

Program Charter


AERIS

Applications for the Environment: Real-time Information Synthesis

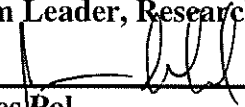
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This Charter is a living document, and while the modes signing agree in principal to providing the necessary resources to complete this body of work, individual staffing commitments are subject to change.

Revision History

Version Number	Primary Author(s)	Description of Version	Date Completed	PM Approval Date
0.1	F Ripkin	Initial Shell	12/24/09	
0.2	AERIS Team	Draft Charter	1/6/10	
0.3	Pincus	Revision 1	1/25/10	
0.4	Pincus	Revision 2	2/2/10	
0.5	Ferlis	Revision 3	2/17/10	
0.6	Pincus	Revision 4	2/18/10	
0.7	Ferlis	Revision 5	2/19/10	
0.8	Pincus	Revision 6	3/3/10	
0.9	Pincus	Revision 7	3/5/10	
0.10	F Ripkin	SPG Review	3/12/10	
1.0	Pol	Signature Ready	3/16/10	

1. Program Charter

This Program Charter is established for two purposes: to estimate the amount of committed resources needed among Federal staff to execute the program and to begin the development of the work activity plan – a critical feature of the program management plan. By signing this Program Charter the ITS JPO and the SPG representatives are affirming their commitment to supply the necessary resources to execute this program, as per SPG Charter Annex C, Dated June, 2009.

1.1. Program Description and Scope

The overall objective of the AERIS (Applications for the Environment: Real-Time Information Synthesis) research program is to generate/acquire environmentally-relevant real-time transportation data, and use this data to create actionable information to support and facilitate “green” transportation choices by transportation system users and operators. Employing a multi-modal approach, the AERIS program will work in partnership with the IntelliDriveSM research effort to better define how IntelliDriveSM data and applications might contribute to mitigating some of the negative environmental impacts of surface transportation.

The core scope of AERIS is the idea of “facilitating green transportation choices.” It is the intent of the program to:

1. Support research into the generation, capture, standardization, and use of real-time data present in the transportation system (i.e., connected travelers and infrastructure) to enable environmentally-beneficial choices by system users and system operators.
2. Leverage existing research and stakeholder activities to create a unique body of knowledge and experience that demonstrates the most effective uses of ITS to reduce the negative impacts of transportation on the environment.
3. Form the foundation for addressing future, long-range efforts to conserve energy, address air and water quality issues, address weather issues, mitigate other environmental impacts of the transportation system, and support likely environmental goals in the new transportation authorization.

Research Questions

The AERIS research program is structured around research questions that encompass both the issue of information availability as well as the feasibility of providing greater “choice” to decision makers. These questions include:

- **What vehicle-based data is available – What is the data quality & validity?**
 - How can we collect environmentally-relevant data from the transportation system? What does this data tell us? Is the data meaningful? Is it valid? Is it of good quality? Is it reliable? Is it the right data? How much of it do we need? How often do we need to collect it? How much penetration into the fleet is necessary to generate useful information and environmental benefit from this data? What technologies and methods are most effective and useful

to get this data? Who would use the data once we prove that it is utile in this context? What data do we NOT have that we really need to be successful?

- **How can vehicle-based data be integrated with existing traffic and emissions data?**
 - What different kinds of information can be generated from the data? What applications make the most sense, from a policy perspective and commercial perspective? What kind of information can best be used by system users? System operators? Can this information be generated? How will access to this information impact transportation system user choices, system management choices, and overall transportation system performance with respect to the environment?
 - How can we leverage the connectivity between transportation system elements (connectivity that already exists, and connectivity that may exist in the future)? How can we leverage the IntelliDriveSM data sets and test beds? How can we work with the Road Weather Program to leverage work done already and work to be undertaken with probe vehicles and weather data?
- **What cross-modal public sector applications are needed & their benefits?**
 - What applications would make the most positive overall impact on the environment? How much impact? Would they make sense to deploy? Would they work effectively? Would people use them? Would governments accept them?
 - What policy or regulatory issues need to be addressed or in place to ensure these applications are effective and useful? What would be the best methods of incentivizing users and operators to use ITS information and data to make greener choices? What are the most effective methods of getting applications into the marketplace, or widely adopted by public sector entities?

1.2. Management Team and Multi-Modal Roles

The Management Team, the ITS Program Manager and the Multi-Modal Lead(s) are responsible for:

- Contracting Officer Technical Representative (COTR) for all contracts let by their respective organizations
- Receipt of all deliverables and work assignments for all contracts let by their respective organizations
- Monitoring and reporting of project scope, cost, schedule, performance, and risk. This may include an earned value management approach.
- Providing quarterly reporting updates for projects using cooperative agreements.
- Providing monthly reporting updates for projects using contracts.
- Joint access to all contract documents, records, performing contractor expenditure data (to include travel), and records as may be defined by the applicable circumstances.
- Participation in any decisions that would result in re-baseline of schedule, scope (e.g., major objectives), or budget.

- Concurrence in the development of the statement of work, evaluation of proposal, and award of procurement.
- Facilitating spot checking/analysis of financial reports by the ITS JPO as necessary.

Multi-Modal Roles

The table below expresses the total amount of Full Time Equivalents (FTE) that are contributing to the programs through various roles. The table expresses the contributing roles anticipated through the entire life cycle of the program.

