

**REQUEST FOR PROPOSALS**

**TECHNICAL ASSISTANCE FOR THE**

**ECORODOVIAS INTELLIGENT TRANSPORTATION SYSTEM MODERNIZATION  
AND EXPANSION PROJECT**

Submission Deadline: **1:00 PM**

**LOCAL TIME**

**FRIDAY, MARCH 16TH, 2012**

Submission Place:

Carlos Paavola  
EcoRodovias Concessões e Serviços, S.A.  
Rodovia dos Imigrantes, km 28,5 - Alvarenga  
São Bernardo do Campo, SP 09845-000, Brazil  
Phone: 011 55 (11) 4359-6150

**SEALED PROPOSALS SHALL BE CLEARLY MARKED AND RECEIVED PRIOR TO THE  
TIME AND DATE SPECIFIED ABOVE. PROPOSALS RECEIVED AFTER SAID TIME  
AND DATE WILL NOT BE ACCEPTED OR CONSIDERED.**

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## **Section 1: INTRODUCTION**

The U.S. Trade and Development Agency (USTDA) has provided a grant in the amount of US\$460,000 to EcoRodovias Concessões e Serviços, S.A. (the "Grantee") in accordance with a grant agreement dated December 21ST, 2011 (the "Grant Agreement"). USTDA will fund the cost of goods and services required for the preparation of a technical assistance ("Technical Assistance") on the proposed EcoRodovias Intelligent Transportation Modernization and Expansion Project ("Project") in Brazil ("Host Country"). The Grant Agreement is attached at Annex 4 for reference. The Grantee is soliciting technical proposals from qualified U.S. firms to provide expert consulting services to perform the Technical Assistance.

### **1.1 BACKGROUND SUMMARY**

EcoRodovias is a Brazilian publicly held logistics company and one of the largest highway concessionaires in Brazil. It covers more than 1,450 km of roads through five highway concessions in various cities, including Sao Paulo. Its concession network handles in excess of 70 million vehicles per year, as well as close to 40% of all cargo traffic in the country. EcoRodovias has 2,028 employees and generated \$830 million in revenues in fiscal year 2010.

Although EcoRodovias has one of the best highway systems in Brazil and is known for its leadership in the adoption of modern ITS technologies, the increasing number of vehicles utilizing its highway system is taking its toll, and failure to maintain a certain level of service could have negative consequences for the company. Given that, the company will be taking several measures to ensure that travel times are improved on the highways it operates, as the company understands efficient traffic flow has been an important consideration in customer usage of highways in the country.

This project is a priority for EcoRodovias. Also, this project is expected to contribute to the government of Brazil's efforts to improve the country's logistics efficiency and highway safety. Portions of a background Definitional Mission is provided for reference in Annex 2.

### **1.2 OBJECTIVE**

The objective of the Technical Assistance is to design a roadmap and implementation plan to modernize and expand EcoRodovias's existing ITS infrastructure. EcoRodovias indicated it needs assistance in the prioritization, modernization and expansion of its ITS technologies, as well as other highway and tunnel related technologies. EcoRodovias is looking for the implementation plan to recommend specific near-term ITS solutions (including corresponding certifications and required personnel training), and to address issues of interoperability with current technologies. The Terms of Reference (TOR) for this Technical Assistance are attached as Annex 5.

### **1.3 PROPOSALS TO BE SUBMITTED**

Technical proposals are solicited from interested and qualified U.S. firms. The administrative and technical requirements as detailed throughout the Request for Proposals (RFP) will apply. Specific proposal format and content requirements are detailed in Section 3.

The amount for the contract has been established by a USTDA grant of US\$460,000. **The USTDA grant of US\$ 460,000 is a fixed amount. Accordingly, COST will not be a factor in the evaluation and therefore, cost proposals should not be submitted.** Upon detailed evaluation of technical proposals, the Grantee shall select one firm for contract negotiations.

#### **1.4 CONTRACT FUNDED BY USTDA**

In accordance with the terms and conditions of the Grant Agreement, USTDA has provided a grant in the amount of US\$ 460,000 to the Grantee. The funding provided under the Grant Agreement shall be used to fund the costs of the contract between the Grantee and the U.S. firm selected by the Grantee to perform the TOR. The contract must include certain USTDA Mandatory Contract Clauses relating to nationality, taxes, payment, reporting, and other matters. The USTDA nationality requirements and the USTDA Mandatory Contract Clauses are attached at Annexes 3 and 4, respectively, for reference.

## **Section 2: INSTRUCTIONS TO OFFERORS**

### **2.1 PROJECT TITLE**

The project is called EcoRodovias Intelligent Transportation Modernization and Expansion Project

### **2.2 DEFINITIONS**

Please note the following definitions of terms as used in this RFP.

The term "Request for Proposals" means this solicitation of a formal technical proposal, including qualifications statement.

The term "Offeror" means the U.S. firm, including any and all subcontractors, which responds to the RFP and submits a formal proposal and which may or may not be successful in being awarded this procurement.

### **2.3 DEFINITIONAL MISSION REPORT**

USTDA sponsored a Definitional Mission to address technical, financial, sociopolitical, environmental and other aspects of the proposed project. Portions of the report are attached at Annex 2 for background information only. Please note that the TOR referenced in the report are included in this RFP as Annex 5.

### **2.4 EXAMINATION OF DOCUMENTS**

Offerors should carefully examine this RFP. It will be assumed that Offerors have done such inspection and that through examinations, inquiries and investigation they have become familiarized with local conditions and the nature of problems to be solved during the execution of the Technical Assistance.

Offerors shall address all items as specified in this RFP. Failure to adhere to this format may disqualify an Offeror from further consideration.

Submission of a proposal shall constitute evidence that the Offeror has made all the above mentioned examinations and investigations, and is free of any uncertainty with respect to conditions which would affect the execution and completion of the Technical Assistance.

## **2.5 PROJECT FUNDING SOURCE**

The Technical Assistance will be funded under a grant from USTDA. The total amount of the grant is not to exceed US\$460,000.

## **2.6 RESPONSIBILITY FOR COSTS**

Offeror shall be fully responsible for all costs incurred in the development and submission of the proposal. Neither USTDA nor the Grantee assumes any obligation as a result of the issuance of this RFP, the preparation or submission of a proposal by an Offeror, the evaluation of proposals, final selection or negotiation of a contract.

## **2.7 TAXES**

Offerors should submit proposals that note that in accordance with the USTDA Mandatory Contract Clauses, USTDA grant funds shall not be used to pay any taxes, tariffs, duties, fees or other levies imposed under laws in effect in the Host Country.

## **2.8 CONFIDENTIALITY**

The Grantee will preserve the confidentiality of any business proprietary or confidential information submitted by the Offeror, which is clearly designated as such by the Offeror, to the extent permitted by the laws of the Host Country.

## **2.9 ECONOMY OF PROPOSALS**

Proposal documents should be prepared simply and economically, providing a comprehensive yet concise description of the Offeror's capabilities to satisfy the requirements of the RFP. Emphasis should be placed on completeness and clarity of content.

## **2.10 OFFEROR CERTIFICATIONS**

The Offeror shall certify (a) that its proposal is genuine and is not made in the interest of, or on behalf of, any undisclosed person, firm, or corporation, and is not submitted in conformity with, and agreement of, any undisclosed group, association, organization, or corporation; (b) that it has not directly or indirectly induced or solicited any other Offeror to put in a false proposal; (c) that it has not solicited or induced any other person, firm, or corporation to refrain from submitting a proposal; and (d) that it has not sought by collusion to obtain for itself any advantage over any other Offeror or over the Grantee or USTDA or any employee thereof.

## **2.11 CONDITIONS REQUIRED FOR PARTICIPATION**

Only U.S. firms are eligible to participate in this tender. However, U.S. firms may utilize subcontractors from the Host Country for up to 20 percent of the amount of the USTDA grant for

specific services from the TOR identified in the subcontract. USTDA's nationality requirements, including definitions, are detailed in Annex 3.

## **2.12 LANGUAGE OF PROPOSAL**

All proposal documents shall be prepared and submitted in English, and only English.

## **2.13 PROPOSAL SUBMISSION REQUIREMENTS**

The **Cover Letter** in the proposal must be addressed to:

**Carlos Paavola  
EcoRodovias Concessões e Serviços, S.A.  
Rodovia dos Imigrantes, km 28,5 - Alvarenga  
São Bernardo do Campo, SP 09845-000, Brazil  
Phone: 011 55 (11) 4359-6150**

**An Original in English and three (3) copies in English of your proposal as well as a CD or Flash Drive with an electronic copy of your proposal must be received at the above address no later than 1:00 pm, on March 16<sup>th</sup>, 2012.**

Proposals may be either sent by mail, overnight courier, or hand-delivered. Whether the proposal is sent by mail, courier or hand-delivered, the Offeror shall be responsible for actual delivery of the proposal to the above address before the deadline. Any proposal received after the deadline will be returned unopened. The Grantee will promptly notify any Offeror if its proposal was received late.

Upon timely receipt, all proposals become the property of the Grantee.

## **2.14 PACKAGING**

The original and each copy of the proposal must be sealed to ensure confidentiality of the information. The proposals should be individually wrapped and sealed, and labeled for content including the name of the project and designation of "original" or "copy number x." The original and three (3) copies as well as the CD or Flash drive should be collectively wrapped and sealed, and clearly labeled, including the contact name and the name of the project.

Neither USTDA nor the Grantee will be responsible for premature opening of proposals not properly wrapped, sealed and labeled.

## **2.15 OFFEROR'S AUTHORIZED NEGOTIATOR**

The Offeror must provide the name, title, address, telephone number, e-mail address and fax number of the Offeror's authorized negotiator. The person cited shall be empowered to make binding commitments for the Offeror and its subcontractors, if any.

## **2.16 AUTHORIZED SIGNATURE**

The proposal must contain the signature of a duly authorized officer or agent of the Offeror empowered with the right to bind the Offeror.

## **2.17 EFFECTIVE PERIOD OF PROPOSAL**

The proposal shall be binding upon the Offeror for NINETY (90) days after the proposal due date, and Offeror may withdraw or modify this proposal at any time prior to the due date upon written request, signed in the same manner and by the same person who signed the original proposal.

## **2.18 EXCEPTIONS**

All Offerors agree by their response to this RFP announcement to abide by the procedures set forth herein. No exceptions shall be permitted.

## **2.19 OFFEROR QUALIFICATIONS**

As provided in Section 3, Offerors shall submit evidence that they have relevant past experience and have previously delivered advisory, technical assistance and/or other services similar to those required in the TOR, as applicable.

## **2.20 RIGHT TO REJECT PROPOSALS**

The Grantee reserves the right to reject any and all proposals.

## **2.21 PRIME CONTRACTOR RESPONSIBILITY**

Offerors have the option of subcontracting parts of the services they propose. The Offeror's proposal must include a description of any anticipated subcontracting arrangements, including the name, address, and qualifications of any subcontractors. USTDA nationality provisions apply to the use of subcontractors and are set forth in detail in Annex 3. The successful Offeror shall cause appropriate provisions of its contract, including all of the applicable USTDA Mandatory Contract Clauses, to be inserted in any subcontract funded or partially funded by USTDA grant funds.

## **2.22 AWARD**

The Grantee shall make an award resulting from this RFP to the best qualified Offeror, on the basis of the evaluation factors set forth herein. The Grantee reserves the right to reject any and all proposals received.

## **2.23 COMPLETE SERVICES**

The successful Offeror shall be required to (a) provide local transportation, office space and secretarial support required to perform the TOR if such support is not provided by the Grantee; (b) provide and perform all necessary labor, supervision and services; and (c) in accordance with best technical and business practice, and in accordance with the requirements, stipulations, provisions and conditions of this RFP and the resultant contract, execute and complete the TOR to the satisfaction of the Grantee and USTDA.

## **2.24 INVOICING AND PAYMENT**

Deliverables under the contract shall be delivered on a schedule to be agreed upon in a contract with the Grantee. The Contractor may submit invoices to the designated Grantee Project Director in accordance with a schedule to be negotiated and included in the contract. After the Grantee's approval of each invoice, the Grantee will forward the invoice to USTDA. If all of the requirements of USTDA's Mandatory Contract Clauses are met, USTDA shall make its respective disbursement of the grant funds directly to the U.S. firm in the United States. All payments by USTDA under the Grant Agreement will be made in U.S. currency. Detailed provisions with respect to invoicing and disbursement of grant funds are set forth in the USTDA Mandatory Contract Clauses attached in Annex 4.

### **Section 3: PROPOSAL FORMAT AND CONTENT**

To expedite proposal review and evaluation, and to assure that each proposal receives the same orderly review, all proposals must follow the format described in this section.

Proposal sections and pages shall be appropriately numbered and the proposal shall include a Table of Contents. Offerors are encouraged to submit concise and clear responses to the RFP. Proposals shall contain all elements of information requested without exception. Instructions regarding the required scope and content are given in this section. The Grantee reserves the right to include any part of the selected proposal in the final contract.

The proposal shall consist of a technical proposal only. A cost proposal is NOT required because the amount for the contract has been established by a USTDA grant of US\$460,000, which is a fixed amount.

Offerors shall submit one (1) original in English, three (3) copies in English and a CD or Flash Drive with an electronic copy of the proposal. Proposals received by fax cannot be accepted.

Each proposal must include the following:

- Transmittal Letter,
- Cover/Title Page,
- Table of Contents,
- Executive Summary,
- Firm Background Information,
- Completed U.S. Firm Information Form,
- Organizational Structure, Management Plan, and Key Personnel,
- Technical Approach and Work Plan, and
- Experience and Qualifications.

Detailed requirements and directions for the preparation of the proposal are presented below.

#### **3.1 EXECUTIVE SUMMARY**

An Executive Summary should be prepared describing the major elements of the proposal, including any conclusions, assumptions, and general recommendations the Offeror desires to make. Offerors are requested to make every effort to limit the length of the Executive Summary to no more than five (5) pages.

### **3.2 U.S. FIRM INFORMATION**

A U.S. Firm Information Form in .pdf fillable format is attached at the end of this RFP in Annex 6. The Offeror must complete the U.S. Firm Information Form and include the completed U.S. Firm Information Form with its proposal.

### **3.3 ORGANIZATIONAL STRUCTURE, MANAGEMENT, AND KEY PERSONNEL**

Describe the Offeror's proposed project organizational structure. Discuss how the project will be managed including the principal and key staff assignments for this Technical Assistance. Identify the Project Manager who will be the individual responsible for this project. The Project Manager shall have the responsibility and authority to act on behalf of the Offeror in all matters related to the Technical Assistance.

Provide a listing of personnel (including subcontractors) to be engaged in the project, including both U.S. and local subcontractors, with the following information for key staff: position in the project; pertinent experience, curriculum vitae; other relevant information. If subcontractors are to be used, the Offeror shall describe the organizational relationship, if any, between the Offeror and the subcontractor.

A manpower schedule and the level of effort for the project period, by activities and tasks, as detailed under the Technical Approach and Work Plan shall be submitted. A statement confirming the availability of the proposed project manager and key staff over the duration of the project must be included in the proposal.

### **3.4 TECHNICAL APPROACH AND WORK PLAN**

Describe in detail the proposed Technical Approach and Work Plan (the "Work Plan"). Discuss the Offeror's methodology for completing the project requirements. Include a brief narrative of the Offeror's methodology for completing the tasks within each activity series. Begin with the information gathering phase and continue through delivery and approval of all required reports.

Prepare a detailed schedule of performance that describes all activities and tasks within the Work Plan, including periodic reporting or review points, incremental delivery dates, and other project milestones.

Based on the Work Plan, and previous project experience, describe any support that the Offeror will require from the Grantee. Detail the amount of staff time required by the Grantee or other participating agencies and any work space or facilities needed to complete the Technical Assistance.

### **3.5 EXPERIENCE AND QUALIFICATIONS**

Provide a discussion of the Offeror's experience and qualifications that are relevant to the objectives and TOR for the Technical Assistance. If a subcontractor(s) is being used, similar

information must be provided for the prime and each subcontractor firm proposed for the project. The Offeror shall provide information with respect to relevant experience and qualifications of key staff proposed. The Offeror shall include letters of commitment from the individuals proposed confirming their availability for contract performance.

As many as possible but not more than six (6) relevant and verifiable project references must be provided for each of the Offeror and any subcontractor, including the following information:

- Project name,
- Name and address of client (indicate if joint venture),
- Client contact person (name/ position/ current phone and fax numbers),
- Period of Contract,
- Description of services provided,
- Dollar amount of Contract, and
- Status and comments.

Offerors are strongly encouraged to include in their experience summary primarily those projects that are similar to the Technical Assistance as described in this RFP.

#### **Section 4: AWARD CRITERIA**

Individual proposals will be initially evaluated by a Procurement Selection Committee of representatives from the Grantee. The Committee will then conduct a final evaluation and completion of ranking of qualified Offerors. The Grantee will notify USTDA of the best qualified Offeror, and upon receipt of USTDA's no-objection letter, the Grantee shall promptly notify all Offerors of the award and negotiate a contract with the best qualified Offeror. If a satisfactory contract cannot be negotiated with the best qualified Offeror, negotiations will be formally terminated. Negotiations may then be undertaken with the second most qualified Offeror and so forth.

The selection of the Contractor will be based on the following criteria:

##### **Technical Experience** (40 points)

- The Contractor shall have substantial and direct experience in all areas of ITS system application and information technology systems to support ITS infrastructure and communications systems, traffic operations, highway traffic management systems, highway traffic safety, electronic toll collection systems, and development of ITS system programs for highway applications, including specific experience in the design, installation, operation, and maintenance of modern ITS systems and equipment.
- The Contractor shall have substantial and direct expertise in ITS systems including, Highway Traffic Management Systems, Electronic Toll Collection (ETC) systems, Free-

Flow Toll Collection Systems, Variable Message Sign (VMS) Systems, Highway Surveillance Systems (CCTV), Automated Incident Detection Systems for highways, Automated Enforcement Systems, Automated Vehicle Location (AVL) Systems, Emergency Telephone Systems, Vehicle Detection, Counting and Classification Systems, Optical Character Recognition (OCR) Systems, Automatic License/Number Plate Recognition Systems (ALPR/ANPR), Vehicle Identity Recognition Systems (VIR), Highway Environmental Monitoring Systems, and Vehicle Weighing Solutions including Weigh-in-Motion Systems (WIM). The Contractor shall have personnel with experience in highway and tunnel lighting systems and tunnel ventilation systems, including self-sustaining lighting systems.

- The Contractor shall have ITS system design and integration service experience and related information technologies expertise to support ITS applications. It is paramount that the Contractor have full knowledge and complete understanding of all concepts and practices in developing recommendations for the application of ITS systems and equipment for highway traffic management, including experience in the development of system-wide ITS integration, development of ITS system master plans, and development of (ITS) equipment and system specifications.
- The Contractor shall have substantial experience in the implementation and operation of Information Technology (IT) systems that are required to be implemented in support of the ITS technologies to be recommended for the management of highways and ITS operational control centers, as well as the required personnel with full knowledge of software and integration requirements for such applications.
- The Contractor shall have substantial and direct experience and actual past involvement in studying, defining, reviewing, and recommending ITS implementation plans (including all necessary ITS systems and equipment), as well as experience in supervising and guiding the implementation of large ITS systems for highways and freeways. The U.S Contractor shall be knowledgeable in the proper use of ITS systems technical standards, regulations, and specifications, with specific knowledge and practicing experience in the application of NTCIP standards.
- The Contractor shall have substantial experience in the areas of ITS system integration and ITS equipment/system inter-operability issues, as well as experience in the implementation of ITS central systems and communications systems for ITS applications.
- The Contractor shall have experience in tolling systems and equipment (manual, automatic, free-flow), radar systems for speed enforcement, radio communications, tunnel equipment and systems (tunnel incident detection, VMS, fire detection systems), and general knowledge of electrical systems that support highway operations (highway lighting, tunnel lighting, toll plaza lighting, power back-up systems, environmental monitoring systems).
- The Contractor shall have experience in the analysis, planning, design, installation, and integration of computerized ITS central systems and in the application of other

information technologies and systems that can support ITS applications to improve highway and toll operational efficiency and safety.

### **Financial Experience**

**(20 points)**

- The Contractor shall have direct experience in conducting economical and financial analysis for the application and implementation of modern ITS systems, equipment and related information technologies. The Contractor shall have extensive experience in the development of capital investment plans/programs for ITS modernization/rehabilitation projects, to include experience in project financing for ITS technology modernization.
- The Contractor shall have experience and prior involvement in identifying eligible financial resources for the acquisition and implementation of ITS systems, equipment and related information technologies (with assistance from the private sector and /or multilateral financial institutions), and experience in identifying new strategies and with ITS services that can lead to increased revenue collection for highway concession operations.
- The Contractor shall have experience in conducting financial analysis, review, and financial planning for highway toll collection operations as well as highway traffic/toll forecasting analysis.

### **Highway Operations Developmental Impact Experience**

**(5 points)**

- The Contractor shall have experience in analyzing and formulating potential developmental impacts as it relates to the application of ITS systems and related information technologies in connection with highway operational efficiency and safety. The Contractor shall have experience in the development and identification of highway related benefits including the areas of infrastructure, market oriented reforms, human capacity building, technology transfer and productivity enhancement, and other developmental benefits associated with the application of ITS technologies on highways.

### **International ITS Experience**

**(10 points)**

- It is preferred that the Contractor have experience at the international level, preferably with experience in Brazil and/or the Latin America Region.

### **Work Plan and Project Methodology**

**(25 points)**

- Adequacy of the proposed work plan and proposed technical assistance approach in responding to the specified Terms of Reference for all activities identified in the TOR. Soundness and thoroughness of the technical approach and work plan presented in the technical proposal and the overall quality and succinctness of the technical proposal. The technical proposal shall include the identification of all key staff proposed for the conduct of the technical assistance with their respective qualifications, availability for the project, and a staffing schedule for each activity.

Proposals that do not include all requested information may be considered non-responsive.

Price will not be a factor in contractor selection.

## ANNEX 1

Carlos Paavola, EcoRodovias Concessões e Serviços, S.A., Rodovia dos Imigrantes, km 28,5  
São Bernardo do Campo, SP 09845-000, Brazil, Phone: 011 55 (11) 4359-6150

### **B – Brazil: Ecorodovias Intelligent Transportation System Modernization and Expansion Project**

POC: Robin Yavuz, USTDA, 1000 Wilson Boulevard, Suite 1600, Arlington, VA 22209-3901, Tel: (703) 875-4357, Fax: (703) 875-4009. ECORODOVIAS INTELLIGENT TRANSPORTATION SYSTEM MODERNIZATION AND EXPANSION PROJECT. The Grantee invites submission of qualifications and proposal data (collectively referred to as the "Proposal") from interested U.S. firms that are qualified on the basis of experience and capability to develop a technical assistance to design a complete roadmap and implementation plan to modernize and expand the existing ITS infrastructure for EcoRodovias Concessões e Serviços, S.A.

This Technical Assistance will provide EcoRodovias a practical plan for the acquisition and implementation of various ITS systems expected to increase efficiency for the control and management of EcoRodovias highways. The ITS Technical Assistance will identify short and medium-term milestones for the acquisition and implementation of various ITS systems. The Terms of Reference (TOR) for this Feasibility Study are attached as Annex 5.

The U.S. firm selected will be paid in U.S. dollars from a \$460,000 grant to the Grantee from the U.S. Trade and Development Agency (USTDA).

A detailed Request for Proposals (RFP), which includes requirements for the Proposal, the Terms of Reference, and a background definitional mission report are available from USTDA, at 1000 Wilson Boulevard, Suite 1600, Arlington, VA 22209-3901. To request the RFP in PDF format, please go to: <https://www.ustda.gov/businessopps/rfpform.asp>. Requests for a mailed hardcopy version of the RFP may also be faxed to the IRC, USTDA at 703-875-4009. In the fax, please include your firm's name, contact person, address, and telephone number. Some firms have found that RFP materials sent by U.S. mail do not reach them in time for preparation of an adequate response. Firms that want USTDA to use an overnight delivery service should include the name of the delivery service and your firm's account number in the request for the RFP. Firms that want to send a courier to USTDA to retrieve the RFP should allow one hour after faxing the request to USTDA before scheduling a pick-up. Please note that no telephone requests for the RFP will be honored. Please check your internal fax verification receipt. Because of the large number of RFP requests, USTDA cannot respond to requests for fax verification. Requests for RFPs received before 4:00 PM

will be mailed the same day. Requests received after 4:00 PM will be mailed the following day. Please check with your courier and/or mail room before calling USTDA.

Only U.S. firms and individuals may bid on this USTDA financed activity. Interested firms, their subcontractors and employees of all participants must qualify under USTDA's nationality requirements as of the due date for submission of qualifications and proposals and, if selected to carry out the USTDA-financed activity, must continue to meet such requirements throughout the duration of the USTDA-financed activity. All goods and services to be provided by the selected firm shall have their nationality, source and origin in the U.S. or host country. The U.S. firm may use subcontractors from the host country for up to 20 percent of the USTDA grant amount. Details of USTDA's nationality requirements and mandatory contract clauses are also included in the RFP.

Interested U.S. firms should submit their Proposal in English and Portuguese directly to the Grantee by 1:00 pm (Local time), March 16<sup>th</sup>, 2012 at the above address. Evaluation criteria for the Proposal are included in the RFP. Price will not be a factor in contractor selection, and therefore, cost proposals should NOT be submitted. The Grantee reserves the right to reject any and/or all Proposals. The Grantee also reserves the right to contract with the selected firm for subsequent work related to the project. The Grantee is not bound to pay for any costs associated with the preparation and submission of Proposals.

**ANNEX 2**

# BRAZIL – INTELLIGENT TRANSPORTATION SYSTEMS DEFINITIONAL MISSION ECORODOVIAS





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## **A. EXECUTIVE SUMMARY**

In June 2011, The U.S. Trade and Development Agency (USTDA) funded a Definitional Mission (DM) with the purpose to support and improve its decision-making process relative to the funding of feasibility studies and technical assistance in the area of Intelligent Transportation Systems (ITS) in Brazil. As a result, USTDA funded the Brazil Intelligent Transportation Systems Definitional Mission (DM) and contracted HEP Transportation Consulting (HEP Consulting) for the conduct of the DM.

Based on the review of the transportation sector and ITS activities in Brazil, along with information received during discussions and meetings held with Brazilian transportation officials, HEP Consulting identified two priority projects that meet USTDA's criteria for grant funding.

The project identified as part of the DM is a technical assistance for ITS system selection and implementation for Ecorodovias Infraestrutura e Logística, S.A. (Ecorodovias). Ecorodovias has been in business since 2003 and is one of Brazil's largest integrated infrastructure logistics firms. Its primary business focus is the operation of intermodal logistics assets, highway concessions, and associated transportation services. Ecorodovias operations are spread among logistics networks that include two logistics terminals – one of which is the largest in Latin America – and five highway concessions covering more than 1,450 km. Ecorodovias' system handled more than 70 million vehicles in 2009, as well as close to 40% of all domestic import and export cargo. The company also has a stake in a payment methods firm that provides related services to infrastructure logistics clients. In 2010 Ecorodovias had 2,028 employees and the overall company revenue reached U.S. \$ 830.2 million.

Ecorodovias has invested substantial amounts of funds in the deployment of ITS systems for its highways and the company presently has several traffic management centers for many of the highways that the company operates. Ecorodovias has developed and constructed a significant ITS infrastructure for the control and management of its highways and the company continues to seek and implement the latest ITS technologies available worldwide. Ecorodovias is a leader in Brazil and South America in the application of ITS technologies for the management of highways and the company is constantly finding ways to stay current with the latest applications of ITS systems.

The Ecorodovias technical assistance assessment will result in the development of a practical plan for the acquisition and implementation of various ITS systems that in turn are expected to increase efficiency for the control and management of Ecorodovias highways which could translate into increased revenues for the company, as well as improve the movement of cargo through the company's logistic centers and highways, while enhancing the movement of U.S. cargo imports through the Brazilian ports and highways. The ITS technical assistance will identify short and medium-term milestones for the acquisition and implementation of various ITS systems. As a result of the technical assistance, Ecorodovias' Diretoria de Tecnologia Corporativa (Corporate Technology Office) is expected to utilize the recommendations from the TA to make decisions in the acquisition and implementation of ITS systems for the company's highways.

USTDA's participation in financing the Ecorodovias' technical assistance is expected to provide technical support to Ecorodovias in the selection of ITS technologies to be implemented in the



company's highway system. Based on the assessments conducted, HEP Consulting determines that funding the Ecorodovias ITS technical assistance is justified as the proposed activity meet USTDA grant funding requirements.

A review of the information obtained as part of the DM indicates that the implementation of the various ITS technologies in Brazil are economically, financially, and technically feasible. Export potential of U.S. goods and services is considered to be moderate given the type of state-of-the-art ITS systems and equipment that are likely to be required by Ecorodovias, with the purpose to upgrade the overall ITS infrastructure for the respective organizations. The primary U.S. export potential for Ecorodovias ITS upgrades has been estimated to be \$ 20 million. Furthermore, it is anticipated that for the period of 2015-2017 the U.S. export potential could reach U.S.\$ 30 million as a result of Ecorodovias ITS investments for that timeframe.

U.S. companies definitely have the expertise required to provide the services and technologies likely to be required by and Ecorodovias. The implementation of new and advanced U.S. technologies for Ecorodovias could represent the mechanism needed to open the door for U.S. companies to penetrate the Brazilian ITS market.

The assessment conducted as part of the DM determines that the project sponsor (Ecorodovias) has the required administrative, financial, and technical capabilities to undertake the implementation of modern ITS systems along their respective transportation facilities, as demonstrated by the project sponsors' prior commitment in pursuing technological modernization of the transportation sector. Ecorodovias' track record is considered to be adequate and acceptable in terms of the agency's ability to plan, finance, and implement ITS technologies in their respective transportation facilities.

