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DOT-TSC-OST-88-1

SBIR-88-1

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

Small Business Innovation Research

Program Solicitation

(Closing Date: May 2, 1988)

SBIR

Transportation Systems Center

SBIR - 88 - 1

PROGRAM SOLICITATION

Small Business Innovation
Research Program

Closing Date: May 2, 1988

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

A. Research or Research and Development

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

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

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

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

B. Small Business

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 "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.

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 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, 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. 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 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 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) 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.

(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.

(5) 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 be submitted only 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 3, 1988. 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 evaluator's comments on the proposal may be provided to the proposer. The identity of the evaluators shall not be disclosed.

V. CONSIDERATIONS

A. Awards

It is estimated that during fiscal year 1988, the Department of Transportation will award approximately 10 Phase I contracts with an anticipated potential maximum of 16 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, 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 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 88-FA4 through 88-FA6, 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 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 outiine 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.

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.

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:

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 2, 1988 to qualify for acceptance and consideration under the current DOT SBIR Program. Proposals postmarked later than May 2, 1988 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 2, 1988.

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.

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 2, 1988. This number will appear on the acknowledgement of receipt card (see 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:

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

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

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

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

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 FY88 PHASE I AWARDS

FEDERAL AVIATION ADMINISTRATION (FAA) . . . . . 7 Awards

Aircraft Safety
88-FA1. Advanced Turbine Engine Containment Technology
88-FA2. Dynamic Test of Aircraft Structures and Furnishings
88-FA3. Nondestructive Inspection Techniques for Composite Aircraft Structures

Aviation Security
88-FA4. Shadowgraph Enhancement
88-FA5. Passenger/Baggage Tracking
88-FA6. Glass Bottle Contents Verification

Avionics
88-FA7. Airborne Instrumentation for Locating Radio Frequency Interference
88-FA8. Instrument System for Aircraft Cockpit Visibility

Air Traffic Control/Flight Services Technology
88-FA9. Advanced Technology Airborne Traffic Alert and Collision Avoidance System
88-FA10. Neural Nets Applied to Air Traffic Control

Aeromedicine
88-FA11. Putrefaction of Body Tissue Substance Levels

Human Factors
88-FA12. Effects of Rotational Shifts on Operational Errors

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

Structures
88-FHl. Measuring Live Load Stresses on Bridges
88-FH2. Non-Intrusive Point Gage for Hydraulic Laboratory Studies

Safety And Traffic Operations
88-FH3. Overhead Infrared Vehicle Detector
88-FH4. Passive Roadway Edgeline Marker
88-FH5 Breakaway Luminaire Support for Mini-Cars

DOT OPERATING ADMINISTRATION/TOPICS	POTENTIAL MAXIMUM FY88 PHASE I AWARDS
FEDERAL RAILROAD ADMINISTRATION (FRA)	1 Award

Inspection - Detection

88-FR1. Nondestructive Evaluation of Accident Damaged Insulated Tank Cars

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

Occupant Protection

88-NH1. Accessories to Increase the Safety of Light Trucks and Vans

88-NH2. Crash Protection Accessories Using Inflated Structures to Increase the Safety of Motor Vehicles Already in Use

88-NH3. Accessories to Increase the Safety of Motorcyclists or School Bus Occupants

Traffic Records

88-NH4. Lap-Top Computer Aided Accident Data Collection and Transmission System

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

Transit Efficiency

88-UM1. Suburban Mobility

88-UM2. Entrepreneurial and Small Business Participation in Transit

FEDERAL AVIATION ADMINISTRATION

AIRCRAFT SAFETY

88-FA1. ADVANCED TURBINE ENGINE CONTAINMENT TECHNOLOGY

Research is needed on advanced turbine engine containment technology to absorb hazardous energy levels due to turbine engine structural fragmentation failures of rotating components (including fan, compressor, turbine sides, blades, spacers, and seals). Proposed containment system designs should provide for absorption of high energy fragments at the engine casing, airframe nacelle, or fire wall structures. Solutions should have specific applications to engine case or airframe structures that may be applied at original design, major overhaul, or in-service retrofit. The concepts should include advanced lightweight energy absorption materials that are technically and economically feasible . They should also tolerate the operational ground/flight envelope. Basic design concepts should consider engine/airframe tradeoffs and be directed to both fixed wing aircraft and helicopters.

