FEDERAL HIGHWAY ADMINISTRATION

BROAD AGENCY ANNOUNCEMENT

No. DTFH61-11-R-00027

“EXPLORATORY ADVANCED RESEARCH PROGRAM”

June 23, 2011

General Information

Technical POC:  David Kuehn, FHWA, (202) 493-3414; David.Kuehn@dot.gov, or Terry Halkyard, FHWA, (202) 493-3467; Terry.Halkyard@dot.gov
Contracting Officer:  Robin K. Hobbs, FHWA, (202) 366-4004, Primary Robin.Hobbs@dot.gov

SUMMARY OF IMPORTANT DATES

The FHWA anticipates that the proposal, evaluation and award process for this BAA will proceed generally in accordance with the following schedule:

BAA Opens (FBO publication)       June 23, 2011
Proposals Due 4:00 pm EST         September 15, 2011
Anticipated Contract Awards Date  March 30, 2012

PROPOSAL SUBMISSION: Electronic transmissions of the proposal shall be sent to FHWAadvancedresearch@dot.gov and to the Contracting Officer, Robin.Hobbs@dot.gov no later than 4:00 p.m., EST, on September 15, 2011. Proposals received after this date and time will not be considered.

INTRODUCTION: Legislation established the Exploratory Advanced Research (EAR) Program that addresses longer-term, higher risk research and strives to develop partnerships with public and private sector entities. Further, the FHWA Corporate
Master Plan for Research and Deployment of Technology & Innovation identifies engaging stakeholders throughout the research and technology process as one of seven guiding principles.

Since 2007 research offices within the FHWA have been meeting with research partners and outside experts to further define areas of investigation for exploratory advanced research. (See Focus Areas at http://www.fhwa.dot.gov/advancedresearch/about.cfm#focus.) The FHWA is moving forward with several of the topic areas that had a strong scientific and technical basis through the issuance of this BAA.

**Award Type**

The FHWA may award either contracts or cooperative agreements as a result of this BAA. In consultation with the technical evaluators, the Contracting Officer will make the determination whether a contract or cooperative will be awarded. Three factors affect the decision to award a procurement contract or assistance award, and if an assistance award, a grant or cooperative agreement. The three factors are:

- Legislative authority
- Principal purpose
- Degree of federal involvement

Assistance agreements differ from contracts in several key ways:

The primary goal of a procurement contract is to procure goods or services for the use of or to directly benefit the federal awarding agency; the primary goal of an assistance agreement is to further a public purpose.

Procurement contracts allow for the vendor/supplier to make a profit, while assistance agreements are cost-reimbursable agreements in that the only permissible charges are actual costs that are directly related to the project and an amount of indirect costs based on an agreed-upon rate.

Procurement contracts require “deliverables” that the CO/COTR must test and accept; assistance agreements do not include deliverables, but may require other submissions described in the award document.

Although the Government encourages cost sharing for both cooperative agreements and contracts, all applications submitted for cooperative agreement consideration shall include a 20 percent or greater non-federal cost share.

**PROGRAM SCOPE:** This program is intended to spur innovation and focus on high risk and high pay-off research. Exploratory Advanced Research bridges basic and applied research. In contrast to applied research, a specific application or product is not the goal of the work. Incremental advances and demonstrations or evaluations of existing technologies are not within the scope of this program. Though the overall program scope
is intentionally ambitious and broad to address the wide spectrum of topics and objectives that funded investigations will strategically support, this solicitation is intended to address specific technology and knowledge gaps, identified through scanning and convening activities, that will help the FHWA improve highway safety, reduce congestion on the nation’s highways, reduce environmental and health impacts of the nation’s highways and reduce the long term costs and improve the efficiency of the nation’s highways.

**OBJECTIVES AND DESCRIPTION:** The Federal Highway Administration (FHWA) is soliciting for proposals under its EAR Program for research projects that could lead to transformational changes and truly revolutionary advances in highway engineering and intermodal surface transportation in the United States. This program shall support scientific investigations and studies to advance the current knowledge and state-of-the-art in the sciences and technologies employed in the planning, design, construction, operation, maintenance and management of the nation’s highways. Strategically, this research will enable and expedite the development of revolutionary approaches, methodologies, and breakthroughs required to drive innovation and greatly improve the efficiency of highway transportation.

The research topics described below are intended to guide potential offerors and are based upon the authorizing legislation, stakeholder input, initial stage research and the strategic needs of the FHWA. Through scanning and convening activities over the past year, FHWA engaged a large number of stakeholders from within and outside the traditional highway research community to identify topics of research that promise transformation and possible breakthroughs in highway technology, processes and policies. Topics found to have strong merit in advancing different fields including engineering, hard sciences, as well as social sciences to support national strategic objectives are included in this solicitation.

