CALIFORNIA PARTNERS FOR ADVANCED TRANSIT AND HIGHWAYS (PATH)

REQUEST FOR PROPOSALS

2001 – 2002 FUNDING YEAR

PROPOSALS DUE JANUARY 31, 2001

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RICHMOND FIELD STATION
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Partners for Advanced Transit and Highways (PATH)
Request for Proposals – 2001-2002 Funding Year
Due January 31, 2001

1. OVERVIEW

The California PATH Program is a multi-campus/multi-disciplinary research program established by the California Department of Transportation (Caltrans) and administered by the PATH headquarters at the University of California Richmond Field Station. The mission of PATH is to develop technological solutions to California's surface transportation problems. The goals of PATH include enhanced safety, improved fuel efficiency and reduced congestion and air pollution.

Current PATH activities include major research programs in advanced transportation management and information systems (ATMIS) and advanced vehicle control and safety systems (AVCSS). Research is conducted at various universities throughout California, as well as with industrial partners.

PATH is an important element of the national program to develop, evaluate and facilitate the deployment of intelligent transportation systems (ITS), and as such receives federal funding and industry support in addition to its primary funding from the State of California. PATH research is intended to focus in areas of particular concern in California, while avoiding duplication of activities funded elsewhere by the federal government. The PATH research agenda is also influenced by specific federal initiatives such as the Intelligent Vehicle Initiative. These programs offer opportunities to augment state resources with substantial federal resources, and therefore affect PATH priorities.

PATH is inviting proposals for research in the 2001-2002 fiscal year. PATH will consider proposals that will lead to solutions for California's surface transportation problems and also advance the state of the art in transportation technology. Any college, university or other non-profit organization in California may submit proposals. Private companies within or outside California, and universities outside of California may also submit proposals, but these proposals must be in collaboration with a principal investigator at a California university or college. Collaboration with a university or college means that a faculty member or student at that institution will perform a significant part of the work. The roles and responsibilities of the private company and the university should be clearly delineated in the proposal. Funding is not available for proprietary product development or for commercialization.

PATH is especially interested in receiving proposals that cross traditional disciplinary lines and proposals that exploit research talents on multiple campuses, as well as in the private sector.
This RFP is organized as follows:

- PATH research needs for the coming year in ATMIS and AVCSS
- Funding restrictions
- Required proposal format
- Submittal procedure
- Evaluation procedure

2 RESEARCH NEEDS

This section outlines PATH research needs within two major programs: Advanced Transportation Management and Information Systems (ATMIS), and Advanced Vehicle Control and Safety Systems (AVCSS). Each program consists of multiple research topics listed in Sections 2.1 and 2.2. Joint ATMIS/AVCSS research topics are listed in Section 2.3. Proposals should be directed, by number, to one (or more) of the topics. Topics are sufficiently general to allow flexibility in selecting an appropriate methodology.

- Advanced Transportation Management and Information Systems (ATMIS).

Technologies and systems that improve the productivity and connectivity of the transportation system through traffic management (including incident detection and response), data collection technologies, public transportation service improvements, traveler information services, integrated operations and related planning and investment decision support.


Studies of vehicle automation concepts, architectures, and operations, as well as technologies that improve highway capacity and safety by use of sensor, communication, and control systems to enhance driver perceptions, speed up drivers’ responses, augment driver control of vehicles and finally assume full control of vehicle operations.

- Coordination with Current ATMIS and AVCSS Research.

PATH currently has research underway that are related to many of the research topics listed below in Sections 2.1-2.3, as well as significant testbed activities throughout the state. Proposers are encouraged to coordinate their proposals with these efforts. For more information on the ATMIS program, contact Robert Tam at (510) 231-5656 or e-mail at rtam@uclink4.berkeley.edu. For more information on the AVCSS program, contact Chin-Woo Tan at (510) 231-9559 or e-mail at tan@robotics.eecs.berkeley.edu. Abstracts of PATH projects can also be obtained on-line on the Web (http://www.path.berkeley.edu).
2.1 ADVANCED TRANSPORTATION MANAGEMENT AND INFORMATION SYSTEMS (ATMIS) TOPICS

ADVANCED TRANSPORTATION MANAGEMENT SYSTEMS (ATMS)

2.1.1 The Use of Technically Innovative Camera Systems for Incident Verification

PATH has conducted a series of R&D efforts in developing new ITS information generation hardware. These efforts to date have largely emphasized quantitative data generators – systems that yield speed, volume, occupancy and other quantitative data. Many of the modern quantitative systems being developed by PATH go beyond conventional detectors and also can be used to generate travel time, incident detection, and origin/destination information.

However, a major function in Transportation Operations involves responding to and clearing incidents or other major perturbations to the system. A large portion of current expenditures for field equipment is dedicated to closed circuit TV (CCTV) and the associated communication infrastructure to capture the images of incidents and initiate appropriate responses.

PATH is seeking proposals which use some of the new innovations in cameras, pan-tilt-zoom controllers, coders, decoders, communications, video servers, and GUI development tools to help reduce the time and cost of camera system installations and to provide more relevant video information to operators more quickly. Priority will be given to working (demonstrable) prototypes, rather than purely theoretical approaches.

2.1.2 Continue Quantitative ITS Field Data Generation System Development

PATH has developed a number of promising prototypes of detection systems (e.g. laser, video imaging, enhanced loop, vehicles as probes) to produce quantitative ITS data. Many of these systems are in the stage where field testing is appropriate and necessary as well as system engineering to integrate these prototypes into real world transportation operations.

PATH is seeking proposals that would result in real world field testing of these ITS data generations. PATH’s interest is toward the end use of these new systems for ITS purposes, rather than researching hardware development. PATH desires to evaluate new detection systems for their ability to provide useful ITS data, and examine the institutional and implementation issues which act as impediments. Proposers should utilize the ATMS Testbed in Orange County or the Berkeley Highway Lab in the San Francisco Bay Area for any field testing (see Appendix B).

2.1.3 Weather Impacts on Traffic Management

The Transportation Management Centers currently use the DTN weather service to monitor weather conditions. Staff time is required to monitor the information. Operational decisions are not often changed due to this system. New weather capabilities
both at the federal government and in the private sector may change this situation. For example, clearly identifying a heavy rain cell where multiple accidents may result could identify a need to modify response plans and provide traveler information. Research is needed to find what weather identification capabilities already exist, what capabilities are needed for improving incident response, and possibly developing new systems to provide needed weather information. Although long term and regional weather forecasts are readily available, short term localized variations of wind, rain, ice, and fog can have a dramatic effect on the local driving conditions experienced by travelers. PATH is interested in systems to more robustly measure and forecast localized weather perturbations that affect traffic conditions. Caltrans has an expanding system of roadway weather information systems that could be used to provide input to research in this area.

2.1.4 Data Fusion and Management

PATH is developing a number of ITS data generation systems such as advanced loops, video image processing, vehicles as probes, and laser detectors which all generate consistent useful parameters for both system performance evaluation and real time operations: travel time, incident detection, and origin/destination. Although these new detection systems should yield largely coherent and consistent data, legacy field equipment often generates data of different resolution, accuracy, and time periods. Most field detectors only detect one specific phenomenon generated by vehicles, and the phenomenology of different detectors is not always consistent. Currently, PATH is developing a two-source (loops & video) fusion prototype system. Research is needed to expand on this work to incorporate new, emerging data sources.

2.1.5 Continue Adaptive Ramp Metering

Ramp metering and incident mitigation are the primary ways of affecting real time freeway operation. Ramp metering is of particular interest because it is something that can be deterministically modeled and controlled. PATH wishes to continue research and demonstration of ramp metering techniques that adapt to the real time traffic conditions and overall corridor strategies. Caltrans is implementing a version of adaptive ramp metering in Southern California while developing a statewide ramp metering algorithm in Sacramento. These efforts may improve current ramp metering operations. PATH has a current project to evaluate other adaptive ramp metering algorithms that may be of value to Caltrans in the future. PATH is now looking for ways to combine these activities into a future adaptive ramp meter algorithm that could provide the most efficient freeway system performance. This future algorithm should be adaptable to different areas of the state. Any proposed research should consider the results of the Minnesota or any other ramp meter study from both a technical and political angle.

2.1.6 New Operational Strategies Development

The ability to accurately measure and predict traffic conditions, the provision of traveler information (including route guidance) by private firms, and the linking of the
infrastructure, vehicle and user elements of the transportation system are core concepts embodied in the national ITS architecture and program. Beyond the conceptual, transportation agencies across the U.S. are enhancing their traffic data collection systems and advanced traveler information services are being aggressively pursued in the private marketplace. This presents real issues and opportunities for transportation managers in the public sector.

Research is needed to better understand these developments and to identify the related opportunities and issues. Specifically, proposals should address the exploration and development of innovative roadway operational strategies that may be illuminated, enabled or required by the following developments:

- New ITS traffic data collection systems;
- The provision of public system-impacting route guidance by private entities; or
- The linking, through ITS, of infrastructure, vehicle and user elements.

The proposed operational strategy research can be based one or more of these ITS core concepts. Operational strategies should have high cost-effectiveness potential and be developed to the point that they can be field tested and evaluated in a real-world environment (e.g., one of the PATH testbeds).

### 2.1.7 Origin/Destination Estimates

PATH seeks proposals to develop software which will help generate origin/destination (O/D) information needed for microscopic traffic simulation models such as Paramics. The Paramics traffic model is used by both PATH and Caltrans as a tool for traffic operational assessments. Paramics requires accurate O/D information, as do a number of other ITS tools. Creating and validating an OD matrix is both difficult and time consuming. PATH seeks both macro and micro level tools to help generate O/D information.

On a micro or route level, PATH is developing a number of traffic surveillance systems optimized to generate one or more feature vectors for every passing vehicle. These features may then be re-recognized between detector sites to determine when a vehicle enters and exits the detected system. This provides the route's origin/destination (O/D) and it's derivatives: travel time and incident detection. However, the algorithms to perform real-time re-correlations are not well understood and are computationally expensive. PATH seeks proposals which will generate working origin/destination (O/D) re-correlation algorithms based on an optimum integration of computational efficiency, statistical validity, and traffic theory.

On a macro or region wide level, PATH seeks proposals also for a Stage One off-line static O/D estimator for the Paramics model to be more useable to Caltrans staff in performing traffic operational studies of roadway networks. Utilizing readily available data (link based inbound cordon flows, link volumes, turning counts at key junctions, and a background pattern matrix available from a 4-step model), this work would develop a methodology and a set of algorithms for a static O/D matrix estimator. The estimator
would be designed to use an iterative process of calibration/validation with user adjustments of the input for the generation of a full static O/D trip matrix. This O/D estimator should be a separate module compatible with Paramics. Its geometric input file should be compatible with Paramics' to reduce user effort. A future development would be a Stage Two on-line O/D estimator for traffic prediction, using near real-time demand data and historical data, with Paramics running in faster-than-real-time mode for traffic prediction. The Stage Two O/D estimator could be used on-line and linked to real-time data such as detector data such that the input data to the estimator would be updated dynamically at near-real-time speed.

ADVANCED PUBLIC TRANSPORTATION SYSTEMS (APTS)

2.1.8 Road-Embedded Light Emitting Diodes as Early Warning Devices

Light Emitting Diodes (LEDs) embedded in the pavement ground can be used as a warning system to increase driver awareness at railroad grade crossings or at pedestrian cross-walks. Currently, PATH is conducting laboratory and field visibility tests of LED fixtures in railroad crossing signals which includes tracking incidents at eighteen LED-equipped railroad crossings in Fresno County, and comparing these to incidents observed at eighteen comparable control crossings without LEDs. The study of road-embedded LEDs would build on the work above, by exploring the use of a series of flashing LEDs, encased in a durable housing, embedded in the roadway. These lights are intended to give the approaching motorist advance warning that a train is occupying or approaching the crossing. Research is needed to determine the most effective LED design for warning motorists, and to investigate resulting driver behavior, especially in areas where visibility is impaired. The study would also need to focus on pavement installation and maintenance issues.

2.1.9 Remote Monitoring at Railroad Crossings

Railroads, such as BNSF Railways, are currently installing equipment that will automatically notify them when the signals at a RR crossing are not operating. This will allow them to quickly dispatch a crew to fix the signal. Historically, the railroads have relied on city personnel, CHP or even the traveling public to inform them if a crossing signal has failed. This lag time between the signal failure and becoming aware that it has failed can cause both a traffic and safety problem until the signal is fixed. This is somewhat mitigated by the fact that when a crossing signal does fail, the default mode is to close the crossing. But, drivers are known to drive around the gates when they realize there's a crossing failure, thus putting them and others at risk.

Although the RR is acting to ensure that warning signals are operating properly, research is needed on methods to get the failure information from these monitoring devices into the Transportation Management Center (TMC) that serves the area. TMC operations could take action to reroute traffic and minimize delay thereby improving driver safety. Another aspect is traffic management during normal signal operation. Information regarding approaching train speed and length of delay could be received at the TMC.
which would allow the signals approaching the grade crossing to be timed to delay or reroute traffic to avoid congestion and/or gridlock at approach intersections. The public could receive the re-routing information from a variety of sources: changeable message signs, highway advisory radio, or other traveler information media.

