

27 November 2014
F500-L15-002

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de la Ciudad de México
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MÉXICO

Subject: Points of Consideration Concerning the Development of NAICM

Dear Lic. Núñez:

President Enrique Peña Nieto made an important and courageous decision when he authorized construction of a major, new and complex airport for Mexico City. At the same time, MITRE staff that has worked on this project, one way or another, continuously, for almost 18 years were very enthusiastic upon hearing the news.

This document has been prepared in an effort to keep you, key aviation officials, and other project stakeholders thoroughly informed, to the best of MITRE's ability, about important factors concerning the initial stages, through late 2015, regarding the development of the Nuevo Aeropuerto Internacional de la Ciudad de México (NAICM). The focus of this document is on actions that require your attention in the near-future, as well as concerns that could potentially become issues.

With the above-mentioned thoughts in mind, we have organized during the present year, here at MITRE, two lengthy, internal meetings attended by our most senior technical experts to determine the best possible way to assist you with our work program as much as possible. During the first of these two MITRE meetings, in early March, we developed a table, entitled *Summary of Critical Aeronautical Steps* (initially sent to ASA as document F500-L14-022, dated 28 March 2014). In May and June we also sent copies of the table to Servicios a la Navegación en el Espacio Aéreo Mexicano (SENEAM) and to you, respectively. We finally sent an additional copy to your attention in September. The table summarizes the aeronautical analyses, their prerequisites, and related actions that need to take place during 2014 and the upcoming years. MITRE wonders to what extent the table has been disseminated and utilized.

The second MITRE meeting took place in early September to prepare a list of actions and concerns regarding the development of NAICM. In late September, Dr. Bernardo

Lisker met with you to communicate the results of that second meeting at MITRE. Later on, during an International Civil Aviation Organization (ICAO) conference in Montreal, Dr. Lisker communicated the same information to Cap. Gilberto López Meyer.

This document details items presented to the Mexican aviation authorities by MITRE on several occasions, as well as the main points presented to you by Dr. Lisker during the meeting mentioned above. Many of these points were also included in the *Summary of Critical Aeronautical Steps* table previously referenced.

Let me start with a question of particular interest that is frequently asked. The question is: *what are the final runway coordinates and elevations of NAICM and how/when can they be determined?* While the answer is straightforward, it is important to emphasize that it is a collaborative answer between the Mexican aviation authorities, the airlines, and MITRE. The MITRE part itself has been advancing and can be completed by the summer of 2015 if the other parties complete the three first bullet items listed below no later than late-April 2015:

- Acceptance by all major Mexican airlines regarding conducting missed approach and departure climb gradients above standard. **To do so, it is critically important for MITRE to receive contact information about top officers at appropriate airlines no later than early-January 2015 to coordinate discussions at the MITRE facilities as soon as possible.** This also assumes that the Mexican aviation authorities will enact norms required to conduct climb gradients above standard.
- Development of flight checks and validation by the Mexican aviation authorities, probably SENEAM, to ensure that undetected obstacles and other safety and operational factors do not affect procedural designs. Flight checks and validation occasionally sometimes need to be repeated when procedures are modified, which is something that can happen for a variety of reasons.
- Assessment of the Chiconautla and Chimalhuacán hills on the basis of runway elevations and existing procedures previously developed by MITRE, to be followed by acceptance by the Mexican aviation authorities about grading the hills to avoid United States (U.S.) Standard for Terminal Instrument Procedures (TERPS) obstacle clearance surface penetrations. Additionally, the authorities will need to decide the extent of grading considering Annex 14 penetrations.
- Final assessment of all approach and departure procedures by MITRE. This assessment is currently being performed on the basis of recent photogrammetric work and will utilize information stemming out of the three previous bullets, as well as **data on the definitive NAICM boundaries to be received by MITRE no later than mid-December 2014.**

Following the above-mentioned collaborative work, the Dirección General de Aeronáutica Civil (DGAC) will be in a position to validate and declare as final all procedural work (with SENEAM's support). The DGAC will likely consider in its final assessment non-aeronautical matters beyond MITRE's work scope, such as civil engineering, site preparation, and drainage analyses. It is at that point that runway

coordinates and elevations may be declared by the DGAC as final with a reasonable degree of certainty.