Given the exploratory and high risk focus of this program, it is anticipated that the results of these investigations will not be methods or technologies that will be immediately implementable and will most likely result in highway industry access to new knowledge and concepts that while proven, will require further development before they would be ready for full implementation. It is envisioned that these results will undergo further development via the other applied research and development programs of the Federal Highway Administration and others. In submitting proposals, offerors are reminded that the intent of this program is to fund applied research that, while high risk and perhaps longer term, is undertaken with a specific problem or need in mind. Basic research is not within the scope of this program.

FHWA may make multiple awards for each of the topics described below.

**Topic 1, Modeling Cement Hydration Kinetics**

This topic supports the EAR Program focus area of “Breakthrough Concepts in Material Science.” Depending on the approach, it also may benefit research in other focus areas.
including “Nano-Scale Research” and “Information Sciences.” See http://www.fhwa.dot.gov/advancedresearch/about.cfm#focus for more information on EAR Program focus areas.

Hydration of portland cement is the cornerstone of the process responsible for microstructure development in concrete and ultimately controls the dynamics of all material properties that make concrete such a useful product for society (properties such as setting, strength, permeability, and durability). A comprehensive understanding and model for cement hydration will enable new applications and discoveries. Recent advances in both experimental and computational technology are providing unprecedented insights into the nature of cement hydration. While a comprehensive theory is not yet available, recent progress suggests that what were once thought to be the most elusive hurdles are now within reach. A number of simulation platforms are now available along with emerging modeling strategies that could provide multi-scale linkages for the development of engineering models and computational research tools. Similarly, newer experimental strategies are yet to be fully exploited although are now positioned to offer real insights and breakthroughs.

Why is kinetics so important? A number of examples should help an answer to emerge. Modern metallurgy utilizes kinetics to manipulate ore processing and to control solidification, crystallization and solid-state phase transformations and as a result, has given us super-alloys, stainless steel, lightweight alloys, corrosion resistant metals and high temperature refractory metallurgy. By controlling the kinetics of organic synthesis, polymer science is able to produce designer macromolecules on demand and the pharmaceutical industry can quickly synthesize new drugs for testing and reliably scale-up to production capacity predictably. Detailed kinetic knowledge of how trace quantities of critical elements react and are transported within semiconductors is required to reliably produce millions of computer chips yearly with baffling quality control specifications measured in parts per million or parts per trillion. Finally, at the heart of modern crude oil refining are numerous kinetically controlled processes including catalytic cracking and hydro-treating. Without sophisticated computational modeling, it would be difficult to control, design and operate refineries to quickly respond to changing market demands and crude feed variations. These examples illustrate that knowledge of kinetics leads to control of outcomes, predictable design, engineered decision making and ability to respond to the changing environmental and economic landscape. Each of the five industries mentioned above, metallurgical, polymer, pharmaceutical, semiconductor and refining, have invested heavily in kinetic and kinetic modeling research in an effort to establish control of product quality and the evolution of their technology.

Unfortunately, the cements community has not endeavored to do the same, though notably there is a body of fine literature on the subject and advances being made. The challenges that lie ahead, including increasing interest in sustainable construction practices, the direct reduction in greenhouse gas emissions and the development of new technologies in response to performance-based specifications, must be met with increased commitment to discover the fundamental principles that govern the transformation of anhydrous cements phases to hydrous materials.
This topic was identified, explored, and refined as part of an initial stage investigation. See http://www.fhwa.dot.gov/advancedresearch/pubs/10078/index.cfm for more information.

**Description of Proposed Approach:** The past two decades have been dominated by a pixel-based strategy for generating cement microstructure developed at the National Institute of Standards and Technology (NIST). The well known simulation environment called CEMHYD3D (see http://fire.nist.gov/concpubs/software/cemhyd3d/readme.htm) is governed by largely empirical rules and a single, likewise empirical, global rate law with no fundamental connection to solution phase dynamics. The simulation has proven a the great contribution to this pioneering work, yet, this strategy could be replaced with one which links solution phase chemistry, transport phenomena and thermochemistry through fundamentally sound kinetic frameworks aligned with past Virtual Cement and Concrete Testing Laboratory (VCCTL) work. (See http://www.nist.gov/el/building_materials/inorganic/vcctl.cfm/) As is typical of such endeavors, modeling is somewhat ahead of experimental capabilities, however, the use of Vertical Scanning Interferometry (VSI) in combination with molecular dynamic simulation promises one route to enable the discovery of basic rate laws and reaction mechanisms. What is clear is that models that make linkages of the basic processes are and must continue to be developed and that such must now turn towards the connection between atomistic and molecular length-scale simulations via up-scaling approaches to produce modeling environments that will be useful for designing clinker phases and admixture systems as well as predicting life-cycle behavior of concrete composites. The endeavor must also focus on fast, predictive models and simulations that are transferable to engineering applications as well as the sophisticated research codes that are their underlying basis.

