

REQUEST FOR PROPOSALS

TECHNICAL ASSISTANCE FOR THE

GUADALAJARA TRAFFIC CONTROL MODERNIZATION PROJECT IN MEXICO

Submission Deadline: 4:00 PM

LOCAL TIME (GUADALAJARA, MEXICO)

APRIL 16, 2015

Submission Place:

**Dr. Mario Cordova
Director General
Instituto de Movilidad y Transporte del Estado de Jalisco
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Col. Zapopan Centro
Zapopan, Jalisco 45100
MEXICO
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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.

REQUEST FOR PROPOSALS

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Section 1: INTRODUCTION

The U.S. Trade and Development Agency (“USTDA”) has provided a grant in the amount of US\$686,275 to the Instituto de Movilidad y Transporte del Estado de Jalisco (“IMTJ”) (the “Grantee”) in accordance with a grant agreement dated December 18, 2014 (the “Grant Agreement”) to fund technical assistance (“Technical Assistance”) for the Guadalajara Traffic Control Modernization Project (the “Project”) in Mexico. This Technical Assistance will allow the Grantee to harmonize traffic control standards and modernize traffic signalization, signage, and intelligent transportation system (“ITS”) deployments in the Guadalajara Metropolitan Area. 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

Located in the State of Jalisco, Guadalajara is Mexico’s second largest metropolitan area, with 8 municipalities and over 4.4 million people. Over the last 10 years, the city’s traffic network has become increasingly complex and its management has become increasingly challenging due to the growing number of people, passengers, and vehicles in the Guadalajara Metropolitan Area.

To address the growing traffic and congestion issues, the Government of the State of Jalisco has passed a Mobility Law and developed the “2013-2018 State Development Plan” that includes plans to renovate and modernize the Guadalajara’s transportation system. The plan’s goal for the Guadalajara Metropolitan Area is to optimize transit times, safety, and user comfort by improving public transportation systems and promoting the use of other transportation means.

In order to support the implementation of the plan, the goal of the Technical Assistance is to harmonize traffic control standards and modernize traffic signalization, signage, and ITS deployments in the Guadalajara Metropolitan Area. The Technical Assistance will cover the following areas:

- A review of existing signage and traffic signal standards used in the Guadalajara Metropolitan Area and a review of related standards, based on U.S. and international standards;
- An assessment of existing traffic signal technologies and recommendations for modernizing or upgrading such technologies, including associated hardware and software;
- An analysis of existing traffic control technologies and recommendations for modernizing or upgrading such technologies, such as vehicle detection, pedestrian detection, pedestrian signalization, priority detection and control for emergency vehicles and buses, video surveillance, dynamic message signs, traffic control center software and hardware, and other traffic control technologies;
- The identification of financing alternatives, including options for private sector participation and financing; and
- A implementation plan.

In addition, the Technical Assistance includes the design of a pilot deployment on traffic control improvements at approximately 80 intersections along the along the city's outer perimeter loop road (the "Periférico") to spur the implementation of traffic control improvements throughout Guadalajara's traffic system. This pilot deployment plan, covered in Task 6-12 of the Technical Assistance, would include designs for signalization upgrades, traffic engineering upgrades, corridor surveillance upgrades, and traffic control center upgrades to monitor and manage traffic on the Periférico.

Portions of a background Definitional Mission report are provided for reference in Annex 2.

1.2 OBJECTIVE

The objective of the Guadalajara Traffic Control Modernization Technical Assistance is to modernize the traffic control technologies and related ITS technologies for surface transportation in the Guadalajara metropolitan area.

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\$686,275. **The USTDA grant of US\$686,275 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\$686,275 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 the “Guadalajara Traffic Control Modernization 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\$686,275.

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 Spanish.

2.13 PROPOSAL SUBMISSION REQUIREMENTS

The Cover Letter in the proposal must be addressed to:

**Dr. Mario Cordova
Director General
Instituto de Movilidad y Transporte del Estado de Jalisco
Ramón Corona 180
Col. Zapopan Centro
Zapopan, Jalisco 45100
MEXICO
Phone: + (52-33) 1377-8888**

An original printed copy in each language, three (3) hard copies in Spanish, and an electronic copy in each language (PDF file preferred) of your proposal must be received at the above address no later than 4:00 PM (local time in Guadalajara, Mexico), on April 16, 2015.

Proposals may be either sent by mail, air 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 printed copies, three (3) hard copies, and the electronic copies 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 the 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, feasibility study, 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\$686,275, which is a fixed amount.

Offerors shall submit one (1) original printed copy in each language, three (3) hard copies in Spanish, and one (1) electronic copy in each language 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 and their corresponding assigned weights:

1. **Technical Experience (40 points):** Offeror's experience in conducting traffic signalization projects, including the planning, design, and implementation of modern traffic signal technologies, adaptive traffic signal control, traffic signal timing and synchronization, and traffic signal priority controls. Offeror's experience in the planning, design, and construction management of roadway infrastructure, with particular experience in urban areas. Offeror's experience in preparing standards and specifications for traffic technologies and products. Offeror's knowledge of signage and pavement marking standards (particularly the U.S. Manual of Uniform Traffic Control Devices), and capacity to adapt such standards to local conditions and requirements. Offeror's experience working in the planning, design, and installation of signage projects. Offeror's experience with ITS and traffic technologies, including (but not limited to) dynamic message signs, CCTV, electronic fare collection, traffic signal priority controls, incident detection systems, vehicle detection systems, plate recognition systems, induced loops, and weigh-in-motion systems. Offeror's experience in ITS design and integration. Offeror's capacity to provide recommendations as to the optimal ITS technologies given local conditions, and capacity to develop product specifications. Offeror's experience conducting pilot projects that required the planning, design, and construction management of traffic system modernizations and upgrades.
2. **Technical Approach and Work Plan (30 points):** Adequacy, soundness, and thoroughness of the Offeror's proposed Technical Approach and Work Plan.
3. **Financial Experience (20 points):** Offeror's experience conducting socioeconomic and financial analyses for the implementation of traffic modernization projects with particular experience with ITS systems. Offeror's capacity to prepare capital investment programs and financial models. Offeror's experience working with financing institutions including development banks, multilaterals, technical cooperation programs, and the U.S. Ex-Im Bank. Offeror's experience conducting due diligence for the financing of traffic and transportation projects. Offeror's capacity to provide recommendations regarding financing sources and terms. Offeror's experience working in projects that involve public-private partnerships and private sector participation. Offeror's experience conducting due diligence for private sector involvement in traffic and transportation projects.

4. Regional Experience (10 points): Offeror's experience working in traffic and transportation projects in Latin America, particularly in Mexico. Offeror's experience working on similar projects in Latin America and Mexico, including projects pertaining to traffic signal modernization, ITS implementation, and public transportation. Offeror's knowledge and experience working with Mexican state institutions. Offeror's experience and ability to work in the Spanish language.

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

Price will not be a factor in Contractor selection.

A N N E X 1

FEDBIZOPPS ANNOUNCEMENT

Dr. Mario Cordova
Director General
Instituto de Movilidad y Transporte del Estado de Jalisco
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Mexico
Phone: + (52-33) 1377-8888

Solicitation Number: 2015-51005A
B – Mexico: Guadalajara Traffic Control Modernization Technical Assistance

POC: Jennifer Van Renterghem, USTDA, 1000 Wilson Boulevard, Suite 1600,
Arlington, VA 22209-3901, Tel: (703) 875-4357, Fax: (703) 875-4009, Email:
RFPQuestions@ustda.gov.

The Grantee (the Instituto de Movilidad y Transporte del Estado de Jalisco) 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 Technical Assistance for the Guadalajara Traffic Control Modernization Project in Mexico.

Located in the State of Jalisco, Guadalajara is Mexico's second largest metropolitan area, with 8 municipalities and over 4.4 million people. Over the last 10 years, the city's traffic network has become increasingly complex and its management has become increasingly challenging due to the growing number of people, passengers, and vehicles in the Guadalajara Metropolitan Area. To address the growing traffic and congestion issues, the Government of the State of Jalisco has passed a Mobility Law and developed the "2013-2018 State Development Plan" that includes plans to renovate and modernize the Guadalajara's transportation system. The plan's goal for the Guadalajara Metropolitan Area is to optimize transit times, safety, and user comfort by improving public transportation systems and promoting the use of other transportation means.

In order to support the implementation of the plan, the objective of this Technical Assistance is to modernize the traffic control technologies and related intelligent transportation system ("ITS") technologies for surface transportation in the Guadalajara metropolitan area. The Technical Assistance will allow the Grantee to harmonize traffic control standards and modernize traffic signalization, signage, and ITS deployments in the Guadalajara Metropolitan Area

The U.S. firm selected will be paid in U.S. dollars from a \$686,275 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 portions of 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 Spanish directly to the Grantee by **4:00 PM (local time in Guadalajara, Mexico) on April 16, 2015** 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.

A N N E X 2

PORTIONS OF BACKGROUND DEFINITIONAL MISSION REPORT

PUBLIC VERSION

Final Report

State of Jalisco ITS Project Definitional Mission

USTDA Project No. 2014-51062

Presented by: **KED Group**

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Columbia, SC 29210
POC: Grace Kalil, President
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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.

Mailing and Delivery Address: 1000 Wilson Boulevard, Suite 1600, Arlington, VA 22209-3901
Phone: 703-875-4357 • **Fax:** 703-875-4009 • **Web site:** www.ustda.gov • **email:** info@ustda.gov



The U.S. Trade and Development Agency

The U.S. Trade and Development Agency helps companies create U.S. jobs through the export of U.S. goods and services for priority development projects in emerging economies. USTDA links U.S. businesses to export opportunities by funding project planning activities, pilot projects, and reverse trade missions while creating sustainable infrastructure and economic growth in partner countries.

A. Executive Summary

Guadalajara is Jalisco's largest city with a metropolitan area that covers eight municipalities and has over 4.4 million inhabitants. During the last decade, the city's traffic network has become complex and its management has become increasingly challenging due to the growing number of users and the growing population in the Guadalajara Metropolitan Area (AMG). There are several forms of transportation available to the traveling public in Guadalajara, including an extensive road network, a light rail metro system, and four bus systems (Macrobus BRT system, Peribus, private buses and minibuses and a trolley bus system), and all mixed with high levels of pedestrian traffic. Furthermore, Guadalajara's vehicular fleet has increased by 4.9% (on average) during the last six years and the state of Jalisco accounts for 13% of all registered vehicles in Mexico. As such, the Government of Jalisco is engaging in projects and programs that will not only modernize the existing systems, but that would ultimately create a sustainable traffic network for the city and its surrounding areas. Specifically, the Government of Jalisco is promoting projects that will enhance traffic safety, decrease traffic congestion and encourage the use of public transportation systems.

Critical elements of Guadalajara's transportation system are:

- A growing private vehicle fleet of about three million vehicles.
- Two light rail lines that cross the city from North to South and East to West, in which are being expanded. One additional line is being constructed which will cross the city diagonally
- A feeder system "Macrobus" that provides services throughout the city and two major stations of the light rail.
- A large fleet of privately owned buses which provides service throughout the city but in an informal manner (lack of predetermined scheduled, overlapping of routes).
- Other informal means of transportation such as minibuses and rickshaws.
- Significant pedestrian and bicycle traffic particularly in the city center.

The key transportation stakeholders are the Secretaria de Movilidad de Jalisco (SEMOV), the Institute of Mobility and Transport of Jalisco (IMTJ) and the Sistema de Tren Eléctrico Urbano (SITEUR). SEMOV is responsible for developing, establishing, implementing and overseeing mobility and transportation policies for the state of Jalisco as well as for planning, coordinating, evaluating and approving any mobility and transportation programs in accordance with current law and with any agreements or modifications imposed by the state. IMTJ is a technical institute which provides support to SEMOV in accordance with the Jalisco Mobility and Transportation Law, including technical advice, transportation planning and regulatory support. SITEUR is responsible for planning, implementing and overseeing the light rail metro system.

SEMOV and IMTJ have requested the assistance of USTDA in funding and project that will decrease traffic congestion and improve the quality of the public transportation systems by applying modern technologies for traffic signalization and deploying intelligent transportation system (ITS) technologies, specifically pertaining to the vehicle detection, priority for buses and

emergency vehicles and CCTVs. Ultimately, the objective of this technical assistance is to develop a phased development program for establishing traffic control standards and modernizing the traffic signalization, signage and ITS in AMG.

In order to accelerate implementation, the project will include a “pilot” of several intersections along the outer ring road (the “Periférico”) where the Contractor’s recommendations will be applied and which could be replicated in the future by the Grantee. This pilot project will include signalized intersection upgrades, ITS upgrades, traffic engineering studies, corridor surveillance and necessary traffic control center upgrades to monitor traffic and manage the traffic control system.

The technical assistance will be completed in two phases. The first phase (Tasks 1-5) will consist of a phased development program and will include the development of standards and specifications, an evaluation of all existing technologies, recommendations for new technologies, and an overall long-term deployment plan that can be used to program and construct projects. The second phase (Tasks 6-12) will focus on the design necessary for a pilot project of approximately 80 signalized intersections. Tasks 13-16 pertain to the entire project and consist of the environmental and developmental analysis, addressing U.S. sources of supply and the final report.

The implementation of the project may provide positive environmental impacts. By providing a smoother traffic flow and decreasing trip length for private vehicles and buses, emissions and fuel use may be reduced. Furthermore, project implementation may lead to a better use of existing roadway infrastructure, transfer of modern technologies such as adaptive traffic signal systems and vehicle detection to controllers and operators, create new positions in the area of traffic signal management, and increase the productivity and efficiency of public transportation systems.

The project will provide a number of opportunities for U.S. suppliers of goods and services, including manufacturers of traffic signal controllers, vehicle detection systems, vehicle preemption devices, variable message signs, CCTVs and other ITS applications. Competitive advantages to U.S. companies include brand recognition, low transportation costs, capacity to provide an integrated solution, existing local representation and distribution. Nonetheless, there is high potential for foreign competition especially from European companies that are active in the market. Some of the existing technology is of Spanish and French origin. Furthermore, some local companies will also be able to compete in some areas.

B. Project Background

The city of Guadalajara is the capital of the state of Jalisco and is Mexico’s second largest city. Mexico’s National Institute of Statistics and Geography indicates that the greater metropolitan area of Guadalajara had 4,434,878 residents in 2010 according to the Census of Population and Housing. It is estimated that in 2013 the population of the metropolitan area was 4,641,511. In

the late 1960's and early 1970's, Guadalajara was already experiencing major traffic congestion within the metropolitan area and public officials began the efforts of combating the traffic problems. In 1974, several houses and streets were demolished near the city center to make way for a new wide roadway, named Avenida Federalismo (Federal Avenue), and the construction of a new public-transport tunnel underneath. Avenida Federalismo is now one of Guadalajara's major thoroughfares. The 6.6 km (4.1 mile) tunnel underneath the avenue was designed for future use by a rail system, but due to a lack of funding at the time, it was initially served by a new trolleybus system, which opened in December of 1976. Several years later, construction began to convert the trolleybus tunnel and stations for use by a new light rail line. The tunnel closed for trolleybuses in early 1988. However, the trolleybus service continued on other routes and is still in operation today. The Trolleybus System of Guadalajara is owned and operated by Sistema de Transporte Colectivo de la Zona Metropolitana (Sistecozome), an agency of the Jalisco state government. As of 2013, the system had two lines operating, each of which connected the area west of the city to the eastern part of the city. In late 1989, the first light rail line opened, Line 1 of the Guadalajara Light Rail System. A few years later, Line 2 was constructed and it opened in July of 1994. Because of the continuing heavy traffic congestion on the city's streets and the large number of users of the rail system, there are plans to extend Line 2 to the west and to build Line 3. Line 1 is underground in the city center, but runs at grade north and south of the city center. Its surface sections include several at grade crossings that are protected by crossing gates. The station platforms only accommodate trains of two cars. Line 2 is entirely underground and its stations are long enough to accommodate trains of up to four cars in length. Current plans include the addition of Line 3, extending Line 2 to the west, and to add two stations to Line 1.

About the same time that Guadalajara was opening its new trolleybus system, a new innovation in transit, the Bus Rapid Transit System, or BRT System, was starting to be used in larger cities throughout Latin America. The first BRT system was the Rede Integrada de Transporte (RIT) that was implemented in Curitiba, Brazil, in 1974. Initially, it only consisted of dedicated bus lanes in the center of major arterial roads. In 1980, Curitiba added a feeder bus network, inter-zone connections, and in 1992, introduced new innovations including off-board fare collection systems, enclosed stations, and platform-level boarding. Other cities made further improvements including platooning of buses, passing lanes and express service. In 1995, Quito, Ecuador opened a trolleybus BRT system and in 2000 Bogota, Colombia opened TransMilenio. TransMilenio was the first BRT system to combine the best elements of Curitiba's BRT with other BRT advances in other cities, and TransMilenio achieved the highest capacity and highest speed BRT system in the world. The success of TransMilenio spurred other cities to develop BRT systems, including Macrobus in Guadalajara. The Macrobus BRT system was launched in March of 2009 and currently operates Line 1, running north to south, with 27 stations, two terminals, and one intersection with the Guadalajara Light Rail System's Line 2 at San Juan de Dios station. Additional lines are currently being planned including the addition of a Line 2 and Line 3. In April, 2013, the Governor of Jalisco, Aristoteles Sandoval Diaz, announced the new "2013-2018 State Development Plan" that includes plans to renovate and

modernize the city's transportation system. The plan calls for the promotion of more efficient vehicular circulation systems in the major population centers in the state, specifically Guadalajara. The Secretary of Infrastructure and Public Works, under the new State Development Plan, will also work to:

- Increase the supply and quality of public transportation in Guadalajara;
- Consolidate intermodal and multimodal communication networks with nodal connectivity in Guadalajara;
- Modernize, expand and maintain the road infrastructure in Guadalajara; and
- Extend the coverage and improve the urban infrastructure for persons with disabilities.

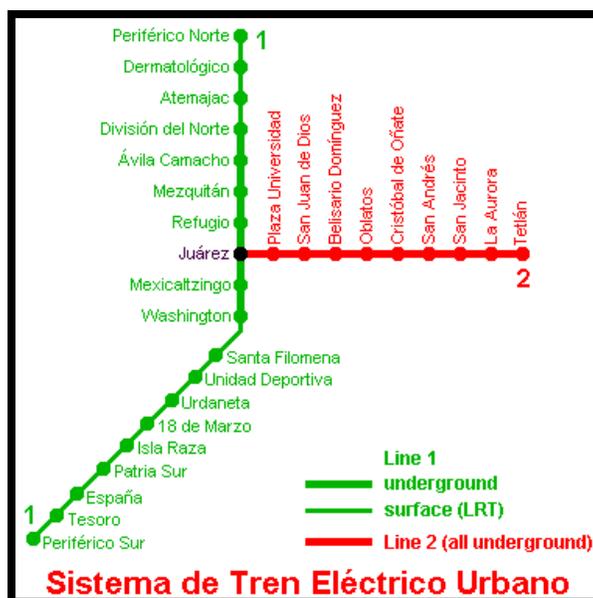
The plan's objective related to the transportation systems is to optimize the costs and time of transfer, safety and comfort of the users of the public transportation systems by improving the various transportation systems while promoting the use of other means of mobility throughout the city.

Today, Guadalajara's traffic network is complex and its management has become increasingly challenging due to the growing number of users and the growing population in the AMG. There are several forms of transportation available to the traveling public in Guadalajara, including an extensive road network, a light rail metro system, and four bus systems (Macrobus BRT system, Peribus, private buses and minibuses and a trolley bus system), and all mixed with high levels of pedestrian traffic. As such, the SEMOV and the IMTJ are engaging in projects and programs that will not only modernize the existing systems, but that would ultimately create a sustainable traffic network for the city and its surrounding areas.

B.1 Light Rail

Guadalajara's light rail metro system consists of two lines (Lines 1 and 2) which serve an average of approximately 135,000 passengers per line per day. Line 1, which crosses the city from North to South, has stations every 800 meters and is the busiest of the two routes. Line 1 is currently working at capacity during peak hours in the morning and late afternoon with demand expected to grow at 4% per annum. Line 2 provides service from downtown to the East suburbs (partially crossing the city but optimizing service through the Macrobus) and is currently working at an estimated 80% capacity. SITEUR, the entity that oversees the operation of the light rail system, estimates that 20% of demand for this line is lost every year due to insufficient capacity. Line 2 crosses in its majority areas of low density.

Figure 1. Light Rail – Existing Lines 1 and 2



SITEUR is working on several programs to modernize existing lines and building new ones. Line 1 is being expanded to accommodate three cab trains (currently can only provide service to two cab trains) in order to increase capacity. The modernization also includes a one-kilometer expansion to the North and the expansion of the station platforms (from 60 meters to 90 meters). Furthermore, stations are being equipped to provide real-time user information (departures, arrivals) and automated fare collection at entrance points. It is anticipated that this project will be operational in 2016. SITEUR is also building a third line (Line 3), for which the civil works are currently being procured. This line, which will cross the city diagonally from the Northwest to the Southeast, has a forecasted demand of 235,000 passengers per day and is estimated to cost about 17,000 million pesos. The line will be elevated in its majority (about 22 kilometers), but will include 6.5 kilometers underground and will use different trains from Lines 1 and 2.

Figure 2. Light Rail – Planned Line 3



Figure 3. Line 1 Station



B.2 Macrobus

The Macrobus is a Bus Rapid Transit (BRT) system (which includes several articulated buses) that serves as a feeder to the light rail metro system, covering a large number of areas throughout the AMG. The Macrobus uses exclusive lines with elevated stations that are equipped with automatic doors and in some cases user information systems and bicycle parking areas. This system functions relatively well, but still presents some challenges. The use of dedicated lanes can be challenging given current vehicular and pedestrian traffic that at times will cross over to these dedicated lanes. Furthermore, implementation throughout the city is difficult considering space requirements and availability for the stations and dedicated lanes.

Figure 4. Macrobus station



Figure 5. Macrobus Station – Interior View



B.3 Peribus

The Peribus is a new 134-kilometer bus system that will provide service only to the city's outer perimeter road using a structure similar to the one of the Macrobus BRT system - elevated stations and articulated buses (expected to be about 114). The perimeter road is one of the busiest roads in the city and provides access to a growing number of suburbs including Zapopan, Tonalá and Tlaquepaque. As such, traffic congestion occurs frequently and the road presents challenges as it also serves a large volume of cargo traffic that travels from the Port of Manzanillo through Guadalajara to reach other cities in Mexico or cargo traffic with Guadalajara as its final destination. Currently, the IMTJ is conducting demand studies to assess potential stations, travel times and frequencies.

B.4 Other Buses

There are a number of buses that travel throughout the city providing a more “informal” service (no dedicated stations or stops, irregular schedules). These buses are operated by private sector concessionaires. Along busy corridors it is common for several bus drivers to provide service concurrently and compete to achieve a higher number of passengers. The operation of these buses is conducted by operators (in its majority small operators that may own one or two buses). Some of the larger operators, such as Sistecozome, subconcession services to independent drivers.

B.5 Micros and Rickshaws

There are also a number of vans or “micros” that provide services to specific suburbs within the AMG usually at a higher price and rickshaws which are used informally especially on lower income suburbs where there is limited road access for other modes of transport due to the condition of the road (e.g. gravel) and/or road width. The IMJT has embarked in a program to enhance roads and access to these areas so that in the future formal means of transport can be provided.

