

Air Accidents Investigation Branch

Department for Transport

**Report on the serious incident to
Boeing 777-236, G-VIIR
at Robert L Bradshaw
International Airport
St Kitts, West Indies
on 26 September 2009**

This investigation was carried out in accordance with
The Civil Aviation (Investigation of Air Accidents and Incidents) Regulations 1996

The sole objective of the investigation of an accident or incident under these Regulations shall be the prevention of accidents and incidents. It shall not be the purpose of such an investigation to apportion blame or liability.

© *Crown Copyright 2010*

Published with the permission of the Department for Transport (Air Accidents Investigation Branch).

This report contains facts which have been determined up to the time of publication. This information is published to inform the aviation industry and the public of the general circumstances of accidents and serious incidents.

Extracts may be published without specific permission providing that the source is duly acknowledged, the material is reproduced accurately and it is not used in a derogatory manner or in a misleading context.

Published 2 September 2010

Printed in the United Kingdom for the Air Accidents Investigation Branch

**Department for Transport
Air Accidents Investigation Branch
Farnborough House
Berkshire Copse Road
Aldershot
Hampshire GU11 2HH**

July 2010

*The Right Honourable Philip Hammond
Secretary of State for Transport*

Dear Secretary of State

I have the honour to submit the report by Mr K Conradi, an Inspector of Air Accidents, on the circumstances of the accident to Boeing 777-236, registration G-VIIR at Robert L Bradshaw International Airport, St Kitts, West Indies on 26 September 2009.

Yours sincerely

David King
Chief Inspector of Air Accidents

Contents

Synopsis.....	1
1 Factual information.....	3
1.1 History of the flight.....	3
1.2 Injuries to persons.....	10
1.3 Damage to the aircraft.....	10
1.4 Other damage.....	10
1.5 Personnel Information.....	10
1.5.1 Commander.....	10
1.5.2 Co-pilot.....	10
1.6 Aircraft information.....	11
1.6.1 General information.....	11
1.6.2 Weight and Balance.....	11
1.6.3 Aircraft performance figures.....	11
1.7 Meteorological information.....	11
1.8 Aids to navigation.....	12
1.9 Communications.....	12
1.10 Aerodrome information.....	12
1.10.1 Background information.....	12
1.10.2 Runway 07.....	12
1.10.3 ECCAA airfield inspection.....	14
1.10.4 AAIB airfield inspection.....	14
1.11 Flight recorders.....	14
1.12 Wreckage and impact information.....	16
1.13 Medical and pathological information.....	16
1.14 Fire.....	16
1.15 Survival aspects.....	16
1.16 Tests and research.....	16
1.17 Organisational and management information.....	16
1.17.1 ICAO Annex 14, Volume I, Aerodrome Design and Operations... ..	16
1.17.2 Air Traffic Control.....	19
1.17.3 Operator's New Destination Assessment.....	19
1.17.4 Operator's charts of SKB.....	20

1.18	Additional information.....	20
1.18.1	Flight crews' comments.....	20
1.18.1.1	Commander's comments.....	20
1.18.1.2	Co-pilot's comments.....	21
1.18.2	Air Traffic Control Officers' (ATCOs') comments.....	21
1.18.2.1	Trainee controller's comments.....	21
1.18.2.2	Supervising Controller's comments.....	21
1.18.2.3	Senior Air Traffic Control Officer's (SATCO's) comments.....	22
1.18.3	Follow-up action by ECCAA.....	22
1.18.4	Safety actions by SKB.....	22
1.18.5	Manufacturer's performance data.....	22
2	Analysis.....	23
2.1	General.....	23
2.2	Conduct of the flight.....	23
2.3	Air Traffic Control.....	24
2.4	Regulator's oversight.....	25
2.5	Operator's oversight.....	25
3	Conclusions.....	27
(a)	Findings.....	27
(b)	Contributory factors.....	27
4	Safety Recommendations.....	28

Appendices

Appendix A ASSI airfield inspection report

Appendix B Extract from ICAO Annex 14 showing appropriate runway signs

GLOSSARY OF ABBREVIATIONS USED IN THIS REPORT

AAIB	Air Accidents Investigation Branch	SARPS	Standards and Recommended Practices
ADM	Airport Duty Manager	SATCO	Senior Air Traffic Control Officer
ANU	VC Bird International Airport, Antigua	SE	Station Manager
ASDA	Accelerate Stop Distance Available	SKB	Robert L Bradshaw International Airport, St Kitts
ASSI	Air Safety Support International	SMS	Safety Management System
ATC(C)(O)	Air Traffic Control (Centre) (Officer)	TODA	Takeoff Distance Available
°C,M,T	Celsius, magnetic, true	TORA	Takeoff Run Available
ECAIP	Eastern Caribbean Aeronautical Information Publication	UK	United Kingdom
ECCAA	Eastern Caribbean Civil Aviation Authority	UTC	Co-ordinated Universal Time (GMT)
ft	feet	V_1	Takeoff decision speed
hrs	hours (clock time as in 1200 hrs)	V_2	Takeoff safety speed
ICAO	International Civil Aviation Organization	V_{MCG}	minimum speed that aircraft can be controlled on the ground
ILS	Instrument Landing System	V_R	Rotation speed
KHz	kilohertz		
km	kilometre(s)		
kt	knot(s)		
m	metre(s)		
MAC	Mean Aerodynamic Chord		
mb	millibar(s)		
MHz	megahertz		
N_1	engine fan or LP compressor speed		
NDA	New Destination Assessment		
NOTAM	Notice to Airmen		
QAR	quick access recorder		
QNH	altimeter pressure setting to indicate elevation amsl		
R/W	Runway		
RESA	Runway End Safety Area		

Air Accidents Investigation Branch**Aircraft Accident Report No: 4/2010 (EW/C2009/09/04)**

Operator: British Airways

Aircraft Type and Model: Boeing 777-236

Registration: G-VIIR

Location: Robert L Bradshaw International Airport, St Kitts, West Indies

Date and Time: 26 September 2009, 2105 hrs
All times in this report are UTC

Synopsis

The crew received the aircraft's takeoff performance figures for a takeoff from Intersection Alpha on Runway 07 at Robert L Bradshaw International Airport, St Kitts, West Indies. Having received taxi clearance to Intersection Alpha, the aircraft taxied to Intersection Bravo from where it subsequently took off; the crew believed they were at Intersection Alpha. Intersection Bravo on Runway 07 is not an authorised takeoff intersection for the Boeing 777. The estimated Take-off Run Available from Intersection Bravo was approximately 1220 m, which was 695 m less than the planned takeoff run from Intersection Alpha.

The AAIB was informed of the incident by the operator on 29 September 2009 who subsequently notified the Eastern Caribbean Civil Aviation Authority (ECCAA)¹. The investigation was then delegated to the AAIB which represents the State of Registration.

Three Safety Recommendations have been made.

The investigation identified the following contributory factors:

- 1 The airport authority had not installed any taxiway or holding point signs on the airfield.

¹ The Eastern Caribbean Civil Aviation Authority, who are based in Antigua, has oversight for Robert L Bradshaw International Airport.

- 2 The crew did not brief the taxi routing.
- 3 The crew misidentified Taxiway Bravo for Taxiway Alpha and departed from Intersection Bravo.
- 4 The trainee ATCO did not inform the flight crew that they were at Intersection Bravo.

1 Factual information

1.1 History of the flight

The aircraft was operating a scheduled service from VC Bird International Airport, Antigua (ANU), West Indies to Robert L Bradshaw International Airport, St Kitts (SKB), West Indies and return. The sector from ANU to SKB was uneventful. On arrival at SKB the aircraft was not parked on a designated stand but at an angle of approximately 45° to the terminal. This allowed the aircraft to self-manoeuvre off the stand as no pushback tug was available. This was the first time the commander or the co-pilot had operated to or from SKB.

Flight planning for the return sector was completed by the commander and the co-pilot on the flight deck. Takeoff performance data for both the full length and from Intersection Alpha on Runway 07 were requested via the on-board data communications system. Once the speed and thrust setting were calculated, the crew agreed that the takeoff performance was satisfactory from Intersection Alpha and that this was considered preferable to backtracking the runway for a full length departure.

The co-pilot was the handling pilot for this sector and although, prior to engine start, he briefed the departure from SKB and the arrival at ANU, he did not brief the taxi routing. He considered that the aerodrome charts provided lacked clarity and information. At the time of the incident it was daylight but the sun was low to the west. A member of the cabin crew was also on the flight deck, sitting on the jump seat.

A trainee ATCO, under supervision, was in the ATC tower on the tower frequency.

After an uneventful start the co-pilot called for taxi at 2059 hrs, 6 minutes ahead of schedule. Figure 1 shows a copy of the charts used by the crew.

