permits cost sharing for its Phase II and Phase IIB efforts under the topic areas identified in this solicitation; however, cost sharing is not required nor will it be a factor in evaluation of offers.

F. Profit

A profit is allowed on awards to SBCs under the U.S. DOT SBIR Program.

G. Joint Ventures or Limited Partnerships

Joint ventures and limited partnerships are permitted to submit offer(s) to this solicitation provided the entity created qualifies as a small business concern in accordance with the Small Business Act, 15 U.S.C. 632, and the definition of small business concern included in this solicitation (Paragraph I.E.6).

H. Research and Analytical Work

1. For Phase I, a minimum of two-thirds of the research or analytical effort, measured in total contract dollars using simple math, must be performed by the awardee (i.e., 66.7% of total contract cost must be for other than subcontractor/consultant costs).
2. For Phase II, a minimum of one-half of the research or analytical effort, measured in total contract dollars on costs incurred for personnel must be performed by the awardee (i.e., labor and indirect rates minus costs such as material, travel, and subcontractor/consultant).

I. Awardee Commitments

Upon award of a U.S. DOT SBIR funding agreement, the SBC will be required to make certain legal commitments through acceptance of Federal Acquisition Regulation (FAR) and Transportation Acquisition Regulation (TAR) clauses. The FAR and TAR may be found using the following links:

FAR: https://www.acquisition.gov/browse/index/far

TAR: https://www.transportation.gov/administrations/assistant-secretary-administration/transportation-acquisition-regulation-tar

The Summary Statements that follow are illustrative of the types of clauses to which the SBC would be committed. This list does not represent a complete list of clauses to be included in Phase I awards, and does not provide the specific wording of such clauses. A complete copy of

the terms and conditions will be provided upon issuance of the contract for signature prior to award.

J. Summary Statements

1. **Standards of Work.** Work performed under all SBIR efforts must conform to high professional standards.

2. **Inspection.** Work performed under all SBIR efforts are subject to Government inspection and evaluation.

3. **Default.** The Government may terminate the funding agreement if the Contractor fails to adhere to its terms.

4. **Termination for Convenience.** The Government may terminate the funding agreement if the Government deems termination to be in the Government's best interest. In such case, the Contractor may submit its costs for work performed and for reasonable termination costs.

5. **Disputes.** Any dispute concerning the funding agreement which cannot be resolved by agreement shall be decided by the Contracting Officer with right of appeal in accordance with the Contracts Disputes Act of 1978, 41 U.S.C. 71.

6. **Equal Opportunity.** The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin.

7. **Equal Opportunity for Veterans.** The Contractor shall not discriminate against any employee or applicant for employment because he or she is a disabled veteran or veteran of the Vietnam Era.

8. **Equal Opportunity for Workers with Disabilities.** The Contractor shall not discriminate against any employee or applicant for employment because he or she is physically or mentally handicapped.

9. **Officials Not to Benefit.** No Government official must benefit personally from the SBIR funding agreement.

10. **Gratuities.** The Government may terminate the funding agreement if any gratuity is or was offered to any representative of the Government to secure the award.

11. **Patent Infringement.** The Contractor shall report each notice or claim of patent infringement based on the performance of the funding agreement to the SBIR Program Contracting Officer.

12. **Procurement Integrity.** Submission of an offer under this solicitation subjects the Offeror to the "Restrictions on Obtaining and Disclosing Certain Information" (41 U.S.C. §§ 2101-2107, commonly known as the Procurement Integrity Act). This statute, as implemented by Federal Acquisition Regulation (FAR, 48 C.F.R.) §3.104, prohibits the following conduct during an agency procurement: prohibits federal employees and certain Government contractors involved in federal procurements from **disclosing** contractor bid or proposal information or source selection information (§2102); prohibits any individual from obtaining contractor bid or proposal information or source selection information prior to award (§2102); requires agency officials to **report employment contacts** regarding non-Federal employment (§2103); and bans for a definitive period certain personnel from accepting compensation from the vendor and the vendor from compensating such certain personnel during this definitive period (§2104). Violations of the statute may result in criminal and/or civil penalties, and administrative actions (e.g., suspension and debarment, cancellation of the procurement, and/or rescission of the contract).

13. **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, an SBIR awardee represents by signature on a funding agreement that all deliverables will comply with the Access Board Standards.

14. **Government Property**. Materials, equipment, special tooling, and special test equipment either furnished by the Government or, in a cost type contract, acquired by the contractor or fabricated by the contractor, is subject to FAR clause 52.245-1 Government Property and may also be subject to special clauses specific to certain items of property.

15. **American Made Equipment and Products**. When purchasing equipment or products under an SBIR funding agreement, purchase only American-made items whenever possible.

K. Additional Information

1. This solicitation reflects current planning. Although not expected, there may be inconsistencies between the information contained in the FY 2019 solicitation and the terms and conditions of any resulting SBIR contract. The terms and conditions of the contract once executed are controlling.

2. The SBC shall complete an Online Representations and Certifications Application at https://sam.gov/SAM/. The SBC should be certified in the designated NAICS code (541715) of this solicitation. The size standard of NAICS code 541715 for the SBIR program is 500 employees.

3. The Government may request the SBC to submit additional management, personnel, and financial information in order for the Government to consider and determine the responsibility of the SBC.

4. The Government is not responsible for any monies expended by the SBC 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 U.S. DOT SBIR Program is not a substitute for existing unsolicited offer mechanisms. Unsolicited offers shall not be accepted under the U.S. DOT SBIR Program for either Phase I or Phase II efforts. For information pertaining to submission requirements for unsolicited offers please refer to the U.S. DOT's Guidelines for Unsolicited Proposal Submission at https://www.volpe.dot.gov/work-with-us/guidelines-unsolicited-proposal-submission.

V. SUBMISSION OF OFFERS

A. Technical and Administrative Questions

Before submitting a technical or administrative question, please visit the following web pages:

- The United States Department of Transportation (U.S. DOT) Small Business Innovation Research (SBIR) Program's Frequently Asked Questions (FAQs): https://www.volpe.dot.gov/work-with-us/small-business-innovation-research/frequently-asked-questions. This webpage provides answers to common administrative questions pertaining to the SBIR Program and participation requirements.