The rest of this document amplifies some of the above points, as necessary, and incorporates others, categorized in several parts. Dates and/or actions of importance will continue to be highlighted in yellow.

NAICM: Construction-Related Items

The following bullet points are all connected to matters that involve, directly or indirectly, construction.

- **IMPORTANT: Reiteration of Relevant Recommendations.** Per Technical Letter F500-L14-022 dated 28 March 2014, mindful about the importance of phasing construction of the airport in a manner that will simultaneously accomplish short-term goals relating to construction best practices and long-term strategic aims, MITRE made two important recommendations concerning runway construction. Please consider in what follows that the six runways at NAICM are denoted as 1 through 6 as counted from west to east.

The two recommendations repeated here are deemed by MITRE as very important because the consequences of not following them may cause important complications in the future.

- MITRE strongly recommends that the first three runways to be opened are runways 1, 3, and 6 (instead of the planned runways 2, 3, and 6 shown in the Arup *Anteproyecto Ejecutivo* of 1 September 2014). Constructing the outer runways (1 and 6) will help to ensure and protect the ability of the airport to achieve its ultimate six-runway layout configuration. The eastern-most runway (runway 6) can at first primarily be used by Fuerza Aérea Mexicana (FAM) transport aircraft that will relocate to NAICM from Santa Lucía Military Base (Santa Lucía), as well as presidential and other governmental aircraft operations. For that reason, taxiing to and from the terminal area will be minimal.

On the basis of many years of experience, MITRE is convinced that if runway 1 is not built initially it may never be built, primarily due to unjustified environmental reasons that may prove to be politically unsustainable. Thus, the envisioned six-runway airport would be curtailed to five runways and a reduced longevity. The allegation that constructing runway 2 after runway 1 is too complicated is not only an overstatement, but also needs to be balanced against the possibility of NAICM ending up with one fewer runway.

- MITRE recommends that all runways be constructed with a width of 60 m (not the 45 m recommended for runway 2 in the Arup *Anteproyecto Ejecutivo* of 1 September 2014). Constructing all runways 60 m wide would allow operational flexibility for all aircraft and ultimately permit

airlines to avoid having to deal with what may amount to substantial restrictions, which is not recommended for a brand new airport. Additionally, while aircraft requiring a 60 m wide runway may always be a proportionally small part of the airport's fleet, within a few years their actual number will be sizeable as the airport's operational volume increases. Another consideration worth mentioning is that under the current *Anteproyecto*, whenever runway 3 closes for any reason, the only alternative for aircraft requiring a 60 m wide runway is going to be taxiing to and from runway 6, which is far away from the terminal area.

Significantly, increasing the runway width by 15 m should not increase relative costs substantially and will save costs and problems later. Widening runway 2 to 60 m in the future would be extremely expensive, complicated, requiring among other things, closing of a runway, relocation of runway lights, and other expensive modifications.

- **Pre-Master Plan.** Following receipt of the Arup *Anteproyecto Ejecutivo* in late October, a MITRE team was assembled and started to work in its review as soon as possible, two weeks ago. Assuming that MITRE receives all associated documents referred to in the main document (Volume 1), MITRE expects to complete this review in the early part of 2015. Please consider the potential impact of the items discussed in this letter on the development of the actual Master Plan. MITRE will be happy to discuss things further.
- **Coordinates of NAICM Property Boundaries.** As mentioned before, MITRE requires a drawing (preferably in AutoCAD) showing the definitive boundaries of the full property allocated for the construction of NAICM, utilizing coordinates based on World Geodetic System 1984 (WGS84). Depending on the specific boundaries that are provided to MITRE, runway ends may need to be displaced for landing and/or the portion of the Approach Lighting System may need to be located outside property boundaries. Therefore, this information is essential to refine MITRE's procedure design work.
MITRE requires this information no later than mid-December 2014.
- **Final Runway Lengths.** Airline payload and range considerations affect runway length requirements. Feedback from the airlines based on their own internal analyses is extremely important in arriving to a final decision concerning runway length. The MITRE approach and departure procedures developed so far utilized runway lengths (all of which are either 4500 m or 5000 m) coordinated by the DGAC during the initial feasibility project which ended in 2012. It is important at this point in time for MITRE to engage with the airlines in order to discuss ways and means to complete the various analyses required to determine final runway lengths. One alternative, of course, would be to keep the runway lengths MITRE utilized during its feasibility analysis. Still, the airlines should validate those lengths and the FAM, in conjunction with the airlines, should validate the length of the eastern-most runway.