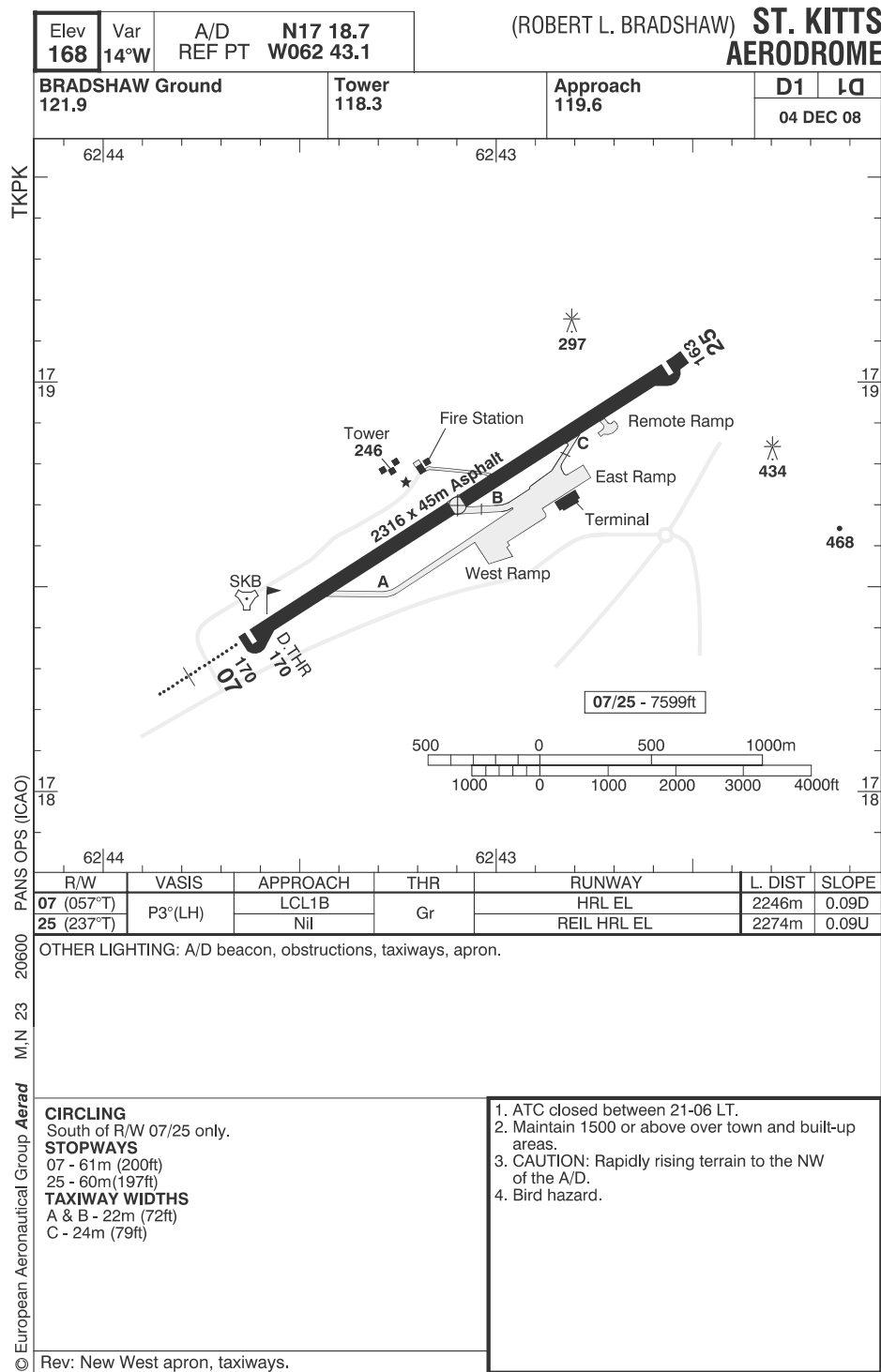


Figure 1
Aerodrome Charts

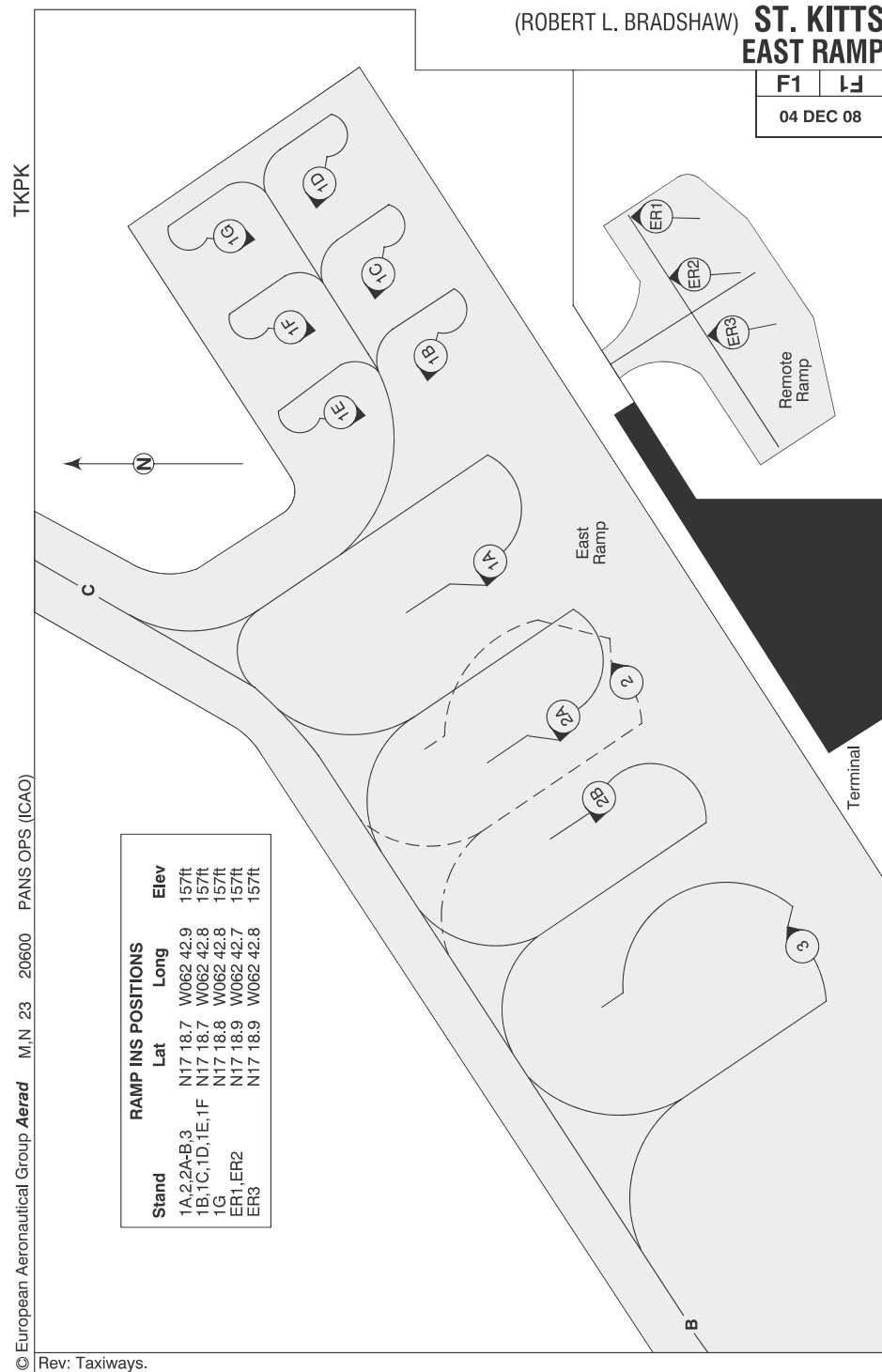


Figure 1

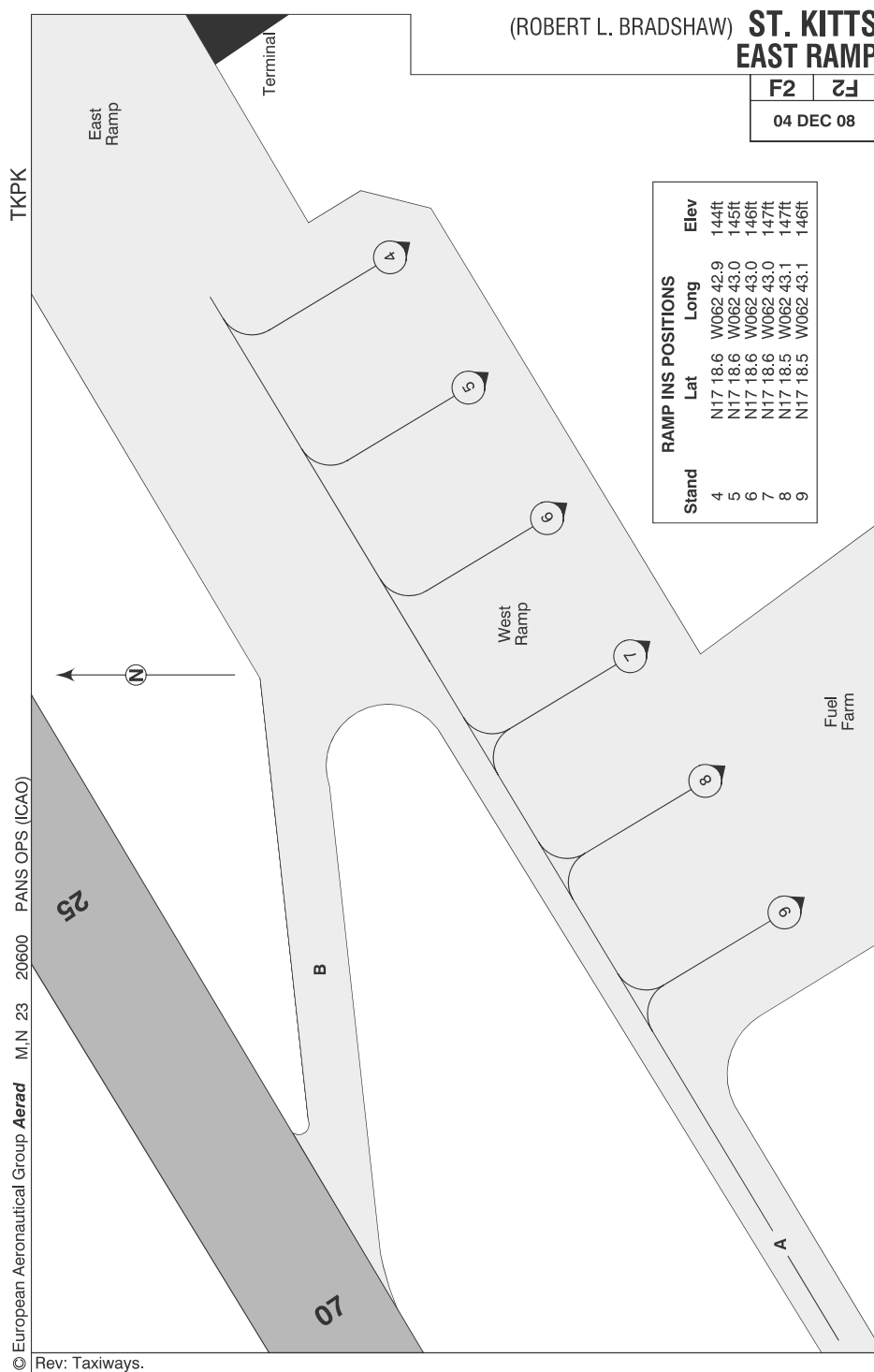


Figure 1

The following exchange then took place between G-VIIR and ATC at 2059:57 hrs.

G-VIIR “BRADSHAW APPROACH SPEEDBIRD TWO ONE FIVE SIX
REQUEST TAXI”

ATC “SPEEDBIRD TAXI VIA ALPHA AND BACKTRACK RUNWAY
ZERO SEVEN. TAXIWAY ALPHA IS PARALLEL THE ACTIVE”

G-VIIR “OK THAT’S COPIED TAXI VIA ALPHA WE’D LIKE TO DEPART
FROM APLHA SPEEDBIRD TWO ONE FIVE SIX”

ATC “ROGER LINE UP FOR DEPARTURE STANDBY ATC
CLEARANCE”

G-VIIR “OK TAXI VIA ALPHA LINE UP FOR DEPARTURE SPEEDBIRD
TWO ONE FIVE SIX”

The co-pilot commenced a right turn through 135° away from the terminal because no taxiway markings were present to guide the aircraft from the ramp in front of the terminal. As he did so he identified a taxiway centreline at the rear of the ramp and assumed it to be Taxiway Alpha. The aircraft continued on this taxiway to Holding Point Bravo, during which time the commander completed the flight controls check and the Before Take-off checklist. By the time the commander looked up and orientated himself, the aircraft was approaching Holding Point Bravo.

The crew informed ATC that they would hold short of Runway 07 as the passenger cabin was not secure. After a short delay the crew notified ATC that they were ready for departure and ATC cleared G-VIIR to line up on Runway 07.

The following exchange then took place between G-VIIR and ATC at 21:02:58 hrs:

G-VIIR “SPEEDBIRD TWO ONE FIVE SIX IS NOW FULLY READY FOR
DEPARTURE”

ATC “ROGER LINE UP FOR DEPARTURE CLEARED VC BIRD VIA
THE GOLF SIX THREE THREE CLIMB TO AND MAINTAIN
FLIGHT LEVEL ZERO SEVEN ZERO”

G-VIIR “SPEEDBIRD TWO ONE FIVE SIX, SORRY I STEPPED ON YOU
THERE”

ATC “CLEARED TO VC BIRD VIA THE GOLF SIX THREE THREE
CLIMB TO AND MAINTAIN FLIGHT LEVEL SEVEN ZERO”

G-VIIR "SPEEDBIRD TWO ONE FIVE SIX IS CLEARED TO ERR VC BIRD VIA THE GOLF SIX THREE THREE CLIMB FLIGHT LEVEL SEVEN ZERO SPEEDBIRD TWO ONE FIVE SIX"

ATC "SPEEDBIRD ERR READBACK IS CORRECT LINE UP FOR DEPARTURE"

G-VIIR "LINING UP FOR ZERO SEVEN SPEEDBIRD TWO ONE FIVE SIX"

As the aircraft entered the runway the crew visually checked that the approach was clear and the commander checked for TCAS returns on his Navigation Display.

