

REQUEST FOR PROPOSALS

**TECHNICAL ASSISTANCE FOR THE
AIR NAVIGATION TECHNOLOGIES PROJECT**

Submission Deadline: 1:00 pm LOCAL TIME
FRIDAY, NOVEMBER 21, 2008

Submission Place: **Address:** Ivan Galan
Jefe Subdepartamento Planes y Proyectos
Dirección General de Aeronáutica Civil
Av. Miguel Claro 1314, Piso 6
Providencia
Santiago, Chile
Phone: 56-2-4392510 - Fax: 56-2-4392454
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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 to conduct the Air Navigation Technologies project on behalf of the Dirección General de Aeronáutica Civil (DGAC). 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 carry out the Technical Assistance.

1.1 BACKGROUND SUMMARY

Established in 1930, the DGAC is a government entity responsible for the management and oversight of air traffic in Chile. In addition, the DGAC is in charge of operational security through certifications, licensing, auditing, and aeronautical meteorological services. As DGAC officials recently signed a technical cooperation agreement with the FAA, they would like to develop an Automatic Dependent Surveillance-Broadcast (ADS-B) and Local Area Augmentation System (LAAS) implementation program in accordance with the FAA's policies and regulations.

In response to increased air traffic demand, the DGAC has acknowledged the need to evaluate the feasibility and adequacy of installing LAAS and ADS-B systems as a means to increase national airspace operational capacity. LAAS is a GPS-based system that can provide multiple precision approach capabilities to runways within the LAAS coverage area. ADS-B is a satellite-based technology used by air traffic control and pilots to ensure proper aircraft separation. The application of these new technologies will also enhance safety through increased data accuracy, air-ground communication and aircraft to aircraft communications. The existing system relies on ground-based navigation aids (NAVAIDS) and surveillance radar systems to guide aircraft, which provides stable and predictable routes via ground-based NAVAIDS but lacks flexibility and often leads to inefficient routing through fixed "highways in the sky".

1.2 OBJECTIVE

The objective of the Technical Assistance is to assist the Grantee with implementation of LAAS and ADS-B systems in Chile, including a pilot program for the Arturo Merino Benítez Airport in Santiago or other airport determined by DGAC. The Technical Assistance will assess the viability and recommend the implementation strategies, if appropriate, for additional sites throughout the country. The Terms of Reference (TOR) for this Technical Assistance is 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.

COST will not be a factor in the evaluation and therefore, cost proposals should not be submitted; upon detailed evaluation of technical proposals, one firm will be selected for contract negotiations. The amount for the negotiated contract has been established by a USTDA grant of U.S. \$980,000 dollars.

1.4 CONTRACT FUNDED BY USTDA

The negotiated contract will be funded by USTDA in accordance with the terms and conditions of its grant to the Grantee. The contract must include certain USTDA mandatory clauses relating to nationality, taxes, payment, reporting, and other matters. The USTDA nationality requirements and the USTDA mandatory clauses are attached at Annexes 3 and 4 for reference.

Section 2: INSTRUCTIONS TO PROPOSERS

2.1 PROJECT TITLE

The project is called the "Air Navigation Technologies."

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. individual, or 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. A copy of the Report is attached at Annex 2 for background information only.

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 U.S. \$980,000 dollars.

2.6 RESPONSIBILITY FOR COSTS

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

2.7 TAXES

Offerors should submit proposals which note that in Annex 4, USTDA Mandatory Contract Provisions, USTDA funds are not to be used to pay taxes or duties under the laws of host country.

2.8 CONFIDENTIALITY

The Grantee will use its best efforts to preserve the confidentiality of any business proprietary or confidential information submitted by the Offeror, which is clearly designated as such by the Offeror.

2.9 ECONOMY OF PROPOSALS

Proposal documents should be prepared simply and economically, providing a comprehensive and concise description of the Offeror's capabilities to satisfy the requirements of the RFP. There is no necessity for expensive bindings, colored displays, or other promotional material unless such material is absolutely pertinent to the proposal. Emphasis should be placed on completeness and clarity of content.

2.10 SUBSTANTIVE PROPOSALS

The Offeror shall certify (a) that its proposal is genuine and is not made in the interest of, or on the 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 himself 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 host country for up to 20 percent of the amount of the USTDA grant. USTDA nationality requirements 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:

Address: Ivan Galan
Jefe Subdepartamento Planes y Proyectos
Dirección General de Aeronáutica Civil
Av. Miguel Claro 1314, Piso 6
Providencia
Santiago, Chile
Phone : 56-2-4392510 - Fax: 56-2-4392454
E-mail: igalan@dgac.cl

An Original in English and Spanish and one (1) copy in each language of your proposal must be received at the above address no later than 1:00 pm (local time), on November 21, 2008.

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

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

2.14 PACKAGING

Each proposal must be sealed to ensure confidentiality of the information. The proposals should be individually wrapped and sealed, and labeled for content including "original" or "copy number x"; the original in English and Spanish and one (1) copy in each language should be collectively wrapped and sealed, and clearly marked for content.

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

2.15 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.

2.16 EFFECTIVE PERIOD OF PROPOSAL

The proposal shall be binding upon the Offeror for sixty (60) days after the proposal due date, and Offeror may withdraw or modify this proposal at any time prior to the due date upon written request, signed in the same manner and by the same person who signed the original proposal.

2.17 EXCEPTIONS

Firms agree by their response to the RFP announcement to abide by the procedures set forth therein. Material modifications in the TOR or responsibilities of the parties will not be accepted.

Any exceptions in the proposal shall be clearly identified, and shall include the scope of such exception, and its impact, on the procurement. The Grantee shall make final determination as to the responsiveness of such exceptions and their acceptability.

2.18 OFFEROR QUALIFICATIONS

As provided in Section 3, Offerors shall submit evidence that they have relevant past experience and have previously delivered advisory and Technical Assistance services similar to those required in the TOR.

2.19 RIGHT TO REJECT PROPOSALS

The Grantee reserves the right to reject any and all proposals and to accept or reject any or all of the items in the proposal, and to award the contract in whole or in part if it is deemed in the best interest of the Grantee.

2.20 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 consultants and subcontractors. USTDA nationality provisions are set forth in detail in Annex 3. The successful Offeror shall cause appropriate provisions of its contract, including all mandatory USTDA clauses, to be inserted in all subcontracts ensuing to ensure fulfillment of all contractual provisions by subcontractors.

2.21 AWARD

An award resulting from this RFP shall be made to the best qualified Offeror, taking into consideration the evaluation factors set forth herein; however, the right is reserved to reject any and all proposals received and, in all cases, the Grantee will be the judge as to whether a proposal has or has not satisfactorily met the requirements of this RFP.

2.22 COMPLETE SERVICES

The successful Offeror shall be required to (a) furnish all supplies, supervision, transportation, and other execution accessories, services, and facilities; (b) provide and perform all necessary labor; and (c) in accordance with good technical practice, with due diligence, and in accordance with the requirements, stipulations, provisions and conditions of this RFP and the resultant contract, execute and complete all specified work to the satisfaction of the Grantee.

2.23 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. Upon approval of each invoice, the Grantee will forward the invoice to USTDA which will process payment to the Contractor. All payments by USTDA under the Grant Agreement will be made in U.S. currency.

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. No cost proposal is required as the value of the USTDA grant is established at U.S. \$980,000 dollars.

Offerors shall submit one (1) original in English and Spanish and one (1) copy of the proposal in each language. Proposals received by fax cannot be accepted.

The following sections and content are required for each proposal:

- Transmittal Letter,
- Cover/Title Page,
- Table of Contents,
- Introduction and Executive Summary,
- Company Information,
- Organizational Structure, Management Plan, and Key Personnel,
- Technical Approach and Work Plan,
- Experience and Qualifications, and
- Miscellaneous.

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

3.1 SECTION 1: INTRODUCTION AND EXECUTIVE SUMMARY

An Executive Summary should be prepared describing the major facts or features of the proposal, including any conclusions, assumptions, and generalized 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 SECTION 2: COMPANY INFORMATION

3.2.1 Company Profile

Provide the information listed below relative to the Offeror's firm. If the Offeror is proposing to subcontract some of the proposed work to another firm(s), similar information must be provided for each subcontractor. Offerors are requested to limit the length of the Company Profile Information to one (1) page per firm.

1. Name of firm and business address, including telephone and fax numbers.
2. Year established (include former firm names and year established, if applicable).
3. Type of ownership and parent company, if any.
4. Project Manager's name, address, telephone and fax number, if different from (1).

3.2.2 Offeror's Authorized Negotiator

Provide name, title, address, telephone 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.

3.2.3 Negotiation Prerequisites

1. Discuss any impact of any current or anticipated commitments which may impact the ability of the Offeror or its subcontractors to complete the Technical Assistance as proposed and within the project schedule.
2. Identify any specific information which is needed from the Grantee before commencing contract negotiations.

3.3 SECTION 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 must have the responsibility and authority to act on behalf of the Offeror in matters related to the proposed Technical Assistance.

Provide a listing of personnel (including subcontractors and consultants) to be engaged in the project, either U.S. or local 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 organizational relationship between the firms must be described.

A manpower schedule and the level of effort for the project period, by activities and tasks, as detailed under the 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 SECTION 4: TECHNICAL APPROACH AND WORK PLAN

Describe in detail the proposed technical approach and work plan. Discuss the project requirements as perceived by the Offeror. Include a brief narrative of 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 Technical Work Plan, including periodic reporting or review points, incremental delivery dates, and other project milestones.

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

3.5 SECTION 5: EXPERIENCE AND QUALIFICATIONS

Provide a discussion of the Offeror's experience and qualifications which 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. Relevant experience and qualifications of key staff proposed shall be provided including letters of commitment from the individuals proposed concerning their availability for contract performance.

As many as possible but not more than six (6) relevant and verifiable project references must be provided, 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 or larger in scope than 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, and the Grantee shall promptly 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 shall then be undertaken with the second most qualified Offeror and so forth.

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

Technical Expertise (30 points): Firm and team's experience (including detailed resumes) in air traffic technologies, specifically ADS-B and LAAS systems. Previous experience working in the implementation of air traffic systems and demonstrated knowledge of FAA programs.

Work Plan and Methodology (40 points): 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.

Regional Experience (20 points): Firm and team's familiarity with the aviation sector in Chile and Latin America and experience working with local authorities, as well as familiarity with local regulations.

Financial Experience (10 points): Firm and team's experience in project financing, cost estimating, and development of capital investment programs for airport and infrastructure projects. Specific experience with the identification of financing mechanisms, project financing and experience structuring finance for projects in Chile and Latin American markets.

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

Price will not be a factor in contractor selection.

