

20 June 2011
F062-L11-016

Lic. Héctor González Weeks
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Providencia No. 807, Piso 6
Col. Del Valle
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México

**Subject: Technical Letter: Summary of Work During the Period
1 April 2011 Through 30 June 2011**

Dear Lic. González Weeks:

This letter respectfully submits to your attention a summary of the most recent project activities conducted by MITRE.

As with the previously submitted Technical Letter, this one starts with the very important matter of a time extension to the contract due to delays in receipt of critical data (e.g., the photogrammetry), resources used by MITRE to obtain data on its own, and incorrect data, which has caused the re-accomplishment of technical work.

MITRE has switched the order of many tasks to reduce the ultimate impact of the delay on the project to approximately twenty months. Therefore, a formal modification of the contract on the basis of Clause 20 needs to be formalized as soon as possible. This modification takes into consideration data delays concerning photogrammetry and Tasks 10 and 11 data, noted in previous Technical Letters.

These and other numerous delays (see Enclosure 1) have been documented throughout communications to SCT, including additional ones in this letter. However, MITRE wishes to move on and complete the project without complications, keeping in mind that MITRE's legal area cannot delay a matter that can result in its penalization.

Dr. Bernard Lisker is going to continue discussions on a contractual amendment with the Dirección de Aeronáutica Civil (DGAC) Administrative Director, Lic. Joel Morales. This matter was also discussed with the Undersecretary of Transportation, Felipe Duarte, during his recent visit to MITRE.

Per request from Ing. Agustín Cano, Enclosure 1 to this letter provides a table that shows how far MITRE has advanced on the project, as well as our estimate regarding how much we expect to accomplish by 30 September 2012. As you will see, the only items that will remain to be completed beyond September 2012, including their estimated percentage to be completed after that date, are as follows:

- *Task 1 – Support on Planning Matters: 15%*
- *Task 9 – Transition Plan: 60%*
- *Task 12 – Other Support: 15%*
- *Preparation of an Integrated Report: 100%*

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Visit by Officials from ASA and SEMARNAT to MITRE

On 7 April 2011, officials from SEMARNAT (led by Secretary Juan Elvira) and ASA (led by Director-General Gilberto López Meyer), visited MITRE for a number of presentations, discussions, and laboratory demonstrations regarding the SCT-MITRE project. Their visit to MITRE was extremely useful and the feedback obtained regarding hydrological needs in the Mexico City area, and particularly Texcoco, was invaluable. The officials from SEMARNAT were also made aware of the bird hazard concerns pertaining to the development of a new airport in the Texcoco area. Following this very useful encounter, SEMARNAT requested a summary report regarding MITRE's analyses relating to water and birds in the Texcoco area. Enclosure 2 to this letter is the summary report that was sent to SEMARNAT.

Visit by Officials from SCT to MITRE

A key outcome during this quarter was the visit to MITRE by Mexico's Undersecretary of Transportation, Lic. Felipe Duarte on 8 April 2011. Yourself (along with Ing. Carlos Espinosa from the DGAC) and Director-General Gilberto López Meyer of ASA joined the visit during the walk through a new laboratory.

In preparation for this visit, MITRE engineers developed a robust agenda and presentations intended to introduce Lic. Duarte to MITRE (this was his first visit), discuss the importance and need for a new Mexico City Airport, and familiarize him with the SCT-MITRE project. The overall status of the project, as well as urgent items that require immediate action were also covered. The agenda also included a visit to MITRE's Air Traffic Management (ATM) Laboratory for several flight demonstrations, which included the Mexico City area. In MITRE's view, the visit was extremely successful and useful for both MITRE and the SCT.

Visit by Officials from SENEAM to MITRE

A team of officials from SENEAM visited MITRE from 4-6 May 2011. SENEAM's Director-General, Ever Molina, participated in the activities of 4 May. The visit by SENEAM, which was originally planned for December 2010, was critical in order to obtain important aeronautical feedback and to coordinate essential work that needs to be conducted by both SENEAM and MITRE in order for the project to continue advancing. As a result, SENEAM is now fully aware of key findings, issues, and urgent technical matters that need to be addressed. A plan to address these matters has been prepared and is currently underway.