**Funds Available:** FHWA anticipates providing up to $800,000 for each award. FHWA may make one, multiple, or no awards on this topic based on the quality and distinctness of proposals and balance across program focus areas.

FHWA anticipated periods of performance may range from two to four years depending on approach, team composition, and institutional arrangements.

**Special Capabilities:** FHWA anticipates that the research team will:

- Be a multi-disciplinary team composed of experts from differing operating elements from one or multiple entities or institutions, and
- Include recognized experts in pavement materials, chemistry, and modeling.

Note: FHWA Anticipates this research team will work in cooperation with experiments conducted at the Turner Fairbank Highway Research Laboratory or on the VCCTL. The proposer should note any expected the level of participation (type and hours) of the FHWA Materials Laboratories staff and contractors on-site at the Turner Fairbank Highway Research Center or work conducted on the VCCTL.
The extent of participation by existing on-site contractors will be considered, arranged for, and facilitated by FHWA under separate procurement actions. For more information about pavements and materials research taking place at Turner Fairbank highway Research Center, see http://www.fhwa.dot.gov/research/topics/infrastructure/pavements/index.cfm. Work using the VCCTL may be included as part of the proposal or could be considered, arranged for, and facilitated by FHWA under separate procurement actions.

**Topic 2, VIDEO DECODING AND FEATURE EXTRACTION AUTOMATION FOR HIGHWAY RESEARCH**

This topic supports the cross cutting EAR Program focus area of “Information Sciences.” Depending on the approach, it also may benefit research in other focus areas including “Human Behavior and Travel Choices” and “Technology for Assessing Performance.” See http://www.fhwa.dot.gov/advancedresearch/about.cfm#focus for more information on EAR Program focus areas.

Highway transportation research is collecting and analyzing an increasing amount of video data. Reasons include recent technological breakthroughs that provide new and enhanced visual and other sensors for conducting research in multiple areas such as system planning, operations, safety, and infrastructure condition assessment.

- Eye tracking technology now allows for more natural behavior and field applications. Examples of research using this technology include the Exploratory Advanced Research (EAR) Program-sponsored research projects, “Seeing in the Dark Improving Understanding of Driver Visibility Requirements at Night,” and “Development of Methodologies to Evaluate the Nighttime Safety Implications of the Roadway Visual Scene Under Varying Cognitive Task Loads.”
- Increased use of traffic cameras and improved analysis software are providing data on vehicle classification, weight, speed, routing. Road-based and vehicle-based cameras also are providing improved recognition of pedestrians, e.g. the EAR Program-sponsored project, “Real–Time Pedestrian Detection Layered Object Recognition System for Pedestrian Collision Sensing.”
- Use of LIDAR and improved analysis software are assisting with the cataloguing of road and roadside conditions including pavement surface conditions, roadside topography, and roadside hardware.

The Strategic Highway Research Program (SHRP) 2 safety area includes elements of the above types of data in the naturalistic driving study. The amount of data can be orders of magnitude larger than what the highway research has worked with previously with research results expected to exceed one petabyte. See http://www.trb.org/StrategicHighwayResearchProgram2SHRP2/Public/Pages/Safety_153.aspx, for more information on the SHRP2 safety area.

While the research community is fortunate to be able to collect more and better data, the amount of data has the potential to overwhelm the capacity to assess the data using current methods. Current methods include a mix of automated and manual, frame-by-
frame coding that is not able to manage massive data stream and provides results that are not consistent or error free enough.

**Description of Proposed Activities:** Given the number of fields other than transportation (from defense, security, and entertainment) that are facing similar issues with video data and given scientific advances such as computer vision, learning systems, and artificial intelligence that could impact multiple types of applications, the initial phase of this research would (1) scan for recently completed and ongoing research supporting improvements in video decoding and feature extraction, (2) assess the potential of different approaches for transportation applications, then (3) provide a detailed work plan for testing one or more of the approaches. The initial phase would provide knowledge of state-of-the-art and future-art approaches for researchers already active in and using techniques applied to highway research leading to recognition of the potential and importance of this area to support and accelerate critical highway research needs. The initial phase also should provide information for the transportation industry about research gaps and technology development needs.

A subsequent phase of the research would test one or more approaches to further understand the potential for transportation applications. The subsequent phase should expand industry understanding of the performance of different approaches for specific transportation applications and attempt modifications to improve the performance of approaches where improved performance is necessary and the potential for improvement likely.

