REPORT

Serious Incident which occurred on **29 March 2010**
at Nice aerodrome (06)
involving **Raytheon 390 Premier 1A** registration **M-FROG**
and **CRJ200** registration **EC-HHV**

BEA

Bureau d'Enquêtes et d'Analyses pour la Sécurité de L'aviation Civile
[Bureau of Investigation and Analysis for Civil Aviation Safety]

Ministry of Ecology, Sustainable Development, Transport and Housing

Foreword

This report sets out the conclusions of the BEA into the circumstances and the causes of this incident.

In accordance with Annex 13 to the Convention on International Civil Aviation and to Regulation (EU) No 996/2010, the investigation was not conducted with a view to apportioning blame or assessing individual or collective liability. Its sole objective is to draw lessons from this incident which might prevent future accidents.

Consequently, any use of this report for purposes other than prevention could lead to misinterpretation.

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Synopsis

EVENT:

Night time runway incursion of an aircraft not detected by ATC; rejection of take off by another aircraft

Consequences and damage:
None
Aircraft:
1. Raytheon 390 Premier 1A (M-FROG)
2. CRJ 200 (EC-HHV)

Date and time:
29 March 2010 at 1844[1]
Operator:
1. The World is Yours Ltd
2. Air Nostrum

Location:
Nice aerodrome (06)
Nature of flight:
1. Public charter flight
2. Scheduled international passenger flight

Persons on board:
1. Two pilots, two passengers
2. Two pilots and passengers

Meteorological Conditions:
Wind 080°/09kt, visibility above 10 km, FEW at 1,100 ft, SCT at 10,000 ft and BKN at 23,000 ft, QNH 1011 hPa. It was dark.

1. Progress of the flight

At 18.38.09, the crew of the EC-HHV were instructed on frequency PVL/SOL to taxi via taxiways Delta and then Tango to the holding point for runway 04L, A1 and hold.

At 18.41.09, the crew of the M-FROG were instructed on frequency PVL/SOL to taxi via taxiway Alpha to the holding point for runway 04L, A1, and hold.

At 18.41.37, the crew of the EC-HHV were cleared on the TWR frequency to cross runway 04L (1).

At 18.42.09, the crew of the M-FROG were transferred to the TWR frequency (2).

At 18.42.15, the crew of the EC-HHV were cleared to line up on 04R via taxiway W (3).

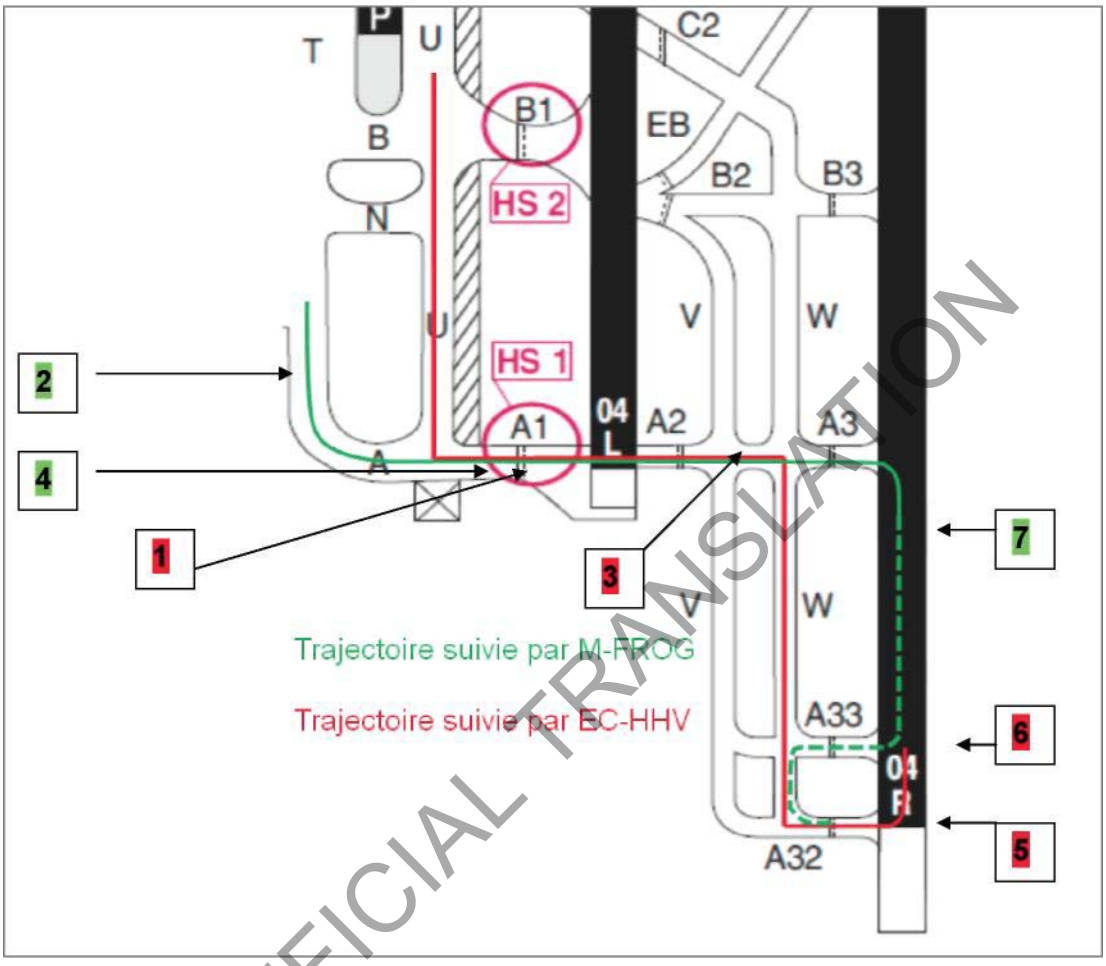
At 18.42.56, the crew of the M-FROG were cleared to cross runway 04L and to taxi via taxiway W. They read back this instruction correctly (4).

