International Civil Aviation Organization

MIDANPIRG AIM Sub-Group

Sixth Meeting (AIM SG/6)
(Cairo, Egypt, 21 - 23 January 2020)

Agenda Item 4: AIM Planning and Implementation in the MID Region

PLANNING FOR DIGITAL DATASETS IN THE MID REGION

(Presented by the Secretariat)

SUMMARY

This paper presents an analysis on the current situation of digital datasets in terms of requirements, guidance and coding specifications and provides some guidelines for digital datasets implementation planning in the MID Region.

Action by the meeting is at paragraph 3.

REFERENCES

- Annex 15, 16th Edition
- PANS-AIM, 1st Edition
- GANP (ICAO DOC 7950), 6th Edition
- IMP-WG-A/2 SODs
- AIM/SWIM Team-17 AP06 & AP07

1. INTRODUCTION

1.1 Amendment 40 to Annex 15 and the PANS-AIM provided recommendations on the provision of AIP datasets and Instrument Flight Procedure datasets. In addition to these new datasets, the provisions related to terrain, obstacle and aerodrome mapping datasets remained unchanged in Annex 15 and the PANS-AIM.

1.2 The following analysis presents some information and insight on the current situation of digital datasets in terms of requirements, guidance and coding specifications; and provide guidelines for digital datasets implementation planning in the MID Region.

2. DISCUSSION

WHAT DATASETS SHOULD BE PROVIDED?

2.1 Annex 15 specifies the following types of datasets:

5.3.1.1 Digital data shall be in the form of the following data sets:

a) AIP data set;

b) terrain data sets;

c) obstacle data sets;

d) aerodrome mapping data sets; and

e) instrument flight procedure data sets.

AVAILABILITY REQUIREMENT

2.2 Annex 15 describes availability requirement for various digital datasets, as follows:

	Recommendation (should)	**Mandated (Shall)**
AIP	• Yes	-
Terrain	• Area 2b, 2c, 2d and 3	• Area 1 • Area 2a plus take-off flight path area and OLS for International aerodromes • Area 4 for CAT II/II aerodromes
Obstacles	• Area 2b, 2c, 2d and 3	• Area 1 • Area 2a plus take-off flight path area and OLS for International aerodromes • Area 4 for CAT II/II aerodromes
AMD	• Yes	-
IFP	• Yes	-

AIP Dataset

5.3.2.1 Recommendation.— An AIP data set should be provided covering the extent of information as provided in the AIP.

5.3.2.2. Recommendation.— When it is not possible to provide a complete AIP data set, the data subset(s) that are available should be provided.

Terrain Dataset

5.3.3.3.2 Terrain data shall be provided for Area 1.

5.3.3.3.3 For aerodromes regularly used by international civil aviation, terrain data shall be provided for:

a) Area 2a;

b) the take-off flight path area; and

c) an area bounded by the lateral extent of the aerodrome obstacle limitation surfaces.

5.3.3.3.8 For aerodromes regularly used by international civil aviation, terrain data shall be provided for Area 4 for all runways where precision approach Category II or III operations have been established and where detailed terrain information is required by operators to enable them to assess the effect of terrain on decision height determination by use of radio altimeters.

2.3 Other terrain datasets (area 2b, 2c, 2d and 3) are recommended.

Obstacle Dataset

5.3.3.4.3 Obstacle data shall be provided for obstacles in Area 1 whose height is 100 m or higher above ground.

5.3.3.4.4 For aerodromes regularly used by international civil aviation, obstacle data shall be provided for all obstacles within Area 2 that are assessed as being a hazard to air navigation.