ITS JPO	FHWA	FMCSA	FTA
PM WAL (10) CRD (4) SME (3)	MML (2) WAL (8) SME (2)	SME	SME

Key: PM – Program Manager
MML – Modal Manager Lead
WAL (#) – Work Activity Lead (Number of individual work activities)
SME – Subject Matter Expert
CRD – Coordination

1.3. Modal Participation

The SPG Charter established multi-modal program teams to support the ITS JPO research programs. The multi-modal team should demonstrate a high degree of collaboration to achieve positive results and foster good working relationships. This section identifies the responsibilities of the Modal team members towards achieving these goals.

The multi-modal team has the responsibility to be open with team members and communicate in a manner that allows participants to have the same information in a timely manner. Major decisions about the program shall be made in a cooperative manner with the program team members.

The team members have certain responsibilities to fulfill as part of the program team. These include:

- Participating in a fully engaged manner in team meetings.
- Working collaboratively with the Program Manager and Primary Modal Manager Lead to identify early in the work program any issues of concern and mapping out a way to address and/or resolve such issues as quickly as possible
- Briefing the SPG modal representative on team activities and to articulate program decisions, approaches, funding, etc.

1.4. Stakeholder Engagement and Collaboration Efforts Planned

Stakeholders	Major Interests	Primary outreach and collaboration to address stakeholder interests
<ul style="list-style-type: none"> ▪ The traveling public ▪ Other Federal agencies ▪ Metropolitan Planning Organizations ▪ State agencies ▪ Transit agencies ▪ Climate action groups ▪ Public interest and environmental groups ▪ Trade associations ▪ International groups ▪ Vehicle manufacturers ▪ ITS manufacturers and operators ▪ Developers of environmental sensor technologies ▪ Land developers ▪ Terminal operators ▪ Energy companies/oil companies ▪ Research community ▪ Data aggregators ▪ Telematics Firms 	<ul style="list-style-type: none"> ▪ Promoting environmental benefits and applications along with safety and mobility as a package strengthens the message. ▪ Cultivate champions, not only stakeholders ▪ Bring what we are learning to groups who may not be knowledgeable about ITS. Develop and nurture relationships with non-traditional ITS stakeholders ▪ The logical initial environmental focus should be on air quality, greenhouse gases and climate change. Other environmentally relevant issues (water/soil quality, noise) may come into play if and when there appears a need that ITS can address ▪ Government participation at all levels is needed for progress on environmentally sustainable transportation. At the Federal level, U.S. DOT should be the lead but the Environmental Protection Agency and Department of Energy should also be involved. State and local agencies that should be involved include state departments of transportation, state and regional environmental/air quality agencies, metropolitan planning organizations, and transit agencies. ▪ Government participation at all levels is needed for progress on environmentally sustainable transportation. ▪ Outreach for developing research ideas and support should be as broad as possible. 	<p><u>Foundational Research</u></p> <ul style="list-style-type: none"> • During the AERIS Foundational Research phase the program will work very closely and coordinate with the IntelliDriveSM technologies and systems being developed and tested in the other research programs. • Establishment of expert stakeholder group that will provide input to research activities as they progress; also, work with the other research program stakeholders to leverage their work and effort to avoid stakeholder “burnout”. • The AERIS program will ensure that it leverages the various IntelliDriveSM test-beds currently being developed in order to conduct its research and evaluations.

1.5. Resource Roster

The table below depicts a percentage estimate of federal staff time anticipated for the research program. This is shown by fiscal year. The estimates are derived from Roadmap Track and Work Activity details in the Appendix A: *Preliminary Scope Statement* and reflect anticipated levels of effort. Specific staffing assignments appear in Section 3 of Appendix A.

Agency	Primary Role	2010 FTE (%)	Est. 2011 FTE (%)	Est. 2012 FTE (%)	Est. 2013 FTE (%)	Est. 2014 FTE (%)
ITS JPO	PM	40	35	25	25	25
	CRD	5	5	5	5	5
	CRD SME(2)	10	10	10	10	10
	CRD SME	3	3	3	3	3
	WAL CRD	10	10	10	10	10
FHWA	MML WAL (5)	20	20	20	20	20
	MML WAL(3)	20	20	20	20	20
	SME	5	20	20	20	20
	SME	5	5	5	5	5
FTA	SME	10	10	10	10	10
FMCSA	SME	10	10	10	10	10

1.6. Methodology for determining Federal Staff FTE

These are only approximations and will be refined in the Program Management Plan.

Assumption for federal FTE calculations

Role	Low Level of Activity	Moderate Level of Activity	High Level of Activity
Program Manager	15%	20%	25%
Modal Manager Lead	15%	20%	25%
Work Activity Lead	15%	20%	25%
Subject Matter Expert (SME)	1%	3%	5%
Coordination	1%	3%	5%

1.7. Program Specific Comments

- Lack of preexisting stakeholder groups and lack of foundational research will make startup particularly challenging.
- Lack of concrete deliverables from transit and freight programs yet anticipated research activities impact AERIS budget
- NHTSA, FRA, MARAD Roles are, to date, unknown and not specified
- Ability to address issue of induced demand is unknown
- Controlling scope, e.g.
 - IntelliDriveSM plus others impacting scope of program

- Controlling size of the program based on outside factors
 - Potential for GH Gas legislation impacting program
 - Timing of testbed activities with IntellidriveSM and other users of the testbed (NCAR) impacts execution of the AERIS schedule
- MOVES model issues and ability to work with EPA constructively

1.8. Preliminary Scope Statement

Appendix A of this charter contains the Program Preliminary Scope Statement and is the first step in articulating the Program Management Plan (PMP). The information contained in the Preliminary Scope Statement provides initial estimates for use in creating this charter and will be refined and updated in the PMP as the program evolves. The PMP will be the official repository of program information and will be updated as warranted.