ANNEX 1

Ivan Galan, Jefe Subdepartamento Planes y Proyectos, Dirección General de Aeronáutica Civil, Av. Miguel Claro 1314, Piso 6, Providencia, Santiago, Chile, Phone: 56-2-439-2510, Fax: 56-2-439-2454, E-mail: igalan@dgac.cl

B - CHILE: AIR NAVIGATION TECHNOLOGIES PROJECT

POC John Kusnierek, USTDA, 1000 Wilson Boulevard, Suite 1600, Arlington, VA 22209-3901, Tel: (703) 875-4357, Fax: (703) 875-4009. AIR NAVIGATION TECHNOLOGIES PROJECT. The Grantee invites submission of qualifications and proposal data (collectively referred to as the "Proposal") from interested U.S. firms which are qualified on the basis of experience and capability to develop technical assistance to implement Local Area Augmentation System (LAAS) and Automatic Dependent Surveillance-Broadcast (ADS-B) systems in Chile, including a pilot program, and assess the viability and recommend the implementation strategies, if appropriate, for additional sites throughout the country

The Technical Assistance will provide a pilot project for installation at the Arturo Merino Benítez (AMB) airport in Santiago or other airport, as determined by the DGAC. The Technical Assistance will be divided into two concurrent tracks. One track will analyze the viability of ADS-B technology for Chile's national airspace. This track will evaluate the associated costs and benefits, and the commitment of project stakeholders such as airlines, equipment manufacturers, and DGAC personnel. The second track will include a similar analysis for LAAS technologies. In addition to these activities, the Contractor shall evaluate any regulatory constraints that may hinder project implementation and identify long-term training needs and transfer of technology for DGAC personnel.

The U.S. firm selected will be paid in U.S. dollars from a \$980,000 grant to the Grantee from the U.S. Trade and Development Agency (USTDA).

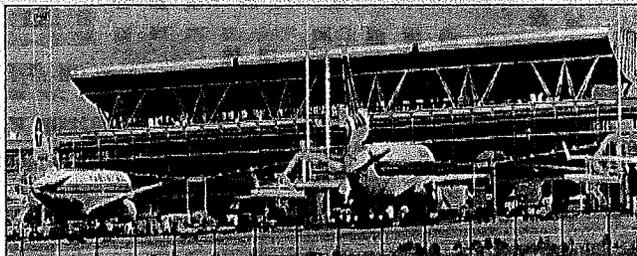
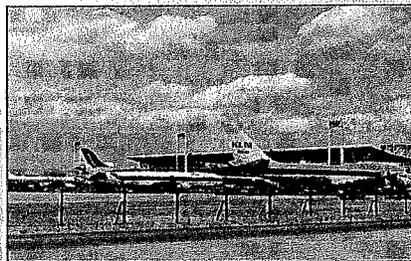
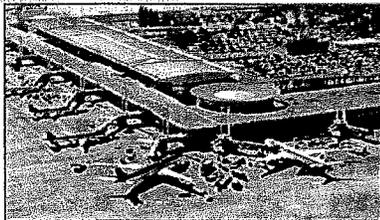
A detailed Request for Proposals (RFP), which includes requirements for the Proposal, the Terms of Reference, and a background definitional mission report are available from USTDA, at 1000 Wilson Boulevard, Suite 1600, Arlington, VA 22209-3901. To request the RFP in PDF format, please go to <https://www.ustda.gov/USTDA/FedBizOpps/RFP/rfpform.asp>. 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 1:00pm (local time), November 21, 2008 at the above address. Evaluation criteria for the Proposal are included in the RFP. Price will not be a factor in contractor selection, and therefore, cost proposals should NOT be submitted. The Grantee reserves the right to reject any and/or all Proposals. The Grantee also reserves the right to contract with the selected firm for subsequent work related to the project. The Grantee is not bound to pay for any costs associated with the preparation and submission of Proposals.

ANNEX 2

DEFINITIONAL MISSION CHILE AEROSPACE SYSTEMS, FACILITIES, AND SAFETY AND SECURITY IMPROVEMENTS



Presented by:



**Travis
Design
Associates**



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 documents 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 (USTDA) advances economic development and U.S. commercial interests in developing and middle income countries. The agency funds various forms of technical assistance, feasibility studies, orientation visits, training, and business workshops that support the development of a modern infrastructure and a fair and open trading environment.

USTDA's strategic use of foreign assistance funds to support sound investment policy and decision-making in host countries creates an enabling environment for trade, investment and sustainable economic development. Operating at the nexus of foreign policy and commerce, USTDA is uniquely positioned to work with U.S. firms and host countries in achieving the agency's trade and development goals. In carrying out its mission, USTDA gives emphasis to economic sectors that may benefit from U.S. exports of goods and services.

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

EXECUTIVE SUMMARY

In March 2008, Travis Design Associates was selected by the U.S. Trade and Development Agency (USTDA) to conduct a definitional mission for Chile's aviation sector. The mission was aimed at evaluating three projects that had been requested by local authorities. These projects included implementation programs for the application of ADS-B and LAAS airspace technologies in 12 locations throughout Chile and a master plan for the Balmaceda Airport in Chile's Aisén region. The first one was requested by the General Aviation Directorate (DGAC), the entity responsible for air traffic management in the country. This report focuses on Travis Design Associates' analysis of the feasibility for implementing ADS-B and LAAS technologies in Chile.

The objective of the Technical Assistance is to provide Chile's DGAC with an implementation plan for ADS-B and LAAS technologies. The DGAC has recently signed a technical cooperation agreement with the U.S. Federal Aviation Administration (FAA) and would like to develop an implementation program in accordance with FAA's program policies and regulations. Further, the Technical Assistance will provide a pilot project for implementation at Arturo Merino Benítez (AMB) Airport in Santiago that will later be used for implementation at 11 other sites throughout the country.

The DGAC is extremely interested in the Technical Assistance and places the highest priority on the implementation of these state-of-the-art technologies as means of responding to increased air traffic demand and existing operational constraints. DGAC's commitment is demonstrated by initial steps taken to implement the technologies, including several meetings with FAA personnel, as well as with ISI and Honeywell, the two companies responsible for executing the FAA's program in the U.S. DGAC considers that these new technologies will allow a more efficient use of the national airspace and provide enhanced levels of service and security for users.

We anticipate that potential exports will exceed US\$40 million. This project targets technologies that are incipient in the market and which are supplied by one a small group of manufacturers such as Sensis, ITT or Honeywell. Furthermore, the recently-signed agreement between the FAA and DGAC will provide competitive advantages to U.S. suppliers which are already working on product certification in the U.S.

Based on conversations with the DGAC, they anticipate that project implementation will be funded through airport revenues and government funds. DGAC's current budget for development is \$12 million per year and we estimate that this amount will be adequate assuming that the project is implemented in phases. Supplier export credits may also be a potential source for funding through U.S. Exim Bank.

This project presents significant developmental impacts in several areas, but mostly in terms of increased efficient use of Chile's national airspace. Once the systems are implemented, the DGAC will be able to monitor traffic with accurate precision, thus reducing the needed separation of aircraft and will benefit from additional coverage in remote or in mountainous terrain where there is no radar coverage or where radar coverage is limited. Increased safety and transfer of technology will also be other important developmental impacts associated with the project. Furthermore, the implementation of the project will have some positive impacts on the environment by reducing fuel burn and noise emissions. No negative impacts on U.S. labor are expected as result of project implementation.

Based on the result of this analysis, Travis Design Associates recommends the funding of this Technical Assistance in the amount of \$980,000. It is important to note that the proposed Technical Assistance covers two projects, the LAAS system and the ADS-B system. Initially, DGAC had approached USTDA for funding of both activities. During the definitional mission, our team discovered that a combined Technical Assistance project as the one proposed, covering both systems, will be a more effective approach as it would take advantage of certain project start-up, financial and environmental tasks that would otherwise have to be completed for each system independently. It is therefore our recommendation that USTDA provides one grant covering both systems, thus avoiding repetition of tasks and maximizing the use of financial resources.

PROJECT DESCRIPTION

This Technical Assistance is aimed at providing Chile's Dirección General de Aeronáutica Civil (DGAC) Technical Assistance for the implementation of LAAS and ADS-B systems in Chile, including a pilot program for Arturo Merino Benítez Airport (AMB) in Santiago. The Technical Assistance will assess the viability and recommend the appropriate implementation strategies, if appropriate, for the following sites:

- Airport Arturo Merino Benítez, Santiago;
- Airport Carriel Sur, Concepción;
- Airport Maquehue. Temuco;
- Airport El Tepual, Puerto Montt;
- Airport Mataverí, Isla de Pascua;
- Airport Carlos Ibáñez del Campo, Punta Arenas;
- Two aerodromes of the Santiago Metropolitan Region;
- Two aerodromes of the Región de los Lagos and;
- Two aerodromes of the Región de Magallanes.

The proposed Technical Assistance will consist of two parts. Part I will focus on the ADS-B system, considering the viability – from a technical standpoint – of implementing this technology in Chile’s national airspace, the associated costs and benefits, including the cost of aircraft equipage, and the commitment of project user groups/stakeholders such as airlines, equipment manufacturers and DGAC personnel. Part II will include a similar analysis for LAAS technologies. In addition, the Contractor shall evaluate any regulatory constraints that may hinder project implementation and identify long-term training needs and transfer of technology for DGAC personnel.

The results of the Technical Assistance shall provide DGAC with the following information:

- Feasibility of implementing LAAS and/or ADS-B technologies
- Ground station site and equipment recommendations
- Cost-benefit analysis for recommended alternatives
- Financing plan
- Long-term training needs and transfer of technology
- Conops for LAAS and ADS-B
- Site survey for LAAS in AMB airport
- Roadmap for implementation

DGAC anticipates implementation of the pilot program at AMB by early 2009, where it is expected that the LAAS/ADS-B system will be in place by the end of the first quarter of 2009 for subsequent implementation of the LAAS system. Success of this project will be carefully tracked to ensure that implementation at other sites is adequate and incorporates any “lessons learned” from the pilot program.

PROJECT SPONSOR COMMITMENT

The DGAC is a government entity responsible for the management and oversight of air traffic in Chile. DGAC was established in 1930 and since then has had a vital role in Chile’s aviation sector. In addition to air traffic, the DGAC is in charge of operational security through certifications, licensing and auditing and for providing aeronautical meteorological services, among others. The DGAC has technical specialists in all areas of aviation and has assigned two specialists to lead this project, Mr. Ricardo Bordali and Eduardo de la Fuente.

DGAC has demonstrated its commitment to the project through the agency’s proactive approach to project implementation. DGAC has signed an MOU with the FAA for technical cooperation in the implementation of ADS-B and LAAS programs. It is our understanding that as of early April an FAA delegation, including the FAA’s current consultants from ISI and Honeywell, were in

Chile to meet with Mr. Ivan Galan, DGAC's Director and other relevant staff from the agency. Mr. Galan has also already visited the Memphis ground site, the pilot program in the U.S., to gain a better understanding of the site functionality and technical requirements. Travis Design Associates' site visit confirmed that the entity places the highest priority and is fully committed to implement the results of the Technical Assistance. DGAC understands that this project is important to respond to increased demand and to enhance the safety and efficiency of the national airspace. Furthermore, DGAC will be responsible for acquiring equipment needed for the pilot program at Santiago. We estimate that this equipment will cost between \$2 to \$ million dollars.

