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SBIR-87-1

U.S. Department of Transportation

Office of the Secretary of Transportation

Small Business Innovation Research

Program Solicitation

(Closing Date: May 1, 1987)

Transportation Systems Center

DOT / SBIR - 87 - 1

PROGRAM SOLICITATION

Small Business Innovation
Research Program

Closing Date: May 1, 1987

U.S. Department of Transportation
Transportation Systems Center
SBIR Program Manager
Cambridge, MA 02142

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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 (PL97-219), signed into law by the President on July 22, 1982. 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 should not exceed $50,000 and the period of performance may be up 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 $300,000. Phase II proposals must be prepared in accordance with guidelines provided by DOT to all Phase I awardees. 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 non-Federal funds to pursue commercial applications of research or R&D funded in Phases I and II by the Department. Phase III may also involve follow-on 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 principle 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, Appendix D).

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

DOT SBIR Program Office, DTS-23
U.S. Department of Transportation
Transportation Systems Center
Kendall Square
Cambridge, MA 02142

Attn: Dr. George Kovatch
Telephone: (617) 494-2051

II. DEFINITIONS

Research or Research and Development

esearch or research and development (R, R&D) ieans any activity which 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.

Small Business

small business concern is one that at the time of ard of Phase I and Phase II funding reements meets the following criteria:

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;

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;

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 "affiliates" is defined in greater detail in 13 CFR 121.3-2(a). The term "number of employees" is defined in 13 CFR 121.3-2(t). 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) Asian-Indian 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 8½" 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.

. Proposal Cover Sheet

notocopy and complete the proposal cover sheet in ppendix A as page 1 of each copy of each proposal. ll pages should be numbered consecutively, ginning with the proposal cover sheet.

Project Summary

notocopy and complete the form in Appendix B as ge 2 of your proposal. The technical abstract ould include a brief description of the problem or portunity, project objectives, description of the ort and anticipated results. Potential applica- ns of the proposed research should also be mmarized in the space provided. The Project mmary of successful proposals may be published the DOT and, therefore, should not contain prietary information.

Technical Content

mitted proposals must include the following:

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, R&D plan. The plan should indicate what will be done, where it will be done, and how the R, R&D will be managed or directed and carried out. Phase I R, R&D 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. Cost Breakdown/Proposed Budget

The submission of simplified cost or budget data is required. Appropriate and simplified forms such as Optional Form 60 may be used. (See Appendix C.)

F. Acknowledgement of Proposal Receipt

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

IV. METHOD OF SELECTION AND EVALUATION CRITERIA

A. General

All Phase I and Phase II proposals will be valuated and judged on a competitive basis. nitially, all proposals will be screened to deter- ıine responsiveness to the solicitation. Proposals assing this screening will be evaluated to deter- ıine the most promising technical and scientific pproaches. Each proposal will be judged on its wn merit. The Department of Transportation is nder no obligation to fund any proposal or any ɔecific number of proposals on a given topic or ıbtopic. It may elect to fund several or none of the :oposed approaches to the same topic or subtopic.

. Evaluation Criteria

he evaluation process involves the following ctors:

) The soundness of merit of the technical approach to assure successful demonstration of the feasibility of the Phase I R or R&D project thereby enhancing prospects for an innovative solution to the research problem that is addressed and prospects for commercialization.

) 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.

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.

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

In Phase II evaluations of proposals of equal technical and scientific merit the Department will give special consideration to proposals which demonstrate Phase III non-Federal capital commitments. Phase II proposals may only be submitted by Phase I contract awardees.

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 comprised of 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, 1987. 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 the technical evaluations of the proposer's proposal may be provided to the proposer. The identity of the reviewer shall not be disclosed.

V. CONSIDERATIONS

A. Awards

It is estimated that during fiscal year 1987, the Department of Transportation will award approximately 10 Phase I contracts with an anticipated potential maximum of 14 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 at a value of up to $50,000 each. Phase II awards will be in the form of cost-plus-fixed fee contracts with a value of up to $300,000 each.

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 following Operating Administrations: Federal Highway Administration, Federal Railroad Administration, National Highway Traffic Safety Administration, and the Urban Mass Transportation Administration. 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, including 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.

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 two years from completion of the project from which the data were generated. However, effective at the conclusion of the two-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 87-FA5 through 87-FA8, 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.)

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 funding agreement officer.

2. For Phase II a minimum of one-half of the research and/or analytical effort must be performed by the proposing firm.

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.

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.

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.

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.

