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Subject: Technical Letter: Summary of Work During the Period 1 July 2014 through 30 September 2014

Dear Capt. López Meyer:

This letter respectfully submits to your attention a summary of the most significant project activities conducted by MITRE during the period 1 July 2014 through 30 September 2014. At the outset, before proceeding with a full description of activities, below is a list of all the documents that we are including along with this technical letter. All the documents on this list are mentioned throughout this letter.

1. Potential Hidalgo Airport Sites: Preliminary Boundary Areas and Runway Locations, dated 14 July 2014 (see MITRE letter F500-L14-036)
2. Automated Weather Observing System (Revised Proposal Review), dated 21 July 2014 (see MITRE letter F500-L14-037)
3. Auditorium Assessment, dated 13 August 2014 (See MITRE letter F500-L-14-039)
4. MITRE letter sent along with this Technical Letter: Automated Weather Observing System (Revised Proposal Review), dated 29 September 2014 (see MITRE letter F500-L14-046)
5. Enclosure No. 1 to this Technical Letter (F500-L14-047): Feasibility of Relocating Military Operations to Querétaro Airport – Preliminary Report, dated 29 September 2014
6. Enclosure No. 2 to this Technical Letter (F500-L14-047): Photogrammetric, Satellite-Based Survey of the Texcoco Area and Its Surroundings – Ground Truth Visit Report, dated September 2014

7. Enclosure No. 3 to this Technical Letter (F500-L14-047): Photogrammetric, Satellite-Based Survey of the Texcoco Area and Its Surroundings – Ground Validation Visit Report, dated September 2014

The three above-listed enclosures are briefly described below:

- **Enclosure No. 1: Feasibility of Relocating Military Operations to Querétaro Airport – Preliminary Report.** This report describes MITRE's analysis to determine the principal changes that may be needed to Querétaro Airport's airspace, routes and published arrival and departure procedures to accommodate Fuerza Aérea Mexicana (FAM) fixed-wing military, operations, such as fighter jets, while also continuing to accommodate existing and future civil operations.

It is critical that MITRE discusses and reviews the contents of this report with FAM officials, experts and other stakeholders in a collaborative manner so that appropriate feedback can be obtained. MITRE hopes that ASA can arrange a FAM visit to MITRE soon to discuss MITRE's work at Querétaro Airport, Hidalgo, and other important matters.

- **Enclosure No. 2: Photogrammetric, Satellite-Based Survey of the Texcoco Area and Its Surroundings – Ground Truth Visit Report.** MITRE is responsible for the procurement of a satellite-based survey of the Texcoco area and its surroundings. A team of survey experts from MDA Geospatial Services Inc. (MDA) visited Mexico City from 9 through 20 June 2014 to perform ground truth work.

The purpose of the ground truth work was to collect Check Points (CPs), which were used in the validation of the information derived from the satellite imagery, and to validate and measure selected features greater than 60 m Above Ground Level ("AGL"). MITRE pre-coordinated the visit details and its objectives. This enclosure describes that work.

- **Enclosure No. 3: Photogrammetric, Satellite-Based Survey of the Texcoco Area and Its Surroundings – Ground Validation Visit Report.** Two teams of survey experts from MDA visited Mexico City over the course of a three-week period from 4 through 22 August 2014 to perform ground validation work. MITRE assisted in the planning and coordination of the visit.

The primary objective of the visit was to collect validation points randomly situated throughout the project areas. The information will be used to ensure that all surveyed items collected meet specifications, and that the heights derived from stereoscopic satellite imagery are accurate. The secondary objectives were to collect additional CPs that will be used to help calculate final accuracies and to visit the few remaining sites that required permission to access.

MITRE wishes to thank ASA for its support and assistance in facilitating the work by the survey teams. The final survey deliverable is expected to be received by MITRE by the end of October 2014. That survey will then be carefully reviewed and then used by MITRE to assess existing Nuevo Aeropuerto Internacional de la

Ciudad de México (NAICM)-related aeronautical work (e.g., instrument approach and departure procedures). Afterwards, Servicios a la Navegación en el Espacio Aéreo Mexicano (SENEAM), in coordination with MITRE, will use that survey to validate and verify MITRE's aeronautical work.

