



Final report on aircraft serious incident

Case no.: **19-158F043**

Date: **28. October 2019**

Location: **Keflavik Airport (BIKF)**

Description: **Runway Excursion**

Investigation per Icelandic Law on Transportation Accident Investigation, No. 18/2013 shall solely be used to determine the cause(s) and contributing factor(s) for transportation accidents and incidents, but not determine or divide blame or responsibility, to prevent further occurrences of similar cause(s). This report shall not be used as evidence in court.

1. FACTUAL INFORMATION

Location and time	
Location:	The end of RWY 01, Keflavik Airport (BIKF)
Date:	28. October 2019
Time¹:	06:04

Aircraft	
Type:	BAE 125 series 800A
Register:	N812AM
Year of manufacture:	1988
Serial number:	NA0433
CoA:	Valid
Engines:	Two Garrett TFE731 series

Other information	
Type of flight:	Medical Evacuation
Persons on board:	8
Injury:	None
Damage:	No
Short description:	Runway excursion off the end of RWY 01

Commander (Pilot Flying)											
Age:	52 years										
Certificate:	Airline Transport Pilot, issued by the FAA										
Ratings:	SEP, Land MEP, Land CA-212 CL-65 DHC-8 HS-125										
Medical Certificate:	Class 1, valid										
Experience:	<table border="1"><tbody><tr><td>Total flight hours:</td><td>12,191.5</td></tr><tr><td>Total flight hours as Commander:</td><td>8,271.7</td></tr><tr><td>Total flight hours on type:</td><td>2,228.0</td></tr><tr><td>Last 90 days on type:</td><td>143.6</td></tr><tr><td>Last 24 hours on type:</td><td>2.6</td></tr></tbody></table>	Total flight hours:	12,191.5	Total flight hours as Commander:	8,271.7	Total flight hours on type:	2,228.0	Last 90 days on type:	143.6	Last 24 hours on type:	2.6
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¹ All times in the report are Icelandic local times (UTC+0), unless otherwise stated

Aircraft N812AM touched down on RWY 01 at Keflavik Airport (BIKF) at 06:03 with 8 persons on board on a medevac flight.

RWY 01 at BIKF Airport is 3054 meters long and the Commander, who was the Pilot Flying (PF), had estimated that the required landing distance was 2000 feet (about 610 meters).

ATC instructed the PF to clear RWY 01 at the end of the runway, using taxiway N. The PF therefore continued to taxi down RWY 01 after landing, having slowed down to taxi speed, towards taxiway N.

At the end of RWY 01, where the RWY meets taxiway N, the PF reported encountering black ice and having difficulty slowing further down before turning onto taxiway N.

According to a witness, aircraft N812AM did not seem to slow down its runway taxi speed, before it reached the end of RWY 01.

Once the aircraft entered the threshold lines for RWY 19, the aircraft started braking. The aircraft skidded off the runway and entered the safety area at the edge of the runway before stopping.

Aircraft N812AM slid off the end of RWY 01, after having only been able to turn partially towards taxiway N.



Figure 1: Aircraft N812AM runway excursion

After exiting the aircraft one of the aircraft crewmembers fell on the paved safety zone area due to its icy condition. The crewmember that fell on the paved safety zone was not injured during the event.

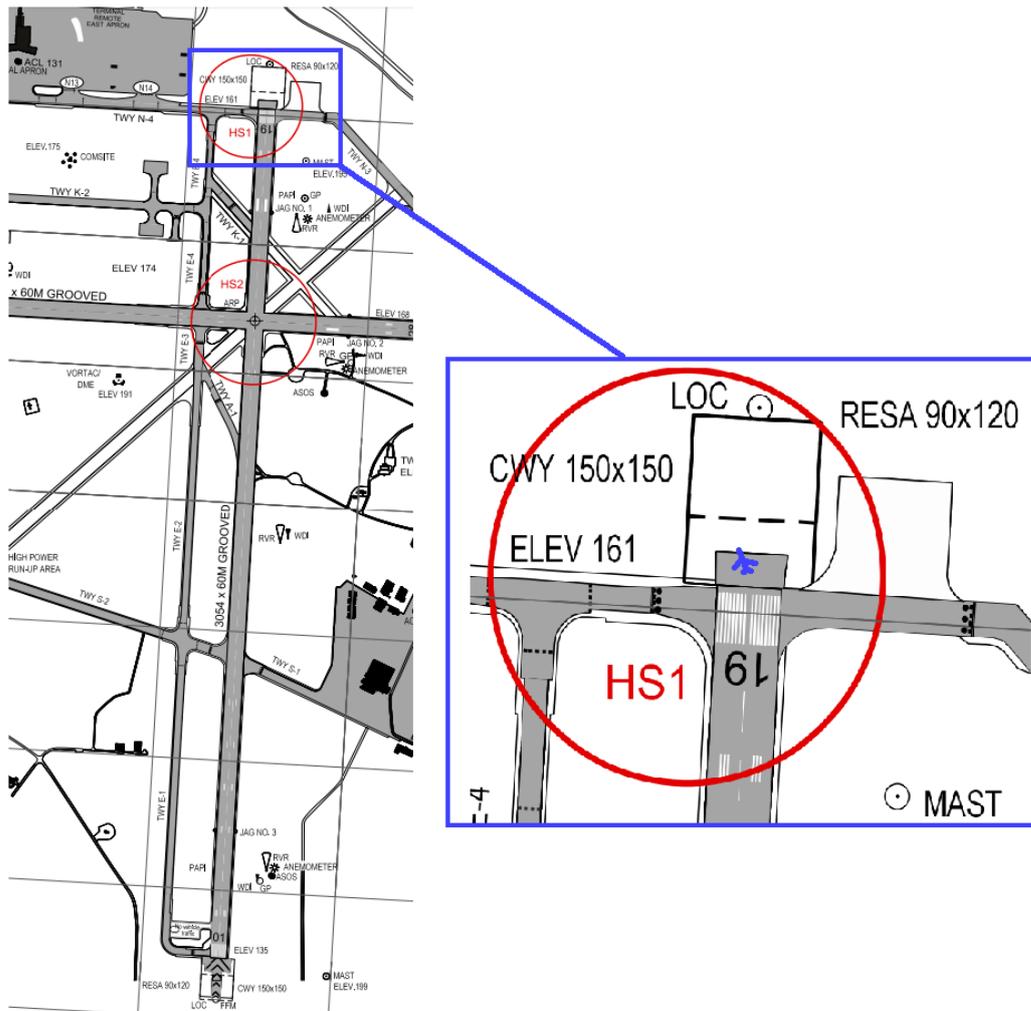


Figure 2: N812AM Runway excursion off the far end of RWY 01 and into the safety zone

The investigation revealed that the airport operator, Isavia, had experienced difficulties maintaining good runway braking action that night. It had rained between 3:30AM and 4:30AM, but due to low temperature and frozen ground, the rain froze on the runway.

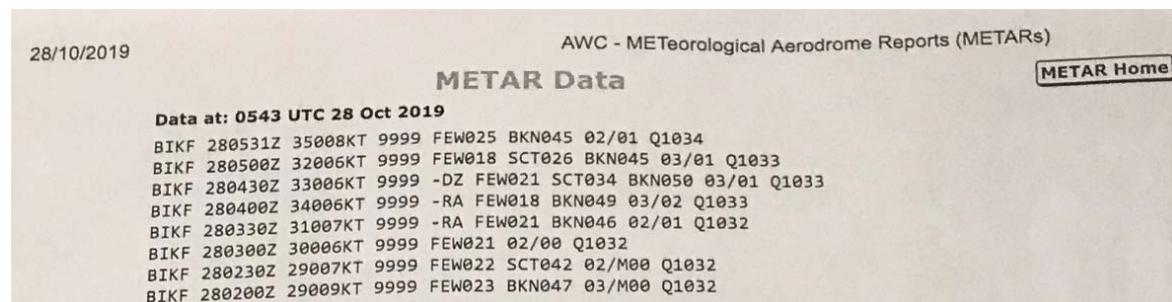


Figure 3: METAR at Keflavik Airport between 2:00AM and 5:31AM

Runway deicing fluid had to be applied three times onto the RWY before the braking action became acceptable². In addition, due to rain drizzle throughout the night, taxiways and aprons had to be re-sanded throughout the night.

Following is a summary of BIKF runway maintenance and runway conditions this night and into the morning.

