15 July, 2022

Mr. Lawrence Fields
Acting Executive Director, Flight Standards Service
Federal Aviation Administration
800 Independence Avenue, S.W.
Washington, DC 20591

Dear Mr. Fields,

The Performance-based Operations Aviation Rulemaking Committee (PARC) Steering Group is pleased to submit the following recommendation from the PARC Navigation Working Group for your consideration: Obstacle Accuracy Standards & Instrument Flight Procedure (IFP) Obstacle Evaluation

This is a multi-layer recommendation as the initial task was to look at IFP Obstacle Evaluation. After much deliberation though, while the benefits of the group's recommendation are strong, it requires a review of the Obstacle Accuracy Standards to bring them up-to-date with current, more accurate survey standards to avoid harm to the current NAS approaches.

I think you'll find this recommendation intriguing and due to the complexities, I'm also attaching a PowerPoint brief to the email which provides some helpful graphics.

The PARC looks forward to the FAA's review of this recommendation and any feedback on the as it pertains to this item.

Sincerely,

Ronald Renk
Industry Co-Chair, PARC

Cc: Chris Hope
Mike Cramer
Angela Williams

Problem Statement.

The Federal Aviation Administration (FAA) uses standards to define the location and height of aeronautical obstacles that are 42 years old. These standards do not match the capabilities of modern aeronautical survey techniques and equipment; today's aircraft navigation systems and avionics; nor the modern navigation facilities and sources these aircraft use. Additionally, the FAA evaluates and applies aeronautical obstacle locations and heights in a nonstandard manner that differs by instrument procedure types. In some instrument procedure types this could eliminate aeronautical obstacles from evaluation in procedure design. This, in turn, may introduce an unidentified hazard to the procedure by publishing minimum procedural altitudes lower than that specified by the Required Obstacle Clearance (ROC) in instrument procedure design criteria.

Problem One - Obstacle Accuracy Standards

The current FAA standards for identifying the location and height of aeronautical obstacles are antiquated and do not reflect the capabilities of modern survey techniques and technologies. Additionally, different lines of business within the FAA apply different standards when identifying the very same aeronautical obstacles. The best Accuracy Code the FAA uses in procedure design today is Accuracy Code 1A. A survey that provides an obstacle Accuracy Code of 1A declares an aeronautical obstacle's height within +/- 3 feet (height error) and the obstacle's location within +/- 20 feet (location error).

A survey accuracy of 1A is representative of the techniques and capabilities surveyors applied in 1979 when the current Accuracy Codes were developed. Yet, today surveyors can provide much more accurate and precise surveys enabled by GPS and other recent technologies. An example of this more modern survey application is the FAA's Airport Surveying-Geospatial Information System (GIS) Program. This program takes advantage of today's survey capabilities and requires very accurate survey standards. For example, FAA Advisory Circular (AC) 150/5300-18B requires GIS surveys for an ILS to meet the accuracies listed below to a 95% confidence level:

ILS Glide Slope Antenna

Horizontal accuracy +/-1.00 feet
Vertical accuracy (ellipsoidal) +/- 0.20 feet
Vertical accuracy (orthometric) +/- 0.25 feet

ILS Localizer Antenna

Horizontal accuracy +/-1.00 feet
Vertical accuracy (ellipsoidal) N/A
Vertical accuracy (orthometric) +/- 0.25 feet

ILS Distance Measuring Equipment Antenna

Horizontal accuracy +/-1.00 feet
Vertical accuracy (ellipsoidal) N/A
Vertical accuracy (orthometric) +/- 1 foot

The FAA could use an airport's survey results for its ILS facilities for instrument procedure design and publication. Additionally, they could use the very precise values that can and are obtained by surveyors when they survey the location of a proposed or existing cell tower, building or other man-made structure. This information is known to the structure owners for a multitude of reasons such as structure insurance requirements, building construction plans construction permit applications, zoning requirements and spectrum analysis and signal propagation to mention just a few. However, across the various FAA lines of business that address aeronautical obstacles, and the accuracy standards to which the location data for these obstacles are established, there is no provision for an Accuracy Code better than 1A. If the owner surveyed data could be incorporated into the FAA obstacle data, it would greatly enhance the quality and the usability for procedure design. Currently, when an instrument procedure is developed, the same ILS system that was required to be surveyed to accuracies of 1 foot or less for the FAA's Airport Surveying-Geospatial Information System (GIS) Program will be classified 1A since there are no accuracy codes better than that in criteria. Specifically, the

following will be applied as the best accuracies for identifying the location and height of an ILS facility in instrument procedure design:

ILS Glide Slope Antenna

Horizontal Accuracy Code 1 +/-20.00 feet
Vertical (ellipsoidal) Accuracy Code N/A
Vertical (orthometric) Accuracy Code A +/- 3.00 feet

ILS Localizer Antenna

Horizontal Accuracy Code 1; +/-20.00 feet
Vertical (ellipsoidal) Accuracy Code N/A
Vertical (orthometric) Accuracy Code A +/- 3.00 feet

ILS Distance Measuring Equipment Antenna

Horizontal Accuracy Code +/-20.00 feet
Vertical (ellipsoidal) Accuracy Code N/A
Vertical (orthometric) Accuracy Code +/-3 foot

