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**Subject: Technical Letter: Summary of Work Completed or Ongoing During the Period 1 October 2017 through 15 January 2018**

Dear Lic. Patiño:

This letter respectfully submits to your attention a summary of the most significant MITRE project activities conducted or being conducted during the period 1 October 2017 through 15 January 2018.

## Reports

At the outset, before proceeding with a full description of activities, please find below a list of the documents included with this Technical Letter, some of which (six documents) have already been delivered in advance to various Parties throughout the concluding quarter.

1. Memorándum: Edificación cercana al Lago Nabor Carrillo (Opción 8.1) Resumen final del análisis aeronáutico. See MITRE Memorandum H560-L18-003, dated 15 November 2017.
2. Memorandum: Urgent Request for Permit to Sacrifice Four Bird Species. See MITRE Memorandum H560-L18-004, dated 16 November 2017.
3. Memorandum: Water Level and Island Flattening Recommendations. See MITRE Memorandum H560-L18-005, dated 17 November 2017.
4. Memorandum: Urgent Request for Permit to Sacrifice Four Bird Species. See MITRE Memorandum H560-L18-007, dated 17 November 2017.
5. Nuevo Aeropuerto Internacional de la Ciudad de México (NAICM): Presentaciones - Información de Apoyo para Delegación de México durante Visita a MITRE. See MITRE document H560-L18-008, dated 1 December 2017.
6. Guidelines for Upcoming Airspace and Procedure Design. See MITRE document H560-L18-023, dated 9 January 2018.

7. Enclosure No. 1 to this Technical Letter (H560-L18-024): Second Cancún Human-In-The-Loop Simulation Evaluation: Results, dated 11 January 2018.
8. Enclosure No. 2 to this Technical Letter (H560-L18-024): Human-In-The-Loop Simulation Evaluations to Support the Nuevo Aeropuerto Internacional de la Ciudad de México: Laboratory Configuration, dated 11 January 2018.
9. Enclosure No. 3 to this Technical Letter (H560-L18-024): Nuevo Aeropuerto Internacional de la Ciudad de México: Regulatory Modernization - Preliminary Observations, dated 11 January 2018.

The nine above-mentioned documents, whether letters, memorandums, or reports (designated as Enclosures) should be read and analyzed in detail.

The Enclosures are described in a very summary manner below:

- **Enclosure 1: Second Cancún Human-In-The-Loop Simulation Evaluation: Results.** This document describes the results of the second, and final, Human-In-The-Loop (HITL) simulation evaluation for Cancún that was conducted at MITRE's Air Traffic Management (ATM) Laboratory from 28 August 2017 through 1 September 2017.
- **Enclosure 2: Human-In-The-Loop Simulation Evaluations to Support the Nuevo Aeropuerto Internacional de la Ciudad de México: Laboratory Configuration.** This document provides MITRE's description of the technical capabilities and equipment that MITRE plans to use during the upcoming HITL simulation evaluations to support dual- and triple-independent operations at NAICM, as well as modifications to the Mexico Area Control Center (ACC) enroute airspace.
- **Enclosure 3: Nuevo Aeropuerto Internacional de la Ciudad de México: Regulatory Modernization - Preliminary Observations.** This document provides appropriate feedback pertaining to a Servicios a la Navegación en el Espacio Aéreo Mexicano (SENEAM)-provided regulatory document (dated 31 July 2017) that was reviewed by MITRE. The objective of MITRE's feedback is to assist SENEAM so that it can continue advancing with the preparation of regulations to support dual- and triple-independent parallel runway operations at NAICM. Regulations are also needed to support dual independent test-bed operations at Cancún.

## Activities

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

- MITRE was informed in the summer of 2017 by the Dirección General de Aeronáutica Civil (DGAC) that all the previously proposed locations for the *Centro de Gestión de Residuos Sólidos en el Bordo Poniente* have been discarded. Afterwards, the Comisión Nacional del Agua (CONAGUA) informed MITRE that a new location (“Option 6.2”) was being considered and that CONAGUA would like MITRE to express its aeronautical opinion on the appropriateness of that location.

Therefore, MITRE prepared a technical letter that provided MITRE’s overall opinion on the appropriateness of locating the facility at Option 6.2 (and Option 6.1, since then also discarded) from an aeronautical perspective. This document was provided to the Secretaría de Comunicaciones y Transportes (SCT), CONAGUA, and DGAC in September 2017. See MITRE document F500-L17-098, dated 11 September 2017. This activity took place before this reporting period; it is, however, mentioned here as a reference to the follow-on activities that occurred during this reporting period.

On 29 October 2017, MITRE was informed that CONAGUA concluded that the best site for the facility from a hydrological, legal, and property point of view was at a location denominated as “Option 8.1”. As a result, CONAGUA asked again MITRE to provide its opinion, based on its previously conducted aeronautical assessments, on what should be the maximum elevation of the facility located at Option 8.1. **Therefore, the MITRE team examined its previous results. The maximum elevation of any structure at the facility (smokestacks, towers, buildings, etc.) located at Option 8.1 should not exceed 2275 m above Mean Sea Level.**

It is important to note that MITRE did not conduct during this latest time a new full assessment of the facility at Option 8.1 because it is located farther to the east of the extended centerline of the eastern-most runways at NAICM (i.e., runways 5 and 6) than the locations of previous facility location options examined by MITRE.