B.6 Cargo Traffic

Cargo traffic within the AMG is comprised of both transient cargo traveling mainly on the outskirts of the city and cargo bound to the metropolitan area. Most cargo trucks only utilize the outer perimeter road as they travel to other cities, especially between the Port of Manzanillo to Mexico City, Monterrey and Nogales. On the other hand, some trucks enter the city in order to distribute products to different companies or factories within the city limits. It is expected that cargo traffic will decrease in the near future as a South bypass that will reroute traffic bound to Monterrey is being built and will be ready in 2015. A bypass to the North is not feasible due to geographical limitations.

Currently, all cargo that goes through the city requires a permit based on allowable weight as follows:

- 1,000-3,500 kilos
- 3,500-13,000 kilos
- Over 13,000 kilos

The latter can only go through main roads that have more than two lanes. Cargo traffic is also controlled throughout different times of the day.

- 8:30am - 1:00pm
- 2:30pm - 5:00pm
- 7:30pm - 6:30am

Cargo traffic is usually allowed between 2:30 pm and 5:00 pm and 7:30 pm and 6:30 am. The

city tries to allow cargo trucks overnight unless there are specific exceptions that require them to deliver during the day. Cargo traffic is regulated in a way that it should always move through the right lane of the road, however there are current traffic issues with limited control of the right lane requirement.

B.7 Traffic Control Centers

Traffic Signal Control

Guadalajara's metropolitan area consists of about 1,800 signalized intersections ("cruceos semaforizados") which include one or more traffic signals throughout the eight municipalities. Each traffic signal in the overall system is interconnected and part of a small subset of synchronized signalized intersections that follow pre-determined timing patterns based on peak hour demand.

There are two distinctive types of communication systems that are currently used. The one is hard-wired communication cabling (multi-strand copper cables) from the signal controller panel at the intersection back to the traffic control center. Each of the hard-wired signal controllers provide real-time communication back to the computerized control system in the traffic control center. The traffic signal controllers (about 975) which are hard-wired to the traffic control center are monitored and controlled in real time from the city's traffic control center. This includes the area of downtown Guadalajara and adjacent intersections. The existing traffic control center also has video monitoring capabilities of traffic in the downtown area through about 36 CCTV cameras (only 32 of these 36 are currently working). The 975 hard-wired traffic signals and the 36 CCTV cameras provide the traffic control center with the necessary information and capabilities for real-time adaptation of the traffic signal controllers for dynamic traffic control in the downtown area. The center also has a software platform that indicates in real time those traffic signals that are faulty and the level of congestion at the intersections using in-pavement vehicle detection systems and a green/yellow/red light mark on the traffic control center monitoring wall map. A good number of the vehicle detection systems are now out of order as roads have been modernized, paved or systems have been damaged. Nevertheless, the traffic control center uses available data in order to adapt existing signal timings and enhance traffic mobility at saturated intersections. The existing software provides flexibility for unlimited patterns, however, about seven pre-programmed timing patterns are used each day. There are three monitoring stations operating on one main server which provides traffic control services 365 days per year.

The second system consists of about 900 intersections which use satellite based communication to apply pre-determined signal timing patterns based on peak hour demand. At this time the system does not provide real-time information, vehicle detection or information on faulty traffic lights back to the traffic control center. Currently the system uses hardwire copper but there are plans to move to fiber optic communication cables. There are eight fiber optic lines that they are connecting to which are currently used by the bus system (Macrobus).

Macrobus and Light Rail Control Centers

Both of these centers are well organized with good level of technology. The center for the Macrobus consists of stations for surveillance (connected through CCTVs at the bus stations entries and hallways) and in one station that controls departures and arrivals. The buses are being tracked with a GPS system which feeds information into a software (SAE). The controller has a schedule and checks the schedule against the departures and arrivals of each bus using the GPS signal. The light rail control center works in a similar manner, with one station for Line 1 and one for Line 2. Trains are controlled by sensors (connected to the rail line) in some areas and radio communication in others.

Figure 7. Control Panel - Macrobus Control Center

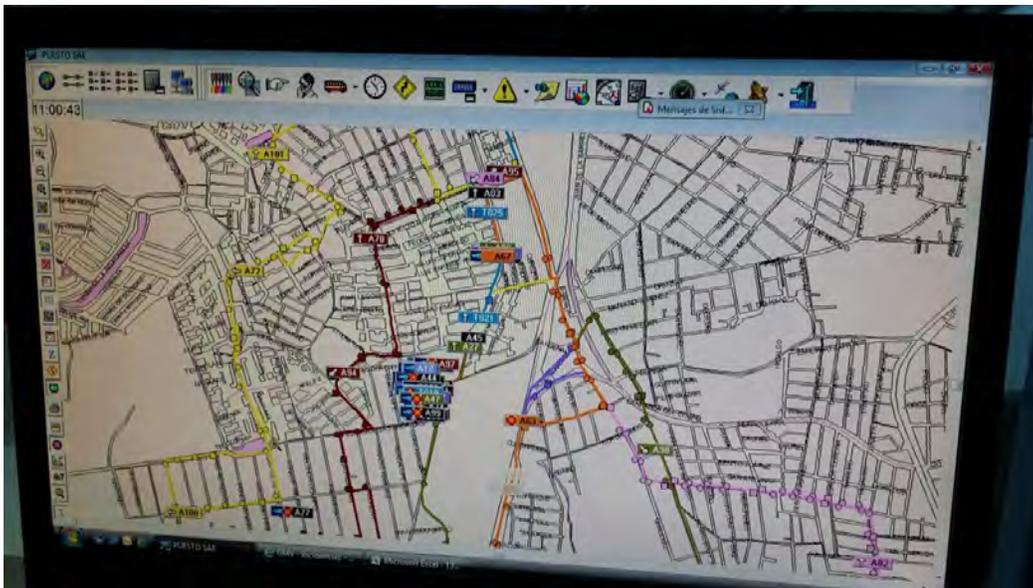
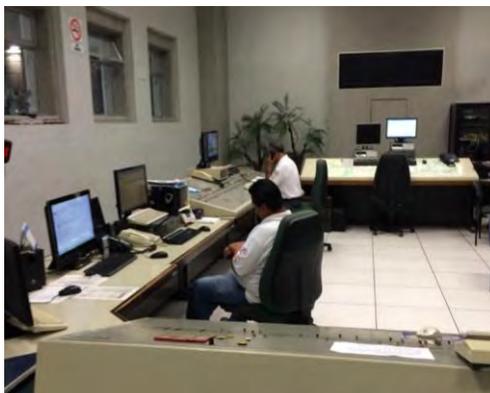


Figure 8. Light Rail Control Center

C. Project Overview

The objective of this technical assistance for the SEMOV and IMTJ is to develop a phased development program for establishing traffic control standards and modernizing the traffic signalization, signage and intelligent transportation system (ITS) in the Guadalajara Metropolitan Area (AMG). The technical assistance consists of:

- A review of existing signage in traffic signal standards used in AMG and reviewing such standards based on U.S. and internationally accepted standards.
- An assessment of current traffic signal technologies and provide recommendations for modernizing or upgrading the system, including recommendations for traffic signal technologies, associated hardware and software, and required modernizations to the traffic control center.
- An analysis of all existing technologies in use with other available traffic control technologies and ITS including traffic signal control, vehicle signalization, vehicle detection, pedestrian detection, pedestrian signalization, emergency vehicle detection and control, bus priority detection and control, CCTV, dynamic message signs, and traffic control center software and hardware. Provide recommendations regarding optimal technologies that may be deployed within the AMG.
- A deployment plan - based on the results of previous analysis and recommendations - that is it divided into small, logical projects that may be implemented in a phased manner.
- Provide financing alternatives including private sector participation alternatives for project financing.

In order to accelerate implementation, the project will include a “pilot” of several intersections (or corridors) where the Contractor’s recommendations will be applied and which could be replicated in the future by the Grantee. This pilot project will include signalized intersection upgrades, ITS upgrades, traffic engineering studies, corridor surveillance and necessary traffic

control center upgrades to monitor traffic and manage the traffic control system to intersections along the outer ring road (the “Periférico”).

The technical assistance will be completed in two phases. The first phase (Tasks 1-5) will consist of a phased development program and will include the development of standards and specifications, an evaluation of all existing technologies, recommendations for new technologies, and an overall long-term deployment plan that can be used to program and construct projects. The second phase (Tasks 6-12) will focus on the design necessary for a pilot project of approximately 80 signalized intersections (70 existing and 10 new).

D. Project Sponsor Commitment

There are several important stakeholders involved in the Guadalajara traffic and transportation system and that are responsible for different areas, subsystems or elements of the transportation network. The primary stakeholders are the Secretaria de Movilidad de Jalisco (SEMOV), the Institute of Mobility and Transport of Jalisco (IMTJ) and the Sistema de Tren Eléctrico Urbano (SITEUR). The functions of each entity are established in Jalisco Mobility and Transportation Law (“Ley de Movilidad y Transporte del Estado de Jalisco”).

SEMOV is responsible for developing, establishing, implementing and overseeing mobility and transportation policies for the state of Jalisco as well as for planning, coordinating, evaluating and approving any mobility and transportation programs in accordance with current law and with any agreements or modifications imposed by the state. In doing so SEMOV may rely on information and/or opinions of the IMTJ or other entities, including universities, non-governmental organizations or others that may be related to the mobility and transportation programs in the state of Jalisco. SEMOV's specific responsibilities are to:

- Ensure compliance with the Mobility and Transportation Law including compliance with its requirements and policies.
- Provide adequate infrastructure, equipment and services associated with mobility.
- Issue driver's licenses, vehicle registrations and vehicle identifications including those for public transport.
- Provide training for drivers and special programs to enhance transportation safety.
- Serve as a mediator between users, concessionaires, temporary users and the private sector in order to ensure the efficiency of the transportation system and resolving any issues that may arise.
- Authorize any marketing and promotional material in vehicles and transportation infrastructure.
- Conduct vehicle inspections to ensure adequate condition.

IMTJ is a technical institute which provides support to SEMOV in accordance with the Jalisco Mobility and Transportation Law. Its specific functions are to:

- Plan, design, research and establish policies regarding mobility and transportation in the state.
- Provide technical opinions to SEMOV that can be used to develop urban mobility and sustainable transportation programs.
- Provide technical opinions regarding public transportation systems, pedestrian and cargo traffic.
- Conduct technical feasibility studies and social, economic and environmental studies pertaining to the implementation of transportation systems.
- Develop integrated projects for public transportation based on user needs.
- Prepare any technical studies required to promote new policies and laws.
- Establish, modify, integrate or eliminate public transportation routes.
- Determine and establish transportation system rates and charges.
- Review and provide technical guidance and feedback regarding any proposed projects pertaining to mobility and transportation in the state.
- Prepare any technical studies as requested by SEMOV for the implementation of mass transportation systems and its integration with other modes of transportation and existing transportation infrastructure.
- Prepare studies and projects pertaining to pedestrian and vehicular traffic in coordination with the municipalities as necessary.
- Provide specialized technical advisory assistance to state and municipal entities regarding mobility and transportation.
- Propose procedures and technical advice to the Comisión de Tarifas pertaining to the modification or change of transportation fees and charges.
- Prepare technical and socioeconomic studies that can be used when establishing or modifying transportation rates and charges.
- Establish technical parameters that can be used to evaluate the quality of service of mass transportation systems based on existing laws and regulations.
- Provide assistance to SEMOV in order to inform users and city center regarding the use of public and other transportation systems.

SITEUR is the entity responsible for planning, implementing and overseeing the light rail metro system in Guadalajara. Furthermore, SITEUR is also responsible for two other transportation systems - the Macrobus and the Pre-tren which serve as feeders to the light rail metro system. SITEUR's functions include to plan, build and procure equipment for the systems including for the upcoming new light rail lines. SITEUR is also responsible for the daily operation and control of these trains and buses.

The proposed grantee for this project is the IMTJ. IMTJ is responsible for conducting all technical studies pertaining to mobility and transportation in the state that can be later used by other entities such as SEMOV and SITEUR. The KED Group team conducted discussions with SEMOV and they are in agreement that IMTJ would be the most adequate channel for

conducting and later implementing the results of the study. Both IMTJ and SEMOV indicated that the project is a high priority for Guadalajara and the state.

Our initial meetings with SEMOV and the IMTJ indicated that there are several priority areas that have been identified by these institutions in order to improve traffic and transportation within AMG. These are:

- Signage and traffic signalization
- Automated fare collection systems
- On board technologies and priority given to public transport
- Cargo traffic

The proposed technical assistance response to the priority given to signage and traffic signalization as well as to on board technologies, priority lanes and automated fare collection systems.

E. Implementation Financing

The KED Group team conducted several discussions with host country officials from SEMOV as well as with Mexico's Infrastructure Bank (Banco de Obras y Servicios Públicos - BANOBRAS) to determine likely financing sources. It is important to note that it is likely the project will be financed through a combination of sources and that both SEMOV and the IMTJ are extremely interested in fostering private sector participation and private sector financing. As such, the contractor selected for this technical assistance should consider ways in which the private sector, including operators and concessionaires, may provide project financing. The private sector is already active in Guadalajara. For instance, the Macrobus is a concessioned system in which the concessionaire is responsible for the buildout of all required infrastructure, as well as any equipment that may need to be procured. Revenue collection is also concessioned to a Korean company from the private sector which is responsible for providing electronic fare collection systems. It is anticipated that host country officials would like to continue fostering private sector investment.

It is also likely that the project will be financed through public funding. Discussions with SEMOV and IMTJ indicate that public funding would be available from the following:

- Federal budget
- State budget
- Municipal budget

Such funds may come directly from the respective national, state or municipal annual budgets "partidas" or line item allocations depending on the priority given by the different authorities and the budget availability. For instance, funding for signage may be obtained through state budget as Governor's Office has made this specific topic a priority. However, funding for the government of traffic signals may be obtained at the city or municipal level.

In addition to direct public funding, projects resulting from the technical assistance will be eligible for funding through BANOBRAS. BANOBRAS is a public development bank with state participation. It provides financing or refinancing for projects directly or indirectly related to infrastructure and public services, as well as for institutional strengthening of the federal, state and municipal governments in order to promote sustainable development. In 2012, BANOBRAS's provided 227,207 millions of pesos in credit, a 33% increase from the previous year. More than 50% of these funding was provided directly to states and municipalities primarily for road transportation (63%) and the energy (15%). There are several ways in which the bank can provide financing; these include:

- Direct loans from foreign sources at concessional rates
- Traditional loans using BANOBRAS funding
- Special credits - for instance, FONADIN provides a special funds for projects, including studies that have 50% or more private sector participation.

BANOBRAS can also assist state entities to obtain financing through multilateral institutions and foreign technical cooperation programs.

F. U.S. Export Potential

The KED Group team has conducted an analysis of potential U.S. exports for this project based on existing technology, discussions and meetings held with host country officials, site visits conducted while in country, discussions with U.S. providers and in-house research. The U.S. export potential assessment focused on those systems and technologies that are expected to be procured as result of the project and which may be classified in two major groups – traffic signalization and ITS application. Traffic signalization exports include traffic signal heads, traffic signal controllers and cabinets and vehicle detection at the intersection level. Vehicle detection includes in pavement detection and preemption devices on signal heads for buses and emergency vehicles. Other ITS applications considered include dynamic message signs, electronic toll collection systems, closed circuit television systems, incident detection and management systems and automatic vehicle location systems. In addition to systems and technologies there are a number of services that may also provide opportunities for U.S. exports; these include ITS design and integration, traffic management center design, IT and signal timing consulting services.

The following summarizes key technologies, systems and services that may provide opportunities for export of U.S. goods and services:

- **Traffic Control Center Upgrades** - The Project Description section of this report provides detailed information on this site inspections conducted by our team at the existing traffic controller management centers. Guadalajara currently has three main traffic control centers to handle (a) traffic signals, vehicular traffic, accidents and infractions, (b) a center to manage the operation of the light train and (c) a center to manage the operation of the Macrobus and potentially the Peribus in the future. The

project will provide opportunities for modernization and update of at least two of these centers - traffic control and bus. Traffic control center will have to be upgraded in order to expand signal timing and vehicle detection capabilities as a network is expanded. This will include updates to the center's hardware, software (e.g., signal timing software), monitors and communication systems between the traffic signals and the center (at this time they are using a hard wired connection but it is anticipated that they will consider fiber optic). The control center for the buses may also need to be updated in order to provide bus priority services.

- **Traffic Signals** - this project will require the modernization and upgrade of traffic signals, including traffic signal heads, controllers and cabinets, as well as the installation of new traffic signals at several intersections. This will provide opportunities for exports of integrated systems (system integrators).
- **Vehicle Detection Systems** - vehicle detection systems are used in order to enhance traffic monitoring capacity at the intersection level. There are several technologies that can be used including induction loops and weigh in motion sensors which are embedded in the pavement. Guadalajara has used this type of vehicle detection systems in the past but the equipment has been lost over time due to installation in poor road surfaces and resurfacing and therefore there is a need to modernize most or all of the existing systems and install new ones at other intersections. In addition to vehicle detection systems, IMTJ is also interested in similar technologies that can enhance pedestrian and bicycle traffic and thus, there will also be opportunities for U.S. suppliers of these types of technology in the future.
- **Bus/Emergency Vehicle Preemption Devices** - in addition to detection systems used for vehicular traffic there is also a need for technologies that will provide priority to bus and emergency vehicles crossing intersections, especially during peak hour traffic. It is anticipated that these types of devices will be connected to the traffic signal at the intersection and would allow a more constant flow of buses throughout the city. Bus priority devices offer the potential for significant reductions in travel time and promote the use of this transportation system by providing improved service reliability. By providing priority to buses either through green extensions or early green recalls, transportation officials can achieve a better control of arrival times at individual stops, improve the regularity of service and reduce operating costs, vehicle maintenance and wear and tear. This type of technology is not currently being used in Guadalajara but due to the high number of buses that travel throughout the city and its surroundings can provide significant benefits to traffic conditions.
- **Closed Circuit Television Cameras (CCTVs)** – CCTVs are used throughout the city to provide visual confirmation of incidents and in order to provide monitoring capabilities of traffic. In Guadalajara, CCTVs are used throughout the city, especially within the city

center, in order to monitor infractions and assess traffic penalties. In addition, CCTVs are also used in order to monitor bus traffic at the bus control center and to provide operational monitoring capabilities and surveillance to enhance security at light train stations. In the future, additional CCTVs may be procured in order to provide real-time traffic monitoring capabilities that will allow traffic and transportation officials to take immediate decisions regarding rerouting traffic, traffic signal timing and incident response.

- **Variable Message Signs** - variable message signs are electronic traffic signs that allow transportation officials to distribute information concerning particular events in a timely manner. For instance, they can provide information regarding traffic congestion, accidents and incidents, road works or speed limits on a specific corridor. They can also provide users with information regarding the best route to take in a given situation.

SEMOV and the IMTJ have demonstrated high interest in procuring technologies that will allow them to enhance traffic flow, increase safety and manage a number of different users within the city. These include not only private vehicles, buses and the light train but also a growing number of pedestrian and bicycle traffic. Both SEMOV and IMTJ understand that the simple expansion of infrastructure (road widening or bus exclusive lanes) is not sufficient to provide a high quality of service to traffic users and will not be able to improve traffic conditions in Guadalajara. Furthermore, existing systems such as traffic signals and vehicle detection have not been modernized in several years and provide limited capabilities to integrate modern traffic management technologies or need to be repaired or modernized in order to provide such capabilities. SEMOV and IMTJ would like to evaluate the potential modernization of the existing traffic signal technologies and the deployment of supporting ITS such as vehicle detection, system priority and surveillance systems. The proposed technical assistance will provide a plan for deployment of these technologies considering an integrated system that can result in an immediate impact to Guadalajara's traffic network as well as providing a long-term sustainable plan of action. The implementation of such plan may open additional opportunities for U.S. export potential including onboard technologies for buses, technologies to manage pedestrian and bicycle traffic, incident detection and response systems or variable message signs.

In order to assess the availability of such technologies and products in the U.S. market, the KED Group team conducted a series of discussions with U.S. suppliers to determine their interest in the potential project, their experience in the market and future prospects for procuring such technology. Overall, several of the U.S. companies contacted demonstrated the high level of interest in the project and already had experience exporting to Mexico, had strong local representation and/or distribution or stated they were interested in the market.

In the past, SEMOV has procured traffic signals using open bids – the government has a well-established supplier database and procurement program - and also through direct purchasing when the products have met required specifications or capabilities. The technologies arising from this technical assistance shall be procured in a similar manner and it is important that U.S.

companies and/or local representatives become suppliers through the state database so that they can be informed and participate on upcoming procurement notices.

Because some of these technologies are new for Guadalajara and some others would require the modernization of existing systems it is anticipated that procurement of equipment and technology will take place in a phased manner as to allow deployment throughout the eight municipalities that comprise the AMG. Therefore, it would be important for U.S. suppliers will to position themselves as early as possible so that they can take advantage of opportunities that will arise during the continuous upkeep and ongoing modernization and replacement of systems and technologies, especially considering that SEMOV is likely to procure were solutions that can be easily integrated and that are complementary to existing or newly established systems.

The following tables provide a breakdown of potential U.S. exports, including unit costs, number of anticipated units when applicable and total costs for the Periférico Improvement Project and considering a long-term, 20-year horizon scenario. Please note that the tables detail the number of intersections that are expected to be modernized or that need a full installation. For purposes of the U.S. export potential we have assumed that at least 70 of the existing currently signalized intersections need to be modernized (in fact these are not synchronized at the moment). There are an additional 10 intersections that are not currently signalized but would likely have to be. Furthermore, our export potential estimate considers the implementation of the Peribus and the number of expected stations (188) and buses (114). These are based on preliminary studies conducted by the IMTJ.

U.S. Export Potential – Periférico Improvement Project

	Description	Unit Cost	Qty	Total Cost	Notes
Traffic Signals	Upgrade Existing Signal Heads	\$ 1,725.00	3150	\$ 5,433,750.00	Assumes an average of six signal heads per intersection
	Upgrade Existing Signal Controllers	\$ 5,750.00	315	\$ 1,811,250.00	Assumes 60% of controllers to be upgraded.
	Upgrade Existing Signal Cabinets	\$ 9,200.00	210	\$ 1,932,000.00	Standard cabinet installation. Assumes 40% of cabinets to be upgraded.
	Install New Signal Heads	\$ 1,725.00	300	\$ 517,500.00	Assumes 50 new signalized intersections.
	Install New Controllers	\$ 5,750.00	50	\$ 287,500.00	Assumes 50 new signalized intersections.
	Install New Cabinets	\$ 9,200.00	50	\$ 460,000.00	Assumes 50 new signalized intersections.
	Install New Vehicle Detection	\$ 25,000.00	460	\$ 11,500,000.00	Inductive loop or equivalent detection on all approaches for 80% of intersections.
	Install Bus/EV Preemption	\$ 5,200.00	50	\$ 260,000.00	(1) per intersection in 50

	Install Intersection Communications	\$ 4,800.00	575	\$ 2,760,000.00	intersections. Assumes wireless point-to-point communication.
ITS	Dynamic Message Signs (DMS)	\$ 85,000.00	24	\$ 2,040,000.00	(1) sign in each direction every 10 kms.
	Install High Mast Color CCTV	\$ 57,500.00	12	\$ 690,000.00	(1) camera every two kms along major corridors.
	TMC Upgrades	\$ 1,200,000.00	LS	\$ 1,200,000.00	Necessary for control of signs, DMS, signals
Total				\$28,892,000	

*Assumes improvements in 72 additional critical intersections located at Av. Adolfo Lopez Mateos (3.23 km), Circunvalacion Jorge Alvarez del Castillo (0.56 km), Circunvalacion Division del Norte (1.32 km), Lazaro Cardenas (3.67 km), Av. Vallarta (4.24 km), and Calz. Independencia (2.40 km), Av. Colon (2.93 km), Av. Federalismo (2.41 km), Av. De los Maestros (1.39 km), Av. Alcalde (1.72 km), Av. 16 de Septiembre (0.69 km), Prol. Mariano Otero (2.46 km), Av. Acueducto (2.35 km), Av. Americas (1.75 km), Av. Manuel Avila Camacho (1.53 km), and Av. Guadalupe (1.74 km).