Other Activities

The following list describes additional important activities conducted by MITRE during this reporting period:

- MITRE has been advancing on its examination of the feasibility of conducting triple independent Category (CAT) II/III Instrument Landing System (ILS) approach procedures, both to the north and south, at NAICM. Although not yet complete, the above-mentioned photogrammetric survey indicates that there have been changes since the previously-conducted 2010 survey. Therefore, once the final 2014 survey has been received, MITRE will re-verify its CAT II/III ILS approach procedure work.

MITRE's instrument procedure design work for NAICM is based on United States (U.S.) Federal Aviation Administration (FAA) standards, which have been used in Mexico for many years. MITRE's preliminary CAT II/III approach procedure design work at NAICM (using the 2010 survey) shows that CAT II/III approach procedures are only feasible to one of the 12 runways (considering the ultimate six-runway development of the airport). This is due in large part to strict U.S. FAA standards that state that in order to allow CAT II/III approach procedures, the CAT I approach procedure to that runway must be unrestricted. An unrestricted CAT I approach procedure is one that supports CAT I minima of 200 ft Height Above Touchdown (HAT) and ½ statute mile (sm) visibility. Additionally, the unrestricted minima must be achieved without the application of a Climb Gradient (CG) on the missed approach. Unfortunately, all of the runways at NAICM, except for Runway 36R (which is not one of the opening-day runways), have either slightly higher than a 200 ft HAT (due to precipitous terrain issues), or a CG on the missed approach (due to obstacle issues), or both. Note, that there is at least one known case in the U.S. of a runway that has a CAT I approach procedure with a CG, as well as CAT II/III approach procedures to the same runway. This, however, is an exception.

International Civil Aviation Organization (ICAO) procedure design requirements and criteria differ from U.S. standards when it comes to the development of CAT II/III approach procedures. Although a direct comparison between the two criteria cannot be made, there are examples of ICAO CAT I approach procedures that have a HAT greater than 200 ft and/or a CG in the missed approach segment yet still allow for CAT II/III approach procedures to the same runway. Therefore, ICAO provides a different CAT II/III approach procedure development philosophy for consideration.

If CAT II/III approach procedures are to be considered at NAICM, it may be necessary for the civil aviation authority of Mexico to adopt or develop criteria that would allow the development of CAT II/III approach procedures at NAICM. This decision is important because CAT II/III approach procedures have different infrastructure requirements than CAT I approach procedures that must be considered early-on in the overall airport construction planning process. For example, more complex runway lighting systems are required for CAT II/III approach procedures.

- On 11 July 2014, Dr. Bernard Lisker and myself had a teleconference with Lic. José Pablo Maauad, Secretary of Economic Development of the State of Hidalgo, and his team to discuss the on-going work that MITRE is conducting regarding the potential new airport sites in his State. During this teleconference, MITRE discussed the preliminary non-aeronautical investigations of the four potential airport sites being conducted by the State of Hidalgo to identify issues that could impede airport construction, as well as next steps and other project-related matters.
- On 14 July 2014, MITRE submitted a document entitled *Potential Hidalgo Airport Sites: Preliminary Boundary Areas and Runway Locations* to Lic. José Pablo Maauad to assist officials of the State of Hidalgo in further examining non-aeronautical matters at the four potential new airport sites. The figures contained in the document show the dimensions and coordinates of the areas being considered for the development of an airport, including the preliminary location of a runway and its approach lighting systems. That document is being sent as a reference, along with this Technical Letter (see MITRE letter F500-L14-036).
- As requested by Ing. Nevárez, the MITRE team reviewed a technical proposal submitted to ASA by Rossbach de México S.A. de C.V. describing the Vaisala AWOS being considered for installation at the three potential airport sites to be selected in the State of Hidalgo. MITRE sent a document to ASA on 21 July 2014 (see MITRE letter F500-L14-037) that provided comments on that proposal. Additional information on other important considerations that should be addressed by ASA early on, such as construction work items, land acquisition or leasing matters, and other installation recommendations was also reiterated. That document is also being sent along this Technical Letter, as a reference.
- In late July and mid-August, officials from the State of Hidalgo submitted the preliminary results of their non-aeronautical investigations of the four potential airport sites being considered in Hidalgo. The MITRE team conducted a thorough review of the information. As a result, MITRE has a better understanding of non-aeronautical matters affecting the potential airport sites. However, more detailed discussions with officials from the State of Hidalgo are required in order to ensure that there are not any issues that could prevent the construction of an airport at any of the sites under consideration.