The following exchange then took place between ATC and G-VIIR at 2103:42 hrs:

ATC "SPEEDBIRD TWO ONE FIVE SIX ERR DO YOU NOT REQUEST ERR BACKTRACK RUNWAY ZERO SEVEN"

G-VIIR "ERR NEGATIVE SPEEDBIRD TWO ONE FIVE SIX WE ARE HAPPY TO GO FROM POSITION ALPHA"

ATC "ROGER CLEARED TAKE OFF RUNWAY ZERO SEVEN WIND ZERO NINE ZERO ONE ZERO KNOTS"

G-VIIR CLEARED FOR TAKE OFF ZERO SEVEN SPEEDBIRD TWO ONE FIVE SIX"

Once the co-pilot had lined up the aircraft and stopped, the commander stated that the runway looked very short. He advised the co-pilot to "stand on the brakes" and apply 55% N_1 before brake release, which the co-pilot did.

The operator's Station Engineer (SE) was travelling next to the operator's Airport Duty Manager (ADM) on the right side of the aircraft in Row 10 of the passenger cabin. As the aircraft taxied onto the runway the SE stated that he expected it to turn left and backtrack down the runway as he recognised that the aircraft was at Intersection Bravo. However, the aircraft turned right and stopped. The ADM said to the SE that the aircraft was going to take off from the wrong intersection. Agreeing with the ADM, the SE ran up to the Cabin Manager seated by the front left door and asked her if she had contacted the flight crew. She assumed he was referring to the cabin secure notification and said yes. He then said he needed to contact the flight crew immediately as "we are in the wrong position". Hearing the engine power increase, towards takeoff thrust and realising that the takeoff run was starting the engineer sat down in Row 4.

Both pilots felt that the aircraft accelerated quickly to 80 kt. The co-pilot then considered the acceleration to V_1 to be much slower and noticed that the end of the runway was approaching. V_1 was achieved as the aircraft reached the touchdown zone aiming point markers for Runway 25 and rotation was commenced with the aircraft lifting off shortly afterwards.

Intersection Bravo on Runway 07 is not authorised, for Boeing 777 takeoffs, by this aircraft's operator. The aircraft had taken off with a Takeoff Run Available (TORA)¹ of 1,220 m; the performance calculations were based on a TORA of 1,915 m.

The takeoff was observed by the ATCOs who stated that the aircraft's rotation appeared normal. They said that the main landing gear left the runway about 1,000 ft from the end of the paved surface.

After takeoff the Cabin Manager went to speak to the SE and asked him what had been the problem. He informed her that the aircraft had taken off from the wrong position. He did not repeat his request to speak to the flight crew and the flight to ANU was uneventful.

After the passengers disembarked, the SE spoke directly to the commander advising that they had departed from Intersection Bravo. The commander initially asserted that they had taken off from Intersection Alpha but quickly established that the aircraft had departed from Intersection Bravo. He subsequently completed an Air Safety Report in the operator's local office and sent it electronically to the operator's headquarters in London. He then called the Duty Flight Crew Manager in London to advise him of what had happened.

When the aircraft returned to London the operator reviewed the event using the data from the aircraft's recorders, and informed the AAIB.

On 8 October 2009 the following NOTAM, A1289/09, was issued by SKB:

'Possible confusion may arise due lack of signage for taxiways 'A' and 'B'. Pilots are required to contact twr [tower] for taxi instructions prior to taxiing. Caution advised.'

This was only valid until 12 October 2009 by which time some temporary taxiway signs were installed.

¹ Takeoff Run Available (TORA). The distance from the point on the surface of the aerodrome at which the aeroplane can commence its takeoff run to the nearest point in the direction of takeoff at which the surface of the aerodrome is incapable of bearing the weight of the aeroplane under normal operating conditions.

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal	0	0	0
Serious	0	0	0
Minor/None	14	87	0

1.3 Damage to the aircraft

None.

1.4 Other damage

None.

1.5 Personnel information

1.5.1 Commander

Age: 44 years
 Licence: UK Airline Transport Pilot's Licence
 Last Licence Proficiency Check: 21 May 2009
 Last Instrument Rating Renewal: 21 May 2009
 Last Medical: 13 May 2009. No limitations
 Flying Experience: Total all types: 12,350 hours
 On Type: 3,750 hours
 Last 90 days: 172 hours
 Last 28 days: 66 hours
 Last 24 hours: 1 hour

1.5.2 Co-pilot

Age: 39 years
 Licence: UK Airline Transport Pilot's Licence
 Last Licence Proficiency Check: 13 May 2009
 Last Instrument Rating Renewal: 13 May 2009
 Last Medical: 29 April 2009. No limitations
 Flying Experience: Total all types: 6,174 hours
 On Type: 3,810 hours
 Last 90 days: 127 hours
 Last 28 days: 36 hours
 Last 24 hours: 1 hour

1.6 Aircraft Information

1.6.1 General information

Manufacturer:	Boeing
Type:	777-236
Aircraft serial No:	29322
Date of construction:	1999
Power plants:	2 General Electric GE90-85BG11 turbofans
Total airframe hours:	52,801 hours
Total airframe cycles:	8,129
Certificate of Registration:	Issued 18 March 1999
Certificate of Airworthiness:	Airworthiness Review Certificate issued 5 March 2009 to 17 March 2010
Certificate of Release to Service:	Issued on 2A Check 9 September 2009

1.6.2 Weight and Balance

The aircraft's takeoff weight was approximately 167,700kg which included a fuel load of 10,000 kg. The centre of gravity at the takeoff weight was at 27.8% of the Mean Aerodynamic Chord (MAC) and at 27.7% of MAC at zero fuel weight, which were within limits.

1.6.3 Aircraft performance figures

The takeoff speeds were received electronically by the crew, from a remote provider of aircraft performance. For a Flap 20² takeoff from Intersection Alpha on Runway 07 the speeds were V_1 of 120 kt, V_R of 120 kt and V_2 of 124 kt. The engine thrust was reduced by the maximum 25% to an assumed temperature of 67°C.

1.7 Meteorological information

Prior to engine start the crew received the latest weather information from ATC. The surface wind was from 090°/10 kt, the visibility was in excess of 10 km, there were FEW clouds at 1,800 ft aal, the temperature was 30°C, the dew point was 25°C and the QNH was 29.91 inches, 1013 mb.

At the time of the incident the sun's elevation was 14.3° above the horizon, bearing 263.8° true. The sun set at 2201 hours.

² Although Flap 20 is not commonly used as a takeoff flap setting on the Boeing 777, it is normally used for shorter runways or runways where there is an obstacle affecting performance close in on the initial climb.

1.8 Aids to navigation

Robert L Bradshaw International Airport has a non-directional beacon transmitting on 325 KHz and distance measuring equipment transmitting on 112.00 MHz, channel 57X, to assist with navigation. Neither was being used by the crew at the time of the incident as they were not required for the planned departure.

1.9 Communications

During the course of the incident the crew were in communication with Bradshaw Tower (119.700 MHz). These transmissions were recorded and a speech transcript was made. Copies of the recording were made available to the investigation.

1.10 Aerodrome information

1.10.1 Background information

Robert L Bradshaw International Airport has one runway orientated 07/25 and two aircraft aprons annotated Main Apron Old Portion, in front of the passenger terminal, and Main Apron New Portion, located adjacent to the Old Portion, in the Eastern Caribbean Aeronautical Information Publication (ECAIP) as shown in Figure 2.

The Main Apron New Portion and Taxiway Alpha were built in 2006. The design included a plan to install electrically illuminated taxiway and holding point signs which would be controlled from the ATC tower. However, the signs were not installed reportedly due to a lack of finance.

1.10.2 Runway 07

Runway 07 has a declared Takeoff Run Available (TORA) of 2,322 m. Its declared Takeoff Distance Available (TODA)³ is 3,483 m and its Accelerate Stop Distance Available (ASDA)⁴ is 2,322 m. It has a Runway End Safety

3 Takeoff Distance Available (TODA). Either the distance from the point on the surface of the aerodrome at which the aeroplane can commence its takeoff run to the nearest obstacle in the direction of takeoff projecting above the surface of the aerodrome and capable of affecting the safety of the aeroplane, or one and one half times the takeoff run available, whichever is the less.

4 Accelerate Stop Distance Available (ASDA). The distance from the point on the surface of the aerodrome at which the aeroplane can commence its takeoff run to the nearest point in the direction of takeoff at which the aeroplane cannot roll over the surface of the aerodrome and be brought to rest in an emergency without the risk of accident.

