



**KOMITE NASIONAL KESELAMATAN TRANSPORTASI  
REPUBLIC OF INDONESIA**

# **PRELIMINARY**

**KNKT.23.01.02.04**

**Aircraft Serious Incident Investigation Report**

**PT Lion Mentari Airlines  
Boeing 737-900 ER; PK-LFO  
Mopah Airport, Merauke  
Republic of Indonesia  
26 January 2023**

**2023**

This Preliminary Report is published by the Komite Nasional Keselamatan Transportasi (KNKT), Transportation Building, 3rd Floor, Jalan Medan Merdeka Timur No. 5 Jakarta 10110, Indonesia.

The report is based upon the investigation carried out by the KNKT in accordance with Annex 13 to the Convention on International Civil Aviation, the Indonesian Aviation Act (UU No. 1/2009) and Government Regulation (PP No. 62/2013).

The preliminary report consists of factual information collected until the preliminary report published. This report will not include analysis and conclusion.

Readers are advised that the KNKT investigates for the sole purpose of enhancing aviation safety. Consequently, the KNKT reports are confined to matters of safety significance and may be misleading if used for any other purpose.

As the KNKT believes that safety information is of greatest value if it is passed on for the use of others, readers are encouraged to copy or reprint for further distribution, acknowledging the KNKT as the source.

When the KNKT makes recommendations as a result of its investigations or research, safety is its primary consideration.

However, the KNKT fully recognizes that the implementation of recommendations arising from its investigations will in some cases incur a cost to the industry.

Readers should note that the information in KNKT reports, and recommendations is provided to promote aviation safety. In no case is it intended to imply blame or liability.

Jakarta, 27 March 2023  
**KOMITE NASIONAL  
KESELAMATAN TRANSPORTASI  
CHAIRMAN**



**SOERJANTO TJAHJONO**

---

# TABLE OF CONTENTS

---

<b>TABLE OF CONTENTS</b> .....	<b>I</b>
<b>TABLE OF FIGURES</b> .....	<b>III</b>
<b>ABBREVIATIONS AND DEFINITIONS</b> .....	<b>IV</b>
<b>SYNOPSIS</b> .....	<b>V</b>
<b>1 FACTUAL INFORMATION</b> .....	<b>1</b>
1.1 History of the Flight .....	1
1.2 Damage to Aircraft.....	2
1.3 Other Damage.....	2
1.4 Personnel Information .....	3
1.4.1 Pilot in Command .....	3
1.4.2 Second In Command .....	3
1.4.3 Flight Attendant .....	3
1.4.4 Aircraft Engineer.....	3
1.4.5 Air Traffic Controller.....	3
1.5 Aircraft Information .....	3
1.6 Meteorological Information .....	5
1.7 Communications.....	5
1.8 Aerodrome Information.....	6
1.9 Flight Recorders .....	7
1.9.1 Flight Data Recorder .....	8
1.9.2 Cockpit Voice Recorder (CVR) .....	8
1.10 Wreckage and Impact Information.....	8
1.11 Medical and Pathological Information .....	10
1.12 Organizational and Management Information .....	10
1.12.1 Aircraft Operator .....	10
1.12.1.1 Airport Information Provided to Pilot.....	10
1.12.1.2 Ramp Operation Procedures .....	12
1.12.2 Airport Operator.....	12
1.12.3 Indonesia Civil Aviation Authority.....	12
1.12.3.1 Regulation on Aircraft Stand Marking.....	12
1.12.3.2 Renewal Process of Airport Certification .....	16
1.13 Additional Information.....	17

1.14 Useful or Effective Investigation Techniques .....	17
<b>2 FINDINGS.....</b>	<b>18</b>
<b>3 SAFETY ACTION.....</b>	<b>21</b>
3.1 Lion Air .....	21
<b>4 SAFETY RECOMMENDATIONS.....</b>	<b>22</b>
4.1 <i>Unit Pelaksana Bandar Udara</i> (Airport Operation Unit) of Mopah Airport.....	22
<b>5 APPENDICES.....</b>	<b>23</b>
5.1 Lion Air notice to Pilot.....	23

---

## TABLE OF FIGURES

---

Figure 1: PK-LFO parking position .....	1
Figure 2: The aircraft dimension .....	4
Figure 3: The aircraft turning radius.....	5
Figure 4: The apron and taxiway layout.....	6
Figure 5: The Aircraft Stand 5 layout.....	7
Figure 6: The damaged wingtip (inside yellow square) .....	9
Figure 7: The damaged airport terminal building from the apron.....	9
Figure 8: The damaged airport terminal building.....	10
Figure 9: The Aerodrome Parking chart for Merauke .....	11
Figure 10: Pilot stop line (taken from MOS CASR Part 139, figure 5.2-17).....	14
Figure 11: Marshaller stop line (taken from MOS CASR Part 139, figure 5.2-18).....	14
Figure 12: Examples of reference bars (taken from MOS CASR Part 139, figure 5.2-19) .....	15
Figure 13: Illustration of self-maneuvering parking (taken from MOS CASR Part 139, figure 5.2-21) .....	16

---

## ABBREVIATIONS AND DEFINITIONS

---

AMEL	:	Aircraft Maintenance Engineer License
AOC	:	Air Operator Certificate
ATPL	:	Airline Transport Pilot License
C of A	:	Certificate of Airworthiness
C of R	:	Certificate of Regulation
CASR	:	Civil Aviation Safety Regulation
CCTV	:	Closed Circuit Television
CPL	:	Commercial Pilot License
CVR	:	Cockpit Voice Recorder
DGCA	:	Directorate General of Civil Aviation
DOA	:	Directorate of Airport
FA	:	Flight Attendant
FAC	:	Flight Attendant Certificate
FAs	:	All Flight Attendant
FCOM	:	Flight Crew Operations Manual
FDR	:	Flight Data Recorder
KNKT	:	The <i>Komite Nasional Keselamatan Transportasi</i> (is the Indonesia Independent Investigation Authority also known as National Transportation Safety Committee/NTSC)
LHS	:	Left Hand Side
LT	:	Local Time
MOS	:	Manual of Standard
OM	:	Operations Manual
PF	:	Pilot Flying
PIC	:	Pilot in Command
PM	:	Pilot Monitoring
RHS	:	Right Hand Side
SIC	:	Second in Command
UTC	:	Universal Time Coordinated

---

## SYNOPSIS

---

On 26 January 2023, a Boeing 737-900 ER registered PK-LFO was being operated by PT. Lion Mentari Airlines (Lion Air) for scheduled passenger flight. The crew member of the flight consisted of Pilot in Command (PIC), Second in Command (SIC) and five flight attendants.

After the flight preparation had been completed, the SIC requested start engine clearance to the tower controller and was approved. The tower controller also advised the pilot that the runway in use was Runway 34 and instructed to report when the pilot was ready to taxi the aircraft.

Both pilots then performed start engine procedure. During the engine start up activity, the pilot was assisted by two ground personnels consisted of an aircraft engineer and a ground handling officer.

At 09:03 LT, SIC requested taxi instruction to the tower controller and was instructed to taxi to Runway 34 via Taxiway B. The tower controller also provided the pilot with Air Traffic Control clearance to Jayapura and was readback by the SIC. The aircraft operator did not utilize towing tractor, and the taxi maneuver conducted using aircraft power. When the aircraft was ready to taxi, the aircraft engineer and ground handling officer were moving to apron service road as the aircraft would be maneuvered to the left to Taxiway B.

At 09:04:04 LT, PIC increased the engine power and the aircraft started moving forward. Four seconds later, the aircraft started turning to the left.

At 09:04:11 LT, the tower controller instructed the pilot to report when the aircraft was ready for the departure and the SIC readback the instruction. About 30 seconds later, the right wingtip of the aircraft impacted terminal building. Both pilots heard an unusual sound but not exactly known the source of the sound. Both pilots also had not been aware that the aircraft impacted the terminal building and continued taxiing to the Runway 34.

Passengers who seated near the right wing noticed that the right wingtip of the aircraft impacted terminal building. The passenger then informed one of the Flight Attendant (FA) which then relayed the information to the SIC.

The PIC who monitored the communication between SIC and FA, asked the tower controller to check any damage on the right wingtip of the aircraft. The tower controller responded that no damaged of the wingtip was observed as the tower controller also did not aware of the collision. About 20 seconds later, tower controller received information from airport personnel that the aircraft impacted the terminal building and relayed the information to the pilot. The PIC then decided to return the aircraft to the apron.