The research should consider the above and include the following recommendations: the most effective ways to communicate the problem to the public for them to comply with re-routing instructions; TMC operations for traffic routing; and procedural guidelines to be used by TMC staff reacting to signal failure.

2.1.10 Intermodal Trip Information Linked to Carsharing Reservations/Customers

The CarLink I, the Smart Carsharing System Field Test, revealed that participants would have carpooled more frequently if they had better communication links to other users. Several participants suggested that a handheld device (e.g., cell phones or personal digital assistants) be developed to facilitate user communications. Furthermore, it was also suggested that an ideal device would provide transit schedules (initially static schedules), real-time traveler information to facilitate inter-modal CarLink transfers, and access to a carsharing reservations system.

Therefore, a handheld tool should be developed and/or identified that can provide: 1) transit information (possibly including ridesharing); 2) linkage to the carsharing reservation system; and, 3) a communication link to the CarLink operator and participants.

2.1.11 Ideal Public Transportation System

There is currently a study underway at PATH to determine what the characteristics of a Demand Responsive Transit (DRT) system should be to have maximum appeal to the public. The intent here is to expand on this theme to include methods of public transportation other than DRT (e.g. fixed route bus, light rail, commuter rail, etc.). If the public transportation system is going to attract new riders in sufficient numbers to help relieve traffic congestion, it clearly has to be responsive to what the public wants. This study would focus on identifying what the characteristics of an “ideal” transit service would be. It is possible that the answer is extensive modification of existing services or it could be services that are not yet available. It is also possible that certain characteristics (e.g. convenience, connectivity, etc.) of these services will consistently have more or less importance than others. A responsive proposal will include an effort to identify the relative importance of these characteristics.

DECISION SUPPORT FOR ITS/SYSTEM MANAGEMENT INVESTMENTS

2.1.12 Methods to Estimate and Value the Effects of Individual ITS Services

The position of ITS in the set of strategies to meet California's transportation needs into the 21st century has moved steadily forward over the last decade. Rather than being considered an anomaly, ITS is being integrated into the mainstream of transportation
Recently, PATH has developed methodologies for evaluating the different technologies, to provide a business/economic case for deploying them more widely in the California system. PATH has developed a format for classifying the effects of ITS in terms of overall transportation goals and system management. This framework is the basis for two existing spreadsheet models, which will help decision-makers assess the benefits and costs of electronic toll collection and ramp metering. These models identified the value of ITS applications for different groups (user, agency and public). New methods are now needed for estimating the effects of commonly implemented ITS services for which good models do not yet exist. These methods should be able to be integrated into Excel spreadsheet models, based on the existing PATH framework, and following the form of the existing PATH benefit-cost models. Measures should include, among others, travel time, delay and emissions. The impact of ITS applications on emissions is a needed area of research linked to the debate of the role of capacity expansion affecting air quality.

### 2.1.13 Methods to Estimate and Value Effects of Combinations of ITS Services

The study of ITS in a network context is perhaps more fundamental research. ITS is heavily information based. It is anchored in an information infrastructure that is designed to increase the productivity and value of our current investment in transportation infrastructure. Continued effort is still needed in building the economic case for applications, and to broaden our understanding of how to measure and monetize both benefits and costs. Furthermore, we must evaluate the extent and nature of synergies that may exist with the simultaneous introduction of different ITS applications. Therefore, we need to understand ITS applications that are combined or packaged, such as Transportation Management Centers (TMCs) that have a network impact. The first priority in this research effort will be to develop a benefit-cost spreadsheet model to evaluate TMCs. This will require the use of network simulation models that are capable of assessing, at a systems level, the impact of the introduction of one or more ITS project. However, the validity of the methods should be tested with real data whenever possible. Measures should include, among others, travel time, delay and emissions.

### 2.1.14 Methods to Estimate Long Term Effects of ITS Services

The long-term consequences of ITS applications on land use, economic growth and general social and economic welfare need to be investigated. While our current research has focused on the impact of ITS applications in a local area, or how its fits into a modal transportation network, there is a need to understand how changes to the transportation system introduced through ITS applications influence overall accessibility including all modes. Further, there is a need to better understand the role that ITS may have in shaping land use, investment and economic development in an urban area or region. This research would be oriented at developing a broad economic and social impact model that would allow such assessments and evaluations. A starting point for such research might be the computable general equilibrium models being developed to examine the role, importance and consequences of public capital investments.
2.1.15 Evaluation of Implemented ITS Projects

In addition to research that evaluates the benefits, costs and other effects of ITS projects, PATH is seeking research to investigate the factors that influenced a project’s effects, such as the implementation environment, design and management. Evaluations involving the formation and execution of public private partnerships and comparisons of the relative effectiveness of various information or control strategies are especially needed.

Research would be directed at developing an understanding of what are the success factors of introducing new technology into a system and organization, and what set of tools need to be provided that would facilitate the introduction and continuous assessment of the ITS applications. There are two avenues that could be explored, one is how and why the private sector has introduced new technology into its logistics and transportation services much faster than the public sector; the second is assessing the differences in governance and institutions and how these inhibit or foster success.

This would require collecting data and in particular doing some detailed case studies. It is not reassessing the ITS technologies but rather examining how ITS technologies were deployed. If the significant contributor to inadequate performance is the way we have implemented the new technology, we can develop strategies to treat the problem.

2.2 ADVANCED VEHICLE CONTROL AND SAFETY SYSTEMS (AVCSS) TOPICS

2.2.1 Evaluation of Truck and Bus Automation Scenarios

It is generally believed that transit buses and heavy trucks will offer earlier opportunities for public implementation of automated operations than light-duty passenger vehicles. As such, a successful deployment of automation technologies on buses and trucks could lead the way towards implementation of an AHS. PATH is already funding projects devoted to developing and evaluating operating concepts for a fully automated bus-truck AHS, as well as intermediate steps that facilitate the deployment of such AHS. The objective here is to assess the benefits and costs of each bus and truck automation scenario, especially from stakeholder perspectives, and compare them to existing alternatives. Conduct benefit-cost comparisons between urban bus-AHS and its conventional public-transit alternatives, including light-rail transit systems and non-automated buses on their own busways. Also conduct benefit-cost comparisons between truck-AHS and its conventional freight alternatives, including the addition of a non-automated truck lane, and inter-modal rail. This project must build on the established body of work already being performed for Bus Rapid Transit (BRT) in the United States and elsewhere, and for truck automation in the European Chauffeur and Combi-Road projects and the analogous Japanese program. Proposals that address both bus and truck automation are preferred, but proposals that address either one without the other will also be considered. To accommodate the schedule of Demo 2002, this project needs to be completed by the summer of 2002. Therefore, the ideal length for the project is one year.
2.2.2 Coordination and Link Layer Control of Automated Trucks and Buses

There are existing PATH research projects that address the regulation layer control of trucks and buses. The objective of this project is to design and implement coordination and link layer control of buses operating in a Bus Rapid Transit (BRT) system and automated trucks operating on dedicated truck lanes. These control system designs should be based on the anticipated operating requirements for the trucks and buses. Design maneuvers that the trucks and buses can perform, and determine the operating limits under which their control systems can still function properly. The coordination layer control system needs to select a nominal vehicle separation for longitudinal control. In selecting this vehicle spacing, the trade-off between spacing and fuel savings should also be addressed. The control system designs should also address the vehicle-vehicle and vehicle-roadside communication needs of the control systems, as well as their eventual need to interact with automated light-duty vehicles (with different inter- and intra-platoon spacings). Evaluate the performance of the control systems along the dimensions of safety and capacity.

2.2.3 Development of Progressive Deployment Strategies for Barrier-Separated Automated Truck Lanes

Considerable research attention has been devoted to defining the architecture and operating protocols, as well as the technology, of different aspects of automated highway systems. Rather less attention has been devoted to defining the steps by which the sub-systems and the overall automated highway system can be built. The focus of this project is to develop progressive deployment strategies for constructing barrier-separated automated truck lanes, taking into account the operational constraints that must be addressed. These dedicated lanes, augmented with advanced vehicle automation technologies, can provide a possibility for deploying automated truck operations in a protected environment. Roadway infrastructure modernizations, expansions and additions will continue to be made, so a deployment process should involve identification of those targets of opportunity that can provide some of the building blocks for the construction of barrier-separated automated truck lanes. Determine the positive net benefits in each of the deployment steps. Also determine the operational constraints to deployment; such as the impact of the locations and number of the access/egress points (to a dedicated truck lane) on traffic flow, safety to other vehicles, and implications for truck logistics (terminal operations and locations). Cost-effectiveness analysis of different deployment strategies should be included.

2.2.4 Experimental Verification of Variable Compression Braking Control for Heavy-Duty Vehicles

To enhance safety and retarding performance, and improve fuel economy of heavy-duty vehicles (HDVs), there have been efforts devoted to developing multivariable framework models, analysis and control methodology for integrating and coordinating compression (engine) braking methods with conventional wheel (service) braking systems for longitudinal control of HDVs. The impact of coordinated engine braking in longitudinal maneuvers has also been quantified. The objective of this project is to experimentally
test and evaluate the performance of variable compression braking control for HDVs, focusing preferably on existing compression braking and vehicle dynamic models, and coordinated braking controls in longitudinal maneuvers. Demonstrate the improvements in longitudinal control of HDVs by coordinating engine brake with service brakes, and measure the improvements in retarding performance and fuel savings. Based on the experimental results, refine the control laws and establish longitudinal control design guidelines for HDVs.

2.2.5 Implementation of Fault-Tolerant Control Systems on Vehicles

To ensure safer and more reliable operations of automated vehicles, vehicle control laws (longitudinal control, platoon join or split, lateral control, lane change) have been redesigned to accommodate abnormal or failure conditions when a fault occurs, the driving conditions are poor, or there are hazards on the roadway. A failure condition could be a communication fault that results in a loss of real-time vehicle position information during a lane change maneuver, a failure of the brake actuator, or malfunction of a distance sensing device which results in loss of vehicle separation information for longitudinal control. Work is needed to implement and fully test the existing fault-tolerant control systems, for passenger vehicles and for trucks. For each fault condition, use the test results to refine the design of the fault-tolerant control systems and define the safety criteria that the control systems must meet. Also address the trade-off between safety and system performance.

2.2.6 Sensor-Friendly Vehicle and Roadway Technologies

Vehicle- or infrastructure-mounted technologies could pose alternative means to improve the reliability and performance of vehicle sensing systems such as used in adaptive cruise control (ACC), forward collision warning (FCW) and avoidance (FCA), and run-off-road (ROR) countermeasures. Near- to mid-term and if possible, passive cooperative markings on vehicles and/or on the roadside could enhance the operation of such systems, particularly in the presence of a cluttered environment. The objective of this research is to develop and test sensor-friendly vehicle and roadway technologies, building on work already begun in prior PATH research under both FHWA and Caltrans sponsorship. Concepts and technologies are sought to enhance the availability and reliability of systems, to reduce false and nuisance alarms, and to increase user acceptance. Proposers should plan on including both analytical and experimental studies to show these improvements, and should demonstrate their knowledge of the prior research on this subject.

2.2.7 Development of Wireless Network Capability for Accurate Vehicle Positioning

There are a number of reasons why it is necessary to be able to locate the position of a mobile vehicle. For vehicle position control applications, a vehicle location system is needed to provide vehicle position information for controlling the vehicle position. The required level of accuracy and reliability is typically very high (cm-accuracy), and the information update rates are usually fast (100 Hz) for this class of applications. On the
other hand, there are other important transportation applications that do not require extremely accurate or very fast update of position information. For example, vehicle position information can be used to provide traffic information to travellers, detect traffic incidents and congestion, or pinpoint the positions of other vehicles near an intersection for collision avoidance application. Also if the vehicle positions relative to a moving vehicle or a fixed base station, where the absolute position is known, are available, the incentive of not having to install location systems (e.g. GPS/INS) to compute the absolute positions of all vehicles could potentially reduce the cost of an automated vehicle. For this group of applications, the potential of employing wireless communication technologies for vehicle location is believed to be great and thus needs to be explored. The objective of this research is to develop wireless network capability (e.g. cellular phone positioning, dedicated short range communication) for accurate vehicle positioning. For each wireless technology considered, address the question of how a vehicle location system can be designed, implemented and tested. Identify the potential ITS applications, and the advantages or disadvantages (e.g. cost, performance limitations) in comparison with other wireless technologies.

2.2.8 Evaluation of Vehicle Positioning Technologies

Several PATH projects on vehicle location technology have been devoted to designing methodologies and algorithms to obtain or estimate vehicle position and speed, and to improve the accuracy. The objective here is to bring together the knowledge that PATH has acquired in this prior research and evaluate a full range of vehicle positioning technologies, including wireless communication approaches and GPS in combination with others (e.g. integrated magnetometer/GPS/INS system). The study should include a survey of existing vehicle positioning technologies, and conduct a comparison of the technologies in terms of cost, range of accuracy, and operating limits. Determine the conditions under which combinations of these technologies will be needed to ensure that the information is sufficiently accurate and available. Develop a scheme for integration and test-bed demonstration of a comprehensive but cost-effective vehicle location system.

