U.S. Department
of Transportation
**Federal Aviation
Administration**

Office of the Regional Administrator
New England Region

1200 District Avenue
Burlington, MA 01803-5299

August 14, 2020

Mr. Matthew A. Romero, Executive Director
Massport Community Advisory Committee
One Broadway, 14th Floor
Cambridge, MA 02142

Dear Mr. Romero:

You requested on May 15 that the Federal Aviation Administration (FAA) provide an early feasibility assessment to a series of Block 2 Area Navigation (RNAV) design concepts for Runways 33 Left and 22 Right/Left at Boston Logan International Airport. We appreciate this opportunity.

We assembled a panel of stakeholders consisting of representatives from the airline industry, the FAA Air Traffic Organization (Mission Support Services, Air Traffic Services, System Operations and the National Air Traffic Controllers Association), the FAA Office of Environment and Energy, and FAA Flight Standards. Enclosed is a consolidated assessment of the proposed concepts by the participating FAA and industry stakeholders.

I would welcome a meeting with you to discuss this assessment further. In the meantime, if you or your staff have any questions, please feel free to call me or Lorna Christian, Senior Advisor, at (781) 238-7020.

Sincerely,

COLLEEN M D'ALESSANDRO

Digitally signed by COLLEEN M D'ALESSANDRO
Date: 2020.08.14 12:24:51 -04'00'

Colleen M. D'Alessandro
Regional Administrator

CC: Flavio Leo (Massport), Dr. John Hansman (MIT), Reginald E. Davis (FAA)

Enclosure

Response to MIT Block 2 RWY 33L, 22L/R Preliminary Proposals
August 13, 2020

The Operations Support Group assembled a panel of stakeholders consisting of representatives from the Airline Industry, the Air Traffic Organization (Mission Support Services, Air Traffic Services, System Operations and the National Air Traffic Controllers Association), the Office of Environment and Energy, and Flight Standards to evaluate the preliminary Boston MIT Block 2 proposals related to RWY 33L/22L/R. Note: All procedure design and air traffic operational changes will follow the NEPA process.

The following represents the consolidated FAA/Industry stakeholder assessment of eight proposals. The impacts and merits of each proposal were carefully considered and evaluated based on local and national operational experiences, expertise, knowledge, and perspectives.

Each reviewer was challenged to compare and contrast operations at KBOS with those of other major airports where the proposed concepts are implemented and utilized. The airports discussed were KDFW, KCLT, and KORD. Review facilitators encouraged reviewers to consider how other airports operate using similar concepts to ensure stakeholders based objections and concerns on the uniqueness of KBOS's runway configuration, its airspace constraints, and its reliance on easterly departures.

The review also identified and emphasized the significant interdependencies of the current instrument flight procedure designs and infrastructure at KBOS. The current airspace and flight procedure design is optimized to ensure maximum safety and efficiency within the national airspace system. Boston airspace has vertical and lateral constraints that make it challenging to adjust operations without significant systemic impacts.

Additionally, reviewers noted three common areas of concern throughout the feedback provided by FAA Air Traffic Control, NATCA, Office of Environment and Energy, and Flight Standards.

- **Flight Track and Altitude Predictability -** This concern stems from the potential of creating an operational environment in which variations in aircraft performance characteristics and human judgment can lead to variations in ground track and climb rates. Unpredictability in departure operations requires controllers to increase spacing and increase controller to pilot transmissions. Both of these lead to measurable increases in controller and pilot workload.

- **Frequency of Pilot and Controller Transmission -** A known correlation exists between high pilot and controller transmission rates and operational errors, including losses in separation, as there is a greater chance for human error to be introduced. Controllers must verbally transmit information that must be accurately heard and processed by the pilot. The pilot must speak the instructions back to the controller for validation. Any error must be detected, and the instruction reissued. A controller will have many pilots on a single frequency that may be trying to speak simultaneously, leading to frequency congestion, further increasing the probability of errors. Utilizing PBN procedures drastically reduces the need for pilot and controller transmissions resulting in enhanced safety.