**Funds Available:** FHWA may make one, multiple, or no awards on this topic based on the quality and distinctness of proposals and balance across program focus areas. FHWA anticipates that funding will be in two or more phases over multiple years with the initial phase taking less than a year. Total FHWA funding could reach $1,000,000 over the course of the work with no more than 20 percent allowed for the initial phase. FHWA anticipates having an expert panel review the first phase of work. Based on the expert review, availability of funding, and continued needs, this research may progress to a second phase.

**Special Capabilities:** FHWA Anticipates this research team will
- Be a multi-disciplinary team composed of experts from differing operating elements from one or multiple entities or institutions,
- Include recognized national or international expertise on visual analysis and video feature extraction,
- Have substantial experience working with one or more elements of the transportation industry including safety, systems operations, or asset management, and
- Potentially have experience working in other industries and gained knowledge of their approaches in video decoding and feature extraction.
Topic 3. NEW TECHNOLOGY SOLUTIONS FOR WAYFINDING AND NAVIGATION GUIDANCE FOR PEOPLE WITH VISION IMPAIRMENT AND OTHER DISABILITIES

This topic supports the EAR Program focus area of “Integrated Highway System Concepts.” Depending on the approach, it also may benefit research in other focus areas including “Human Behavior and Travel Choices.” See http://www.fhwa.dot.gov/advancedresearch/about.cfm#focus for more information on EAR Program focus areas.

For millions of people with vision disabilities, a white cane or guide dog has been the main form of guidance for finding and navigation for years. The white cane solved the immediate navigation problem and provided users with clues both indoors and outdoors to avoid bumping into things, or falling due to obstacles. Guide dogs worked well in crowds. The guide animal or cane did not provide spatial awareness for long path planning or adherence; nor navigation to the next signalized intersection, a safe mid-block crossing, to a specific gate or exit in public places such as airports or train stations; nor information on whether portions of the route where unavailable, such as a sidewalk closure.

The concept of Event Horizon (e.g., looking ahead in time and space) as used in robotics and artificial intelligence could be explored to present information to a blind person when it is critical and needed: such as giving information to take a diagonal path or approach to reaching an exit door instead of navigating at right angles; or adaptively changing the event horizon for someone who wants to travel at a different speed and needs appropriate information for safe decision-making. Similarly, other people might benefit from such research to further advance mobility and promote greater independence, both indoors and outdoors.

**Description of Proposed Activities:** The objective of this research is to develop concepts and prototypes that use new technologies such as robotics, artificial intelligence, and sensors that could improve Event Horizons related to finding and navigation guidance. For purposes of this research, assume that broadband wireless technology, Intelligent Transportation Systems, GPS, DSRC, etc, are widely available. The concepts should be futuristic and focus on one or more of the following key areas of Event Horizon: (1) sensing with laser, cameras, computer vision, robotics, artificial intelligence or any other technology, (2) human interface that decides how much information to be presented, at what time, and in what form, and (3) algorithms that help plan the event and layout the scope for the whole event. The concept should be flexible to extend this research to find accessible transportation solutions for people with other disabilities such as sensory, cognitive and mobility and those who are aging.

This research should be conducted in two phases. The first phase shall include: (1) the development of a concept of operation (ConOps), (2) a description of data needs required to build a prototype, and (3) a detailed description of potential market size and impact in terms of safety, mobility, and other factors. The second phase would include (1) the
development and testing of a prototype system and (2) a detailed market assessment including benefit-cost analysis. Proposal should cover both phase one and two.

**Funds Available:** FHWA may make one, multiple, or no awards on this topic based on the quality and distinctness of proposals and balance across program focus areas. FHWA anticipates that funding will be in two phases over multiple years with first phase taking less than a year. Total FHWA funding could reach $600,000 over the course of the work with no more than 25 percent allowed for first phase. FHWA anticipates having an expert panel review the first phase of work. Based on the expert review, availability of funding, and continued needs, this research may progress to a second phase.

**Special Capabilities:** FHWA anticipates that that research team will
- Be a multi-disciplinary team composed of experts from differing operating elements from one or multiple entities or institutions,
- Include recognized experts in assistive technology, human-machine interfaces and transportation systems, and
- For the second phase have experience with technology prototyping and testing, development of market assessments, and capabilities in or relationships with manufacturing processes.

**Note: Future Topic Areas**

FHWA continues to investigate other research areas for potential breakthrough opportunities. FHWA welcomes questions or thoughts about opportunities and other areas of focus that could lead to transformation changes in highway research. At this time, however, FHWA has not identified other focus areas or topics for funding under the EAR Program. For further information about the EAR Program, please see [http://www.fhwa.dot.gov/advancedresearch/contacts.cfm](http://www.fhwa.dot.gov/advancedresearch/contacts.cfm).

**GENERAL PROPOSAL INFORMATION:**

Offerors should prepare proposals with a baseline period of performance up to 12 months, and if needed, with one or more options, each with a 12-month period of performance. The FHWA anticipates that proposals funded in FY2011 would have an approximate award date beginning in March 2012.