Prior to the above-mentioned visit, the MITRE team prepared numerous highly detailed technical briefings and demonstrations covering its airspace and procedure-related analyses of the Texcoco site, as well as materials on both Tasks 10 and 11. This required extensive preparations by MITRE prior to the visit.

The following is a listing of the briefings and demonstrations provided by MITRE to SENEAM during the visit:

4 May 2011

- Introduction to the MITRE Team
- MITRE and its Work
- The SCT-MITRE Project: Description and Status
- Visit to the Air Traffic Management (ATM) Laboratory: Flight Demonstrations
- Impact of Santa Lucía on Texcoco Operations: Findings and Recommendations
- Civil/Military Airports: Important Considerations
- Advanced Navigation Technology
- Performance-Based Navigation (PBN): Lessons Learned
- Bird Hazard Considerations and Risks
- Texcoco-Toluca Weather Analysis

5 May 2011

- Exploratory Airspace Investigation of the Texcoco-Toluca Area: Issues and Potential Constraints
- Independent Approach Procedures at Denver and Atlanta
- Preliminary Runway Spacing Analysis of the Texcoco Area
- Examination of Instrument Procedure Development for the Texcoco Site
- Texcoco Potential Runway Configurations
- Toluca Airport Expansion: General Discussion
- Air Traffic Management (ATM) Considerations Pertaining to Texcoco Development

6 May 2011

- Planning for Upcoming Collaboration
- Task 10-Related Work: Overview and Status
- Task 11-Related Work: Overview and Status
- Next Steps

The most important conclusion of this meeting was a requirement and technical agreement between SENEAM and MITRE concerning the Santa Lucía Military Base. The Base needs to be moved to a new location, probably within the new Texcoco Airport by the time the new airport opens. Not doing it would lead to important issues of safety

and capacity. For more details, read below the section entitled *Santa Lucía Military Base Relocation*. MITRE needs urgently a final decision on this matter by SCT.

Visit by MITRE Engineers to Performance-Based Navigation (PBN) Go-Team Meetings in Mexico City

As a part of Task 10 work, two MITRE engineers visited Mexico City from 26-29 April 2011 to participate in PBN Go-Team meetings. During the meetings, MITRE's leading expert in the area of Flight Management Computers (FMCs) provided a detailed briefing on the benefits of advanced navigation procedures, important considerations regarding the differences between FMCs, and procedure development issues. MITRE also participated in technical workshops.

Texcoco-Related Activities

The above-mentioned visits to MITRE allowed detailed discussions to be held on several items of importance that affect Texcoco work. The most important items are described below.

Santa Lucía Military Base Relocation

MITRE engineers presented their work regarding the assessment of potential interactions between operations at an airport in the Texcoco site and the Santa Lucía Military Base using its ATM Laboratory visualization and simulation demonstration, as well as other supporting presentations. As mentioned in the previous Technical Letter, MITRE has arrived at the conclusion that the existence of the Santa Lucía Military Base along with a new airport at Texcoco would create a highly complex airspace environment (with all the safety issues that come with that) and would adversely impact runway capacity, thus reducing the overall benefit of the Texcoco Airport. Therefore, MITRE is recommending that Santa Lucía Military Base be relocated (see the "Next Steps" section of this letter for important decision-making requests). SENEAM is also in agreement with this technical recommendation.

SCT officials are now fully aware of this matter, including Lic. Felipe Duarte. However, a final decision regarding the relocation of Santa Lucía Military Base needs to be made by federal authorities as soon as possible. This matter has been adding to other project delays since December 2010 (read below "Next Steps"). MITRE stands ready to support the federal authorities in making this essential decision.

Hydrology and Birds

As mentioned above, the feedback obtained from SEMARNAT regarding hydrological needs in the Mexico City area, and particularly Texcoco was extremely useful. The officials from SEMARNAT and SCT were made fully aware of the bird hazard concerns pertaining to the development of a new airport in the Texcoco area.