The financial assessment conducted for the project sponsors revealed that the agencies have been operating in good financial standings for the last five years, with organizations like Ecorodovias generating substantial profits from services the company provides. A substantial portion of Ecorodovias' revenues have been invested back into the ITS and information technologies areas.

The overall assessment of the foreign competition component for the proposed ITS projects in Brazil indicates that U.S. companies could expect significant foreign competition in the Brazilian ITS market, primarily from European companies that have dominated these markets for quite some time and have established their systems and business relationships in the country. The European presence in Brazil is predominant and substantial in terms of surface transportation technologies that have been implemented over the years. However, U.S. technologies (ITS) in general are known to be of the highest quality and the highest level of reliability and durability which in the long-term often provides for a cost effective way to operate roadways and highways.

In discussions held with Ecorodovias officials, these have expressed the desire to have more U.S. companies participate in tenders or bids in order to introduce U.S. technologies in their respective transportation systems. In particular, Ecorodovias officials indicated that reliability and accuracy are the most important factors in their decision making process to select and procure ITS systems, simply because the company can't afford to implement unreliable systems that require frequent maintenance which later translates into additional cost and loss revenues for the company.



The findings indicate that after the consideration of all elements and factors collectively reviewed under the DM, the requirements for grant funding are met for two viable USTDA activities in Brazil, and as such, *USTDA should consider funding a technical assistance for Ecorodovias ITS system upgrades.*

***This report presents all of the findings and recommendations associated with the Ecorodovias ITS Technical Assistance Project.***

## **B. PROJECT DESCRIPTION**

### **1.0 Surface Transportation Overview – Brazil**

Vehicular traffic has continued to increase in many of Brazil's largest metropolitan areas over the last five years and the trend is expected to continue with additional demand for surface transportation infrastructure in the country. The impact of surface transportation in Brazil's state and municipal economies has grown substantially and has continued to spur demand for additional services and infrastructure. However, building roadway and highway infrastructure is very costly and due to the recent economic downturn, local governments have not been able to keep pace with the need to construct additional capacity by building infrastructure.

Instead, some municipal governments in Brazil are seeking the implementation of Intelligent Transportation Systems (ITS) to improve the efficiency of existing roads and highways. Cities like Sao Paulo, Rio de Janeiro, and Curitiba have been implementing ITS systems with the purpose to improve traffic conditions in city streets as well as traffic safety.

On the other hand, some Brazilian states have resorted to the use of public-private-partnership (PPP) for the construction and management of state highways under private concessions that allow the private sector to invest in the construction of highways and receiving returns based on toll collection and other highway services. Ecorodovias is an example of one of the largest highway concessionaries in Brazil that manages the operation of several state highways in the country with the assistance and utilization of ITS systems.

Some cities and states in Brazil have taken important steps to improve surface transportation in their respective geographical areas while trying to address the increased demand for transportation operations and services. Some cities in Brazil and some road concessionaries like Ecorodovias have invested significantly in the development of ITS infrastructure and advanced technologies for the management of surface transportation facilities. Other cities in Brazil are starting to experience increased traffic congestion, but some cities lack the proper roadway infrastructure to introduce ITS technologies. As time progresses, some smaller cities in Brazil will eventually experience significant traffic congestion that will require some form of ITS implementation.

Key players in the surface transportation sector in Brazil are the Inter-American Development Bank (IADB), the World Bank, and Brazil's National Development Bank (BNDES). Ecorodovias is currently planning the implementation of ITS projects aimed at continuing to modernize their ITS infrastructures and to provide the required technologies for increased roadway capacity, safety, and efficiency. Accordingly, these ITS projects represent good opportunities for U.S. exporters of ITS systems and equipment. Additionally, Brazil will host the 2014 FIFA Soccer World Cup and the 2016 Summer Olympics. These world-known events are expected to bring a



significant influx of visitors to Brazil and transportation officials from the host cities are starting to prepare for these events with the potential utilization of advance technologies such as ITS, IT systems, and security systems.

As the significant growth continues in Brazil, the ITS market in is expected to increase as well as the country has registered sustained economic activity and tourism growth, which should extend well into the next ten years.

USTDA is interested in assisting the public and private transportation stakeholders in Brazil in further developing the transportation sector with potential financial grants for the development of feasibility studies and/or technical assistance covering the area of Intelligent Transportation Systems. As such, HEP Consulting was contracted by USTDA and conducted a comprehensive assessment of several ITS project proposals in Brazil, with the objective to support or improve USTDA's decision-making relative to funding ITS related projects in the country. This report outlines the results from the technical, financial, and economic evaluations undertaken by HEP Consulting for the assessment of ITS project proposals in Brazil.

## **2.0 Assessment of Intelligent Transportation Systems Projects in Brazil**

The U.S. Trade and Development Agency received a proposal from Ecorodovias for financial assistance in connection with the development of a technical assistance in the area of Intelligent Transportation Systems (ITS).

### **2.1 Ecorodovias**

Ecorodovias is one of Brazil's largest highway concessionaires and integrated infrastructure logistics companies. Ecorodovias primary business focus is the operation of intermodal and logistics facilities, highway concessions, and associated services. Ecorodovias operations are spread among logistics networks that include two logistics terminals – one of which is the largest in Latin America – and five highway concessions covering more than 1,450 km. Ecorodovias highway system handled more than 70 million vehicles in 2009, as well as close to 40% of all domestic import and export cargo in Brazil. Ecorodovias also has a stake in a company named *Servicios e Tecnologia de Pagamentos (STP)* which provides services related to electronic toll collection systems and related services to infrastructure logistics clients. Ecorodovias' assets are part of a growing, integrated intermodal logistics network that generates operational and economic activities and whose concessions coincide with the main corridors involved with Brazilian import/export operations and the circulation of domestic market goods, as well as routes crucial to production, consumption, and tourism activities throughout Brazil.

Ecorodovias is a publicly held company that has been registered with the Brazilian Securities and Exchange Commission (CVM) since 2003 with the main stakeholders being *Primav Construcoes e Comercio S.A.* (part of *Grupo CR Almeida*) and *Impregilo International Infrastructures N.V.* (part of *Grupo Impregilo*). The following present's summary information associated with Ecorodovias' various highway concession companies as well as logistics and service companies.

### **Ecovias dos Imigrantes**



Ecovias dos Imigrantes is a subsidiary company of Ecorodovias. Ecovias was created for the construction and management of the Anchieta – Imigrantes highway, a connection between the metropolitan region of Sao Paulo State and the Port of Santos (the largest in Latin America). The Anchieta-Imigrantes highway also connects the Cubatao Petrochemical Complex and the Baixada Santista industrial park. The highway concession covers 177 km long and has annual traffic in excess of 30 million vehicles. The Anchieta-Imigrantes highway is vital to the Brazilian economy, since the highway services the most important export corridor in all of Latin America, as well as the Baixada Santista tourist district.

The Anchieta-Imigrantes highway comprises a very important import and export corridor in Brazil that also connects Sao Paulo to Santo Andre, Sao Bernardo do Campo, Sao Caetano and Diadema factories and the Greater Santos region where there is significant tourism.

Ecovias' largest contractual investment, the construction of the Imigrantes highway which was built within a mountain range, was completed in December of 2002 and was considered a benchmark in Brazilian engineering.

The Anchieta-Imigrantes highway is monitored and managed with the use of Intelligent Transportation Systems that work together to supply information about highway, traffic, and weather conditions in real time in conjunction with an Operations Control Center, which allows detailed planning of routine operations and fast decision making in critical or emergency situations. The ITS system operates 24 hours/day, 365 days per year providing Ecovias and Ecorodovias staff with the necessary tools and equipment to safely manage traffic operations on the highway.

In addition, Ecovias conducts traffic inspections throughout the highway by utilizing traffic monitoring vehicles to detect and provide road-side assistance to motorists along the highway. This includes the use of maintenance vehicles, tow trucks, and emergency medical service units. Emergency telephone systems are installed along the highway to allow motorist access to emergency calls to the control center if assistance is needed for any reason.

### **Ecopistas**

Ecopistas is another one of Ecorodovias' subsidiaries that was created as a concessionaire to manage and operate the Ayrton Senna - Carvalho Pinto highway system. The Ayrton Senna-Carvalho Pinto highway provides a connection between Sao Paulo and the Paraiba Valley, as well as the mountainous region of Campos do Jordao and the beaches of the northern coast. This highway also services the Port of Sao Sebastiao. The concession covers 135 km of highway and has annual traffic flows of 20 million vehicles. The Ayrton Senna-Carvalho Pinto highway has become one of the most important distribution corridors for industrial development as almost two thousand companies have been established in the Paraiba Valley region, including the presence of automakers such as Volkswagen and Ford.

### **Ecovia Caminho do Mar**

The Ecovia Caminho do Mar highway is managed and operated as a concession connecting the City of Curitiba and the Port of Paranagua (Brazil's largest grain export port), via the BR-277 highway. Ecovia Caminho do Mar is 137 km long and has annual traffic of 5 million vehicles, 30% of which represents cargo traffic.



The Ecovia Caminho do Mar company manages state highways PR-508 and PR-407, which traverses Matinhos, Pontal do Parana, and Praia de Leste on the state's coast, and maintains 38 km of access on highways PR-804, PR-408 and PR-411.

### **Ecocataratas**

The Ecocataratas - Cataratas highway serves as an important Mercosur connector that manages a 387 km of highway along BR-277 in the Parana State between Guarapuava and Foz do Iguacu on the Brazil-Paraguay-Argentina border serving one of Brazil's major agricultural regions. The Ecocataratas highway provides a point of entry for products from Argentina and the road is the primary access to the Iguacu Falls attracting many visitors every year. The highway is used by 11 million vehicles every year where 28% of the traffic represents cargo vehicles. The BR-277 highway is used to transport agricultural products from western Parana to Mato Grosso do Sul at Paranagua. Ecocataratas administers and manages the BR-277 highway through the use of ITS systems that have been implemented along the facility.

### **Ecosul – Rodovias do Sul**

Ecosul manages the largest highway network in Brazil, known as the Polo Rodoviario de Pelotas, which includes 624 km of federal roadways. Ecosul manages the concession of the highway system which includes five major roadways that are vital to the regional and national economies, the longest of them known as the "Mercosur Corridor" is 124 km long and is used to transport millions of tons of cargo each year. The Camaquã-Pelotas stretch of Highway BR-116 is the main connection between Porto Alegre and the northern part of Rio Grande do Sul. The highway systems operated and managed by Ecosul also includes the Pelotas-Bage and Pelotas-Santana da Boa Vista stretches. Of the 8 million vehicles that use the Ecosul highways each year, 46.3% represent cargo traffic. In addition to its economic importance, the highway network provides access to the main border crossing for Argentine and Uruguayan tourists travelling to destinations along the Brazilian coast.

### **Ecopatio Logistica Cubatao and Ecopatio Logistica Imigrantes**

The Ecorodovias group also has operations in the port logistics. Ecopatio Logistica Cubatao provides an area measuring 443,000 square meters that provides an intermodal terminal to handle the flow of trucks and cargo bound for the Port of Santos. Similarly, Ecopatio Logistica Imigrantes, a joint venture with Bracor Investimentos Imobiliarios, is constructing 665,000 square meters of intermodal space near the Imigrantes highway. When completed, the complex will have a 60,000 square meters of distribution center space to service Colgate-Palmolive operations.

Ecopatio Logistica Cubatao is Latin America's largest intermodal terminal with 442,700 square meters operating in conjunction with the Port of Santos. Ecopatio Logistica Cubatao has been providing intermodal services since 2008 as a cargo vehicle regulating terminal with metal-working shop to repair containers for the world's main container leasing/shipping companies and customs export terminal services.



Ecopatio has an operational control center with centralized video monitoring (CCTV system), in addition to large paved areas, buildings, and maintenance facilities. In addition, Ecopatio utilizes a variety of software and information technologies for managing the export of outbound cargo that passes through the intermodal facilities. Other technologies being used by Ecopatio include cargo scanners, cargo detection systems, truck weight systems, and cold storage facilities.

Ecopatio continues to invest in information technologies for its intermodal operations and system management to guarantee the timely deliveries to and from the Port of Santos.

### Servicios e Tecnologia de Pagamentos (STP)

Since 2003 Ecorodovias has been providing services to its subsidiary companies involved in toll collection operations for concessioned highways. Servicios e Tecnologia de Pagamentos (STP) is a leader in the implementation of electronic toll collection systems and parking payment systems for malls and airports. The company operates in six Brazilian states, 43 highway concessionaires and 220 toll plazas, covering 86% of toll roads in Brazil.

### Ecorodovias Traffic Growth – 1<sup>st</sup> Half of 2011

Consolidated traffic in terms of number of equivalent paying vehicles rose 16.3% in the first half of 2011 (1H11) compared to the same period for the previous year. Growth in consolidated traffic was 11.7% for commercial vehicles and 20.8% for passenger vehicles. Considering the traffic adjustment for passenger vehicles on both directions at Ecopistas between January 1 and February 17, 2010, consolidated growth was 11.8%. On July 1, 2011, the Ecovias dos Imigrantes and Ecopistas toll tariffs received contractual adjustments of 9.8% and 6.6%, respectively. The table below demonstrates Ecorodovias highway traffic growth between 2010 and 2011 for the first half of 2011.

Table N <sup>o</sup> . 1 Traffic Volume (vehicle-equivalents-thousands)	1H11	1H10	% Change
<b>Commercial</b>			
Ecovias dos Imigrantes	12,019	11,620	3.4%
Ecopistas	13,391	11,219	19.4%
Ecovia Caminho do Mar	5,127	4,585	11.8%
Ecocataratas	7,431	6,795	9.4%
Ecosul Rodovias do Sul	8,714	7,559	15.3%
<b>Total</b>	<b>46,682</b>	<b>41,778</b>	<b>11.7%</b>
<b>Passenger</b>			
Ecovias dos Imigrantes	15,909	13,995	13.7%
Ecopistas	26,404	20,271	30.3%
Ecovia Caminho do Mar	2,032	1,856	9.5%
Ecocataratas	5,063	4,575	10.7%
Ecosul Rodovias do Sul	2,748	2,491	10.3%
<b>Total</b>	<b>52,156</b>	<b>43,188</b>	<b>20.8%</b>
<b>Commercial + passenger</b>			
Ecovias dos Imigrantes	27,928	25,615	9.0%
Ecopistas	39,795	31,490	26.4%



Ecovia Caminho do Mar	7,159	6,441	11.1%
Ecocataratas	12,494	11,370	9.9%
Ecosul Rodovias do Sul	11,462	10,050	14.0%
<b>CONSOLIDATED</b>	<b>98,838</b>	<b>84,966</b>	<b>16.3%</b>

Note: Vehicles-equivalent is a basic reference unit used in toll collection statistics in Brazil. Light vehicles, such as passenger vehicles, correspond to one vehicle-equivalent. Heavy vehicles, such as trucks and buses, are converted into axle-equivalents by a multiplier applied to the number of axles per vehicle, as established in the terms of each concession contract

**Information Technology (IT) and Intelligent Transportation Systems (ITS)**

The amount of ITS systems that the Ecorodovias group operates and maintains is significant and it covers a wide array of systems and technologies that aid the company and its subsidiaries in the daily operation of highway and logistic operations. Ecorodovias and its subsidiary companies rely heavily on ITS and IT systems for the companies’ administration, management, and revenue collection. As such, Ecorodovias places a high priority on ITS and IT systems and the company has invested consistently over the years on advanced technologies that are capable of providing safe, reliable, and efficient mechanisms for the operation of its highways and other operations.

The following table provides a summary of the amount and type of IT and ITS systems that Ecorodovias currently operates.

<b>Table N°. 2 ITS &amp; Automation</b>	
ITS	36 VMS
	63 Traffic Counter Systems
	235 Cameras (Road Monitoring)
	8 Environmental monitoring units
	384 Emergency Phones
	45 Highway Radars
Weighting Systems	14 Truck weigh stations
Toll	262 Optical sensors
	1,183 Contact sensors
	405 Video auditing cameras
Electrical Systems	84 Power generators
	42 Tunnel Turbines
Radio Communication	139 Fixed stations
	67 Mobile radios
Network	310 km (192 miles) optical fiber network



Automation Projects	159 Automation projects in 2011
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The table below demonstrates the amount and type of corporate (IT) systems that Ecorodovias currently operates.

<b>Table N°. 3 IT Corporate Systems</b>	
Corporate System	54 Different IT Systems
	6,574 Software modifications applied in 2010
Corporate System	225 Servers
	157 Switches and Routers
	2,148 Notebooks/Desktops
	34 Major Communication Links
Toll System	124 million traffic records (2010)
	858 million photographic records (2010)
	1.8 billion traffic sensor records (2010)
Projects	230 IT projects expected to be completed in 2011

In discussions with Ecorodovias representatives they indicated that the areas of concentration for ITS systems include VMS, non-invasive highway traffic counting systems, alternatives to loop detection systems, weigh-in-motion systems, emergency telephone systems (call box), CCTV systems, enforcement systems, Object Character Recognition Systems (OCR), traffic management systems, radar systems for highway applications, LED lighting, solar energy generation, electronic toll collection systems, free flow toll collection systems, and other technologies that may be available to enhance operational efficiency and safety for Ecorodovias highways.

**Technical Assistance for ITS – Ecorodovias**

Ecorodovias is one of the largest highway concessionaries in Brazil and a key player in the logistics market in that country. Ecorodovias has invested substantial amount of funds in the deployment of ITS systems for its highways and the company presently has several traffic management centers for many of the highways that the company operates. Ecorodovias has developed and constructed a significant ITS infrastructure for the control and management of its highways and the company continues to seek and implement the latest ITS technologies available worldwide.

Ecorodovias is a leader in Brazil and South America in the application of ITS technologies for the management of highways and the company is constantly finding ways to stay current with the latest applications of ITS systems. Ecorodovias is engaged in the planning process to upgrade, replace, and/or modernize the company’s ITS systems which requires a comprehensive evaluation of the latest state-of-the-art ITS technologies available in the market today. As a result, Ecorodovias has requested financial assistance (in the form of a grant) from USTDA for the conduct of a technical assistance (TA) to evaluate ITS technologies that are applicable to Ecorodovias highway operations.



The technical assistance assessments will result in the development of a practical plan for the acquisition and implementation of various ITS systems that in turn are expected to increase efficiency for the control and management of Ecorodovias highways which could translate into increased revenues for the company. The ITS technical assistance will identify short and medium-term milestones for the acquisition and implementation of various ITS systems by Ecorodovias.

As a result of the technical assistance, Ecorodovias' Diretoria de Tecnologia Corporativa (Department of Corporate Technology) is expected to utilize the recommendations from the TA to make decisions in the acquisition and implementation of ITS systems for the company's highways. It is expected that the technical assistance will be conducted over a period of seven months and the implementation plan shall recommend the various types of ITS technologies, including the necessary systems, equipment, certifications, implementation procedures, and required personnel training that should be considered for the deployment of such ITS systems at Ecorodovias' highways.

The technical assistance will evaluate the current ITS infrastructure and technical aspects of the ITS equipment and systems being utilized at the various Ecorodovias highways and determine if any of the existing ITS systems should be upgraded, enhanced, and/or replaced with modern ITS technologies, as well as the identification of new ITS systems that are likely to improve Ecorodovias highway operational efficiencies and safety.

Some of the technologies that will be evaluated include (but not limited to) CCTV systems, ETC, AVL, VMS, Incident Management Systems, Emergency Telephone Systems, Vehicle Detection, Counting and Classification Systems, Optical Character Recognition Systems (OCR), Electronic Enforcement Systems, Automatic License/Number Plate Recognition Systems (ALPR/ANPR), Vehicle Identity Recognition Systems (VIR), Environmental Monitoring Systems, Traffic Management Center software and systems, Vehicle Weighing Solutions including Weigh in Motion Systems (WIM), and Tunnel Lighting and Ventilation Systems, self-sufficient or partially self-sufficient regarding power generation (such as eolic or fotovoltaic generation).

Tolls, incidents, traffic congestion, and weather are major contributors to creating delay at highways. There continues to be new developments in ITS technology that lead to enhancements of highway operation, traffic management and safety that include automation, information systems, and other technologies and applications uniquely tailored to address highway-related operations. At the same time, there are a number of applications and software programs that address and support highway operators in maintaining an efficient and systematic flow of traffic along the highways. The technical assistance will consider the technologies and applications that may be relevant to improving the management and operation of Ecorodovias highways in Brazil.

The final product of the TA will be the development of a practical Implementation plan for the acquisition and deployment of ITS systems for Ecorodovias including the development of specific projects for different applications of the recommended ITS technologies for the various highways managed by Ecorodovias in Brazil.

### **C. PROJECT SPONSOR CAPABILITY AND COMMITMENT**



This section of the report describes the project sponsor capability and commitment to support and expand the acquisition and deployment of ITS systems by Ecorodovias in Brazil.

## 1.0 Ecorodovias

Ecorodovias is one of the leading logistics and highway concessionaires in Brazil with more than five highway concessions in that country. Ecorodovias has invested significantly over the years in ITS technologies, programs, and training that has led Ecorodovias to become one of the premier highway operators and intermodal service provider in Brazil. Ecorodovias continues to ensure that its overall business strategy is aligned with the trends of modern technology developments to support the company's growth and quality of service.

Ecorodovias has continued to strengthen the company's growth strategy towards marketing and delivering a comprehensive range of traffic management solutions and services for the highway industry in Brazil and the company has focused on the need to expand Ecorodovias services beyond their highway environment to include the areas of electronic payment system, intermodal and logistic services, and more.

Ecorodovias has not only demonstrated the commitment to expand its services and investment in ITS technologies, but the company has placed emphasis on creating an adequate framework for monitoring the company's control environment by implementing a company governance framework to support the various functions to enhance corporate accountability. Ecorodovias has substantial human capital and the company continues to invest in research and development allowing Ecorodovias to constantly find innovative solutions in highway traffic management and intermodal and logistic services. Ecorodovias' ability to implement innovative solutions is well demonstrated by the many projects that the company has delivered in Brazil for many years.

In addition, Ecorodovias has developed an information technology plan which provides the strategic view and direction for the company's IT organization and management. The IT plan provides strategies, rules, and procedures by which information technology is to be structured and implemented to accommodate the different types of highway activities, traffic volume, and other services.

The continued growth in highway traffic along with significant demand that traffic places on highway infrastructure, requires an effective and sustainable strategy to meet the challenges that highway concessionaire's face in today's growing highway business. The rapid growth of traffic activity in Ecorodovias' highways has required the company to seek alternative systems that can provide accurate and reliable information to more efficiently manage the Ecorodovias highways in Brazil.

Through the massive highway infrastructure development that Ecorodovias embarked on several years ago, the company has once again demonstrated that is capable and committed to further modernizing its intelligent transportation systems infrastructure.

Ecorodovias corporate governance structure consists of three main divisions which include the Board of Directors, the Board of Directors' Committees (Auditing, Evaluation, and Compensation), and the Executive Board.



The Board of Directors provide business guidance, approval of strategic and other company plans, and establishes specific guidelines for the purpose of monitoring business performance for the entire Ecorodovias conglomerate.

The Audit, Evaluation, and Compensation Committees normally get involved in monitoring and recommending approval of projects to Ecorodovias' Board of Directors. Ecorodovias Executive Board exercises the management strategies for the Ecorodovias group. Ecorodovias reports the utilization of the following institutional guidelines as a reference for its officers and employees:

- Add value to business with excellence in management and operations
- Anticipate results and minimize investment risk with strategic partnerships
- Ensure representative and competent participation in the highway concessions market
- Stakeholders' satisfaction is the compensation and business continuity base
- Maintain standards in corporate conduct and social responsibility
- Preserve and respect the environment
- Expand business prospects focused on continuity
- Build a corporate image that keeps the business on a solid footing

## **1.1 Ecorodovias Corporate Technology Office**

Ecorodovias has an entire department dedicated to the development, operations, and maintenance for the company's information technologies and intelligent transportation systems. Ecorodovias' Corporate Technology Office is comprised of two main divisions known as the Systems, Infrastructure, and Automation Division and the second one named the Technical Services Division. Under the Systems, Infrastructure, and Automation Division, there are four sections that include infrastructure, Systems, Preventive Maintenance/Operations, and ITS/Automation. Under the Technical Services Division there are four sections that include Maintenance, Help Desk, Call Center, and Repair Laboratory. The Technical Services Division is responsible for the maintenance of all highway and IT systems for the company, staffing and operating a Help Desk and Call Center for highway operations, and finally a maintenance shop where repairs are made for many of the systems that Ecorodovias operates on its highways.

Ecorodovias' Corporate Technology Office provides its services to other companies within the corporate conglomerate including Ecovia, Ecosul, Ecovias, Ecocataratas, Ecopistas, Ecopatio, Ecopatio Inmigrantes, Ecopatio Viracopos, Elog Sul, and Elog Sudeste.

The DM findings indicate that Ecorodovias has the capability to undertake the development of ITS projects and the company has demonstrated the commitment to support and strengthen the transportation sector in Brazil.

## **D. IMPLEMENTATION FINANCING**

### **1.0 Financial Review**

This section of the report describes the process that was followed during the financial evaluation of potential ITS projects in Brazil, the financing methods expected to be utilized for the HEP Transportation Consulting



implementation of ITS related projects, a report on the financial assessment performed for Ecorodovias, a summary of the discussions held with those financial institutions that were contacted during the DM assessment process, and an estimate for the capital cost Ecorodovias ITS project.

The financial review as part of the DM consisted of the following steps:

- Identification of ITS technology modernization projects and objectives,
- Evaluation of assumptions for future traffic conditions and forecast,
- Identification and screening of reasonable ITS projects and alternatives,
- Review of the implementation periods for selected ITS projects,
- Identification, quantification, and evaluation of potential ITS projects,
- Measurement of impact on the transportation system with modern technologies,
- Evaluation of cost estimates for the selected projects,
- Evaluation of financial resources most likely to be utilized for funding the proposed ITS projects.
- Review of financial institutions that are likely to finance the ITS projects, and
- Development of recommendations for ITS technology modernization projects.

## 2.0 Ecorodovias Financial Assessment

While many highway concession operators around the world have experienced a decrease in revenues collected due primary to the global economic downturn, Ecorodovias has weathered the economic situation better than many other highway operators. With the significant growth that Brazil has experienced in recent years, highway traffic has seen an increase over the last two years which has represented additional revenues for Ecorodovias. Additionally, logistic and multimodal operations have also increased in Brazil due primarily to increase activities in the Brazilian ports which has also allowed the Ecorodovias group to grow financially in this area.

Ecorodovias has established sound economic and internal controls that play a key role in providing an objective view and continuous assessment of the effectiveness of the financial operation of the company.

The financial standings for Ecorodovias was reviewed to determine company's financial status as well as to determine if the company has the financial capabilities and resources necessary to fund the implementation and acquisition of ITS projects and products for the various highways that Ecorodovias operates under various private concessions. Ecorodovias total revenues recorded in 2010 was U.S. \$830.2 million and the total net income reported for the same year reached U.S. \$343 million.

The review of the financial statements for Ecorodovias revealed the following:

- In the first quarter of 2011 (1Q11), highway traffic grew by 21.1% in terms of equivalent paying vehicles over the first quarter in 2010 (1Q10);
- Net revenue grew by 14.7% to U.S. \$ 241 million in 1Q11, versus U.S. \$ 211 million in 1Q10. Excluding construction revenue, net revenue was U.S. \$ 225 million in 1Q11, 28.2% more than in 1Q10 under the same comparison basis and,
- Net income in 1Q11 was U.S. \$ 53 million, 47.1% up on the U.S. \$ 36 million recorded in 1Q10.



The following table demonstrates the financial reports for Ecorodovias as a comparison of earnings between the first quarters in 2010 and 2011.

Economic Indicators (U.S. \$ in Millions)	1Q2011	1Q2010	Change %
Gross Revenue	261	223	17.1%
Net Revenue	241	211	14.7%
Adjusted Net Revenue	225	175	28.2%
<b>Traffic Volume (Thousands/vehicles-equivalents)</b>	<b>49,335</b>	<b>40,735</b>	<b>21.1%</b>

Highway traffic volumes were reviewed for those highways operated by the Ecorodovias group to find that the consolidated traffic (in terms of number of equivalent paying vehicles) increased 21.1% over the first quarter of 2010.

Commercial traffic grew by 10.2% over the first quarter in 2010 while passenger traffic grew by 31.3% in the first quarter of 2011 which is a reflection of the continued heavy passenger vehicle traffic in the tourist regions on the southeastern Brazil near the borders with Argentina, Paraguay, and Uruguay.

	1Q2011	1Q2010	Change %
<b>Commercial</b>			
Ecovias dos Imigrantes	5,677	5,442	4.3%
Ecopistas	6,375	5,491	16.1%
Ecovia Caminho do Mar	2,277	2,213	2.9%
Ecocataratas	3,705	3,546	4.5%
Ecosul Rodovias do Sul	3,741	3,060	22.2%
<b>Total</b>	<b>21,775</b>	<b>19,752</b>	<b>10.2%</b>
<b>Passenger</b>			
Ecovias dos Imigrantes	8,744	7,689	13.7%
Ecopistas	13,420	8,388	60.0%
Ecovia Caminho do Mar	1,284	1,187	8.2%
Ecocataratas	2,635	2,368	11.3%
Ecosul Rodovias do Sul	1,477	1,351	9.3%
<b>Total</b>	<b>27,560</b>	<b>20,983</b>	<b>31.3%</b>
<b>Commercial + Passenger</b>			
Ecovias dos Imigrantes	14,421	13,131	9.8%
Ecopistas	19,795	13,879	42.6%
Ecovia Caminho do Mar	3,561	3,400	4.7%
Ecocataratas	6,340	5,914	7.2%
Ecosul Rodovias do Sul	5,218	4,411	18.3%
<b>Consolidated</b>	<b>49,335</b>	<b>40,735</b>	<b>21.1%</b>



In addition, the toll revenue collection for the highways operated by the Ecorodovias group was reviewed for the first quarter of 2011 and compared to the first quarter of 2010 to find that toll revenue accounted for 73.9% of consolidated gross revenue for the company, amounting to U.S.\$ 193 million which reflects a 13.9% increment from the first quarter in 2010. Additionally, ancillary revenues (which include to those revenues derived from the monitoring of special cargo, advertising boards, utilization of right-of-way/accesses and other services) accounted for 2.6% of Ecorodovias group's gross revenue in the first quarter of 2011.