U.S. Export Potential (Long-Term Deployment in AMG)

	Description	Unit Cost	Qty	Total Cost	Notes
Traffic Signals	Upgrade Existing Signal Heads	\$ 1,725.00	11,256	\$ 19,416,600.00	Assumes an average of 6 signal heads per intersection
	Upgrade Existing Signal Controllers	\$ 5,750.00	1,126	\$ 6,472,200.00	Assumes 60% of controllers to be upgraded
	Upgrade Existing Signal Cabinets	\$ 9,200.00	750	\$ 6,903,680.00	Assumes 40% of cabinets to be upgraded
	Install New Signal Heads	\$ 1,725.00	300	\$ 517,500.00	Assumes 50 new signalized intersections
	Install New Controllers	\$ 5,750.00	50	\$ 287,500.00	Assumes 50 new signalized intersections
	Install New Cabinets	\$ 9,200.00	50	\$ 460,000.00	Assumes 50 new signalized intersections
	Install New Vehicle Detection	\$ 25,000.00	1,541	\$ 38,520,000.00	Assumes 80% of intersections to receive vehicle detection
	Install Bus/EV Preemption	\$ 5,200.00	482	\$ 2,503,800.00	Assumes 25% of intersections to receive preemption
	Install Intersection Communications	\$ 5,200.00	1,926	\$ 10,015,200.00	Assumes wireless point-to-point communication
ITS	Dynamic Message Signs (DMS)	\$ 85,000.00	54	\$ 4,590,000.00	(1) sign in each direction every 10 km along major corridors
	Install High Mast Color CCTV	\$ 57,500.00	135	\$ 7,762,500.00	(1) camera every 2 kms along major corridors
	TMC Upgrades	\$ 1,250,000.00	LS	\$ 1,250,000.00	Necessary for control of signs, DMS, signals
Transit	Bus Dashboard Cameras	\$ 5,000.00	114	\$ 570,000.00	For Peribus Project
	On-Board Automated Fare Collection	\$ 1,500.00	114	\$ 171,000.00	For Peribus Project

Bus Station CCTV Security System	\$ 25,000.00	188	\$ 4,700,000.00	For Peribus Project
Automated Fare Card Distribution	\$ 3,000.00	188	\$ 564,000.00	For Peribus Project
MacroBus Control Center Upgrades	\$ 375,000.00	LS	\$ 375,000.00	For Peribus Project
Total			\$ 105,078,980	

U.S. suppliers and service providers have several competitive advantages over foreign competitors some of which will be discussed in the next section of this report. It is important to mention that a national ITS Architecture Plan issued in 2004 by the Mexican Secretary of Communications and Transportation (SCT) and the Mexican Transportation Institute (ITM) defines the overall ITS system architecture that should be deployed in Mexico and has used several examples particularly those of U.S. cities such as Dallas, Chicago, New York and Los Angeles. The SEMOV and IMTJ have both indicated that they believe that the U.S. has much experience and expertise to offer in the areas of traffic and ITS deployment.

G. Foreign Competition

The KED Group team also conducted an assessment of foreign competition for those systems, technologies and services that may provide export opportunities. In developing such analysis, our team considered (a) the origin of existing technologies, (b) the compatibility of foreign products and technologies with existing and planned ones, (c) past procurement practices, (d) foreign product availability, characteristics and capabilities. Furthermore, our analysis gave consideration to specific risk factors such as local presence of foreign competitors, existing distribution channels, technology, pricing and participation of foreign companies in equipment specification and procurement.

The procurement of services, technologies and equipment associated with this technical assistance is expected be conducted by the SEMOV, which is a state agency and therefore has to follow procurement procedures and regulations as required by the state. As noted earlier most procurement will take place through an open bid in which all suppliers can participate when their products meet the specifications required. Therefore, it is anticipated that procurement opportunities will be readily available for foreign competitors including local companies and European providers.

It is important to note that for some technologies local competition will be limited; however, there is a strong presence of local competitors to provide subsystems and parts such as signal heads, signs, connectors, arms and masts and associated construction services. It is likely that local companies will have a pricing advantage to provide these products. On the other hand, local competition may be limited for those items such as traffic signal controllers, vehicle detection systems, communication systems and software. U.S. companies are likely to have competitive advantages for these products as they are widely available in the United States. More complex ITS products that may be required for integration of the systems in the future will also be readily

available from U.S. sources. However, similar technologies and services are used throughout Europe and Asia successfully and it is anticipated that European and Asian companies will compete with U.S. providers.

Our site visits indicate that in Guadalajara a number of different technologies from different origins are used to provide different capabilities. While traffic signals are a combination of U.S. and local sources, other elements such as the traffic timing software is of European origin (Spanish). In the light train systems, for instance, there is a strong presence from Siemens (trains, traffic control) as well as Korean companies that provide electronic collection systems. It is unlikely that the latter can be sourced by U.S. companies as electronic collection is currently a concession to a Korean provider which is responsible for procurement of all equipment and technologies associated with the system.

Pricing is another factor that can affect the procurement of U.S. products; local companies have a pricing advantage over U.S. and European counterparts. U.S. products tend in general to be more costly due to high reliability, higher quality and more stringent standards. However, transportation costs tend to be lower and U.S. companies have easy access to Mexican officials as required. Further, U.S. products are well-regarded for their high quality and in the case of Mexico key U.S. suppliers have been able to already establish representation or distribution channels which will open opportunities for these companies to be informed regarding upcoming procurements and to participate in them. For U.S. companies it is important to ensure that local representatives have full knowledge of product characteristics or capabilities especially if these applications have not yet been widely implemented in Mexico. It is recommended that U.S. companies consider full training of local representatives and distributors in order to achieve maximum marketing results.

H. Impact on the Environment

Road transportation is a significant source of air pollution worldwide. Increases in vehicle traffic during the last few decades has resulted in a higher number of emissions of sulphur dioxide, carbon dioxide, carbon monoxide, nitrogen oxides, volatile organic carbons, particulate matter and other pollutants. ITS applications can address the issue of air pollution by mitigating specific traffic issues such as road congestion, vehicle speed control, acceleration/deceleration, traffic flow, travel distance and reduction of number of vehicles on roads resulting in decreased emissions. Traffic signal control can play a role by avoiding unnecessary display of red signals on priority lanes, allowing the intersection to work at maximum efficiency. As such, it is anticipated that the implementation of traffic control and ITS systems will provide several environmental benefits that can be achieved by decreasing traffic congestion, reducing travel time, enhancing road safety and improving mobility.

High emissions occur during power enrichment (acceleration) and power motoring (deceleration) of vehicles. During acceleration, the enrichment of the engine's fuel-air mixture achieves maximum engine power and creates high levels of unburned hydrocarbons and carbon monoxide that in turn result in high vehicle emissions. Similarly, poor combustion caused

during rapid deceleration results in high emissions of unburned hydrocarbons and carbon monoxide. Rapid acceleration and deceleration are contingent upon traffic flow conditions. Vehicles operating in unsteady traffic are more likely to experience numerous power enrichment and motoring events which will ultimately lead to high levels of emissions under stop-and-go or other variable speed conditions. Therefore, ITS applications that increase the smoothness of traffic flow and decrease the variability of traffic flow conditions will decrease potential emissions and pollution.

The use of traffic signal timing and ITS technologies will also provide the benefit of reduced energy use. As traffic flows more smoothly and accelerations and decelerations are minimized not only the number of emissions decreased but also less fuel is consumed by vehicles, buses, trains and motorcycles. This decrease in energy use provides environmental benefits but also monetary benefits to users.

Expected environmental benefits that may be result from the proposed project include:

- Emission reductions from reduced congestion in smaller traffic flows by applying the traffic signal timing and synchronization, and priority service to buses.
- Emission reductions achieved through enhanced signage and user information tools such as monitors and displays that could assist in rerouting or promoting the use faster routes.
- By providing priority to buses and other public transportation means users may be encouraged to use these public transportation systems in lieu of private vehicles, thus decreasing the impacts associated with a growing number of private vehicle use.
- Improved fleet operations (through priority lanes, signal timing, user information, CCTV surveillance) may reduced the number of vehicles required for service and thus decrease emissions and energy consumption.

At the same time, it is important to keep in mind the decreasing traffic congestion can also result in an increased number of trips and thus it becomes crucial to address medium to short-term impacts of any benefits gained. The proposed technical assistance requires the contractor to address these issues and to identify not only be beneficial but also negative impacts to the environment.

I. Impact on U.S. Labor

It is KED's opinion that the Project will not cause any dislocation of U.S. jobs. It is not expected to provide any incentive to induce a business enterprise currently located in the U.S. to relocate in Mexico or another foreign country; contribute to the violation of internationally recognized workers' rights; or contribute to the production of any commodity that is in surplus in the global markets.

J. Developmental Impacts

KED Group has conducted an assessment of developmental impacts associated with the project based on USTDA's parameters for infrastructure, human capacity building, technology transfer and productivity and spin off benefits of the project.

J.1 Infrastructure

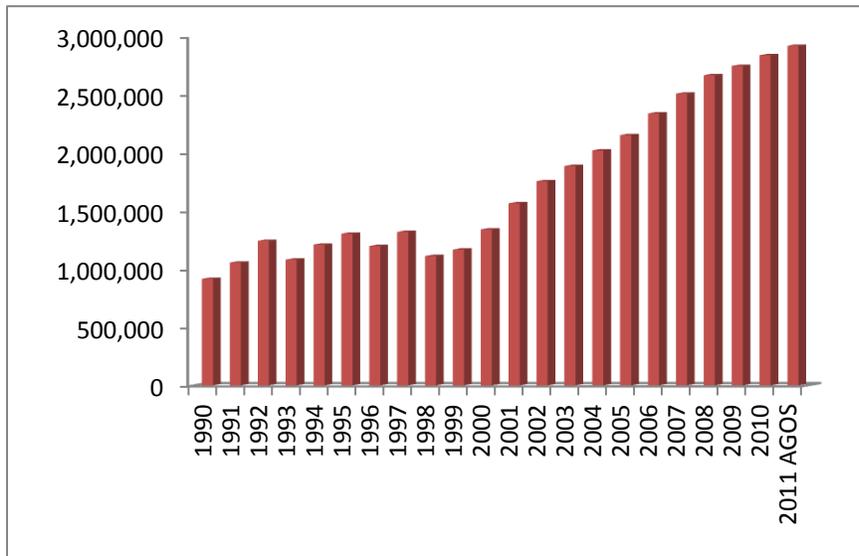
The implementation of the project will require enhancements in the city's transportation infrastructure, specifically geometric improvements at critical intersections, road signage, and infrastructure related to the installation or upgrade of traffic signals. The proposed technical assistance requires the analysis of about 80 intersections at which geometric improvements such as road widening, changes in turning lane or turning radius may be required. Another important aspect of technical assistance is establishment of standards for road signage which will be later use to install new signs throughout the city and the metropolitan area. Finally, infrastructure improvements will be required in order to upgrade or modernize traffic lights including new masts/arms, installation of cabinets and controllers and communications infrastructure (potentially fiber optic).

Furthermore, the implementation of these technologies may actually optimize the use of existing infrastructure without requiring the construction of new roads to alleviate traffic congestion. As in the case of Guadalajara, growing cities throughout the world are experiencing high degrees of traffic congestion in the urban areas. Transportation officials in Mexico understand that the simple construction of new roads or lanes without the optimal use of the existing network cannot solve these growing traffic issues. As such, they use an application of modern traffic signal technologies, vehicle detection, priority lanes and adequate signage will have an impact on infrastructure by enhancing its efficiency and use and reducing the high costs associated with roadway building.

J.2 Technology Transfer and Productivity

Guadalajara's vehicular fleet has increased by 4.9% (on average) during the last six years and the state of Jalisco accounts for 13% of all registered vehicles in Mexico. In addition, the city provides several other means of transportation including two (soon to be four) light train lines, a feeder bus system (Macrobus), a bus system exclusively for the city's outer ring road (Peribus), a network of buses that provide informal and irregular transportation throughout the AMG, pedestrian traffic, and a growing number of small mopeds and bicycles.

Figure 9. Vehicle Fleet Growth (Years 1990-2011)



Managing this growing and complex transportation network will require Guadalajara’s officials to apply the most modern technologies in order to increase productivity and safety. As noted earlier, some of these technologies may even be new or provide new capabilities. There are several ways in which the implementation of such technologies will enhance productivity:

- Traffic flow can be improved through the application of signal timing and synchronization, the surveillance of traffic (through CCTV cameras for example), applying adaptive traffic management systems, providing priority flow of mass transportation systems and emergency vehicles. Furthermore, traffic flow may also be improved as more efficient signage is used throughout AMG providing users with information regarding alternate routes, allowable use of lanes, traffic regulations (e.g., movement of cargo traffic). The use of dynamic message boards can also reduce delays and provide a smoother traffic flow as users are better informed regarding potential incidents, congestion areas and upcoming delays. AMG's average speed during peak hours at major corridors (especially those around the city center) is between 21 and 40 km/h.
- Traffic safety can be enhanced by enabling police, local authorities and public transport operators to share information and creating an integrated and more efficient transport system that can better respond to incidents and accidents (for example by providing priority lanes to emergency vehicles). Traffic safety can also be enhanced by providing adequate signage, markings and the time needed for pedestrians and bicycle drivers to cross intersections as needed. Other tools such as CCTVs can deter vehicle drivers from speeding, stop/use pedestrian crossing areas or commit other infractions.

- Travel times and delays may be reduced by updating signal timings and synchronizations. According to the Department of Transportation, outdated traffic signal timing account for more than 10% of all traffic delay and congestion on major routes. The cost of traffic congestion is \$87.2 billion in wasted fuel and lost productivity which translates to \$750 per traveler¹. It is anticipated that the average user uses between 5 and 9% of his or her time to reach his/her destination². Decreasing the number of travel delays will also enhance the quality of service to users and promote the use of mass transportation systems such as buses and the light rail once the systems can efficiently reach stations in a timely manner. It is important to note that mobility is of key importance to people with special needs, including the elderly, people with disabilities and people who live in remote areas. Better mobility improves quality of life and boosts the ability of individuals and organizations to contribute to the growth of the economy.
- Efficiencies can be gained at the traffic control centers. For instance, the use of vehicle detection devices and CCTVs may allow operators at the bus traffic center to have more accurate information regarding arrivals and departures, enhance bus schedules, reroute buses if necessary and better deal with incidents and accidents. Similarly, more modern traffic signals will increase the efficiency and productivity at the traffic signal control center by providing flexibility for rerouting traffic, change signal timing and respond to special events.

J.3 Human Capacity Building

At this time, the existing traffic signal control center is operated by 3 controllers and one supervisor. It is important to note that these controllers only handle the management of traffic signals at the city center, specifically those that are linked to the control center and not those that are controlled remotely. The other two, the one for the Macrobus and the one for the light rail, and staff with two controllers and one supervisor each. The implementation of the results from the technical assistance will enhance the human capacity of traffic and transportation officials as they apply and use modern technologies for traffic management. Because it is anticipated that the systems will be upgraded and that new systems will be installed the project may require the hiring of additional maintenance staff. Commonly one maintenance engineer is required to operate between 30 and 40 traffic lights. Assuming that 280 (70 intersections with 4 traffic lights each) of new traffic lights will be required the project may create approximately 7-10 new positions for traffic light maintenance and repair.

¹ Retrieved from <https://www.fhwa.dot.gov/everydaycounts/technology/adsc/>.

² Evaluacion Costo Beneficio del Libramiento Interior Inglaterra en Guadalajara.

K. Justification

KED Group recommends the funding of this activity based on the following:

- Priority given by the grantee – Both SEMOV and IMTJ have indicated that improving traffic conditions and alleviating traffic congestion in AMG is a top priority of this government, not only for these two institutions but also for state officials that has identified traffic and transportation as the second most important issue faced by the state to enhance quality of life and economic growth.
- During our initial project discussions, SEMOV and IMTJ highlighted the importance of developing a project that can have some immediate impact in AMG traffic conditions while providing a platform for sustainable long-term growth. The proposed technical assistance will address this concern by providing them with a pilot project that can be used for modernizing and upgrading systems throughout AMG in the future. Another issue that concerned SEMOV and IMTJ was safety. This project can result in enhanced safety for pedestrians and public transportation users.
- The project will provide over \$28 million in the short-term and more than \$100 million during full project implementation in U.S. export potential opportunities. U.S. companies are already active in the market or perceive Mexico as a key market within the Latin American region. Based on our discussions and meetings, it is anticipated that a number of U.S. companies will be interested in providing products and services to SEMOV and IMTJ. U.S. companies are well-positioned to local representation and distribution, low transportation costs and reputation for high quality.
- This project will have significant developmental impacts and potentially will provide environmental benefits. This would include:
 - Reduced emissions and fuel use.
 - Improvement in traffic flow for private vehicle owners and public transport operators.
 - Enhanced quality of service (reliability, timeliness, frequency) for transportation users.
 - Optimal use of existing infrastructure.
 - Application of modern technologies.
 - Enhanced respond to incidents and accidents.
 - Improved safety and control of traffic infractions.
 - Human capacity building in modern traffic management technologies.
 - Potential for new jobs in areas such as traffic signal maintenance.

L. Qualifications

The objective of the proposed technical assistance is to develop an implementation plan and to conduct a pilot project for modernizing and upgrading traffic signals, signage and certain ITS applications throughout the eight municipalities that comprise the AMG. It is anticipated that through the deployment of these technologies traffic conditions are improved, providing smoother traffic flow, decreased congestion, better management of public transport systems, in a higher quality of service to users including pedestrians, private vehicle owners, bus system operators, public transportation users and other stakeholders. Furthermore, the implementation of such technologies may also result in a decrease in accidents and enhanced safety.

As such, the selected contractor should have strong experience in traffic management, traffic signalization, ITS deployment and public transport systems. Because of the unique characteristics of AMG experience within the region and particularly in Mexico is highly recommended.

Technical Experience (40 pts)

- Experience conducting traffic signalization projects, including the planning, design and implementation of modern traffic signal technologies, adaptive traffic signal control, traffic signal timing and synchronization and traffic signal priority controls.
- Experience in the planning, design and construction management of roadway infrastructure, with particular experience in the urban areas.
- Experience in preparing standards and specifications for traffic technologies and products.
- Knowledge of signage and pavement marking standards (MUTCD) and capacity to adapt such standards to local conditions and requirements. Experience working in the planning design and installation of signage projects.
- Experience with ITS and traffic technologies including, but not limited to, dynamic message signs, CCTV, electronic fare collection, traffic signal priority controls, incident detection systems, vehicle detection systems, plate recognition systems, induced loops, weigh-in motion systems.
- Experience in ITS design and integration. Capacity to provide recommendations as to the optimal ITS technologies given local conditions and capacity to develop product specifications.
- Previous experience conducting pilot projects that required the planning, design and construction management of traffic system modernizations and upgrades.

Financial Experience (20 pts)

- Specific experience conducting socioeconomic and financial analyses for the implementation of traffic modernization projects with particular experience with ITS systems.
- Capacity to prepare capital investment programs and financial models.

- Experience working with financing institutions including development banks, multilaterals, technical cooperation programs and the U.S. Ex-Im Bank. Experience conducting due diligence for the financing of traffic and transportation projects. Capacity to provide recommendations regarding financing sources and terms.
- Experience working in projects that involve public-private sector partnerships and private sector participation. Experience conducting due diligence for private sector involvement in traffic and transportation projects.

Regional Experience (10 pts)

- Previous experience working in traffic and transportation projects in Latin America particularly in Mexico.
- The contractor should have completed at least five similar projects within the region including projects pertaining to traffic signal modernization, ITS implementation, and public transport.
- Preferably knowledge and previous experience working with Mexican state institutions.

Work Plan and Methodology (30 pts)

Adequacy of the proposed work plan and suggested overall approach in responding to the Terms of Reference. Soundness and thoroughness of the technical approach and work plan sections of the proposal, and overall quality of proposal presentation will be evaluated. The proposal should also provide an organization chart of key personnel with their qualifications, and a staffing schedule for each key activity.

M. Terms of Reference**Objective**

The objective of the technical assistance (“TA”) for the Guadalajara Traffic Control Modernization Project (“Project”) is to modernize the traffic control technologies and related intelligent transportation system (“ITS”) technologies for surface transportation in the Guadalajara metropolitan area. The TA will allow the Instituto de Movilidad y Transporte del Estado de Jalisco (“Grantee”) to harmonize traffic control standards and modernize traffic signalization, signage, and ITS deployments in the Guadalajara Metropolitan Area, as well as initiate a pilot deployment on traffic control improvements along the city’s outer perimeter loop road (the “Periferico”).

Activities**Task 1: Project Kick-Off and Review of Existing Information**

The Contractor shall:

- 1.1 Conduct a two-day kick-off meeting with officials from the Government of the State of Jalisco, including, but not limited to, the Grantee, the Secretariat of Mobility, the Fideicomiso para el Desarrollo Urbano de Jalisco (“FIDEUR”), and the Sistema de Tren Eléctrico Urbano (“SITEUR”) to identify objectives related to traffic operations and control in the eight (8) municipalities of the Guadalajara Metropolitan Area.
- 1.2 Gather and review previous traffic and transportation studies completed by the Government of the State of Jalisco and the eight (8) municipalities of the Guadalajara Metropolitan Area.
- 1.3 Collect and review previous studies (e.g. demand, station designs, implementation plans) conducted by the Grantee and other pertinent stakeholders regarding the proposed bus system (the “Peribus”) to be implemented on the Periferico.
- 1.4 Conduct a general review of existing ITS architecture, traffic signal, signage, and pavement marking standards and practices. This review shall include both existing documents and representative field installations.
- 1.5 Identify all existing equipment and technology currently in use at the traffic control center and at the Periferico intersections. At a minimum, the Contractor shall review the following:
 - Software and hardware used in traffic signal cabinets;
 - Vehicle detection;
 - Communication systems for signals and other ITS devices;
 - Video cameras (closed-circuit television, “CCTV”) for monitoring traffic; and
 - Dynamic Message Signs (“DMS”).
- 1.6 Conduct a general review of existing intersection geometries and design standards utilized throughout the Guadalajara Metropolitan Area, specifically along the Periferico.
- 1.7 Conduct a general review of existing traffic signal design practices and specifications, specifically along the Periferico.
- 1.8 Identify the most common intersection geometric configurations that exist along the Periferico that will serve as the basis for the typical intersection designs.
- 1.9 Conduct a general review of existing signal timing practices, specifically along the Periferico.
- 1.10 Conduct a general review of the existing traffic control center hardware, software, and communications infrastructure, specifically for the Periferico.

