BEA
Bureau d'Enquêtes et d'Analyses
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INVESTIGATION REPORT

Serious incident to the ATR 42-600 registered V2-LIK

on 14 October 2014
during landing at
Martinique Aimé Césaire airport

RÉPUBLIQUE FRANÇAISE
Liberté
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v2-k141014.en/**October 2020**

SAFETY INVESTIGATIONS

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SPECIAL FOREWORD TO ENGLISH EDITION

This is a courtesy translation by the BEA of the Final Report on the Safety Investigation published in September 2020. As accurate as the translation may be, the original text in French is the work of reference.

Contents

GLOSSARY

Abbreviation	English	French
AIP	Aeronautical Information Publication	
AIS	Aeronautical Information Service	
AP	Autopilot	
APAPI	Abbreviated Precision Approach Path Indicator *Similar system to PAPI but composed of two units instead of four*	
ATC	Air Traffic Control	
ATIS	Automatic Terminal Information Service	
CRM	Crew Resource Management	
CVR	Cockpit Voice Recorder	
DGAC	French civil aviation authority	Direction Générale de l'Aviation Civile
DSAC	French civil aviation safety directorate	Direction de la Sécurité de l'Aviation Civile
DTHR	Displaced THReshold	
EASA	European Aviation Safety Agency	
ECCAA	Eastern Caribbean Civil Aviation Authority	
FDR	Flight Data Recorder	
FOO	Flight Operations Officer	
Ft	Feet	
GNSS	Global Navigation Satellite System	
ICAO	International Civil Aviation Organization	
IMSS	Integrated Maintenance Support System	
KP	Kilometric Point (distance to runway threshold (in metres))	
Kt	Knots	

Abbreviation	English	French
LOC	LOCalizer	
MDH	Minimum Descent Height	
NDB	Non Directional Beacon	
NOTAM	NOtice To AirMen	
PAPI	Precision Approach Path Indicator	
PF	Pilot Flying	
PM	Pilot Monitoring	
QFU	Magnetic bearing of runway (in tens of degrees)	
QNH	Altimeter setting to obtain aerodrome elevation when on the ground	
RESA	Runway End Safety Area	
RNAV	aRea NAVigation	
SAFA	Safety Assessment of Foreign Aircraft	
SAMAC	Martinique Aimé Césaire airport company	Société Aéroport Martinique Aimé Césaire
SMS	Safety Management System	
SNA-AG	West Indies-French Guyana air navigation service	Service de la Navigation Aérienne en Antilles Guyane
SUP AIP	AIP supplement	
TOD	Temporary Operational Directive	
UTC	Coordinated Universal Time	
VOR	VHF Omnidirectional Range	

Synopsis

Time	12:42[1]
Operator	Leeward Islands Air Transport (LIAT)
Type of flight	Commercial air transport - passenger
Persons on board	Captain (PM); first officer (PF); 1 cabin crew; 23 passengers
Consequences and damage	Left main landing gear damaged

[1]Except where otherwise indicated, times in this report are in Martinique local time. Four hours should be added to obtain universal time coordinated (UTC).

Landing before displaced threshold of runway undergoing work, collision with an obstacle during landing run

The crew of the ATR 42 registered V2-LIK were carrying out the passenger commercial air transport flight LIAT 370 from Saint-Lucia bound for Martinique Aimé Césaire airport. The aeroplane took off around 2 hours 50 minutes behind the scheduled time. A few minutes later, the crew were cleared for a visual approach to runway 10 where the first 1,500 m were not available due to work in progress.

The aeroplane landed 940 m from the runway 10 threshold, i.e. 560 m from the temporary displaced threshold, in the work zone; during the landing run, it struck a temporary boundary light.

The investigation found that insufficient flight preparation, added to the crew's feeling of being under substantial time pressure, contributed to them having partial situational awareness of the presence of work on runway 10, the position of the displaced threshold and the associated approach procedure. Neither the temporary markings and lights, nor the information provided by the ATC were sufficient to draw the crew's attention to the position of the work and prevent landing on the closed part of the runway.

ORGANIZATION OF THE INVESTIGATION

The BEA was informed of the serious incident on 15 October 2014. In accordance with Annex 13 to the Convention on International Civil Aviation, and European regulation No 996/2010[(2)], the BEA opened a safety investigation and notified the same day its counterparts from the Eastern Caribbean Civil Aviation Authority (ECCAA), representing the state of registration and state of operation of the aeroplane. The ECCAA appointed an accredited representative who retained the skills of an adviser from Leeward Islands Air Transport (LIAT). The manufacturer, ATR, also notified on 15 October, designated a technical adviser to participate in the investigation.

The French civil aviation safety directorate (DSAC), the West Indies-French Guyana air navigation service (SNA-AG) and the Martinique Aimé Césaire airport company (SAMAC) also provided the BEA with useful information for the investigation.

[(2)] Regulation (EU) 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 and repealing Directive 94/56/EC.

1 - FACTUAL INFORMATION

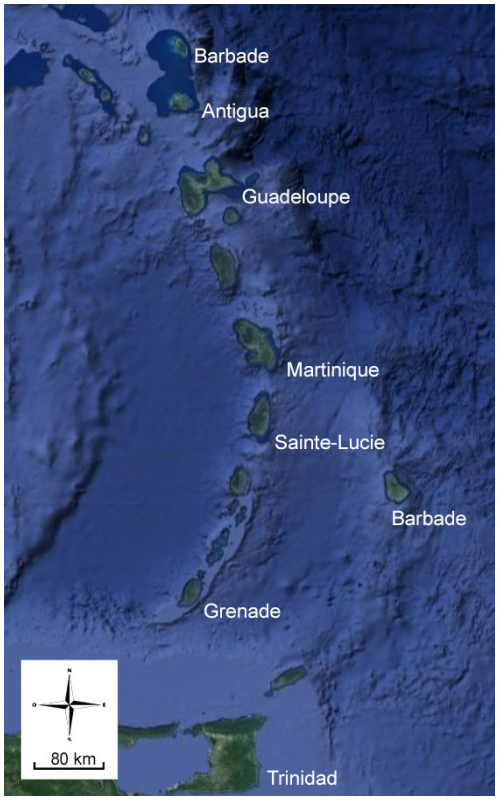
1.1 History of the flight

Note: The following description is principally based on data from the flight recorders and the radio communications, supplemented by the statements.

Due to the hurricane Gonzalo, flights in the northern region of the Leeward Islands had been severely disrupted from 12 October up to and including 14 October. LIAT (hereafter referred to as the "operator") aeroplanes and crew were spread over the area south of Antigua to avoid the effects of the hurricane. The situation was returning to normal during the day of 14 October.

On 13 October, the day before the event, the first officer carried out a series of flights including a turnaround at Martinique Aimé Césaire airport. The airport was at this time in a period of normal operation (all of runway 10/28 available[3]). Due to modifications in the flight schedule and although he was in his rest period on Barbados, the first officer was contacted the morning of 14 October and given very short notice to carry out flights departing from this island.

[3] 3,000 m x 45 m.



The captain arrived at Trinidad-Piarco airport on 14 October at 07:00 to carry out a series of flights. He received a flight file containing the weather information and NOTAMs concerning the destination and diversion airports[4]. This series of flights finished at Barbados-Grantley Adams airport at 09:03 where he was to continue flights with the first officer who had just been contacted.

[4] This file contained the NOTAM and the SUP AIP NR 001/14 to which it refers and which concerns the work. Refer to appendices Nos 1 and 2.

The aeroplane took off from Barbados at 11:29, i.e. 24 minutes after the first officer's arrival at the airport and 3 hours 14 minutes late with respect to the scheduled take-off time. It landed at Saint Lucia airport at 12:05. During this turnaround of approximately 15 minutes, the tower informed the crew that Martinique Aimé Césaire airport was closed between 12:50 and 13:30.

Around 12:25, flight LIAT 370 took off from Saint Lucia around 2 hours 50 minutes late.

At 12:30, the captain (PM) contacted Martinique approach. He informed the controller that the flight was running late and referred to the closure of Martinique Aimé Césaire airport. The latter replied that the airport would only close after the arrival of the aeroplane and cleared the descent. The PM was in contact with the airport ground staff for around 30 seconds.

At 12:32, the PM received clearance for a visual approach on runway 10. The controller specified that they were not to descend below 2,000 ft. The arrival briefing started after this clearance. It mentioned in particular, the visual approach, weight, landing speed and go-around procedure. Neither the touchdown point or the runway length available were mentioned.

