

8th Global Air Traffic Flow Management (AFTM) Conference

AFTM Technology Showcase: ASUR Case Study

*Dejan Damjanovic,
Managing Director, FANS Group
Thursday Nov 6th - 09:00 to 11:15*

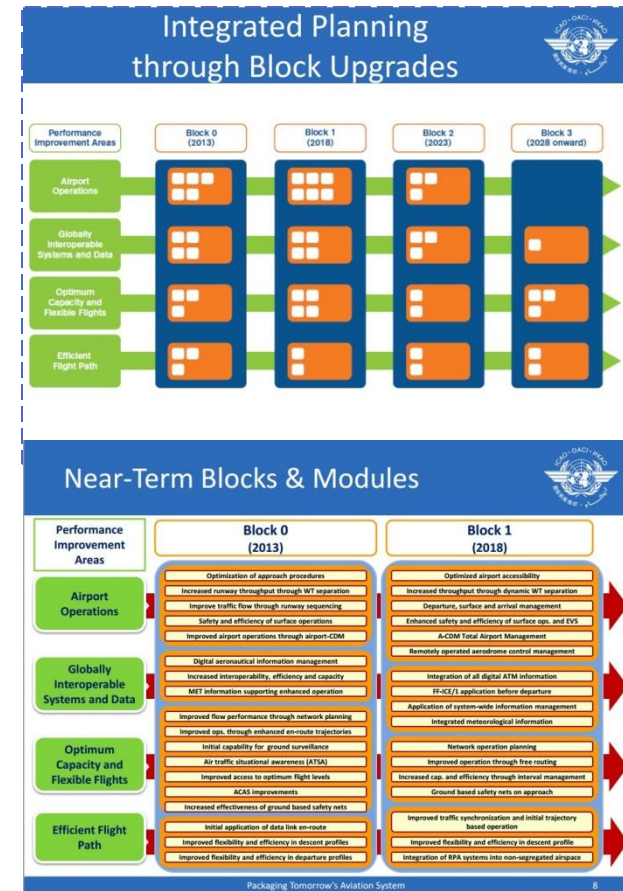
Agenda Topics

1. Overview of the ICAO Block Upgrade concept.
2. AIXM, FIXM, WIXM - and the Life Cycle
3. ICAO Regulations that mandate eTOD collection
4. Objective & Scope of ASUR Project
5. Grupo Aeroportuario del Sureste (ASUR)
6. Merrick & FANS Group team
7. How we collect Annex-15, Chapter 10 eTOD for ASUR
8. Deliverable Review,
9. Commercial Benefits of eTOD & AMDB's
10. Thank you!

Overview of the ICAO Block Upgrades

ICAO has subdivided their future vision of Air Travel into a series of Block Upgrades. These are the foundation of the Global Air Navigation Plan (GANP).

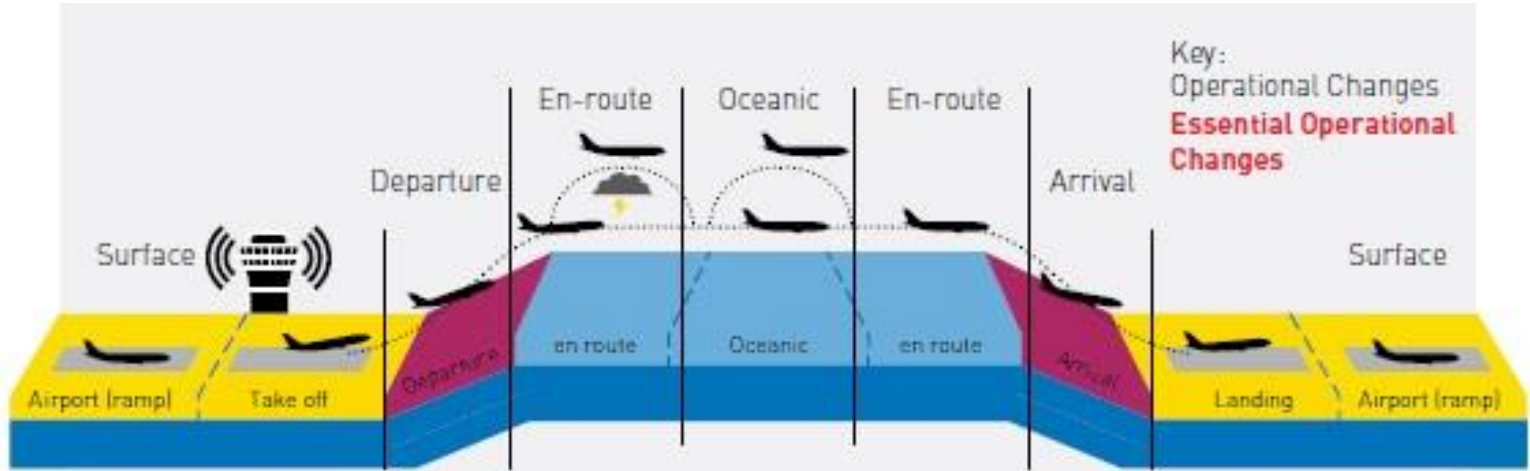
- ▲ The GANP allows countries to package their upgrades according to available resources.
- ▲ This provides a clear, planned & structured pathway towards the Future Air Navigation system (FANS) for all ICAO nations.
- ▲ Mexico's DGAC is a key contributor to the Block Upgrade process and pathway in Latin America & North America.
- ▲ Our project here is one of the earliest steps towards adoption of Block Zero (0) & Block One (1), to greatly enhance present and future air traffic in the 9 ASUR airports, which represent some of Mexico's largest and most valuable Tourist Destinations.
- ▲ To succeed - we need a common Aeronautical Language..



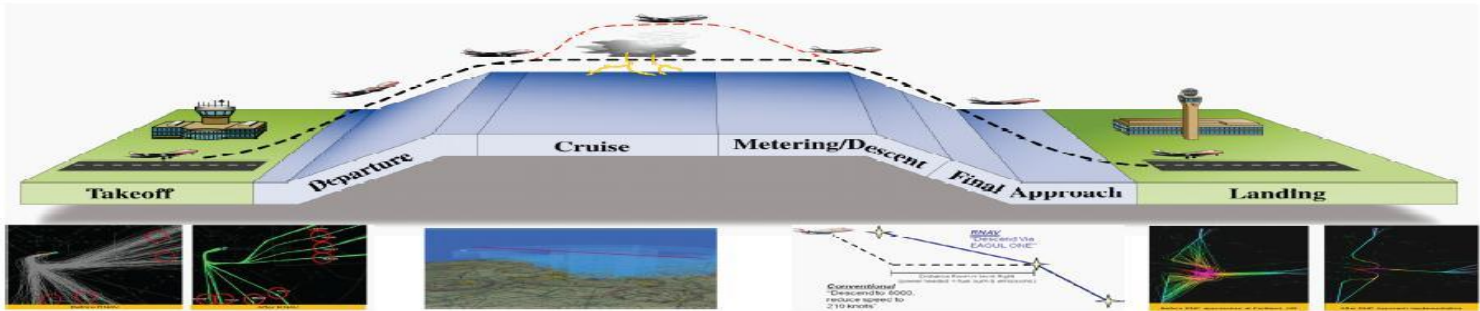
And that language is AIXM....

