4 June 2014
F500-L14-030

MITRE

Center for Advanced
Aviation System Development

Summary of Critical Aeronautical Steps Pertaining to the NAICM Project

In order to assist Aeropuertos y Servicios Auxiliares (ASA) and other stakeholders, such as Servicios a la Navegación en el Espacio Aéreo Mexicano (SENEAM), in the planning of the Nuevo Aeropuerto Internacional de la Ciudad de México (NAICM) project, MITRE identified critical NAICM-related aeronautical items that should be addressed during the 2014 through early 2016 timeframe.

It is hoped that the table included here, originally prepared for ASA in late March 2014, will assist other key stakeholders in understanding important upcoming project related activities.

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Summary of Critical Aeronautical Steps

In order to assist Aeropuertos y Servicios Auxiliares (ASA) and other stakeholders, such as Servicios a la Navegación en el Espacio Aéreo Mexicano (SENEAM), in the planning of the Nuevo Aeropuerto Internacional de la Ciudad de México (NAICM) project, MITRE gathered a large group of airport, procedure, Air Traffic Control (ATC), and airspace experts together and held several intense brainstorming meetings to discuss the critical NAICM-related aeronautical items that should be addressed during the 2014 through early 2016 timeframe.

The objective of these meetings was to identify upcoming key aeronautical analyses and/or tasks that should be conducted in order to make all stakeholders aware of crucial aeronautical items so that decisions are properly addressed.

The table presented below shows, in a preliminary manner, the prerequisites needed to address various items. Primary and secondary stakeholders are also identified. The table is a summary tool rather than an all-encompassing review of all the details affecting each item. This information will help the project stakeholders avoid costly mistakes that have been made during the planning and construction of major international airports.

Some items discussed on the table are outside of MITRE's area of expertise or responsibility, such as flight checks, Instrument Landing System (ILS) equipment signal verification, as well as tasks associated with the Master Plan and engineering/construction plans. Nevertheless, it is important that these items be handled in a coordinated manner, with MITRE's participation where appropriate.

Finally, non-aeronautical related items such as the acquisition of non-federally owned land to the east of the NAICM site that is required for runway construction, as well as preparatory construction planning and work (e.g., drainage, soil engineering, etc.) are outside the table's information.

Beyond the early 2016 timeframe, key NAICM-related aeronautical activities such as the analysis of the enroute airspace structure to support NAICM operations, as well as assisting SENEAM with its development of Human-in-the-Loop (HITL) simulations and developing a monitoring plan to assess operating procedures once the NAICM operation starts will also be conducted by MITRE, but are not mentioned at this point.

Summary of Critical Aeronautical Steps

Critical Aeronautical Step	Description	Prerequisite	Primary Participants	Secondary Participants	Important Associated Issues/Comments
Coordination with airlines and other key airport stakeholders	Joint meetings with airlines and other key airport users to make them fully aware of all aeronautical- and master planning-related matters, and to obtain important input and feedback.	Coordination by ASA of a joint meeting with the airlines and others.	ASA, master planners, MITRE, airlines	SENEAM, DGAC	Airlines may have important issues that could affect the overall plans and operation of the airport that would need to be addressed, which could impact other activities and schedules.
Flight Checks and/or Flight Validation activities[1]	Final approaches at NAICM are very long and exceed normal operating standards of ILS equipment. Flight Checks using actual ILS equipment to ensure that appropriate signal reception can be achieved, including magnetic effects, should be conducted. High terrain and numerous obstacles exist around the NAICM site, which complicates procedure development. Flight Validation activities should be conducted to ensure that unknown/uncharted obstacles do not exist, and that procedures are safe and flyable, including the examination of Ground Proximity Warning System matters.	Appropriate discussions with ILS manufacturer. Commissioning of an appropriately equipped aircraft, including Performance-Based Navigation (PBN) capabilities.	ASA, MITRE, SENEAM, airlines	ILS manufacturer	This requires intense planning and coordination, including technical consultation with the appropriate ILS manufacturer before a decision is made on how to proceed. All of this takes long lead-times to conduct, including the acquisition and installation of ILS equipment.
Finalize runway lengths *This item and the following one are part of an iterative process*	Establish the ultimate runway length requirements considering the types of aircraft and operations that are expected to use the airport. This should involve feedback from the airlines.	Conduct a payload and range analysis to establish runway length requirements. This should be complemented by an engine-out analysis.	ASA, airlines	MITRE	Any required longitudinal shifts of the runway need to be closely coordinated with MITRE. Decisions regarding the grading of hills at Chiconautla and Chimalhuacán may affect final runway lengths and other aeronautical factors.

[1] A Flight Check is an inflight investigation and evaluation of air navigation aids and instrument flight procedures to ascertain or verify that they meet established tolerances and provide safe operations for intended use. It involves the operation of a suitably equipped aircraft for the purpose of calibrating ground based navigational aids or monitoring the performance of navigation systems. A Flight Validation is part of the instrument flight procedure validation process to confirm that the procedure is operationally acceptable for safety, flyability and design accuracy. It is an inflight evaluation concerned with factors that may affect the suitability of an instrument flight procedure for publication, other than those associated with the performance of a navigation aid or system. Refer to United States (U.S.) Federal Aviation Administration Order 8200.1C, United States Standard Flight Inspection Manual.