5.3.3.4.5 For aerodromes regularly used by international civil aviation, obstacle data shall be provided for:

a) Area 2a for those obstacles that penetrate an obstacle data collection surface outlined by a rectangular area around a runway that comprises the runway strip plus any clearway that exists. The Area 2a obstacle collection surface shall have a height of 3 m above the nearest runway elevation measured along the runway centre line, and for those portions related to a clearway, if one exists, at the elevation of the nearest runway end;

b) objects in the take-off flight path area which project above a plane surface having a 1.2 per cent slope and having a common origin with the take-off flight path area; and

c) penetrations of the aerodrome obstacle limitation surfaces.

5.3.3.4.10 For aerodromes regularly used by international civil aviation, obstacle data shall be provided for Area 4 for all runways where precision approach Category II or III operations have been established.

2.4 Other obstacle datasets (area 2b, 2c, 2d and 3) are recommended.

Aerodrome Mapping Dataset

5.3.4.2 Recommendation.— Aerodrome mapping data sets should be made available for aerodromes regularly used by international civil aviation.

Instrument Flight Procedure Dataset

5.3.5.2 Recommendation.— Instrument flight procedure data sets should be made available for aerodromes regularly used by international civil aviation.

HOW DATASETS SHOULD BE PROVIDED?

2.5 Datasets contents and format

2.5.1. Annex 15 and PANS-AIM provide some general requirements and guidelines on how the datasets should be provided. However, detailed guidance on how to develop and provide the datasets, in particular for AIP and IFP datasets, is needed.

AIP Dataset

Annex 15 (5.3.2.3) The AIP data set shall contain the digital representation of aeronautical information of lasting character (permanent information and long duration temporary changes) essential to air navigation.

PANS-AIM (5.3.3.1.1) The AIP data set shall include data about the following subjects, with the properties indicated in brackets being included as a minimum (if applicable):

a) air traffic services (ATS) airspace (type, name, lateral limits, vertical limits, class of airspace);

b) special activity airspace (type, name, lateral limits, vertical limits, restriction, activation);

c) ATS route and other route (designator, flight rules);

d) route segment (navigation specification, from point, to point, track, length, upper limit, lower limit, minimum en-route altitude (MEA), minimum obstacle clearance altitude (MOCA), direction of cruising level, required navigation performance);

e) waypoint – en-route (identification, location, formation);

f) aerodrome/heliport (ICAO location indicator, name, designator IATA, served city, certified ICAO, certification date, certification expiration date, control type, field elevation, reference temperature, magnetic variation, reference point);

g) runway (designator, nominal length, nominal width, surface type, strength);

h) runway direction (designator, true bearing, threshold, take off run available (TORA), take-off distance available (TODA), accelerate-stop distance available (ASDA), landing distance available (LDA));

i) final approach and take-off (FATO) (designation, length, width, threshold point);

j) touchdown and left-off (TLOF) (designator, centre point, length, width, surface type);

k) radio navigation aid (type, identification, name, aerodrome/heliport served, hours of operation, magnetic variation, frequency/channel, position, elevation, magnetic bearing, true bearing, zero bearing direction);

PANS-AIM (5.2.1.1.3) When the AIP data set (as specified in 5.3.3.1) is provided, the following sections of the AIP may be omitted and reference to the data set availability shall be provided:

a) GEN 2.5 List of radio navigation aids;
b) ENR 2.1 FIR, UIR, TMA and CTA;
c) ENR 3.1 Lower ATS routes;
d) ENR 3.2 Upper ATS routes;
e) ENR 3.3 Area navigation routes;
f) ENR 3.4 Helicopter routes;
g) ENR 3.5 Other routes;
h) ENR 3.6 En-route holding;
i) ENR 4.1 Radio navigation aids — en-route;
j) ENR 4.2 Special navigation systems;
k) ENR 4.4 Name-code designators for significant points;
l) ENR 4.5 Aeronautical ground lights – en-route;
m) ENR 5.1 Prohibited, restricted and danger areas;
n) ENR 5.2 Military exercise and training areas and air defence identification zone (ADIZ);
o) ENR 5.3.1 Other activities of a dangerous nature;
p) ENR 5.3.2 Other potential hazards;
q) ENR 5.5 Aerial sporting and recreational activities;
r) AD 2.17 Air traffic services airspace;
s) AD 2.19 Radio navigation and landing aids;
t) AD 3.16 Air traffic services airspace; and
u) AD 3.18 Radio navigation and landing aids.