Appendix A: Preliminary Scope Statement

The Preliminary Scope Statement is a first iteration of program scope and will be refined over time as the Program Management Plan is developed.

All projected scope and projected resources are subject to Management Council approval.

1. Work Program Overview and Roadmap

The AERIS program has four major activities focusing on research questions/projects. It is the intention of the AERIS program to use extensive foundational research as a basis for moving forward with more focused research projects. AERIS will also strive to leverage the work being conducted through IntelliDriveSM, other multi-modal research programs, and mode-specific research programs. The AERIS program activities will be comprised of several research tracks and work activities which are articulated in section 3 below.

AERIS intends to focus on the following six (6) major activity areas:

- Undertake an extensive foundational research program
- Identify, model, evaluate what are the most effective technological applications/strategies.
- Undertake intensive analysis of the most promising applications/strategies and explore possible implementation opportunities
- Develop recommendations on most effective applications/strategies for further research and real-world testing
- Explore and, if possible resolve, policy, regulatory, and knowledge transfer issues and needs
- Effectively engage the stakeholder community and experts in the field; use feedback to guide research path.

Undertaking an extensive foundational research program

The AERIS program will undertake foundational analytics to support a rigorous research program that leverages IntelliDriveSM research and data sets/standards to assess what environmentally-relevant data can currently be acquired, assess if this is the “right” data, examine if there are data gaps, and undertake research that will create the most useful data sets and information to support “green choices.” This foundational research will identify opportunities for further research to analyze and evaluate specific applications/strategies for improving environmental decisions by public agencies and consumers and for improving environmental outcomes through ITS.

The approach to undertaking an intensive, rigorous program of foundational research and analysis includes a comprehensive review of the state of the practice in a variety of areas to determine the following:

- *Limits of current technology* – Examine what are the current limits to the technologies that may enable environmental data acquisition (from a variety of travelers, vehicles and system sources) that will help to achieve the research objectives. In other words, for example, what environmental data can in-vehicle sensors currently acquire? Can environmentally-relevant information be derived from it? Does this support what we want to achieve with our research? Do we need more advanced sensors? Do the sensors need to measure and acquire different data than they currently do, or at a different level of granularity? Related questions will also be addressed, including to what extent can post-processing improve the usefulness of this information to support environmentally-relevant actions.
- *Limits of Currently Available Data Sets*: Use probe vehicle tests and the IntelliDriveSM test bed to begin to acquire data that might be environmentally relevant. Parse, analyze and sift through the data to answer the following questions: what do we have, what does it tell us, is it good quality, how might it be used, and what do we still need?
- *Limits and challenges of monitoring and analyzing*: Examine what the state of the practice is with respect to environmental monitoring and modeling technologies. What data can be captured from infrastructure-based sensors? What ITS data feeds different models? Also, are certain models more effective in reporting certain types of information? Which types of data and how much is needed to make major improvements in current models and algorithms?
- *What are the most valuable ITS applications with respect to environmental needs* – Examine and evaluate where ITS technologies and data can be most effective and contribute maximum value to addressing environmental challenges. Conduct system analysis to better understand the potential roles of ITS in mitigating negative impacts of transport and what types of performance metrics might be most appropriate. Refine results and also inform future work.
- *State of the Practice Scan (Domestic) and Site Visits* – Undertake a detailed scan of existing initiatives/research on ITS and the environment within the DOT, others in the public sector, the private sector and academia, and across the US. This scan will seek to identify opportunities to leverage existing or ongoing research to reduce costs, risks and/or schedule requirements associated with AERIS research requirements.
- *State of the Practice Scan (International) and Site Visits* – Undertake several trips to relevant deployments or research being undertaken internationally. Undertake a gap analysis (i.e., where is the rest of the world compared to us), and begin the process of reaching out to international stakeholder groups and governments. These activities will seek to identify opportunities to leverage the result of existing or ongoing international research to reduce costs, risks and/or schedule requirements associated with AERIS research requirements. Develop a plan for extended international cooperation and joint research. Cooperative research conducted with

the European Union (EU) will be conducted within the framework of the existing USDOT/RITA-EU cooperative research agreement and will be coordinated with the US-EU ITS research task force.

- *Stakeholder Engagement* – An extensive effort will be undertaken to identify, meet with, learn from, cooperate with, and get the support of a wide range of stakeholders. Included is attendance at a wide range of workshops, conferences, meetings, etc, to gain knowledge, cultivate support and buy-in for our research, and leverage existing stakeholder activities.
- *Cultivate relationships with other research programs* – Although the environmental research will likely identify and champion new strategies to improve the environment, the other IntellidriveSM research initiatives will also develop strategies to improve mobility and safety that could potentially improve environmental performance and so must be considered. The US DOT Weather program and related activities are one example of current research and program activities that need to be evaluated within the context of environmental improvement. AERIS expects to be able to leverage data, promising applications, and the results of Field Operational Tests (FOT) from other ITS programs (Dynamic Mobility Applications/Real Time Data) as part of this research.
- *Evaluation techniques* – examine what is the state of the practice in evaluation techniques when evaluating the performance of technologies and integrated systems that are designed to mitigate the negative impacts of transportation on the environment. What are the different evaluation options and what results to they yield? Are the results accurate and robust? Are they actual measurements or from models?
- *Activity based travel models* – from the perspective of the traveler, what is the true market for various modes of travel and under what conditions? How can this behavior be influenced? How can these markets be expanded or shrunk to meet environmental goals system-wide How can this make good business sense for service providers and also meet the needs of the traveling public?
- *Traffic simulation models* – how will the proposed environmental improvement strategies work, and how effective will they be? How do the strategies compare with each other, with strategies developed elsewhere including within the ITS program to improve mobility and safety? A comprehensive test-bed that will allow scenarios representative of target communities will be needed to allow these comparisons and assessments to be made.
- *Signal Phasing and Timing (SPaT)* – work with other research initiatives to initially explore how SPaT can help to yield environmental benefits.
- *World Congress activities (with a focus on 2010 and 2011)* – The World Congresses will provide important opportunities to discuss and perhaps demonstrate promising