Construction revenues which are established by concession contracts and include improvements made to the various highways in terms of infrastructure, represented U.S.\$ 18.3 million in the first quarter of 2011 or 49.8% lower than in the first quarter of 2010.

<b>Gross Revenue (U.S.\$ Million)</b>	<b>1Q2011</b>	<b>1Q2010</b>	<b>Change %</b>
Highway Concessions			
Revenue from Toll Collection	193	171.2	13.9%
Ecovias dos Imigrantes	97.3	87.7	10.9%
Ecopistas	26.3	21.6	21.6%
Ecovia Caminho do Mar	24.6	22.3	10.1%
Ecocataratas	28.3	24.9	13.4%
Ecosul-Rodovias do Sul	18.6	14.6	27.7%
Ancillary Revenues – Concessions	6.9	6.6	5.2%
Construction Revenues	18.5	36.9	-49.8%

STP is Ecorodovias' subsidiary that provides electronic toll collection services for all concessions. The total installed tags associated with the Sem Parar/ Via Facil system reached 2,792,000 on March 31, 2011, representing an increase of 38.6% over the period of 2010. Electronic toll collection represented 39.1% of the overall toll collected for all concessions. Gross revenue from STP came to U.S. \$ 58.8 million in the first quarter of 2011, reflecting an increment of 1.7% when compared to the first quarter of 2010. Ecorodovias holds 12.75% ownership of STP and as such the table below demonstrates total STP gross revenues as well as Ecorodovias percentage gross revenues.

<b>Gross Revenue (U.S.\$ Million)</b>	<b>1Q2011</b>	<b>1Q2010</b>	<b>Change %</b>
Electronic Toll Collection Services			
Revenue from Services (100%)	58.8	57.8	1.7%
Revenue from Services (12.75%)	7.5	7.3	1.7%

Other services provided by Ecorodovias were down on the first quarter of 2011 compared to the first quarter of 2010.



The review of Ecorodovias financial statements indicates that the combined net revenue came to U.S. \$ 243.8 million in 1Q11, taking into account the construction revenue introduced by the new accounting standards, an increase of 14.7% over 1Q10. Net revenue (excluding Construction Revenues) came to U.S. \$ 225.3 million during the first quarter of 2011.

<b>Net Revenue (U.S. \$ Million)</b>	<b>1Q2011</b>	<b>1Q2010</b>	<b>Change %</b>
Highway Concessions	208.4	204.3	2.0%
Logistics	30.9	3.11	N/A
Revenue from Services	4.3	5.1	-15.7%
Consolidated Revenues	243.8	212.6	14.7%
Consolidated Revenues ( excluding Construction)	225.3	175.7	28.2%

Ecorodovias representatives indicated that the likely sources of financing the acquisition and implementation of the ITS systems would come from the company's operating and annual capital budgets which is supported by highway toll collection revenues and other service revenues. Since the utilization of ITS systems on the highways is an integral part of the overall operation and success Ecorodovias highway concession program, Ecorodovias representatives understand the importance of investing in the acquisition and implementation of state-of-the-art ITS systems that would serve Ecorodovias highways now and in the future. At the same time, Ecorodovias understands that highway capacity must keep pace with the forecast growth in highway traffic in Brazil and as such, Ecorodovias is committed to working with all of its highways concession subsidiaries on the modernization of ITS systems to ensure that the highways are managed as efficiently as possible to maintain optimum operational highway capacities and revenues.

Ecorodovias representatives confirmed that funding would be available for the acquisition and implementation of modern ITS systems, but the company needs to understand the level of funding required, the most suitable and effective ITS technologies available, and ultimately a plan that paves the way for the effective and efficient implementation of ITS technologies to maintain and/or increase operational efficiencies, capacity, and safety for Ecorodovias' highway concession program.

As part of the financial assessment, HEP Consulting reviewed the latest financial reports for Ecorodovias to determine that the company's financial standing is sound and the company is producing substantial revenues and profits. The financial assessment involved the review of the Ecorodovias' ITS capital improvement program to determine how the agency supports the specific areas of highway operation and administration and determined that Ecorodovias currently invest substantial amounts of funds in the operation, maintenance, and upgrade of the company's ITS and IT infrastructures. Also, as part of the financial assessment, current revenues that support the overall highway operations of Ecorodovias highways and its facilities were reviewed to conclude that after expenditures and debt service payments, the company still operates with substantial profits sufficient to continue to support the company's ITS development initiatives.

The financial review conducted for Ecorodovias indicates that the company should demonstrate a healthy financial standing and good performance in future years, as highway traffic and revenues are expected to increase.



The financial review conducted by HEP Consulting revealed that Ecorodovias operates with profitable margins, which has allowed the company to continue to invest in ITS systems and equipment. Ecorodovias has a history of funding highway infrastructure and ITS modernization with a combination of the company's own financial resources supplemented at times by financial loans from local private sector banks.

HEP Consulting reviewed Ecorodovias' procurement methods to determine that the company's Corporate Technology Office carefully reviews the acquisition of ITS and IT systems seeking the highest quality systems that provide the substantial level of accuracy and reliability with cost usually being a secondary factor in the decision making process for equipment acquisition. Additionally, Ecorodovias has the proper licenses to import goods into Brazil without having to use local import brokers which allows Ecorodovias to save on import service fees. Given the fact that Ecorodovias' primary factor in their decision making process for equipment and system acquisition is quality, reliability, and low life cycle cost, this should be very important to USTDA because it could promote U.S. companies' competitiveness as opposed to other procurement environments where low bids are the standard for product selection.

Ecorodovias has invested in excess of U.S.\$ 35 million over the last three years in ITS system acquisition and development of ITS infrastructure and the company now wishes to further invest in ITS and other highway technologies for the period of 2012 to 2014. A review of Ecorodovias' Corporate Technology Office capital investment plans indicate that the company is expected to invest approximately U.S.\$36 million in ITS systems and other highway/tunnel equipment during the period of 2012 to 2014. The intent is for Ecorodovias to work on a new initiative with the purpose to replace, upgrade, and/or modernize various ITS systems and to continue to promote more efficient transportation services and increase revenues for the company.

Based on the financial assessment conducted, HEP Consulting determines that Ecorodovias and its highways subsidiaries enjoy excellent financial standings and the companies are very capable of continuing to fund ITS infrastructure and modern ITS technology acquisitions to support and strengthen Ecorodovias' highway concession program in Brazil. The result from the financial assessment reveals that Ecorodovias and its highway subsidiary companies operate under self-sustainable and independent corporate-style programs that provide for the sound administration of the companies generating substantial annual revenues and profits for its shareholders.

### **3.0 Financial Institutions**

HEP Consulting made contact with some financial institutions with the purpose to determine if the Ecorodovias ITS technical assistance would meet the requirements for financial participation from the institutions identified, as well as to determine if these institutions had any on-going financing activities in the transportation sector in Sao Paulo.

#### **3.1 BNDES**

The Brazilian National Development Bank (BNDES) is a federal public company that is associated to the Brazilian Ministry of Development, Industry, and Foreign Trade, which has an objective for long term financing of endeavors that contribute towards the development of the



country. Contact was not made with BNDES as Ecorodovias staff indicated that the agency would not seek financial assistance from BNDES for the implementation of ITS systems.

### 3.2 International Finance Corporation - (IFC)

HEP Consulting contacted Mr. Ravi Bugga, Senior Manager for IFC Infrastructure and Mr. Gabriel Goldschmidt to inquire about the IFC's involvement in the surface transportation sector in Sao Paulo and to determine if the Ecorodovias ITS project was a good candidate for the corporation to support the financing of the ITS activities in Brazil. Mr. Bugga indicated that the IFC is considering the financing of toll collection systems in other countries besides Brazil, and as such, in principle, ITS technologies could be finance by the IFC. However, Mr. Bugga pointed out that concerning the Ecorodovias ITS implementation, that local commercial Brazilian banks offer better opportunities for this type of implementation.

Additionally, Mr. Goldschmidt indicated that the IFC is familiar with Ecorodovias and the IFC would be happy to help Ecorodovias, but there is typically sufficient appetite from local Brazilian banks to finance investments such as ITS implementation.

### 4.0 Estimated Capital Cost for Project Implementation

This section of the report presents the estimated capital cost for the recommended ITS system implementations by Ecorodovias. Regarding Ecorodovias ITS modernization project, the cost estimates are provided for the implementation of the various ITS technologies (and associated elements) that are anticipated by Ecorodovias' Corporate Technology Office.

#### 4.1 Ecorodovias Capital Cost for Implementation of ITS Systems

The following table demonstrates the capital cost estimated for the implementation of the various ITS systems anticipated by Ecorodovias. The total capital cost estimate is approximately U.S. \$ 37.8 million.

<b>No.</b>	<b>ITS System/Equipment Replacement/Upgrades</b>	<b>TOTAL U.S. \$</b>
<b>1.0</b>	Variable Message Sign (VMS) – Replacement/New Installation	4,315,000
<b>2.0</b>	Traffic Counting and Classification System Project (equipment and installation, and Testing)	3,150,000
<b>3.0</b>	CCTV- Highway Monitoring System (Equipment, Installation, and Testing)	400,000
<b>4.0</b>	Emergency Telephone Systems (Equipment, Installation, Testing)	1,000,000
<b>5.0</b>	Highway Radars (Equipment, Installation, and Testing)	500,000
<b>6.0</b>	Video Auditing Cameras –Tolling (Equipment, Installation, and Testing)	400,000
<b>7.0</b>	Electronic Toll Collection Systems (Equipment, Installation, and Testing)	1,500,000



<b>8.0</b>	ETC High Speed Cameras (Equipment, Installation, and Testing)	200,000
<b>9.0</b>	Weighing Systems (Equipment, Installation, Testing, Calibration, Acceptance)	6,800,000
<b>10.0</b>	High Performance Servers for ITS	175,000
<b>11.0</b>	Radio Communications (Equipment, Installation, and Testing)	500,000
<b>12.0</b>	Environmental Monitoring System	1,440,000
<b>13.0</b>	ITS Spare Parts, Components, and Repair Projects	5,000,000
<b>14.0</b>	Supportive Infrastructure for ITS Systems (Construction, Communications, Toll Plaza, Traffic Management Center)	5,000,000
<b>15.0</b>	Tunnel Equipment Repairs, Spare Parts, and other Equipment (Lighting Systems, Ventilation Systems/Turbines, Incident Detection)	6,000,000
<b>16.0</b>	ITS System Design & Integration	1,500,000
	<b>GRAND TOTAL</b>	<b>37,880,000</b>

## E. U.S. EXPORT POTENTIAL

### 1.0 U.S. Export Potential Assessment

This section of the report summarizes the findings that resulted from the U.S. export potential assessment conducted as part of the DM. The U.S. export potential was developed from discussions held with the various Brazilian transportation officials, from site inspections conducted at transportation facilities in Brazil, and from the review of documentation as part of the DM research. The U.S. export potential assessment was conducted based on the potential acquisition and implementation of a wide range of ITS technologies by Ecorodovias. The following categories of ITS systems were evaluated and considered as part of the DM assessment for Ecorodovias potential implementation:

#### Systems and Equipment:

- Incident Detection/Management Systems
- Advanced Traffic Management Systems
- Closed Circuit Television Systems
- Variable Message Signs
- Traffic control centers (computer stations, Video display/monitors, communications systems, others)
- Various system software
- Communications systems
- Automated enforcement systems
- Automatic Vehicle Location System
- Over-height Detection Systems
- Object Recognition Systems
- Electronic Toll Collection Systems
- Others



### Engineering Services:

- ITS System design services
- ITS System integration services
- Traffic Management Center Design services
- ITS System Implementation services
- Others

## 2.0 Intelligent Transportation Systems Applications

Some of the ITS applications and systems that will be considered as part of the technical assistance for Ecorodovias include:

- **Traffic Control and Management Centers** - This is an excellent tool when operating and managing highways and freeways. A Traffic Management Center is the focal point of a system that manages traffic on streets and highways because all the information is received and transmitted through the center computer components. Ecorodovias currently operates their own version of a Traffic Control and Management Center in order to better control, monitor, and supervise the operation of highways. With compatible ITS systems on all of Ecorodovias' highways, a Traffic Management Center can integrate the major ITS components for the various highways that would further strengthen Ecorodovias' capability to manage its highways.
- **Variable Message Signs** - Light-emitting, fiber optic, overhead variable message signs (VMS) provide advance warning to motorists of changing highway and street traffic conditions and allow drivers to make informed decisions on trip routing. VMS signs are already being used by Ecorodovias as part of a traffic management tool. Ecorodovias will require a substantial amount of VMS signage for the company's highways.
- **Closed Circuit TV Cameras** - Serving as a primary source of highway monitoring above the highway, closed circuit television systems provide a means of visually confirming highway incidents and monitoring highway and street operations. Color cameras can be spaced about a mile apart and mid-way between interchanges to monitor traffic in real-time and assisting transportation officials in making decisions for rerouting traffic in the event of incidents. Cameras are normally equipped with remote control iris, zoom lens, and pan/tilt capabilities encased in weatherproof enclosures. CCTV systems are already being used by Ecorodovias, however the company will have the need to upgrade several systems in the near future.
- **Roadway and Highway Sensors/Incident Management Systems** - Sensors buried beneath highway pavement, known as loop detectors, are often spaced approximately every one-third mile. The sensors provide real time traffic flow information to control center computers and also allow instant traffic counts. However, loop sensors are considered intrusive detection systems due to the impact of maintenance on roads and as such other modern systems such as video detection, laser, microwave, and others offer non-intrusive methods for traffic detection are required by Ecorodovias. Ecorodovias staff wishes to implement non-intrusive detection systems as part of their respective traffic management techniques. Additionally, the use of detector information in an effective and efficient manner represent yet another tool for transportation officials to better manage transportation



facilities. Incident Management Systems serve as central repository of information that with software is able to analyze traffic conditions in real-time thus allowing transportation officials to make better decisions for how to manage traffic incidents.

- **Electronic Toll Collection** - Already in use throughout Brazil, Electronic Toll Collection is a technology that allows for the electronic payment of highway tolls. With the use of electronic sensors on the road and automatic vehicle identification devices in the car, a monetary transaction is performed electronically as the vehicle passes through the toll station, allowing the vehicle to proceed without having to stop for the toll payment. Ecorodovias utilizes ETC on all of its highways and the company wishes to identify modern ETC or free-flow toll collection systems for its highways.
- **Automatic Vehicle Location Systems** - Automatic Vehicle Location (AVL) Systems utilize various technologies to track vehicles throughout a particular area. Systems such as Global Positioning Systems (GPS) are being used in Brazil by private companies to track their vehicles while others are using it to track stolen vehicles. These systems combined with other technologies represent important tools in the management and control of traffic. Ecorodovias has expressed the desired to identify AVL systems for potential applications on its highway system.

### 3.0 U.S. Export Potential - Ecorodovias

This section of the DM report summarizes the findings that resulted from the U.S. export potential assessment conducted for the implementation of ITS systems on Ecorodovias' highway system. The U.S. export potential was developed from discussions held with Ecorodovias representatives and the review of documentation provided by the company for ITS related activities. Given the increase in highway travel in some parts of Brazil, vehicular and commercial traffic has increased steadily over the last five years requiring Ecorodovias to more efficiently manage the operations of its highways while enhancing safety and increasing revenues.

Ecorodovias is now looking towards the future on how to better manage highway operations that would yield increased revenues and enhance customer service, and as such the company wishes to evaluate the potential deployment of ITS systems including Highway Traffic Management Systems, Electronic Toll Collection (ETC) systems, Variable Message Sign (VMS) Systems, Highway Surveillance Systems (CCTV systems), Incident Detection Systems, Automated Enforcement Systems, Automated Vehicle Location (AVL) Systems, Emergency Telephone Systems, Vehicle Detection, Counting and Classification Systems, Optical Character Recognition (OCR) Systems, Automatic License/Number Plate Recognition Systems (ALPR/ANPR), Vehicle Identity Recognition Systems (VIR), Environmental Monitoring Systems, Traffic Management Center software and systems, and Vehicle Weighing Solutions including Weigh-in-Motion Systems (WIM). Additionally, Ecorodovias intends to improve lighting systems for its tunnels and highways with the potential use of self-sustaining lighting systems as well as the modernization of ventilation systems for the tunnels that the company operates.

The development of a technical assistance which would include the assessment, identification, and prioritization of ITS technologies could possibly create further opportunities for U.S. export potential as U.S. companies would be made aware of the potential procurement for equipment, systems, and professional services that may be required by Ecorodovias.



### 3.1 Estimate of Potential Procurement – Ecorodovias

The information obtained as part of the DM indicates that the type of ITS technologies most likely required for implementation by Ecorodovias must be, in its majority, imported by the company as these systems are not currently manufactured in Brazil. The proposed implementation of ITS systems by Ecorodovias is expected cover sophisticated ITS systems and applications that have been developed and used in the United States. U.S. companies have the required knowledge and expertise to provide the services and technologies that may be recommended as part of the proposed ITS technical assistance for Ecorodovias.

After reviewing the potential needs for ITS technologies, it is determined that U.S. companies could adequately supply the required ITS systems and equipment to Ecorodovias. Furthermore, the U.S. export assessment indicates that the type of technologies that are likely to be required by Ecorodovias are currently being utilized widely throughout the United States, and are therefore readily available for export to Brazil.

Ecorodovias has a substantial inventory of ITS systems and equipment throughout its highways and these systems require the continued upkeep and an on-going replacement program to ensure that the company utilizes the most up-to-date technologies in the market. Ecorodovias' capital investments in technology averaged U.S.\$10.4 million per year between 2008 and 2011.

The company is projecting that its capital investments in ITS technologies will average U.S. \$ 12.7 million per year for the period of 2012 and 2014. The investments expected for the 2012 to 2014 period have been forecasted according to a multi-year plan for the replacement and upgrade of ITS systems and equipment developed by Ecorodovias' Corporate Technology Department. Based on Ecorodovias' multi-year investment plan, the company is expected to either replace or upgrade a variety of ITS systems throughout the highways that the company operates in Brazil.

As part of its multi- year plan for investment in ITS technology, Ecorodovias is concentrating its efforts in the replacement, upgrade, and/or new implementation of systems that include Emergency Telephone Systems (Call Box), CCTV Systems, non-invasive traffic counter systems, Weighing Systems, Automated Enforcement Systems, Traffic Counting and Classification Systems, Variable Message Sign Systems (VMS), radar sensors, Electronic Toll Collection Systems, other ITS components. As current ITS systems that operate along Ecorodovias' highway network become outdated or reach the end of their useful life, new technologies that provide more accurate and reliable information will be sought by Ecorodovias in an attempt to modernize the ITS infrastructure that the company already has established.

The following table provides an indication for the type and amount of ITS systems that are expected to be acquired by Ecorodovias' Corporate Technology Office as part of the company's multi-year investment plan for 2012-2014.

**Table N<sup>o</sup> 10**  
**Ecorodovias – U.S. Export Potential- 2012-2014 ITS Program**



No.	ITS System/Equipment	Quantity	Unit Cost U.S. \$	TOTAL U.S. \$
1.0	Variable Message Sign (VMS) - Replacement	10	200,000	2,000,000
2.0	Variable Message Sign (VMS) – New installation	3	200,000	600,000
3.0	Traffic Counting and Classification System	6	350,000	2,100,000
4.0	CCTV- Highway Monitoring System	55	2,500	137,500
5.0	Emergency Telephone Systems	50	6,000	300,000
6.0	Highway Radars	21	5,000	105,000
7.0	Video Auditing Cameras -Tolling	70	3,000	210,000
8.0	Electronic Toll Collection Systems	81	15,000	1,215,000
9.0	ETC High Speed Cameras	20	5,000	100,000
10.0	Weighing Systems	4	1,200,000	4,800,000
11.0	High Performance Servers for ITS	25	7,000	175,000
12.0	Radio Communications	195	1,500	292,500
13.0	Environmental Monitoring System	8	60,000	480,000
14.0	Optical Sensors	65	6,000	390,000
15.0	Optical Character Recognition (OCR) initial Implementation	10	50,000	500,000
16.0	Weigh-in-Motion System	1	1,900,000	1,900,000
17.0	Spare Parts and ITS Components	Lump Sum	1,000,000	1,000,000
18.0	ITS Planning, Design & Integration Services	Lump Sum		1,200,000
19.0	Tunnel Ventilation Systems	20	80,000	1,600,000
20.0	Energy Efficient Lighting Systems	Lump Sum		500,000
21.0	Power Generators	5	100,000	500,000
	<b>GRAND TOTAL</b>			<b>\$20,105,000</b>

Ecorodovias is very interested in evaluating OCR Systems, Weigh-In-Motion Systems, Free Flow Toll Collection Systems, tunnel lighting and ventilation systems, and other highway lighting and energy efficient systems. The technical assistance will review these and other applicable systems for highway operations with Ecorodovias and identify the most suitable and capable systems that could aid the company in improving highway operational efficiency, safety, energy savings, and increase revenues. The identification of these systems are expected to result in additional U.S. exports as Ecorodovias would most likely acquire most of the systems recommended by the technical assistance. It is anticipated that Ecorodovias will continue to support ITS investments for the company's 2015-2017 ITS investment program at the same or greater funding levels as the 2012-2014 period. As such the following table provides a representation of the systems and equipment that Ecorodovias is likely to upgrade/replace, as well as those new systems that are expected to be acquired and implemented for the first time.

**Table N<sup>o</sup> 11**  
**Ecorodovias – U.S. Export Potential 2015-2017 ITS Program (Anticipated)**



No.	ITS System/Equipment	Quantity	Unit Cost U.S. \$	TOTAL U.S. \$
1.0	Variable Message Sign (VMS) – Replacement	10	200,000	2,000,000
2.0	Variable Message Sign (VMS) – New installation	2	200,000	400,000
3.0	Traffic Counting and Classification System Replacement	5	350,000	1,750,000
4.0	CCTV- Highway Monitoring System	65	2,500	162,500
5.0	Emergency Telephone Systems	150	6,000	900,000
6.0	Highway Radars	25	5,000	125,000
7.0	Video Auditing Cameras -Tolling	200	3,000	600,000
8.0	Electronic Toll Collection Systems	125	15,000	1,875,000
9.0	ETC High Speed Cameras	40	5,000	200,000
10.0	Weigh-in-Motion Systems (New)	5	1,900,000	9,500,000
11.0	High Performance Servers for ITS	30	7,000	210,000
12.0	Radio Communications	225	1,500	337,500
13.0	Environmental Monitoring System	6	60,000	360,000
14.0	Optical Sensors	100	8,000	800,000
15.0	Optical Character Recognition Syst. (New)	25	100,000	2,500,000
16.0	Traffic Management Center Upgrades (New)	Lump Sum		2,500,000
17.0	Implementation- Free Flow Toll System (New)	Lump Sum		2,500,000
18.0	Tunnel Ventilation Systems	22	80,000	1,760,000
19.0	Energy Efficient Lighting Systems	Lump Sum		1,000,000
20.0	Power Generators	10	100,000	1,000,000
	<b>GRAND TOTAL</b>			<b>\$30,480,000</b>

Note: "New" denotes systems that would be acquired new for the first time by Ecorodovias.

Based on the U.S. export assessment conducted for the implementation of ITS systems by Ecorodovias, it is expected that the U.S. export potential could reach approximately U.S.\$ 20 million during the 2012-2014 period and U.S.\$ 30 million for the period of 2015-2017.

#### 4.0 List of Potential U.S Suppliers

HEP Consulting made contact with numerous U.S. suppliers of ITS products with the purpose to appraise the companies' interest in the upcoming activities associated with Ecorodovias ITS system implementations. HEP Consulting staff attended the ITS America and ITS World Congress events in Orlando, Florida and discussed the potential ITS projects with various U.S. suppliers.

The responses from the U.S. suppliers contacted were positive, with the majority of those U.S. companies interviewed expressing interest in the possibility of exporting their ITS products to Brazil. Some of the main questions raised by some U.S. suppliers were related to project funding, the type of ITS product specifications to be used, and whether or not Ecorodovias



would be implementing their ITS systems under NTCIP standards. Some U.S. suppliers questioned the fact of who would be developing the various ITS systems' specifications for the various projects. This question is very important to U.S. suppliers given the fact that sometimes system specifications are written to favor other standards and/or European equipment, which limits the participation of U.S. companies from competing in international bids.

In general, ITS suppliers from the U.S. understand that Brazil is today where the U.S. was 15 to 20 years ago in sorting out and deciding on the best and most suitable ITS technologies that could be utilized for improving existing transportation infrastructure efficiency, and as such U.S. suppliers understand that the market potential in Brazil is growing.

The following list represents companies that demonstrated interest in doing business with Ecorodovias:

- AECOM
- Cambridge Systematics, Inc.
- CASE Systems, Inc.
- Control Technologies of Central Florida
- Daktronics
- Global Traffic Technologies, LLC
- Horizon Signal Technologies
- IBM
- INEX/ZAMIR Technologies
- Intelligent Devices
- IntelLight-ITS
- Iteris
- MG Squared
- Nema
- NTELEX
- Science Applications International Corporation - SAIC
- SQL Stream
- Skyline Products
- TransCore
- Trafficon USA
- Raytheon

In summarizing this section of the report, there is clear indication of the interest by U.S. suppliers for the potential of exporting U.S. goods to Brazil in association with the Ecorodovias ITS activities. However, the message was clear from the U.S. industry in that the various systems specifications need to be developed to be inclusive of U.S. technology and products in order for U.S. companies to compete. In addition, the adoption and utilization of NITCIP standards for ITS implementation would also be an encouraging factor for U.S. companies to compete in the implementation of ITS technologies for Ecorodovias.

## **F. FOREIGN COMPETITION**

### **1.0 Foreign Competition Key Elements**



An assessment of foreign competition was conducted for potential ITS projects and supply of ITS technologies in Brazil. The foreign competition assessment was performed based on information obtained from various meetings and interviews held in Brazil, from the review of documentation pertaining to Ecorodovias activities, and from communications with representatives from the U.S. industry. The DM findings indicate that there are seven key elements associated with the foreign competition component related to the procurement of ITS technologies as follows:

- Ecorodovias' procurement methods and tendencies
- Prime transportation contractors - Equipment selection
- Use of foreign consulting firms to define specifications and design elements
- European companies' strong presence in Brazil
- Transportation Equipment pricing
- Risk factors
- Market entry issues

Ecorodovias as a private corporation is not bound by the Brazilian procurement laws and the company conducts its procurement of ITS systems based on the agency's needs, product quality and reliability, and preferred technologies that are most suitable in supporting the operation of Ecorodovias highways. This presents opportunities for U.S. firms to expose their high quality ITS products to Ecorodovias since the company does not procure equipment on the basis of low bid.

It is important to note that while ITS technologies and services have been well developed and implemented in the United States, other countries in Europe and Asia have also been successful in developing their own ITS technologies. A great majority of the ITS technologies deployed in Brazil today are of European origin. As such, the competitive nature of the implementation of ITS technologies (associated with the Ecorodovias) would be considered high. Traditionally, Latin American countries have selected, for the most part, European technologies when it comes to the transportation sector. There is clear evidence of European dominance not only in Brazil, but also in other countries such as Argentina, Chile, and others, where the majority of the ITS systems are of European origin. The European companies will continue to pursue ITS projects in the Brazilian market, unless the United States becomes aggressively involved in Brazil.

As far as the acquisition and implementation of ITS systems by Ecorodovias, company staff pays particular attention to quality and reliability which tend to favor U.S. products. While product cost is important to Ecorodovias, staff understands the implications of low cost products as it relates to life-cycle costs, increase maintenance, and sometimes unreliable operations with inaccurate results.

There is no question that European firms are very aggressive in the Brazilian transportation market and have created business relationships in the country for quite some time. These well established relationships create for an environment that strengthens the opportunities for European companies to be the primary suppliers of ITS technology in Brazil, as well as other countries in the region. However, it is important to point out that there are U.S. companies that are willing to enter the Brazilian ITS market in pursuit of business and USTDA plays a key role in supporting the U.S. industry in exporting ITS systems to Brazil by funding technical assistance like the one for Ecorodovias.



The results of the DM findings demonstrate that there is a clear indication that European firms are well established in Brazil and there is evidence that they intend to continue to dominate the Brazilian market in terms of the supply of ITS systems. Cultural issues in some cases also play a factor in the foreign competition element since European companies have somewhat more experience in the Latin American markets facing less cultural barriers, and as such, some of those companies enjoy established business relationships with the various governments and the private sector in Brazil.

Pricing is also another factor that plays a role in foreign competition because U.S. technology (due to its high quality and reliability) tends to be more costly. Usually U.S. standards and specifications are more stringent and require higher levels of quality control and more reliable/accurate systems that often lead to a higher price. In fact, the issue of the operating standards for ITS systems is of primary concern to some U.S. suppliers, as U.S. firms prefer to work under NTCIP standards.

Risks factors also tend to somewhat scare U.S. firms away from markets like Brazil due to specific tender requirements, procurement laws, methods of payments, repayment periods, different and inconsistent legal requirements and procurement policies, government and private industry corruption, lack of transparency on government contracts, and local bureaucracy.