2.5.2. It is to be noted that the removal of the above sections from the AIP (when the dataset is available) may cause issues for some users that are not ready to use the datasets. Therefore, it is recommended that those sections be kept in the AIP for a certain period and their removal be done in close coordination with the users.

Terrain and Obstacle Datasets

Annex 15 (5.3.3.3.1) Terrain data sets shall contain the digital representation of the terrain surface in the form of continuous elevation values at all intersections (points) of a defined grid, referenced to common datum.

Annex 15 (5.3.3.4.1) Obstacle data sets shall contain the digital representation of the vertical and horizontal extent of obstacles.

Annex 15 (5.3.3.4.2) Obstacle data shall not be included in terrain data sets.

PANS-AIM (5.2.1.1.4) When the Obstacle Data Set (as specified in 5.3.3.2.2) is provided, the following sections of the AIP may be omitted and a reference to the data set availability shall be provided:

a) ENR 5.4 Air navigation obstacles;
b) AD 2.10 Aerodrome obstacles; and
c) AD 3.10 Heliport obstacles.

2.5.3. It is to be noted that the removal of the above sections from the AIP (when the dataset is available) may cause issues for some users that are not ready to use the datasets. Therefore, it is recommended that those sections be kept in the AIP for a certain period and their removal be done in close coordination with the users.

2.5.4. PANS-AIM describes Numerical requirements for terrain and obstacle data sets and requirements for terrain and obstacle data collection surfaces.

Aerodrome Mapping Dataset

Annex 15 (5.3.4.1) Aerodrome mapping data sets shall contain the digital representation of aerodrome features.

Note.— Aerodrome features consist of attributes and geometries, which are characterized as points, lines or polygons. Examples include runway thresholds, taxiway guidance lines and parking stand areas.

Instrument Flight Procedure Dataset

Annex 15 (5.3.5.1) Instrument flight procedure data sets shall contain the digital representation of instrument flight procedures.

PANS-AIM (5.3.3.4.1) The instrument flight procedure data set shall include data about the following data subjects, with the properties indicated in brackets being included as a minimum (if applicable):

a) procedure (all properties);
b) procedure segment (all properties);
c) final approach segment (all properties);
d) procedure fix (all properties);
e) procedure holding (all properties); and
f) helicopter procedure (all properties).

2.6 Distribution services

2.6.1. Annex 15 provides the following general recommendation for the distribution of aeronautical information products:

Annex 15 (5.4.1.1) Recommendation.— Global communication networks such as the Internet should, whenever practicable, be employed for the provision of aeronautical information products.

2.6.2. Further guidance on digital data set distribution would be found in the Manual on System-wide Information Management (SWIM) Concept (Doc 10039). Updated version of Doc 10039 is expected to be available Q1-Q2 2020. However, means of distribution of each type of SWIM information should be defined by that respective domain (e.g. AIS information). Development of such information services over SWIM for AIS would be a task of the IMP-WG-A.

WHEN DATASETS SHOULD BE PROVIDED?

2.7 Annex 15 provisions mandate or recommend, as appropriate, the availability of the various datasets, as described before. However, the majority of datasets have not yet been provided by States, due to lack of complete guidance on the content, coding requirements and distribution services, lack of enough resources, etc. Some ICAO Regions have started planning for the provision of digital datasets and other Regions are in the process of planning.