environmental improvement strategies and technologies, as well as to obtain feedback from important stakeholders.

Technology and Application/Strategy Opportunities

- Identify, model, evaluate what are the most effective technological applications/strategies.
- Undertake intensive analysis of the most promising applications/strategies and explore possible implementation opportunities
- Develop recommendations on most effective applications/strategies for further research and real-world testing

AERIS will systematically examine and assess the most effective technology and application strategies and solutions that may emerge from the foundational analytics and other sources. The approach will be to identify candidate strategies and applications; analyze and evaluate the candidate strategies and applications that emerge, and recommend strategies/applications for in-depth testing.

Identify Candidate Strategies and Applications

This phase will identify a number of strategies to improve environmental decisions by public agencies and consumers or to improve environmental outcomes through ITS strategies. A key component of this step is to undertake initial benefit/cost analyses and modeling for the purpose of identifying a preliminary set of candidate applications/strategies.

The approach may include:

- Screening and characterization of applications/strategies - Candidate applications/strategies identified and a knowledge base will be developed and characterized sufficiently to enable initial evaluation. This will include the definition of preliminary data requirements.
- Assessing technology needs – Some of the applications/strategies are likely to need technologies beyond data to enable them, and these technologies must be assessed. In some cases, experimental prototypes or models will be developed or other testing conducted in order to fully understand the technologies needed to achieve an environmental improvement strategy and to assess their potential.
- Review and down-select – The candidate applications/strategies will be reviewed with various stakeholder communities, and the most promising initial applications/strategies will be selected for further analyses. Criteria will include stakeholders' acceptance of the strategies with respect to state of the research, research investments already made or anticipated, size and significance of the environmental improvements expected, and potential for deployment. This down-select of applications/strategies will necessarily depend upon others' research and

other available information, which must be validated in subsequent research by this project.

Analyze and Evaluate Candidate Strategies and Applications

This next phase will allow the selected applications/strategies to be further developed, analyzed, and evaluated to confirm that the initial assumptions are still valid and to develop firm expectations of their potential contributions. Some of the activities needed to evaluate the applications/strategies are:

- Detailed and extensive Cost/benefit analyses – undertake basic analytics to assess the costs of current technology and data options, including communications and hardware costs, and compare with the quantified benefits of ITS to the environment. Identify how benefits might be quantified. Might the cost per ton of carbon emissions avoided be an appropriate measure of the benefits of ITS technologies? Conduct a gap analysis to better understand what additional information is required to credibly analyze benefits and costs.

Recommend Strategies/Applications for In-Depth Testing

The third phase will develop recommendations for applications/strategies that should undergo more in-depth testing and evaluation. This will also include the development of a major research investment plan that would articulate whether there is sufficient benefit to move forward with more in-depth research and progress to the next research phase. Some of the activities needed to evaluate the strategies are:

- Stakeholder reviews – Identify and convene stakeholders on an ongoing, consistent basis. The “state of the practice research” will be leveraged to identify stakeholder groups, and individual stakeholders, to review and evaluate the selected environmental improvement strategies. Develop a summary of their roles and anticipated goals/products. Develop a plan for outreach and community organizing. Convene stakeholder group and receive constant input from group throughout life of program. The stakeholder communities will be important consumers and beneficiaries of the evaluation results, and their acceptance and other feedback is essential.
- In-depth workshops - Undertake workshops (including those connected with Dynamic Mobility Applications, Real-Time Data Management and other IntelliDriveSM workshops) to assess what data is desired, what is still needed and what could be done with the data if it existed and how/who would be able to acquire it. These more detailed activities may be needed to further develop and validate specific concepts and strategies.
- Research gaps and requirements – The stakeholder reviews, and the results of evaluation activities, will also allow specific research gaps and requirements to be identified for the strategies. These will be used to develop a focused research program and a corresponding research investment plan that can be considered by the US DOT and others who might further develop the environmental strategies towards deployment.

Policy, regulatory, and knowledge transfer issues and needs

AERIS will explore and, if possible resolve, policy, regulatory, and knowledge transfer issues and needs throughout the life of the program. Research below (and additional research as necessary) will be undertaken as appropriate. The items below are not listed in priority order; rather, priorities will develop as foundational research (and other research) is undertaken.