IMPLEMENTATION FINANCING

Implementation costs for this project are highly dependent of the viability results of the Technical Assistance. At this time, it would be difficult to assess the total cost of the project without having a clear understanding of the number of sites where the systems will be installed. However, in terms of implementation financing, it is important to note that this is a long-term project that will be implemented by phases, where AMB will represent the pilot program for future sites.

Travis Design Associates' conversations with Mr. Ivan Galan from the DGAC indicate that the agency anticipates funding implementation through its annual budget, which is estimated at over \$12 million. We believe that this provides sufficient funding for project implementation, particularly considering project phasing. However, we also believe that this project would be a good candidate for funding through suppliers credits such as U.S. Exim Bank. It is important to note that as mentioned above, the first phase of the project will be comprised of the pilot program. During this phase, DGAC will acquire the needed equipment for the project site.

Additional sources of funding, if needed, may be obtained through user fees as this project will ensure efficient use of the national airspace. However, in this regard it is important to keep in mind that the airline will face equipage costs, particularly those that need to modernize the existing fleets and those in general aviation. Our preliminary research indicates that about 50 aircrafts of the ones currently operating in Chile will need to be modernized. The cost of equipage relative to the aircraft in which they are installed is important. Equipage that costs \$10,000 may be a negligible investment for commercial airlines but extremely expensive for general aviation pilots. Our initial conversations with the DGAC indicate that they will be open to provide subsidies to the general aviation users for this reason. Furthermore, aircraft operators incur several costs in addition to the cost of the equipment itself including installation costs, costs associated with the training of pilots and technicians, and the lost revenue as a result of downtime.

DEVELOPMENTAL IMPACTS

The following are some identified developmental impacts for the project:

Infrastructure

The project will result in the development of Chile's aviation infrastructure as it will require the modernization of existing air traffic control facilities and ground stations. Depending on project viability, the impact on infrastructure could reach up to 12 LAAS system and 20 ADS-B antennas. We anticipate that the Technical Assistance will recommend at the minimum implementation of these technologies at AMB.

In addition, air traffic management improvements that will result from project implementation will also enhance air transportation safety through increased reliance on GPS-based technology, improved real-time data transfer and dependent cooperative surveillance. In the medium-term, the implementation of the LAAS and ADS-B technologies will allow DGAC to work in greater coordination with the procedures that are already in place in the U.S. and that will facilitate the recently-signed agreement with the FAA.

Human Capacity Building

It is expected that the implementation of these new technologies would be accompanied with training programs for existing personnel. This project includes a long-term training component that is vital for successful project implementation as these technologies are fairly new in the market and in Chile. Based on estimates provided by the DGAC, it is anticipated that the planning stages of the project will require the training of close to 15 staff members, and project implementation will affect over 120 air traffic controllers and 30 engineers currently on staff.

Technology Transfer and Productivity Enhancement

Technology transfer and training in U.S. technology of local workforce in air traffic control and surveillance will result in additional benefits for airport employees, and will increase productivity and efficiency levels. It is important to note that this project will provide significant safety enhancements by providing pilots and in-ground air traffic controllers with more accurate data both during navigation and aircraft landing. The existing system relies on ground-based navigation aids (NAVAIDS) and surveillance radar systems to guide aircraft. This type of system provides stable and predictable path and routes based on ground-based NAVAIDS but lacks flexibility and often leads to inefficient routing through fixed "highways in the sky". In addition the radar systems EUROCAT are reaching obsolescence. Systems that will be implemented

through this project take advantage of new navigation technologies such as Global Positioning Systems (GPS), now fitted on many modern aircraft. This allows aircrafts to fly more direct paths (point-to-point routes) and eliminates the need for equipped aircraft to be anchored to ground-based NAVAIDS. Further, the implementation of these systems can lead to the reduction of the minimum separation of aircrafts, hence increasing the airport's operational capacity. It also allows aircrafts to determine accurately its position in regards to other aircraft sharing the airspace and flexible routing and dynamic modifications to aircraft routes based on air traffic and weather conditions.

Market-oriented Reforms

The implementation of these technologies in Chile will allow them to become one of the leading countries in Latin America in terms of air navigation. Chile has traditionally had a well-developed aviation sector and attracts several national and international companies such as American, Delta, Continental Airlines, AirFrance, KLM, Iberia, Avianca, and Tam, among others. AMB is used as a hub for Chile's flag carrier, LanChile Airlines, which has expanded operations rapidly throughout Latin America in recent years. It is important to note that approximately 65% of all passengers are served by U.S. carriers.

IMPACT ON U.S. LABOR

Projects proposed by the Technical Assistance will have a positive impact in the U.S. labor market by opening business opportunities in the region for U.S. manufacturers and equipment suppliers of air navigation technologies. Examples of anticipated tasks available for U.S. firms include the design, engineering, manufacture and installation of equipment and training of the local operators in the use of such equipment.

IMPACT ON THE ENVIRONMENT

It is anticipated that the Technical Assistance proposed by this Definitional Mission will have negligible negative impacts on the environment. However, it is important to highlight that positive environmental impacts could result from the implementation of new LAAS and ADS-B technologies. The implementation of these systems offers an effective mean of reducing fuel burn and avoiding unnecessary emissions and noise. Existing technologies in Chile result in inefficient routing and sub-optimal flight profiles. As air traffic management systems are implemented, the impact of these limitations will be reduced and consequently fuel burn and emissions will decrease.

US EXPORT POTENTIAL

Travis Design Associates’ assessment of this project indicates that there is significant export potential for the U.S. This project will require the application of fairly unique technologies that are manufactured and supplied by a limited number of companies worldwide. The U.S. offers great products in terms of airspace equipment and U.S. brands are well regarded in the Chilean market. Most importantly, DGAC, the project sponsor has requested that this project be completed in accordance with the recently-signed agreement with the FAA, hence requiring that equipment used follows some of the U.S. technologies currently used by FAA or equipment that is compatible with FAA’s systems.

The following table presents U.S. Export Potential for the project.

**TABLE 1
U.S. Export Potential**

Potential of US Exports	Unit	QTY	Unit Cost	Total Cost
LAAS IMPLEMENTATION				
LAAS Equipment for AMB Pilot Plan	LS	1	\$1,750,000	\$1,750,000
Equipment for other airports and aerodromes	EACH	11	\$700,000	\$7,700,000
UPS and power conditioning equipment	EACH	12	\$65,000	\$780,000
IT and communication equipment to ATCT	LS	12	\$100,000	\$1,200,000
Transponders general aviation	EACH	1800	\$5,000	\$9,000,000
Transponders commercial aviation	EACH	50	\$12,500	\$625,000
Subtotal				\$21,055,000
ADS-B				
Antennae stations	EACH	20	\$750,000	\$15,000,000
UPS and power conditioning equipment	EACH	20	\$65,000	\$1,300,000
Communication equipment for commercial aviation	EACH	50	\$12,500	\$625,000
Communication equipment for general aviation	EACH	1800	\$5,000	\$9,000,000
Subtotal				\$25,925,000
ATCT COMMUNICATION EQUIPMENT				
Equipment	EACH	12	\$100,000	\$1,200,000
Subtotal				\$1,200,000
TOTAL				\$48,180,000

**This estimate considers implementation at the 12 proposed facilities.*



Chile Aerospace Systems, Facilities, and Safety and Security Improvements

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As noted above, this project is highly specialized and thus, few firms in the U.S. have experience in this area of aviation. Among possible manufacturers, we can identify Sensis, ITT and Honeywell. Components or part of the system may be provided by companies such as All Weather, Inc, or Northrop Grumman. Companies that would be able to develop the Technical Assistance proposed include Robinson Aviation, Innovative Solutions International (ISI), IBM Business Consulting Services, The Washington Group, Wyle and Associates, Advanced Management Technology, Inc. (AMTI).

Contact information for these companies is the following:

**Advanced Management Technology, Inc.
(AMTI)**
1515 Wilson Blvd.
Suite 1100
Arlington, Virginia
Phone: 703-841-2684

The Washington Group
10550 Richmond Ave., Suite 300
Houston, TX 77042
Phone: 281-529-3100

IBM Business Consulting Services
1 New Orchard Road
Armonk, New York 10504
Phone: 1-888-839-9289

Robinson Aviation
Bill Peacock, President
Phone: 202-479-9793

Sensis Corporation
85 Collamer Crossings
East Syracuse, NY 13057 USA
Phone: 315-445-0550

ITT Corporation
1133 Westchester Avenue
White Plains, NY 10604
Phone: 914-641-2000

ISI
Dieter Gunter, VP
1608 Spring Hill Rd.
Suite 200
Vienna, VA 22182
Phone: 703-561-8203

Honeywell
Patrick Reines, Business Development
7412 Argus Ct.
Gaithersburg, MD 20879
Phone: 301-740-9702

FOREIGN COMPETITION

As noted above, there are only a limited number of companies that provide these types of equipments. However, Europeans have developed these kinds of technologies and some foreign competition may be posed by firms in the UK, Spain and France. A partial list of potential competitors includes the following:

- Thales – UK
- Bae Systems – UK
- Ericsson Radar - Sweden
- Delta Electronics – Spain
- Engineered Support Systems – Poland
- Galileo Avionica – Italy
- Euroradar – Germany

It is important to note that we have discussed equipment alternatives with the DGAC and they are extremely interested in U.S. technology. DGAC's commitment combined with the current progress of the project and the close relation of the entity and Honeywell indicate that foreign competition is not strong for this project.

JUSTIFICATION

The results of Travis Design Associates' analysis for this project based on findings of the site visit and meetings and conversations with DGAC representatives indicate that the project is well-justified and necessary due to the need for increased operational capacity and enhanced safety. Chile has shown significant increases in air traffic demand in recent years and is in need to responding to changes in aviation technologies in order to maintain and, if possible, improve, the levels of service provided to all aviation sector users (airlines, passengers, cargo operators, etc.). In response, the DGAC has acknowledge the need to evaluate the feasibility and adequacy of new LAAS and ADS-B system as means to increase the national airspace operational capacity by reducing aircraft separation and enhance safety through increased data accuracy and air-ground communications, as well as communication between aircrafts.

Travis Design Associates' assessment indicates that the implementation of these systems would be adequate due to Chile's mountainous and remote areas where there is limited or no radar coverage at this time. Furthermore, we believe that Chile would be an ideal candidate to evaluate the efficiency of these technologies in Latin America, where the application has been limited. Chile's aviation sector has traditionally been well-advanced in comparison with other neighboring countries and the proposed pilot program at AMB could be very well be used as a

Final Report – LAAS and ADS-B Technologies

model for implementation in other airports with high traffic such as Bogota El Dorado, the new airport in Quito, or Jorge Chávez in Lima.