During the evening of October 27th, between 21:00 and 22:00:

- First application of runway deicing fluid on RWY 01/19
- RWY braking condition improve considerable

In the early part of the night:

- Sanding taxiways and aprons
- At 00:28AM RWY 19-01 braking measurement 0.69/0.61/0.52 - Average 0.61
- At 02:35AM RWY 01-19 braking measurement 0.37/0.58/0.66 - Average 0.54
- At 02:53AM RWY 10-28 braking measurement 0.18/0.21/0.26 - Average 0.22

² Measured braking coefficient per ICAO Annex 14, 0.26/0.29/0.33 at 5:27 for RWY 01, 0.59/0.44/0.35 at 5:55 for RWY 19 and 0.38/0.47/0.53 at 6:04 for RWY 01 at BIKF Airport on October 28th 2019

Between 4:00 and 5:00 AM:

- Around 4AM considerable rain at 2°C air temperature with frozen ground
- The rain freezes once it hits the ground
- At 04:25AM RWY 28-10 braking measurement 0.25/0.18/0.14 - Average 0.19
- At 04:40AM RWY 19-01 braking measurement 0.26/0.18/0.18 - Average 0.21
- Second application of runway deicing fluid on RWY 01/19
- At 04:57AM RWY 19-01 braking measurement 0.38/0.25/0.22 - Average 0.28

Between 5:00 and 6:00 AM:

- Rain drizzle during the night required re-sanding of taxiways and aprons
- At 05:05AM RWY 01-19 braking measurement 0.24/0.25/0.37 - Average 0.29
- At 05:18AM RWY 19-01 braking measurement 0.44/0.28/0.24 - Average 0.32
- At 05:27AM RWY 01-19 braking measurement 0.26/0.29/0.45 - Average 0.33
- At 05:41AM RWY 19-01 braking measurement 0.47/0.34/0.26 - Average 0.35
- Third application of runway deicing fluid on RWY 01/19
- At 05:55AM RWY 19-01 braking measurement 0.59/0.44/0.35 - Average 0.46

Between 6:00 and 7:00 AM:

- Rain drizzle during the night required re-sanding of taxiways and aprons
- At 06:04AM RWY 01-19 braking measurement 0.38/0.47/0.53 - Average 0.46
- At 06:49AM RWY 19-01 braking measurement 0.61/0.62/0.50 - Average 0.58
- At 06:52AM RWY 01-19 braking measurement 0.48/0.62/0.66 - Average 0.58

Between 7:00 and 8:00 AM:

- At 07:32AM RWY 19-01 braking measurement 0.68/0.60/0.42 - Average 0.57

Between 8:00 and 9:00 AM:

- At 08:35AM RWY 01-19 braking measurement 0.65/0.72/0.66 - Average 0.68

Although the overall runway condition of RWY 01 had become acceptable before the landing of aircraft N812AM at 06:03, a close scrutiny of the braking action measurement taken at 05:55 reveals at the end of the runway, at the RWY 19 threshold, the braking action coefficient went down to 0.22 (See Figure 4).

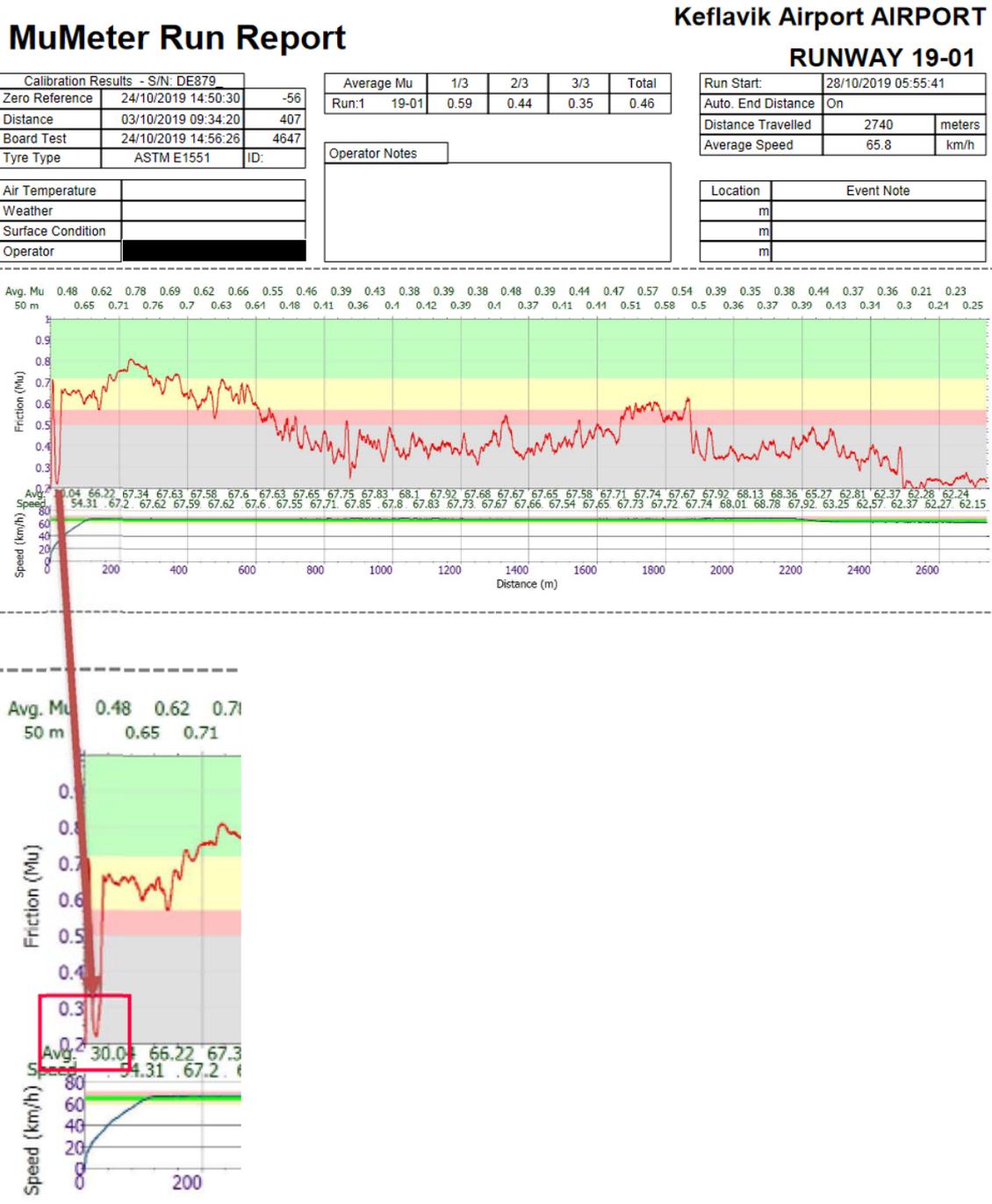


Figure 4: Braking action measurement taken at 05:55 on RWY 19-01

Per ICAO Annex 14, 0.25 and below is poor braking action.

<i>Measured coefficient</i>	<i>Estimated braking action</i>	<i>Code</i>
0.40 and above	Good	5
0.39 to 0.36	Medium to good	- 4
0.35 to 0.30	Medium	3
0.29 to 0.26	Medium to poor	2
0.25 and below	Poor	1

Figure 5: ICAO Annex 14 estimated braking action

Aircraft N812AM slid of the far end of RWY 01 at 06:04. As a result the runway was closed while several aircraft were coming in for landing.

Decision was made by Isavia Airport Services for Keflavik Airport to remove the aircraft from the edge of the runway to be able to reopen it.

This decision was made due to the two following reasons:

- Runway 10/28 had not received any runway de-icing fluid during the night
- The last measured braking measurement at runway 10/28 had shown poor braking conditions
 - At 04:25AM RWY 10-28 braking measurement 0.25/0.18/0.14 with a total of 0.19
 - Per ICAO Annex 14, 0.25 and below is poor braking action

Isavia Airport Services for Keflavik Airport therefore determined that it would be much quicker to remove aircraft N812AM from the serious incident site, than deicing RWY 10/28 to such an extent, that sufficient braking action could be gained on that runway.

At 06:27 aircraft TF-ISF landed on closed RWY 01 at Keflavik Airport due to low fuel. The ITSB³ has a separate investigation for that serious incident and the ITSB will be issuing a report concerning that serious incident.