- Future of VMT Fee: Effect on Applications for Environment: If we are moving toward a VMT-fee environment and VMT can be used as a proxy for emissions, how would ITS facilitate and leverage both? How would EVs and other alternative fuel vehicles complicate this?
- Traveler behavior and incentivization – regulation and incentivization are appropriate governmental roles. In this case, how can government assist transportation users/operators in making greener transportation choices by enabling those choices.
- Private Sector Application Development and Commercialization: How can the JPO support getting the applications or technologies resulting from this research into the marketplace? How can we work with the private sector to ensure applications are feasible and marketable?
- Role of Alternative Energy Vehicles – if there is increasingly popularity with cars that operate with electricity, battery power, or other alternative fuel – or hybrids with fossil fuel – how do we model Vehicle Mileage Tax relationships with emissions (and road wear and tear).
- Carbon Cap and Trade and the Role of ITS: In order for agencies or localities to generate revenue from carbon offsets created due to ITS deployments, what does this mean? Who owns the offsets? Are there recognized entities related to offset policy? How do we evaluate ITS deployments in order to meet cap and trade requirements?
- Regulatory Needs: Are there opportunities for regulatory actions? Are standards of some type needed to bring applications to market?
- What are viable technology alternatives and alternative applications available to users with different needs (economic, financial, informational, and physical)?
- In fee-based ITS applications, are there policy approaches that support the economically disadvantaged?
- Role of pedestrians and bicycles, and systems to facilitate these modes with respect to providing system users the ability to make greener choices.

2. Preliminary Mapping of Work Activities to Research Questions

Research Question	Primary Work Activities (Track Work Activity #)
What vehicle-based data is available?	<i>Foundation (1.1-1.4)</i>
What is the data quality & validity?	<i>Foundation (1.1-1.4)</i>
How can vehicle-based data be integrated with existing traffic and emissions data?	<i>Foundation (1.1-1.4)</i> <i>Identify Candidate Strategies/Applications (2.1-2.4)</i> <i>Analyze/Evaluate Candidate Strategies (3.1)</i> <i>Recommend Strategies and Applications(4.1)</i> <i>Stakeholder Engagement (6.1)</i>
What cross-modal public sector applications are needed & their benefits?	<i>Foundation (1.1-1.4)</i> <i>Identify Candidate Strategies/Applications (2.1-2.4)</i> <i>Analyze/Evaluate Candidate Strategies (3.1)</i> <i>Recommend Strategies and Applications(4.1)</i> <i>Policy and Regulatory Research (5.1)</i> <i>Stakeholder Engagement (6.1)</i>

3. Research Plan Roadmap and Work Activities

Note: Assumptions for determining Work Activity Lead and Contractor FTE

Assumption for federal FTE calculations

Role	Low Level of Activity	Moderate Level of Activity	High Level of Activity
Work Activity Lead	15%	20%	25%

Assumptions for ROM and Contractor FTE Calculations

\$230 for Loaded Hourly Labor/\$478,000 Loaded Yearly Labor

- High Labor Work Activity: 90% Labor 10% ODCs
- Medium Labor Work Activity: 60% Labor 40% ODCs
- Low Labor Work Activity: 30% Labor 70% ODCs

Staffing Assignments

Staffing assignments reflect current roles and are subject to change based on program needs.

Agency	Name	Primary Role	2010 FTE (%)	Est. 2011 FTE (%)	Est. 2012 FTE (%)	Est. 2013 FTE (%)	Est. 2014 FTE (%)
ITS JPO	Marcia Pincus	PM	40	35	25	25	25
	Brian Cronin	CRD	5	5	5	5	5
	James Pol	CRD SME(2)	10	10	10	10	10
	Valerie Briggs	CRD SME	3	3	3	3	3
	Steve Sill	WAL CRD	10	10	10	10	10
FHWA	Robert Ferlis	MML WAL (5)	20	20	20	20	20
	Michael Savonis	MML WAL(3)	20	20	20	20	20
	David Yang	SME	5	20	20	20	20
	Randy Butler	SME	5	5	5	5	5
FTA	Sean Ricketson	SME	10	10	10	10	10
FMCSA	Mike Johnsen	SME	10	10	10	10	10

Roadmap Tracks and Activities:

1. Track 1 – Establishing the Foundation (Analytics)

Undertake foundational analytics to support a rigorous research program that leverages IntelliDriveSM research and data sets/standards to assess what environmentally-relevant data can currently be acquired, assess if this is the “right” data, examine if there are data gaps, and undertake research that will create the most useful data sets and information to support “green choices.” This foundational research will identify opportunities for further research to develop specific strategies for improving environmental decisions by public agencies and consumers and for improving environmental outcomes through ITS.

Track 1: Establishing the Foundation (Analytics)	
ROM\$	\$ 1,900,000
FTE	2.90

Work Activities to be started (by fiscal year):

FY2010 Work Activity Starts

Work Activity 1.1 – Develop AERIS Concept of Operations

Develop a ConOps/PMP for the AERIS research initiative that defines and describes in detail how the proposed research program will be executed.