88-FA2. DYNAMIC TEST OF AIRCRAFT STRUCTURES AND FURNISHINGS

Innovative approaches are needed to develop a simulator capable of providing a family of dynamic and controlled acceleration profiles which realistically represent the crash environment against which aircraft structures and cabin interior furnishings (including seat/restraint systems, overhead racks and galleys) may be evaluated. The purpose of these approaches is to develop equipment capable of precise, economical and repeatable testing of aircraft structures and components under laboratory conditions. The proposed approach should be directed toward reducing costs, increasing operational effectiveness and interfacing state-of-the-art data acquisition systems. Safety and efficiency should be of primary concern.

General performance characteristics of the proposed system should include:

a.	acceleration	50 g max
b.	velocity	100 ft/sec max
c.	payload	20,000 lbs max
d.	pulse shape(s)	triangular, triangular skewed, sinusoidal, sinusoidal skewed, trapezoidal, ramp rise
e.	pulse duration	.240 sec max

88-FA3. NONDESTRUCTIVE INSPECTION TECHNIQUES FOR COMPOSITE AIRCRAFT STRUCTURES

Research is needed to develop a portable nondestructive inspection (NDI) system for defect characterization and analysis of composite aircraft structures (i.e., graphite/epoxy, glass/epoxy, kevlar/epoxy systems). The system should have the capability to characterize the defect's size and type, and be able to analyze and project its effect on the integrity of the composite structure(s). Ideally, the NDI system should be able to inspect the composite laminate on a ply-by-ply basis and then communicate that data to an analysis program contained in a PC type computer/plotting system. A small-scale testing program must be included to demonstrate the system's effectiveness in

characterizing and analyzing the discontinuities/defects within composite laminates of varying thickness.

AVIATION SECURITY

*88-FA4. SHADOWGRAPH ENHANCEMENT

Various airport baggage interrogation techniques used to detect threats (firearms, grenades, incendiary and explosive devices, or pure incendiaries and explosives) yield a two or three dimensional presentation that is the least expensive and most informative. Research is needed on a computer aided detection method to help the viewer interpret the two dimensional display where a threat may appear in any orientation and be partly or completely masked. The proposed shadowgraph enhancement technique should indicate when a bag contains a threat, contains no threat, or may contain a threat.

*88-FA5. PASSENGER/BAGGAGE TRACKING

Research is needed to develop a computer-driven automated system to physically track passengers and baggage as they progress through their flight schedule. There is a need to track passengers and baggage within airports and also from flight to flight, if transfers are involved. The system could serve multiple purposes such as security, passenger boarding verification for revenue purposes, misplaced baggage location, etc. The system should operate with minimum human intervention on the part of both passengers and airline personnel.

*88-FA6. GLASS BOTTLE CONTENTS VERIFICATION

Research is needed to develop a system to differentiate hazardous or flammable contents of sealed bottles from innocent contents without opening the bottles carried on board by airline passengers. The system should be fast, with a go/no go decision made at the rate of at least 20 bottles per minute. The system should be compatible with existing airport carry-on baggage screening procedures and should be safe for the passenger and screener. The system should be able to accommodate bottles up to 2 liter capacity. The system should also accommodate ceramic and all colors of glass bottles. Examination of the bottle may take place in a dedicated cavity or well, or by using a touch pad or flexible probe.

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

FEDERAL AVIATION ADMINISTRATION

AVIONICS

88-FA7. AIRBORNE INSTRUMENTATION FOR LOCATING RADIO FREQUENCY INTERFERENCE

Research is needed for the design of airborne instrumentation to locate radio frequency interference (rf) that is mountable on aircraft with a gross weight of less than 5000 pounds. The unit should be automatic or be operable by one person. The unit should be capable of locating an rf emitter that radiates in the ranges of 100-400 mHz and provides a signal-in-space of at least 5 microvolts at the system's antenna. Determination of the direction of the emitter within +/–3 degrees should be achievable within a 10 second period for a signal that has a duty cycle of at least 50 percent.

The unit should be capable of operating from the aircraft's standard power supply, from its own battery source, from a combination of aircraft and battery sources, or from an aircraft's power supply that is nonstandard but can be installed and certificated from stock components. Installation of the antenna system associated with the instrumentation package must be achievable with minimal modification to the aircraft's structure and with no significant modification to the aircraft's aerodynamic performance. The basic design should be translatable to use on larger aircraft where the removal of power and space constraints allow improvement in system performance. To the greatest extent possible, system elements should be off-the-shelf.

88-FA8. INSTRUMENT SYSTEM FOR AIRCRAFT COCKPIT VISIBILITY

Research is needed to develop an instrument system for aircraft cockpit visibility. A basic tenet of flight safety has always been "see and avoid". This principle is the rationale for a number of FAA regulations which resulted in criteria for prescribing the minimum recommendations of acceptable visibility for transport aircraft. Inadequate technical means to measure, record and analyze cockpit visibility were fostered by the development of the now antiquated FAA Binocular Camera. The FAA is in the process of preparing new rules which are intended to address the need for improved cockpit visibility. Innovative approaches are needed to develop a cost effective state-of-the-art instrument or system to measure, record and analyze the extent of cockpit visibility.