European suppliers of ITS products are more experienced in working with the governments and also contractors in Brazil in managing contracts and often have good product representation through the use of local distributors. Local distributors or agents are a must in Brazil if U.S. companies are to enter those markets.

The factors identified as part of the foreign competition assessment clearly illustrate and confirm that foreign competition is considered high for U.S. companies in Brazil. However, the conduct of the technical assistance for Ecorodovias could represent a deciding factor that may open the door for potential U.S. exports and may prove to assist U.S. companies in expanding their product line and services into Brazil.

## **2.0 Market Entry Issues**

Competition in the Brazilian market for ITS systems and equipment is sensitive to price while quality has not been as important for government institutions. Competition for the sale of ITS products to Ecorodovias is more sensitive to quality than price and there seems to be a desire from Ecorodovias officials to consider U.S. made products.

While price is a decisive buying factor for government tenders in Brazil, U.S. made products, which generally carry a higher price tag, are also recognized for their quality and therefore have a potential for finding market acceptance in Brazil. This is especially true in the information technology sector where computer systems and software packages require operating systems by companies like Oracle and Microsoft as the standard.

It is determined that for U.S. companies to become successful in penetrating the Brazilian ITS market they must do so with the aid of local representation or through licensing agreements with the private sector. The knowledge of local regulatory and business framework in Brazil is best left for the local companies that have experience and can assist U.S. companies in entering the



market. Personal contact is considered a necessity when doing business in Brazil, with both the private and public sectors and when dealing with government sponsored tenders. Having a local agent is a must due to complicated bureaucratic regulations and procedures.

### **3.0 Summary of Foreign Competition Assessment**

The DM findings determine that the foreign competition component is considered high in Brazil, presenting significant challenges to U.S. suppliers of ITS systems. However, with the development of technical assistance, Ecorodovias staff can be exposed to U.S. technologies and begin building a business relationship with U.S. suppliers that could eventually allow U.S. firms to break through in the Brazilian market.

## **G. DEVELOPMENTAL IMPACT**

This section of the report includes an assessment of the developmental impact associated with the utilization of Intelligent Transportation Systems in connection with the deployment of ITS systems by Ecorodovias. The developmental impact section is divided into two sections to cover the aspects of the primary developmental benefits as well as the alternatives to the proposed ITS projects.

The highways operated by Ecorodovias have continued to see an increase in vehicular traffic requiring the company to seek solutions with the use of ITS technologies. ITS systems include a wide collection of applications from advanced traveler information systems to freeway ramp metering systems, electronic toll collection systems, among many others. In order to apply ITS services most effectively, it is important to understand their benefits. The diverse array of ITS applications available can address a variety of transportation problems and needs. Some applications provide more cost-effective benefits than others, and as technology evolves, the available choices change.

ITS systems have now been implemented in many regions of the world with positive results for the transportation sector. As the United States, Europe, Asia, and Australia have developed strategic plans for mobility, ITS has become an integral and essential part of transportation. The benefits of ITS projects around the world are significant to say the least. Developed countries worldwide began to realize that building transportation infrastructure alone would not provide the answer to many of the existing transportation problems that governments face today. The philosophy of ITS systems is to improve and maximize the efficiency of existing transportation systems and those of the future.

### **1.0 Primary Development Impact**

The implementation of ITS systems could translate into a safer and more efficient use of the transportation infrastructure (highways), positively impacting time spent in Ecorodovias' highways throughout Brazil. A primary developmental impact would be the reduced time spent by highway users in the form of reduced delay, more efficient traffic flows, traffic safety, better and more accurate traveler information, less fuel consumption and others.

#### **1.1 Infrastructure**



The transportation sector is key to Brazil's economic growth and the country's integration with the rest of the world. The implementation of ITS systems for Ecorodovias is expected to support and improve the existing transportation infrastructure (highways) in Brazil and further increasing the efficiency of those transportation facilities.

Vehicle travel continues to grow in Brazil as the population increases, particularly in the urbanized areas. Construction of new roadway capacity to accommodate the growth and travel has not kept up with traffic demand in Brazil. In the last 15 years in Sao Paulo, vehicle miles traveled have increased while road expansion to meet this demand has lagged behind. Building new roadway and highway infrastructure for Ecorodovias' highways is extremely expensive and it can be, in some cases, detrimental to the environment. While the need for new transportation infrastructure will continue to be in high demand in Brazil, it is becoming more difficult and costly to build enough roads and new travel lanes to meet existing and future transportation demand. By applying the latest technological advances to the existing transportation system, Intelligent Transportation Systems can help meet the increasing demand for transportation by improving the quality, safety, and effective capacity of the existing infrastructure.

## **1.2 Technology Transfer and Productivity Enhancement**

Technology transfer opportunities could be created by implementing ITS systems for Ecorodovias' highways given that new intelligent transportation systems are comprised of sophisticated technologies. Examples of technology transfer systems include VMS, CCTV, ETC, Incident Detection Systems, Traffic Management Systems, Automated Enforcement Systems and others. Through the implementation of state-of-the-art ITS systems, Ecorodovias could increase operational efficiency of the transportation system, increase safety, and in some cases handle more vehicular and cargo traffic which could support productivity in the country. Currently the type of technologies needed by Ecorodovias, would necessitate importing these technologies into Brazil. The level of technology transfer is therefore considered high for the application of ITS systems in Brazil.

Productivity enhancements can be mentioned as another factor related to other improvements such as reduced roadway delay, improved travel time, reduced roadway/highway congestion, and others. ITS implementation can reduce operating cost and allow productivity to increase in some cases. Some ITS applications may save time in completing business or regulatory processes, enabling business to increase their economic efficiency and therefore increasing productivity as well as promoting a more efficient movement of imports and exports through the Brazilian port system. Other ITS applications enable the collection and recording of data that can translate into cost savings and performance improvements. Operational efficiencies and cost savings may be possible with ITS implementations, thus helping public and private entities make the most productive use of their resources.

## **1.3 Human Capacity Building**

The implementation of new state-of-the-art ITS systems would support existing roadway/highway infrastructure that in turn is expected to create new jobs in the construction and ITS/information technology industries in Brazil. Ecorodovias is expected to support additional jobs in the construction, operations, and maintenance areas for the company and for



private sector contractors as new ITS systems are implemented. These ITS activities if carried out, could further support human capacity building in Brazil.

#### **1.4 Other Benefits**

Another developmental benefit associated with the implementation of ITS systems by Ecorodovias is the factor of mobility. Improving mobility by reducing delay and travel time is a major goal for Ecorodovias. Measures of effectiveness typically used to evaluate mobility include the amount of delay (time) and the variability in travel time. High delays in transportation corridors contribute to congestion, longer travel times, inconvenience, negative impact on safety, and a negative impact on productivity. The more hours that are spent by drivers, commuters, bus riders, cargo trucks and other users, the less productivity the region experiences, as well as the higher the levels of fatigue, inconvenience, and negative impact to the quality of life.

With the use of ITS systems, delay could be reduced and travel time improved. By improving operations, incident response, and traffic flow and providing better traveler information to the citizens, ITS systems can reduce the variability of travel time. This increases mobility, productivity, and improves quality of life.

Another benefit often over-looked in ITS system applications is the issue of customer satisfaction. Given that many ITS system projects and programs are specifically developed to serve the public, it is important to insure that travelers' expectation are being met or surpassed. Customer satisfaction measures are characterized by the difference between the user's expectations and experiences in relation to a service or product. Ecorodovias places customer satisfaction as one of the company's top principle and the company wishes to continue to improve customer satisfaction for its highway users. With the implementation of ITS systems along its highways, Ecorodovias is expected to improve traffic conditions (better access to highway information, safety, improved traffic flows, faster toll lanes, others) that consequently is expected to translate into better customer satisfaction.

#### **1.5 Alternatives**

Normally in evaluating major transportation projects such as roadway infrastructure, the construction of a bridge, the construction of new rail lines, construction of a new airport it becomes important to evaluate other alternatives to the proposed transportation projects to ensure the viability and feasibility of transportation facilities. In the case of Ecorodovias, the implementation of ITS systems represents the best alternative compare to the building of additional roadway and highway infrastructure given the fact that ITS seeks to improve the efficiency and safety of existing transportation systems. The alternatives to widen Ecorodovias highways is not considered feasible at this time given the extremely high cost for construction as well as the substantial and expensive right of way acquisitions. The enhancement of operational efficiencies and safety along Ecorodovias highways represent a much lower investment than if additional highway infrastructure had to be built.

## **H. IMPACT ON THE ENVIRONMENT**



The environment can be negatively impacted by several factors, and one of them implicates air pollution generated by vehicular emissions. Air pollution is normally associated with pollution generated from the exhaust system of vehicles, buses, trucks, and other modes of transportation that generate pollutants.

One of the great benefits that ITS systems offer is the improvement of the efficiency of transportation facilities. ITS technologies have shown positive impacts on the environment as contamination levels decrease with improved and efficient traffic flows. Decreases in contamination levels and energy consumption have been identified as measure of effectiveness for ITS applications.

With the utilization of ITS, highway congestion is often reduced, highway accidents are reduced, mobility improves, delays are reduced and highway safety is improved. All could be improvements to the environment since it makes transportation more efficient and safe.

Some of the benefits from ITS as it relates to the environment are listed below.

- Less congestion
- Less vehicle emission
- Less fuel consumption
- Better air quality
- Time savings to users
- Operating cost reduction
- Reduction of accidents

The implementation of ITS systems by Ecorodovias is not expected to have a negative impact on the environment in Brazil.

## **I. IMPACT ON U.S. LABOR**

Components of ITS systems that would be required by Ecorodovias are being manufactured in the United States by U.S. companies. Other services such as consulting engineers, system design and integration services could be performed by U.S. firms. As such, U.S. labor should not be negatively impacted by the proposed implementation of ITS systems in Ecorodovias' highways.

## **J. QUALIFICATIONS**

This section of the report describes the qualifications for the U.S. firm to the conduct the Technical Assistance for Ecorodovias.

### **1.0 Ecorodovias ITS Technical Assistance**



The focus of the Ecorodovias ITS Technical Assistance is to identify, quantify, analyze, prioritize and recommend modern ITS technologies and associated ITS infrastructure improvements for the purpose of enhancing highway operational efficiencies and safety, as well as increased accuracy and revenue collection operations for Ecorodovias' highways. In addition, the technical assistance will include the identification and recommendations of new technologies that would be beneficial to Ecorodovias in further promoting a safer and more efficient highway environment for its customers in Brazil.

As such, the U.S. U.S. firm selected shall have personnel with ample experience in the various ITS technologies and applications such as Highway Traffic Management Systems, Electronic Toll Collection (ETC) systems, Variable Message Sign (VMS) Systems, Highway Surveillance Systems (CCTV systems), Incident Detection Systems, Automated Enforcement Systems, Automated Vehicle Location (AVL) Systems, Emergency Telephone Systems, Vehicle Detection, Counting and Classification Systems, Optical Character Recognition (OCR) Systems, Automatic License/Number Plate Recognition Systems (ALPR/ANPR), Vehicle Identity Recognition Systems (VIR), Environmental Monitoring Systems, and Vehicle Weighing Solutions including Weigh-in-Motion Systems (WIM). Additionally, Ecorodovias intends to improve lighting systems for its tunnels and highways with the potential use of self-sustaining lighting systems as well as the modernization of ventilation systems for the tunnels that the company operates.

The following qualifications should be required of the U.S. U.S. firm to be selected for the conduct the Ecorodovias ITS technical assistance:

### **Technical Experience**

(40 points)

- The U.S. firm shall have substantial and direct experience in all areas of ITS system application and information technology systems to support ITS infrastructure and communications systems, traffic operations, highway traffic management systems, highway traffic safety, electronic toll collection systems, and development of ITS system programs for highway applications, including specific experience in the design, installation, operation, and maintenance of modern ITS systems and equipment.
- The U.S. firm shall have substantial and direct expertise in ITS systems including, Highway Traffic Management Systems, Electronic Toll Collection (ETC) systems, Free-Flow Toll Collection Systems, Variable Message Sign (VMS) Systems, Highway Surveillance Systems (CCTV), Automated Incident Detection Systems for highways, Automated Enforcement Systems, Automated Vehicle Location (AVL) Systems, Emergency Telephone Systems, Vehicle Detection, Counting and Classification Systems, Optical Character Recognition (OCR) Systems, Automatic License/Number Plate Recognition Systems (ALPR/ANPR), Vehicle Identity Recognition Systems (VIR), Highway Environmental Monitoring Systems, and Vehicle Weighing Solutions including Weigh-in-Motion Systems (WIM). The U.S. firm shall have personnel with experience in highway and tunnel lighting systems and tunnel ventilation systems, including self-sustaining lighting systems.
- The U.S. firm shall have ITS system design and integration service experience and related information technologies expertise to support ITS applications. It is paramount that the U.S. firm have full knowledge and complete understanding of all concepts and practices in developing recommendations for the application of ITS systems and



equipment for highway traffic management, including experience in the development of system-wide ITS integration, development of ITS system master plans, and development of (ITS) equipment and system specifications.

- The U.S. firm shall have substantial experience in the implementation and operation of Information Technology (IT) systems that are required to be implemented in support of the ITS technologies to be recommended for the management of highways and ITS operational control centers, as well as the required personnel with full knowledge of software and integration requirements for such applications.
- The U.S. firm shall have substantial and direct experience and actual past involvement in studying, defining, reviewing, and recommending ITS implementation plans (including all necessary ITS systems and equipment), as well as experience in supervising and guiding the implementation of large ITS systems for highways and freeways. The U.S. firm shall be knowledgeable in the proper use of ITS systems technical standards, regulations, and specifications, with specific knowledge and practicing experience in the application of NTCIP standards.
- The U.S. firm shall have substantial experience in the areas of ITS system integration and ITS equipment/system inter-operability issues, as well as experience in the implementation of ITS central systems and communications systems for ITS applications.
- The U.S. firm shall have experience in tolling systems and equipment (manual, automatic, free-flow), radar systems for speed enforcement, radio communications, tunnel equipment and systems (tunnel incident detection, VMS, fire detection systems), and general knowledge of electrical systems that support highway operations (highway lighting, tunnel lighting, toll plaza lighting, power back-up systems, environmental monitoring systems).
- The U.S. firm shall have experience in the analysis, planning, design, installation, and integration of computerized ITS central systems and in the application of other information technologies and systems that can support ITS applications to improve highway and toll operational efficiency and safety.

### **Financial Experience**

(20 points)

- The U.S. firm shall have direct experience in conducting economical and financial analysis for the application and implementation of modern ITS systems, equipment and related information technologies. The U.S. firm shall have extensive experience in the development of capital investment plans/programs for ITS modernization/rehabilitation projects, to include experience in project financing for ITS technology modernization.
- The U.S. firm shall have experience and prior involvement in identifying eligible financial resources for the acquisition and implementation of ITS systems, equipment and related information technologies (with assistance from the private sector and /or multilateral financial institutions), and experience in identifying new strategies and with ITS services that can lead to increased revenue collection for highway concession operations.



- The U.S. firm shall have experience in conducting financial analysis, review, and financial planning for highway toll collection operations as well as highway traffic/toll forecasting analysis.

**Highway Operations Developmental Impact Experience  
(5 points)**

- The U.S. firm shall have experience in analyzing and formulating potential developmental impacts as it relates to the application of ITS systems and related information technologies in connection with highway operational efficiency and safety. The U.S. firm shall have experience in the development and identification of highway related benefits including the areas of infrastructure, market oriented reforms, human capacity building, technology transfer and productivity enhancement, and other developmental benefits associated with the application of ITS technologies on highways.

**International ITS Experience  
(10 points)**

- It is preferred that the U.S. firm have experience at the international level, preferably with experience in Brazil and/or the Latin America Region.

**Work Plan and Project Methodology  
(25 points)**

- Adequacy of the proposed work plan and proposed technical assistance approach in responding to the specified Terms of Reference for all activities identified in the TOR. Soundness and thoroughness of the technical approach and work plan presented in the technical proposal and the overall quality and succinctness of the technical proposal. The technical proposal shall include the identification of all key staff proposed for the conduct of the technical assistance with their respective qualifications, availability for the project, and a staffing schedule for each activity.

**K. JUSTIFICATION**

This section of the report outlines the justification for the Ecorodovias ITS Technical Assistance.

**1.0 Ecorodovias ITS Technical Assistance**

Based on the overall evaluation of Ecorodovias' highway operation and ITS systems, HEP Consulting has determined that the company has identified the need to implement state-of-the-art ITS technologies to improve highway operational efficiency, capacity, and safety, as well as increased revenues from toll facility operations in Brazil. Ecorodovias has invested in excess of U.S. \$35 million over the last three years in ITS system acquisition and development of ITS infrastructure and the company now wishes to further invest in ITS and other highway technologies for the period of 2012 to 2014. A review of Ecorodovias' Corporate Technology Office capital investment plans indicate that the company is expected to invest approximately U.S.\$36 million in ITS systems and other highway/tunnel equipment during the period of 2012 to 2014. The intent is for Ecorodovias to work on a new initiative with the purpose to replace, HEP Transportation Consulting



upgrade, and/or modernize various ITS systems and to continue to promote more efficient transportation services and increase revenues for the company.

Ecorodovias wishes to continue to strengthen its position as the leading private highway operator in Brazil by acquiring and implementing ITS technologies and further investing in the company's ITS infrastructure that would ultimately increase highway revenues, and highway operational efficiency and safety for the Ecorodovias highway system.

Based on the DM assessment, it is evident that Ecorodovias plans to continue to invest in ITS systems and other supporting IT technologies in an attempt to maximize full potential of the highway facilities operated by the company, while increasing services to highway users.

Ecorodovias is considered a the leader in Brazil when it comes to the use of ITS technologies as the company has implemented an impressive capital improvement program for ITS and substantial financial investment has been made by Ecorodovias that now puts the company in the forefront of ITS technology users in Brazil and the South American region.

Ecorodovias' staff has expressed the desire to evaluate and consider various technologies (including U.S. technologies) for applications in the company's highways including the specific areas of Highway Traffic Management Systems, Electronic Toll Collection (ETC) systems, Free-Flow Toll Collection Systems, Variable Message Sign (VMS) Systems, Highway Surveillance Systems (CCTV), Automated Incident Detection Systems for highways, Automated Enforcement Systems, Automated Vehicle Location (AVL) Systems, Emergency Telephone Systems, Vehicle Detection, Counting and Classification Systems, Optical Character Recognition (OCR) Systems, Automatic License/Number Plate Recognition Systems (ALPR/ANPR), Vehicle Identity Recognition Systems (VIR), Highway Environmental Monitoring Systems, and Vehicle Weighing Solutions including Weigh-in-Motion Systems (WIM) and others.

The development of state-of-the-art ITS technologies is an area that U.S. firms have had an opportunity to create and implement successfully for many years, and as such, U.S. firms are extremely proficient and capable of engaging in the conduct of feasibility studies/technical assistance, design, and ultimately the potential implementation of ITS technologies for Ecorodovias.

It is clear that the technical expertise needed to evaluate the potential deployment of ITS technologies and ITS infrastructure review for Ecorodovias' highways will have to come from foreign firms. Given the interest on the part of Ecorodovias' staff to continue to work towards the development of a new ITS implementation plan to achieve improved highway operations, the DM visit was timely in the sense that USTDA is now in an excellent position to offer assistance to Ecorodovias for the development of a project that carries a high priority for the company.

The identification and recommendation of state-of-the-art ITS technologies by the Ecorodovias technical assistance should not present a major funding problem for the company as long as the companies' staff is convinced that the proposed technologies and practices will indeed lead to improved highway operational efficiencies, safety, highway capacity, and increased revenues.

Ecorodovias' track record on the acquisition and deployment of ITS systems is remarkable and the company is expected to continue an active pursuit for the development and implementation of ITS projects with the purpose to deal with existing and future highway capacity constraints.



Given the strong presence of European companies in Brazil, it may not be long before other non-U.S. firms propose to study and implement new ITS technologies for Ecorodovias. The hiring of a consulting firm (by Ecorodovias) would most likely be done through a request for qualifications that could invite international firms to submit proposals for a similar ITS technical assistance and provide an opportunity for other non-U.S. firms (most likely European) to compete for the conduct of the Ecorodovias technical assistance.

On the other hand, if USTDA finances the technical assistance for Ecorodovias, this would guarantee that a U.S. firm would be the one performing the work that could eventually lead to the procurement and installation of U.S. equipment and systems and assist U.S. firms to compete in a market that is currently dominated by European firms. Rather than waiting for this to happen, USTDA has an excellent opportunity to fund the Ecorodovias technical assistance that could allow a U.S. firm to take the first steps in defining the best practices and utilization of ITS technologies for Ecorodovias' highways.

The Ecorodovias ITS technical assistance represents a good opportunity for USTDA to assist a private sector company in Brazil in their need to evaluate advanced technologies for legitimate and practical purposes and would aid in establishing a relationship between USTDA, Ecorodovias, and possibly other private highway operators. USTDA's participation in the technical assistance could add significant value to the overall highway modernization program that has been implemented by the private sector in Brazil.

HEP Consulting evaluated the financial reports for Ecorodovias, including highway traffic forecast for Ecorodovias' highways, indicating that growth is expected in future years and the financial forecasts look promising for Ecorodovias as vehicular traffic increases and more customers are expected to use the highways in future years. Additionally, Ecorodovias has demonstrated its commitment to the development and implementation of ITS technologies as the company's corporate technology office and corporate management places a high priority on initiatives that seek to maintain and/or improve efficient levels of service for highway operations while increasing revenues.

Based on the overall assessment conducted as part of the DM, it is determined that funding the Ecorodovias ITS technical assistance by USTDA is justified and meets USTDA grant funding requirements.

## **L. TERMS OF REFERENCE**

This section of the report presents the Terms of Reference (TOR) proposed by HEP Consulting for the Ecorodovias technical assistance. The proposed TORs were discussed, reviewed, and approved by Ecorodovias staff.

### **1.0 Ecorodovias ITS Technical Assistance**

The following presents the proposed TOR for Ecorodovias ITS technical assistance.

#### **1.1 Proposed Scope of Work**



The United States Trade and Development Agency (USTDA) intends to provide assistance in the form of a grant to Ecorodovias Infraestrutura e Logística, S.A. (Ecorodovias) for the conduct of a technical assistance (TA) covering the area of Intelligent Transportation Systems (ITS). Ecorodovias is one of the largest highways concessionaries in Brazil and a key player in the logistics market in that country. Ecorodovias has invested substantial amount of funds in the deployment of ITS systems for its highways and the company presently has several traffic management centers for many of the highways that the company operates.

Ecorodovias has developed and constructed a significant ITS infrastructure for the control and management of its highways and the company continues to seek and implement the latest ITS technologies available worldwide. Ecorodovias is a leader in Brazil and South America in the application of ITS technologies for the management of highways and the company is constantly finding ways to stay current with the latest applications of ITS systems.

The Scope of Work (SOW) will serve as a guide for the conduct of the technical assistance (TA). The technical assistance assessments will result in the development of a practical plan for the acquisition and implementation of various ITS systems that in turn are expected to increase efficiency for the control and management of Ecorodovias highways which could translate into increase revenues for the company. The ITS technical assistance will identify short and medium-term milestones for the acquisition and implementation of various ITS systems.

As a result of the technical assistance, Ecorodovias' Corporate Technology Office is expected to utilize the recommendations from the TA to make decisions in the acquisition and implementation of ITS systems for the company's highways. It is expected that the technical assistance will be conducted over a period of seven months and the implementation plan shall recommend the various types of ITS technologies, including the necessary systems, equipment, certifications, implementation procedures, and required personnel training that should be considered for the deployment of such ITS systems at Ecorodovias' highways.

The U.S. U.S. firm shall evaluate the current ITS infrastructure and technical aspects of the ITS equipment and systems currently being utilized at the various Ecorodovias highways and determine if any of the existing ITS systems should be upgraded, enhanced, and/or replaced with modern ITS technologies, as well as the identification of new ITS systems that are likely to improve Ecorodovias highway operational efficiencies, safety, and revenue collection.

Some of the technologies that shall be evaluated include (but not limited to) CCTV systems, ETC, AVL, VMS, Incident Management Systems, Emergency Telephone Systems, Vehicle Detection Systems, Counting and Classification Systems, Optical Character Recognition Systems (OCR), Electronic Enforcement Systems, Automatic License/Number Plate Recognition Systems (ALPR/ANPR), Vehicle Identity Recognition Systems (VIR), Environmental Monitoring Systems, Traffic Management Center software and systems, Vehicle Weighing Solutions (including Weigh-In-Motion Systems (WIM), Tunnel Lighting and Ventilation Systems, self-sufficient or partially self-sufficient regarding power generation (such as eolic or photovoltaic generation).

Tolls, incidents, traffic congestion, and weather are major contributors to creating delay along freeways and highways. There continues to be new developments in ITS technology that lead to enhancements of highway operation, traffic management, and safety that include automation, information systems, and other technologies and applications uniquely tailored to address highway-related operations. At the same time there are a number of applications and software



programs that address and support highway operators in maintaining an efficient and systematic flow of traffic along the highways. The U.S. U.S. firm shall consider these technologies and applications that may be relevant to improving the management and operation of Ecorodovias highways in Brazil.

The U.S. firm shall identify and recommend the use of other ITS technologies (not in use at this time by Ecorodovias) that would further aid Ecorodovias in the safe and efficient operation of its highways in Brazil. The U.S. firm shall focus its technical assessment and analysis on proven technologies and ITS applications that are available in the market/industry at the time of the TA. Further, the U.S. firm shall identify locations where the recommended technologies/applications have been implemented successfully, any associated technology dependence requirements, required regulatory approvals, acquisition and installation costs, required training for implementation, and potential benefits associated with the recommended technologies and applications.

The final product of the TA will be the development of a practical Implementation plan for the acquisition and deployment of ITS systems by Ecorodovias including the development of specific projects for different applications of the recommended ITS technologies for the various highways managed by Ecorodovias in Brazil. The purpose of the final ITS implementation plan is not to develop a general ITS system plan or an ITS concept architecture, but rather to formulate a specific roadmap as a practical approach that defines the actions needed to be taken by Ecorodovias to effectively and efficiently implement the recommended ITS technologies and applications for the company's highways.

The SOW identifies the specific tasks and deliverables associated with the technical assistance below. The SOW is comprised of nine major tasks identified below:

**Task N°1- Review Ecorodovias ITS System Infrastructure**

- a) The U.S. firm shall work closely with Ecorodovias to identify the key personnel that will participate in the technical assistance in guiding the process through the proper course.
- b) The U.S. firm shall define the technical assistance goals, parameters, and objectives in close coordination with representatives from Ecorodovias.
- c) The U.S. firm shall develop a project timeline to be utilized as a guide in the development of the technical assistance, including the venue and frequency of meetings that shall be agreed upon and documented.
- d) The U.S. firm shall coordinate all efforts necessary to conduct the project kick-off meetings (in Brazil) for the technical assistance. The purpose of the kick-off meetings will be to familiarize and acquaint all those involved in the technical assistance with the goals and responsibilities and to gather the necessary information on the project, including materials, documentation, previous technical studies, and other relevant information.



## **M. TECHNICAL ASSISTANCE BUDGETS**

This section of the report provides information that includes the estimated resource requirement per task, personnel requirements, personnel costs, and other direct cost for Ecorodovias' technical assistance.

### **1.0 Ecorodovias ITS Technical Assistance**

#### **Personnel Requirements and Costs**

The following outlines the personnel requirements associated with Ecorodovias' ITS technical assistance.

#### **1.1 Personnel Requirements**

##### **Principal - ITS Program Manager**

The individual in the capacity of ITS Program Manager will be responsible for overseeing the technical assistance work and will provide the necessary leadership and support to insure a successful completion of the technical assistance according to the specified terms of reference. The individual in this capacity will have at a minimum, 20 years of experience in the development and implementation of ITS Systems. The ITS Program Manager should have particular experience and substantial knowledge in Highway Traffic Management Systems, Electronic Toll Collection (ETC) and Free-Flow Toll systems, Variable Message Sign (VMS) Systems, Highway Surveillance Systems (CCTV systems), Incident Detection Systems, Automated Enforcement Systems, Automated Vehicle Location (AVL) Systems, Emergency Telephone Systems, Vehicle Detection, Counting and Classification Systems, Optical Character Recognition (OCR) Systems, Automatic License/Number Plate Recognition Systems (ALPR/ANPR), Vehicle Identity Recognition Systems (VIR), Environmental Monitoring Systems, Traffic Management Center software and systems, and Vehicle Weighing Solutions including Weigh-in-Motion Systems (WIM).

Particular experience and substantial knowledge in the development of ITS systems and information technologies deployment plans for highway operations and safety, as well as knowledge and experience in IT applications and procedures to improve highway operational efficiencies. In addition, a person in this capacity shall have ample experience in the development of ITS modernization plans and projects. It is estimated that 44 days will be required for the conduct of the work.

##### **ITS Project Director**

The individual in the capacity of ITS Project Director will be responsible for directing and managing the technical assistance work in its entirety. The ITS Project Director will be responsible for establishing the technical assistance's strategies, goals, and objectives together with the ITS Program Manager and stakeholders. The individual in this capacity will be responsible for directing and supervising the work according to the specified terms of reference including schedules, meeting coordination, and quality control of all deliverables. The person in this capacity will have significant experience in the evaluation of institutional, legal, and regulatory issues associated with ITS projects.