VI. SUBMISSION OF PROPOSALS

A. Submittal Instructions

The original plus four copies of each proposal submitted under the DOT SBIR Program should be addressed to:

DOT SBIR Program Office, DTS-23
U.S. Department of Transportation
Transportation Systems Center
Kendall Square
Cambridge, MA 02142

Attn: Dr. George Kovatch
Telephone: (617) 494-2051

Proposals must be postmarked NO LATER than May 1, 1987 to qualify for acceptance and consideration under the current DOT SBIR Program. Proposals postmarked later than May 1, 1987 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 1, 1987.

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.

3. **Confirmation.** The DOT SBIR Program Office will assign an identification number to each proposal received at the above address postmarked no later than May 1, 1987. This number will appear on the acknowledgement of receipt card (see back cover) which will be mailed to the proposer 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:

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

Aerospace Research Applications Center
611 North Capital
Indianapolis, IN 46204
(317) 262-5003

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

NASA/Florida State Technology
Applications Center
State University System of Florida
500 Weil Hall
Gainesville, FL 32611
(904) 392-6626

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

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

North Carolina Science and Technology
Research Center
P. O. Box 12235
Research Triangle Park, NC 27709
(919) 549-0671

NERAC, Inc.
Mansfield Professional Park
Storrs, CT 06268
(203) 429-3000

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

VIII. RESEARCH TOPICS

Phase I research topics for each DOT Operating Administration 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.

DOT OPERATING ADMINISTRATION/TOPICS — POTENTIAL MAXIMUM FY87 PHASE I AWARDS

FEDERAL AVIATION ADMINISTRATION (FAA) . . . . . 5 Awards

Aircraft Fire Safety
87-FA1. Development of Ice Formulations for Firefighting
87-FA2. Post-Crash Aircraft Jet Fuel-Fed Fire Prevention
87-FA3. Integrated Fuselage Fire Detection and Monitoring System

Aeromedicine
87-FA4. Personal Computer Model of Aircraft Evacuation Process

Security Measures
87-FA5. Shadowgraph Enhancement
87-FA6. X-Ray False Image Projection
87-FA7. Remote Passenger Baggage Identification
87-FA8. Electronic Bomb Fuze Timer Oscillator Detector

Airport/Runway Technology
87-FA9. Mobile Rubber Deposit Gage

Air Traffic Control/Flight Services Technology
87-FA10. Traffic Management Concept Evaluation
87-FA11. General Aviation Pilot Advisory System
87-FA12. Computer Voice and Speech Data Entry and Recognition

Human Factors
87-FA13. Data Link Controller Workload Assessment

FEDERAL HIGHWAY ADMINISTRATION (FHWA) . . . . . 3 Awards

Structures
87-FH1. Measuring Deflection of Bridges
87-FH2. Coating Systems for Steel Bridges

Safety And Traffic Operations
87-FH3. Traffic Signal Light Output Measurement Device
87-FH4. Self-Restoring Channelizing Device

DOT OPERATING ADMINISTRATION/TOPICS

POTENTIAL MAXIMUM FY87 PHASE I AWARDS

FEDERAL RAILROAD ADMINISTRATION (FRA) . . . . . 1 Award

Inspection - Detection

87-FR1. Programmable Defect Simulator to Test Ultrasonic Rail Flaw Systems

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION (NHTSA) . . . . . 3 Awards

Occupant Protection

87-NH1. Accessories to Increase the Safety or Convenience of Use of Child or Adult Restraints

87-NH2. Crash Protection Accessories Using Inflated Structures

Emergency Medical Services

87-NH3. Prototype Design of a Laser Disc Computer Program (or Related Technology) to Use to Maintain the Skills of Emergency Medical Technicians

Accident Investigation

87-NH4. An Automated Injury Coding Program

Crash Avoidance

87-NH5. A Warning Device for Hazardous Driving Conditions

URBAN MASS TRANSPORTATION ADMINISTRATION (UMTA) . . . . . 2 Awards

Transit Efficiency

87-UM1. Financing Value in Urban Transit

87-UM2. Mass Transportation Competition and Involvement of the Private Sector

87-UM3. Reaching the Mass Transportation Consumer

FEDERAL AVIATION ADMINISTRATION

AIRCRAFT FIRE SAFETY

87-FA1. DEVELOPMENT OF ICE FORMULATIONS FOR FIRE FIGHTING:

Water is a widely used traditional fire fighting agent. One of the mechanisms with which water fights fire is through the endothermic phase change from liquid to vapor. If ice were the fire fighting agent, an additional phase change endotherm would be available. Research is needed to evaluate mechanical or physical chemical systems for containing and applying ice particles to fire. Delivery systems should also be considered. The research should also compare the fire fighting effectiveness of ice with a water delivery system of equal capacity.