Work Activity Name: Develop AERIS Concept of Operations			
ROM\$	\$300,000		
Federal Staff	Organization	Name	FTE (%) 10
Activity Lead	HOIT	Marcia Pincus	10
Contractor FTE	0.56		
Deliverables	<ul style="list-style-type: none">▪ Charter▪ Detailed Roadmap▪ Project Management Plan▪ Concept of Operations▪ Stakeholder Management Plan		
Acquisition Strategy	<ul style="list-style-type: none">▪ Noblis support▪ Volpe support		

Work Activity 1.2 – State of the Practice Analyses

Undertake foundational analytics to support a rigorous research program that leverages IntelliDriveSM research. This foundational research will create a baseline body of knowledge about ITS and the environment from various angles. This research will provide the basis for beginning to identify opportunities for further examination and research of applications/strategies for improving environmental decisions by public agencies and consumers and for improving environmental outcomes through ITS. This activity will make use of technical program support staff to conduct broad scans of literature, state of the

practice, directed contacts with research projects, preliminary assessments of candidate strategies, and other technical papers and reports as required. This activity will also include travel by AERIS team to assess and understand current research project results in various locations and build partnerships. This activity may also include a possible RFA to identify ongoing research programs and results that AERIS can leverage through limited partnership and funding support

Work Activity Name: State of the Practice Analyses			
ROM\$	\$400,000		
Federal Staff Activity Lead	Organization TFHRC	Name Bob Ferlis	FTE (%) FY10 &11 10
Contractor FTE	0.75		
Deliverables	<ul style="list-style-type: none"> ▪ Technical Report(s) ▪ Summary report 		
Acquisition Strategy	<ul style="list-style-type: none"> ▪ Noblis support ▪ Volpe support ▪ Possible other support if necessary (NREL, NCSL, etc) 		

Work Activity 1.3 – Determine Environmental Benefit Criteria/Program Scoping

Begin to scope the research effort. Develop defined criteria for grouping and examining the universe of applications/scenarios, and setting up the AERIS program to conduct a reasoned examination and comparison across and between applications/scenarios. This activity will begin to refine the characteristics, indicators, measures of effectiveness, and other aspects of candidate strategies and approaches to evaluating them.

Work Activity Name: Determine Environmental Benefit Criteria/Program Scoping			
ROM\$	\$140,000		
Federal Staff Activity Lead	Organization HEP	Name Mike Savonis	FTE (%) FY10 10
Contractor FTE	0.26		
Deliverables	<ul style="list-style-type: none"> ▪ Technical Report ▪ Workshop 		
Acquisition Strategy	<ul style="list-style-type: none"> ▪ Volpe support ▪ Noblis support ▪ Other support if necessary 		

Work Activity 1.4 – Assessing Environmental Data Resources and Opportunities

As the IntelliDriveSM activities ramp up, particularly with respect to the testbeds, planned IntelliDriveSM Demonstrations, and SPaT research, the AERIS initiative will actively seek opportunities to capture and analyze real-time data by leveraging other research activities. The potential use of infrastructure- and vehicle-generated data will be understood and assessed for use in supporting environmental assessment and improvement strategies. The data resources needed to support possible environmental assessment and improvement applications/strategies (identified under Work Activities 1.2 and 1.3) will begin to be

established. Once the data requirements are known, the corresponding vehicle-generated data resources to meet these requirements will be identified through coordination with existing and new research partners. Finally, it is possible that a prototype cooperative infrastructure and vehicle system will be developed to generate environmentally useful data and to test/model outputs/results.

Work Activity Name: Assessing Environmental Data Resources and Opportunities			
ROM\$	\$1,060,000		
Federal Staff Activity Lead	Organization TFHRC	Name Bob Ferlis	FTE (%) FY10 &11 5
Contractor FTE	1.33		
Deliverables	<ul style="list-style-type: none"> ▪ Technical Report(s) ▪ Demonstration system/model 		
Acquisition Strategy	<ul style="list-style-type: none"> ▪ Noblis support ▪ Volpe support ▪ Leverage additional contractual vehicles related to IntellidriveSM 		

▪ **Major Milestone or Decisions:**

• **Milestones:**

1. Report: ConOps/PMP
2. Report: Stakeholder Management Plan
3. Report: State of the Practice Analysis Results Technical Report
4. Report: Report on Program Scoping
5. Report: Results of Data Capture and Analysis
6. Workshop

• **Go/No Go Decisions**

1. **None: This activity is designed to support Track 2's Go/No Go decision point.**

2. Track 2 – Identify Candidate Strategies and Applications

The objective of this track is to identify a number of ITS applications/strategies that can effectively reduce/mitigate the negative environmental impacts of transportation. This track includes screening and characterization of applications/strategies, assessing technology need, conducting high-level cost benefit analyses, and a review and down-select to a set of candidate applications/strategies that seem to be most effective and/or innovative.

Track 2: Identify Candidate Strategies and Applications	
ROM\$	\$1,080,000
FTE	1.81

Work Activities to be started (by fiscal year):

FY2010 Work Activity Starts

Work Activity 2.1 – Screening and Characterizing Applications/Strategies

Candidate applications/strategies identified through the stakeholder workshop(s)/survey and knowledge base will be developed and characterized sufficiently to enable initial evaluation. This will include the definition of preliminary data requirements.

Work Activity Name: Screening and Characterizing Applications/Strategies			
ROM\$	\$250,000		
Federal Staff Activity Lead	Organization	Name	FTE (%)FY10 &11
		Bob Ferlis	2
Contractor FTE	0.47		
Deliverables	<ul style="list-style-type: none">▪ Technical Report▪ RFI		
Acquisition Strategy	<ul style="list-style-type: none">▪ Noblis▪ Volpe		

Work Activity 2.2 – Assessing Technology Options

Some of the applications/strategies are likely to need additional technologies and/or data to enable them, and these technologies must be assessed and, in some cases, if they do not exist, must be described. In some cases, experimental prototypes or models may be developed or other testing/evaluations conducted in order to fully understand the technologies (or data) needed to achieve an environmental improvement and assess the potential for success (if possible).