The ITS Project Director shall have extensive experience and direct knowledge of Highway Traffic Management Systems, Electronic Toll Collection (ETC) and Free-Flow Toll systems, Variable Message Sign (VMS) Systems, Highway Surveillance Systems (CCTV systems), Incident Detection Systems, Automated Enforcement Systems, Automated Vehicle Location (AVL) Systems, Emergency Telephone Systems, Vehicle Detection, Counting and Classification Systems, Optical Character Recognition (OCR) Systems, Automatic License/Number Plate Recognition Systems (ALPR/ANPR), Vehicle Identity Recognition Systems (VIR), Environmental Monitoring Systems, Traffic Management Center software and systems, and Vehicle Weighing Solutions including Weigh-in-Motion Systems (WIM). Furthermore, the ITS Project Director shall have experience in the design, installation, integration, operations, and maintenance of ITS systems as it relates to highway applications and operations. The ITS Project Director will be responsible for directing the evaluation of the current ITS systems in use by Ecorodovias, assembling and coordinating the various equipment and systems specifications for those ITS systems and equipment that will ultimately be recommended for deployment on Ecorodovias highways, including recommending the needs for ITS systems integration.

The individual in this capacity shall have a strong background in the various aspects of ITS operations and experience with modern ITS system applications and procedures including experience in working with highway operators. The ITS Project Director will coordinate with Ecorodovias' Corporate Technology Office in developing the recommendations for the implementation of modern ITS systems and related information technologies for Ecorodovias' highways.

The proposed individual will have at a minimum, 20 years of direct experience in directing and managing ITS projects and studies, with particular emphasis in ITS system implementation, including the development of technical specifications for ITS systems and equipment. It is estimated that 80 days will be required for the conduct of the work.

### **ITS Systems Engineer**

The individual in the capacity of ITS Systems Engineer will be responsible for evaluating existing systems, determining the needs for future systems that the technical assistance may recommend, as well as for the development of functional design and specifications for the recommended ITS systems and equipment.

The individual in the capacity of ITS Systems Engineer will be responsible for evaluating the technological needs for the implementation of state-of-the-art ITS systems for highway applications, as well as assisting the ITS Project Manager and ITS Project Director in identifying the needs to upgrade, modernize, and identify future ITS systems/equipment and information technologies that may be recommended for implementation.

The individual in this capacity will be primarily responsible for identifying the needs, proposing solutions and developing the technical specifications for the various ITS systems and equipment that are recommended by the technical assistance. The individual serving in the capacity of Systems Engineer will have a minimum of 15 years of direct experience in ITS systems engineering and applications, including the areas of Highway Traffic Management Systems, Electronic Toll Collection (ETC) systems, Free Flow Toll Systems, Variable Message Sign (VMS) Systems, Highway Surveillance Systems (CCTV systems), Incident Detection Systems, Automated Enforcement Systems, Automated Vehicle Location (AVL) Systems, Emergency



Telephone Systems, Vehicle Detection, Counting and Classification Systems, Optical Character Recognition (OCR) Systems, Automatic License/Number Plate Recognition Systems (ALPR/ANPR), Vehicle Identity Recognition Systems (VIR), Environmental Monitoring Systems, Traffic Management Center software and systems, and Vehicle Weighing Solutions including Weigh-in-Motion Systems (WIM). It is estimated that 40 days will be required for the conduct of the work.

### **ITS Systems Integrator**

An individual in the capacity of ITS Systems Integrator will oversee all aspects of system integration including the possibility of integration of existing systems, future systems, as well as the requirements and integration capabilities for Ecorodovias' Traffic Management Centers. The individual in this capacity will be responsible for reviewing and developing the system integration aspects for those ITS systems that are ultimately recommended for implementation in conjunction with Ecorodovias' existing ITS infrastructure.

The individual in this capacity will be responsible for evaluating all IT communications infrastructure and requirements for the implementation and integration of ITS systems and equipment. The ITS Systems Integrator will be responsible for determining the needs for upgrading existing communication technologies, identifying and prioritizing future ITS and communications systems that the technical assistance recommends, as well as responsible for the development of technical specifications for the recommended systems and defining the technical integration needs for communication systems and protocols that may be ultimately used by Ecorodovias. The individual in this capacity will be primarily responsible for identifying the needs, proposing solutions and developing the ITS and communication systems functional design/infrastructure for the recommended systems to be implemented by Ecorodovias.

The individual proposed will have at a minimum, 15 years of direct experience in ITS and communication systems engineering including knowledge and experience in highway ITS communication systems. It is estimated that 40 days will be required for the conduct of the work.

### **Electrical Engineer**

An individual in the capacity of Electrical Engineer will oversee all aspects of tunnel lighting, tunnel ventilation systems, and highway lighting system/equipment required by Ecorodovias. The individual in this capacity will be responsible for reviewing and developing plans for those electrical tunnel and highways systems that are ultimately recommended for implementation.

The individual in this capacity will be responsible for evaluating Ecorodovias' tunnel and highways lighting infrastructure, tunnel ventilation systems, fire protection systems, power generation, power supply, and other electrical systems associated with tunnels and highways. The Electrical Engineer will be responsible for determining the needs for upgrading existing tunnel and highway lighting technologies, identifying and prioritizing future tunnel and highway lighting and tunnel ventilation systems, tunnel fire protection systems, highway, toll plaza, and tunnel power generating systems, back-up power systems, and other related electrical systems that the technical assistance recommends, as well as responsible for the development of technical specifications for the recommended systems and defining the technical operational requirements and maintenance factors. The individual in this capacity will be primarily responsible for identifying the needs, proposing solutions and developing the highway and



tunnel systems (lighting, ventilation, fire protection, electrical generation, back-up power, other) functional design for the recommended systems to be implemented by Ecorodovias.

The individual proposed will have at a minimum, 15 years of direct experience in tunnel lighting and ventilation systems as well as highway lighting systems, including self-sufficient or partially self-sufficient power generation (such as eolic or fotovoltaic generation) to support highway/tunnel lighting, tunnel fire protection systems, electrical power generation for tunnels, highway operations (toll plaza, maintenance facilities, etc) and other electrical systems for highway applications. It is estimated that 35 days will be required for the conduct of the work.

### **Economic, Financial and Environmental Personnel**

The individuals that work in the economic, financial, legal, and environmental aspects of the technical assistance will be responsible for the successful completion of the tasks involving the review, analysis, and recommendations of the economic and financial aspects of the technical assistance, as well as any legal implications and environmental impacts that may result from the implementation of ITS systems, equipment, and related information technologies for highway operations. Individuals in the various capacities (economic, financial, legal, and environmental) will have (each in his/her individual area of expertise) a minimum of 10 years' experience. It is estimated that the combined effort will take 21 days.

### **Administrative Staff**

An individual(s) in the capacity of administrative staff will be responsible for all administrative work in connection with the technical assistance including typing of all reports, correspondence, documentation, preparation of presentations, and all other aspects of administrative services needed to support the members of the U.S. firm's team. The individual(s) in this capacity will have experience in secretarial/administrative services with a strong background in technical report preparation, graphics, tables, etc. It is estimated that throughout the technical assistance period, 58 days will be required.

Based on the proposed personnel requirements outlined above, the total personnel cost anticipated for the conduct of the technical assistance is estimated at U.S. \$322,850. The table below provides a breakdown of the various tasks, personnel, and cost associated with the Ecorodovias ITS technical assistance.

## **1.2 Other Direct Costs**

### **1.2.1 Travel**

The following provides information regarding the trips that are estimated for the conduct of the Ecorodovias ITS technical assistance.

#### **Trip N°1**

The Project Manager, Project Director, ITS Systems Engineer, ITS System Integrator, and Electrical Engineer travel to Sao Paulo, Brazil for the initial kick-off meetings with the Ecorodovias group and for the review and evaluation of existing conditions and definition of goals and objectives for the technical assistance activities. Site visits to the various Ecorodovias



highways and traffic management centers take place where the U.S. firm's team will perform the initial ITS assessments for each highway.

### **Trip N°2**

This trip will be required for the work in connection with the technical analysis of ITS systems and the identification of ITS equipment and system needs, communication systems, and other ITS improvements and to identify the various ITS system/equipment requirements, potential solutions, and proposed technological improvements for the implementation of ITS technologies in Ecorodovias highways.

### **Trip N°3**

This trip is required to review the economic and financial aspects for the project and to collect relevant information that will be used in the economic and financial analysis. In addition, the legal, regulatory, and institutional review will be conducted and information will be collected through meetings and investigations conducted in Brazil. It is expected that any legal work and environmental review associated with the technical assistance will be conducted with local personnel. The Economic/Financial personnel will consist of one person for this trip.

### **Trip No. 4**

This trip is required to conduct the final evaluations and finalize the technical issues pertaining to the technical assistance. Additional meetings will be held in connection with the development of equipment and system specifications that will be presented by the U.S. firm for discussion. Interoperability issues, concerns, and priorities will be identified as well as all other issues pertaining to the selection of the various ITS equipment and system specifications and standards for the implementation of ITS technologies and procedures.

Potential technical system solutions will be presented and discussed. All final relevant information will be collected during this trip for the purpose of developing the technical specifications and functional system design for those ITS systems that will be recommended for implementation.

The Program Manager and the Project Director travel to Brazil to hold meetings with representatives from Ecorodovias in connection with the development of Ecorodovias' ITS implementation/action plan. The U.S. firm holds discussions on the necessary activities that will be required for the implementation of the various ITS equipment and systems and the final review of all other aspects pertaining to the technical assistance, including institutional, economic, financial, and technical aspects.

The U.S. firm discusses a "step- by- step" process to be recommended for Ecorodovias to take the recommendations for ITS systems to the final design, procurement, and implementation levels.

### **Trip No. 5**

The Project Manager and Project Director travel to Brazil to meet with representatives from the Ecorodovias and to present the draft report including recommendations, the ITS implementation plan, and all other relevant information pertaining to the technical assistance findings. The U.S.



firm meets with Ecorodovias representatives and reviews the draft report findings and recommendations for comments and final modifications. The U.S. firm uses this opportunity to discuss a possible Orientation Visit (OV) or RTM (if approved by USTDA) to the United States for Ecorodovias representatives with the intent to evaluate ITS technologies in operation at U.S. highways. The U.S. firm collects all final comments, suggestions, and recommendations from Ecorodovias in order to complete the final technical assistance report.

The Table below outlines the breakdown of the various trips required for the conduct of the technical assistance including the personnel, the specific trip, number of days for each trip, and travel expenses associated with each trip.

**1.2.2 Reproduction and Binding**

Copies of the Interim Technical Reports (4 copies in Portuguese and one in English) will be reproduced and bound and 5 copies of the Final Report (in Portuguese) and two copies in English will be reproduced and bound in accordance with the Terms of Reference.

Interim report reproduction: 300 pages x 0.40/copy x 5  
 Final report reproduction: 500 pages x 0.40/copy x 7  
 Binding and final report specifications \$100.00 x 12

**1.2.3 Courier Services**

While a significant amount of information and documents could be sent to and from Brazil via electronic mail, there may still be the need for courier services in order to mail large documents, plans, design drawings and other materials. It is expected that some 6 packages could be sent via courier service.

**1.2.4 Communications**

While a significant amount of communications will most likely take place via electronic mail, a study of this magnitude could require voice communications at certain intervals of the technical assistance. Ten (10) hours of long distance calls are estimated for the first 3 months.

**1.2.5 Interpreter/Translation Services**

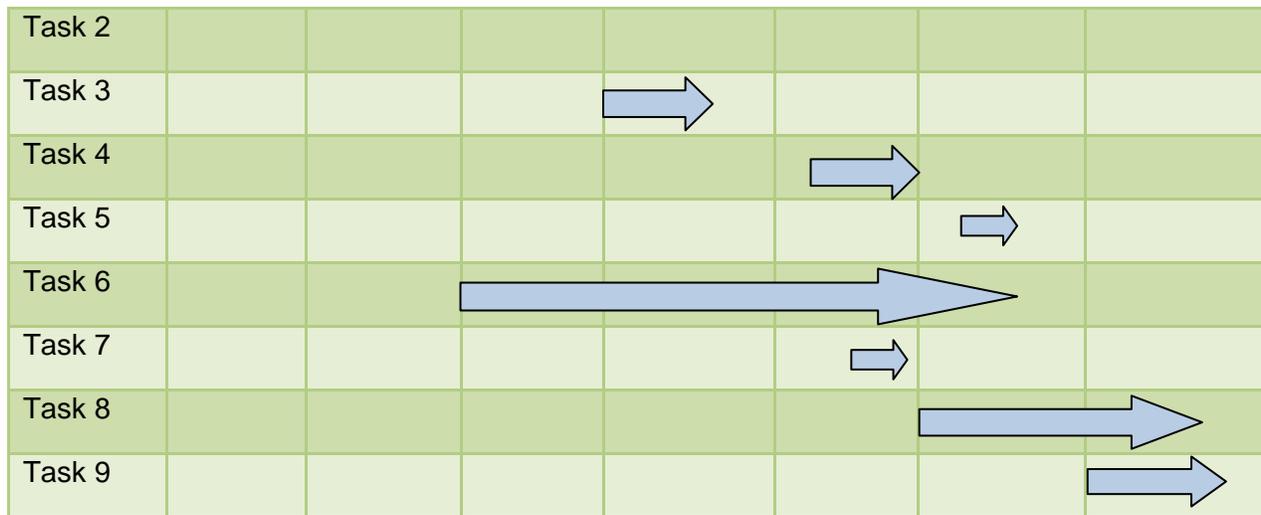
It is estimated that interpreter services will be required for the conduct of the technical assistance for some 50 days

**1.2.6 Ecorodovias Technical Assistance Schedule**

The technical assistance is expected to take seven months to be completed. The table below outlines the proposed schedule for conducting the technical assistance.

Table N°. 15 Ecorodovias Technical Assistance Schedule							
Task No.	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7
Task 1	➔						

HEP Transportation C ➔



**N. RECOMMENDATIONS**

This section of the report outlines the Definitional Mission recommendations as it pertains to the technical assistance for Ecorodovias.

**1.0 Ecorodovias ITS Technical Assistance**

The results from the DM assessment indicate that Ecorodovias staff has great interest in further developing and improving the company’s ITS infrastructure and systems by investing in ITS development projects. In particular, Ecorodovias has invested significantly in the implementation of ITS systems and ITS infrastructure over the years with expenditures in the order of U.S.\$ 13.8 million per year from 2009 to 2011. Ecorodovias has increased ITS spending projections for the period of 2012 to 2014 to an estimated U.S.\$ 17 million per year with the objective to modernize ITS systems for the company’s concessioned highways, as well as IT systems for operations and administration.

Ecorodovias presently has several ITS systems in use along its highways, including VMS, CCTV, ETC, Traffic management centers, speed enforcement, emergency telephone systems, and many others that provide coverage to the various segments of highways operated by the company. Ecorodovias continues to ensure that its overall business strategy is aligned with the trends of modern technology developments to support the company’s growth and quality of service.

Ecorodovias has continued to strengthen the company’s growth strategy towards marketing and delivering a comprehensive range of traffic management solutions and services for the highway industry in Brazil and the company has focused on the need to expand Ecorodovias services beyond their highway environment to include the areas of electronic payment system, intermodal and logistic services, and more.



Ecorodovias has not only demonstrated the commitment to expand its services and investment in ITS technologies, but the company has placed emphasis in creating an adequate framework for monitoring the company's control environment by implementing a company governance framework to support the various functions to enhance corporate accountability. Ecorodovias has substantial human capital (2,028 employees) and the company continues to invest in research and development, allowing Ecorodovias to constantly find innovative solutions in highway traffic management and intermodal and logistic services. Ecorodovias' ability to implement innovative solutions is well demonstrated by the many projects that the company has delivered in Brazil for many years.

In addition, Ecorodovias has developed an information technology plan which provides the strategic view and direction for the company's IT organization and management. The IT plan provides strategies, rules, and procedures by which information technology is to be structured and implemented to accommodate the different types of highway activities, traffic volume, and other services. Through the massive highway infrastructure development that Ecorodovias embarked on several years ago, the company has once again demonstrated that is capable and committed to further modernizing its intelligent transportation systems infrastructure.

Ecorodovias has an entire department dedicated to the development, operations, and maintenance for the company's information technologies and intelligent transportation systems. The DM findings indicate that Ecorodovias has the capability to undertake the development of ITS projects and the company has demonstrated the commitment to support and strengthen the transportation sector in Brazil as evidenced by their development of ITS strategic plans and ITS infrastructure and the company has dedicated significant investments in the areas of surface transportation.

The financial review of Ecorodovias indicates that the company is in excellent financial standings and fully capable of supporting its operations and maintenance responsibilities for its highways and ITS infrastructure, allowing the company to invest further in additional systems such as ITS to improve the operational efficiency and safety of its highways. Ecorodovias recorded revenues in the order of U.S.\$ 830 million and net income of U.S.\$ 343 million in 2010. It is evident that Ecorodovias has plans to continue its movement towards full ITS deployment for the highways the company operates and the company is in need of a technical assistance in order to identify and prioritize the implementation and modernization of ITS equipment and systems, as well as other highway and tunnel related technologies.

USTDA should consider funding the Ecorodovias ITS technical assistance because the proposed ITS activities by Ecorodovias meet USTDA grant funding criteria as confirmed by the Definitional Mission findings. A review of the information obtained as part of the Definitional Mission indicates that the implementation of ITS equipment and systems on Ecorodovias highways is economically, financially, and technically feasible. Export potential of U.S. goods and services is considered to be moderate given the type of modern ITS systems that are likely to be required by Ecorodovias. U.S. export potential for ITS systems and other highway/tunnel related equipment has been estimated at U.S. \$ 20 million for the period of 2012 to 2014. Additional U.S. export potential is expected during the period of 2015 to 2017 that could reach U.S. \$ 30 million.

If the proposed technical assistance proves to be successful in the implementation of U.S. technologies (ITS), Ecorodovias could expand the use of U.S. manufactured ITS systems to other highway and logistic applications throughout Brazil and long term, this could translate into



additional business opportunities for U.S. firms, thus potentially increasing U.S. exports. In addition, the technical assistance is expected to make recommendations in regards to Free-Flow Toll Collection systems, Object Recognition Systems, Weigh-in-Motion Systems, and other technologies that Ecorodovias does not currently use.

The technical assistance would contribute to the introduction of these modern ITS systems and others to Ecorodovias staff and this could very well increase the U.S. export potential significantly. There are systems that would eventually (4 to 5 years from now) will require replacement such as VMS signs, highway counter and classification systems, ETC equipment, CCTV system, traffic management systems, and others. The technical assistance would assist Ecorodovias in identifying a plan that not only identifies the most immediate and short-term needs for ITS technologies, but also for those medium and long-term system replacements and upgrades. This could also increase the medium and long-term potential for U.S. exports. Also, depending on the success of the technical assistance, Ecorodovias may decide to review other technologies in the logistics arena that could also lead to additional exports for the company.

Other U.S. exports could be realized in the area of information technology systems as Ecorodovias has a substantial IT center that requires the use of servers and computers in order to operate its highways, logistic centers, and for the overall administration of the company and its subsidiaries. Other highway and tunnel technologies (other than ITS) could also represent U.S. export potential as Ecorodovias expects to replace tunnel lighting, ventilation, and fire protection systems for its tunnels in the near future. Additionally, Ecorodovias is interested in the use of energy efficient lighting systems for its highways, toll plazas, tunnels, and other facilities and this too could represent a higher level of U.S. export potential.

The implementation of ITS systems on Ecorodovias highways would be very important for the U.S. industry because Ecorodovias is interested in evaluating U.S. technologies that are of the highest quality and with the level of investments expected in future years, this could represent an opportunity for U.S. companies to introduce their products to Ecorodovias.

U.S. companies definitely have the expertise required to provide the services and technologies likely to be required by Ecorodovias. In reviewing the need for equipment, systems, and engineering services, HEP Consulting determined that U.S. companies should be able to adequately supply the ITS technologies and services that are likely to be required by Ecorodovias.

The ITS technologies most likely required for Ecorodovias' highways are currently being utilized widely in the U.S., and are therefore readily available for export to Brazil. The United States is an industry leader in ITS technology with a significant number of applications for international, regional, and local transportation systems. Furthermore, since the substantial increase in highway traffic over the last 15 years, the ITS industry in the United States has experienced significant growth and technological advancement that has led to the development and application of the most sophisticated technologies for highway systems.

Several of the U.S. companies contacted in connection of with Ecorodovias plans for ITS deployment demonstrated a positive interest in exporting their products to Brazil. There is sufficient interest on the part of U.S. suppliers to sale their products in Brazil, as these U.S. companies recognize the potential of the ITS market in that country and the immediate region. The implementation of new and advanced U.S. technologies in Brazil could represent the mechanism needed to open the door for U.S. companies to penetrate the Brazilian market.



The assessment conducted as part of the Definitional Mission determines that Ecorodovias has the required administrative and technical capacity to undertake the implementation of ITS systems, as demonstrated by the company's prior commitment in pursuing the technological modernization of highway traffic management and highway infrastructure in Brazil. Ecorodovias' track record is considered excellent in terms of the company's ability to develop ITS and IT plans and strategies, strategic planning, financing the transportation and logistics sectors, project implementation, as well as the operation and maintenance of Ecorodovias' highways.

A substantial portion of Ecorodovias' revenues have been invested back into the company, some in the area of ITS systems, which has resulted in the impressive implementation of ITS equipment and systems for the highways the company operates. Ecorodovias' diversification of its assets and services combined with the increases in highway traffic along with the growth experienced by activities in the Brazilian ports, has proven to strengthen the company's financial standings while providing quality highways and logistic services.

The overall assessment of the foreign competition component indicates that U.S. companies currently face significant foreign competition in the Brazilian transportation market. However, U.S. technologies are known to be of the highest quality and with one of the highest levels of reliability and durability. The DM findings indicate that Ecorodovias has not had a quality opportunity to evaluate and experience the full use of ITS technologies made in the U.S. and as such, it is important that the necessary steps be taken to introduce U.S. transportation technologies to the corporate technology staff at Ecorodovias.

USTDA could play a key role in promoting U.S. business activities in the transportation sector in Brazil by financing the Ecorodovias ITS technical assistance, which could open the door for U.S. companies to export their products to Brazil. One of the advantages that Ecorodovias represent for U.S. firms is that the company does not rely on low bids or lowest price tenders for the acquisition of its technologies, but rather high quality products and life cycle costs are even more important factors for the decision making process to purchase an implement ITS and IT systems. Ecorodovias staff understands that revenues and customer satisfaction factors depend heavily on the use of the most reliable and accurate technologies, and as such the company focuses on the procurement of high quality products. Additionally, Ecorodovias has a license to directly import goods into Brazil without having to utilize import brokers in the process and this allows the company to buy directly from a foreign supplier with minimal intermediary services which also represents lower cost for Ecorodovias.

The implementation of ITS technologies for Ecorodovias highways could provide for the building of advanced technologies and support for highway infrastructure that would likely enhance highway operational efficiency, improve cargo movements from neighboring countries, and enhance the movement and import of U.S. cargo and goods through Ecorodovias' highways and logistics centers. In addition, highway safety, interstate and international travel could be improved along Ecorodovia's highways and this could assist Brazil with its plans to strengthen the country's tourism industry and increase international/regional commercial trade to further promote economic development.

The proposed implementation of ITS systems on Ecorodovias highways is likely to have a positive impact on human capacity building because private service providers will have to be trained in the operation and maintenance of modern highway systems, including significant amount of training in the application of new and advanced ITS technologies. Furthermore, the



implementation of ITS equipment and systems would represent good technology transfer opportunities for Brazil.

The proposed implementation of ITS systems is likely to result in productivity improvements as time spent by highway users could improve in the form of reduced delay, more efficient processing at toll plazas, reduced idle time for commercial vehicles, less travel time crossing international borders and more efficient transportation of goods (including U.S. imports/cargo) to and from the Brazilian ports. Furthermore, the proposed ITS implementation by Ecorodovias is not expected to have a negative impact on the environment nor on U.S. labor.

In summary, the findings indicate that after the consideration of all elements and factors collectively reviewed under the DM, the requirements for grant funding are met for a viable USTDA activity in Brazil, and such, it is recommended that USTDA consider funding the Ecorodovias ITS technical assistance in the amount of U.S. \$460,000 and select Ecorodovias as the Grantee.

## O. CONTACTS

### **Afranio Spolador**

ECORODOVIAS  
Gerente de Sistemas e Automacao  
Rod. Dos Imigrantes, Km 28,5  
Jd. Represa  
Sao Bernardo do Campo – SP  
CEP 09845 000  
Tel: +11 4359-6171/6167  
E-mail:  
[Afranio.Spolador@ecorodovias.com.br](mailto:Afranio.Spolador@ecorodovias.com.br)

Tel: (Cell) 757-342-2149  
Fax: 202-429-9574  
E-mail: [davidelliott@kealtd.com](mailto:davidelliott@kealtd.com)  
[www.kealtd.com](http://www.kealtd.com)

### **Ebe Raso**

Business Development Specialist  
Embassy of the United States of America  
Rua Thomas Deloney, 381  
04710-041 Sao Paulo, SP Brazil  
Tel: (55-11) 5186-7339  
E-mail: [ebe.raso@trade.gov](mailto:ebe.raso@trade.gov)  
[www.buyusa.gov/brazil](http://www.buyusa.gov/brazil)

### **Carlos Paavola**

ECORODOVIAS  
Directoria de Tecnologia Corporativa  
Rod. Dos Imigrantes, Km 28,5  
Jd. Represa  
Sao Bernardo do Campo – SP  
CEP 09845 000  
Tel: +11 4359-6150  
E-mail: [carlos.paavola@ecorodovias.com.br](mailto:carlos.paavola@ecorodovias.com.br)

### **Gabrielle Mandel**

USTDA  
Country Manager for Brazil and the  
Southern Cone  
1000 Wilson Blvd. Suite 1600  
Arlington, Virginia 22209  
Tel: (703) 875-4357  
E-mail: [gmandel@ustda.gov](mailto:gmandel@ustda.gov)

### **David Elliott**

Koeppen, Elliott & Associates, Ltd.  
Vice President  
1875 I Street, N.W., Suite 500  
Washington, D.C. 20006  
HEP Transportation Consulting

### **Gabriel Goldschmidt**

International Finance Corporation- IFC  
E-mail: [Ggoldschmidt@ifc.org](mailto:Ggoldschmidt@ifc.org)



**John Fay**

Commercial Officer  
U.S. Commercial Service  
Orlando U.S. Export Assistance Center  
3201 East Colonial Drive, Suite A-20  
Orlando, FL 32803  
Tel: (407) 420-4420  
Cell: (407) 754-7909  
E-mail: [John.Fay@trade.gov](mailto:John.Fay@trade.gov)  
[www.export.gov/florida](http://www.export.gov/florida)

**Michael A. Koeppen**

President & CEO  
Koeppen, Elliott & Associates, Limited  
International Trade Development  
1875 I Street, N.W., Suite 500  
Washington, D.C. 20006  
Tel: (202) 429-5245  
Cell: (757) 592-2004  
Fax: (202) 429-9574  
E-mail: [mak@kealtd.com](mailto:mak@kealtd.com)  
[www.kealtd.com](http://www.kealtd.com)

**Nathan Young**

Regional Director for Latin America and the  
Caribbean  
USTDA  
1000 Wilson Blvd. Suite 1600  
Arlington, Virginia 22209  
Tel: (703) 875-4357  
E-mail: [nyoung@ustda.gov](mailto:nyoung@ustda.gov)

**Ravi S. Bugga**

Transportation/Infrastructure Specialist  
International Finance Corporation  
IFC" [rbugga@ifc.org](mailto:rbugga@ifc.org)

**Rodrigo Mota**

Country Representative, Brazil  
U.S. Trade & Development Agency  
Phone: 55-11-5186-7335  
Fax: 55-11-5186-7396  
E-mail: [rmota@ustda.gov](mailto:rmota@ustda.gov)  
[www.ustda.gov](http://www.ustda.gov)



Cell: 610) 716-3897  
E-mail: [Edward.Reagle@aecom.com](mailto:Edward.Reagle@aecom.com)  
[www.aecom.com](http://www.aecom.com)

**Cambridge Systematics, Inc.**

Erin Flanigan  
Principal  
4800 Hampden Lane, Suite 800  
Bethesda, MD 20814  
Tel: (301) 347-0100  
E-mail: [eflanigan@camsys.com](mailto:eflanigan@camsys.com)

**CASE Systems, Inc.**

Sebastian E. Guitierrez  
President/ CEO  
5 Goddard  
Irvine, CA 92618  
Tel: (949) 988-7501  
Cell: (949) 394-2942  
E-mail: [sgutierrez@casesystemsinc.com](mailto:sgutierrez@casesystemsinc.com)  
[www.casesystemsinc.com](http://www.casesystemsinc.com)

**Clever Devices**

Francis "Buddy" Coleman  
Executive Vice President and Principal  
137 Commercial Street  
Plainview, NY 11803  
Tel: (516) 403-8388  
Cell: (631) 338-7082  
E-mail: [bcoleman@cleverdevices.com](mailto:bcoleman@cleverdevices.com)

**Clever Devices**

Michel A. Perez,  
Advisor  
Tel: (914) 834 70 26 or 917 273 8737  
E-mail: [michelaperez@gmail.com](mailto:michelaperez@gmail.com)

**U.S. COMPANY CONTACTS**

**AECOM**

Edward C. Reagle, PE  
Project Manager  
Discipline Manager Traffic & ITS  
1700 Market Street, Suite 1600  
Philadelphia, PA 19103  
Tel: (215) 789-2148  
Fax: (215) 735-0883  
HEP Transportation Consulting

**Clever Devices**

Steve Bennett, Vice President & Managing  
Director International Business  
Development  
E-mail: [SBENNETT@cleverdevices.com](mailto:SBENNETT@cleverdevices.com)

**Comnet**

Dave Sinise  
Eastern Regional Sales Manager,  
Transportation and Infrastructure