At 18.43.48, the crew of the EC-HHV were cleared to take off on runway 04R (5).

[1] Unless otherwise stated, the times contained in this report are expressed in Coordinated Universal Time (UTC). Add two hours to obtain the time in mainland France on the date of the event

At 18.44.09, the crew of the EC-HHV reported an aircraft on the runway. They aborted take-off (6).

The controller asked the M-FROG "Confirm you are not on the Whiskey taxiway". The crew replied that they believed they were on the runway (7).



Trajectoire suivie par = trajectory followed by

Figure 1: extract from the aerodrome chart (source: IAC) and trajectories on the ground

The controller then instructed the crew of the M-FROG to leave the runway, take the first right and return to taxiway W. The crew, who were already on the runway, interpreted the controller's instruction "first right" as an instruction to leave the runway at A33. They therefore went to holding point A33 via the runway (trajectory shown as a dotted line in Figure 1), whereas the controller thought they would go there via taxiway W. The crew of the M-FROG therefore found themselves facing the EC-HHV. The crew of the EC-HHV had to move aside slightly to allow the M-FROG to pass and thus vacate the runway via A33.

The crew of the EC-HHV was then cleared for take-off a second time on runway 04R, followed shortly afterwards by the M-FROG.

2 ADDITIONAL INFORMATION

2.1 Testimonies

The crew of the ECF-HHV said that, after powering up to take off on runway 04R, they noticed an aircraft entering the runway at holding point A3. They aborted take-off after about 150 metres. They then informed the tower controller. They estimated that when they aborted take-off, they were travelling at a speed close to that of the normal speed on a taxiway.

The crew of the M-FROG said that after encountering considerable difficulty in finding out where they were while taxiing, they ended up on runway 04R without realising it. The co-pilot, seated on the left, had the controls while taxiing and the pilot-in-command was guiding himself using the electronic aerodrome chart displayed on board. The crew said that they had been cleared to cross runway 04L and then to taxi to the holding point for runway 04R via taxiway W. The two pilots said that they had had problems locating the edge lights of the taxiways after runway 04L, and that the taxiway's centreline lights were on but not very visible. The crew followed the yellow centreline lights, which curved towards the right, believing that this was guiding them to taxiway W. On seeing the white edge lights of the runway and the lights of another aircraft, they realised that they had inadvertently strayed onto the runway.

The crew were not familiar with Nice aerodrome at night.