- Fiscal Year (FY) 2019 Technical and Administrative Questions and Answers: https://www.volpe.dot.gov/work-with-us/small-business-innovation-research/19-technical-and-administrative-questions. This page provides answers to technical questions regarding specific research topics, along with administrative questions not listed in the FAQs.

If you have any administrative questions not listed in the FAQs, or any technical questions pertaining to the FY 2019 U.S. DOT SBIR solicitation research topics, please submit such question(s) via email to the U.S. DOT SBIR Program Office at dotsbir@dot.gov. All questions must be submitted by email.

Please be aware that all questions and answers will be posted on the U.S. DOT SBIR Program website continually throughout the solicitation's open period as questions are received and answered. Questions should not include any information that you do not want to become public. Questions and answers for this solicitation can be found at: https://www.volpe.dot.gov/work-with-us/small-business-innovation-research/19-technical-and-administrative-questions.

Technical and administrative questions will be accepted through 5:00 PM ET on April 3, 2019. Questions received after this time may not be answered. All questions must be submitted by email to dotsbir@dot.gov.

Questions about the Contract Pricing Worksheet (Appendix C) or how to save it as a PDF will be accepted through 5:00 PM ET on April 15, 2019. Questions received after this time may not be answered. Please contact the U.S. DOT SBIR Program Office at (617) 494-2051 between the hours of 9:00 am and 5:00 pm ET or by email to dotsbir@dot.gov.

B. Offer Content

Only one offer shall be submitted. No duplicate offers shall be sent by any other means. An offer may respond to any of the research topics listed in Section VIII herein, but must be limited to one topic. No one offer may be accepted under more than one topic. A small business may, however, submit separate offers on different topics, or different offers on the same topic under this solicitation.

1. Offer Layout – Offers must be submitted using the SBIR Program's electronic submission process during open solicitation periods only. Offers must be submitted as three separate files:

   a. **Technical** – The technical section must be submitted in PDF format in accordance with the following requirements:
      i. It shall not exceed 25 pages; the Prior Phase II Awards and SBA Company Registry Confirmation do not count towards the 25 pages.
      ii. Font size shall be no smaller than 10 point.
      iii. Offers shall be on standard letter size pages (8.5" by 11").
      iv. All pages should be numbered consecutively.

   b. **Contract Pricing Worksheet (Appendix C)** – The contract pricing worksheet (Appendix C) may be submitted as an Excel document or PDF and must contain the required supporting information described in the table below. This section does not count toward the 25-page limit for the technical section. There is no limit on the number of pages for Appendix C and its supporting data. SBCs **must** use the template provided by the U.S. DOT SBIR Program Office.

   c. **Appendices A and B**–Appendices A and B must be saved as one single PDF file, which does not count toward the 25-page limit for the technical section.

2. File Names – Offer file names shall include the following:

   a. The first three characters shall be the topic number the offer is associated with (i.e., FH2).
   b. The remaining characters must include an abbreviation of the company's name and a distinct character to designate each file (e.g. 1, 2, 3).

C. Submission Process

Complete offers must be received in the Government system no later than **5:00 P.M. ET on April 22, 2019.** All offers must be submitted using the U.S. DOT's SBIR online submittal page: https://hostedsites.volpe.dot.gov/SBIR/SubmitProposal.aspx. An automated notice will be sent via email when the offer is received through the SBIR Program's electronic submission process.

Offers received after the specified due date and time will be automatically rejected; no exception will be permitted. **Please be aware that the submittal process may take several minutes to complete due to a multi- step process. Offers will not be considered received by the Government until this multi-step process is complete. Applicants are encouraged to submit offers as early as possible.**

VI. SCIENTIFIC AND TECHNICAL INFORMATION SOURCES

The following publications and websites are referenced in the research topics found in Section VIII.

Federal Highway Administration (FHWA)

190-FH2: Innovative, Low-Cost Methods for Concrete Bridge Deck Assessment

FHWA. Long-Term Bridge Performance. Website: https://highways.dot.gov/long-term-infrastructure-performance/ltbp/long-term-bridge-performance.

FHWA. LTBP InfoBridge. Website: https://infobridge.fhwa.dot.gov/.

Federal Motor Carrier Safety Administration (FMCSA)

190-FM1: Secure Motor Carrier Safety Data Information Exchange Using Blockchain

FMCSA. Do I Need a USDOT Number? Website: https://www.fmcsa.dot.gov/registration/do-i-need-usdot-number.

Federal Railroad Administration (FRA)

190-FR2: Wireless Pore Water Pressure Sensor

FRA Office of Safety. (1997). *FRA Guide for Preparing Accident/Incident Reports*. Retrieved from https://www.fra.dot.gov/Elib/Document/16397.

190-FR3: Automated Detection of Broken Spike Fasteners in Wood Tie Railroad Track

Roadcap, T., Dersch, M., & Edwards, J. R. (2018). *Broken Spikes in Premium Fastening Systems*. Retrieved from https://uofi.app.box.com/s/zlc365nde6f10apkdozns9hfyu7j36q2/file/386361826876.

190-FR6: Automated, Drone-Based Grade Crossing Inspection

American Association of State Highway and Transportation Officials. (2018). *A Policy on Geometric Design of Highways and Streets* (7th ed.).

American Rail Engineering and Maintenance-of-Way Association. (2018). *Manual for Railway Engineering* (2018 ed.).

FHWA. (2007). *Railroad-Highway Grade Crossing Handbook* (2nd ed.). Retrieved from https://safety.fhwa.dot.gov/hsip/xings/com_roaduser/07010/07010.pdf.

FRA. Office of Safety Analysis. Website: https://safetydata.fra.dot.gov/OfficeofSafety/default.aspx.

FRA. (2016). *The Federal Railroad Administration's LiDAR-Based Automated Grade Crossing Survey System*. Retrieved from https://www.fra.dot.gov/eLib/details/L18342.

National Transportation Safety Board (2018). *Motorcoach Collision With Train on Railroad Crossing, Biloxi, Mississippi, March 7, 2017*. Retrieved from https://www.ntsb.gov/news/events/Documents/HWY17MH010-Abstract-Biloxi.pdf.

