

## **Dual Independent Test-Bed Operations at Cancún**

### ***Key Airspace and Procedure Design-Related Activities***

The purpose of this document is to provide general information to Servicios a la Navegación en el Espacio Aéreo Mexicano (SENEAM) on some of the key activities and milestones to be achieved during the March 2016 through early 2018 timeframe pertaining to the redesign of the Cancún/Cozumel Terminal Maneuvering Area (TMA) to support dual independent test-bed operations at Cancún.

The majority of the activities and milestones described in this document were discussed with officials from SENEAM during an intense planning and coordination visit by MITRE engineers to Mexico in late January 2016. Additionally, the activities and milestones take into consideration Nuevo Aeropuerto Internacional de la Ciudad de México (NAICM) airspace and procedure design work that is commencing simultaneously with Cancún dual independent test-bed operation work.

The roles and responsibilities of both MITRE and SENEAM were also discussed during MITRE's visit to Mexico in late January 2016. For example, while MITRE can provide assistance and advice in many key areas, ultimately it is SENEAM that must manage, execute, and oversee the redesign of the Cancún/Cozumel TMA, as well as the overall implementation process pertaining to the eventual operation of dual independent test-bed operations at Cancún. MITRE will, of course, provide as much assistance to SENEAM as possible on items within MITRE's area of expertise.

While this document attempts to cover as many of the key activities and milestones as possible, it is important to note that the redesign of the Cancún/Cozumel TMA is a complex project that also involves investigative work. Therefore, it is difficult for SENEAM and MITRE to anticipate every single detail and activity that will need to be addressed. Thus, the plans described below are as specific as possible, but still general in nature. Actual activities and milestone dates will be coordinated closely between SENEAM and MITRE, and updated and/or modified to address and reflect changes as the project progresses. It is also important to mention that many of the activities and milestones depend on the timely receipt of data and feedback from SENEAM.

It is important to note that this document does not consider the activities and milestones that must be conducted by SENEAM and other aviation authorities that are outside the area of MITRE's expertise and scope of work. For example, some important items that should be considered by SENEAM and other aviation authorities are:

- Workforce planning for staffing of controllers and other relevant essential support staff for Cancún. This includes establishing the current staffing situation and any constraints that may affect handling dual independent test-bed operations at Cancún.

- Assessing the current training capabilities and capacity to take account of the training of controllers to support dual independent test-bed operations at Cancún
- Acquiring Air Traffic Control (ATC) equipment, including the incorporation of the Final Monitor Aid (FMA), with appropriate lead-times in order to allow equipment to be ready for operation well in advance of commencing dual independent test-bed operations at Cancún. Facilities to accommodate the equipment (e.g., Operations Room) must also be ready in time to install and test the equipment.
- Establishing new regulations needed to conduct dual independent test-bed operations at Cancún. This involves close coordination with the Dirección General de Aeronáutica Civil (DGAC).
- Addressing any environmental or Safety Management System-related matters, as necessary
- Developing educational materials for pilots and others to ensure a smooth transition to dual independent test-bed operations at Cancún
- Performing required implementation activities for conducting dual independent test-bed operations at Cancún

Next, coordination with other project stakeholders, such as the airlines and Aeropuertos del Sureste is important. Note that airline-related matters should be closely coordinated with MITRE before links are established. This is because there is a linkage between Cancún and NAICM work that should be appropriately coordinated.

The following list represents the key activities and milestones to be achieved during the March 2016 through early 2018 timeframe pertaining to the redesign of the Cancún/Cozumel TMA to support dual independent test-bed operations. Dual independent test-bed operations are envisioned to commence in early 2018. The list is not in a specific order of priority, but it does consider a likely sequence in which activities may need to be conducted. As previously mentioned, actual activities and milestone dates will be coordinated closely between SENEAM and MITRE, and updated and/or modified to address and reflect changes as the project progresses.