87-FA2. POST-CRASH AIRCRAFT JET FUEL-FED FIRE PREVENTION:

One of the major causes of aircraft occupant fatalities in survivable accidents is post-crash fire. Thousands of gallons of flammable jet fuel carried in the wings of large aircraft are susceptable to spillage and misting during a crash. The misted fuel can readily ignite and can, in turn, ignite the remainder of the spilled fuel. An innovative solution is needed to minimize the possibility of large fuel spills and mitigate or eliminate such fires through the use of fuel additives, ignition suppression (including turbine engines), nonstructural wing modifications, fire control and extinguishment techniques, or a combination of these approaches. Evaluative research of several proposed solutions is needed to determine if solutions involving lightweight, inherently safe fuels that are compatible with existing aircraft, are technically and economically feasible.

87-FA3. INTEGRATED FUSELAGE FIRE DETECTION AND MONITORING SYSTEM:

In recent years, great strides have been made in fire detection technology along with a trend toward faster and greater capacity aircraft cockpit computers for real-time processing of pertinent flight data. In order to merge these two technologies, research or development is needed on an integrated fuselage fire detection system with the capability of continually monitoring for computer display the occurrence and spread of fire in inaccessible areas of a typical transport aircraft.

AEROMEDICINE

87-FA4. PERSONAL COMPUTER MODEL OF AIRCRAFT EVACUATION PROCESS:

Several.computer models have been developed to describe the movement of passengers during aircraft emergency evacuations. Research is needed to determine the feasibility of developing an evacuation model which can be run on a small personal computer so that it can be used and evaluated by a diverse user group. The model would be capable of predicting the individual movement of up to 500 passengers during an evacuation.

A time-driven model, with screen or printout display of passenger and aircraft status at specified periods during the evacuation is sought. The expected research results will include the software itself along with detailed model logic documentation and a complete user guide.

SECURITY MEASURES

***87-FA5. SHADOWGRAPH ENHANCEMENT:**

Various airport baggage interrogation techniques used to detect threats such as firearms, grenades, incendiary and explosive devices, and pure incendiaries and explosives yield a two or three dimensional presentation that is the least expensive and least informative. Therefore, a computer aided detection scheme is desired to help the viewer interpret the two dimensional display where a threat may appear in any orientation and be partly or completely masked. The scheme should indicate when a bag contains a threat, contains no threat, or may contain a threat. A detailed analytic investigation of this scheme is needed.

***87-FA6. X-RAY FALSE IMAGE PROJECTION:**

The effectiveness of airport concourse security X-ray screening depends on the alertness and motivation of the X-ray operator. Research is needed to design, build, and test a computer-based system to superimpose the image of threat weapons on that of the hand baggage being screened. The techniques can be used to measure operator performance and to provide positive motivation by the detection of threat devices. In real life, an operator would probably encounter one weapon per 250,000 bags screened. This system will provide a more frequent exposure to threat images and increase morale and performance.

***87-FA7. REMOTE PASSENGER BAGGAGE IDENTIFICATION:**

A need exists for a low cost identifier to be placed on passenger bags to allow them to be rapidly identified as belonging to a specific individual. Laser readable tags currently exist but have problems.

A low-cost tag which can be interrogated at a distance using RF or sonic energy is sought. Approximately 500 million bags are checked each year. Unique identification would be desired for each bag. The needed research will present several alternate designs, addressing their technical feasibility, manufacturing costs, accuracy and effectiveness.

***87-FA8. ELECTRONIC BOMB FUZE TIMER OSCILLATOR DETECTOR:**

Research is needed on high-speed screening techniques to detect the signals of passive and running oscillators which may be present as part of the fuzing system of a terrorist bomb. These proposed detection systems may be either active or passive and should be capable of checking both the airline passenger and baggage. The needed research will address technical feasibility, cost and, most importantly, effectiveness.

***See Section V.D.2.**

AIRPORT/RUNWAY TECHNOLOGY

87-FA9. MOBILE RUBBER DEPOSIT GAGE:

Rubber is deposited during landing operations on ends of runways at airports. The deposited rubber accumulates with the number of landings and presents a slippery and therefore unsafe condition for operating aircraft. Currently, the accumulation of the rubber deposit is monitored generally by visual means, and by results of friction measuring devices. The latter are used to determine when rubber deposits are to be removed. A mobile rubber deposit gage which records the thickness of rubber deposits on runways is needed. This gage would be portable, relatively inexpensive when compared to the cost of friction measuring devices, and pushed or pulled by remote control across the rubber deposited area in a grid pattern to obtain a contour of the rubber accumulation. When used periodically, the buildup of rubber deposit can be obtained. The rate of buildup can be used as a planning guide to determine when removal is required. (Note: 93 percent of airports do not own a friction measuring device). Research is needed to investigate and establish the physical principles behind the design of such a device as it would apply to asphalt and concrete pavement.