If these technologies are recommended by the Technical Assistance, the likelihood for implementation is extremely high. The DGAC is extremely committed to this project and has made many efforts to take initial steps. The entity has conducted a site visit to the U.S. Memphis pilot station and has signed a technical cooperation agreement with the FAA. DGAC has established a very aggressive schedule for implementation for early 2009.

The project will result in significant developmental and environmental benefits as explained in earlier sections of this report. In addition to increased operational capacity and enhanced safety, the project will reduce operational costs and fuel burn by allowing point-to-point flight routing. Transfer of technology is also expected to be significant as air traffic controllers and electronic engineers will be trained in the new systems. This project also presents high potential for U.S. exports and the DGAC has expressed its interest and commitment in using U.S. technologies.



Final Report – LAAS and ADS-B Technologies

3. The Contractor and the Grantee shall be careful to ensure that the public version of the Final Report contains no security or confidential information.
4. The Grantee and USTDA shall have an irrevocable, worldwide, royalty-free, non-exclusive right to use and distribute the approved/public Final Report that is developed under these Terms of Reference.

QUALIFICATIONS

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

Technical Expertise (30 points): Firm and team's experience (including detailed resumes) in air traffic technologies, specifically ADS-B and LAAS systems. Previous experience working in the implementation of air traffic systems and demonstrated knowledge of FAA programs.

Work Plan and Methodology (40 points): 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.

Regional Experience (20 points): Firm and team's familiarity with the aviation sector in Chile and Latin America and experience working with local authorities, as well as familiarity with local regulations.

Financial Experience (10 points): Firm and team's experience in project financing, cost estimating, and development of capital investment programs for airport and infrastructure projects. Specific experience with the identification of financing mechanisms, project financing and experience structuring finance for projects in Chile and Latin American markets.

BUDGET NARRATIVE

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 aviation projects with specific experience in airspace and CNS/ATM. The Project Manager should have at least 5 years experience working internationally, preferably in Latin America. It is expected that 121 days will be required at a daily rate of \$1,400.

Electronic Engineers: These individuals will work under the supervision of the Project Manager. He/she should have at least 10 years of experience as electronic engineers with particularly relevant experience in airports. It is expected that 102 days will be required at a daily rate of \$1,200.

NAVAIDS Expert: This individual should have at least 10 years of experience in the planning and design of aviation projects. They will be responsible for conducting an evaluation of navigational equipment and play a vital role in the pilot program. It is expected that 110 days will be required at a daily rate of \$1,360.

Regulatory Expert: This individual will be responsible for exploring any regulatory issues that will hinder project implementation and make recommendations for changes. He/she should have at least 10 years in the evaluation of policy and regulatory aspects of aviation projects. It is expected that 61 days are required at a rate of \$1,600.

Environmental Specialist: This individual should have experience in the preparation of environmental impact analysis for airport-related projects. He/she will be responsible for conducting an environmental impact assessment for the project. Knowledge of local conditions and regulations is important. It is expected that this task will require 55 days at a daily rate of \$1,200.

Financial Analyst: This individual should have at least 10 years of experience working as financial analyst for aviation projects. Experience in Latin America, specifically in Chile, is highly advisable. It is expected that 71 days will be required at a daily rate of \$1,200.

Civil Engineer: This individual should have at least 5 years of experience working as civil engineer for airport projects. This individual will support the technical team. It is expected that 33 days will be required at a daily rate of \$1,200.

Airspace Specialist: This individual will work closely with the Project Manager in assessing technologies and implementation of the new systems. He/she should have at least 10 years of

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experience working as airspace consultant and demonstrated knowledge of CNS/ATM and other navigation, communication and surveillance technologies. It is expected that 67 days will be required at a daily rate of \$1,360.

Report Preparer: The Report Preparer will provide administrative support for all other personnel. It is expected that 79 days will be required at a daily rate of \$800.

TRAVEL SUMMARY

The Project Manager, NAVAIDS, Electronic Engineer and Airspace Experts will be required to travel to the host country for Task 1.

Twelve (12) days of travel time will be required for each individual.

Roundtrip Airfare: $\$1,300 \times 4 \text{ people} = \$5,200$

Lodging and Per Diem: $\$170 \times 12 \text{ days} = \$2,040 \times 4 \text{ people} = \$8,160$

Ground Transportation: $\$100 \times 12 \text{ days} = \$1,200 \times 4 \text{ people} = \$4,800$

The Project Manager, Senior Electronic Engineer, Airspace Expert and NAVAIDS Expert will be required to travel to the host country for Task 4.

Seven (7) days of travel time will be required for each individual.

Roundtrip Airfare: $\$1,300 \times 4 \text{ people} = \$5,200$

Lodging and Per Diem: $\$170 \times 7 \text{ days} = \$1,190 \times 4 \text{ people} = \$4,760$

Ground Transportation: $\$100 \times 7 \text{ days} = \$700 \times 4 \text{ people} = \$2,800$

The Project Manager, Airspace Expert, NAVAIDS Expert and Financial Analyst will be required to travel to the host country for Tasks 6 and 7.

Seven (7) days of travel time will be required for each individual.

Roundtrip Airfare: $\$1,300 \times 4 \text{ people} = \$5,200$

Lodging and Per Diem: $\$170 \times 7 \text{ days} = \$1,190 \times 4 \text{ people} = \$4,760$

Ground Transportation: $\$100 \times 7 \text{ days} = \$700 \times 4 \text{ people} = \$2,800$

The Project Manager, Airspace Expert, NAVAIDS Expert and Financial Analyst will be required to travel to the host country for Task 11.

Seven (7) days of travel time will be required for each individual.

Roundtrip Airfare: $\$1,300 \times 4 \text{ people} = \$5,200$

Lodging and Per Diem: $\$170 \times 7 \text{ days} = \$1,190 \times 4 \text{ people} = \$4,760$

Ground Transportation: $\$100 \times 7 \text{ days} = \$700 \times 4 \text{ people} = \$2,800$

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The Project Manager, Financial Analyst, NAVAIDS Expert and Airspace Expert will be required to travel to the host country for the final report presentation.

Seven (7) days of travel time will be required for each individual.

Roundtrip Airfare: $\$1,300 \times 4 \text{ people} = \$5,200$

Lodging and Per Diem: $\$170 \times 7 \text{ days} = \$1,190 \times 4 \text{ people} = \$4,760$

Ground Transportation: $\$100 \times 7 \text{ days} = \$700 \times 4 \text{ people} = \$2,800$



ANNEX 3



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

NATIONALITY, SOURCE, AND ORIGIN REQUIREMENTS

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

USTDA STANDARD RULE (GRANT AGREEMENT STANDARD LANGUAGE):

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

NATIONALITY:

1) Rule

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

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

2) Application

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

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

3) Definitions

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

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

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

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

SOURCE AND ORIGIN:

1) Rule

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

2) Application

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

3) Definitions

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

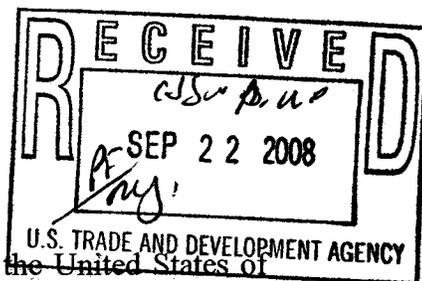
“Origin” means the place of production, through manufacturing, assembly or otherwise.

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

ANNEX 4

USTDA # 08-51038A

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 Dirección General de Aeronáutica Civil ("Grantee"). USTDA agrees to provide the Grantee under the terms of this Agreement US\$980,000 ("USTDA Grant") to fund the cost of goods and services required for technical assistance ("Technical Assistance") on the proposed Air Navigation Technologies Project ("Project") in Chile ("Host Country"). The goods and services required for the Technical Assistance are described in the attached Terms of Reference.

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1. USTDA Funding

I- English + Spanish Text

The funding 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 Technical Assistance ("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 Technical Assistance ("Terms of Reference") are attached as Annex I and are hereby made a part of this Grant Agreement. The Technical Assistance will examine the technical, financial, environmental, and other critical aspects of the proposed Project. The Terms of Reference for the Technical Assistance 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. The parties to this Grant Agreement and the Contractor shall observe these standards, which include not accepting payment of money or anything of value, directly or indirectly, from any person for the purpose of illegally or improperly inducing anyone to take any action favorable to any party in connection with the Technical Assistance.

4. Grantee Responsibilities

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

5. USTDA as Financier

(A) USTDA Approval of Competitive Selection Procedures

Selection of the U.S. 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 Approval of Contractor Selection

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

(C) USTDA Approval of Contract Between Grantee and Contractor

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

(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 United States Government funds, and that any decision by USTDA to exercise or refrain from exercising these approval rights shall be made as a financier in the course of funding the Technical Assistance and shall not be construed as making USTDA a party to the 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 subcontract thereunder must be consistent with this Grant Agreement. In the event of any inconsistency between the Grant Agreement and any contract or subcontract funded by the Grant Agreement, the Grant Agreement shall be controlling.

6. Disbursement Procedures

(A) USTDA Approval of Contract Required

USTDA will make disbursements of 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 Technical Assistance by submitting invoices in accordance with the procedures set forth in the USTDA Mandatory 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.

8. Technical Assistance Schedule

(A) Technical Assistance Completion Date

The completion date for the Technical Assistance, which is March 31, 2010 is the date by which the parties estimate that the Technical Assistance will have been completed.

(B) Time Limitation on Disbursement of USTDA Grant Funds

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

9. USTDA Mandatory Clauses

All contracts funded under this Grant Agreement shall include the USTDA mandatory 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 clauses, except for clauses B(1), G, H, I, and J.

10. Use of U.S. Carriers

(A) Air

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

(B) Marine

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

11. Nationality, Source and Origin

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

12. Taxes

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

13. Cooperation Between Parties and Follow-Up

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

14. Implementation Letters

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

15. Recordkeeping and Audit

The Grantee agrees to maintain books, records, and other documents relating to the Technical Assistance and the Grant Agreement adequate to demonstrate implementation of its responsibilities under the Grant Agreement, including the selection of 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 Technical Assistance and the Grant Agreement.

