



# Federal Aviation Administration

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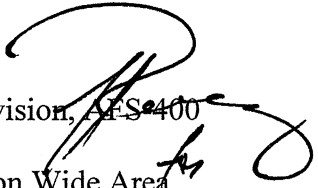
## Memorandum

Date: JAN 11 2011

To: Chas. Frederic Anderson, Manager, AeroNav Products, AJV-3

From: Leslie H. Smith, Manager, Flight Technologies and Procedures Division, AFS-400

Subject: Clarification of Locating the Flight Path Alignment Point (FPAP) on Wide Area Augmentation System (WAAS) Approach Procedures.



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### Purpose:

The WAAS system is designed to provide guidance simulating an Instrument Landing System (ILS) installation. This memo clarifies and simplifies the process of determining the FPAP location and associated values.

### Definitions:

**LTP.** *Landing Threshold Point.* A point on runway centerline at the threshold identified by a WGS-84 latitude, longitude, elevation above Mean Sea Level (MSL), and Height Above the WGS-84 Ellipsoid (HAE).

**FTP.** *Fictitious Threshold Point.* A point that serves as a pseudo LTP for procedures that are offset from true runway alignment.

**FPAP.** *Flight Path Alignment Point.* A WGS-84 latitude/longitude point that serves as the departure end of runway in the Final Approach Segment (FAS) data block in WAAS approach coding. The LTP/FTP and FPAP are used to define the final approach course alignment.

**GARP.** *Global Navigation Satellite System (GNSS) Azimuth Reference Point.* A calculated point 1000 feet beyond the FPAP lying on an extension of a geodesic line from the LTP/FTP through the FPAP. This point is used by the airborne system as the origin of the lateral guidance sector (*see diagram below*). It may be considered the location of an imaginary localizer antenna.

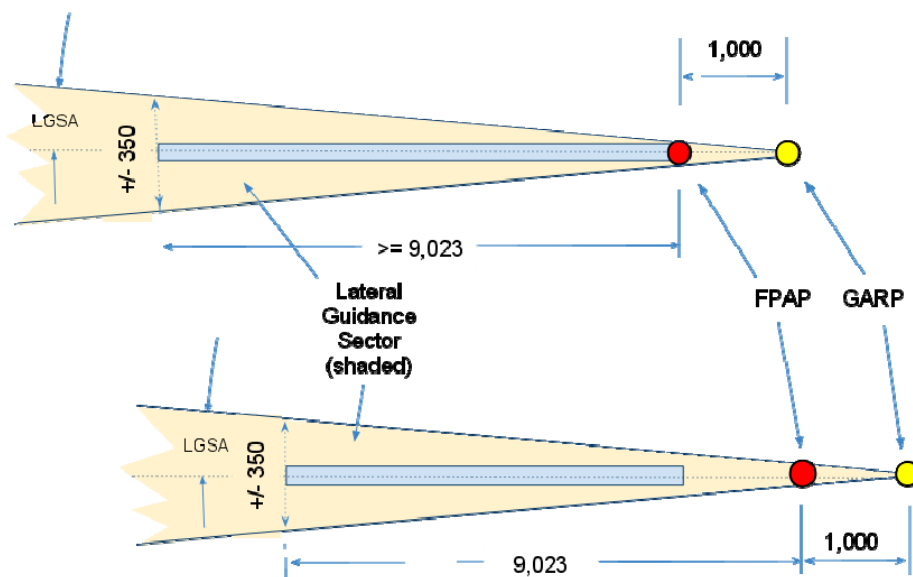
**LGSA.** *Lateral Guidance Sector Angle.* The angular dimension of the lateral guidance sector boundaries relative to the course measured at the GARP. Specifying the calculated angle tailors the width of the lateral guidance sector to  $\pm 350$  at the LTP/FTP. Order 8260.54A, Table 2-6 column 3 refers to LGSA as "Slay".

**OFFSET LENGTH.** The distance between the departure end of runway and the GARP. This is the value in Table 2-6 column 5.

**RUNWAY LENGTH.** The along-track distance from the LTP to the departure end of the runway.

**WGS-84.** *World Geodetic System of 1984.* It is the earth reference frame used by the United States for (*among other things*) GPS "broadcast" and defining "precise" satellite orbits.

**WIDTH.** Lateral guidance sector half-width at the LTP/FTP.



**Policy:**

Locate the FPAP at the departure end of runway or 9023 feet from the LTP/FTP, whichever is the greater distance from the LTP/FTP.

The following calculations replace 8260.54A, table 2-6. An existing ILS is no longer a factor.

$$\begin{aligned}
 d_{FPAP} &= \max(RWY\ Length, 9023) \\
 d_{GARP} &= d_{FPAP} + 1000 \\
 Offset_{Length} &= d_{FPAP} - RWY\ Length \\
 LGSA &= \text{round}\left(\text{atan}\left(\frac{350}{d_{GARP}}\right) \times \frac{180}{\pi}, 2\right) \\
 Width_{feet} &= 350 \\
 Width_{meters} &= 106.75 \\
 \\ 
 \text{If } RWY\ Length > 12366 \text{ then} \\
 LGSA &= 1.5 \\
 Width_{feet} &= \text{round}\left(\tan\left(1.5 \times \frac{\pi}{180}\right) \times d_{GARP}, 0\right) \\
 Width_{meters} &= \frac{\text{round}\left(4 * Width_{feet} \times 0.3048, 0\right)}{4}
 \end{aligned}$$

If you have any questions, please contact Mr. Jack Corman, Program Analyst, Flight Procedure Standards Branch, AFS-420, at (405) 954-0012.