The tower controller said that when the EC-HHV was about to take off, he was busy watching an aircraft in final on runway 04L and the take-off of the EC-HHV. He said that from the control tower it was very difficult, if not impossible, at night to see precisely the position of an aircraft the size of the M-FROG at that particular location of the platform.

2.2 Aerodrome information

2.2.1 Lighting of holding points

Since runway incursions are frequent at Nice, the lighting of certain holding points identified as potentially dangerous (including holding point A3) has been reinforced by:

- two pairs of yellow lights (wig wag) on either side of the taxiway, flashing alternately,
- flashing orange threshold lights, embedded into the runway and spaced three metres from one another.

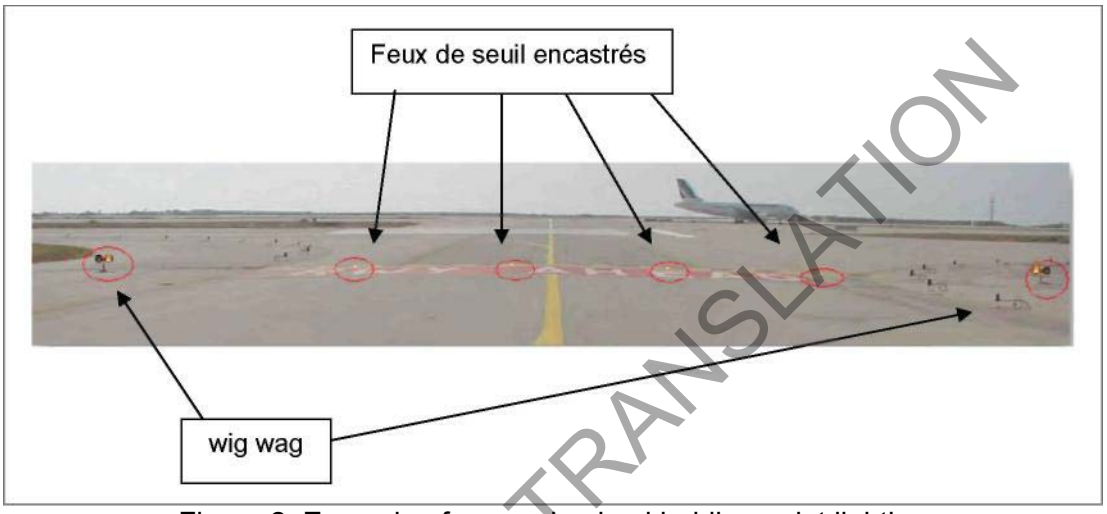


Figure 2: Example of re-emphasised holding point lighting
[feux de seuil encastrés = embedded threshold lights]

This lighting was switched on and working normally at the time of the incident.

Also, in order to raise the awareness of crews when reading the aerodrome chart, some holding points have been designated as hot spots (HS) and are circled in red on the chart (see Annex 1). These holding points are located mainly between the stands and runway 04L. On the date of the incident, holding point A3 was not listed as an HS.

NB: since the incident, holding point A3 has been added to the HS list.

2.2.2 Taxiway marking

2.2.2.1 Ground marking

Taxiways V and W are marked by a solid yellow centreline.

At the aerodrome, the junction of taxiways V and W is before holding point A2. On the IAC chart diagram (and the Jeppesen chart), the junction of taxiways V and W is after holding point A2 (see Figure 3 below).