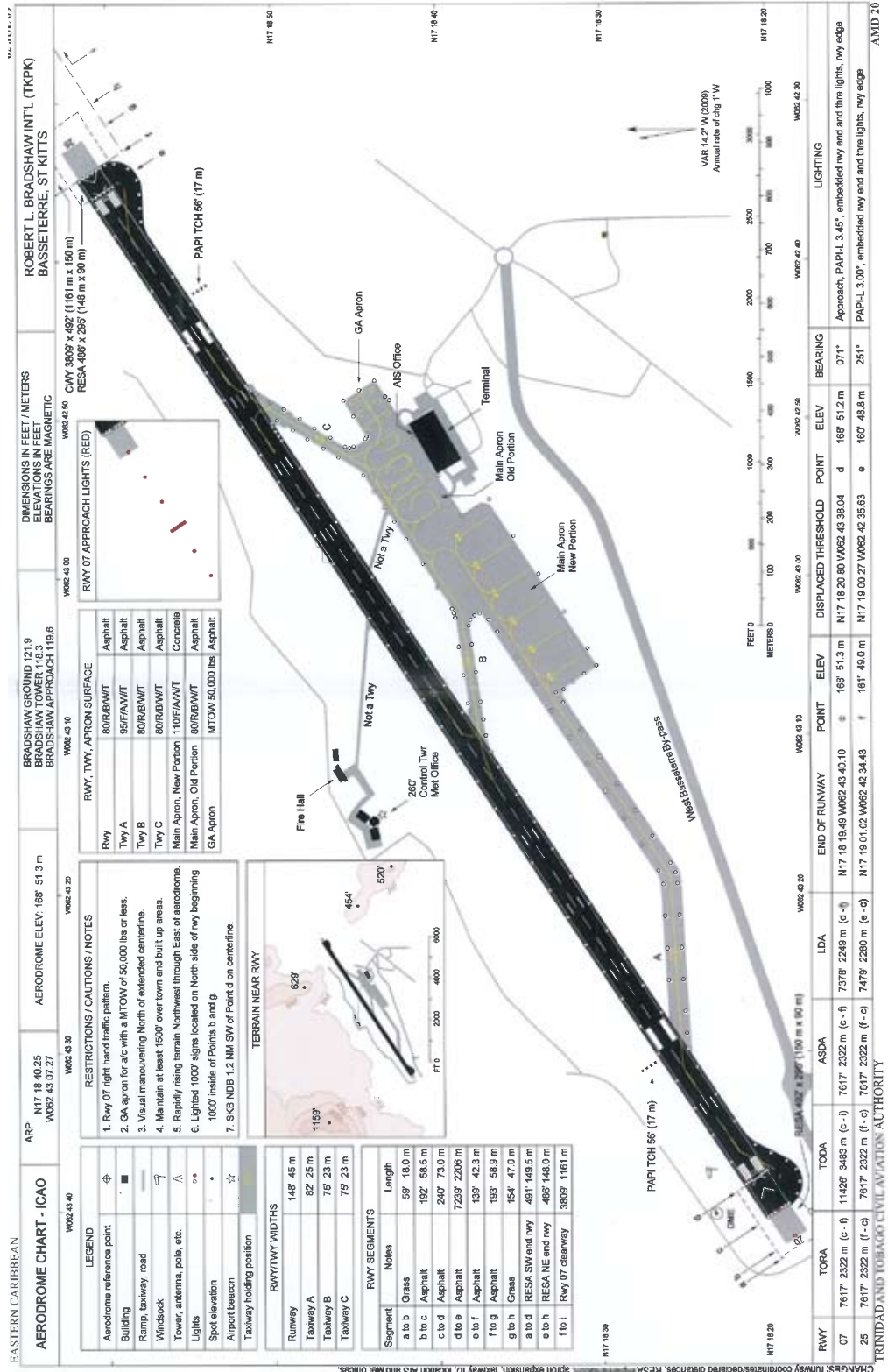


Figure 2

Eastern Caribbean Aeronautical Information Publication Chart

Area (RESA)⁵ 148 m long by 90 m wide. At the end of the RESA is a near vertical drop of approximately 160 ft.

From Intersection Alpha the TORA and TODA are reduced by approximately 380 m and from Intersection Bravo by 1,110 m.

There were distance-to-go marker boards every 1,000 ft on the edge of the runway. Although a useful indication of relative position on the runway, this is not an Annex 14, Volume I, Aerodrome Design and Operations, requirement and is more commonly used at military airports.

1.10.3 ECCAA airfield inspection

In August 2006 Air Safety Support International (ASSI)⁶ conducted an airfield inspection of SKB on behalf of the regulator, the ECCAA.

One of the findings was that there were no holding point signs. This observation was classified as needing urgent action. The lack of taxiway signs was not commented on.

The operator was not aware that this report existed.
A full copy of the report is at Appendix A.

1.10.4 AAIB airfield inspection

During its visit to SKB the AAIB found that, as mentioned in the 2006 ASSI inspection, there were no holding point signs. Additionally there were no taxiway signs and the taxiway centreline linking the rear of the Main Apron Old Portion to the rear of the Main Apron New Portion, as shown in the ECAIP, was not present.

1.11 Flight recorders

Recorded data for the incident on both the flight data recorder and cockpit voice recorder was overwritten due to the delay in notification of the incident. However, the aircraft was fitted with a quick access recorder (QAR) that had been routinely downloaded by the operator, which contained flight data for the

⁵ Runway End Safety Area (RESA). An area symmetrical about the extended runway centreline and adjacent to the end of the strip primarily intended to reduce the risk of damage to an aeroplane undershooting or overrunning the runway.

⁶ Air Safety Support International (ASSI) is a subsidiary company of the UK Civil Aviation Authority. Its objective is to help provide a more cohesive system of civil aviation safety regulation in the UK Overseas Territories.

incident. A copy of this data was provided by the operator to the AAIB for analysis.

Salient parameters from the QAR recordings are presented in Figure 3, which starts with the aircraft lined up on the runway at Bravo with the thrust beginning to increase just prior to brake release. Figure 3 also shows the distance travelled along the runway from brake release, which was calculated from groundspeed.

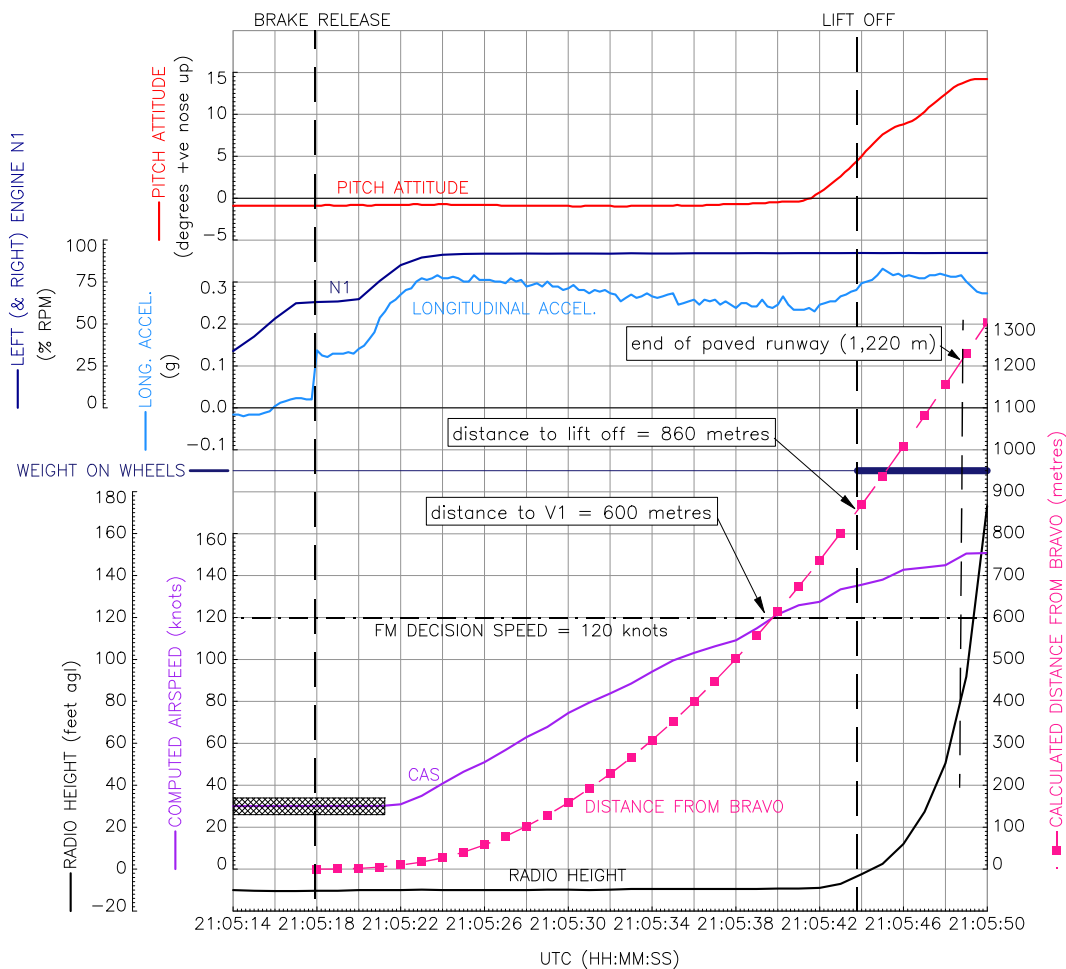


Figure 3

G-VIIR salient QAR data

This data shows that at the point at which V_1 was reached, the aircraft had travelled 600 m along the runway and that it travelled a further 260 m as the aircraft rotated and became airborne. The total distance travelled during takeoff was 860 m and the maximum pitch rate achieved during the rotation was 2.5°/s.

As the aircraft left the ground its airspeed was approximately 135 kt, and as the aircraft passed over the end of the runway (1,220 m from the start of takeoff), its height above the ground was 80 ft.

1.12 Wreckage and impact information

Not applicable.

1.13 Medical and pathological information

Not applicable.

1.14 Fire

There was no fire.

1.15 Survival aspects

Not applicable.

1.16 Tests and research

Not applicable.

1.17 Organisational and management information

1.17.1 ICAO Annex 14, Volume I, Aerodrome Design and Operations.

Annex 14 states the following with regard to signs:

5.4 Signs

5.4.1 General

Application

5.4.1.1 Signs shall be provided to convey a mandatory instruction, information on a specific location or destination on a movement area or to provide other information to meet the requirements of 9.8.1.

5.4.2 Mandatory instruction signs

Note.— See Figure 5-29 for pictorial representation of mandatory instruction signs and Figure 5-31 for examples of locating signs at taxiway/runway intersections.

Application

5.4.2.1 A mandatory instruction sign shall be provided to identify a location beyond which an aircraft taxiing or vehicle shall not proceed unless authorized by the aerodrome control tower.

5.4.2.2 Mandatory instruction signs shall include runway designation signs, category I, II or III holding position signs, runway-holding position signs, road-holding position signs and NO ENTRY signs.

5.4.2.3 A pattern “A” runway-holding position marking shall be supplemented at a taxiway/runway intersection or a runway/runway intersection with a runway designation sign.

5.4.2.4 A pattern “B” runway-holding position marking shall be supplemented with a category I, II or III holding position sign.

5.4.2.5 A pattern “A” runway-holding position marking at a runway-holding position established in accordance with 3.12.3 shall be supplemented with a runway-holding position sign.

Note.— See 5.2.10 for specifications on runway-holding position marking.

5.4.2.6 **Recommendation.**— A runway designation sign at a taxiway/runway intersection should be supplemented with a location sign in the outboard (farthest from the taxiway) position, as appropriate.

Note.— See 5.4.3 for characteristics of location signs.

Location

5.4.2.8 A runway designation sign at a taxiway/runway intersection or a runway/runway intersection shall be located on each side of the runway-holding position marking facing the direction of approach to the runway.

5.4.2.10 A NO ENTRY sign shall be located at the beginning of the area to which entrance is prohibited on each side of the taxiway as viewed by the pilot.

5.4.2.11 A runway-holding position sign shall be located on each side of the runway-holding position established in accordance with 3.12.3, facing the approach to the obstacle limitation surface or ILS/MLS critical/sensitive area, as appropriate.

5.4.3 Information signs

Note.— See Figure 5-30 for pictorial representations of information signs.

Application

5.4.3.1 An information sign shall be provided where there is an operational need to identify by a sign, a specific location, or routing (direction or destination) information.

5.4.3.2 Information signs shall include: direction signs, location signs, destination signs, runway exit signs, runway vacated signs and intersection take-off signs.

5.4.3.5 **Recommendation.**— An intersection take-off sign should be provided when there is an operational need to indicate the remaining take-off run available (TORA) for intersection take-offs.

5.4.3.7 A combined location and direction sign shall be provided when it is intended to indicate routing information prior to a taxiway intersection.

5.4.3.8 A direction sign shall be provided when there is an operational need to identify the designation and direction of taxiways at an intersection.'

A copy of the relevant pages from Annex 14, showing examples of the appropriate signs, is at Appendix B.

At the time of incident the airport manager held some locally sourced self-illuminating (reflective) taxiway signs, but they had not been installed. These signs were installed, post-incident, on 12 October 2009. There was no evidence of any holding point signs.