AIR TRAFFIC CONTROL/FLIGHT SERVICES TECHNOLOGY

88-FA9. ADVANCED TECHNOLOGY AIRBORNE TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM

Innovation is needed to implement the latest technology and signal processing techniques in an Airborne Traffic Alert and Collision Avoidance System (TCAS) that meets all TCAS I operational requirements and would be beneficial to the small aircraft operator. TCAS I requirements are described in the Radio Technical Commision for Aeronautics (RTCA) Minimum Operational Performance Standards (MOPS) for TCAS I (RTCA Document Number D.O. 197). The latest techniques for airborne vehicle surveillance, data and signal processing techniques using advanced mathematical

methods, and the latest cockpit display technology should be addressed. The research should insure that an optimum TCAS I System can be made available to the small aircraft operator at a reasonable cost.

Over 10 years of FAA/industry development has resulted in two types of TCAS systems to be implemented in U.S. airspace: TCAS I which is a limited capability, low cost Proximity Warning Indicator (PWI) system for smaller aircraft; and TCAS II, an extended capability system that provides traffic alerts and recommends collision avoidance maneuvers for larger aircraft. An FAA rule will be issued in September, 1988, mandating TCAS I or TCAS II on specific classes of aircraft within three to five years. Several TCAS II systems have reached the production stage. However, TCAS I has only been defined through evaluation and test of several prototype systems and extrapolation of TCAS II results.

88-FA10. NEURAL NETS APPLIED TO AIR TRAFFIC CONTROL

Model neural nets have been developed that have the ability to recognize the patterns inherent in temporal spatial processes if these processes can be defined quantitatively. In theory, this means that if a neural net was connected to the Air Traffic Control (ATC) process, it could identify the control processes used by controllers and, in effect, "learn" how to control traffic. Innovative approaches are needed to explore the feasibility of applying neural net models to the ATC process and to assess the extent to which these techniques could be used in the ATC process.

AEROMEDICINE

88-FA11. PUTREFACTION OF BODY TISSUE SUBSTANCE LEVELS

Research is needed to develop techniques for measuring the effect of putrefaction on observed analytical results from tissues and fluids with known starting levels of alcohol and common drugs of abuse. Induced putrefaction of samples (in one day increments from baseline to 7 days maximum) from at least four environments is required: 100 degrees F/80% humidity, 100 degrees F/40% humidity, 70 degrees F/40% humidity, 40 degrees F/40% humidity. Analytical results from exposed samples should be compared to samples maintained frozen for 1, 3 and 7 days at 32, 0 and -20 degrees F. Starting tissues and fluids should be derived from standard animal preparation, or fresh human specimens obtained with appropriate consent by donation (e.g., blood), or post surgical tissue removed for conditions unrelated to toxicological insult. Analytical procedures used to track blood and tissue levels must represent "state-of-the-art" legally and medically acceptable methods, as currently employed by functional forensic laboratories. Alternate formats may be proposed.

FEDERAL AVIATION ADMINISTRATION

HUMAN FACTORS

88-FA12. EFFECTS OF ROTATIONAL SHIFTS ON OPERATIONAL ERRORS

Innovative research is required to determine if it is possible to identify and quantify any causal effects brought on by rotational work shifts on the number or severity of operational errors experienced by air traffic control (ATC) personnel. ATC personnel are required to work rotational shifts in the normal course of their duties. These shifts result in disruptions to the traditional work, relaxation and sleep cycles which may have a relationship to operational errors. The proposed research should address development of a methodology for minimizing or eliminating any effect which may have been identified from rotational work shifts.

FEDERAL HIGHWAY ADMINISTRATION

STRUCTURES

88-FH1. MEASURING LIVE LOAD STRESSES ON BRIDGES

A simple reliable instrument needs to be developed to measure live load stress ranges that are caused in beams by the passage of trucks over bridges. The instrumentation should display the maximum stress range but would not need to record the stresses. It should be inexpensive, portable, and easy-to-operate. The stress range of interest is from 0 to 10,000 psi. Noté that the instrumentation would include some kind of strain transducer in conjunction with the sensing and display module.