**Important:** MITRE was informed by CONAGUA that the smokestacks at the facility would be higher than what was discussed in the past. MITRE had previously been informed that the highest structure at the facility would be the smokestacks, at 40-m high). Now, MITRE was informed, other parts of the facility would be higher than the smokestacks. This caused considerable confusion, clarified in the latest document.

A summary of MITRE’s opinion, including other important recommendations and considerations, was provided to SCT (specifically, to the Undersecretariat of Transportation), CONAGUA and DGAC through a memorandum. This

memorandum is being sent along with this Technical Letter as a reference (see MITRE Memorandum H560-L18-003, dated 15 November 2017).

Finally, on 27 November 2017, MITRE was informed by CONAGUA of yet another potential plan (“Option 10”) that involved dividing the facility in two different locations in the Rellenos Sanitarios area. However, the Option 10 plan cannot be endorsed due to potential safety issues. This feedback was transmitted to CONAGUA via e-mail.

The work concerning the *Centro de Gestión de Residuos Sólidos* has taken excessive time because of so many repetitions of the same work in various locations.

- Dr. Bernardo Lisker visited Mexico City from 9 through 12 October 2017 to conduct several high-level executive meetings to discuss important matters pertaining to the NAICM project. Specifically, Dr. Lisker met with you, Ing. Ricardo Tapia, Lic. Alejandro Virchez, and other GACM officials. Also, Dr. Lisker met officials from CONAGUA, including its Director General, Mtro. Roberto Ramírez, as well as Subdirector General Técnico, Dr. Víctor Hugo Alcocer. Key subjects such as the planning and coordination of important bird mitigation experimentation, as well as associated bird survey and hazard work, were covered. Finally, a GACM-MITRE contractual amendment was discussed in detail with you. MITRE accepted to start some activities not yet in the contract on the basis of your verbal approval (such as the bird-related activity discussed below).

During this same trip, Dr. Lisker was honored on 9 October 2017 by the top SCT leadership with the Emilio Carranza Award for Lifetime Merit.

- MITRE is not an expert in bird hazard and/or mitigation matters. However, MITRE has been in discussions with GACM, CONAGUA and others, including Lic. Yuriria Mascott, Undersecretary of Transportation, regarding mitigation experimentation plans and ideas to deal with the bird hazard concern in the Texcoco area. As a result, and due to the urgency to resolve bird hazard matters, MITRE conducted a significant amount of work to contract the services of Dr. Richard Dolbeer and Environmental Resource Solutions (ERS), Inc., as described below:
  - Dr. Dolbeer is a world-renowned wildlife hazard management expert who also has in-depth hands-on knowledge of bird hazard risks to NAICM in the Texcoco area. Dr. Dolbeer was contracted by MITRE to provide consultation on the examination, assessment, and management of potential bird hazards and/or bird attractants on future aircraft operations within and around the NAICM site.
  - ERS, Inc. is a United States (U.S.)-based company that specializes in aviation-related wildlife hazard matters, including conducting bird surveys.

Over a five-month period starting in early November 2017 through March 2018 (i.e., the critical winter months when birds migrate to the Texcoco area), the ERS, Inc. team is to conduct monthly bird surveys (the period may be extended to obtain counts outside the winter) of the following bodies of water in the Texcoco area:

- Lago Nabor Carrillo
- Laguna Facultativa
- Laguna Recreativa
- Lago Churubusco

Additionally, ERS, Inc. is conducting surveys of bodies of water to the north and south of the Texcoco area. Specifically, the ERS, Inc. team is conducting surveys of the following bodies of water:

- Lago de Guadalupe
- Laguna de Zumpango
- Presa Cuevecilla
- Tláhuac Wetlands
- Xochimilco Wetlands and Open Water Habitats

Finally, ERS, Inc. is also evaluating water quality matters through appropriate water sampling and laboratory testing to investigate potential water treatment options to reduce bird food sources, in particular at Lago Nabor Carrillo.

**Important:** since all the above-mentioned work is not contained in MITRE's current scope of work, a modification of the contract will be required. Nevertheless, as mentioned before, due to the urgent request by the Undersecretariat of Transportation and yourself for assistance, MITRE agreed to start this work with the understanding that associated costs would be covered through an upcoming contractual amendment. See farther below in this document for additional information on contractual amendment matters.

- In late October 2017, Dr. Lisker, Dr. Dolbeer, and two representatives from ERS, Inc., Ms. Kimberly Allerton and Ms. Sarah Brammell, visited Mexico City to conduct intense meetings with government officials and other stakeholders regarding the above-mentioned bird survey and bird hazard mitigation work. The following activities were conducted during the visit:
  - 29 October 2017
    - Dr. Dolbeer, Ms. Allerton and Ms. Brammell conducted a helicopter flight of the above-mentioned bodies of water in the Texcoco area, as well as bodies of water farther to the north and south of Texcoco. Afterwards, they were taken by ground vehicle to the bodies of water in the Texcoco area. The helicopter flight

and ground visits were extremely useful and allowed the bird experts to obtain a good overall understanding of the bird situation.

MITRE would like to thank the authorities of CONAGUA, in particular Dr. Víctor Hugo Alcocer, for providing the helicopter and permits for ground visits to the bodies of water.