- ▲ Aeronautical Information eXchange Model
- ▲ An XML specification for all Aeronautical Information that previously resided in paper Aeronautical Information Publications (AIP)
- ▲ Allows all 200+ ICAO signatory countries to electronically share their AIP information in a common data format
- ▲ Enables the use of **Digital NOTAMS**, where the critical airmen's information is tied to a database record, not just text
- ▲ There is a companion format known as Flight Information eXchange Model (**FIXM**), used for Aircraft Position reporting in 4D space for Collision Avoidance and Spacing
- ▲ There is a 3rd companion format known as Weather Information eXchange Model (**WIXM**) to report weather worldwide in a standard format.

The Life Cycle of FANS Flight Ops



NextGEN or SESAR – the Life Cycle is the same!



What are those components?

- I. **Integrated Flight Planning and Departure Management.**
- II. **PBN Everywhere** - SID, Climb, Enroute, STAR, Procedure and Surface Movements.
- III. **Metroplex** for large, integrated Hubs that maximize the \$\$ benefits of FANS operations, by operators who invested first.
- IV. **Enhanced Arrival Management of In-Trail flights** to prevent bottlenecks.
- V. **Continuous Descent Approach** to minimize noise & carbon emissions, reduce fuel burns, and increase \$\$.
- VI. **Surface Movement Optimization** - so that taxiing does not rob us of the benefits of the inflight portions.

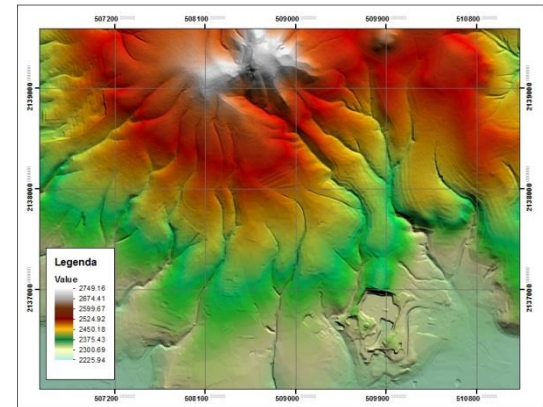
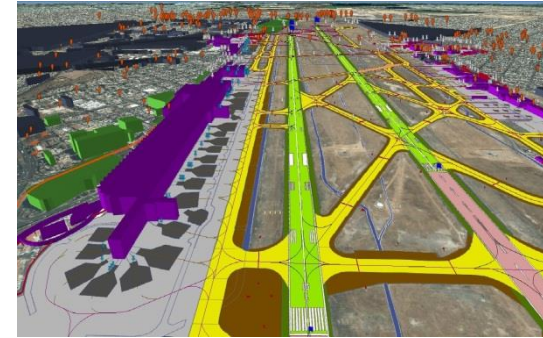
So, how can we share this data Globally to support ATFM?

NEXTGEN & SESAR Components:	Information Sharing:
(1) Flight Plan & Departure Management	AIXM
(2) ERAM with PBN Enroute	
(3) Metroplex Hub Airports	FIXM
(4) Air Carrier In-Trail Alignment	
(5) Continuous Descent Arrivals (CDA)	WIXM
(6) Surface Movements & SMGCS	

Why does AIXM electronic Terrain & Obstacle data matter to ICAO?

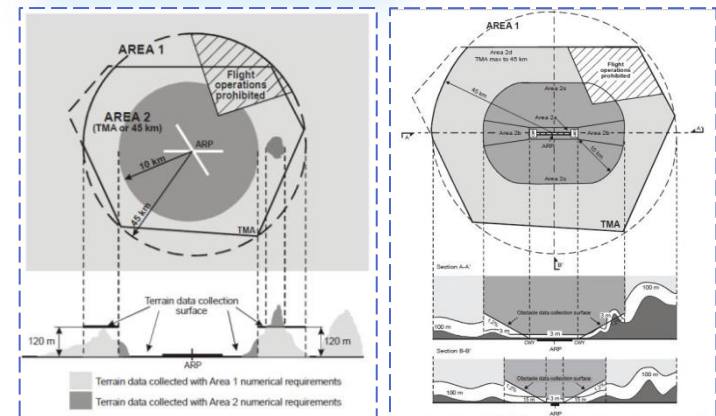
This information is far more precise than anything aviation has previously/presently used, which makes it possible for aircraft to fly the Performance based navigation (PBN) procedures and routes required by the GANP. By 2015, all ICAO Civil Aviation Authorities are mandated to capture this data in support of some or all of the following:

- ▲ Ground proximity warning system (TAWS) minimum safe altitude
- ▲ Contingency procedures for use in the event of an emergency during a missed approach or take-off
- ▲ Navaid-based Procedure Design (legacy), PBN Procedure Design (future)
- ▲ Engine-Out Procedure Design
- ▲ Noise-Abatement Procedure Design
- ▲ Drift-down/Let-down Procedures, Pressurization-Failure Escape Routes
- ▲ Unmanned Aerial System (UAS, UAV), synthetic vision system
- ▲ Transition AIS to AIM (Paper to Digital) chart production and on-board database
- ▲ Aerodrome impacting the circling area
- ▲ Aerodrome advanced surface movement guidance and control system (ASMGCS)
- ▲ Aerodrome impacting the approach /take-off phases of flight
- ▲ Analysis for Obstacle (height restriction) tower/tree removal planning
- ▲ **Key component of NextGEN and SESAR**



ICAO Regulations that mandate Terrain & Obstacle collection

- ▲ Amendment 36 of ICAO Annex 15 was passed in the spring of 2012.
- ▲ It introduced the Concepts of **Area-1, Area-2, Area-3** and **Area-4** to segment Terrain & Obstacle Requirements by Zones.
- ▲ Overriding reason was to support the ICAO Performance-Based Navigation (PBN) mandate, which is the cornerstone of the ICAO Global Air Navigation Plan (GANP).
- ▲ The PBN mandate is part of the larger series of ICAO Block Updates, that define a progressive path for nations such as Mexico to move into Future Air Navigation Systems (FANS) as implemented in FAA's NextGEN and the EU's SESAR.



Type A, Type B, Type C are Obsolete.....

- ▲ We are moving from Paper-based AIP to Digital Data in AIM.
- ▲ Paper-based Type A, B and C Obstacle charts cannot document all Area-1, Area-2 obstacles.
- ▲ ICAO's new charting guidelines document is moving away from this paper-limited format towards pure Geospatial-based AIXM data.