Around 12:34, the PM contacted the Martinique Aimé Césaire airport control tower. The controller told him he was "number one" for landing on runway 10; he invited the pilots to be careful when overflying the work zone. The first officer (PF) read back the information regarding the work and the lifting of the altitude restriction.

The PM transmitted the ATIS information to the PF; he specified that taxiways were closed and that only 1,500 metres of runway were available due to runway work. He did not specify the presence of a displaced threshold. The PM was in contact with the Fort de France LIAT ground staff for one minute[5]. At the same time, the crew started configuring the aeroplane for the approach.

Between 12:37 and 12:38, the controller cleared flight LIAT 370 to land and specified once again, that there were only 1,500 metres of runway available. The PM read back the landing clearance and the presence of work in progress. The PF disconnected the autopilot (AP). The crew carried out the pre-landing actions and checklist.

At 12:39:18, the radio altimeter synthetic voice called out 500 ft. The PF indicated that he could see where he had to land[6] on runway 10. The PM saw the PAPI and observed that it was not operating without being visibly worried[7] about it being inoperative.

At 12:40:25, the controller asked the crew to watch the aeroplane's altitude. A few seconds later, the aeroplane landed 940 m from the runway 10 threshold, in the work zone. During the landing run, the aeroplane struck a temporary boundary light. The controller asked the crew to perform a go-around which the PF refused to do.

The aeroplane continued the run. The pilots saw the APAPI. The first officer told the captain that he had not correctly identified the line marking out the work. He thought that the APAPI was "*too far away*" and had thus not been alerted by its red lights. He specified that the day before he had landed at the beginning of the runway.

[5] Information was exchanged about the flight (in particular, times and parking).

[6] Based on the CVR recording, the PF agreed with the captain's comment, "*It's down the runway we have to land.*"

[7] "*Yeah, probably down, that's why. Huh… No worries.*"

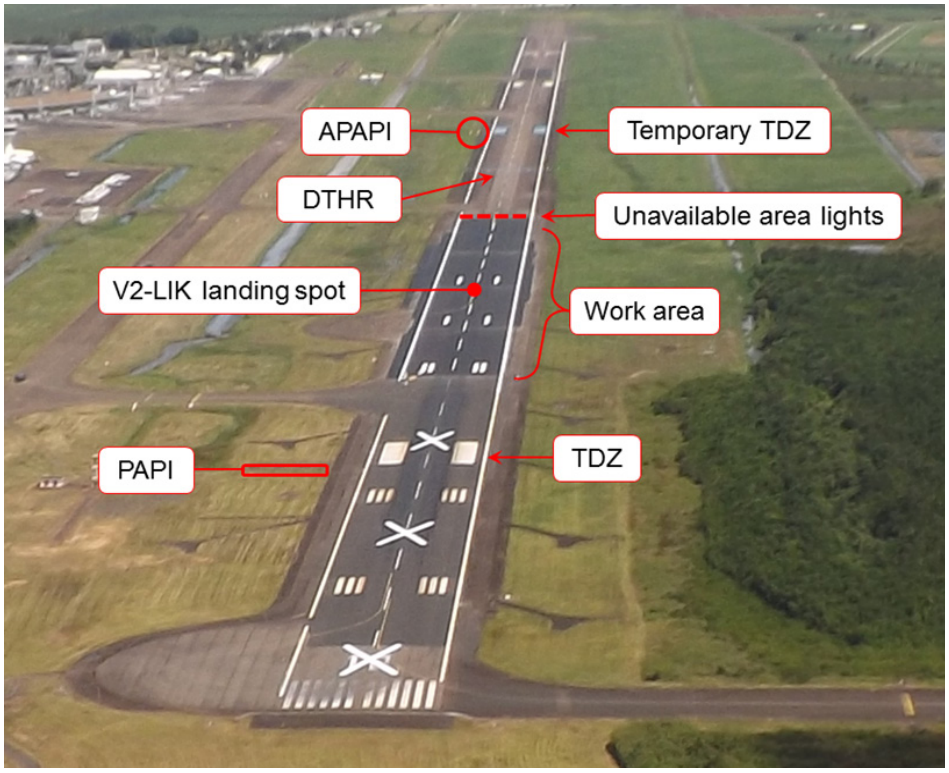


Photo source: Gendarmerie Nationale

Figure 1: View of airport taken day after event. See Appendix 4.

1.2 Injuries to persons

The crew and passengers were unharmed.

1.3 Damage to aircraft

The left main landing gear was damaged when it collided with a temporary boundary light.

1.4 Other damage

A temporary boundary light was damaged during the landing run.

1.5 Pilot information

1.5.1 Captain

The pilot joined the operator in 2000 and had logged 5,317 flight hours in the company.

He obtained his type rating on 7 April 2014.

His last line check was on 20 May 2014 and his last proficiency check was on 7 April 2014.

He had been captain since 2009.

1.5.2 First officer

The pilot joined the operator in 2007 and had logged 3,512 flight hours in the company.

He obtained his type rating on 6 July 2013.

His last line check was on 8 September 2014 and his last proficiency check was on 2 August 2014.

1.6 Aircraft information

LIAT acquired ownership of the aeroplane in July 2014. It was delivered new.

The aeroplane had a valid airworthiness review certificate. No failure had affected the operation of the flight.

1.7 Meteorological information

The weather conditions observed at the time of the event at Martinique Aimé Césaire airport were the following:

- horizontal visibility greater than 10 km;
- broken clouds at 3,100 and 3,700 ft;
- wind from 180° at 9 kt.

1.8 Aids to navigation

Due to the work, the PAPI was temporarily withdrawn from service. It was replaced by an APAPI, a visual approach slope indicator with two lights (instead of the four of the conventional PAPI). It was situated at 1,800 m from the runway threshold (PK 1800).

1.9 Communications

1.91 ATIS Message

The information message received by the crew, of a total time of around three minutes (of which around 50 seconds in English) indicated:

- Information Golf recorded at 1613 UTC.
- Approach Localizer runway ten, take off runway ten, planned departure route five Echo.
- Caution one thousand five hundred metres available on the runway.
- Transition level ninety.
- Caution, aire Zoulou, taxiway Delta, taxiway Mike, taxiway Lima between Charlie and Delta are closed.
- Caution to displaced threshold, one thousand five hundred metres available runway ten, work in progress.
- Wind 180°, 9 kts, visibility 10 km, clouds broken 3 100 ft, broken 3 700 ft, temperature 33, due point 24, QNH 1 013.

1.9.2 Information received by crew

The tower controller advised the crew of the presence of work two times:

- at 12:34:47: "*caution when overflying the work site*";
- at 12:37:46: "*one thousand five hundred metres available*".

1.10 Aerodrome information

Martinique Aimé Césaire airport is open to general and controlled air traffic. It has one runway orientated 10-28 with a run length of 3,000 m outside of work periods.

1.10.1 Organisation of work

Following damage to the pavement and the appearance of cracks, work to re-profile and reinforce the runway was decided. This programme was spread over five years. The second part of the work, sub-divided into three phases, concerned the part of the runway situated between PK 600 and PK 1,200 and took place between 22 September and 24 October 2014.

At the time of the event, the work was in phase B, from 29 September to 17 October 2014. During this phase, the organisation of the work required, on a daily basis, two complete closures of the runway and a restricted availability slot; this particular organisation was necessary in order to have a period when the runway could be used by long-haul aeroplanes (period No 4). The different periods are described below:

- Period 1 from 23:00 to 06:00: Runway closed
- Period 2[8] from 06:00 to 13:00: Reduced runway (see section 1.10.2).
- Period 3 from 13:00 to 13:30: Runway closed
- Period 4 from 13:30 to 23:00: Runway open

[8] V2-LIK landed during this period.