2.3 JOINT ATMIS/AVCSS RESEARCH TOPICS

2.3.1 Bus Rapid Transit (BRT)

Bus systems provide a versatile form of public transportation with the flexibility to serve a variety of mobility needs at an unlimited range of locations throughout a metropolitan area. Low-cost investments in infrastructure, equipment, operational improvements, and technology can provide the foundation for Bus Rapid Transit systems that substantially upgrade performance by offering significantly faster operating speeds, greater service reliability, and increased convenience, which can match the quality of rail transit when implemented in appropriate settings.

Even though there is substantial interest in BRT, one of the areas that requires further analysis is how BRT passengers can most effectively get to the site where BRT services are provided and how to ensure that these same passengers effectively get to their...
ultimate destination after leaving the system. Possible complementary services could that could address this need include park and ride, carsharing, feeder and scatter linkages. Clearly BRT will not be optimally successful if potential riders have difficulty at either end of the BRT service. Research should focus on proposing and/or analyzing ingress and egress solutions that complement BRT services.

2.3.2 Interface of Traffic Simulations with SmartAHS

The control hierarchy developed at PATH for highway automation is a complex and very large-scale system, so there a need for a simulation environment and modular modeling to support design and evaluation of these systems. SmartAHS has been developed to provide a microscopic and distributed simulation framework. Traffic simulation tools (e.g. micro-simulation software such as Paramics) have also been developed for better understanding and management of traffic. The purpose of this topic is to develop the interface software for incorporating traffic simulations with SmartAHS so that the interactions at high-volume AHS entry and exit locations can be understood.

2.3.3 Development of AHS Deployment Sketch Planning Tool

A variety of deployment issues will need to be addressed and researched so that the current highway system can be progressively advanced towards full highway automation. Proposed schemes for each deployment step will need to be simulated to demonstrate the effectiveness of the design in terms of various system performance criteria, such as safety enhancement, traffic flow and travel time improvement, emissions reduction, and congestion relief. This project is to develop a planning tool for facilitating AHS deployment. The development of such a tool can be built upon some of the simulation tools that have been developed at PATH for evaluating deployment strategies. (For example, SmartCAP predicts AHS traffic volume.) Also address the question of how a planning tool can be easily used to evaluate the impacts, costs and benefits associated with a deployment strategy.

2.3.4 Fusion of Microscopic and Macroscopic Traffic Data

Recent advances in information technology have enabled both microscopic and macroscopic traffic data (e.g. microscopic data collected by a Data Acquisition System installed on a test vehicle, and macroscopic data from roadside sensors) to be collected in real-time. These data are very useful in understanding traffic flow patterns, estimating travel times, and executing link and network layer control. Traditional traffic models that were developed using crude traffic data or assumptions could also be improved. The objective of this research is to focus on the use of these data to enhance models of traffic dynamics. The research will develop new or improve existing traffic dynamics models so that the new models can provide better understanding and predictive capability of traffic dynamics (e.g. the models predict traffic behaviors such as car following and lane change). The work should demonstrate how the microscopic and macroscopic data are used or fused for developing traffic models. Propose a scheme for verification of the traffic model.
2.4 DEVELOPMENT OF NEW AND INNOVATIVE IDEAS

The developers of this RFP recognize that not all of the most worthwhile topics for research attention can be pre-defined "from the top down". Therefore, in this topic category proposers are encouraged to suggest innovative, new ideas not addressed elsewhere in this RFP, but still directly related to PATH's subject matter of Intelligent Transportation Systems. Note that proposals in this category will be reviewed according to the same criteria as other proposals, as identified in Section 6, and therefore need to be relevant to Caltrans' and PATH's missions and goals.

3. FUNDING RESTRICTIONS

The maximum limit on individual awards is $400,000 total, and $200,000 in any one year. In the past, most PATH projects have been funded at levels between $10,000 and $100,000 annually. In addition, high-cost proposals have had a significantly lower probability of success in being selected than low-cost proposals. Private sector involvement is strongly encouraged, though cost sharing may be required to be cost competitive. In all cases, funding requests must be justified relative to the research contribution and the effort required for each task. PATH reserves the right to modify proposed budgets.

3.1 Multi-Year Proposals

Multi-year proposals – up to a three-year maximum – are encouraged when warranted by the research. However, multi-year proposals will be funded by fiscal-year increments and are subject to an annual review, by PATH and Caltrans, of project performance, results, and continued relevance to program goals. In exceptional cases, PATH reserves the right to redirect funding or scope as priorities change. PATH has established guidelines with respect to the following categories of funding:

3.2 Research Assistants

PATH will pay research assistant salaries up to the maximum permitted by each university. Current Caltrans policy is to deny requests for tuition reimbursement. However, Caltrans will pay for fee remission, up to $2,230 per semester per GSR at University of California campuses.

3.3 Travel

Funding for conferences requires explicit justification, along with specification of the conferences to be attended. PATH will not pay for more than one trip per year per investigator unless there is a specific and strong justification. International trips are only granted in exceptional cases and must be justified in the proposal. There is no limit on travel required for the direct performance of the research when justified by the work.

3.4 Equipment
Purchases over $5000 must be itemized and justified relative to project objectives. All purchased equipment becomes the property of the California Department of Transportation.

4. FURTHER INFORMATION

For information on the PATH RFP and proposal process, contact Alan Lochhead (Tel: (510) 231-5614; e-mail alan@nt.path.berkeley.edu). For information on specific topics or current and past PATH research projects: for ATMIS, contact Robert Tam (Tel: (510) 231-5656; e-mail rtam@uclink4.berkeley.edu), for AVCSS, contact Chin-Woo Tan (Tel: (510) 231-9559; e-mail tan@robotics.eecs.berkeley.edu). Abstracts of PATH projects can also be obtained on-line on the web (http://www.path.berkeley.edu).

5. PROPOSAL FORMAT

Each proposal, including the budget and cover page, must be made available in PDF format and submitted on-line at the PATH electronic Proposal Submittal and Review website at:

http://www.path.berkeley.edu/RFP

The cover page can be downloaded at the above URL address. For more information regarding PDF files, please visit the following Adobe Acrobat website at:

http://www.adobe.com/products/acrobat

Two hard copies of each proposal should also be submitted with the following format:

- two single-sided copies on white 8-1/2 x 11 paper
- stapled, upper left hand corner
- one separate stapled copy of the cover page and summary
- no binding
- no cardstock, plastic, or other covers (use the cover page provided at the PATH Proposal Submittal and Review website as the cover)

Proposals should be written in sufficient depth to allow assessment of the contribution both to transportation practice and to the state-of-the-art in research. Although there is no minimum or maximum length, we expect that most proposals will fall in the range from 10-20 pages single-spaced (excluding appendix). We also expect that proposal length will reflect the magnitude of the project. Each proposal should be divided into eleven sections as outlined below:

A. Cover Page

Standard cover page as provided at the end of this RFP.

B. Summary
i. One paragraph summary of the problem statement, significance of research contribution, and contribution of research to California's ITS program.

ii. One or two paragraph summary of the research plan, deliverables and research contribution.

C. Background

i. Separately review:
   • Related research in the problem area (literature search);
   • Complementary research completed or underway at PATH and other California transportation research programs or centers.

ii. State project scope, objectives, and motivation, in light of California's ITS program.

iii. Describe how the proposed research will complement existing PATH projects.

iv. Describe the outcome of this research in terms of next steps; will the outcome result in a product that is usable by the practitioner? If not, what further research or additional activities would be required to reach that point? Be as specific as possible. Caltrans is looking for applied research and results.

D. Methodology

Explain the proposed research methods in sufficient detail to enable evaluation of feasibility, originality and significance of the proposal. For multiple-year projects, later year tasks need not be described in as much detail as the first year.

However, a detailed plan will be required in each subsequent year, in sufficient detail that PATH and Caltrans managers can evaluate reasonableness of progress, workload, and budget estimates.

E. Research Plan and Deliverables

Provide a research plan with specific milestones and deliverables. Deliverables should be described precisely and in depth, and should be clearly related to the methodology. Multi-partner proposals should clearly identify which party is responsible for each task. Quarterly progress reports/meetings are required for all projects, regardless of the duration of the project, and every project must have a final report. At the conclusion of the project, the P. I. will deliver a final report and present his/her results in a workshop forum, including a full explanation of the applied usefulness of the research. This may be done as a single-topic workshop or bundled with other related topics. Also include in the proposal a list of tasks and a set of deliverables summarized in two separate tables. This will serve the purpose of setting up a web-based PATH quarterly report information page for your project, should your proposal be funded. (Please refer to http://www.path.berkeley.edu/Quarterly for more information regarding the web page for PATH technical quarterly reports.)
The tables must have the same formats as those in the examples shown below. Otherwise, the proposal will not be accepted.

<table>
<thead>
<tr>
<th>List of tasks</th>
<th>Start date</th>
<th>End date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Literature survey</td>
<td>7/1/01</td>
<td>9/30/02</td>
</tr>
<tr>
<td>2. Problem formulation, methodology and solution</td>
<td>9/1/01</td>
<td>12/31/02</td>
</tr>
<tr>
<td>3. Implementation issues: hardware design, and coding of algorithms</td>
<td>12/1/01</td>
<td>3/15/02</td>
</tr>
<tr>
<td>4. System integration</td>
<td>3/1/01</td>
<td>6/30/02</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>List of deliverables</th>
<th>Date of completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. MATLAB subroutine algorithms</td>
<td>3/15/02</td>
</tr>
<tr>
<td>2. Circuit layout, system block diagram, system specifications</td>
<td>3/30/02</td>
</tr>
<tr>
<td>3. A working prototype</td>
<td>6/30/02</td>
</tr>
<tr>
<td>4. A final report with documentation</td>
<td>6/30/02</td>
</tr>
<tr>
<td>5. A workshop presentation</td>
<td>6/30/02</td>
</tr>
</tbody>
</table>

F. Qualifications of Principal Investigator, Key Researchers and Collaborators

Describe previous experience and training in relevant areas of research (one-two paragraphs). When relevant, highlight the contribution of research collaborations (across disciplines and campuses or with private sector) to the project.

G. Vita

Curriculum vita or resume for the P.I. and each key researcher (2 pages maximum per individual).

H. Budget

Each proposal must include a project budget for each fiscal year and a total budget. Note that the state fiscal year ends June 30. Proposals covering only the fiscal year 2001-2002 must include a budget for the period from project start date to June 30, 2002. Multi-year proposals must include a separate budget for each fiscal year. Specifically, include budgets for the period from project start date to June 30, 2002, and for each subsequent fiscal year ending June 30. Also include a total budget for the project. Non-university respondents must provide an elemental cost breakdown on the form provided in the Appendix D. For each item, non-university respondents should specify cost-share as well as funds requested.

I. Resources

Justify each major budget category relative to the research plan, project objectives and research contribution. Private sector respondents should highlight cost-sharing, and clearly state how funds will be directed to the specific project.
J. Progress Reports

Current or former PATH P.I.s must submit a one-page statement of progress on each project funded under PATH, using the form provided at the end of this RFP.

K. Appendix

Business Information Form; Cost Element Breakdown; PATH Progress Statement.

6. EVALUATION

PATH will screen proposals to ensure that format requirements and RFP topics have been addressed. Proposals will then be sent to PATH and university researchers, as well as Caltrans practitioners, for independent evaluation. These evaluations will then be compiled by PATH staff and presented to the PATH Executive Committee. Final funding decisions will be made jointly by the Executive Committee and Caltrans. Proposals will be evaluated with respect to the following criteria:

- Significance and relevance to Caltrans mission and goals
- Significance and relevance to PATH mission and goals
- Research methodology
- Quality of research plan
- Qualifications of research team
- Budget
- Utility of research outcome
- Feasibility of implementation of research outcome

We strongly encourage collaborations with the private sector, between campuses, and across disciplines. We especially encourage collaborations which increase the value of the research to enable integrated solutions to major transportation challenges.

Proposals will compete both within and across research topics and there is no guarantee that a project will be awarded for every topic. In some cases, multiple projects may be awarded within the same topic.

7. PROPOSAL SUBMITTAL

Each proposal, including the budget and cover page, must be made available in PDF format and submitted on-line at the PATH electronic Proposal Submittal and Review website at:

http://www.path.berkeley.edu/RFP

For more information about how to submit proposals using this on-line Proposal Submittal and Review system, please visit the website listed above. Proposals must be submitted by January 31, 2001 to receive consideration. The PATH Proposal Submittal and Review system will not accept any proposal that is submitted after 12 midnight PST.

Also submit two hard copies of the proposal, including all elements cited in the “Proposal Format” section, and one copy of the cover page and the summary to: Alan Lochhead PATH RFP 2001-2002, University of California at Berkeley, Richmond Field Station, Bldg. 452, 1357 South 46th Street, Richmond, CA 94804-4698. These copies must be postmarked by February 2, 2001. We expect that proposers will be notified of preliminary funding decisions by the end of May 2001. Contracts or Task Orders are expected to be processed by Fall 2001.