OBSTACLES			
130	Obstacle		
131	Lighted obstacle		
132	Group obstacles		
133	Lighted group obstacles		
134	Exceptionally high obstacle (optional symbol)		
135	Exceptionally high obstacle — lighted (optional symbol)		
<i>Note— For obstacles having a height of the order of 300 m (1 000 ft) above terrain.</i>			
136			

SYMBOLS FOR AERODROME OBSTACLE CHARTS - TYPE A, B AND C				
		Plan	Profile	
162	Tree or shrub			
163	Pole, tower, spire, antenna, etc.			
164	Building or large structure			
165	Railroad			
166	Transmission line or overhead cable			
167	Terrain penetrating obstacle plane			
168	Escarpment			
169	Stopway	SWY		
170	Cleanway	CWY		

Mexico is very Strategic to the success of SESAR & NextGEN..... with many Routes to Europe and US





Sustainability
is a
key strategy in
our business
model

MEMBER OF
**Dow Jones
Sustainability Indices**
In Collaboration with RobecoSAM



Red Pacto Mundial
México



EMPRESA
SOCIALMENTE
RESPONSABLE



- Member of Dow Jones and Bolsa Mexicana de Valores **sustainability indices**
- Active participant of **United Nations Global Compact**, in Mexico and internationally
- Certified by **CEMEFI** as Socially Responsible Company (6th year)
- Airports' Environmental Management Systems certified under **ISO 14001**
- **Environmental Compliance** certification from Mexican Environmental Protection Agency
- Focus on **quality of life for employees and community relations**
- Strict standards of **corporate governance and business ethics**

Geographical
presence



Mexico



21.1M PAX
(2013)

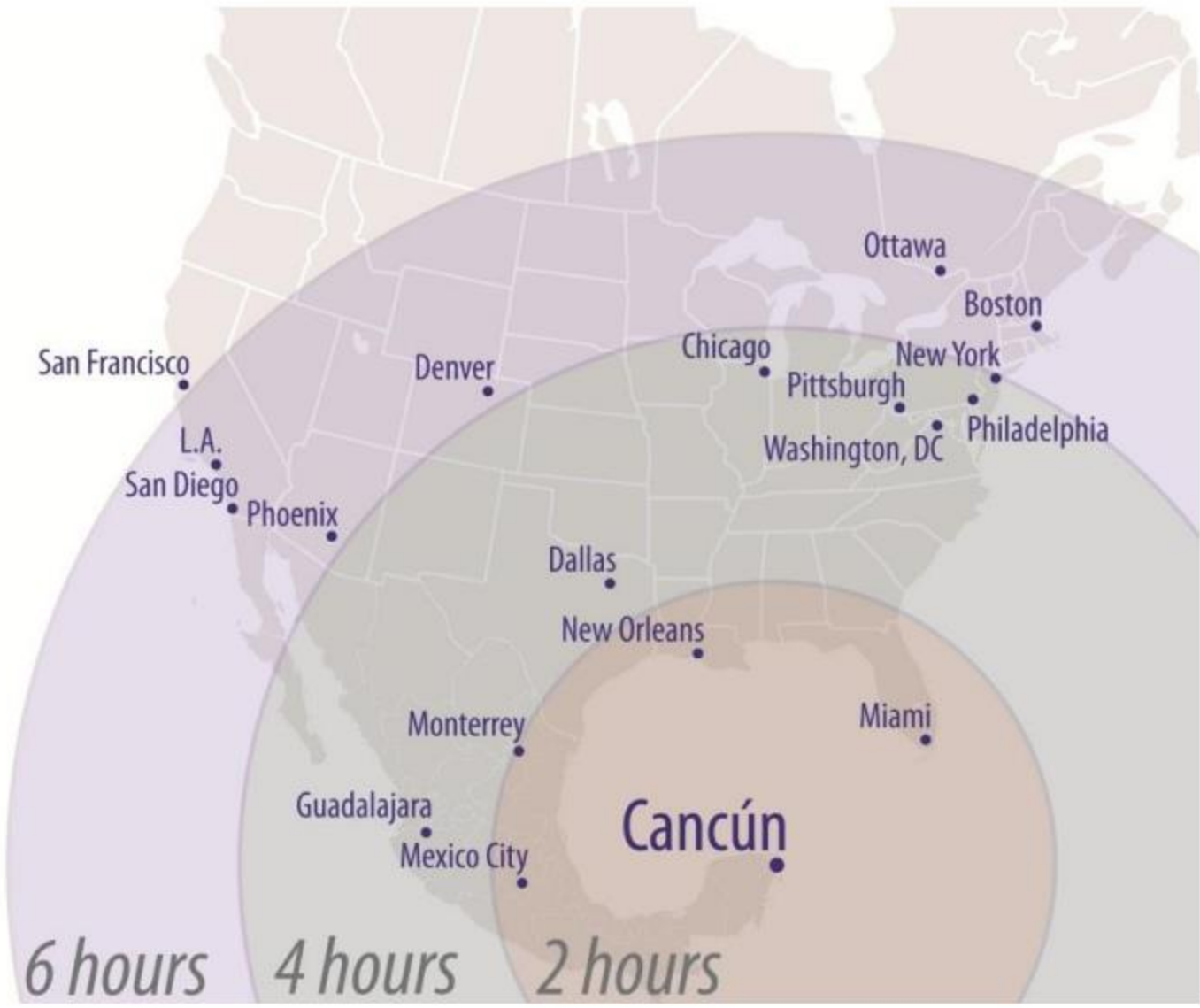
Puerto Rico



8.3M PAX
(2013)

