Enclosure 5
(Ref. Technical Letter F063-L08-040)

MITRE
Center for Advanced
Aviation System Development

Specifications for an Automated
Meteorological Observation System
for the Texcoco Area

These specifications are provided at this time to assist the DGAC in obtaining quotations
from qualified and experienced providers of automated meteorological observation systems.
The automated meteorological system is requested to be installed and activated by
Friday 31 October 2008.

Please contact Ing. Kleinhaus no later than Monday 30 June 2008 if there are any issues or
concerns regarding the acquisition of the automated meteorological system, as MITRE needs
to start assessing the Texcoco weather as soon as possible.

Prepared for

Dirección General de Aeronáutica Civil
Secretaría de Comunicaciones y Transportes

6 June 2008
1.0 Introduction

This document is intended to assist Mexico’s Dirección General de Aeronáutica Civil (DGAC) in obtaining quotations from qualified and experienced providers of automated meteorological observation systems. It describes the meteorological data that MITRE needs to adequately examine weather conditions at the Texcoco area and provides information on additional requirements such as site selection, data retrieval and format, and maintenance.

Having a complete and accurate understanding of weather patterns is crucial when determining the suitability of a site for the development of an airport. Important weather related factors such as ceiling, visibility, and wind conditions should be analyzed in order to characterize weather patterns. This can be important in a number of situations. For example, a comparison of the frequencies of weather patterns with requirements for approach procedures should be conducted, as well as the appropriateness of the DGAC-proposed runway orientations.

As stipulated in the DGAC-MITRE contract, the DGAC should have an operational automated meteorological observation system installed at an appropriate location within the Texcoco area by late October 2008 (earlier if possible). The reason for mentioning October is that this is just before the onset of winter (i.e., bad weather) and also because at least one full year of reliable and non-erratic information is needed. Coordinating the acquisition and installation of an automated meteorological observation system is a time and labor-intensive effort. Therefore, in order to meet the 31 October 2008 installation and activation requirement, it is important that the DGAC start the acquisition process as soon as possible.

MITRE can assist the DGAC during the review process of the system technical proposals. Specifically, MITRE can review the technical proposals being submitted to the DGAC by companies desiring to provide and/or install the automated meteorological observation system. This will help ensure that responsive, complete and appropriate proposals are being submitted. Additionally, MITRE strongly recommends that an experienced technical representative from the company that is selected to provide and/or install the automated meteorological observation system contact MITRE to discuss requirements (e.g., equipment, data accuracy, format, etc.) and schedules prior to starting work.

Nevertheless, it is important to state that MITRE cannot be co-responsible in the DGAC’s formal selection of an automated meteorological observation system brand, provider, its siting, actual installation, or its maintenance.
2.0 Background

The automated meteorological observation system to be procured should be certified by the United States Federal Aviation Administration (U.S. FAA) or the International Civil Aviation Organization (ICAO) for use at airports and/or for aviation-related purposes, such as an Automated Weather Observing System (AWOS). MITRE does not have a preference regarding which type of system is installed in the Texcoco area as long as the required data can be recorded, archived, retrieved, and transmitted to MITRE as per the data requirements specified later in this document.

The U.S. FAA provides information in:


ICAO provides sensor standards and tolerances for automated meteorological observation systems in:

- ICAO Doc. 9837, Manual on Automatic Meteorological Observing Systems at Aerodromes, and
- Annex 3, Meteorological Services for International Air Navigation.

3.0 Key Automated Meteorological Observation System Requirements

This section provides data required by MITRE for analytical purposes. Note that additional data sensors, specifications, parameters, reporting criteria, and other items may need to be considered if the system is to eventually be used for actual aviation-related operational purposes.

