

**Boston Overflight Noise Study (BONS)
BOS/TAC Meeting**

MEETING SUMMARY

March 30, 2006

Attendance:

BOS/TAC Members:

Joseph Davies (FAA Air Traffic), Joseph Bellabona (FAA), Gail Lattrell (FAA Airports), Flavio Leo (Massport), Steve Kelley (FAA), Steve Lathrop (Hull), Maura Zlody (Boston Environmental Department), Sandra Kunz (Braintree), Bob D'Amico (City of Boston Mayor's Office), Jerry Falbo (Winthrop), Ron Fama (Weymouth)

Project Consultant (PC) Team:

Greg Wellman (Ricondo & Associates, Inc.), Dennis Burke (Ricondo & Associates, Inc.), Stephen Smith (Ricondo & Associates, Inc.), Robert Varani (ASRC Aerospace), Scott Hamwey (Planners Collaborative)

Independent Consultant (IC) Team:

Jon Woodward (Landrum & Brown, Inc.), Bud Riebel (Landrum & Brown, Inc.), Rob Adams (Landrum & Brown)

1. Introductions

Greg Wellman started the conference call by taking a roll call and then introduced the format. He explained that there were two hours budgeted for the call and that the primary topic would be Alternative 5. At the February meeting, Alternative 5 had been set aside for further discussion, and a memo had been distributed on March 20 that presented the PC's, IC's and FAA's attempt at a revised design for the alternative. The purpose of this call is to review that revised design and determine if the BOSTAC wished to carry the alternative forward. G. Wellman added that if time allowed they could attempt to cover some outstanding issues surrounding Alternative 12.

2. Alternative 5

Steve Smith explained that at the February meeting, the PC presented what it believes was the best available design based on airspace and design, and one that met the intent of procedure. The issue that was raised at the meeting was the location of waypoint 629, and its viability in terms of separation from 27 arrivals and its relationship to northern tip of Hull. Steve Lathrop had inquired as to what waypoint 629's impact was given the 3.5 mile lateral separation with the approach to 27. Robb Varani's findings had been that the waypoint could only be moved 0.2 nautical miles to the south without impacting the remaining elements of the design. Anything more than 0.2 would put the waypoint outside the departure sector and impact TRACON to Center transition. The PC still had concerns that even moving the waypoint 0.2 miles would not meet the FAA's desired 3.5 nautical miles between the center of 22 RNAV and center of 27's approach.

S. Lathrop said that he was confused. He said the memo stated that the procedure cannot be redesigned to meet FAA separation requirements, but then R. Varani had referred to the 3.5 mile separation. S. Smith replied that FAA was concerned about the center line. He explained that there is a 0.6 nautical mile width on either side of the center line. S. Lathrop asked if there was an expectation that the northern edge of the dispersion corridor would be 3.5 miles to the north if flights meet standards. S. Smith corrected his statement that the 3.5 mile separation starts from the northern edge of the RNAV procedure as discussed at the February 17th meeting. S. Lathrop suggested that there was agreement that this is a requirement. Dennis Burke replied that they were looking at it from the point of view of trying to get 3.5 miles of lateral separation. The refinement proposed by PC incorporates a vertical separation as well as staying 1.5 miles south of the departure sector line that separates Runway 27 arrivals from Runway 22 departures. The PC believes this is practical depending on how the procedure comes out of FAA's 18-step process. There was uncertainty due to the fact that this will be one of the first procedures of this kind to be reviewed. D. Burke suggested that, in the PC's opinion, this is on the only opportunity to put an RNAV procedure for runway 22 into the 18-step process with a chance to come out on the other side as an approved procedure. It can't be moved north because of 27 and it can't be moved south because it will go against the goal of reducing flight tracks over Hull. As a result, as per the March 20th memo, the PC is recommending that this procedure go into noise analysis.