The investigation is continuing, should any further relevant safety issues emerge during the course of the investigation, KNKT will immediately bring the issues to the attention of the relevant parties and publish as required.

The KNKT acknowledges the safety actions taken by the aircraft operator and considered that the safety actions were relevant to improve safety, however there still safety issues remain to be considered. Therefore, the KNKT issued safety recommendations to address safety issues identified in this report to the airport operator.

---

# 1 FACTUAL INFORMATION

---

## 1.1 History of the Flight

On 26 January 2023, a Boeing 737-900 ER registered PK-LFO was being operated by PT. Lion Mentari Airlines (Lion Air) for schedules passenger flight. The flight plan of the day for the aircraft and the flight crew were Jayapura<sup>1</sup> – Merauke<sup>2</sup> – Jayapura – Makassar<sup>3</sup>.

At 2217 UTC (0717 LT<sup>4</sup>), the aircraft departed from Jayapura to Merauke with flight number LNI794 to conduct the first flight of that day. On board the aircraft was two pilots and five flight attendants. During this flight, the Pilot in Command (PIC) acted as Pilot Flying (PF) and the Second in Command (SIC) acted as Pilot Monitoring (PM). Prior to the flight, the pilots underwent alcohol test and the result showed that no alcohol concentration was detected by the diagnostic device.

The flight from Jayapura to Merauke were uneventful and landed at 0821 LT which was nine minutes earlier from the flight scheduled. The aircraft landed using Runway 34 and was instructed by Merauke air traffic controller (tower controller) to taxi to Aircraft Stand 5 via Taxiway B. During the parking process, the PIC was assisted by marshaller. The aircraft was stopped about two meters ahead of pilot stop line<sup>5</sup> at Parking Stand 5 by following the marshaller signal. The marshaller intended to make the aircraft parked on flat surface as some of the apron surfaces were wavy.



**Figure 1: PK-LFO parking position**

After the passenger disembarkation have been completed, Directorate General of Civil Aviation (DGCA) inspectors conducted random surveillance to all crew member and aircraft engineer. The passenger boarding process for subsequent flight schedule was started during the surveillance activities.

---

<sup>1</sup> Jayapura in this report is referred to Sentani International Airport (WAJJ). Jayapura, Papua.

<sup>2</sup> Merauke in this report is referred to Mopah Airport (WAKK). Merauke, Papua.

<sup>3</sup> Makassar in this report is referred to Sultan Hasanuddin International Airport (WAAA). Makassar.

<sup>4</sup> The 24-hours clock in Universal Time Coordinated (UTC) is used in this report to describe the local time as specific events occurred. Local time is UTC+7 hours.

<sup>5</sup> According to Indonesia Manual of Standard CASR Part 139 Volume I, pilot stop line is stop marking on apron if no marshaller was available.



The DGCA surveillance took approximately 20 minutes. The exterior inspection of the aircraft for the subsequent flight, was performed by the aircraft engineer.

After the flight preparation had been completed, at 0900 LT, the SIC requested start engine clearance to the tower controller and was approved. The tower controller also advised the pilot that the runway in use was Runway 34 and instructed to report when the pilot was ready to taxi the aircraft.

At 0901 LT, both pilots performed start engine procedure. During the engine start up activity, the pilot was assisted by two ground personnels consisted of an aircraft engineer and a ground handing officer. The ground handling officer helped the aircraft engineer during the aircraft start up activities by preparing a fire extinguisher.

At 09:03:00 LT, the PIC and SIC performed Before Taxi Checklist and completed 15 seconds later. The aircraft operator did not utilize towing tractor, and the taxi maneuver conducted using aircraft power. When the aircraft was ready to taxi, the aircraft engineer and ground handling officer were moving to apron service road as the aircraft would be maneuvered to the left to Taxiway B.

At 09:03:45 LT, SIC requested taxi instruction to the tower controller and was instructed to taxi to Runway 34 via Taxiway B. The tower controller also provided the pilot with Air Traffic Control clearance to Jayapura and was readback by the SIC.

At 09:04:04 LT, PIC increased the engine power and the aircraft started moving forward. Four seconds later, the aircraft started turning to the left.

At 09:04:11 LT, the tower controller instructed the pilot to report when the aircraft was ready for the departure and the SIC readback the instruction. About 30 seconds later, the right wingtip of the aircraft impacted terminal building. Both pilots heard an unusual sound but not exactly known the source of the sound. Both pilots also had not been aware that the aircraft impacted the terminal building and continued taxiing to the Runway 34.

Passengers who seated near the right wing noticed that the right wingtip of the aircraft impacted terminal building. The passenger then informed one of the Flight Attendant (FA) which then relayed the information to the SIC.

The PIC who monitored the communication between SIC and FA, asked the tower controller to check any damage on the right wingtip of the aircraft. The tower controller responded that no damaged of the wingtip was observed as the tower controller also did not aware of the collision. About 20 seconds later, tower controller received information from airport personnel that the aircraft impacted the terminal building and relayed the information to the pilot. The PIC then decided to return the aircraft to the apron. The tower controller instructed the pilot to taxi to Aircraft Stand 6 via Taxiway B. After the aircraft parked, all passenger disembarked and no one injured in this occurrence.

## **1.2 Damage to Aircraft**

The aircraft was minor damaged as a result of this occurrence.

## **1.3 Other Damage**

The airport terminal building was damage.

## **1.4 Personnel Information**

### **1.4.1 Pilot in Command**

The PIC was 34 years old Indonesian who held valid Air Transport Pilot License (ATPL) and qualified as Boeing 737-900ER aircraft pilot. The PIC also held valid First-Class medical certificate without medical limitation.

The last proficiency check of the PIC was conducted on 8 November 2022 and the result was proficient.

The PIC had total flying hour of 5,302 hours and 55 minutes. Prior to the occurrence flight, the PIC had performed one landing with total flying hours about one hour.

At the day of the occurrence was the first time for PIC to park and maneuver an aircraft from Aircraft Stand 5 of Merauke.

### **1.4.2 Second In Command**

The SIC was 27 years old Indonesian who held valid Commercial Pilot License (CPL) and qualified as Boeing 737-900ER aircraft pilot. The SIC also held valid First-Class medical certificate without medical limitation.

The last proficiency check of the PIC was conducted on 18 January 2023 and the result was proficient.

The SIC had total flying hour of about 1,950 hours. Prior to the occurrence flight, the SIC had performed one landing with total flying hours about one hour.

The SIC had several experiences assisting pilot in command to maneuver an aircraft from Aircraft Stand 5 of Merauke.

### **1.4.3 Flight Attendant**

All Flight Attendants (FAs) were Indonesian who held valid Flight Attendant Certificate (FAC) and rated on Boeing 737-900ER. The FAs also held valid Second-Class medical certificate.

### **1.4.4 Aircraft Engineer**

The aircraft engineer had valid Aircraft Maintenance Engineer License (AMEL) and qualified as Boeing 737-900ER aircraft engineer.

### **1.4.5 Air Traffic Controller**

The air traffic controller was Indonesian who held valid Air Traffic Control License and qualified as aerodrome controller of Merauke. The air traffic controller also held valid Third-Class medical certificate.