88-FH2. NON-INTRUSIVE POINT GAGE FOR HYDRAULIC LABORATORY STUDIES

The FHWA is currently conducting hydraulic laboratory studies of riprap stability around bridge piers which involve measuring the elevation of a gravel bed while water is flowing. One of the problems is that the blunt end probe that is normally used to measure bed elevations creates a flow disturbance that causes some additional scour just as the probe touches bottom; as a result, it is difficult to get a true measurement. It is desired to obtain proposals to design and fabricate a small probe (around 1/4-inch in diameter) that has an emitter such as light or sonic energy, so that it senses when the probe is a predetermined distance from a boundary without actually having to touch the boundary.

SAFETY AND TRAFFIC OPERATIONS

88-FH3. OVERHEAD INFRARED VEHICLE DETECTOR

The buried loop vehicle detector is used by over 90 percent of traffic control systems. When installed and maintained properly, these detectors perform their function satisfactorily under all environmental conditions, but there are costs associated with their use. Their average life time is 3 to 5 years due mainly to loop failure. Replacement costs are high, traffic is disrupted, and the pavement surface weakened due to the saw cuts required to bury the loop and lead-in wires. Loops cannot be used on steel bridge decks, pavements with heavy reinforcement rods, or in unstable pavement. A reliable, low-cost easily installed overhead vehicle detector is needed that can operate under all highway environmental conditions and detect both presence (stopped vehicles) and passage (maximum speed detection 70 mph) of all vehicle types. Infrared technology has advanced considerably in the last few years as evidenced by its common use in automatic 35mm cameras. Both active and passive infrared sensors should be investigated for use in this application. The device should be simple to install and operate by highway technicians and be electrically compatible with highway traffic control systems.

Research activities should include a survey of current infrared sensors appropriate for this application; a technical analysis of device sensitivities, speed of response, signal-to-noise ratios, and mounting site geometrics; and experimental models for obtaining laboratory and outdoor test results.

FEDERAL HIGHWAY ADMINISTRATION

88-FH4. PASSIVE ROADWAY EDGELINE MARKER

A passive roadway edgeline marker is needed to reduce run-off-road accidents. The marker would provide a signal to the driver that the vehicles is about to leave the roadway. A vehicle mounted roadway edge marker detector would scan the edge marker by transmitting a signal (rf or infrared) to the edge marker which would be reflected or re-transmitted back to the vehicle for range detection. Edge marker location could be determined using surface acoustic wave (SAW) technology. The edge marker should be designed for all environmental conditions and provide retroreflectance for standard headlights.

Research activities should include a survey of appropriate system technology; a mathematical analysis of system components, including power levels, range, signal-to-noise ratio, range/resolution, response time, bandwidth, detection zone shape and size, and mechanical mounting. An experimental model should be proposed for obtaining laboratory or outdoor test results.

88-FH5. BREAKAWAY LUMINAIRE SUPPORTS FOR MINI-CARS

Research is needed to develop a new type of breakaway mechanism that will meet current safety guidelines for luminaire supports when impacted by mini-cars. Recent downsizing in automobiles has resulted in an increased population of 1,800 pound vehicles in the motor vehicle fleet. This new class of vehicles is called mini-cars. Recent FHWA testing has shown a large proportion of existing breakaway luminaire supports do not meet current safety guidelines when impacted by mini-cars. Innovation is needed to develop a new type of breakaway mechanism capable of use on luminaire supports up to 55 feet in height with total weights up to 1,000 pounds. The breakaway device must be compatible with existing practice and American Association of State Highway and Transportation Officials (AASHTO) wind load guidelines.

FEDERAL RAILROAD ADMINISTRATION

INSPECTION-DETECTION

88-FR1. **NONDESTRUCTIVE EVALUATION OF ACCIDENT DAMAGED INSULATED TANK CARS**

An innovative nondestructive evaluation (NDE) technique/device is sought for use on insulated railroad tank cars. Current NDE techniques/devices are useful in detecting damage and cracks in uninsulated tank cars. An insulated tank car has a one-eighth inch thick outer steel jacket, up to four inches of insulation (urethane foam, glass fiber, mineral fiber, ceramic fiber, etc.), and an inner tank shell. Therefore, surface contact NDE devices cannot detect cracks or flaws in the inner tank shell. In an accident situation, it may be necessary to determine if the internal shell has any damage, cracks or flaws prior to moving the tank car. Such a device must be portable enough to gain access to railroad accident sites, and be easy to use by technically untrained emergency response personnel (i.e., have no knowledge of electronics, optics or NDE).

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

OCCUPANT PROTECTION

88-NH1. ACCESSORIES TO INCREASE THE SAFETY OF LIGHT TRUCKS AND VANS

Research is needed to identify accessories which could increase the safety of light trucks and vans which are increasingly used to carry passengers rather than products. Federal Motor Vehicle Safety Standards in some cases do not yet apply to these types of vehicles. Accessories to increase the safety of light trucks and vans include add-on head restraints, restraints for passengers in the open backs of light trucks, and other safety devices. The proposals should show the engineering design and analyses of the safety need and benefit of the proposed product, and include the tests planned for such documentation.

