

**COMMAND OF AERONAUTICS**  
**AERONAUTICAL ACCIDENT INVESTIGATION AND**  
**PREVENTION CENTER**



**FINAL REPORT**  
**I - 067/CENIPA/2013**

|                          |                      |
|--------------------------|----------------------|
| <b><u>OCURRENCE:</u></b> | <b>INCIDENT</b>      |
| <b><u>AIRCRAFT:</u></b>  | <b>CS-TOF</b>        |
| <b><u>MODEL:</u></b>     | <b>A-330</b>         |
| <b><u>DATE:</u></b>      | <b>13 APRIL 2013</b> |



## NOTICE

*According to the Law 7565 of 19 December 1986, Article 86, the Aeronautical Accident Investigation and Prevention System - SIPAER – has the competence to plan, guide, coordinate, monitor and carry out the activities concerning the investigation and prevention of aeronautical accidents.*

*The preparation of this Final Report was based on contributing factors and hypotheses, being a technical document that reflects the result obtained by SIPAER in relation to the circumstances that contributed or may have contributed to trigger this event.*

*This report does not focus on quantifying the degree of contribution of the contributing factors, including the variables that conditioned human performance, whether individual, psychosocial or organizational, and that interacted, creating a scenario favorable to the accident.*

*The sole purpose of this report is to recommend the study and the establishment of preventive measures, while the decision on the pertinence of accepting them is the sole responsibility of the President, Director, Chief, or the person corresponding to the highest level in the hierarchy of the organization to whom they have been forwarded.*

*This report does not resort to any proof producing procedures for determination of civil or criminal liability, in conformity with item 3.1 of Annex 13 to the 1944 Chicago Convention, hosted by the Brazilian legal system through the Decree No. 21713 of 27 August 1946.*

*Moreover, it is worth stressing the importance of protecting the individuals who provided information on the occurrence of an aeronautical accident. The use of this Report for punitive purposes in relation to these individuals taints the principle of "non-self-incrimination" derived from the "right to remain silent," hosted by the Federal Constitution.*

*Consequently, the use of this report for any purpose other than the prevention of future accidents, may lead to erroneous interpretations and conclusions.*

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## SYNOPSIS

This is the Final Report of the 13 April 2013 aeronautical incident involving the model A-330 aircraft, registered as CS-TOF. The incident was classified as collision with obstacle on the ground.

While taxiing toward the parking area of SBBR (Brasilia International Airport), the aircraft's left wing tip collided with a floodlight tower.

The passengers and crew were not injured.

The aircraft sustained serious damage to the left wing tip.

An accredited representative from the GPIAA (Portugal) was designated for participation in the investigation.

**GLOSSARY OF TECHNICAL TERMS AND ABBREVIATIONS**

|           |  |
|-----------|--|
| ACI       | Airports Council International                                     |
| ADC       | Aerodrome Chart  |
| AIP       | Aeronautical Information Publication                               |
| AIRAC     | Aeronautical Information Regulation and Control                    |
| ANAC      | Brazil's National Civil Aviation Agency                            |
| ATC       | Air Traffic Control  |
| ATIS      | Automatic Terminal Information Service                             |
| ATS       | Air Traffic Services   |
| CMA       | Aeronautical Medical Certificate                                   |
| CENIPA    | Aeronautical Accident Investigation and Prevention Center          |
| CHT       | Technical Qualification Certificate                                |
| CINDACTA  | Integrated Air Defense and Air Traffic Control Center              |
| DECEA     | Department of Air Space Control                                    |
| DTCEA     | Air Space Control Detachment                                       |
| EASA      | European Aviation Safety Agency                                    |
| GND       | Ground Control   |
| GOPS/ANAC | ANAC's Aeronautical and Airport Operations Management              |
| GPIAA     | Portugal's Aircraft Accidents Prevention and Investigation Cabinet |
| GTSA/ANAC | ANAC's Technical Aeronautical Services Management                  |
| ICA       | Aeronautics' Institute of Cartography                              |
| ICA       | Instruction of the Command of Aeronautics                          |
| ICAO      | International Civil Aviation Organization                          |
| IFR       | Instrument Flight Rules  |
| INFRAERO  | Brazilian Airports Infrastructure Enterprise                       |
| JAR       | Joint Aviation Requirements  |
| Lat       | Latitude   |
| Long      | Longitude  |
| LPPT      | ICAO location designator – Lisbon Airport                          |
| NOTAM     | Notice to Airmen   |
| RBAC      | Brazilian Civil Aviation Regulation                                |
| RBHA      | Brazilian Aeronautical Certification Regulation                    |
| RFFS      | Rescue and Fire Fighting Service                                   |
| ROTAER    | Air Routes Auxiliary Manual  |

|          |   |
|----------|---|
| RSV      | Flight Safety Recommendation                  |
| SBBR     | ICAO location designator – Brasilia Aerodrome |
| SISNOTAM | NOTAM Management System                       |
| SOP      | Standard Operating Procedure                  |
| TWR      | Aerodrome Control Tower                       |
| UTC      | Coordinated Universal Time                    |
| VFR      | Visual Flight Rules                           |

|                   |  |   |
|-------------------|--|---|
| <b>AIRCRAFT</b>   | <b>Model:</b> A-330<br><b>Registration:</b> CS-TOF<br><b>Manufacturer:</b> AIRBUS  | <b>Operator:</b> TAP Linhas Aéreas                    |
| <b>OCCURRENCE</b> | <b>Date/time:</b> 13APR2013 / 18:00 UTC<br><b>Location:</b> Brasília Aerodrome (SBBR)<br><b>Lat.</b> 15°52'09"S – <b>Long.</b> 047°55'15"W<br><b>Municipality – State:</b> Brasília – Federal District | <b>Type:</b><br>Collision with obstacle on the ground |

## 1 FACTUAL INFORMATION

### 1.1 History of the occurrence

The aircraft departed from LPPT (Lisbon), and landed on the runway 29L of SBBR. While taxiing, it was instructed to proceed to the apron via taxiways K, M, R, and L4.

Upon joining taxiway L4, the aircraft's left wing tip collided with a floodlight tower on apron 1.

### 1.2 Injuries to persons

| Injuries | Crew | Passengers | Third parties |
|----------|------|------------|---------------|
| Fatal    | -    | -          | -             |
| Serious  | -    | -          | -             |
| Minor    | -    | -          | -             |
| Unhurt   | 11   | 239        | -             |

### 1.3 Damage to the aircraft

The aircraft left wing tip sustained serious damage.

### 1.4 Other damage

The floodlight tower sustained moderate damage.

### 1.5 Personnel information

#### 1.5.1 Information on the crew

| HOURS FLOWN                       |           |          |
|-----------------------------------|-----------|----------|
|                                   | PILOT     | COPILOT  |
| Total                             | 19,468:50 | 9,635:30 |
| Total in the last 30 days         | 42:15     | 40:35    |
| Total in the last 24 hours        | 09:40     | 09:40    |
| In this type of aircraft          | 2,222:05  | 1,598:20 |
| In this type in the last 30 days  | 42:15     | 31:50    |
| In this type in the last 24 hours | 09:40     | 09:40    |

NB.: Data provided by the operator.

#### 1.5.1.1 Professional training

The pilots did all their operational training in Portugal.

#### 1.5.1.2 Validity and category of licenses and certificates

The pilots had valid licenses and technical qualification certificates, in accordance with the ICAO and EASA-JAR rules.

### 1.5.1.3 Qualification and flight experience

The pilots were qualified, and had enough experience for conducting the type of flight.

### 1.5.1.4 Validity of the medical certificate

The pilots had valid medical certificates (CMA).

### 1.6 Aircraft information

The serial number 308 aircraft was manufactured by AIRBUS in 1999, and its documentation was up-to-date.

### 1.7 Meteorological information

The weather conditions were VMC.

### 1.8 Aids to navigation

Nil.

