DOT-VNTSC-OST-94-1

SBIR-94-1

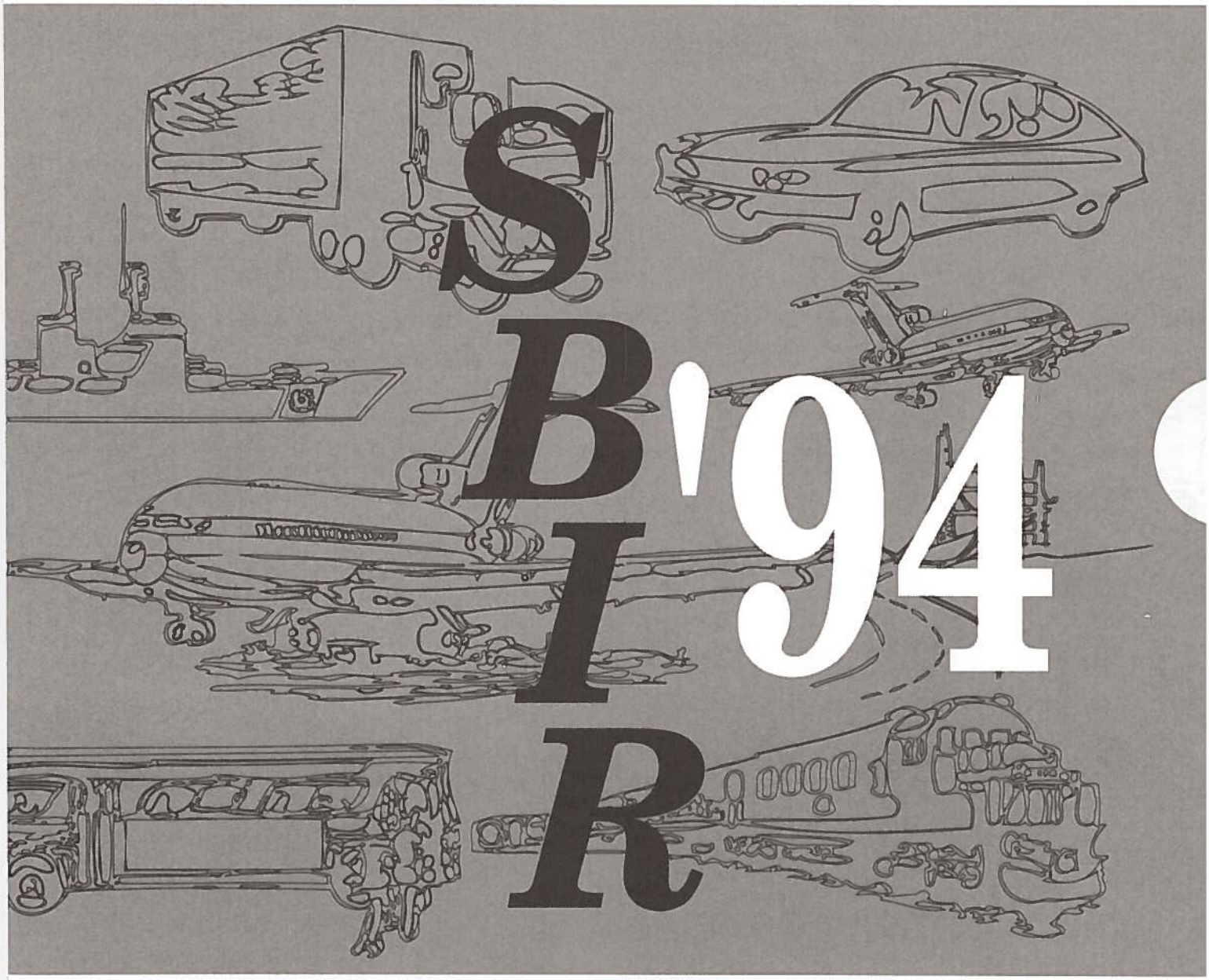
ref.

U.S. Department of Transportation
Office of the Secretary of Transportation

Small Business Innovation Research

Program Solicitation

(Closing Date: May 3, 1994)



Research and Special Programs Administration
John A. Volpe National Transportation Systems Center

U.S. DEPARTMENT OF TRANSPORTATION
SMALL BUSINESS INNOVATION RESEARCH PROGRAM
SOLICITATION NO. 94-1

PROPOSAL CHECKLIST

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

____ 1. The proposal reflects the fact that for Phase I a minimum of two-thirds (and for Phase II a minimum of one-half) of the research and/or analytical effort will be performed by the proposing firm as required (see Sections V.H.1 and V.H.2) and the primary employment of the principal investigator (for both Phase I and Phase II) must be with the small business firm at the time of award and during the conduct of the proposed research as required (see Section 1.C).

____ 2. The proposal is 25 PAGES OR LESS in length.

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

____ 4. The proposal budget may be up to $100,000 unless otherwise indicated and duration does not exceed six months.

____ 5. The technical abstract contains no proprietary information, does not exceed 200 words, and is limited to the space provided on the Project Summary sheet (Appendix B).

____ 6. The proposal contains only pages of 8 1/2" x 11" size.

____ 7. The proposal contains no type smaller than elite (except as legend on reduced drawings, but not tables).

____ 8. The COVER SHEET (Appendix A) has been completed and is PAGE 1 of the proposal.

____ 9. The PROJECT SUMMARY (Appendix B) has been completed and is PAGE 2 of the proposal.

____ 10. The TECHNICAL CONTENT of the proposal begins on PAGE 3 and includes the items identified in SECTION III.D of the Solicitation.

____ 11. The Contract Pricing Proposal (Appendix C) has been included as the last section of the proposal.

____ 12. The acknowledgement of proposal receipt card on the back cover of the solicitation has been detached, filled out and included with the proposal package.

____ 13. An original and four copies of the proposal are submitted.

____ 14. The additional information on prior Phase II awards, if required, in accordance with Section III.H.

____ 15. The proposal must be postmarked (or delivered to the DOT SBIR Program Office) no later than May 3, 1994 as required (see Section VI.A).

SBIR-94-1

PROGRAM SOLICITATION

Small Business Innovation

Research Program

Closing Date: May 3, 1994

DOT SBIR Program Office, DTS-22
U.S. Department of Transportation
Research and Special Programs Administration
John A. Volpe National Transportation Systems Center
55 Broadway, Kendall Square
Cambridge, MA 02142-1093

CONTENTS

DOT PROGRAM SOLICITATION FOR SMALL BUSINESS INNOVATION RESEARCH

I. PROGRAM DESCRIPTION

A. Introduction

This solicitation for research proposals is issued by the Department of Transportation (DOT) pursuant to the Small Business Innovation Development Act of 1982, P.L. 97-219, as amended by P.L. 99-443, and P.L. 102-564, Small Business Research and Development Act of 1992, signed October 28, 1992. The law seeks to encourage the initiative of the private sector and to use small business as effectively as possible in meeting Federal research and development objectives.

The purposes of the Act are:

(1) To stimulate technological innovation;
(2) To use small business to meet Federal research and development needs;
(3) To increase private sector commercialization of innovations derived from Federal research and development; and
(4) To foster and encourage minority and disadvantaged participation in technological innovation.

In consonance with the statutory obligations of the Act, the U.S. Department of Transportation has established a Small Business Innovation Research Program - hereinafter referred to as the DOT SBIR Program.

The purpose of this solicitation is to invite small businesses with their valuable resources and creative capabilities to submit innovative research proposals that address high priority requirements of the Department.

B. Three-Phase Program

The SBIR Program is a three-phase process. **THIS SOLICITATION IS FOR PHASE I PROPOSALS ONLY.**

Phase I. Phase I is for the conduct of feasibility-related experimental or theoretical research or R&D efforts on research topics as described herein. The dollar value of the proposal may be up to $100,000 unless otherwise noted and the period of performance may be up to six months. The primary basis for award will be the scientific and technical merit of the proposal and its relevance to DOT requirements. Only awardees in Phase I are eligible to participate in Phase II.

Phase II. Phase II is the principal research or R&D effort having a period of performance of approximately two years with a dollar value of up to $750,000 unless otherwise noted. Phase II proposals must be prepared in accordance with guidelines provided by DOT to all Phase I awardees. DOT will accept Phase II proposals under the SBIR Program only from firms which have previously received a DOT Phase I award. Phase II awards will be based on results of Phase I efforts, technical merit, Agency priority and commercial applications, and the availability of appropriated funds to support the Phase II effort. Special consideration may be given to proposals that have obtained commitments for follow-on funding from non-Federal sources for Phase III.