- 30 October 2017
  - Dr. Lisker, Dr. Dolbeer, Ms. Allerton and Ms. Brammell visited GACM's office to conduct intense discussions with representatives from CONAGUA, and other officials regarding the bird survey and bird hazard mitigation work. Representatives from SUCOFA (a Mexico-based consultant on environmental matters to GACM) were also present.
  - Following the visit to GACM's office, Dr. Lisker, Dr. Dolbeer, Ms. Allerton and Ms. Brammell met with Lic. Mascott, yourself, representatives from CONAGUA, and other high-level government officials, to discuss the bird survey and bird hazard mitigation work further, including the approaching start in early November of surveys.
- Following the completion of the above-mentioned late October 2017 trip to Mexico City, the ERS, Inc. team commenced its bird survey work. During this quarter, the following bird surveys activities were conducted:
  - 3 through 7 November 2017 Survey
    - Survey results indicate that the predominant bird species at the bodies of water in the Texcoco area are Northern Shovelers and Ruddy Ducks. During the morning of 3 November 2017 (peak period during this survey), an estimated 47,633 Northern Shovelers and Ruddy Ducks were observed at the four lakes being considered at Texcoco.
    - Note that initial water quality samples from Lago Nabor Carrillo were obtained during this survey activity. However, the samples were determined to be insufficient for testing purposes. Therefore, additional water samples were obtained again in late November 2017, as described farther below in this document.

- 4 through 8 December 2017 Survey
  - During the morning of 4 December 2017 (peak period during this survey), an estimated 47,401 Northern Shovelers and Ruddy Ducks were observed at Lago Nabor Carrillo and Laguna Recreativa alone. (Bird surveys of Laguna Facultativa and Lago Churubusco were not conducted on 4 December 2017 due to some access issues.)
  - The ERS, Inc. team conducted necropsies of four bird species (two Northern Shovelers and two Ruddy Ducks) obtained by Mexican authorities from Lago Nabor Carrillo during this survey activity. The objective of the necropsies was to determine what those birds are eating, which is an important factor in identifying potential options on how to treat the water at Lago Nabor Carrillo to remove the food sources attracting these types of birds.

In order to sacrifice the above-mentioned four birds for the necropsies, it was necessary for the Mexican authorities to obtain an appropriate permit. Therefore, MITRE provided assistance to the authorities to justify the permit by preparing two separate memorandums describing the need for the necropsies and other matters, such as where the birds should be obtained from, when they should be obtained, and important coordination considerations with the experts from ERS, Inc. Those two memorandums are being sent along with this Technical Letter as references (see MITRE Memorandum H560-L18-004, dated 16 November 2017, and MITRE Memorandum H560-L18-007, dated 17 November 2017).

The results of the necropsies of the Northern Shovelers showed mainly, in the professional opinion of ERS, Inc., algae. The results of the necropsies of the Ruddy Ducks showed mainly seeds and invertebrates.

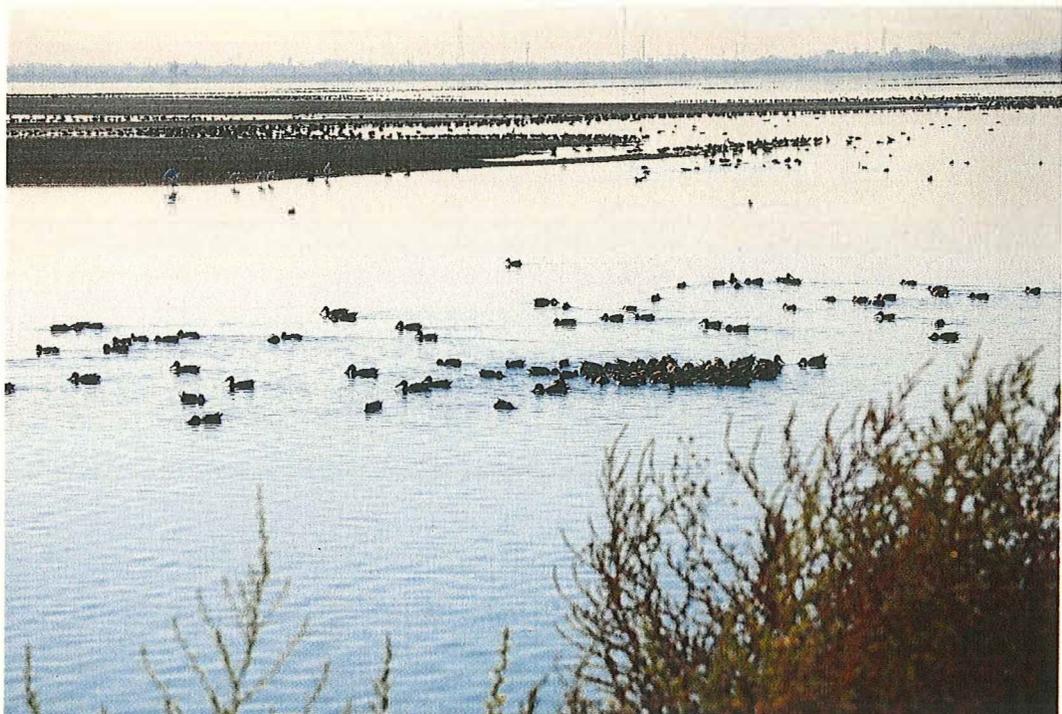
- 8 through 12 January 2018 Survey
  - Results regarding this survey activity will be provided next quarter.

Figures 1 and 2 below show pictures of Northern Shovelers at Lago Nabor Carrillo.