## **1.5 Aircraft Information**

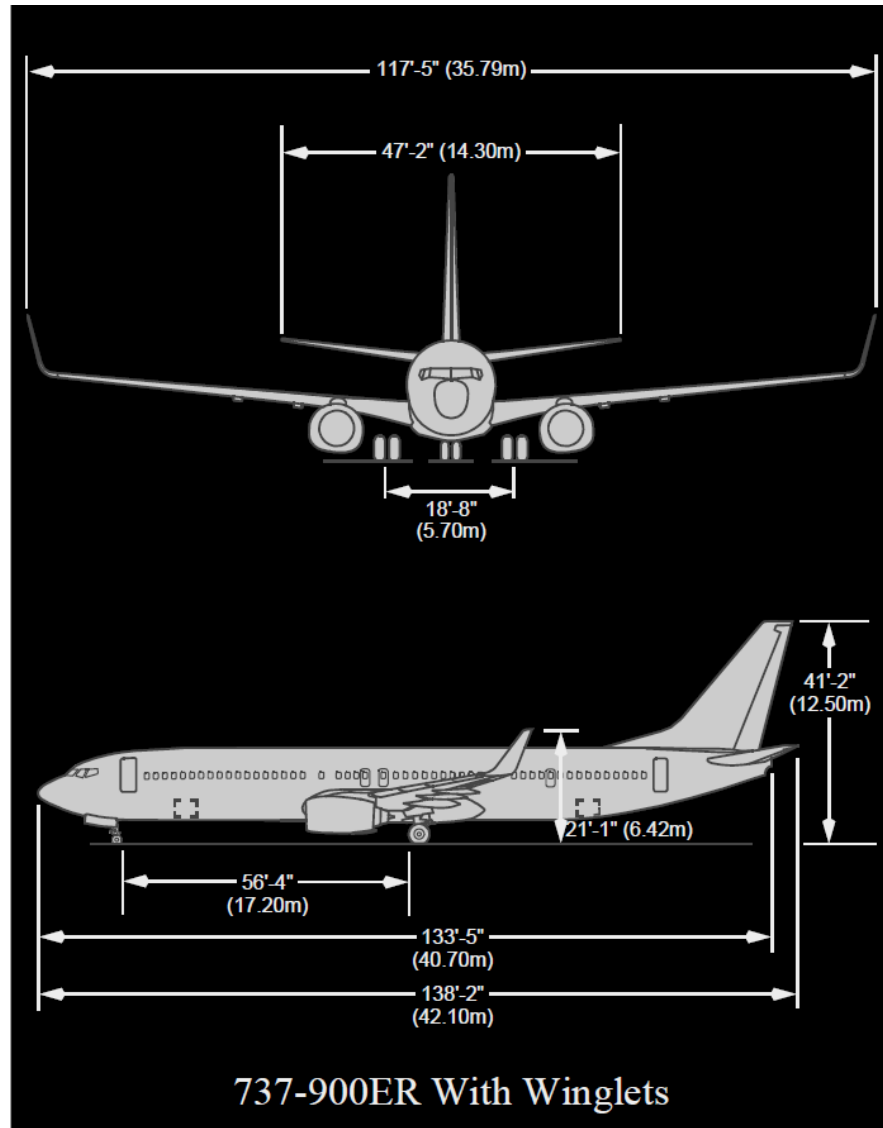
Boeing 737-900ER aircraft with serial number of 35716 registered PK-LFO was manufactured by Boeing Company at United States of America in 2008. The aircraft had valid Certificate of Airworthiness (C of A) and Certificate of Registration (C of R).

The aircraft had total hour since new of 36,937 hours 36 minutes and total cycles since new of 25,353 cycles.

The engines installed on the aircraft were CFM56-7B26/3, manufactured by CFM International. The total time of the engine since new was 37,708 hours 8 minutes (Engine 1) and 28,449 hours 6 minutes (Engine 2).

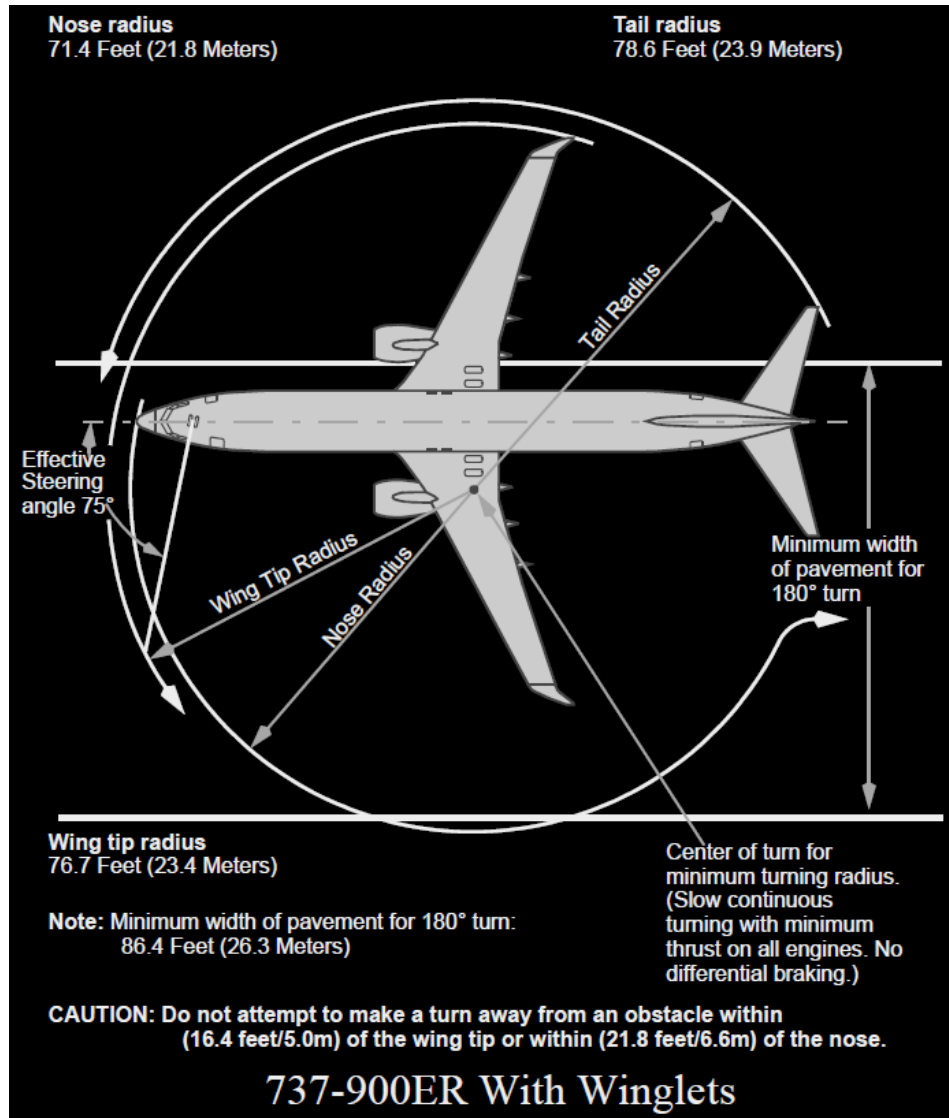
Prior to the collision event, there was no record or report of aircraft system malfunction nor the nose wheel steering problem.

The dimension of the aircraft based on the Lion Air 737 Flight Crew Operations Manual (FCOM) was as follows:



**Figure 2: The aircraft dimension**

The turning radius of the aircraft based on the FCOM was as follows:



**Figure 3: The aircraft turning radius**

## 1.6 Meteorological Information

Based on the meteorological report provided by meteorological station at Merauke, the visibility on 26 January 2023, at 0001 UTC (0901 LT) was 10 km. The Closed-Circuit Television (CCTV) indicated that there was no degradation of visibility during the collision event.

## 1.7 Communications

All communications between tower controller and the pilot were recorded by ground based automatic voice recording equipment and the Cockpit Voice Recorder (CVR) for the duration of the flight. The quality of the recorded transmission was good.

## 1.8 Aerodrome Information

Name	: Mopah Airport
Aerodrome Identification	: WAKK
Aerodrome Reference Code	: 4D
Airport Certificate	: 052.1/SBU – DBU/IX/2017
Validity	: 9 January 2022
Coordinate	: 08°31'16" S; 140°26'01" E
Elevation	: 10 feet
Runway Direction	: 34/16 (340.3°/160.3°)
Runway Length	: 2,500 m
Runway Width	: 45 m
Surface	: Asphalt

The airport had two taxiways connected the apron and the runway, identified as Taxiway A and Taxiway B. The airport had nine aircraft stands which all were nose-in parking which facing the aircraft to the terminal building.

The Aircraft Stand 5 located in the middle of the apron at coordinate 08°31'08.57" S 140°24'56.55" E.