The data gathering process in Subtasks 1.2 to 1.9 shall take place through site visits conducted by the Contractor that are anticipated to take two (2) weeks to complete.

Interim Deliverable #1 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 1.

Task 2: Assess Current Traffic Control Conditions

Based on the initial meetings and site visits conducted in Task 1, the Contractor shall evaluate the current state of traffic control practices, infrastructure, and technology in general throughout the Guadalajara Metropolitan Area and in particular along the Periferico, as follows:

- 2.1 Identify any major deficiencies pertaining to signage and pavement marking, considering regulatory, warning, and guide signs, as well as lane markings and painted curbs. Determine if existing signage and marking practices comply with the U.S. Manual of Uniform Traffic Control Devices (“MUTCD”) and identify major areas that need to be addressed in order to achieve compliance. [Note: This is not intended to be a detailed audit of the entire system identifying specific problem locations, but rather a general compliance review.]
- 2.2 Conduct an initial evaluation of traffic signal technology and controls, including types of signal controllers, vehicle detection technology, signal timing practices, communications systems, and software. Specifically address whether the existing infrastructure can be upgraded to accommodate vehicle detection (if none present), bus priority, coordinated timing plans by time of day and day of week, traffic responsive or adaptive control, and centralized management. Address whether existing technologies can be upgraded to improve vehicle traffic flow in the Guadalajara Metropolitan Area.
- 2.3 Conduct an initial evaluation of the traffic control center to determine its level of control over the traffic signal system and existing ITS devices. Specifically address whether the existing traffic control center software, hardware, and communications infrastructure will be compatible with traffic signal and ITS device upgrades or expansions that will be designed within this TA.
- 2.4 Conduct an initial evaluation of the existing ITS devices (video cameras, DMS, etc.) and associated communication mechanisms to assess their scalability and compatibility with U.S. ITS communication protocol standards. Specifically address their current level of integration with the traffic control center and their compatibility with potential traffic control center upgrades.
- 2.5 Conduct a one-day meeting with the Grantee to discuss initial findings of the TA.

Interim Deliverable #2 – The Contractor shall prepare a detailed written two-volume report describing the work performed and findings from Task 2. Volume 1 of the report shall contain a diagnostic of existing conditions for signage, pavement markings, and traffic signalization systems throughout the Guadalajara Metropolitan Area. Volume 2 of the report shall contain a diagnostic of existing conditions for signage, pavement markings, traffic signalization, traffic control center hardware and software, and ITS devices along the Periferico.

Task 3: Develop Traffic Control and ITS Standards, Practices, and Specifications

Based on the review and evaluation of the existing standards and practices currently in use and on discussions with the Grantee, the Contractor shall develop a new set of Traffic Control and ITS Standards and Specifications for the State of Jalisco to be adopted and utilized in the Guadalajara Metropolitan Area. Each subtask below will result in a separate standard. The new standards and specifications will explicitly address the following aspects and develop a separate standard for each of the following traffic control aspects, as follows:

- 3.1 Review all traffic control standards and specifications currently in use in the State of Jalisco and the eight (8) municipalities of the Guadalajara Metropolitan Area.
- 3.2 Compare existing standards with the MUTCD and other relevant specifications for traffic control equipment and ITS devices, pavement markings, signage, and on-street parking.
- 3.3 Develop a standard for traffic control, traffic signalization, and ITS that covers the following aspects, at a minimum:
 - Traffic Signals
 1. Traffic signal cabinetry and internal wiring, including power and surge protection;
 2. Traffic signal controller functionality to provide for centralized management, bus priority control, and vehicle detection;
 3. Bus priority control detection and functionality, including controller parameters;
 4. Vehicle detection installation and functionality, including controller parameters;
 5. Basic traffic signal timing guidelines that address the determination of minimum green time, yellow time, all-red time, pedestrian walk time, pedestrian clearance time, vehicle extension time, and maximum green time;
 6. Intersection-to-intersection communication system performance and functionality; and
 7. Intersection-to-server communication mechanism that complies with previously identified ITS communication standards.
 - Dynamic Message Signs

1. Communication mechanism and protocol that complies with previously identified ITS communication standards, which allows for remote management and configuration of DMS from the traffic control center;
 2. Support pole and foundation;
 3. Mounting height;
 4. Sign dimensions;
 5. Text dimensions, number of lines, and brightness;
 6. Cabinetry and wiring, including power and surge protection; and
 7. Maintenance accessibility.
- Closed-Circuit Television
 1. Communication mechanism and protocol that complies with previously identified ITS communication standards, which allows for remote pan/tilt/zoom control and viewing of CCTV from the traffic control center;
 2. Support pole and foundation;
 3. Mounting height;
 4. Camera zoom and resolution;
 5. Video compression and format;
 6. Cabinetry and wiring, including power and surge protection; and
 7. Maintenance accessibility, such as a lowering device.
 - Traffic Control Center
 1. ITS communication protocols; and
 2. Software and hardware requirements to remotely control and manage traffic signal systems, DMS, and CCTV.
- 3.4 Develop a procedure for the determination and justification of new traffic control signals at intersections. The procedure shall be developed utilizing the procedure contained in the MUTCD and shall include the following, at a minimum:
- Engineering study requirements; and
 - Development and analysis of signal warrants, including:
 1. Eight-hour vehicular volume;
 2. Four-hour vehicular volume;
 3. Peak hour volume;
 4. Pedestrian volume;
 5. School crossings;
 6. Coordinated signal system;
 7. Crash experience; and
 8. Roadway network.

- 3.5 Develop a road classification system, similar to what is used in the United States, to be used in the Guadalajara Metropolitan Area for the classification of roads. The road classification system shall include the development of criteria and definitions by road function to easily classify a road in the Guadalajara Metropolitan Area into one of the road classes. The road classification system shall be developed to classify urban and rural roads by function, and each function class shall be based on the type of service the road provides to the traveling public. The function classes shall be divided into: 1) arterial roads, 2) collector roads, and 3) local roads, and standards shall be developed for each function class, including allowable lane widths, shoulder widths, turning radii, and other design and planning criteria. Prepare a checklist that allows the Grantee to clearly and easily identify and classify a road in the future.
- 3.6 Develop a standard for pavement markings that covers the following aspects, at a minimum:
- Appropriate use;
 - Installation location guidelines;
 - Design/appearance;
 - Dimensions;
 - Material type; and
 - Installation procedures.
- 3.7 Develop a standard for signing that covers the following aspects, at a minimum:
- Appropriate use;
 - Installation location guidelines;
 - Design/appearance;
 - Dimensions;
 - Lateral offset;
 - Mounting height;
 - Material type and retroreflectivity; and
 - Support and foundation.
- 3.8 Develop a standard for on-street parking that covers the following aspects, at a minimum:
- Appropriate use and type of parking allowed;
 - Recommended design and layout;
 - Dimensions; and
 - Pavement markings.

Development of the standards for pavement markings, signage, and on-street parking included in Subtasks 3.6, 3.7, and 3.8 shall include standards for each of the three (3) road classes developed in Subtask 3.5.

Interim Deliverable #3 – The Contractor shall prepare a detailed written four-volume report describing the work performed and findings from Task 3. The four (4) volumes of the report shall be as follows:

1. Traffic Signalization and ITS Standards
2. Pavement Markings Standards
3. Signage Standards
4. On-Street Parking Standards.

Task 4: Evaluate Technology Alternatives and Recommendations

The Contractor shall:

- 4.1 Evaluate traffic control center hardware, software, and communications infrastructure to determine scalability and compatibility.
- 4.2 Compare all existing technologies in use with other available technologies, including traffic signal control, vehicle signalization, vehicle detection, pedestrian detection, pedestrian signalization, emergency vehicle detection and control, bus priority detection and control, CCTV, DMS, and traffic control center software and hardware.
- 4.3 Provide recommendations regarding the specific technologies to be used for future signalization and ITS projects. The recommendations shall focus on the technology's functionality (for example, video versus inductive loop versus radar for vehicle detection) and shall be non-vendor specific. However, documented evaluations of specific vendor's products can be factored into the recommendations.
- 4.4 The Contractor shall provide a list of U.S. suppliers that provide the recommended technologies, brochures and product data, and contact information for each supplier.

Interim Deliverable #4 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 4.

Task 5: Financial Analysis and Implementation Plan

The Contractor shall:

- 5.1 Develop an overall traffic signalization and ITS deployment plan for the Guadalajara Metropolitan Area, consistent with the objectives identified in Task 1.
- 5.2 Conduct a cost-benefit analysis for recommended changes in traffic signalization systems, ITS applications, and the traffic control center, considering delay/travel time reductions, safety, and emissions and energy aspects, among others.
- 5.3 Conduct discussions and meetings with potential financing sources for the recommended improvements (for both the Project and the pilot deployment) including, but not limited to the following:

- Federal, state, and municipal funds;
 - BANOBRAS (Mexico's public works development bank) and FONADIN (Mexico's national infrastructure fund);
 - Private sector engagement opportunities; and
 - Supplier credits and commercial banking loans.
- 5.4 Conduct a working session with the Grantee to discuss the findings of the technology recommendations and the cost-benefit analysis. The result of the working session should be a list of prioritized improvement projects that can be used to develop a implementation plan in Subtasks 5.5 to 5.7. Prioritize improvement projects based on those that provide the highest benefit/cost ratio.
- 5.5 Divide the overall implementation plan into a series of smaller, logically grouped improvement projects (e.g., by technology deployment type or by region/corridor) and work with the Grantee to prioritize those projects based on local needs. The overall implementation plan shall be prioritized and divided into a short-term, medium-term, and long-term deployment plan.
- 5.6 Prepare an implementation schedule for deployment based on the improvement projects identified in Subtasks 5.4 and 5.5.
- 5.7 Based on the overall implementation plan for the Guadalajara Metropolitan Area, develop order-of-magnitude construction cost estimates for each of the improvement projects identified and divide them into cost estimates for the short-term, medium-term, and long-term deployment plans. The cost estimates shall also be divided into separate cost estimates for each of the various traffic control standards:
- Signalization and ITS (protocols, CCTV, and DMS);
 - Pavement markings;
 - Signage; and
 - On-street parking.
- 5.8 The Contractor shall prepare the construction cost estimates in a format that can be changed, modified, and manipulated by the Grantee in the future (e.g. in an Excel format).

Interim Deliverable #5 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 5.

Introductory Note on Tasks 6-12

Tasks 6-12 of the TA focus on designing a pilot deployment of traffic control and technology improvements at approximately 80 intersections along the Periferico. In these tasks, the Contractor shall plan and provide preliminary design improvements along the approximately 70

kilometer-long Periferico with approximately 70 existing signalized intersections and 10 new signalized intersections. The corridor improvements will include, but not be limited to, updated signal infrastructure, vehicle detection, bus priority control, emergency vehicle preemption, centralized traffic signal management, DMS, CCTV, pavement markings, signage, and on-street parking. The existing traffic control center in Guadalajara will be upgraded to integrate with these devices for remote control and monitoring. The Periferico is currently planned to have a preferred bus lane in each direction. The Contractor shall conduct discussions with the Grantee to address the progress of the proposed Peribus project, including the scope, implementation schedule, station designs, and anticipated traffic demand. Transit improvements to be designed include surveillance and automated fare card distribution at the planned Peribus stations, and on-board automated fare collection and dashboard cameras to capture passenger cars violating the preferred bus lane policies.

Task 6: Develop Existing Traffic Model and Simulation for Pilot Deployment

The Contractor shall:

- 6.1 Gather and review existing traffic data from the Government of the State of Jalisco and the five (5) municipalities along the Periferico route, including intersection turning movement counts, mid-block traffic flows (volume and speed), vehicle classification counts (bikes, motorcycles, autos, single-unit trucks, combination trucks, buses), pedestrian counts, and collision data (crash reports that could yield information about specific safety problems).
- 6.2 Based on the availability of traffic data and recent traffic statistics for the Periferico and immediate vicinity, conduct additional traffic counts to supplement available data along the pilot deployment corridor.
- 6.3 Conduct travel time and delay studies (morning, mid-day, and afternoon peaks) for the major movements along the Periferico.
- 6.4 Develop a microscopic simulation model for the Periferico using a software package that allows for both the optimization and evaluation of existing signalized corridor performance.
- 6.5 Implement the existing signal control parameters in the model and quantify the existing performance (e.g., vehicle delay, travel time, average speed) along the Periferico, which will serve as the baseline in order to quantify the operational benefits of the pilot deployment.
- 6.6 Based on data collected and other economic and growth characteristics of the Guadalajara Metropolitan Area, forecast the 20-year traffic demand along the Periferico and configure these volumes in the model for use in Task 7.

Interim Deliverable #6 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 6.

Task 7: Identify Geometry, Capacity, and Safety Improvements for Pilot Deployment

The Contractor shall:

- 7.1 Based on the existing conditions derived from the model and field observations, develop new traffic signal strategies to maximize system performance (e.g., signal timings, detection, traffic responsive control, adaptive control).
- 7.2 Configure these improvements in the model developed in Task 6 and quantify the expected benefits of deploying signal system improvements. [Note: The recommendations from this subtask could be implemented independent of any capacity and safety improvements.]
- 7.3 Based on the existing conditions, 20-year projected conditions, field observations, and other planned improvements, identify capacity improvements necessary to maximize system performance (e.g., addition of auxiliary turn lanes, etc.)
- 7.4 Configure these capacity improvements in the 20-year projected model, along with any associated traffic signal strategies, and quantify the expected benefits of these capacity improvements.
- 7.5 Based on a review of existing geometric conditions, identify general geometric improvements to improve traffic flow (e.g., edge of pavement geometry, turning radii, etc.).
- 7.6 Based on a review of available crash data and discussion with local officials, identify modifications to improve vehicle, pedestrian, and cyclist safety (e.g., sight distance improvements, pedestrian facilities, etc.).
- 7.7 If the geometric and safety improvements are likely to affect capacity, incorporate those changes into the 20-year projected model from Subtask 7.4 and quantify the expected benefits.

Interim Deliverable #7 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 7.

Task 8: Design Signalized Intersection Improvements for Pilot Deployment

The Contractor shall produce 3-4 typical intersection designs that can be applied to the majority of the intersection layouts and configurations, rather than producing a specific design for each intersection. These designs will differ in terms of the placement of signal heads, support poles, vehicle detection, pavement markings, and other aspects that are affected by geometry and presence of minor approaches. Variations of signal control features, such as pedestrian/bicycle

movements and protected left-turn movements, can be addressed within each typical intersection design. The design shall be in accordance with the standards developed in Task 3.

The Contractor shall:

8.1 Review existing design documents, computer-aided design (“CAD”) files, surveys, and other information provided by the Grantee, and shall supplement existing documents with a field survey to capture the geometry of the defined typical intersection configurations. At a minimum, the review and supplemental field survey shall include the following:

- Shoulder-to-shoulder widths and lane widths up to 300 feet from the stop bar on the mainline approaches and 200 feet from the stop bar on the minor approaches;
- Median widths along the mainline up to 300 feet from the stop bar;
- Turning radii at the intersection;
- Location of existing signal infrastructure, specifically support poles, signal heads, signal cabinet, signage, as well as underground cabling, conduit, and junction boxes;
- Location of existing vehicle detection zones and pavement markings, particularly stop bars; and
- Location of other roadway infrastructure within the right-of-way, including lighting and signage.

8.2 Generate the typical intersection design drawings in CAD. At a minimum, the plans shall address the following aspects:

- Signal head placement and configuration;
- Signal head support and location;
- Cabinet, cabling, conduit, and junction box locations;
- Ring structure and phase assignments;
- Vehicle and pedestrian detection placement and phase assignments;
- Bus priority detection location and phase assignments;
- Pavement marking locations, particularly stop bars, lane use arrows, and crosswalks;
- Basic signal timing parameters, including minimum green time, yellow time, all-red time, pedestrian walk time, pedestrian clearance time, vehicle extension time, and maximum green time; and
- Intersection-to-intersection communications infrastructure, if necessary, based on centralized management configuration.

8.3 Generate up to three coordinated signal timing plans that correspond to the AM (morning) peak hour traffic conditions, PM (afternoon) peak hour traffic conditions, and

off-peak traffic conditions. Specific activities that need to be addressed within this task shall include the following:

- Review of existing coordinated traffic signal timing plans for subject intersections, if available;
- Evaluate traffic signal locations and identification of signal groups that should be coordinated. [Note: This subtask will affect the intersection-to-intersection communication design in Subtask 3.2, since each intersection within a coordinated system only needs to communicate with the other intersections within that system.];
- Identify existing traffic count data that can be used to model each coordinated traffic signal system for the AM peak hour, PM peak hour, and off-peak conditions;
- If necessary, collect additional traffic count data at major intersections to serve as a basis for the traffic model;
- Develop a traffic model for each coordinated signal system using software that allows the optimization and evaluation of intersection performance; and
- Develop coordinated signal timings for the AM peak, PM peak, and off-peak scenarios, which includes cycle length, phase splits, and offset values.

8.4 Identify the general location (both along the route and within the general cross-section) and number of DMS and CCTV needed along the route. The locations of the DMS shall consider the location of major access points to the roadway to provide drivers with advance information regarding route decisions, as well as periodic placement for general driver information regarding crashes and weather. The locations of the CCTV shall allow the surveillance of the majority of the route with major intersections being of particular interest.

8.5 Generate a set of standards and specifications for DMS installation and performance. At a minimum, these standards and specifications shall address the following aspects:

- Communications mechanism and protocol that complies with previously identified ITS communication standards, which allows for remote management and configuration of DMS from the traffic control center;
- Support pole and foundation;
- Mounting height;
- Sign dimensions;
- Text dimensions, number of lines, and brightness;
- Cabinetry and wiring, including power and surge protection; and
- Maintenance accessibility.

- 8.6 Generate a set of standards and specifications for CCTV installation and performance. At a minimum, these standards and specifications shall address the following aspects:
- Communication mechanism and protocol that complies with previously identified ITS communication standards, which allows for remote pan/tilt/zoom control and viewing of CCTV from the traffic control center;
 - Support pole and foundation;
 - Mounting height;
 - Camera zoom and resolution;
 - Video compression and format;
 - Cabinetry and wiring, including power and surge protection; and
 - Maintenance accessibility, such as a lowering device.

Interim Deliverable #8 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 8.

Task 9: Design Bus System Improvements for Pilot Deployment

- 9.1 The Contractor shall develop specifications for the installation and implementation of an automated fare collection system to be utilized at the bus stations for distribution of fare media and on-board each bus for the automated fare collection. The automated fare collection system shall consistently provide quick boarding of passengers while focusing the bus driver's attention on operating the bus safely. The automated fare collection system shall include development of the design and specifications for the following items:
- Bus driver console controls;
 - Bus station ticket office terminals for fare card distribution;
 - Bus station ticket vending machines for fare card distribution;
 - Bus station stand-alone ticket validator;
 - On-board ticket validator;
 - On-board automated fare collection; and
 - Back-office servers and software for management and oversight, including fare management systems, media management systems, and financial and passenger reporting systems.
- 9.2 The Contractor shall develop specifications for the installation and implementation of a security/surveillance system to be installed at each bus station.

Interim Deliverable #9 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 9.

Task 10: Traffic Control Management Center Improvements for Pilot Deployment

The Contractor shall design software and hardware upgrades for the traffic control center to communicate with the technologies that will be deployed along the Periferico. The software and hardware upgrades shall be in accordance with the standards developed in Task 3 and using the technology recommended in Task 4.

The Contractor shall:

10.1 Define the software and hardware upgrades that are necessary to facilitate the management of the traffic signal system, DMS, and CCTV, based on the specifications developed within the pilot deployment. Specific functionality shall include the following:

- Real-time monitoring of traffic signal phase status and detection status in a graphical format;
- Real-time monitoring of coordination plan settings and signal fault conditions;
- Real-time monitoring of intersection performance, which can be based on saturation levels or other measures that result from discussions with traffic control center operators;
- Upload and download of traffic signal controller database;
- Implementation of pre-programmed controller timing plan on an intersection or system level;
- Real-time monitoring of communication status of traffic signals, DMS, and CCTV;
- DMS message programming, including text configuration, duration, and sequencing for either individual DMS or groups of DMS;
- Ability to view active DMS messages;
- Archive of DMS messages by location, time, and operator;
- Pan/tilt/zoom of CCTV;
- Ability to configure and activate preset CCTV views;
- Ability to configure CCTV text overlay to indicate camera location and preset view; and
- Dynamic map that provides interface to individual traffic signals, DMS, and CCTV.

Interim Deliverable #10 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 10.

Task 11: Pilot Deployment Plan

- 11.1 The Contractor shall develop a three-phase development plan for the pilot deployment and shall develop preliminary cost estimates and a cost-benefit analysis for the three phases of development. Each phase shall include all aspects of the pilot deployment for a specified length of the Periferico corridor. The specific extents of each phase shall be determined by the Contractor in coordination with the Grantee, based on the most logical division of the pilot deployment corridor. The Contractor shall develop the three-phased pilot deployment plan in close coordination and consultation with the Grantee, as it will serve as the basis for the detailed cost estimates to be completed in Task 12.
- 11.2 The Contractor shall compile bid documents for each phase of the pilot deployment. The bid documents for each phase shall be divided into separate bid document packages for each of the various traffic control standards, as follows:
- Signalization and ITS (protocols, CCTV, and DMS);
 - Pavement markings in accordance with pavement marking standards developed in Task 3;
 - Signage in accordance with signage standards developed in Task 3; and
 - On-street parking in accordance with on-street parking standards developed in Task 3.

Interim Deliverable #11 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 11.

Task 12: Capital Investment Requirements and Financing Alternatives for Pilot Deployment

- 12.1 Based on the requirements and improvements identified for the pilot deployment, the Contractor shall generate detailed cost estimates for each phase of the pilot deployment plan developed in Task 11. The cost estimates shall include costs for each phase of the pilot deployment, including engineering and construction management, civil works, facilities construction, equipment costs, software and hardware costs, and land acquisition costs (if any). The cost estimates for each phase shall be divided into separate cost estimates for each of the various traffic control standards, as follows:
- Signalization and ITS (protocols, CCTV, and DMS);
 - Pavement markings;
 - Signage; and
 - On-street parking.
- 12.2 The Contractor shall identify potential financing sources for the pilot deployment, based on the findings of Subtask 5.3. The Contractor shall hold discussions with potential financing sources to gauge their interest in the pilot deployment.

Interim Deliverable #12 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 12.

Task 13: Preliminary Environmental Impact Assessment

The Contractor shall conduct a preliminary review of the Project's environmental impact and environmental compliance with reference to local requirements and those of multilateral development banks (such as the World Bank and Inter-American Development Bank). This review shall identify potential positive and negative impacts, discuss the extent to which negative impacts can be mitigated, and develop plans for a full environmental impact assessment in anticipation of the Project moving forward to the implementation stage.

Interim Deliverable #13 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 13.

Task 14: U.S. Sources of Supply

Based on the findings from Subtask 4.4 and in accordance with Clause I of Annex II of the Grant Agreement, the Contractor shall identify prospective U.S. suppliers of equipment and services for Project implementation. The Contractor shall estimate the potential value of U.S. exports of equipment and services and shall prepare a searchable list of U.S. suppliers that outlines prospective U.S. sources for the procurement of goods and services related to Project implementation. The list shall include business name, point of contact, address, telephone and fax numbers, e-mail address, and a general description of products and services that may be procured.

Interim Deliverable #14 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 14.