³ Icelandic Transportation Safety Board, or Rannsóknarnefnd samgönguslysa (RNSA) in Icelandic

Pictures were taken of aircraft N812AM being moved from the runway excursion site at 06:46.

At 06:47, the ATCO⁴ at BIKF Airport called the ITSB duty phone to report that B757-200 aircraft TF-ISF had landed on closed RWY 01 at 06:27.



Figure 6: Airplane N812AM being moved at 06:46

At the same time, the ATCO informed the ITSB that RWY 01 had been closed due to aircraft N812AM runway excursion at 06:04 and that aircraft N812AM was being moved from the runway excursion site.

- Per Appendix I of Icelandic regulation 763/2013, both runway excursion and landing on a closed runway are classified as serious incidents.
- Serious incidents are investigated by the ITSB and are per article 13 of regulation 763/2013 and article 12 of Icelandic law 18/2013 to be notified without a delay to the ITSB.

As Isavia did not report the serious incident, until the runway excursion site had been disturbed, and aircraft N812AM was already being moved from the site, the on-site evidence had already been destroyed. Therefore it was not possible for the ITSB to perform on-site investigation of the serious incident site.

The ITSB believes the cause of the runway excursion, of aircraft N812AM, to be poor RWY condition at the far end of the runway (as per Figure 4).

⁴ Air Traffic Control Officer

2. SAFETY RECOMMENDATIONS

The ITSB issues the following safety recommendations to Isavia:

19-158F043 T01

During braking action measurement, if abnormally worse braking actions are measured at the runway ends that do not concur with the average 1/3 runway value being measured, pilots should be notified.



The following board members approved the report:

- Geirprúður Alfreðsdóttir, chairman
- Bryndís Lára Torfadóttir, board member
- Gestur Gunnarsson, board member
- Hörður Arilússon, deputy board member
- Tómas Davíð Þorsteinsson, deputy board member

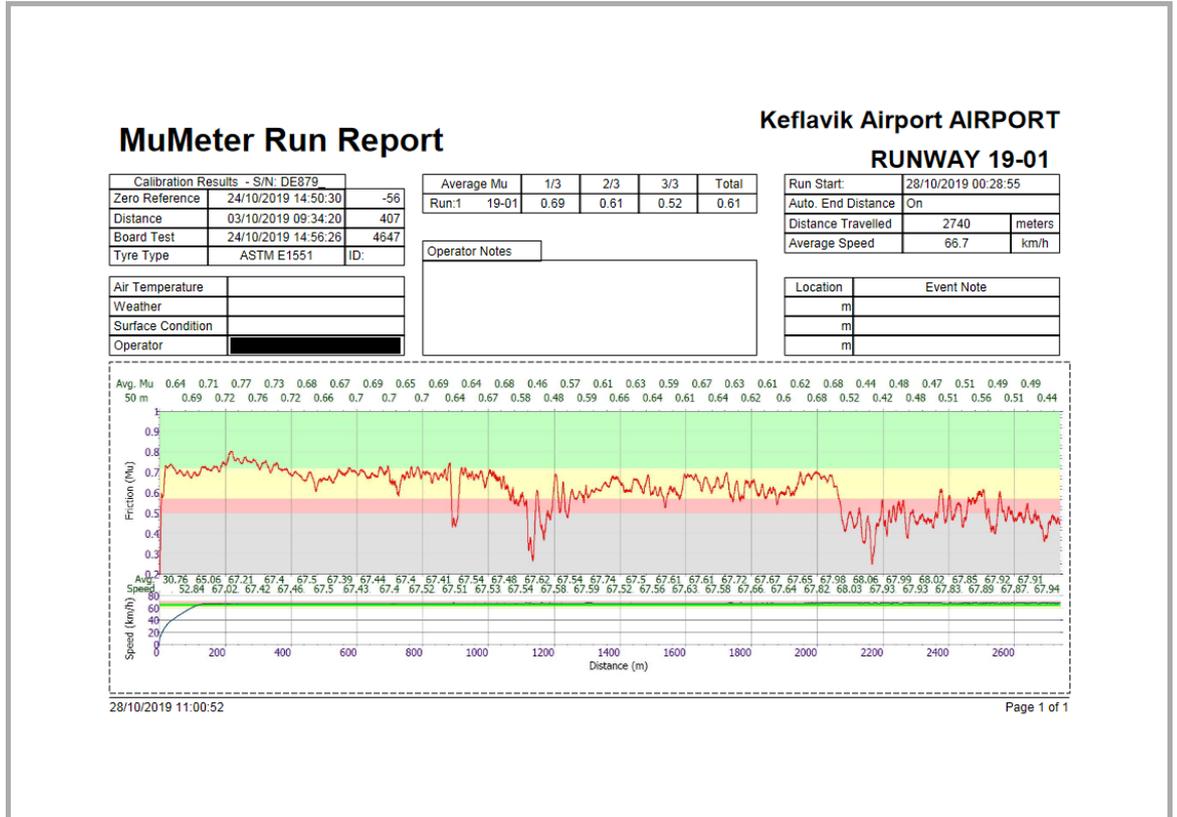
Reykjavík, 12. November 2020

On behalf of the Icelandic Transportation Safety Board

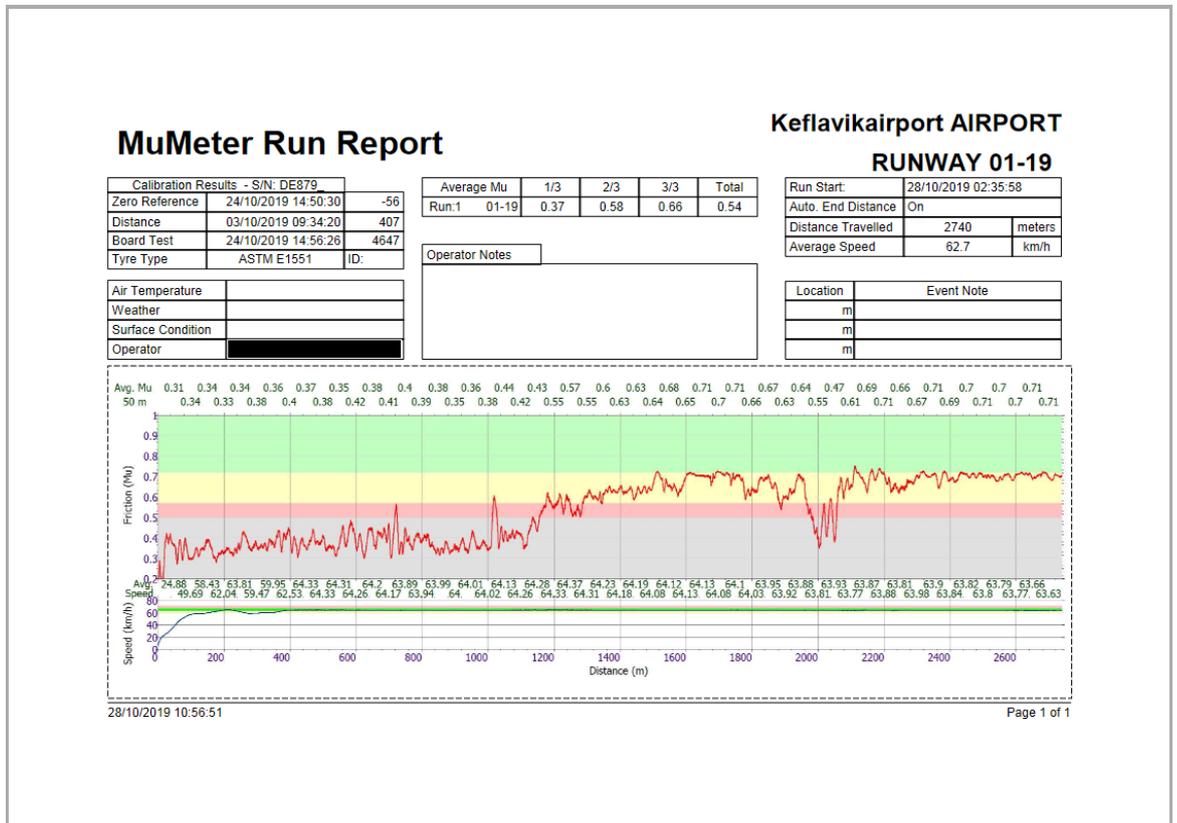
Ragnar Guðmundsson
Investigator-In-Charge