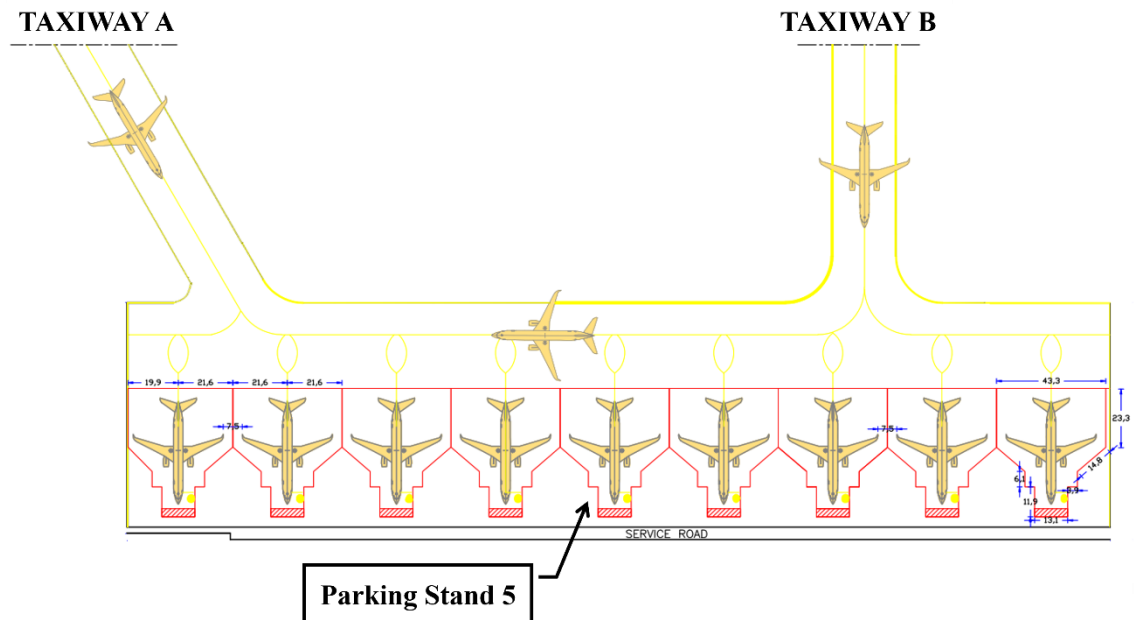
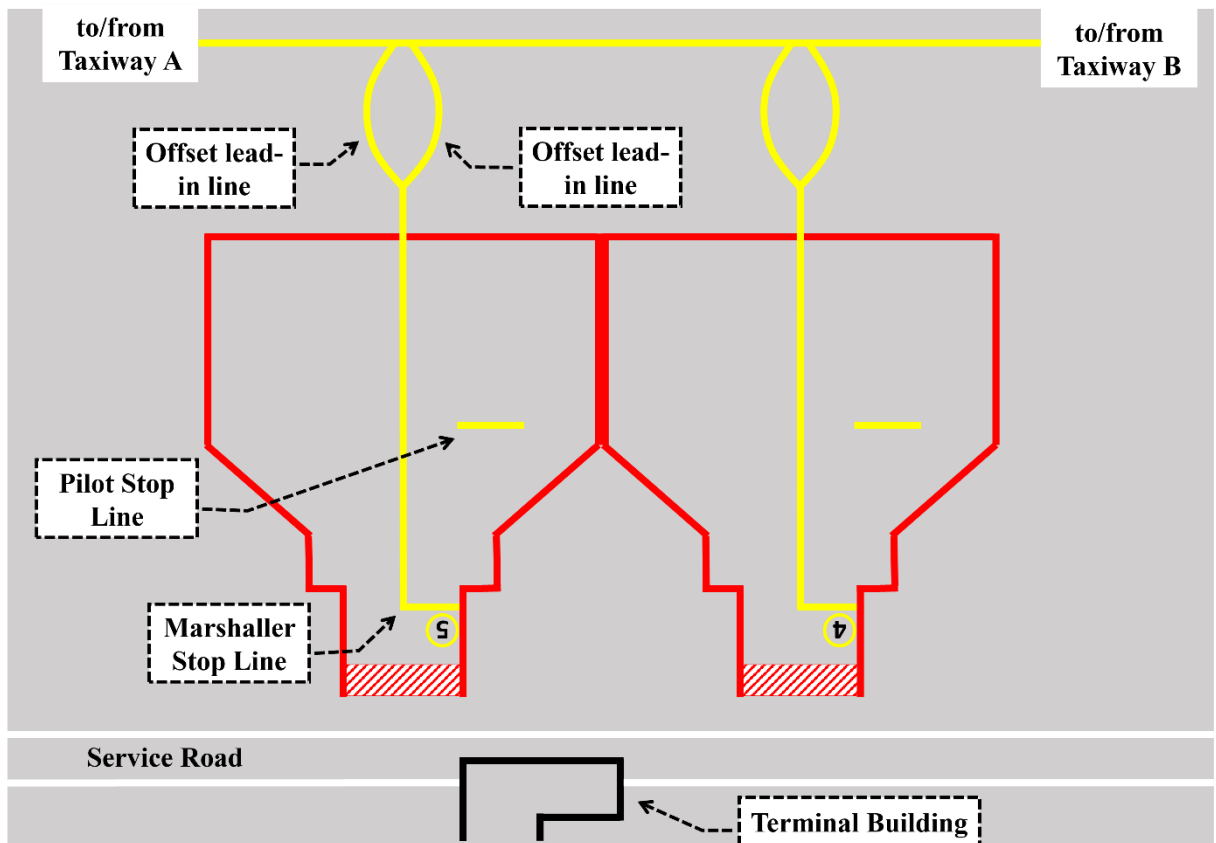


Figure 4: The apron and taxiway layout

The Aircraft Stand 5 had two offset lead-in lines which is used for guidance during taxi in maneuver. The aircraft stand also utilized with two different stop lines – Marshaller Stop Line<sup>6</sup> and Pilot Stop Line.

All available markings/guidelines on the apron were suitable for aircraft to leave the aircraft stand utilizing towing tractor. There was no turn bar, turning line, lead-out line nor alignment bar available in the apron which can be used for self-maneuvering parking<sup>7</sup>. All aircraft parked in the apron did not utilize towing tractor and the parking maneuver was conducted by self-maneuvering using aircraft own power.



**Figure 5: The Aircraft Stand 5 layout and the location of the terminal building impacted to the aircraft**

## 1.9 Flight Recorders

The aircraft was equipped with a Flight Data Recorder (FDR) and a Cockpit Voice Recorder (CVR). Both recorders were transported to KNKT recorder facility and the data were successfully downloaded. The detail of the flight recorders data will be included in the final report.

<sup>6</sup> According to Indonesia Manual of Standard CASR Part 139 Volume I, Marshaller Stop Line is a stop marking for aircraft on apron if marshaller was available.

<sup>7</sup> Self-maneuvering parking is the procedure whereby an aircraft enters and leaves the parking stand under its own power, that is, without recourse to a tractor for any part of the maneuver.

### **1.9.1 Flight Data Recorder**

Manufacturer : Honeywell  
Type/Model : FDR  
Part Number : 980-4700-042  
Serial Number : SSFDR-14281

The FDR contained data of 1,211 parameters with approximately 26 hours of aircraft operation, which was containing 16 flights including the aircraft movement during the collision event.

### **1.9.2 Cockpit Voice Recorder (CVR)**

Manufacturer : Honeywell  
Type/Model : CVR  
Part Number : 980-6022-001  
Serial Number : CVR120-13805

The CVR contained two hours of aircraft operation including the record during the collision event.

### **1.10 Wreckage and Impact Information**

The wingtip of the right wing impacted terminal building. The wingtip and the terminal building were damaged.



**Figure 6: The damaged wingtip (inside yellow square)**



**Figure 7: The damaged airport terminal building from the apron**





**Figure 8: The damaged airport terminal building**

## **1.11 Medical and Pathological Information**

After the collision, the pilots undergone drugs tests consisted of cocaine, methamphetamine, amphetamine, morphine, cannabis/marijuana, and benzodiazepine. The result of the drug tests were negative.