Task 15: Developmental Impact Assessment

The Contractor shall assess the developmental impacts associated with Project implementation and explain the methodology for measuring those impacts. The developmental impacts considered shall be relevant to the Project, *i.e.*, reasonably expected to flow from its implementation as outlined in the TA. Such impacts may include impacts in the following categories:

- *Infrastructure*: Potential developmental impacts in this category may include the expected infrastructure impacts of the Project, particularly in relation to traffic-related infrastructure in the Guadalajara Metropolitan Area;
- *Technology Transfer and Productivity Improvement*: Potential developmental impacts in this category may include any advanced ITS technologies that would be utilized and any efficiencies that would be gained due to traffic improvements;

- *Human Capacity Building:* Potential developmental impacts in this category may include the number and type of local positions that would be created to implement, operate, and maintain the Project, as well as any specialized training that would be required;
- *Market-Oriented Reforms:* Potential developmental impacts in this category may include any regulations, laws, or institutional changes that may be recommended, as well as their anticipated effect; and
- *Other:* Additional potential developmental impacts that may result from the Project, such as improved safety or environmental benefits.

Interim Deliverable #15 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 15.

Task 16: Final Report

The Contractor shall prepare and deliver to the Grantee and USTDA a substantive and comprehensive final report of all work performed under these Terms of Reference (“Final Report”). The Final Report shall be organized according to the above tasks, and shall include all deliverables and documents that have been provided to the Grantee. The Final Report shall be prepared in accordance with Clause I of Annex II of the Grant Agreement. The Final Report shall be prepared in English and Spanish.

Budget

TASK DESCRIPTIONS			LABOR IN PERSON DAYS							LABOR RECAP BY TASK		TRIP RECAP BY TASK	
DISCIPLINE										TOTAL	LABOR	TRIPS	TRIP
TASK	TASK NAME		Project Manager	Traffic Engineer	ITS Engineer	Transit Engineer	Financial Expert	Environmental Expert	Administrative	DAYS	COST		DAYS
1	Project Startup		12	15	11	11	7	4	4	64	\$76,950	4	60
2	Diagnostic of Conditions		4	8	7	4	0	0	2	25	\$29,900		
3	Develop ITS and Traffic Control Standards		5	25	10	15	0	0	2	57	\$69,350		
4	Evaluate Technology Alternatives		5	5	5	3	0	0	2	20	\$23,950		
5	Financial Analysis and Deployment Plan		10	15	8	7	18	0	2	60	\$73,450	4	52
6	Periferico - Existing Traffic Model and Simulation		4	17	0	0	0	0	0	21	\$26,850		
7	Periferico - Geometric, Capacity, and Safety Improvements		4	25	0	10	0	0	2	41	\$49,950	2	12
8	Periferico - Signalized Intersection Improvements		4	20	9	0	0	0	0	33	\$41,400	2	12
9	Periferico - Bus System Improvements		5	0	0	15	0	0	0	20	\$25,000		
10	Periferico - Traffic Control Center Improvements		4	2	10	2	0	0	2	20	\$23,600		
11	Periferico - Phased Deployment Plan		10	20	20	20	0	0	5	75	\$89,750	4	20
12	Periferico - Capital Investment Requirements		4	3	3	3	5	0	2	20	\$23,650		
13	Periferico - Preliminary Environmental Assessment		2	0	0	0	0	12	0	14	\$16,000		
14	Periferico - US Sources of Supply		1	1	1	0	0	0	2	5	\$4,950		
15	Periferico - Developmental Impact Assessment		2	1	1	1	0	2	1	8	\$9,200		
16	Final Report		7	5	3	3	5	5	12	40	\$41,350	3	9
LABOR IN PERSON DAYS			83	162	88	94	35	23	38	523		19	165
LABOR INCLUDING OVERHEAD & GENERAL ADMINISTRATIVE											\$625,300	Trips	Days
Daily Rate*			\$1,400	\$1,250	\$1,200	\$1,200	\$1,200	\$1,100	\$550	TOTAL LABOR COST			
TOTAL LABOR			\$116,200	\$202,500	\$105,600	\$112,800	\$42,000	\$25,300	\$20,900	\$625,300			
Other Direct Costs			Number	Unit	Cost /Unit	Totals							
Airfare			19	trips	\$625	\$11,875							
Lodging			165	days	\$161	\$26,565							
Ground Transportation			165	days	\$40	\$6,600							
Meals and Incidentals			165	days	\$79	\$13,035							
DBA and Medex Insurance						\$1,200							
Repro, courier, communication						\$1,700							
Total ODCs						\$60,975							
TOTAL PROJECT COST											\$686,275		

Note: Budget provided includes all translations and interpretations needed during the course of the study.

Budget Narrative**Travel Summary****Task 1**

The Project Manager, Traffic, ITS and Transit Engineers will be required to travel to the host country for Task 1.

Fifteen (15) days of travel time will be required for each individual.

Roundtrip Airfare: $\$625 \times 4 = \$2,500$

Lodging: $\$161 \times 15 \text{ days} \times 4 \text{ people} = \$9,660$

Per Diem: $\$79 \times 15 \text{ days} \times 4 \text{ people} = \$4,740$

Ground Transportation: $\$40 \times 15 \text{ days} \times 4 \text{ people} = \$2,400$

Task 5

The Project Manager, Traffic and ITS Engineers and the Financial Expert will be required to travel to the host country for Task 5.

Fourteen (14) days of travel time will be required for the Project Manager, Traffic and ITS Engineers. Ten (10) days of travel will be required for the Financial Expert.

Roundtrip Airfare: $\$625 \times 4 = \$2,500$

Lodging: $\$161 \times 14 \text{ days} \times 3 \text{ people} = \$6,762$

Per Diem: $\$79 \times 14 \text{ days} \times 3 \text{ people} = \$3,318$

Ground Transportation: $\$40 \times 14 \text{ days} \times 3 \text{ people} = \$1,680$

Lodging: $\$161 \times 10 \text{ days} = \$1,610$

Per Diem: $\$79 \times 10 \text{ days} = \790

Ground Transportation: $\$40 \times 10 \text{ days} = \400

Task 7

The Project Manager and Traffic Engineer will be required to travel to the host country for Task 7.

Four (4) days of travel time will be required for the Project Manager

Roundtrip Airfare: $\$625 \times 2 = 1,250$

Lodging: $\$161 \times 4 \text{ days} = \644

Per Diem: $\$79 \times 4 \text{ days} = \316

Ground Transportation: $\$40 \times 4 \text{ days} = \160

Eight (8) days of travel will be required for the Traffic Engineer

Lodging: $\$161 \times 8 \text{ days} = \$1,288$

Per Diem: $\$79 \times 8 \text{ days} = \632

Ground Transportation: $\$40 \times 8 \text{ days} = \320

Task 8

The Project Manager and Traffic Engineer will be required to travel to the host country for Task 8.

Four (4) days of travel time will be required for the Project Manager

Roundtrip Airfare: $\$625 \times 2 = 1,250$

Lodging: $\$161 \times 4 \text{ days} = \644

Per Diem: $\$79 \times 4 \text{ days} = \316

Ground Transportation: $\$40 \times 4 \text{ days} = \160

Eight (8) days of travel will be required for the Traffic Engineer

Lodging: $\$161 \times 8 \text{ days} = \$1,288$

Per Diem: $\$79 \times 8 \text{ days} = \632

Ground Transportation: $\$40 \times 8 \text{ days} = \320

Task 11

The Project Manager, Traffic, ITS and Transit Engineers will be required to travel to the host country for Task 11.

Five (5) days of travel time will be required for each individual.

Roundtrip Airfare: $\$625 \times 4 = \$2,500$

Lodging: $\$161 \times 5 \text{ days} \times 4 \text{ people} = \$3,220$

Per Diem: $\$79 \times 5 \text{ days} \times 4 \text{ people} = \$1,580$

Ground Transportation: $\$40 \times 5 \text{ days} \times 4 \text{ people} = \800

Task 12

The Project Manager, Traffic and Transit Engineers will be required to travel to the host country for Task 12.

Three (3) days of travel time will be required for each individual.

Roundtrip Airfare: $\$625 \times 3 = \$1,875$

Lodging: $\$161 \times 3 \text{ days} \times 3 \text{ people} = \$1,449$

Per Diem: $\$79 \times 3 \text{ days} \times 3 \text{ people} = \711

Ground Transportation: $\$40 \times 3 \text{ days} \times 3 \text{ people} = \360

DIRECT LABOR

Project Manager: This individual will provide the necessary guidance and support for the successful completion of the project. The Project Manager should have at least 15 years of experience managing traffic projects, including experience related to urban traffic studies, traffic demand analysis, ITS and traffic signalization. The Project Manager should be fluent in Spanish and have at least 5 years of experience working internationally, preferably in Latin America.

Traffic Engineer: This individual should have at least 10 years of experience in traffic engineering of large signalization projects with a strong background in signal timing, vehicle detection, communications and new technologies in signalization. He/she will be responsible for developing new signalization standards for the State of Jalisco as well as developing a phased development plan for signalization improvements for the AMG. The Traffic Engineer should be fluent in Spanish with experience working in international projects, particularly in Latin America.

ITS Engineer: This individual will work under the supervision of the Project Manager. He/she should have at least 10 years of experience as an ITS Engineer. He/she should have at least 5 years of recent experience in ITS projects that include Dynamic Message Signs and CCTV. The ITS Engineer should be fluent in Spanish with experience working in international projects, particularly in Latin America.

Transit Engineer: This individual will work under the supervision of the Project Manager. He/she should have at least 10 years of experience as a Transit Engineer. He/she should have at least 5 years of recent experience in transit projects that include Bus Rapid Transit projects, CCTV and fare collection systems. The Transit Engineer should be fluent in Spanish with experience working in international projects, particularly in Latin America.

Financial Expert: This individual should have at least 10 years of experience working as financial analyst or economist for traffic and transit projects. He/she will be responsible for developing a financial analysis of the proposed project and assisting with a financing plan for implementation of the project. Experience working in international projects is highly advisable.

Environmental Engineer: This individual should have experience in the preparation of environmental impact analysis for transportation projects, preferably urban studies and traffic and transit-related projects. He/she will be responsible for conducting an environmental impact assessment for the project. Knowledge of local conditions and regulations is important.

Project Coordinator: The Project Coordinator will provide administrative support for all other personnel. It is expected that 38 days will be required at a daily rate of \$450.

A N N E X 3

USTDA NATIONALITY REQUIREMENTS



U.S. TRADE AND DEVELOPMENT AGENCY
Arlington, VA 22209-3901

NATIONALITY, SOURCE, AND ORIGIN REQUIREMENTS
[As of January 17, 2014]

The purpose of USTDA's nationality, source, and origin requirements is to ensure 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, the following provisions shall govern the delivery of goods and professional services funded by USTDA under the Grant Agreement:

- (a) the Contractor must be a U.S. firm;
- (b) the Contractor may use U.S. subcontractors without limitation;
- (c) employees of U.S. Contractor or U.S. subcontractor firms shall be U.S. citizens, non-U.S. citizens lawfully admitted for permanent residence in the United States or non-U.S. citizens lawfully admitted to work in the United States, except as provided pursuant to subpart (d) below;
- (d) up to twenty percent (20%) of the USTDA Grant amount may be used to pay for services performed by (i) Host Country subcontractors, and/or (ii) Host Country nationals who are employees of the Contractor;
- (e) a Host Country subcontractor may only be used for specific services from the Terms of Reference identified in the subcontract;
- (f) subcontractors from countries other than the United States or Host Country may not be used;
- (g) goods purchased for performance 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

(h) goods and services incidental to Study support (e.g., local lodging, food, and transportation) in Host Country are not subject to the above restrictions.

NATIONALITY:

1) Application

A U.S. firm that submits a proposal must meet USTDA's nationality requirements as of the date of submission of the proposal and, if selected, must continue to meet such requirements throughout the duration of the USTDA-funded activity. These nationality provisions apply to all portions of the Terms of Reference that are funded with the USTDA grant.

2) Definitions

A "U.S. firm" is a privately owned firm that 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. citizens and/or non-U.S. citizens lawfully admitted for permanent residence in the United States, 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 that is organized in the U.S., has its principal place of business in the U.S., and is more than 50% owned by U.S. citizens and/or permanent residents, qualifies as a "U.S. firm".

A nonprofit organization, such as an educational institution, foundation, or association, also qualifies as a "U.S. firm" if it is incorporated in the U.S. and managed by a governing body, a majority of whose members are U.S. citizens and/or permanent residents.

SOURCE AND ORIGIN:

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.

Version 01.17.2014

A N N E X 4

**USTDA GRANT AGREEMENT,
INCLUDING MANDATORY CONTRACT CLAUSES**

GRANT AGREEMENT

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 the Government of the State of Jalisco, acting through the Instituto de Movilidad y Transporte del Estado de Jalisco (“Grantee”). USTDA agrees to provide the Grantee under the terms of this Grant Agreement US\$686,275 (“USTDA Grant”) to fund the cost of goods and services required for technical assistance (“TA”) on the proposed Guadalajara Traffic Control Modernization project (“Project”) in Mexico (“Host Country”).

1. USTDA Funding

The USTDA Grant to be provided under this Grant Agreement shall be used to fund the costs of a contract between the Grantee and the U.S. firm selected by the Grantee (“Contractor”) under which the Contractor will perform the TA (“Contract”). Payment to the Contractor 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 TA (“Terms of Reference”) are attached as Annex I and are hereby incorporated by reference into this Grant Agreement. The TA will examine the technical, financial, environmental, and other critical aspects of the proposed Project. The Terms of Reference for the TA shall also be included in the Contract.

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. Therefore, USTDA, the Grantee, and the Contractor shall not directly or indirectly provide, offer or promise to provide money or anything of value to any public official in violation of any United States or Host Country laws relating to corruption or bribery.

4. Grantee Responsibilities

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

5. Contract Matters and USTDA’s Rights as Financier

(A) Grantee Competitive Selection Procedures

Selection of the U.S. Contractor 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). Upon request, the Grantee will submit these contracting procedures and related documents to USTDA for information and/or approval.

(B) USTDA's Right to Approve Contractor Selection

The Grantee shall notify USTDA at the address of record set forth in Article 16 below upon selection of the Contractor to perform the TA. USTDA then shall notify the Grantee whether or not USTDA approves the Grantee's Contractor selection. Upon USTDA approval of the Grantee's Contractor selection, the Grantee shall notify in writing the U.S. firms that submitted unsuccessful proposals to perform the TA that they were not selected. The Grantee and the Contractor then shall enter into a Contract for performance of the TA.

(C) USTDA's Right to Approve Contract Between Grantee and Contractor

(1) Contract

The Grantee and the Contractor shall enter into a Contract for performance of the TA. The Grantee (or the Contractor on the Grantee's behalf) shall transmit to USTDA, at the address set forth in Article 16 below, photocopy of an English language version of the signed Contract or a final negotiated draft version of the Contract. USTDA then shall notify the Grantee and the Contractor whether or not USTDA approves the Contract.

(2) Amendments and Assignments

The Grantee or the Contractor may submit any proposed amendment to the Contract, including any proposed amendment to any annex thereto, or any proposed assignment of the Contract, to USTDA at the address set forth in Article 16 below. USTDA then shall notify the Grantee and the Contractor whether or not USTDA approves the proposed amendment or assignment.

(D) USTDA Not a Party to the Contract

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 Contract and any amendments thereto, including assignments, the selection of all contractors, the Terms of Reference, the Final Report, and any and all documents related to any Contract 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 U.S. 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 TA and shall not be construed as making USTDA a party to the Contract. 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 Contract or any subcontract, 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 Contractor, or relieve the Contractor of any liability which the Contractor 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 Contract or any subcontract thereunder must be consistent with this Grant Agreement. In the event of any inconsistency between the Grant Agreement and the Contract or any subcontract funded by the Grant Agreement, the Grant Agreement shall control.

6. Disbursement Procedures

(A) USTDA Approval of Contract Required

USTDA will make disbursements of USTDA Grant funds directly to the Contractor only after USTDA approves the Grantee's Contract with the Contractor.

(B) Contractor Invoice Requirements

The Grantee should request disbursement of funds by USTDA to the Contractor for performance of the TA by submitting invoices in accordance with the procedures set forth in the USTDA Mandatory Contract Clauses in Annex II.

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. In the event that only one signature is dated, such date shall constitute the Effective Date.

8. TA Schedule

(A) TA Completion Date

The completion date for the TA, which is December 31, 2015, is the date by which the parties estimate that the TA will have been completed.

(B) Time Limitation on Disbursement of USTDA Grant Funds

Except as USTDA may otherwise agree, (i) no USTDA funds may be disbursed under this Grant Agreement for goods and services which are provided prior to the Effective Date of the Grant Agreement; and (ii) no USTDA funds may be disbursed more than four (4) years after the Effective Date of the Grant Agreement.

9. USTDA Mandatory Contract Clauses

All contracts funded under this Grant Agreement shall include the USTDA Mandatory Contract Clauses set forth in Annex II to this Grant Agreement. All subcontracts funded or partially funded with USTDA Grant funds shall include the USTDA Mandatory Contract Clauses, except for Clauses B(1), G, H, I, and S.

10. Use of U.S. Carriers

(A) Air

Transportation by air of persons or property funded under this 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 this 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 professional services funded by USTDA under the Grant Agreement:

- (a) the Contractor must be a U.S. firm;
- (b) the Contractor may use U.S. subcontractors without limitation;
- (c) employees of U.S. Contractor or U.S. subcontractor firms shall be U.S. citizens, non-U.S. citizens lawfully admitted for permanent residence in the United States or non-U.S. citizens lawfully admitted to work in the United States, except as provided pursuant to subpart (d) below;
- (d) up to twenty percent (20%) of the USTDA Grant amount may be used to pay for services performed by (i) Host Country subcontractors, and/or (ii) Host Country nationals who are employees of the Contractor;
- (e) a Host Country subcontractor may only be used for specific services from the Terms of Reference identified in the subcontract;
- (f) subcontractors from countries other than the United States or Host Country may not be used;
- (g) goods purchased for performance of the TA and associated delivery services (e.g., international transportation and insurance) must have their nationality, source, and origin in the United States; and

(h) goods and services incidental to TA 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 this Grant Agreement shall not be used to pay any taxes, tariffs, duties, fees, or other levies imposed under laws in effect in Host Country, except for taxes of a de minimis nature imposed on local lodging, food, transportation, or airport arrivals or departures. Neither the Grantee nor the Contractor will seek reimbursement from USTDA for taxes, tariffs, duties, fees, or other levies, except for taxes of a de minimis nature referenced above.

13. USTDA Project Evaluation

The parties will cooperate to assure that the purposes of the 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. Inquiries will include, but not be limited to, whether the Final Report recommendations have been or will be used to implement the Project, anticipated Project implementation timeline, and likely source of financing. In addition, the Grantee agrees to notify USTDA any time the Grantee selects a new primary contact person for this Project during the five-year period referenced above.

14. Recordkeeping and Audit

The Grantee agrees to maintain books, records, and other documents relating to the TA and this Grant Agreement adequate to demonstrate implementation of its responsibilities under this Grant Agreement, including the selection of contractors, receipt and approval of Contract deliverables, and approval or disapproval of Contractor 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 TA and the Grant Agreement.

15. 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 the Grantee will be represented by the Director General of the Instituto de Movilidad y Transporte del Estado de Jalisco. The parties hereto may, by written notice, designate additional representatives for all purposes under this Grant Agreement.

16. 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 an electronic medium that produces a tangible record of the transmission, such as a facsimile or e-mail message, and will be deemed duly given or sent when delivered to such party at the following:

To: Instituto de Movilidad y Transporte del Estado de Jalisco
Ramón Corona 180
Col. Zapopan Centro
Zapopan, Jalisco 45100
MEXICO

Phone: +(52-33) 1377-8888
Fax: +(52-33) 1377-8888
E-Mail: mario.cordova@jalisco.gob.mx

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
E-Mail: LAC@ustda.gov

All such communications shall be in English, unless the parties otherwise agree in writing. In addition, the Grantee shall provide the Commercial or Economic 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.: 11 15/16 1001
Activity No.: 2015-51005A
Reservation No.: 2015036
Grant No.: GH201551036

17. Implementation Letters

To assist the Grantee in the implementation of the TA, USTDA may, from time to time, issue implementation letters that will provide additional information about matters covered by this Grant Agreement. USTDA may also issue implementation letters to (i) extend the estimated completion date set forth in Article 8(A) above, or (ii) change the fiscal data set forth in Article 16 above. The parties may also use jointly agreed upon implementation letters to confirm and record their mutual understanding of matters covered by this Grant Agreement.

18. Grant Agreement Amendments

Either party may submit to the other party at any time a proposed amendment to the Grant Agreement. A Grant Agreement amendment shall be effective only if it has been signed by both parties.

19. Termination Clause

Either party may terminate this Grant Agreement by giving the other party written notice thereof. The termination of the Grant Agreement will end any obligations of the parties to provide financial or other resources for the TA, except for payments that may be made pursuant to Clause H of the USTDA Mandatory Contract Clauses set forth in Annex II to this Grant Agreement. This article and Articles 5, 12, 13, 14, and 21 of the Grant Agreement shall survive termination of the Grant Agreement.

20. Non-waiver of Rights and Remedies

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

21. U.S. Technology and Equipment

By funding this TA, 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.

22. Governing Law

This Grant Agreement shall be governed by, and construed in accordance with, the applicable laws of the United States of America. In the absence of federal law, the laws of the State of New York shall apply.

23. Counterparts

This Grant Agreement may be executed in counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same agreement. Counterparts may be delivered via electronic mail or other transmission method and any counterpart so delivered shall be deemed to be valid and effective for all purposes.

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IN WITNESS WHEREOF, the Government of the United States of America and the Government of the State of Jalisco, 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: 
Susan K. Abeyta
Consul General
U.S. Consulate General Guadalajara

Date: December 18, 2014

Witness of Honor:

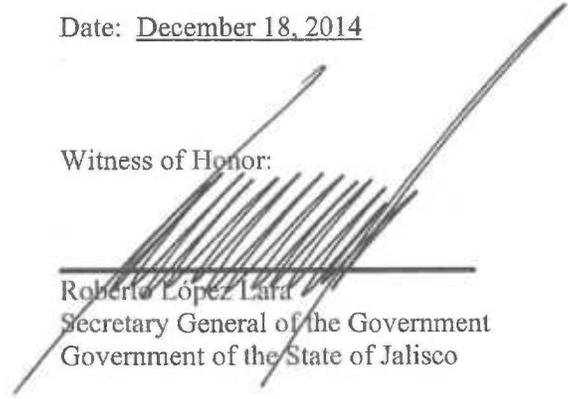

Linda Caruso
Commercial Consul
U.S. Consulate General Guadalajara

**For the Government of the
State of Jalisco**

By: 
Mauricio Gudifio Coronado
Secretary of Mobility
Government of the State of Jalisco

Date: December 18, 2014

Witness of Honor:


Roberto López Lara
Secretary General of the Government
Government of the State of Jalisco

Annex I -- Terms of Reference

Annex II -- USTDA Mandatory Contract Clauses

Annex I

Terms of Reference

Objective

The objective of the technical assistance (“TA”) for the Guadalajara Traffic Control Modernization Project (“Project”) is to modernize the traffic control technologies and related intelligent transportation system (“ITS”) technologies for surface transportation in the Guadalajara metropolitan area. The TA will allow the Instituto de Movilidad y Transporte del Estado de Jalisco (“Grantee”) to harmonize traffic control standards and modernize traffic signalization, signage, and ITS deployments in the Guadalajara Metropolitan Area, as well as initiate a pilot deployment on traffic control improvements along the city’s outer perimeter loop road (the “Periferico”).