Phase III. Phase III is to be conducted by the small business with either non-Federal funds to pursue commercial applications of research or R&D funded in Phases I and II, or non-SBIR funded contracts with components of DOT for products or processes intended for use by the United States Government.

C. Eligibility

Each concern submitting a proposal must qualify as a small business for research or R&D purposes. In addition, **the primary employment of the principal investigator must be with the small business firm at the time of award and during the conduct of the proposed research** unless otherwise approved by the contracting officer. Primary employment means that more than one-half of the principal investigator's time is spent with the small business. Also for both Phase I and Phase II, the research or R&D work must be performed in the United States. "United States" means the several states, the Territories and possessions of the United States, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, the Trust Territory of the Pacific Islands, and the District of Columbia.

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

D. General Information

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

The Phase I research proposals should demonstrate a sound approach to the investigation of an important transportation-related scientific or engineering problem categorized under one of the topics listed in Section VIII.

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

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

Proposals should be confined principally to scientific or engineering research which may be carried out through construction and evaluation. Proposals must be for research or R&D, particularly on advanced or innovative concepts, and should not be for incremental or scaled-up versions of existing equipment or the development of technically proven ideas. Proposals for the development of already proven concepts toward commercialization, or which offer approaches already developed to an advanced prototype stage or for market research should not be submitted. Commercialization is the objective of Phase III, in which private capital or non-SBIR funds are to be used to continue the innovative research supported by DOT under Phase I and Phase II.

The proposal should be self-contained and checked carefully by the applicant to ensure that all preparation instructions have been followed. (See proposal checklist, inside front cover.)

Requests for additional information or questions relating to the DOT SBIR Program may be addressed to:

Dr. George Kovatch
DOT SBIR Program Director, DTS-22
U.S. Department of Transportation
Research and Special Programs Administration
John A. Volpe National
Transportation Systems Center
55 Broadway, Kendall Square
Cambridge, MA 02142-1093

Telephone: (617) 494-2051
Fax: (617) 494-2497

II. DEFINITIONS

A. Research or Research and Development

Research or research and development (R or R&D) means any activity which is:

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

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

(3) A systematic application of knowledge toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.

B. Small Business

A small business concern is one that at the time of award of Phase I and Phase II funding agreements meets the following criteria:

(1) Is independently owned and operated, is not dominant in the field of operation in which it is proposing, and has its principal place of business located in the United States and is organized for profit;

(2) Is at least 51 percent owned, or in the case of a publicly owned business, at least 51 percent of its voting stock is owned by United States citizens or lawfully admitted permanent resident aliens;

(3) Has, including its affiliates, a number of employees not exceeding 500, and meets the other regulatory requirements found in 13 CFR Part 121. Business concerns, other than investment companies licensed, or state development companies qualifying under the Small Business Investment Act of 1958, 15 U.S.C. 661, et seq., are affiliates of one another when either directly or indirectly (A) one concern controls or has the power to control the other; or (B) a third party or parties controls or has the power to control both. Control can be exercised through common ownership, common management, and contractual relationships. The term "affiliation" is defined in greater detail in 13 CFR 121.401. The term "number of employees" is defined in 13 CFR 121.407. Business concerns include, but are not limited to, any individual, partnership, corporation, joint venture, association or cooperative.

C. Minority and Disadvantaged Small Business

A minority and disadvantaged small business concern is one that is:

(1) At least 51 percent owned by one or more minority and disadvantaged individuals; or in the case of a publicly owned business, at least 51 percent of the voting stock of which is owned by minority and disadvantaged individuals; and

(2) Whose management and daily business operations are controlled by one or more such individuals.

A minority and disadvantaged individual is defined as a member of any of the following groups:

(1) Black Americans.

(2) Hispanic Americans.

(3) Native Americans.

(4) Asian-Pacific Americans.

(5) Subcontinent Asian Americans.

D. Women-Owned Small Business

A small business that is at least 51 percent owned by a woman or women who also control and operate it. "Control" in this context means exercising the power to make policy decisions. "Operate" in this context means being actively involved in the day-to-day management.

E. Subcontract

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

III. PROPOSAL PREPARATION INSTRUCTIONS AND REQUIREMENTS

A. Limitation on Length of Proposal

Please note that:

(1) SBIR Phase I proposals should not exceed a total of 25 pages (regular size type - no smaller than elite - single or double spaced, standard 8 1/2" X 11" pages) including proposal cover sheet, budget and all enclosures or attachments.

(2) Attachments, appendices and references are included in the 25 page limitation. Proposals in excess of 25 pages shall not be considered for review or award.

B. Proposal Cover Sheet

Photocopy and complete the proposal cover sheet in Appendix A as page 1 of each copy of each proposal. All pages should be numbered consecutively, beginning with the proposal cover sheet. Do not add an overlay on the cover sheet.

C. Project Summary

Photocopy and complete the form in Appendix B as page 2 of your proposal. The Project Summary should include a technical abstract with a brief statement of the problem or opportunity, project objectives, and description of the effort. Anticipated results and potential applications of the proposed research should also be summarized in the space provided. The Project Summary of successful proposals may be published by the DOT and, therefore, should not contain classified or proprietary information. The technical abstract must be limited to two hundred words in the space provided on the Project Summary form.

D. Technical Content

Submitted proposals must include the following:

(1) **Identification and Significance of the Problem or Opportunity.** The specific technical problem or innovative research opportunity addressed and its potential benefit to the Nation's transportation system should be clearly stated.

(2) **Phase I Technical Objectives.** State the specific objectives of the Phase I research or research and development effort, including the technical questions it will try to answer to determine the feasibility of the proposed approach.

(3) **Phase I Work Plan.** Describe the Phase I R or R&D plan. The plan should indicate what will be done, where it will be done, and how the R or R&D will be managed or directed and carried out. Phase I R or R&D should address the objectives and the questions cited in (2) above. The methods planned to achieve each objective or task should be discussed in detail, including the level of effort associated with each task.

(4) **Related Research or R&D.** Describe significant research or R&D that is directly related to the proposal including any conducted by the project manager/principal investigator or by the proposing firm. Describe how it relates to the proposed effort, and any planned coordination with outside sources. The proposer must persuade reviewers of his or her awareness of key recent research or R&D conducted by others in the specific topic area.

(5) **Key Personnel and Bibliography of Directly Related Work.** Identify key personnel involved in Phase I including their directly related education, experience, and bibliographic information. Where vitae are extensive, summaries that focus on the most relevant experience or publications are desired and may be necessary to meet proposal page limitation.

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

(a) State the anticipated results of the proposed approach if the project is successful (Phase I and Phase II).

(b) Discuss the significance of the Phase I effort in providing a foundation for Phase II research or research and development effort.

(7) **Facilities.** A detailed description, availability and location of instrumentation and physical facilities proposed for Phase I should be provided.

(8) **Consultants.** Involvement of consultants in the planning and research stages of the project is permitted.

(a) If such involvement is intended, it should be described in detail.

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

(a) Whether and by what means the proposed project appears to have potential commercial application.

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

(10) **Similar Proposals or Awards.** A firm may elect to submit essentially equivalent work under other Federal Program Solicitations, or may have received other Federal awards for essentially equivalent work. In these cases, a statement must be included in each such proposal indicating:

(a) The name and address of the agencies to which proposals were submitted or from which awards were received;

(b) Date of proposal submission or date of award;

(c) Title, number, and date of SBIR Program Solicitations under which proposals were submitted or awards received;

(d) The applicable research topics for each SBIR proposal submitted or award received;

(e) Titles of research projects; and

(f) Name and title of Project Manager or Principal Investigator for each proposal submitted or award received.

E. Contract Pricing Proposal

A firm fixed price Phase I Contract Pricing Proposal (Standard Form 1411) must be submitted in detail as shown in Appendix C. Note: Firm Fixed Price (FFP) is the type of contract to be used for Phase I SBIR awards. Some cost breakdown items of Appendix C may not apply to the proposed project. If such is the case, there is no need to provide information for each and every item. It is important, however, to provide enough information to allow the DOT to understand how the proposer plans to use the requested funds if the contract is awarded. Phase I contract awards may include a profit or fee.

F. DUNS Identification Number

If available, a firm should note its DUNS identification number on Appendix C, Contract Pricing Proposal, Standard Form 1411. This number is assigned by Dun & Bradstreet, Inc., and is contained in that Company's Data Universal Numbering System (DUNS).

G. Acknowledgement of Proposal Receipt

Proposers should cut out and fill out the acknowledgement of receipt card on the inside back cover of this solicitation and include it with the proposal to DOT.