3 Corporate Drive  
Danbury, CT 06810  
Tel: (203) 796-5300  
Cell: (203) 521-9948  
E-mail: [dsinise@comnet.net](mailto:dsinise@comnet.net)  
[www.comnet.net](http://www.comnet.net)

**Comnet**

Dan Anderson  
Western Regional Accounts Manager  
3 Corporate Drive  
Danbury, CT 06810  
Tel: (972) 447-9505  
Cell: (214) 454-9926  
E-mail: [danderson@comnet.net](mailto:danderson@comnet.net)  
[www.comnet.net](http://www.comnet.net)

**Consystec**

Robert Jaffe  
President  
P.O. Box 517  
Shenorock, NY 10587-0517  
Tel: (914) 248-8466  
Fax: (914) 248-5840  
E-mail: [rsj@consystec.com](mailto:rsj@consystec.com)

**Control Technologies of Central Florida**

Michael Day  
President  
2776 South Financial Court  
Sanford, Florida 32773  
Tel: (407) 330-2800  
Fax: (407) 330-2804  
E-mail: [cttraffic@aol.com](mailto:cttraffic@aol.com)  
[www.cttraffic.com](http://www.cttraffic.com)

**Daktronics**

Brian Vanorny  
Project Manager/Transportation Market  
117 Prince Drive  
P.O. Box 5120  
Brookings, SD 57006-5120  
Tel: (888) 325-8726  
Fax: (605)697-4700  
Cell: (605) 695-8271  
E-mail: [brian.vanorny@daktronics.com](mailto:brian.vanorny@daktronics.com)  
HEP Transportation Consulting

**Daktronics**

DeWayne Anderson  
Manager - Transportation Market  
tel 605.692.0200 ext 57239 mobile  
605.691.9438  
E-mail:  
[Dewayne.Anderson@daktronics.com](mailto:Dewayne.Anderson@daktronics.com)  
[www.daktronics.com](http://www.daktronics.com)

**Econolite**

Persephone Oliver  
Vice President Marketing Communications  
3360 East La Palma Avenue  
Anaheim, CA 92806  
Tel: (714) 630-3700  
Fax: (714) 630-6349  
E-mail: [poliver@econolite.com](mailto:poliver@econolite.com)  
[www.econolite.com](http://www.econolite.com)

**Gannett Fleming**

Jay H.L. Calhoun, P.E.  
Vice President  
4350 West Cypress Street, Ste 340  
Tampa, FL 33607  
Tel: (813) 831-870, ext 207  
E-mail: [jcalhoun@gfnet.com](mailto:jcalhoun@gfnet.com)

**Gannett Fleming**

Todd D. Patton  
System Analyst  
4350 West Cypress Street, Ste 340  
Tampa, FL 33607  
Tel: (813) 831-870, ext 229  
E-mail: [tpatton@gfnet.com](mailto:tpatton@gfnet.com)

**Global Traffic Technologies, LLC**

Elaine Bliss  
Vice President Marketing and Product  
Development  
7800 Third Street North, Bldg. 100  
St. Paul, Minnesota 55128  
Tel: (651) 789-7329  
Cell: (612) 865-6459  
E-mail: [Elaine.bliss@gtt.com](mailto:Elaine.bliss@gtt.com)  
[www.gtt.com](http://www.gtt.com)



**Global Traffic Technologies, LLC**

Eric E. Rensel  
Project Manager  
207 Senate Ave  
Camp Hill, PA 17011  
Tel: (717) 763-7211  
Cell: (717) 645-3791  
E-mail: [rensel@gfnet.com](mailto:rensel@gfnet.com)

**Global Traffic Technologies, LLC**

Walter Weichselbaumer  
Systems Consultant  
7800 Third Street North, Bldg. 100  
St. Paul, Minnesota 55128  
Tel: (954) 551-3676  
E-mail: [walterw@gtt.com](mailto:walterw@gtt.com)  
[www.gtt.com](http://www.gtt.com)

**Horizon Signal Technologies**

David Krahulec  
Vice President/COO  
202 Conestoga Road  
Wayne, PA 19087  
Tel: 800) 852-8796 ext 302  
Fax: (717) 336-8824  
E-mail: [dkrahulec@horizonsignal.com](mailto:dkrahulec@horizonsignal.com)

**IBM**

Jason A. Gonzalez  
IT Specialist  
Global Solution Center  
1177 S Beltline Rd/  
Coppell, TX 75019  
Tel: (469) 549-81448  
Fax: (469) 549-8235  
E-mail: [jasongon@us.ibm.com](mailto:jasongon@us.ibm.com)

**IBM**

Bill McCrosky  
CTO, Travel and Transportation Industries  
Systems and Technology Group  
606 Pine Crest Drive  
Heathsville, VA 22473  
Tel: (804) 916-9365  
E-mail: [mccrosky@us.ibm.com](mailto:mccrosky@us.ibm.com)

**ICX Transportation**

HEP Transportation Consulting

Peter Dwyer  
Managing Director  
1720 Clay Street, Suite 14  
San Francisco, CA 94109  
Tel/Fax: (888) 511 ICXT  
Cel: (415) 559-2150  
E-mail: [peter.dwyer@icxt.com](mailto:peter.dwyer@icxt.com)  
[www.icxt.com](http://www.icxt.com)

**ICX Technologies**

Michael Berman  
Marketing Director  
19030 Lenton Place, Suite 564  
Monroe, WA 98275  
Tel: (888) 511 ICXT  
Cell: (425) 367-4403  
E-mail: [Michael.berman@icxt.com](mailto:Michael.berman@icxt.com)  
[www.icxt.com](http://www.icxt.com)

**INEX/ZAMIR Technologies**

Jim Kennedy  
10870 Murdock Drive  
Knoxville, TN 37932  
865 671 1400 x22  
865 671 1416 fax  
865 712 6758 cell  
[www.inexzamir.com](http://www.inexzamir.com)

**Intelligent Devices**

Andrew Baker  
Account Manager  
4411 Suwanee Dam Rd., Suite 510  
Suwanee, GA 30024  
Tel: (770) 831-3370  
Cell: (678) 447-6281  
E-mail: [abaker@intelligentdevicesinc.com](mailto:abaker@intelligentdevicesinc.com)

**IntelLight-ITS**

Maxime De Baynast  
Senior Systems Engineer  
3450 S. Broadmont Drive, Ste. 126  
Tucson, AZ 85713  
Tel: (520) 795-8808  
E-mail: [maxime.debaynast@intelight-its.com](mailto:maxime.debaynast@intelight-its.com)  
[www.intelight-its.com](http://www.intelight-its.com)

**Intuicom**

Joe Traddii  
Director of Product Mgmt. and Marketing



4900 Nautilus Ct., Suite 100  
Boulder CO 80301  
Tel: (303) 449-4330 x 225  
Cell: (425) 417-5408  
E-mail: [jtradii@intuicom.com](mailto:jtradii@intuicom.com)

**Iteris**

Melvyn Haxby  
Director, International Sales Sensors  
1700 Carnegie Ave. Suite 100  
Santa Ana, CA 92705  
Tel: (949) 270-9528  
Fax: (949) 270-9441  
E-mail: [mjh@iteris.com](mailto:mjh@iteris.com)  
[www.iteris.com](http://www.iteris.com)

**MDL**

Dan Freveletti  
Business Development Manager  
17555 Groeschke Rd.  
Houston, TX 77084  
Tel: (281) 646-0050  
Cell: (832) 274-6003  
E-mail: [dfreveletti@mdl-laser.com](mailto:dfreveletti@mdl-laser.com)  
[www.mdl-laser.com](http://www.mdl-laser.com)

**MG Squared**

Martin A. Maners, III  
Vice President and General Counsel  
LoweringSystemsS.com  
3301 Oak Hill Drive  
Birmingham, AL 35216  
Tel: (205) 823-6688  
Fax: (205) 823-6615  
E-mail: [martin@mgsquared.com](mailto:martin@mgsquared.com)

**Nema**

John Miller  
Industry Director  
1300 North 17<sup>th</sup> street, suite 1752  
Rosslyn, VA 22209  
Tel: (703) 841-3202  
E-mail: [john.miller@ntelx.com](mailto:john.miller@ntelx.com)

**NTELX**

Amrinder Arora  
Vice President – Technology  
1945 Old Gallows Road, #700  
Vienna, VA 22182  
E-mail: [aarora@ntelx.com](mailto:aarora@ntelx.com)  
HEP Transportation Consulting

**Science Applications International Corporation - SAIC**

Satinder S. Bhalla  
Assistant Vice President Intelligent Transportation Systems  
1000 Broadway, Suite 680  
Oakland, CA 94607  
Tel: (510) 286-2300  
Fax: (510) 663-0899  
E-mail: [satinder.s.bhalla@saic.com](mailto:satinder.s.bhalla@saic.com)  
[www.saic.com](http://www.saic.com)

**Science Applications International Corporation - SAIC**

Gary Carlin, PTP  
511 Traffic Program Manager Space and Information Solutions Division  
1000 Broadway, Suite 680  
Oakland, CA 94607  
Tel: (510) 286-2302  
Cell: (510) 333-7867  
Fax: (510) 663-0899  
E-mail: [gary.carlin@saic.com](mailto:gary.carlin@saic.com)  
[www.saic.com](http://www.saic.com)

**SQL Stream**

Harrison Baker  
Account Executive  
1540 Market Street, Suite 400  
San Francisco, CA 94102  
Tel: (510) 523-7039  
E-mail: [Harrison.Baker@sqlstream.com](mailto:Harrison.Baker@sqlstream.com)

**Skyline Products**

Matt Wecker  
Regional Sales Manager  
Transportation Systems Division  
2903 Delta Drive  
Colorado Springs, CO 80910  
Tel: (800) 759-9046  
Cell: (719) 464-8877  
E-mail: [mattwecker@skylineproducts.com](mailto:mattwecker@skylineproducts.com)  
[www.SkylineProducts.com](http://www.SkylineProducts.com)

**TransCore**

William L Skillas, P.E.  
Vice President  
192 Technology Parkway, Suite 500  
Norcross, GA 30092



Tel: (770) 246-6242  
Fax: (770) 449-7268  
Cell: (678) 910-8602  
E-mail: [William.skills@transcore.com](mailto:William.skills@transcore.com)

**Transdyn, Inc**

Jim McCullough  
Business Development Manager  
4230 Lafayette Ctr. Dr., Suite K  
Chantilly, VA 20151  
Tel: (703) 378-7380  
Fax: (703) 378-7387  
E-mail: [jmccullough@transdyn.com](mailto:jmccullough@transdyn.com)  
[www.transdyn.com](http://www.transdyn.com)

**Transdyn, Inc.**

James Montgomery  
Business Development Manager  
4256 Hacienda Dr., Suite 100  
Pleasanton, CA 94588  
Tel: (925) 225-1600  
Cell: (510) 913-5148  
E-mail: [jmontgomery@transdyn.com](mailto:jmontgomery@transdyn.com)  
[www.transdyn.com](http://www.transdyn.com)

**Raytheon**

Brian Patno  
Sr. Manager Business Development  
Highway Transportation Management  
Systems  
1801 Hughes Drive  
675/DD311  
Fullerton, California 92834  
Tel: (714) 446-2315  
E-mail: [bpatno@raytheon.com](mailto:bpatno@raytheon.com)



**U.S. TRADE AND DEVELOPMENT AGENCY  
Arlington, VA 22209-2131**

**NATIONALITY, SOURCE, AND ORIGIN REQUIREMENTS**

The purpose of USTDA's nationality, source, and origin requirements is to assure the maximum practicable participation of American contractors, technology, equipment and materials in the prefeasibility, feasibility, and implementation stages of a project.

**USTDA STANDARD RULE (GRANT AGREEMENT STANDARD LANGUAGE):**

Except as USTDA may otherwise agree, each of the following provisions shall apply to the delivery of goods and services funded by USTDA under this Grant Agreement: (a) for professional services, the Contractor must be either a U.S. firm or U.S. individual; (b) the Contractor may use U.S. subcontractors without limitation, but the use of subcontractors from host country may not exceed twenty percent (20%) of the USTDA Grant amount and may only be used for specific services from the Terms of Reference identified in the subcontract; (c) employees of U.S. Contractor or U.S. subcontractor firms responsible for professional services shall be U.S. citizens or non-U.S. citizens lawfully admitted for permanent residence in the U.S.; (d) goods purchased for implementation of the Study and associated delivery services (e.g., international transportation and insurance) must have their nationality, source and origin in the United States; and (e) goods and services incidental to Study support (e.g., local lodging, food, and transportation) in host country are not subject to the above restrictions. USTDA will make available further details concerning these standards of eligibility upon request.

**NATIONALITY:**

1) Rule

Except as USTDA may otherwise agree, the Contractor for USTDA funded activities must be either a U.S. firm or a U.S. individual. Prime contractors may utilize U.S.

subcontractors without limitation, but the use of host country subcontractors is limited to 20% of the USTDA grant amount.

## 2) Application

Accordingly, only a U.S. firm or U.S. individual may submit proposals on USTDA funded activities. Although those proposals may include subcontracting arrangements with host country firms or individuals for up to 20% of the USTDA grant amount, they may not include subcontracts with third country entities. U.S. firms submitting proposals must ensure that the professional services funded by the USTDA grant, to the extent not subcontracted to host country entities, are supplied by employees of the firm or employees of U.S. subcontractor firms who are U.S. individuals.

Interested U.S. firms and consultants who submit proposals must meet USTDA nationality requirements as of the due date for the submission of proposals and, if selected, must continue to meet such requirements throughout the duration of the USTDA-financed activity. These nationality provisions apply to whatever portion of the Terms of Reference is funded with the USTDA grant.

## 3) Definitions

A "U.S. individual" is (a) a U.S. citizen, or (b) a non-U.S. citizen lawfully admitted for permanent residence in the U.S. (a green card holder).

A "U.S. firm" is a privately owned firm which is incorporated in the U.S., with its principal place of business in the U.S., and which is either (a) more than 50% owned by U.S. individuals, or (b) has been incorporated in the U.S. for more than three (3) years prior to the issuance date of the request for proposals; has performed similar services in the U.S. for that three (3) year period; employs U.S. citizens in more than half of its permanent full-time positions in the U.S.; and has the existing capability in the U.S. to perform the work in question.

A partnership, organized in the U.S. with its principal place of business in the U.S., may also qualify as a "U.S. firm" as would a joint venture organized or incorporated in the United States consisting entirely of U.S. firms and/or U.S. individuals.

A nonprofit organization, such as an educational institution, foundation, or association may also qualify as a "U.S. firm" if it is incorporated in the United States and managed by a governing body, a majority of whose members are U.S. individuals.

## **SOURCE AND ORIGIN:**

### 1) Rule

In addition to the nationality requirement stated above, any goods (e.g., equipment and materials) and services related to their shipment (e.g., international transportation and insurance) funded under the USTDA Grant Agreement must have their source and origin in the United States, unless USTDA otherwise agrees. However, necessary purchases of goods and project support services which are unavailable from a U.S. source (e.g., local food, housing and transportation) are eligible without specific USTDA approval.

### 2) Application

Accordingly, the prime contractor must be able to demonstrate that all goods and services purchased in the host country to carry out the Terms of Reference for a USTDA Grant Agreement that were not of U.S. source and origin were unavailable in the United States.

### 3) Definitions

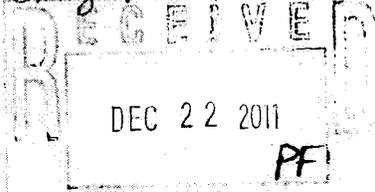
“Source” means the country from which shipment is made.

“Origin” means the place of production, through manufacturing, assembly or otherwise.

*Questions regarding these nationality, source and origin requirements may be addressed to the USTDA Office of General Counsel.*

**ANNEX 4**

Brazil 2012-51005A



**GRANT AGREEMENT**

LZ  
JW

This Grant Agreement is entered into between the Government of the United States of America, acting through the U.S. Trade and Development Agency ("USTDA") and EcoRodovias Concessões e Serviços, S.A. ("Grantee"). USTDA agrees to provide the Grantee under the terms of this Grant Agreement US\$460,000 ("USTDA Grant") to fund the cost of goods and services required for the preparation of a technical assistance ("Technical Assistance") on the proposed EcoRodovias Intelligent Transportation Modernization and Expansion Project ("Project") in Brazil ("Host Country").

SU NY MB  
GM IS EB  
KM PD AY  
SP

U.S. TRADE AND DEVELOPMENT AGENCY

**1. USTDA Funding**

The funding to be provided under this Grant Agreement shall be used to fund the costs of an Agreement of Understanding to Perform the Technical Assistance ("Agreement of Understanding") between the Grantee and the U.S. firm selected by the Grantee ("U.S. Firm") under which the U.S. Firm will perform the Technical Assistance. Payment to the U.S. Firm will be made directly by USTDA on behalf of the Grantee with the USTDA Grant funds provided under this Grant Agreement.

**2. Terms of Reference**

The Terms of Reference for the Technical Assistance ("Terms of Reference") are attached as Annex I and are hereby made a part of this Grant Agreement. The Technical Assistance will examine the technical, financial, environmental and other critical aspects of the proposed Project. The Terms of Reference shall also be included in the Agreement of Understanding.

**3. Standards of Conduct**

USTDA and the Grantee recognize the existence of standards of conduct for public officials, and commercial entities, in their respective countries. The parties to this Grant Agreement and the U.S. Firm shall observe these standards, which include not accepting payment of money or anything of value, directly or indirectly, from any person for the purpose of illegally or improperly inducing anyone to take any action favorable to any party in connection with the Technical Assistance.

**4. Grantee Responsibilities**

The Grantee shall undertake its best efforts to provide reasonable support for the U.S. Firm, such as local transportation, office space and secretarial support.



## **5. USTDA as Financier**

### **(A) USTDA Approval of Competitive Selection Procedures**

Selection of the U.S. Firm shall be carried out by the Grantee according to its established procedures for the competitive selection of contractors with advance notice of the procurement published online through *Federal Business Opportunities* ([www.fedbizopps.gov](http://www.fedbizopps.gov)). Upon request, the Grantee will submit these contracting procedures and related documents to USTDA for information and/or approval.

### **(B) USTDA Approval of U.S. Firm Selection**

The Grantee shall notify USTDA at the address of record set forth in Article 17 below upon selection of the U.S. Firm to perform the Technical Assistance. Upon approval of this selection by USTDA, the Grantee and the U.S. Firm shall then enter into an Agreement of Understanding. The Grantee shall notify in writing the U.S. firms that submitted unsuccessful proposals to perform the Technical Assistance that they were not selected.

### **(C) USTDA Approval of the Agreement of Understanding**

The Grantee and the U.S. Firm shall enter into the Agreement of Understanding. The Agreement of Understanding, and any amendments thereto, including assignments and changes in the Terms of Reference, must be approved by USTDA in writing. To expedite this approval, the Grantee (or the U.S. Firm on the Grantee's behalf) shall transmit to USTDA, at the address set forth in Article 17 below, a photocopy of an English language version of the signed Agreement of Understanding or a final negotiated draft version of the Agreement of Understanding.

### **(D) USTDA Not a Party to the Agreement of Understanding**

It is understood by the parties that USTDA has reserved certain rights such as, but not limited to, the right to approve the terms of the Agreement of Understanding and any amendments thereto, including assignments, the selection of all contractors, the Terms of Reference, the Final Report (as defined in Clause I of Annex II), and any and all documents related to any Agreement of Understanding funded under the Grant Agreement. The parties hereto further understand and agree that USTDA, in reserving any or all of the foregoing approval rights, has acted solely as a financing entity to assure the proper use of United States Government funds, and that any decision by USTDA to exercise or refrain from exercising these approval rights shall be made as a financier in the course of funding the Technical Assistance and shall not be construed as making USTDA a party to the Agreement of Understanding. The parties hereto understand and agree that USTDA may, from time to time, exercise the foregoing approval rights, or discuss matters related to these rights and the Project with the parties to the Agreement of Understanding or any sub-agreement, jointly or

separately, without thereby incurring any responsibility or liability to such parties. Any approval or failure to approve by USTDA shall not bar the Grantee or USTDA from asserting any right they might have against the U.S. Firm, or relieve the U.S. Firm of any liability which the U.S. Firm might otherwise have to the Grantee or USTDA.

**(E) Grant Agreement Controlling**

Regardless of USTDA approval, the rights and obligations of any party to the Agreement of Understanding or any sub-agreement thereunder must be consistent with this Grant Agreement. In the event of any inconsistency between the Grant Agreement and the Agreement of Understanding or any sub-agreement funded by the Grant Agreement, the Grant Agreement shall be controlling.

**6. Disbursement Procedures**

**(A) USTDA Approval of Agreement of Understanding Required**

USTDA will make disbursements of USTDA Grant funds directly to the U.S. Firm only after USTDA approves the Agreement of Understanding.

**(B) Contractor Invoice Requirements**

The Grantee should request disbursement of USTDA Grant funds by USTDA to the U.S. Firm for performance of the Technical Assistance by submitting invoices in accordance with the procedures set forth in the USTDA Mandatory Clauses in Annex II. The Grantee shall not be responsible for any payment to the U.S. Firm under this Grant Agreement.

**7. Effective Date**

The effective date of this Grant Agreement ("Effective Date") shall be the date of signature by both parties or, if the parties sign on different dates, the date of the last signature.

**8. Technical Assistance Schedule**

**(A) Technical Assistance Completion Date**

The completion date for the Technical Assistance, which is August 31, 2013, is the date by which the parties estimate that the Technical Assistance will have been completed.

**(B) Time Limitation on Disbursement of USTDA Grant Funds**

Except as USTDA may otherwise agree, (a) no USTDA funds may be disbursed under this Grant Agreement for goods and services which are provided prior to the Effective Date; and (b) all funds made available under the Grant Agreement must be disbursed within four (4) years from the Effective Date.

**9. USTDA Mandatory Clauses**

The Agreement of Understanding and any other agreement funded under this Grant Agreement shall include the USTDA mandatory clauses set forth in Annex II. All sub-agreements funded or partially funded with USTDA Grant funds shall include the USTDA mandatory clauses, except for clauses B(1), G, H, I and J.

**10. Use of U.S. Carriers**

**(A) Air**

Transportation by air of persons or property funded under the Grant Agreement shall be on U.S. flag carriers in accordance with the Fly America Act, 49 U.S.C. 40118, to the extent service by such carriers is available, as provided under applicable U.S. Government regulations.

**(B) Marine**

Transportation by sea of property funded under the Grant Agreement shall be on U.S. carriers in accordance with U.S. cargo preference law.

**11. Nationality, Source and Origin**

Except as USTDA may otherwise agree, the following provisions shall govern the delivery of goods and services funded by USTDA under the Grant Agreement: (a) for professional services, the U.S. Firm must be either a U.S. firm or U.S. individual; (b) the U.S. Firm may use U.S. subcontractors without limitation, but the use of subcontractors from Host Country may not exceed twenty percent (20%) of the USTDA Grant amount and may only be used for specific services from the Terms of Reference identified in the sub-agreement; (c) employees of the U.S. Firm or U.S. subcontractors responsible for professional services shall be U.S. citizens or non-U.S. citizens lawfully admitted for permanent residence in the U.S.; (d) goods purchased for performance of the Technical Assistance and associated delivery services (e.g., international transportation and insurance) must have their nationality, source and origin in the United States; and (e) goods and services incidental to Technical Assistance support (e.g., local lodging, food, and transportation) in Host Country are not subject to the above restrictions. USTDA will make available further details concerning these provisions upon request.

## **12. Taxes**

USTDA funds provided under the Grant Agreement shall not be used to pay any taxes, tariffs, duties, fees or other levies imposed under laws in effect in Host Country. Neither the Grantee nor the U.S. Firm will seek reimbursement from USTDA for such taxes, tariffs, duties, fees or other levies.

## **13. Cooperation Between Parties and Follow-Up**

The parties will cooperate to assure that the purposes of this Grant Agreement are accomplished. For five (5) years following receipt by USTDA of the Final Report, the Grantee agrees to respond to any reasonable inquiries from USTDA about the status of the Project.

## **14. Implementation Letters**

To assist the Grantee in the implementation of the Technical Assistance, USTDA may, from time to time, issue implementation letters that will provide additional information about matters covered by the Grant Agreement. The parties may also use jointly agreed upon implementation letters to confirm and record their mutual understanding of matters covered by the Grant Agreement.

## **15. Recordkeeping and Audit**

The Grantee agrees to maintain books, records and other documents relating to the Technical Assistance and the Grant Agreement adequate to demonstrate implementation of its responsibilities under the Grant Agreement, including the selection of U.S. Firms, receipt and approval of the Agreement of Understanding deliverables, and approval or disapproval of U.S. firm invoices for payment by USTDA. Such books, records, and other documents shall be separately maintained for three (3) years after the date of the final disbursement by USTDA. The Grantee shall afford USTDA or its authorized representatives the opportunity at reasonable times to review books, records and other documents relating to the Technical Assistance and the Grant Agreement.

**16. Representation of Parties**

For all purposes relevant to this Grant Agreement, the Government of the United States of America will be represented by the U. S. Ambassador to Host Country or USTDA and Grantee will be represented by its Bylaws. The parties hereto may, by written notice, designate additional representatives for all purposes under this Grant Agreement.

**17. Addresses of Record for Parties**

Any notice, request, document or other communication submitted by either party to the other under the Grant Agreement shall be in writing or through a wire or electronic medium which produces a tangible record of the transmission, such as a telegram, cable or facsimile, and will be deemed duly given or sent when delivered to such party at the following:

To: EcoRodovias Concessões e Serviços, S.A.

Rodovia dos Imigrantes, km 28,5 - Alvarenga  
São Bernardo do Campo, SP 09845-000

Brazil

Phone: 011 55 (11) 4359-6150

Fax: 011 55 (11) 4359-6056

[carlos.pauvola@ecorodovias.com.br](mailto:carlos.pauvola@ecorodovias.com.br)

To: U.S. Trade and Development Agency  
1000 Wilson Boulevard, Suite 1600  
Arlington, Virginia 22209-3901  
USA

Phone: (703) 875-4357

Fax: (703) 875-4009

All such communications shall be in English, unless the parties otherwise agree in writing. In addition, the Grantee shall provide the Commercial Section of the U.S. Embassy in Host Country with a copy of each communication sent to USTDA.

Any communication relating to this Grant Agreement shall include the following fiscal data:

Appropriation No.: 1112/131001  
Activity No.: 2012-51005A

Reservation No.: 2012063  
Grant No.: GH201251063

**18. Termination**

Either party may terminate this Grant Agreement by giving the other party thirty (30) days advance written notice. The termination of this Grant Agreement will end any obligations of the parties to provide financial or other resources for the Technical Assistance, except for payments which they are committed to make pursuant to noncancellable commitments entered into with third parties prior to the written notice of termination.

**19. Non-waiver of Rights and Remedies**

No delay in exercising any right or remedy accruing to either party in connection with this Grant Agreement shall be construed as a waiver of such right or remedy.

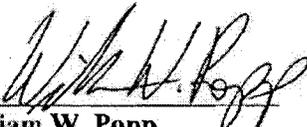
**20. U.S. Technology and Equipment**

By funding this Technical Assistance, USTDA seeks to promote the project objectives of the Host Country through the use of U.S. technology, goods, and services. In recognition of this purpose, the Grantee agrees that it will allow U.S. suppliers to compete in the procurement of technology, goods and services needed for Project implementation.

**[THE REMAINDER OF THIS PAGE IS INTENTIONALLY LEFT BLANK]**

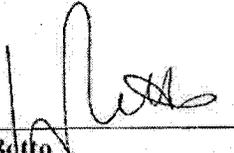
IN WITNESS WHEREOF, the Government of the United States of America and the Grantee, each acting through its duly authorized representative, have caused this Grant Agreement to be signed in the English language in their names and delivered as of the day and year written below. In the event that this Grant Agreement is signed in more than one language, the English language version shall govern.

**For the Government of the  
United States of America**

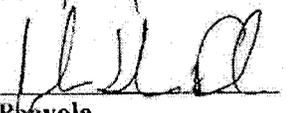
By:   
**William W. Popp  
Acting Consul General**

Date: 21/12/2011

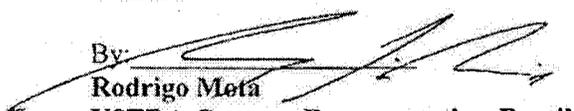
**For EcoRodovias Concessões e Serviços,  
S.A.**

By:   
**Federico Botto  
Executive Vice President**

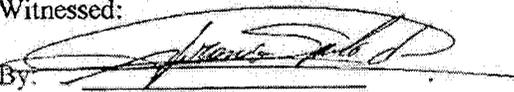
Date: 21/12/2011

By:   
**Carlos Pravola  
Corporate Technology Director**

Witnessed:

By:   
**Rodrigo Metá  
USTDA Country Representative, Brazil**

Witnessed:

By:   
**Afrânio Spolador  
Systems and Automation Manager**

**Annex I -- Terms of Reference**

**Annex II -- USTDA Mandatory Clauses**

## Annex I

### Terms of Reference

#### Objective

The objective of the Technical Assistance for the EcoRodovias Intelligent Transportation System Modernization and Expansion Project ("Technical Assistance") is to develop a practical plan for the acquisition and implementation of various ITS systems expected to increase efficiency for the control and management of EcoRodovias highways. The ITS Technical Assistance will identify short and medium-term milestones for the acquisition and implementation of various ITS systems.

EcoRodovias' Diretoria de Tecnologia Cooperativa is expected to utilize the recommendations from the Technical Assistance to make decisions in the acquisition and implementation of ITS systems for the company's highways. It is expected that the Technical Assistance will be conducted over a period of seven months and the implementation plan shall recommend the various types of ITS technologies, including the necessary systems, equipment, certifications, implementation procedures, and required personnel training that should be considered for the deployment of such ITS systems at EcoRodovias' highways.