### 1.9 Communications

According to the transcript of the communications between the aircraft and Brasilia Ground Control (GND-BR), illustrated in the figure below, the aircraft received the following instruction: *"taxi via Kilo, Mike and report before taxiway Romeo."*

In the sequence, the aircraft transmitted *"Air Portugal zero five nine, approaching Romeo."*

Then, GND-BR informed: *"Zero five nine, taxi via Romeo, Lima "quarto" until...Lima four until gate one two Alfa."*

The aircraft read back: *"Lima four until gate one two Alfa, Air Portugal zero five nine."*

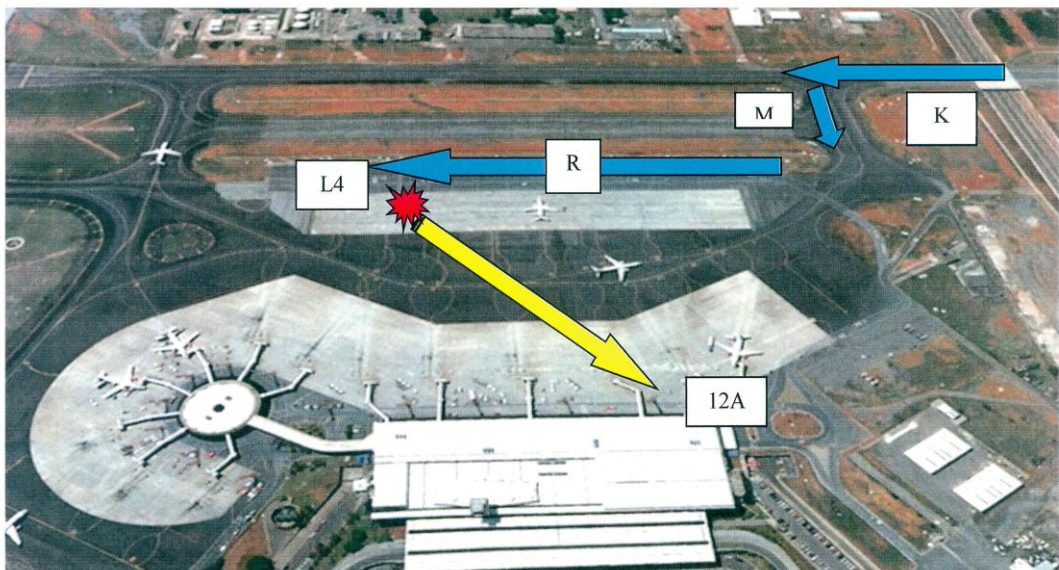


Figure 1 – Path traveled by the aircraft up to the collision with the floodlight tower at the entrance of Apron 1.



## 1.10 Aerodrome information

The aerodrome is public/military, under the administration of the INFRAMERICA Enterprise, and operates during day and night time. It features two parallel asphalt runways, thresholds 11/29, measuring 3,200m x 45m and 3,300m x 45m, with an elevation of 3,479ft.

## 1.11 Flight recorders

Nil.

## 1.12 Wreckage and impact information

There was considerable structural damage to the left wing tip on account of the impact against one of the floodlight towers of Apron 1.



Figures 2 and 3 – Aircraft situation after the collision.

## 1.13 Medical and pathological information

### 1.13.1 Medical aspects

Not investigated.

### 1.13.2 Ergonomic information

Nil.

### 1.13.3 Psychological aspects

#### 1.13.3.1 Individual information

In interviews, the flight crew did not complain about any problems or situations concerning a psychological aspect, which might have affected the aircraft operation safety.

The female air traffic controller had been in the airspace control activity for almost five years. On the day before the incident, she had worked in the morning shift, and had had good rest during the night. According to accounts, up to the date of occurrence, she had not had any problems of either personal or professional nature that could be affecting her job as a controller.

She was described by the workmates as a calm, easy-going person, who had good professional performance.

In an interview, she said that on the day of the incident the traffic was light, typical of Saturday afternoons.

Most aircraft that landed during her work shift on the day of the incident, joined taxiway L4 on their way to Apron 1. She was aware of the taxiway L4 restrictions, since this piece of information was addressed during the daily operational briefing delivered by the team supervisor in the beginning of the work shift.

The ATCO's training process followed the routine prescribed and standardized for her professional qualification.

#### **1.13.3.2 Psychosocial information**

Nil.

#### **1.13.3.3 Organizational information**

Nil.

#### **1.14 Fire**

There was no fire.

#### **1.15 Survival aspects**

Nil.

#### **1.16 Tests and research**

Nil.

#### **1.17 Organizational and management information**

Brasilia Aerodrome is undergoing a phase of construction work designed to enlarge its aircraft parking area.

The end of the year 2012 saw the beginning of the arrangements between the aerodrome operator (INFRAMERICA), the Brasilia Airspace Control Detachment (DTCEA-BR), and the company contracted to do the construction work.

On 22 November 2012, the INFRAMERICA enterprise concluded the Operational Safety Plan for the phase of Works and Services (nº 10/SBBR/2012 – Version 2), which was forwarded to the DTCEA-BR on 23 January 2013.

Among others, the objective of the above mentioned document was to manage the risk posed by the operations during the phase of operational enlargement of the apron in the direction of the taxiway R, and the construction of three new taxiways for access to apron 1.

Besides describing the works and services to be executed, the Operational Safety Plan, identified the hazards, evaluated the risks, and established the mitigating actions.

On 19 February 2013, a meeting was held with the purpose of presenting the work in progress, as well as the future works to be done in the Aerodrome of Brasilia. Attending to the meeting, were representatives of INFRAMERICA, DECEA, ANAC and airlines, including representatives of the operator of the aircraft involved in the incident.

The item number 3 of the minutes of the aforementioned meeting reads that the INFRAMERICA's Operational Safety Manager presented the Operational Safety Informative Bulletins nº 5 and nº 6/SBBR/2013, and requested that they be forwarded to the crews by means of the respective airline companies.

The DTCEA-BR also received the two Operational Safety Informative Bulletins.

At the meeting, it was agreed that the Operational Safety Bulletins would not replace the official aeronautical information documents (Charts, AIP/BRASIL and NOTAM), but the intention of the Aerodrome Operator was to detail the changes that would be made in SBBR, and publicize them to the operators.

On 26 February 2013, a new meeting was held between INFRAMERICA and CINDACTA I. At this meeting, the schedule of the works was presented, and INFRAMERICA informed of the plan to build the L4 and L5 taxiways.

During this meeting, they addressed the issue of the Operational Safety Bulletins that would be sent again to the ones concerned, in updated form, in the course of the works whenever the changes occurred.

The Operational Safety Informative Bulletins nº 05 and nº 06/SBBR/2013 are shown in the figures below:

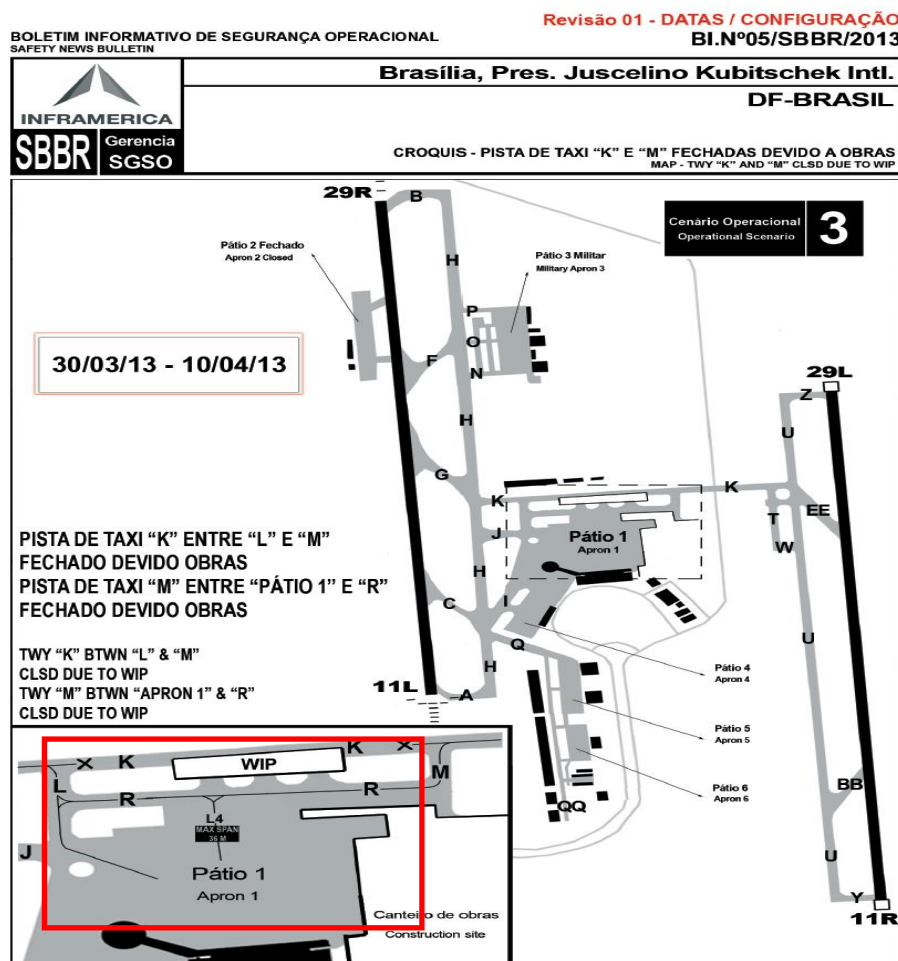


Figure 4 – Operational Safety Informative Bulletin nº 05/SBBR/2013.