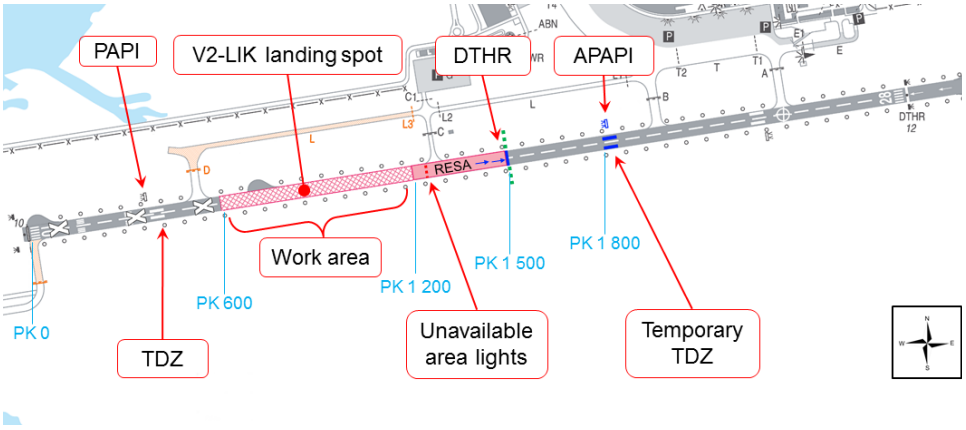
1.10.2 Use of reduced runway

The worksite was positioned between PK 600 and PK 1,200 (see Figure 2: work zone). A RESA[9] was created before the displaced threshold, between PK 1,200 and PK 1,500 (see Figure 2). The runway use restrictions, indicated in the AIP supplement (SUP AIP, refer to annexe 2) were the following:

[9] Runway End Safety Area.

- Portions of manoeuvring area closed:
  - First 1,500 metres of runway 10.
  - TWY M.
  - TWY L between C and D.
- Day markings:
  - White (removable) crosses indicating runway closure between PK 0 and PK 600.
  - Yellow crosses indicating taxiway closure on TWY L between C and D.
  - Blue temporary displaced threshold (DTHR) arrows, displaced threshold markings and touchdown zone markings between PK 1,250 and PK 1,800.
- Day lighting:
  - Green temporary displaced threshold lights positioned at PK 1,500.
  - Red unavailable zone lights[10] positioned at PK 1,250.
  - APAPI positioned at PK 1,800 (in line with the blue temporary touchdown zone markings).

[10] These lights are directed towards the opposite QFU, their beam is not visible when landing on runway 10.



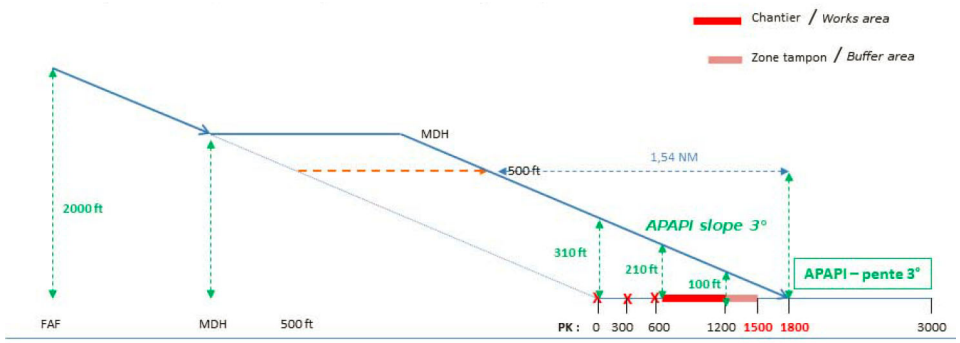
Basemap source: AIS airport chart

Figure 2: Diagram of runway

1.10.3 Landing procedure

The SUP AIP describes the approach procedures which can be used for reduced runway 10 (NDB, VOR, LOC, RNAV) and which allow the crew to reach the published MDH associated with the procedure used.

In final, once the MDH has been reached and the runway visual references acquired, the pilots must fly above 500 ft until intercepting and following the glidepath defined by the APAPI (glidepath at 3°) associated with the temporary displaced threshold.



Source: SUP AIP

Figure 3: Vertical profile of approach procedure to reduced runway 10

1.11 Flight recorders

The aeroplane was equipped with two flight recorders in accordance with the regulations in force. The data from the flight data recorder and cockpit voice recorder was recovered by the BEA.

Figure 4 below shows:

- In **green**, the normal glidepath associated with the PAPI (in work zone).
- In **red**, the temporary glidepath associated with the APAPI.
- In **blue**, the path followed by the aeroplane.

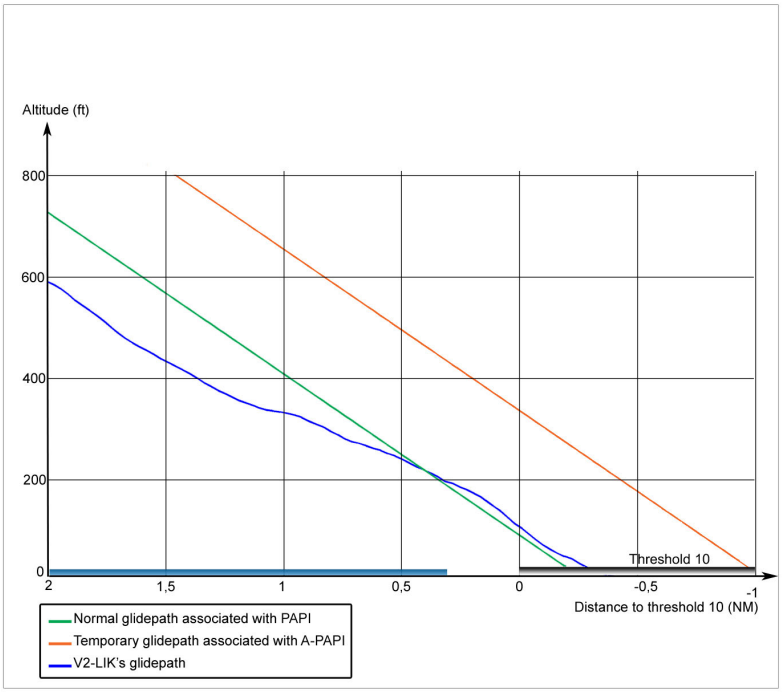


Figure 4: Glidepaths

It can be seen that the aeroplane was below the normal glidepath up to around 0.4 NM from the threshold of runway 10 before passing above this path up until landing. It landed 940 m from the runway threshold. It did not follow the temporary glidepath shown by the APAPI.

The CVR, with a two-hour recording capacity, recorded the event. The salient elements appear in the history of the flight.

1.12 Wreckage and impact information

Not applicable.

1.13 Medical and pathological information

Not applicable.

1.14 Fire

Not applicable.

1.15 Survival aspects

Not applicable.

1.16 Tests and research

Not applicable.

1.17 Organizational and management information

1.17.1 Airport operator information

Martinique Aimé Césaire international airport has been operated by SAMAC (hereafter called "*airport operator*") since 2012 as a State concession.

1.17.1.1 Impact study

Prior to the work, the airport operator assessed the impact this would have on airport safety in order to identify the main undesired events and introduce mitigation measures. This assessment was based, in part, on the feedback from the first part of the work, carried out in 2013; it identified the following items:

- The temporary marking in blue (displaced threshold and TDZ) was hard to see.
- No SUP AIP published.
- Aircraft incursion in work zone (non compliance with displaced threshold).
- Low altitude overflight of work zone (non compliance with overflight heights).

In particular, the risk associated with a collision with the lighting installed at PK 1,250 or a near collision with a worksite machine was assessed as unacceptable without a mitigation measure. The possible causes of an aircraft incursion into the work zone when landing on runway 10, mentioned by the study included:

- Insufficient aeronautical information.
- Marking of displaced threshold hard to see (existence of two markings).
- Change in references for the pilots (position of threshold).
- Lack of pilot and/or controller awareness of work zone.
- Low altitude overflight of worksite.
- Failure to comply with the directives.

1.17.1.2 Risk mitigation measures

The airport operator had planned 52 mitigation measures for the various undesired events listed in the impact study. Fifteen measures were designed to mitigate the frequency or seriousness of the undesired event, "*incursion of an aircraft in work zone*", including:

- Aeronautical information brought to the user's knowledge - available distances and applicable approach procedures, SUP AIP.
- Aeronautical information (NOTAM, ATIS, SUP AIP).
- Specifying of MIN overflight height of threshold 10.
- Marking out of worksite with cones.
- Implementation of markings showing temporary displaced threshold and closed zones.
- Implementation of safety area between aircraft and worksite (i.e. between PK 1,500 and PK 1,200).
- Implementation of an APAPI at PK 1,800.
- Reminder about the presence of the worksite and use of displaced threshold on the frequency.