## **1.12 Organizational and Management Information**

### **1.12.1 Aircraft Operator**

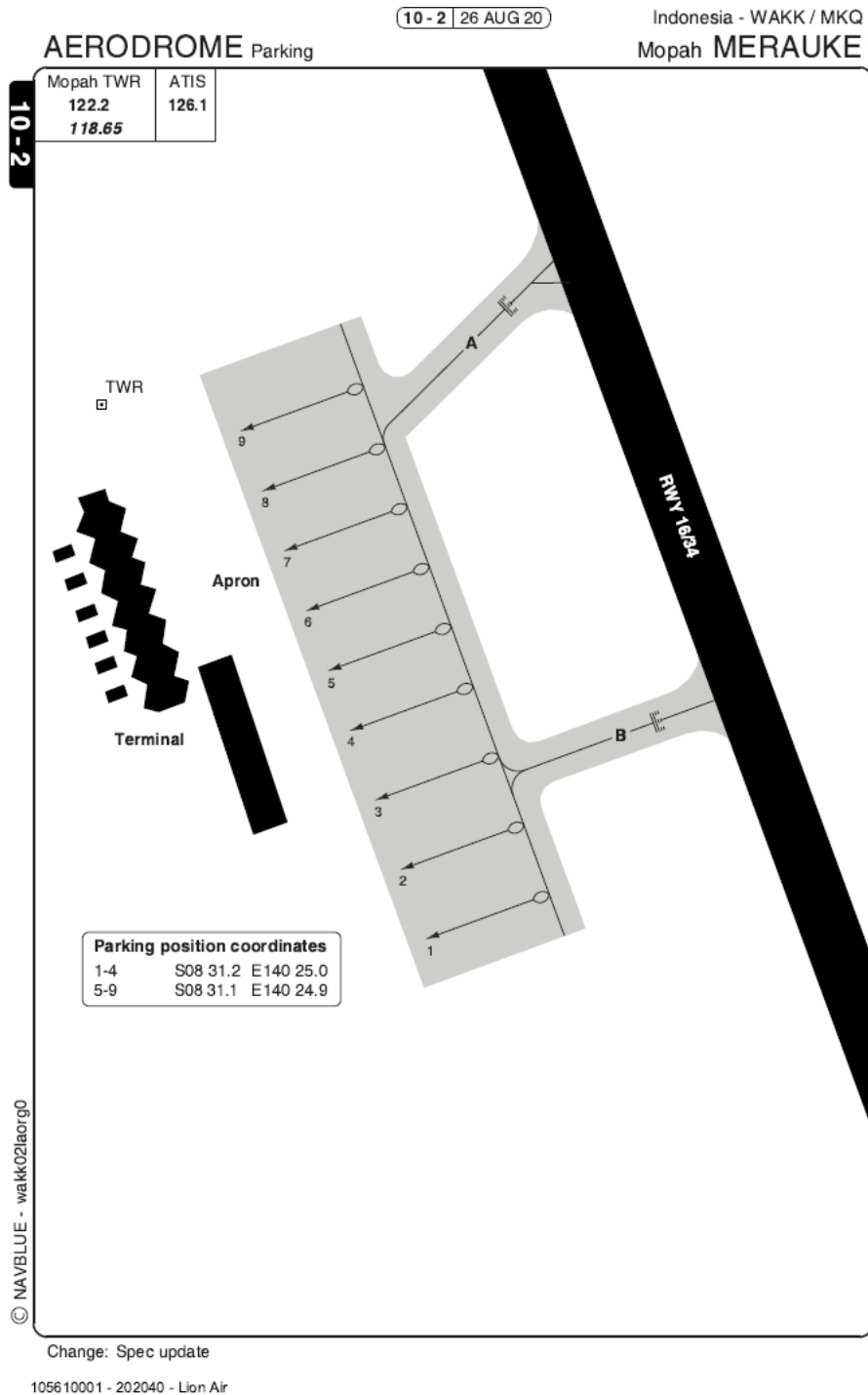
The aircraft was operated by PT. Lion Mentari Airlines (Lion Air) which had valid Air Operator Certificate (AOC) number 121-010. The Lion Air is authorized to conduct air transportation carrying passenger and cargo in schedules and non-scheduled operation within and outside Indonesia for aircraft operation under Civil Aviation Safety Regulation (CASR) Part 121.

The Lion Air developed Operation Manuals (OM)s which contains policy and procedure approved by the Directorate General of Civil Aviation (DGCA).

#### **1.12.1.1 Airport Information Provided to Pilot**

According to the Lion Air Operation Manual Part C (OM-C), the aircraft operator utilizes Navblue Document for airport aeronautical data. The aircraft operator also developed Company Airport Briefing Leaflet to provide pilot with specific data for each airport operated by the company.

The Navblue Document for Merauke did not provide any specific procedure for pilot when maneuvering aircraft from aircraft stand. The Aerodrome Parking chart in the Navblue Document was as follows:



**Figure 9: The Aerodrome Parking chart for Merauke**

The Lion Air Company Airport Briefing Leaflet, contained company extra consideration ground operation at Merauke as follows:

1. *Use minimum thrust during ground operation.*
2. *Observe carefully during taxi due to restricted apron condition.*
3. *Apron self-maneuvring, push back car is not available.*

### 1.12.1.2 Ramp Operation Procedures

The Lion Air Operation Manual Part A (OM-A) sub-chapter 8.2.3 describe the procedures of ramp operation as follows:

The OM-A subchapter 8.2.4.1 described the general procedures of ramp departure and arrival as follows:

*Whenever an airplane is to be positioned on the ramp, whether under tow or under its own power, the assistance of marshallers or wingtip guides, as appropriate, should be obtained if there is any doubt about the clearances available for maneuvering. Ground marshallers and pilots should use hand signals as defined in ICAO Annex 2 - Rules of the Air.*

The OM-A subchapter 8.2.4.2.1 described the pushback procedures as follows:

*At stations where nose-in parking is used, a push back is necessary. Start-up clearance must be obtained after doors closed and engines start can be executed during or after push back. After the copilot receives push back clearance from ATC, the pilot informs the maintenance personnel that the push back commencement is now approved.*

### 1.12.2 Airport Operator

The Mopah Airport is operated by *Unit Pelaksana Bandar Udara* (Airport Operation Unit) under the DGCA. The airport certificate of the airport was valid until 9 January 2022. At the day of the occurrence, the renewal process of the certificate had not completed.

### 1.12.3 Indonesia Civil Aviation Authority

Civil aviation in Indonesia is regulated and oversighted by DGCA under Ministry of Transportation. The DGCA has several directorates including the Directorate of Airport (DOA) that responsible for airport regulation including supervision of airport operation and issuance of airport certificate.

#### 1.12.3.1 Regulation on Aircraft Stand Marking

The following regulations described in the Manual of Standard (MOS) Civil Aviation Safety Regulation (CASR) Part 139 were described in Indonesia language and translated by KNKT for the purpose of the investigation.

The MOS CASR Part 139 subchapter 5.2.13.3 described marking characteristic for aircraft stand as follows:

*5.2.13.3 Marka aircraft stand harus memasukkan unsur-unsur sebagai berikut: stand identification, taxilane centerline, lead-in line, lead-out line, Taxi Lead-in line Designation, turn bar, turning line, alignment bar dan stop line seperti yang dipersyaratkan dalam*

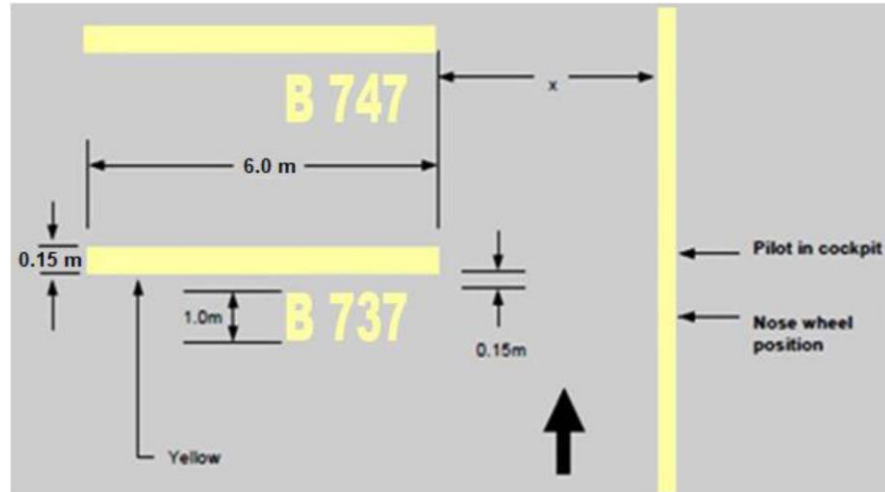
5.2.13.3 Aircraft stand marking must include the following elements: stand identification, taxi lane centerline, lead-in line, lead-out line, taxi lead-in line designation, turn bar, turning line, alignment bar and stop line as required in the parking configuration and to