8. ADDENDA

No oral or written statements made by University personnel shall be considered addenda to this RFP unless that statement is contained in a written document identified as a written addendum to this RFP. Official addenda or notices are issued only by the PATH Director. PATH will not be responsible for any costs or expenses incurred by any proposer in connection with the preparation of its proposal.

9. TERMS AND CONDITIONS

9.1 Data Rights

Awardee agrees to maintain (in sufficient detail as will properly reflect research done and results achieved in the performance of this Agreement) books, records, reports, research notes, charts, graphs, comments, computations, analyses, recordings, photographs, computer programs, and documentation thereof, computer information storage means, samples of materials, and other written graphic or written data generated by the Awardee concerning the Work performed under this Agreement (hereinafter called "Data"). All Data and equipment produced or generated under this Agreement, including under any subcontracts or purchase orders for customized equipment or services, shall become the sole and separate property of University and unpublished copies of such Data and the customized equipment shall be deliverable to University. University and Awardee shall have the rights in any resulting invention provided in 37 CFR part 401 "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements," and any implementing regulations issued by the awarding agency. Awardee agrees that any work under this Agreement, but excluding preexisting work, constitutes a work(s) made for hire under the federal Copyright Act of 1976 ("the Act"). To the extent said concept development does not constitute a work made for hire under the Act, Awardee will assign all right, title, and interest, including the copyright and all copyright rights, in the Work to University. Awardee hereby grants to University a royalty-free, non-exclusive irrevocable license to reproduce, translate, publish, use and to authorize others to do so, all data collected. As used in this clause, data collected means the original records of scientific and technical data collected during the performance of the work by the Principal Investigator or the project personae. Data collected includes, but is not limited to notebooks, drawings, lists, specifications, and computations, in written, pictorial, graphic, or machine form.
9.2 Patent Rights

When there is no Federal participation in the research project, the parties to this Agreement hereby mutually agree that, if patentable discoveries or inventions should result from work described herein, all rights accruing from such discoveries or inventions shall be the sole property of University. However, University agrees to and does hereby grant to all State highway or transportation departments and the United States government, for governmental purposes, an irrevocable non-exclusive, nontransferable and royalty-free license to practice each invention in the manufacture, use and disposition, according to law, of any article or material, and in the use of any method that may be developed as a part of the work under this Agreement. All title and rights to inventions conceived or first actually reduced to practice in the course of the work performed by Awardee for University under this Agreement, and all patent rights thereto, shall vest in University. Awardee shall make no claim to rights in such inventions.

9.3 Inspection of Work

The awardee shall permit PATH and Caltrans to review and inspect the research project activities at all reasonable times during the performance period of a contract or memorandum of understanding. When there is Federal participation in the research project, the awardee shall also permit the applicable Federal agency to review and inspect the research project activities at all reasonable times during the performance period. Any resulting award(s) will be subject to the examination and audit of the Auditor General of the State of California for a period of three (3) years after submission of the final invoice. The examination and audit will be confined to those matters connected with the performance of the contract including, but not limited to, the costs of administering the contract. With due respect for the reasonable convenience of awardee, PATH and Caltrans staff will be permitted to work side-by-side with the awardee to the extent and under conditions that may be requested by Caltrans or PATH. In this connection, Caltrans and PATH staff will be given access to all data, working papers, facilities, etc., which must be utilized in the performance of contracted services.

9.4 Publications

The awardee(s) will provide PATH and Caltrans the opportunity to review any proposed manuscripts describing results of work performed in whole or in part under any resulting contract. The reviews of draft reports will normally be completed within 90 days. In the event that PATH and/or Caltrans fails to provide the awardee with any comments on the draft report within 130 days of its submission, the awardee may proceed to the preparation of the final manuscript and its submission for formal acceptance in documentation of completion of contract objectives. Reference: Publication Provisions Non-Federal Participating, dated December 20, 1974, incorporated herein as “Section 10”; and Publication Provisions Federal Participating, dated December 13, 1974, incorporated herein as “Section 11.”
9.5 Acknowledgment of Support and Disclaimer

Both an acknowledgment of support and disclaimer must appear in the publication of any material, including but not limited to copyrighted or other material developed under the award, in the following terms: "Prepared in cooperation with the State of California, Business, Transportation and Housing Agency, Department of Transportation, and Partners for Advanced Transit and Highways (PATH)." "The contents of this report reflect the views of the author who is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the State of California. This report does not constitute a standard, specification, or regulation."

9.6 Non-Discrimination

The awardee shall comply with regulations relative to Title VI (non-discrimination in federally-assisted programs of the Department of Transportation - Title 49 Code of Federal Regulations Part 21 - Effectuation of Title VI of the 1964 Civil Rights Act). Title VI provides that the recipients of federal assistance will implement and maintain a policy of non-discrimination in which no person in the state of California shall, on the basis of race, color, national origin, religion, sex, age, disability, be excluded from participation in, denied the benefits of or subjected to discrimination under any program or activity by the recipients of federal assistance or their assignees and successors in interest. (See Appendix.)

9.7 Publicity/Use of Name

The awardee will not use either the name of Caltrans or the University of California, either expressly or by implication, in any publicity or advertisement without the express written approval of the named party.

9.8 Major Personnel Changes

There shall be no change in the Principal Investigator or key researcher on a project without prior written approval by PATH and Caltrans.

9.9 Progress Reporting

As a condition of acceptance, all P.I.s will be required to submit quarterly progress reports and a final report. At the conclusion of the project, the P.I. will present his/her results in a workshop forum.

9.10 Adherence

All awards from University of California to private entities must adhere to the University's Terms and Conditions of Purchase and Service, as provided in the Appendix.

9.11 Inventory

PATH RFP: 2001-2002
9.11.1 UC and any subcontractor shall maintain an inventory record for each piece of nonexpendable equipment purchased or built with funds provided under terms of a Memorandum of Understanding. The inventory record for each piece of such equipment shall include its inventory control number, the date acquired, total cost, serial and model identification (on purchased equipment), and any other information or description necessary to identify the equipment. The inventory record shall include the location or section to which each piece of equipment is assigned, the number of the applicable research project’s Memorandum of Understanding to which the special equipment is charged, and whether or not Federal money was involved in its purchase or construction.

9.11.2 Nonexpendable equipment to be so inventoried shall be those items of equipment which have a normal life expectancy of two years or more and an approximate unit price of less than five thousand dollars. In addition, other items of equipment costing less than five hundred dollars and being especially popular or attractive shall also be inventoried. Each item of nonexpendable equipment inventoried will have a tag affixed to it with its inventory control number shown thereon or with its inventory control number engraved directly on the item of nonexpendable equipment.

9.11.3 Periodically, but at least annually, UC shall provide Caltrans with a copy of UC’s inventory record for nonexpendable equipment purchased with or built with funds provided under terms of the applicable Memorandum of Understanding. If no such nonexpendable equipment was purchased or constructed with said funds, formal notice to that effect shall be provided to Caltrans at least annually by UC.

9.12 Minority Business Enterprises

9.12.1 It is the policy of the State that disadvantaged business and women business enterprises as defined in 49 CFR Part 23 shall have the maximum opportunity to participate in the performance of contracts financed in whole or in part with Federal funds under this Interagency Agreement. Consequently, the disadvantaged business and women business enterprises requirements of 49 CFR Part 23 shall apply to this Interagency Agreement.

9.12.2 UC agrees to ensure that disadvantaged business and women business enterprises as defined in 49 CFR Part 23 have the maximum opportunity to participate in the performance of any subcontracts financed in whole or in part with Federal funds provided by Memorandum of Understandings under this Interagency Agreement. In this regard, UC shall take all necessary and reasonable steps in accordance with 49 CFR Part 23 to ensure that disadvantaged business and women business enterprises have the maximum opportunity to compete for and perform any subcontracts. UC and any subcontractors shall not discriminate on the basis of race, color, national origin, or sex in the award and performance of any work done under the provisions of this Interagency Agreement.

10. PUBLICATIONS PROVISIONS – NON-FEDERAL PARTICIPATING

10.1 General
The word, “State,” as used herein refers to the California Department of Transportation. These Publication Provisions are to provide for adequate documentation of the completed contract obligations, to encourage publication and distribution of research information, and to protect the State from unwarranted implications of policy or concurrence with the conclusions of the contractor.

10.2 Review of Reports

The process of the State’s review of the drafts of interim and final research reports to ensure adequate compliance with provisions of this agreement will include:

10.2.1 A general technical review to ensure that all aspects of the study provided for by this agreement have been adequately carried out and documented. Correction of deficiencies found in this review is a requirement for the State’s acceptance of a report as evidence of partial or final fulfillment of the agreement objectives.

10.2.2 Consideration as to whether or not the organization, language and content of the report are presented in a manner which will be intelligible to its intended audience. Reports on studies which produce an implementable product in the form of a device, procedure or the like must be written in a manner understandable to the user. Where studies conclude with intermediate research results, they may be written in the language of that research field but must contain a technical summary in terms intelligible to the user of the ultimate system to which the research is expected to contribute and in sufficient detail to permit the practicing engineer to implement the items. Correction of deficiencies found in this review is also a requirement for the State’s acceptance of a report as satisfactory documentation of the agreement requirements.

10.2.3 An analysis of the recommendations and conclusions of the report in relationship to the data and theories developed therein to determine whether or not the State concurs that the contractor’s recommendations and conclusions are supported by the data. Recognizing that professional differences of opinion do arise, the concurrence of the contractor with review comments of this type is not a requirement for acceptance, but may affect decisions regarding State distribution of the report and use of the research results.

10.2.4 General comments on the technical content and presentation may be furnished for the optional use of the author in preparing the manuscript for publication.

10.3 Acknowledgment and Disclaimer Statements

All reports published by the Contractor under provisions of this agreement shall contain the following:

10.3.1 A credit reference: “Prepared in cooperation with the State of California, Business Transportation and Housing Agency, Department of Transportation.”
10.3.2 A disclaimer statement: “The contents of this report reflect the views of the author who is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the State of California. This report does not constitute a standard, specification, or regulation.”

10.4 Publication Rights

Reports prepared by the contractor under provisions of this agreement may be published under the following conditions:

10.4.1 Any material contained in interim or final reports which have received final acceptance by the State may be published in any form and through any media the contractor may desire without further written permission by the State, subject only to the inclusion of credit and disclaimer statements of Sections C-1 and C-2 of these Publication Provisions.

10.4.2 In the event that the contractor cannot agree with the comments of the State, the contractor may publish the material contained in the report 70 days after it has been resubmitted in final form to the State subject to the inclusion of (1) a statement that the State does not concur with the findings and conclusions of the research, and (2) the credit and disclaimer statements of Sections C-1 and C-2 of these Publication Provisions. In the event of said lack of agreement, the contractor may include the State’s technical comments in the report in a clearly identified section such as “Sponsor’s comments.”

10.4.3 The State reviews of draft reports will normally be completed within 90 days. In the event that the State fails to provide the contractor with any comments on the draft reports within 130 days of its submission by the contractor, the contractor may proceed to the preparation of the final manuscript and its submission for formal acceptance in documentation of completion of contract objectives. The State will authorize the contractor to publish the material contained in the report 40 days after it has been resubmitted in final form to the State, subject to the inclusion of (1) a statement that the State has not completed its review of the report, and (2) the credit and disclaimer statements of Sections C-1 and C-2 of these Publication Provisions.

10.5 Dissemination of Results

The contractor may publish the results of the study or any of its particulars in separate reports or by submission of technical papers to professional organizations subject to these Publication Provisions. Both written and oral releases are considered to be within the context of publication. However, there is no intention to limit discussions of the study with small technical groups or lectures to employees or students. Lectures to other groups which describe the plans but disclose neither data nor results are permissible without advance review by the State.

10.6 Presentation of Papers and Articles
In unusual cases when the scheduled time for the preparation of a technical paper, containing previously undisclosed findings, for presentation at professional meetings or submission to professional organizations does not permit time for formal review and acceptance, an abstract and notification of intent to present the paper should be submitted for State concurrence. Such concurrence will normally be given unless there is indication of new and controversial findings and conclusions based on data that the State has not been given adequate opportunity to review. To protect the interest of the State such presentation should contain (1) a statement that the State has not reviewed the paper, and (2) the credit and disclaimer statements of Sections C-1 and C-2 of these Publications Provisions. Draft copies of these papers should be submitted for State review as soon as completed.

10.7 Copyright

The contractor shall be free to copyright material developed under the agreement with the provision that the State reserve a royalty-free, nonexclusive, and irrevocable license to reproduce, publish or otherwise use, and to authorize others to use, the work for Government purposes.

11. PUBLICATIONS PROVISIONS – FEDERAL PARTICIPATING

11.1 General

The word “State,” as used herein refers to the California Department of Transportation. These Publications Provisions are to provide for adequate documentation of the completed contract obligations, to encourage publication and distribution of research information, and to protect the State and the Federal Highway Administration from unwarranted implications of policy or concurrence with the conclusions of the contractor.