- On 11 September 2014, MITRE received from ASA a revised technical proposal submitted to ASA by Rossbach de México S.A. de C.V. describing the Vaisala AWOS being considered for installation at the three potential airport sites to be selected in the State of Hidalgo. Additionally, MITRE received from ASA a letter that provided feedback regarding important ASA-related considerations and responsibilities highlighted by MITRE in its previously submitted above-mentioned AWOS response letter (see MITRE Letter F500-L14-037).

The MITRE team reviewed both documents. MITRE comments and feedback are provided in a document that is being sent along with this Technical Letter (see MITRE Letter F500-L14-046). Note that it is important that appropriate AWOSs be ordered very soon so they can be installed in a timely manner at each of the three potential airport sites once they are selected.

- MITRE is responsible for the procurement of a satellite-based survey of the three potential airport sites in the State of Hidalgo once they are selected. In anticipation of this requirement, MITRE has continued to conduct and coordinate technical preparatory activities. For example, MITRE is in the process of determining preliminary survey boundaries and preparing technical specifications material. This will allow MITRE and MDA to advance at a quick pace so that Hidalgo-related survey work can commence as early as possible.
- It is important to mention that MITRE has made a significant effort to coordinate a visit by officials from the State of Hidalgo to MITRE to discuss MITRE's Hidalgo-related work. However, that visit has not yet occurred. As a result, a decision on which three potential airport sites should be selected for further analysis by MITRE has not been made, which is causing a delay to MITRE's overall Hidalgo work schedule. For example, the photogrammetric surveys and installation of AWOSs, which are very time consuming tasks, cannot commence until the three potential airport sites are selected. Additionally, efforts were made to coordinate a visit to MITRE by officials from FAM to discuss both Hidalgo and Santa Lucía matters, but they were also not available. MITRE hopes that ASA can arrange for those visits soon, to avoid further delays.
- Following conversations between Dr. Bernardo Lisker and you in August during which you instructed MITRE to move on with the Hidalgo studies, Dr. Lisker consulted on the course of the Hidalgo work with Lic. Manuel Ángel Núñez in September. Lic. Núñez provided identical feedback as yours.
- As requested by ASA, MITRE examined the potential impact to aeronautical operations caused by the proposed construction of an auditorium to be constructed by the State of Mexico near the NAICM site. MITRE sent a document to ASA and to Ing. Manuel Ortiz, Secretary of Public Works and Water of the State of Mexico, on 13 August 2014 that provided the results of MITRE's extensive examination. That document is being sent along with this technical letter as a reference (see MITRE letter F500-L14-039).

It is also important to mention that MITRE sent to ASA the files that Ing. Ortiz provided to MITRE containing the appropriate information required for MITRE to conduct its assessment of the auditorium.

- As mentioned in MITRE's previous work summary Technical Letters, MITRE agreed to examine (despite being out of scope) the feasibility of new helicopter training areas to be recommended by FAM officials (as Santa Lucía Military Base will not be safe for such training once NAICM opens). FAM was to send to MITRE the coordinates of those areas by 25 February 2014, seven months ago, for MITRE's immediate analysis. MITRE, however, has not received to-date any information nor has received an explanation as to why the information was not sent. In early July, MITRE requested via e-mail assistance from ASA in obtaining the data from FAM. Unfortunately, the data has still not been provided to MITRE.
- ASA requested that MITRE examine the impact of the following proposed construction projects on future NAICM operations:
 - Feasibility of Comisión Federal de Electricidad (CFE) powerline
 - ARUP-proposed runway shift (i.e., Runway 5, as counted from west to east)
 - Feasibility of a new water tank and examination of an existing water tank, north of the Texcoco site