The following measures were designed to mitigate other undesired events but could contribute to reducing the risks associated with the "*incursion of an aircraft in work zone*":

- Raising user awareness about the operational modification - information meetings before work.
- An information folder sent by email and available on the website.
- Publication of GNSS coordinates of displaced threshold and touchdown zones.
- Availability of worksite and traffic drawings in operations office for operator flight preparation.

1.17.1.3 Circulation of information about work

The airport operator carried out the following information actions:

- February 2014: Work programme meeting
- April 2014: Coordination meeting with SNA-AG
- 15 April 2014: Operator information
- 21 May 2014: New operator information
- 24 June 2014: Meeting with operators (LIAT was invited but was unable to attend)

As requested by the airport operator, the AIS published SUP AIP 001/14 on 7 August 2014. This document described the various work phases and the runway operation restrictions. In addition, two NOTAMs indicated the declared distances in period No 2 and the closure of the runway in period No 3.

1.17.2 Information available to tower controllers

On 11 September 2014, in the "*Management*"[(11)] working group meeting, the shift supervisors received information about the planned work for October and the temporary procedures to be complied with. All the controller teams were represented in this meeting.

The various temporary procedures were grouped in a temporary operational directive[(12)] (TOD) issued on 30 September and available via the integrated maintenance support system (IMSS); these directives were repeated in daily briefings made by the tower manager.

[(11)] This working group concerns the general operation of the service.

[(12)] Cf. annexe n°3.

The TOD indicated that for QFU 10, the first 1,500 metres of the runway were closed and that there were white crosses on the first 600 metres of the runway. An ATIS message indicating these restrictions had to be transmitted. The controller had to remind pilots of the presence of the work on first contact and when the aeroplane intercepted the runway axis in final approach using the phraseology: caution overflight of worksite.

The TOD specified that the controllers had to actively monitor aeroplane paths in short final; for inbound traffic, controllers were asked to pay particular attention to the aeroplane's final approach course. When overflight of the work site was clearly too low, the tower controller was to initiate a go-around

1.17.3 Operator information

LIAT flies to around 20 destinations in the Caribbean Islands. It has been operating ATR 42 and ATR 72 aeroplanes since 2013, replacing the Bombardier DHC 8.

1.17.3.1 Operator organisation

The flight operations department is responsible for flight preparation. It is composed of three people (the flight operations director assisted by a chief pilot and a captain responsible for training) who constitute the flight files by grouping weather information, NOTAMs, etc.

This department had been managed since February 2014 by the new head pilot who simultaneously held these two management posts. He was the sole person present in the flight operations department for 24 of the 49 working days between the publication of the NOTAM (7 August) and the serious incident (14 October). In addition, he had flight duties for seven days.

The table below shows the number of days the personnel of the flight operations department were at their post between 7 August and 14 October. The nominal personnel (three people) were only there a single day during the given period.

Number of personnel in flight operations dept.	0	1	2	3
Number of days	8	31	9	1

1.17.3.2 Operator procedures

Flight preparation

The operator's operations manual (hereafter referred to as "*operations manual*") specifies the division of roles between the flight operations department and the flight crew.

The FOO's[13] tasks include having to:

- ❒ Obtain and acquaint himself with all relevant information (weather, NOTAMs, etc.) and supply copies of this information to the flight crew.
- ❒ Inform the flight crew of reservations he may have regarding this information or any other operational information that he may consider as important.

In addition, it is up to the captain to:

- ❒ Collect from the FOO, information about the route, radionavigation means, weather conditions, diversion airports, dangerous and prohibited zones, the latest NOTAMs, etc.
- ❒ Inform the crew about relevant operational issues for the proposed flight.
- ❒ Ensure that the documents required for the flight are on the aeroplane.

Lastly, the first officer is responsible for collecting the flight envelope from the flight operations department.

This manual indicates that in the case of general or non-technical information, but relevant for the flight crew or FOO, the personnel must check for the presence of and then read the new directives before signing the file. These directives are removed when they are no longer relevant.

Aeroplane operation

The standard operating procedures require that a briefing is carried out between the flight crew members before starting an approach to an airport. The applicable NOTAMS and the runway conditions for landing are among the items to be covered.

1.17.3.3 Circulation of information about work at operator's

The operator had been invited to a preparatory meeting about the work. The flight operations director and chief pilot who had planned to go to the meeting, was not able to do so because of flight duties.

The day after the SAFA check[14] of 22 September, the Fort-De-France LIAT ground staff manager sent an electronic mail to the flight operations department, underlining the lack of information about the work.

In the week preceding the event, all the information about the work was made available to the crews in the onboard airport documents, on all the operator's aeroplanes.

There was no particular directive to attract the crew's attention to the presence of the SUP AIP on the aeroplane. In particular, the officer who had put the documents on V2-LIK had not informed the crew of this.

[13] Flight Operations Officer.

[14] Safety Assessment of Foreign Aircraft.

1.17.3.4 Corrective and safety actions

The flight safety manager met with the two pilots the day after the serious incident. They were reminded about the importance of flight preparation, including the NOTAMs, even for familiar destinations and the various types of pressure which can affect decisions and erode safety margins. They also benefited from several additional training sessions (CRM and aeroplane systems).

As provided for by the operator's SMS, an internal investigation was carried out. This led to several internal safety recommendations principally designed to improve the transmission of information between the flight operations department and crews.

1.17.4 Civil Aviation Authority information

1.17.4.1 Oversight authority

The West Indies-French Guyana DSAC (DSAC-AG) carries out the oversight missions in the flight operations field. In particular, it is responsible for the oversight of air carriers and the technical check of aircraft operation. In this respect, the DSAC-AG contributes to the European SAFA Ramp Inspection programme governed by Commission Regulation (EU) No 965/2012[(15)].

[(15)] https://eur-lex.europa.eu/legal-content/FR/TXT/HTML/?uri=CELEX:02012R0965-20160825&from=FR

This programme provides for the targeted or random ground inspections by the civil aviation authorities of the Member States, of aircraft used by third party operators outside the European Union.

These checks are carried out using a standardized list of 53 items which includes, in particular, pilot licenses, the procedures and manuals that must be carried in the cockpit, compliance with these procedures by the crew, safety equipment, cargo carried in the aircraft and the technical condition of the aircraft.

The results of these inspections are recorded in a shared format; when an inspection identifies a deviation from the international rules and from the applicable regulations, the deviation is reported to the operator and its oversight authority. If these deviations have an immediate impact on safety, the inspector can request a corrective action before the aeroplane takes off. All the inspection reports and any corrective actions are centralized in a database set up by EASA.

1.17.4.2 SAFA Ramp Inspection concerning operator

Between 1 January 2013 and the date of the event, the operator's aeroplanes were the subject of 18 checks by DSAC-AG. Six of these checks revealed deviations with respect to items in flight preparation (weather file, NOTAM, weight and balance sheet). In particular, four of these checks revealed that the crew were not aware of the NOTAMs applicable to the departure, destination and alternate airports. These led to corrective actions before flight and were notified to the captain, operator and the operator's oversight authority.

The report relating to the check of 22 September on flight LIAT 370, the first day of the work, indicated, "*while the crew was aware of the NOTAM, the inherent supplement wasn't available and the crew was unaware of its content*." It was specified that the corresponding SUP AIP was given to the crew.

1.18 Additional information

1.18.1 Statements

1.18.1.1 Captain

Flight preparation: the captain said that he arrived at his Barbados base one hour before the flight's departure. He specified that he then had to go from the LIAT offices to the airport and go through the security check. He estimated that he then had less than 30 minutes to prepare a flight.

He had made numerous flights to Martinique during his career but had not been there recently. He received the flight file containing, in particular, the weather information and NOTAMs concerning the destination and diversion airports but he did not consult it. He said that he did not know that the SIP supplement was on board the aeroplane and he was not aware of the temporary modifications to the appearance of the runway and of the markings and lights. He specified that he had not been able to contact the flight operations department before leaving for the series of flights (series started at Trinidad-Piarco airport at 07:00).

He made this series of flights starting with a flight for Grenada and then Barbados. In Barbados, he contacted the flight operations department about the relief of the first officer. He explained that he waited more than two hours for the first officer to arrive and felt he was under a great deal of time pressure. He added that he started boarding passengers while waiting for the first officer in order to minimise the consequences of the delay.