AIR TRAFFIC CONTROL/FLIGHT SERVICES TECHNOLOGY

87-FA10. TRAFFIC MANAGEMENT CONCEPT EVALUATION:

Current air traffic control is evolving to a nationwide strategic level which allows the FAA to manage traffic flowing throughout the continental United States. Not a new concept, flow control is applied by a cadre of experts who depend on their experience when they supply traffic acceptance and departure advisories to the major hubs. A more disciplined quantitative decision-making process is needed. A methodology leading to that process should be identified and tried on a reduced basis. Relying on formal mathematical optimization techniques, the methododgy will confirm or even complement the human decisions made daily to smooth the flow of traffic and to thereby minimize delays without sacrificing safety.

87-FA11. GENERAL AVIATION PILOT ADVISORY SYSTEM:

In view of the growing general aviation traffic at minimally attended airports throughout the country, a need exists to develop a voice advisory system able to broadcast information vital to pilots flying within a few miles of these small fields. This concept envisions a continuous-cycle, synthetic-voice broadcast disseminating airport weather conditions, active runway assignments and even surrounding air traffic activity. Supported by inexpensive ground equipment consisting of a small-range primary radar (covering low-altitude airspace within about a 10-mile radius), conventional weather instruments, a radio transmitter, and one or more small dedicated computers, the advisory system would require only a standard radio receiver in the cockpit to relay information to the pilot. An innovative approach is needed to explore and demonstrate how weather data, air traffic tracking and ancillary flight service information can be broadcasted and received through this inexpensive voice advisory system.

87-FA12. COMPUTER VOICE AND SPEECH DATA ENTRY AND RECOGNITION:

With the advent of highly computerized air traffic control systems, a need exists to demonstrate the feasibility of continuous speech recognition by computers. Research is required to evaluate how machines should recognize large human vocabularies and complex syntaxes used in an air traffic control environment. The concept must demonstrate the ability to convert speech into machine-executable American Standard Code II (ASC II) in real-time. It should be possible to prove this concept later in a simulation environment.

HUMAN FACTORS

87-FA13. DATA LINK CONTROLLER WORKLOAD ASSESSMENT:

The FAA is evaluating candidate services to be provided by a Mode S Data Link system. The expectation is that the services provided by such a new system will also result in a reduction in workload for air traffic controllers while providing increased benefits to the airborne users. Research is needed to identify any new or modified controller procedures that would be applicable when Mode S Data Link becomes operational in the future. Moreover, these procedures should be compared in terms of controller workload assessment to the procedures used in the current system void of Data Link. A controller procedure workload test scenario also needs to be developed to evaluate the Mode S Data Link option.

FEDERAL HIGHWAY ADMINISTRATION

STRUCTURES

87-FH1. MEASURING DEFLECTION OF BRIDGES:

It is often necessary to measure the deflection or deflected shape of bridge spans and components under loading to better understand how they are performing. For small bridges with ready access in and around the structural components, this generally is not a problem and instrumentation is available. When bridge spans are long, high or otherwise inaccessible this task becomes very difficult. New sensors are needed for these situations. The sensors must be rugged and suitable for long use in harsh environments. What is needed is an improvement in accuracy and long term stability over double integration of accelerometer outputs, and a reduction in cost as compared to current optical/laser techniques.

87-FH2. COATING SYSTEMS FOR STEEL BRIDGES:

The corrosion of structural steel has resulted in a billion-dollar problem for the highway industry. A breakthrough in coating technology is needed in order to improve coating of new bridges and the maintenance of deteriorating structures. New techniques may involve the use of composites, some parts of which may require heat treatment for proper application. The composites would comprise specially tailored materials including organics, metals, and ceramics. Such systems would provide desired mechanical properties (physical bonding) as well as accounting for the effects of the operating environment.

SAFETY AND TRAFFIC OPERATIONS

87-FH3. TRAFFIC SIGNAL LIGHT OUTPUT MEASUREMENT DEVICE:

A field measurement system is needed to assist traffic engineers in locating traffic signals where the light output has dropped below the level required to meet the visibility requirements of the driving public. Signals can provide less than adequate intensity levels for many reasons. A field test method is needed which will make the in-service detection of light output less cumbersome. The Institute of Transportation Engineers' "Adjustable Face Vehicular Traffic Control Signal Heads" standard contains a laboratory test method for evaluation of some of the problems which cause signals to have lower than desired light output. However, to use these techniques requires the in-service signal to be demounted and returned to the laboratory. Other problems can be detected only by having maintenance personnel make electrical measurements at the signal head, thus interfering with traffic flow. Field testing of light output with currently available instrumentation is impractical because the signal's directional light distribution requirements make it all but impossible to align the measuring instrument.