Problem Two - Obstacle Evaluation Standards

The aeronautical obstacle evaluation standards FAA procedure designers use for all instrument procedures, except for the standards for Required Navigation Performance Authorization Required (RNP AR) instrument procedures, do not account for all aeronautical obstacles potentially underlying the Terminal Instrument Procedures (TERPS) Obstacle Clearance Surfaces (OCS). FAA procedure design only evaluates obstacles during the development of conventional procedures (e.g., a VOR/DME approach) and during design of RNP procedures (e.g., an RNAV (GPS) approach) when the documented location of an aeronautical obstacle location underlies the procedure's OCS. Current procedure design standards do not consider any aeronautical obstacles with a low-quality location identification i.e., a high alphanumeric value, that do not underlie an instrument procedure's OCS. Yet, this same low-quality horizontal accuracy may place these obstacles under an instrument procedure's OCS. Due to this procedural application of an obstacle with a low-quality accuracy code, an obstacle may underlie an instrument procedure's path and possibly penetrate the procedure's OCS. When a published instrument procedure ignores these potential obstacles, these obstacles effectively become unidentified, potential hazards for the procedure types.

In contrast, in RNP AR procedure development the procedure designer considers the location and height of each identified obstacle with consideration of the obstacles' accuracy codes. The procedure designer then uses the potential locations and potential heights to determine the minimum altitudes for each RNP AR procedure leg segment. The designer does this by applying a "cylinder model" to the obstacle's published location and height where the obstacle's accuracy code defines the width and height of the cylinder. If the cylinder underlies and penetrates a RNP AR OCS, then the designer takes this into account in the design by either ensuring a leg segment's minimum procedural altitude provides the ROC or by moving the lateral procedural track to avoid the obstacle (i.e., avoid the "cylinder" defining the obstacle's impact). Thus, RNP AR procedure design requires that procedure designers evaluate and apply obstacles in their designs that conventional instrument procedures and RNP instrument procedures ignore.

Since RNP AR procedure design considers the obstacles that other procedure designs ignore, through the application of the "cylinder model" technique, an airport can have two different instrument procedures with identical leg segments overlying the same ground track. In these situations, the same actual obstacles are present, yet the RNP AR procedure design will potentially have a different, higher minimum procedural altitude than the procedural altitude for the identical ground track a conventional or RNP procedure uses.

Accuracy Standards - Recommendation 1.:

RECOMMENDATION 1: The FAA should standardize the survey requirements for the height and location of aeronautical obstacles across all lines of business. To enable this, the Nav WG recommends that the FAA should update the obstacle accuracy standards in FAA orders to match the more precise and accurate survey standards available today that FAA AC

150/5300-18B requires. It is not suggested that the existing standards be replaced, but that they should be enhanced to accommodate and record aeronautical obstacle locations to the better survey standards of FAA AC 150/5300-18B. This will require the development of Accuracy Codes better than 1A to accommodate the location accuracies of +/- 1 foot horizontally and +/- 1 foot vertically or better required by FAA AC 150/5300-18B.

RATIONALE: Updating and harmonizing the survey standards in the FAA orders for aeronautical obstacle location and height determination to match the standards in FAA Advisory Circular 150/5300-18B will result in standard identification of obstacles locations and heights. This will allow all FAA lines of business to define obstacle locations and heights in a consistent, standardized manner, allowing the FAA to use the more stringent, but wholly practical, survey standards as those of FAA AC 150/5300-18B. Publishing more accurate data defining the location and height of an obstacle results in more optimum instrument procedural paths while enhancing safety (by ensuring consideration of potential hazardous obstacles) and while ensuring efficiency in support of the FAA's Next Gen implementation plans.

IFP Obstacle Evaluation - Recommendation 2.:

RECOMMENDATION 2.: After standardizing the aeronautical survey standards and requirements, the FAA should standardize the procedure design criteria application of identified obstacles across all different types of procedures. That is, the FAA should standardize the procedure design application of an obstacle's location and height for all procedure designs. Doing this would apply the standardized survey standards Recommendation 1. (above) suggests. The new procedure design criteria should embrace any obstacle that actually or potentially underlies the OCS of any instrument procedure.

RATIONALE: The current procedure design techniques are not standardized and do not properly consider advances in aeronautical survey accuracies. Adopting this recommendation would eliminate the lack of standardization in obstacle identification and application in future procedure designs while taking advantage of the capabilities of a modern aeronautical survey's results. This will enable refining and more accurately identifying an obstacle's location and impact(s) on a procedure design's desired path. The recommendation embraces today's "cylinder model" obstacle identification and application RNP AR procedures use today and would not require extensive brainstorming and consensus-building to publish the new procedure design standards. This enables the following implementation phases should the FAA adopt the recommendations in this paper:

Phase 1: Publish the new survey accuracy standards and accuracy code changes in the FAA guidance materials and orders.

Phase 2: After completing Phase 1, apply today's RNP AR procedure design cylinder model obstacle accuracy technique to all Navigation Service Group (NSG) 1 airports and any new or amended instrument procedure designs at these airports.

Phase 3: As Phase 2 nears completion, begin applying the new survey standards and the new cylinder model obstacle accuracy technique to all new and amended instrument procedure designs at NSG 2 airports (budget permitting).

Phase 4: As Phase 3 nears completion, begin applying the new survey standards and the new cylinder model obstacle accuracy technique to all new and amended instrument procedure designs at NSG 3 airports (budget permitting).

Phase 5: As Phase 4 nears completion, begin applying the new survey standards and the new cylinder model obstacle accuracy technique to all new and amended instrument procedure designs at NSG 4 airports (budget permitting).

Phase 6: Apply the new survey standards and the new cylinder model obstacle accuracy technique to all new and amended instrument procedure designs (end state).