Source: ERS, Inc.

**Figure 1. Northern Shovelers at Lago Nabor Carrillo  
(Picture taken during the Helicopter Flight)**



Source: ERS, Inc.

**Figure 2. Northern Shovelers at Lago Nabor Carrillo  
(Picture taken from the Ground)**

ERS, Inc. is evaluating water quality through appropriate water sampling and laboratory testing to investigate potential water treatment options to reduce bird food sources, specifically in Lago Nabor Carrillo. As mentioned above, initial water quality samples from Lago Nabor Carrillo were obtained during the early November 2017 survey activity. As these samples were deemed insufficient, once again, an ERS, Inc. team travelled to Mexico City from 26 through 28 November 2017 to collect additional water samples from Lago Nabor Carrillo. Sediment samples from Lago Nabor Carrillo were also collected. Additionally, water samples from Laguna Facultativa, Laguna Recreativa, and Lago Churubusco were obtained at that time to obtain a better understanding of the water quality of those bodies of water as well.

The laboratory test results from the above-mentioned late November 2017 samples indicate that all four lakes have very high nutrients (Phosphorus and Nitrogen) and Chlorophyll A levels. The levels indicate each lake is hypereutrophic. Hypereutrophic lakes are very nutrient-rich lakes characterized by severe nuisance algae and low transparency.

The ERS, Inc. team has also been investigating water treatment options to remove the bird food sources (e.g., algae) at Lago Nabor Carrillo. This is work in progress, and MITRE will provide an update on the water treatment investigation being conducted by ERS, Inc. once results are more robust.

Again, since all the above-mentioned water quality sampling, testing, and water treatment investigation work is not contained in MITRE's current scope of work, a modification of the contract will be required.

- MITRE, through the assistance of Dr. Dolbeer, has been discussing with CONAGUA and GACM a number of recommendations to attempt to reduce the number of large and flocking birds at Lago Nabor Carrillo and adjacent bodies of water, especially during winter, when migratory birds are present. Two recommendations that are being pursued at this time are the following:
  - Water Level Reduction: the reduction of the water level at Lago Nabor Carrillo, Laguna Facultativa, Laguna Recreativa, and Lago Churubusco.
  - Flattening of Islands: the flattening/leveling of islands that can be seen at Lago Nabor Carrillo that are, or will be after the water level is reduced, protruding through the surface of the water.
  - CONAGUA is planning to install a new water pump in August 2018 that should ensure that Lago Nabor Carrillo will contain clean, running water constantly, hopefully, removing current algae's presence.

In order to support CONAGUA's implementation of some of these recommendations, MITRE prepared a memorandum describing them in more detail. That memorandum is being sent along with this Technical Letter as a reference (see MITRE Memorandum H560-L18-005, dated 17 November 2017).

MITRE would like to be made aware of other bird mitigation experimentation being conducted (or planned to be conducted) at the bodies of water south of the Autopista Peñón-Texcoco, and especially at Lago Nabor Carrillo. Additionally, MITRE would like to be informed of other bird-mitigation activities that are being conducted by government authorities, such as improving the habitats at Lago de Zumpango and other areas so that birds find those areas more attractive.

- On 1 December 2018, a large delegation of officials and journalists from Mexico, led by Lic. Vicente Rodríguez from the Office of the President of Mexico, visited MITRE for a full-day of presentations and demonstrations on the NAICM project, as well as on the Plan Alternativo del NAICM presented by the MORENA Party in late 2015. The visit also included several demonstrations at MITRE's ATM Laboratory. The following officials and journalists participated in the visit:
  - Lic. Vicente Rodríguez, Office of the President of Mexico
  - Dr. Víctor Hugo Alcocer, CONAGUA
  - Ing. Antonio Juárez, CONAGUA
  - Lic. Ivabelle Arroyo, Periódico Digital Sendero
  - Lic. Marco Silva, Grupo Imagen
  - Lic. Sarahí Méndez, Televisa
  - Lic. Juan Rocha, Grupo Fórmula
  - Lic. José López, Notimex
  - Lic. Jorge Ayala, Notimex

The MITRE team spent a significant amount of time preparing for this visit to be able to inform the officials and journalists of important NAICM project-related matters, including the Plan Alternativo del NAICM. This included an intense review and reexamination of the Plan Alternativo del NAICM from an aeronautical point of view to ensure that MITRE's view of the plan is clear to non-technical personnel.

**It is MITRE's opinion that the Plan Alternativo del NAICM is not feasible from an aeronautical perspective in neither the near- nor the long-term due to significant capacity-limiting procedural and airspace interactions associated**

**simultaneously when operations at Aeropuerto Internacional de la Ciudad de México and Santa Lucía would be conducted. Furthermore, implementation of this plan would result in the creation of a severely congested and complicated airport and airspace system that would cause delays and other operational problems, not allowing future long-term aviation demand in the Mexico City area to be met. Finally, it is likely that these delays and operational problems would adversely impact (as a “chain reaction”) the overall airport and national airspace system throughout Mexico.**

MITRE also prepared a document for use by the journalists and officials that contains selected information on key items that were discussed during their visit. That document is being sent along with this Technical Letter as a reference (see MITRE document H560-L18-008, dated 1 December 2017). The visit was successful and the officials and journalists left MITRE well informed.