H. Prior SBIR Phase II Awards

If the small business concern has received more than 15 Phase II awards in the prior 5 fiscal years, submit name of awarding agency, date of award, funding agreement number, amount, topic or subtopic title, follow-on agreement amount, source and date of commitment and current commercialization status for each Phase II. (This required proposal information shall not be counted toward proposal pages count limitation.)

IV. METHOD OF SELECTION AND EVALUATION CRITERIA

A. General

All Phase I and Phase II proposals will be evaluated and judged on a competitive basis. Initially, all proposals will be screened to determine responsiveness to the solicitation. Proposals passing this screening will be evaluated to determine the most promising technical and scientific approaches. Each proposal will be judged on its own merit. The Department of Transportation is under no obligation to fund any proposal or any specific number of proposals on a given topic or subtopic. It may elect to fund several or none of the proposed approaches to the same topic or subtopic.

B. Evaluation Criteria

The evaluation process involves the following factors:

(1) Scientific and technical merit and the feasibility of the proposal's commercial potential, as evidenced by:

a) past record of successful commercialization of SBIR or other research;

b) existence of second phase funding commitments from private sector or non-SBIR funding sources;

c) existence of third phase, follow-on commitments; and

d) presence of other indicators of the commercial potential of the idea.

(2) The adequacy of the work plan and approach to achieve specified work tasks and stated objectives of the proposed effort within budgetary constraints and on a timely schedule.

(3) Qualifications of the proposed principal/key investigator(s) including demonstrated expertise in a disciplinary field related to the particular R or R&D topic that is proposed for investigation.

(4) Adequacy of supporting staff and facilities, equipment, and data for the successful completion of the proposed research or research and development.

C. Prescreening

Each proposal submission will be examined to determine if it is complete and contains an adequate amount of technical and financial data. Proposals that do not meet the basic requirements of the solicitation will be excluded from further consideration. Each organization will be notified promptly by letter of such action.

D. Schedule

All DOT reviews should be completed and awards made within 5 months of the closing date for Phase I proposals.

E. Program Selection

A Proposal Review Panel, chaired by the Department's SBIR Program Director and comprising senior management officials representing the Department's Operating Administrations and the Office of the Secretary, will arrange for review and evaluation by professionals, in their respective organizations, of all Phase I proposals that meet the requirements of this solicitation. The Proposal Review Panel will review the technical evaluations by the specialists and recommend to the Program Director the proposals for awards. The Program Director will announce the awards.

F. Contact with DOT

Contact with DOT relative to this solicitation during the Phase I proposal preparation and evaluation period is restricted for reasons of competitive fairness. No information on proposal status will be available until formal notification of award or declination is made. For planning purposes this is expected to occur by October 1, 1994. Correspondence relating to proposals should reference the proposal identification number assigned on the acknowledgement of receipt card and be sent to the DOT SBIR Program Office.

After final award decisions have been announced, a debriefing may be provided to the proposer upon written request. The identity of the evaluators shall not be disclosed.

V. CONSIDERATIONS

A. Awards

It is estimated that during fiscal year 1994, the Department of Transportation will award approximately 25 Phase I contracts with an anticipated potential maximum of 30 awards, depending on actual funding available and the responses from small business firms to the solicited research topics in Section VIII.

All Phase I awards will be firm fixed-price contracts and may be up to $100,000 unless otherwise noted. Phase II awards will be in the form of cost-plus-fixed-fee contracts with a value of up to $750,000 each unless otherwise noted. Phase II awardees will be required to have acceptable accounting systems.

Only recipients of Phase I contracts will be eligible to compete for Phase II awards.

Under the Department of Transportation's implementation of the SBIR Act, the Department's Operating Administrations contribute to SBIR funding. Each Administration's contribution may be used only to support research of concern to that Operating Administration. For example, funds furnished by the Federal Aviation Administration may not support research solely of concern to the Federal Highway Administration. Based on anticipated funding levels, there may not be adequate funding within the SBIR program to support Phase II awards for research which is solely of concern to the Office of the Secretary and the following Operating Administrations: Federal Highway Administration, Federal Railroad Administration, Federal Transit Administration, Maritime Administration, National Highway Traffic Safety Administration, and the United States Coast Guard. Phase II awards for such research will depend on the actual funding available.

B. Reports

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

C. Payment Schedule

Payments will be made in three equal installments upon presentation of invoices by the contractor in conjunction with the submission of the reports described above.

D. Innovations, Inventions, and Patents

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

If proprietary information is provided by a proposer in a proposal which constitutes a trade secret, proprietary commercial or financial information, confidential personal information or data affecting the national security, it will be treated in confidence, to the extent permitted by law, provided this information is clearly marked by the proposer with the term "confidential proprietary information" and provided the following legend appears on the title page of the proposal:

> "For any purpose other than to evaluate the proposal, these data 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 proposer as a result of or in connection with the submission of these data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the contract. This restriction does not limit the Government's right to use information contained in the data if it is obtained from another source without restriction. The data subject to this restriction is contained in pages _____ of this proposal."

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

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

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

(NOTE: With respect to topics listed under Aviation Security, information will not be released unless approved by the Director, Civil Aviation Security. The release of such information must comply with 14 CFR, part 191.)

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

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

E. Cost-Sharing

Cost-sharing is permitted for proposals under this solicitation; however, cost-sharing is not required nor will it be a factor in proposal evaluations.

F. Profit or Fee

A profit is allowed on awards to small businesses under the DOT SBIR Program.

G. Joint Ventures or Limited Partnerships

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

H. Research and Analytical Work

1. **For Phase I a minimum of two-thirds of the research and/or analytical effort must be performed by the proposing firm** unless otherwise approved in writing by the contracting officer.

2. **For Phase II a minimum of one-half of the research and/or analytical effort must be performed by the proposing firm** unless otherwise approved in writing by the contracting officer.

I. Contractor Commitments

Upon award of a contract, the awardee will be required to make certain legal commitments through acceptance of numerous contract clauses. The outline that follows is illustrative of the types of clauses to which the contractor would be committed. This list should not be understood to represent a complete list of clauses to be included in Phase I contracts, nor to be the specific wording of such clauses. Copies of complete terms and conditions are available upon request.

1. **Standards of Work.** Work performed under the contract must conform to high professional standards.

2. **Inspection.** Work performed under the contract is subject to Government inspection and evaluation at all times.

3. **Examination of Records.** The Controller General (or a duly authorized representative) shall have the right to examine any directly pertinent records of the contractor involving transactions related to this contract.

4. **Default.** The Government may terminate the contract if the contractor fails to perform the work contracted.

5. **Termination for Convenience.** The contract may be terminated at any time by the Government if it deems termination to be in its best interest, in which case the contractor will be compensated for work performed and for reasonable termination costs.

6. **Disputes.** Any dispute concerning the contract which cannot be resolved by agreement shall be decided by the contracting officer with right of appeal.

7. **Contract Work Hours.** The contractor may not require an employee to work more than eight hours a day or forty hours a week unless the employee is compensated accordingly (i.e., overtime pay).

8. **Equal Opportunity.** The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin.

9. **Affirmative Action for Veterans.** The contractor will not discriminate against any employee or applicant for employment because he or she is a disabled veteran or veteran of the Vietnam era.

10. **Affirmative Action for Handicapped.** The contractor will not discriminate against any employee or applicant for employment because he or she is physically or mentally handicapped.

11. **Officials Not to Benefit.** No member of or delegate to Congress shall benefit from the contract.

12. **Covenant Against Contingent Fees.** No person or agency has been employed to solicit or secure the contract upon an understanding for compensation except bonafide employees or commercial agencies maintained by the contractor for the purpose of securing business.

13. **Gratuities.** The contract may be terminated by the Government if any gratuities have been offered to any representative of the Government to secure the contract.

14. **Patent Infringement.** The contractor shall report each notice or claim of patent infringement based on the performance of the contract.

15. **Procurement Integrity.** Submission of a proposal under this solicitation subjects the offeror to the procurement integrity provision (§27) of the Office of Federal Procurement Policy Act (41 U.S.C. 423). This statute, as implemented by Federal Acquisition Regulation (FAR, 48 CFR) §3.104, proscribes the following conduct by competing contractors during an agency procurement: offering or discussing future employment or business opportunities with an agency procurement official; promising or offering a gratuity to an agency procurement official; soliciting or obtaining proprietary or source selection information regarding the procurement. Violations of the statute may result in criminal and/or civil penalties, disqualification of an offeror, cancellation of the procurement, or other appropriate remedy.