In the case of the CFE powerline, MITRE is awaiting confirmation that the part of the powerline that runs along the western boundary of the NAICM site will be fully underground. Additionally, MITRE is waiting for information regarding plans to continue the powerline from the eastern side of El Caracol to the northeast towards Teotihuacán. In early September, MITRE was informed by ASA that Sr. Raúl González Apaolaza from Grupo Aeroportuario de la Ciudad de México (GACM) will be providing this information. However, MITRE has not yet been contacted by Sr. González nor has MITRE received any information on the powerlines. MITRE then requested that ASA contact Sr. González to find out the status of the powerline information.

In the case of the ARUP-proposed runway shift, for MITRE to conduct this examination it is important that it receives information regarding plans to continue the powerline from the eastern side of El Caracol to the northeast towards Teotihuacán since it could affect Runway 5, and potentially Runway 6.

In the case of the water tanks, in early September MITRE received confirmation from ASA that there are no other structures associated with the proposed water tank facility that have an elevation higher than the top of the water tank. As a result, MITRE is proceeding with its examination of the water tanks and plans to provide results by the end of October.

- MITRE has been coordinating with top former executives that have experience in the area of organizational structures and practices. The executives can provide SCT with lectures and suggestions on best organizational practices and

lessons-learned based on years of supporting major air navigation service providers and civil aviation authorities around the world. Apart from the fact that such assistance is considered within the ASA-MITRE agreement, this is very timely as the SCT moves forward with plans to create a new civil aviation agency in Mexico. MITRE expects to have more detailed discussions with these top executives in the autumn.

- Dr. Lisker travelled to Mexico City during the week of 1 September to attend the announcement by President Enrique Peña Nieto of the NAICM construction. In preparation for the announcement, MITRE created a video describing MITRE's efforts in determining the aeronautical feasibility of the airport. Additionally, Dr. Lisker attended several other meetings and conducted interviews during his visit to Mexico City.
- MITRE would like to reiterate the importance for ASA to use the critical steps document that MITRE submitted in March 2014 (MITRE Technical Letter F500-L14-022) as a guide to avoid delays and potential costly mistakes. Many of these items require intense planning and coordination and long lead-times. Additionally, many of these activities can cause longitudinal runway shifts and/or affect the location of thresholds, which may affect work being conducted by others involved in the planning and development of the airport (e.g., engineering drawings/plans). Some key activities, to name a few, that can lead to longitudinal runway shifts are as follows:
 - Coordination of studies and plans with airlines and other stakeholders
 - Flight checks and/or flight validation activities
 - Note that this requires the acquisition and/or installation of appropriate ILS equipment. MITRE provided information to SENEAM regarding the manufacturer of the type of specialized ILS equipment that is required for conducting the long final approaches envisioned for NAICM.
 - Finalization of runway lengths, partially through Payload and Range analyses
 - Decision by aviation authorities regarding grading (including to what extent) and waivers connected to the hills at Chiconautla and Chimalhuacán
 - Final review of instrument procedures and other key aeronautical work by SENEAM and other authorities
 - Requires a detailed survey of the NAICM site and its surroundings (expected to be provided to MITRE by the end of October 2014)
- MITRE sent to SENEAM in late March 2014 a report on preliminary runway spacing and Air-Traffic-Control-related equipment requirements pertaining to conducting dual independent approaches at Cancún, entitled Independent

Approaches to Two Runways at Cancún (MITRE document F500-L14-022). ASA received this document previously. The report enables SENEAM to start making arrangements for the acquisition and/or development of appropriate equipment and systems to support dual independent operations at Cancún and later at NAICM. This will allow Cancún to serve as a test location so that air traffic controllers can obtain an understanding of issues associated with independent operations and gain experience for the future implementation of such procedures at NAICM.

As stated in MITRE's previous technical letter, MITRE is unaware of any actions taken so far by any party regarding this matter.

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Rob', with a long horizontal flourish extending to the right.

Ing. Robert W. Kleinhans
Project Technical Coordinator

Enclosures: 3

cc: Dr. Bernard Lisker