Work Activity Name: Assessing Technology Options			
ROM\$	\$350,000		
Federal Staff Activity Lead	Organization	Name	FTE (%)FY10 &11
	HOIT	Steve Sill	5
Contractor FTE	0.44		
Deliverables	<ul style="list-style-type: none">▪ Technical Report		

Acquisition Strategy	<ul style="list-style-type: none"> ▪ Noblis support ▪ Volpe support ▪ Other support
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Work Activity 2.3 – Initial/Preliminary Benefit Cost Analysis

Conduct a preliminary benefit/cost analysis of candidate applications/strategies in order to provide a clearly articulated basis for the first down-selections of candidate strategies to pursue in the next phase of research. Information from research publications, from research partnerships, and from other readily available sources will be used as the basis of the preliminary benefit/cost analysis. Although the benefit and cost metrics are unlikely to be directly comparable between strategies, this initial analysis should be sufficient to permit strategies to be broadly compared and initially screened.

Work Activity Name: Initial/Preliminary Benefit Cost Analysis			
ROM\$	\$255,000		
Federal Staff Activity Lead	Organization HOIT	Name Marcia Pincus James Pol	FTE (%) FY10 &11 5
Contractor FTE	0.48		
Deliverables	<ul style="list-style-type: none"> ▪ Technical Report 		
Acquisition Strategy	<ul style="list-style-type: none"> ▪ Volpe support ▪ Noblis support 		

FY2011 Work Activity Starts

Work Activity 2.4 – Review and Down-select

The candidate strategies will be reviewed with various stakeholder communities appropriate to the strategies, and the most promising initial strategies will be selected for further analyses. Criteria will include stakeholders' acceptance of the strategies with respect to state of the research, research investments already made or anticipated, size and significance of the environmental improvements expected, and potential for deployment. This down-select of strategies will necessarily depend upon others' research and other available information, which must be validated in subsequent research by this project.

Work Activity Name: Review and Down-select			
ROM\$	\$225,000		
Federal Staff Activity Lead	Organization HOIT	Name Marcia Pincus	FTE (%) 15
Contractor FTE	0.42		
Deliverables	<ul style="list-style-type: none"> ▪ Final Report ▪ Workshop ▪ Go/No-Go Decision 		
Acquisition Strategy	<ul style="list-style-type: none"> ▪ Noblis support ▪ Volpe support 		

▪ **Major Milestone or Decisions:**

• **Milestones:**

1. Final Report: Candidate Strategies
2. Workshop: Stakeholder Review

• **Go/No Go Decisions**

1. A Go/No Go decision will be made that the end of this task, after the delivery of the final report, whether to continue with more in-depth research, or conclude that the available universe of applications/strategies does not have enough environmental benefit to warrant further investment.

3. Track 3 – Analyze and Evaluate Candidate Strategies and Applications

The objective of this Track is to examine in-depth the narrowed field of applications/strategies, conduct detailed cost-benefit analyses, modeling, simulations and other activities to validate initial results from Track 2 and further down-select for the most robust applications/strategies.

Track 3: Analyze and Evaluate Candidate Strategies and Applications	
ROM\$	\$3,470,000
FTE	6.53

Work Activities to be started (by fiscal year):

FY2011 Work Activity Starts

Work Activity 3.1 – Analysis of Evaluation Tools and Baselineing

This work activity will analyze potential evaluation tools, build an evaluation process, and develop baseline estimates for which environmental assessment and improvement strategies can be evaluated. An evaluation methodology and process, building upon the range of candidate strategies identified under Work Activity 1.2 and the environmental benefit criteria identified under Work Activity 1.3, will first be developed. A limited number of potential application scenarios will then be established under which the benefits of the candidate environmental strategies can be assessed. Tools and models needed to support that process will be identified, representative application scenarios built, an evaluation testbed assembled, and baseline estimates of the environmental and other key performance measures for the application scenarios will then be developed.

Work Activity Name: Analysis of Evaluation Tools and Baselineing			
ROM\$	\$350,000		
Federal Staff Activity Lead	Organization TFHRC HEP	Name Bob Ferlis Mike Savonis	FTE (%) FY10 &11 25
Contractor FTE	0.66		
Deliverables	▪ Report of evaluation methodology, tools, and models		

	<ul style="list-style-type: none"> ▪ Evaluation testbed of models and application datasets needed to characterize the range of evaluation scenarios ▪ Baseline estimates of the environmental and other key performance measures
Acquisition Strategy	<ul style="list-style-type: none"> ▪ Noblis support ▪ Volpe support

FY2012 Work Activity Starts

Work Activity 3.2 – Benefit/Cost Analyses

Undertake in-depth analytics to assess the costs of current technology and data options, including communications and hardware costs, and compare with the quantified benefits of ITS to the environment. The evaluation methodology, analysis testbed, and baseline estimates of environmental and other key performance measures that were developed under Work Activity 3.1 will allow comparisons between alternative environmental improvement applications/strategies. At the conclusion of this task, the AERIS research will make a determination of which, if any, applications/strategies merit further research investment.