11.2 Review of Reports

The process of the State’s and the Federal Highway Administration’s review of the drafts of interim and final research reports to ensure adequate compliance with provisions of this agreement will include:

11.2.1 A general technical review to ensure that all aspects of the study provided for by this agreement have been adequately carried out and documented. Correction of deficiencies found in this review is a requirement for the State’s and the Federal Highway Administration’s acceptance of a report as evidence of partial or final fulfillment of the agreement objectives.

11.2.2 Consideration as to whether or not the organization, language and content of the report are presented in a manner which will be intelligible to its intended audience. Reports on studies which produce an implementable product in the form of a device, procedure or the like must be written in a manner understandable to the user. Where studies conclude with intermediate research results, they may be written in the language of that research field but must contain a technical summary in terms intelligible to the
user of the ultimate system to which the research is expected to contribute and in sufficient detail to permit the practicing engineer to implement the items. Correction of deficiencies found in this review is also a requirement for the State’s and the Federal Highway Administration’s acceptance of a report as satisfactory documentation of the agreement requirements.

11.2.3 An analysis of the recommendations and conclusions of the report in relationship to the data and theories developed therein to determine whether or not the State and the Federal Highway Administration concur that the contractor’s recommendations and conclusions are supported by the data. Recognizing that professional differences of opinion do arise, the concurrence of the contractor with review comments of this type is not a requirement for acceptance, but may affect decisions regarding State and Federal Highway Administration distribution of the report and use of the research results.

11.2.4 General comments on the technical comment and presentation may be furnished for the optional use of the author in preparing the manuscript for publication.

11.3 Acknowledgment and Disclaimer Statements

All reports published by the State and/or the contractor under provisions of this agreement shall contain the following:

11.3.1 Credit reference: “Prepared in cooperation with the State of California, Business Transportation and Housing Agency, Department of Transportation and the U.S. Department of Transportation Federal Highway Administration”.

11.3.2 Disclaimer statement: “The contents of this report reflect the views of the author who is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the State of California or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.”

11.4 Publication Rights

Reports prepared by the contractor under provisions of this agreement may be published under the following conditions:

11.4.1 Any material contained in interim or final reports which have received final acceptance by the State and the Federal Highway Administration may be published in any form and through any media the contractor may desire without further written permission by the State or the Federal Highway Administration, subject only to the inclusion of credit and disclaimer statements of Sections C-1 and C-2 of these Publication Provisions.

11.4.2 In the event that the contractor cannot agree with the comments of the State or the Federal Highway Administration, the contractor may publish the material contained in the report 70 days after it has been resubmitted in final form to the State subject to the
inclusion of (1) a statement that the Federal Highway Administration does not concur with the findings and conclusions of the research, and (2) the credit and disclaimer statements of Sections C-1 and C-2 of these Publication Provisions. In the event of said lack of agreement, the contractor may include the State’s and the Federal Highway Administration’s technical comments in the report in a clearly identified section such as “Sponsor’s comments.”

11.4.3 Federal Highway Administration reviews of draft reports will normally be completed within 90 days of submission by the State. In the event that the State fails to provide the contractor with any comments on the draft report within 130 days of its submission by the contractor, the contractor may proceed to the preparation of the final manuscript and its submission for formal acceptance in documentation of completion of contract objectives. The State will authorize the contractor to publish the material contained in the report 40 days after it has been resubmitted in final form to the State, subject to the inclusion of (1) a statement that the Federal Highway Administration has not completed its review of the report, and (2) the credit and disclaimer statements of Sections C-1 and C-2 of these Publication Provisions.

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The contractor may publish the results of the study or any of its particulars in separate reports or by submission of technical papers to professional organizations subject to these Publication Provisions. Both written and oral releases are considered to be within the context of publication. However, there is no intention to limit discussions of the study with small technical groups or lectures to employees or students. Lectures to other groups that describe the plans but disclose neither data nor results are permissible without advance review by the State and the Federal Highway Administration.

11.6 Presentation of Papers and Articles

In unusual cases when the scheduled time for the preparation of a technical paper, containing previously undisclosed findings, for presentation at professional meetings or submission to professional organizations does not permit time for formal review and acceptance, an abstract and notification of intent to present the paper should be submitted through the normal channels for State and Federal Highway Administration concurrence. Such concurrence will normally be given unless there is indication of new and controversial findings and conclusions based on data that the State and the Federal Highway Administration have not been given adequate opportunity to review. To protect the interest of the sponsoring agencies, such presentation should contain (1) a statement that the sponsoring agencies have not reviewed the paper, and (2) the credit and disclaimer statements of Sections C-1 and C-2 of these Publication Provisions. Draft copies of these papers should be submitted through normal channels for State and Federal Highway Administration review as soon as completed.

11.7 Copyright
The contractor shall be free to copyright material developed under the agreement with the provision that the State and the Federal Highway Administration reserve a royalty-free, nonexclusive, and irrevocable license to reproduce, publish or otherwise use, and to authorize others to use, the work for Government purposes.

12. APPENDICES

A. University of California Terms and Conditions of Purchase.
B. California Advanced Testbed – Infrastructure Components
C. University of California Business Information Form.
D. Cost-Element Breakdown.
E. Non-Discrimination Statement and Non-Segregation Statement.
F. PATH Progress Statement.
G. Standard Cover Page (which can be downloaded from the PATH RFP website).
A. UNIVERSITY OF CALIFORNIA TERMS AND CONDITIONS OF PURCHASE
University of California

Terms and Conditions of Purchase

ARTICLE 1 - THE MATERIALS, SUPPLIES OR SERVICES COVERED BY THIS ORDER SHALL BE FURNISHED BY SELLER SUBJECT TO ALL THE TERMS AND CONDITIONS SET FORTH IN THIS ORDER INCLUDING THE FOLLOWING, WHICH SELLER, IN ACCEPTING THIS ORDER, AGREES TO BE BOUND BY AND TO COMPLY WITH IN ALL PARTICULARS AND NO OTHER TERMS OR CONDITIONS SHALL BE BINDING UPON THE PARTIES UNLESS HEREAFTER ACCEPTED BY THEM IN WRITING. WRITTEN ACCEPTANCE OR SHIPMENT OF ALL OR ANY PORTION OF THE MATERIALS, SUPPLIES, OR THE PERFORMANCE OF ALL OR ANY PORTION OF THE SERVICES, COVERED BY THIS ORDER SHALL CONSTITUTE UNQUALIFIED ACCEPTANCE OF ALL ITS TERMS AND CONDITIONS. THE TERMS OF ANY PROPOSAL REFERRED TO IN THIS ORDER ARE INCLUDED AND MADE A PART OF THE ORDER ONLY TO THE EXTENT IT SPECIFIES THE MATERIALS, SUPPLIES, OR SERVICES ORDERED, THE PRICE THEREFOR, AND THE DELIVERY THEREOF, AND THEN ONLY TO THE EXTENT THAT SUCH TERMS ARE CONSISTENT WITH THE TERMS AND CONDITIONS OF THIS ORDER.

ARTICLE 2 - INSPECTION. THE SERVICES, MATERIALS AND SUPPLIES FURNISHED SHALL BE EXACTLY AS SPECIFIED IN THIS ORDER FREE FROM ALL DEFECTS IN SELLER'S PERFORMANCE, DESIGN, WORKMANSHIP AND MATERIALS, AND, EXCEPT AS OTHERWISE PROVIDED IN THIS ORDER, SHALL BE SUBJECT TO INSPECTION AND TEST BY UNIVERSITY AT ALL TIMES AND PLACES. IF, PRIOR TO FINAL ACCEPTANCE, ANY SERVICES AND ANY MATERIALS AND SUPPLIES FURNISHED THEREWITH ARE FOUND TO BE INCOMPLETE, OR NOT AS SPECIFIED, UNIVERSITY MAY REJECT THEM, REQUIRE SELLER TO CORRECT THEM WITHOUT CHARGE, OR REQUIRE DELIVERY OF SUCH MATERIALS, SUPPLIES, OR SERVICES AT A REDUCTION IN PRICE WHICH IS EQUITABLE UNDER THE CIRCUMSTANCES. IF SELLER IS UNABLE OR REFUSES TO CORRECT SUCH ITEMS WITHIN A TIME DEEMED REASONABLE BY UNIVERSITY, UNIVERSITY MAY TERMINATE THE ORDER IN WHOLE OR IN PART. SELLER SHALL BEAR ALL RISKS AS TO REJECTED SERVICES AND, IN ADDITION TO ANY COSTS FOR WHICH SELLER MAY BECOME LIABLE TO UNIVERSITY UNDER OTHER PROVISIONS OF THIS ORDER, SHALL REIMBURSE UNIVERSITY FOR ALL TRANSPORTATION COSTS, OTHER RELATED COSTS INCURRED, OR PAYMENTS TO SELLER IN ACCORDANCE WITH THE TERMS OF THIS ORDER FOR UNACCEPTABLE SERVICES AND MATERIALS AND SUPPLIES INCIDENTAL THEREIN. NOTWITHSTANDING FINAL ACCEPTANCE AND PAYMENT, SELLER SHALL BE LIABLE FOR LATENT DEFECTS, FRAUD OR SUCH GROSS MISTAKES AS AMOUNT TO FRAUD.

ARTICLE 3 - CHANGES. UNIVERSITY MAY MAKE CHANGES WITHIN THE GENERAL SCOPE OF THIS ORDER IN DRAWINGS AND SPECIFICATIONS FOR SPECIALLY MANUFACTURED MATERIALS, PLACEMENT OF DELIVERY, METHOD OF SHIPMENT OR PACKING OF THE ORDER BY GIVING NOTICE TO SELLER AND SUBSEQUENTLY CONFIRMING SUCH CHANGES IN WRITING. IF SUCH CHANGES AFFECT THE COST OR THE TIME REQUIRED FOR PERFORMANCE OF THIS ORDER, AN EQUITABLE ADJUSTMENT IN THE PRICE OR DELIVERY OR BOTH SHALL BE MADE. NO CHANGE BY SELLER SHALL BE ALLOWED WITHOUT WRITTEN APPROVAL OF UNIVERSITY. ANY CLAIM OF SELLER FOR AN ADJUSTMENT UNDER THIS ARTICLE MUST BE MADE IN WRITING WITHIN THIRTY (30) DAYS FROM THE DATE OF RECEIPT BY SELLER OF NOTIFICATION OF SUCH CHANGE UNLESS UNIVERSITY WAIVES THIS CONDITION IN WRITING. NOTHING IN THIS ARTICLE SHALL EXCUSE SELLER FROM PROCEEDING WITH PERFORMANCE OF THE ORDER AS CHANGED HEREAFTER.

ARTICLE 4 - TERMINATION. A. UNIVERSITY MAY, BY WRITTEN NOTICE STATING THE EXTENT AND EFFECTIVE DATE, CANCEL AND/OR TERMINATE THIS ORDER FOR CONVENIENCE IN WHOLE OR IN PART, AT ANY TIME. UNIVERSITY SHALL PAY SELLER AS FULL COMPENSATION FOR PERFORMANCE UNTIL CANCELLATION.

(1) THE UNIT OR PRO RATA ORDER PRICE FOR THE PERFORMED AND ACCEPTED PORTION;

AND

(2) A REASONABLE AMOUNT, NOT OTHERWISE RECOVERABLE FROM OTHER SOURCES BY SELLER AS APPROVED BY UNIVERSITY, WITH RESPECT TO THE UNPERFORMED OR UNACCEPTED PORTION OF THIS ORDER, PROVIDED COMPENSATION HEREUNDER SHALL IN NO EVENT EXCEED THE TOTAL ORDER PRICE.

B. UNIVERSITY MAY BY WRITTEN NOTICE TERMINATE THIS ORDER FOR SELLER'S DEFAULT, IN WHOLE OR IN PART, AT ANY TIME, IF SELLER FAILS OR REFUSES TO PERFORM THE SERVICES WITHIN THE TIME SPECIFIED OR ANY EXTENSION THEREOF. IN SUCH EVENT, UNIVERSITY MAY SUBMIT SUCH OTHER SERVICES AND, EXCEPT AS OTHERWISE PROVIDED HEREIN, SELLER SHALL BE LIABLE TO UNIVERSITY FOR ANY DEFECTS OR DELAYS OCCURRING AFTER SELLER'S SPECIFIED PERFORMANCE DATE.
be due to the negligent or willful acts or omissions of Seller, its officers, employees, subcontractors, or anyone directly or indirectly employed by them, or any person or persons under Seller's direction and control.