Prior to award of an SBIR contract estimated to cost over $100,000 (normally a Phase II award), the competing contractor will be required to execute the Certificate of Procurement Integrity contained in FAR provision 52.203-8, "Requirement for Certificate of Procurement Integrity (SEP 1990)."

J. Additional Information

1. This solicitation is intended for informational purposes and reflects current planning. If there is any inconsistency between the information contained herein and the terms of any resulting SBIR contract, the terms of the contract are controlling.

2. Before award of an SBIR contract, the Government may request the proposer to submit certain organizational, management, personnel, and financial information to assure responsibility of the proposer.

3. The Government is not responsible for any monies expended by the proposer before award of any contract.

4. 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.

5. The SBIR Program is not a substitute for existing unsolicited proposal mechanisms. Unsolicited proposals shall not be accepted under the SBIR Program in either Phase I or Phase II.

6. If an award is made pursuant to a proposal submitted under this solicitation, the contractor will be required to certify that he or she has not previously been, nor is currently being paid for essentially equivalent work by any agency of the Federal Government.

7. When purchasing equipment or a product with funds provided under the SBIR program, purchase only American made equipment and products, to the extent possible in keeping with the overall purposes of the program.

VI. SUBMISSION OF PROPOSALS

A. Submittal Instructions

An original and four copies of each proposal submitted under the DOT SBIR Program should be sent to:

Dr. George Kovatch
DOT SBIR Program Director, DTS-22
U.S. Department of Transportation
Research and Special Programs Administration
John A. Volpe National
Transportation Systems Center
55 Broadway, Kendall Square
Cambridge, MA 02142-1093
Telephone: (617) 494-2051

Proposals must be postmarked NO LATER than May 3, 1994 to qualify for acceptance and consideration under the current DOT SBIR Program. Proposals postmarked later than May 3, 1994 will not be accepted.

Proposals delivered to the DOT SBIR Program Office by any means other than the U.S. Postal Service, must be received at the above address on or before May 3, 1994.

B. Additional Information

1. **Bindings.** Please do not use special bindings or covers. Staple the pages in the upper left corner of the cover sheet of the proposal with a single staple.

2. **Packaging.** All copies of the proposal should be sent in one package together with the acknowledgement of receipt card which appears on the back cover of this document.

3. **Confirmation.** The DOT SBIR Program Office will assign an identification number to each proposal received at the above address by May 3, 1994 or postmarked no later than May 3, 1994. This number will appear on the acknowledgement of receipt card (see inside back cover) which will be sent to the proposer by return mail confirming receipt of the proposal.

VII. SCIENTIFIC AND TECHNICAL INFORMATION SOURCES

The following organizations may be sources for providing technology search and/or document services and may be contacted directly for service and cost information:

Aerospace Research Applications Center
611 North Capital
Indianapolis, IN 46204
(317) 274-4621

Central Industrial Applications Center
Southeastern Oklahoma State University
Durant, OK 74701
(405) 924-6822

NASA Industrial Applications Center
University of Southern California
3716 S. Hope Street #200
Los Angeles, CA 90007
(213) 743-6132

NASA Industrial Applications Center
823 William Pitt Union
University of Pittsburgh
Pittsburgh, PA 15260
(412) 648-7000

NASA/Southern Technology
Applications Center
University of Florida
One Progress Boulevard
Alachua, FL 32615
(904) 462-3913

NASA/UK Technology Applications Center
University of Kentucky
109 Kinkead Hall
Lexington, KY 40506
(606) 257-6322

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
(703) 487-4600

NERAC, Inc.
One Technology Drive
Tolland, CT 06084
(203) 872-7000

VIII. RESEARCH TOPICS

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

OFFICE OF THE SECRETARY AND DOT OPERATING ADMINISTRATION/TOPICS		POTENTIAL MAXIMUM FY94 PHASE I AWARDS
OFFICE OF THE SECRETARY (OST)		1 Award
Space Transportation		
[1] 94-OS1	Commercial Space Launch Frequency Requirements	
FEDERAL AVIATION ADMINISTRATION (FAA)		16 Awards
Aircraft Safety		
94-FA1	Effectiveness of Fire Retardant Chemicals at Elevated Temperatures	
94-FA2	Hybrid Fire Extinguishing Concepts	
94-FA3	Fire Resistant Thermoplastics for Aircraft Cabin Interiors	
94-FA4	Biosensors for Aircraft Smoke Detection	
94-FA5	Raman Fiber-Optic Cure Monitoring System for Polymer Composites	
94-FA6	Nondestructive Inspection (NDI) of Aging Aircraft	
94-FA7	Improved Life Preservers for Aircraft	
94-FA8	Improved Emergency Evacuation Slides for Aircraft	
Aviation Security		
[2] 94-FA9	X-Ray Sources	
[2] 94-FA10	Gamma Ray Detector Materials	
[2] 94-FA11	Gamma Ray Sources	
[2] 94-FA12	Luggage Materials Database	

[1]Phase I may be up to $75,000 and Phase II may be up to $500,000
[2]See Note Section V.D.2

OFFICE OF THE SECRETARY AND DOT OPERATING ADMINISTRATION/TOPICS		POTENTIAL MAXIMUM FY94 PHASE I AWARDS
[2] 94-FA13	Concepts in Incendiary Detection	
[2] 94-FA14	Effects of X-Rays on Film and Magnetic Recording Material	
Human Factors		
94-FA15	Assessment of Airman Cognitive Rehearsal on Time to Regain Flight Proficiencies	
94-FA16	Correlation of Failures on Written/Practical Pilot Tests to Potential Involvement in Accidents/Incidents/Violations	
FEDERAL HIGHWAY ADMINISTRATION (FHWA)		7 Awards
Traffic		
[3] 94-FH1	Integrated Traffic Data Input Software	
[3] 94-FH2	Computerization of Highway Routing Designation for Hazardous Materials	
[3] 94-FH3	On-Board Weigh-in-Motion System	
[3] 94-FH4	Vehicle Axle Detectors	
Hydraulics		
[3] 94-FH5	Positioning System	
Intermodal Transportation		
[3] 94-FH6	Comprehensive Intermodal Freight Transportation Visual Database	
Highway Safety		
[3] 94-FH7	Roadway Visibility Sensor	
FEDERAL RAILROAD ADMINISTRATION (FRA)		1 Award
[4] 94-FR1	Determining the Integrity of Insulation- and Lining-covered Welds of Tank Cars	

[2]See Note Section V.D.2
[3]Phase I may be up to $100,000 and Phase II may be up to $500,000
[4]Phase I may be up to $100,000 and Phase II may be up to $300,000

OFFICE OF THE SECRETARY AND DOT OPERATING ADMINISTRATION/TOPICS		POTENTIAL MAXIMUM FY94 PHASE I AWARDS
FEDERAL TRANSIT ADMINISTRATION (FTA)		**2 Awards**
94-FT1	Geographic Information System (GIS) Transit Applications	
94-FT2	Computerized Applications for Transit Operations and Scheduling	
94-FT3	Application of Bar Coding Technology to Transit	
94-FT4	Transit System Computer Simulation Models	
MARITIME ADMINISTRATION (MARAD)		**1 Award**
[5] 94-MA1	Advanced Ship Technology and Intermodal Operations	
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION (NHTSA)		**2 Awards**
Crashworthiness		
[1] 94-NH1	Advanced Restraint Systems	
Emergency Medical Services		
[1] 94-NH2	Emergency Medical Services Simulation Model	

[1]Phase I may be up to $75,000 and Phase II may be up to $500,000
[5]Phase I may be up to $50,000 and Phase II may be up to $300,000

OFFICE OF THE SECRETARY

SPACE TRANSPORTATION

[1] **94-OS1. COMMERCIAL SPACE LAUNCH FREQUENCY REQUIREMENTS**

The Office of Commercial Space Transportation (OCST) seeks to advance the U.S. Government policy of encouraging, promoting, and facilitating a viable, competitive U.S. commercial space transportation industry. OCST wishes to understand the impacts on the U.S. space launch industry's ability to continue to provide safe and reliable service, given a recent decision to allocate a portion of dedicated frequency spectrum for commercial launch operations to other users. Specifically, OCST desires research on the adequacy of the current band (2310-2390 MHz) for tracking, telemetry, and control relating to commercial launch operations. Furthermore, the U.S. Government and U.S. commercial space launch industry would both benefit from this research because vehicles used by them are essentially identical. OCST also desires research to determine a viable and available additional frequency spectrum, if required, for commercial launch operations in the near and far term.