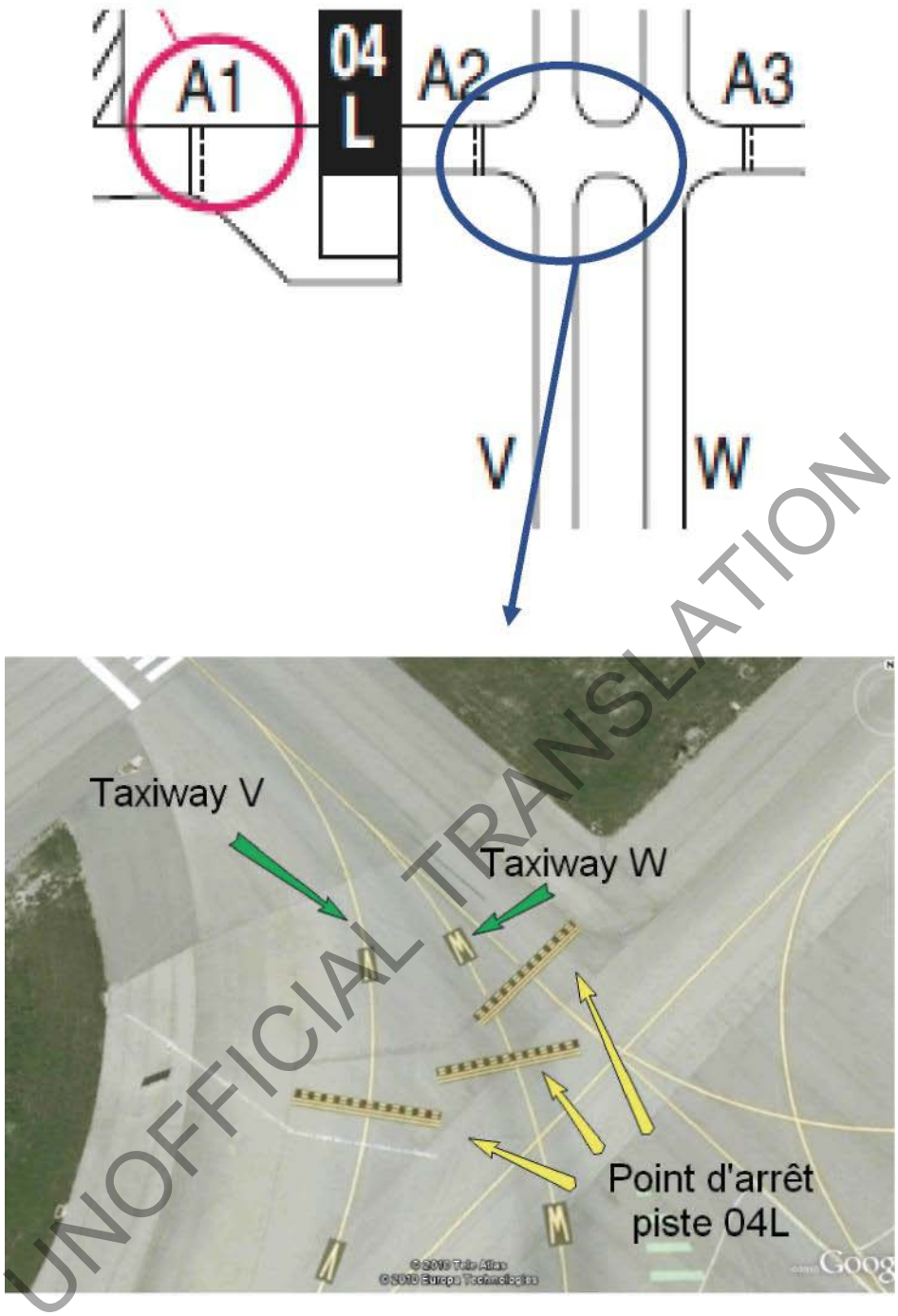


Figure 3: aerodrome chart diagram (source: AIP) and aerial photograph of the junction of taxiways V and W [Point d'arrêt piste 04L = holding point runway 04L]

A sign indicating taxiway W could not be seen clearly from the junction of taxiway W.

2.2.2.2 Lighting

To the north of runway 04L, connecting taxiway A1 has blue edge lighting. To the south, this is replaced by blue retro-reflective edge lighting.

Between runway 04L and runway 04R, the taxiways have green centreline lighting. At the time of the incident, the taxiway V lighting was switched off,

and the taxiway W lighting was switched on. The route between holding points A2 and A3 was also lit at the time of the incident (see Figure 4).

Note 1: where landings are performed on runway 04L, taxiway V is one of the service accesses to and from runway 04L. The taxiway V lighting is then switched off in order to deter crews from following that taxiway.

Note 2: since the event, the centreline lighting leading to A3 has been concealed and the use of this connecting taxiway has been prohibited at night.

Figure 4: diagram of the status of the taxiway lighting between runways 04L and 04R at the time of the incident

The intensity of the lighting of the taxiways (other than V) was set to position 2 (on a scale of 4).