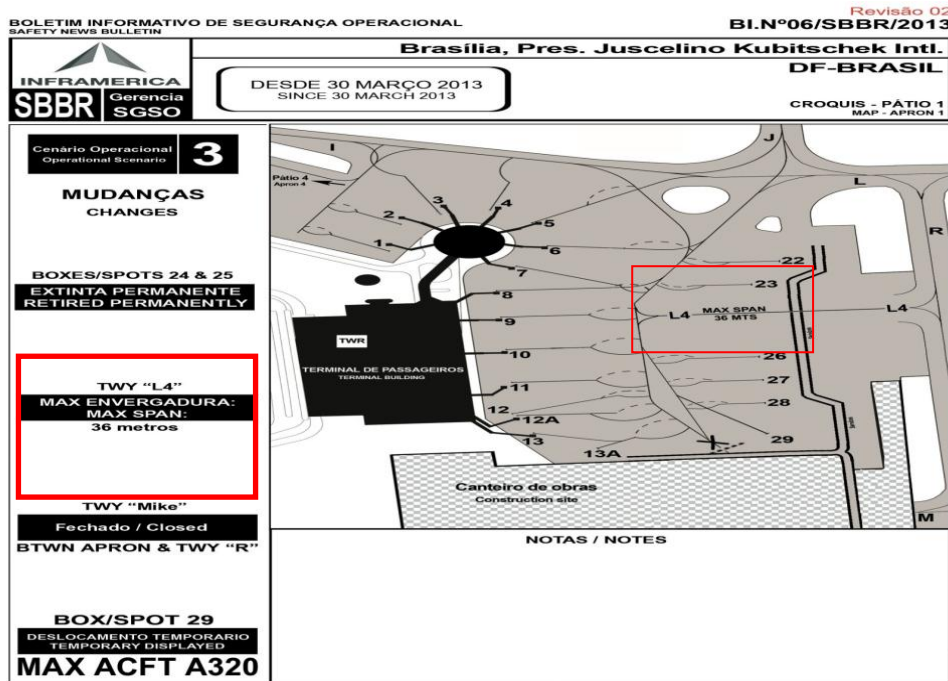


Figure 5 - Operational Safety Informative Bulletin nº 06/SBBR/2013.

Likewise, it was established that INFRAMERICA would update and pass the information on the resulting changes of the works to the operators, in addition to requesting the issuance of NOTAMs from the DECEA, by means of the ANAC.

On 1<sup>st</sup> March 2013, INFRAMERICA sent the Aeronautical and Airport Operations Management (GOPS/ANAC) a request for the issuance of a NOTAM relative to Brasília International Airport, containing the following information:

Opening of TWY "L4" to traffic (between TWY "R" and Apron 1)

- *Location: Brasília International Airport – SBBR;*
- *Period: starting 15 March 2013;*
- *Service hours: H24;*
- *Reason (summary): Opening of taxiway "L4" to traffic;*
- *Whereabouts: taxiway "L4" is located in front of the SCI – Fire Fighting Section, between taxiways "L" and "M", from taxiway "R" to apron 1;*
- *Physical features:*
  - *Width: 18m*
  - *Length: 95m*
  - *PCN: 44/F/B/X/T*
  - *Type of pavement: ASPH*

*Reason: Conclusion of the Taxiway "L"4 construction works, between TWY "R" and apron 1, and subsequent opening for aircraft operation for access to apron 1."*

Internally, INFRAMERICA issued a document concerning the apron 1 changes due to infrastructural works on taxiways L4, L5 and L6, identifying hazards related to the new

configuration of the access to apron 1, such as, item “c” on page 5: *entry of code “D” and “C” aircraft on taxiway L4 – risk of collision between aircraft and apron 1 floodlight towers.*

The table A-1 of the RBAC 154 (Aerodromes Design) establishes the aircraft categories for operation on taxiways according to their respective wing span:

| <u>Code letter</u> | <u>Wing span</u>            |
|--------------------|-----------------------------|
| A                  | less than 15m               |
| B                  | from 15m to 24m (exclusive) |
| C                  | from 24m to 36m (exclusive) |
| D                  | from 36m to 52m (exclusive) |
| E                  | from 52m to 65m (exclusive) |
| F                  | from 65m to 80m (exclusive) |

Operation on taxiway L4 was limited to code “A”, “B” and “C” aircraft.

According to the table above, the A-330 fitted in code “E”.

In the aforementioned document, the risk evaluation carried out by the Aerodrome Operator classified as “remote” the probability of collision between aircraft and one of the floodlight towers of apron 1. Notwithstanding, the following mitigating actions were taken by the Aerodrome Operator:

- Request of a NOTAM informing on the new infrastructure (L4) and its location, alerting to nearby interdicted areas (L5, L6, which still did not exist, and M);
- Operational Safety Informative Bulletins containing information on authorized or interdicted accesses (temporary/permanent), to be sent to the airline companies and to the DTCEA-BR;
- Request for inclusion of information on the new configuration for access to apron 1 in the ATIS;
- Horizontal signage (markings) concerning interdiction of taxiways R, M, L5 e L6 (which still did not exist); and
- Illuminated vertical signage (signs) for the new access to apron 1, via taxiway L4 (MAX SPAN 36m).

As for the request and issuance of a NOTAM concerning the taxiway L4, it was possible to observe the following sequence, by means of a research in the SISNOTAM:

- The first issue of the NOTAM (F0573/2013), dated 6 March 2013, did not contain any restrictions to the operations, and presented only the dimensions, type of pavement and PCN. It is worth pointing out that there was a discrepancy; “connecting taxiway K to apron 1”. As a matter of fact, taxiway L4 connects taxiway R to apron 1;

- The second issue of the NOTAM (F0614/2013), dated 12 March 2013, only changed the period of the event, without any other alterations in the text of the previous NOTAM;

- The third issue of the NOTAM (F0655/2013), dated 18 March 2013 corrected the information related to taxiway K, and then the text reads that taxiway L4 connects taxiway R to apron 1. The remainder of the text remained the same.

On 8 March 2013, INFRAMERICA sent to ANAC's Aeronautical Services Technical Management (GTSA) a project of horizontal, vertical and illuminated signage of the taxiway L4 for access to apron 1 by aircraft belonging up to the code "C" limit.

On 19 March 2013, the ANAC issued the Technical Note nº 09/2013/GTSA/GOPS/SAI, which evaluated the non-conformity of the projects and the taxiway L4 existing infrastructure (regarding its opening to traffic) on account of the lack of horizontal, vertical and illuminated signage.

According to a report by the ANAC inspector, there was latent danger posed by the illumination posts on the sides of taxiway L4.

The RBAC 154, in its item 154.303 (q) – Horizontal Information Signage prescribes:

- (i) *Wherever installing an informative vertical sign is impracticable, an informative horizontal marking must be placed on the pavement surface.*
- (ii) *Whenever an informative vertical sign is necessary in operational terms, it must be complemented by an informative horizontal marking.*

Thus, as a mitigating measure, the ANAC determined the painting of horizontal markings in the vicinity of the entrance of the aforementioned taxiway L4, containing information on the maximum wingspan for aircraft that were about to taxi onto L4.

The painting was done by the Aerodrome Operator in accordance with the requirements of the *Apron Markings and Signs (Second Edition, 2007) Manual of the Airport Council International (ACI)*.

The item 3.3 of the manual (Maximum Wingspan Marking) reads:

*"A MAX SPAN marking is an information marking according to ICAO Annex 14, Volume 1. It should be located across the surface of a taxiway / taxilane centerline. When there is insufficient contrast between the marking and the pavement surface, it shall be surrounded by a yellow borderline".*



Figures 6 and 7 – Standard marking adopted by the ACI, and the marking on taxiway R, short of the entrance to taxiway L4.

On 21 March 2013, a new inspection of the Brasilia Aerodrome conducted by the ANAC confirmed that the discrepancies informed by the above mentioned Technical Note had been corrected.

By means of the Official Document nº 11/2013/GOPS/SAI – ANAC, dated 22 March 2013, forwarded to the INFRAMERICA Director of Operations, a provisional opening of the taxiway L4 to traffic was authorized. The ANAC document read:



“The set of horizontal, illuminated and vertical signs and markings is sufficient for the provisional opening of taxiway L4 to traffic, since the information available guarantees the safe movement of aircraft and protection of the taxiway”.