Federal Transit Administration (FTA)

190-FT1: Cost Allocation Technology for Non-Emergency Medical Transportation

Government Accountability Office. (2015). *Nonemergency Medical Transportation*. Retrieved from https://www.gao.gov/modules/ereport/handler.php?1=1&path=/ereport/GAO-15-404SP/data_center/General_government/5._Nonemergency_Medical_Transportation.

National Academies of Sciences, Engineering, and Medicine. (2011). *Sharing the Costs of Human Services Transportation*. Retrieved from http://www.trb.org/Main/Blurbs/165015.aspx.

National Highway Traffic Safety Administration (NHTSA)

190-NH1: Automated Driving Systems (ADS) Test Data Interface

NHTSA. (2000). *Laboratory Test Procedure for FMVSS 124, Accelerator Control Systems*. Retrieved from https://one.nhtsa.gov/DOT/NHTSA/Vehicle%20Safety/Test%20Procedures/Associated%20Files/TP-124-06.pdf.

NHTSA. (2005). *Laboratory Test Procedure for FMVSS 135, Light Vehicle Brake Systems*. Retrieved from https://one.nhtsa.gov/DOT/NHTSA/Vehicle%20Safety/Test%20Procedures/Associated%20Files/TP-135-01.pdf.

NHTSA. (2011). *Laboratory Test Procedure for FMVSS 126, Electronic Stability Control Systems*. Retrieved from https://one.nhtsa.gov/staticfiles/nvs/pdf/test-procedures/TP126-03.pdf.

Pipeline and Hazardous Materials Safety Administration (PHMSA)

No references.

VII. SUBMISSION FORMS AND CERTIFICATION (APPENDICES)

A. Offer Signature Page (Appendix A)

MS Word version of Appendix A is available on U.S. DOT's SBIR website.

B. Project Summary (Appendix B)

MS Word Version of Appendix B is available on U.S. DOT's SBIR website.

C. Contract Pricing Worksheet (Appendix C)

MS Excel Version of Appendix C is available on U.S. DOT's SBIR website.

D. Offer Submission Checklist (Appendix D)

(Do not include with offer – for Offeror's use only)

A. Offer Signature Page (Appendix A)

U.S. DEPARTMENT OF TRANSPORTATION
SMALL BUSINESS INNOVATION RESEARCH PROGRAM
SOLICITATION NO. 6913G619QSBIR1, FY 2019
SIGNATURE PAGE

Proposal Information		
Topic No. (see Solicitation):	Solicitation No.:	
Topic Title:		
Proposal Title:		
Company Information		
Company:		
Address:		
City:	State:	Zip:

Offeror Certification	
By signing belowand submitting this offer in response to Solicitation No. 6913G619QSBIR1, Topic Number_____, I(We) am(are) 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:	Corporate/Business Official Name:
Title:	Title:
Address:	Address:
Telephone Number:	Telephone Number:
Email:	Email:
Signature:	Signature:
Date:	Date:

B. Project Summary (Appendix B)

U.S. DEPARTMENT OF TRANSPORTATION
SMALL BUSINESS INNOVATION RESEARCH PROGRAM
SOLICITATION NO. 6913G619QSBIR1 FY 2019
PROJECT SUMMARY

Project Summary

Abstract (Limited to two hundred words in this space only. The Project Summary of successful offers may be published by the U.S. DOT and, therefore, shall not contain classified or proprietary information.).

Anticipated Results/Potential Commercial Applications of Results.

Keywords

C. Contract Pricing Worksheet (Appendix C)

U.S. DEPARTMENT OF TRANSPORTATION
SMALL BUSINESS INNOVATION RESEARCH PROGRAM
SOLICITATION NO. 6913G619QSBIR1, FY 2019
CONTRACT PRICING WORKSHEET

Appendix C can be found on our website here in Microsoft Excel 2013 format. Please fill out the spreadsheets as directed in the instructions. You must submit three separate documents: (1) Technical, (2) Cost (Appendix C), and (3) Appendices A and B to **DOT SBIR's automated proposal site** which is located at: https://hostedsites.volpe.dot.gov/SBIR/SubmitProposal.aspx.

Additional information about the contract pricing worksheet and its requirements can be found on our FAQ page (https://www.volpe.dot.gov/work-with-us/small-business-innovation-research/frequently-asked-questions) as well as in the Appendix C Instructions (https://www.volpe.dot.gov/work-with-us/small-business-innovation-research/19-appendix-c-instructions).

If you have any trouble accessing or have questions about the Appendix C spreadsheets please contact the U.S. DOT SBIR Program Office at 617-494-2051 between the hours of 9:00 am and 5:00 pm ET no later than April 15, 2019.

D. Offer Submission Checklist (Appendix D)

U.S. DEPARTMENT OF TRANSPORTATION
SMALL BUSINESS INNOVATION RESEARCH PROGRAM
SOLICITATION NO. 6913G619QSBIR1, FY 2019
OFFER SUBMISSION CHECKLIST

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

____ 1. The offer reflects that for Phase I, a minimum of two-thirds of the research or analytical effort, measured in total contract dollars using simple math, must be performed by the awardee (i.e., 66.7% of total contract cost must be for other than subcontractor/consultant costs).

____ 2. The offer is submitted according to the requirements described in Section II.

____ 3. The offer is limited to only ONE of the research topics in Section VIII.

____ 4. The budget may be up to $150,000 ***unless otherwise indicated in Section VIII of 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 offer contains no type smaller than ten point font size.

____ 7. All Appendices have been completed.

____ 8. The TECHNICAL SECTION includes all items identified in Section II.B of the Solicitation.

____ 9. The technical section includes the Sustainable Acquisition Requirement provision (Section II.B.)

____ 10. The additional information on prior Phase II awards, if required, in accordance with Section II.B is included.

____ 11. The Contract Pricing Worksheet (Appendix C) has been completed and provides the necessary supporting information.

____ 12. The offer must be submitted online and received by the U.S. DOT automated proposal website by 5:00 pm ET, April 22, 2019. **Offers received via email or any other means will not be accepted. Do not send duplicate offers via email or by any other means.** Instructions for online submission are included on the submission page.