16. Representation of Parties

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

17. Addresses of Record for Parties

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

To: Dirección General de Aeronáutica Civil
Miguel Claro 1314, Piso 6

Santiago, Chile

Phone: 56-2-204-7676

Fax: 56-2-209-0532

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

Phone: (703) 875-4357

Fax: (703) 875-4009

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

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

Appropriation No.:	118/91001	Appropriation No.:	117/81001
Activity No.:	2008-51038A	Activity No.:	2008-51038A
Reservation No.:	2008510054	Reservation No.:	2008510054
Grant No.:	GH2008510017	Grant No.:	GH2008510017
Amount:	\$608,476	Amount:	\$371,524

18. Termination Clause

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

19. Non-waiver of Rights and Remedies

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

20. U.S. Technology and Equipment

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

[THE REMAINDER OF THIS PAGE IS INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the Government of the United States of America and the Dirección General de Aeronáutica Civil, each acting through its duly authorized representative, have caused this 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: Larry W Walther
Larry Walther
Director
U.S. Trade and Development Agency

Date: 9/23/08

Witnessed:

By: Leonida J. [Signature]

For the Dirección General de Aeronáutica
Civil

By: [Signature]
José Huepe
Director
Dirección General de Aeronáutica Civil

Date: 22-09-2008

Witnessed:

By: [Signature]

Annex I -- Terms of Reference

Annex II -- USTDA Mandatory Clauses

Annex I

Terms of Reference

Objective

This Technical Assistance is aimed at providing Chile's Dirección General de Aeronáutica Civil (DGAC) Technical Assistance for the implementation of LAAS and ADS-B systems in Chile, including a pilot program ("Pilot Program") for Arturo Merino Benítez Airport in Santiago, or another airport selected by DGAC. The Technical Assistance will assess the viability of these systems and recommend the appropriate implementation strategies, if appropriate, for the following sites:

- Airport Arturo Merino Benítez, Santiago;
- Airport Carriel Sur, Concepción;
- Airport Maquehue, Temuco;
- Airport El Tepual, Puerto Montt;
- Airport Mataverí, Isla de Pascua;
- Airport Carlos Ibáñez del Campo, Punta Arenas;
- Two aerodromes of the Santiago Metropolitan Region;
- Two aerodromes of the Región de los Lagos and;
- Two aerodromes of the Región de Magallanes.

Scope of Work

Task 1: Project Start-Up & Data Collection

Upon notification of award, the Contractor shall contact the Grantee and schedule an initial project kick-off meeting. During the meeting, the Contractor and the Grantee will review the scope of work and schedule, as well as discuss the work approach and methodology.

Subsequently, the Contractor shall conduct a two-week visit to Chile to assess the present airspace technologies, including the system conditions, and collect, review and analyze all data that may be relevant to the implementation of the LAAS and ADS-B systems.

The Contractor shall conduct a detailed review of the cooperation agreement between the U.S. Federal Aviation Administration (FAA) and DGAC in matters regarding the

implementation of LAAS and ADS-B systems. The Technical Assistance shall be completed in strict adherence to such agreement.

The Contractor shall conduct a data collection effort for all information relevant to the project. From DGAC's data bank, the Contractor shall compile and review the following:

- Previous studies completed regarding ionosphere measurements and topographic and geo-referenced satellite surveying of the Chilean terrain. The Contractor shall use these studies to evaluate the location of the existing communications, navigation and surveillance (CNS) equipment and their actual coverage.
- All available information concerning the airspace coverage, military airspace restrictions and non-covered mountainous terrain for the optimization of the new airspace architecture covered by the existing radar systems and the proposed ADS-B system.
- All available information concerning the Instrument Landing Systems (ILS) and instrument approaches utilized at all the airports in Chile.
- Existing Environmental Impact Studies for the airports and aerodromes included in the Technical Assistance, with emphasis on the noise restrictions and fuel fall out and dumping conditions for the airports' surrounding areas.
- Existing requirements documentation for CNS/ATM implementation
- Traffic information and estimates

Task 2: Identification of Available Technologies

The Contractor shall identify available LAAS and ADS-B technologies, including, at a minimum, equipment manufactured by Rockwell Collins, Honeywell, ITT, SENSIS and Universal Avionics. Additional product manufacturers shall be identified as necessary to ensure that a good representation of manufacturers and technologies available in the market is included in the Technical Assistance. The Contractor shall compile an equipment inventory that details product specifications, uses and availability for the technologies identified that are compatible with the FAA program.

DELIVERABLE #1: The Contractor shall develop a report containing the findings of Task 2. This report shall contain a list of appropriate technologies and options for LAAS and ADS-B systems. Four copies of the report shall be provided to the Grantee in English and Spanish.

Task 3: LAAS System Implementation

The Contractor shall review and assess the viability of installing twelve LAAS systems at the following airports and aerodromes in Chile:

- Airport Arturo Merino Benítez, Santiago;
- Airport Carriel Sur, Concepción;
- Airport Maquehue. Temuco;
- Airport El Tepual, Puerto Montt;
- Airport Mataverí, Isla de Pascua;
- Airport Carlos Ibáñez del Campo, Punta Arenas;
- Two aerodromes of the Santiago Metropolitan Region;
- Two aerodromes of the Región de los Lagos and;
- Two aerodromes of the Región de Magallanes.

3.1 The Contractor shall identify and evaluate the impact of Chile's ionosphere conditions on the LAAS system. The evaluation shall include at a minimum an analysis of the effects of large gradients in ionosphere conditions that may pose a potential threat to the LAAS or limit its integrity or availability during certain weather conditions. The Contractor shall investigate and recommend equipment or technologies capable of compensating for the reduction of coverage of the LAAS systems installed if applicable. The Contractor shall incorporate into the analysis all existing environmental studies and/or aspects including, but not limited to, noise contours and fuel fall out and dumping for the proposed LAAS paths.

3.2 The Contractor shall identify, evaluate and recommend the most appropriate technologies for the implementation of the LAAS systems at each of the airports considered in the Technical Assistance. The Contractor shall conduct a detailed evaluation of the conditions at the proposed facilities to determine the suitability for LAAS implementation at each site, considering the following:

- Operational goals, requirements and capabilities

- Airspace Architecture
 - Weather Conditions
- 3.3 Based on the findings from this analysis, the Contractor shall provide recommendations for implementation of LAAS systems at suitable sites and incorporate such recommendations into the project implementation schedule. The Contractor shall prioritize its findings to ensure that implementation is completed effectively considering, among other things, the project site location, projected demand and operational compatibility.
- 3.4 The Contractor shall develop a transition study to either introduce new technologies into the existing ILS system and/or phase out the equipment rendered obsolete by the implementation of the new LAAS systems.
- 3.5 The Contractor shall identify and initiate LAAS user groups for each recommended project site in Santiago. This process shall include the analysis of projected demand at the selected locations, as well as meetings, interviews and discussions with airline and airport representatives. At a minimum, the analysis shall consider the following:
- The Contractor shall identify the type of fleet used by commercial carriers, executive aircraft and General Aviation aircraft operating at the recommended sites.
 - For the user community, the Contractor shall develop transition estimates and strategies for the implementation of new avionics required by each type of aircraft.
 - The Contractor shall assess fleet demands and projected fleet modernization plans of the airlines operating at the recommended sites.
- 3.6 The Contractor shall identify and evaluate the regulatory framework, including any policies, regulations or norms that may affect project implementation. As part of this task, the Contractor shall identify any regulatory constraints that may limit or hinder the proposed implementation program, and the Contractor shall make recommendations concerning any ways in which such regulatory constraints could be ameliorated or eliminated.

3.7 The Contractor shall develop an implementation schedule that shall illustrate project milestones, goals and objectives for each site and for the entire program.

3.8 The Contractor shall develop a detailed implementation plan that will provide a roadmap for project implementation. Among other things, the implementation plan should cover the following:

- Provide the operational goals and desired capabilities for the new architecture of the Chilean airspace.
- Provide the minimum statistical testing and trials requirements to obtain international certification of the LAAS system.
- Measure the update rate, "Navigational Uncertainty Category" (NUC) distribution to comply with the minimum ICAO requirements.

DELIVERABLE #2: The Contractor shall develop a report containing the findings of Task 3. This report shall contain an implementation plan for LAAS, including appropriate technologies, sites and schedule. Four copies of the report shall be provided to the Grantee in English and Spanish.

Task 4: Implementation of Pilot Program at Santiago International Airport

The Contractor shall develop a **Pilot Program** for LAAS technology at the Arturo Merino Benitez (AMB) International Airport in Santiago. However, the DGAC may change, at their discretion, the designated airport for the Pilot Program to minimize the impact to the Chilean airspace or to accelerate the implementation of approach and landing capabilities at another airport not fitted with ILS equipment. The Contractor shall use USTDA Grant funds dispersed pursuant to this Grant Agreement to pay any expenses associated with the use of measurement equipment (topographical tasks) and training as anticipated for the pilot program. The Grantee will be responsible for acquiring the equipment recommended for implementation of the systems at the selected site, and no USTDA Grant funds shall be used to acquire any such equipment.

For the Pilot Program, the Contractor shall conduct all subtasks 3.1 to 3.7 above, in addition to subtasks 4.1 to 4.5. The Pilot Program shall incorporate the most advanced LAAS technologies in accordance with the FAA-DGAC agreement.

- 4.1 The Contractor shall conduct a site assessment and topographical survey of the airport, considering LAAS siting options and terrain surveys and signal analysis and limitations. Based on the results of the survey, the Contractor shall recommend the most appropriate site for installation of LAAS augmentation stations and equipment.
- 4.2 The Contractor shall develop new airspace layouts to illustrate the capabilities of the LAAS system and its impact on airspace and operations.
- 4.3 The Contractor shall research availability of generic handbooks and/or procedures for the siting, implementation, operation certification, testing and maintenance of the LAAS systems.
- 4.4 The Contractor shall identify the requirements for equipment for a testing and certification aircraft to ensure that Grantee has the capability of testing and certifying the installed equipment.
- 4.5 The Contractor shall investigate and coordinate the operation, interaction and performance of all other installed NAVAIDS, communication, weather, surveillance and air traffic control equipment with the installation of the LAAS system.
- 4.6 The Contractor shall investigate how the recommended GBAS location could support data collection and information for a GNSS performance monitor system as part of the implementation of GNSS into Chilean airspace for a nationwide GNSS performance monitor system.

Task 5: Implementation of an ADS-B System

The Contractor shall develop an implementation plan that will allow the DGAC to comply with ICAO's ADS-B policies and programs. As part of this task, the Contractor shall identify, evaluate and recommend coverage requirements to minimize the existing gaps in the Chilean airspace, therefore increasing the operational safety of the aviation community. The Contractor shall recommend the most appropriate technologies for the implementation and installation of ADS-B stations. The Contractor shall prioritize the

implementation of the ADS-B system for the regions with the largest number of users and the largest number of non-radar covered areas.