He stated that he was PF between Barbados and Saint Lucia. On arriving in Saint Lucia, he learnt over the radio, that Martinique Aimé Césaire airport was going to close shortly due to work. He added that at this point he was at the limit of his daily maximum flight duty time which added additional pressure.

He explained that during the approach, the first officer told him that he had already been to Martinique Aimé Césaire airport the day before. He added that he was relieved to learn from the ATC that they were waiting for flight LIAT 370 before closing the airport.

On final, he thought that he had landed after the three white crosses and said that he did not see the temporary day markings (blue markings).

He considered that his workload was high and that the flight was short. He could not remember the points mentioned in the arrival briefing.

1.18.1.2 First officer

The first officer said that at the Antigua base he had one hour for flight preparation. He specified that around 15 minutes travel time between the LIAT head office and the aeroplane had to be subtracted from this (travel by car, parking, security check). This meant that less than 45 minutes were left for the pre-flight inspection, aeroplane preparation and start-up. He added that the passengers started boarding around 20 minutes before take-off which left little time to study the flight file and share information.

He explained that he had been to Martinique Aimé Césaire airport the day before; all of the runway was then available. He added that the flight schedule had been changed because of the storm. Arriving at the limit of his daily maximum flight duty time, he had been forced to spend the night in Barbados. It had then been planned that he would not leave before the afternoon of the next day.

The following morning, he was contacted by the flight operations department who asked him to carry out a flight that very morning. He replied that he would be ready at 08:30 and waited for his transport to Barbados-Grantley Adams airport. However, the taxi was late and the journey took a long time. He arrived at the airport at 11:05, i.e. around 25 minutes before take-off. He observed that the passengers were already boarding. He made sure that the captain had the flight file. He was PM on the Barbados-Saint Lucia leg and PF on the Saint Lucia-Martinique leg.

He said that after landing at Saint Lucia at around 12:30, the control tower informed the crew by radio that Martinique Aimé Césaire airport would be shortly closing. He specified that he then felt under very high time pressure.

Shortly after take-off, the first officer (PF) observed that the captain (PM) did not have a lot of free time as he was busy contacting operations, listening to the ATIS (listened to in French and then in English) and filling in the approach card. The first officer could not exactly remember the information indicated on the card or in the arrival briefing but remembered that the presence of the displaced threshold was mentioned.

On final, he looked for the PAPI but was not able to see it. He did not see the blue temporary day markings. He specified that his aiming point was after the white crosses.

1.18.1.3 Other pilots working for operator

Company pilots, questioned after the serious incident, declared that they were not aware of the presence of the SUP AIP in the onboard documentation. From force of habit, they considered themselves sufficiently acquainted with this information. It is probable that they do not frequently refer to it unless informed of a change by the flight operations department.

1.18.1.4 Controller

The controller explained that the serious incident occurred the last day of the work period and that the controllers were familiarized with the particular procedures in force. He added that at the time of the event, there was only one aeroplane flying under VFR in the airport circuit.

He said that the crew had correctly read back the information regarding the presence of work transmitted during the approach. On final, he had not observed any particularity concerning the aeroplane's glidepath.

A few moments before the landing of V2-LIK, the controller told the crew to watch their altitude; despite this message, the aeroplane landed on the part of the runway undergoing work; he then asked for a go-around which was not carried out by the crew.

1.18.2 Regulations regarding work on runway

The provisions applicable at the time of the event and concerning the ground markings of runway zones undergoing work can be found in annex A of the order of 28 August 2003 regarding approval conditions and aerodrome operation procedures ("*CHEA*")[16].

[16] CHEA order, consolidated version at the date of the event: https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=LEGITEXT000005657923&dateTexte=20141014

1.18.2.1 Marking of unavailable runway zone

The CHEA order indicates that the markings of the unavailable zone[17] must be affixed to the parts of the runway which are not to be used. These unavailable zone marks are white crosses, centred on the axis and positioned at each end of the portion not to be used. Additional marks can be affixed with a 300 m interval between two successive marks. The order specifies that these marks can, however, be left out when the closure is temporary and users are informed by radio or by NOTAM.

[17] Cf: CHEA paragraph I.5.1.4.

1.18.2.2 Temporary displaced threshold

When the threshold is temporarily displaced[18] during work carried out at an airport, the configuration of the temporary displaced threshold depends on the extent and duration of the work and the need to provide complete visual indications. The colour of these visual indications is not specified. The possible configurations are detailed below:

[18] Cf: CHEA paragraph I.5.1.2.2.3.

- Configuration A is adopted for work of a short duration on account of it being simple and quick to implement. A 2 m-wide band is affixed over the whole width of the runway; it is preceded by arrows spaced at 30 m intervals and arrow heads, the tips of which are 2 m from the threshold.
- Configuration B is identical to that adopted for a permanently displaced threshold. It is the configuration to be used for work of a long duration.

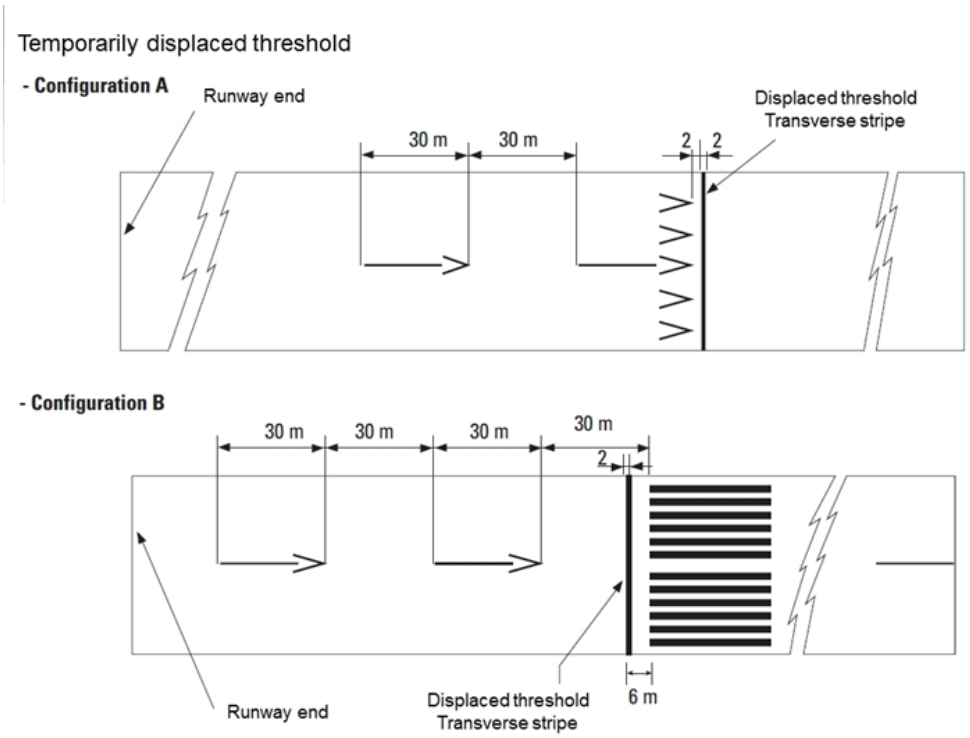


Figure 5: Offset threshold markings (excerpt from CHEA)

2 - ANALYSIS

2.1 Scenario

The first officer (PF) was assigned to flight LIAT 370 with short warning. When he arrived at the airport, the flight was running very late and he had very little time to prepare the flight. The captain (PM), on the aeroplane for the preceding two hours, was worried about the management of the passengers and the delay. In the absence of particular information from the flight operations department and accustomed to flying to Martinique Aimé Césaire airport, the crew only partially read the flight file (containing the NOTAMs) and the onboard documents (containing the SUP AIP).

Consequently, on the departure of flight LIAT 370, the flight crew members were not aware of the application of a temporary landing procedure. The first officer had been to the airport the day before, during a period when all of the runway was open.

Before the departure from Saint Lucia, the crew felt under increased pressure due to time and commercial factors, when they learnt of the imminent closure of Martinique Aimé Césaire airport.

It was during the approach, on listening to the ATIS, that the crew learnt of the presence of work, of a displaced threshold and of the available runway being limited to 1,500 metres. In his arrival briefing, the PM gave the available runway distance to the PF but did not advise him of the displaced threshold.