It is important that appropriate officials (e.g., CONAGUA, SEMARNAT, etc.) determine if the water bodies in the Texcoco site can be totally removed, including Lago Nabor Carrillo, or not. If not, it is important to know which water bodies would remain

and what new water bodies would need to be created and where. This is because their location can influence runway siting and overall operational safety at Texcoco. Furthermore, important bird mitigation experiments (which can only be performed during the high-bird population periods of the winter months) would need to be conducted to ensure that aircraft can operate safely.

Nearby Hills

Hills located to the north and south of the Texcoco site penetrate the International Civil Aviation Organization (ICAO) Annex 14 Obstacle Limitation Surfaces. It would be ideal if they could be removed. Therefore, ASA investigated the possibility of eliminating the hills. Feedback from ASA indicates that the removal of the hills in question is likely to be feasible. Furthermore, officials from SENEAM examined if eliminating the hills is actually necessary or not from an operational perspective (i.e., if the hills could be waived). Feedback from SENEAM indicates that the penetrations can be waived.

Minimum Vectoring Altitude Charts (MVAC)

The results of SENEAM's radio and radar coverage examination of the Texcoco/Toluca area were received by MITRE in early June. MITRE is now in the process of reviewing the information. Assuming there are no coverage issues, MITRE will submit a final MVAC package to SENEAM for a final review. If there are issues, however, SENEAM will need to take appropriate actions to address and resolve the problems as soon as possible. This is important since the Texcoco/Toluca MVAC must be finalized in order for MITRE to advance its work.

Long Finals

While the Texcoco site itself is relatively flat, high terrain surrounding the site complicates procedure development. MITRE's analyses indicate that the high terrain may require final approach paths for Texcoco that are relatively long (sometimes referred to as "long finals"). The main concern regarding long finals is that they may extend well beyond the normal operating range of Instrument Landing System (ILS) signals. This matter was discussed with officials from SENEAM who are exploring how to investigate this matter to determine if the long finals would create a problem. This is an important subject that needs to be addressed as soon as possible, but no later than August 2011 so that MITRE's work can advance. It is a matter beyond the scope of the project.

Climb Gradients on Missed Approaches

Many of the ILS approach procedures at Texcoco require climb gradients on missed approaches in order to avoid obstacles and provide appropriate and usable minimums. ICAO has, for a long time, permitted climb gradients to be published for missed approach procedures and the United States (U.S.) Federal Aviation Administration (FAA) has recently adopted this practice. These standards would need to be adopted by Mexico.

Officials from SENEAM reviewed the relevant U.S. FAA criteria and determined that Mexico could eventually adopt this practice. It is also important to mention that

SENEAM should coordinate with airline representatives to ensure that this practice would be accepted for operations in the Mexico City area.

It is important to reach a conclusion on the above-mentioned items that have not yet been addressed as soon as possible so that a final decision on a Texcoco runway configuration can be made. As a result, final procedure- and airspace-related work can then commence.

Task 10-Related Analyses

As you know, Task 10 activities are intended to enhance navigation in Mexico and to examine plans for the development of an airport in the Riviera Maya area in Quintana Roo state. In doing so, the MITRE Task 10 team is providing support in the three areas described below.

MVACs:

The guidelines and criteria for developing MVACs in Mexico have been agreed upon. In that context, an overall design of the Monterrey MVAC is considered complete. The overall design of the Texcoco/Toluca MVAC is considered preliminarily complete. As mentioned before, MITRE is now in the process of reviewing the recently received results of the Texcoco/Toluca radar and radio coverage examinations conducted by SENEAM.

Riviera Maya Interoperability:

This work focuses on the airspace interoperability of a new airport in the Riviera Maya area and the airports in Cozumel and Cancún. MITRE engineers have advanced on the development of potential airspace concepts to determine if any conflicts may arise in the future. Runway siting work for the Riviera Maya site was also conducted, which was based on potential runway coordinates, site boundaries, and noise sensitive areas provided by SENEAM under authorization of DGAC.

Unfortunately, later on, the DGAC provided coordinates of the Riviera Maya site boundaries (originally requested to be received by 30 September 2010) which did not match the ones by SENEAM. This happened until late March 2011, very late in the process. Upon review of the information, MITRE determined that the coordinates of the site boundaries provided by SENEAM were different than those provided by the DGAC. As a result, MITRE had to re-do all of its runway siting work using the site boundary coordinates provided by the DGAC. The delay in receiving this basic data, as well as associated discrepancies and resulting re-do has caused a delay on Task 10 work. Fortunately, MITRE now has the most important data it needs to advance.