The foreward of Annex 14 states:

'Action by Contracting States

*Notification of differences. The attention of Contracting States is drawn to the obligation imposed by Article 38 of the Convention by which Contracting States **are required** [AAIB bold] to notify the Organization of any differences between their national regulations and practices and the International Standards contained in this Annex and any amendments thereto. Contracting States are invited to extend such notification to any differences from the Recommended Practices contained in this Annex and any amendments thereto, when the notification of such differences is important for the safety of air navigation. Further, Contracting States are invited to keep the Organization currently informed of any differences which may subsequently occur, or of the withdrawal of any differences previously notified. A specified request for notification of differences will be sent to Contracting States immediately after the adoption of each amendment to this Annex.'*

No differences to Annex 14 have been filed with ICAO by the contracting state, St Kitts and Nevis, up to and including Amendment 10.

1.17.2 Air Traffic Control

During the AAIB's visit to SKB it was noted that there was no process to report incidents or to disseminate internal staff instructions within ATC. There was also no evidence of resource management training for the ATCOs.

1.17.3 Operator's New Destination Assessment

The operator had been operating to SKB since January 2009. A New Destination Assessment (NDA) was completed by reference to the ECAIP, commercially available charts and NOTAMS. A crew Route Brief was issued which contained no warning about the lack of taxiway and holding point signs as the operator was unaware of the poor signage situation. Prior to the service commencing there had been no site visit by the operator.

1.17.4 Operator's charts of SKB

The charts used by the crew were provided by a commercial supplier. Details of the Main Apron New Portion and Main Apron Old Portion were provided on separate pages in different scales as shown in Figure 1. There was no indication of the taxiway line that connects Taxiway Alpha and Bravo as depicted in the ECAIP. After this incident, the operator highlighted these points to the commercial provider who has subsequently reissued the chart of the apron on one page. The following caution was also added:

'CAUTION:

Due to lack of signage and poor taxiway delineation, extreme care must be taken ensuring that taxiway A is correctly identified when taxiing for take-off for R/W 07.

Note: At present there are no taxiway lines on the physical apron linking taxiways A and B. Other taxi lines may not be consistent with the diagram.'

1.18 Additional information

1.18.1 Flight crews' comments

1.18.1.1 Commander's comments

The commander stated that it is normal practice to brief the expected taxi route at large, busy and complex airports. However, as SKB was a small airport he would have considered it "odd" if the co-pilot had made specific reference on how to taxi to Holding Point Alpha.

From their position on the apron it was not possible to see the start of Taxiway Alpha, at the end of the Main Apron New Portion, because it was too far and the taxi line was not painted clearly. Also the low sun was directly over the western end of the ramp.

As they were lining up on Runway 07, the commander did notice the runway to his left but he did not register its length. He did not note the runway length remaining as he called rotate and believed the aircraft lifted off just as it went past the 300 m to go markings.

The commander stated that he has not taken off from any other runways where the intersection was approximately 50% of the overall runway length. He has

previously noticed runways being short from a landing perspective but not from a takeoff viewpoint.

1.18.1.2 Co-pilot's comments

The co-pilot stated that the shortest runway from which he had operated a Boeing 777 was approximately 2,000 m. He added that during the takeoff roll he was always certain that the aircraft was going to get airborne with the amount of runway remaining. Just after the aircraft became airborne he saw the grass at the end of the runway under the nose. At this time he realised that something was not right and realised that although the aircraft was airborne, the end of the runway was closer than normal. The co-pilot added that as the commander appeared not to be unsettled by the departure and there was a member of the cabin crew on the jump seat, he did not speak about his concerns to the commander during the sector.

1.18.2 Air Traffic Control Officers' (ATCOs') comments

1.18.2.1 Trainee controller's comments

The trainee controller stated that he heard the crew of G-VIIR respond "NEGATIVE WE ARE HAPPY TO GO FROM POSITION ALPHA". Although he realised that they were at Bravo and not Alpha, he did not consider correcting them as he has been told not to be forceful towards pilots. He added that he understands a Boeing 777 can get airborne in 4,000 ft (1,220 m) of runway.

1.18.2.2 Supervising Controller's comments

The supervising controller stated that when G-VIIR started to line up at Intersection Bravo for Runway 07 he instructed the trainee to ask the crew if they wanted to backtrack. He did not recall hearing them reply "NEGATIVE WE ARE HAPPY TO GO FROM POSITION ALPHA."

At this time he discussed with the trainee controller that although it appeared to be a short takeoff run, pilots are aware of their own aircraft's performance. Although he had seen many smaller local aircraft start their takeoff rolls from Intersection Bravo he had not seen a Boeing 777 do this.

Additionally he said the misidentification of Taxiway Bravo for Alpha was, on average, a weekly occurrence and it appeared to be happening mostly to overseas operators.

1.18.2.3 Senior Air Traffic Control Officer's (SATCO's) comments

The SATCO stated that the ATCOs have been asking for taxiway signs for many years. To mitigate against the lack of signs he has verbally instructed his controllers to closely monitor taxiing aircraft to ensure they comply with their clearance and to add the additional information '*Taxiway Alpha is parallel the active*' onto the taxi instructions. He believes the signs were not installed when the new apron was constructed due to a lack of finance.

He added that although he was aware that Taxiway Bravo had previously been misidentified for Taxiway Alpha, he was not aware of the regularity of this event as the ATCOs had not been reporting incidents.

1.18.3 Follow-up action by ECCAA

As a result of this incident the ECCAA conducted their own inspection of SKB, on 17 November 2009, to determine whether the taxiway signage conformed to ICAO Annex 14 Standards and Recommended Practices (SARPS). It found that the self-illuminating signs were in place but they still did not fully conform to Annex 14 SARPS. No mention was made with regard to the lack of holding point signage. SKB subsequently informed the ECCAA, on 21 January 2010, that additional signage had been installed and adjustments to the existing signage had been made to rectify the findings of the November 2009 inspection.

The ECCAA were informed by the SKB airport manager on 1 February 2010 of the outstanding observations from the 2006 inspection. He stated that the lack of holding point signs will be addressed by June 2010.

1.18.4 Safety actions by SKB

The SKB airport manager informed the ECCAA on 14 October 2009 that a Safety Management System (SMS) would be implemented by 31 December 2009 and that they intend to provide human factors training for all ATCOs during 2010.

Corrections to the ECAIP have also been introduced.

1.18.5 Manufacturer's performance data

The aircraft's manufacturer calculated a hypothetical V_1 of 101 kt (ignoring V_{MCG}) for the Intersection Bravo departure TORA of 1,220 m. If the crew had rejected the takeoff at their calculated V_1 of 120 kt, the aircraft would have overrun the end of the paved runway by approximately 100 m.

2 Analysis

2.1 General

The crew of G-VIIR took off from Runway 07 at Intersection Bravo believing they were at Intersection Alpha. As a result, the TORA was 695 m shorter than that they had planned and for which they had calculated the takeoff performance. The investigation focused on the human factors issues relating to the crew and the ATCOs, the infrastructure of the airfield and the regulator who had oversight for SKB.

2.2 Conduct of the flight

The crew mistook Taxiway Bravo for Taxiway Alpha. According to anecdotal reports by the ATC personnel, this was a common mistake among visiting crews. This disorientation can be attributed in part to the poor state of the ground markings and the lack of taxiway and holding signs. Neither the commander nor the co-pilot had visited SKB before and their lack of familiarity with the airfield was a contributory factor. If they had been departing from an unfamiliar, large, complex airport, it is likely that they would have briefed the taxi routing and the commander might have devoted more attention to monitoring the taxiing process rather than concentrating on the Before Takeoff checks. The lack of similar emphasis in preparing to depart from an unfamiliar, but small, simple airport is unlikely to be unique, as the ATCO's anecdotal reports confirm.

The crew did not identify their error. Although the commander explicitly commented on the apparent shortness of the runway, neither he nor the co-pilot effectively tested their belief that they were at the intended position. They could have done this by comparing the location of identifiable features (such as the control tower) with the aerodrome chart or by asking ATC. They did make reference to the uncommon take-off flap setting. As this is normally used for departing from short runways, there was an expectation that the runway remaining may look shorter than usual after lining up. The lack of challenge, on both the flight crew and ATCO's behalf, involved a normal tendency in human decision making: confirmation bias. The tendency to attend only to evidence that supports the default hypothesis is natural but can result in flawed analysis. Crew resource management training should address this tendency in two ways: first, by emphasizing the need to seek evidence that disproves assumptions whenever they are called into doubt; second, by providing the communication skills required for confident and clear discussion of the problem.

2.3 Air Traffic Control

ATC did not inform the crew that they were at Bravo and not Alpha. The transmission “DO YOU NOT REQUEST BACK TRACK RUNWAY 07?” contained a broad hint, but this was not picked up by the crew as they had already decided a backtrack was not necessary. Their reply: “NEGATIVE, WE ARE HAPPY TO GO FROM POSITION ALPHA”, clearly implied a misinterpretation on their part. The reasons why this was overlooked by ATC are not clear. It is conceivable that the trainee controller lacked the confidence to challenge the aircrew. His supervisor reports not hearing this crucial transmission but there is no evidence to explain this.

ATC did not challenge the aircrew’s decision. The trainee controller and his supervisor discussed G-VIIR lining up at Bravo. Although smaller aircraft take off from Bravo, the supervisor had never seen a Boeing 777 start its takeoff roll there but both he and the trainee controller had witnessed crews mistaking Bravo for Alpha. Nevertheless, they assumed that the crew knew what they were doing. This lack of challenge possibly occurred as a result of insufficient human factors and resource management training. As a result of this incident, the SKB airport manager has undertaken to introduce human factors training for their resident ATCOs during 2010.

The potential for errors in taxiway identification had been recognized by the airport management but physical remedies had not been pursued effectively. The reasons are not clear. Although the ATCOs had been advised, verbally, to monitor aircraft movements with a view to detecting or preventing such errors, the trainee controller’s attempt to assist with the identification of Taxiway Alpha by describing it as “parallel the active” was ineffective. Although this phrase was an initiative of the SATCO, it is not known how effectively it was used by other controllers.

The lack of other than anecdotal evidence for taxiway misidentifications suggests that there is no provision for incident reporting at SKB or that it is ineffective. An effective SMS, such as that planned by SKB, would include an incident reporting system. Although the SKB airport manager has undertaken to introduce a SMS by the end of 2009, there is no evidence that this has yet taken place. Therefore:

It is recommended that the Eastern Caribbean Civil Aviation Authority ensure that Robert L Bradshaw International Airport, St Kitts, establishes a Safety Management System for its airfield operations.

Safety Recommendation 2010-047

2.4 Regulator's oversight

An airfield inspection by the ECCAA in 2006 identified a number of deficiencies in the infrastructure and organization of the airfield. None of these were directly relevant to this incident. The inspection report did not comment on the poor taxiway markings and lack of taxiway signs (other than signs at the holding points). Arguably these inadequacies were less significant than many of the deficiencies identified in the report. Further inspections might have allowed a shift of focus from essential to desirable improvements, such as taxiway markings, after confirmation of the implementation of the initial recommendations. There was no evidence of such a shift of focus.

Although a Corrective Action Plan has been agreed by the ECCAA with SKB, and some improvements have been achieved, the airfield does not currently comply with ICAO Annex 14 Standards and Recommended Practices. Therefore:

It is recommended that the Eastern Caribbean Civil Aviation Authority ensures that the infrastructure of Robert L Bradshaw International Airport, St Kitts, complies with ICAO Annex 14 Standards and Recommended Practices or any differences are filed. In the interim a NOTAM of outstanding deficiencies should be published.