The air traffic controller, on the tower frequency, twice advised the pilots of the presence of work and of the restriction to 1,500 metres of available runway without giving the position of the displaced threshold or the particularities of the approach (APAPI, blue marking). This could be explained by the fact that the operational directive notified to the controllers had certain imprecisions and ambiguities. The caution about overflight of the work implied the presence of a displaced threshold without, however, making it explicit.

The crew started the visual approach with the feeling that they were under very high time pressure, partially aware of the work and runway configuration, in particular the position of the displaced threshold. The presence of white crosses before the work zone and the clearly visible marking on the renovated part of the runway (situated immediately after the white crosses) caused the PF to have an erroneous mental representation of the portion of runway available. He thus defined his aiming point on the newly surfaced part of the runway, in the work zone which was at the time unoccupied.

The crew were surprised that the PAPI was not working but continued the approach. The pilot's attention was focused on the aiming point which he had identified. The displaced threshold marking in blue did not constitute sufficiently salient information to make the pilot question the planned path for landing. The crew did not see the APAPI lights.

The controller did not detect that the aeroplane was not following the planned path of the new procedure. He made a late call for a go-around just after wheel touchdown.

2.2 Organisation of work

The organisation of the work had to take into account the need for long-haul aircraft to land at the airport. In order to meet this requirement, an operating period had to be provided in which all of the runway was available (period 4). For the use of the reduced runway, a temporary displaced threshold was set up.

Prior to the work, the airport operator had carried out an impact study based in part, on the feedback from the first part of the work carried out in 2013. To guard against the undesired event, "*incursion of an aircraft in work zone*", the study recommended setting up several safety barriers. Besides the temporary marking, the implementation of a specific approach procedure and an APAPI, these barriers principally relied on the circulation of information about the presence of the work (NOTAM, SUP AIP, operational directive, information meetings and radio, including the ATIS).

The airport operator chose to mark the unavailable zone of the runway with white crosses as recommended by the CHEA order. However, the white crosses were only affixed before the work zone and not at each end of the prohibited portion.

2.3 Flight preparation

The operations manual stipulates that the captain collects all useful flight information (in particular the NOTAMs) from the FOO. The first officer is responsible for collecting the envelope containing, among other information, the flight file.

However, the short flight time, the small amount of time allotted to flight preparation and being in the habit of flying to the same airports meant that the pilots only partially acquainted themselves with the information in the flight file. Pilots working for the operator said that they trusted the flight operations department to advise them of any particularity concerning a flight.

Several checks of foreign operators carried out by the civil aviation authorities (SAFA checks) had found that certain crews did not have knowledge of the information in the flight files. In particular, around three weeks before the serious incident, one of these checks revealed that the crew did not have the required information about the presence of work at Martinique Aimé Césaire airport. This check led, in particular, to the flight operations department placing the SUP AIP about the work, in the onboard documentation of all the operator's aeroplanes the week preceding the flight. The crews were not informed about the presence of these documents on the aeroplane.

During the work period, the flight operations department did not have the nominal number of personnel. This could have affected its ability to carry out its flight file preparation and crew information missions.

3 - LESSONS LEARNED AND CONCLUSIONS

3.1 Findings

- Runway reprofiling work had been in progress since 22 September 2014 at Martinique Aimé Césaire airport; the operators flying to the airport, including LIAT, had been informed of the various restrictions and particularities linked to the work (length of runway and temporary marking).
- A SAFA check on 22 September 2014 had found that one of the operator's crews did not have all the documentation required for the flight and in particular, the SUP AIP AIRAC CAR SAM NAM 001/14 regarding the work in progress at Martinique Aimé Césaire airport.
- Following this check, the SUP AIP AIRAC CAR SAM NAM 001/14 was made available in all LIAT's aeroplanes.
- During the flight preparation, the crew did not consult the flight file.
- The day of the event, the operator's flight operations department did not inform any of the crew members of the presence of the work and the SUP AIP.
- Three white crosses marked the unavailable zone of the runway and were affixed before the work zone.
- These white crosses were not present on the renovated part of the runway, but only on the unavailable part.
- The definitive markings on the renovated part of the runway, situated immediately after the white crosses and before the portion of available runway, stood out more than on the other parts.
- The aeroplane took off from George F.L. Charles (Saint Lucia) airport around three hours late.
- During the approach, the controller advised that the airport would close after flight LIAT 370 had landed.
- The ATIS message mentioned the presence of work, a displaced threshold and a reduction in the runway length available. The PM gave the PF the information about the landing distance available but did not mention the presence of the displaced threshold.
- The arrival briefing did not mention any particularity concerning the landing except for the runway restriction of 1,500 metres.
- The controller cleared flight LIAT 370 for landing and mentioned the runway length restriction. He asked the crew to exercise caution when overflying the work.
- After flying through 1,000 ft and up to around 200 ft, the aeroplane was below the temporary glidepath.
- The controller warned the crew about their altitude before requesting a go-around immediately after wheel touchdown.
- The aeroplane landed in a work zone at 560 m from the displaced threshold. It struck obstacles during the landing run.

3.2 Causes of serious incident

The crew's insufficient flight preparation and the absence of an alert from the operations department contributed to their ignorance of the temporary provisions regarding the runway work, provided in the flight file. Although the crew were informed of the presence of the work several times during the flight, only the ATIS formally specified the presence of a displaced threshold. No mention was made to the crew of either the position of the displaced threshold or the particularities of the approach (APAPI, blue marking) during the approach.

In these conditions, landing beyond the temporary displaced threshold was, from then on, only ensured by it being visually detected by the crew. The position of the three runway-closed white crosses on the first 600 metres of the runway, added to the presence of the usual and definitive markings which were particularly visible on the portion of the newly renovated runway, resulted in the pilots defining an aiming point situated immediately after the last cross but before the temporary displaced threshold, in the zone where work was still ongoing.

The controller's detection of the aeroplane's deviation from the vertical profile of the temporary procedure flight path was too late to perform a go-ground and to avoid a serious incident.

LIST OF APPENDICES

Appendix 1:

Excerpt from NOTAMs in force at Martinique Aimé Césaire airport

TTPP-A0803/14

A) TFFF MARTINIQUE AIME CESAIRE
B) 2014 Sep 22 03:00 C) 2014 Oct 24 10:00
E) DUE TO WORKS OF STRENGTHENING AND REPROFILING OF THE RUNWAY 10/28, LIMITATIONS OF USE AD, OPERATIONAL LIMITATION OF RWY 10/28, MODIFICATION OF DECLARED DISTANCES, MODIFICATION OF APPROACH IFR AND VFR PROCEDURES, PARTIAL CLOSURE OF TWY-REF SUP AIP AIRAC CAR SAM NAM 001/14 AVAILABLE ON WWW.SIA.AVIATION-CIVILE.GOUV.FR

TTPP-A0993/14

A) TFFF MARTINIQUE AIME CESAIRE
B) 2014 Oct 01 10:00 C) 2014 Oct 17 17:00
D) DAILY 1000-1700 EXC 04-06 11-13
E) REF SUP AIP NR 001/14 : PHASE B ACTIVATION. DUE TO WIP RWY 10, NEW DECLARED DISTANCES:
RWY TORA TODA ASDA LDA
10 1500 1800 1800 1500
28 1500 1500 1500 1250

TTPP-A0998/14

A) TFFF MARTINIQUE AIME CESAIRE
B) 2014 Oct 01 17:00 C) 2014 Oct 17 17:30
D) DAILY 1700-1730 EXC 04-06 AND 11-13
E) REF SUP AIP NR 001/14 : PHASE B ACTIVATION. DUE TO WIP, RWY 10/28 CLOSED.

Appendix 2:

Excerpt from SUP AIP AIRAC CAR SAM NAM 001/14.

dgac Direction des Opérations Service de l'Information Aéronautique DSNA	Liberté • Égalité • Fraternité RÉPUBLIQUE FRANÇAISE ☎ : 05 57 92 57 95 ou 57 97 ✉ : sia.supaip@aviation-civile.gouv.fr Internet : www.sia.aviation-civile.gouv.fr	**SUP AIP AIRAC CAR SAM NAM 001/14** Date de publication : 07 AUG

LIEU	:	**AD Martinique Aimé Césaire TFFF**
VALIDITE	:	**Du 22 septembre au 24 octobre 2014**
OBJET	:	**Travaux de renforcement et de reprofilage de la piste 10/28, restrictions d'utilisation sur l'AD de Martinique Aimé Césaire TFFF**

PREAMBULE :

Dans le cadre des travaux de renforcement de piste, un chantier sera installé sur la piste 10 dans la portion située entre 600 et 1200 m après le seuil 10 (points kilométriques PK 600 et PK 1200). L'objet de ce SUP AIP est de décrire les différentes phases des travaux et les périodes d'exploitation journalières de la piste.