B. Proprietary Rights: Seller shall indemnify, defend, and hold harmless University, its officers, agents, and employees against all losses, damages, liabilities, costs, and expenses (including but not limited to attorneys' fees) resulting from any judgment or proceeding in which it is determined, or any settlement agreement arising out of the allegation, that Seller's furnishing or supplying University with parts, goods, components, programs, practices, or methods under this order or University's use of such parts, goods, components, programs, practices, or methods supplied by Seller under this order constitutes an infringement of any patent, copyright, trademark, trade name, trade secret, or other proprietary or contractual right of any third party. The foregoing shall not apply unless University has informed Seller as soon as practicable of the suit or action alleging such infringement. Seller shall not settle such suit or action without the consent of University. University retains the right to participate in the defense against any such suit or action. C. Products. Seller shall fully indemnify, defend, and hold harmless University from and against any and all claim, action, and liability, for injury, death, and property damage, arising out of the dispensing or use of any of Seller's product provided under authorized University orders. In addition to the liability imposed by law on the Seller for damage or injury (including death) to persons or property by reason of the negligence, willful acts or omissions, or strict liability of the Seller or his agents, which liability is not impaired or otherwise affected hereby, the Seller hereby assumes liability for and agrees to save University harmless and indemnify it from every expense, liability or payment by reason of any damage or injury (including death) to persons or property suffered or claimed to have been suffered through any act or omission of the Seller.

The University agrees to provide Seller with prompt notice of any such claims and to permit Seller to defend any claim or suit, and that it will cooperate fully in such defense.

ARTICLE 11 DECLARED VALUATION OF SHIPMENTS. Except as otherwise provided on the face of this order, all shipments by Seller under this order for University's account shall be made at the maximum declared value applicable to the lowest transportation rate and classification and the bill of lading shall so state.

ARTICLE 12. WARRANTY. Seller agrees that the supplies or services furnished under this order shall be covered by the most favorable commercial warranties the Seller gives to any customer for the same or substantially similar supplies or services, or such other more favorable warranties as specified in this order. The rights and remedies so provided are in addition to and do not limit any rights afforded to University by any other article of this order. Such warranties will be effective notwithstanding prior inspection and/or acceptance of the services or supplies by the University.

ARTICLE 13. ASSIGNMENT AND SUBCONTRACTING. This order is assignable by University. Except as to any payment due hereunder, this order may not be assigned or subcontracted by Seller without written approval of University. In case such consent is given, it shall not relieve Seller from any of the obligations of this Agreement and any transferee or subcontractor shall be considered the agent of Seller and, as between the parties hereto, Seller shall be and remain liable as if no such transfer or subcontracting had been made.

ARTICLE 14. EQUAL OPPORTUNITY AFFIRMATIVE ACTION. Seller shall not maintain or provide racially segregated facilities for employees at any establishment under its control. Seller agrees to adhere to the requirements set forth in Executive Orders 11246 and 11375, and with respect to activities occurring in the State of California, to the California Fair Employment and Housing Act (Government Code section 12900 et seq.). Expressly, Seller shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, ancestry, medical condition (as defined by California Code section 12928(j)), marital status, age, physical and mental handicap in regard to any position for which the employee or applicant for employment is qualified, or because he or she is a disabled veteran or veteran of the Vietnam era. Seller shall further specifically undertake affirmative action regarding the hiring, promotion and treatment of minority group persons, women, the handicapped, and disabled veterans and veterans of the Vietnam era. Seller shall communicate this policy to all English and Spanish to all persons concerned within its company, with outside recruiting services, and the minority community at large. Seller shall provide the University on request a breakdown of its labor force by groups, specifying the above characteristics within job categories, and shall discuss with the University its policies and practices relating to its affirmative action programs.

ARTICLE 15. The clauses contained in the following paragraphs of the Federal Acquisition Regulations are incorporated by reference. The full text is available upon request:

FAR 52.222-4 Contract Work Hours and Safety Standards Act
FAR 52.222-6 Equal Opportunity
FAR 52.223-02 Clean Air and Water (If order exceeds $100,000)

ARTICLE 16. WORK ON UNIVERSITY OR GOVERNMENT PREMISES. If Seller's work under this order involves performance by Seller at University or United States Government owned sites or facilities, the following provisions shall apply:

A. Liens. Seller agrees that at any time upon request of University he will submit an sworn statement setting forth the work performed or material furnished by subcontractors, suppliers and materialmen, and the amount due and to be paid for such work. In case such consent is given, it shall not relieve Seller from an obligation imposed by law on the Seller for damage or injury (including death) to persons, material, and property damage, arising out of the dispensing or use of the Seller's product provided under authorized University orders. In addition to any other legal or contractual rights of University, issue an order stopping the work of the Seller.

B. Cleaning Up. Seller shall at all times keep University premises where the work is performed and adjoining premises free from accumulations of waste material or rubbish caused by the Seller or any of its subcontractors, and, at the completion of the work; shall remove all rubbish from and about the building and all its and its subcontractors' tools, scaffolds, and shall leave the work "broom clean" or its equivalent, unless more exactly specified. In case of dispute between Seller and the subcontractors employed on or about the structure or structures upon which the work is to be done, as herein provided, as to responsibility for the removal of the rubbish, or in case the same be not promptly removed as herein required, University may remove the rubbish and charge the cost to Seller.

C. Employees. Seller shall not employ on the work any unifit person or anyone not skilled in the work assigned to him or her, and shall devote only its best-qualified personnel to work under this order. Should University deem anyone employed on the work incompetent or unfit for his or her duties and so inform Seller, Seller shall immediately remove such person from work under this order and he or she shall not again, without written permission of University, be assigned to work under this order.

It is understood that if employees of University shall perform any acts for the purpose of discharging the responsibility undertaken by the Seller in this Article 15, whether requested to perform such acts by the Seller or not, such employees of the University while performing such acts shall be considered the agents of the Seller subject to the exclusive control of the Seller.

D. Safety, Health and Fire Protection. Seller shall take all reasonable precautions in the performance of the work under this order to protect the health and safety of employees and members of the public and to minimize dangers to life and property, and shall comply with all health, safety, and fire protection regulations and requirements (including reporting requirements) of University. In the event that Seller fails to comply with said regulations or requirements of University, University may, without prejudice to any other legal or contractual rights of University, issue an order stopping
all or any part of the work; thereafter a start order for resumption of work may be issued at the discretion of the University. Seller shall make no claim for extension of time or for compensation or damages by reason of or in connection with such work stoppage.

The safety of all persons employed by Seller and its subcontractors on University premises, or any other person who enters upon University premises for reasons relating to this order, shall be the sole responsibility of Seller. Seller shall at all times maintain good order among its employees and shall not employ on the work any unfit person or anyone not skilled in the work assigned to him or her. Seller shall confine its employees and all other persons who come onto University’s premises at Seller’s request or for reasons relating to this order and its equipment to that portion of University’s premises where the work under this order is to be performed or to roads leading to and from such work sites, and to any other area which University may permit Seller to use. Seller shall take all reasonable measures and precautions at all times to prevent injuries to or the death of any of its employees or any other person who enters upon University premises. Such measures and precautions shall include, but shall not be limited to, all safeguards and warnings necessary to protect workers and others against any conditions on Owner’s premises which could be dangerous and to prevent accidents of any kind whenever work is being performed in proximity to any moving or operating machinery, equipment or facilities, whether such machinery, equipment or facilities are the property of or in being operated by, the Seller, its subcontractors, the University or other persons.

To the extent compliance is required, Seller shall comply with all University safety rules and regulations when on University premises.

ARTICLE 17 - INSURANCE

Seller shall defend, indemnify, and hold the University, its officers, employees, and agents harmless from and against any and all liability, loss, expense (including reasonable attorneys’ fees), or claims for injury or damages that are caused by or result from the negligent or intentional acts or omissions of Seller, its officers, agents, or employees. Seller, at its sole cost and expense, shall insure its activities in connection with the work under this order and obtain, keep in force, and maintain insurance as follows:

A. Comprehensive or Commercial Form General Liability Insurance (contractual liability included) with limits as follows:

- Each Occurrence: $__________
- Products/Completed Operations Aggregate: $__________
- Personal and Advertising Injury: $__________
- General Aggregate (Not applicable to the Comprehensive Form): $__________

If the above insurance is written on a claims-made form, it shall continue for three years following termination of this Agreement. The insurance shall have a retroactive date of placement prior to or coinciding with the effective date of this Agreement.

B. Business Automobile Liability Insurance for owned, scheduled, non-owned, or hired automobiles with a combined single limit not less than $__________ per occurrence.

C. Professional Liability Insurance with a limit of $__________ per occurrence and an aggregate of not less than $__________.

D. Worker’s Compensation as required by California State law.

It is understood that the coverage and limits referred to under a., b., and c. above shall not in any way limit the liability of Seller. Seller shall furnish the University with certificates of insurance evidencing compliance with all requirements prior to commencing work under this Agreement. Such certificates shall:

1. Provide for thirty (30)-days advance written notice to the University of any modification, change, or cancellation of any of the above insurance coverage.

2. Indicate that The Regents of the University of California has been endorsed as an additional insured for the coverage referred to under a. and b. This provision shall only apply in proportion to and to the extent of the negligent acts or omissions of Seller, its officers, agents, or employees.

3. Include a provision that the coverage will be primary and will not participate with nor be excess over any valid and collectible insurance or program of self-insurance carried or maintained by the University.

ARTICLE 18 - PERMITS. Seller agrees to procure all necessary permits or licenses and abide by all applicable laws, regulations and ordinances of the United States and of the state, territory and political subdivision in which the work under this order is performed. Seller shall be liable for all damages and shall indemnify and save University harmless from and against all damages and liability which may arise out of failure of Seller to secure and pay for any such licenses or permits or to comply fully with any and all applicable laws, ordinances and regulations.

ARTICLE 19 - COOPERATION. Seller and its subcontractors, if any, shall cooperate with University and other vendors and contractors on the premises and shall carry on their work that other cooperating vendors and contractors shall not be hindered, delayed or interfered with in the progress of their work, and so that all of such work shall be a finished and complete job of its kind.

ARTICLE 20 - WAIVER OF DEFAULT. Any failure of University at any time, or from time to time, to require or enforce the strict keeping and performance by Seller of any of the terms or conditions of this order shall not constitute a waiver by University of breach of any such terms or conditions and shall not affect or impair such terms or conditions in any way, or the right of University at any time to avail itself of such remedies as it may have for any such breach or breaches of such terms or conditions.

ARTICLE 21 - TAXES. Seller shall pay all contributions, taxes and premiums payable under federal, state and local laws and measured upon the payroll of employees engaged in the performance of work under this order, and all applicable sales, use, excise, transportation, privilege, occupational and other taxes applicable to materials and supplies furnished or work performed hereunder and shall pay University harmless from liability for any such contributions, premiums, and taxes. Seller shall furnish University with certificates of insurance evidencing compliance with all requirements prior to commencing work under this Agreement. Such certificates shall:

1. Be endorsed as an additional insured for the coverage referred to under a. and b.

2. Indicate that The Regents of the University of California has been endorsed as an additional insured for the coverage referred to under a. and b. This provision shall only apply in proportion to and to the extent of the negligent acts or omissions of Seller, its officers, agents, or employees.

3. Include a provision that the coverage will be primary and will not participate with nor be excess over any valid and collectible insurance or program of self-insurance carried or maintained by the University.

ARTICLE 22 - OTHER APPLICABLE LAWS. Any provision required to be included in a contract of this type by any applicable and valid federal, state or local law, ordinance, rule or regulations shall be deemed to be incorporated herein.

ARTICLE 23 - GOVERNING LAW. The law of the State of California shall control this Agreement and any document to which it is appended.
B. California Advanced Testbed
Infrastructure Components
CALIFORNIA ATMS TESTBED AT UC IRVINE

The ATMS Testbed Program was initiated in early 1991 to provide an instrumented, multi-jurisdictional, multi-agency transportation operations environment linked to university laboratories for real-world development, testing and evaluation of near-term technologies and applications, and to serve as an ongoing testing ground for California and national ITS efforts. Located in Orange County, California, and under the direction of the UCI Institute of Transportation Studies, the Testbed is intended to:

- accelerate deployment through advanced technology research;
- demonstrate the readiness of advanced systems;
- implement and evaluate operations of an integrated multi-jurisdictional, multi-agency transportation operations system.

The Testbed is based on real-time, computer-assisted traffic management and communication. The transportation operations system that forms the backbone of the Testbed is structured to provide intelligent computer-assisted decision support to traffic management personnel by integrating network-wide traffic information (both surface street and freeway) in a real-time environment. The Testbed currently either has, or is developing, direct links to three traffic operations centers (Caltrans District 12 TMC, City of Anaheim TMC, and City of Irvine Transportation Research and Analysis Center) that provide real-time data links from area freeways and major arterials directly to dedicated Testbed research laboratories located at UCI.

The broad mission of the Testbed Program is to work toward overcoming institutional, technical and philosophical barriers to introducing innovative technologies into the management of complex transportation systems. Working together with California PATH and the Testbed Partners, the Testbed Research Implementation and Prototype Development Program is designed to establish an intermediary link between basic research in ATMS/ATIS technologies (supported both by PATH and USDOT) and their full deployment.

Testbed Facility and Supporting Infrastructure

The Testbed covers the entire freeway system in Orange County and two contiguous sub-areas comprising an arterial system that includes most of the major decision points for freeway travelers in the region. The City of Anaheim sub-area encompasses the City’s major special event traffic generators and is centered about two of its designated "smart streets,” Harbor Boulevard and Katella Avenue. This sub-area is ideal for network-wide applications of advanced technologies in traffic management. The City of Irvine sub-area provides freeway access to many business and office complexes on both sides of the I-5 freeway and is ideal for corridor-level integration of real-time communication and control in traffic management.