Cancún: Close to major U.S. destinations

Illustrative
flight times
from various
destinations

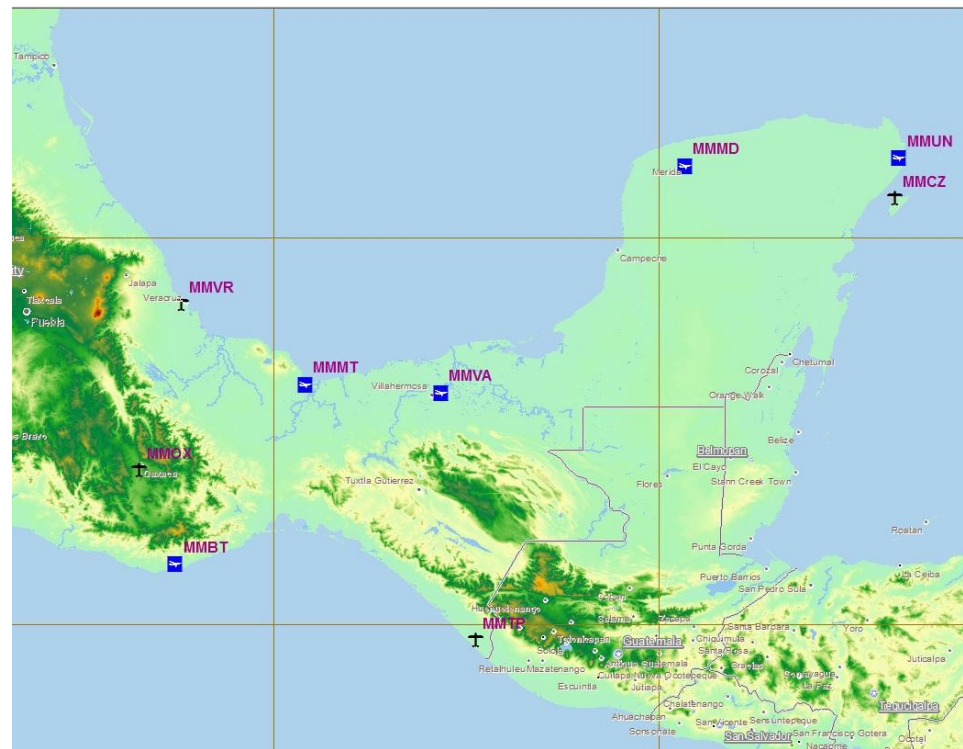


Scope of Project: ASUR Airports

Objective: Meet ICAO Annex 15, Chapter 10 eTOD requirements by Nov-2015

Grupo Aeroportuario del Sureste

- ▲ **MMVA: (DELIVERED)**
 - ▶ Carlos Rovirosa Pérez International Airport
- ▲ **MMVR:**
 - ▶ General Heriberto Jara International Airport
- ▲ **MMMD: (DELIVERED)**
 - ▶ Manuel Crescencio Rejón International Airport
- ▲ **MMUN:**
 - ▶ Cancún International Airport
- ▲ **MMCZ:**
 - ▶ Cozumel International Airport
- ▲ **MMBT: (DELIVERED)**
 - ▶ Bahías de Huatulco International Airport
- ▲ **MMMT: (DELIVERED)**
 - ▶ Minatitlán/Coatzacoalcos International Airport
- ▲ **MMOX:**
 - ▶ Xoxocotlán International Airport
- ▲ **MMTP:**
 - ▶ Tapachula International Airport



ASUR Partners: MAPA & FANS Group

MAPA Soluciones Geoespaciales

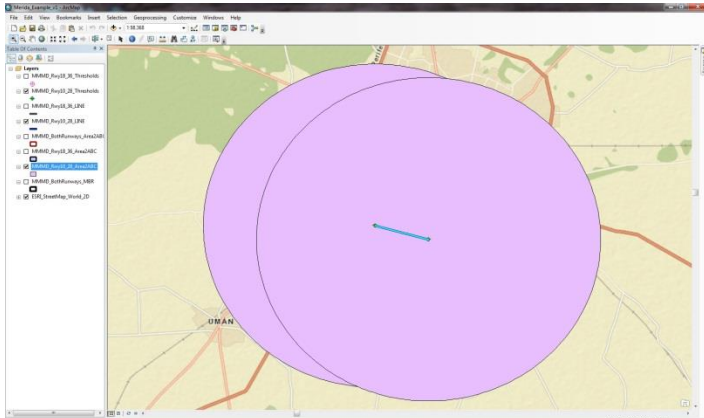
- ▲ Soluciones para el procesamiento, manejo y distribución de datos espaciales. Transformando los datos geoespaciales en información útil y oportuna para la toma de decisiones
- ▲ Servicio's:
 - ▶ Escaneo de fotografía
 - ▶ Restitución Digital
 - ▶ Ortofotos
 - ▶ Fotogrametría Satelital
 - ▶ Soluciones Web

The FANS Group

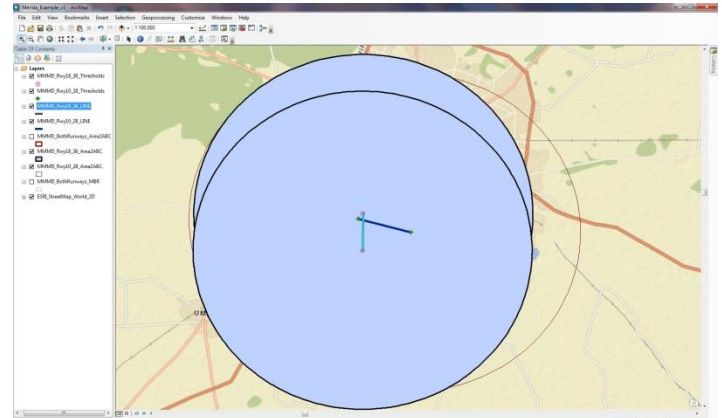
- ▲ Industry leaders in the manufacture of Airport Mapping Databases and Terrain & Obstacle databases around the world for US and Foreign customers.
- ▲ Collection of subject matter experts in all phases of Aeronautical Information Management (AIM) in support of NextGEN and SESAR worldwide.
- ▲ Corporate Membership in important organizations such as IFAIMA and RTCA.
- ▲ Previous projects in Mexico include Mexico City, (MEX), (TLC), San Jose (SJO) and 13 other airports in Latin America



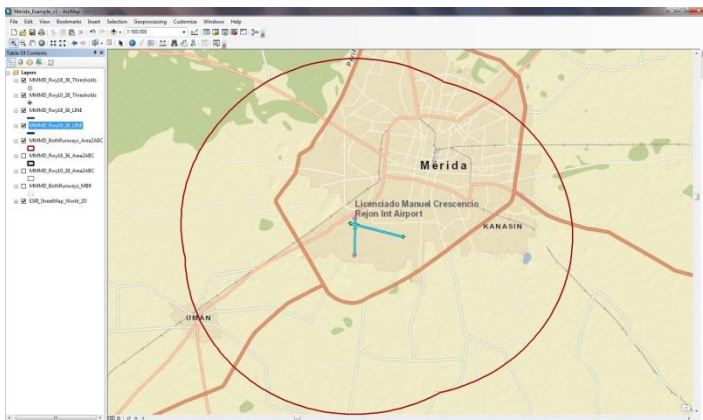
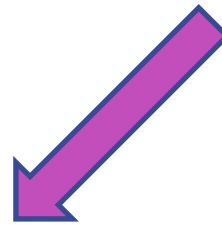
How do you meet the ICAO Annex 15 Rules?



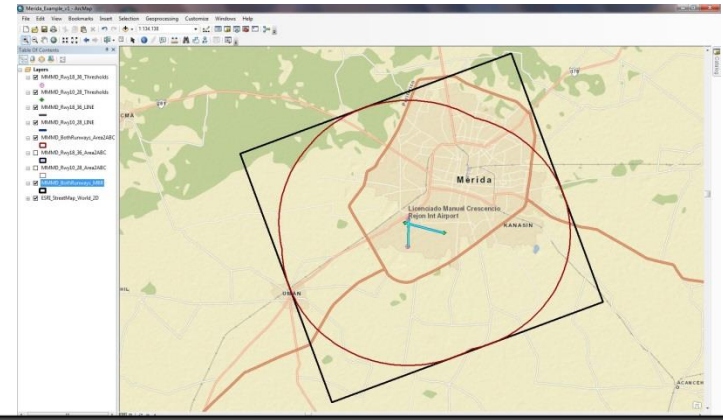
(1) Determine Area-2ABC for runway 10/28, by drawing 20km circle around each runway threshold (10km radius)