**INSTRUCTIONS FOR SUBMISSION OF PROPOSALS:**

**ADMINISTRATIVE INFORMATION:** Offerors are required to follow the guidance contained herein. The following sections provide information on proposal format, the submission process, evaluation and funding processes, and other general information. Proposals not meeting the format described in this BAA will not be reviewed.

All administrative correspondence or questions on this BAA should be directed to the Contracting Officer at the following email address: Robin.Hobbs@dot.gov.
**EVALUATION CRITERIA:** Evaluations will be performed using the following criteria listed in descending order of relative importance:

- **Scientific and Technical Merit:** Overall scientific and technical merit of the proposal, including the potential to result in increased understanding/knowledge in the field of highway research.

- **Importance to Agency Programs** in providing foundational research that would promote research investment in applying technology, process improvements or policy solutions that could lead to significant innovations in the highway system.

- **Capabilities and Experience:** Overall capabilities, including the qualifications, capabilities, and experience of the proposed principal investigator, team leader, and key personnel who are critical in achieving the proposal objective; the offeror's qualifications, capabilities, and experience in related technical areas; and the offeror's facilities and demonstrated ability for achieving the proposal objectives. For proposals involving prototype development this will include availability (either in-house, through subcontract, or through industrial affiliates) of design and development tools/capabilities appropriate to the proposed prototype.

- **Partnership:** Degree to which the proposal develops partnerships with public and private sector entities. Significant partnering is an essential aspect of this program. Within the EAR Program, successful research teams often include entities or researchers who traditionally have not been involved in transportation research partnering with entities or researchers who have.

- **Research Management:** Overall capability to manage the effort, including plans to objectively measure the value and impact of the research and ensure value whether the inquiry leads or does not lead to anticipated results.

- **Total Cost and Cost Realism:** Proposed cost to the Federal government and cost realism.

**GENERAL INFORMATION REGARDING THE PROPOSAL PROCESS**

Proposals will be evaluated by FHWA against the evaluation criteria outlined above. The FHWA may make more than one award for each of the topics listed in the BAA.

Offerors may submit more than one proposal; however each one must be in response to a single topic on the BAA. The topic of the proposal must be clearly identified in the proposal title on the cover page.

It will be of added value for the proposing organization's management to demonstrate flexibility in support of this approach. Examples of support are strong internal backing
with matching funds, innovative approaches in contracting and leveraging current and past technology development efforts that support this program.

Awards under this program may be subject to the requirements of Section 508 of the Rehabilitation Act, depending on the type of final products or reports to be delivered under each award. The Act requires that all electronic products prepared for the Federal Government be accessible to persons with disabilities, including those with vision, hearing, cognitive, and mobility impairments. Proposers can view Section 508 of the Rehabilitation Act (http://www.access-board.gov/508.htm) and the Federal IT Accessibility Initiative (Home Page) (http://section508.gov/) for detailed information.

The Paperwork Reduction Act of 1995 (PRA): Offerors are advised that any activities involving information collection (i.e., surveys, questionnaires, etc) from 10 or more non-Federal entities, including States, are subject to PRA requirements and may require the FHWA to coordinate an OMB Information Collection Clearance, a process that generally takes six months.

INSTRUCTIONS FOR SUBMISSION OF PROPOSALS

All proposals should be submitted in Microsoft® Word processing program or text searchable Adobe® Portable Document Format (PDF).

Proposals shall consist of two separate volumes:

Volume I – Technical Proposal and Management Approach
Volume II – Cost Proposal and Business Information

The proposals shall be prepared in the following format: 8.5 x 11 inches, one and one-half line spacing or double spaced, in at least 10 point type.

Volume I

Volume I must be no longer than 36 pages in length. The contents of any appendices shall count against the 36-page limit and shall be limited to figures that directly support items discussed in the text of the proposal. If items are included in an appendix, which is not explicitly discussed, in the basic proposal, the proposal may not be reviewed. Proposals with Volume I in excess of 36 pages may not be reviewed. Proposals with less than the maximum number of allowed pages will not be penalized. Offerors are encouraged to submit concise, but descriptive, proposals.

Volume I of the proposal shall include the following sections, each starting on a new page (an estimated page breakdown is included):

(a) Cover Page: This must include the BAA number, proposal title, project duration, type of business (large business, small disadvantaged business, other small business, HBCU or MI, other educational, or other nonprofit), complete list of subcontractors, technical and
administrative points of contact including addresses, telephone numbers, electronic mail addresses, and facsimile machine numbers. The cover page does not count against the page limit for Volume I.