Then, by means of the FAX nº 706/2013/GTSA/GOPS/SAI, dated 22 March 2013, the ANAC forwarded to the Aeronautics’ Institute of Cartography the following information to be inserted in the pertinent aeronautical publication:

- *“LOCATION – SBBR – BRASÍLIA / PRES. JUSCELINO KUBITSCHEK, DF*
- *BEGINNING OF VALIDITY – 30/March/2013 – 03:00*
- *END OF VALIDITY – 23/June/2013 – 02:59*
- *DAYS AND SERVICE HOURS – H24*
- *TEXT: TWY LIMA 4 DIMENSIONS 95 X 18M  
PAVEMENT ASPH PCN 44/F/B/X/T*
- *CONNECTING TWY ROMEO TO APRON 1 BTN TWY LIMA AND MIKE  
LOCATED IN FRONT OF THE RFFS INSTL*
- *REMARKS*

After analysis by the ICA, the following NOTAM was generated (in force at the moment of the incident):

*SBBR F0683/2013 NOTAM*

*Q) SBBS/MXCS/IV/M/A/000/999/1552S04755W005*

*A) SBBR – BRASÍLIA/PRES. JUSCELINO KUBITSCHEK, DF*

*B) 30/03/2013 03:00 – C) 21/06/2013 02:59*

*E) TWY LIMA 4 DIMENSOES 95 X 18M PISO ASPH PCN 44/F/B/X/T LIGANDO  
TWY ROMEO AO PATIO 1 BTN LIMA E MIKE SITUADA EM FRENTE AO RFFS INSTL)*

*DT EXPED: 20/03/13 18:47*

*STATUS: IN FORCE*

*ORIGEM: SBBRZXBN*

The transcript of the 1754:15 ATIS broadcast is shown below (four minutes before the occurrence):

*INTERNACIONAL DE BRASÍLIA/ INFORMAÇÃO M/ UNO SETE UNO ZERO ZULU/ VENTO DOIS SETE ZERO GRAUS UNO MEIA NÓS/ VISIBILIDADE MAIOR QUE DEZ QUILOMETROS/ CÉU NUBLADO/ TRÊS MIL PÉS / POUCAS NUVENS/ QUATRO MIL PÉS GRANDES CÚMULOS/ AJUSTE DE ALTÍMETRO UNO ZERO UNO SETE/ TEMPERATURA DOIS MEIA GRAUS/ CHUVA LEVE/ PISTA EM USO PARA POUSO DOIS NOVE ESQUERDA/ PISTA EM USO PARA DECOLAGEM DOIS NOVE DIREITA/ PISTA MOLHADA/ TAXIWAY KILO INTERDITADA ENTRE LIMA E MIKE/ TAXIWAY MIKE INTERDITADA ENTRE ROMEO E PÁTIO UNO/ INFORME QUE RECEBEU INFORMAÇÃO M*

*Translation: BRASÍLIA INTERNATIONAL AIRPORT / INFORMATION M/ ONE SEVEN ONE ZERO ZULU/ WIND TWO SEVEN ZERO DEGREES, ONE SIX KNOTS/ VISIBILIDADE MORE THAN ONE ZERO KILOMETERS/ SKY BKN/ THREE THOUSAND*

FEET / FEW/ FOUR THOUSAND FEET LARGE CUMULUS/ ALTIMETER SETTING ONE ZERO ONE SEVEN/ TEMPERATURE TWO SIX DEGREES/ LIGHT RAIN/ RUNWAY IN USE FOR LANDING TWO NINE LEFT/ RUNWAY IN USE FOR DEPARTURE TWO NINE RIGHT/ RUNWAY IS WET/ TAXIWAY KILO INTERDICTED BETWEEN LIMA AND MIKE/ TAXIWAY MIKE INTERDICTED BETWEEN ROMEO AND APRON ONE/ INFORM THAT YOU HAVE RECEIVED INFORMATION M.

According to the items 10.12.1 and 10.12.3 of the ICA 100-12/2009:

*The essential information on the aerodrome conditions is the one necessary for the safety operation of aircraft concerning the area of movement and the installations related to it. The essential information on the aerodrome conditions shall be given to all aircraft, except when one knows that they have received it from other sources.*

*NOTE: "Other sources" include NOTAMs, ATIS broadcast, and display of proper signage.*

On the day of the incident, the SBBR Aerodrome Chart issued by DECEA did not depict taxiway L4, on account of the works that were being done in Brasilia Aerodrome (see the picture below). This fact is related to the AIRAC (Aeronautical Information Regulation and Control) cycle, which sets up the "international and permanent calendar established by the International Civil Aviation Organization (ICAO), setting the dates for advance publicizing of data about situations or changes relative to airports and air navigation infrastructure or about new procedures, such as utilization of GPS. The calendar is defined according to cycles of 28 days, which were instituted with the objective of publicizing the new information with sufficient advance".

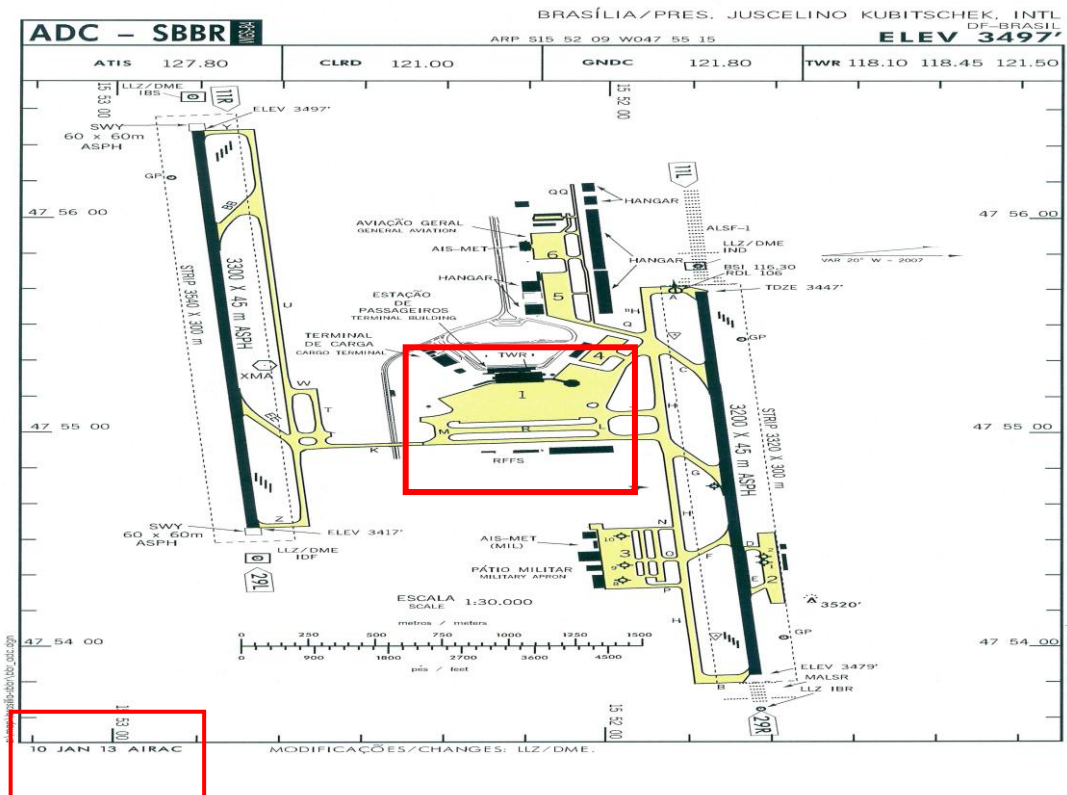


Figure 8 – SBBR Aerodrome Chart (ADC) issued by the DECEA, dated 10 January 2013, and valid for the day of the occurrence.



As for the Aerodrome Chart issued by Jeppesen on 12 April 2013, i.e., on the day prior to the occurrence, it already showed the taxiways L4, L5, L6 and L7, although some of them had not been built yet, according to the two pictures below.