Critical Aeronautical Step	Description	Prerequisite	Primary Participants	Secondary Participants	Important Associated Issues/Comments
Decision by aviation authorities regarding the grading (including to what extent) of hills at Chiconautla and Chimalhuacán *This item and the previous one are part of an iterative process*	The hills at Chiconautla and Chimalhuacán penetrate some International Civil Aviation Organization (ICAO) Annex 14 Obstacle Limitation Surface(s). Chiconautla penetrates the ICAO Annex 14 Approach and Takeoff Climb Surfaces, as well as the U.S. Standard for Terminal Instrument Procedures (TERPS) final approach obstacle assessment surface. Chimalhuacán, on the other hand, only penetrates the ICAO Annex 14 Approach Surface.	Determination of final runway lengths.	ASA, MITRE, SENEAM, DGAC	Master planners	The TERPS penetrations at Chiconautla must be removed. Note that several tall antennas need to be removed as well.
Development of the final Master Plan	Development of the final Master Plan based on the MITRE-Recommended Runway Configuration (July 2012). Note that this configuration assumes that the terminal building will be constructed between the western-most and center pair of closely-spaced parallel runways. In order to ensure that signal interference and line-of-site problems, as well as obstacles are kept under control, at a minimum, a general architectural plan depicting building heights should be completed at this point. Likewise, the position and height of the Air Traffic Control Tower should have been established.	Coordination with airlines and other stakeholders; finalize runway lengths; Flight Checks and Flight Validation, and final examination of all relevant aeronautical matters that could potentially affect runway locations and instrument procedures.	ASA, master planners, airlines, and any other key stakeholders	MITRE	Coordinate any runway shifts with MITRE. Runways 1, 3, and 6 (from west to east) should be constructed first for the opening of the airport. All runways should be 60 m wide. To minimize impact when constructing future runways (i.e., beyond the first three mentioned above), it is advisable that the taxiway system/flow plan for the ultimate runway/taxiway system be examined before initial airport construction begins. This will allow for taxiways to be located in such a way as to match up with taxiways that will eventually cross future runways. Ensure no facilities are located that could impact ILS critical/sensitive areas or cause electromagnetic issues.
Final review of instrument procedures and other key aeronautical work by SENEAM and other authorities	All aeronautical work needs to be reviewed and modified as necessary by SENEAM to obtain DGAC approval.	Completion of all aeronautical work that can affect runway siting and operational procedures.	ASA, MITRE, SENEAM, DGAC	Not Applicable	Requires a detailed survey of the NAICM site and its surroundings (for which MITRE is responsible). Note that this survey is underway and it is to be completed by October 2014.

Critical Aeronautical Step	Description	Prerequisite	Primary Participants	Secondary Participants	Important Associated Issues/Comments
Development of airport engineering and construction plans	Preparation of detailed civil engineering designs and plans taking into consideration the final Master Plan. This is an extremely detailed plan, with highly interactive components. For example, a modern airport's automated functions are strongly correlated to its architectural design.	Conclusion of the final Master Plan and subsequent final review of instrument procedures and other aeronautical work.	ASA, DGAC, construction management company, master planners	MITRE	Drainage, soil preparation, and grading for the ultimate runway/taxiway system, independent of runway phasing, should be completed before initial construction. This will help to mitigate operational issues during future runway construction.
Regulatory modernization to support the operation of NAICM	Development of selected regulations.	Identify key regulatory guidance and processes that are currently missing/incomplete and are required for NAICM.	ASA, MITRE, SENEAM, DGAC	Airlines and other stakeholders	Key regulatory matters to address include authorization to allow climb gradients on missed approaches, as well as regulations concerning Area Navigation (RNAV) and Required Navigation Performance (RNP) procedures.
Airspace design of the new Mexico Terminal Maneuvering Area (TMA)	Development of the final airspace design of the new Mexico TMA to support opening-day operations at NAICM and, subsequently, development of a notional airspace design of the ultimate six-parallel runway configuration.	Completion of all aeronautical work that can affect runway siting and operational procedures.	ASA, SENEAM, MITRE	Airlines	This must consider plans for an expanded Toluca Airport and a new airport in the State of Hidalgo. This should also assume closing of Santa Lucía's runway and elimination of its associated Special Use Airspace (SUA), as well as the establishment of a non-interfering helicopter training area. SENEAM-lead Human-in-the-Loop (HITL) simulations will occur later in the project, possibly leading to some modifications to this item's work.
Initial Air Traffic Management transition planning	Implement dual independent operations at Cancún as a test case to prepare controllers. Examine workforce planning, radar positions, and other operational requirements needed to conduct dual independent approach and departure operations at Cancún.	ATC equipment acquisition, procedure development, airspace design.	ASA, SENEAM, MITRE, airlines	ASUR	MITRE successfully conducted recently and delivered to ASA a preliminary collision risk analysis for Cancún to determine if its runway spacing is appropriate to conduct dual independent approaches. Information on surveillance, display, and communications-override equipment required to conduct those operations was also provided to ASA.