- 5.1 The Contractor shall consider the interaction of the new airspace architecture, including the existing EUROCAT radar systems and the SSR Mode S Extended Squitter (SE) for commercial carriers and the Universal Access Transceivers (UAT) for general aviation.
- 5.2 The Contractor shall identify and evaluate the regulatory framework, including any policies, regulations or norms that may impact project implementation. As part of this task, the Contractor shall identify any regulatory constraints that may limit or hinder the proposed implementation program, and the Contractor shall make recommendations concerning any ways in which such regulatory constraints could be ameliorated or eliminated.
- 5.3 The Contractor shall design a chart that illustrates the new airspace architecture resulting from the implementation of the ADS-B system and research availability of handbooks and/or procedures for the siting, implementation, operation certification, testing and maintenance of the ADS-B systems.
- 5.4 The Contractor shall identify the requirements for equipment of a testing and certification aircraft to ensure that the Grantee has the capability of testing and certifying the installed equipment.
- 5.6 The Contractor shall develop an implementation schedule that will illustrate project milestones, goals and objectives. The implementation schedule shall be phased and shall include all recommended project sites based on Task 3.
- 5.7 The Contractor shall identify and initiate an ADS-B user group. This process shall include the analysis of projected demand at the selected locations, as well as meetings, interviews and discussions with airline and airport representatives in Santiago. At a minimum the analysis shall consider the following:
 - The Contractor shall identify the type of fleet used by commercial carriers, executive aircraft and General Aviation aircraft;
 - For each group the Contractor shall develop transition estimates and strategies for the implementation of new avionics required by each type of aircraft;

- The Contractor shall analyze fleet demands and projected fleet modernization plans of the airlines operating within the Chilean airspace.
- 5.8 The Contractor shall develop a detailed implementation plan that will provide a roadmap for project implementation. Among other things, the implementation plan should cover the operational goals and desired capabilities for the new architecture of the Chilean airspace.
- 5.9 The Contractor shall develop a specific site analysis for those areas in Chile that are not covered by radars. The analysis shall include the following:
- ADS-B siting optimization options and surveys;
 - Airspace analysis;
 - Airports operational requirements;
 - Draft ADS-B procedures, handbooks and manuals;
 - Benefit analysis; and
 - User group meeting as described in 5.7.

DELIVERABLE #3: The Contractor shall develop a report containing the findings of Tasks 4 and 5. This report shall contain the Pilot Program for AMB or another location to be determined by DGAC and the implementation plan for ADS-B, including appropriate technologies, sites and schedule. Four copies of the report shall be provided to the Grantee in English and Spanish.

Task 6: Cost-Benefit Analysis

The Contractor shall prepare detailed cost estimates, including engineering costs and capital costs for LAAS and ADS-B implementation at each recommended site and for each phase of development. The cost estimates shall be based on the results from Tasks 1 through 5 of the Technical Assistance. Based on these cost estimates, the Contractor shall propose a capital investment program for the short, medium and long terms.

The Contractor shall develop a cost-benefit analysis considering operational improvements, safety enhancements and any economic gains from the project. For the ADS-B program, the Contractor shall focus on evaluating the benefits of replacing the existing radars with ADS-B technologies.

Task 7: Assess Long-Term Training Needs for LAAS & ADS-B Implementation

The Contractor shall recommend a training program to the Grantee based on the recommended LAAS and ADS-B systems. As part of this task, the Contractor shall provide a listing of training programs, including a description of the curriculum for each course, a listing of individuals (by position) that would benefit from the course and an estimated course budget. The Contractor shall develop minimum training requirements and certifications for DGAC personnel to conduct the testing certification and maintenance of the LAAS and ADS-B equipment.

DELIVERABLE #4: The Contractor shall develop a report containing the findings of Tasks 6 and 7. This report shall contain the results of the cost-benefit analysis and a list of appropriate courses along with the curriculum for each course. Four copies of the report shall be provided to the Grantee in English and Spanish.

Task 8: Develop a Financing Plan

The Contractor shall develop a preliminary financing plan to implement the recommended level of infrastructure, based upon the Grantee's financial considerations. The financial plan shall include capital costs of acquiring the recommended equipment and systems. The financial plan shall allow for gradual implementation of technologies, thus enabling a practical transition from the existing environment for airspace users and providers.

The Contractor shall identify potential funding mechanisms available for LAAS / ADS-B equipment and systems expenditures identified in previous tasks. Among other sources, the Contractor shall assess funding through U.S. export credit agencies, credit from manufacturers and non-traditional funding arrangements, including leasing and buy back options.

The Contractor shall prepare a list of potential U.S. suppliers of equipment and services that could participate or provide the recommended technologies. Contact information for potential U.S. suppliers shall be provided as part of the Final Report.

Task 9: Conduct a Preliminary Environmental Impact Assessment

The Contractor shall conduct a preliminary review of the Project's environmental impact with reference to local requirements and those multi-lateral lending agencies (such as the World Bank). This review shall identify potential negative impacts of the Project. The review is intended to be generic and not location by location, except that the review will include a specific review concerning the Pilot Program site. The Contractor shall briefly discuss the extent to which potential negative impacts can be mitigated, and develop plans for full environmental impact assessment in anticipation of the Project moving forward to the implementation stage. The Contractor shall recommend future in-depth studies. The Contractor shall use current conditions at some of the existing facilities as a baseline for identification of impacts.

Task 10: Preliminary Assessment of Developmental Impacts

The Contractor shall conduct a preliminary and generic assessment to identify significant potential development impacts of the Project in Chile. While specific focus should be paid to the immediate impact(s) of the Project, the Contractor will include, where appropriate, any additional developmental benefits of the Project, including spin-off and demonstration effects. The Contractor shall provide estimates of the Project's potential benefits in the following areas:

(a) Infrastructure and Industry: The Contractor shall provide a generic statement on the infrastructure impact giving a brief synopsis of upgrades to the country's infrastructure.

(b) Market-Oriented Reforms: The Contractor shall provide an overview of potential changes in the market as a result of the project, focusing on increased competition and level of service.

(c) Human Capacity Building: The Contractor shall provide a brief synopsis of the type of positions that would be needed to implement, manage, and operate the proposed Project and identify benefits of the proposed training program.

(d) Technology Transfer and Productivity Enhancement: The Contractor shall provide an overview of any advanced technologies that would be implemented as a result of the Project. The Contractor shall provide a brief description of any efficiency that would be gained.

(e) Other: The Contractor shall identify and present a generic statement regarding any other developmental benefits of the Project, including any spin-off or demonstration effects.

DELIVERABLE #5: The Contractor shall develop a report containing the findings of Tasks 8-10. Four copies of the report shall be provided to the Grantee in English and Spanish.

Task 11: Concepts of Operation for LAAS and ADS-B.

The Contractor shall develop a Concept of Operation (CONOPS) program for the implementation of LAAS and ADS-B systems in Chile. This program shall follow FAA guidelines and policies.

The CONOPS program developed by the Contractor shall identify an on-going workgroup composed of technical and operational experts that would be responsible for researching, updating and implementing ADS-B / LAAS standards, including one individual who will be responsible for all workgroup activities. The CONOPS program shall provide guidelines for improved safety and enhanced capacity for the use and implementation of the proposed systems in Chile. The CONOPS Program shall also provide recommendations for assessing and improving the cost of the system. The workgroup shall coordinate the input provided by DGAC units/departments, including, but not limited to, GPS, Flight Standards, Certification, Air Traffic Control, Flight Checks and Airway facilities; the manufacturers of components (avionics, ground elements and transponders); the operators (DGAC, concessionaires and airports authorities); and the users (airlines, general aviation and airports). The CONOPS program shall encourage the involvement of all stakeholders, including participation in any meetings that would result from the Pilot Program.

The Contractor shall develop, in conjunction with the DGAC, a complete schedule of meetings, deadlines, milestones and deliverables related to the CONOPS program, establishing the requirements of the new systems for:

- Normal Operations
- Precision Approach
- Missed approach- Straight approach and complex approach

- RNAV/LAAS/ADS-B Operations
- Surface Navigation
- Adjacent Airport Coverage
- Displaced Threshold
- PVT Capabilities
- Position, Velocity and Time (PVT)
- Complex Terminal Arrivals (Terminal Approach Path - TAP)
- Complex Terminal Departures (TAP)
- Low Visibility Ground Operations
- LAAS Accuracy
- Aircraft ground movements (runway to gate and gate to runway) and situation awareness
- Runway Incursion
- Airport ground handling equipment and vehicles
- Required navigational performance
- En-route ADS-B
- Terminal Navigation (arrivals, departures and instruments approach)
- Complex approach procedures
- PVT/RNAV
- Curved Approach
- Offset Approach
- Multi-Segment Arrivals
- Multi-Segment Miss Approach
- Multi-Segment Departure Procedures

Task 12: 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, including an Executive Summary ("Final Report"). The Final Report shall incorporate comments from the Grantee on the previous deliverables and shall include findings from Tasks 1 through 11. When the Final Report is complete, the Contractor shall provide a final oral presentation of the Final Report to the Grantee and other stakeholders at the Grantee's offices in Santiago, Chile.

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 Contractor shall provide to the Grantee five (5) hard copies and one (1) electronic version of both the confidential and public versions of the Final Report in Spanish, and one (1) hard copy of both the confidential and public versions of the Final Report in English. The Grantee also shall provide copies to USTDA and the U.S. Embassy in Chile in accordance with Clause I of Annex II of the Grant Agreement.

Notes:

1. The Contractor is responsible for compliance with U.S. export licensing requirements, if applicable, in the performance of the Terms of Reference.
2. The Contractor and the Grantee shall be careful to ensure that the public version of the Final Report contains no security or confidential information.
3. The Grantee and USTDA shall have an irrevocable, worldwide, royalty-free, non-exclusive right to use and distribute the Final Report that is developed under these Terms of Reference.

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 Dirección General de Aeronáutica Civil ("Client"), dated _____ ("Grant Agreement"). The Client has selected _____ ("Contractor") to perform the technical assistance ("TA") for the Air Navigation Technologies project ("Project") in Chile ("Host Country"). 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 J. In addition, in the event of any inconsistency between the Grant Agreement and any contract or subcontract thereunder, the Grant Agreement shall be controlling.

B. USTDA as Financier

(1) USTDA Approval of Contract

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

(2) 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 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 parties hereto further understand and agree that USTDA, in reserving any or all of the foregoing approval rights, has acted solely as a financing entity to assure the proper use of United States Government funds, and that any decision by USTDA to exercise or refrain from exercising these approval rights shall be made as a financier in the course of financing the Technical Assistance and shall not be construed as making USTDA a party to the 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 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 services funded by USTDA under the Grant Agreement: (a) for professional services, the Contractor must be either a U.S. firm or U.S. individual; (b) the Contractor may use U.S. subcontractors without limitation, but the use of subcontractors from Host Country may not exceed twenty percent (20%) of the USTDA Grant amount and may only be used for specific services from the Terms of Reference identified in the subcontract; (c) employees of U.S. Contractor or U.S. subcontractor firms responsible for professional services shall be U.S. citizens or non-U.S. citizens lawfully admitted for permanent residence in the U.S.; (d) goods purchased for performance of the Technical Assistance and associated delivery services (e.g., international transportation and insurance) must have their nationality, source and origin in the United States; and (e) goods and services incidental to Technical Assistance support (e.g., local lodging, food, and transportation) in Host Country are not subject to the above restrictions. USTDA will make available further details concerning these provisions upon request.

D. Recordkeeping and Audit

The 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 contract term 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. 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 Technical Assistance. 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, and fax number. Since this information may be made publicly available by USTDA, any information which is confidential shall be designated as such by the Contractor and provided separately to USTDA. USTDA will maintain the confidentiality of such information in accordance with applicable law.

H. Disbursement Procedures

(1) USTDA Approval of Contract

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

(2) Payment Schedule Requirements

A payment schedule for disbursement of Grant funds to the 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 receipt by USTDA of an approved Final Report in accordance with the specifications and quantities set forth in Clause I below. Invoicing procedures for all payments are described below.