FEDERAL AVIATION ADMINISTRATION

AIRCRAFT SAFETY

94-FA1. EFFECTIVENESS OF FIRE RETARDANT CHEMICALS AT ELEVATED TEMPERATURES

Additive chemicals can affect the ignitability and flammability of polymeric materials through a variety of mechanisms. Scavenging of gas phase radicals and sealing of the material surface are two examples. Innovative research is needed on the high temperature performance of one or a number of classes of fire retardants incorporated into polymeric materials. Such research could provide a basis for determining the level of fire threat, in terms of thermal radiation exposure, that can be endured by a given polymeric system without ignition or flame spread.

94-FA2. HYBRID FIRE EXTINGUISHING CONCEPTS

Suppression of accidental fires generally involves application of a solid, liquid, gas, or two-phase system that can chemically or thermally interrupt the combustion processes. Innovative research is needed to determine the feasibility of hybrid suppression systems in which one component is an externally applied agent and the other component is a product generated during the pyrolysis of a burning material. The hybrid system of externally applied chemical and *in-situ* chemical generation should suppress the gas- or solid-phase combustion reactions which support burning. Alternatively, no external agent is required and the agent or combination of agents is released or formed via a thermophysical or thermochemical mechanism in the pyrolyzing material.

94-FA3. FIRE-RESISTANT THERMOPLASTICS FOR AIRCRAFT CABIN INTERIORS

High-performance fire-resistant, thermoplastic polymers are needed for aircraft cabin interior components. Applications include transparent glazing and coatings, textile fibers, fiber composite resins, and injection molded parts. Unfilled materials should be amorphous and isotropic (i.e., not liquid crystalline), high modulus (> 5 GPa), high tensile strength (> 150 MPa), easily melt processable at moderate temperature ($< 300°$ C), soluble in common solvents, have excellent thermo-oxidative stability, abrasion resistance, and exhibit minimal heat release

[1]Phase I may be up to $75,000 and Phase II may be up to $500,000

and smoke generation when tested according to FAR 25.853 (a-1). Polymers should be synthesized from readily available starting materials or natural products so as to be moderately priced ($\leq$ $10/lb) in production quantities.

94-FA4. BIOSENSORS FOR AIRCRAFT SMOKE DETECTION

Current optical density smoke detectors are reliable only at relatively high smoke concentrations (parts-per-hundred) corresponding to fully developed aircraft fires. A biochemical sensor capable of measuring parts-per-million smoke concentrations is required for early detection of in-flight aircraft fires to provide additional time for suppression or emergency landing. A smoke-detection biosensor which mimics the chemical-physical mechanism of human olfactory response to smoke (i.e., biomimetic "chemical nose") is one of particular interest.

94-FA5. RAMAN FIBER-OPTIC CURE MONITORING SYSTEM FOR POLYMER COMPOSITES

A reliable and economical system for *in-situ* monitoring of the cure chemistry of thermoset polymers and composites using fiber-optic Raman spectroscopy is desired. New high-performance, fire-resistant polymers and composites for aircraft applications are likely to be more expensive than current materials, so process innovations are required to reduce the cost of fabrication and ensure acceptance by commercial manufacturers. Laser Raman spectroscopy using near-visible/near-infrared diode lasers and disposable communications-grade quartz optical fiber sensors has been demonstrated to be a viable cure monitoring technique for pure resins. Changes in the concentrations of reactive chemical groups in the resin are followed using Raman-active bands in the Stokes scattering region, and temperature is determined *in-situ* from the ratio of Stokes and anti-Stokes band intensity. A prototype cure monitoring system based on these principles is needed for industrial process monitoring of resin cure. Sensors must be developed for non-contact surface scattering and *in-situ* measurements of composites containing a high volume fraction of carbon, glass, or aramid fibers. Chemometrics techniques may be required to improve the sensitivity of the method.

94-FA6. NONDESTRUCTIVE INSPECTION (NDI) OF AGING AIRCRAFT

Research is needed on innovative, low cost ways of enhancing visual inspections for corrosion and cracks currently performed on commercial aircraft. State-of-the art electronics, optics, and/or computerized software could be integrated into the systems which enhance flaw visualization and data storage retrieval. Enhancements to existing NDI equipment should be easily added and offer the advantages of inspecting quickly and reliably areas of structures for defects. Proposals should demonstrate an ability to provide or acquire the necessary cracked and corroded aircraft specimens to complete a Phase I feasibility study. Special consideration will be given to proposals whose product concept is deemed to be readily transferable to industry. Projected production and operation cost, anticipated ease of operation, and potential safety concerns are significant factors with respect to the transfer of new technologies to industry.

94-FA7. IMPROVED LIFE PRESERVERS FOR AIRCRAFT

Recommendations made by the National Transportation Safety Board (NTSB) have pointed to difficulties in the use of water survival equipment on airliners which crash in water. It has been noted that passengers can have particular difficulty in finding the flotation device, removing it from where it is stowed, and donning it properly. Moreover, the device has only a limited ability to deal effectively with the range of sizes of passengers (particularly children). The NTSB has also commented on the flotation capabilities and hypothermia protection provided by the devices currently used. Innovative water flotation device designs appropriate for commercial aircraft are sought. Such designs should demonstrate that they address problems with current designs that have been identified by the NTSB, including issues related to stowing, donning, and passenger size. Requirements of the Federal Aviation Administration's TSO-C13f, "Life Preservers," must also be shown.

FEDERAL AVIATION ADMINISTRATION

94-FA8. IMPROVED EMERGENCY EVACUATION SLIDES FOR AIRCRAFT

Recent full-scale emergency evacuation demonstrations of large, dual-aisle, transport category aircraft revealed problems with the safety of their long, dual-lane emergency evacuation slides deployed from Type A aircraft doors. These demonstrations provided evidence that the larger emergency slides bend during use, creating a "cup" at the bottom which causes passengers to pile up on top of each other as the evacuation proceeds. This situation is exacerbated by an insufficient slide marking system intended to guide egress. The consequence of these factors was injury to many of the evacuating passengers. Innovative emergency slide designs are sought which can overcome these problems in a manner appropriate for commercial aircraft. Such designs should demonstrate that they address the problems by eliminating hazards to produce safe, efficient egress. Compliance with the requirements of the FAA's TSO-C69a, "Emergency Evacuation Slides, Ramps, and Slide/Raft Combinations," must be shown.

AVIATION SECURITY

[2] 94-FA9. X-RAY SOURCES

Certain explosives detection systems use X-rays to measure material density by means of X-ray attenuation or crystal structure (powder diffraction). For attenuation, present sources have energy output characteristics allowing only crude "elemental" separation into organic (low Z) and inorganic (high Z). For X-ray diffraction systems, novel X-ray detectors with good energy resolution are required to make use of the broad energy output. To allow for more detailed attenuation analysis and simplified diffraction detector systems, new sources of intense, narrow-band and readily tunable X-rays of energies ranging from 50 to 200 keV are desired.

[2] 94-FA10. GAMMA RAY DETECTOR MATERIALS

The FAA has under consideration techniques for explosives identification using radiation emitted at characteristic frequencies to identify isotopes of interest. These gamma rays typically have energies of 1 to 8 MeV. To facilitate development of commercial systems using these techniques faster scintillators with better operating characteristics are desired.

Material characteristics to be considered are energy resolution (photo-efficiency), efficiency (intrinsic and photo peak), stopping power, operation at high count rates, and operating conditions. Also of interest are detector materials using direct gamma to (electrical) charge conversion (not requiring use of UV/visible photon to electron conversion) and normal operation at or near 300K.

[2] 94-FA11. GAMMA RAY SOURCES

There are techniques for materials identification that use the resonant absorption of photons at characteristic energies to identify specific isotopes of interest. Isotopes of current interest include, but are not limited to, ^{12}C, ^{14}N, ^{16}O, $^{35}C1$, and $^{37}C1$. Generally the absorption energies may correspond to either nuclear, typically 100 keV to 10 MeV, or atomic, less than 100 keV, transitions of a specific isotope. These transitions are characterized by a resonance magnitude and width (cross section and line width, respectively) and the strength of the resonant response can be characterized by the product of the magnitude and width. Typically, these techniques suffer from a lack of useful photon flux (able to excite a resonant transition). An innovative device is needed with sufficient flux and spectral purity that will allow further development of these techniques.