- **Presence of Acceptable Levels of Safety (for criteria deviations)** - Often referred to as an equivalent level of safety, this term applies to FAA instrument flight procedures or FAA actions that deviate from FAA rules or regulations. A nonstandard IFP is not substandard; however, it must be approved by special studies that demonstrate no derogation of safety is involved with the action. The review members are among the same subject matter experts who supply acceptable levels of safety for such deviation to standards.

Finally, the review panel also noted that it is not practical to consider RWY 33L proposals for low traffic periods because the current noise abatement practice is to use RWY 15R for nighttime departures.

The FAA has invested significant time and resources to explore various solutions for the aircraft noise over the Boston area, beginning with BONS (Boston Overflight Noise Study)/BLANS (Boston Logan Airport Noise Study) in the early 2000s. Throughout this period, the Boston area has benefited from the advances in NextGen safety and efficiency, and the FAA remains committed to its primary mission of aviation safety and efficiency in the National Airspace System.

Proposal 1: Altitude Based Dispersion RWY 33L

MIT design proposal:

To utilize an Altitude-based dispersion by using natural variability in aircraft climb gradients. Upon reaching a specific altitude, aircraft would proceed directly to the transition waypoint.

FAA/Industry response:

This departure design is called Vector to Altitude/Direct-to-Fix (VA/DF) departure. In this design, departing aircraft climb on a designated heading until reaching a specified altitude, at which point the aircraft turns direct to an assigned fix. Boston-Logan Intl aircraft types and performance characteristics vary widely, which is at the center of the panel's concern should Boston rely on this type of procedure. For example, a typical heavy aircraft climbs at a slower rate than a higher-performing aircraft. When a higher-performing aircraft departs in trail of a heavier, less maneuverable aircraft, there is the potential that the trailing aircraft to reach the prescribed turn altitude earlier (than the leading heavy) despite departing later. In doing so, the potential for the loss of separation between the two aircraft is greatly enhanced. This scenario is common in VA/DF situations where a turn at the VA point is anticipated. This scenario results in compression, unpredictability, leaves little margin for deviation, and introduces safety concerns.

In contrast, the current departure procedure is very predictable and reliable, which enhances safety and is preferred by ATC.

Assessment: Not a Candidate for Further Evaluation

Reason(s):

- Reduces predictability, increases potential safety concerns.
- Significant departure ground track turn variations are discouraged at Boston, which this proposal will introduce, thereby risking separation violations.
- Confined airspace restricts the ability to take advantage of VA/DF design legs, so little benefit realized.

Proposal 2: Controller-based Dispersion (Logan Two) RWY 33L and RWY 22L/R

MIT design proposal:

Controller-based dispersion arising from radar vectoring.

FAA/Industry response:

The Logan Two Departure is a conventional procedure known as a 'Vector SID.' Departing aircraft receive instructions to fly the appropriate heading, followed by "expect RADAR vectors to route/NAVAID/fix…"

The panel acknowledges this type of instruction affords air traffic control (ATC) some latitude to vary ground tracks to assist with dispersion. However, the panel highlighted additional burdens this proposal places on ATC to ensure separation and manage a corresponding increase in the frequency of radio transmissions. Additionally, Boston-Logan's runway configuration, varied aircraft performance characteristics, and nearby airspace boundaries caused the panel additional concerns that ATC would need to improvise routing, which leaves very little room for error should something unexpected occur (e.g., a controller gives a late instruction).

Finally, the Logan Two SID is heavily used for non-turbojet aircraft and jet departures, not requesting climb above 10,000 MSL. Increasing usage by jets climbing above 10,000 MSL introduces new safety concerns of sector/ATC overload and frequency congestion during a critical phase of flight.

For all the above reasons, users of Boston-Logan airspace favor PBN-based departure procedures over conventional.