3. APPENDIX

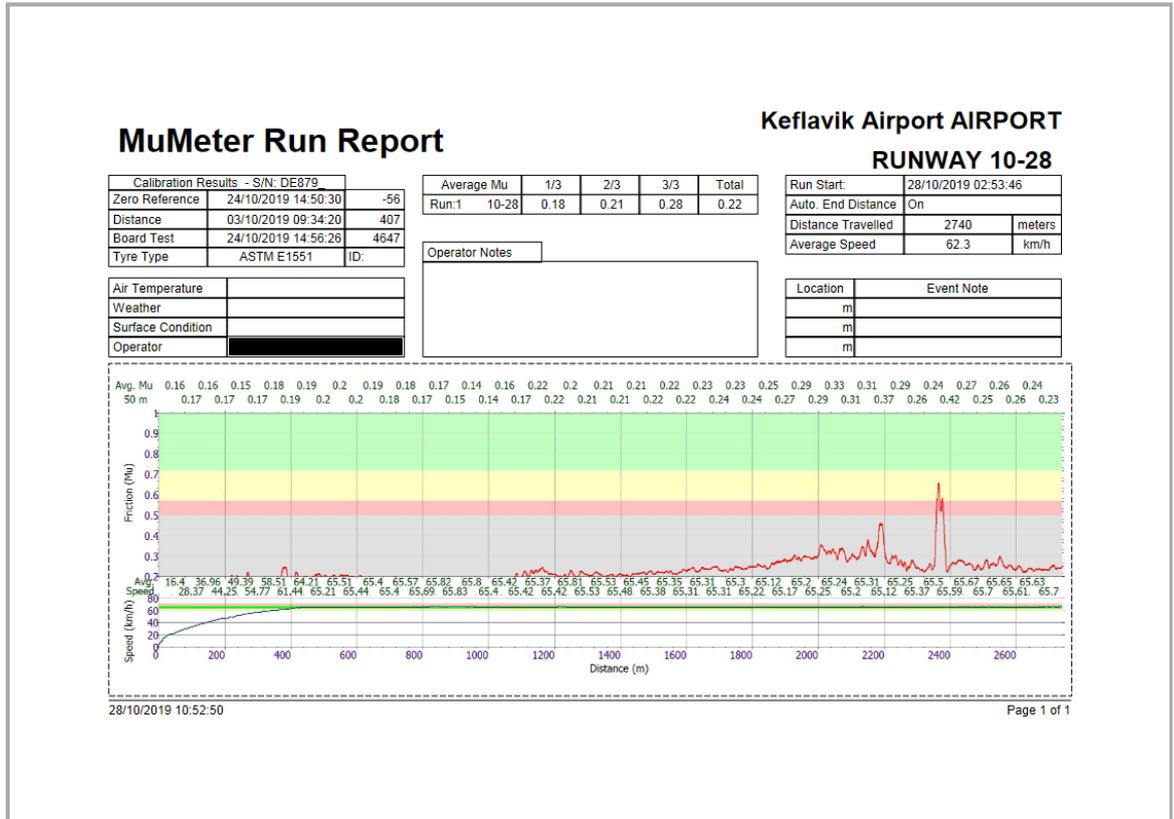
1) Braking measurement at 00:28AM RWY 19-01



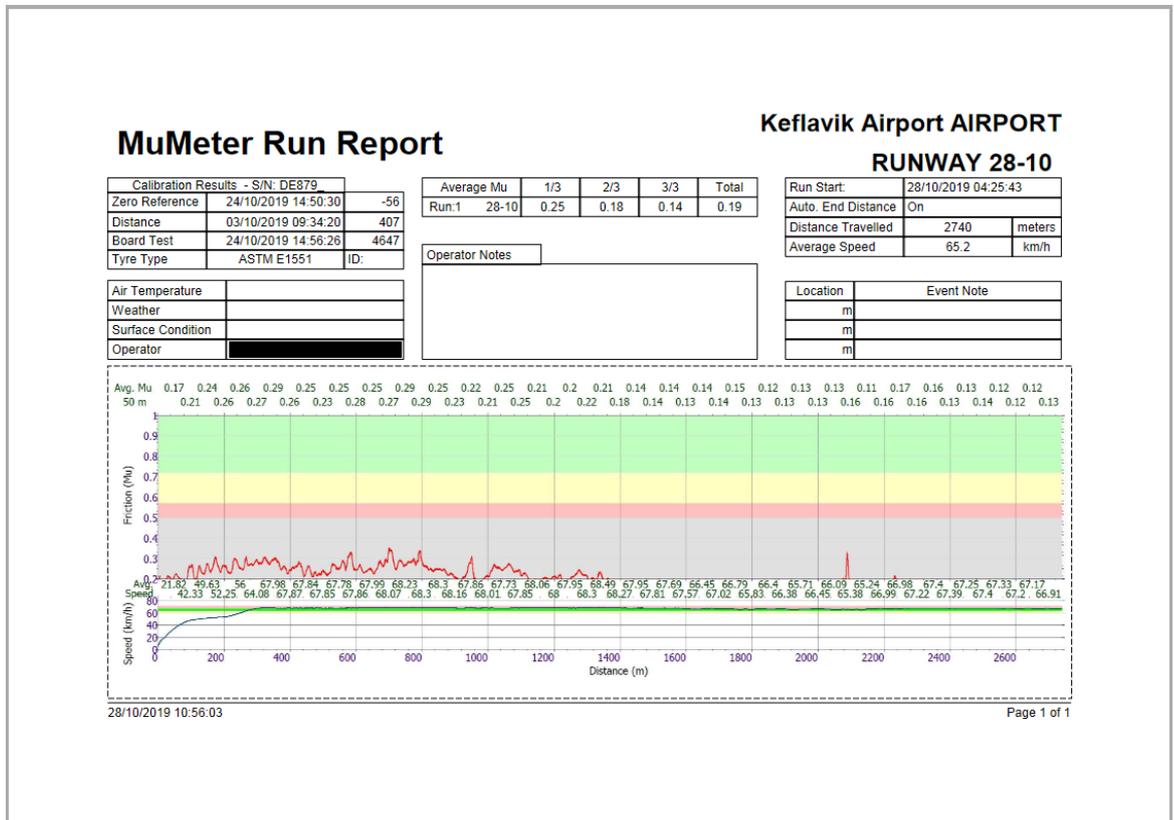
2) Braking measurement at 02:35AM RWY 01-19



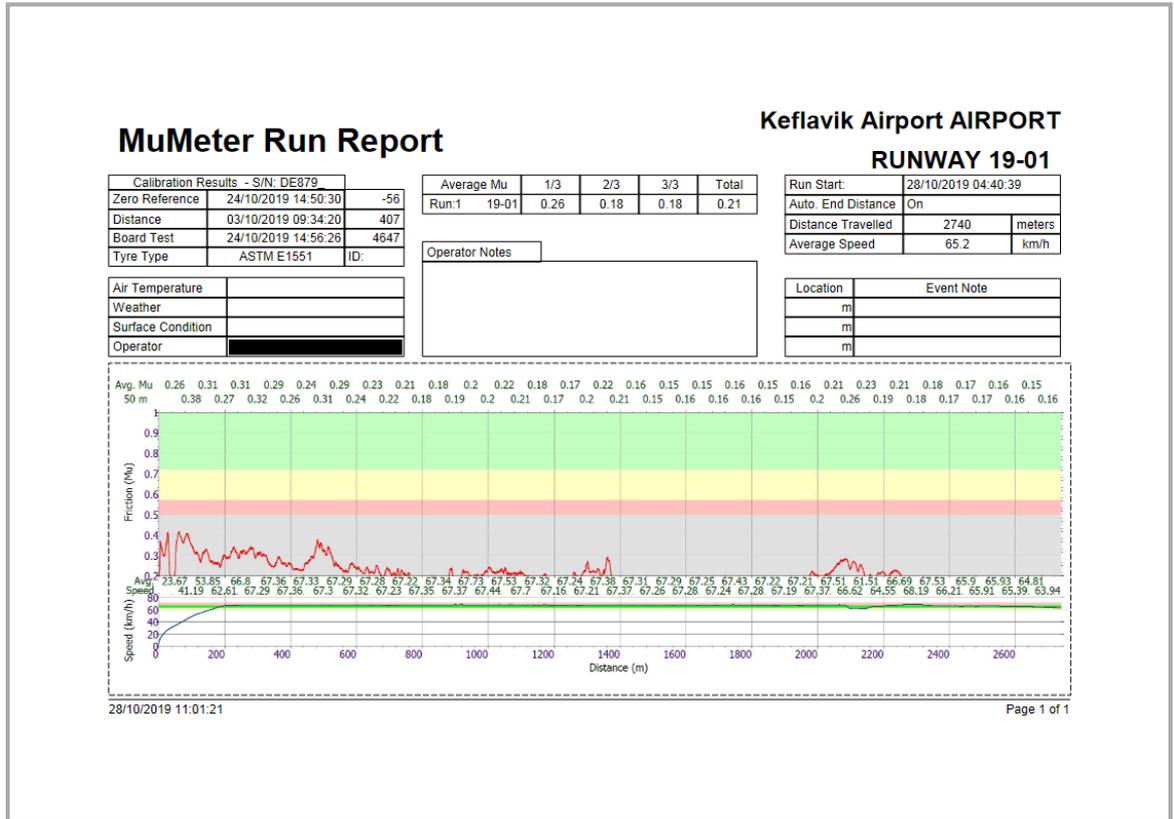
3) Braking measurement at 2:53AM RWY 10-28