The U.S. Firm shall evaluate the current ITS infrastructure and technical aspects of the ITS equipment and systems being utilized at the various EcoRodovias highways and determine if any of the existing ITS systems should be upgraded, enhanced, and/or replaced with modern ITS technologies as well as the identification of new ITS systems that are likely to improve EcoRodovias highway operational efficiencies and safety. A non-disclosure agreement should be entered into between the U.S. firm and EcoRodovias.

The final product of the Technical Assistance will be the development of a practical Implementation Plan for the acquisition and deployment of ITS systems for EcoRodovias including the development of specific projects for different applications of the recommended ITS technologies for the various highways managed by EcoRodovias in Brazil. The purpose of the final ITS implementation plan is not to develop a general ITS system plan or an ITS concept architecture, but rather to formulate a specific roadmap as a practical approach that defines the actions needed to be taken by EcoRodovias to effectively and efficiently implement the recommended ITS technologies and applications at its highways.

The Technical Assistance tasks are as follows:

### **Task 1: Review EcoRodovias ITS System Infrastructure**

Data provided by EcoRodovias will likely be in Portuguese and it will be the U.S. Firm's responsibility to translate the information for its use, if necessary.

- a) The U.S. Firm shall work closely with EcoRodovias to identify the key personnel that will participate in the Technical Assistance in guiding the process through the proper course.
- b) The U.S. Firm shall define the Technical Assistance goals, parameters, and objectives in close coordination with representatives from EcoRodovias.
- c) The U.S. Firm shall develop a project timeline to be utilized as a guide in the development of the Technical Assistance, including the venue and frequency of meetings that shall be agreed upon and documented.
- d) The U.S. Firm shall coordinate all efforts necessary to conduct the project kick-off meetings (in Brazil) for the Technical Assistance. The purpose of the kick-off meetings will be to familiarize and acquaint all those involved in the Technical Assistance with the goals and responsibilities and to gather the necessary information on the project, including materials, documentation, previous technical studies, and other relevant information.
- e) The U.S. Firm shall review previous documentation developed in connection with the implementation of ITS technologies by EcoRodovias including:
  - review of traffic forecast for the next 5 to 7 years
  - latest highway infrastructure improvement plans;
  - ITS investment plans; and
  - other relevant documentation with the purpose to recommend ITS technologies and applications that are viable for implementation at the highways by EcoRodovias.

### **Task 2: Technical Analysis of ITS Technologies and Applications**

Tolls, incidents, traffic congestion, and weather are major contributors to creating delays at highways. There continues to be new developments in ITS technology that lead to enhancements of highway operation, traffic management and safety that include automation, information systems, and other technologies and applications uniquely tailored to address highway-related operations. At the same time there are a number of applications and software programs that address and support highway operators in maintaining an efficient and systematic flow of traffic along the highways. The U.S. Firm shall consider the technologies and applications that may be relevant to improving the management and operation of EcoRodovias highways in Brazil.

Some of the technologies that shall be evaluated include, but are not limited to: CCTV systems, ETC, AVL, VMS, Incident Management Systems, Emergency Telephone Systems, Vehicle Detection Systems, Counting and Classification Systems, Optical Character Recognition Systems (OCR), Enforcement Systems, Automatic

License/Number Plate Recognition Systems (ALPR/ANPR), Vehicle Identity Recognition Systems (VIR), Environmental Monitoring Systems, Traffic Management Center software and systems, Vehicle Weighing Solutions (including Weigh-In-Motion Systems (WIM), Tunnel Lighting and Ventilation Systems, self-sufficient or partially self-sufficient regarding power generation (such as wind or photovoltaic generation).

The U.S. Firm shall identify and recommend the use of ITS technologies (not in use at this time by EcoRodovias) that would further aid EcoRodovias in the safe and efficient operation of its highways in Brazil. The U.S. Firm shall focus its technical assessment and analysis on proven technologies and ITS applications that are available in the market/industry at the time of the Technical Assistance. Further, the U.S. Firm shall identify locations where the recommended technologies/applications have been implemented successfully, any associated technology dependence requirements, required regulatory approvals, acquisition and installation costs, required training for implementation, and potential benefits associated with the recommended technologies and applications.

The U.S. Firm shall:

- a) Conduct an analysis of existing ITS systems being used at the EcoRodovias highways and identify potential measures for upgrades and/or replacement.
- b) Conduct a technical analysis of existing communication systems for the highways management systems in order to identify potential upgrades and/or replacement that could lead to highway operational enhancements.
- c) Conduct a technical analysis of the existing electronic toll collection (ETC) systems and supplementary equipment, to determine potential modernization, upgrades, and/or replacement.
- d) Conduct an assessment of existing traffic monitoring systems (CCTV) for highways, interchanges, toll plazas, and other critical spaces.
- e) Identify potential technologies and their applications to improve highway operational efficiency and safety with the purpose to reduce delays at the highways, improve vehicle detection accuracy, and recommend viable ITS technologies to increase toll collection revenues, operational efficiency, and improved accountability and accuracy in highway operations and management.
- f) Conduct a comprehensive review of the various ITS technologies and applications that are found to be needed by EcoRodovias to improve the operations and management of its highways. Identify the ITS systems' functional requirements for those systems that are recommended for implementation for each highway, including elements of hardware, software, procedures, and approvals.
- g) Provide information as to the ITS system requirements including:
  - costs;
  - operation;
  - certification;
  - installation;
  - maintenance; and
  - personnel requirements.

- h) Define personnel needs for operation and maintenance as well as training requirements for the recommended ITS technologies.
- i) Identify other supplementary electronic and/or IT equipment and system requirements that may be necessary for the successful implementation of the recommended ITS technologies.
- j) Analyze the needs to fully integrate the use of the new ITS technologies with other existing ITS systems.
- k) Evaluate the technical capabilities of existing computer, communications, and highway management systems at EcoRodovias highway management centers with the purpose of determining if the existing systems and technologies are capable of being integrated with the newly recommended ITS technologies proposed for implementation.
- l) Address the technical challenges such as overcoming barriers associated with interoperability issues and/or proprietary systems currently in use by EcoRodovias and develop recommendations for future system integration with the recommended ITS technologies.

**Deliverable #1:** The U.S. Firm shall prepare and submit the first interim report in Portuguese at the end of Task 2.

**Task 3: Economic and Financial Analysis**

- a) The U.S. Firm shall review the various financing alternatives for the acquisition and implementation of the recommended ITS technologies. The U.S. Firm shall develop estimates of projected annual cost savings and potential revenues that are likely to result from the implementation of the recommended ITS technologies, as well as the appropriate benefit-cost analysis for those technologies likely to improve highway operation and management as well as revenue.
- b) The U.S. Firm shall evaluate the revenue streams generated from highway operations from EcoRodovias in Brazil and determine the specific sources of revenue that are likely to be utilized for the acquisition and implementation of the recommended ITS technologies. The U.S. Firm shall examine EcoRodovias' annual capital improvement/investment plan and determine the sources of funding expected to be used for the ITS improvements.
- c) The U.S. Firm shall investigate all sources of funding from potential financial institutions (The Ex-Im Bank, OPIC, IFC, and other local financial institutions, such as BNDES), including multilateral financial lending institutions and private and commercial sources for the possibility of financing the acquisition and implementation of the ITS technologies.
- d) The financial analysis will review the cost, including operation and maintenance, training, certifications, regulatory approvals, permits, and method of procurement for the recommended ITS technologies.
- e) The U.S. Firm shall conduct a financial analysis that will include the identification of cost savings that may be achieved by implementing the recommended ITS technologies, including potential savings to EcoRodovias,

highway users, operational savings, user savings in terms of highways delay reduction, improved safety, and any social benefits, as well as potential positive impacts to the environment.

- f) The U.S. Firm shall review EcoRodovias' procurement methods and identify any issues that may affect the acquisition/implementation of the recommended ITS technologies.
- g) Based on the results from the financial analysis, the U.S. Firm shall formulate an overall financial plan for EcoRodovias to use as a guide to carry out the acquisition and implementation of the ITS technologies in a reasonable timeframe.

**Deliverable #2:** The U.S. firm shall prepare and submit the second interim report in Portuguese at the end of Task 3.

**Task 4: Review Institutional, Legal, and Regulatory Issues**

The U.S. Firm shall review institutional, legal, and regulatory issues pertaining to the implementation of ITS technologies and applications and determine if there are any significant issues that could represent a barrier for system or equipment implementation and operation.

The U.S. Firm shall review local, state and federal laws and highway regulations that may have an impact on the application of the recommended technologies, including applicable standards and regulations.

**Task 5: Preliminary Environmental Analysis**

The U.S. Firm shall conduct a preliminary environmental impact study for the implementation of the Project with reference to local requirements and multi-lateral lending agencies (such as the World Bank). This review shall identify potential negative impacts of the Project. The U.S. Firm shall briefly discuss the extent to which potential negative impacts can be mitigated, and develop plans for full environmental impact assessment or other studies in anticipation of the Project moving forward to the implementation stage, if necessary. The U.S. Firm shall identify the necessary environmental approvals required for the implementation of any recommended ITS technology.

**Deliverable #3:** The U.S. Firm shall prepare and submit the third interim report in Portuguese at the end of Task 5.

**Task 6: Development of ITS Systems/Equipment Specifications and Recommendations**

- a) The U.S. Firm shall be responsible for developing a cost estimate for the acquisition of ITS technologies for each developed project or application.
- b) The U.S. Firm shall develop technical specifications for the recommended ITS technologies.
- c) The U.S. Firm shall develop technical specifications for any other component or supplementary system/equipment required as part of any ITS system/equipment recommended. The U.S. Firm shall develop a comprehensive list of U.S. manufacturers and suppliers for those ITS technologies and applications that are ultimately recommended for implementation by EcoRodovias. This list shall include a description for each manufacturer/supplier and contact information. The list shall include business name, point of contact, address, telephone and fax numbers for each commercial source, as well as a general description of products and services that may be procured
- d) The U.S. Firm shall identify any interoperability issues between the recommended ITS technologies and other existing systems. If applicable, the U.S. Firm shall make recommendations applicable to overcoming inter-operability issues as necessary.
- e) The U.S. Firm shall take into account applicable standards, regulations, and recommendations from Brazilian state and federal agencies.
- f) For each of the recommended ITS technologies, the U.S. Firm shall examine the nature of the highway management contribution expected to be provided by the technology, assess its potential effect on highways operational and management, explore implementation/installation considerations that would have to be addressed, and identify the likely risks involved.

**Task 7: Developmental Impact Analysis**

The U.S. Firm shall analyze the developmental impacts of implementing the recommendations for ITS technologies in Brazil. The developmental impact analysis shall include an assessment of each of the following categories:

- a) Infrastructure- The Technical Assistance shall provide a statement describing how the implementation of the recommended ITS technologies and applications will supplement highway infrastructure and general vehicular transport affecting developmental impact in Brazil.
- b) The U.S. Firm shall be responsible for conducting all analytical assessments to identify the developmental impacts that will result from the implementation of the ITS technologies.
- c) Market-Oriented Reforms – The U.S. Firm shall provide a description of any regulation, laws, or institutional changes that would be recommended and the effect these would have if new ITS technologies were implemented.
- d) Human Capacity Building – The U.S. Firm shall assess the number and type of local positions that would most likely be required for the implementation, operation, and maintenance of ITS technologies. It shall be the responsibility of the U.S. Firm to specifically identify in a quantitative measure, the amount of new

jobs that may be created as part of the implementation of ITS technologies, as well as the required specialized training.

- e) Technology Transfer and Productivity Enhancement -The U.S. Firm shall provide a description of advanced ITS technologies and the latest ITS applications that will most likely be utilized at the EcoRodovias highways. This shall include mention of any efficiency factors that would be derived from the application of ITS technologies. One particular area of importance shall be for the U.S. Firm to analyze and identify the potential delay reduction rates that may result from the application of modern ITS technologies, as well as the potential highways safety enhancements that could be expected. These include activities and achievements that may be accomplished by EcoRodovias in reducing operational cost, delay, and maintenance, as well as fuel consumption and improved operational efficiency for highway users and possibly lower transportation costs.
- f) The U.S. Firm shall be responsible for selecting specific performance indicators as it relates to the application of ITS technologies and applications to improve safety and efficiency for highway management and operations, including but not limited to savings in travel time for different group users, savings in fuel and operating costs for highway users, reduced emissions, and other benefits that the implementation of ITS technologies are likely to generate for the local economy.
- g) The U.S. Firm shall identify the developmental impacts in terms of safety enhancements and highway operational efficiency that would aid EcoRodovias in learning how the application of advanced ITS technologies are capable of assisting the EcoRodovias in achieving their operational and business goals.
- h) Other Issues- The U.S. Firm shall identify other developmental impacts and/or benefits that are likely to result from the ITS improvements.

#### **Task 8: Development of an Implementation Plan**

The U.S. Firm shall formulate the specific activities necessary for a practical implementation plan of the recommended ITS technologies for EcoRodovias. The necessary steps and actions to be taken in connection with the various requirements such as institutional, legal, financial and technical aspects shall be defined as part of the ITS Implementation Plan. The actual implementation plan shall be very specific and detailing step by step the actions necessary to be taken by EcoRodovias in the acquisition and implementation of the recommended ITS technologies.

The U.S. Firm shall be responsible for the following:

- a) Develop a timeline, execution schedule, and process outline for EcoRodovias to complete the implementation of the recommended technologies either as a turn-key project or in project phases.
- b) Develop a systematic action plan that details the actions necessary for the acquisition and implementation of ITS technologies shall be formulated, including the identification of short and medium-term implementations in accordance the technical assistance objectives.

- c) Provide a list of local companies (with all available contact information and background data) that may be able to partner with U.S. firms in order to facilitate the export of the ITS technologies recommended for implementation.
- d) Evaluate the most effective and efficient approach to ITS technology implementation. The U.S. Firm shall specify if a "phase" implementation approach would be beneficial to EcoRodovias and shall prioritize the implementation of the various ITS systems and applications recommended.
- e) Prepare a report that summarizes the technical assistance findings and recommendations. The final report shall identify the potential cumulative benefits expected from the implementation of the recommended technologies as it directly relates to highway operational and management improvements for EcoRodovias.

**Deliverable #4:** The Fourth interim report shall be submitted in Portuguese at the end of Task 8 and the U.S. Firm shall obtain EcoRodovias approval prior to completing the final report.

**Task 9: Final Report**

The U.S. Firm shall prepare and provide a comprehensive Final Report to EcoRodovias, which shall contain the key findings, recommendations and conclusions of the Technical Assistance, and shall incorporate all other documents and/or reports provided pursuant to Tasks 1 through 8 above.

The U.S. Firm shall ensure that the Final Report is submitted in accordance with Clause I of Annex II of the Grant Agreement. The Final Report shall be a substantive and comprehensive report of work performed to carry out all of the tasks set forth in these Terms of Reference and shall include, among other things, an Executive Summary and all deliverables. Each task of these Terms of Reference shall form a separate chapter of the Final Report.

The U.S. Firm shall provide EcoRodovias and USTDA with both the public and confidential versions of the Final Report in English. The U.S. Firm shall also provide EcoRodovias with both the public and confidential versions of the Final Report in Portuguese, as well. The U.S. Firm shall prepare and provide to EcoRodovias, USTDA and the U.S. Consulate in Sao Paulo, a Public Version of the Final Report on CD-ROM.

**Notes:**

- (1) The U.S. Firm is responsible for compliance with U.S. export licensing requirements, if applicable, in the performance of these Terms of Reference.
- (2) The U.S. Firm and EcoRodovias shall be careful to ensure that the public version of the Final Report contains no security or confidential information.

(3) EcoRodovias and USTDA shall have an irrevocable, worldwide, royalty-free, non-exclusive right to use and distribute the Final Report and all work product that is developed under these Terms of Reference.

(4) Confidential information relative to the technical assistance shall be presented under a separate report and labeled "Confidential Information Report".

## Annex II

### USTDA Mandatory Agreement of Understanding Clauses

#### A. USTDA Mandatory Clauses Controlling

The parties to this Agreement of Understanding to Perform the Technical assistance ("Agreement of Understanding") acknowledge that this Agreement of Understanding is funded in whole or in part by the U.S. Trade and Development Agency ("USTDA") under the Grant Agreement between the Government of the United States of America acting through USTDA and EcoRodovias Concessões e Serviços ("Client"), dated \_\_\_\_\_ ("Grant Agreement"). The Client has selected \_\_\_\_\_ ("U.S. Firm") to perform the Technical assistance ("Technical Assistance") for the EcoRodovias Intelligent Transportation System Modernization and Expansion Project ("Project") in Brazil ("Host Country"). Notwithstanding any other provisions of this Agreement of Understanding, the following USTDA Mandatory Agreement of Understanding Clauses shall govern. All sub-agreements entered into by the U.S. Firm funded or partially funded with USTDA Grant funds shall include these USTDA Mandatory Agreement of Understanding Clauses, except for clauses B(1), G, H, I and J. In addition, in the event of any inconsistency between the Grant Agreement and the Agreement of Understanding or sub-agreement thereunder, the Grant Agreement shall be controlling.

#### B. USTDA as Financier

##### (1) USTDA Approval of Agreement of Understanding

All agreements of understanding funded under the Grant Agreement, and any amendments thereto, including assignments and changes in the Terms of Reference, must be approved by USTDA in writing in order to be effective with respect to the expenditure of USTDA Grant funds. USTDA will not authorize the disbursement of USTDA Grant funds until the Agreement of Understanding has been formally approved by USTDA or until the Agreement of Understanding conforms to modifications required by USTDA during the Agreement of Understanding review process.

##### (2) USTDA Not a Party to the Agreement of Understanding

It is understood by the parties that USTDA has reserved certain rights such as, but not limited to, the right to approve the terms of this Agreement of Understanding and amendments thereto, including assignments, the selection of all U.S. Firms, the Terms of Reference, the Final Report, and any and all documents related to any Agreement of Understanding funded under the Grant Agreement. The parties hereto further understand and agree that USTDA, in reserving any or all of the foregoing approval rights, has acted solely as a financing entity to assure the proper use of United States Government funds, and that any decision by USTDA to exercise or refrain from exercising these approval rights shall be made as a financier in the course of financing

the Technical Assistance and shall not be construed as making USTDA a party to the Agreement of Understanding. The parties hereto understand and agree that USTDA may, from time to time, exercise the foregoing approval rights, or discuss matters related to these rights and the Project with the parties to the Agreement of Understanding or any sub-agreement, jointly or separately, without thereby incurring any responsibility or liability to such parties. Any approval or failure to approve by USTDA shall not bar the Client or USTDA from asserting any right they might have against the U.S. Firm, or relieve the U.S. Firm of any liability which the U.S. Firm might otherwise have to the Client or USTDA.

### **C. Nationality, Source and Origin**

Except as USTDA may otherwise agree, the following provisions shall govern the delivery of goods and services funded by USTDA under the Grant Agreement: (a) for professional services, the U.S. Firm must be either a U.S. firm or U.S. individual; (b) the U.S. Firm may use U.S. subcontractors without limitation, but the use of subcontractors from Host Country may not exceed twenty percent (20%) of the USTDA Grant amount and may only be used for specific services from the Terms of Reference identified in the sub-agreement; (c) employees of the U.S. Firm or U.S. subcontractors responsible for professional services shall be U.S. citizens or non-U.S. citizens lawfully admitted for permanent residence in the U.S.; (d) goods purchased for performance of the Technical Assistance and associated delivery services (e.g., international transportation and insurance) must have their nationality, source and origin in the United States; and (e) goods and services incidental to Technical Assistance support (e.g., local lodging, food, and transportation) in Host Country are not subject to the above restrictions. USTDA will make available further details concerning these provisions upon request.

### **D. Recordkeeping and Audit**

The U.S. Firm and subcontractors funded under the Grant Agreement shall maintain, in accordance with generally accepted accounting procedures, books, records and other documents sufficient to reflect properly all transactions under or in connection with the Agreement of Understanding. These books, records and other documents shall clearly identify and track the use and expenditure of USTDA funds separately from other funding sources. Such books, records and documents shall be maintained during the Agreement of Understanding term and for a period of three (3) years after final disbursement by USTDA. The U.S. Firm and subcontractors shall afford USTDA, or its authorized representatives, the opportunity at reasonable times for inspection and audit of such books, records and other documentation.

## **E. U.S. Carriers**

### **(1) Air**

Transportation by air of persons or property funded under the Grant Agreement shall be on U.S. flag carriers in accordance with the Fly America Act, 49 U.S.C. 40118, to the extent service by such carriers is available, as provided under applicable U.S. Government regulations.

### **(2) Marine**

Transportation by sea of property funded under the Grant Agreement shall be on U.S. carriers in accordance with U.S. cargo preference law.

## **F. Workman's Compensation Insurance**

The U.S. Firm shall provide adequate Workman's Compensation Insurance coverage for work performed under this Agreement of Understanding.

## **G. Reporting Requirements**

The U.S. Firm shall advise USTDA by letter as to the status of the Project on March 1st annually for a period of two (2) years after completion of the Technical Assistance. In addition, if at any time the U.S. Firm receives follow-on work from the Client, the U.S. Firm shall so notify USTDA and designate the U.S. Firm's contact point including name, telephone and fax number. Since this information may be made publicly available by USTDA, any information which is confidential shall be designated as such by the U.S. Firm and provided separately to USTDA. USTDA will maintain the confidentiality of such information in accordance with applicable law.

## **H. Disbursement Procedures**

### **(1) USTDA Approval of Agreement of Understanding**

Disbursement of Grant funds will be made only after USTDA approval of this Agreement of Understanding. To make this review in a timely fashion, USTDA must receive from either the Client or the U.S. Firm a photocopy of an English language version of a signed Agreement of Understanding or a final negotiated draft version to the attention of the General Counsel's office at USTDA's address listed in Clause M below.

**(2) Payment Schedule Requirements**

A payment schedule for disbursement of Grant funds to the U.S. Firm shall be included in this Agreement of Understanding. Such payment schedule must conform to the following USTDA requirements: (1) up to twenty percent (20%) of the total USTDA Grant amount may be used as a mobilization payment; (2) all other payments, with the exception of the final payment, shall be based upon Agreement of Understanding performance milestones; and (3) the final payment may be no less than fifteen percent (15%) of the total USTDA Grant amount, payable upon receipt by USTDA of an approved Final Report in accordance with the specifications and quantities set forth in Clause I below. Invoicing procedures for all payments are described below.

**(3) U.S. Firm Invoice Requirements**

USTDA will make all disbursements of USTDA Grant funds directly to the U.S. Firm. The U.S. Firm must provide USTDA with an ACH Vendor Enrollment Form (available from USTDA) with the first invoice. The Client shall request disbursement of funds by USTDA to the U.S. Firm for performance of the contract by submitting the following to USTDA:

**(a) U.S. Firm's Invoice**

The U.S. Firm's invoice shall include reference to an item listed in the Agreement of Understanding payment schedule, the requested payment amount, and an appropriate certification by the U.S. Firm, as follows:

**(i) For a mobilization payment (if any):**

"As a condition for this mobilization payment, the U.S. Firm certifies that it will perform all work in accordance with the terms of its Agreement of Understanding with the Client. To the extent that the U.S. Firm does not comply with the terms and conditions of the Agreement of Understanding, including the USTDA mandatory provisions contained therein, it will, upon USTDA's request, make an appropriate refund to USTDA."

**(ii) For Agreement of Understanding performance milestone payments:**

"The U.S. Firm has performed the work described in this invoice in accordance with the terms of its Agreement of Understanding with the Client and is entitled to payment thereunder. To the extent the U.S. Firm has not complied with the terms and conditions of the Agreement of Understanding, including the USTDA mandatory provisions contained therein, it will, upon USTDA's request, make an appropriate refund to USTDA."

(iii) For final payment:

"The U.S. Firm has performed the work described in this invoice in accordance with the terms of its Agreement of Understanding with the Client and is entitled to payment thereunder. Specifically, the U.S. Firm has submitted the Final Report to the Client, as required by the Agreement of Understanding, and received the Client's approval of the Final Report. To the extent the U.S. Firm has not complied with the terms and conditions of the Agreement of Understanding, including the USTDA mandatory provisions contained therein, it will, upon USTDA's request, make an appropriate refund to USTDA."

**(b) Client's Approval of the U.S. Firm's Invoice**

(i) The invoice for a mobilization payment must be approved in writing by the Client.

(ii) For Agreement of Understanding performance milestone payments, the following certification by the Client must be provided on the invoice or separately:

"The services for which disbursement is requested by the U.S. Firm have been performed satisfactorily, in accordance with applicable Agreement of Understanding provisions and the terms and conditions of the USTDA Grant Agreement."

(iii) For final payment, the following certification by the Client must be provided on the invoice or separately:

"The services for which disbursement is requested by the U.S. Firm have been performed satisfactorily, in accordance with applicable Agreement of Understanding provisions and terms and conditions of the USTDA Grant Agreement. The Final Report submitted by the U.S. Firm has been reviewed and approved by the Client. "

**(c) USTDA Address for Disbursement Requests**

Requests for disbursement shall be submitted by courier or mail to the attention of the Finance Department at USTDA's address listed in Clause M below.

**(4) Termination**

In the event that the Agreement of Understanding is terminated prior to completion, the U.S. Firm will be eligible, subject to USTDA approval, for reasonable and documented costs which have been incurred in performing the Terms of Reference prior to termination, as well as reasonable wind down expenses. Reimbursement for such costs shall not exceed the total amount of undisbursed Grant funds. Likewise, in

the event of such termination, USTDA is entitled to receive from the U.S. Firm all USTDA Grant funds previously disbursed to the U.S. Firm (including but not limited to mobilization payments) which exceed the reasonable and documented costs incurred in performing the Terms of Reference prior to termination.

## **I. USTDA Final Report**

### **(1) Definition**

"Final Report" shall mean the Final Report described in the attached Annex I Terms of Reference or, if no such "Final Report" is described therein, "Final Report" shall mean a substantive and comprehensive report of work performed in accordance with the attached Annex I Terms of Reference, including any documents delivered to the Client.

### **(2) Final Report Submission Requirements**

The U.S. Firm shall provide the following to USTDA:

(a) One (1) complete version of the Final Report for USTDA's records. This version shall have been approved by the Client in writing and must be in the English language. It is the responsibility of the U.S. Firm to ensure that confidential information, if any, contained in this version be clearly marked. USTDA will maintain the confidentiality of such information in accordance with applicable law.

and

(b) One (1) copy of the Final Report suitable for public distribution ("Public Version"). The Public Version shall have been approved by the Client in writing and must be in the English language. As this version will be available for public distribution, it must not contain any confidential information. If the report in (a) above contains no confidential information, it may be used as the Public Version. In any event, the Public Version must be informative and contain sufficient Project detail to be useful to prospective equipment and service providers.

and

(c) Two (2) CD-ROMs, each containing a complete copy of the Public Version of the Final Report. The electronic files on the CD-ROMs shall be submitted in a commonly accessible read-only format. As these CD-ROMs will be available for public distribution, they must not contain any confidential information. It is the responsibility of the U.S. Firm to ensure that no confidential information is contained on the CD-ROMs.

The U.S. Firm shall also provide one (1) copy of the Public Version of the Final Report to the Foreign Commercial Service Officer or the Economic Section of the U.S. Embassy in Host Country for informational purposes.

### **(3) Final Report Presentation**

All Final Reports submitted to USTDA must be paginated and include the following:

(a) The front cover of every Final Report shall contain the name of the Client, the name of the U.S. Firm who prepared the report, a report title, USTDA's logo, USTDA's mailing and delivery addresses. If the complete version of the Final Report contains confidential information, the U.S. Firm shall be responsible for labeling the front cover of that version of the Final Report with the term "Confidential Version." The U.S. Firm shall be responsible for labeling the front cover of the Public Version of the Final Report with the term "Public Version." The front cover of every Final Report shall also contain the following disclaimer:

"This report was funded by the U.S. Trade and Development Agency (USTDA), an agency of the U. S. Government. The opinions, findings, conclusions or recommendations expressed in this document are those of the author(s) and do not necessarily represent the official position or policies of USTDA. USTDA makes no representation about, nor does it accept responsibility for, the accuracy or completeness of the information contained in this report."

(b) The inside front cover of every Final Report shall contain USTDA's logo, USTDA's mailing and delivery addresses, and USTDA's mission statement. Camera-ready copy of USTDA Final Report specifications will be available from USTDA upon request.

(c) The U.S. Firm shall affix to the front of the CD-ROM a label identifying the Host Country, USTDA Activity Number, the name of the Client, the name of the U.S. Firm who prepared the report, a report title and the following language:

"The U.S. Firm certifies that this CD-ROM contains the Public Version of the Final Report and that all contents are suitable for public distribution."

(d) The U.S. Firm and any subcontractors that perform work pursuant to the Grant Agreement must be clearly identified in the Final Report. Business name, point of contact, address, telephone and fax numbers shall be included for U.S. Firm and each subcontractor.

(e) The Final Report, while aiming at optimum specifications and characteristics for the Project, shall identify the availability of prospective U.S. sources of supply. Business name, point of contact, address, telephone and fax numbers shall be included for each commercial source.

(f) The Final Report shall be accompanied by a letter or other notation by the Client which states that the Client approves the Final Report. A certification by the Client to this effect provided on or with the invoice for final payment will meet this requirement.

#### **J. Modifications**

All changes, modifications, assignments or amendments to this Agreement of Understanding, including the appendices, shall be made only by written agreement by the parties hereto, subject to written USTDA approval.

#### **K. Technical Assistance Schedule**

##### **(1) Technical Assistance Completion Date**

The completion date for the Technical Assistance, which is August 31, 2013, is the date by which the parties estimate that the Technical Assistance will have been completed.