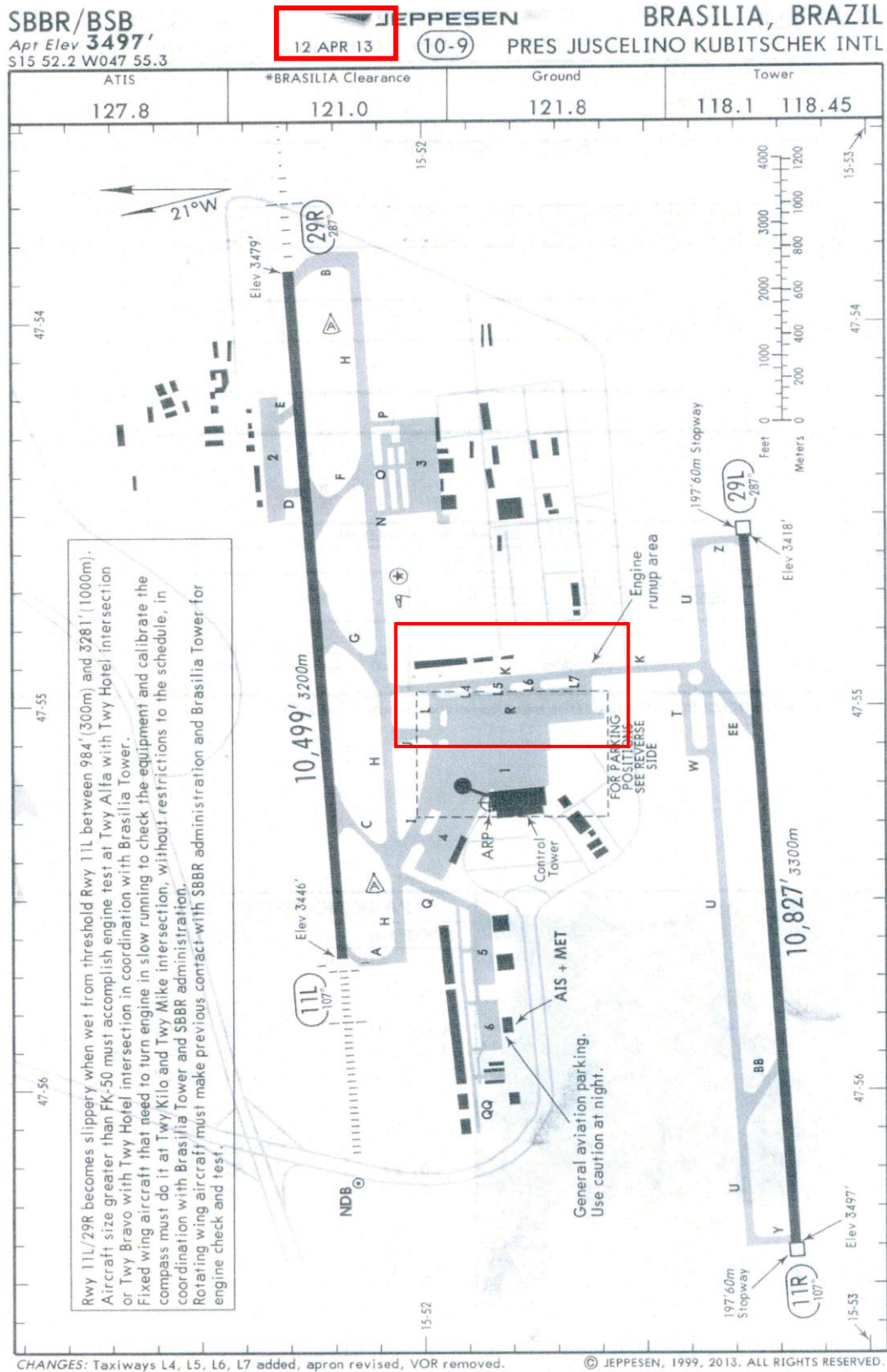


Figure 9 – SBBR Aerodrome Chart issued by Jeppesen on 12 April 2013.

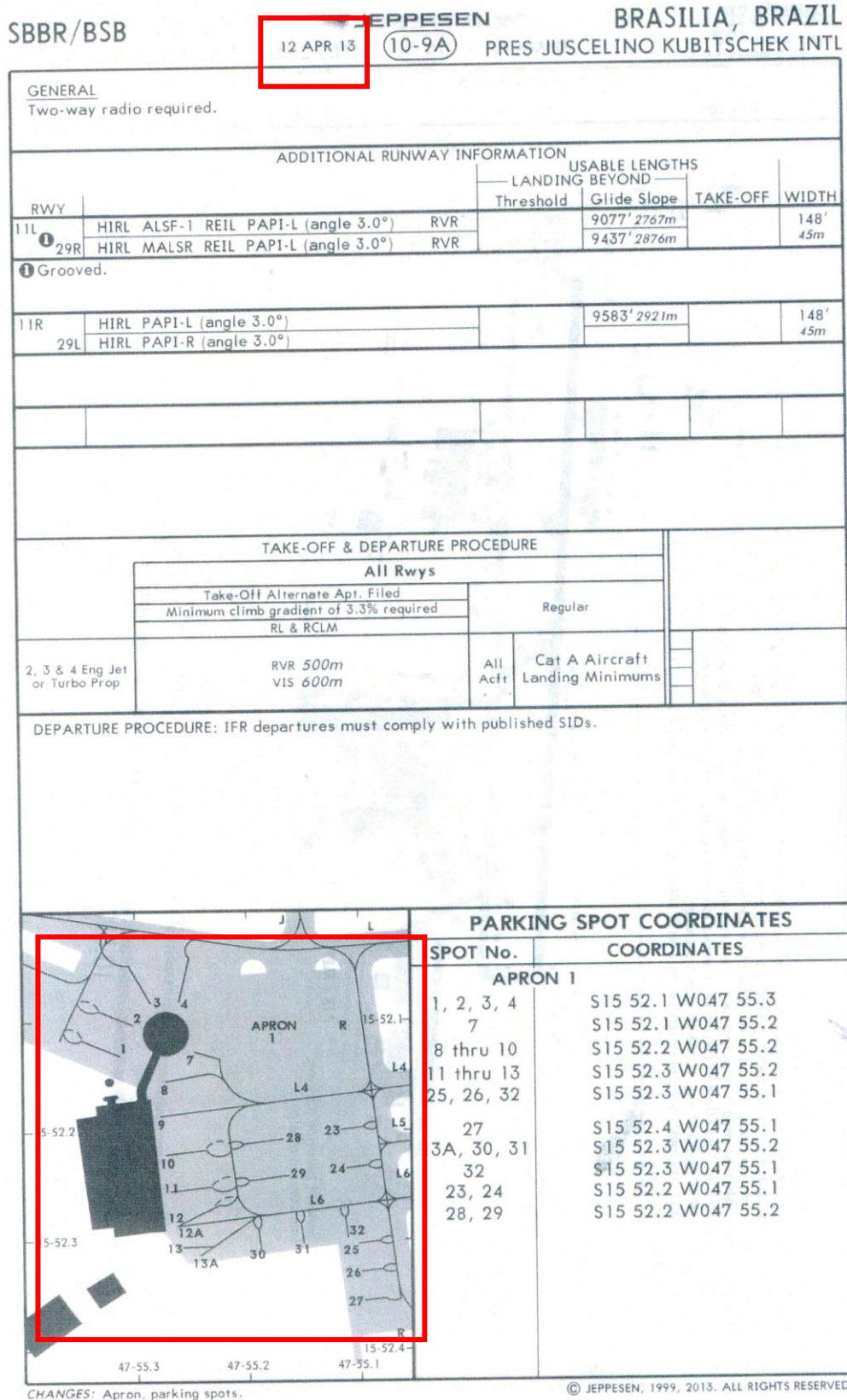


Figure 10 – Overleaf of the SBBR Aerodrome Chart issued by Jeppesen on 12 April 2013.

During the Initial Action, in an interview with the flight crew, the commission learned that they utilized an Aerodrome Chart like the one in the figure below, used by the aircraft operator, containing differences in relation to the Operational Safety Informative Bulletins issued by the Aerodrome Operator, the ADC issued by the DECEA, and the ADC issued by Jeppesen.