Safety Recommendation 2010-048

2.5 Operator's oversight

The operator's and crew's lack of familiarity with SKB was a contributory factor in their mistaking Taxiway Bravo for Taxiway Alpha. Although the operator has a New Destination Assessment in place, a physical survey of the airfield and its facilities by this operator may have identified potential operational issues such as those identified by the 2006 inspection. For these reasons, it may be advisable for an airport facilities survey prior to the first deployment or formal feedback provided from suitably qualified flightcrew undertaking the inaugural visit. This would allow the preparation of briefing notes that contain relevant and up-to-date information advising subsequent flightcrew of the local conditions.

Additionally this survey could be used as a basis for exerting pressure to improve standards at less well-equipped airports.

The following Safety Recommendation is made:

It is recommended that British Airways review the process by which all new destination airfields are inspected to identify any operational issues.

Safety Recommendation 2010-049

3 Conclusions

(a) Findings

- 1 Both the pilot and co-pilot were properly licensed and qualified to operate the aircraft.
- 2 The aircraft was certified, equipped and maintained in accordance with the existing regulations and approved procedures.
- 3 The crew had calculated the aircraft performance figures for a TORA of 1,915 m from Intersection Alpha.
- 4 The TORA from Intersection Bravo was 1,220 m.
- 5 The crew did not brief the taxi routing.
- 6 There were no taxiway or holding point signs on the airfield.
- 7 The crew misidentified Taxiway Bravo for Taxiway Alpha and departed from Intersection Bravo.
- 8 The ECCAA did not take appropriate action to ensure the findings of the 2006 airfield inspection were acted upon in a timely manner.
- 9 St Kitts had not filed any differences to Annex 14 with ICAO.
- 10 The lack of signage was not published in the ECAIP.
- 11 There was no formal means of incident reporting within ATC.
- 12 The operator had not conducted a physical survey of the airfield.

(b) Contributory factors

- 1 The airport authority had not installed any taxiway or holding point signs on the airfield.
- 2 The crew did not brief the taxi routing.
- 3 The crew misidentified Taxiway Bravo for Taxiway Alpha and departed from Intersection Bravo.
- 4 The trainee ATCO did not inform the flight crew that they were at Intersection Bravo.

4 Safety Recommendations

The following Safety Recommendations have been made:

- 4.1 Safety Recommendation 2010-047:** It is recommended that the Eastern Caribbean Civil Aviation Authority ensure that Robert L Bradshaw International Airport, St Kitts, establishes a Safety Management System for its airfield operations.
- 4.2 Safety Recommendation 2010-048:** It is recommended that the Eastern Caribbean Civil Aviation Authority ensures that the infrastructure of Robert L Bradshaw International Airport, St Kitts, complies with ICAO Annex 14 Standards and Recommended Practices or any differences are filed. In the interim a NOTAM of outstanding deficiencies should be published.
- 4.3 Safety Recommendation 2010-049:** It is recommended that British Airways review the process by which all new destination airfields are inspected to identify any operational issues.

K Conradi
Principal Inspector of Air Accidents
Air Accidents Investigation Branch
Department for Transport
July 2010

Appendix A

ASSI airfield inspection report

Copy

18°

Report: Robert L Bradshaw International Airport – St Kitts

Site Visit: 09-11 August 2006

Inspector: - Aerodrome Inspector

Present: - Airport Manager
- Deputy Airport Manager
- Operations Officer
- Assistant Operations Officer
- Inspector/Senior Fire Officer
- Fire Station Sub Officer

1 Introduction

An aerodrome audit was conducted 09-11 August 2006 of Robert L Bradshaw International Airport

The purpose of the audit was to establish whether the airport is compliant with I.C.A.O. Annex 14 Aerodromes Standards and Recommended Practices (SARPs). The findings and recommendations of this audit are in Table No 1.

Many Caribbean airports where instrument procedures are in place have only the capability of achieving non-instrument runway strip characteristics, due in the main to the close proximity of the sea and/or extensive obstacles in the transitional surfaces, Robert L Bradshaw fits this profile. To overcome the deficiencies in instrument strip terms the airport may need to raise the minimum decent height/altitude (MDH/A) to that of the visual circling minima which the Inspector recommends. The runway physical characteristics were assessed as for non-instrument, Aerodrome Reference Code (ARC) 4E.

The Airport Fire Service (AFS) operates at Category 8, with a minimum operational staffing level of 2 supervisors and 5 firefighters per watch. The minimum staffing level was not being maintained during this audit. The Inspector's view is that in the event of an aircraft accident the deployment of 7 operational fire personnel immediately to an aircraft accident scene is not appropriate for the type of aircraft operations, fire vehicles/equipment and command and control currently in use at the airport. An appropriate staffing level of 10 should be the minimum for AFS Category 8, which includes 1 incident commander, 2 crew commanders and 7 firefighters.

2 Findings

The runways are appropriate in length and width to ARC 4E and found in good condition.

The runway strip width of 150 metres (m) is maintained throughout the length of the runways. **Note:** The strip width of 300m cannot be achieved throughout the length of the runways in relation to an instrument (non-precision) runway.

- *A strip for a non-instrument runway should extend on each side of the centre line of the runway and its extended centre line throughout the length of the strip, to a distance of at least 75m where the code number is 4. A strip shall extend before the threshold and beyond the end of the runway or stopway for a distance of at least 60m where the code number is 4.*

09-11 August 2006

Page 1 of 9

Appendix A

There are known natural infringements in the transitional surface north and south of the runway near to threshold 25 in the form of hills. These are marked with appropriate lighting and published in the AIP. **Note:** There are however, additional obstacle infringements both sides of the runways in relation to an instrument (non-precision) runway.

- *Transitional surface is a complex surface along the side of the runway strip and part of the side of the approach surface, that slopes upwards and outwards to the inner horizontal surface. A non-instrument runway Code 4 slope is equal to 1:7.*

There are obstacle infringements in runway 25 take-off and 07 approach surfaces.

A full WGS-84 survey of the following obstacle limitation surfaces was not evident.

- Conical, inner horizontal, transitional, approach and take-off surfaces.

A full WGS-84 survey would clearly identify the extent of any obstacle in the surfaces and would benefit the aerodrome safeguarding process between the airport and local planning authority. It is recommended that this survey be conducted for non-instrument and instrument and an associated safeguarding map be produced at the same time.

There is little evidence of a robust aerodrome safeguarding process between the aerodrome and the local planning authority. The purpose of aerodrome safeguarding is to take the measures necessary to ensure the safety of aircraft, and thereby the passengers and crews aboard them, while taking-off or landing, or while flying in the vicinity of an aerodrome.

No runway friction measuring takes place.

- *Measurements of the friction characteristics of a runway surface shall be made periodically with a continuous friction measuring device using self-wetting features.*

The runway-holding position marking is marked incorrectly and no signage is established on both sides of the holding position. **See APPENDIX A.**

- *A runway-holding position marking shall be displayed along a runway-holding position.*
- *A runway designation sign at a taxiway/runway intersection or a runway/runway intersection shall be located on each side of the runway-holding position marking facing the direction of approach to the runway and illuminated if used at night.*

No road holding position markings or signage are established on the roads leading from the AFS north side and apron south side to the runway.

- *A road-holding position marking shall be provided at all road entrances to a runway. The marking shall be located across the road at the holding position. The marking shall be in accordance with the local road traffic regulations.*
- *The road-holding position sign shall be located 1.5 m from one edge of the road (left or right as appropriate to the local traffic regulations) at the holding position. A road-holding position sign shall consist of an inscription in white on a red*

Appendix A

background. The inscription on a road-holding position sign shall be in the national language, be in conformity with the local traffic regulations and include the following: a requirement to stop; and where appropriate a requirement to obtain ATC clearance. A road-holding position sign intended for night use shall be retro reflective or illuminated.

Airport details promulgated in Aeronautical Information Publication (AIP) requires scrutiny for accuracy and amendment without delay.

The draft Aerodrome Manual requires some minor amendments and then should be ready for acceptance by the regulator. The Manual is a fundamental requirement of the aerodrome Certification/Licence process.

- *The purpose and scope of this Manual is to contain all the pertinent information concerning the aerodrome site, facilities, services, equipment, operating procedures, organisation and management including **safety management system**. It is recommended that the airport authority follows the guidance of ICAO Doc 9774 Manual on Certification Aerodromes with regards to the content of the Aerodrome Manual.*

The draft Emergency planning document requires some minor amendments and then should be ready for acceptance by the regulator.

A full scale emergency exercise is due and currently being planned for this year.

- *The purpose of a full-scale exercise is to ensure the adequacy of the plan to cope with different types of emergencies. The purpose of a partial exercise is to ensure the adequacy of the response to individual participating agencies and components of the plan, such as the communications system.*
- *The plan shall be tested by conducting a full-scale aerodrome emergency exercise at intervals not exceeding two years and partial emergency exercises in the intervening year to ensure that any deficiencies found during the full-scale aerodrome emergency exercise have been corrected; and reviewed thereafter, or after an actual emergency, so as to correct any deficiency found during such exercises or actual emergency.*

A preventative Maintenance Programme is in place, but not wholly being adhered to. Not in place are procedures to support the programme.

The AFS organisation and facilities were assessed and found not satisfactory in the following areas. The Airport Authority should conduct an intensive oversight of the AFS for at least 6 months and be satisfied that the AFS meets the minimum requirements essential for the saving of life.

- Communications** – Communications between ATC and the AFS were assessed as not satisfactory resulting in response time test failures. These failures were caused by the lack of practice between the two departments.
- Staffing levels** – The minimum agreed staffing is 7, which includes supervisory staff. During this audit it was observed that not all of the agreed 7 operational fire personnel attended the response time test. Arrangements