88-NH2. CRASH PROTECTION ACCESSORIES USING INFLATED STRUCTURES TO INCREASE THE SAFETY OF MOTOR VEHICLES ALREADY IN USE

Research is needed to identify inflated structures which could provide controlled deformation without injury when struck by body parts in a crash. Markets appear to be available for systems, such as air belts, inflated pads (to secure luggage, pet cages, wheelchairs, handicapped children, the elderly, etc.), or an inflated seat structure with attached restraints. Accessories are sought to replace present metal seat structures which often contribute to injuries of occupants in or behind these seats, or to use as auxilliary temporary seats, particularly if they can be made as low cost pre-inflated systems. The proposals should show the engineering design and analyses and expected produceability, marketability, and cost/benefit, and particularly the tests planned to document the safety benefits of the crash protection accessory.

88-NH3. ACCESSORIES TO INCREASE THE SAFETY OF MOTORCYCLISTS OR SCHOOL BUS OCCUPANTS

Research is needed on accessories to increase the safety of motorcyclists or school bus occupants. In 1985, 4,570 motorcyclists and 24 school bus occupants were killed in traffic accidents. Motorcycles as a class are the most dangerous vehicles to ride and ways are needed to increase their safety. School buses have a high safety record; however, innovative accessories are sought which will further increase the safety of children transported in the 330,000 school buses in use. Proposals may include innovative use of products utilizing an advanced or new concept or application of a product already built (at least in prototype). The proposal should also present the engineering design, expected produceability, marketability, and cost/benefit, and the tests to document the safety benefit of the accessory.

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

TRAFFIC RECORDS

88-NH4. LAP-TOP COMPUTER AIDED ACCIDENT DATA COLLECTION AND TRANSMISSION SYSTEM

Accident data is of little use to state program highway safety managers until it is available in the state traffic records system. Many states take up to nine months to automate this accident data. The St. Peterburg Police Department and the Florida Highway Patrol - Miami District are currently utilizing lap-top computers for in-field preparation of police accident reports. Research is needed to develop software and lap-top computer system specifications for the preparation of police accident reports, including accident diagrams. The system should have capability for data transmission to a central state location for storage and analysis. The resulting system should have the potential to reduce accident data reporting time from four to nine months to two or three days.

URBAN MASS TRANSPORTATION ADMINISTRATION

TRANSIT EFFICIENCY

88-UM1. SUBURBAN MOBILITY

It is estimated that job growth in the suburbs will capture 40 percent of new jobs in metropolitan areas over the next 20 years. Congestion in some of these areas is already worse than in the central city. Solutions to these critical growth pressures will require more than the conventional transit and highway approaches. Increased research is needed on demand management, land use planning, private/public cooperative ventures, site design, and new institutional arrangements. Innovative approaches are sought to identify emerging growth situations and spatial distributions, and to assess the impact of congestion on suburban mobility. Proposers should identify and describe a proposed range of generic solutions to the suburban mobility problem. A model strategic planning process description would be appropriate.

88-UM2. ENTREPRENEURIAL AND SMALL BUSINESS PARTICIPATION IN TRANSIT

UMTA is encouraging entrepreneurial and small business participation in the development of market-oriented services to meet urban transit needs currently not being served by public transportation systems, particularly for inner city areas. Innovative techniques are needed for identifying appropriate markets for such ventures and the financing strategies necessary for their implementation. Techniques are needed which will assist entrepreneurs in planning and providing market-oriented services.

U.S. DEPARTMENT OF TRANSPORTATION
SMALL BUSINESS INNOVATION RESEARCH PROGRAM
SOLICITATION NO. 88-1
PROPOSAL COVER SHEET

Project Title: _____

Research Topic No. _____ Research Topic Title _____

Submitted By: Name _____

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 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. 88-1

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 (Limit to 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. 88-1
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 *(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 N/A

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 N/A

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 N/A

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

☐ YES ☐ NO N/A

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)
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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 to the DOT SBIR Program 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. Royalites (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 excutive 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)

U.S. DEPARTMENT OF TRANSPORTATION
SMALL BUSINESS INNOVATION RESEARCH PROGRAM
SOLICITATION NO. 88-1
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).

_____ 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 research topics in Section VIII.

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

_____ 5. The technical 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 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 proposal must be postmarked or delivered no later than May 2, 1988 as required per Section VI.A.