MITRE requires contact information about top officers at appropriate airlines no later than early-January 2015 to coordinate discussions at MITRE's facilities as soon as possible.

- **Chiconautla and Chimalhuacán Hills.** The hills at Chiconautla and Chimalhuacán penetrate some important obstacle limitation (ICAO Annex 14) and/or obstacle clearance surfaces (U.S. Federal Aviation Administration [FAA] TERPS). Penetrations can affect safety in an important manner and therefore, a decision by the Mexican aviation authorities regarding the grading (including to what extent) of the hills at Chiconautla and Chimalhuacán must be made. MITRE plans to determine the extent of the penetration of the two hills to the surfaces mentioned above by mid-April 2015.

In the meantime, MITRE recommends that the Mexican aviation authorities investigate ownership matters to support future decisions regarding the grading of the hills. Note that several tall antennas are located on the Chiconautla hill.

- **Runway Coordinates and Elevations.** This subject is presented in the first part of this letter (before the "NAICM: Construction-Related Items" section). It is a subject that should not be rushed as errors can lead to engineering and construction issues that can be very difficult and expensive to rectify. Hence, MITRE would like to stress that rushing work or skipping steps before critical aeronautical evaluations are completed can result in major engineering and construction problems.
- **Commencement of Operations.** It is MITRE's understanding that NAICM's operations are slated to begin towards 2020/2021. This is a positive development. MITRE's overall work plan extends into the 2021 timeframe. This is due to our position that, given past experiences of major airport development projects, it is difficult to conceive commencement of a safe and efficient three-runway operation before the above-mentioned timeframe. This is not to say that the present Mexican federal administration may not be able to deliver parts of the project at a very advanced stage.

FAM-Related Items

- **Permanent Closure of the Runway at the Base Aérea Militar No. 1 and Elimination of Associated Special Use Airspace (SUA).** MITRE maintains that in order for NAICM to operate safely, the runway at the Base Aérea Militar No. 1 (hereafter referred to as Santa Lucía) must be closed and its fixed-wing non-transport aircraft, such as fighter and trainer aircraft, must be relocated to another airport. Additionally, all SUAs associated with Santa Lucía need to be eliminated.

This traffic relocation would transfer Santa Lucía traffic to airports located in the proximity of the Valley of Mexico, such as any new airport in the state of Hidalgo, Querétaro Airport, and other, currently unnamed airports. The airport to which

such aircraft would be relocated needs to be examined in great detail. MITRE was commissioned to do so in Hidalgo and has done out-of-scope work on the feasibility of Querétaro Airport. None of that work is conclusive and no other airport has been analyzed.

Permanent closure of Santa Lucía's runway, that is, **having the runway marked and published as closed**, is one of the essential pre-conditions to enable MITRE and various international aviation entities declare NAICM a safe operation. This was ascertained by MITRE in document F500-L14-022, dated 28 March 2014, where we explained that

"...the need to close the Santa Lucía runway has been studied for several years...and its connection to crucial aspects of safety and capacity established beyond doubt. Leaving that runway open for a theoretically low number of operations...is not advisable from a safety and capacity point of view..." We also added in that communication our *"...strongest concern about continuing efforts to leave that runway open, as MITRE does not want to be associated with a decision that could cause serious air traffic problems."*

Additionally, following a visit to MITRE during which we presented our NAICM work in great detail, ICAO issued document TC2/3.45, dated 7 May 2014. **The ICAO conclusions matched MITRE's entirely and, if anything, strengthened the case for closing Santa Lucía's runway by commenting on additional concerns.**

Last but not least, **experts from SENEAM who collaborated with MITRE during the past few years expressed their technical opinion that the runway at Santa Lucía should be permanently closed.** This opinion was communicated in writing by MITRE in document F500-L12-015, dated 3 July 2012.