<i>konfigurasi parkir dan untuk melengkapi alat bantu parkir lainnya.</i>	complement other parking aids.
---------------------------------------------------------------------------	--------------------------------

The MOS CASR Part 139 subchapter 5.2.13.13 described requirement of pilot stop line as follows:

<i>Pilot stop line disediakan jika tidak ada marshaller. Perletakan Pilot stop line harus ditempatkan sedemikian rupa dengan memperhatikan kebutuhan fasilitas pelayanan pushback /towing, jika diperlukan, sehingga saat pesawat udara udara dihentikan, garis tersebut berada tepat di sebelah kiri penerbang. Pilot stop line harus memiliki panjang 6 m dan offset dari alignment line.</i>	Pilot stop line is provided if there is no marshaller available. The pilot stop line must be located in such way by considering the need for pushback/towing service facilities, if necessary, so that when the aircraft is stopped, the line is immediately to the left of the pilot. The pilot stop line must be 6 m long and offset from the alignment line.										
<i>Jika segala jenis pesawat udara udara akan ditempatkan pada satu posisi parkir, maka offset untuk code letter C harus digunakan dan Markanya diperpanjang hingga 11 m.</i>	Where aircraft of all types are to be accommodated at the one parking position, the offset for code letter C must be used and the marking extended in length to 11 m.										
<i>Tabel 5.2- 4 Pilot Stop line</i>											
<table border="1"> <thead> <tr> <th><b>Reference Code Letter<sup>8</sup></b></th> <th><b>Offset X</b></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><i>A, B</i></td> <td style="text-align: center;"><i>0 m</i></td> </tr> <tr> <td style="text-align: center;"><i>C</i></td> <td style="text-align: center;"><i>5 m</i></td> </tr> <tr> <td style="text-align: center;"><i>D</i></td> <td style="text-align: center;"><i>10 m</i></td> </tr> <tr> <td style="text-align: center;"><i>E</i></td> <td style="text-align: center;"><i>10 m</i></td> </tr> </tbody> </table>		<b>Reference Code Letter<sup>8</sup></b>	<b>Offset X</b>	<i>A, B</i>	<i>0 m</i>	<i>C</i>	<i>5 m</i>	<i>D</i>	<i>10 m</i>	<i>E</i>	<i>10 m</i>
<b>Reference Code Letter<sup>8</sup></b>	<b>Offset X</b>										
<i>A, B</i>	<i>0 m</i>										
<i>C</i>	<i>5 m</i>										
<i>D</i>	<i>10 m</i>										
<i>E</i>	<i>10 m</i>										
<i>Aircraft type designation harus dibuat dengan huruf warna kuning dengan tinggi 1 m dan jarak 0,15 m di bawah penerbang stop line, sebagaimana diperlihatkan di bawah ini.</i>	The aircraft type designation must be written in yellow letters 1 m high and spaced 0.15 m below the pilot stop line, as shown below.										

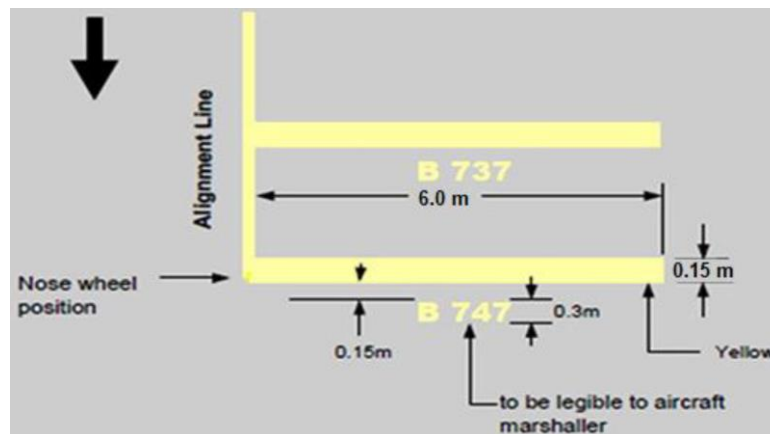
<sup>8</sup> Reference code letter is referred to aerodrome reference code. Merauke is classified as 4D aerodrome.



**Figure 10: Pilot stop line (taken from MOS CASR Part 139, figure 5.2-17)**

The MOS CASR Part 139 subchapter 5.2.13.14 described requirement of marshaller stop line as follows:

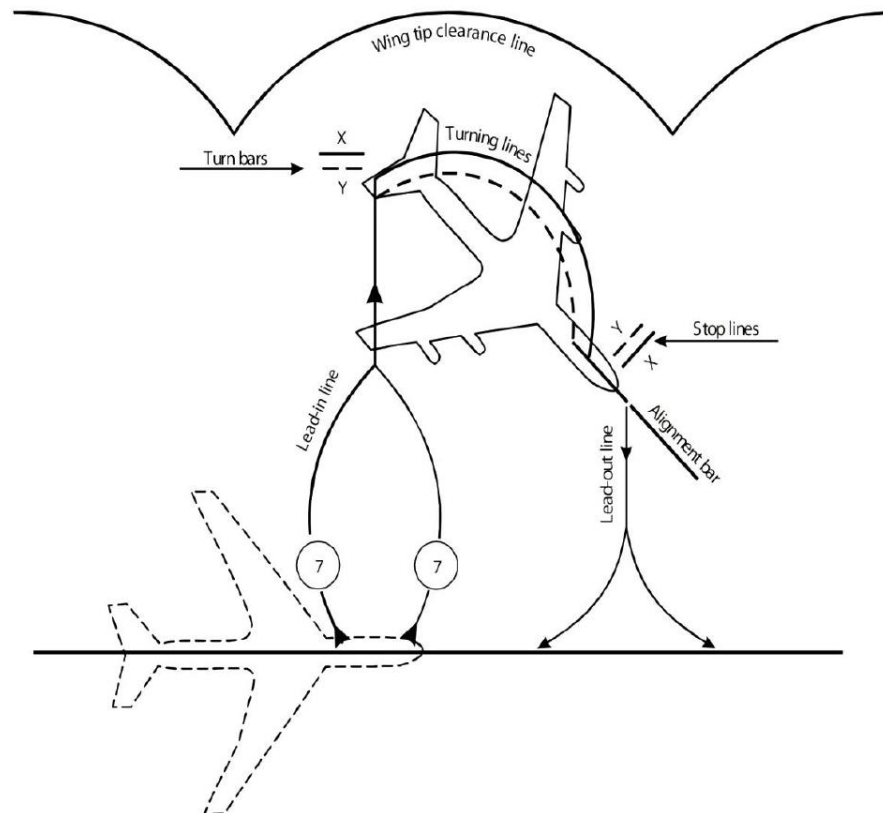
<p><i>Marshaller Stop line harus ditempatkan dimana nose wheel pesawat udara udara berhenti, pada sisi kanan dari, dengan posisi tegak lurus terhadap alignment line, sebagaimana yang dilihat oleh marshaller pada posisi menghadap pesawat udara udara yang datang.</i></p>	<p>Marshaller stop line must be located where the aircraft nose wheel is to stop, on the right hand side of, in a position perpendicular to the alignment line, as seen by the marshaller facing the incoming aircraft.</p>
<p><i>Aircraft type designation harus berwarna kuning, dengan tinggi huruf 0,3 m dan jarak 0,15 m di bawah stop line. Hurufnya harus dapat dibaca oleh marshaller yang menghadap ke pesawat udara udara yang datang, sebagaimana diperlihatkan dalam gambar dibawah ini.</i></p>	<p>The aircraft type designation must be yellow, in letters 0.3 m high, and spaced 0.15 m below the stop line. The lettering must be legible to the marshaller facing the incoming aircraft, as shown below.</p>



**Figure 11: Marshaller stop line (taken from MOS CASR Part 139, figure 5.2-18)**

The MOS CASR Part 139 subchapter 5.2.13.16 described reference bars as follows:

<p>5.2.13.16 Contoh reference bars dan fungsinya adalah:</p> <p>a) Turn bar (menunjukkan titik di mana untuk memulai berputar);</p> <p>b) stop line (menunjukkan titik di mana berhenti); dan</p> <p>c) alignment bar (membantu menyelaraskan pesawat terbang di sudut yang diinginkan)</p>	<p>Examples of reference bars and their functions are:</p> <p>a) turn bar (indicates the point at which to begin a turn);</p> <p>b) stop line (indicates the point at which to stop); and</p> <p>c) alignment bar (assists in aligning the aircraft on the desired angle).</p>
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------