What is required is a low cost device to assure that in-service signals provide adequate visibility for safe and efficient traffic operations. This device should be simple to operate by a technician, should be usable from ground level during daylight, and should not require a lane closure to obtain reliable measurements.

87-FH4. SELF-RESTORING CHANNELIZING DEVICE:

As stated in Part VI of the Manual on Uniform Traffic Control Devices, "The functions of channelizing devices are to warn and alert drivers of hazards created by construction or maintenance activities in or near the traveled way, and to guide and direct drivers safely past the hazards." Channelizing devices currently in use consist of cones, vertical panels, drums, and barricades. There is a need to develop a low-cost, self-restoring channelizing device for use in separating traffic in two-lane, two-way operation (TLTWO). Two-lane, two-way operation is the situation created when one directional roadway of a divided, four-lane highway is closed for construction or maintenance operations and the traffic which normally uses that roadway is crossed over the median and shares the other roadway with opposing traffic. The remaining open roadway is operated with one lane in each direction with passing prohibited.

The self-restoring channelizing devices are intended to be placed intermittently along the temporary roadway centerline of TLTWO. The following factors need to be considered in developing the device: durability, hazard potential, size and appearance, effectiveness in alerting the driver, and installation and removal.

FEDERAL RAILROAD ADMINISTRATION

INSPECTION-DETECTION

87-FR1. PROGRAMMABLE DEFECT SIMULATOR TO TEST ULTRASONIC RAIL FLAW SYSTEMS:

The ability of a rail flaw inspection system to detect hidden fatigue defects is difficult to quantify because a programmed series of different types of flaws is very difficult to create. Drill holes and sawcuts are used to simulate some defects, but these machined patterns do not simulate the complex shapes and irregular surfaces of a fatigue-induced crack. Large numbers of actual defects can be collected in the field, but the exact size and other characteristics of any defect can not be reliably determined non-destructively because of the uncertainties inherent in ultrasonic transmission and reflection properties.

A programmable device which could create controlled simulations of defects within a test setup would solve this problem. The rail flaw detection system to be tested would transmit its usual ultrasonic beams into the test setup. The programmed simulated defects would reflect the beams in a manner similar to real defects. The system could then rapidly be reprogrammed to simulate a new defect size, angle, or type. The capabiities of various detection systems could be determined repeatably, objectively, and relatively rapidly and economically, avoiding the need for extensive field testing.

This concept could make use of technologies developed by the Department of Defense for electronic countermeasures; general work in computer graphics techniques; and innovative materials technologies such as liquid crystals. The major challenge to be overcome is developing a material which can be programmed to change its transmission/reflectance characteristics for ultrasonic energy.

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

OCCUPANT PROTECTION

87-NH1. ACCESSORIES TO INCREASE THE SAFETY OR CONVENIENCE OF USE OF CHILD OR ADULT RESTRAINTS:

A number of devices have been considered to increase the safety or convenience of use of child or adult restraints. These include: a) an accessory strap attached between the lap belt and shoulder belt to hold the shoulder strap off the neck of a child or short person; b) improved devices to take the slack from the car seat belt retractor; c) improved padding, particularly against side impacts; d) improved attachments of a child seat to a car; e) an infant car bed, required for premature infants, who have difficulty breathing sitting up even in the reclined rear facing infant car seats. This must pass Federal Motor Vehicle Safety Standard (FMVSS) 213 while attached only by the car safety belt in a 30 mph barrier crash, yet may use additional attachments for additional safety; f) improved restraints or protective devices for handicapped children; g) improved safety belts for adults, for example, an attachment design for the double shoulder strap race driver safety belt for use in an ordinary car. Other innovative devices, which meet the Federal Motor Vehicle Safety Standards and have potential marketability, may be proposed under this research topic area.

87-NH2. CRASH PROTECTION ACCESSORIES USING INFLATED STRUCTURES:

A number of inflatable devices could be produced for retail sale to increase the crash safety of motor vehicles already in use. These devices could be developed utilizing existing inflated belt concepts, or inflatable pads for securing luggage, pet cages and/or wheelchairs, or pre-inflated airbags for supporting handicapped children and the elderly. Other devices to be considered are a retro-fit airbag restraint system using new concepts of inflation and rebound reduction without venting. Research is needed under this area to design, develop, and demonstrate innovative crash protection accessory devices utilizing inflated structures which have potential marketability.