- On 15 December 2017, CTA. Martín García from SENEAM, and three officials from the Fuerza Aérea Mexicana (FAM), General Óscar Rubio (presented as Liaison of FAM to GACM, SENEAM, and MITRE), Coronel Gabriel García, and Coronel Manuel Cenicerros, visited MITRE for a full-day of presentations on the NAICM project, the Plan Alternativo del NAICM, and other important matters of interest to FAM. The officials were also given a tour of MITRE’s ATM Laboratory, which included several demonstrations of scenarios showing potential interactions between operations at Santa Lucía and NAICM.

During that visit, the officials were given the following presentations:

- MITRE and Its Origins – Familiarization
- Overview of the Plan Alternativo del NAICM
- FAM Helicopter Operations at or Near Santa Lucía
  - From NAICM’s Runway 6 to Santa Lucía and back
  - Helicopter Training Areas
- FAM Military Fixed-Wing Operations at Querétaro Airport
  - Joint Civil-Military Airports: Key Considerations and Observations
  - Evolving Special Use Airspace
  - Enroute Traffic to NAICM

The above-mentioned presentations provided the officials with a thorough understanding of MITRE and the overall NAICM project, including key matters of

importance to FAM. Throughout the day, important discussions were held regarding the need for closure of Santa Lucía's runway, the relocation of the air base's fixed-wing non-transport aircraft to Querétaro Airport, Special Use Airspace (SUA) needs, the relocation of Santa Lucía's fixed-wing transport aircraft to NAICM (i.e., east of runway 6), as well as the continued operation of helicopter operations at Santa Lucía and the potential locations of helicopter practice areas.

The visit by the officials from SENEAM and FAM was very useful. MITRE will be able to start advancing on FAM-related work soon. However, a modification of MITRE's contract is required to include that work. (See further down below in this document for additional information on contractual amendment matters.)

Regarding matters pertaining to reports previously provided by MITRE to government officials on FAM helicopter operations, it is important to mention that those reports should not be considered valid anymore. This is because the new Mexico City Terminal Maneuvering Area (TMA) and Mexico ACC enroute airspace design, which is an important consideration when examining helicopter routes and practice areas, has significantly changed since MITRE's previous FAM-related helicopter work was conducted. Therefore, the following reports should be considered out-of-date and not valid:

- Enclosure No. 1 referenced to MITRE Technical Letter F500-L14-022, dated 28 March 2014: *Helicopter Operations at Santa Lucía Military Base in Conjunction with NAICM Operations – Preliminary Report.*
- Enclosure No. 1 referenced to MITRE Technical Letter F500-L14-033, dated 27 June 2014: *Helicopter Routes Between Nuevo Aeropuerto Internacional de la Ciudad de México and Santa Lucía Military Base – Preliminary Report.*

**MITRE takes this opportunity to recommend once again (this has been suggested in writing many times before, for years) that a written document is prepared where the matter of clear and permanent closure of the runway at Santa Lucía is established and agreed upon. While FAM considers that closure is the “official” position, there is still reluctance to understand the major safety matter discussed over and over by MITRE, also validated by an independent International Civil Aviation Organization (ICAO) study. The current Mexican government should surely desire to leave this matter closed. As for MITRE, this is a matter of enormous concern.**

- SENEAM and MITRE continue to advance on the design of the airspace of Mexico City to accommodate dual- and triple-independent operations at NAICM. Since that work is now entering an even more complex phase, including conducting HITL simulation evaluations, it is important that the two organizations strengthen their modus operandi. Therefore, the MITRE team prepared a document that describes a collaboration guidelines pertaining to upcoming SENEAM and MITRE airspace- and procedure-design related work. That

document was sent to SENEAM on 9 January 2018, and is being sent along with this Technical Letter as a reference (see MITRE document H560-L18-023, dated 9 January 2018).

- As mentioned in the previous quarterly Technical Letter, five air traffic controllers from SENEAM visited MITRE's facilities in McLean, Virginia from 28 August 2017 through 1 September 2017 to participate in the second, and final, Cancún HITL simulation evaluation at MITRE's ATM Laboratory. The second HITL simulation evaluation was very successful and all its objectives were met. Overall, the Cancún controllers were pleased and satisfied with the airspace design.

The above-mentioned second HITL simulation evaluated the airspace design by collecting and analyzing information from simulation system data, observations, questionnaires, and discussions with the Cancún Approach Control controllers. The MITRE team then reviewed and examined the information and, during this quarter, prepared a detailed document that presents the results of the second HITL simulation evaluation in the form of subjective and objective metrics. Refer to Enclosure 1 of this Technical Letter for details.

As a result of the above-mentioned Cancún-related work and delivery of the report on the second HITL results, **all of MITRE's contractual obligations concerning its assistance to SENEAM on the planned implementation of dual independent test-bed operations at Cancún have been completed.**

MITRE, of course, remains available for consultation. Additionally, MITRE would be available during the dual-independent operation testing phase at Cancún after appropriate equipment (e.g., Final Monitor Aid) is installed.

- As mentioned in the previous quarterly Technical Letter, two MITRE engineers visited *Centro México* on 7 September 2017 to observe operations and conduct discussions with controllers in preparation for upcoming NAICM-related HITL simulation evaluations. The goal of the visit was for MITRE's HITL laboratory and simulation experts to obtain a better understanding of Air Traffic Control equipment and system functionality in use at *Centro México* to support upcoming NAICM HITL simulation evaluations planned for 2018.