The two following bullet items relate to specific solutions concerned with the relocation of fixed-wing traffic currently operating at Santa Lucía, as well as MITRE's urgent need to re-engage FAM.

- **Relocation of Fixed-Wing Traffic Currently Operating at Santa Lucía.** FAM officers visited MITRE on 30 January 2014 and, to avoid any delays, MITRE corresponded with a visit to Santa Lucía less than three weeks later, on 18 February 2014. Throughout the two visits, MITRE described the full NAICM project and no questions were left unanswered. The two encounters, during which you honored us with your presence, resulted in the following understandings:
 1. All Santa Lucía helicopter operations (including helicopter maintenance) are to remain at the base, pending a MITRE analysis. That analysis was later completed and transmitted to ASA, but was never presented by MITRE to FAM for review and discussion. MITRE attempted to coordinate a meeting several times, but all three scheduled meetings were cancelled.
 2. All Santa Lucía helicopter training is to relocate to a FAM-recommended area that MITRE will analyze. FAM was to send to MITRE the coordinates of that area by 25 February 2014 for MITRE's immediate analysis. MITRE,

however, never received the information nor has received an explanation as to why the information was not sent.

3. Fixed-wing military non-transport aircraft, such as fighter and trainer aircraft, are to relocate, along with its support facilities, to another airport, possibly a new airport in Hidalgo, or Querétaro Airport.
4. Fixed-wing transport aircraft operations are to relocate to NAICM's runway 6, along with its support facilities.
5. All SUAs associated with Santa Lucía operations are to be eliminated.

Ever since the visit to Santa Lucía in February 2014, MITRE has worked very intensely on two potential solutions to accommodate military fixed-wing non-transport aircraft:

- The existing Querétaro Airport, which MITRE visited, was studied and preliminary solutions including a new SUA close to Querétaro were analyzed. This work was out-of-scope, as mentioned elsewhere in this document.
- Four sites in the state of Hidalgo were studied and slated for further examination.

Despite several attempts, none of these solutions to accommodate FAM's military fixed-wing non-transport aircraft have been presented, reviewed, and discussed by MITRE with FAM.

Furthermore, we are somewhat confused by ASA's recent instruction to stop all work in Hidalgo. During your conversation with Dr. Lisker, you confirmed (and we fully agree with you) on how important it is that MITRE continues to work on Hidalgo as the sites in that state may end up being among the few solutions for FAM's military fixed-wing non-transport aircraft in the area. Cap. López Meyer had also agreed with this assessment.

MITRE has just stopped all work in Hidalgo. Restarting it could prove complicated if MITRE is engaged by then in other activities. More importantly, a significant loss of time could affect opening NAICM. It is urgent that this matter is discussed and decided.

- **FAM-MITRE Engagement.** It is critical that MITRE discusses and reviews all key matters with FAM and other aviation officials in a collaborative manner. Much of MITRE's work, including the design of Mexico City's airspace, cannot proceed without resolving all pending work with the FAM.

MITRE requires contact information about top FAM officers no later than early-January 2015 to coordinate the re-establishment of discussions at the earliest convenience.

Additional Items

As explained at the beginning of this letter, the objective of this document is to help you prepare and inform you about concerns (before concerns become issues) regarding the development of NAICM between now and late 2015.

Needless to say, there are many remaining action items not discussed in this letter, including some that may (and others that may not) start in 2015, but are not currently a matter of concern. For instance, MITRE plans to discuss with the DGAC norms that need to be enacted to allow the operation of NAICM. Another example is the collaboration of MITRE with SENEAM on such matters as making Cancún Airport a test-bed for NAICM.

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

Sincerely,



Ing. Robert W. Kleinhans
Project Technical Coordinator

cc:

Cap. Gilberto López Meyer
Ing. Jorge Nevárez
Dr. Bernardo Lisker