(b) **Executive Summary**: The summary (approximately 3 pages) should include: (1) a description of the proposed visionary technology or system and how the proposed effort will meet the objectives of the BAA, (2) a description of the significant innovative ideas proposed, (3) a comparison of these innovative ideas with current approaches and the current state of the art, (4) the expected impact of the research if successful, (5) a brief description of the technical approach and the key technology and system development milestones for proof of concept (6) the process and metrics recommended for measuring the impact of the developed technologies and system, and (7) a summary of the anticipated program deliverables.

(c) **Innovative Claims (optional)**: Provide a summary of significant innovative technical claims (approximately 2 pages). Identify any innovative technologies and technical ideas to be pursued and the expected impact on the state of the art if the proposed efforts are successful.

(d) **Vision**: Describe (approximately 2 pages) the proposed technology or system and how the proposed effort will meet the objectives described in the topic’s description in the BAA. Describe the impact and relevance of this proposed research or technology development effort to the creation of a revolutionary concept/design/component(s)/system for the nation’s intermodal transportation systems. Describe the contribution and relevance of this proposed effort to related FHWA and highway programs and activities, where appropriate.

(e) **Technical Rationale**: The technical rationale section (approximately 6 pages) must include technical arguments to substantiate the technical quality and merit of the claims made in Sections (b), (c), and (d), provide a summary description of the technical approach, consistent with Sections (f) and (g), and also provide a comparison with other ongoing research indicating both advantages and disadvantages of the proposed effort/approach. Describe and order the two or three most challenging technical areas and activities related to the proposed research or technology development. Indicate approaches for mitigating technical and schedule risk should proposed technologies produce weaker than anticipated results. Describe any parallel or alternative development approaches or technologies, and the rationale for their use. Indicate the potential impact of these alternatives on the performance goals and objectives described for the topic in the BAA.

(f) **Statement of Work (SOW)**: This section (approximately 6 pages) must detail the relevant background information, the objective(s) of the proposed effort, the overall planned scope of the effort, and the technical approach for accomplishing the proposed effort. A chart of the proposed Work Breakdown Schedule (WBS) must be provided to describe both the high level tasks and the subtasks at a level of detail sufficient to ensure that individual subtasks are clearly identified and allocated to a single project group or
functional group within the proposing organization or to a single clearly identified subcontractor. For each task and subtask, provide a description of the proposed effort, significant timing constraints associated with the specific task and subtask to be performed (such as, "this task y can only be initiated after successful completion of task x"), the anticipated duration in both calendar time (weeks) and in resource time (person-hours and person-weeks), the planned specific utilization of personnel from specific project groups, functional groups and subcontractors, and also the anticipated results, products, or deliverables associated with the completion of each tasks and subtasks.

NOTE: Topics 2 and 3 anticipate successful results in an initial phase before moving into one or more subsequent phases. For these topics, proposals shall include a detailed work scope for the initial phase. Where the approach of subsequent phases is dependent on the work of the initial phase, proposers should use their best judgment to outline a likely approach, schedule, deliverables, key personnel, etc.

(g) Schedule, Milestones, and Evaluation Metrics: This section must provide a summary (approximately 3 pages) of the schedule, milestones, and associated evaluation metrics for the proposed effort. A Plan of Action and Milestones (POA&M) format will be utilized in which the technical tasks and subtasks from the SOW, described in section (f) above, will be listed along the vertical axis of the schedule chart and time, with planned program phases (in 12 month increments), calendar year and fiscal year identified along the horizontal axis of the schedule chart. All significant experiments, simulations, lab demonstrations and field demonstrations to be performed should be identified. Each milestone on the chart(s) will be numbered. There will be a separate table listing each of these milestones, the planned date of completion, the planned evaluation metrics, and the criteria for successful completion of the milestone. This table must be specific, with both goal and specific quantified performance criteria (or range of anticipated performance) described for each planned milestone. This section must also provide a summary description of any Measures of Effectiveness expressions planned to be utilized in this development effort. A descriptor of the proposed approach to designing experiments, simulations and demonstrations to ensure consistent and effective software/system development and associated test planning should be provided if appropriate. Techniques or methodologies to facilitate repeatable, risk mitigation experimentation in all phases of the proposed development effort should be described.

(h) Deliverables and Products: This section (approximately 2 pages) must consist of two subsections: Deliverables and Products. The deliverables subsection must describe and enumerate the anticipated deliverables for the proposed effort, both preliminary and final. The products subsection must describe and enumerate any additional anticipated results or products, including transferable technology expected for users on this program or for developers or users on related programs. This section should address specific innovative approaches the offeror will take to facilitate technology transition. This subsection should contain a clear description of how results will be made sharable to other funded highway research programs and what use these results might be to these other activities. Any restrictions on software, other data, or hardware developed under proposals that would affect this practice should be clearly identified in this section. The government expects to
obtain no less than Government Purpose License Rights to all software delivered as a part of these funded efforts. All software deliveries, preliminary and final, will include as a minimum, well-documented source code in electronic readable format, overall software architecture documentation, overall and individual module interface documentation, and a users operations manual. All hardware deliveries will include all documentation necessary to reproduce (assemble) and operate the delivered hardware system(s).