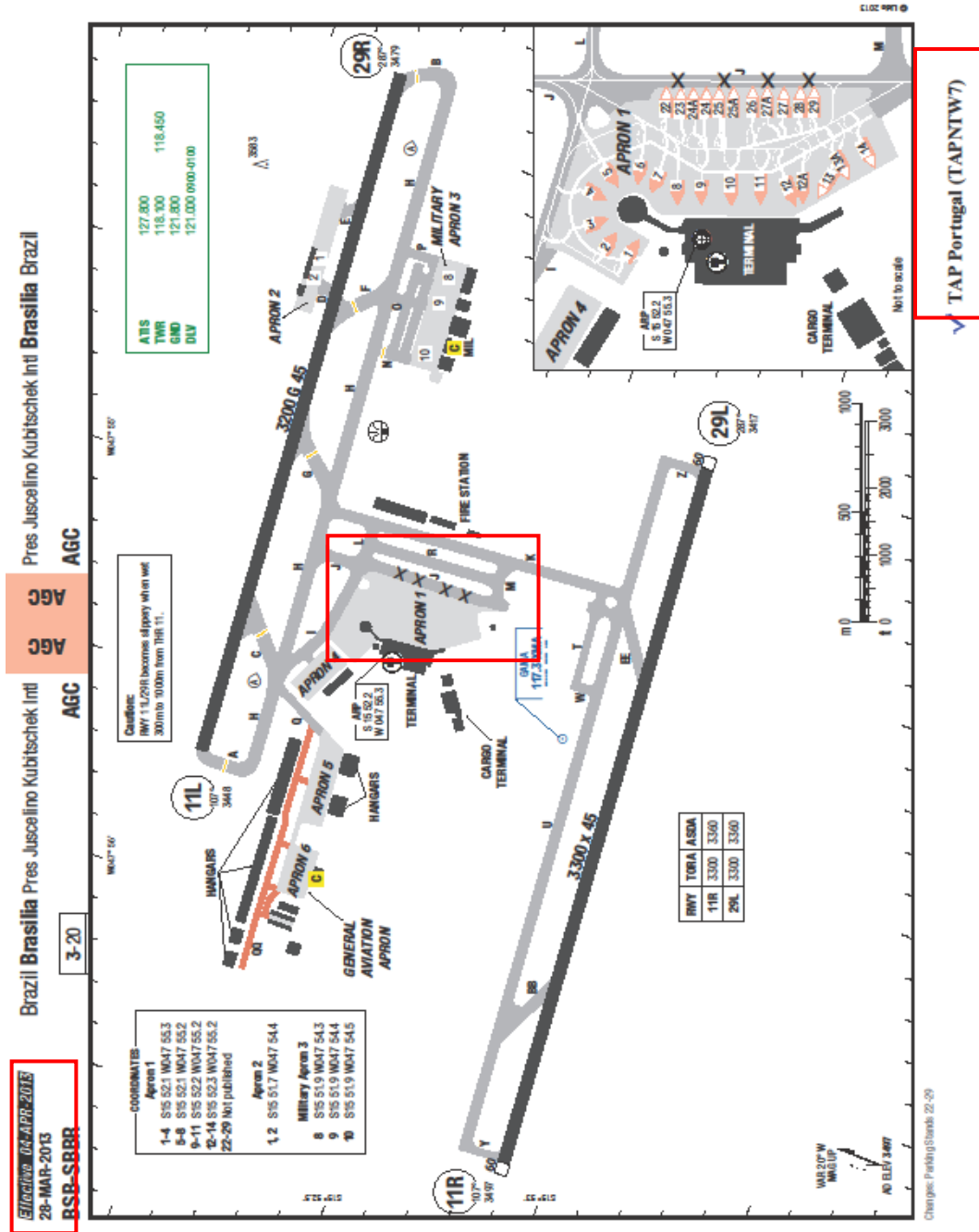


Figure 11 – SBBR Aerodrome Chart issued by the aircraft operator, dated 28 March 2013, and effective from 4 April 2013 (Chart LIDO AGC 3-20).

## 1.18 Operational aspects

### Air Traffic Control

The air traffic controller became a worker of the DTCEA-BR on 19 December 2008, and started as a trainee. She was enrolled in the Operational Training supervised by the Brasilia Airport Control Tower (TWR-BR).

She was apt to work as an air traffic controller in the GND-BR position, since she had satisfactorily met all the requirements to perform the job.

The work schedule was in accordance with the CINDACTA I specific documentation directives.

On the day of the occurrence, the service at TWR-BR had begun uneventfully. The controllers' supervisor gave his team the routine daily operational briefing, by means of a power-point presentation. In this briefing, the controllers were alerted to the works being conducted in the airport, as well as the aircraft wing-span limit for joining taxiway L4.

The air traffic controller confirmed that she was aware of the taxiway L4 wing-span limit, and also that the aircraft involved in the incident had a wing-span of more than 36 meters.

Up to the moment of the occurrence, the controller had an accumulated experience of about four years and four months, having successfully passed all the academic stages and practices required for her job, and had a curriculum of good operational performance.

The controller did not have any restrictions, including linguistic ones, to perform her air traffic control activities.

At the moment of the occurrence, there were no student-controllers in the controller positions, and two aircraft were on the GND-BR frequency (TAP 059 and GLO 1867).

### Crew

The pilots informed that they had already operated in SBBR.

According to information provided by the crew, the flight was uneventful until the aircraft landed on the runway 29L.

They informed that they were aware of the SBBR conditions by means of NOTAM and ATIS.

According to the aircraft captain, a landing briefing had been conducted by the copilot, who would be the pilot-flying for landing, and according to the company's standard operating procedure (SOP), he would hand over the controls of the aircraft to the captain before the beginning of the taxi towards the gate on the apron.

The aircraft landed normally. The captain started the taxi towards apron 1, while the copilot was in charge of the RT.

The aircraft captain informed that he did not have the Operational Safety Informative Bulletins issued by INFRAMERICA, and thus he utilized the Aerodrome Chart made and provided by the aircraft operator (Figure 11), together with the list of NOTAMs in force at SBBR.

He also informed that, while on taxiway R, even before joining taxiway L4, he saw the marking "MAX SPAN – 36 meters", but did not relate this information with taxiway L4, since GND-BR instructed him to proceed to gate 12A on apron 1, via taxiway L4.

After an analysis of the images captured by the safety cameras of Brasilia Airport, it was possible to confirm that the aircraft was moving exactly on top of the taxiway L4 center line (yellow line), before colliding with the floodlight tower.

### 1.19 Additional information

The ANAC's RBHA 91 (CIVIL AIRCRAFT GENERAL OPERATING RULES) reads:

#### 91.101 - Applicability

*This subpart establishes only operational rules applicable to the operation of civil aircraft within the Brazilian airspace. The "reserved" sections of this subpart would contain the rules relative to the ICAO Annex 2 (Rules of the Air). However, in accordance with the Brazilian legislation, it is the competence of the DECEA (Department of Airspace Control, an organization subordinated to the Command of Aeronautics) to issue such rules and control compliance with them.*

#### 91.102 – General Rules

*(a) No person is authorized to operate a civil aircraft within the Brazilian airspace unless the operation is conducted in accordance with this regulation, and in conformity with the rules of the air contained in the ICA 100-12 "Rules of the Air and Air Traffic Services, the information contained in the Aeronautical Information Publications (AIP BRASIL, AIP BRASIL MAP, AIP Supplement and NOTAM) and in the other documents published by the Department of Airspace Control - DECEA).*

The ANAC's RBAC 129 (OPERATION OF FOREIGN AIRLINES WHICH DEAL WITH PUBLIC AIR TRANSPORT IN BRAZIL) reads:

#### 129.19 – Air traffic rules and other procedures

*(a) Every pilot must be familiarized with the applicable rules, with the navigation and communication facilities, with the air traffic control, as well as with other procedures relative to the areas in Brazil where the flight will take place.*

*(b) Every foreign air-transport company shall establish procedures to guarantee that all their pilots have the knowledge required by the paragraph (a) of this section, and shall verify the ability of their pilots to conduct the operation with safety and in accordance with the applicable rules and procedures.*

*(c) Every foreign air-transport company shall comply with the practices, procedures and other special requirements established by ANAC for the operation of national airline companies in the locations where they already operate.*

The ICA 100-12 (Rules of the Air and Air Traffic Services) reads:

#### 3.4.2 FLIGHT PLANNING

*3.4.2.1 Before starting a flight, the pilot-in-command of an aircraft must be aware of all the information necessary for flight planning.*

*3.4.2.2 The information necessary for the flight mentioned in 3.4.2.1 shall include, at least, a detailed study of:*

*a) The meteorological conditions (up-to-date weather reports and forecasts) pertinent to the aerodromes involved and to the route to be flown;*

*b) The calculation of the fuel necessary for the flight;*

*c) The alternate plan in case it is not possible to complete the flight; and*



d) The conditions pertinent to the flight listed in the AIP-BRASIL and in the ROTAER, as well as those published by means of NOTAM (emphasis added).

*NOTE: The conditions mentioned above refer, for example, to operational restrictions of the aerodromes involved, conditions relative to the functioning of route, approach and departure navigational aids, airport infrastructure necessary for the proposed operation, service hours of the aerodromes and ATS units relevant to the flight, etc.”*

The RBHA 91, item 91.123 (compliance with ATC authorizations and instructions) prescribes:

b) *Except in an emergency situation, no person is allowed to operate an aircraft in discordance with an ATC instruction in an area where air traffic control is being provided.*

In item 91.3, the same regulation states the following:

*The pilot-in-command is directly responsible for the operation of the aircraft and has ultimate authority for such.*

According to the item 10.7.2 of the ICA 100-12 (Rules of the Air and Air Traffic Services):

*If a clearance is not convenient for the pilot in command, he may request another clearance, which will be granted whenever there is neither damage nor conflict for the traffic.*

The item 2.3.5 of the ICA 53-1 (NOTAM) reads: the wording of the NOTAM shall be clear, simple, concise, and free from ambiguities, so as to be understood without needing to refer to other documents (emphasis added).

## 1.20 Utilization of other Investigation techniques

Nil.

## 2 ANALYSIS

The incident occurred while Brasilia Airport was under construction work designed to enlarge its apron and taxiways.

The normal operation of an aerodrome under construction work in its operational area requires a series of special mitigating measures, by means of an updated and constantly supervised risk management, aimed at the prevention of aeronautical incidents/accidents.

During the works in Brasilia Airport, a new taxiway was created to allow the aircraft to access apron 1.

This taxiway was limited to the operation of aircraft with a maximum wingspan of 36 meters, on account of the presence of floodlight towers to the sides of it.