[2]See Note Section V.D.2

[2] 94-FA12. LUGGAGE MATERIALS DATABASE

Explosives detection techniques are being developed which inspect air passenger luggage with a variety of nondestructive evaluation techniques, such as dual-energy X-ray analysis, pulsed fast neutron analysis and others. These techniques measure one or more parameters which either directly or indirectly indicate the presence of explosive materials. These parameters include total mass, physical density, effective atomic number, and several elemental densities (C, H, N, O, etc.).

However, the variation of these parameters among the different types and strengths of explosives is significant, and may overlap with normal materials commonly found in luggage, leading to false alarms (false positives). It would be of value to have a database containing the parameters mentioned above pertaining to items commonly found in luggage so that false positive rates can be understood and predictable.

Typical materials of concern are clothing, footwear, cosmetics, and toiletry items. Note that there may be variations within a given type of item, depending on the manufacturer or other factors, which should be identified. In addition, the database must contain a host of items which are not as common but are found in luggage, such as various foodstuffs, gift items, alcoholic beverages, electronic items, etc. A precise knowledge of very detailed objects is not necessary, whereas information on the materials contained therein is valuable.

This effort may require substantial literature searches, manufacturer surveys, or luggage surveys and may be supplemented with the gathering of empirical data using actual devices and luggage items, depending on the information available. It is anticipated that 1000-10,000 items and materials should be identified. Phase I of this effort would be a feasibility study and would identify the method of approach for gathering the data. Phase II would involve gathering data and development of the database. Phase III, if deemed necessary by the FAA, would involve expanding the database to induce more characteristics and to make it compatible with a luggage simulation system currently being developed.

[2] 94-FA13. CONCEPTS IN INCENDIARY DETECTION

In addition to the threat posed to tourists by explosive devices; incendiary devices could be concealed in passenger luggage and cause a major fire aboard an aircraft in flight, possibly leading to loss of life or catastrophic failure. The FAA is searching for innovative techniques capable of detecting incendiary materials in luggage without a hand inspection or removing any of the contents for further inspection. Phase I would be a feasibility study and/or demonstration and Phase II, if appropriate, could be a prototype development project.

[2] 94-FA14. EFFECTS OF X-RAYS ON FILM AND MAGNETIC RECORDING MATERIAL

The FAA is developing a wide variety of X-ray devices. A study is needed to determine the effects of X-ray systems on film and magnetic recording materials (floppy disks, hard disks, tapes, etc.). The study would consider the full range of X-ray equipment currently being considered by the FAA. The project should result in a solid statistical estimate of the likelihood of damage to various types of film and magnetic recording media.

[2]See Note Section V.D.2

FEDERAL AVIATION ADMINISTRATION

HUMAN FACTORS

94-FA15. ASSESSMENT OF AIRMAN COGNITIVE REHEARSAL ON TIME TO REGAIN FLIGHT PROFICIENCIES

Learning and retention studies generally indicate that a skill not used or practiced for some period of time deteriorates, and results in a loss of skill proficiency. A period of practice or retraining is necessary to bring performance up to previously demonstrated levels of competency. In complex situations such as piloting an aircraft, both cognitive and procedural knowledge deterioration is a bigger factor in total proficiency than loss of motor skills.

Studies on pilot proficiency have generally dealt with time required to regain a previously attained standard of proficiency following a period of complete absence from the cockpit, such as when a military pilot returns to the cockpit after a period of duty on a desk job. There are no studies, however, that deal with the motor skills practice required to regain/maintain proficiency when the pilot has been involved in frequent cognitive rehearsal of procedures even though he/she seldom touches the controls. Such is the case of an FAA aviation safety inspector responsible for the examination of airmen. A study of this nature would provide empirical data to help ascertain the level of practice which should be afforded to such individuals through internal FAA programs such as the Support Flight Program.

94-FA16. CORRELATION OF FAILURES ON WRITTEN/PRACTICAL PILOT TESTS TO POTENTIAL INVOLVEMENT IN ACCIDENTS/INCIDENTS/VIOLATIONS

Pilot are certificated after satisfactorily completing a written examination and a practical (flight) test. Presently there are no maximum number of attempts a pilot may make to complete these two prerequisites.

In addition to maintaining files on the results of these test attempts, the Federal Aviation Administration (FAA) maintains databases that track operational occurrences involving accidents, incidents, and violations. Correlation of the certification files, specifically the test results, with the operational occurrences could provide proactive safety insights. For example, do pilots who fail a written and/or practical test for a given level of pilot certification have a significantly greater incidence of accidents, incidents, or violations; and do pilots who have multiple failures, in written and/or practical examinations for a given rating, have a significantly greater incidence of accidents, incidents or violations?

By identifying the pilots most likely to be involved in accidents, incidents, or violations the answers could help in establishing proactive methods of preventing this mishaps; in addition, they could help in reevaluating the FAA pilot certification and certification record-keeping philosophy.

FEDERAL HIGHWAY ADMINISTRATION

TRAFFIC

[3] 94-FH1. INTEGRATED TRAFFIC DATA INPUT SOFTWARE

The efficient movement of traffic through streets and intersections helps reduce congestion and emissions. Three traffic models address this: (1) TRAF-NETSYM simulates traffic conditions, produces performance statistics and

[3]Phase I may be up to $100,000 and Phase II may be up to $500,000

graphic outputs, generates and compares alternative solutions, and is useful in identifying problems; (2) TRANSYT-7F; and (3) PASSER II optimize traffic signal timing and are useful in moving traffic efficiently. A combination of these models provides the best tool. However, they are independent programs with different data requirements and although some data may be common to all programs, a user has to input the data separately because of different formats. Attempts to bring the data into a common base so far has only been successful between TRANSYT-7F and PASSER II, and limited to arterials. The recent advancement of data management and graphics user interface software tools makes the possibility of integration of these three models more promising. The data input software will: (1) eliminate the redundancy of coding the same data for separate models; and (2) facilitate the application of these models. The computer programs are available for a nominal fee from: McTrans Transportation Research Center, 512 Well Hall, University of Florida, Gainsville, Florida 32611-2083, Phone: 904-392-0378.

[3] **94-FH2. COMPUTERIZATION OF HIGHWAY ROUTING DESIGNATIONS FOR HAZARDOUS MATERIALS**

The Secretary of Transportation is required to periodically update and publish a list of currently effective hazardous materials highway route designations. The Federal Highway Administration (FHWA) is developing a list of all routing designations for highway transport of hazardous materials. There is need for a personal computer-based database for the information and queriable software which will be useful in answering questions about route designations. The software must also be useful in publishing the list in the Federal Register, in transmitting the list and queried information between computers, and in making the list available on computer bulletin boards. The database and software must also be compatible with or include a GIS mapping system so that it can be used in a point/retrieve graphical/menu system for retrieval of routing designation information listings and routing connectivity.

[3] **94-FH3. ON-BOARD WEIGH-IN-MOTION SYSTEM**

An important goal of the IVHS Program is to allow legal commercial vehicles to travel unimpeded from state to state. This would require that a truck's credentials could be checked electronically and the safety record of the carrier and the vehicle could be examined as the truck approaches an enforcement facility. This also implies that truck weights be checked prior to entering weigh stations to allow obviously legally loaded trucks to proceed without stopping. All efforts to date in this area have used in-pavement weigh-in-motion systems.

An alternative approach is to provide an on-board system which would continuously determine the weight of a vehicle and provide that information to enforcement officials through some communication link. Such a system would not only allow screening of trucks at permanent enforcement facilities, but also allow for screening of truck weights by mobile crews. It might be used as part of vehicle-specific warning systems at ramps and downgrades to advise drivers of safe speeds. Such a system would have to be relatively accurate, tamperproof, reliable, and low-cost.

[3] **94-FH4. VEHICLE AXLE DETECTORS**

Current methods for detecting vehicle axles use tapeswitches (tire actuated contacts) which are affixed to the road surface via adhesives. These sensor inputs, when properly configured and attached to suitable recording devices can accumulate highly accurate data of vehicle axle passage to determine parameters about traffic flow: vehicle counts, lane displacement, lane changes, velocity (acceleration/deceleration), headway, gap, axle counts, and wheelbase. Such information can be used to evaluate a wide range of traffic reactions to such things as tunnel portal size, channelization, traffic signal displays, etc. However, deployment of these tapeswitches is both very tedious

[3]Phase I may be up to $100,000 and Phase II may be up to $500,000

and dangerous. The tapeswitches themselves are subject to destruction by rapid acceleration/deceleration, rain, and constant traffic flow. Installation requires researchers to be exposed repeatedly to traffic. A sensing device/technique is needed which provides outputs that are equivalent to tapeswitches, yet are designed to be temporary by nature, low cost, easy to deploy, reliable, capable of providing lane definition (4 lanes), and be unobtrusive.