VIII. RESEARCH TOPICS

The FY 2019 Solicitation Phase I research topics for U.S. DOT Operating Administrations are listed on the following pages. These topics indicate the specific areas for which SBIR Phase I offers are to be considered for acceptance by U.S. DOT. The topics are not listed in any order of priority. Each offer submitted must respond to one (and only one) topic and/or focus area as described in this section. An offer may, however, indicate and describe its relevance to other topics. Offerors are encouraged to review Section VI. of this solicitation for scientific and technical information sources that may be referenced in the respective topic descriptions.

U.S. DOT Operating Administration	**Topic Number & Title**	**Estimated Award Amount Phase I***	**Estimated Award Amount Phase II****
Federal Highway Administration (FHWA)	190-FH1: Vehicle Communication via Induction Paint	$150,000	$500,000
	190-FH2: Innovative, Low-Cost Methods for Concrete Bridge Deck Assessment	$150,000	$1,000,000
Federal Motor Carrier Safety Administration (FMCSA)	190-FM1: Secure Motor Carrier Safety Data Information Exchange Using Blockchain	$150,000	$1,000,000
Federal Railroad Administration (FRA)	190-FR1: Portable Stiffness/Elastic Modulus Measurement System	$150,000	$300,000
	190-FR2: Wireless Pore Water Pressure Sensor	$150,000	$300,000
	190-FR3: Automated Detection of Broken Spike Fasteners in Wood Tie Railroad Track	$150,000	$300,000
	190-FR4: In-Vehicle Highway Rail Grade Crossing Alert System	$150,000	$500,000
	190-FR5: Improved Condition Monitoring of Traction Motors	$150,000	$500,000
	190-FR6: Automated, Drone-Based Grade Crossing Inspection	$150,000	$300,000
Federal Transit Administration (FTA)	190-FT1: Cost Allocation Technology for Non-Emergency Medical Transportation	$150,000	$750,000
National Highway Traffic Safety Administration (NHTSA)	190-NH1: Automated Driving Systems (ADS) Test Data Interface	$150,000	$500,000

U.S. DOT Operating Administration	Topic Number & Title	Estimated Award Amount Phase I*	Estimated Award Amount Phase II**
Pipeline and Hazardous Materials Safety Administration (PHMSA)	190-PH1: Inline-Inspection (ILI) Tool for Detecting Coating Defects/Disbondment of Coating	$150,000	$1,000,000

* Proposals that exceed the Phase I Estimated Award Amount will not be considered for award.

**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 when instructions on the Phase II process are sent approximately 1 month prior to the end of the Phase I project.

Research topics are organized into six sections:

A. Federal Highway Administration (FHWA)
B. Federal Motor Carrier Safety Administration (FMCSA)
C. Federal Railroad Administration (FRA)
D. Federal Transit Administration (FTA)
E. National Highway Traffic Safety Administration (NHTSA)
F. Pipeline and Hazardous Materials Safety Administration (PHMSA)

A. Federal Highway Administration (FHWA)

19-FH1: Vehicle Communication via Induction Paint

The purpose of this Phase I project is to develop road striping paint or thermoplastic tape that is capable of communicating information to passing vehicles. Road striping provides nearly continuous longitudinal contact with vehicles, and offers a unique capability as a medium to communicate location information, roadway hazard information, roadway geometry, and lane keeping, among other possible uses. The presence of roadway striping means that, with some amount of power generation locally from the vehicles themselves, the paint can perform as a broadcast antenna to communicate to vehicles. It may be possible, given enough power and backend communications, for roadway striping paint to function as a transceiver, offering two-way communications about approaching hazards on a real-time basis.

The development of induction paint could enable broader spot and/or longitudinal communications between the vehicle and the roadway. This could deliver a range of services to rural America and other disadvantaged communities. Furthermore, development of this technology can assist with increasing American competitiveness with technology development overseas that has looked into aspects of conductivity, such as light emission.

In this Phase I project the selected offeror shall establish a proof of concept that demonstrates the ability for lane marking and striping to communicate to the vehicle. Messages may be encoded to warn drivers of approaching hazards, whether or not they are infrastructure based.

Expected Phase I Outcomes:

The expected Phase I outcome is a prototype design with demonstrated proof of concept. The design would be one in which inductive and conductive road marking can communicate messages to a passing vehicle. The offeror also shall develop a final report that describe the technical limitations encountered in developing the proof of concept. The selectee shall describe the environmental, power distribution, and vehicle characteristics factors that are an impediment to vehicle communication via induction paint.

Expected Phase II Outcomes:

Phase II outcomes can consider test deployments of such induction paint in locations that the team considers the greatest benefit. For instance, a team may consider the marking and striping for decision zones approaching an intersection. Testing is expected to be conducted in a testing environment (e.g., parking lot). A team may consider deployment of such induction paint in rural location where there is a high speed arterial highway intersecting a minor roadway. In this case, the intent would be to supply the vehicle with additional warning information about the approaching intersection.

190-FH2: Innovative, Low-Cost Methods for Concrete Bridge Deck Assessment

The Long-Term Infrastructure Performance (LTIP) Programs include the Long-Term Pavement Performance (LTPP) Program and the Long-Term Bridge Performance (LTBP) Program. These programs, conducted in collaboration with the State department of transportation infrastructure owners, provide for characterization and monitoring of in-service highway pavement test sections (LTPP) and bridges (LTBP) to assemble the data needed to improve infrastructure design and advance the understanding of highway infrastructure performance necessary to effectively manage transportation assets.

This topic focuses on the bridge component of the LTIP. The purpose of LTBP is to develop a better understanding of bridge performance through assessing a sample population of the most common in-service bridges over the long-term. Ultimately, the LTBP program will enable the development of tools and methods that improve infrastructure design and transportation asset management. Currently, collecting bridge performance data and making it available to researchers and infrastructure owners is hampered by the high cost of using existing assessment methods that tend to be slow and require traffic control. This presents a major limiting factor by restricting the number of bridges that can be evaluated which reduces the benefit of the experiment.

New evaluation tools and methods are needed to enhance the efficiency and repeatability of the LTBP program's field data collection. Novel concrete bridge deck assessment technologies – that do not require closures of traffic lanes – would greatly reduce the cost associated with data collection. These technologies must be capable of assessing bare concrete bridge decks as well as decks with overlay. Traffic lane closures incur non-value added cost and present a major inconvenience to the driving public. The number of personnel required to be in the field will be minimal resulting in enhanced safety to data collectors and to drivers. This technology would increase the number of bridges that may be evaluated which would greatly increase the benefit of the LTBP program.