The Aerodrome Operator, after an evaluation of the risks, issued Operational Safety Informative Bulletins to the airline companies and to the DTCEA-BR, alerting to the hazards posed by the works in SBBR, mainly on taxiway L4.

Likewise, markings were painted on taxiway R, aimed at informing on the maximum wingspan allowed for taxiway L4, thus increasing the operational safety level and reducing the possibility of aircraft with a wing span greater than 36 meters entering taxiway L4.

However, the marking on taxiway R, before the entrance on taxiway L4 did not comply exactly with the standard adopted by ACI, that is, the standards of the ICAO Annex 14 described in item 1.17 of this document.

The mitigating actions taken by the Aerodrome Operator included the request of a NOTAM to be issued.

In relation to the requesting, making and issuing of NOTAMs, it was observed that, in the case of this NOTAM, there were several versions and adjustments. The information forwarded to the ICA (via ANAC), did not make it clear as to the maximum wingspan allowed for taxiway L4, failing to comply with the requirements of the item 2.3.5 of ICA 53-1, which recommends: *the composition of a NOTAM shall be clear, simple, concise, free from ambiguities, so that it can be understood without the need of consulting other documents.*

The NOTAM issued by ICA on request by ANAC (before the occurrence) showed just the dimensions of the structural reinforcement of the new taxiway, composition, resistance, trajectory and location, respectively, not addressing the aircraft wingspan restriction in a clear manner.

*SBBR F0683/2013 NOTAM*

*Q) SBBS/MXCS/IV/M/A/000/999/1552S04755W005*

*A) SBBR – BRASILIA/PRES. JUSCELINO KUBITSCHEK, DF*

*B) 30/03/2013 03:00 – C) 21/06/2013 02:59*

*E) TWY LIMA 4 DIMENSOES 95 X 18M PISO ASPH PCN 44/F/B/X/T LIGANDO TWY ROMEO AO PATIO 1 BTN LIMA E MIKE SITUADA EM FRENTE AO RFFS INSTL)*

*DT EXPED: 20/03/13 18:47*

*STATUS: IN FORCE*

*ORIGEM: SBBRZXBN*

*Translation:*

*SBBR F0683/2013 NOTAM*

*Q) SBBS/MXCS/IV/M/A/000/999/1552S04755W005*

*A) SBBR – BRASILIA/PRES. JUSCELINO KUBITSCHEK, DF*

*B) 30/03/2013 03:00 – C) 21/06/2013 02:59*

*E) TWY LIMA 4 DIMENSIONS 95 X 18M PAVEMENT ASPH PCN 44/F/B/X/T CONNECTING TWY ROMEO TO APRON 1 BTN LIMA AND MIKE LOCATD IN FRONT OF RFFS INSTL)*

*DATE OF ISSUE: 20/03/13 18:47*

*STATUS: IN FORCE*

*ORIGIN: SBBRZXBN*

This fact became evident that, shortly after the incident, a new additional NOTAM\* was written, containing the following information: *TWY L4 LTD to operation of ACFT with Max wing span of 36 m. (\*translated from the original in Portuguese).*

After analysis of the Brasilia Aerodrome ATIS broadcast between 30 March and 13 April 2013, one concluded that no information was available on the maximum wingspan allowed for taxiway L4.

Thus, two efficient tools for alerting the pilots to the limitations of taxiway L4 were not utilized, namely, NOTAM and ATIS.

The air traffic controller on duty in GND-BR was qualified, and her professional performance background was within normal parameters.

On the day of the occurrence, she had entered duty in the afternoon shift, after attending a briefing given by the team supervisor.

In this briefing, the supervisor reinforced the details concerning the operation with caution in Brasilia Aerodrome on account of construction work in progress.

The controller did not have limitations, including linguistic ones, to perform her activities in air traffic control. Therefore, this aspect did not contribute to the incident.

During the taxi after the landing of the aircraft, the radiotelephony communication was normally carried out in English, as required, and the GND-BR operator instructed the aircraft to proceed to apron 1, via taxiways M, R and L4.

GND-BR instructed the aircraft in an improper manner, since the wingspan of the A330 is 60.4 meters, that is, an excess of more than 24 meters in relation to the maximum wingspan allowed for operation on taxiway L4.

It is a fact that GND-BR made a mistake by instructing the aircraft to proceed via a taxiway not applicable to the aircraft type. However, such fact may be associated with a low level of attention on the part of the controller, as it was a calm day, with a reduced flow of aircraft, and, earlier, several shorter wingspan aircraft (e.g., B737, A320) had been instructed to join taxiway L4 on their way to apron 1.

After reading back the message, the aircraft proceeded in accordance with the GND-BR instructions.

During the investigation of this incident, it was observed the existence of different Aerodrome Charts associated with Brasilia Aerodrome. One of them was issued by the DECEA, that is, it was the official one provided by the Brazilian State. There was another one, issued by Jeppesen. And, then, there was the one that was being used by the crew, adopted by the aircraft operator.

It is also possible to observe differences between the three versions mentioned above and the Operational Safety Informative Bulletins issued by the Aerodrome Operator.

The crew utilized the ADC adopted by the aircraft operator, and shown in Figure 11 of this report. It had differences in relation to the other charts and in relation to the operational safety informative bulletins issued by the aerodrome operator. Such fact has the potential of becoming a latent condition, which, in association with another event, may cause an active failure.

If one studies the contents of the regulations associated with the incident (and described in the item 1.19 of this report), it becomes clear that the Brazilian State official publications, which are available to be utilized in Brazil, are those issued by the DECEA, and that must be complied with by every foreign passenger-transport company operating in Brazil.

Even though one takes into account the prescription of the RBAC 129.19 (b), described in the item 1.19 of this report: "Every foreign air-transport company must establish procedures to guarantee that each one of their pilots has the knowledge required by the paragraph (a) of this section, in addition to verifying the ability of their pilots to conduct operations with safety and in accordance with the applicable rules and procedures", the



practice of establishing procedures must not allow the existence of conflicting information, as was the case in this occurrence.

Still according to item 1.19: “Unless the aircraft is in an emergency, no person is allowed to operate against an ATC instruction in an area where air traffic control is being provided”. This was the case at the moment of the incident. However, it is worth pointing out that, if the clearance received is not convenient for the pilot-in-command of the aircraft, he may request another clearance, which will be granted whenever there is no damage or conflict to traffic.

The pilots were experienced and had already operated in SBBR. According to the aircraft captain, the crew performed the procedures for landing in accordance with the prescriptions of the company SOP. Despite being aware of the NOTAM and ATIS, the crew did not have the Operational Safety Informative Bulletins issued by the Aerodrome Operator. This made it impossible for them to obtain a previous knowledge of the taxiway L4 characteristics, because the NOTAM and the ATIS lacked maximum wingspan information relative to the taxiway L4.

The aircraft captain told the investigators that, despite having seen the maximum wingspan marking on taxiway R before the entrance onto taxiway L4, he did not associate the marking with taxiway L4, and did not worry with the floodlight towers, since he was following clear instructions given by GND-BR. Such fact demonstrates that the marking alone was not enough to mitigate the risks for a safe operation on taxiway L4.

Since the crew did not have previous information on any taxiway L4 restrictions either by means of a clear NOTAM or a complete ATIS message, they accepted the instruction given by GND-BR, and entered taxiway L4 without questioning.

The crew was the last barrier that could have prevented the incident, since they could have questioned the instruction given by GND-BR, if they had had any doubts regarding the distance of the obstacles.

This investigation found out that there had been an analysis of the risks associated with the construction work being done without discontinuing aircraft operation, and that a latent hazard had been identified relative to the taxiways under construction, more specifically taxiway L4, resulting in the taking of a number of mitigating actions, which ended up not being totally efficient in preventing the collision of the aircraft with the floodlight tower.

### **3 CONCLUSIONS**

#### **3.1 Facts**

- a) The pilots had valid aeronautical medical certificates;
- b) The pilots had valid licenses and certificates;
- c) The pilots were qualified and had enough experience for conducting the flight;
- d) The aircraft documentation was valid;
- e) The maintenance services were considered periodic and adequate;
- f) The A-330 aircraft departed from LPPT, destined for SBBR, with 250 POB;
- g) Brasilia Aerodrome was undergoing a process of construction work aimed at operational upsizing;
- h) Taxiway L4 was created as a connection between taxiway R and Apron 1, and was limited to aircraft with a maximum wing span of 36 meters;

- i) After landing on runway 29L of SBBR, the aircraft was instructed by GND-BR to proceed to Apron 1, via taxiway L4;
- j) The A-330 TAP aircraft has a wing span of 60.4 meters;
- k) Neither the NOTAM nor the ATIS in Brasilia had information on wing span restrictions relative to taxiway L4;
- l) While taxiing along taxiway L4, the aircraft's left wing tip collided with a floodlight tower of Apron 1;
- m) The aircraft sustained serious damage to the left wing tip; and
- n) None of the aircraft occupants was injured.