EMERGENCY MEDICAL SERVICES

87-NH3. PROTOTYPE DESIGN OF A LASER DISC COMPUTER PROGRAM (OR RELATED TECHNOLOGY) TO USE TO MAINTAIN THE SKILLS OF EMERGENCY MEDICAL TECHNICIANS:

Research is needed to establish the design and demonstrate a prototype of a computer-based teaching system which will be used to maintain the skills of emergency medical technicians (EMTs). The computer will test the EMT for proper responses, showing the consequences of the EMT's response and the reasons for the correct response. Visuals will be used to show emergency scenes and patient conditions. The resulting prototype should be acceptable to the user community and have potential marketability.

ACCIDENT INVESTIGATION

87-NH4. AN AUTOMATED INJURY CODING PROGRAM:

Hospital reports and death certificates typically contain free text descriptions of the injuries. These descriptions can be keyboarded by secretarial staff, but special training is required for the coding in the Occupant Injury Classification (OIC), the Abbreviated Injury Classification (AIC 85), or especially the International Classification of Disease (ICD, the predominant injury code, used by hospitals) for computer sorting of cases by injury types. An "expert system" computer program is needed to translate the injury description words, sometimes covering two pages of free text, into a tabulated list of codes indicating body part, lesion, and severity for all the injuries described. Research is needed to develop and demonstrate a prototype computer program and dictionary, which is acceptable to the user community and has potential marketability.

CRASH AVOIDANCE

87-NH5. A WARNING DEVICE FOR HAZARDOUS DRIVING CONDITIONS:

Drivers frequently fail to recognize that certain driving conditions, particularly speed, must be controlled depending on the road environment and the type and condition of the vehicle. For example, the maximum speed in a turn of a vehicle with a high center of gravity and/or narrow wheel track width should be less than for a typical passenger car to prevent rollover. Providing an automatic warning of hazardous or improper driving might decrease accidents. A device sensing vehicle roll angle and lateral acceleration could warn of a developing dangerous condition, alerting the driver to slow down. This would be a significant safety device for use on all vehicles of lower roll stability. Another warning device could sense vehicle longitudinal deceleration and brake pedal force, and warn the driver if the ratio becomes less than a pre-set value, indicating a slippery road or defective brakes. Research is needed on these or other innovative warning devices to alert drivers to hazardous driving conditions, and should lead to the development of devices which are marketable.

URBAN MASS TRANSPORTATION ADMINISTRATION

TRANSIT EFFICIENCY

37-UM1. FINANCING VALUE IN URBAN TRANSIT:

Innovative approaches are needed to increase the cost-efficiency of transit investments of all types. This includes the development of creative new approaches and techniques to project design, financing, implementation, and evaluation, as well as more incisive project management activities.

37-UM2. MASS TRANSPORTATION COMPETITION AND INVOLVEMENT OF THE PRIVATE SECTOR:

Innovative approaches are needed to promote the involvement of the private sector in the provision of mass transportation services. This includes development of innovative methods to reduce costs, increase operating efficiencies, and increase types of service provided through improved private/public partnership in transit acitivities.

37-UM3. REACHING THE MASS TRANSPORTATION CONSUMER:

Creative and effective approaches are needed to reach the mass transportation consumer with information about the varieties of transit services, financing arrangements, and institutional options which are available in the provision of mass transit. The objective of these activities is to increase the public's understanding and acceptance of new approaches to transit service provision, finance, and institutional organization.

U.S. DEPARTMENT OF TRANSPORTATION
SMALL BUSINESS INNOVATION RESEARCH PROGRAM
SOLICITATION NO. 87-1
PROPOSAL COVER SHEET

Project Title: _____

Topic No. _____ Topic Title _____

Submitted By: Firm _____

Address _____

City _____ State _____ Zip _____

Amount Requested (Phase 1) $ _____ Proposed Duration: _____
(Not to exceed $50,000) (in months, Phase 1)(Not to exceed six months)

1. The above concern certifies it is a small business firm and meets the definition stated in section IIB; and that it meets the eligibility requirement in section IC. Yes _____ No _____

2. The above concern certifies it _____does _____does not qualify as a minority and disadvantaged small business as defined in IIC.

3. The above concern certifies it _____does _____does not qualify as a women-owned small business as defined in IID.

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 offical of your firm, if your proposal does not result in an award, to firms which may be interested in contacting you for further information? Yes _____ No _____

Principal Investigator

Name _____

Title _____

Signature _____ Date _____

Telephone No. _____

Corporate/Business Offical

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. 87-1

PROJECT SUMMARY

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

Name and Title of Principal Investigator

Title of Project

Topic No.	Topic Title

Technical Abstract (Limit to this space only)

Anticipated Results/Potential Commerical Applications of Results

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

U.S. DEPARTMENT OF TRANSPORTATION
SMALL BUSINESS INNOVATION RESEARCH PROGRAM
SOLICITATION NO. 87-1

CONTRACT PRICING PROPOSAL

CONTRACT PRICING PROPOSAL (RESEARCH AND DEVELOPMENT)	Office of Management and Budget Approval No. 29-RO184
This form is for use when (i) submission of cost or pricing data (see FPR 1-3.807-3) is required and (ii) substitution for the Optional Form 59 is authorized by the contracting officer.	PAGE NO / NO. OF PAGES