The commercialization potential of this opportunity is directly in proportion to the effectiveness of the proposed solution. Federal, state, and local agencies own hundreds of thousands of bridges that must be inspected routinely per federal law. Private consulting firms and in-house resources are used to inspect and evaluate this large number of highway bridges. Also, applications of this technology may include other infrastructure and non-infrastructure assets such as buildings, pipelines, etc.

Information on the FHWA LTBP program is available at: https://highways.dot.gov/long-term-infrastructure-performance/ltbp/long-term-bridge-performance and https://infobridge.fhwa.dot.gov/.

Expected Phase I Outcomes:

Outcomes expected from the Phase I include a detailed concept and technical approach that demonstrate the viability of creating and testing a prototype device(s) (hardware and software) capable of identifying:

1. Precursors to steel reinforced concrete deterioration, which is most commonly determined through testing for chloride content of measuring electrical conductivity.
2. Existing concrete deterioration which is most commonly determined through Impact Echo and Ground Penetrating Radar evaluations.

The design concept for the device(s) must show promise for low-cost field data collection with no or minimal disruption to traffic. Also, it should demonstrate the feasibility of efficient post-processing of the collected data.

Expected Phase II Outcomes:

Outcomes expected from Phase II efforts include:

1. Fully developing and demonstrating a working prototype.
2. Manufacturing, lab validation, and field validation of the device(s) (hardware and software). Field validation should be conducted on multiple sites to demonstrate the efficiency of data collection and data post-processing.
3. Development of a marketing plan as described in the Phase II proposal's commercialization plan.

B. Federal Motor Carrier Safety Administration (FMCSA)

190-FM1: Secure Motor Carrier Safety Data Information Exchange Using Blockchain

FMCSA has the need to exchange information in a secure environment among motor carriers, inspection facilities, and Federal and State government facilities. For example, FMCSA and its State partners record inspections, crashes, and insurance status (for-hire carriers). FMCSA electronically collects and exchanges safety performance and credentials information with States, Federal agencies, and motor carriers. FMCSA also enables online solutions for motor carrier companies to apply for, review, and pay registration fees and file fuel taxes with State agencies.

To improve the current system, FMCSA is interested in determining the feasibility of a system that uses blockchain technology to create a secure transaction platform with a distributed ledger. Information will be logged on a distributed ledger, which is used for establishing validity of the message as well as for auditing purposes. This information is envisioned to be a record of all the actions and transactions that a motor carrier has with FMCSA and States to maintain an active USDOT# status[1] which is required to operate commercial motor vehicles in interstate commerce. The system must be cost-effective and comply with information security requirements of confidentiality, integrity, privacy and security. Also, FMCSA is interested in whether this system is scalable to interact with the required entities. Ideally, FMCSA will use this technology to have real-time, reliable data available to all the States. The benefits of this system should result in improved data quality, increased timeliness, and reduced cost. Prospective buyers of this technology are organizations that wish to replace centralized data systems with decentralized distributed ledger systems. This includes state governments as well as private entities that have a need to track data in a timely and secure way.

Expected Phase I Outcomes:

The Phase I SBIR project should complete a feasibility study for the successful implementation of blockchain technology in as operational environment. The contractor shall recruit a State and a carrier to volunteer to participate and provide input to determine feasibility of the approach. The contractor shall also work closely with FMCSA operation and IT staff. The report will address reliability and accuracy of the system as well as how the technology will affect the stakeholders. The report will also examine the potential benefits of the system including improved data quality, increased timeliness, and reduced cost.

Expected Phase II Outcomes:

The Phase II SBIR project will have a fully operational test system implemented at selected States, Federal agencies, motor carriers and inspection facilities. The system must be secure, reliable and accurate in the operational environment. The expected Phase II outcome is a demonstration of a working system with measureable results where motor carriers, FMCSA, States and other stakeholders can successfully record action and transactions on a distributed ledger using blockchain technology. The potential benefits of this system are improved data quality, increased timeliness, and reduced cost.

[1] https://www.fmcsa.dot.gov/registration/do-i-need-usdot-number

C. Federal Railroad Administration (FRA)

190-FR1: Portable Stiffness/Elastic Modulus Measurement System

This project seeks to develop a portable stiffness/elastic modulus measurement system to assess the condition of crushed aggregate bases and ballast which consist of large diameter aggregate. In these materials, quality control measurements are not readily available and these materials must be placed uniformly and with adequate compaction to achieve the required structural performance. It is envisioned that the proposed stiffness/modulus measurement system would be useful for measurements during construction, maintenance that disturbs these layers, and throughout the life of the infrastructure to assess changes in performance that might affect infrastructure behavior and lifespan. While envisioned to be applied to railway ballast, this technology is likely to be applied to any crushed aggregate structural layer in highways, airfield, and pipeline infrastructure.

For this project, FRA will consider either the adaptation of existing technology or the development of a new technology to meet the desired outcome.

Expected Phase I Outcomes:

During Phase I, the outcomes expected from this topic would be identification and demonstration of a suitable adapted or new technology for the Portable Stiffness/Elastic Modulus Measurement System. Any technology or measurement that meets the goal of detecting structural properties related to the strength and stiffness of crushed aggregate would be applicable. The Phase I proof-of-concept report should describe the intended system design and functionality of the adapted or new technology and how it integrates with commercially available smart phones or tablet computers, including linking measurement location with the actual measurement and associated parameters.

It is envisioned, although not required, that an existing portable system may be adapted to achieve the expected outcome based on its mechanical properties of stiffness/elastic modulus measurement. These measurements could be approached at any strain level (small strain seismic response, or large strain load-deflection response) as long as the data is consistent and can be associated with macro-behavior responsible for load-deformation trends affecting infrastructure performance.

A paper and presentation describing the technology, the correlation of the system response to aggregate performance, and a description of the envisioned field unit and applications will be required. Development of a prototype is highly encouraged during Phase I and will be required in Phase II.

Expected Phase II Outcomes:

The expected Phase II outcomes from the Portable Stiffness/Elastic Modulus Measurement System topic includes development and testing of a field deployable unit. The field unit will be tested in a lab to demonstrate reliability in providing data useful for detecting structurally poor

crushed aggregate layers. Then, two phases of field testing[2] for railway applications are expected with initial testing to demonstrate successful performance in a variety of railway ballast conditions. Then the second phase will be a technology demonstration phase where ballast conditions are tested before and periodically over a month after maintenance to capture changes in response with densification under traffic.