The MITRE HITL team reviewed during this reporting quarter the information that was gathered, and prepared a document that describes the technical capabilities and equipment that MITRE plans to use during the upcoming HITL simulation evaluations to support dual- and triple-independent operations at NAICM, as well as modifications to the Mexico ACC enroute airspace. Refer to Enclosure 2 of this Technical Letter for details.

- MITRE is supporting the Mexican aviation authorities in identifying key regulatory guidance and authorization processes that are currently missing or appear incomplete that are required to operate NAICM. During this quarter, the MITRE team spent a significant amount of time reviewing a SENEAM-provided

document pertaining to regulations it is preparing to support independent operations in Mexico. Refer to Enclosure 3 of this Technical Letter for details on MITRE's feedback regarding the SENEAM-provided regulatory document.

- In Mexico, Minimum Vectoring Altitude Chart (MVAC) sector altitudes must consider radio and radar coverage. As radio and radar coverage matters are not within MITRE's area of expertise, MITRE has been coordinating with SENEAM to ascertain where coverage, both radio and radar, does or does not exist so that MVAC sector altitudes can be adjusted appropriately. This is important as changes to MVAC sector altitudes can affect the overall airspace design for the new Mexico City TMA to support operations at NAICM and Toluca Airport, as well as other matters (e.g., surveillance requirements).

As mentioned in MITRE's previous quarterly Technical Letters, SENEAM has requested assistance from a radar manufacturer to provide appropriate radar coverage information. During this quarter, MITRE received from SENEAM the radar coverage information that was prepared by a radar manufacturer. As a result, MITRE now has data on both radar and radio coverage to support its MVAC design work. (Note that radio coverage information was provided to MITRE during last quarter.)

The MITRE team reviewed both the radar and radio coverage information. Specifically, MITRE compared the radar and radio coverage information with the proposed MVACs for both NAICM and Toluca Airport, and evaluated each minimum vectoring altitude sector to determine if radar and radio coverage was provided at the proposed minimum vectoring altitudes. MITRE noted some sectors where radar and radio coverage was not adequate.

The MITRE team conducted a teleconference with SENEAM on 9 January 2018 to discuss the above-mentioned matter in more detail. Additionally, MITRE is planning on working with SENEAM on the design of the MVAC taking into consideration radar and radio coverage matters during an upcoming workshop planned for mid-January 2018.

- MITRE's procedure design team previously developed preliminary instrument approach and departure procedures for the existing single-runway at Toluca Airport to support the redesign of the new Mexico City TMA to accommodate NAICM. This work was necessary because many of the existing procedures at Toluca Airport need to be modified, as per previous SENEAM-MITRE airspace design workshops, to reduce interactions and complexity relating to operations at NAICM. During this quarter, MITRE's procedure design team spent a significant amount of time reviewing its procedure design work for Toluca Airport.

Additionally, MITRE evaluated the International Civil Aviation Organization (ICAO) Annex 14 Obstacle Limitation Surfaces (OLS) for the single-runway at Toluca Airport considering the above-mentioned instrument approach and departure procedures developed by MITRE. The ICAO Annex 14 OLS are used

for identifying obstacles and preventing the development of obstacles that could adversely impact aircraft operations.

Next, the MITRE team prepared a briefing on the above-mentioned Toluca Airport instrument procedure and ICAO Annex 14 OLS work for presentation to SENEAM during the upcoming NAICM airspace design workshop planned for mid-January 2018. This will allow MITRE to inform SENEAM of its Toluca Airport single-runway instrument procedure development and ICAO Annex 14 OLS findings, discuss any issues in more detail, and obtain appropriate feedback.

- MITRE is planning on conducting an airspace design workshop with SENEAM in mid-January 2018. The key objectives of the workshop are as follows:
  - To address any outstanding issues regarding the NAICM and Toluca TMA and Mexico ACC enroute airspace designs so that they can be solidified, which will allow the MITRE team to prepare for upcoming NAICM-related HITL simulation evaluation activities planned for the late spring and summer 2018 timeframe.
  - To discuss the protocol (e.g., collaboration guidelines) of upcoming NAICM-related HITL simulation evaluations, as well as scenarios to be evaluated.

The MITRE team spent a large amount of time during this quarter preparing for the mid-January 2018 NAICM airspace design workshop about to commence in a few days. Preparatory activities consisted of the following key items:

- Rechecking and reevaluating the NAICM and Toluca Airport routes and procedures for flyability and compliance with U.S. Federal Aviation Administration (FAA) design criteria.
- Identifying solutions to any issues with NAICM and Toluca Airport routes and procedures for discussion with SENEAM to allow for collaborative decision making to be accomplished.
- Development of a proposed NAICM-related HITL simulation evaluation plan for presentation and discussion with SENEAM.
- Development of proposed NAICM-related HITL simulation evaluation scenarios for presentation and discussion with SENEAM.
- Preparation of several briefings on topics such as NAICM and Toluca Airport instrument procedures, Toluca Airport ICAO Annex 14 OLSs, NAICM and Toluca Airport MVACs (including radio and radar coverage matters), and NAICM-related HITL simulation evaluations.