General Considerations for Deliverables and Documents

The U.S. firm selected by the Grantee to perform the TA (“Contractor”) shall undertake a quality control review process, including a technical and editorial review, of all deliverables and documents submitted to the Grantee to ensure readability, accuracy, and consistency. All deliverables and documents shall be submitted in draft form to the Grantee for review and comment prior to finalization. The interim deliverables specified in these Terms of Reference shall serve to keep the Grantee informed about the Contractor’s work on the TA and to ensure that the Contractor’s work is performed satisfactorily, in accordance with applicable Contract provisions and the terms and conditions of the USTDA Grant Agreement (per Clause G of Annex II of the Grant Agreement). The Contractor shall submit monthly progress reports to the Grantee. All deliverables and documents shall be submitted in English and Spanish.

Activities

Task 1: Project Kick-Off and Review of Existing Information

The Contractor shall:

- 1.1 Conduct a two-day kick-off meeting with officials from the Government of the State of Jalisco, including, but not limited to, the Grantee, the Secretariat of Mobility, the Fideicomiso para el Desarrollo Urbano de Jalisco (“FIDEUR”), and the Sistema de Tren Eléctrico Urbano (“SITEUR”) to identify objectives related to traffic operations and control in the eight (8) municipalities of the Guadalajara Metropolitan Area.
- 1.2 Gather and review previous traffic and transportation studies completed by the Government of the State of Jalisco and the eight (8) municipalities of the Guadalajara Metropolitan Area.

- 1.3 Collect and review previous studies (e.g. demand, station designs, implementation plans) conducted by the Grantee and other pertinent stakeholders regarding the proposed bus system (the “Peribus”) to be implemented on the Periferico.
- 1.4 Conduct a general review of existing ITS architecture, traffic signal, signage, and pavement marking standards and practices. This review shall include both existing documents and representative field installations.
- 1.5 Identify all existing equipment and technology currently in use at the traffic control center and at the Periferico intersections. At a minimum, the Contractor shall review the following:
 - Software and hardware used in traffic signal cabinets;
 - Vehicle detection;
 - Communication systems for signals and other ITS devices;
 - Video cameras (closed-circuit television, “CCTV”) for monitoring traffic; and
 - Dynamic Message Signs (“DMS”).
- 1.6 Conduct a general review of existing intersection geometries and design standards utilized throughout the Guadalajara Metropolitan Area, specifically along the Periferico.
- 1.7 Conduct a general review of existing traffic signal design practices and specifications, specifically along the Periferico.
- 1.8 Identify the most common intersection geometric configurations that exist along the Periferico that will serve as the basis for the typical intersection designs.
- 1.9 Conduct a general review of existing signal timing practices, specifically along the Periferico.
- 1.10 Conduct a general review of the existing traffic control center hardware, software, and communications infrastructure, specifically for the Periferico.

The data gathering process in Subtasks 1.2 to 1.9 shall take place through site visits conducted by the Contractor that are anticipated to take two (2) weeks to complete.

Interim Deliverable #1 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 1.

Task 2: Assess Current Traffic Control Conditions

Based on the initial meetings and site visits conducted in Task 1, the Contractor shall evaluate the current state of traffic control practices, infrastructure, and technology in general throughout the Guadalajara Metropolitan Area and in particular along the Periferico, as follows:

- 2.1 Identify any major deficiencies pertaining to signage and pavement marking, considering regulatory, warning, and guide signs, as well as lane markings and painted curbs. Determine if existing signage and marking practices comply with the U.S. Manual of Uniform Traffic Control Devices (“MUTCD”) and identify major areas that need to be addressed in order to achieve compliance. [Note: This

is not intended to be a detailed audit of the entire system identifying specific problem locations, but rather a general compliance review.]

- 2.2 Conduct an initial evaluation of traffic signal technology and controls, including types of signal controllers, vehicle detection technology, signal timing practices, communications systems, and software. Specifically address whether the existing infrastructure can be upgraded to accommodate vehicle detection (if none present), bus priority, coordinated timing plans by time of day and day of week, traffic responsive or adaptive control, and centralized management. Address whether existing technologies can be upgraded to improve vehicle traffic flow in the Guadalajara Metropolitan Area.
- 2.3 Conduct an initial evaluation of the traffic control center to determine its level of control over the traffic signal system and existing ITS devices. Specifically address whether the existing traffic control center software, hardware, and communications infrastructure will be compatible with traffic signal and ITS device upgrades or expansions that will be designed within this TA.
- 2.4 Conduct an initial evaluation of the existing ITS devices (video cameras, DMS, etc.) and associated communication mechanisms to assess their scalability and compatibility with U.S. ITS communication protocol standards. Specifically address their current level of integration with the traffic control center and their compatibility with potential traffic control center upgrades.
- 2.5 Conduct a one-day meeting with the Grantee to discuss initial findings of the TA.

Interim Deliverable #2 – The Contractor shall prepare a detailed written two-volume report describing the work performed and findings from Task 2. Volume 1 of the report shall contain a diagnostic of existing conditions for signage, pavement markings, and traffic signalization systems throughout the Guadalajara Metropolitan Area. Volume 2 of the report shall contain a diagnostic of existing conditions for signage, pavement markings, traffic signalization, traffic control center hardware and software, and ITS devices along the Periferico.

Task 3: Develop Traffic Control and ITS Standards, Practices, and Specifications

Based on the review and evaluation of the existing standards and practices currently in use and on discussions with the Grantee, the Contractor shall develop a new set of Traffic Control and ITS Standards and Specifications for the State of Jalisco to be adopted and utilized in the Guadalajara Metropolitan Area. Each subtask below will result in a separate standard. The new standards and specifications will explicitly address the following aspects and develop a separate standard for each of the following traffic control aspects, as follows:

- 3.1 Review all traffic control standards and specifications currently in use in the State of Jalisco and the eight (8) municipalities of the Guadalajara Metropolitan Area.
- 3.2 Compare existing standards with the MUTCD and other relevant specifications for traffic control equipment and ITS devices, pavement markings, signage, and on-street parking.

- 3.3 Develop a standard for traffic control, traffic signalization, and ITS that covers the following aspects, at a minimum:
- Traffic Signals
 1. Traffic signal cabinetry and internal wiring, including power and surge protection;
 2. Traffic signal controller functionality to provide for centralized management, bus priority control, and vehicle detection;
 3. Bus priority control detection and functionality, including controller parameters;
 4. Vehicle detection installation and functionality, including controller parameters;
 5. Basic traffic signal timing guidelines that address the determination of minimum green time, yellow time, all-red time, pedestrian walk time, pedestrian clearance time, vehicle extension time, and maximum green time;
 6. Intersection-to-intersection communication system performance and functionality; and
 7. Intersection-to-server communication mechanism that complies with previously identified ITS communication standards.
 - Dynamic Message Signs
 1. Communication mechanism and protocol that complies with previously identified ITS communication standards, which allows for remote management and configuration of DMS from the traffic control center;
 2. Support pole and foundation;
 3. Mounting height;
 4. Sign dimensions;
 5. Text dimensions, number of lines, and brightness;
 6. Cabinetry and wiring, including power and surge protection; and
 7. Maintenance accessibility.
 - Closed-Circuit Television
 1. Communication mechanism and protocol that complies with previously identified ITS communication standards, which allows for remote pan/tilt/zoom control and viewing of CCTV from the traffic control center;
 2. Support pole and foundation;
 3. Mounting height;
 4. Camera zoom and resolution;
 5. Video compression and format;
 6. Cabinetry and wiring, including power and surge protection; and
 7. Maintenance accessibility, such as a lowering device.
 - Traffic Control Center
 1. ITS communication protocols; and
 2. Software and hardware requirements to remotely control and manage traffic signal systems, DMS, and CCTV.

- 3.4 Develop a procedure for the determination and justification of new traffic control signals at intersections. The procedure shall be developed utilizing the procedure contained in the MUTCD and shall include the following, at a minimum:
- Engineering study requirements; and
 - Development and analysis of signal warrants, including:
 1. Eight-hour vehicular volume;
 2. Four-hour vehicular volume;
 3. Peak hour volume;
 4. Pedestrian volume;
 5. School crossings;
 6. Coordinated signal system;
 7. Crash experience; and
 8. Roadway network.
- 3.5 Develop a road classification system, similar to what is used in the United States, to be used in the Guadalajara Metropolitan Area for the classification of roads. The road classification system shall include the development of criteria and definitions by road function to easily classify a road in the Guadalajara Metropolitan Area into one of the road classes. The road classification system shall be developed to classify urban and rural roads by function, and each function class shall be based on the type of service the road provides to the traveling public. The function classes shall be divided into: 1) arterial roads, 2) collector roads, and 3) local roads, and standards shall be developed for each function class, including allowable lane widths, shoulder widths, turning radii, and other design and planning criteria. Prepare a checklist that allows the Grantee to clearly and easily identify and classify a road in the future.
- 3.6 Develop a standard for pavement markings that covers the following aspects, at a minimum:
- Appropriate use;
 - Installation location guidelines;
 - Design/appearance;
 - Dimensions;
 - Material type; and
 - Installation procedures.
- 3.7 Develop a standard for signing that covers the following aspects, at a minimum:
- Appropriate use;
 - Installation location guidelines;
 - Design/appearance;
 - Dimensions;
 - Lateral offset;
 - Mounting height;
 - Material type and retroreflectivity; and
 - Support and foundation.
- 3.8 Develop a standard for on-street parking that covers the following aspects, at a minimum:
- Appropriate use and type of parking allowed;

- Recommended design and layout;
- Dimensions; and
- Pavement markings.

Development of the standards for pavement markings, signage, and on-street parking included in Subtasks 3.6, 3.7, and 3.8 shall include standards for each of the three (3) road classes developed in Subtask 3.5.

Interim Deliverable #3 – The Contractor shall prepare a detailed written four-volume report describing the work performed and findings from Task 3. The four (4) volumes of the report shall be as follows:

1. Traffic Signalization and ITS Standards
2. Pavement Markings Standards
3. Signage Standards
4. On-Street Parking Standards.

Task 4: Evaluate Technology Alternatives and Recommendations

The Contractor shall:

- 4.1 Evaluate traffic control center hardware, software, and communications infrastructure to determine scalability and compatibility.
- 4.2 Compare all existing technologies in use with other available technologies, including traffic signal control, vehicle signalization, vehicle detection, pedestrian detection, pedestrian signalization, emergency vehicle detection and control, bus priority detection and control, CCTV, DMS, and traffic control center software and hardware.
- 4.3 Provide recommendations regarding the specific technologies to be used for future signalization and ITS projects. The recommendations shall focus on the technology's functionality (for example, video versus inductive loop versus radar for vehicle detection) and shall be non-vendor specific. However, documented evaluations of specific vendor's products can be factored into the recommendations.
- 4.4 The Contractor shall provide a list of U.S. suppliers that provide the recommended technologies, brochures and product data, and contact information for each supplier.

Interim Deliverable #4 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 4.

Task 5: Financial Analysis and Implementation Plan

The Contractor shall:

- 5.1 Develop an overall traffic signalization and ITS deployment plan for the Guadalajara Metropolitan Area, consistent with the objectives identified in Task 1.
- 5.2 Conduct a cost-benefit analysis for recommended changes in traffic signalization systems, ITS applications, and the traffic control center, considering delay/travel time reductions, safety, and emissions and energy aspects, among others.
- 5.3 Conduct discussions and meetings with potential financing sources for the recommended improvements (for both the Project and the pilot deployment) including, but not limited to the following:
 - Federal, state, and municipal funds;
 - BANOBRAS (Mexico's public works development bank) and FONADIN (Mexico's national infrastructure fund);
 - Private sector engagement opportunities; and
 - Supplier credits and commercial banking loans.
- 5.4 Conduct a working session with the Grantee to discuss the findings of the technology recommendations and the cost-benefit analysis. The result of the working session should be a list of prioritized improvement projects that can be used to develop a implementation plan in Subtasks 5.5 to 5.7. Prioritize improvement projects based on those that provide the highest benefit/cost ratio.
- 5.5 Divide the overall implementation plan into a series of smaller, logically grouped improvement projects (e.g., by technology deployment type or by region/corridor) and work with the Grantee to prioritize those projects based on local needs. The overall implementation plan shall be prioritized and divided into a short-term, medium-term, and long-term deployment plan.
- 5.6 Prepare an implementation schedule for deployment based on the improvement projects identified in Subtasks 5.4 and 5.5.
- 5.7 Based on the overall implementation plan for the Guadalajara Metropolitan Area, develop order-of-magnitude construction cost estimates for each of the improvement projects identified and divide them into cost estimates for the short-term, medium-term, and long-term deployment plans. The cost estimates shall also be divided into separate cost estimates for each of the various traffic control standards:
 - Signalization and ITS (protocols, CCTV, and DMS);
 - Pavement markings;
 - Signage; and
 - On-street parking.
- 5.8 The Contractor shall prepare the construction cost estimates in a format that can be changed, modified, and manipulated by the Grantee in the future (e.g. in an Excel format).

Interim Deliverable #5 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 5.

Introductory Note on Tasks 6-12

Tasks 6-12 of the TA focus on designing a pilot deployment of traffic control and technology improvements at approximately 80 intersections along the Periferico. In these tasks, the Contractor shall plan and provide preliminary design improvements along the approximately 70 kilometer-long Periferico with approximately 70 existing signalized intersections and 10 new signalized intersections. The corridor improvements will include, but not be limited to, updated signal infrastructure, vehicle detection, bus priority control, emergency vehicle preemption, centralized traffic signal management, DMS, CCTV, pavement markings, signage, and on-street parking. The existing traffic control center in Guadalajara will be upgraded to integrate with these devices for remote control and monitoring. The Periferico is currently planned to have a preferred bus lane in each direction. The Contractor shall conduct discussions with the Grantee to address the progress of the proposed Peribus project, including the scope, implementation schedule, station designs, and anticipated traffic demand. Transit improvements to be designed include surveillance and automated fare card distribution at the planned Peribus stations, and on-board automated fare collection and dashboard cameras to capture passenger cars violating the preferred bus lane policies.

Task 6: Develop Existing Traffic Model and Simulation for Pilot Deployment

The Contractor shall:

- 6.1 Gather and review existing traffic data from the Government of the State of Jalisco and the five (5) municipalities along the Periferico route, including intersection turning movement counts, mid-block traffic flows (volume and speed), vehicle classification counts (bikes, motorcycles, autos, single-unit trucks, combination trucks, buses), pedestrian counts, and collision data (crash reports that could yield information about specific safety problems).
- 6.2 Based on the availability of traffic data and recent traffic statistics for the Periferico and immediate vicinity, conduct additional traffic counts to supplement available data along the pilot deployment corridor.
- 6.3 Conduct travel time and delay studies (morning, mid-day, and afternoon peaks) for the major movements along the Periferico.
- 6.4 Develop a microscopic simulation model for the Periferico using a software package that allows for both the optimization and evaluation of existing signalized corridor performance.
- 6.5 Implement the existing signal control parameters in the model and quantify the existing performance (e.g., vehicle delay, travel time, average speed) along the Periferico, which will serve as the baseline in order to quantify the operational benefits of the pilot deployment.
- 6.6 Based on data collected and other economic and growth characteristics of the Guadalajara Metropolitan Area, forecast the 20-year traffic demand along the Periferico and configure these volumes in the model for use in Task 7.

Interim Deliverable #6 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 6.

Task 7: Identify Geometry, Capacity, and Safety Improvements for Pilot Deployment

The Contractor shall:

- 7.1 Based on the existing conditions derived from the model and field observations, develop new traffic signal strategies to maximize system performance (e.g., signal timings, detection, traffic responsive control, adaptive control).
- 7.2 Configure these improvements in the model developed in Task 6 and quantify the expected benefits of deploying signal system improvements. [Note: The recommendations from this subtask could be implemented independent of any capacity and safety improvements.]
- 7.3 Based on the existing conditions, 20-year projected conditions, field observations, and other planned improvements, identify capacity improvements necessary to maximize system performance (e.g., addition of auxiliary turn lanes, etc.)
- 7.4 Configure these capacity improvements in the 20-year projected model, along with any associated traffic signal strategies, and quantify the expected benefits of these capacity improvements.
- 7.5 Based on a review of existing geometric conditions, identify general geometric improvements to improve traffic flow (e.g., edge of pavement geometry, turning radii, etc.).
- 7.6 Based on a review of available crash data and discussion with local officials, identify modifications to improve vehicle, pedestrian, and cyclist safety (e.g., sight distance improvements, pedestrian facilities, etc.).
- 7.7 If the geometric and safety improvements are likely to affect capacity, incorporate those changes into the 20-year projected model from Subtask 7.4 and quantify the expected benefits.

Interim Deliverable #7 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 7.

Task 8: Design Signalized Intersection Improvements for Pilot Deployment

The Contractor shall produce 3-4 typical intersection designs that can be applied to the majority of the intersection layouts and configurations, rather than producing a specific design for each intersection. These designs will differ in terms of the placement of signal heads, support poles, vehicle detection, pavement markings, and other aspects that are affected by geometry and presence of minor approaches. Variations of signal control features, such as pedestrian/bicycle movements and protected left-turn movements, can be addressed within each typical intersection design. The design shall be in accordance with the standards developed in Task 3.

The Contractor shall:

- 8.1 Review existing design documents, computer-aided design (“CAD”) files, surveys, and other information provided by the Grantee, and shall supplement existing documents with a field survey to capture the geometry of the defined typical intersection configurations. At a minimum, the review and supplemental field survey shall include the following:
 - Shoulder-to-shoulder widths and lane widths up to 300 feet from the stop bar on the mainline approaches and 200 feet from the stop bar on the minor approaches;
 - Median widths along the mainline up to 300 feet from the stop bar;
 - Turning radii at the intersection;
 - Location of existing signal infrastructure, specifically support poles, signal heads, signal cabinet, signage, as well as underground cabling, conduit, and junction boxes;
 - Location of existing vehicle detection zones and pavement markings, particularly stop bars; and
 - Location of other roadway infrastructure within the right-of-way, including lighting and signage.
- 8.2 Generate the typical intersection design drawings in CAD. At a minimum, the plans shall address the following aspects:
 - Signal head placement and configuration;
 - Signal head support and location;
 - Cabinet, cabling, conduit, and junction box locations;
 - Ring structure and phase assignments;
 - Vehicle and pedestrian detection placement and phase assignments;
 - Bus priority detection location and phase assignments;
 - Pavement marking locations, particularly stop bars, lane use arrows, and crosswalks;
 - Basic signal timing parameters, including minimum green time, yellow time, all-red time, pedestrian walk time, pedestrian clearance time, vehicle extension time, and maximum green time; and
 - Intersection-to-intersection communications infrastructure, if necessary, based on centralized management configuration.
- 8.3 Generate up to three coordinated signal timing plans that correspond to the AM (morning) peak hour traffic conditions, PM (afternoon) peak hour traffic conditions, and off-peak traffic conditions. Specific activities that need to be addressed within this task shall include the following:
 - Review of existing coordinated traffic signal timing plans for subject intersections, if available;
 - Evaluate traffic signal locations and identification of signal groups that should be coordinated. [Note: This subtask will affect the intersection-to-intersection communication design in Subtask 3.2, since each intersection within a

coordinated system only needs to communicate with the other intersections within that system.];

- Identify existing traffic count data that can be used to model each coordinated traffic signal system for the AM peak hour, PM peak hour, and off-peak conditions;
 - If necessary, collect additional traffic count data at major intersections to serve as a basis for the traffic model;
 - Develop a traffic model for each coordinated signal system using software that allows the optimization and evaluation of intersection performance; and
 - Develop coordinated signal timings for the AM peak, PM peak, and off-peak scenarios, which includes cycle length, phase splits, and offset values.
- 8.4 Identify the general location (both along the route and within the general cross-section) and number of DMS and CCTV needed along the route. The locations of the DMS shall consider the location of major access points to the roadway to provide drivers with advance information regarding route decisions, as well as periodic placement for general driver information regarding crashes and weather. The locations of the CCTV shall allow the surveillance of the majority of the route with major intersections being of particular interest.
- 8.5 Generate a set of standards and specifications for DMS installation and performance. At a minimum, these standards and specifications shall address the following aspects:
- Communications mechanism and protocol that complies with previously identified ITS communication standards, which allows for remote management and configuration of DMS from the traffic control center;
 - Support pole and foundation;
 - Mounting height;
 - Sign dimensions;
 - Text dimensions, number of lines, and brightness;
 - Cabinetry and wiring, including power and surge protection; and
 - Maintenance accessibility.
- 8.6 Generate a set of standards and specifications for CCTV installation and performance. At a minimum, these standards and specifications shall address the following aspects:
- Communication mechanism and protocol that complies with previously identified ITS communication standards, which allows for remote pan/tilt/zoom control and viewing of CCTV from the traffic control center;
 - Support pole and foundation;
 - Mounting height;
 - Camera zoom and resolution;
 - Video compression and format;
 - Cabinetry and wiring, including power and surge protection; and
 - Maintenance accessibility, such as a lowering device.

Interim Deliverable #8 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 8.

Task 9: Design Bus System Improvements for Pilot Deployment

- 9.1 The Contractor shall develop specifications for the installation and implementation of an automated fare collection system to be utilized at the bus stations for distribution of fare media and on-board each bus for the automated fare collection. The automated fare collection system shall consistently provide quick boarding of passengers while focusing the bus driver's attention on operating the bus safely. The automated fare collection system shall include development of the design and specifications for the following items:
- Bus driver console controls;
 - Bus station ticket office terminals for fare card distribution;
 - Bus station ticket vending machines for fare card distribution;
 - Bus station stand-alone ticket validator;
 - On-board ticket validator;
 - On-board automated fare collection; and
 - Back-office servers and software for management and oversight, including fare management systems, media management systems, and financial and passenger reporting systems.
- 9.2 The Contractor shall develop specifications for the installation and implementation of a security/surveillance system to be installed at each bus station.

Interim Deliverable #9 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 9.

Task 10: Traffic Control Management Center Improvements for Pilot Deployment

The Contractor shall design software and hardware upgrades for the traffic control center to communicate with the technologies that will be deployed along the Periferico. The software and hardware upgrades shall be in accordance with the standards developed in Task 3 and using the technology recommended in Task 4.

The Contractor shall:

- 10.1 Define the software and hardware upgrades that are necessary to facilitate the management of the traffic signal system, DMS, and CCTV, based on the specifications developed within the pilot deployment. Specific functionality shall include the following:
- Real-time monitoring of traffic signal phase status and detection status in a graphical format;
 - Real-time monitoring of coordination plan settings and signal fault conditions;

- Real-time monitoring of intersection performance, which can be based on saturation levels or other measures that result from discussions with traffic control center operators;
- Upload and download of traffic signal controller database;
- Implementation of pre-programmed controller timing plan on an intersection or system level;
- Real-time monitoring of communication status of traffic signals, DMS, and CCTV;
- DMS message programming, including text configuration, duration, and sequencing for either individual DMS or groups of DMS;
- Ability to view active DMS messages;
- Archive of DMS messages by location, time, and operator;
- Pan/tilt/zoom of CCTV;
- Ability to configure and activate preset CCTV views;
- Ability to configure CCTV text overlay to indicate camera location and preset view; and
- Dynamic map that provides interface to individual traffic signals, DMS, and CCTV.