A test plan for all field testing will be developed in cooperation with FRA to ensure that adequate field testing is conducted to assess the system along with suitable data to document the field conditions.

A report and presentation at FRA is expected during Phase II along with two technical papers documenting the results from the different test phases.

[2] Initial field testing will be conducted at a location that is mutually acceptable, but could include testing at the Transportation Test Center in Pueblo, CO at several ballast types and conditions currently being tested.

190-FR2: Wireless Pore Water Pressure Sensor

Poor drainage is a common concern related to poor infrastructure performance due to settlement and instability. For railroad track, the ultimate result of poor drainage can be saturated roadbed conditions noted in Appendix C of the FRA Guide for Preparing Accident/Incident Reports[3] as the first accident cause code: T001 Roadbed Settled or soft. Providing a measurement to better understand the link between failure and trapped water in the track, this topic seeks to develop a wireless communication and sensor package to measure the generation of pore water pressure in the shallow substructure of transportation infrastructure. The measurements will be used to assess drainage system effects on infrastructure support layer performance under various saturation conditions. While, specifically envisioned for rail applications to diagnose track performance under saturated conditions, it is expected that the system could be applied to any infrastructure system relying on drained structural support layers such as crushed aggregate bases, open grade crushed stone, and railway ballast.

Expected Phase I Outcomes:

Expected Phase I outcomes for a wireless pore water pressure sensor include development of a process or device that can be used to assess the magnitude of pore water pressure developed dynamically under traffic. The Phase I proof of concept report should provide the initial system design and identification of a measurement system that is expected to provide the most reliable assessment of pore water pressure under traffic. Finally, a paper and presentation describing the technology and a description of the envisioned field unit and applications will be required.

Expected Phase II Outcomes:

Expected outcomes in Phase II include development and testing of a prototype measurement device. Demonstration of the device or process developed in Phase I can be conducted in a laboratory environment but should acknowledge the challenges in making the field measurement and address means of installation with minimum disruption to the track bed and with the ability to control the depth and position of placement to help support comparisons between sites. Ideally, this device should be retrievable and reusable. An additional requirement during Phase II is development of a plan for the system to function with commercially available smart phones or tablet computers including linking measurement location with the actual measurement and associated parameters. A report and presentation at FRA is expected during Phase II along with two technical papers documenting the test results for presentation at professional and industry conferences selected in consultation with FRA.

[3] https://www.fra.dot.gov/Elib/Document/16397

190-FR3: Automated Detection of Broken Spike Fasteners in Wood Tie Railroad Track

Many North American railroads are experiencing performance problems related to tie-plate spike fasteners when used in combination with premium elastic rail fastening systems in wood-tie track. The spikes in question are failing in service and these failures have contributed to several derailments in recent years, including Mosier, OR (Union Pacific, 2016); Vandergrift, PA (Norfolk Southern, 2014); and Fabyan, AB, Canada (Canadian National, 2012). FRA is currently engaged in research to determine the root cause of these spike failures. Additional information on this research is available here:

https://uofi.app.box.com/s/zlc365nde6f10apkdozns9hfyu7j36q2/file/386361826876

Railroads ensure the integrity of their systems through regular inspections, but it can be very difficult to identify these failed spikes in track; the spikes in question are failing below the surface of the tie, and typically remain in place after failure. In many cases, visual inspections are not adequate to identify a failed spike, and many railroads have modified their inspection techniques to include manual manipulation of spikes in high-risk areas.

The mission of the Track Research Division, the infrastructure arm of the FRA's Office of Research, Development, and Technology, is to conduct basic and applied research to improve track safety, and to develop advanced technologies to assist both the FRA and the railroad industry with track safety inspections. To fulfill this mission, FRA seeks the development of an automated inspection method for the detection of broken spike fasteners in the field. This technology development project aligns with the U.S. Department of Transportation's strategic goals for Safety and Innovation by advancing technology that improves the efficiency of safety inspections on our nation's railways.

Expected Phase I Outcomes:

The outcome expected from this Phase I effort will be the development of a proof of concept system design for an automated, non-destructive method that can reliably detect broken spike fasteners in wood-tie track (i.e., identify discontinuities in metal fasteners installed in wood ties).

Expected Phase II Outcomes:

Phase II outcomes will include the development of a market-ready prototype for field testing (in order to establish operational capabilities and limitations) and possible commercialization. Field testing is expected to be a critical component of a successful Phase II effort.

190-FR4: In-Vehicle Highway Rail Grade Crossing Alert System

Fatalities and injuries to automobile occupants as a result of grade crossing accidents is a significant contributor to the safety risks associated with railroad operations. Many of these accidents are caused by human performance issues attributable to the automobile driver, such as distracted driving. A mechanism that warns drivers when they approach high-risk grade crossings has the potential to reduce grade crossing incidents, fatalities and injuries. The intent of this effort is to develop an in-vehicle alert system for automobiles approaching high-risk railroad crossings. High risk is defined as those locations with high accident/incident/fatality rates.

The device would locate high-risk rail grade crossing locations using GPS and send alerts to the driver when they are within a given proximity. The alert may be through the in-vehicle computer system or through other means, such as a mobile phone or other GPS device. This would notify drivers to be aware of higher-risk crossings and to exercise caution as they approach those areas. Given the proliferation of GPS devices already installed in most vehicles, the base hardware for the system already exists. Therefore, the focus of this work would be to develop a system that can tie-in hardware performance with available data on high-risk crossings to generate an alert for the drivers, without adding to the level of distraction that drivers are already subjected to under the current environment.

The ultimate goal is that successful implementation of the prototype in the real-world environment will result in a reduction in the number of grade crossing incidents, fatalities, and injuries, leading to a notable improvement in safety.

Expected Phase I Outcomes:

The Phase I outcome includes the identification of railroad crossings that present high risks to drivers as well as conceptual development of an automobile on-board device to provide warnings of upcoming high risk grade crossings. The Phase I proof of concept report will result in the development of an architecture and system design that is ready for prototyping.