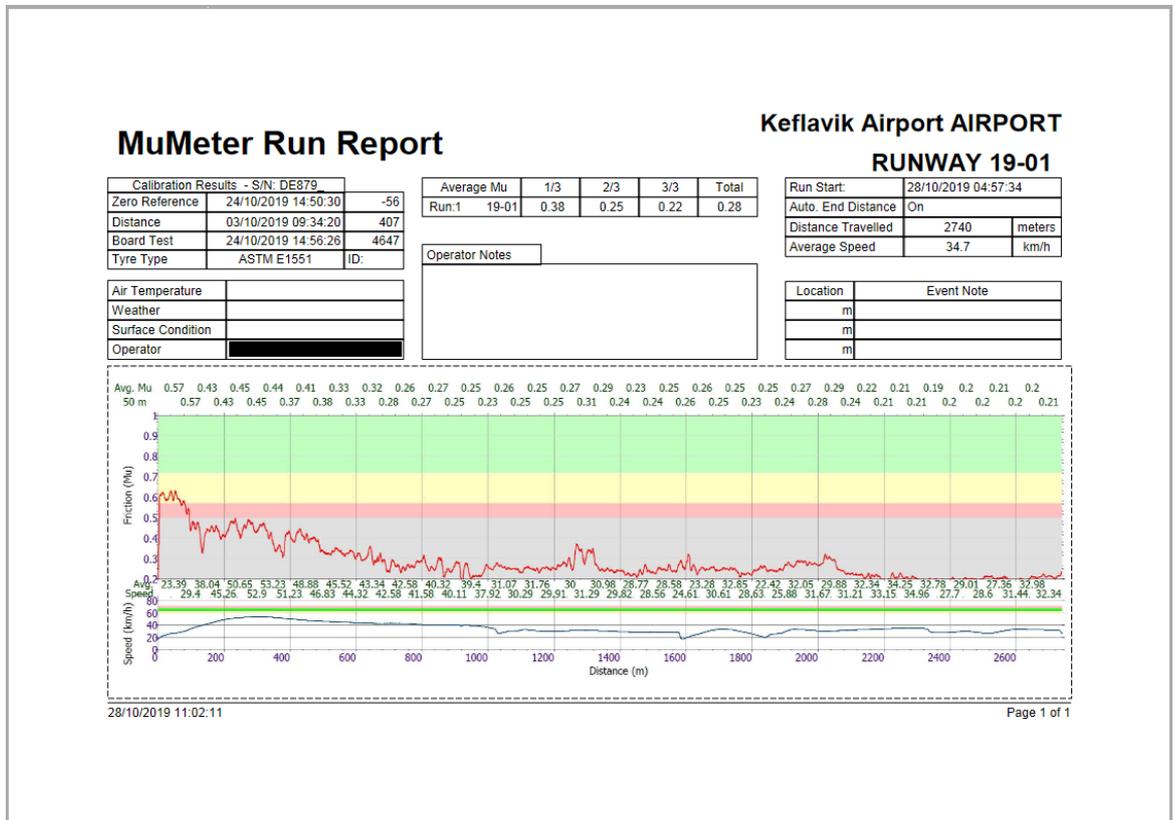
4) Braking measurement at 04:25AM RWY 28-10



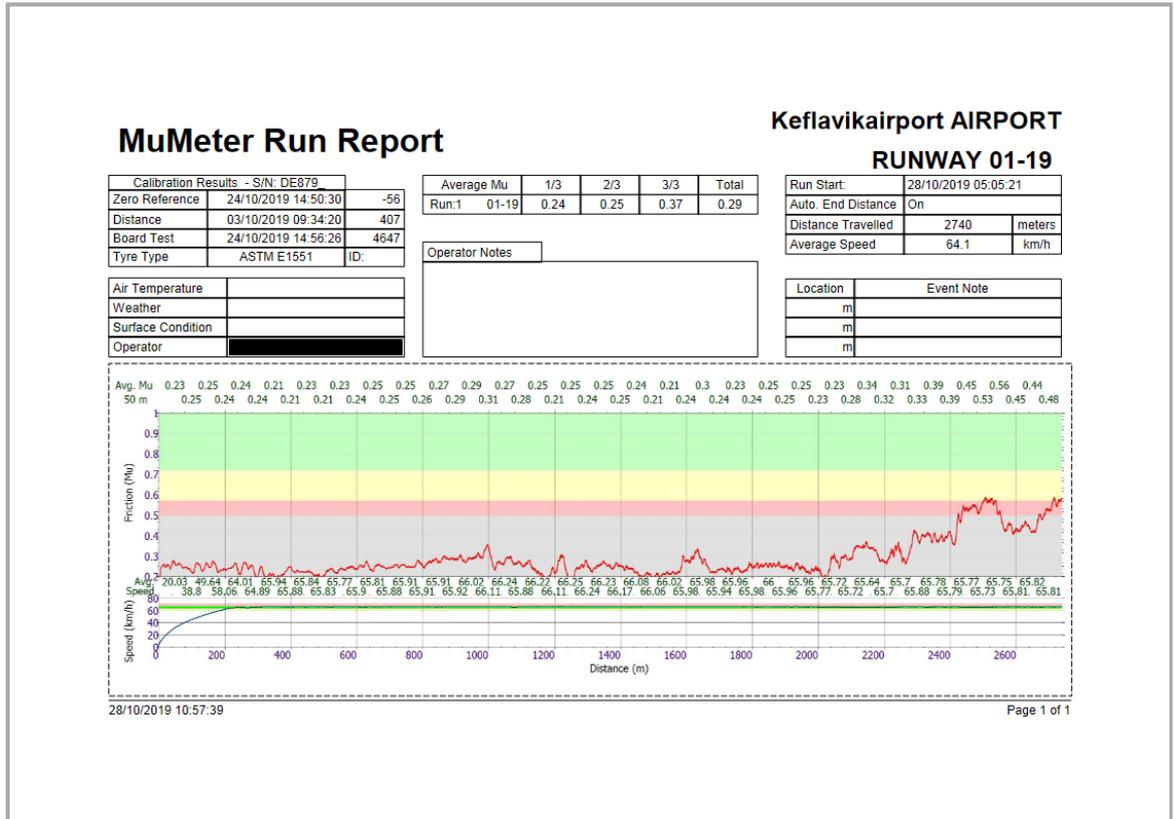
5) Braking measurement at 04:40AM RWY 19-01