Interim Deliverable #10 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 10.

Task 11: Pilot Deployment Plan

- 11.1 The Contractor shall develop a three-phase development plan for the pilot deployment and shall develop preliminary cost estimates and a cost-benefit analysis for the three phases of development. Each phase shall include all aspects of the pilot deployment for a specified length of the Periferico corridor. The specific extents of each phase shall be determined by the Contractor in coordination with the Grantee, based on the most logical division of the pilot deployment corridor. The Contractor shall develop the three-phased pilot deployment plan in close coordination and consultation with the Grantee, as it will serve as the basis for the detailed cost estimates to be completed in Task 12.
- 11.2 The Contractor shall compile bid documents for each phase of the pilot deployment. The bid documents for each phase shall be divided into separate bid document packages for each of the various traffic control standards, as follows:
- Signalization and ITS (protocols, CCTV, and DMS);
 - Pavement markings in accordance with pavement marking standards developed in Task 3;
 - Signage in accordance with signage standards developed in Task 3; and
 - On-street parking in accordance with on-street parking standards developed in Task 3.

Interim Deliverable #11 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 11.

Task 12: Capital Investment Requirements and Financing Alternatives for Pilot Deployment

- 12.1 Based on the requirements and improvements identified for the pilot deployment, the Contractor shall generate detailed cost estimates for each phase of the pilot deployment plan developed in Task 11. The cost estimates shall include costs for each phase of the pilot deployment, including engineering and construction management, civil works, facilities construction, equipment costs, software and hardware costs, and land acquisition costs (if any). The cost estimates for each phase shall be divided into separate cost estimates for each of the various traffic control standards, as follows:
- Signalization and ITS (protocols, CCTV, and DMS);
 - Pavement markings;
 - Signage; and
 - On-street parking.
- 12.2 The Contractor shall identify potential financing sources for the pilot deployment, based on the findings of Subtask 5.3. The Contractor shall hold discussions with potential financing sources to gauge their interest in the pilot deployment.

Interim Deliverable #12 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 12.

Task 13: Preliminary Environmental Impact Assessment

The Contractor shall conduct a preliminary review of the Project's environmental impact and environmental compliance with reference to local requirements and those of multilateral development banks (such as the World Bank and Inter-American Development Bank). This review shall identify potential positive and negative impacts, discuss the extent to which negative impacts can be mitigated, and develop plans for a full environmental impact assessment in anticipation of the Project moving forward to the implementation stage.

Interim Deliverable #13 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 13.

Task 14: U.S. Sources of Supply

Based on the findings from Subtask 4.4 and in accordance with Clause I of Annex II of the Grant Agreement, the Contractor shall identify prospective U.S. suppliers of equipment and services for Project implementation. The Contractor shall estimate the potential value of U.S. exports of equipment and services and shall prepare a searchable list of U.S. suppliers that outlines prospective U.S. sources for the procurement of goods and services related to Project implementation. The list shall include business name,

point of contact, address, telephone and fax numbers, e-mail address, and a general description of products and services that may be procured.

Interim Deliverable #14 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 14.

Task 15: Developmental Impact Assessment

The Contractor shall assess the developmental impacts associated with Project implementation and explain the methodology for measuring those impacts. The developmental impacts considered shall be relevant to the Project, *i.e.*, reasonably expected to flow from its implementation as outlined in the TA. Such impacts may include impacts in the following categories:

- *Infrastructure*: Potential developmental impacts in this category may include the expected infrastructure impacts of the Project, particularly in relation to traffic-related infrastructure in the Guadalajara Metropolitan Area;
- *Technology Transfer and Productivity Improvement*: Potential developmental impacts in this category may include any advanced ITS technologies that would be utilized and any efficiencies that would be gained due to traffic improvements;
- *Human Capacity Building*: Potential developmental impacts in this category may include the number and type of local positions that would be created to implement, operate, and maintain the Project, as well as any specialized training that would be required;
- *Market-Oriented Reforms*: Potential developmental impacts in this category may include any regulations, laws, or institutional changes that may be recommended, as well as their anticipated effect; and
- *Other*: Additional potential developmental impacts that may result from the Project, such as improved safety or environmental benefits.

Interim Deliverable #15 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 15.

Task 16: Final Report

The Contractor shall prepare and deliver to the Grantee and USTDA a substantive and comprehensive final report of all work performed under these Terms of Reference (“Final Report”). The Final Report shall be organized according to the above tasks, and shall include all deliverables and documents that have been provided to the Grantee. The Final Report shall be prepared in accordance with Clause I of Annex II of the Grant Agreement. The Final Report shall be prepared in English and Spanish.

Annex II

USTDA Mandatory Contract Clauses

A. USTDA Mandatory Clauses Controlling

The parties to this Contract acknowledge that this Contract 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 the Government of the State of Jalisco acting through the Instituto de Movilidad y Transporte del Estado de Jalisco ("Client"), dated _____ ("Grant Agreement"). The Client has selected _____ ("Contractor") to perform technical assistance ("TA") for the Guadalajara Traffic Control Modernization project ("Project") in Mexico ("Host Country"). The Client and the Contractor are the parties to this Contract, and they hereinafter are referred to collectively as the "Contract Parties." Notwithstanding any other provisions of this Contract, the following USTDA Mandatory Contract Clauses shall govern. All subcontracts entered into by Contractor funded or partially funded with USTDA Grant funds shall include these USTDA Mandatory Contract Clauses, except for Clauses B(1), G, H, I, and S. In addition, in the event of any inconsistency between the Grant Agreement and the Contract or any subcontract thereunder, the Grant Agreement shall be controlling.

B. USTDA as Financier

(1) USTDA Approval of Contract

This Contract, and any amendment thereto, including any amendment to any annex thereto, and any proposed assignment of this Contract, 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 Contract conforms to modifications required by USTDA during the Contract review process and the Contract has been formally approved by USTDA. To make this review in a timely fashion, USTDA must receive from either the Client or the Contractor an English language version of a final negotiated draft Contract or a signed Contract to the attention of the General Counsel's office at USTDA's address listed in Clause M below.

(2) USTDA Not a Party to the Contract

It is understood by the Contract Parties that USTDA has reserved certain rights such as, but not limited to, the right to approve the terms of this Contract and amendments thereto, including assignments, the selection of all contractors, the Terms of Reference, the Final Report, and any and all documents related to any contract funded under the Grant Agreement. The Contract 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 TA and shall not be construed as making USTDA a party to the Contract. The Contract 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 Contract Parties or the parties to any subcontract, jointly or separately; and in consideration of USTDA's role as financier, the Contract Parties further agree that USTDA's rights may be exercised without thereby incurring any responsibility or liability, in contract, tort, or otherwise, to the Contract Parties or the parties to any subcontract. Any approval or failure to approve by USTDA shall not bar the Client or USTDA from asserting any right they might have against the Contractor, or relieve the Contractor of any liability which the Contractor 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 professional services funded by USTDA under the Grant Agreement:

- (a) the Contractor must be a U.S. firm;
- (b) the Contractor may use U.S. subcontractors without limitation;
- (c) employees of U.S. Contractor or U.S. subcontractor firms shall be U.S. citizens, non-U.S. citizens lawfully admitted for permanent residence in the United States or non-U.S. citizens lawfully admitted to work in the United States, except as provided pursuant to subpart (d) below;
- (d) up to twenty percent (20%) of the USTDA Grant amount may be used to pay for services performed by (i) Host Country subcontractors, and/or (ii) Host Country nationals who are employees of the Contractor;
- (e) a Host Country subcontractor may only be used for specific services from the Terms of Reference identified in the subcontract;
- (f) subcontractors from countries other than the United States or Host Country may not be used;
- (g) goods purchased for performance of the TA and associated delivery services (e.g., international transportation and insurance) must have their nationality, source, and origin in the United States; and
- (h) goods and services incidental to TA 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 Contractor 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 Contract. 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 period of performance of work provided for by this Contract, and for a period of three (3) years after final disbursement by USTDA. The Contractor 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 Contractor shall provide adequate Workman's Compensation Insurance coverage for work performed under this Contract.

G. Disbursement Procedures

(1) USTDA Approval of Contract

Disbursement of Grant funds will be made only after USTDA approval of this Contract.

(2) Payment Schedule Requirements

A payment schedule for disbursement of Grant funds to the Contractor shall be included in this Contract. 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 Contract performance milestones; and (3) the final payment may be no less than fifteen percent (15%) of the total USTDA Grant amount, payable upon approval by USTDA of a Final Report that has been (i) prepared and submitted in accordance with the requirements set forth in Clause I below, and (ii) approved in writing by the Client in the manner provided for by Clause G(3)(b)(iii) below. Invoicing procedures for all payments are described below.

(3) Contractor Invoice Requirements

USTDA will make all disbursements of USTDA Grant funds directly to the Contractor. The Contractor 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 Contractor for performance of the Contract by submitting the following to USTDA:

(a) Contractor's Invoice

The Contractor's invoice shall include reference to an item listed in the Contract payment schedule, the requested payment amount, and an appropriate certification by the Contractor, as follows:

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

“As a condition for this mobilization payment, the Contractor certifies that it will perform all work in accordance with the terms of its Contract with the Client. To the extent that the Contractor does not comply with the terms and conditions of the Contract, including the USTDA Mandatory Contract Clauses contained therein, it will, upon USTDA’s request, make an appropriate refund to USTDA.”

(ii) For Contract performance milestone payments:

“The Contractor has performed the work described in this invoice in accordance with the terms of its Contract with the Client and is entitled to payment thereunder. To the extent the Contractor has not complied with the terms and conditions of the Contract, including the USTDA Mandatory Contract Clauses contained therein, it will, upon USTDA's request, make an appropriate refund to USTDA.”

(iii) For final payment:

“The Contractor has performed the work described in this invoice in accordance with the terms of its Contract with the Client and is entitled to payment thereunder. Specifically, the Contractor has submitted the Final Report to the Client, as required by the Contract, and received the Client’s approval of the Final

Report. To the extent the Contractor has not complied with the terms and conditions of the Contract, including the USTDA Mandatory Contract Clauses contained therein, it will, upon USTDA's request, make an appropriate refund to USTDA."

(b) Client's Approval of the Contractor's Invoice

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

(ii) For Contract 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 Contractor have been performed satisfactorily, in accordance with applicable Contract 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 Contractor have been performed satisfactorily, in accordance with applicable Contract provisions and the terms and conditions of the USTDA Grant Agreement. The Final Report submitted by the Contractor has been reviewed and approved by the Client."

(c) USTDA Address for Disbursement Requests

Requests for disbursement shall be submitted to the attention of the Finance Department at USTDA's address listed in Clause M below, or by e-mail to invoices@ustda.gov.

H. Termination

(1) Method of Termination

Either Contract Party may terminate this Contract upon giving written notice to the other party and USTDA. This notice shall be effective after either 30 days, or any other period set forth elsewhere in this Contract. Furthermore, this Contract shall terminate immediately upon notification of USTDA's termination of the Grant Agreement or the term of availability of any funds thereunder.

(2) Ramifications of Termination

In the event that this Contract is terminated prior to completion, the Contractor will be eligible, subject to USTDA approval, for payment for the value of the work performed pursuant to the terms of this Contract. Likewise, in the event of

such termination, USTDA is entitled to receive from the Contractor all USTDA Grant funds previously disbursed to the Contractor (including but not limited to mobilization payments) which exceed the value of the work performed pursuant to the terms of this Contract.

(3) Survivability

Clauses B, D, G, H, N, and S of the USTDA Mandatory Contract Clauses shall survive the termination of this Contract.

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 Contractor shall provide the following to USTDA:

(a) One (1) complete hard copy 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 Contractor 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) hard 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 Contractor to ensure that no confidential information is contained on the CD-ROMs.

The Contractor shall also provide one (1) hard copy of the Public Version of the Final Report to the Commercial or 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 Contractor who prepared the report, a report title, USTDA's logo, and USTDA's address. If the complete version of the Final Report contains confidential information, the Contractor shall be responsible for labeling the front cover of that version of the Final Report with the term "Confidential Version". The Contractor 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 address, and USTDA's mission statement. Camera-ready copy of USTDA Final Report specifications will be available from USTDA upon request.

(c) The Contractor 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 Contractor who prepared the report, a report title, and the following language:

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

(d) The Contractor 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, and e-mail address shall be included for Contractor 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, and e-mail address 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.

(g) The Client, USTDA, and the Commercial and/or Economic Section(s) of the U.S. Embassy in Host Country shall have irrevocable, worldwide, royalty-free, non-exclusive rights to use and distribute the Final Report.

J. Modifications

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

K. TA Schedule

(1) TA Completion Date

The completion date for the TA, which is December 31, 2015, is the date by which the Contract Parties estimate that the TA 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 Contract for goods and services which are provided prior to the Effective Date of the Grant Agreement; and (b) no USTDA funds may be disbursed more than four (4) years after the Effective Date of the Grant Agreement.

L. Business Practices

The Contract Parties recognize the existence of standards of conduct for public officials and commercial entities in their respective countries. Therefore, the Contract Parties shall fully comply with all United States and Host Country laws relating to corruption or bribery. For example, the Contractor and its subcontractors shall fully comply with the requirements of the Foreign Corrupt Practices Act, as amended (15 U.S.C. §§ 78dd-1 et seq.). Each Contract Party agrees that it shall require that any agent or representative hired to represent it in connection with the TA will comply with this paragraph and all laws which apply to activities and obligations of that Contract Party, including, but not limited to, those laws and obligations referenced above.

M. USTDA Address and Fiscal Data

Any communication with USTDA regarding this Contract 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
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Fiscal Data:

Appropriation No.: 11 15/16 1001
Activity No.: 2015-51005A
Reservation No.: 2015036
Grant No.: GH201551036

N. 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, except for taxes of a de minimis nature imposed on local lodging, food, transportation, or airport arrivals or departures. Neither the Client nor the Contractor will seek reimbursement from USTDA for taxes, tariffs, duties, fees, or other levies, except for taxes of a de minimis nature referenced above.

O. Export Licensing

The Contractor and all subcontractors are responsible for compliance with U.S. export licensing requirements, if applicable, in the performance of the Terms of Reference.

P. Contact Persons

The Client designates the following person as the contact person for matters concerning this Contract:

Name: Dr. Mario Córdova
Title: Director General
Phone: +(52-33) 1377-8888
Fax: +(52-33) 1377-8888
E-Mail: mario.cordova@jalisco.gob.mx

The Contractor designates the following person as the contact person for matters concerning this Contract:

Name:
Title:
Phone:
Fax:
E-Mail:

If anyone designated by a Contract Party as a contact person ceases service as a contact person at any point during the ten-year period following the date of signing of this Contract, the Contract Party that had designated that contact person shall provide USTDA and the other Contract Party with the name and contact information of a replacement contact person.

Q. Liability

This Contract may include a clause that limits the liability of the Contract Parties, provided that such a clause does not (i) disclaim liability for damages that are natural, probable, and reasonably foreseeable as a result of a breach of this Contract, or (ii) limit the total amount of damages recoverable to an amount less than the total amount disbursed to the Contractor pursuant to this Contract. If any clause included by the Contract Parties is inconsistent with either or both of these limitations, it shall be invalid and unenforceable to the extent of the inconsistency.

R. Arbitration

If the Contract Parties submit any dispute arising under this Contract for arbitration, the scope of any such arbitration shall be limited to the Contract Parties' rights and/or obligations under this Contract and may not extend to any right or obligation of USTDA. The arbitrator(s) shall not arbitrate issues directly affecting the rights or obligations of USTDA.

S. Reporting Requirements

The Contractor 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 TA. In addition, if at any time the Contractor receives follow-on work from the Client, the Contractor shall so notify USTDA and designate the Contractor's contact point including name, telephone, fax number, and e-mail address. Since this information may be made publicly available by USTDA, any information which is confidential shall be designated as such by the Contractor and provided separately to USTDA. USTDA will maintain the confidentiality of such information in accordance with applicable law.

A N N E X 5

**TERMS OF REFERENCE
(FROM USTDA GRANT AGREEMENT)**

Annex I

Terms of Reference

Objective

The objective of the technical assistance (“TA”) for the Guadalajara Traffic Control Modernization Project (“Project”) is to modernize the traffic control technologies and related intelligent transportation system (“ITS”) technologies for surface transportation in the Guadalajara metropolitan area. The TA will allow the Instituto de Movilidad y Transporte del Estado de Jalisco (“Grantee”) to harmonize traffic control standards and modernize traffic signalization, signage, and ITS deployments in the Guadalajara Metropolitan Area, as well as initiate a pilot deployment on traffic control improvements along the city’s outer perimeter loop road (the “Periferico”).

General Considerations for Deliverables and Documents

The U.S. firm selected by the Grantee to perform the TA (“Contractor”) shall undertake a quality control review process, including a technical and editorial review, of all deliverables and documents submitted to the Grantee to ensure readability, accuracy, and consistency. All deliverables and documents shall be submitted in draft form to the Grantee for review and comment prior to finalization. The interim deliverables specified in these Terms of Reference shall serve to keep the Grantee informed about the Contractor’s work on the TA and to ensure that the Contractor’s work is performed satisfactorily, in accordance with applicable Contract provisions and the terms and conditions of the USTDA Grant Agreement (per Clause G of Annex II of the Grant Agreement). The Contractor shall submit monthly progress reports to the Grantee. All deliverables and documents shall be submitted in English and Spanish.

Activities

Task 1: Project Kick-Off and Review of Existing Information

The Contractor shall:

- 1.1 Conduct a two-day kick-off meeting with officials from the Government of the State of Jalisco, including, but not limited to, the Grantee, the Secretariat of Mobility, the Fideicomiso para el Desarrollo Urbano de Jalisco (“FIDEUR”), and the Sistema de Tren Eléctrico Urbano (“SITEUR”) to identify objectives related to traffic operations and control in the eight (8) municipalities of the Guadalajara Metropolitan Area.
- 1.2 Gather and review previous traffic and transportation studies completed by the Government of the State of Jalisco and the eight (8) municipalities of the Guadalajara Metropolitan Area.

- 1.3 Collect and review previous studies (e.g. demand, station designs, implementation plans) conducted by the Grantee and other pertinent stakeholders regarding the proposed bus system (the “Peribus”) to be implemented on the Periferico.
- 1.4 Conduct a general review of existing ITS architecture, traffic signal, signage, and pavement marking standards and practices. This review shall include both existing documents and representative field installations.
- 1.5 Identify all existing equipment and technology currently in use at the traffic control center and at the Periferico intersections. At a minimum, the Contractor shall review the following:
 - Software and hardware used in traffic signal cabinets;
 - Vehicle detection;
 - Communication systems for signals and other ITS devices;
 - Video cameras (closed-circuit television, “CCTV”) for monitoring traffic; and
 - Dynamic Message Signs (“DMS”).
- 1.6 Conduct a general review of existing intersection geometries and design standards utilized throughout the Guadalajara Metropolitan Area, specifically along the Periferico.
- 1.7 Conduct a general review of existing traffic signal design practices and specifications, specifically along the Periferico.
- 1.8 Identify the most common intersection geometric configurations that exist along the Periferico that will serve as the basis for the typical intersection designs.
- 1.9 Conduct a general review of existing signal timing practices, specifically along the Periferico.
- 1.10 Conduct a general review of the existing traffic control center hardware, software, and communications infrastructure, specifically for the Periferico.

The data gathering process in Subtasks 1.2 to 1.9 shall take place through site visits conducted by the Contractor that are anticipated to take two (2) weeks to complete.

Interim Deliverable #1 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 1.

Task 2: Assess Current Traffic Control Conditions

Based on the initial meetings and site visits conducted in Task 1, the Contractor shall evaluate the current state of traffic control practices, infrastructure, and technology in general throughout the Guadalajara Metropolitan Area and in particular along the Periferico, as follows:

- 2.1 Identify any major deficiencies pertaining to signage and pavement marking, considering regulatory, warning, and guide signs, as well as lane markings and painted curbs. Determine if existing signage and marking practices comply with the U.S. Manual of Uniform Traffic Control Devices (“MUTCD”) and identify major areas that need to be addressed in order to achieve compliance. [Note: This

is not intended to be a detailed audit of the entire system identifying specific problem locations, but rather a general compliance review.]

- 2.2 Conduct an initial evaluation of traffic signal technology and controls, including types of signal controllers, vehicle detection technology, signal timing practices, communications systems, and software. Specifically address whether the existing infrastructure can be upgraded to accommodate vehicle detection (if none present), bus priority, coordinated timing plans by time of day and day of week, traffic responsive or adaptive control, and centralized management. Address whether existing technologies can be upgraded to improve vehicle traffic flow in the Guadalajara Metropolitan Area.
- 2.3 Conduct an initial evaluation of the traffic control center to determine its level of control over the traffic signal system and existing ITS devices. Specifically address whether the existing traffic control center software, hardware, and communications infrastructure will be compatible with traffic signal and ITS device upgrades or expansions that will be designed within this TA.
- 2.4 Conduct an initial evaluation of the existing ITS devices (video cameras, DMS, etc.) and associated communication mechanisms to assess their scalability and compatibility with U.S. ITS communication protocol standards. Specifically address their current level of integration with the traffic control center and their compatibility with potential traffic control center upgrades.
- 2.5 Conduct a one-day meeting with the Grantee to discuss initial findings of the TA.

Interim Deliverable #2 – The Contractor shall prepare a detailed written two-volume report describing the work performed and findings from Task 2. Volume 1 of the report shall contain a diagnostic of existing conditions for signage, pavement markings, and traffic signalization systems throughout the Guadalajara Metropolitan Area. Volume 2 of the report shall contain a diagnostic of existing conditions for signage, pavement markings, traffic signalization, traffic control center hardware and software, and ITS devices along the Periferico.

Task 3: Develop Traffic Control and ITS Standards, Practices, and Specifications

Based on the review and evaluation of the existing standards and practices currently in use and on discussions with the Grantee, the Contractor shall develop a new set of Traffic Control and ITS Standards and Specifications for the State of Jalisco to be adopted and utilized in the Guadalajara Metropolitan Area. Each subtask below will result in a separate standard. The new standards and specifications will explicitly address the following aspects and develop a separate standard for each of the following traffic control aspects, as follows:

- 3.1 Review all traffic control standards and specifications currently in use in the State of Jalisco and the eight (8) municipalities of the Guadalajara Metropolitan Area.
- 3.2 Compare existing standards with the MUTCD and other relevant specifications for traffic control equipment and ITS devices, pavement markings, signage, and on-street parking.

- 3.3 Develop a standard for traffic control, traffic signalization, and ITS that covers the following aspects, at a minimum:
- Traffic Signals
 1. Traffic signal cabinetry and internal wiring, including power and surge protection;
 2. Traffic signal controller functionality to provide for centralized management, bus priority control, and vehicle detection;
 3. Bus priority control detection and functionality, including controller parameters;
 4. Vehicle detection installation and functionality, including controller parameters;
 5. Basic traffic signal timing guidelines that address the determination of minimum green time, yellow time, all-red time, pedestrian walk time, pedestrian clearance time, vehicle extension time, and maximum green time;
 6. Intersection-to-intersection communication system performance and functionality; and
 7. Intersection-to-server communication mechanism that complies with previously identified ITS communication standards.
 - Dynamic Message Signs
 1. Communication mechanism and protocol that complies with previously identified ITS communication standards, which allows for remote management and configuration of DMS from the traffic control center;
 2. Support pole and foundation;
 3. Mounting height;
 4. Sign dimensions;
 5. Text dimensions, number of lines, and brightness;
 6. Cabinetry and wiring, including power and surge protection; and
 7. Maintenance accessibility.
 - Closed-Circuit Television
 1. Communication mechanism and protocol that complies with previously identified ITS communication standards, which allows for remote pan/tilt/zoom control and viewing of CCTV from the traffic control center;
 2. Support pole and foundation;
 3. Mounting height;
 4. Camera zoom and resolution;
 5. Video compression and format;
 6. Cabinetry and wiring, including power and surge protection; and
 7. Maintenance accessibility, such as a lowering device.
 - Traffic Control Center
 1. ITS communication protocols; and
 2. Software and hardware requirements to remotely control and manage traffic signal systems, DMS, and CCTV.