Expected Phase II Outcomes:

In Phase II, it is expected that a prototype system will be developed and tested in real-world driving situations. This real-word testing may require partnership with industry stakeholders to implement the testing. The system will be user-friendly and easy to implement for a large population of vehicles. Initial feedback from drivers/users will be collected and used to improve the prototype.

190-FR5: Improved Condition Monitoring of Traction Motors

Traction motor failures on locomotives can occur due to overheating, snow effects causing a short, or issues tied to traction control. When these failures occur they can have several negative consequences ranging from loss of performance to stranded trains. Most modern locomotives use sophisticated control systems to drive and control traction motor systems; however, no significant monitoring of traction motor performance from the perspective of predictive maintenance is utilized. The intent of this topic is to investigate the feasibility of developing an economical intelligent diagnostic condition monitoring system for the railway traction system.

Expected Phase I Outcomes:

A review of common traction motor failure modes and potential precursors to such failures will be identified and documented. A review of the available traction motor condition monitoring equipment will be performed to identify performance capabilities and limitations. The potential for improving the ease of use and prediction accuracy will be investigated using appropriate modification of available condition monitoring systems. The proof of concept report will include a conceptual architecture and methodology for traction motor condition monitoring, capable of identifying precursors to key failure modes.

Expected Phase II Outcomes:

Based on the Phase I concept, a prototype system would be developed and deployed in a controlled environment to assess the effectiveness of fault detection and failure prevention. The controlled environment may be with a facility provider proposed by the offeror and/or with FRA assistance in determining an appropriate facility. The effectiveness of the system in detecting precursors to failure will be demonstrated using simulated failures on an actual traction motor system. Successful implementation of the system in the real world would improve both the safety and performance of locomotives and train operations.

190-FR6: Automated, Drone-Based Grade Crossing Inspection

There are thousands of highway-rail grade crossings in the United States. Some of these crossings have humped geometric profiles that present a risk to motor vehicles. Each year, about 14 percent of grade crossing accidents[4] involve a tractor-trailer, and a substantial number of those are a result of the vehicle getting stuck on the tracks due to the low ground clearance across the crossing (humped crossing). There are also other incidents involving buses, although less frequent but more dangerous due to presence of bus passengers.

Many incidents and accidents have occurred at these humped crossings, including the fatal 2017 incident in Biloxi, Mississippi when a tour bus became stuck on a crossing and was struck by a freight train. The National Transportation Safety Board (NTSB) has determined that the probable causes of this crash was the grounding of the tour bus on the high vertical profile crossing.[5]

FRA's Research, Development & Technology (RD&T) has previously developed LiDAR technology to automatically map and measure grade crossings for high vertical profile. Due to the size of the system, this technology can only be deployed on rail vehicles, which limits the efficiency of inspections. Additional information about this system can be found here: https://www.fra.dot.gov/eLib/details/L18342.

The U.S. DOT FHWA document *FHWA Railroad-Highway Grade Crossing Handbook, 2nd edition,* August 2007 (pg 138 – 140) provides information on the criteria for determining compliance with crossing design guidelines. This document can be viewed at: https://safety.fhwa.dot.gov/hsip/xings/com_roaduser/07010/07010.pdf. Additional information on this topic (though not required) can be found in various industry sources, such as: the American Rail Engineering and Maintenance of Way Association (AREMA) *Manual for Railway Engineering* and American Association of State Highway and Transportation Officials (AASHTO) publication *A Policy on Geometric Design of Highways and Streets*.

The objective of this project is to develop a drone-based grade crossing inspection system to improve the efficiency of grade crossing inspections for humped conditions and other safety-related attributes, including visual sight lines, and locations of gates, lights, signage, etc. This system shall be easily deployed and controlled by FRA and state DOT personnel and shall leverage advances in automated flight controls, sensor technologies, and automated data acquisition and processing.

Expected Phase I Outcomes:

This Phase I project is expected to yield a proof of concept prototype system and technical report. The system shall be demonstrated in a controlled environment.

[4] https://safetydata.fra.dot.gov/
[5] https://www.ntsb.gov/news/events/Documents/HWY17MH010-Abstract-Biloxi.pdf

Expected Phase II Outcomes:

Phase II outcomes include pre-production prototype development and field testing on actual highway-rail grade crossings to validate measurement accuracy and establish the operational capabilities and limitations of the system necessary to prepare the technology for commercialization. Phase II should include comparing the results to other proven but less portable methods in order to validate the system. These could be existing measurements obtained by state DOTs or the FRA for the specified crossings, or ground measurements obtained for comparison by the research team.

D. Federal Transit Administration (FTA)

190-FT1: Cost Allocation Technology for Non-Emergency Medical Transportation

Federal Public Transportation Law directs the Department of Transportation (DOT) and the Coordinating Council on Access and Mobility to develop a cost allocation technology to account for disparate federal reporting requirements and maintain separation of funding sources by trip for non-emergency medical transportation. The persistent challenge is harmonizing different systems that utilize different levels of financial accounting – e.g., the health and human services side typical flows funds by the person who receives the service; public transportation on the other hand is funded at the system level with formula grants. This creates an inherent systemic problem when it comes to funding transportation services that vary by type, mode, and service across different regional settings.

This project seeks innovative solutions for a cost allocation method/technology that accounts for divergent federal requirements and funding sources by trip. Development of an 'allocated cost model' for non-emergency medical transportation can result in improved coordination across multiple Federal Agency programs that provide funding to access human services transportation. This approach also responds to a Government Accountability Office audit finding to "take steps to enhance federal, state, and local coordination among 42 programs that provide nonemergency medical transportation to individuals who cannot provide their own transportation due to age, disability, or income constraints."[6]

The primary customer for this topic is transit agencies and human services nonprofits. However, this solution can also be widely applicable to providers of Federally-funded transportation services, beyond public transportation. In addition, this solution has the potential for wide-ranging impact on tax payer savings. It encourages Federal funding recipients to share resources, reduce redundancy and collaborate to streamline programs and serve more people and regions with the same or fewer resources.

Additional information on this topic can be found in the Transportation Research Board's (TRB) Transit Cooperative Research Program (TCRP) Report 144: *Sharing the Costs of Human Services Transportation, Volume 1: The Transportation Services Cost Sharing Toolkit* and *Volume 2: Research Report*. These reports explore issues and potential solutions for identifying and sharing the cost of providing transportation services for access to community-based human services programs: http://www.trb.org/Main/Blurbs/165015.aspx.