Appendix A

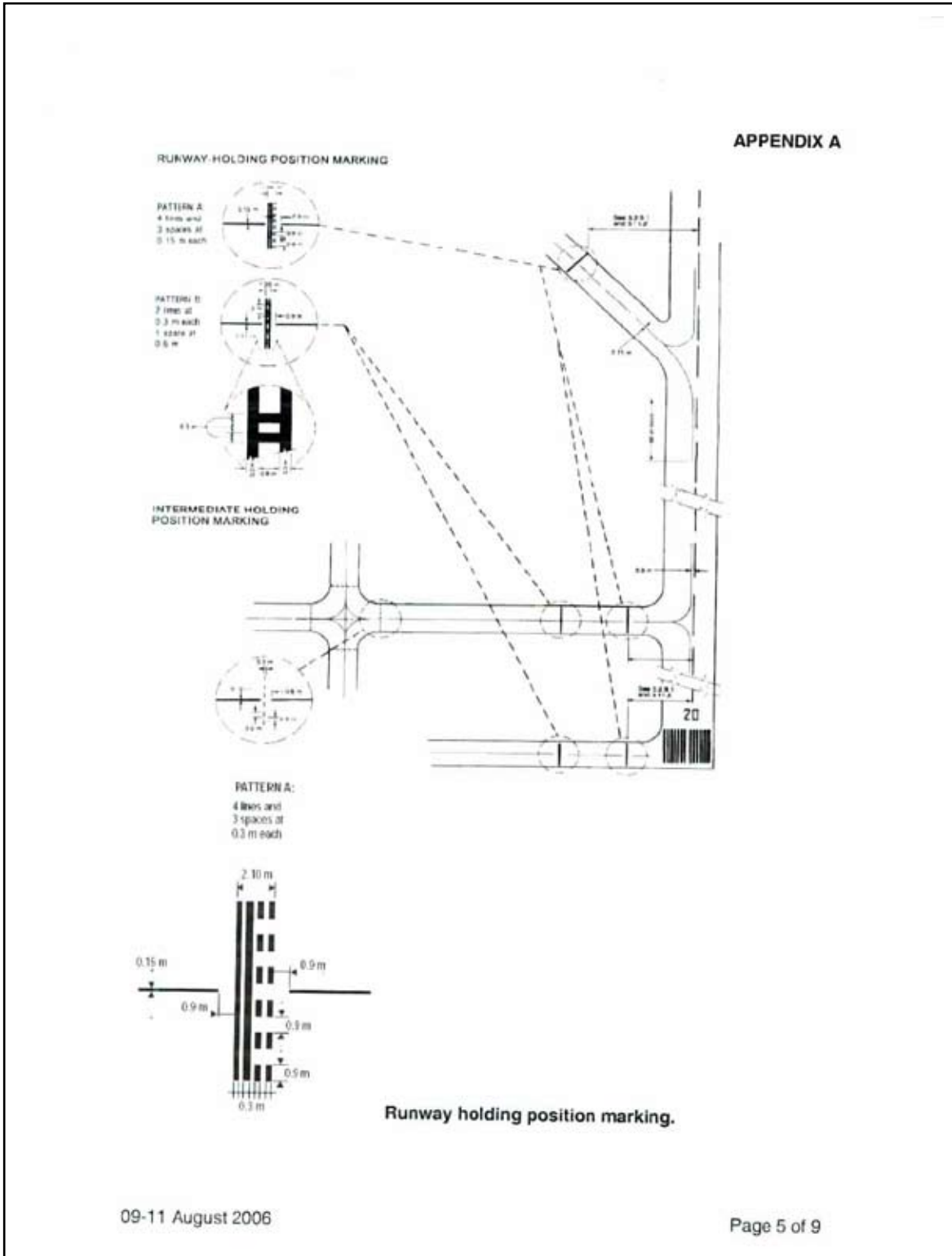
for the agreed minimum staffing must be made to ensure that 7 operational fire personnel respond immediately to the scene of an aircraft or simulated accident.

- i) The minimum operational staffing level immediately deployed to an aircraft accident should be increased to 10 per watch for Category 8, which includes 1 incident commander, 2 crew commanders and 7 fire fighters.
- iii) **Training** – Fire personnel are not initially or recurrently being trained properly to perform their duties in an efficient manner and not participating in live fire drills commensurate with the type of aircraft and type of rescue equipment in use at the airport, including pressure fed fires.
 - i) No fire training facility available at the airport.
 - ii) No suitably qualified trainers.
 - iii) No robust training programme.
 - iv) No external fire training apart from one person who was sent to the UK recently.
- iv) **Personal Protective Equipment (PPE)** – The PPE provided was found in a poor condition. Fire personnel are unable to perform their duties in an effective manner without suitable PPE.
- v) **Vehicles and equipment** – The Inspector was not satisfied that a system of preventative maintenance of rescue and fire fighting vehicles and equipment is employed to ensure effectiveness. The current standard test and inspections process was assessed as poor. There was no evidence presented regarding a vehicle replacement programme.
- vi) **Emergency Access route** – Emergency access route onto or out of the airport requires a review for effectiveness. No emergency rendezvous point signage was observed at the time of this audit.
- vii) **Water rescue** – There is no suitable rescue equipment immediately available at the aerodrome to effectively deal with an aircraft accident in the water. This is particularly important as a significant portion of approach operations takes place over the water.
- viii) **Crash Map** – A grid map (also known as a Crash Map) of the aerodrome and its immediate vicinity is available and forms part of the draft Emergency planning document. This grid map is essential to coordinate responding emergency services and AFS to an aircraft accident. The current crash map requires a review for accuracy and clarity and distributed to relevant agencies without delay. A programme of training exercises needs to be developed, so that regular training in the use of the crash map by all agencies is practiced.

Aerodrome Inspector
Air Safety Support International

Email:
Tele:
Cell:

Appendix A



Appendix A

Table No 1

No	Findings	ICAO Reference	Recommendations	Priority
1	There are obstacle infringements in runway 25 take-off and 07 approach surfaces.	Annex 14 Chapter 4	Carry out a full WGS-84 survey of the obstacle limitation surfaces for a non-instrument and instrument runway. Conduct an aeronautical study of the obstacle limitation surfaces to determine any safety that may significantly affect the regularity of aircraft operations.	Urgent
2	A full WGS-84 survey of the obstacle limitation surfaces was not evident.	Annex 14 Chapter 4	Promulgate all obstacles in the AIP. Conduct a full WGS-84 survey of the obstacle limitation surfaces according to Annex 14 Chapter 4.	Urgent
3	There is little evidence of a robust aerodrome safeguarding process between the aerodrome and the local planning authority	ICAO Doc 9184 Part 2 Airport Planning Manual	Commission a safeguarding map as part of the WGS-84 survey. Establish a robust aerodrome safeguarding process between the aerodrome and the local planning authority	Urgent
4	No runway friction measuring takes place.	Annex 14 Chapter 10	Establish a process for measuring the frictional characteristics of the runway surfaces.	Urgent
5	The runway-holding position marking is marked incorrectly and no signage is established on both sides of the holding position.	Annex 14 5.2 & 5.4	Repaint the runway holding position marking to the correct measurements. Establish mandatory instruction signage on each side of the runway holding position markings.	Urgent
6	No road holding position markings or signage are established on the roads leading from the AFS north side and apron south side to the runway.	Annex 14 5.2 & 5.4	Establish road holding position markings and signage on the roads leading from the AFS north side and apron south side to the runway.	Urgent
7	Airport details promulgated in Aeronautical Information Publication (AIP) requires scrutiny for accuracy and amendment without delay	Annex 14 Chapter 2 & Annex 15	Airport details promulgated in Aeronautical Information Publication (AIP) requires scrutiny for accuracy and amendment without delay	Urgent

Appendix A

8	The draft Aerodrome Manual requires some minor amendments and should then be ready for acceptance by the regulator.	Annex 14 1.4	Amend and complete any formatting and submit the manual to the regulator for review and acceptance.	Urgent
9	The draft Emergency planning document requires some minor amendments and should then be ready for acceptance by the regulator. A full scale emergency exercise is being planned for this year.	Annex 14 Chapter 9	Amend and complete any formatting and submit the document to the regulator for review and acceptance. Conduct a full scale emergency exercise before the end of 2006.	Urgent
10	A preventative Maintenance Programme is in place, but not wholly being adhered to. Not in place are procedures to support the programme.	Annex 14 Chapter 10	Ensure the preventative Maintenance Programme is adhered to. Ensure procedures to support the programme are put in place.	Normal
Airport Fire Service				
11	The AFS organisation and facilities was assessed and found not satisfactory in its function in some areas.	Annex 14 Chapter 9	The Airport Authority should pursue a detailed report from the Chief Fire Officer on how the findings for the AFS are to be addressed, this report to be forwarded to EOCOA The Airport Authority should conduct an intensive oversight of the AFS for at least 6 months and be satisfied that the AFS meets the minimum requirements essential for the saving of life. Communications between ATC and AFS should be fully investigated. Comprehensive understanding and regular training in standard emergency and exercise messages are essential. Regular training in the use of the emergency grid map (crash map) by all emergency responding agencies should take place and records kept.	Very Urgent
11a	Communications between ATC and the AFS was assessed as not satisfactory resulting in response time test failures	Annex 14 Chapter 9	Communications between ATC and AFS should be fully investigated. Comprehensive understanding and regular training in standard emergency and exercise messages are essential. Regular training in the use of the emergency grid map (crash map) by all emergency responding agencies should take place and records kept.	Very Urgent

Appendix A

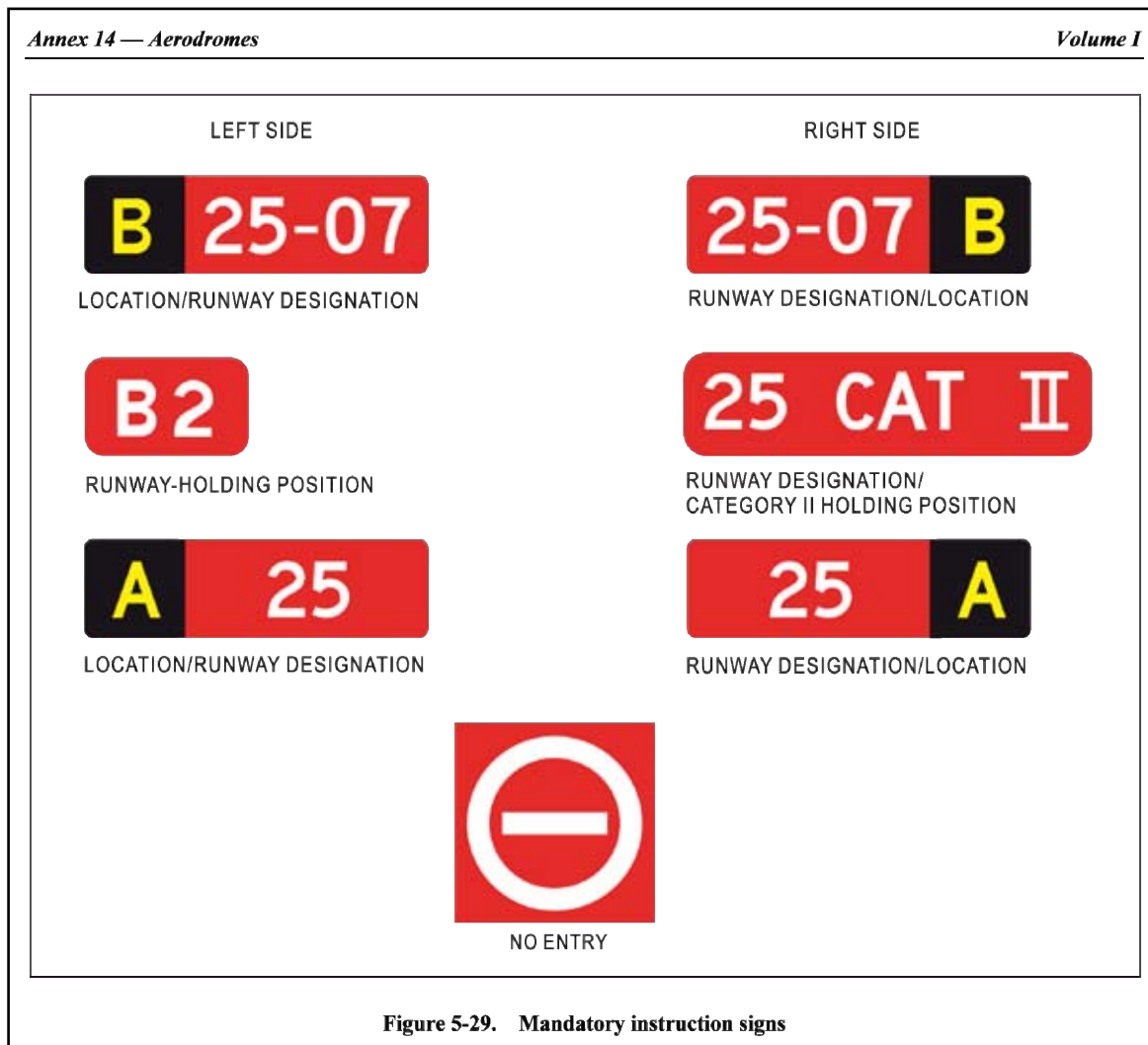
11b	During this audit it was observed that not all of the agreed 7 operational fire personnel attended the response time test. Arrangements for the agreed minimum staffing must be made to ensure that 7 operational fire personnel respond immediately to the scene of an aircraft or simulated accident.	Annex 14 Chapter 9	Establish arrangements to ensure all operational fire personnel immediately respond to the scene of an aircraft accident or any training exercise.	Very Urgent
11c	The minimum operational staffing level immediately deployed to an aircraft accident should be increased to 10 per watch for Category 8, which includes 1 incident commander, 2 crew commanders and 7 fire fighters.	Annex 14 Chapter 9	Establish the minimum operational staffing level immediately deployed to an aircraft accident at 10, which includes 1 incident commander, 2 crew commanders and 7 fire fighters per watch.	Urgent
11d	Fire personnel are not initially or recurrently being trained properly to perform their duties in an efficient manner and not participating in live fire drills commensurate with the type of aircraft and type of rescue equipment in use at the airport, including pressure fed fires.	Annex 14 Chapter 9	Establish a robust fire training regime that clearly demonstrates that all fire personnel are properly and effectively trained initially and recurrently.	Very Urgent
11e	Personal Protective Equipment (PPE) provided was found in a poor condition.	Annex 14 Chapter 9	Establish a robust process for initial issue and replacement of PPE which will enable the fire personnel to perform their duties in an effective manner.	Urgent
11f	The Inspector was not satisfied that a system of preventative maintenance of rescue and fire fighting vehicles and equipment is employed to ensure effectiveness. The current standard test and inspections process was assessed as poor. There was no evidence presented regarding a vehicle replacement programme.	Annex 14 Chapter 9	Establish a robust rescue vehicles and equipment standard test and inspection process. Establish a vehicle replacement programme.	Urgent
11g	Emergency access route onto or out of the airport: requires a review for effectiveness. No emergency rendezvous point signage was observed at the time of this audit.	Annex 14 Chapter 9	Review the emergency access route onto or out of the airport for effectiveness. No emergency rendezvous point signage was observed at the time of this audit.	Urgent