3.1 Weather Data

The automated meteorological observation system should be equipped with sensors that can measure the following weather conditions/parameters, and meet the applicable U.S. FAA or ICAO sensor standards and tolerances:

1. Cloud heights (i.e., ceiling)
2. Visibility
3. Present weather (e.g., rain, drizzle, fog, haze, mist, etc.); a thunderstorm sensor should also be installed to detect the presence of a thunderstorm within 30 NM of the system and report its location.
4. Barometric pressure
5. Ambient temperature
6. Dew point
7. Wind speed and wind direction, including gusts. The wind direction sensor should be aligned to true north.

3.2 Data Collection and Retrieval

The automated meteorological observation system should report and record (i.e., internally archive) observations at least every half-hour, 24 hours a day. “Special” reports may be provided in addition to the half-hour reports.

Observations provided to MITRE should be in a sub-set of Aviation Routine Weather Report (METAR) data, as shown in the Appendix to this document. Additionally, data provided to MITRE should be in ASCII/text format. A data description and key must also be provided to MITRE that describes each data field, units of measurement, and other important information.

3.3 Data Archiving and Retrieval

The automated meteorological observation system should be equipped with a data logger to record the observations at least every half-hour, 24 hours a day. The internal data logger should be able to archive, at a minimum, up to 36 days worth of observations.

Data logger retrieval should enable the user to download the information onto a laptop computer, memory stick, or other electronic medium. After retrieval, the data should be transmitted to MITRE in the most expeditious method (i.e., via email).

3.4 Training and Maintenance

Training for data retrieval and electronic maintenance personnel is critical and should be part of the purchase and maintenance contract. Training can be accomplished in-country using the newly installed system as a training aid. Once trained, a strict preventive maintenance program should be established. This is not only cost effective, but preventive maintenance also provides frequent hands-on visits to the system, thus re-enforcing previous training. A minimum amount of spare parts are recommended as waiting for a part can impact weather monitoring for weeks. In any case, under the maintenance contract, the system should be repaired within seven calendar days of the initial reporting of failure.

The DGAC should also provide personnel to keep vegetation growth in check, do minimal equipment maintenance such as cleaning dust off the sensors and lenses, keeping orifices cleared of insects, and maintaining an adequate fuel level for the auxiliary power unit.

The vendor should provide all documentation on equipment sensor operation and maintenance procedures. Training should include application of on-site diagnostics.
preventative maintenance, and equipment calibration to determine equipment performance. Note that a calibration kit should also be included.

3.5 Site Selection and System Installation

The location of the system should meet U.S. FAA or ICAO siting criteria. It should be noted that a large circular area surrounding the system should be cleared of any visual obstacles. The diameter of the circular area may be several hundred meters (installers should provide specifications). An electrical line will need to be provided to the automated meteorological observation system site. The installation should be supervised by an individual with ample experience in the installation of automated meteorological observation system equipment. MITRE has overviewed five installations of automated meteorological observation system equipment in Mexico (there are not many more such systems in Mexico) and has concluded that local subcontractor experience is ordinarily insufficient. Nevertheless, the system provider should also ensure that the selected site meets appropriate siting criteria.

3.6 Miscellaneous

The automated meteorological observation system should be equipped with both a high quality auxiliary power unit to serve as an emergency power source during commercial power outages, and an uninterrupted power supply (UPS) unit. The capacity of the backup power should be estimated based on the duration of the longest foreseeable commercial power outage.

Arrangements should be made by the DGAC for someone to oversee security for the system. Additionally, a perimeter fence with barbed wire may need to be constructed.
Appendix

Figure A-1 illustrates a portion of data that was downloaded from an automated meteorological observation system and transmitted via e-mail to MITRE for analysis. It is important that the data be provided in the format shown below.

**Figure A-1. Sample Automated Meteorological Observation System Data Output**

**Key**

1. Observation number
2. Date and time (year, month, day, hour, minute)
3. Sky Condition (three separate observations)
4. Visibility
5. Temperature
6. Dew point
7. Wind direction
8. Wind speed
9. Wind gust speed
10. Pressure
11. Density altitude
12. Variable wind direction
13. Daytime or nighttime
14. These fields are typically used to provide information on present weather conditions