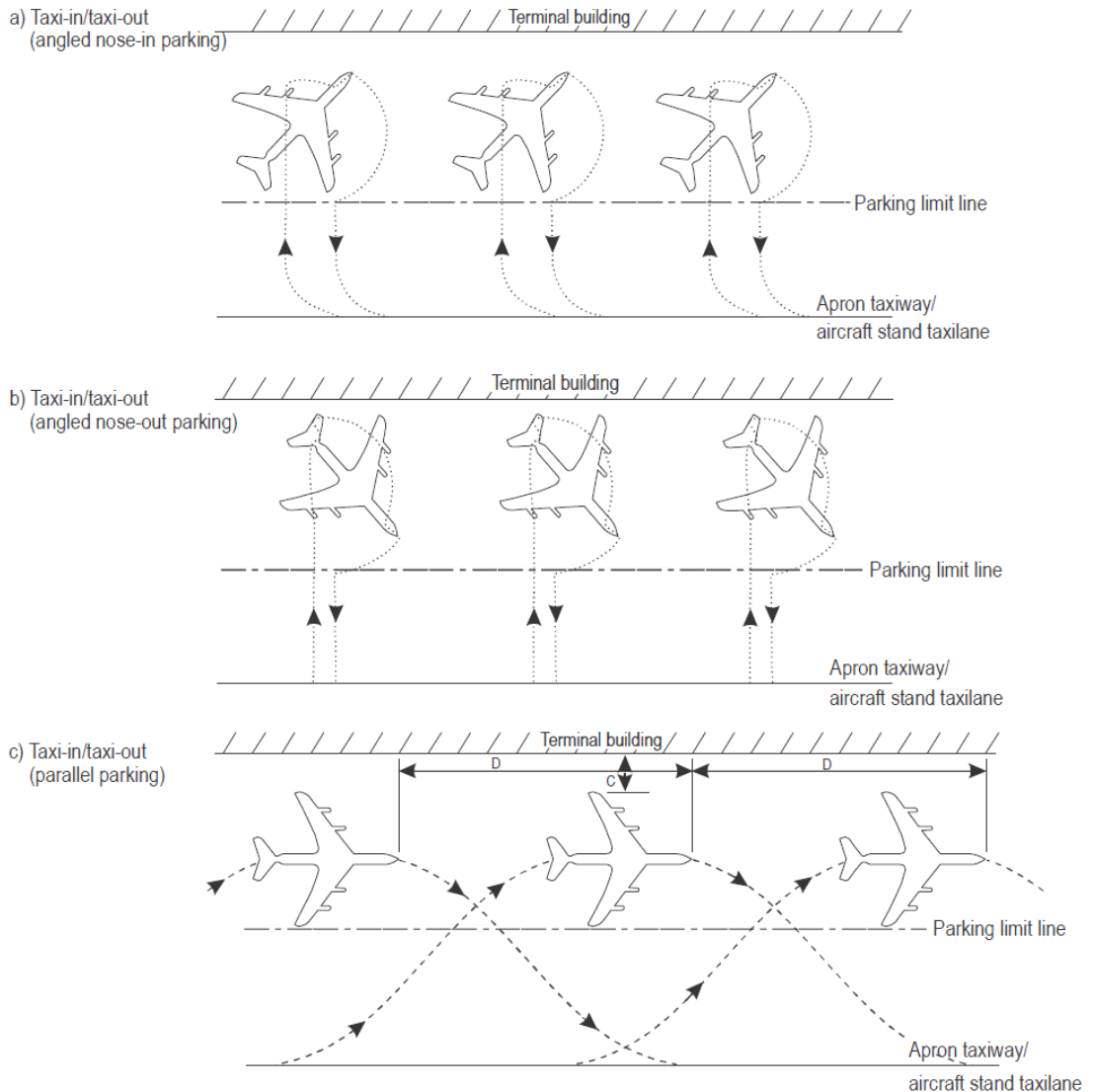
**Figure 12: Examples of reference bars (taken from MOS CASR Part 139, figure 5.2-19)**

The MOS CASR Part 139 subchapter 5.2.13.18 described requirement of aircraft stand marking configuration for self maneuvering parking as follows:

<p>5.2.13.18 Self Manoeuvring Parking</p> <p>Istilah ini digunakan untuk prosedur dimana pesawat udara udara masuk dan meninggalkan aircraft stand dengan menggunakan tenaga sendiri.</p>	<p>5.2.13.18 Self Maneuvering Parking</p> <p>This term denotes the procedure whereby an aircraft enters and leaves the aircraft stand under its own power.</p>
<p>Gambar 5.2-21 a), b) dan c) memperlihatkan area yang dibutuhkan</p>	<p>Figure 5.2-21 a), b) and c) shows the area required for aircraft maneuver into</p>

untuk manuver pesawat udara udara masuk dan keluar posisi aircraft stand untuk angled nose-in, angled nose-out dan konfigurasi parkir paralel, secara berturut-turut.

and out of an aircraft stand position for angled nose-in, angled nose-out and parallel parking configuration, respectively.



**Figure 13: Illustration of self-maneuvering parking (taken from MOS CASR Part 139, figure 5.2-21)**

### 1.12.3.2 Renewal Process of Airport Certification

On 17 until 19 March 2022, the DOA conducted audit as part of airport certification renewal process for Mopah Airport. During the audit process, the DOA inspector found that the parking configuration at the apron was nose in parking and all available markings were limited for aircraft to leave the aircraft stand utilizing towing tractor. In addition, towing tractor was not available for aircraft movement at Mopah Airport and there was no procedure for self-maneuvering parking. The DOA inspectors considered the absence of lead-out line and procedure for self-maneuvering parking as one of the audit findings. Until the collision event, the finding had not been closed.

### **1.13 Additional Information**

The investigation is continuing, should any further relevant safety issues emerge during the course of the investigation, KNKT will immediately bring the issues to the attention of the relevant parties and publish as required.

### **1.14 Useful or Effective Investigation Techniques**

The investigation was conducted in accordance with the KNKT approved policies and procedures, and in accordance with the standards and recommended practices of Annex 13 to the Chicago Convention.



---

## 2 FINDINGS

---

The findings are statements of all significant conditions, events or circumstances in the accident sequence. The findings are significant steps in the accident sequence, but they are not always causal, or indicate deficiencies. Some findings point out the conditions that pre-existed the accident sequence, but they are usually essential to the understanding of the occurrence, usually in chronological order.

In this occurrence, the KNKT identified several findings as follows:

1. The aircraft had valid Certificate of Airworthiness (C of A) and a valid Certificate of Registration (C of R).
2. Prior to the collision event, there was no record or report of aircraft system malfunction nor the nose wheel steering problem.
3. The air traffic controller was Indonesian who held valid Air Traffic Control License and qualified as aerodrome controller of Merauke. The air traffic controller also held valid Third-Class medical certificate.
4. All Flight Attendants (FAs) were Indonesian who held valid Flight Attendant Certificate (FAC) and qualified rated on as Boeing 737-900ER flight attendant. The FAs also held valid Second-Class medical certificate.
5. The aircraft engineer had valid Aircraft Maintenance Engineer License (AMEL) and qualified as Boeing 737-900ER aircraft engineer.
6. The Pilot in Command (PIC) held valid Air Transport Pilot License (ATPL) and the Second in Command held valid Commercial Pilot License (CPL). They were qualified as Boeing 737-900ER aircraft pilot. Both pilots also had valid first-class medical certificates without medical limitation.
7. The alcohol test for the pilots that was conducted prior the first flight of the day, showed no alcohol concentration was detected by the diagnostic device. After the collision, the pilots undergone drugs tests and the result were negative.
8. The aircraft landed at Merauke using Runway 34 at 0821 LT which was nine minutes earlier from the flight scheduled. The pilot was instructed by the tower controller to taxi to Aircraft Stand 5 via Taxiway B.
9. The aircraft stopped about two meters ahead of pilot stop line at Aircraft Stand 5 by following the marshaller signal. The marshaller intended to make the aircraft parked on flat surface as some of the apron surfaces were wavy.
10. At the day of the occurrence was the first time for PIC to park and maneuver an aircraft from Aircraft Stand 5 of Merauke. The SIC had several experiences assisting pilot in command to maneuver an aircraft from Aircraft Stand 5 of Merauke.
11. While the aircraft parking, the Directorate General of Civil Aviation (DGCA) inspectors conducted random surveillance to all crew member and aircraft engineer. This surveillance took approximately 20 minutes.
12. The exterior inspection of the aircraft for the subsequent flight, was performed by the aircraft engineer.