(2) Determine Area-2ABC for runway 18/36

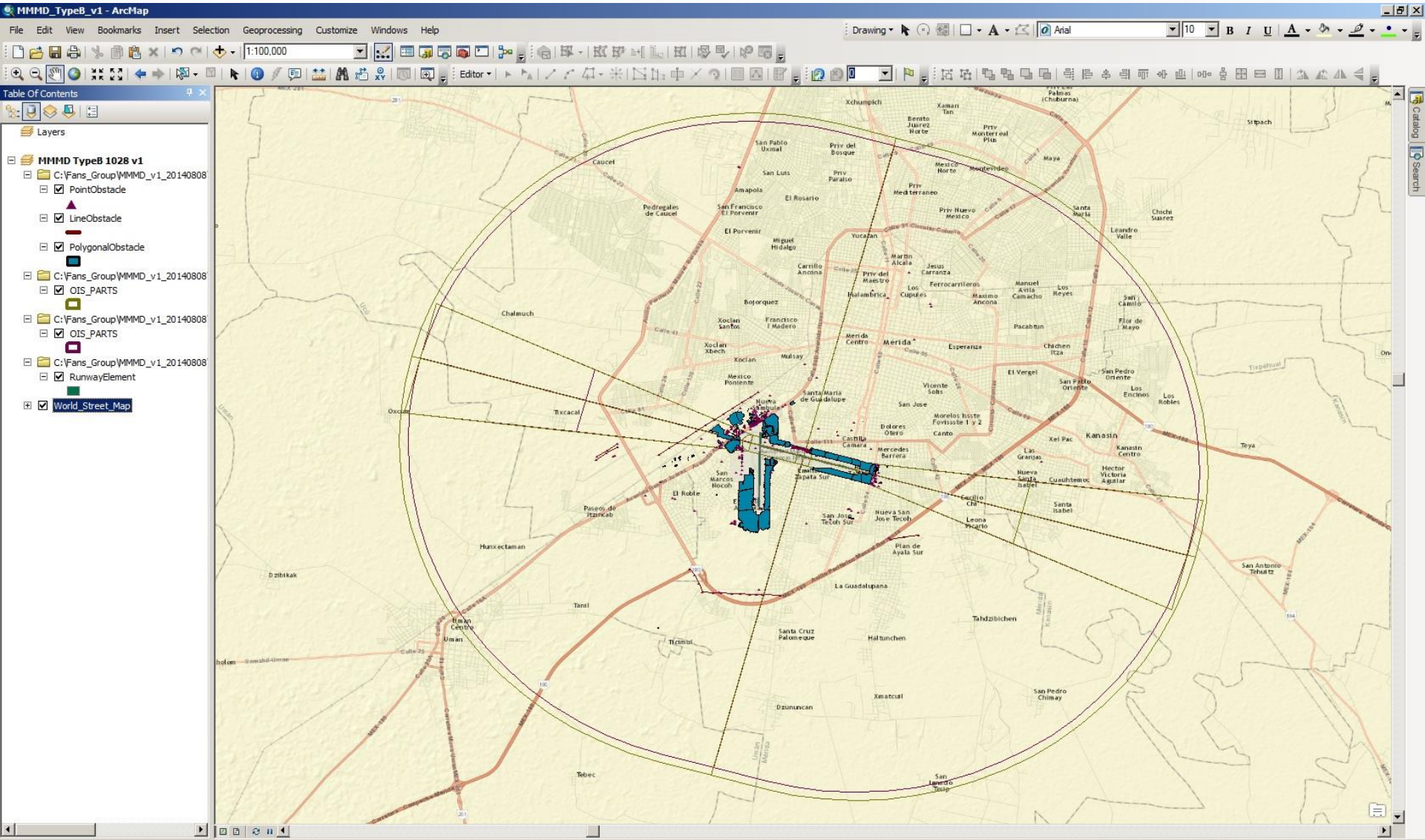


(3) Now combine both runways Area-2ABC



(4) Last, create square for Satellite Collection

And that looks like; for 10/28



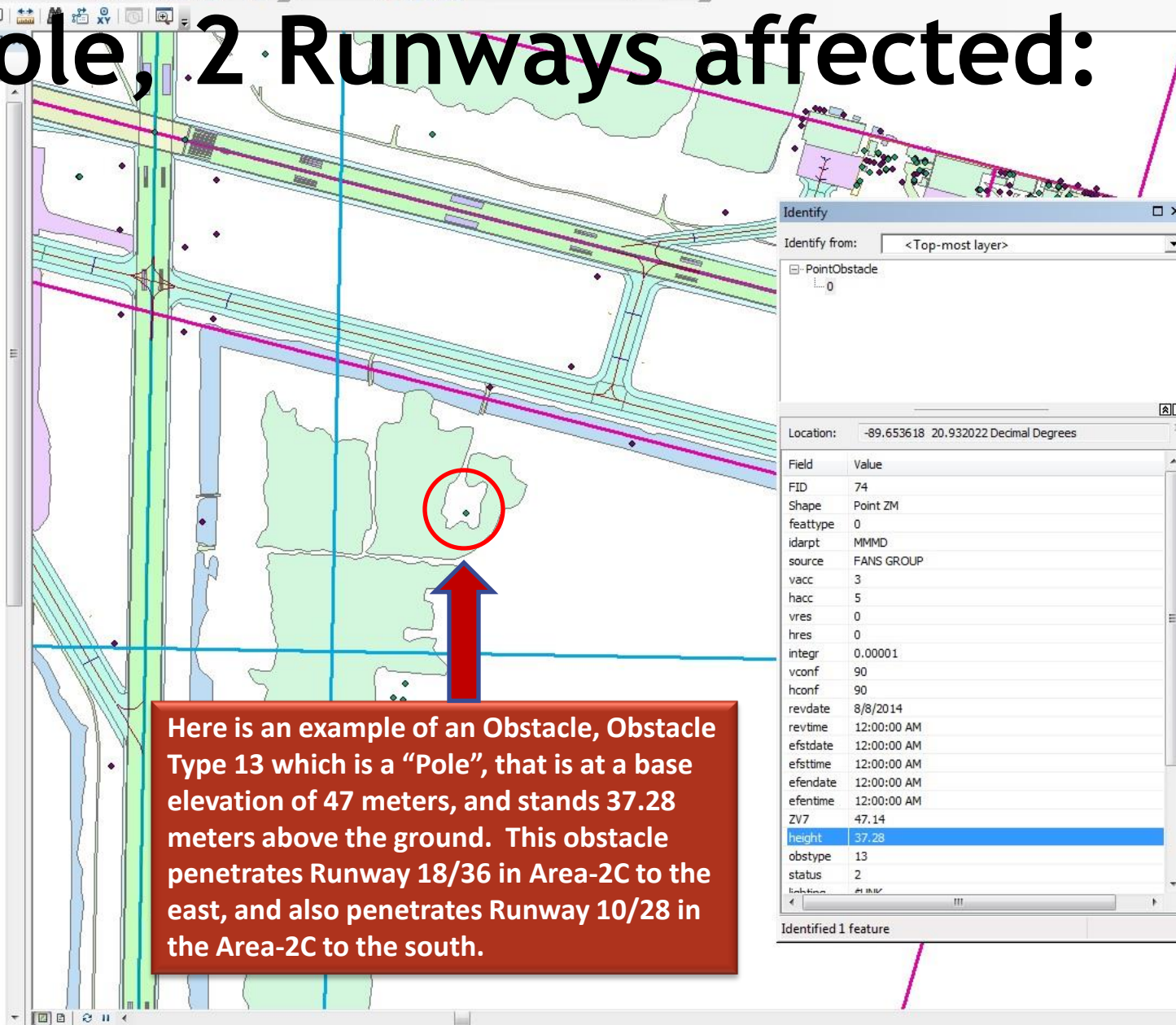
Same Pole, 2 Runways affected:

Layers

PointObstacle

<<enumeration>>
obstypeType

- Arch = 0
- Tethered Balloon = 1
- Bridge = 2
- Building = 3
- Catenary = 4
- Cooling Tower = 5
- Crane = 6
- Control Tower = 7
- Dam = 8
- Dome = 9
- Elevator = 10
- Monument = 11
- Power Plant = 12
- Pole = 13
- Rig = 14
- Refinery = 15
- Sign = 16
- Spire = 17
- Stack = 18
- Tank = 19
- Transmission Line Tower = 20
- Tower = 21
- Tramway = 22
- Windmill = 23
- Antenna = 24
- Tree = 25
- Vegetation = 26
- Natural Highpoint = 27
- Windmill Farms = 28
- Transmission Line = 29
- Wall = 30
- Cable Railway = 31
- Fence = 32
- Grain Elevator = 33
- Lighthouse = 34
- Navaid = 35
- Nuclear Reactor = 36
- Water Tower = 37
- Stadium = 38
- Other = 39



Here is an example of an Obstacle, Obstacle Type 13 which is a "Pole", that is at a base elevation of 47 meters, and stands 37.28 meters above the ground. This obstacle penetrates Runway 18/36 in Area-2C to the east, and also penetrates Runway 10/28 in the Area-2C to the south.

Same Powerlines, 2 Runways affected:

- <<enumeration>>
obstypeType
- Arch = 0
 - Tethered Balloon = 1
 - Bridge = 2
 - Building = 3
 - Catenary = 4
 - Cooling Tower = 5
 - Crane = 6
 - Control Tower = 7
 - Dam = 8
 - Dome = 9
 - Elevator = 10
 - Monument = 11
 - Power Plant = 12
 - Pole = 13
 - Rig = 14
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 - Grain Elevator = 33
 - Lighthouse = 34
 - Navaid = 35
 - Nuclear Reactor = 36
 - Water Tower = 37
 - Stadium = 38
 - Other = 39

Identify

Identify from: <Top-most layer>

LineObstacle
1

Location: -89.671272 20.943705 Decimal Degrees

Field	Value
FID	4
Shape	Polyline ZM
featype	1
idart	MMMD
source	FANS GROUP
vacc	3
hacc	5
vres	0
hres	0
integr	0.00001
vconf	90
hconf	90
revdate	8/8/2014
revtime	12:00:00 AM
efstdate	12:00:00 AM
efstime	12:00:00 AM
efendate	12:00:00 AM
efetime	12:00:00 AM
ZV7	36.45
height	27.93
obstype	29
status	2
lighting	SUNK

Identified 1 feature

Here is a second example of an Obstacle, Obstacle Type 29 which is a "Transmission Line", that is at a base elevation of 36.45 meters, and stands 29.93 meters above the ground. This obstacle penetrates Runway 18/36 in Area-2C to the west, and also penetrates Runway 10/28 in the Area-2B to the west-northwest.

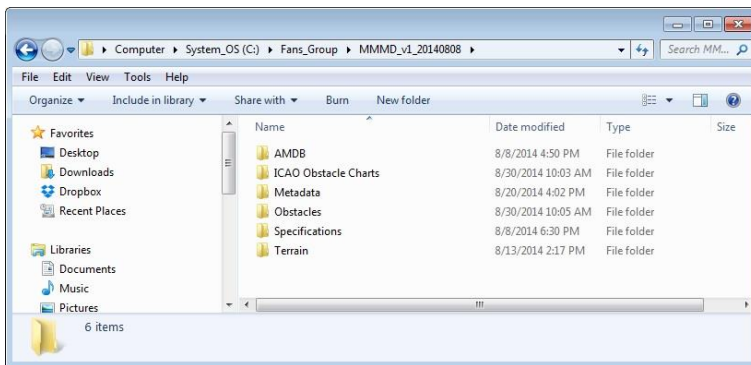
Standard Terrain, Obstacle, Airport Deliverables for this project:

Terrain & Obstacles delivery

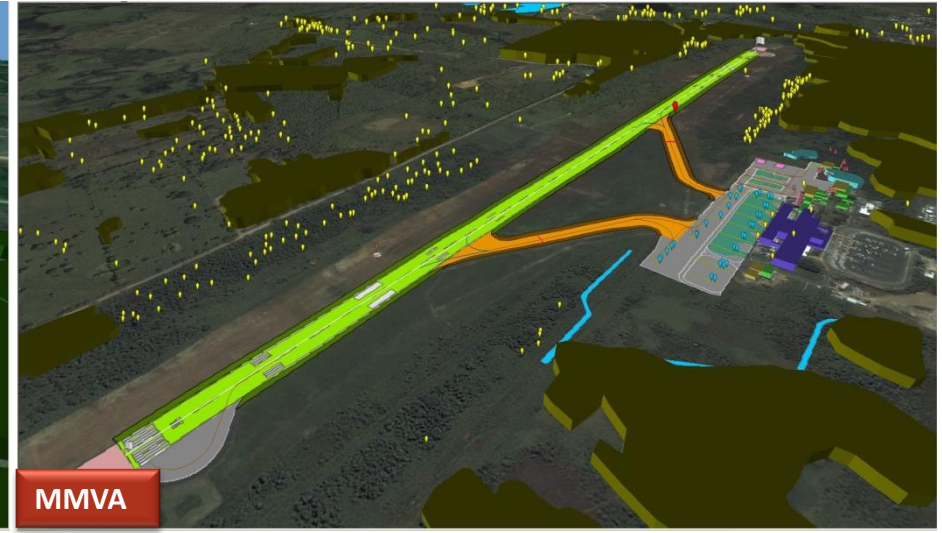
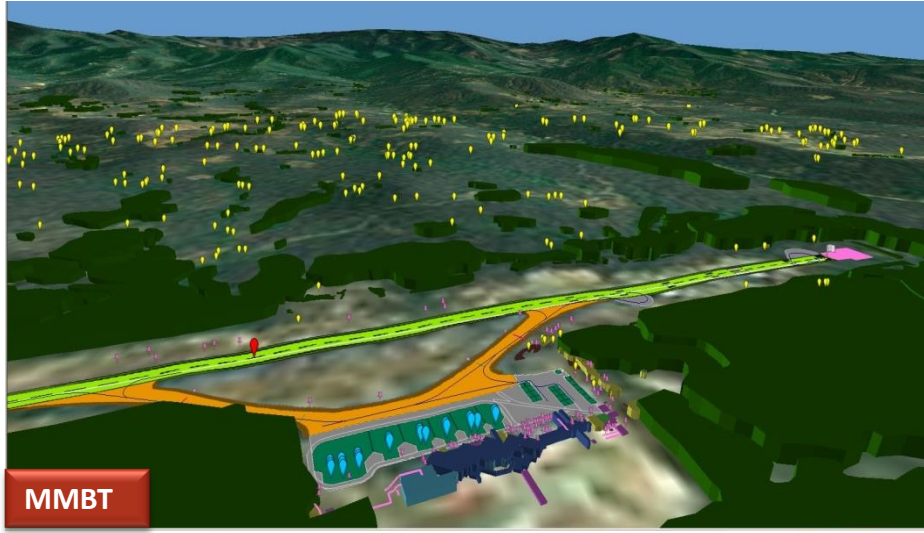
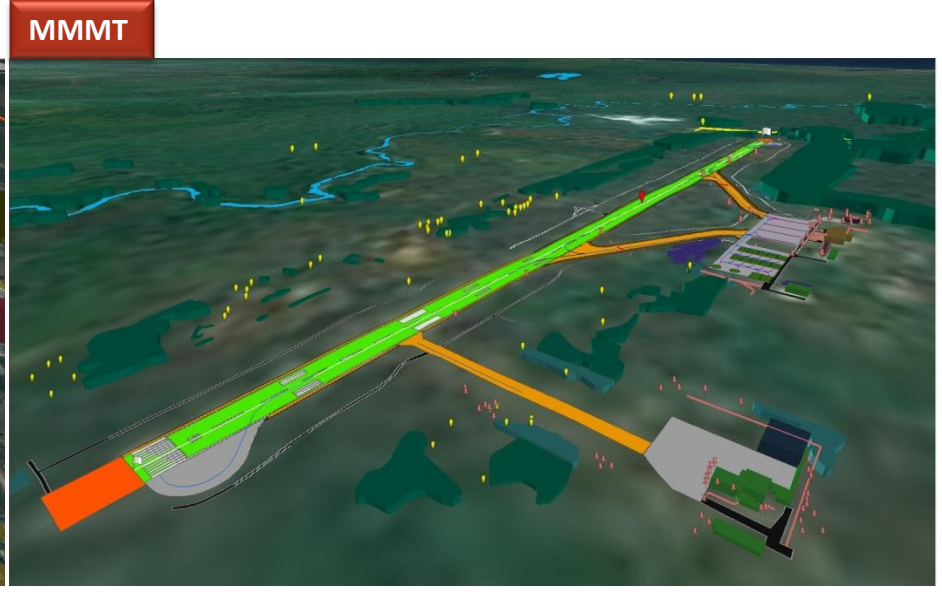
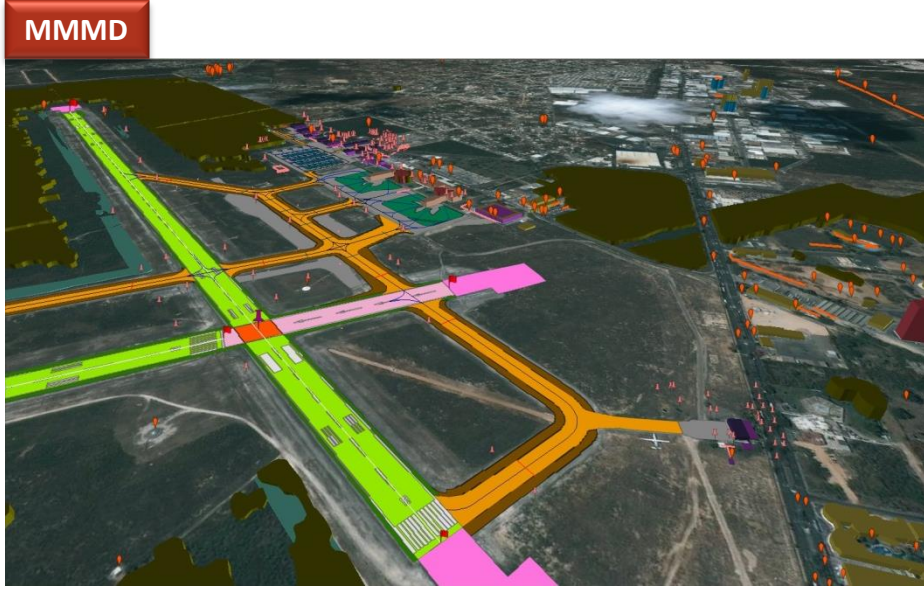
- ▲ Database standard is EUROCAE ED-98(A).
- ▲ Obstacle Criteria is ICAO Annex 15, Chapter 10
- ▲ Coverage is ICAO Area-2ABC.
- ▲ Formats include: AIXM, SHP, AutoCAD, KML/KMZ

Airport Mapping delivery

- ▲ Airport Mapping Database (AMDB) standard is EUROCAE ED-99(B).
- ▲ All features include building or obstacle ground elevation, and height of structure or feature.
- ▲ These AMDB are suitable for all ICAO requirements, as well as being used in Airline Electronic Flight Bag systems such as iPads.
- ▲ Formats include: AIXM, SHP, AutoCAD, KML/KMZ



Airports already completed 2014



BENEFITS: SWIM & Digital NOTAMs

ATM Viewer 2.0 : MMDM

File Options Tools Labels Help

Viewing Software is Snowflake ATM Viewer 2.0

WMS Layers
Layers

Measuring Tool
Selected Item

Snowflake Software - Modernising Air Traffic Management via Open Standards



Search

Name or Lat, Lon?