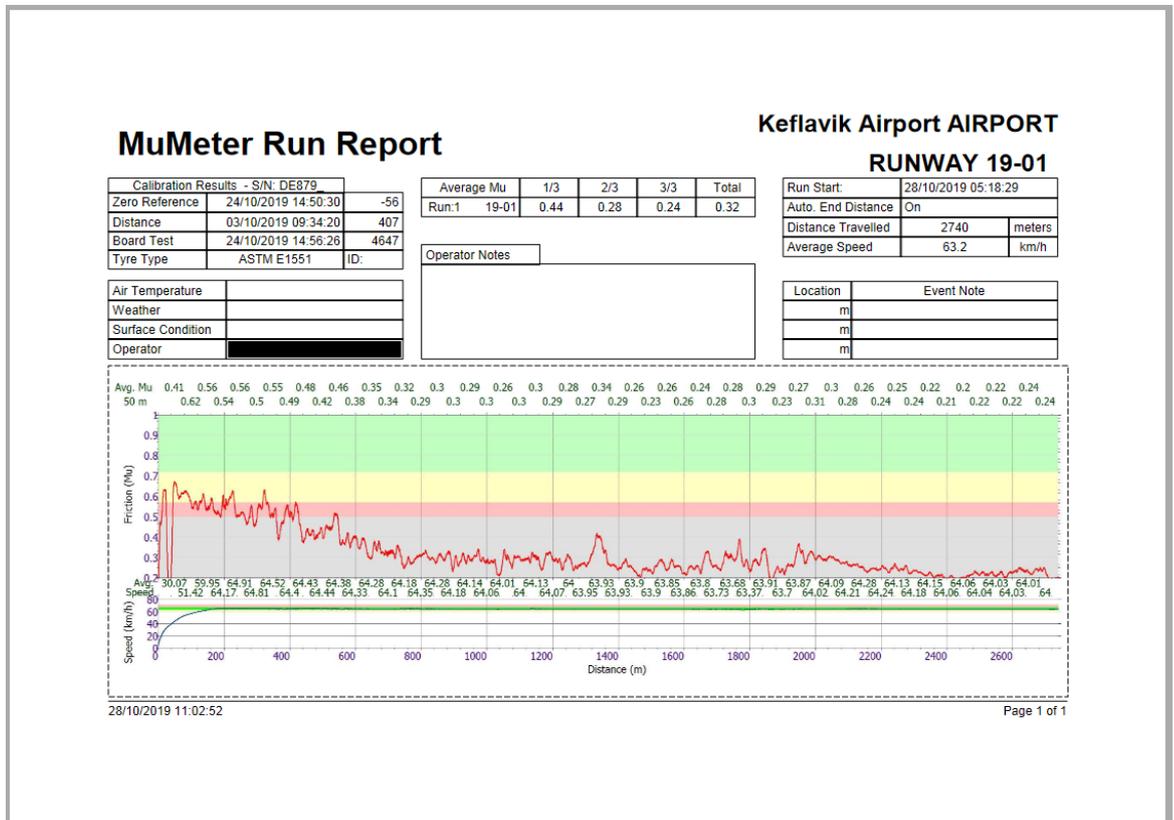
6) Braking measurement at 04:57AM RWY 19-01



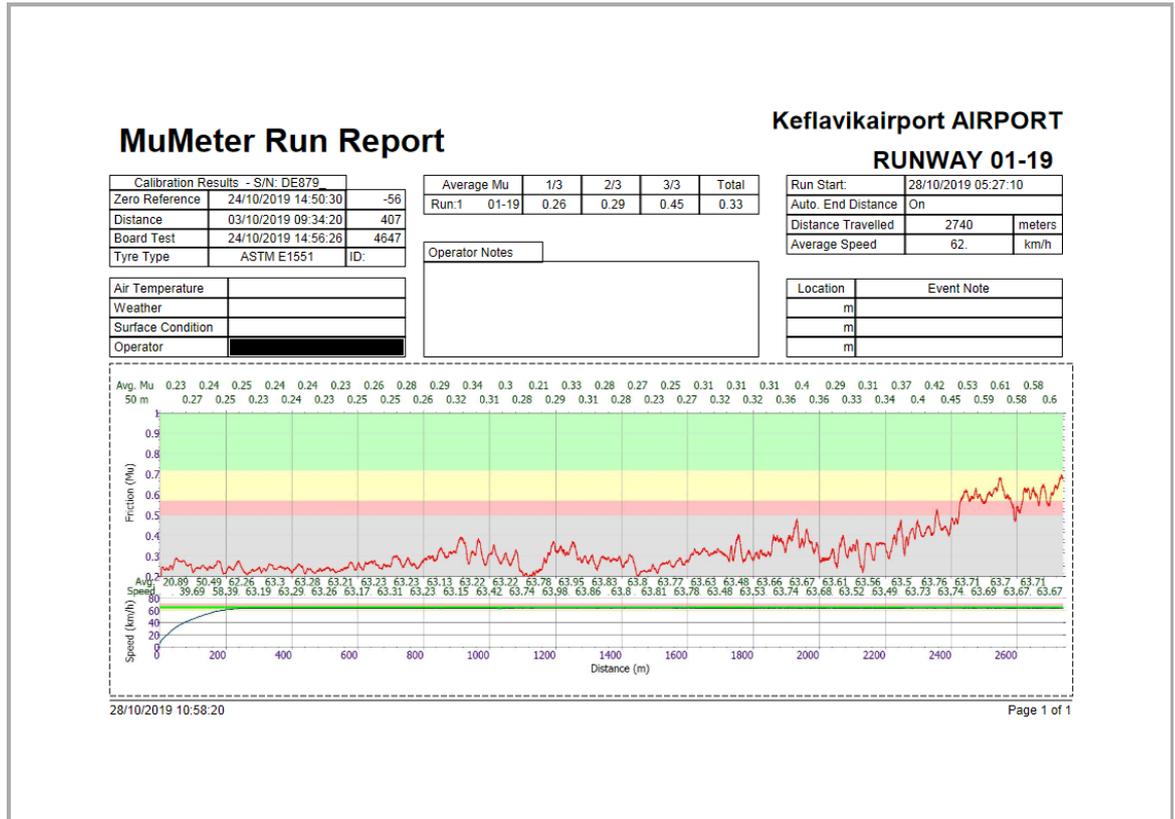
7) Braking measurement at 05:05AM RWY 01-19



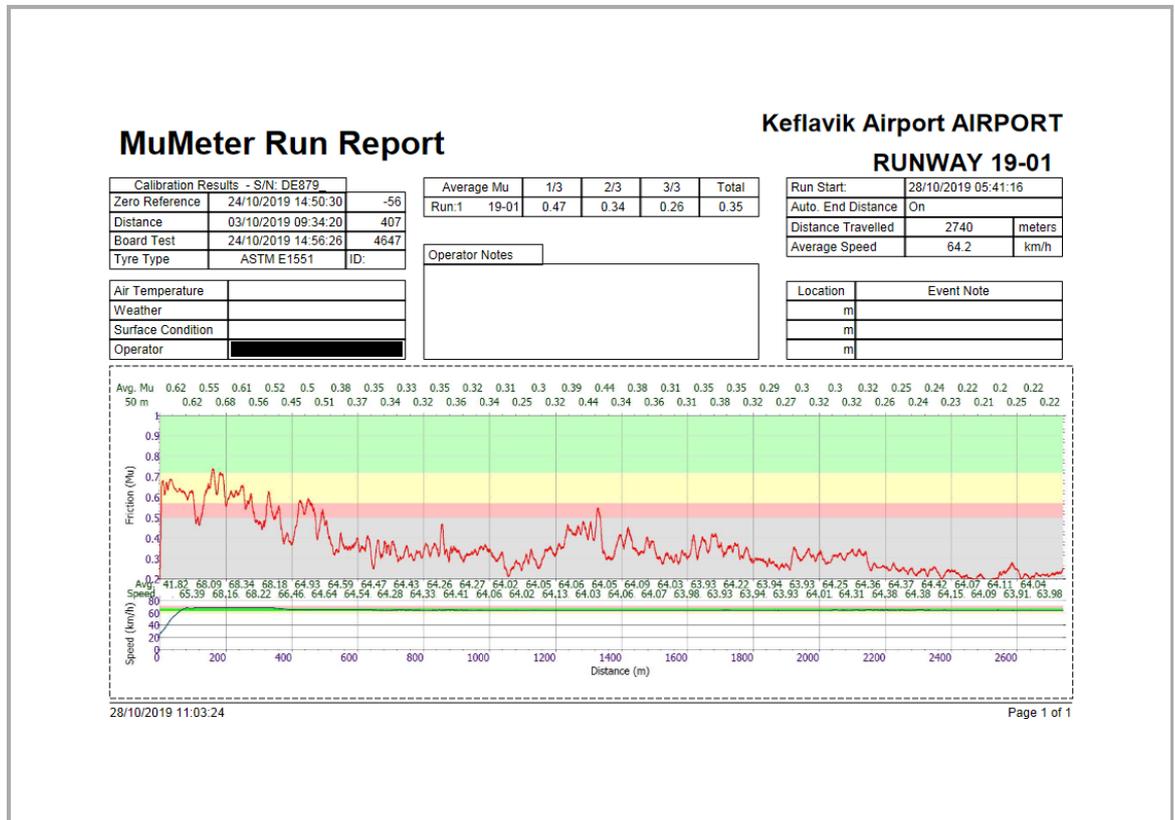
8) Braking measurement at 05:18AM RWY 19-01