2.8 ICAO Global Air Navigation Plan (DOC 9750) recommends the following timelines for the provision of digital datasets:

Timeline	Description	Remarks
Block 1 (2019 upward)	Full move into an automated data-centric environment so that the management, processing, verification, usage and exchange can be done in a structured, automatic manner and human intervention is reduced	AIS automation eAIP Availability of information in AIXM 5.1 format
Block 1 (2019 upward)	Provision of digital datasets for: - AIP Dataset - Terrain Dataset - Obstacle Dataset - Aerodrome Mapping Dataset - Instrument Flight Procedure Dataset	Availability of digital datasets
Block 2 (2025 upward)	Dissemination of aeronautical information in a SWIM environment	Distribution services (through AIM information services on SWIM)

2.9 Whereas development of some digital datasets requires additional guidelines such as coding guidelines, etc. (in particular, AIP dataset and IFP datasets), provision of those datasets may take longer than expected.

2.10 In Europe, milestones for the new ATM Master Plan Level 3 objectives is under discussion. An initial draft of the objectives and timelines (draft) is as follows. The objectives are similar to the GANP DAIM for B1, B2 and B3, however the timelines are more flexible:

- Block 1 (2020-2025): Data-centric environment
- Block 2 (2025-2030): Provision of ICAO data sets
- Block 3 (2030 and beyond): Availability of data set distribution and aeronautical information feature services

2.11 ICAO IMP-WG-A/2 meeting (Montreal, 8-11 July 2019) agreed that the AIS Manual should contain high-level guidance explaining the purpose and content of the coding specifications for each data set. In this regard, AIS Manual Volume 4 will provide guidance for the digital data sets. For the detailed rules, the AIS Manual would reference the EUROCONTROL Specifications which are under development. The purpose of the EUROCONTROL Digital Data Set Specifications, when available, will be to ensure the harmonisation of data set contents and scope, both in ECAC and worldwide.

2.12 The current plan for the development of formal EUROCONTROL Specifications is outlined below:

- Q4 2019 – prepare AIP data set specification and the obstacle data set specification proposals and launch the formal consultation process. The proposed AIP Data Set coding rules are considered mature and are accessible on a public web-site: https://ext.eurocontrol.int/aixm_confluence/display/ACGAIP/Overview .
- Q1 2020 – stakeholder public consultation, including workshop
- Q2 2020 – finalise consultation process and publish the EUROCONTROL Specification for AIP data sets version 1.0 and obstacle data sets version 1.0
- Q3 2020 – start a similar process for the Instrument Flight Procedure data set coding guidelines/ specifications, with finalisation in 2021.

CONCLUSION

2.13 Based on the foregoing, MID Region is expected to start planning for the provision of AIS digital datasets in line with the global SWIM provisions with regard to the digital information (for different domains), future information services and dissemination of information in the SWIM environment. In this regard, future developments at the Global level and in other Regions should be constantly monitored by the AIM Sub-Group in order to keep the Regional Plans/Roadmap in line with the Global provisions and developments. Furthermore, the recommendations and timelines of the GANP should also be considered in the Regional planning process in the MID Region.

2.14 Based on the Global developments and current activities in other Regions, the following guidelines for planning could be considered:

- Near term (Until 2024)
  - Establishment of data-centric environment (implementation of AIS automation and relevant processes)
  - Availability of information in AIXM 5.1+ format
  - Provision of eAIP
  - Required terrain and obstacle datasets (area 1, area 2/TKOF flight path area/OLS and area 4 for CAT II/III)
  - AMD, if applicable (based on the Regional Decision)

- Mid-term (2024 – 2028)
  - AIP dataset
  - IFP Datasets

- Long-term (2028 upward)
  - Dataset Distribution Services
  - Information Services over SWIM

Note – States should provide the ICAO MID Office with their plan and timetable for the provision of the new digital data sets.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information provided in this Working Paper;

b) discuss, amend, as appropriate, and endorse the proposed plan for the implementation of Digital Datasets in the MID Region; and

c) urge States to provide the ICAO MID Office with their plan and timetable for the provision of the new Digital Datasets.

- END -