Work Activity Name: Benefit/Cost Analyses			
ROM\$	\$3,120,000		
Federal Staff Activity Lead	Organization TFHRC HEP HOIT	Name Bob Ferlis Mike Savonis James Pol	FTE (%) FY12 & 13 25
Contractor FTE	5.87		
Deliverables	<ul style="list-style-type: none"> ▪ Workshop ▪ Final Report ▪ Go/No-Go Decision 		
Acquisition Strategy	<ul style="list-style-type: none"> ▪ Noblis support ▪ Volpe support 		

▪ **Major Milestone or Decisions:**

• **Milestones:**

1. Final Report: Results of Cost Benefit Analyses
2. Workshop: Stakeholder Review

• **Go/No Go Decisions**

1. A Go/No Go decision will be made at the end of this task, after the delivery of the final report, whether to continue with more in-depth research, or conclude that the available universe of applications/strategies does not have enough environmental benefit to warrant further investment.

4. Track 4 – Recommend Strategies/Applications for In-Depth Testing

Strategies found to offer significant benefits, and reasonable costs, of potential deployment under Work Activity 3.2 will be considered for further investment in in-depth testing.

Track 4: Recommend Strategies/Applications for In-Depth Testing	
ROM\$	\$2,770,000
FTE	5.22

Work Activities to be started (by fiscal year):

FY2013 Work Activity Starts

Work Activity 4.1 – Develop Recommendations

The most promising environmental assessment and improvement strategies will be considered for possible further research investments. This consideration will include not just the benefits/costs themselves, but also the risks and opportunities of enabling technologies, the acceptance of key stakeholders, the feasibility of deployment, the potential for alternative private sector and other public sector investments, and the appropriateness of further US DOT support. A research investment plan will be developed in consultation with key stakeholder communities,

Work Activity Name: Develop Recommendations			
ROM\$	\$2,770,000		
Federal Staff Activity Lead	Organization HOIT	Name Marcia Pincus	FTE (%) FY13 & 14 14
Contractor FTE	5.22		
Deliverables	<ul style="list-style-type: none">▪ Workshops▪ Final Report▪ Research Investment Plan		
Acquisition Strategy	<ul style="list-style-type: none">▪ Noblis support▪ Volpe support		

▪ **Major Milestone or Decisions:**

• **Milestones:**

1. Final Report: Recommendations and Research Investment Plan
2. Workshop: Stakeholder Review

• **Go/No Go Decisions**

1. A Go/No Go decision will be made that the end of this task, after the delivery of the final report, whether to continue with more in-depth research, or conclude that the available universe of applications/strategies does not have enough environmental benefit to warrant further investment.

5. Track 5 – Policy and Regulatory Research

This track is specifically oriented toward contributing to the achievement of objectives under the Policy Goal. Research will be undertaken as appropriate and necessary to support work in Tracks 1-4.

Track 5: Policy and Regulatory Research	
ROM\$	\$1,180,000
FTE	2.23

Work Activities to be started (by fiscal year):

FY2010 Work Activity Starts

Work Activity 5.1 – Initial Review (Foundational)

Research will be undertaken as appropriate and necessary to support work in Tracks 1-2.

Work Activity Name:			
ROM\$	\$200,000		
Federal Staff Activity Lead	Organization HOIT	Name Marcia Pincus	FTE (%) FY10 &11 2
Contractor FTE	0.38		
Deliverables	▪ Technical reports as necessary		
Acquisition Strategy	▪ Noblis support ▪ Volpe support ▪ Other support as needed		

FY2012 Work Activity Starts

Work Activity 5.2 – Policy Issues: Applications/Strategies

Research will be undertaken as appropriate and necessary to support work in Tracks 3-4.

Work Activity Name: Policy Issues: Applications/Strategies			
ROM\$	\$980,000		
Federal Staff Activity Lead	Organization HOIT	Name Marcia Pincus Valerie Briggs	FTE (%) FY 12 , 13, 14 5
Contractor FTE	1.85		
Deliverables	▪ Technical reports as necessary		
Acquisition Strategy	▪ Noblis support ▪ Volpe support ▪ Other support as needed		

- **Major Milestone or Decisions:**
 - Technical reports as necessary

6. Track 6 – Stakeholder Interaction

Identify, meet with, learn from, cooperate with, and get the support of a wide range of stakeholders. Included is attendance at a wide range of workshops, conferences, meetings, etc, to gain knowledge, cultivate support and buy-in for our research, and leverage existing stakeholder activities.

Track 6: Stakeholder Interaction	
ROM\$	\$1,680,000
FTE	3.16

Work Activities to be started (by fiscal year):

FY2010 Work Activity Starts

Work Activity 6.1 – Stakeholder Interaction

Develop a plan for outreach and community organizing, establish and work with an “expert panel” and engage stakeholders in review of research and deliverables. The stakeholder reviews, and the results of evaluation activities, will also allow specific research gaps and requirements to be identified for the strategies. These will be used to develop a focused research program and a corresponding research investment plan that can be considered by the US DOT and others who might further develop the environmental strategies towards deployment.

Work Activity Name: Stakeholder Interactions			
ROM\$	\$1,680,000		
Federal Staff Activity Lead	Organization HOIT	Name Marcia Pincus	FTE (%) 5
Contractor FTE	3.16		
Deliverables	<ul style="list-style-type: none">▪ Stakeholder workshops/reviews▪ Establishment of “Expert Panel”▪ World Congress activities		
Acquisition Strategy	<ul style="list-style-type: none">▪ Noblis support▪ Volpe support▪ ITS America support		

▪ Major Milestone or Decisions:

- Establishment of “Expert Panel”
- Kickoff workshop
- Regular formal stakeholder reviews

7. Budget Breakdown by Fiscal Year

	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	Total Budget
Fiscal Year Total	\$1,930,000	\$2,030,000	2,880,000	\$2,830,000	\$2,430,000	\$12,100,000