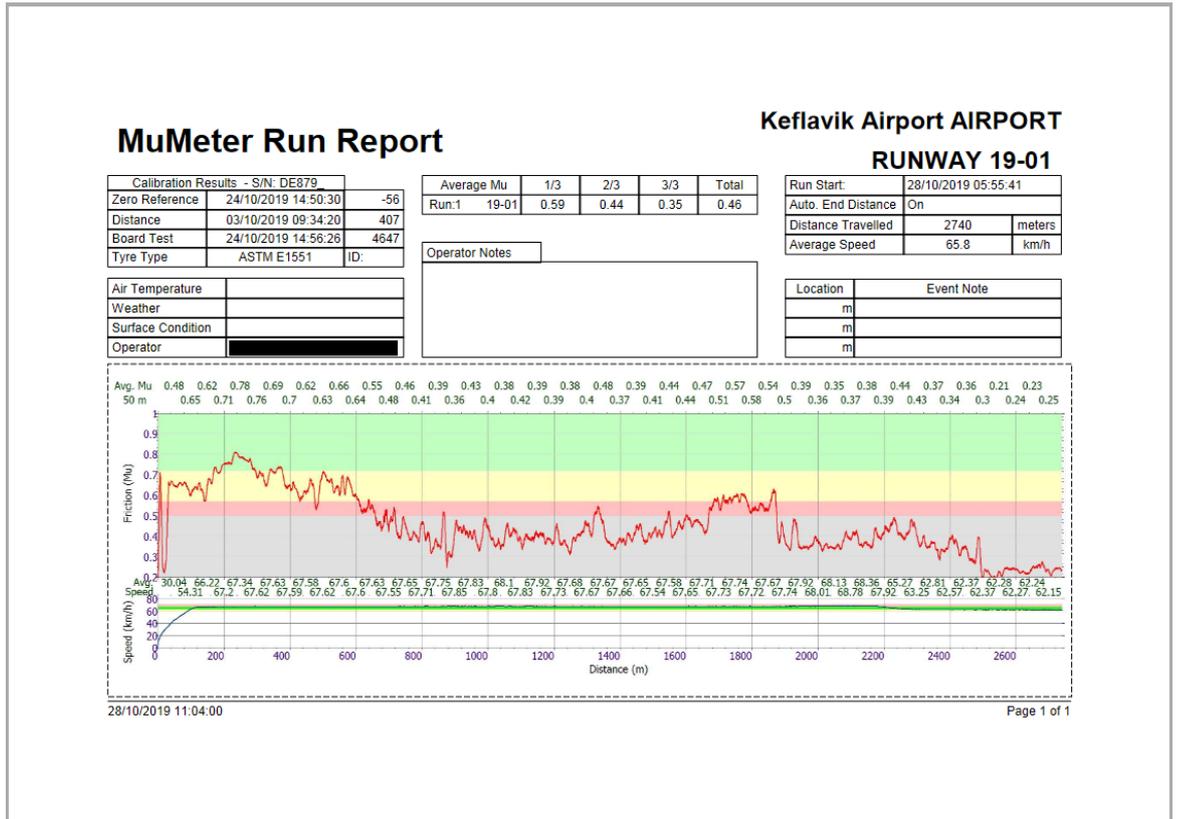
9) Braking measurement at 05:27AM RWY 01-19



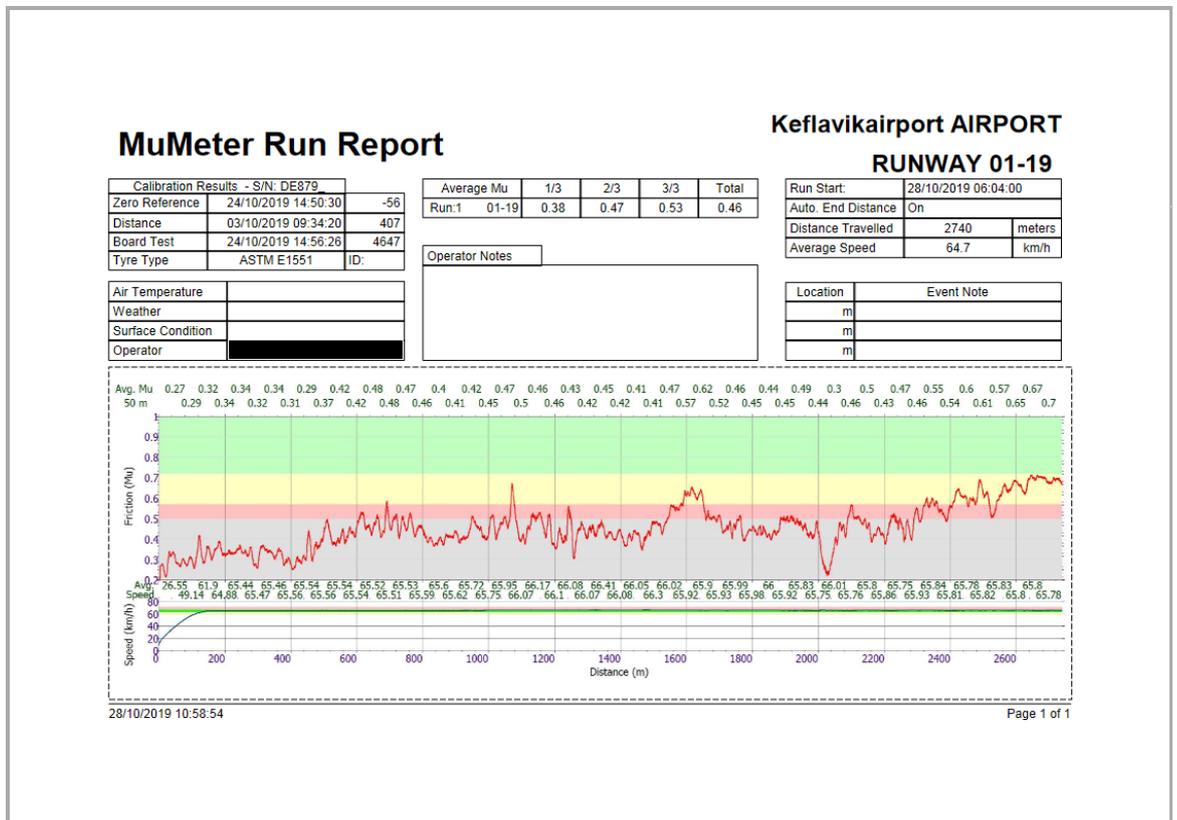
10) Braking measurement at 05:41AM RWY 19-01