(3) 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 provisions 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 provisions 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 provisions 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 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 by courier or mail to the attention of the Finance Department at USTDA's address listed in Clause M below.

(4) Termination

In the event that the Contract is terminated prior to completion, the Contractor will be eligible, subject to USTDA approval, for reasonable and documented costs which have been incurred in performing the Terms of Reference prior to termination, as well as reasonable wind down expenses. Reimbursement for such costs shall not exceed the total amount of undisbursed Grant funds. Likewise, in the event of such termination, USTDA is entitled to receive from the Contractor all USTDA Grant funds previously disbursed to the Contractor (including but not limited to mobilization payments) which exceed the reasonable and documented costs incurred in performing the Terms of Reference prior to termination.

I. USTDA Final Report

(1) Definition

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

(2) Final Report Submission Requirements

The Contractor shall provide the following to USTDA:

(a) One (1) complete version of the Final Report for USTDA's records. This version shall have been approved by the Client in writing and must be in the English language. It is the responsibility of the 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) 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) copy of the Public Version of the Final Report to the Foreign Commercial Service Officer or the Economic Section of the U.S. Embassy in Host Country for informational purposes.

(3) Final Report Presentation

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

(a) The front cover of every Final Report shall contain the name of the Client, the name of the Contractor who prepared the report, a report title, USTDA's logo, USTDA's mailing and delivery addresses. If the complete version of the Final Report contains confidential information, the 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 mailing and delivery addresses, and USTDA's mission statement.

Camera-ready copy of USTDA Final Report specifications will be available from USTDA upon request.

(c) The 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 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 shall be included for each commercial source.

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

J. Modifications

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

K. Technical Assistance Schedule

(1) Technical Assistance Completion Date

The completion date for the Technical Assistance, which is March 31, 2010, is the date by which the parties estimate that the Technical Assistance will have been completed.

(2) Time Limitation on Disbursement of USTDA Grant Funds

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

L. Business Practices

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

M. USTDA Address and Fiscal Data

Any communication with USTDA regarding this 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
USA

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

Fiscal Data:

Appropriation No.:	118/91001	Appropriation No.:	117/81001
Activity No.:	2008-51038A	Activity No.:	2008-51038A
Reservation No.:	2008510054	Reservation No.:	2008510054
Grant No.:	GH2008510017	Grant No.:	GH2008510017
Amount:	\$608,476	Amount:	\$371,524

N. Definitions

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

O. Taxes

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

ANNEX 5

Annex I

Terms of Reference

Objective

This Technical Assistance is aimed at providing Chile's Dirección General de Aeronáutica Civil (DGAC) Technical Assistance for the implementation of LAAS and ADS-B systems in Chile, including a pilot program ("Pilot Program") for Arturo Merino Benítez Airport in Santiago, or another airport selected by DGAC. The Technical Assistance will assess the viability of these systems and recommend the appropriate implementation strategies, if appropriate, for the following sites:

- Airport Arturo Merino Benítez, Santiago;
- Airport Carriel Sur, Concepción;
- Airport Maquehue, Temuco;
- Airport El Tepual, Puerto Montt;
- Airport Mataverí, Isla de Pascua;
- Airport Carlos Ibáñez del Campo, Punta Arenas;
- Two aerodromes of the Santiago Metropolitan Region;
- Two aerodromes of the Región de los Lagos and;
- Two aerodromes of the Región de Magallanes.

Scope of Work

Task 1: Project Start-Up & Data Collection

Upon notification of award, the Contractor shall contact the Grantee and schedule an initial project kick-off meeting. During the meeting, the Contractor and the Grantee will review the scope of work and schedule, as well as discuss the work approach and methodology.

Subsequently, the Contractor shall conduct a two-week visit to Chile to assess the present airspace technologies, including the system conditions, and collect, review and analyze all data that may be relevant to the implementation of the LAAS and ADS-B systems.

The Contractor shall conduct a detailed review of the cooperation agreement between the U.S. Federal Aviation Administration (FAA) and DGAC in matters regarding the

implementation of LAAS and ADS-B systems. The Technical Assistance shall be completed in strict adherence to such agreement.

The Contractor shall conduct a data collection effort for all information relevant to the project. From DGAC's data bank, the Contractor shall compile and review the following:

- Previous studies completed regarding ionosphere measurements and topographic and geo-referenced satellite surveying of the Chilean terrain. The Contractor shall use these studies to evaluate the location of the existing communications, navigation and surveillance (CNS) equipment and their actual coverage.
- All available information concerning the airspace coverage, military airspace restrictions and non-covered mountainous terrain for the optimization of the new airspace architecture covered by the existing radar systems and the proposed ADS-B system.
- All available information concerning the Instrument Landing Systems (ILS) and instrument approaches utilized at all the airports in Chile.
- Existing Environmental Impact Studies for the airports and aerodromes included in the Technical Assistance, with emphasis on the noise restrictions and fuel fall out and dumping conditions for the airports' surrounding areas.
- Existing requirements documentation for CNS/ATM implementation
- Traffic information and estimates

Task 2: Identification of Available Technologies

The Contractor shall identify available LAAS and ADS-B technologies, including, at a minimum, equipment manufactured by Rockwell Collins, Honeywell, ITT, SENSIS and Universal Avionics. Additional product manufacturers shall be identified as necessary to ensure that a good representation of manufacturers and technologies available in the market is included in the Technical Assistance. The Contractor shall compile an equipment inventory that details product specifications, uses and availability for the technologies identified that are compatible with the FAA program.

DELIVERABLE #1: The Contractor shall develop a report containing the findings of Task 2. This report shall contain a list of appropriate technologies and options for LAAS and ADS-B systems. Four copies of the report shall be provided to the Grantee in English and Spanish.

Task 3: LAAS System Implementation

The Contractor shall review and assess the viability of installing twelve LAAS systems at the following airports and aerodromes in Chile:

- Airport Arturo Merino Benítez, Santiago;
- Airport Carriel Sur, Concepción;
- Airport Maquehue. Temuco;
- Airport El Tepual, Puerto Montt;
- Airport Mataverí, Isla de Pascua;
- Airport Carlos Ibáñez del Campo, Punta Arenas;
- Two aerodromes of the Santiago Metropolitan Region;
- Two aerodromes of the Región de los Lagos and;
- Two aerodromes of the Región de Magallanes.

3.1 The Contractor shall identify and evaluate the impact of Chile's ionosphere conditions on the LAAS system. The evaluation shall include at a minimum an analysis of the effects of large gradients in ionosphere conditions that may pose a potential threat to the LAAS or limit its integrity or availability during certain weather conditions. The Contractor shall investigate and recommend equipment or technologies capable of compensating for the reduction of coverage of the LAAS systems installed if applicable. The Contractor shall incorporate into the analysis all existing environmental studies and/or aspects including, but not limited to, noise contours and fuel fall out and dumping for the proposed LAAS paths.

3.2 The Contractor shall identify, evaluate and recommend the most appropriate technologies for the implementation of the LAAS systems at each of the airports considered in the Technical Assistance. The Contractor shall conduct a detailed evaluation of the conditions at the proposed facilities to determine the suitability for LAAS implementation at each site, considering the following:

- Operational goals, requirements and capabilities

- Airspace Architecture
 - Weather Conditions
- 3.3 Based on the findings from this analysis, the Contractor shall provide recommendations for implementation of LAAS systems at suitable sites and incorporate such recommendations into the project implementation schedule. The Contractor shall prioritize its findings to ensure that implementation is completed effectively considering, among other things, the project site location, projected demand and operational compatibility.
- 3.4 The Contractor shall develop a transition study to either introduce new technologies into the existing ILS system and/or phase out the equipment rendered obsolete by the implementation of the new LAAS systems.
- 3.5 The Contractor shall identify and initiate LAAS user groups for each recommended project site in Santiago. This process shall include the analysis of projected demand at the selected locations, as well as meetings, interviews and discussions with airline and airport representatives. At a minimum, the analysis shall consider the following:
- The Contractor shall identify the type of fleet used by commercial carriers, executive aircraft and General Aviation aircraft operating at the recommended sites.
 - For the user community, the Contractor shall develop transition estimates and strategies for the implementation of new avionics required by each type of aircraft.
 - The Contractor shall assess fleet demands and projected fleet modernization plans of the airlines operating at the recommended sites.
- 3.6 The Contractor shall identify and evaluate the regulatory framework, including any policies, regulations or norms that may affect project implementation. As part of this task, the Contractor shall identify any regulatory constraints that may limit or hinder the proposed implementation program, and the Contractor shall make recommendations concerning any ways in which such regulatory constraints could be ameliorated or eliminated.

- 3.7 The Contractor shall develop an implementation schedule that shall illustrate project milestones, goals and objectives for each site and for the entire program.
- 3.8 The Contractor shall develop a detailed implementation plan that will provide a roadmap for project implementation. Among other things, the implementation plan should cover the following:
- Provide the operational goals and desired capabilities for the new architecture of the Chilean airspace.
 - Provide the minimum statistical testing and trials requirements to obtain international certification of the LAAS system.
 - Measure the update rate, "Navigational Uncertainty Category" (NUC) distribution to comply with the minimum ICAO requirements.

DELIVERABLE #2: The Contractor shall develop a report containing the findings of Task 3. This report shall contain an implementation plan for LAAS, including appropriate technologies, sites and schedule. Four copies of the report shall be provided to the Grantee in English and Spanish.

Task 4: Implementation of Pilot Program at Santiago International Airport

The Contractor shall develop a **Pilot Program** for LAAS technology at the Arturo Merino Benitez (AMB) International Airport in Santiago. However, the DGAC may change, at their discretion, the designated airport for the Pilot Program to minimize the impact to the Chilean airspace or to accelerate the implementation of approach and landing capabilities at another airport not fitted with ILS equipment. The Contractor shall use USTDA Grant funds dispersed pursuant to this Grant Agreement to pay any expenses associated with the use of measurement equipment (topographical tasks) and training as anticipated for the pilot program. The Grantee will be responsible for acquiring the equipment recommended for implementation of the systems at the selected site, and no USTDA Grant funds shall be used to acquire any such equipment.

For the Pilot Program, the Contractor shall conduct all subtasks 3.1 to 3.7 above, in addition to subtasks 4.1 to 4.5. The Pilot Program shall incorporate the most advanced LAAS technologies in accordance with the FAA-DGAC agreement.