Ron Fama stated that Weymouth has a serious problem with 140 degrees instead of 100. He said that 140 degree heading brings flights over Weymouth. He suggested that people were being protected from noise who were much further from the airport than Weymouth. R. Fama said that Weymouth is the most overflowed community in New England and requested that his dissent be noted as well as his citing of the federal court order and the record of decision. He also inquired as to whether Swampscott or Lynn receives any problems currently. Flavio Leo stated that both communities do get overflights, but discussions associated with these areas do not pertain the agenda item for this meeting. He did say that its highly unlikely that Massport would receive complaints on 22 departures from those communities. G. Wellman asked that the group restrict discussion to this alternative and procedure.

S. Lathrop asked when pilots would begin RNAV—at the first waypoint or earlier. D. Burke replied that the plane comes off on a 140 heading, and the controller will tell them to turn left to waypoint 629 ("cleared direct to the RNAV departure) and then the pilot would engage the RNAV portion of the procedure. S. Smith asked what the controller would need to know before releasing the pilot direct. D. Burke said that the controller needs to confirm radar contact. He added that weather information would also be a deciding factor. He estimated that this may occur somewhere between 2 to 2.5 miles from the end of the runway, but will vary from one operation to another. R. Varani added that pilot navigation begins at the end of the runway. S. Lathrop asked if pilot nav was the same as RNAV. Joe Bellabona said that they were different. Pilot navigation is a term for the pilot controlling aircraft movement by actively participating in rudder, aileron, elevator or thrust application(s).

S. Lathrop asked J. Bellabona about the point at which the pilot would engage RNAV. J. Bellabona replied that there had been no modeling done yet and that it would need to be simulated first. He said that all pilots will engage RNAV at different times. When they are told to go direct to fix, the pilot will engage their navigation system to go direct to fix. J. Bellabona explained that some are more aggressive than others. Up to that point, pilot nav is the same as you have today. When the flight management system is engaged, the pilot is no longer navigating the aircraft. The flight management system is. He said there would be pilot variances on making that turn. He added that the only thing guaranteed is that after waypoint 629 the aircraft will be on RNAV track.

S. Lathrop asked for clarification on pilot nav. J. Bellabona explained that the pilot is holding the wheel and flying the aircraft. Once the pilot engages lateral navigation and couples to the autopilot, then the autopilot is flying the aircraft. The pilot will engage LNAV when he is told to fly direct to that fix. J. Bellabona explained that this meant the pilot will engage it before that fix. He added that it would not be guaranteed that any track from end of the runway to waypoint 629 would avoid Hull.

S. Lathrop asked if it would be reasonable that the pilot nav would turn the plane away from 140 and towards to 629 at about the same point where this occurs presently. D. Burke replied that the answer is yes, PC expects that it will be close to the same. S. Lathrop asked if that meant that they could do an analysis on where those instructions are typically being issued now. S. Smith explained that such an analysis is not included in Phase I. The analysis involves collecting audio tapes of controller-pilot communication while simultaneously viewing radar data. Phase 1 budget does not include the level of analysis suggested here. S. Smith said that if there are any issues with this procedure, the 18-step process is designed to identify and assess them. What has been done already is sufficient to get into the 18-step process.

Bob D'Amico asked if the northbound turn would take place at waypoint 703. R. Varani replied that he thinks it will be a little farther east in order to get them above the 27 arrivals.

S. Lathrop said that the inability to know where the turn from course to 140 takes place introduces uncertainty. He pointed out that some of radar tracks don't seem to have flown a 140 heading for any length of time after takeoff, and suggested that factoring that into this analysis confuses the issue. J. Bellabona said that those tracks are normally used as a guide. He said that if you're looking at the data sent out, the line in the center is the one they are shooting for, and that once you are on that RNAV track, you will tend to be established on that track on the centerline. S. Smith said that they are depicting the situation as best as they can with the current available information.