HYDRAULICS

[3] **94-FH5. POSITIONING SYSTEM**

The goal of this project is to develop a low cost Positioning System (PS) for use in gathering positioning bathymetry data (topography of the river bottom) and mapping scour holes near bridges. A boat is used as a platform for sensing depth(s) to bottom. The position of the boat must be coupled with bed elevation data in order to delineate local scour at bridge piers and abutments and to map the riverbed. While the following specifications are desirable, compromises can be made for cost, simplicity, durability, and ease of use: passive operation (unmanned); accuracy, 1-decimeter vertical and 1-meter horizontal; update rate, 50 Hz; range, 300 meters; self-calibrating.

INTERMODAL TRANSPORTATION

[3] **94-FH6. COMPREHENSIVE INTERMODAL FREIGHT TRANSPORTATION VISUAL DATABASE**

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) highlighted the importance of intermodal transportation facilities and systems and the need for current transportation statistics. Additionally, ISTEA instituted a requirement for each State to develop an intermodal management system including an intermodal database. The collection and aggregation of current intermodal freight transportation data from throughout the U.S. into one broad-based visual database is a key to meeting the information requirements mandated by ISTEA. This information will also be useful for State and local planning activities.

To tie this information together into one national inventory and to ease data interpretation, a user-friendly visual database shall be developed including visual images, narrative project descriptions, and data. Visual images may include photographs of intermodal facilities, problem areas, and equipment; facility layout and access plans; and other computer graphics and images. This approach would use CD-ROM, hypermedia, and multimedia technologies to capture and organize information from throughout the U.S. into a comprehensive intermodal freight transportation visual database that will enable rapid retrieval and universal dissemination of information. It may some day be tied into other hypermedia and GIS applications.

The Phase I research effort would consist of a feasibility study and the investigation of possible techniques. Upon successful completion of Phase I, the actual development of the visual database would be undertaken.

HIGHWAY SAFETY

[3] **94-FH7. ROADWAY VISIBILITY SENSOR**

Current visibility sensors were primarily developed for airport use. As such, they only measure spot visibility to advise pilots when the visibility is restricted for landings and takeoffs. The highway problem is different in that

[3]Phase I may be up to $100,000 and Phase II may be up to $500,000

the visibility restriction range is much less, 200 to 300 feet versus 1000 to 10,000 feet used for airports. Also the highway visibility needs to be linear, along a stretch of roadway, at the driver's eye height. Fog is known to be variable along a route. Thus, a reliable, low-cost visibility sensor is needed to scan a section of roadway and make real-time measurements that can be used to accurately warn motorists to slow down when the visibility ahead is restricted.

FEDERAL RAILROAD ADMINISTRATION

[4] **94-FR1. DETERMINING THE INTEGRITY OF INSULATION- AND LINING-COVERED WELDS OF TANK CARS**

Certain tank car designs with foam insulation or thermal protection and rubber and other non-metallic lining have been experiencing failures because of corrosion and wear damage to tank material as well as to the lining and insulation. The insulation or thermal protection covers the exterior of the tank car, the lining covers the interior of the tank car. Some means of inspection of the welds in such tank cars is needed to assure the required tank car integrity. These tank cars carry hazardous materials.

The present method of inspection is to remove the insulation and lining, and then inspect the weld. Tank cars needing repair are repaired, otherwise the tank car is reinsulated and relined. This method is very costly, since it involves the removal and replacement of the lining and insulation.

There is a need to develop a procedure using available equipment or novel detection devices that can inspect certain welds without removing or damaging the insulation and lining material. The inspection areas are those that contain the following:

1. Welds located within the lower third of the tank car, especially longitudinal welds in this areas.

2. Attachment welds throughout the tank car which are covered by the insulation and lining.

FEDERAL TRANSIT ADMINISTRATION

94-FT1. GEOGRAPHIC INFORMATION SYSTEMS (GIS) TRANSIT APPLICATIONS

The GIS system is believed to have applications to transit in the areas of planning, marketing, and service implementation. It also has applications in developing spatial data systems that can integrate information systems across transit systems as well as across government agencies. The information that could be shared could be in graphical or tabular form and could be user friendly to a host of diverse computer applications. The National Spatial Data Infrastructure (NSDI) system is currently being developed in many sectors of the federal government to provide a national network of geospatial data. A study is now needed to search for the most promising applications of GIS systems to the transit industry. In collaboration with industry leaders, a selection should be made of the most promising applications in terms of cost effectiveness to transit. Computer packages should be developed that are user friendly and applicable to today's full range of technology. Such packages would be demonstrated, evaluated, and prepared so that they can be effectively implemented by private small businesses throughout the country.

[4]Phase I may be up to $100,000 and Phase II may be up to $300,000

FEDERAL TRANSIT ADMINISTRATION

94-FT2. COMPUTERIZED APPLICATIONS FOR TRANSIT OPERATIONS AND SCHEDULING

This project is needed to review the state of the art, and to develop and deploy computer applications in the transit industry, specifically as they apply to transit operations and scheduling procedures. In the past for example, computer models were developed for run cutting, and handling extra board personnel. Most of these models were developed with early 1980 technology and measures of effectiveness that are now outdated. Models should be developed that are abreast of today's new technology and that incorporate a wider variety of labor constraints and operating periods. The models should be demonstrated and evaluated in transit operations of different sizes and operating characteristics.

94-FT3. APPLICATION OF BAR CODING TECHNOLOGY TO TRANSIT

Bar coding technology has been in existence since the 1950's. A number of industries use it extensively and it has become the standard for identification technology. Some transit agencies have implemented bar coding for control of inventory and assets but its use is limited and the full advantage of the technology has not been realized throughout the industry. One area of transit operations that could benefit from the use of bar code technology is fare collection. An analysis is needed of the modifications required to existing bar code technology to facilitate its use in fare collection systems. The cost effectiveness of a bar code based fare collection system needs to be addressed as well as the feasibility of developing prototype bar code equipment and software for use in a transit fare collection system demonstration.

94-FT4. TRANSIT SYSTEM COMPUTER SIMULATION MODELS

It has been over ten years since significant efforts were made in the area of developing demand models for transit. Most existing models are obsolete or in need of updating because of advances in personal computers as well as new opportunities for advanced applications of statistical and operations research methods. The opportunities for applying computer analysis to transit problems have broadened to include not only demand analysis at the macro level but also the possibility of subsystems simulations at the micro level. There is also the need for the transit industry to become more sophisticated in its methods of analyzing the impact of fares on ridership and revenues and to be able to tie these expected impacts with improved methods of market analysis and strategies. A new generation of ridership, supply, and cost models is needed that will move the transit industry into the era of advanced computer systems and analysis. Advanced modeling techniques are needed to forecast ridership at the micro and systems level, taking into consideration multimodal interaction. Sublevel demand models are needed to forecast the impact of vehicle supply and make cost comparisons between alternative modes. An entire new range of factors needs to be addressed for analyzing impacts, including measures of congestion and air pollution. Besides the obvious applications to planning analysis, this effort should include the more general application of computer-assisted decisionmaking capabilities by the transit industry to the areas of fare analysis, marketing, scheduling, and service and performance monitoring.

MARITIME ADMINISTRATION

[5] 93-MA1. ADVANCED SHIP TECHNOLOGY AND INTERMODAL OPERATIONS

Innovative research is sought to improve the productivity, efficiency, safety, and environmental quality of maritime shipping systems in the commercial cargo and passenger sectors of the international ocean and domestic waterway

[5]Phase I may be up to $50,000 and Phase II may be up to $300,000

IX. SUBMISSION FORMS AND CERTIFICATIONS

1.	PROPOSAL COVER SHEET	Appendix A
2.	PROJECT SUMMARY	Appendix B
3.	CONTRACT PRICING PROPOSAL	Appendix C
4.	PROPOSAL CHECKLIST ON INSIDE FRONT COVER	
5.	PROPOSAL ACKNOWLEDGEMENT CARD ON INSIDE BACK COVER	

U.S. DEPARTMENT OF TRANSPORTATION
SMALL BUSINESS INNOVATION RESEARCH PROGRAM
SOLICITATION NO. 94-1

PROPOSAL COVER SHEET

Project Title _____

Research Topic No. _____ Research Topic Title _____

Submitted by: Name _____

Address _____

City _____ State _____ Zip + 4 _____

Amount Requested (Phase I) $ _____ Proposed Duration _____
(May be up to $100,000 unless otherwise indicated) (in months) (Not to exceed six months)

1. The above concern certifies it is a small business firm and meets the definition stated in section 11B; and that it meets the eligibility requirement in Section 1C. Yes_____ No_____

2. The above concern certifies it _____does_____does not qualify as a minority and disadvantaged small business as defined in IIC. (For statistical purposes only.)