DESCRIPTION :

Le créneau de réalisation de l'opération globale est prévu pour une durée de 4 semaines à partir du 22 septembre 2014. Les travaux se dérouleront du lundi soir au vendredi matin. Cette durée prend en compte les phases de mise en place puis de dépose des installations provisoires ainsi que le retard possible du chantier et les conditions météo défavorables.
Ce chantier d'envergure générera une circulation significative d'engins de travaux publics sur l'aire de mouvement (raboteuses, cylindres, pelles mécaniques, finisseurs, semi-remorques).

DATES EFFECTIVES DES TRAVAUX :

Du 22 septembre au 24 octobre 2014.
Les travaux se dérouleront en 3 phases A, B et C, selon le calendrier suivant :

PHASES	Dates prévisionnelles	Objet des travaux
A	22 au 26 septembre 2014	Préparation des travaux, mise en place des dispositifs temporaires
B	29 septembre au 17 octobre 2014	Travaux de reprofilage et renforcement de la piste
C	20 au 24 octobre 2014	Repli des dispositifs temporaires

Ces dates sont données à titre indicatif et seront confirmées par NOTAM édité pour chaque phase.

DISPOSITIONS GENERALES :

- Pendant toute la durée des travaux, piste fermée de 0300 à 1000 UTC ;
- L'aire d'attente Z sera fermée sur toute la durée des travaux ;
- Balisage diurne de couleur bleue, adapté et approuvé par la direction de la sécurité de l'aviation civile (DSAC) du seuil décalé temporaire et du point cible mis en place (cf. ANNEXES 1 à 3A) et maintenu pendant toute la période de travaux ;
- Balisage diurne existant de couleur blanche sur la piste maintenu pendant la durée des travaux.

PHASE A (DU 22 AU 26 SEPTEMBRE 2014) :

De 0300 à 1000 UTC :
- Piste fermée ;
- Pas de dégagement du chantier possible ;
- TFFF ne pourra pas être pris comme aérodrome de déroutement.

PHASE B (DU 29 SEPTEMBRE AU 17 OCTOBRE 2014) :

Période 1 : de 0300 à 1000 UTC
- Piste fermée ;
- Pas de dégagement du chantier possible ;
- TFFF ne pourra pas être pris comme aérodrome de déroutement.

Période 2 : de 1000 à 1700 UTC

Piste réduite avec les distances déclarées suivantes :

RWY ID	TORA	TODA	ASDA	LDA
10	1500	1800	1800	1500
28	1500	1500	1500	1250

- Pas de dégagement du chantier possible
- TFFF ne pourra pas être pris comme aérodrome de déroutement
- GLIDE PATH indisponible

Portions de l'aire de manœuvre fermées :
- 1500 premiers mètres de la piste 10 – fermés
- TWY M – fermé
- TWY L entre C et D – fermé

Balisage diurne par marque (cf. ANNEXE 1) :
- Croix de couleur blanche de fermeture de piste mises en place sur les 600 premiers mètres de la piste 10
- Croix de couleur jaune de fermeture de taxiway mises en place sur le TWY L entre C et D.

Balisage diurne lumineux (cf. ANNEXE 1) :
- Feux de seuil décalé temporaire de couleur verte mis en place au PK 1500
- Feux de balisage de zone non utilisable de couleur rouge mis en place au PK 1250
- APAPI mis en place pour le seuil décalé temporaire au PK 1800 et calé à 3°

Circulation au sol (cf. ANNEXE 2):
Les TWY C et L (entre les TWY C et B) ne sont utilisés que pour les aéronefs utilisant la Zone Aviation Générale.
Les demi-tours sur piste sont autorisés entre le PK 1400 (100 m en amont du seuil décalé temporaire) et le PK 3000 – L'attention des pilotes est attirée sur le fait que les feux de bord de piste sont hors sol.
Les aéronefs utilisant le parking principal pénètrent la piste via le TWY B pour le départ et dégagent la piste à l'arrivée via le TWY A sauf ordre contraire du contrôle aérien.

La mise en puissance des aéronefs en piste 10 doit obligatoirement se faire à partir du seuil décalé temporaire (PK 1500)

Vols à l'arrivée
L'utilisation de la piste 28 à l'arrivée nécessite un préavis d'une heure et demi.

Vols IFR (cf. ANNEXES 3A et 3B) **:**
Les approches sont limitées aux aéronefs de catégories A et B.
Les procédures d'approche utilisables en piste 10 réduite sont les suivantes :
- LOC z, y, x
- VOR z, y
- RNAV RWY 10
- NDB RWY 10
Elles permettent aux équipages de rejoindre la MDH publiée et associée à la procédure utilisée.

Le volet d'approche finale des procédures citées supra est modifié comme suit :

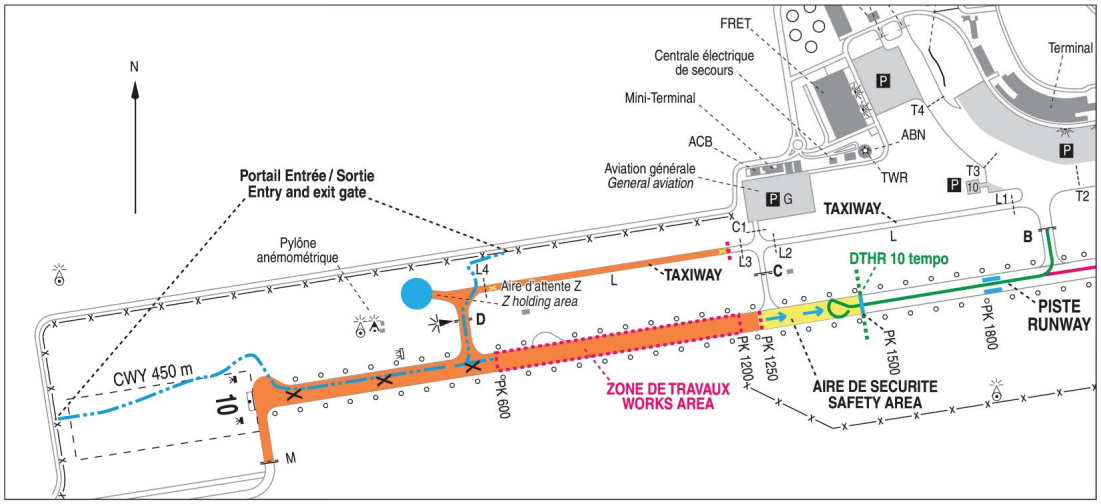
Une fois la MDH atteinte et les références visuelles de la piste acquises, les pilotes évolueront à une hauteur supérieure à 500ft jusqu'à intercepter et suivre le plan de descente défini par l'APAPI associé au seuil décalé temporaire.

Vols VFR (cf. annexe 3A et 3B) **:**
Les aéronefs en finale piste 10 maintiendront une altitude minimale de 500ft jusqu'à l'interception du plan de l'APAPI calé à 3° associé au seuil décalé temporaire.