Expected Phase I Outcomes:

A cost allocation proof of concept model for a software application or other technology solution that can track different Federal funding sources by trip and funding source reporting requirements. The proof-of concept report must describe the proposed prototype; how it will enhance trip chain segments and allow for trip segment billing by different funding sources; and how it will support accessibility for persons of all types and user groups, e.g. Medicaid,

[6] https://www.gao.gov/modules/ereport/handler.php?1=1&path=/ereport/GAO-15-404SP/data_center/General_government/5._Nonemergency_Medical_Transportation

Veterans, Older Americans, etc. The final Phase I proof of concept report should also include a preliminary feasibility study that identifies the potential market demand. Specific reference should be made for potential use cases for the disabled, Medicaid recipients, aging, Veterans, low income, and other demographics. The prototype should be useable at the local and State level, scalable and able to provide information that could be used for Federal reporting requirements.

Expected Phase II Outcomes:

Phase II will include the development of a market-ready cost allocation prototype for user testing and commercialization. The resulting technology model will include a user training and marketing plan. The Phase II outcome will include further development and refinement of the cost allocation model and cost sharing algorithm that can localize each individual community and/or State's transportation funding choices.

E. National Highway Traffic Safety Administration (NHTSA)

190-NH1: Automated Driving Systems (ADS) Test Data Interface

To ensure safety on U.S public roadways, vehicles are required to comply with Federal Motor Vehicle Safety Standards (FMVSS). These standards and their associated compliance tests were developed for traditional vehicles and potentially are operational road blocks for automated driving systems (ADS). To certify an ADS, FMVSS standards and test procedures may need to be modified to be applied to an ADS environment. While in many cases, the ADS may not pose a safety hazard to the public, to the ADS could potentially not comply with the test procedures due to the way the standard was written.

In order to test ADS vehicles without standard controls and be able to meet FMVSS, a method for injecting control signals may be needed. The ADS may need to allow for a testing service to command control signals for the transmission selector, accelerator, brake, and steering systems to mimic a test driver input as described in the existing FMVSS test procedures (TP). [See Brake, Throttle, and Steering type TPs for FMVSS 124[7], FMVSS 126[8], and FMVSS 135[9].] These commanded inputs may need to be measured against the output responses of the ADS. It is desired to have this Test Data Interface secure to prevent nefarious control of the vehicle under any circumstance except its intended use.

The test data interface would be developed for a variety of potential users/buyers, including car manufacturers, third-party vehicle testers, Federal or State regulatory agencies, and others.

Expected Phase I Outcomes:

The Phase I project should result in a proof-of concept report that describes the proposed test data interface, how it will enable FMVSS testing on vehicles without standard controls, and how it will be secured from unintended use. The proof-of-concept report should describe how the attributes listed below will be addressed in the prototype.

- A preliminary feasibility study that identifies the potential market demand for a test data interface.
- Specific reference to the extent to which the proposed solution would enhance FMVSS testing and a detailed overview of potential use cases for the testing community and beyond.
- Documents the potential unique needs and capabilities of the test data interface. It should include data rates, data channels, data resolution, and other information that is pertinent for its use in FMVSS testing.
- Documents the approach taken to secure the test data interface. This should include a detailed description on the design methods proposed to prevent misuse or nefarious actions via the interface.

[7] https://one.nhtsa.gov/DOT/NHTSA/Vehicle%20Safety/Test%20Procedures/Associated%20Files/TP-124-06.pdf
[8] https://one.nhtsa.gov/staticfiles/nvs/pdf/test-procedures/TP126-03.pdf
[9] https://one.nhtsa.gov/DOT/NHTSA/Vehicle%20Safety/Test%20Procedures/Associated%20Files/TP-135-01.pdf

Expected Phase II Outcomes:

- Phase II outcomes will include the development of a market-ready prototype for user testing and possible commercialization. The prototype will be developed in an open-source manner or one that is not cost-prohibitive based on the platform used, resulting in a product that can be used by a wide variety of users (academia, OEMs, third party testing organizations, etc.)
- One expected Phase II outcome is further development and refinement of the security of the test data interface. Plans and actual penetration testing should be conducted showing the robustness of the interface from external nefarious activities.
- Another expected Phase II outcome includes a demonstration of the prototype device being used to perform FMVSS 124, FMVSS 126, and an FMVSS 135 test procedure in a test vehicle. The prototype test data interface may make use of existing vehicle interfaces and/or be installed into a test vehicle for demonstration purposes. As an option, NHTSA can supply a relevant test vehicle and test track for demonstration purposes.

F. Pipeline and Hazardous Materials Safety Administration (PHMSA)

190-PH1: Inline-Inspection (ILI) Tool for Detecting Coating Defects/Disbondment of Coating

Current ILI tools are able to detect corrosion anomalies, but lack the capabilities to detect coating defects or disbondment of coating. Pipeline operators rely on External Corrosion Detection Assessment (ECDA) to understand pipeline coating conditions. The challenges to this effort are compounded by the array of coatings in use. Corrosion could grow severe under the disbonded coating since the pipe is not protected by cathodic protection due to cathodic protection shielding effect by this type of coating. ILI tools with the capability to identify coating defects/disbonded coating will provide the information for operators to plan the maintenance and prevent corrosion.

For this project, pipeline operators are the expected customer, but typically with a service provider being the primary user. The type of technology envisioned for this effort may include something that could either be added to an existing ILI platform or be a standalone platform.

Expected Phase I Outcomes:

For Phase I, it is expected that the offeror will investigate the gaps from past research to determine the feasibility for developing a new ILI tool that could be used to detect coating disbondment in the future. The expected outcome of Phase I will be a feasibility study illustrating the capabilities required to develop a new ILI tool along with a preliminary system design to be used for the prototype development in Phase II.

Expected Phase II Outcomes:

Phase II includes the development of a benchtop disbondment coating ILI prototype. Field testing will be a critical part of Phase II in order to develop a tool that will be commercialized and used in the industry. The key characteristics to be tested include the tool navigability, accuracy (location and sizing), probability of identification/detection, etc.