NB: the operations manual stipulates that brilliance of the lighting on taxiways V and W should be set at 3 during the day and 1 at night.

Since taxiways V and W are opened and closed depending on runway configuration, intrusion loops have been installed to trigger an alert in the control tower if an aircraft takes the incorrect route.

2.2.3 Tools available to ATC

Nice aerodrome does not have the following:

- radar allowing the routing of aircraft on the ground to be monitored;
- a RIMCAS (runway incursion management and collision avoidance system), a system for detecting and reporting conflicts between aircraft and other objects in the areas associated with runways.

3 ANALYSIS

3.1 Incident scenario

The controller cleared the crew of the M-FROG to cross runway 04L and taxi to taxiway W. The crew then had problems:

- identifying the route described in the documentation;

- making out the edge lighting of the taxiways because of the transition between the edge lighting and the retro-reflective lighting.

The green centreline lighting was therefore its main aid. The width of the taxiways at this location of the aerodrome together with the low height of the cockpit made it even more difficult to find the correct route.

While taxiing, the crew probably failed to locate the taxiway W junction for several reasons:

- in line with the documentation, the crew expected to find the V junction after holding point A2, whereas it was in fact before it;

- the green centreline lighting of taxiway V had been switched off, and the crew proceeded straight to the taxiway W junction, doubtless thinking that this was the taxiway V junction. It thus continued to taxi using the green lighting, which took it to holding point A3.

A sign indicating taxiway W could not be seen clearly from the taxiway junction.

The crew, which was probably looking at the chart and trying to locate its position, failed to notice that they had passed holding point A3, and only realised that they were on the runway when they saw the white edge lighting.

The crew of the EC-HHV, shortly after powering up and at a speed corresponding to taxiing speed, detected the M-FROG visually. They aborted take-off and stopped at holding point A3.

3.2 Lack of equipment available to ATC

The investigation showed that at night and at this location on the aerodrome, it was not possible for ATC to precisely identify the position of an aircraft. In the absence of an aid to monitor the routing of the aircraft on the ground and to detect and report conflicts between aircraft, ATC were unable to detect the runway incursion of the M-FROG and to anticipate a risk of a collision on the ground between aircraft.

The installation of additional wig wag-type lighting and embedded threshold lighting at the holding point was unable to prevent the crew of the M-FROG from crossing the holding point and encroaching onto runway 04R.

4 - CONCLUSION

The incident was the result of the crossing of holding point A3 undetected by either the crew of the M-FROG or ATC. While taxiing, the crew encountered many problems making it difficult to locate their position, including:

- the diagram of the junction of taxiways V and W on the aerodrome chart, which did not reflect reality;
- the lighting of taxiway A3, which probably distracted the crew's attention;
- the extinguished lighting of taxiway V may have been responsible for the crew's mistake while looking for the junction of taxiway W;
- the sign indicating taxiway W could not be seen clearly from the taxiway junction.
- the complexity of the area between runways 04L and 04R, which is an intersection of several taxiways and is very wide;
- the low height of the cockpit of the Raytheon 390;
- the transition from the edge lighting to the reflective lighting;
- the inability of ATC to detect the conflict also contributed to the incident.

5 - RECOMMENDATIONS

NB: in accordance with the provisions of Article 17.3 of Regulation No 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation, a safety recommendation must in no case create a presumption of blame or liability for an accident, serious incident or incident. The addressees of the safety recommendations must report to the authority responsible for safety investigations which formulated those recommendations on the action taken or under consideration with a view to their implementation in line with the provisions of Article 18 of the aforementioned Regulation.

This event showed that the installation of additional lighting at holding point A3 failed to prevent the inadvertent crossing of that point by the crew. It also showed that ATC was unable to estimate the precise position of the aircraft on the ground at that aerodrome location, and was therefore unable to detect an error in the route taken and thus to prevent a runway incursion and a risk of a collision between the aircraft.

Consequently, the BEA makes the following recommendation:

- **that the DGAC should install at aerodromes with heavy traffic equipment allowing ATC to detect and be alerted to the risk of a collision on the ground, and in particular of a runway incursion.**

This event showed that there may be differences between the data shown on the aeronautical charts of aerodromes and the reality on the ground.