Assessment: Not a Candidate for Further Evaluation

Reason(s):

- Increases pilot to controller transmissions.
- Introduces new safety concerns through frequency congestion in critical phases of flight.
- Elevates the concern of read back and hear back errors.
- The existing PBN procedure alternatives provide more efficiency and throughput. RNAV procedures are preferred over conventional throughout the NAS.
- Decreases track predictability requiring increased controller vigilance.
- Removes procedural separation introducing the possibility of human error and frequency-congestion induced errors.

Proposal 3: Divergent Heading Dispersion – Charted by Enroute Fix RWY 33L

MIT design proposal:

Divergent heading dispersion utilizing 15° divergent headings either off the runway or after flying an initial runway heading. The aircraft would then fly a direct routing to the transition waypoint.

FAA/Industry response:

This concept requires relocating the RNAV waypoint TEKKK. Placing TEKKK where it currently resides was very difficult to achieve due to an airspace boundary 1.5 NM to the east. Alternatives to the current location were carefully evaluated, and the panel is confident the fix cannot be relocated.

The easterly movement of TEKKK would conflict with JFUND RNAV STAR arrivals, and the westerly movement of TEKKK shortens the leg length between TEKKK and COUSY. COUSY has an altitude restriction to allow positive separation from RWY 27 departure traffic, and reducing TEKKK to COUSY presents fly-ability issues.

MIT indicates options of using VI/CF and VA/DF legs; however, the panel discovered issues with passing FAA design criteria preventing certification and publication (Issues have been identified with VA/DF departure legs in another section).

To the question of whether a waiver could be pursued for any criteria failures, industry indicates there is no equivalent level of safety to justify such a proposal.

Assessment: Not a Candidate for Further Evaluation

Reason(s):

- The proximity of conflicting airspace.
- Failure of the procedure construction due to leg length and altitude criteria.
- The proposal creates design criteria failures.

Proposal 4: RNAV Waypoint Relocation RWY 33L

MIT design proposal:

Repositioning the waypoint TEKKK so that the RNAV tracks branch off could allow for population exposure reduction.

FAA/Industry response:

As previously discussed in proposal 3, relocating TEKKK is not practical. Additionally, the anticipated benefit to this proposal is based upon unrestricted climb to 14,000, which Boston-Logan controllers agree is not a normal or standard possibility.

Assessment: Not a Candidate for Further Evaluation

Reason(s):

- Relocating TEKKK is not practical.
- The unrestricted climb would not be possible due to conflicting airspace/traffic flows.
- Refer to reasons listed in Proposal 3.

Proposal 5: Variable Rotation Departures (VRD) RWY 33L

MIT design proposal:

Variable Rotation Departure (VRD) is a community proposed departure procedure. Controllers would rotate between waypoints during operations on departing aircraft.

FAA/Industry response:

As noted in the MIT proposal, this concept has many hurdles: "RNAV Procedure Naming Convention is Major Operational Barrier to VRD" FAA Order 8260.46G 3-1-2(d) states: "DPs designed using conventional, RNAV, or required navigation performance (RNP) guidance must be named to correspond with the enroute fix/NAVAID name where the DP ends." Industry indicated significant concerns regarding FMS memory issues as chart naming convention requires 48 separate procedures accompanied by the establishment of 42 new exit waypoints. The panel is concerned about the complexity of this proposal, the requirement to create 48 individually named departure procedures, and Air traffic Control's requirement to develop excessively complicated Letters of Agreement and Standard Operating Procedures to accommodate the new exit waypoints. Additionally, panel concerns arose over uncertainty whether or not the FAA ATC software is capable and equipped to handle variable waypoints within charted SIDs/Transitions. Absent Pilot Direct to Controller (PDC) automation, clearances must be relayed verbally for flight plans containing the incorrect SID. The potential pilot and controller workload increase is of great concern to the review panel.