Appendix A

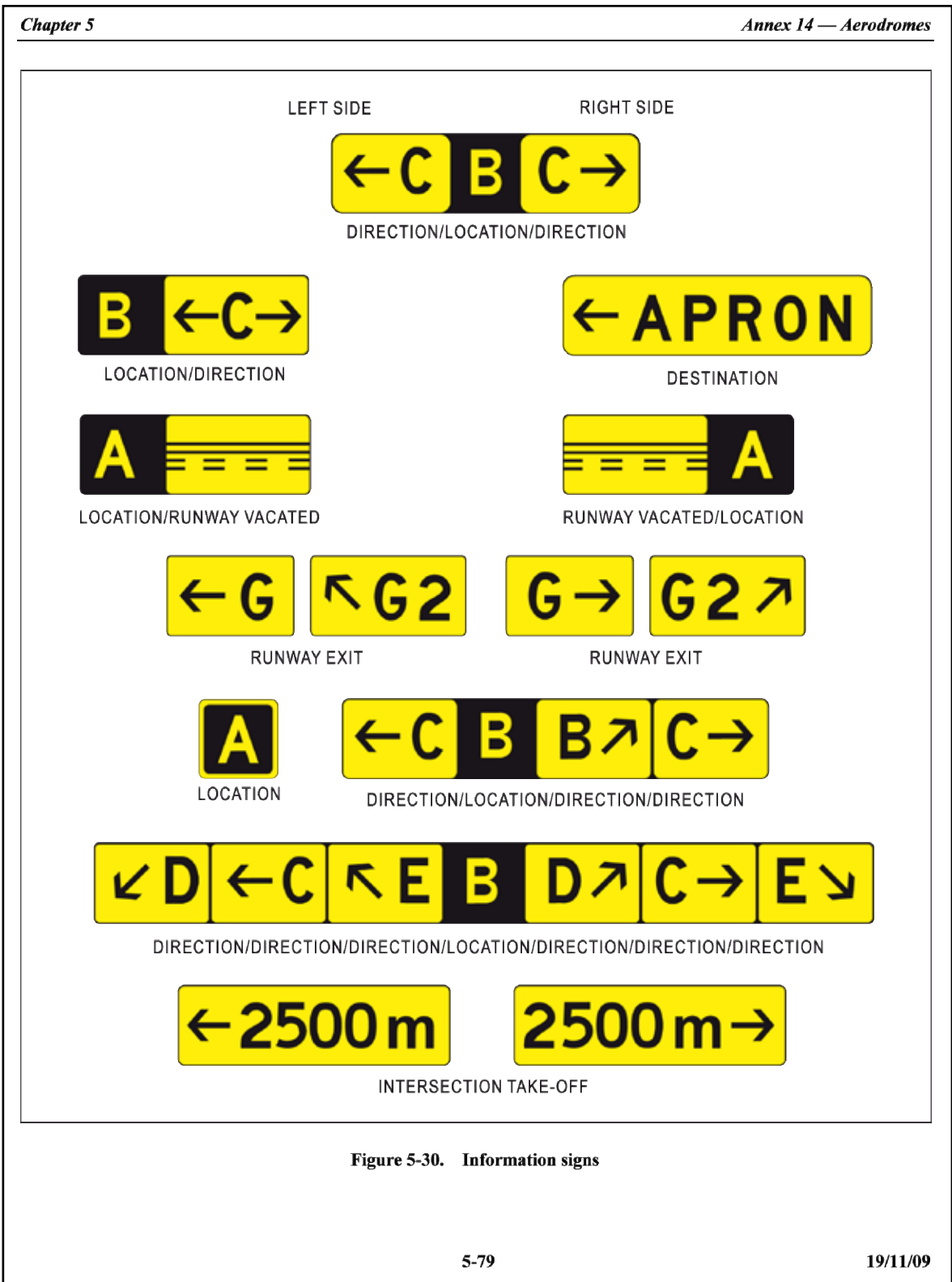
11h	There is no suitable rescue equipment immediately available at the aerodrome to effectively deal with an aircraft accident in the water.	Annex 14 Chapter 9	Establish suitable rescue equipment at the aerodrome to effectively deal with an aircraft accident in the water.	Urgent
11i	The current crash map requires a review for accuracy and clarity and distributed to relevant agencies without delay. A programme of training exercises needs to be developed, so that regular training in the use of the crash map by all agencies is practiced.	Annex 14 Chapter 9	Review the current crash map for accuracy and clarity and distributed to relevant agencies without delay. Develop a programme of training exercises, so that regular training in the use of the crash map by all agencies is practiced.	Urgent
END				

Appendix B

Extract from ICAO Annex 14
showing appropriate runway signs



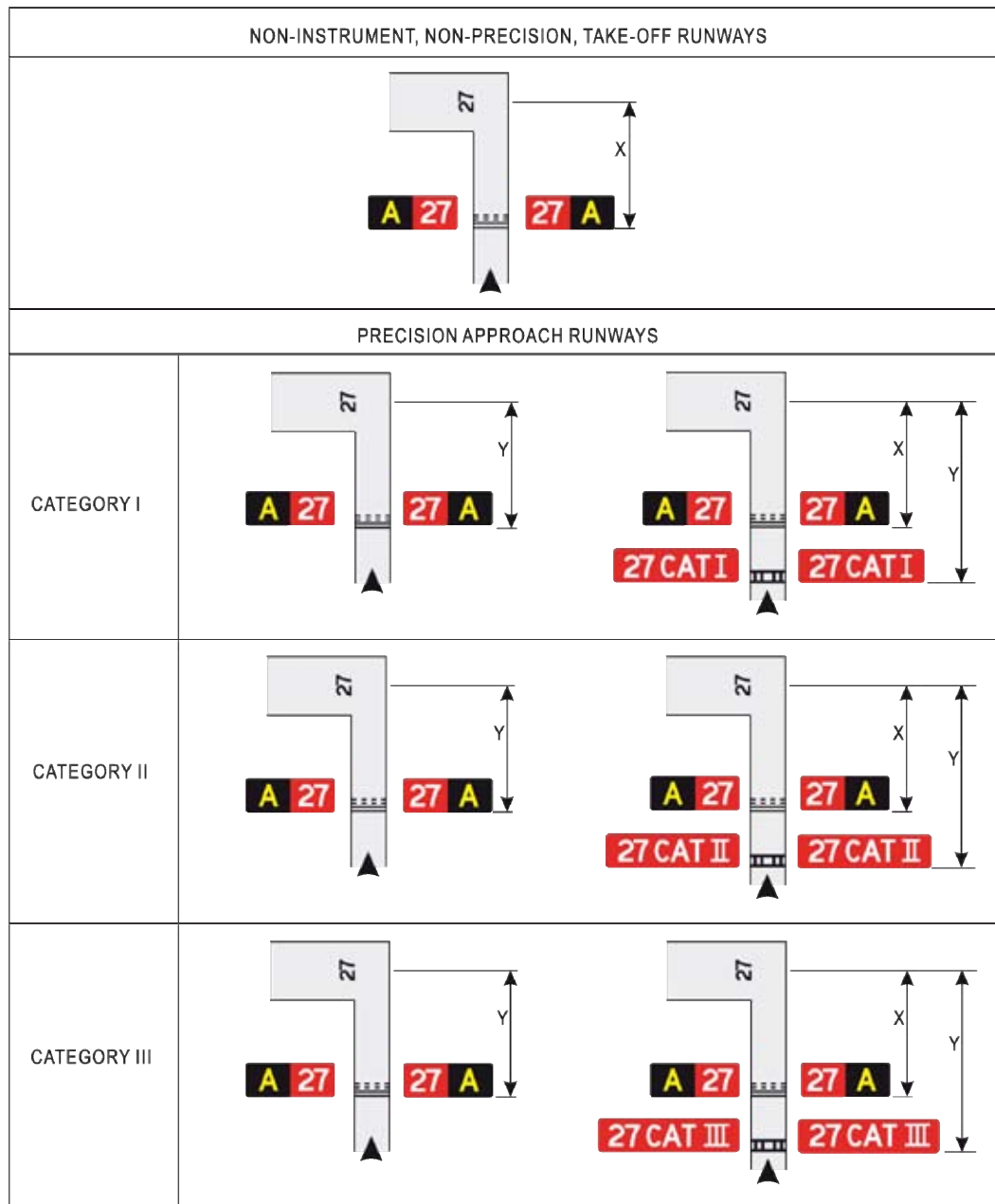
Appendix B



Appendix B

Chapter 5

Annex 14 — Aerodromes



Note.— Distance X is established in accordance with Table 3-2. Distance Y is established at the edge of the ILS/MLS critical/sensitive area.

5-31. Examples of sign positions at taxiway/runway intersections