- Numerous time-consuming tasks need to be conducted to prepare for the upcoming NAICM-related HITL simulation evaluations to be conducted at MITRE's facilities. Since these tasks take a significant amount of time to complete, MITRE's HITL laboratory and simulation engineers and other experts worked on a variety of efforts during this quarter in order to be ready for the upcoming HITL simulation evaluations. For example, MITRE's HITL laboratory engineers began recreating the Mexico air traffic controller environment, preparing flight plan data for the scenarios that will be evaluated, and developing potential scenarios and tentative scenario schedules for discussion with SENEAM. NAICM-related HITL simulation evaluation preparatory work is ongoing and will continue over the next several months.

This ongoing activity, presented to you by Dr. Lisker in October, will require contractual modification. It is worth recalling that the Cancún HITL activities (now completed), including extensive use of MITRE laboratories, took place out of contractual scope. MITRE extended this assistance as a courtesy and a no cost to avoid project delays (the activity was going to occur originally at SENEAM, but appropriate equipment and training were not acquired). Thus, NAICM's HITL activity, to take place at MITRE, will require the contractual modification explained to you by Dr. Lisker.

- As mentioned in MITRE's previous quarterly technical letter, both the NAICM RVR and AWOS systems experienced operational problems/issues resulting in significant loss of data, which is concerning. Due to the above-mentioned data loss issues and concerns, MITRE proposes to conduct another analysis of RVR data in the spring of 2018, so that more robust results can be provided to further assist authorities in their decision-making process. However, it was first essential that the RVR and AWOS systems operate in a reliable, accurate, and consistent manner.

On that matter, MITRE was informed that the RVR and AWOS systems were to be relocated inside the NAICM perimeter fence for security reasons. Note that MITRE previously requested that this be completed by 1 August 2017 and most recently the MITRE request was changed to finish the job to no later than 1 October 2017 so that the systems would be ready to appropriately observe and record data during the start of the important winter weather months.

During this quarter, the RVR and AWOS systems were relocated inside the NAICM perimeter fence. MITRE was informed that the AWOS and RVR systems were checked and calibrated on 17 and 23 November 2017, respectively. The clocks of both the RVR and AWOS systems, MITRE was informed, have also be synchronized.

**MITRE's weather analysts will consider data starting from the above-mentioned dates for the next analysis of RVR data. However, this unfortunately reduces the amount of winter weather data that MITRE's analysis will be able to consider.**

- In August 2017, during a visit to Mexico City, Dr. Lisker hand-delivered and presented to officials a MITRE-prepared document that provides a list of key pending items that should be addressed (see MITRE document F500-L17-094, dated 11 August 2017). Several copies of that document were submitted at the end of last quarter to GACM, SENEAM, and DGAC.

In MITRE's previous quarterly technical letter, MITRE requested that GACM investigate the status of the pending items listed in the above-mentioned document with relevant Mexican aviation authorities, and provide MITRE with feedback and an update on their status no later than Friday 27 October 2017. MITRE has received feedback on some of the pending items, but not all. **Therefore, in order to stay organized, MITRE urgently requests that GACM prepare a document with feedback, including the status on each pending item for review by MITRE as soon as possible.**

- The key, most urgent items of the pending list mentioned above, are listed below. Please inform MITRE as soon as possible through Ing. Ricardo Tapia, GACM Liaison to MITRE, about the status of all items.
  - Acquisition of a Category (CAT) III Instrument Landing System (ILS) for Testing Purposes at NAICM
    - It is critical that GACM ensure that CAT III ILS equipment meeting all appropriate recommendations be acquired as soon as possible. This is important so that pre-commissioning flight validation and inspection activities can be conducted prior to runway construction, something that MITRE has requested for several years. MITRE notes with great concern that preparatory runway construction work is already underway.

Also, it is important that consideration be given (based on recommendations by the ILS manufacturer) for the need to utilize the mobile CAT III ILS testing equipment to inspect all six initial runway thresholds, as necessary, based on recommendations by experts, to ensure that ILS system signal coverage on all six runway thresholds can be achieved.

  - Acquisition of New Procedure Design Software Tool by SENEAM
    - Per conversations with Lic. Mascott, a procedure design tool based on U.S. Federal Aviation Administration (FAA) Standard for Terminal Instrument Procedures (TERPS) criteria will be acquired to facilitate SENEAM's review of MITRE's procedural work. This will allow SENEAM and MITRE to work efficiently together on procedure design matters.

MITRE held discussions with the software provider of the procedure design tool being considered. After numerous discussions, the software provider agreed to offer an 18-month evaluation license to SENEAM at no cost.

Following the 18-month evaluation period, hopefully much earlier, **which ends in mid-May 2018**, SENEAM will need to purchase the software tool. Preferably, two licenses should be purchased so that SENEAM designers can review each other's work. Therefore, the cost of these two licenses (USD \$280,000, not including a minimal cost for "help desk" support services) should be budgeted appropriately.

**Ing. Roberto Kobeh, Director General of SENEAM, has told MITRE that this should not be an issue. Therefore, GACM does not require to take any action on this item.**

- Airport Expansion Feasibility Analysis and Transfer of Technology
  - Under Task 8 of the GACM-MITRE contract, MITRE is to assist the Mexican aviation authorities in the examination of problems relating to airport expandability in Mexico, so that, in the process, Mexican engineers and other analysts practice and learn how to reexamine future modifications concerning NAICM airside and aeronautical matters (i.e., achieving in the process transfer of technology). As mentioned in MITRE's previous quarterly Technical Letter, the aviation authorities of Mexico have selected Guadalajara Airport for MITRE to examine.