Assessment: Not a Candidate for Further Evaluation

Reason(s):

- Industry indicated significant concerns regarding FMS memory issues.
- Support of this concept requires numerous changes to the ATC Letters of Agreements and Standard Operating Procedures.
- FAA indicated concerns with ATC software with its ability to handle variable waypoints within charted SIDs/Transitions.
- Increases pilot, dispatcher, and controller workloads, which introduces potential safety concerns into the Boston airspace system.
- Refer to reasons listed in Proposal 3 and Proposal 4.

Proposal 6: VI-CF Rev 2 RWY 22L/R (for when RWY 27 in use) and VI-CF Rev 2 (for when RWY27 not in use)

MIT design proposal:

Revision of current RNAV VI-CF procedure to move tracks farther north, away from the Hull peninsula. MIT is requesting a waiver to separation standards.

FAA/Industry response:

As noted in the MIT proposal, this concept, if used when RWY 27 is in use for arrivals, requires a waiver for the 45-degree separation rule (7110.65Y 6-3-1). It also requires guidance for VI-CF turn > 90 degrees (no existing guidance in 8260.58A). Under this proposal, the initial turn would be 111/113 degrees, and industry panel members indicate that their FMS systems will not fly the procedure. MIT also includes this proposal for use when RWY 27 is not in use.

Assessment: Not a Candidate for Further Evaluation

Reason(s):

- ATC does not support having a departure procedure available only when RWY 27 is not in use due to the human factors and subsequent safety concerns that could arise.
- Does not comply with RNAV design criteria.
  - Turn is greater than 90 degrees.
- Would require a waiver to air traffic control separation standards.
  - Waivers are not available for separation standards, particularly with no acceptable level of safety.
- MIT claims aircraft are separated by altitude.
  - Aircraft must also be procedurally separated.
- FAA/Industry does not support the necessary waivers absent acceptable levels of safety for procedural separation.
- Industry concerns over their FMS incompatibility with the proposal.

Proposal 7: Vector SID (RNAV with initial vectors) RWY 22L/R

MIT design proposal:

MIT is requesting new RNAV SID for 22L/R that relies on initial vectors off the runway. Rejoins the current RNAV tracks at waypoint BRRRO.

FAA/Industry response:

Issuing a heading off 22L/R is an issue. If the tower gives heading on takeoff clearance, some airplanes will be turning just over the runway. Others will be turning up to 2 NM south of the field. ATC will lose predictability on where the aircraft turns.

Assessment: Not a Candidate for Further Evaluation, however, an alternative has been proposed

Reason(s):

- Radio transmissions may be delayed causing late turns.
- Loss of predictability.
- Climb rate varies by aircraft type.
- Airspace constraints may limit turn angles.

Proposal 8: Thrust cutback RWY 22L/R

MIT design proposal:

Aircraft continue to fly the current RNAV path off 22L/R, but execute a thrust cutback when flying by the Hull peninsula to reduce engine noise.

FAA/Industry response:

This concept has many hurdles. Industry states that a clearance is to climb to assigned altitude, and a level off is not an assigned altitude. Leveling off aircraft, in the vicinity of the HULL intersection, could cause conflictions with adjacent airspace and traffic flows. In addition, this process could create issues while crossing back over the minimum shoreline altitude. ATC advises this is not possible due to compression and airspace separation.

Assessment: Not a Candidate for Further Evaluation

Reason(s):

- Voluntary reduction in thrust during level off, in the vicinity of HULL, would not be possible due to increased compression issues with trailing aircraft, creating a potential loss of separation.
- Voluntary compliance is not an option.
- ATC issues unrestricted climb to 14,000. Due to conflicts with other procedures and airspace boundaries, ATC does not want to level aircraft. By leveling off aircraft, ATC runs the risk for potential safety concerns with adjacent airspace and/or potential loss of separation with inbound traffic.
- May create issues with crossing back over the shoreline at or above the expected charted altitude.
- Aircraft climb rate during summer and peak loads could impact climb criteria during this phase of flight.