3. The above concern certifies it_____does_____does not qualify as a women-owned small business as defined in IID. (For statistical purposes only.)

4. Will you permit the Government to disclose the title and technical abstract of your proposed project, plus the name, address, and telephone number of the Corporate Official and Principal Investigator of your firm, if your proposal does not result in an award, to any party that may be interested in contacting you for further information? Yes_____ No_____

Principal Investigator

Name_____

Title_____

Signature_____Date_____

Telephone No._____

Corporate/Business Official

Name _____

Title_____

Signature_____Date_____

Telephone No. _____

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

U.S. DEPARTMENT OF TRANSPORTATION
SMALL BUSINESS INNOVATION RESEARCH PROGRAM
SOLICITATION NO. 94-1

PROJECT SUMMARY

Name and Address of Proposer	FOR DOT USE ONLY Proposal No.

Name and Title of Principal Investigator

Project Title

Research Topic No.	Research Topic Title

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

Anticipated Results/Potential Commercial Applications of Results

Provide key words (8 maximum) description of the project useful in identifying the technology, research thrust and/or potential commercial application.

U.S. DEPARTMENT OF TRANSPORTATION
SMALL BUSINESS INNOVATION RESEARCH PROGRAM
SOLICITATION NO. 94-1

CONTRACT PRICING PROPOSAL

CONTRACT PRICING PROPOSAL COVER SHEET | 1. SOLICITATION/CONTRACT/MODIFICATION NO. | FORM APPROVED OMB NO. 3090-0116

NOTE: This form is used in contract actions if submission of cost or pricing data is required *(See FAR 15.804-6(b))*

2. NAME AND ADDRESS OF OFFEROR *(Include ZIP Code)*

3A. NAME AND TITLE OF OFFEROR'S POINT OF CONTACT | 3B. TELEPHONE NO.

4. TYPE OF CONTRACT ACTION *(Check)*

- ☐ A. NEW CONTRACT
- ☐ B. CHANGE ORDER
- ☐ C. PRICE REVISION/ REDETERMINATION
- ☐ D. LETTER CONTRACT
- ☐ E. UNPRICED ORDER
- ☐ F. OTHER *(Specify)*

5. TYPE OF CONTRACT *(Check)*

☐ FFP ☐ CPFF ☐ CPIF ☐ CPAF
☐ FPI ☐ OTHER *(Specify)*

6. PROPOSED COST *(A+B=C)*

A. COST	B. PROFIT/FEE	C. TOTAL
$	$	$

7. PLACE(S) AND PERIOD(S) OF PERFORMANCE

8. List and reference the identification, quantity and total price proposed for each contract line item. A line item cost breakdown supporting this recap is required unless otherwise specified by the Contracting Officer. *(Continue on reverse, and then on plain paper, if necessary. Use same headings.)*

A. LINE ITEM NO	B. IDENTIFICATION	C. QUANTITY	D. TOTAL PRICE	E. REF

9. PROVIDE NAME, ADDRESS, AND TELEPHONE NUMBER FOR THE FOLLOWING *(If available)*

A. CONTRACT ADMINISTRATION OFFICE

B. AUDIT OFFICE

10. WILL YOU REQUIRE THE USE OF ANY GOVERNMENT PROPERTY IN THE PERFORMANCE OF THIS WORK? *(If "Yes," identify)*

☐ YES ☐ NO

11A. DO YOU REQUIRE GOVERNMENT CONTRACT FINANCING TO PERFORM THIS PROPOSED CONTRACT? *(If "Yes," complete Item 11B)*

☐ YES ☐ NO

11B. TYPE OF FINANCING *(If one)*

☐ ADVANCE PAYMENTS ☐ PROGRESS PAYMENTS
☐ GUARANTEED LOANS

12. HAVE YOU BEEN AWARDED ANY CONTRACTS OR SUBCONTRACTS FOR THE SAME OR SIMILAR ITEMS WITHIN THE PAST 3 YEARS? *(If "Yes," identify item(s), customer(s) and contract number(s))*

☐ YES ☐ NO

13. IS THIS PROPOSAL CONSISTENT WITH YOUR ESTABLISHED ESTIMATING AND ACCOUNTING PRACTICES AND PROCEDURES AND FAR PART 31 COST PRINCIPLES? *(If "No," explain)*

☐ YES ☐ NO

14. COST ACCOUNTING STANDARDS BOARD (CASB) DATA *(Public Law 91-379 as amended and FAR PART 30)*

A. WILL THIS CONTRACT ACTION BE SUBJECT TO CASB REGULATIONS? *(If "No," explain in proposal)*

☐ YES ☐ NO

B. HAVE YOU SUBMITTED A CASB DISCLOSURE STATEMENT *(CASB DS-1 or 2)? (If "Yes," specify in proposal the office to which submitted and if determined to be adequate)*

☐ YES ☐ NO

C. HAVE YOU BEEN NOTIFIED THAT YOU ARE OR MAY BE IN NONCOMPLIANCE WITH YOUR DISCLOSURE STATEMENT OR COST ACCOUNTING STANDARDS? *(If "Yes," explain in proposal)*

☐ YES ☐ NO

D. IS ANY ASPECT OF THIS PROPOSAL INCONSISTENT WITH YOUR DISCLOSED PRACTICES OR APPLICABLE COST ACCOUNTING STANDARDS? *(If "Yes," explain in proposal)*

☐ YES ☐ NO

This proposal is submitted in response to the RFP contract, modification, etc. in Item 1 and reflects our best estimates and/or actual costs as of this date.

15. NAME AND TITLE *(Type)*

16. NAME OF FIRM

17. SIGNATURE

18. DATE OF SUBMISSION

NSN 7540-01-142-9845 1411-101 STANDARD FORM 1411 (10-83) Prescribed by GSA FAR (48 CFR) 53.215-2(c)

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

Background

The following items, as appropriate, should be included in proposals responsive this Solicitation.

Cost Breakdown Items (in this order, as appropriate); (See Section III.E)

1. Name of proposer
2. Address of proposer
3. Location where work will be performed
4. Proposer's Project Title
5. Research topic number and title from DOT SBIR Program Solicitation
6. Total dollar amount of the proposal (dollars)
7. Direct material costs
   a. Purchased parts (dollars)
   b. Subcontracted items (dollars)
   c. Other
      (1) Raw materials (dollars)
      (2) Standard commercial items (dollars)
   d. Total direct materials (dollars)
8. Material overhead rate _____ % x total direct material = dollars
9. Direct labor (specify)
   a. Type of labor, estimated hours, rate per hour and dollar cost for each type
   b. Total estimated direct labor (dollars)
10. Labor overhead
    a. Identify overhead rate, the hour base and dollar cost
    b. Total estimated labor overhead (dollars)
11. Special testing (include field work at Government installations)
    a. Specify each item of special testing, including estimated usage and unit cost
    b. Estimated total special testing (dollars)
12. Other special equipment
    a. If direct charge, specify each item of special equipment, including usage and unit cost
    b. Estimated total other special equipment (dollars)

13. Travel (if direct charge)
    a. Transportation (detailed breakdown and dollars)
    b. Per diem or subsistence (details and dollars)
    c. Estimated total travel (dollars)
14. Consultants Service
    a. Identify each consultant, including purpose and dollar rates
    b. Total estimated consultant service costs (dollars)
15. Other direct costs (specify)
    a. Total estimated direct cost and overhead (dollars)
16. General and administrative expense
    a. Percentage rate applied
    b. Total estimated cost of G&A expense (dollars)
17. Royalties (specify)
    a. Estimated cost (dollars)
18. Fee or profit (dollars)
19. Total estimated cost and fee or profit (dollars)
20. The cost breakdown portion of a proposal must be signed by a responsible official of the firm (include typed name and title and date of signature).
21. Provide a yes or no answer to each of the following questions:
    a. Has any executive agency of the United States Government performed any review of your accounts or records in connection with any other government prime contract or subcontract within the past twelve months? If yes, provide the name and address of the reviewing office, name of the individual and telephone/extension.
    b. Will you require the use of any government property in the performance of this proposal? If yes, identify.
    c. Do you require government contract financing to perform this proposed contract? If yes, specify type as advanced payments or progress payments.
22. Type of contract proposed, firm-fixed price.
23. DUNS number, if available_____
    (See Section III.F)