Advanced Navigation Implementation:

MITRE is tasked with providing guidance to SENEAM regarding plans for the implementation of advanced navigation systems and procedures, such as Area Navigation (RNAV) or Required Navigation Performance (RNP). In doing so, the MITRE team has begun preparing a technical seminar intended for SENEAM experts and other interested parties. This seminar would preferably be conducted at MITRE's facilities towards the

end of the summer. Having the seminar at MITRE provides the advantage of access to various experts in advanced navigation as well as MITRE's laboratories.

Task 11-Related Analyses

Task 11 consists of analyses conducted by MITRE to assist the DGAC in the development of plans intended to protect and preserve the land and airspace around key airports in Mexico. In the previous Technical Letter, MITRE submitted a document that provided an executive summary of MITRE's exploratory runway expandability examination of the initial ten DGAC-selected airports. The intent of that document was to provide sufficient information to the DGAC to allow it to select the five airports it considers most critical for further analysis by MITRE.

In mid-April 2011, the DGAC selected the following five airports for further analysis by MITRE:

- Guadalajara
- Monterrey
- Toluca
- Tijuana
- San José del Cabo

MITRE is now in the process of conducting more detailed analyses of those five airports, such as the investigation of future approach and departure tracks, the analysis of relevant ICAO Obstacle Limitation Surfaces, the estimation of runway capacity, and the potential impact of noise.

MITRE is also planning to visit some of these airports this summer. This trip is important in order to gain a better understanding of the current airport situation (e.g., constraints and issues) and potential for expansion. It is also necessary to observe operations from the Air Traffic Control Tower and Area Control Center, and to meet with local SENEAM controllers in order to obtain information to support MITRE's work.

Next Steps

MITRE has thoroughly analyzed numerous aeronautical factors and considerations at the Texcoco site. The main non-aeronautical consideration concerns the abundance of birds in the area during the winter. In August 2010, MITRE issued a summary document that establishes that a sharp elimination or dispersion of the birds is necessary. The Mexican authorities may want to attempt experimental mitigation measures (not an area of MITRE's expertise) throughout the final planning phase prior to construction of the new airport.

The following is a summary of required Texcoco-related critical decisions. Most, if not all, of these critical decisions have been mentioned through briefings and Technical Letters such as this one since at least October 2009.

MITRE wants to express its concern about the delay on these decisions, as it causes as much delay to the project as did previous delays with data. It certainly also causes a delay in the construction of an airport that should substitute an airport that has reached its saturation point.

Essential items for MITRE to proceed with its work:

- Santa Lucía Military Base Relocation:

Initiation of intense discussions at appropriate Mexican government levels on the decision of the relocation of the Santa Lucía Military Base when the new Texcoco Airport opens for operation, in about 8 to 10 years. Military personnel may want to come to MITRE to see simulations and other work.

Back in September 2010, nine months ago, MITRE requested that this decision be made at the latest by the end of December 2010 so that work in the area of runway configuration design, procedure design, and noise impact would not stop. MITRE has not been informed of any decision and, as a result, nine months without additional configuration work have elapsed.

- Airspace and Procedure Design:

Continued uninterrupted intense and flexible collaboration with SENEAM airspace design experts regarding procedural and airspace matters, including an expanded Toluca.

- Runway Configuration Development:

Initiation of intense discussions with DGAC, SENEAM, ASA, CONAGUA, and other interested parties regarding the selection of a runway configuration for Texcoco considering all key factors (runway spacing, runway length, obstacles, instrument procedures, airspace, noise, bird hazards, etc.). Many of the items mentioned in the "Texcoco-Related Activities" part of this letter need to be addressed so that a decision regarding the Texcoco runway configuration can be made.

Please do not hesitate to contact me if you need any clarification or any other assistance.

Sincerely,



Ing. Robert W. Kleinhans
Project Leader

Enclosures

cc: Lic. Felipe Duarte, SCT
Ing. Agustín Cano Galván, SCT
Dr. Bernardo Lisker, MITRE