## **3.2 Contributing factors**

### **3.2.1 Human Factor**

#### **3.2.1.1 Medical Aspect**

Nil.

#### **3.2.1.2 Psychological Aspect**

##### **3.2.1.2.1 Individual Information**

###### **a) Attention – undetermined**

The reduced flow of controlled aircraft at the moment of the occurrence, associated with the fact that, before the incident, other aircraft of shorter wing span had been instructed to join taxiway L4 on their way to apron 1, may have lowered the level of attention of the air traffic controller in relation to the type of the incident aircraft (A-330).

##### **3.2.1.2.2 Psychosocial Information**

Nil.

##### **3.2.1.2.3 Organizational information**

###### **a) Support system – a contributor**

Even though there was a daily briefing given by the controllers' team supervisor to alert the personnel on duty to the works in the aerodrome and to the aircraft wing-span restriction for joining taxiway L4, the lack of clarity of the NOTAM (considered a formal publication) was a contributing factor in the relationship between the air traffic controller and the official support system available for the accomplishment of her work.

### **3.2.2 Operational Factor**

#### **3.2.2.1 Concerning the operation of the aircraft**

##### **a) Airport infrastructure – a contributor**

The works in the operational area of SBBR resulted in the opening of the taxiway L4, limited to the operation of aircraft with a maximum wing-span of 36 meters, since there were floodlight towers that might be hit during the taxi.

The Operational Safety Informative Bulletins issued by the Aerodrome Operator, the processes of requesting, making and issuing the NOTAM, the information contained in the ATIS broadcast, and the markings on the pavement of taxiway R were not enough to prevent the incident.

**b) Management Supervision – a contributor**

The process of supervision and coordination between the Aerodrome Operator, the ANAC, the ICA and the DTCEA-BR, relative to the activities of planning, execution, publication in the administrative, technical and operational fields, and the mitigating actions taken as a result of the management of the risk on account of the construction works in the aerodrome of Brasilia, contributed to the occurrence of the incident.

**c) Judgment – a contributor**

The crew made an inadequate judgment by entering taxiway L4, even after having observed the marking (which was not compliant exactly with the standard adopted by ACI) of maximum wing-span available on taxiway R, and being knowledgeable of the wing-span of their airplane (60.4 meters).

**3.2.2.2 Concerning ATS units****a) ATS Publication – a contributor**

The NOTAM relative to taxiway L4, concerning the aircraft authorized wing-span limit, was not clear enough, and caused ambiguity in the interpretation by the aircraft crew and by the air traffic controller.

**b) ATS Publication – undetermined**

The existence of different Aerodrome Charts for the aerodrome of Brasilia, that is, one that was issued by the DECEA, another one that was issued by Jeppesen, and still another one that was adopted by the Aircraft Operator (and that was being used by the crew), and the Operational Safety Informative Bulletins issued by the Aerodrome Operator, all of which containing differences in relation to one another, may have contributed to the occurrence.

**c) ATS Supervision – a contributor**

The fact that the information on taxiway L4 (restricting the operation to aircraft of a maximum wing span of 36 meters) was not included in the ATIS broadcast contributed to the incident.

**d) Traffic planning – a contributor**

The Air Traffic Control Unit (GND-BR) planned the maneuver, and inadequately instructed the aircraft with a wing-span of 60.4 meters to proceed via taxiway L4, which in turn was limited to aircraft of a maximum wing-span of 36 meters.

**3.2.3 Material Factor****3.2.3.1 Concerning the aircraft**

Nil.

**3.2.3.2 Concerning ATS equipment and technology systems**

Nil.

**4 SAFETY RECOMMENDATION (RSV)**

*A safety recommendation is the establishment of an action which the Aeronautical Authority or SIPAER-Link issues to their respective area of responsibility, aiming at eliminating or mitigating the risk of a latent condition or the consequence of an active failure.*

*From a SIPAER perspective, a safety recommendation is essential for the safety of flight, refers to a specific hazard, and has to be complied with by a certain deadline.*

**Safety Recommendations made by the CENIPA:**

**To the National Civil Aviation Agency (ANAC):**

**I – 067/CENIPA/2013 – RSV 001**

**Issued on: 10/07/2013**

Assure that all requests for NOTAMs sent to the ICA, in what refers to the airport infrastructure, present the information needed by the airmen in a clear, simple, concise, ambiguity-free manner, so that it is understood without requiring consultation of other documents, as prescribed by the ICA 53-1, item 2.3.5.

**I – 067/CENIPA/2013 – RSV 002**

**Issued on: 10/07/2013**

Refine the process of coordination between ANAC, Aerodrome Operators and DECEA, relative to Operational Safety information which can be utilized by airmen, mainly in aerodromes undergoing a process of airport infrastructure modification.

**I – 067/CENIPA/2013 – RSV 003**

**Issued on: 10/07/2013**

Verify, in conjunction with Brazilian and Foreign Operators that operate in Brazilian aerodromes, the requirements of RBHA 91.101, RBHA 91.102 and RBAC 129.19 (a) (b) (c), taking into account that the investigation found out different Aerodrome Charts (ADC) associated with the Aerodrome of Brasilia, and, also, verify the Operational Safety Informative Bulletins produced and issued by the Aerodrome Operator, all of them showing discrepancies with one another and with the ADCs, and that may become latent conditions for aeronautical occurrences.

**I - 067/CENIPA/2013 – RSV 004**

**Issued on: 10/07/2013**

Work in conjunction with Aerodrome Operators with the objective of establishing formal procedures, so that the Engineering Sector provides all the necessary data for the Operations Sector to be able to formalize the request of NOTAMs containing, in a complete and timely manner, all the information needed by the aerodrome users for a safe planning of their flights, especially in relation to contingent temporary or permanent restrictions to air operations, in accordance with the ICA 53-1/2012.

**I - 067/CENIPA/2013 – RSV 005**

**Issued on: 10/07/2013**

Work in conjunction with Aerodrome Operators with the objective of establishing formal procedures, so that the Engineering and Operations Sectors provide, in a timely manner, all the necessary data for the DTCEA to have enough time to give training to their air traffic controllers and to broadcast information to the users (by means of ATIS) relative to modifications to be made in the operational routine.

**I - 067/CENIPA/2013 – RSV 006**

**Issued on: 10/07/2013**

Provide the Aerodrome Operator with guidance so that the NOTAM requests are made in a planned and definitive manner, thus avoiding the sequential issuance of NOTAMs to rectify previous information, in view of the negative impact that sequenced alterations of the same subject have on operational safety, in accordance with ICA 53-1/2012, item 2.3.5

**I – 067/CENIPA/2013 – RSV 007**

**Issued on: 10/07/2013**

Publicize the content of this Final Report to all Brazilian Aerodrome Operators.

**To the DECEA:****I - 067/CENIPA/2013 – RSV 008****Issued on: 10/07/2013**

In a standardized and systemic fashion, refine the daily alert briefing delivered by controllers' team supervisors to all personnel on duty, concerning every piece of information that can be utilized by air traffic controllers, mainly in aerodromes undergoing an airport infrastructure modification process.

**I - 067/CENIPA/2013 – RSV 009****Issued on: 10/07/2013**

Refine the process of coordination and information exchange with aerodrome operators and the ANAC, concerning all the pieces of information and tools that can be utilized by air traffic controllers and, consequently, by the airmen, mainly in aerodromes undergoing an airport infrastructure modification process.

**I - 067/CENIPA/2013 – RSV 010****Issued on: 10/07/2013**

Study a way of implementing intermediate updating of Aerodrome Charts in relation to aerodromes undergoing a process of airport infrastructure modification, in order to mitigate the risks posed by the possibility of utilization of other documents, such as informative bulletins and charts issued by the operators.

**I - 067/CENIPA/2013 – RSV 011****Issued on: 10/07/2013**

Publicize the content of this Final Report to all the Airspace Control Detachments.

**5 CORRECTIVE/PREVENTATIVE ACTION ALREADY TAKEN**

On 14 April 2013, the day after the incident, another NOTAM was issued (F0847/2013)\* that is still in force and has the following information: *"TWY L4 LTD to operation of ACFT with maximum wing span of 36 m."* \*(Translated from the original in Portuguese).

The same information was added to be broadcast in the SBBR ATIS.

**6 DISSEMINATION**

- *Gabinete de Prevenção e Investigação de Acidentes com Aeronaves (GPIAA – Portugal)* (Aircraft Accidents Prevention and Investigation Cabinet – Portugal)
- Brazilian Department of Airspace Control (DECEA)
- Brazil's National Civil Aviation Agency (ANAC)
- INFRAMERICA Concessionária S.A (INFRAMERICA Concessionaire PLC)
- TAP Linhas Aéreas

**7 APPENDICES**

Nil.

On 10 July 2013.