Consequently, the BEA makes the following recommendation:

- **that the DSNA should ensure that, at all aerodromes, that the aerodrome charts precisely reflect the reality of the infrastructure.**

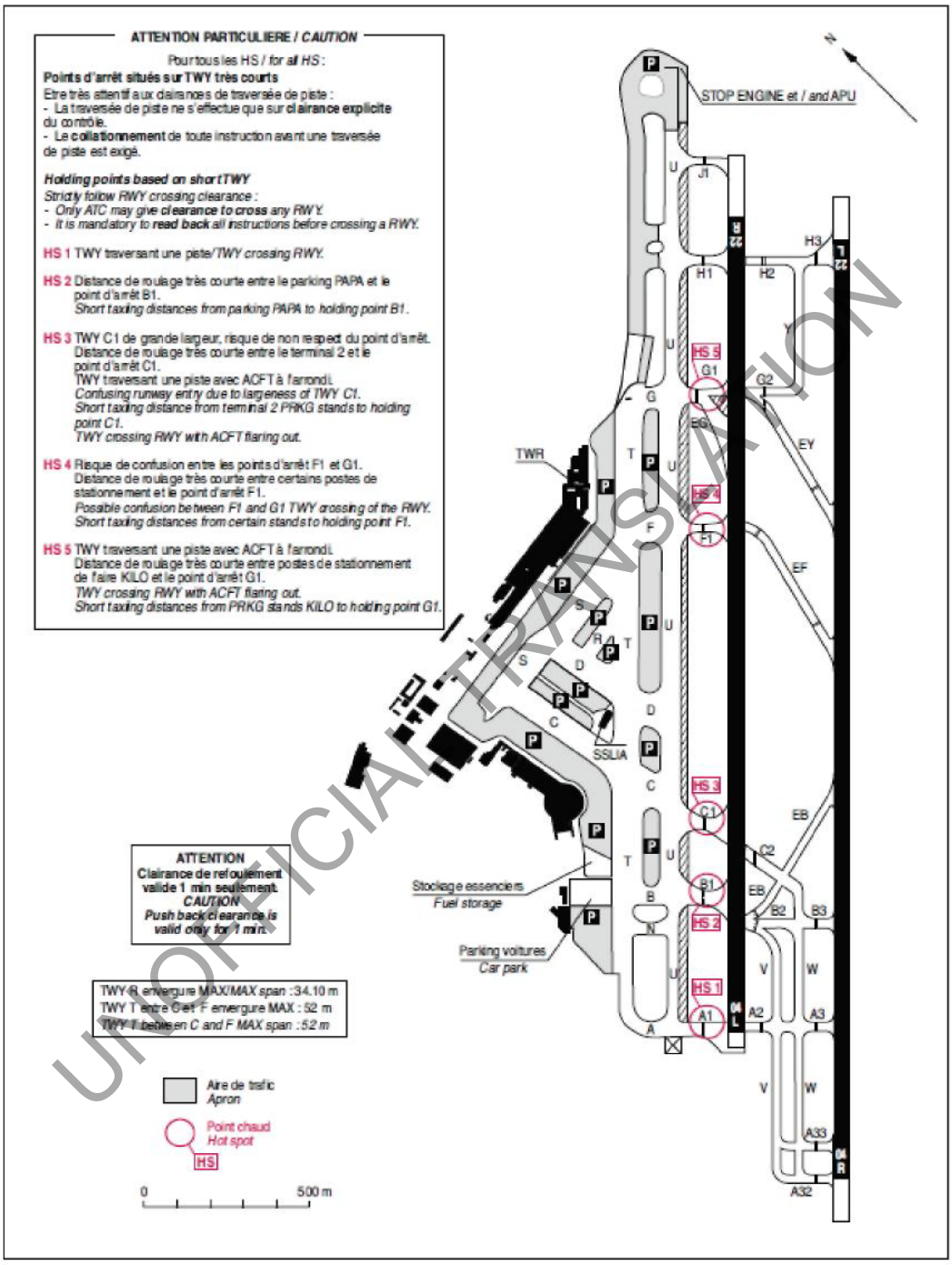
ANNEX

AIP
FRANCE

AD2 LFMN GMC 01
11 FEB 10

MOUVEMENTS A LA SURFACE
Ground movements

NICE COTE D'AZUR



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