A comprehensive testing and evaluation system has been established to support activities in the Testbed. The system has been developed to interface with existing traffic surveillance and control components and provide a common integrated real-time traffic database for ATMS research conducted within the Testbed. The system design is built upon a wide-area communications network backbone linking the Cities of Anaheim and Irvine Transportation.
Management Centers (TMCs) to the California Department of Transportation’s District 12 TMC and with the ATMS Research Laboratories at the UCI Institute of Transportation Studies. The communications network is configured to permit easy future expansion to accommodate appropriate private/public sector research implementation projects that may be conducted within the Testbed.

**Testbed Communications Network**

The Testbed Communications Network is based on an ATM infrastructure. Originally, this network linked the Caltrans District 12 TMC and the City of Irvine TMC via an OC3 155Mbps SONET fiber optics network, and the City of Anaheim TMC via ATM T-1 line provided by PacBell. In its original configuration, the system also included MPEG 1 video transmission system provided between the UCI ATMS Laboratories and the Caltrans District 12 TMC, allowing for selection and display of freeway video surveillance cameras within District 12. With the move of the Caltrans District 12 TMC to its current temporary location, the fiber connection to its TMC has been lost; upon completion of a new permanent facility at the Sand Canyon location, the fiber connection will be reestablished.

The real-time data retrieval subsystem has been designed to interface directly with the Caltrans District 12 Front End Processor (FEP), utilizing the ATMS Testbed server (Nemesis) which will provide a bridge between the system and CORBA compliant objects,\(^1\) with communication with the Caltrans District 12 FEP provided over the Testbed ATM Private LAN. Similar communications systems are being designed for subsystems within the cities of Anaheim and Irvine.

**Testbed Laboratories**

The Testbed laboratories form a computerized research environment connected to the real world transportation system. The laboratories are a testing ground for the development of particular ATMIS modules and of integrated ATMIS applications. The goal is for the Testbed laboratories to have a complete simulation of the transportation systems that are part of the Testbed. The Paramics (parallel microsimulation) traffic model is the core simulation for the Testbed laboratories. It can simulate all of the existing and currently envisioned traffic measurement and control devices associated with ATMS.

The Testbed laboratories have access (or are in the process of gaining access) to cooperating agencies' transportation management infrastructure via Orbix or other forms of commercial or public domain CORBA objects. To the extent that we are able to exercise control, the Testbed infrastructure outside the ITS labs is being standardized as TAO as well. Data from these external agencies include:

**Inductance Loop Detectors (ILD)** - provide readable interface to point-based measurements of traffic flow (vehicles/hour), occupancy (a proxy for stream density, vehicles/mile), and computed average stream speed (miles/hour). *Currently defined on the Testbed*

**Traffic Signals (SIC)** - provide readable and writable interface\(^2\) to the current state of

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\(^1\) The ATMS Testbed Server is known as Nemesis. An analysis is currently underway to determine any required modifications to support this interface.

\(^2\) Currently under development with Cities of Anaheim and Irvine.
intersection signal controllers such as the current timing plan and active phasing each intersection. **Testbed does not currently have a SIC interface defined.**

**Ramp Meter Stations (RMS)** - provide readable and writable interface to the current state of ramp meter controllers (metering rate in vehicles/minute). **Currently defined on the Testbed**

**Changeable Message Signs (CMS)** - provide readable interface to the currently displayed message. **Currently defined on the Testbed**

**Closed Circuit Television (CCTV)** - provide a means for operators to monitor traffic conditions visually. Not currently used for as an input to traffic control algorithms but may feed video processing algorithms in the future. This can further be used to validate data using different types of Video Image Processing applications. **Currently defined on the Testbed**

Future data collection devices might include:

**Probe Vehicles** - In the near future, the Testbed will be equipped with a limited number of portable GPS-enabled data collection devices that connect to the laboratory via wireless internet and can be installed in autos used as probes in the system. For traffic management applications, these devices will provide true in-stream traffic flow measurements instead of the traditional point-based measurements available from ILDs including direct measurements of link travel times.

**Advanced Detectors** - examples include Autoscope-like video processing detection devices, particularly for intersection queue measurements which are difficult to measure using existing technology.

A general goal of the Testbed is to develop and maintain an implementation platform that gives Testbed researchers “plug and play” capabilities with ATMIS modules and sub-systems. The idea is to be able to create ATMIS applications by substituting in different modules, or reconfiguring how data is distributed between modules. At the same time, we wish to be able to connect a particular ATMIS application to both simulated and real-world data so that we can prove its effectiveness and then evaluate it in the field. This concept has been implemented in the form of TRICEPS (Testbed Real-time Integrated Control and Evaluation Prototype System), which consists of the control subsystem of the Testbed Workbench ATMS and a set of evaluation tools. TRICEPS is structured to interface both with real-time data provided through the Testbed’s ATM real-time data intertice as well as with simulation data provided by the Testbed’s traffic simulation software. The architecture of TRICEPS allows for the introduction of a full range of control and management techniques, not limited to those already implemented into the TRICEPS.

**BERKELEY HIGHWAY LABORATORY**

The Berkeley Highway Laboratory (BHL) is a test site covering 2.7 miles of I-80 immediately north of the San Francisco-Oakland Bay Bridge with 4-5 lanes in each direction, including HOV

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30 units are due for delivery in Fall, 2000 with more planned for the future. These units will utilize CDPD to connect with an ISP to make the units accessible via the Internet. The units will run the Linux kernel and be programmable for customized interactive research.

PATH RFP 2001-2002
lanes. The video and loop detector components of the BHL are now in operation. The video component consists of twelve fixed-focus cameras and two Pan-Tilt-Zoom (PTZ) dome cameras mounted on top of a 30-story building alongside I-80 in Emeryville. Wireless communication between the Richmond Field Station and this site enable researchers to receive data from the PTZ cameras and to control the cameras remotely. The fixed-focus cameras cover a mile-long surveillance region with overlapping fields of view. The feeds from these cameras will be used by a machine vision system, which will produce continuous vehicle trajectories over the combined fields of view. The raw video data is also available for verification of other types of surveillance methods, for validating and improving simulation models, and for studying traffic dynamics.

The site also includes 7 loop detector stations between Ashby Avenue and Gilman Street. These stations have double loops, and travel times between stations are estimated by reidentifying vehicles or groups of vehicles based on their lengths as they travel from station to station. Flow and occupancy are also recorded. Both real time and historical data (since 1999) are available. See http://www.its.berkeley.edu/projects/freewaydata/ for more details.

The Berkeley Highway Laboratory offers an extensive sample of video and loop data describing traffic on a varied and often congested section of freeway. The data can be used for a number of research purposes. Researchers are invited to utilize these data. For more information, contact Joy Dahlgren at (510)231-9409 or joy@uclink4.berkeley.edu.

CALTRANS-UC SANTA BARBARA TESTBED CENTER FOR INTEROPERABILITY (TCFI)

Research proposals are sought to utilize the resources and capabilities (software, hardware, simulation models, communications networks, and support staff) available at the University of California at Santa Barbara (UCSB) Testbed Center for Interoperability (TCFI). This center has been established by Caltrans and UCSB to pioneer efforts in the development, testing, demonstration, and deployment of distributed systems, ITS standards, standards dependencies, interoperability and system integration. One of the Center's objectives is to help establish a statewide integrated transportation high speed networking and advanced wireless communications network linking Caltrans districts, TMCs, UC campuses, and other partners from local and state agencies and private industry. The testbed provides facilities for research in the following areas:

Distributed Systems

- Software reuse (CORBA Component Model, COM/CORBA inter-working, object oriented s/w cost models, testing, verification, configuration management, sustainability and maintainability)
- Security in distributed object environment
- Data interchange and mobile agents
- Real-time and fault tolerant CORBA specifications and implementation issues (specifically WAN related issues)
- ORB portability and ORB interoperability
• CORBA specifications in the special interest groups; electronics commerce domain, telecommunications domain, and transportation domain

Transportation Information and Control (Communication Systems):

• Integrated communications/sensors
• Interoperability of high speed networks (special interest to multimedia, interactive real-time virtual simulation application and parallel systems over ATM MAN/WAN)
• Deregulation impact on communications networks technology, services, and economics
• Emerging wireless technology and services (DSRC spectrum IMT 2000)

Standards and Interoperability and Integration:

• Experimental design, protocol testing and demonstration of ITS standards (CORBA, ITS DATUM and location referencing, DSRC, and NTCIP), dependencies and interoperability. Special interest in end-to-end integration issues (from application to wireless and wireline media).

For more information call Ramez Gerges at (805) 568-1252.
C. UNIVERSITY OF CALIFORNIA BUSINESS INFORMATION FORM
FOR YOUR INFORMATION – PLEASE KEEP

UNIVERSITY OF CALIFORNIA
Business Information Form

DEFINITIONS

ASIAN-INDIAN AMERICAN: United States citizens and legal resident aliens whose origins are in India, Pakistan, or Bangladesh.

ASIAN-PACIFIC AMERICAN: United States citizens and legal resident aliens whose origins are in Japan, China, Korea, Taiwan, Cambodia, Laos, Vietnam, the Philippines, Samoa, Guam, the US Trust Territories of the Pacific Islands, and the Northern Marianas Islands.

BLACK/AFRICAN AMERICAN: United States citizens and legal resident aliens whose origins are in any of the Black racial groups of Africa.

DISABLED VETERAN: United States citizens and legal resident aliens who are veterans of the military, naval, or air service of the United States with service-connected disabilities who are residents of the State of California. To qualify as a veteran, the person must be currently declared by the United States Veterans Administration to be ten percent (10%) or more disabled as a result of service in the armed forces.

DISABLED VETERAN BUSINESS ENTERPRISE [DVBE]: a DVBE is a business owned and controlled by one or more disabled veterans. Owned and controlled means that: a. A sole proprietorship owned by a disabled veteran; or a partnership or corporation, 51% of the stock or partnership interests of which are owned by one or more disabled veterans; b. Management and daily business operation are controlled by one or more disabled veterans; c. A sole proprietorship, corporation, or partnership with its home office located in the United States, which is not a branch or subsidiary of a foreign corporation, firm or other foreign based business. PLEASE NOTE: The University of California requires that a DVBE applicant submit proof of DVBE certification provided by the State of California, Department of General Services, Office of Small Minority Business (OSMB).

DISADVANTAGED BUSINESS ENTERPRISE [DBE]: a business concern which is at least fifty-one percent (51%) owned by one or more socially and economically disadvantaged individuals or, in the case of any publicly owned business, at least fifty-one percent (51%) of the stock of which is owned by such individuals; and whose management and daily business operations are controlled by one or more of such individuals. The following individuals are considered socially and economically disadvantaged: Native Americans, Asian-Indian Americans, Black African Americans, and Hispanic Americans.

HISPANIC AMERICAN: United States citizens and legal resident aliens whose origins are in Mexico, Puerto Rico, Spain, Portugal, Central or South America.

NATIVE AMERICAN/AMERICAN INDIANS: United States citizens and legal resident aliens whose origins are in any of the original peoples of North America, i.e., American Indians, Eskimos, Aleuts, and native Hawaiians.

SMALL BUSINESS ENTERPRISE [SBE] (Supplier - Goods and Services): an independently owned and operated firm, certified or certifiable, as a small business by the Federal Small Business Administration (SBA).

SMALL BUSINESS ENTERPRISE [SBE] (Construction Contractor/Design Professional): a firm whose annual average gross receipts, taken for the last three fiscal years, do not exceed the amount listed in the MAXIMUM RECEIPTS TABLE below. Annual average gross receipts computation: the quotient of the arithmetical sum of the gross receipts of the prior three fiscal years divided by three (3).

SOCially AND ECONOMICALLY DISADVANTAGED: United States citizens and legal resident aliens who are defined as socially and economically disadvantaged individuals by the United States Small Business Administration.

WHITE AMERICAN: United States citizens and legal resident aliens whose origins are in Europe, North Africa, or southwest Asia.

WOMAN-OWNED BUSINESS ENTERPRISE [WBE]: a business concern which is at least 51% owned by one or more women; and management and daily business operations are controlled by one or more women who own the business concern.

MAXIMUM RECEIPTS TABLE

<table>
<thead>
<tr>
<th>CONTRACTOR’S LICENSE TYPE</th>
<th>ANNUAL AVERAGE (Preceding Three Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. General Engineering</td>
<td>$17,000,000</td>
</tr>
<tr>
<td>B. General Building</td>
<td>17,000,000</td>
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<tr>
<td>C. Specialty</td>
<td>7,000,000</td>
</tr>
<tr>
<td>DESIGN PROFESSIONALS</td>
<td>2,500,000</td>
</tr>
</tbody>
</table>

Formal Certification of DBE/WBE/DVBE Status (Does not apply to laboratories)

All DESIGN, PROFESSIONAL, CONSTRUCTION and GOODS and SERVICES firms receiving $10,000 or more business annually from a University location and seeking to do business as a DBE, WBE, or DVBE with the University or with a prime contractor doing business with the University must be certified.