- 4.1 The Contractor shall conduct a site assessment and topographical survey of the airport, considering LAAS siting options and terrain surveys and signal analysis and limitations. Based on the results of the survey, the Contractor shall recommend the most appropriate site for installation of LAAS augmentation stations and equipment.
- 4.2 The Contractor shall develop new airspace layouts to illustrate the capabilities of the LAAS system and its impact on airspace and operations.
- 4.3 The Contractor shall research availability of generic handbooks and/or procedures for the siting, implementation, operation certification, testing and maintenance of the LAAS systems.
- 4.4 The Contractor shall identify the requirements for equipment for a testing and certification aircraft to ensure that Grantee has the capability of testing and certifying the installed equipment.
- 4.5 The Contractor shall investigate and coordinate the operation, interaction and performance of all other installed NAVAIDS, communication, weather, surveillance and air traffic control equipment with the installation of the LAAS system.
- 4.6 The Contractor shall investigate how the recommended GBAS location could support data collection and information for a GNSS performance monitor system as part of the implementation of GNSS into Chilean airspace for a nationwide GNSS performance monitor system.

Task 5: Implementation of an ADS-B System

The Contractor shall develop an implementation plan that will allow the DGAC to comply with ICAO's ADS-B policies and programs. As part of this task, the Contractor shall identify, evaluate and recommend coverage requirements to minimize the existing gaps in the Chilean airspace, therefore increasing the operational safety of the aviation community. The Contractor shall recommend the most appropriate technologies for the implementation and installation of ADS-B stations. The Contractor shall prioritize the

implementation of the ADS-B system for the regions with the largest number of users and the largest number of non-radar covered areas.

- 5.1 The Contractor shall consider the interaction of the new airspace architecture, including the existing EUROCAT radar systems and the SSR Mode S Extended Squitter (SE) for commercial carriers and the Universal Access Transceivers (UAT) for general aviation.
- 5.2 The Contractor shall identify and evaluate the regulatory framework, including any policies, regulations or norms that may impact project implementation. As part of this task, the Contractor shall identify any regulatory constraints that may limit or hinder the proposed implementation program, and the Contractor shall make recommendations concerning any ways in which such regulatory constraints could be ameliorated or eliminated.
- 5.3 The Contractor shall design a chart that illustrates the new airspace architecture resulting from the implementation of the ADS-B system and research availability of handbooks and/or procedures for the siting, implementation, operation certification, testing and maintenance of the ADS-B systems.
- 5.4 The Contractor shall identify the requirements for equipment of a testing and certification aircraft to ensure that the Grantee has the capability of testing and certifying the installed equipment.
- 5.6 The Contractor shall develop an implementation schedule that will illustrate project milestones, goals and objectives. The implementation schedule shall be phased and shall include all recommended project sites based on Task 3.
- 5.7 The Contractor shall identify and initiate an ADS-B user group. This process shall include the analysis of projected demand at the selected locations, as well as meetings, interviews and discussions with airline and airport representatives in Santiago. At a minimum the analysis shall consider the following:
 - The Contractor shall identify the type of fleet used by commercial carriers, executive aircraft and General Aviation aircraft;
 - For each group the Contractor shall develop transition estimates and strategies for the implementation of new avionics required by each type of aircraft;

- The Contractor shall analyze fleet demands and projected fleet modernization plans of the airlines operating within the Chilean airspace.
- 5.8 The Contractor shall develop a detailed implementation plan that will provide a roadmap for project implementation. Among other things, the implementation plan should cover the operational goals and desired capabilities for the new architecture of the Chilean airspace.
- 5.9 The Contractor shall develop a specific site analysis for those areas in Chile that are not covered by radars. The analysis shall include the following:
- ADS-B siting optimization options and surveys;
 - Airspace analysis;
 - Airports operational requirements;
 - Draft ADS-B procedures, handbooks and manuals;
 - Benefit analysis; and
 - User group meeting as described in 5.7.

DELIVERABLE #3: The Contractor shall develop a report containing the findings of Tasks 4 and 5. This report shall contain the Pilot Program for AMB or another location to be determined by DGAC and the implementation plan for ADS-B, including appropriate technologies, sites and schedule. Four copies of the report shall be provided to the Grantee in English and Spanish.

Task 6: Cost-Benefit Analysis

The Contractor shall prepare detailed cost estimates, including engineering costs and capital costs for LAAS and ADS-B implementation at each recommended site and for each phase of development. The cost estimates shall be based on the results from Tasks 1 through 5 of the Technical Assistance. Based on these cost estimates, the Contractor shall propose a capital investment program for the short, medium and long terms.

The Contractor shall develop a cost-benefit analysis considering operational improvements, safety enhancements and any economic gains from the project. For the ADS-B program, the Contractor shall focus on evaluating the benefits of replacing the existing radars with ADS-B technologies.

Task 7: Assess Long-Term Training Needs for LAAS & ADS-B Implementation

The Contractor shall recommend a training program to the Grantee based on the recommended LAAS and ADS-B systems. As part of this task, the Contractor shall provide a listing of training programs, including a description of the curriculum for each course, a listing of individuals (by position) that would benefit from the course and an estimated course budget. The Contractor shall develop minimum training requirements and certifications for DGAC personnel to conduct the testing certification and maintenance of the LAAS and ADS-B equipment.

DELIVERABLE #4: The Contractor shall develop a report containing the findings of Tasks 6 and 7. This report shall contain the results of the cost-benefit analysis and a list of appropriate courses along with the curriculum for each course. Four copies of the report shall be provided to the Grantee in English and Spanish.

Task 8: Develop a Financing Plan

The Contractor shall develop a preliminary financing plan to implement the recommended level of infrastructure, based upon the Grantee's financial considerations. The financial plan shall include capital costs of acquiring the recommended equipment and systems. The financial plan shall allow for gradual implementation of technologies, thus enabling a practical transition from the existing environment for airspace users and providers.

The Contractor shall identify potential funding mechanisms available for LAAS / ADS-B equipment and systems expenditures identified in previous tasks. Among other sources, the Contractor shall assess funding through U.S. export credit agencies, credit from manufacturers and non-traditional funding arrangements, including leasing and buy back options.

The Contractor shall prepare a list of potential U.S. suppliers of equipment and services that could participate or provide the recommended technologies. Contact information for potential U.S. suppliers shall be provided as part of the Final Report.

Task 9: Conduct a Preliminary Environmental Impact Assessment

The Contractor shall conduct a preliminary review of the Project's environmental impact with reference to local requirements and those multi-lateral lending agencies (such as the World Bank). This review shall identify potential negative impacts of the Project. The review is intended to be generic and not location by location, except that the review will include a specific review concerning the Pilot Program site. The Contractor shall briefly discuss the extent to which potential negative impacts can be mitigated, and develop plans for full environmental impact assessment in anticipation of the Project moving forward to the implementation stage. The Contractor shall recommend future in-depth studies. The Contractor shall use current conditions at some of the existing facilities as a baseline for identification of impacts.

Task 10: Preliminary Assessment of Developmental Impacts

The Contractor shall conduct a preliminary and generic assessment to identify significant potential development impacts of the Project in Chile. While specific focus should be paid to the immediate impact(s) of the Project, the Contractor will include, where appropriate, any additional developmental benefits of the Project, including spin-off and demonstration effects. The Contractor shall provide estimates of the Project's potential benefits in the following areas:

- (a) Infrastructure and Industry: The Contractor shall provide a generic statement on the infrastructure impact giving a brief synopsis of upgrades to the country's infrastructure.
- (b) Market-Oriented Reforms: The Contractor shall provide an overview of potential changes in the market as a result of the project, focusing on increased competition and level of service.
- (c) Human Capacity Building: The Contractor shall provide a brief synopsis of the type of positions that would be needed to implement, manage, and operate the proposed Project and identify benefits of the proposed training program.
- (d) Technology Transfer and Productivity Enhancement: The Contractor shall provide an overview of any advanced technologies that would be implemented as a result of the Project. The Contractor shall provide a brief description of any efficiency that would be gained.

(e) Other: The Contractor shall identify and present a generic statement regarding any other developmental benefits of the Project, including any spin-off or demonstration effects.

DELIVERABLE #5: The Contractor shall develop a report containing the findings of Tasks 8-10. Four copies of the report shall be provided to the Grantee in English and Spanish.

Task 11: Concepts of Operation for LAAS and ADS-B.

The Contractor shall develop a Concept of Operation (CONOPS) program for the implementation of LAAS and ADS-B systems in Chile. This program shall follow FAA guidelines and policies.

The CONOPS program developed by the Contractor shall identify an on-going workgroup composed of technical and operational experts that would be responsible for researching, updating and implementing ADS-B / LAAS standards, including one individual who will be responsible for all workgroup activities. The CONOPS program shall provide guidelines for improved safety and enhanced capacity for the use and implementation of the proposed systems in Chile. The CONOPS Program shall also provide recommendations for assessing and improving the cost of the system. The workgroup shall coordinate the input provided by DGAC units/departments, including, but not limited to, GPS, Flight Standards, Certification, Air Traffic Control, Flight Checks and Airway facilities; the manufacturers of components (avionics, ground elements and transponders); the operators (DGAC, concessionaires and airports authorities); and the users (airlines, general aviation and airports). The CONOPS program shall encourage the involvement of all stakeholders, including participation in any meetings that would result from the Pilot Program.

The Contractor shall develop, in conjunction with the DGAC, a complete schedule of meetings, deadlines, milestones and deliverables related to the CONOPS program, establishing the requirements of the new systems for:

- Normal Operations
- Precision Approach
- Missed approach- Straight approach and complex approach

- RNAV/LAAS/ADS-B Operations
- Surface Navigation
- Adjacent Airport Coverage
- Displaced Threshold
- PVT Capabilities
- Position, Velocity and Time (PVT)
- Complex Terminal Arrivals (Terminal Approach Path - TAP)
- Complex Terminal Departures (TAP)
- Low Visibility Ground Operations
- LAAS Accuracy
- Aircraft ground movements (runway to gate and gate to runway) and situation awareness
- Runway Incursion
- Airport ground handling equipment and vehicles
- Required navigational performance
- En-route ADS-B
- Terminal Navigation (arrivals, departures and instruments approach)
- Complex approach procedures
- PVT/RNAV
- Curved Approach
- Offset Approach
- Multi-Segment Arrivals
- Multi-Segment Miss Approach
- Multi-Segment Departure Procedures

Task 12: 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, including an Executive Summary (“Final Report”). The Final Report shall incorporate comments from the Grantee on the previous deliverables and shall include findings from Tasks 1 through 11. When the Final Report is complete, the Contractor shall provide a final oral presentation of the Final Report to the Grantee and other stakeholders at the Grantee’s offices in Santiago, Chile.

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 Contractor shall provide to the Grantee five (5) hard copies and one (1) electronic version of both the confidential and public versions of the Final Report in Spanish, and one (1) hard copy of both the confidential and public versions of the Final Report in English. The Grantee also shall provide copies to USTDA and the U.S. Embassy in Chile in accordance with Clause I of Annex II of the Grant Agreement.

Notes:

1. The Contractor is responsible for compliance with U.S. export licensing requirements, if applicable, in the performance of the Terms of Reference.
2. The Contractor and the Grantee shall be careful to ensure that the public version of the Final Report contains no security or confidential information.
3. The Grantee and USTDA shall have an irrevocable, worldwide, royalty-free, non-exclusive right to use and distribute the Final Report that is developed under these Terms of Reference.