International Civil Aviation Organization

THE EIGHTH MEETING OF THE ASIA/PACIFIC GBAS/SBAS IMPLEMENTATION TASK FORCE (GBAS/SBAS ITF/8)

(Melbourne, Australia, 12-14 May 2026)

Agenda Item 5: Review of remaining Action Item List

GBAS Safety Assessment in Japan

(Presented by Japan)

SUMMARY

This paper describes the safety assessment process for GBAS in Japan. Thanks to the long-term research of the Electronic Navigation Research Institute and the technology of NEC, the Haneda GBAS was able to become operational.

1. INTRODUCTION

1.1 The Electronic Navigation Research Institute (ENRI) began research on GBAS in 1996.

1.2 In 2002, a test bed was established at Sendai Airport. In 2010, a GBAS prototype was deployed at Kansai International Airport, where the first GLS test approach was conducted by a Boeing 787 under VFR conditions.

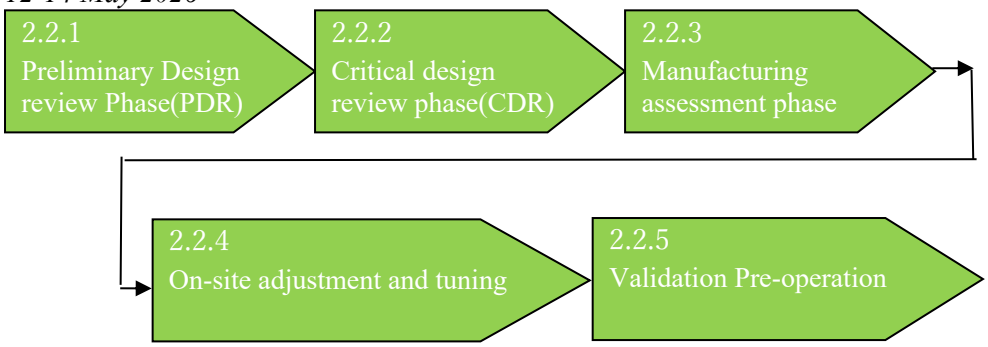
1.3 In 2016, the JCAB decided to manufacture GBAS. A trial was conducted at Haneda Airport in 2020, and full operational service began in 2025.

1.4 From 2016 to 2024, a safety assessment was conducted in preparation for full GBAS operations. During this period, pre-operational evaluations were performed by monitoring GLS approaches during VFR operations, in cooperation with Japanese airlines.

2. SAFETY ASSESSMENT

2.1 The safety assessment was performed in accordance with the GNSS Manual (ICAO Doc 9849) and verified for compliance with Annex 10 SARPs, RTCA DO-278A, SAE ARP-4754A/4761, and Japan-specific requirements.

2.2 Safety assessments are carried out in each phase of manufacturing.



2.2.1 Preliminary Design review Phase

2.2.1.1 Safety assessment includes "safety management planning process" and "safety design". In the system safety management planning process, the equipment manufacturing contractor presents a system safety plan that clarifies the work breakdowns and their outputs at each phase. The contents are as follows.

- FHA：Functional Hazard Assessment
- FMEA：Fault Mode and Effect Analysis
- FMES：Fault Mode and Effect Summary
- CCA：Common Cause Analysis
- FTA：Fault Tree Analysis
- System Safety Assessment
- Create algorithm description document

(“Safety design” is based on RTCA DO-278A, ED-109A, etc.)

2.2.1.2 Safety assessment is carried out by the preliminary level shown in the system safety plan. And safety assessment report and algorithm description document are prepared. The system safety plan, the safety assessment report and the algorithm description document are reviewed by Technical Review Panel. Once the review is completed by the Panel, PDR is held. After all of the action items raised during PDR were closed, preliminary design is approved by JCAB.

2.2.2 Critical design review phase (CDR)

2.2.2.1 Safety assessment is carried out by the critical design level based on the system safety plan. And the updated safety assessment report and the algorithm description document reflecting the results of the PDR are submitted.

2.2.2.2 They are reviewed by the Technical Review Panel and CDR is held. Likewise, after all the action items raised during CDR were closed, critical design is approved by JCAB.

2.2.3 Manufacturing assessment phase

2.2.3.1 Safety assessment is carried out by the manufacturing assessment level based on the system safety plan. And the updated safety assessment report and the algorithm description document reflecting the results of CDR are submitted. They are reviewed by the Technical Review Panel and then, Manufacturing Verification Review is held. After all action items were closed, manufacturing is approved by JCAB.

2.2.4 On-site adjustment and tuning

2.2.4.1 Manufacturer verifies the safety requirements of this equipment and proves fully compliant with the requirements under operational environment. For that purpose, the equipment manufacturer prepares the safety verification practice manual. It is presented in the technical review and is reviewed by the Review Committee dedicated to on-site adjustment and tuning work manual. Then safety verification based on the manual is conducted as part of the adjustment work.

2.2.4.2 Function related to safety and Algorithm are confirmed by actually measured data and the results are reflected in the Algorithm description document (final version).

2.2.4.3 These two documents are presented and reviewed in the technical review. After all action items were closed, On-site adjustment and tuning is approved by JCAB.

2.2.5 Validation Pre-operation

2.2.5.1 After the completion of on-site adjustment activities, flight inspections were conducted. In addition, GPS data and GBAS signals were collected to further assess compliance with the GBAS system safety requirements. With the cooperation of airlines, GLS monitoring was performed during VFR approaches. A total of 309 flights were monitored during the data collection period. Pilots expressed confidence in the stability of GLS and voiced strong expectations for its early operational deployment.

3. ACTION REQUIRED BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and
b) discuss any relevant matters as appropriate.

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