NAME OF OFFEROR	SUPPLIES AND/OR SERVICES TO BE FURNISHED
HOME OFFICE ADDRESS	
DIVISION(S) AND LOCATION(S) WHERE WORK IS TO BE PERFORMED	TOTAL AMOUNT OF PROPOSAL $ / GOV'T SOLICITATION NO

DETAIL DESCRIPTION OF COST ELEMENTS

			EST COST ($)	TOTAL EST COST[1]	REFERENCE[2]
1 DIRECT MATERIAL (Itemize on Exhibit A)					
a. PURCHASED PARTS					
b. SUBCONTRACTED ITEMS					
c. OTHER—(1) RAW MATERIAL					
(2) YOUR STANDARD COMMERCIAL ITEMS					
(3) INTERDIVISIONAL TRANSFERS (At other than cost)					
TOTAL DIRECT MATERIAL					
2 MATERIAL OVERHEAD[3] (Rate %X$ base=)					
3 DIRECT LABOR (Specify)	ESTIMATED HOURS	RATE/ HOUR	EST COST ($)		
TOTAL DIRECT LABOR					
4 LABOR OVERHEAD (Specify Department or Cost Center)[3]	O H RATE	X BASE =	EST COST ($)		
TOTAL LABOR OVERHEAD					
5 SPECIAL TESTING (Including field work at Government installations)			EST COST ($)		
TOTAL SPECIAL TESTING					
6 SPECIAL EQUIPMENT (If direct charge) (Itemize on Exhibit A)					
7 TRAVEL (If direct charge) (Give details on attached Schedule)			EST COST ($)		
a. TRANSPORTATION					
b. PER DIEM OR SUBSISTENCE					
TOTAL TRAVEL					
8 CONSULTANTS (Identify—purpose—rate)			EST COST ($)		
TOTAL CONSULTANTS					
9 OTHER DIRECT COSTS (Itemize on Exhibit A)					
10 TOTAL DIRECT COST AND OVERHEAD					
11 GENERAL AND ADMINISTRATIVE EXPENSE (Rate % of cost element Nos.)[3]					
12 ROYALTIES[4]					
13 TOTAL ESTIMATED COST					
14 FEE OR PROFIT					
15 TOTAL ESTIMATED COST AND FEE OR PROFIT					

1

OPTIONAL FORM 60
October 1971
General Services Administration
FPR 1-16.806
5060-101

This proposal is submitted for use in connection with and in response to *(Describe RFP, etc.)*

and reflects our best estimates as of this date, in accordance with the Instructions to Offerors and the Footnotes which follow.

TYPED NAME AND TITLE	SIGNATURE

NAME OF FIRM	DATE OF SUBMISSION

EXHIBIT A—SUPPORTING SCHEDULE *(Specify. If more space is needed, use reverse)*

COST EL NO.	ITEM DESCRIPTION *(See footnote 5)*	EST COST *($)*

I. 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?

☐ YES ☐ NO *(If yes, identify below.)*

NAME AND ADDRESS OF REVIEWING OFFICE AND INDIVIDUAL	TELEPHONE NUMBER/EXTENSION

II. WILL YOU REQUIRE THE USE OF ANY GOVERNMENT PROPERTY IN THE PERFORMANCE OF THIS PROPOSED CONTRACT?

☐ YES ☐ NO *(If yes, identify on reverse or separate page)*

III. DO YOU REQUIRE GOVERNMENT CONTRACT FINANCING TO PERFORM THIS PROPOSED CONTRACT?

☐ YES ☐ NO *(If yes, identify.)* ☐ ADVANCE PAYMENTS ☐ PROGRESS PAYMENTS OR ☐ GUARANTEED LOANS

IV. DO YOU NOW HOLD ANY CONTRACT *(Or, do you have any independently financed (IR&D) projects)* FOR THE SAME OR SIMILAR WORK CALLED FOR BY THIS PROPOSED CONTRACT?

☐ YES ☐ NO *(If yes, identify.)*:

V. DOES THIS COST SUMMARY CONFORM WITH THE COST PRINCIPLES SET FORTH IN AGENCY REGULATIONS?

☐ YES ☐ NO *(If no, explain on reverse or separate page)*

See Reverse for Instructions and Footnotes

OPTIONAL FORM 60 (10–71)

2

INSTRUCTIONS TO OFFERORS

1. The purpose of this form is to provide a standard format by which the offeror submits to the Government a summary of incurred and estimated costs *(and attached supporting information)* suitable for detailed review and analysis. Prior to the award of a contract resulting from this proposal the offeror shall, under the conditions stated in FPR 1-3.807-3 be required to submit a Certificate of Current Cost or Pricing Data (See FPR 1-3.807-3(h) and 1-3.807-4).