In late June 2017, MITRE submitted a document to GACM requesting initial data on Guadalajara Airport that are needed for MITRE to perform many of the early project tasks (refer to Enclosure 4 referenced to MITRE Technical Letter F500-L17-070, dated 28 June 2017). MITRE requested that the data be provided by 31 July 2017, five and a half months ago. However, to date, MITRE has not received any data.

**This task is now very delayed as the data are required for MITRE to advance on its work, including procurement of a satellite-based photogrammetric survey (a MITRE obligation).** To avoid further project delays, GACM needs to gather and obtain the data requested by MITRE as soon as possible.

- Aeronautical Information Publication (AIP) of Mexico
  - On 17 November 2017, MITRE received from GACM an electronic version of the Mexico AIP. MITRE has also requested a paper version of the Mexico AIP. Additionally, a subscription for MITRE to receive both paper and electronic amendments to the AIP (either directly or through GACM) for as long a period of time as possible (but at least one year) should be provided. This is essential to ensure that MITRE is using the latest and most up-to-date aeronautical information for Mexico.

**The paper copy of the AIP, as well as both paper and electronic amendments should be provided to MITRE as soon as possible.**

- Contractual Matters
  - **Hidalgo-Related Work** – ASA issued a stop-work order on all of MITRE’s work in the state of Hidalgo, based on the FAM’s preference to relocate Santa Lucía’s fixed-wing non-transport aircraft operations to Querétaro Airport.

MITRE informed ASA that FAM’s operations at Querétaro Airport, along with the establishment of SUAs to support those operations, must be thoroughly examined to ensure that the airport is feasible and, more importantly, that FAM’s operations do not interfere with future operations at NAICM. Such investigation must be conducted in close coordination with FAM and SENEAM officials.

Since this work is not contained in MITRE’s current contract, a modification of the contract will be required, possibly exchanging the Hidalgo work, never completed, for the new work for Querétaro Airport, without requiring additional compensation. As previously mentioned, in December 2017 MITRE met with officials from SENEAM and FAM to discuss Querétaro Airport and other matters. As a result, MITRE should be able to start working on Querétaro Airport as soon as the contract modification is submitted by MITRE and signed by GACM. Prior to the modification of the contract, however, MITRE may start some preparatory work and initial examinations to save time.

- **Other Items** – Other contractual items, such as support regarding NAICM HITL simulation evaluations for NAICM, the bird survey, water sampling/testing and treatment investigations, and other tasks require contractual modifications as well. MITRE proposes to discuss these modifications with GACM in the January/February 2018 timeframe.

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

Sincerely,



Ing. Robert W. Kleinhans  
Project Technical Coordinator

Included with this letter:

Nine documents (including three Enclosures)

cc: Ing. Enrique Lavin, GACM  
Ing. Ricardo Tapia, GACM  
Dr. Bernardo Lisker, MITRE

**This two-page return receipt (*acuse de recibo*) is to be scanned and e-mailed to Ing. R. Kleinhans as soon as possible**

**15 JANUARY 2018 TECHNICAL LETTER DISTRIBUTION**

MITRE requests that the documents enclosed with this Technical Letter be distributed as follows:

1. Memorandum: Edificación cercana al Lago Nabor Carrillo (Opción 8.1) Resumen final del análisis aeronáutico. See MITRE Memorandum H560-L18-003, dated 15 November 2017.
  - GACM: 5 copies
  - SENEAM: 5 copies
  - DGAC: 5 copies
2. Memorandum: Urgent Request for Permit to Sacrifice Four Bird Species. See MITRE Memorandum H560-L18-004, dated 16 November 2017.
  - GACM: 5 copies
3. Memorandum: Water Level and Island Flattening Recommendations. See MITRE Memorandum H560-L18-005, dated 17 November 2017.
  - GACM: 5 copies
4. Memorandum: Urgent Request for Permit to Sacrifice Four Bird Species. See MITRE Memorandum H560-L18-007, dated 17 November 2017.
  - GACM: 5 copies
5. Nuevo Aeropuerto Internacional de la Ciudad de México (NAICM): Presentaciones - Información de Apoyo para Delegación de México durante Visita a MITRE. See MITRE document H560-L18-008, dated 1 December 2017.
  - GACM: 5 copies
6. Guidelines for Upcoming Airspace and Procedure Design. See MITRE document H560-L18-023, dated 9 January 2018.
  - GACM: 5 copies

7. Enclosure No. 1 to this Technical Letter (H560-L18-024): Second Cancún Human-In-The-Loop Simulation Evaluation: Results, dated 11 January 2018.

- GACM: 5 copies
- SENEAM: 5 copies
- DGAC: 5 copies

8. Enclosure No. 2 to this Technical Letter (H560-L18-024): Human-In-The-Loop Simulation Evaluations to Support the Nuevo Aeropuerto Internacional de la Ciudad de México: Laboratory Configuration, dated 11 January 2018.

- GACM: 5 copies
- SENEAM: 5 copies
- DGAC: 5 copies

9. Enclosure No. 3 to this Technical Letter (H560-L18-024): Nuevo Aeropuerto Internacional de la Ciudad de México: Regulatory Modernization - Preliminary Observations, dated 11 January 2018.

- GACM: 5 copies
- SENEAM: 5 copies
- DGAC: 5 copies

Distribution of the nine, above-mentioned documents, was completed.

\_\_\_\_\_  
Signature of GACM Point of Contact for MITRE

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name of GACM Point of Contact for MITRE