Backdrop Layers

- Airspace Height Filter Controls
- Snowflake Logo
- On Screen Controls
- Compass
- Scale bar
- World Map
- Place Names

Data Layers

- Airport Heliport
- Vertical Structure
- Guidance Line Marking
- Runway Marking
- Taxiway Marking
- Taxi Holding Position Marking
- Stand Marking

Files

C:\FANS Group\MMDM.xml

Altitude 0 km

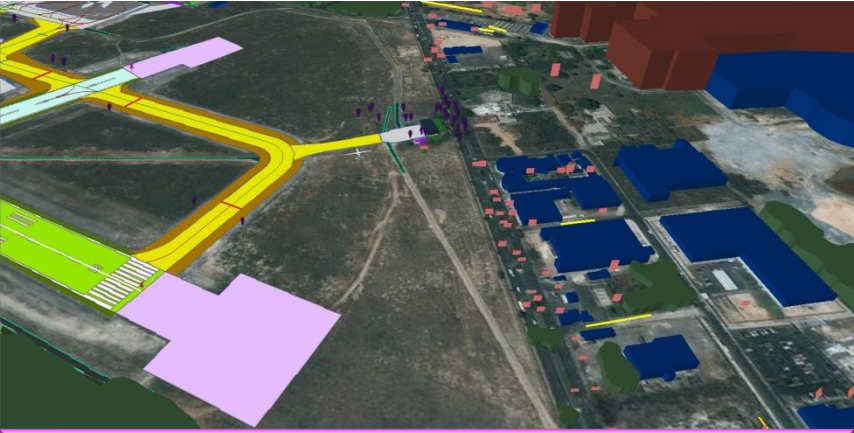
Lat 20.9328°

Lon -89.6621°

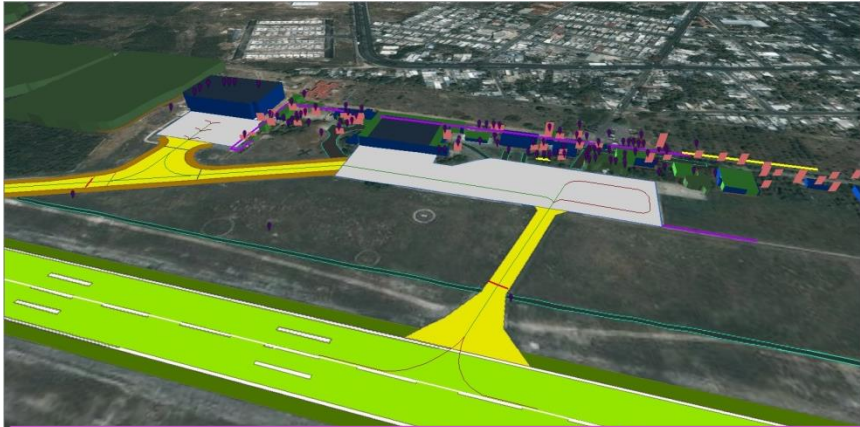
Elev 0 meters

Developed by [Snowflake Software](#) using the [GML API for AIXM](#) and [NASA World Wind](#)

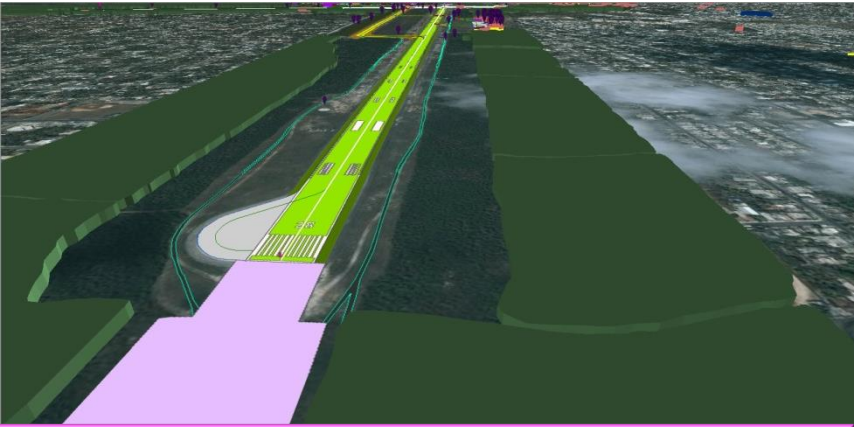
BENEFITS: Airport Management & Surface Movements Optimization



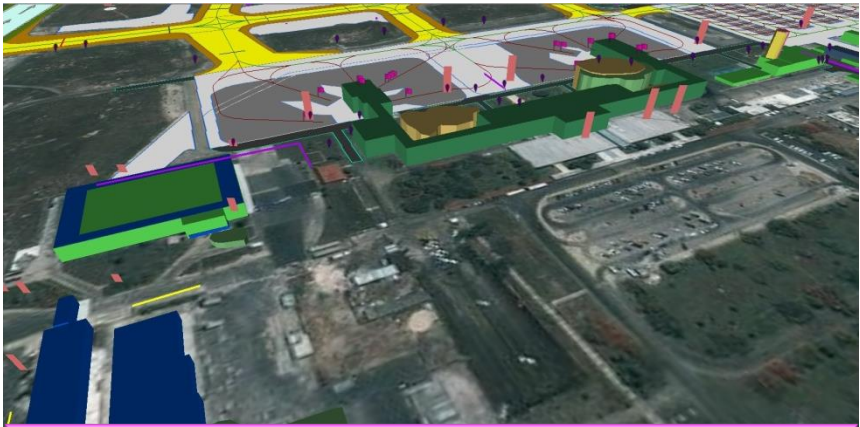
(AMDB) helps Airport in development of airport real estate



(AMDB) helps Airport in Neighborhood Noise Management



(Obstacles) helps Airport improve takeoffs with tree removals



(AMDB) helps develop better Road & Rail links to Airport

BENEFITS: Airlines who fly into ASUR airports can be more profitable.....

Airline	Airline	Airline
Aeroflot	Delta Air Lines	Southwest Airlines
Aerolíneas Argentinas	EuroAtlantic Airways	Spirit Airlines
Aeroméxico	Finnair	Sun Country Airlines
Aeroméxico Connect	Frontier Airlines	Sunwing Airlines
Aerotucán	Interjet	Thomas Cook Airlines
Air Berlin	Jetairfly	Thomas Cook Airlines Scandinavia
Air Canada	JetBlue Airways	Thomson Airways
Air Canada Rouge	LAN Airlines	Transaero Airlines
Air Europa	LAN Peru	Transportes Aéreos Guatemaltecos
Air France	LOT Polish Airlines	Tropic Air
Air Transat	Magnicharters	TUIfly operated by Arkefly
AirTran Airways	Maya Island Air	TUIfly Nordic
Alaska Airlines	MAYAir	United Airlines
American Airlines	Monarch Airlines	US Airways
Apple Vacations	Nordwind Airlines	Vacation Express
Arkefly	Novair	Virgin America
Avianca	Neos	Virgin Atlantic
Avianca El Salvador	Orbest Portugal	VivaAerobus
Blue Panorama Airlines	Orenair	Volaris
British Airways	PAL Airlines	WestJet
Condor	Perla Airlines	White
Copa Airlines	Pullmantur Air	Whitejets
Cubana de Aviación	SATA International	XL Airways France

All of these airlines fly into some or all of the ASUR airports. They can all benefit from improved:

- Two-Engine Take-Off Performance,
- Engine-Out Performance,
- New fuel-efficient PBN Procedures,
- Electronic Flight Bag Airport Maps

This project provides for new potential Revenues for ASUR & it's partners!



Thank you for your time

Dejan Damjanovic, Managing Director

Email: ddam@fans-group.aero

Mobile: +1-303-817-0226

8703 Yates Drive, suite 125

Westminster, CO 80031, USA

www.fans-group.aero

Office: +1-877-710-7932

Members – International Federation of
Aeronautical Information Management
Associations (IFAIMA.ORG),

Members - **RTCA**