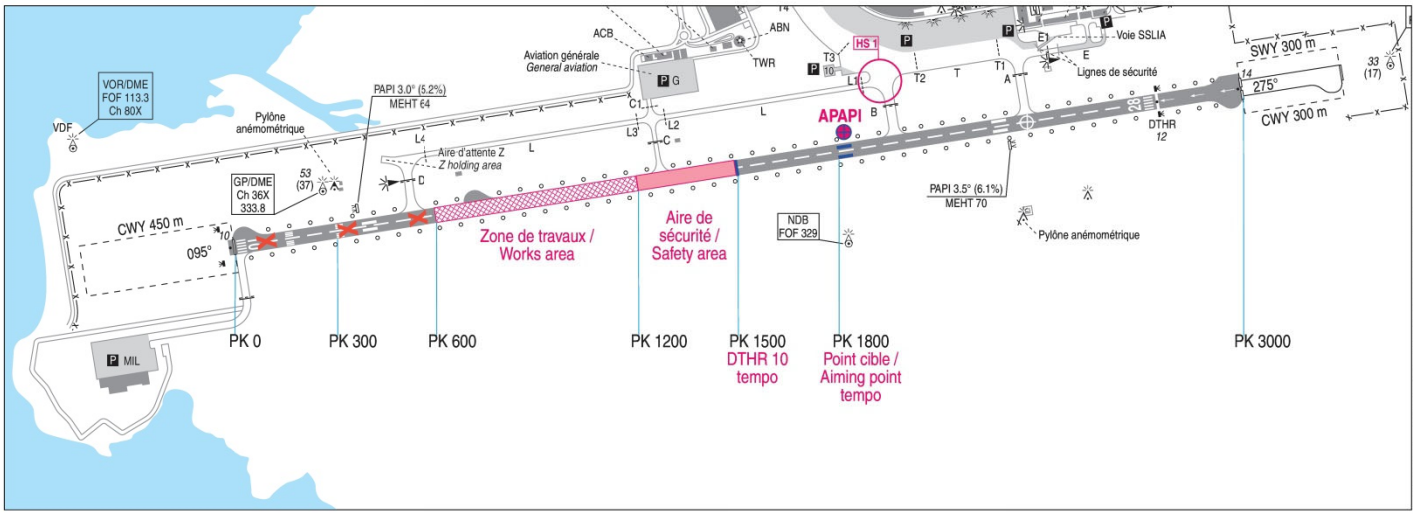
Sont interdits durant les phases de travaux :
- Les vols d'entrainement en solo (Tours de Piste et Navigation).
- Les circuits « basse hauteur »
- Les encadrements
- L'activité de parachutisme, de voltige et de tractage de banderoles.

Le nombre de vols d'entrainement en double commande simultanés pourra être restreint.

ANNEXE 1 / APPENDIX 1 :
BALISAGE PAR MARQUES ET FEUX TEMPORAIRES DURANT LES TRAVAUX / WORKS TEMPORARY MARKINGS AND LIGHTS



ANNEXE 3A / APPENDIX 3A :
PROCEDURE D'APPROCHE PISTE 10 REDUITE – POSITION DTHR / APPROACH PROCEDURE ON REDUCED RWY 10 – DTHR POSITION



Coordonnées géographiques clé / Key geographical coordinates (*) :

	Latitude	Longitude	H ellipsoïdale (GUND)
Seuil décalé/DTHR (PK 1500)	14°35'26.91401" N	61°00'16.58578" W	- 35.08 m
Point cible/Aiming point (PK 1800)	14°35'28.60672" N	61°00'06"71617 W	- 35,64 m

** système géodésique / World Geodesic System WGS 84*

ANNEXE 3B / APPENDIX 3B
PROCEDURE D'APPROCHE PISTE 10 REDUITE / APPROACH PROCEDURE ON REDUCED RWY 10

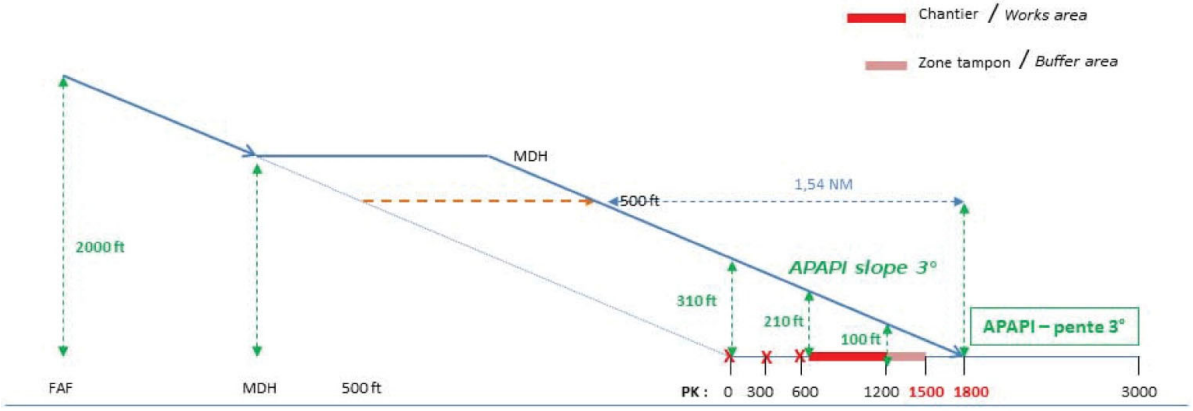
Arrivée sur trajectoire LOC, VOR ou GNSS / *IFR arrivals with LOC, VOR or GNSS*
Les approches sont limitées aux aéronefs de catégories A et B. / Approaches are limited to categories A and B aircraft.

Type d'approches possibles en piste 10 réduite / *Approaches available on reduced RWY 10 :*
LOC z, y, x - VOR z, y - GNSS 10.

Descente jusqu'à la MDH publiée à l'AIP pour acquérir les références visuelles. / *Descend to the MDH published in the AIP to acquire the visual references.*

Une fois les références visuelles acquises, **pas de descente en dessous de 500ft/** *When the visual references are acquired,* **do not descend below 500 ft avant d'intercepter et suivre le plan de l'APAPI installé au PK 1800,** **before intercepting and following the path of the APAPI installed at PK 1800.**

L'utilisation du QFU 28 nécessite un préavis d'1h30 auprès de la TWR./*The use of QFU 28 requires a 1h30 PN to the TWR.*



Appendix 3:

Excerpt from Temporary Operational Directives

COT Travaux

Période 2 – 10h00 à 17h00 TU

Exploitation avec seuil décalé.

Seuil	TORA	TODA	ASDA	LDA
10	**1500**	1800	1800	**1500**
28	1500	1500	1500	1250

- Les 1500 premiers mètres de la piste 10 sont fermés
- Des croix blanches sont disposées sur les 600 premiers mètres de la piste
- Les TWY M et D sont fermés
- Le TWY L entre C et D est fermé

Le CDT s'assure préalablement à l'exploitation avec le seuil décalé que :

- **Le LOC rayonne – Glide coupé.**
- Les deux visites de piste ont bien été effectuées (GUEZ & V.I.)
- **L'ATIS est renseigné – rappel aux pilotes sur la fréquence au premier contact.**
- L'information du seuil décalé a bien été transmise aux centres adjacents (TLPL, TLPC, TFFR).
- D'éventuelles mesures de régulation du trafic ont été coordonnées avec les mêmes centres.

L'avion critique pouvant utiliser la piste est l'ATR72

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Une surveillance active de la plateforme est demandée à tous pendant la durée des travaux

Période 2 – 10h00 à 17h00 TU

A L'ARRIVÉE.

- L'approche réduit la vitesse des aéronefs à l'interception de l'axe : 160kts max à 8 NM Finale.
- Les contrôleurs font un rappel du chantier aux avions au moment de l'interception de l'axe final ou avant l'entrée en étape de base pour les VFR.
- Tous les aéronefs (dont Hélicos) survolant le chantier devront se conformer à la procédure décrite dans le SUP AIP
- Une attention particulière est demandée aux contrôleurs vis-à-vis des trajectoires des avions en finale. En cas de survol manifestement trop bas du chantier, le CTL initiera une RMG. Le CDT rédigera une FNE et préviendra l'IAO.
- **La cadence d'atterrissage est définie à 5 min**. (cette valeur pourra être réévaluée à la baisse ultérieurement)
- **Dans un premier temps, les circuits nord après survol du Lamentin : VFR – App à vue sont interdits** – prévoir une verticale Tour 1500ft puis circuit au sud – une révision de ce point pourra être envisagée ultérieurement.

Phraséo :

APP : F-OIFR – Attention au survol du chantier – Contactez la Tour 118,5 MHz.
TWR : F-OVFR – Attention au survol du chantier – Rappelez en Finale.

TWR : FOXXX – Vérifiez votre hauteur de survol du chantier.
TWR : FOXXX – Vous êtes trop bas – remettez les gaz .

Fonctionnement dégradé

- **L'exploitation est suspendue en cas de panne des feux de seuil décalé au PK1500.**
- **L'atterrissage des avions en VFR est suspendu en cas d'indisponibilité de l'A-PAPI.**
- **En cas de panne du LOC, les entrainements tours de piste VFR sont interdits.**

7

Une surveillance active de la plateforme est demandée à tous pendant la durée des travaux

Appendix 4:

Aerial photos of runway 10 of Martinique Aimé Césaire airport

Source: GTA

Source: GTA

BEA

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