- 3.4 Develop a procedure for the determination and justification of new traffic control signals at intersections. The procedure shall be developed utilizing the procedure contained in the MUTCD and shall include the following, at a minimum:
- Engineering study requirements; and
 - Development and analysis of signal warrants, including:
 1. Eight-hour vehicular volume;
 2. Four-hour vehicular volume;
 3. Peak hour volume;
 4. Pedestrian volume;
 5. School crossings;
 6. Coordinated signal system;
 7. Crash experience; and
 8. Roadway network.
- 3.5 Develop a road classification system, similar to what is used in the United States, to be used in the Guadalajara Metropolitan Area for the classification of roads. The road classification system shall include the development of criteria and definitions by road function to easily classify a road in the Guadalajara Metropolitan Area into one of the road classes. The road classification system shall be developed to classify urban and rural roads by function, and each function class shall be based on the type of service the road provides to the traveling public. The function classes shall be divided into: 1) arterial roads, 2) collector roads, and 3) local roads, and standards shall be developed for each function class, including allowable lane widths, shoulder widths, turning radii, and other design and planning criteria. Prepare a checklist that allows the Grantee to clearly and easily identify and classify a road in the future.
- 3.6 Develop a standard for pavement markings that covers the following aspects, at a minimum:
- Appropriate use;
 - Installation location guidelines;
 - Design/appearance;
 - Dimensions;
 - Material type; and
 - Installation procedures.
- 3.7 Develop a standard for signing that covers the following aspects, at a minimum:
- Appropriate use;
 - Installation location guidelines;
 - Design/appearance;
 - Dimensions;
 - Lateral offset;
 - Mounting height;
 - Material type and retroreflectivity; and
 - Support and foundation.
- 3.8 Develop a standard for on-street parking that covers the following aspects, at a minimum:
- Appropriate use and type of parking allowed;

- Recommended design and layout;
- Dimensions; and
- Pavement markings.

Development of the standards for pavement markings, signage, and on-street parking included in Subtasks 3.6, 3.7, and 3.8 shall include standards for each of the three (3) road classes developed in Subtask 3.5.

Interim Deliverable #3 – The Contractor shall prepare a detailed written four-volume report describing the work performed and findings from Task 3. The four (4) volumes of the report shall be as follows:

1. Traffic Signalization and ITS Standards
2. Pavement Markings Standards
3. Signage Standards
4. On-Street Parking Standards.

Task 4: Evaluate Technology Alternatives and Recommendations

The Contractor shall:

- 4.1 Evaluate traffic control center hardware, software, and communications infrastructure to determine scalability and compatibility.
- 4.2 Compare all existing technologies in use with other available technologies, including traffic signal control, vehicle signalization, vehicle detection, pedestrian detection, pedestrian signalization, emergency vehicle detection and control, bus priority detection and control, CCTV, DMS, and traffic control center software and hardware.
- 4.3 Provide recommendations regarding the specific technologies to be used for future signalization and ITS projects. The recommendations shall focus on the technology's functionality (for example, video versus inductive loop versus radar for vehicle detection) and shall be non-vendor specific. However, documented evaluations of specific vendor's products can be factored into the recommendations.
- 4.4 The Contractor shall provide a list of U.S. suppliers that provide the recommended technologies, brochures and product data, and contact information for each supplier.

Interim Deliverable #4 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 4.

Task 5: Financial Analysis and Implementation Plan

The Contractor shall:

- 5.1 Develop an overall traffic signalization and ITS deployment plan for the Guadalajara Metropolitan Area, consistent with the objectives identified in Task 1.
- 5.2 Conduct a cost-benefit analysis for recommended changes in traffic signalization systems, ITS applications, and the traffic control center, considering delay/travel time reductions, safety, and emissions and energy aspects, among others.
- 5.3 Conduct discussions and meetings with potential financing sources for the recommended improvements (for both the Project and the pilot deployment) including, but not limited to the following:
 - Federal, state, and municipal funds;
 - BANOBRAS (Mexico's public works development bank) and FONADIN (Mexico's national infrastructure fund);
 - Private sector engagement opportunities; and
 - Supplier credits and commercial banking loans.
- 5.4 Conduct a working session with the Grantee to discuss the findings of the technology recommendations and the cost-benefit analysis. The result of the working session should be a list of prioritized improvement projects that can be used to develop a implementation plan in Subtasks 5.5 to 5.7. Prioritize improvement projects based on those that provide the highest benefit/cost ratio.
- 5.5 Divide the overall implementation plan into a series of smaller, logically grouped improvement projects (e.g., by technology deployment type or by region/corridor) and work with the Grantee to prioritize those projects based on local needs. The overall implementation plan shall be prioritized and divided into a short-term, medium-term, and long-term deployment plan.
- 5.6 Prepare an implementation schedule for deployment based on the improvement projects identified in Subtasks 5.4 and 5.5.
- 5.7 Based on the overall implementation plan for the Guadalajara Metropolitan Area, develop order-of-magnitude construction cost estimates for each of the improvement projects identified and divide them into cost estimates for the short-term, medium-term, and long-term deployment plans. The cost estimates shall also be divided into separate cost estimates for each of the various traffic control standards:
 - Signalization and ITS (protocols, CCTV, and DMS);
 - Pavement markings;
 - Signage; and
 - On-street parking.
- 5.8 The Contractor shall prepare the construction cost estimates in a format that can be changed, modified, and manipulated by the Grantee in the future (e.g. in an Excel format).

Interim Deliverable #5 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 5.

Introductory Note on Tasks 6-12

Tasks 6-12 of the TA focus on designing a pilot deployment of traffic control and technology improvements at approximately 80 intersections along the Periferico. In these tasks, the Contractor shall plan and provide preliminary design improvements along the approximately 70 kilometer-long Periferico with approximately 70 existing signalized intersections and 10 new signalized intersections. The corridor improvements will include, but not be limited to, updated signal infrastructure, vehicle detection, bus priority control, emergency vehicle preemption, centralized traffic signal management, DMS, CCTV, pavement markings, signage, and on-street parking. The existing traffic control center in Guadalajara will be upgraded to integrate with these devices for remote control and monitoring. The Periferico is currently planned to have a preferred bus lane in each direction. The Contractor shall conduct discussions with the Grantee to address the progress of the proposed Peribus project, including the scope, implementation schedule, station designs, and anticipated traffic demand. Transit improvements to be designed include surveillance and automated fare card distribution at the planned Peribus stations, and on-board automated fare collection and dashboard cameras to capture passenger cars violating the preferred bus lane policies.

Task 6: Develop Existing Traffic Model and Simulation for Pilot Deployment

The Contractor shall:

- 6.1 Gather and review existing traffic data from the Government of the State of Jalisco and the five (5) municipalities along the Periferico route, including intersection turning movement counts, mid-block traffic flows (volume and speed), vehicle classification counts (bikes, motorcycles, autos, single-unit trucks, combination trucks, buses), pedestrian counts, and collision data (crash reports that could yield information about specific safety problems).
- 6.2 Based on the availability of traffic data and recent traffic statistics for the Periferico and immediate vicinity, conduct additional traffic counts to supplement available data along the pilot deployment corridor.
- 6.3 Conduct travel time and delay studies (morning, mid-day, and afternoon peaks) for the major movements along the Periferico.
- 6.4 Develop a microscopic simulation model for the Periferico using a software package that allows for both the optimization and evaluation of existing signalized corridor performance.
- 6.5 Implement the existing signal control parameters in the model and quantify the existing performance (e.g., vehicle delay, travel time, average speed) along the Periferico, which will serve as the baseline in order to quantify the operational benefits of the pilot deployment.
- 6.6 Based on data collected and other economic and growth characteristics of the Guadalajara Metropolitan Area, forecast the 20-year traffic demand along the Periferico and configure these volumes in the model for use in Task 7.

Interim Deliverable #6 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 6.

Task 7: Identify Geometry, Capacity, and Safety Improvements for Pilot Deployment

The Contractor shall:

- 7.1 Based on the existing conditions derived from the model and field observations, develop new traffic signal strategies to maximize system performance (e.g., signal timings, detection, traffic responsive control, adaptive control).
- 7.2 Configure these improvements in the model developed in Task 6 and quantify the expected benefits of deploying signal system improvements. [Note: The recommendations from this subtask could be implemented independent of any capacity and safety improvements.]
- 7.3 Based on the existing conditions, 20-year projected conditions, field observations, and other planned improvements, identify capacity improvements necessary to maximize system performance (e.g., addition of auxiliary turn lanes, etc.)
- 7.4 Configure these capacity improvements in the 20-year projected model, along with any associated traffic signal strategies, and quantify the expected benefits of these capacity improvements.
- 7.5 Based on a review of existing geometric conditions, identify general geometric improvements to improve traffic flow (e.g., edge of pavement geometry, turning radii, etc.).
- 7.6 Based on a review of available crash data and discussion with local officials, identify modifications to improve vehicle, pedestrian, and cyclist safety (e.g., sight distance improvements, pedestrian facilities, etc.).
- 7.7 If the geometric and safety improvements are likely to affect capacity, incorporate those changes into the 20-year projected model from Subtask 7.4 and quantify the expected benefits.

Interim Deliverable #7 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 7.

Task 8: Design Signalized Intersection Improvements for Pilot Deployment

The Contractor shall produce 3-4 typical intersection designs that can be applied to the majority of the intersection layouts and configurations, rather than producing a specific design for each intersection. These designs will differ in terms of the placement of signal heads, support poles, vehicle detection, pavement markings, and other aspects that are affected by geometry and presence of minor approaches. Variations of signal control features, such as pedestrian/bicycle movements and protected left-turn movements, can be addressed within each typical intersection design. The design shall be in accordance with the standards developed in Task 3.

The Contractor shall:

- 8.1 Review existing design documents, computer-aided design (“CAD”) files, surveys, and other information provided by the Grantee, and shall supplement existing documents with a field survey to capture the geometry of the defined typical intersection configurations. At a minimum, the review and supplemental field survey shall include the following:
 - Shoulder-to-shoulder widths and lane widths up to 300 feet from the stop bar on the mainline approaches and 200 feet from the stop bar on the minor approaches;
 - Median widths along the mainline up to 300 feet from the stop bar;
 - Turning radii at the intersection;
 - Location of existing signal infrastructure, specifically support poles, signal heads, signal cabinet, signage, as well as underground cabling, conduit, and junction boxes;
 - Location of existing vehicle detection zones and pavement markings, particularly stop bars; and
 - Location of other roadway infrastructure within the right-of-way, including lighting and signage.
- 8.2 Generate the typical intersection design drawings in CAD. At a minimum, the plans shall address the following aspects:
 - Signal head placement and configuration;
 - Signal head support and location;
 - Cabinet, cabling, conduit, and junction box locations;
 - Ring structure and phase assignments;
 - Vehicle and pedestrian detection placement and phase assignments;
 - Bus priority detection location and phase assignments;
 - Pavement marking locations, particularly stop bars, lane use arrows, and crosswalks;
 - Basic signal timing parameters, including minimum green time, yellow time, all-red time, pedestrian walk time, pedestrian clearance time, vehicle extension time, and maximum green time; and
 - Intersection-to-intersection communications infrastructure, if necessary, based on centralized management configuration.
- 8.3 Generate up to three coordinated signal timing plans that correspond to the AM (morning) peak hour traffic conditions, PM (afternoon) peak hour traffic conditions, and off-peak traffic conditions. Specific activities that need to be addressed within this task shall include the following:
 - Review of existing coordinated traffic signal timing plans for subject intersections, if available;
 - Evaluate traffic signal locations and identification of signal groups that should be coordinated. [Note: This subtask will affect the intersection-to-intersection communication design in Subtask 3.2, since each intersection within a

coordinated system only needs to communicate with the other intersections within that system.];

- Identify existing traffic count data that can be used to model each coordinated traffic signal system for the AM peak hour, PM peak hour, and off-peak conditions;
 - If necessary, collect additional traffic count data at major intersections to serve as a basis for the traffic model;
 - Develop a traffic model for each coordinated signal system using software that allows the optimization and evaluation of intersection performance; and
 - Develop coordinated signal timings for the AM peak, PM peak, and off-peak scenarios, which includes cycle length, phase splits, and offset values.
- 8.4 Identify the general location (both along the route and within the general cross-section) and number of DMS and CCTV needed along the route. The locations of the DMS shall consider the location of major access points to the roadway to provide drivers with advance information regarding route decisions, as well as periodic placement for general driver information regarding crashes and weather. The locations of the CCTV shall allow the surveillance of the majority of the route with major intersections being of particular interest.
- 8.5 Generate a set of standards and specifications for DMS installation and performance. At a minimum, these standards and specifications shall address the following aspects:
- Communications mechanism and protocol that complies with previously identified ITS communication standards, which allows for remote management and configuration of DMS from the traffic control center;
 - Support pole and foundation;
 - Mounting height;
 - Sign dimensions;
 - Text dimensions, number of lines, and brightness;
 - Cabinetry and wiring, including power and surge protection; and
 - Maintenance accessibility.
- 8.6 Generate a set of standards and specifications for CCTV installation and performance. At a minimum, these standards and specifications shall address the following aspects:
- Communication mechanism and protocol that complies with previously identified ITS communication standards, which allows for remote pan/tilt/zoom control and viewing of CCTV from the traffic control center;
 - Support pole and foundation;
 - Mounting height;
 - Camera zoom and resolution;
 - Video compression and format;
 - Cabinetry and wiring, including power and surge protection; and
 - Maintenance accessibility, such as a lowering device.

Interim Deliverable #8 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 8.

Task 9: Design Bus System Improvements for Pilot Deployment

- 9.1 The Contractor shall develop specifications for the installation and implementation of an automated fare collection system to be utilized at the bus stations for distribution of fare media and on-board each bus for the automated fare collection. The automated fare collection system shall consistently provide quick boarding of passengers while focusing the bus driver's attention on operating the bus safely. The automated fare collection system shall include development of the design and specifications for the following items:
- Bus driver console controls;
 - Bus station ticket office terminals for fare card distribution;
 - Bus station ticket vending machines for fare card distribution;
 - Bus station stand-alone ticket validator;
 - On-board ticket validator;
 - On-board automated fare collection; and
 - Back-office servers and software for management and oversight, including fare management systems, media management systems, and financial and passenger reporting systems.
- 9.2 The Contractor shall develop specifications for the installation and implementation of a security/surveillance system to be installed at each bus station.

Interim Deliverable #9 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 9.

Task 10: Traffic Control Management Center Improvements for Pilot Deployment

The Contractor shall design software and hardware upgrades for the traffic control center to communicate with the technologies that will be deployed along the Periferico. The software and hardware upgrades shall be in accordance with the standards developed in Task 3 and using the technology recommended in Task 4.

The Contractor shall:

- 10.1 Define the software and hardware upgrades that are necessary to facilitate the management of the traffic signal system, DMS, and CCTV, based on the specifications developed within the pilot deployment. Specific functionality shall include the following:
- Real-time monitoring of traffic signal phase status and detection status in a graphical format;
 - Real-time monitoring of coordination plan settings and signal fault conditions;

- Real-time monitoring of intersection performance, which can be based on saturation levels or other measures that result from discussions with traffic control center operators;
- Upload and download of traffic signal controller database;
- Implementation of pre-programmed controller timing plan on an intersection or system level;
- Real-time monitoring of communication status of traffic signals, DMS, and CCTV;
- DMS message programming, including text configuration, duration, and sequencing for either individual DMS or groups of DMS;
- Ability to view active DMS messages;
- Archive of DMS messages by location, time, and operator;
- Pan/tilt/zoom of CCTV;
- Ability to configure and activate preset CCTV views;
- Ability to configure CCTV text overlay to indicate camera location and preset view; and
- Dynamic map that provides interface to individual traffic signals, DMS, and CCTV.

Interim Deliverable #10 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 10.

Task 11: Pilot Deployment Plan

- 11.1 The Contractor shall develop a three-phase development plan for the pilot deployment and shall develop preliminary cost estimates and a cost-benefit analysis for the three phases of development. Each phase shall include all aspects of the pilot deployment for a specified length of the Periferico corridor. The specific extents of each phase shall be determined by the Contractor in coordination with the Grantee, based on the most logical division of the pilot deployment corridor. The Contractor shall develop the three-phased pilot deployment plan in close coordination and consultation with the Grantee, as it will serve as the basis for the detailed cost estimates to be completed in Task 12.
- 11.2 The Contractor shall compile bid documents for each phase of the pilot deployment. The bid documents for each phase shall be divided into separate bid document packages for each of the various traffic control standards, as follows:
- Signalization and ITS (protocols, CCTV, and DMS);
 - Pavement markings in accordance with pavement marking standards developed in Task 3;
 - Signage in accordance with signage standards developed in Task 3; and
 - On-street parking in accordance with on-street parking standards developed in Task 3.

Interim Deliverable #11 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 11.

Task 12: Capital Investment Requirements and Financing Alternatives for Pilot Deployment

- 12.1 Based on the requirements and improvements identified for the pilot deployment, the Contractor shall generate detailed cost estimates for each phase of the pilot deployment plan developed in Task 11. The cost estimates shall include costs for each phase of the pilot deployment, including engineering and construction management, civil works, facilities construction, equipment costs, software and hardware costs, and land acquisition costs (if any). The cost estimates for each phase shall be divided into separate cost estimates for each of the various traffic control standards, as follows:
- Signalization and ITS (protocols, CCTV, and DMS);
 - Pavement markings;
 - Signage; and
 - On-street parking.
- 12.2 The Contractor shall identify potential financing sources for the pilot deployment, based on the findings of Subtask 5.3. The Contractor shall hold discussions with potential financing sources to gauge their interest in the pilot deployment.

Interim Deliverable #12 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 12.

Task 13: Preliminary Environmental Impact Assessment

The Contractor shall conduct a preliminary review of the Project's environmental impact and environmental compliance with reference to local requirements and those of multilateral development banks (such as the World Bank and Inter-American Development Bank). This review shall identify potential positive and negative impacts, discuss the extent to which negative impacts can be mitigated, and develop plans for a full environmental impact assessment in anticipation of the Project moving forward to the implementation stage.

Interim Deliverable #13 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 13.

Task 14: U.S. Sources of Supply

Based on the findings from Subtask 4.4 and in accordance with Clause I of Annex II of the Grant Agreement, the Contractor shall identify prospective U.S. suppliers of equipment and services for Project implementation. The Contractor shall estimate the potential value of U.S. exports of equipment and services and shall prepare a searchable list of U.S. suppliers that outlines prospective U.S. sources for the procurement of goods and services related to Project implementation. The list shall include business name,

point of contact, address, telephone and fax numbers, e-mail address, and a general description of products and services that may be procured.

Interim Deliverable #14 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 14.

Task 15: Developmental Impact Assessment

The Contractor shall assess the developmental impacts associated with Project implementation and explain the methodology for measuring those impacts. The developmental impacts considered shall be relevant to the Project, *i.e.*, reasonably expected to flow from its implementation as outlined in the TA. Such impacts may include impacts in the following categories:

- *Infrastructure*: Potential developmental impacts in this category may include the expected infrastructure impacts of the Project, particularly in relation to traffic-related infrastructure in the Guadalajara Metropolitan Area;
- *Technology Transfer and Productivity Improvement*: Potential developmental impacts in this category may include any advanced ITS technologies that would be utilized and any efficiencies that would be gained due to traffic improvements;
- *Human Capacity Building*: Potential developmental impacts in this category may include the number and type of local positions that would be created to implement, operate, and maintain the Project, as well as any specialized training that would be required;
- *Market-Oriented Reforms*: Potential developmental impacts in this category may include any regulations, laws, or institutional changes that may be recommended, as well as their anticipated effect; and
- *Other*: Additional potential developmental impacts that may result from the Project, such as improved safety or environmental benefits.

Interim Deliverable #15 – The Contractor shall prepare a detailed written report describing the work performed and findings from Task 15.

Task 16: Final Report

The Contractor shall prepare and deliver to the Grantee and USTDA a substantive and comprehensive final report of all work performed under these Terms of Reference (“Final Report”). The Final Report shall be organized according to the above tasks, and shall include all deliverables and documents that have been provided to the Grantee. The Final Report shall be prepared in accordance with Clause I of Annex II of the Grant Agreement. The Final Report shall be prepared in English and Spanish.

A N N E X 6

U.S. FIRM INFORMATION FORM



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 [<i>To be completed by USTDA</i>]	Feasibility Study	Technical Assistance	Other (specify)
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Activity Title [*To be completed by USTDA*]

Full Legal Name of U.S. Firm

Business Address (street address only)

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

Type of Ownership	Publicly Traded Company
	Private Company
	Other (please specify)

Please provide a list of directors and principal officers as detailed in Attachment A. Attached? (Not Applicable for U.S. Publicly Traded Company)	Yes
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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?	Yes
	No

If so, please provide the name of the U.S. Firm's parent company(ies). 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?	Yes
	No

If yes, U.S. Firm shall complete Attachment C for each subcontractor. Attached?	Yes
	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 an 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. **(U.S. publicly traded companies need not include Articles of Incorporation or Good Standing Certificate)**
3. Neither the U.S. Firm nor any of its directors and 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 directors and 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		Signature	
Title			
Full Legal Name of U.S. Firm		Date	



ATTACHMENT B

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

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

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 [To be completed by USTDA]	
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Activity Title [To be completed by USTDA]	
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Full Legal Name of U.S. Firm	
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Full Legal Name of Shareholder	
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Business Address of Shareholder (street address only)	
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Telephone number		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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Country of Shareholder’s Principal Place of Business	
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Please provide a list of directors and principal officers as detailed in Attachment A. Attached?	Yes
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Type of Ownership	Publicly Traded Company
	Private Company
	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.	
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Is the Shareholder a wholly-owned or partially owned subsidiary?	Yes
	No

If so, please provide the name of the Shareholder’s parent(s). In addition, for any parent identified, please complete Attachment B.	
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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 [*To be completed by USTDA*]

Activity Title [*To be completed by USTDA*]

Full Legal Name of Prime Contractor U.S. Firm ("U.S. Firm")

Full Legal Name of Subcontractor

Business Address of Subcontractor (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.

Subcontractor Point of Contact

Name	Surname	
	Given Name	

Address

Telephone

Fax

Email

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: .

2. 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.
3. Neither the subcontractor nor any of its directors and 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.
4. Neither the subcontractor, nor any of its directors and principal officers, is presently indicted for, or otherwise criminally or civilly charged with, commission of any of the offenses enumerated in paragraph 2 above.
5. 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.
6. 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.
7. 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	<input type="text"/>	Signature	<input type="text"/>
Title	<input type="text"/>		
Full Legal Name of Subcontractor	<input type="text"/>	Date	<input type="text"/>