*Note: FHWA seeks research that encourages continued research and development by providing reasonable and broad access to products such as models, algorithms, software, or data.*

(i) **Proprietary Claims:** This section (approximately 1 page) must provide a summary of any proprietary claims to results, software, hardware, prototypes, or systems supporting and/or necessary for the use of the research, results, software, hardware, prototype, or system proposed for development under this BAA. Any claims made in other parts of the proposal, such as in sections (c) and (h) above, which would impact the claims in this section must be identified in a cross-reference table in this section. As mentioned in section (h) above, the government expects to obtain no less than Government Purpose License Rights to all software delivered as a part of these funded efforts. If there are no proprietary claims this section shall consist of a statement to that effect.

(j) **Management Plan:** This section (approximately 2 pages) must describe the overall approach to management of this effort, including a brief discussion of the proposed organization and the use of personnel and other resources. Provide a description of how the proposed effort, as described in the Work Breakdown Structure (WBS), will be executed. Refer to significant tasks and subtasks identified in the SOW (section (f) above) and to the Schedule, Milestones, and Evaluation Metrics (section (g) above) and provide a rationale for allocation of resources to proposed project groups, functional groups, and subcontractors. Indicate planned government research and facility interfaces, and planning, scheduling and control practices. This section should also describe the partnership structure between the entity proposing work and other public and private sector entities funding or otherwise substantially participating in the work, including State Departments of Transportation, Metropolitan Planning Organizations, Universities, Foundations, etc.

*Note: The Management Plan and Technology Transition plan (section (k), next) should provide some discussion on how we will know the work is successful. Project evaluations will be conducted at key mid-point milestones or at completion to document accomplishments.*

(k) **Technology Transition Plan:** The technology transition plan (approximately 1 page) should describe the plans and capabilities to accomplish technology transition. It should describe the anticipated stage of development of the technology at the completion of the proposed effort, describing how the research is anticipated to result in an increased understanding/expansion of the knowledge base for the topic, and the anticipated overall
approach to advancing the technology further, either through further applied research, commercialization other mechanisms.

(l) **Facilities:** This section should include a description (approximately 2 pages) of the facilities that would be used for the proposed effort.

(m) **Experience:** This section should include a description (approximately 2 pages) of relevant capabilities, work, and significant accomplishments in areas associated with proposed research area or in closely related areas. Associate the described relevant experience to the specific project group or functional group in the proposing organization or to the specific proposed subcontractor(s).

(n) **Key Personnel:** This section should include a list of key personnel (approximately 1 page), with title and identification of association to a specific project or functional group within the proposing organization or to a specific proposed subcontractor. Indicate the proposed amount of effort (person-hours) to be expended by each person during the proposed program (by both calendar year and by fiscal year). Resumes shall be provided for all key personnel. Resumes shall not exceed one page, and are not included in the total page limitation for this part of the proposal. **Note:** This section **is not included in the page limit.**

(p) **Other Proposals:** This section must include a summary list of all current and pending proposals (approximately 2 pages) being executed or proposed to be executed with the support of personnel proposed in this effort. This list should be ordered by the size of the effort and should include start and end dates, total project cost, and the average amount of time (person-hours per month) planned or currently being expended on each effort. The list should be organized by names of the key personnel and other significant senior personnel. If the summary list is greater than 2 pages long, indicate at the bottom of the second page the number of additional current and pending proposals and the total project cost associated with these remaining efforts. If required, a request for the complete list will be made.

(q) **Bibliography:** This section should include a bibliography (approximately 1 page) of relevant technical papers and research notes which support the technical concepts and innovative ideas described in this proposal.

**Volume II**

Volume II of the proposal shall be limited to a maximum of 12 pages not including the Cover Page. If necessary, the government will request additional cost back-up information, as appropriate.
Volume II shall include:

A fully detailed cost break-down showing costs by each major cost category, including (as applicable) direct labor, fringe benefits, subcontract costs, other direct costs (travel, equipment, etc), and indirect costs for the initial phase of the proposed effort.

Provide a separate and also fully detailed cost break-down for each optional future phase proposed.

NOTE: Some topics anticipate successful results in an initial phase before moving into one or more subsequent phases. In these cases, proposals shall include a fully detailed cost break-down for the initial phase. Where the approach of subsequent phases is dependent on the work of the initial phase, proposers should use their best judgment regarding the levels of direct and indirect costs and categories of personnel.