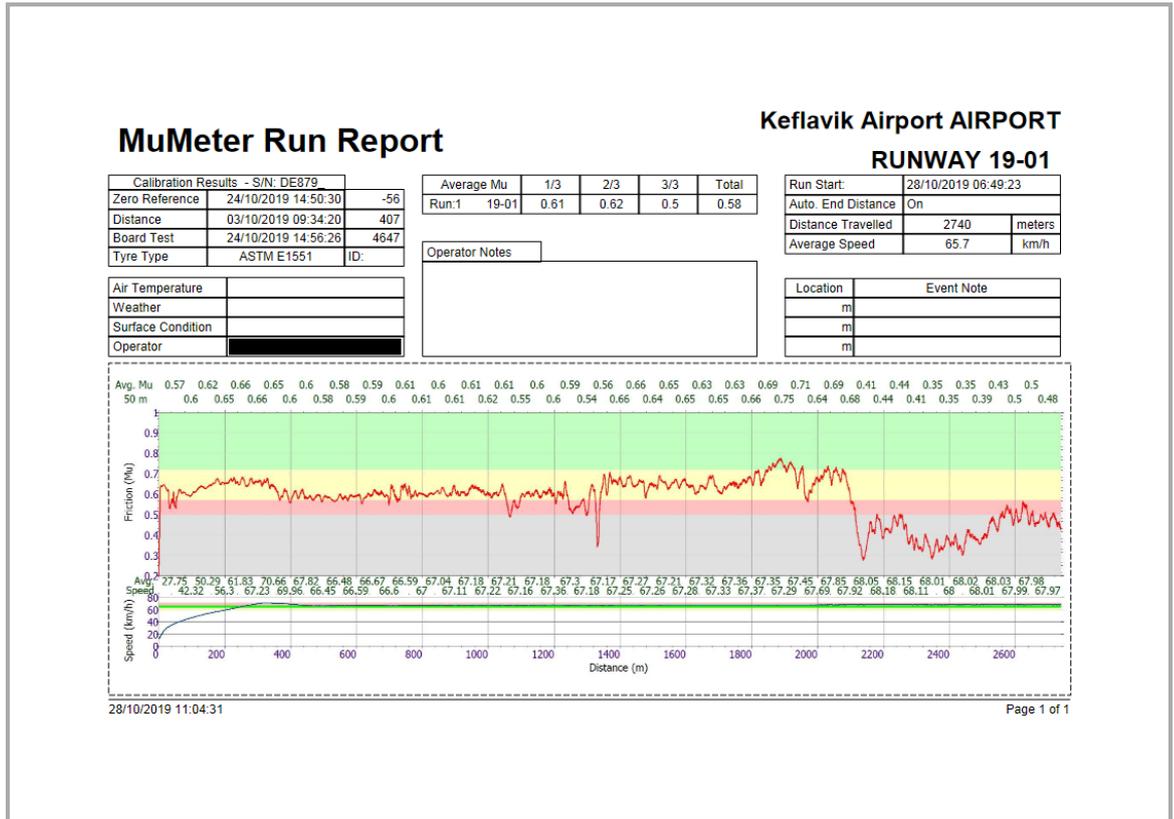
11) Braking measurement at 05:55AM RWY 19-01



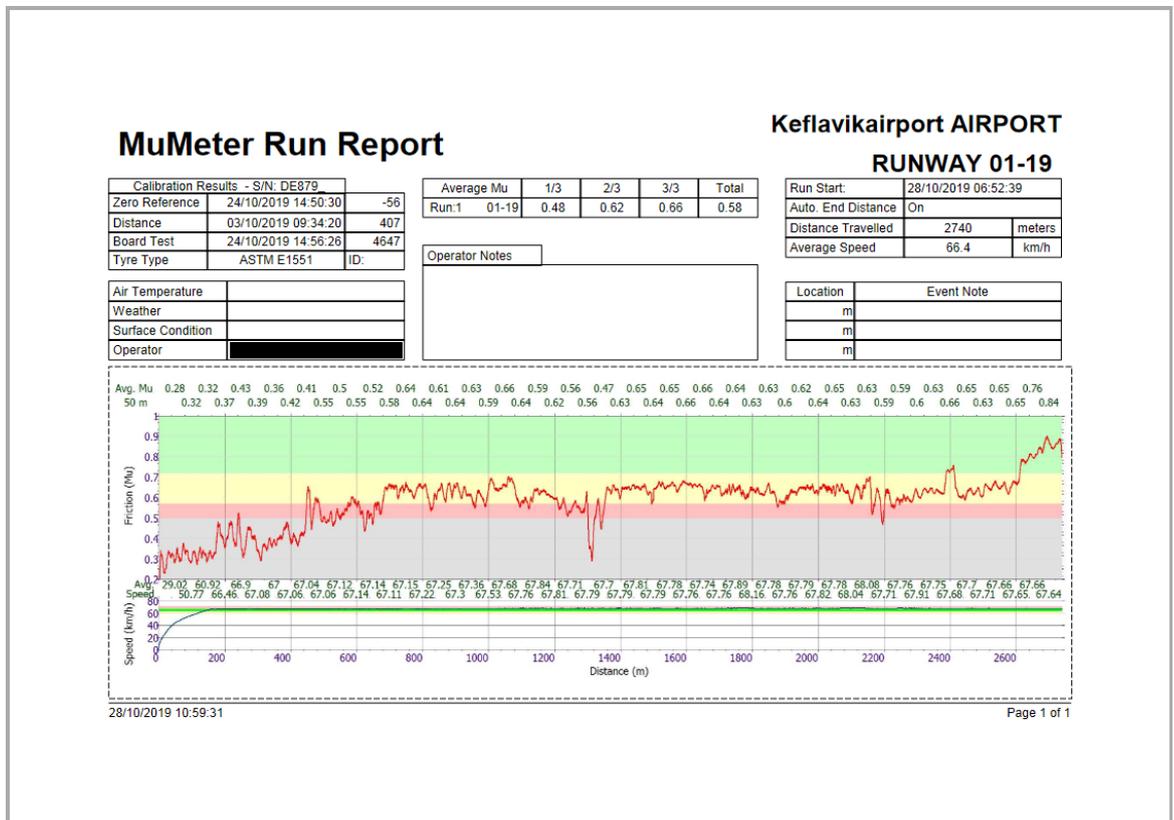
12) Braking measurement at 06:04AM RWY 01-19



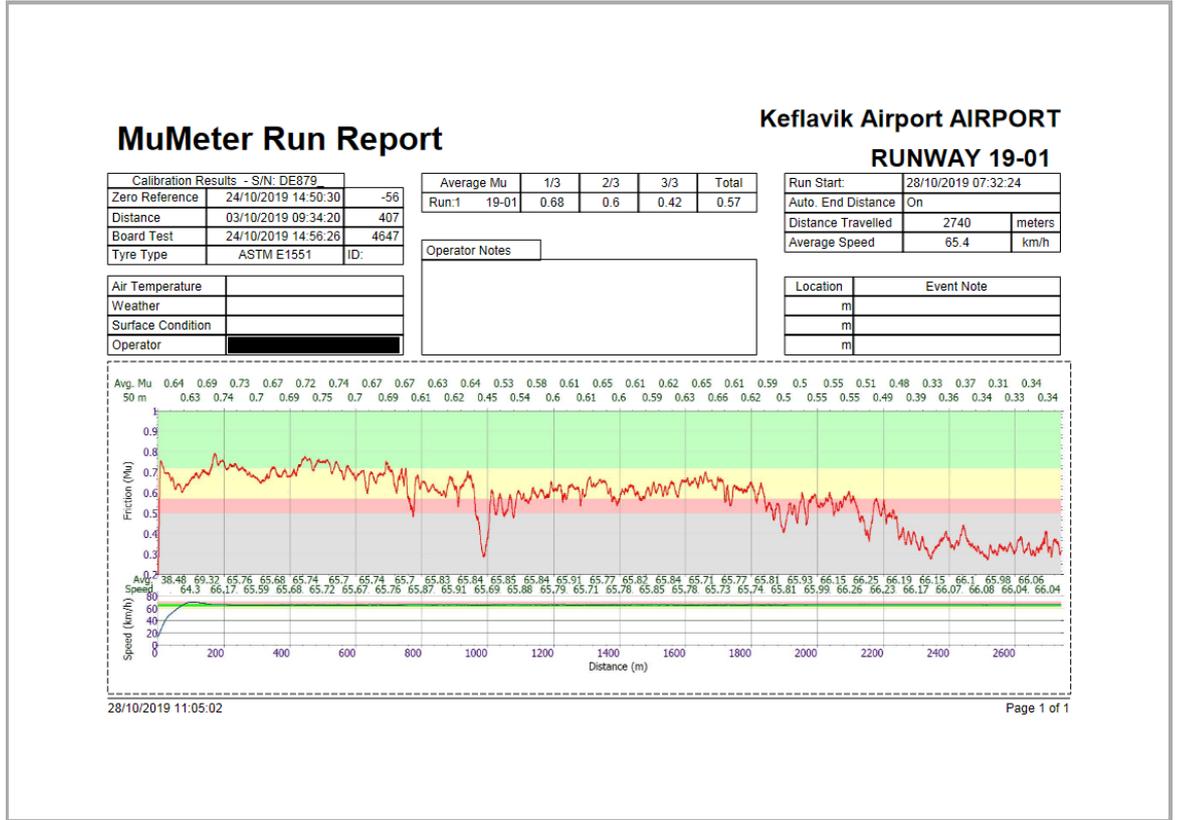
13) Braking measurement at 06:49AM RWY 19-01



14) Braking measurement at 06:52AM RWY 01-19



15) Braking measurement at 07:32AM RWY 19-01



16) Braking measurement at 08:35AM RWY 01-19