2. In addition to the specific information required by this form, the offeror is expected, in good faith, to incorporate in and submit with this form any additional data, supporting schedules, or substantiation which are reasonably required for the conduct of an appropriate review and analysis in the light of the specific facts of this procurement. For effective negotiations, it is essential that there be a clear understanding of:

a. The existing, verifiable data.
b. The judgmental factors applied in projecting from known data to the estimate, and
c. The contingencies used by the offeror in his proposed price.

In short, the offeror's estimating process itself needs to be disclosed

3. When attachment of supporting cost or pricing data to this form is impracticable, the data will be described *(with schedules as appropriate)*, and made available to the contracting officer or his representative upon request.

4. The formats for the "Cost Elements" and the "Proposed Contract Estimate" are not intended as rigid requirements. These may be presented in different format with the prior approval of the Contracting Officer if required for more effective and efficient presentation. In all other respects this form will be completed and submitted without change.

5. By submission of this proposal the offeror grants to the Contracting Officer, or his authorized representative, the right to examine, for the purpose of verifying the cost or pricing data submitted, those books, records, documents and other supporting data which will permit adequate evaluation of such cost or pricing data, along with the computations and projections used therein. This right may be exercised in connection with any negotiations prior to contract award.

FOOTNOTES

1 Enter in this column those necessary and reasonable costs which in the judgment of the offeror will properly be incurred in the efficient performance of the contract. When any of the costs in this column have already been incurred (e.g., on a letter contract or change order), describe them on an attached supporting schedule. Identify all sales and transfers between your plants, divisions, or organizations under a common control, which are included at other than the lower of cost to the original transferror or current market price.

2 When space in addition to that available in Exhibit A is required, attach separate pages as necessary and identify in this "Reference" column the attachment in which the information supporting the specific cost element may be found. No standard format is prescribed, however, the cost or pricing data must be accurate, complete and current, and the judgment factors used in projecting from the data to the estimates must be stated in sufficient detail to enable the Contracting Officer to evaluate the proposal. For example, provide the basis used for pricing materials such as by vendor quotations, shop estimates, or invoice prices; the reason for use of overhead rates which depart significantly from experienced rates (reduced volume, a planned major re-arrangement, etc.); or justification for an increase in labor rates (anticipated wage and salary increases, etc.). Identify and explain any contingencies which are included in the proposed price, such as anticipated costs of rejects and defective work, or anticipated technical difficulties.

3 Indicate the rates used and provide an appropriate explanation. Where agreement has been reached with Government representatives on the use of forward pricing rates, describe the nature of the agreement. Provide the method of computation and application of your overhead expense, including cost breakdown and showing trends and budgetary data as necessary to provide a basis for evaluation of the reasonableness of proposed rates.

4 If the total cost entered here is in excess of $250, provide on a separate page the following information on each separate item of royalty or license fee: name and address of licensor; date of license agreement; patent numbers, patent application serial numbers, or other basis on which the royalty is payable; brief description, including any part or model numbers of each contract item or component on which the royalty is payable; percentage or dollar rate of royalty per unit; unit price of contract item; number of units; and total dollar amount of royalties. In addition, if specifically requested by the contracting officer, a copy of the current license agreement and identification of applicable claims of specific patents shall be provided.

5 Provide a list of principal items within each category indicating known or anticipated source, quantity, unit price, competition obtained, and basis of establishing source and reasonableness of cost.

CONTINUATION OF EXHIBIT A—SUPPORTING SCHEDULE AND REPLIES TO QUESTIONS II AND V.

U.S. DEPARTMENT OF TRANSPORTATION
SMALL BUSINESS INNOVATION RESEARCH PROGRAM
SOLICITATION NO. 87-1

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 Section III of this solicitation).

_____ 1. The proposal reflects the fact that for Phase I a minimum of two-thirds of the research and/or analytical effort will be performed by the proposing firm as required per Section V.H.1 and 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 as required per Section I.C.

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

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

_____ 4. The proposal budget is for $50,000 OR LESS and duration does not exceed six months.

_____ 5. The abstract contains no proprietary information and does not exceed space provided on 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 inlcudes the items identified in SECTION III.D of the Solicitation.

_____ 11. The Contract Pricing Proposal (Appendix C) has been completed and is the LAST PAGE of the proposal.

_____ 12. The proposal must be postmarked or delivered no later than May 1, 1987 as required per Section VI.A.