In the CONSTRUCTION area certification is required by bidders that are SDBEs, SWBES, or SDVBEs that wish to claim the 5% bid preference and those SDBE/SWBE/SDVBE subcontractors listed by a bidder to meet the 5% participation rate.

Information on certification can be obtained from a University location or the University of California, Office of the President.
UNIVERSITY OF CALIFORNIA BUSINESS INFORMATION FORM

SECTION I - To be Completed By ALL FIRMS OR INDIVIDUALS PROPOSING TO DO BUSINESS WITH THE UNIVERSITY (regardless of commodity service or product offered)

COMPANY NAME

CONTACT PERSON (Indicate Ms, Mr, etc.)

ADDRESS

MAILING ADDRESS (if different)

REMITTANCE ADDRESS (if different)

TELEPHONE NUMBER

DO YOU ACCEPT COLLECT CALLS? YES NO

FAX NUMBER

TOLL FREE NO (800)

FEDERAL IDENTIFICATION NO. OR SOCIAL SECURITY NO.: DUN & BRAD STREET NO.

PRIMARY TYPE OF BUSINESS:

OWNERSHIP OF BUSINESS:

Are any of the owners or owners relatives currently employed by the University of California? YES NO

If yes, please provide details on an attached sheet of paper.

PRINCIPAL OWNERS:

NAME

TITLE

SEX (M or F) ETHNICITY

PERCENT OWNERSHIP

% %

THIS IS A PARENT COMPANY Name of subsidiaries:

% %

THIS IS A SUBSIDIARY Name and location of parent company:

SECTION II- To Be Completed By SUPPLIER OF GOODS or SERVICES ONLY (Design Professionals Please See Section IV Below)

NUMBER OF YEARS BUSINESS

AVERAGE ANNUAL SALES (PRIOR THREE YEARS)

NET WORTH OF BUSINESS

NORMAL INVENTORY VALUE

APPROXIMATE SIZE OF FACILITIES (SQ. FT.)

NUMBER OF EMPLOYEES

Please list the name(s) or description(s) of the major product(s) or service(s) that your firm offers.

BANK REFERENCE NAME:

ADDRESS (Number, City, State, ZIP)

CUSTOMER REFERENCES:

Name Address Phone Number

PERSON(S) AUTHORIZED TO COMMIT YOUR FIRM TO A CONTRACT:

Name Title

Name Title

SECTION III- To Be Completed By CONSTRUCTION CONTRACTOR ONLY

License Type A B C

California License No.: Expiration Date:

If C license, specify and describe Specialty:

Average Annual Gross Receipts $ Year Company Started:

(based on prior three fiscal years)

SECTION IV- To Be Completed By DESIGN PROFESSIONAL ONLY

ARCHITECT ENGINEER LANDSCAPE ARCHITECT OTHER: REGISTRATION NO.:

Please list below the major and supplemental service you offer

Major Services: Supplemental Services:

Average Annual Gross Receipts $ Year Company Started:

(based on prior three fiscal years)
SECTION V - Ownership

Status Categories: Place an “X” in the boxes that best describe your firm’s ownership status. (See Definitions on page 4.)

<table>
<thead>
<tr>
<th>Ownership Status Categories</th>
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</thead>
<tbody>
<tr>
<td>Nat. Am./Am. Ind. (LARGE)</td>
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<tr>
<td>Asian/Pacific American</td>
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<tr>
<td>Asian/Indian American</td>
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<tr>
<td>Black African American</td>
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<tr>
<td>White American</td>
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<tr>
<td>Hispanic American</td>
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<tr>
<td>Disabled Veteran</td>
</tr>
<tr>
<td>Socially &amp; Economically Disadvantaged</td>
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</table>

<table>
<thead>
<tr>
<th>Ownership Status Categories</th>
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<tbody>
<tr>
<td>WOMAN OWNED</td>
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<tr>
<td>MALE OWNED</td>
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<td>SMALL BUSINESS</td>
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<tr>
<td>WOMAN OWNED</td>
</tr>
<tr>
<td>MALE OWNED</td>
</tr>
</tbody>
</table>

Has your firm applied for or received DBE/WBE/DVBE certification from the University of California? If yes, please give date of application or date of certification.

<table>
<thead>
<tr>
<th>Certification Status</th>
<th>Yes</th>
<th>No</th>
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</thead>
<tbody>
<tr>
<td>DBE/WBE/DVBE</td>
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</table>

University of California facilities with which you wish to conduct business.

<table>
<thead>
<tr>
<th>University Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Northern CA Locations</td>
</tr>
<tr>
<td>Berkeley</td>
</tr>
<tr>
<td>Los Angeles</td>
</tr>
<tr>
<td>San Francisco</td>
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<tr>
<td>All Southern CA Locations</td>
</tr>
<tr>
<td>Davis</td>
</tr>
<tr>
<td>Los Angeles Med. Center</td>
</tr>
<tr>
<td>San Francisco Med. Center</td>
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<tr>
<td>Ag. Field Stations</td>
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<tr>
<td>Davis Med. Center</td>
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<tr>
<td>Riverside San Diego</td>
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<tr>
<td>Santa Barbara</td>
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<td>Santa Cruz</td>
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<td>LLNL</td>
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<tr>
<td>Irvine Med. Center</td>
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<tr>
<td>San Diego Med. Ctr.</td>
</tr>
</tbody>
</table>

PRIVACY NOTIFICATIONS

STATE

The State of California Information Practices Act of 1977 (effective July 1-1978) requires the University of California to provide the following information to individuals who are asked to supply information about themselves.

The principal purpose for requesting the information on this form is to evaluate your qualifications as a supplier to the University and for reporting purposes in accordance with state law and University policy.

Furnishing all information (except Social Security Number) requested on this form is mandatory - failure to provide all requested information will delay or may prevent evaluation of your firm’s ability to do business with the University.

The official responsible for maintaining the information contained in this form is the Senior Vice President - Administration in the Office of the President.

FEDERAL

Pursuant to the Federal Privacy Act of 1974, you are hereby notified that the disclosure of your social security number is voluntary. This record keeping system was established pursuant to the authority of The Regents of the University of California under Art. IX, Sec. 9 of the California Constitution.

The social security number is used to verify your identity.

I hereby certify under penalty of perjury under the laws of the State of California that I have read this application and know the contents thereof, and that the business category and ethnicity indicated above reflect the true and correct status of the business in accordance with Federal Small Business Administration criteria and Federal Acquisition Regulations, FAR 19, pertaining to small, disadvantaged, woman, disabled veteran, small and disadvantaged, and small and woman-owned business enterprises. I understand that falsely certifying the status of this business, obstructing, impeding, or otherwise inhibiting University of California who is attempting to verify the information on this form, may result in suspension from participation in University of California business contracts for a period up to five (5) years and the imposition of any civil penalties allowed by law. In addition, I understand that this business must notify the University of California in writing thirty (30) days in advance of any changes in size, ownership, control, or operation which may affect this business’s continued eligibility as a SBE, DBE, WBE, DVBE, SDBE, SWBE or SDVBE.

INFORMATION FURNISHED BY (Print or type name of owner and/or principal)

NAME ____________________________ TITLE ____________________________

SIGNATURE ______________________ DATE ____________________________

FOR U.C. USE ONLY REVIEWED BY __________ DATE __________ COMMENTS __________
D. COST-ELEMENT BREAKDOWN
## COST ELEMENTS BREAKDOWN

<table>
<thead>
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<th>ITEM</th>
<th>COST ELEMENTS</th>
<th>REFERENCE SCHEDULE AND PAGE NUMBER</th>
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<td></td>
<td>RATES HOURS</td>
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<td>AMOUNT $</td>
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<td>MATERIAL</td>
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<td>SUBCONTRACT</td>
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<td>TOTAL SUBCONTRACT</td>
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<td>OTHER DIRECT COSTS</td>
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<td>SUBTOTAL COST</td>
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<td>SUBCONTRACTORS</td>
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<td>OTHER DIRECT COSTS</td>
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<td>SUB-TOTAL COSTS</td>
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<td>6 FEE (PROG SUMMARY ONLY)</td>
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PREPARED BY: ____________________________  TITLE: ____________________________  DATE: ____________
E. NON-DISCRIMINATION AND NON-SEGREGATION STATEMENTS
NON-DISCRIMINATION STATEMENT

During the performance of this contract, the contractor, for itself, its assignees and successors in interest (hereinafter referred to as the “contractor”) agree as follows:

(1) Compliance with Regulations: The contractor shall comply with regulations relative to Title VI (non-discrimination in federally-assisted programs of the Department of Transportation - Title 49 Code of Federal Regulations Part 21 - Effectuation of Title VI of the 1964 Civil Rights Act.) Title VI provides that the recipients of federal-assistance will implement and maintain a policy of non-discrimination in which no person in the state of California shall, on the basis of race, color, national origin, religion, sex, age, disability, be excluded from participation in, denied the benefits of or subjected to discrimination under any program or activity by the recipients of federal assistance or their assignees and successors in interest.

(2) Non-discrimination: The contractor, with regard to the work performed by it during the contract shall act in accordance with Title VI. Specifically, the contractor shall not discriminate on the basis of race, color, national origin, religion, sex, age, or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall not participate either directly or indirectly in the discrimination prohibited by Section 21.5 of the U.S. DOT's Regulations, including employment practices when the contract covers a program whose goal is employment.

(3) Solicitations of Subcontracts, Including Procurements of Materials and Equipment: In all solicitations, either by competitive bidding or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor’s obligations under this contract and the Regulations relative to non-discrimination on the grounds of race, color or national origin.

(4) Information and Reports: The contractor shall provide all information and reports required by the Regulations, or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the State Department of Transportation or the Federal Highway Administration to be pertinent to ascertain compliance with such Regulations or directives. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information, the contractor shall so certify to the State Department of Transportation, or the Federal Highway Administration as appropriate, and shall set forth what efforts it has made to obtain the information.

(5) Sanctions for Noncompliance: In the event of the contractor's noncompliance with the non-discrimination provisions of this contract, the State Department of Transportation shall impose such contract sanctions as it or the Federal Highway Administration may determine to be appropriate, including, but not limited to:

(a) withholding of payments to the contractor under the contract until the contractor complies, and/or

(b) cancellation, termination or suspension of the contract, in whole or in part.

(1) Incorporation of Provisions: The contractor shall include the provisions of paragraph (1) through (6) in every subcontract including procurements of materials and leases of equipment, unless exempt by the Regulations or directives issued pursuant thereto. The contractor will take such action with respect to any subcontractor or procurement as the State Department of Transportation or the Federal Highway Administration may direct as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request the State Department of Transportation to enter into such litigation to protect the interest of the State, and, in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.
Certification of Non-Segregated Facilities

As a supplier of goods or services to the University of California I/we certify that racially segregated facilities will not be maintained nor provided for employees at any establishment under my/our control; and that I/we adhere to the principles set forth in Executive Orders 11246 and 11375, and undertake specifically: to maintain employment policies and practices that affirmatively promote equality of opportunity for minority group persons and women; to take affirmative steps to hire and promote women and minority group persons at all job levels and in all aspects of employment; to communicate this policy in both English and Spanish to all persons concerned within the company, with outside recruiting services, and the minority community at large; to provide the University on request a breakdown of our total labor force by ethnic group, sex, and job category; and to discuss with the University our policies and practices relating to our affirmative action program.

Authorized Signature

[Signature]

bate
F. PATH PROGRESS STATEMENT
### PATH Progress Statement as of January 2001 (Current and Former PATH PIs Only)

<table>
<thead>
<tr>
<th>Project Title:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal Investigator:</td>
<td></td>
</tr>
<tr>
<td>Funding Allocated:</td>
<td></td>
</tr>
<tr>
<td>Funding Spent to Date:</td>
<td></td>
</tr>
<tr>
<td>Starting Date:</td>
<td></td>
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<td>End Date:</td>
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</tbody>
</table>

In the space below, describe research progress relative to original research plan. Explain any deviation from plan.

---

In the space below, list all project deliverables completed to date (research reports, software, publications, etc.).
G. STANDARD COVER PAGE
**PATH RFP for Fiscal Year 2001-2002**

<table>
<thead>
<tr>
<th>Project Title:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Principal Investigator,</strong> Mailing Address (<em>include institution</em>) Telephone Fax E-mail:</td>
<td></td>
</tr>
<tr>
<td><strong>Other Investigators,</strong> Mailing Address (<em>include institution</em>) Telephone Fax E-mail</td>
<td></td>
</tr>
<tr>
<td><strong>Submitting Unit; Institution/Address:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Funding Requested</strong> (For FY 01-02 only proposals: project start date – 6/30/02); (For multi-year proposals: project start date - 6/30/02, and each subsequent fiscal year ending June 30)</td>
<td></td>
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<tr>
<td><strong>Start Date:</strong></td>
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<td><strong>End Date:</strong></td>
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<tr>
<td><strong>Program</strong> <em>(ATMIS, AVCSS, Joint ATMIS/AVCSS)</em></td>
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