##### **(2) Time Limitation on Disbursement of USTDA Grant Funds**

Except as USTDA may otherwise agree, (a) no USTDA funds may be disbursed under this Agreement of Understanding for goods and services which are provided prior to the Effective Date of the Grant Agreement; and (b) all funds made available under the Grant Agreement must be disbursed within four (4) years from the Effective Date of the Grant Agreement.

#### **L. Business Practices**

The U.S. Firm agrees not to pay, promise to pay, or authorize the payment of any money or anything of value, directly or indirectly, to any person (whether a governmental official or private individual) for the purpose of illegally or improperly inducing anyone to take any action favorable to any party in connection with the Technical Assistance. The Client agrees not to receive any such payment. The U.S. Firm and the Client agree that each will require that any agent or representative hired to represent them in connection with the Technical Assistance will comply with this paragraph and all laws which apply to activities and obligations of each party under this Agreement of Understanding, including but not limited to those laws and obligations dealing with improper payments as described above.

#### **M. USTDA Address and Fiscal Data**

Any communication with USTDA regarding this Agreement of Understanding shall be sent to the following address and include the fiscal data listed below:

U.S. Trade and Development Agency  
1000 Wilson Boulevard, Suite 1600  
Arlington, Virginia 22209-3901  
USA

Phone: (703) 875-4357  
Fax: (703) 875-4009

Fiscal Data:

Appropriation No.:	1112/131001
Activity No.:	2012-51005A
Reservation No.:	2012063
Grant No.:	GH201251063

**N. Definitions**

All capitalized terms not otherwise defined herein shall have the meaning set forth in the Grant Agreement.

**O. Taxes**

USTDA funds provided under the Grant Agreement shall not be used to pay any taxes, tariffs, duties, fees or other levies imposed under laws in effect in Host Country. Neither the Client nor the U.S. Firm will seek reimbursement from USTDA for such taxes, tariffs, duties, fees or other levies.

**ANNEX 5**

## Annex I

### Terms of Reference

#### Objective

The objective of the Technical Assistance for the EcoRodovias Intelligent Transportation System Modernization and Expansion Project ("Technical Assistance") is to develop a practical plan for the acquisition and implementation of various ITS systems expected to increase efficiency for the control and management of EcoRodovias highways. The ITS Technical Assistance will identify short and medium-term milestones for the acquisition and implementation of various ITS systems.

EcoRodovias' Diretoria de Tecnologia Corporativa is expected to utilize the recommendations from the Technical Assistance to make decisions in the acquisition and implementation of ITS systems for the company's highways. It is expected that the Technical Assistance will be conducted over a period of seven months and the implementation plan shall recommend the various types of ITS technologies, including the necessary systems, equipment, certifications, implementation procedures, and required personnel training that should be considered for the deployment of such ITS systems at EcoRodovias' highways.

The U.S. Firm shall evaluate the current ITS infrastructure and technical aspects of the ITS equipment and systems being utilized at the various EcoRodovias highways and determine if any of the existing ITS systems should be upgraded, enhanced, and/or replaced with modern ITS technologies as well as the identification of new ITS systems that are likely to improve EcoRodovias highway operational efficiencies and safety. A non-disclosure agreement should be entered into between the U.S. firm and EcoRodovias.

The final product of the Technical Assistance will be the development of a practical Implementation Plan for the acquisition and deployment of ITS systems for EcoRodovias including the development of specific projects for different applications of the recommended ITS technologies for the various highways managed by EcoRodovias in Brazil. The purpose of the final ITS implementation plan is not to develop a general ITS system plan or an ITS concept architecture, but rather to formulate a specific roadmap as a practical approach that defines the actions needed to be taken by EcoRodovias to effectively and efficiently implement the recommended ITS technologies and applications at its highways.

The Technical Assistance tasks are as follows:

**Task 1: Review EcoRodovias ITS System Infrastructure**

Data provided by EcoRodovias will likely be in Portuguese and it will be the U.S. Firm's responsibility to translate the information for its use, if necessary.

- a) The U.S. Firm shall work closely with EcoRodovias to identify the key personnel that will participate in the Technical Assistance in guiding the process through the proper course.
- b) The U.S. Firm shall define the Technical Assistance goals, parameters, and objectives in close coordination with representatives from EcoRodovias.
- c) The U.S. Firm shall develop a project timeline to be utilized as a guide in the development of the Technical Assistance, including the venue and frequency of meetings that shall be agreed upon and documented.
- d) The U.S. Firm shall coordinate all efforts necessary to conduct the project kick-off meetings (in Brazil) for the Technical Assistance. The purpose of the kick-off meetings will be to familiarize and acquaint all those involved in the Technical Assistance with the goals and responsibilities and to gather the necessary information on the project, including materials, documentation, previous technical studies, and other relevant information.
- e) The U.S. Firm shall review previous documentation developed in connection with the implementation of ITS technologies by EcoRodovias including:
  - review of traffic forecast for the next 5 to 7 years
  - latest highway infrastructure improvement plans;
  - ITS investment plans; and
  - other relevant documentation with the purpose to recommend ITS technologies and applications that are viable for implementation at the highways by EcoRodovias.

**Task 2: Technical Analysis of ITS Technologies and Applications**

Tolls, incidents, traffic congestion, and weather are major contributors to creating delays at highways. There continues to be new developments in ITS technology that lead to enhancements of highway operation, traffic management and safety that include automation, information systems, and other technologies and applications uniquely tailored to address highway-related operations. At the same time there are a number of applications and software programs that address and support highway operators in maintaining an efficient and systematic flow of traffic along the highways. The U.S. Firm shall consider the technologies and applications that may be relevant to improving the management and operation of EcoRodovias highways in Brazil.

Some of the technologies that shall be evaluated include, but are not limited to: CCTV systems, ETC, AVL, VMS, Incident Management Systems, Emergency Telephone Systems, Vehicle Detection Systems, Counting and Classification Systems, Optical Character Recognition Systems (OCR), Enforcement Systems, Automatic

License/Number Plate Recognition Systems (ALPR/ANPR), Vehicle Identity Recognition Systems (VIR), Environmental Monitoring Systems, Traffic Management Center software and systems, Vehicle Weighing Solutions (including Weigh-In-Motion Systems (WIM), Tunnel Lighting and Ventilation Systems, self-sufficient or partially self-sufficient regarding power generation (such as wind or photovoltaic generation).

The U.S. Firm shall identify and recommend the use of ITS technologies (not in use at this time by EcoRodovias) that would further aid EcoRodovias in the safe and efficient operation of its highways in Brazil. The U.S. Firm shall focus its technical assessment and analysis on proven technologies and ITS applications that are available in the market/industry at the time of the Technical Assistance. Further, the U.S. Firm shall identify locations where the recommended technologies/applications have been implemented successfully, any associated technology dependence requirements, required regulatory approvals, acquisition and installation costs, required training for implementation, and potential benefits associated with the recommended technologies and applications.

The U.S. Firm shall:

- a) Conduct an analysis of existing ITS systems being used at the EcoRodovias highways and identify potential measures for upgrades and/or replacement.
- b) Conduct a technical analysis of existing communication systems for the highways management systems in order to identify potential upgrades and/or replacement that could lead to highway operational enhancements.
- c) Conduct a technical analysis of the existing electronic toll collection (ETC) systems and supplementary equipment, to determine potential modernization, upgrades, and/or replacement.
- d) Conduct an assessment of existing traffic monitoring systems (CCTV) for highways, interchanges, toll plazas, and other critical spaces.
- e) Identify potential technologies and their applications to improve highway operational efficiency and safety with the purpose to reduce delays at the highways, improve vehicle detection accuracy, and recommend viable ITS technologies to increase toll collection revenues, operational efficiency, and improved accountability and accuracy in highway operations and management.
- f) Conduct a comprehensive review of the various ITS technologies and applications that are found to be needed by EcoRodovias to improve the operations and management of its highways. Identify the ITS systems' functional requirements for those systems that are recommended for implementation for each highway, including elements of hardware, software, procedures, and approvals.
- g) Provide information as to the ITS system requirements including:
  - costs;
  - operation;
  - certification;
  - installation;
  - maintenance; and
  - personnel requirements.

- h) Define personnel needs for operation and maintenance as well as training requirements for the recommended ITS technologies.
- i) Identify other supplementary electronic and/or IT equipment and system requirements that may be necessary for the successful implementation of the recommended ITS technologies.
- j) Analyze the needs to fully integrate the use of the new ITS technologies with other existing ITS systems.
- k) Evaluate the technical capabilities of existing computer, communications, and highway management systems at EcoRodovias highway management centers with the purpose of determining if the existing systems and technologies are capable of being integrated with the newly recommended ITS technologies proposed for implementation.
- l) Address the technical challenges such as overcoming barriers associated with interoperability issues and/or proprietary systems currently in use by EcoRodovias and develop recommendations for future system integration with the recommended ITS technologies.

**Deliverable #1:** The U.S. Firm shall prepare and submit the first interim report in Portuguese at the end of Task 2.

**Task 3: Economic and Financial Analysis**

- a) The U.S. Firm shall review the various financing alternatives for the acquisition and implementation of the recommended ITS technologies. The U.S. Firm shall develop estimates of projected annual cost savings and potential revenues that are likely to result from the implementation of the recommended ITS technologies, as well as the appropriate benefit-cost analysis for those technologies likely to improve highway operation and management as well as revenue.
- b) The U.S. Firm shall evaluate the revenue streams generated from highway operations from EcoRodovias in Brazil and determine the specific sources of revenue that are likely to be utilized for the acquisition and implementation of the recommended ITS technologies. The U.S. Firm shall examine EcoRodovias' annual capital improvement/investment plan and determine the sources of funding expected to be used for the ITS improvements.
- c) The U.S. Firm shall investigate all sources of funding from potential financial institutions (The Ex-Im Bank, OPIC, IFC, and other local financial institutions, such as BNDES), including multilateral financial lending institutions and private and commercial sources for the possibility of financing the acquisition and implementation of the ITS technologies.
- d) The financial analysis will review the cost, including operation and maintenance, training, certifications, regulatory approvals, permits, and method of procurement for the recommended ITS technologies.
- e) The U.S. Firm shall conduct a financial analysis that will include the identification of cost savings that may be achieved by implementing the recommended ITS technologies, including potential savings to EcoRodovias,

highway users, operational savings, user savings in terms of highways delay reduction, improved safety, and any social benefits, as well as potential positive impacts to the environment.

- f) The U.S. Firm shall review EcoRodovias' procurement methods and identify any issues that may affect the acquisition/implementation of the recommended ITS technologies.
- g) Based on the results from the financial analysis, the U.S. Firm shall formulate an overall financial plan for EcoRodovias to use as a guide to carry out the acquisition and implementation of the ITS technologies in a reasonable timeframe.

**Deliverable #2:** The U.S. firm shall prepare and submit the second interim report in Portuguese at the end of Task 3.

**Task 4: Review Institutional, Legal, and Regulatory Issues**

The U.S. Firm shall review institutional, legal, and regulatory issues pertaining to the implementation of ITS technologies and applications and determine if there are any significant issues that could represent a barrier for system or equipment implementation and operation.

The U.S. Firm shall review local, state and federal laws and highway regulations that may have an impact on the application of the recommended technologies, including applicable standards and regulations.

**Task 5: Preliminary Environmental Analysis**

The U.S. Firm shall conduct a preliminary environmental impact study for the implementation of the Project with reference to local requirements and multi-lateral lending agencies (such as the World Bank). This review shall identify potential negative impacts of the Project. The U.S. Firm shall briefly discuss the extent to which potential negative impacts can be mitigated, and develop plans for full environmental impact assessment or other studies in anticipation of the Project moving forward to the implementation stage, if necessary. The U.S. Firm shall identify the necessary environmental approvals required for the implementation of any recommended ITS technology.

**Deliverable #3:** The U.S. Firm shall prepare and submit the third interim report in Portuguese at the end of Task 5.

**Task 6: Development of ITS Systems/Equipment Specifications and Recommendations**

- a) The U.S. Firm shall be responsible for developing a cost estimate for the acquisition of ITS technologies for each developed project or application.
- b) The U.S. Firm shall develop technical specifications for the recommended ITS technologies.
- c) The U.S. Firm shall develop technical specifications for any other component or supplementary system/equipment required as part of any ITS system/equipment recommended. The U.S. Firm shall develop a comprehensive list of U.S. manufacturers and suppliers for those ITS technologies and applications that are ultimately recommended for implementation by EcoRodovias. This list shall include a description for each manufacturer/supplier and contact information. The list shall include business name, point of contact, address, telephone and fax numbers for each commercial source, as well as a general description of products and services that may be procured
- d) The U.S. Firm shall identify any interoperability issues between the recommended ITS technologies and other existing systems. If applicable, the U.S. Firm shall make recommendations applicable to overcoming inter-operability issues as necessary.
- e) The U.S. Firm shall take into account applicable standards, regulations, and recommendations from Brazilian state and federal agencies.
- f) For each of the recommended ITS technologies, the U.S. Firm shall examine the nature of the highway management contribution expected to be provided by the technology, assess its potential effect on highways operational and management, explore implementation/installation considerations that would have to be addressed, and identify the likely risks involved.

#### **Task 7: Developmental Impact Analysis**

The U.S. Firm shall analyze the developmental impacts of implementing the recommendations for ITS technologies in Brazil. The developmental impact analysis shall include an assessment of each of the following categories:

- a) Infrastructure- The Technical Assistance shall provide a statement describing how the implementation of the recommended ITS technologies and applications will supplement highway infrastructure and general vehicular transport affecting developmental impact in Brazil.
- b) The U.S. Firm shall be responsible for conducting all analytical assessments to identify the developmental impacts that will result from the implementation of the ITS technologies.
- c) Market-Oriented Reforms – The U.S. Firm shall provide a description of any regulation, laws, or institutional changes that would be recommended and the effect these would have if new ITS technologies were implemented.
- d) Human Capacity Building – The U.S. Firm shall assess the number and type of local positions that would most likely be required for the implementation, operation, and maintenance of ITS technologies. It shall be the responsibility of the U.S. Firm to specifically identify in a quantitative measure, the amount of new

jobs that may be created as part of the implementation of ITS technologies, as well as the required specialized training.

- e) Technology Transfer and Productivity Enhancement -The U.S. Firm shall provide a description of advanced ITS technologies and the latest ITS applications that will most likely be utilized at the EcoRodovias highways. This shall include mention of any efficiency factors that would be derived from the application of ITS technologies. One particular area of importance shall be for the U.S. Firm to analyze and identify the potential delay reduction rates that may result from the application of modern ITS technologies, as well as the potential highways safety enhancements that could be expected. These include activities and achievements that may be accomplished by EcoRodovias in reducing operational cost, delay, and maintenance, as well as fuel consumption and improved operational efficiency for highway users and possibly lower transportation costs.
- f) The U.S. Firm shall be responsible for selecting specific performance indicators as it relates to the application of ITS technologies and applications to improve safety and efficiency for highway management and operations, including but not limited to savings in travel time for different group users, savings in fuel and operating costs for highway users, reduced emissions, and other benefits that the implementation of ITS technologies are likely to generate for the local economy.
- g) The U.S. Firm shall identify the developmental impacts in terms of safety enhancements and highway operational efficiency that would aid EcoRodovias in learning how the application of advanced ITS technologies are capable of assisting the EcoRodovias in achieving their operational and business goals.
- h) Other Issues- The U.S. Firm shall identify other developmental impacts and/or benefits that are likely to result from the ITS improvements.

#### **Task 8: Development of an Implementation Plan**

The U.S. Firm shall formulate the specific activities necessary for a practical implementation plan of the recommended ITS technologies for EcoRodovias. The necessary steps and actions to be taken in connection with the various requirements such as institutional, legal, financial and technical aspects shall be defined as part of the ITS Implementation Plan. The actual implementation plan shall be very specific and detailing step by step the actions necessary to be taken by EcoRodovias in the acquisition and implementation of the recommended ITS technologies.

The U.S. Firm shall be responsible for the following:

- a) Develop a timeline, execution schedule, and process outline for EcoRodovias to complete the implementation of the recommended technologies either as a turn-key project or in project phases.
- b) Develop a systematic action plan that details the actions necessary for the acquisition and implementation of ITS technologies shall be formulated, including the identification of short and medium-term implementations in accordance the technical assistance objectives.

- c) Provide a list of local companies (with all available contact information and background data) that may be able to partner with U.S. firms in order to facilitate the export of the ITS technologies recommended for implementation.
- d) Evaluate the most effective and efficient approach to ITS technology implementation. The U.S. Firm shall specify if a "phase" implementation approach would be beneficial to EcoRodovias and shall prioritize the implementation of the various ITS systems and applications recommended.
- e) Prepare a report that summarizes the technical assistance findings and recommendations. The final report shall identify the potential cumulative benefits expected from the implementation of the recommended technologies as it directly relates to highway operational and management improvements for EcoRodovias.

**Deliverable #4:** The Fourth interim report shall be submitted in Portuguese at the end of Task 8 and the U.S. Firm shall obtain EcoRodovias approval prior to completing the final report.

**Task 9: Final Report**

The U.S. Firm shall prepare and provide a comprehensive Final Report to EcoRodovias, which shall contain the key findings, recommendations and conclusions of the Technical Assistance, and shall incorporate all other documents and/or reports provided pursuant to Tasks 1 through 8 above.

The U.S. Firm shall ensure that the Final Report is submitted in accordance with Clause I of Annex II of the Grant Agreement. The Final Report shall be a substantive and comprehensive report of work performed to carry out all of the tasks set forth in these Terms of Reference and shall include, among other things, an Executive Summary and all deliverables. Each task of these Terms of Reference shall form a separate chapter of the Final Report.

The U.S. Firm shall provide EcoRodovias and USTDA with both the public and confidential versions of the Final Report in English. The U.S. Firm shall also provide EcoRodovias with both the public and confidential versions of the Final Report in Portuguese, as well. The U.S. Firm shall prepare and provide to EcoRodovias, USTDA and the U.S. Consulate in Sao Paulo, a Public Version of the Final Report on CD-ROM.

**Notes:**

- (1) The U.S. Firm is responsible for compliance with U.S. export licensing requirements, if applicable, in the performance of these Terms of Reference.
- (2) The U.S. Firm and EcoRodovias shall be careful to ensure that the public version of the Final Report contains no security or confidential information.

(3) EcoRodovias and USTDA shall have an irrevocable, worldwide, royalty-free, non-exclusive right to use and distribute the Final Report and all work product that is developed under these Terms of Reference.

(4) Confidential information relative to the technical assistance shall be presented under a separate report and labeled "Confidential Information Report".

**ANNEX 6**



**USTDA-Funded Feasibility Study, Technical Assistance, or Training Grant**

**U.S. Firm Information Form**

This form is designed to enable the U.S. Trade and Development Agency ("USTDA") to obtain information about entities and individuals proposed for participation in USTDA-funded activities. Information in this form is used to conduct screening of entities and individuals to ensure compliance with legislative and executive branch prohibitions on providing support or resources to, or engaging in transactions with, certain individuals or entities with which USTDA must comply.

USTDA Activity Number [To be completed by USTDA]

Activity Type [To be completed by USTDA]	<input type="checkbox"/> Feasibility Study	<input type="checkbox"/> Technical Assistance	<input type="checkbox"/> Other (specify)
--	--	---	--

Activity Title [To be completed by USTDA]

Full Legal Name of U.S. Firm

Business Address (street address only)

Telephone		Fax		Website	
-----------	--	-----	--	---------	--

Year Established (include any predecessor company(s) and year(s) established, if appropriate).  
Please attach additional pages as necessary.

Please provide a list of directors and principal officers as detailed in Attachment A. Attached?  Yes  No

Type of Ownership	<input type="checkbox"/> Publicly Traded Company
	<input type="checkbox"/> Private Company
	<input type="checkbox"/> Other (please specify)

If Private Company or Other (if applicable), provide a list of shareholders and the percentage of their ownership. In addition, for each shareholder that owns 15% or more shares in U.S. Firm, please complete Attachment B.

Is the U.S. Firm a wholly-owned or partially owned subsidiary?	<input type="checkbox"/> Yes
	<input type="checkbox"/> No

If so, please provide the name of the U.S. Firm's parent company(s). In addition, for any parent identified, please complete Attachment B.

Is the U.S. Firm proposing to subcontract some of the proposed work to another firm?	<input type="checkbox"/> Yes
	<input type="checkbox"/> No

If yes, U.S. Firm shall complete Attachment C for each subcontractor. Attached?	<input type="checkbox"/> Yes
	<input type="checkbox"/> Not applicable

**Project Manager**

Name	Surname	
	Given Name	
Address		
Telephone		
Fax		
Email		

**Negotiation Prerequisites**

Discuss any current or anticipated commitments which may impact the ability of the U.S. Firm or its subcontractors to complete the Activity as proposed and reflect such impact within the project schedule.

Identify any specific information which is needed from the Grantee before commencing negotiations.

*U.S. Firm may attach additional sheets, as necessary.*

**U.S. Firm's Representations**

U.S. Firm shall certify to the following (or provide any explanation as to why any representation cannot be made):

1. U.S. Firm is a [check one]  Corporation  LLC  Partnership  Sole Proprietor  Other:   
 duly organized, validly existing and in good standing under the laws of the State of:   
 The U.S. Firm has all the requisite corporate power and authority to conduct its business as presently conducted, to submit this proposal, and if selected, to execute and deliver a contract to the Grantee for the performance of the USTDA Activity. The U.S. Firm is not debarred, suspended, or to the best of its knowledge or belief, proposed for debarment or ineligible for the award of contracts by any federal or state governmental agency or authority.
2. The U.S. Firm has included herewith, a copy of its Articles of Incorporation (or equivalent charter or document issued by a designated authority in accordance with applicable laws that provides information and authentication regarding the legal status of an entity) and a Certificate of Good Standing (or equivalent document) issued within 1 month of the date of signature below by the State of:   
 The U.S. Firm commits to notify USTDA and the Grantee if it becomes aware of any change in its status in the state in which it is incorporated. USTDA retains the right to request an updated certificate of good standing.
3. Neither the U.S. Firm nor any of its principal officers have, within the ten-year period preceding the submission of this proposal, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a federal, state or local government contract or subcontract; violation of federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating federal or state criminal tax laws, or receiving stolen property.
4. Neither the U.S. Firm, nor any of its principal officers, is presently indicted for, or otherwise criminally or civilly charged with, commission of any of the offenses enumerated in paragraph 3 above.
5. There are no federal or state tax liens pending against the assets, property or business of the U.S. Firm. The U.S. Firm, has not, within the three-year period preceding the submission of this proposal, been notified of any delinquent federal or state taxes in an amount that exceeds US\$3,000 for which the liability remains unsatisfied. Taxes are considered delinquent if (a) the tax liability has been fully determined, with no pending administrative or judicial appeals; and (b) a taxpayer has failed to pay the tax liability when full payment is due and required.
6. The U.S. Firm has not commenced a voluntary case or other proceeding seeking liquidation, reorganization or other relief with respect to itself of its debts under any bankruptcy, insolvency or other similar law. The U.S. Firm has not had filed against it an involuntary petition under any bankruptcy, insolvency or similar law.
7. The U.S. Firm certifies that it complies with USTDA Nationality, Source, and Origin Requirements and shall continue to comply with such requirements throughout the duration of the USTDA-funded activity. The U.S. Firm commits to notify USTDA and the Grantee if it becomes aware of any change which might affect U.S. Firm's ability to meet the USTDA Nationality, Source, and Origin Requirements.

*The U.S. Firm shall notify USTDA if any of the representations are no longer true and correct.*

U.S. Firm certifies that the information provided in this form is true and correct. U.S. Firm understands and agrees that the U.S. Government may rely on the accuracy of this information in processing a request to participate in a USTDA-funded activity. If at any time USTDA has reason to believe that any person or entity has willfully and knowingly provided incorrect information or made false statements, USTDA may take action under applicable law. The undersigned represents and warrants that he/she has the requisite power and authority to sign on behalf of the U.S. Firm.

Name	<input type="text"/>	Signature	<input type="text"/>
Title	<input type="text"/>		
Organization	<input type="text"/>	Date	<input type="text"/>





**ATTACHMENT B**

**USTDA-Funded Feasibility Study, Technical Assistance, or Training Grant**

**U.S. Firm Information Form – Shareholder(s) and Parent Company(s)**

If applicable, U.S. Firm provided a list of shareholders and the percentage of their ownership. This form shall be completed for each shareholder that owns 15% or more shares in U.S. Firm, as well as any parent corporation of the U.S. Firm ("Shareholder"). In addition, this form shall be completed for each shareholder identified in Attachment B that owns 15% or more shares in any Shareholder, as well as any parent identified in Attachment B.

USTDA Activity Number <i>[To be completed by USTDA]</i>	
---	--

Activity Title <i>[To be completed by USTDA]</i>	
--	--

Full Legal Name of U.S. Firm	
------------------------------	--

Full Legal Name of Shareholder	
--------------------------------	--

Business Address of Shareholder (street address only)	
---	--

Telephone number		Fax Number	
------------------	--	------------	--

Year Established (include any predecessor company(s) and year(s) established, if appropriate). Please attach additional pages as necessary.	
---	--

Country of Shareholder's Principal Place of Business	
--	--

Please provide a list of directors and principal officers as detailed in Attachment A. Attached?	Yes
--	-----

Type of Ownership	<input type="checkbox"/> Publicly Traded Company
	<input type="checkbox"/> Private Company
	<input type="checkbox"/> Other

If applicable, provide a list of shareholders and the percentage of their ownership. In addition, for each shareholder that owns 15% or more shares in Shareholder, please complete Attachment B.	
---	--

Is the Shareholder a wholly-owned or partially owned subsidiary?	<input type="checkbox"/> Yes
	<input type="checkbox"/> No

If so, please provide the name of the Shareholder's parent(s). In addition, for any parent identified, please complete Attachment B.	
--	--

*Shareholder may attach additional sheets, as necessary.*



**ATTACHMENT C**

**USTDA-Funded Feasibility Study, Technical Assistance, or Training Grant**

**Subcontractor Information Form**

This form is designed to enable the U.S. Trade and Development Agency ("USTDA") to obtain information about entities and individuals proposed for participation in USTDA-funded activities. Information in this form is used to conduct screening of entities and individuals to ensure compliance with legislative and executive branch prohibitions on providing support or resources to, or engaging in transactions with, certain individuals or entities with which USTDA must comply.

USTDA Activity Number <i>[To be completed by USTDA]</i>	
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Activity Title <i>[To be completed by USTDA]</i>	
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Full Legal Name of Prime Contractor U.S. Firm ("U.S. Firm")	
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Full Legal Name of Subcontractor	
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Business Address of Subcontractor (street address only)	
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Telephone Number	
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Fax Number	
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Year Established (include any predecessor company(s) and year(s) established, if appropriate). Please attach additional pages as necessary.	
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**Subcontractor Point of Contact**

Name	Surname	
	Given Name	

Address	
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Telephone	
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Fax	
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Email	
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**Subcontractor's Representations**

Subcontractor shall provide the following (or any explanation as to why any representation cannot be made), made as of the date of the proposal:

1. Subcontractor is a <i>[check one]</i>	<input type="checkbox"/> Corporation	<input type="checkbox"/> LLC	<input type="checkbox"/> Partnership	<input type="checkbox"/> Sole Proprietor	<input type="checkbox"/> Other
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duly organized, validly existing and in good standing under the laws of: \_\_\_\_\_ .

The subcontractor has all the requisite corporate power and authority to conduct its business as presently conducted, to participate in this proposal, and if the U.S. Firm is selected, to execute and deliver a subcontract to the U.S. Firm for the performance of the USTDA Activity and to perform the USTDA Activity. The subcontractor is not debarred, suspended, or to the best of its knowledge or belief, proposed for debarment or ineligible for the award of contracts by any federal or state governmental agency or authority.

2. Neither the subcontractor nor any of its principal officers have, within the ten-year period preceding the submission of the Offeror's proposal, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a federal, state or local government contract or subcontract; violation of federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating federal or state criminal tax laws, or receiving stolen property.

3. Neither the subcontractor, nor any of its principal officers, is presently indicted for, or otherwise criminally or civilly charged with, commission of any of the offenses enumerated in paragraph 2 above.

4. There are no federal or state tax liens pending against the assets, property or business of the subcontractor. The subcontractor, has not, within the three-year period preceding this RFP, been notified of any delinquent federal or state taxes in an amount that exceeds \$3,000 for which the liability remains unsatisfied. Taxes are considered delinquent if (a) the tax liability has been fully determined, with no pending administrative or judicial appeals; and (b) a taxpayer has failed to pay the tax liability when full payment is due and required.

5. The subcontractor has not commenced a voluntary case or other proceeding seeking liquidation, reorganization or other relief with respect to itself or its debts under any bankruptcy, insolvency or other similar law. The subcontractor has not had filed against it an involuntary petition under any bankruptcy, insolvency or similar law.

6. The Subcontractor certifies that it complies with the USTDA Nationality, Source, and Origin Requirements and shall continue to comply with such requirements throughout the duration of the USTDA-funded activity. The Subcontractor commits to notify USTDA, the Contractor, and the Grantee if it becomes aware of any change which might affect U.S. Firm's ability to meet the USTDA Nationality, Source, and Origin Requirements.

*The selected Subcontractor shall notify the U.S. Firm, Grantee and USTDA if any of the representations included in its proposal are no longer true and correct.*

Subcontractor certifies that the information provided in this form is true and correct. Subcontractor understands and agrees that the U.S. Government may rely on the accuracy of this information in processing a request to participate in a USTDA-funded activity. If at any time USTDA has reason to believe that any person or entity has willfully and knowingly provided incorrect information or made false statements, USTDA may take action under applicable law. The undersigned represents and warrants that he/she has the requisite power and authority to sign on behalf of the Subcontractor.

Name		Signature	
Title			
Organization		Date	