**Cancún Key Activities and Milestones:**March 2016:

- MITRE to begin preparation of draft Letters of Agreement (LOAs), Standard Operating Procedures (SOPs), and Concept of Operations documents to support upcoming Human-in-the-Loop (HITL) simulations

April 2016 – June 2016:

- SENEAM to review MITRE's draft LOAs, SOPs, and Concept of Operations documents to support upcoming HITL simulations
- MITRE HITL simulation engineers to visit Cancún and Mérida to gather information necessary to conduct HITL simulations at MITRE
- SENEAM to simulate the Cancún/Cozumel TMA and enroute airspace routes and procedures in their simulator. The objective of this is to evaluate the routes and procedures that have been designed in order to obtain operational feedback. Modifications to the routes and procedures can then be made based on any issues that are uncovered during the evaluation.

July 2016 – September 2016:

- SENEAM and MITRE to finalize LOAs, SOPs, and Concept of Operations documents to support upcoming HITL simulations
- MITRE to develop conventional independent departure procedures for Cancún
- SENEAM to review and validate MITRE's approach and departure procedures for Cancún
- SENEAM to design conventional and Area Navigation (RNAV) STARs, as well as RNAV departure procedures for Cancún
- SENEAM to design conventional and RNAV STARs and departure procedures for Cozumel, as necessary
- MITRE to begin HITL simulation laboratory preparations

October 2016 – December 2016:

- SENEAM to simulate the Cancún/Cozumel TMA and enroute airspace routes and procedures in their simulator to identify issues before procedurally separating routes and conducting HITL simulations
- SENEAM to develop altitude restrictions along the STARs and departure procedures to ensure procedural separation within the Cancún/Cozumel TMA
- SENEAM and MITRE to conduct an airspace design workshop to complete procedural separation of routes, begin Cancún/Cozumel TMA sectorization development, and initiate development of HITL simulation scenarios
- SENEAM and MITRE to complete the Cancún/Cozumel TMA sectorization that was started during the previous airspace design workshop
- SENEAM and MITRE to complete HITL simulation scenarios started during the previous airspace design workshop
- MITRE to continue with HITL simulation laboratory preparations

January 2017 – March 2017:

- MITRE to complete HITL simulation laboratory preparations
- SENEAM to develop a process to familiarize controllers that will participate in upcoming HITL simulation with dual independent arrival and departure operations
- SENEAM and MITRE to conduct a one-week dry run of the first HITL simulation at MITRE's facilities. The dry run provides an opportunity to eliminate any issues that are present in the scenarios before the actual HITL simulation is conducted.
- SENEAM and MITRE to conduct a one-week HITL simulation of the Cancún/Cozumel TMA for the purpose of evaluating the new routes, procedures, and sectorization that have been developed for the test-bed operations

April 2017 – June 2017:

- MITRE to examine results of the first HITL simulation

- SENEAM to review results of the first HITL simulation, and make any airspace modifications, as necessary
- SENEAM and MITRE to conduct an airspace design workshop to discuss the overall results of the first HITL simulation, discuss any airspace modifications, and develop scenarios for the second HITL simulation
- SENEAM and MITRE to complete scenario design for the second HITL simulation

July 2017 – September 2017:

- SENEAM and MITRE to conduct a one-week dry run of the second HITL simulation at MITRE's facilities. The dry run provides an opportunity to eliminate any issues that are present in the scenarios before the actual HITL simulation is conducted.
- SENEAM and MITRE to conduct a one-week second HITL simulation of the Cancún/Cozumel TMA for the purpose of evaluating the new routes, procedures, and sectorization that have been developed for the test-bed operations
- MITRE to examine results of the second HITL simulation
- SENEAM to review results of the second HITL simulation, and make any airspace modifications, as necessary

October 2017 – March 2018:

- SENEAM to complete all implementation activities required to commence actual dual independent test-bed operations at Cancún