The cost detail shall include:

*Direct Labor*:  
- Personnel by name or labor category
- Number of hours proposed (commercial organizations) or percent of effort (organizations subject to OMB Circulars)
- Hourly unburdened labor rate (commercial organizations) or salary rate and basis (9- or 12-month basis) (organizations subject to OMB Circulars)
- Fringe Benefits Rates applied

*Other Direct Costs*. Other Direct Costs shall be supported by explanation of estimating factors and other relevant supporting details. For example, travel costs shall be supported by detail on the estimated trips, number of travelers, and associated costs for airfare, per diem, other transportation, etc. A similar level of detail shall be provided for any meeting costs, equipment, duplication/printing charges, and other direct costs.

*Indirect Costs*. Discuss your proposed rates for all years. Identify the various specific indirect rates and what they are based on (e.g., labor overhead based on direct labor dollars) and how they are applied/calculated. State any differing rate applications (for example if there is a different proposed rate when applied to travel or material purchases than when applied to subcontractor costs). Offerors must provide dollar values as well as percentages.

Subcontractor costs should be fully detailed, and the information used by the proposer to analyze the price of the subcontract shall be provided. An SF1411 is not required for this submission of your proposal.
Details of any cost sharing to be undertaken by the offeror shall also be included in the cost section. Describe the type of funds (cash, in-kind, etc.) and its contribution and relationship in enhancing the proposed effort.

Volume II must also include a separate breakdown of costs by major task area. Use the same task or subtask numbers as described in the SOW submitted as part of your Technical proposal in Volume I.

If necessary, the government will request additional cost back-up information, as appropriate.

(d) Other Business Information:

**IMPORTANT NOTE:** The FHWA may award either contracts or cooperative agreements as a result of this BAA. Due to the requirements of Public Law 11-244 (signed 6/6/08), the FHWA can offer cooperative agreements **only** if the proposer can offer a cost share of at least twenty (20) percent from non-federal sources of funding. Proposals selected for funding that offer LESS than 20 percent cost sharing may be awarded as contracts.

The requirements outlined below will vary depending on whether a contract or cooperative agreement is anticipated.

Proposals for CONTRACT awards that are received from other than small businesses and that exceed $650,000 **must** include a Small Business Subcontracting Plan in accordance with the Federal Acquisition Regulation Part 19.7. The Subcontracting Plan does not count against the page limit for Volume II.

All proposers shall include in the cost proposal the following mandatory business information regarding your business or institution:

- Business Size
- Federal Tax Identification Number (TIN)
- Dun & Bradstreet Number
- Name and contact information (mail address, telephone, and email address) of your authorized business representative/point of contact

**Special Instructions for Cooperative Agreement Applicants:** In addition to the information above, proposals eligible for cooperative agreement awards shall also complete and submit the following forms (available at [www.grants.gov](http://www.grants.gov) or [http://grants.nih.gov/grants/funding/424/index.htm](http://grants.nih.gov/grants/funding/424/index.htm)).

Submission of these forms does not count against the 12-page limit for Volume II.

• SF424 (Note: Applicants may leave 5a, 5b, 6, 7, 13 and blank on the form)
• SF424A

Note: Section A: block 1(a) print title of your project, block 1(b) print 20.205, block 1(c) print $ Total Federal Funds Requested, 1(d) print $ Total Cost Share, and leave blank columns (e), (f), and (g) and rows 2, 3, and 4.

• SF424B

• SFLLL

Note: The SFLLL form must be completed and submitted even if no lobbying to report. If no lobbying to report insert “none” or “n/a” in the relevant blocks.

OTHER ADMINISTRATIVE INFORMATION: It is the policy of the FHWA to treat all proposals as competitive information and to disclose the contents only for the purposes of evaluation. The Government may use selected support contractor personnel as special resources to assist in administering the evaluation of the proposals. These persons are restricted by their contracts from disclosing the proposal information or using it for other than performing the administrative task. Contractor personnel are required to sign non-disclosure statements. By submission of your proposal, you agree that your proposal information may be disclosed to those selected contractors for the limited purpose stated above.

This announcement constitutes the Broad Agency Announcement as contemplated by FAR 6.102(d)(2). A formal Request for Proposals or other solicitation regarding this announcement will not be issued. Requests for same will be disregarded.

The Government reserves the right to select for award any, all, part, or none of the proposals received in response to this announcement. In addition, the Government reserves the right to award either contracts, grants, or other instruments determined to be of benefit to the government in achieving the goals of this program.

This BAA is an expression of interest only and does not commit the Government to pay any proposal preparation costs. All responsible sources capable of satisfying the Government's needs may submit proposals, which will be evaluated. Historically Black Colleges and Universities (HBCU) and Minority Institutions (MI) are encouraged to submit proposals and join others in submitting proposals. However, no portion of this BAA will be set aside for HBCU and MI participation due to the desire to solicit ideas as broadly as possible.