13. During the engine start up activity, the pilot was assisted by two ground personnels consisted of an aircraft engineer and a ground handling officer. The ground handling officer helped the aircraft engineer during the aircraft start up activities by preparing a fire extinguisher.
14. The aircraft operator did not utilize towing tractor and the taxi maneuver conducted using aircraft power.
15. When the aircraft was ready to taxi, the aircraft engineer and ground handling officer were moving to apron service road as the aircraft would be maneuvered to the left to Taxiway B.
16. The PIC increased the engine power and the aircraft started moving forward. Four seconds later the aircraft started turning to the left. During the turning maneuver, the tower controller instructed the pilot to report when the aircraft was ready for the departure and the SIC readback the instruction.
17. About 30 seconds after the SIC readback tower controller instruction, the right wingtip of the aircraft impacted terminal building. Both pilots heard an unusual sound but not exactly known the source of the sound.
18. Both pilots had not been aware that the aircraft impacted the terminal building and continued taxiing to the Runway 34.
19. Passengers who seated near the right wing noticed that the right wingtip of the aircraft impacted terminal building. The passenger then informed one of the Flight Attendant (FA) which then relayed the information to the SIC.
20. After received information from tower controller that the aircraft impacted the terminal building, the PIC decided to return the aircraft to the apron.
21. Based on the meteorological report provided by meteorological station at Merauke, the visibility at 0001 UTC (0901 LT) was 10 km. The Closed-Circuit Television (CCTV) indicated that there was no degradation of visibility during the collision event.
22. All aircraft stands at Merauke were nose-in parking which facing the aircraft to the terminal building.
23. The Aircraft Stand 5 had two offset lead-in lines which is used for guidance during taxi in maneuver. The aircraft stand was also provided with Marshaller Stop Line and Pilot Stop Line.
24. All available markings/guidelines on the apron were suitable for aircraft to leave the aircraft stand utilizing towing tractor. There was no turn bar, turning line nor alignment bar available in the apron which can be used for self-maneuvering parking.
25. All aircraft parked on the apron did not utilize towing tractor and the parking maneuver was conducted by self-maneuvering using aircraft own power.
26. The Navblue Document utilized by the aircraft operator for Merauke did not provide any specific procedure for pilot when maneuvering aircraft from aircraft stand.

27. The Company Airport Briefing Leaflet utilized by the aircraft operator, contained company extra consideration ground operation at Merauke, including to use minimum thrust during ground operation, to observe carefully during taxi due to restricted apron condition, and ground maneuver at apron was conducted by self-maneuvering without the push back car. There was no detailed maneuver procedure for pilot during the self-maneuver.
28. According to the Lion Air Operation Manual Part A (OM-A), whenever an aircraft is to be positioned on the ramp, whether under tow or under its own power, the assistance of marshallers or wingtip guides, as appropriate, should be obtained if there is any doubt about the clearances available for maneuvering.
29. The OM-A described that push back is necessary at an airport with nose-in parking configuration.
30. The Manual of Standard (MOS) Civil Aviation Safety Regulation (CASR) Part 139 described self-maneuvering parking as procedure whereby an aircraft enters and leaves the aircraft stand under its own power. The self-maneuvering parking configuration might use angled nose-in, angled nose-out and parallel parking configuration.
31. According to the MOS CASR Part 139, reference bar should be available on apron consisted of turn bar, stop line and alignment bar. Those guidelines could be used as reference for self-maneuvering parking.
32. The Mopah Airport is operated by *Unit Pelaksana Bandar Udara* (Airport Operation Unit) under the DGCA. The airport certificate of the airport was valid until 9 January 2022. At the day of the occurrence, the renewal process of the certificate had not completed.
33. During the audit as part of airport certification renewal process for Mopah Airport, the Directorate of Airport inspector considered the absence of lead-out line and procedure for self-maneuvering parking as one of the audit findings. Until the collision event, the finding had not been closed.

---

## **3 SAFETY ACTION**

---

At the time of issuing this draft Final Report, the KNKT had been informed of safety actions resulting from this occurrence taken by the related parties.

### **3.1 Lion Air**

Following the occurrence, the Lion Air conducted safety actions as follows:

- Issued notice to pilot to use assistance of marshaller or wingtip guides when the airports require self-maneuvering at the apron.
- Issued notice to pilot when it is likely that Left Hand Side (LHS) pilot does not have clear view of the intended taxi route the Right Hand Side (RHS) pilot shall observe clearly and state “CLEAR RIGHT’ If any doubt exist, the aircraft must be stopped until the situation resolved.
- Issued safety notice to review hand signals as a communication between the flight crew and ground marshaller.

---

## **4 SAFETY RECOMMENDATIONS**

---

The KNKT acknowledges the safety actions taken by the aircraft operator and considered that the safety actions were relevant to improve safety, however there still safety issues remain to be considered. Therefore, the KNKT issued safety recommendations to address safety issues identified in this report.

The safety recommendation in this investigation report is made with the intention of preventing accidents or incidents and which in no case has the purpose of creating a presumption of blame or liability for an accident or incident.

### **4.1 *Unit Pelaksana Bandar Udara (Airport Operation Unit) of Mopah Airport***

- **04.B-2023-02.01**

The parking configuration at Mopah Airport was nose-in parking and all available markings/guidelines in the apron were suitable for aircraft to leave the aircraft stand utilizing towing tractor. However, all aircraft parked on the apron did not utilize towing tractor and the parking maneuver was conducted by self-maneuvering using aircraft own power.

Considering that there was no turn bar, turning line, lead-out line nor alignment bar available in the apron which can be used for self-maneuvering parking, a safe aircraft maneuver cannot be ensured as pilot did not have any guidelines during the self-maneuver.

Therefore, KNKT recommends the Airport Operation Unit of Mopah Airport in cooperation with aircraft operators to review the parking configuration to ensure safe maneuver when aircraft leave the aircraft stand.

---

## 5 APPENDICES

---

### 5.1 Lion Air notice to Pilot

	<b>NOTICE TO PILOT</b>
Notice Number : <b>004/ NTP / OQ / I / 2023</b>	Date of Issued : January 30,2023
Applicability : <b>B737 PILOT</b>	Date of Effectiveness : January 30,2023
Distribution List : <b>DO / DS / OQ / OF / OS / SF /OR</b>	Validity Period : June 30, 2023
<b>SUBJECT:</b>  <b>GROUND COLLISION AT MKQ</b>	

Dear colleagues,

Recently Lion Air flight experienced ground collision at Mopah Airport, Merauke(MKQ). Right-hand wing tip hit part of the terminal building causing damage to either. We would like to inform that flight crew:

1. MUST request the assistance of marshallers or wingtip guides, as appropriate. Whenever an airplane is to be positioned on the ramp, whether under tow or under its own power, at STA BKS, BDO, MKQ or other airports that require self maneuvering at apron
2. The RHS pilot will clearly observe and state that the aircraft is "CLEAR RIGHT" when it is likely that the LHS pilot does not have a clear view of the intended taxi route. If any doubt exists, the aircraft must be stopped until the situation is resolved
3. Should review hand-signals as a communication way between the flight crews and ground marshaller

Since Ground Collision at Mopah Airport, Merauke(MKQ) is under investigation, we would like to inform preventive action that dock into Parking stand 3(three),4(four) and 5(five) MKQ is **PROHIBITED** until further notice.

Safe flight always.

**KOMITE NASIONAL KESELAMATAN TRANSPORTASI REPUBLIK INDONESIA**

Jl. Medan Merdeka Timur No.5 Jakarta 10110 INDONESIA

Phone : (021) 351 7606 / 384 7601 Fax : (021) 351 7606 Call Center : 0812 12 655 155

website 1 : <http://knkt.dephub.go.id/webknkt/> website 2 : <http://knkt.dephub.go.id/knkt/>

email : [knkt@dephub.go.id](mailto:knkt@dephub.go.id)