S. Lathrop asked if the plane will be on the centerline after it hits 629. J. Bellabona replied that this was correct. S. Lathrop asked where the plane would be before that. J. Bellabona explained the switch to LNAV, saying that there is nothing that can be considered typical from the end of the runway to 629. S. Lathrop asked why there was a drawing, and if someone engages LNAV from the end of the runway whether the typical performance would change. J. Bellabona replied that they wouldn't know until it is modeled. He added that he is confident that nothing will change with this procedure on the northern tip of the Hull peninsula, but that he also doesn't think it will make anything worse. S. Smith stated that this conclusion should not be made until after noise modeling is completed.

G. Wellman interrupted the discussion and requested that conference call participants give each other an opportunity to speak. Before moving on he asked S. Lathrop for one final comment.

S. Lathrop said that the group is receiving professional opinion about what is going to happen, but that it is accompanied by descriptions of several factors that might affect the outcomes. He used the timing of LNAV engagement as an example, to which R. Varani clarified due to some misinterpretation. F. Leo said that he had always envisioned that once you use an RNAV on this procedure that you would get the same splay, just narrower. He asked if it was a realistic concern that, in addition to the narrower splay, that you could get a shifting of the splay as well. R. Varani replied that they do not know how the controllers are going to handle this, but that they can include a preferred vector.

J. Bellabona said that he never said the splay would shift further south. He said that there would be no difference from what you have today.

S. Lathrop asked if LNAV was software. J. Bellabona explained that it was a combination of hardware and software. S. Lathrop said that since there will be software in the equation, and the software will have something to say about how to fly that particular plane, then the outcomes will depend on discussions between FAA and software developers. He asked who would develop it. J. Bellabona replied that there are multiple developers. S. Lathrop suggested that it would be reasonable to assume that the developers would do as much as they can to match the FAA procedures. J. Bellabona said that they do it to a national safety standard. Procedures are not designed for noise abatement but for safety and efficiency. Then noise abatement is applied to the procedures.

Steve Kelley said that he didn't understand the thrust of the question, but that he thought J. Bellabona had done a great job of explaining how this works and what the potential benefits are. He agreed that there are a lot of variables and unknowns between takeoff and RNAV. S. Lathrop said that he knows there will be a lot of variables, and that he's asking if the software and procedural requirement are going to interact in a way such that airplanes are going to try to observe FAA's separation

requirements as close as possible. S. Kelley replied no, that the software does not know or care about FAA's separation requirements.

S. Lathrop asked if the software designer knows that there is a procedure that takes the plane into the separation zone, can it be rewritten so that it flies south of the centerline in order to increase safety. R. Varani replied that the software had already been written. When the procedure is developed, all that gets loaded is data on the procedure. The software is programmed to follow the procedure as designed. All elements that involve safety, such as separation, are accounted for during the procedure design.

R. Fama said that they could not look at safety and ignore the welfare of 60,000 people on the ground. He stated millions had been spent on noise abatement and yet the safety standards are rubber stamped. R. Fama suggested that this was backwards and a return to 1950s thinking. He said that he refuses to accept it and requested that the record reflect this.

S. Kelly said he understood the sensitivity, but that the bottom line is that the technical efforts involved in the design of this procedure meet the needs of this process. He said that it is not possible to give a guarantee and that they are up against a brick wall if the group can't go forward without one.

Sandra Kunz said that it is more perfectly clear today that we need the noise analysis to see what this procedure gets the group. She offered strong support for going forward with the noise analysis. Maura Zlody agreed.

S. Lathrop said it was not clear to him what would happen if this goes to noise analysis. G. Wellman reviewed the process—explaining how the PC and IC would move forward with a noise analysis and then come back to the BOS/TAC with the results. The BOS/TAC would be asked to make a decision for each alternative. The BOS/TAC would take the resulting package to the full CAC, which would then recommend procedures to Massport. Those involving RNAV would go into the 18-step process.

S. Lathrop asked if a procedure can be stopped once it is in the 18-step process. J. Bellabona said that once a procedure is in the process, you can stop it, but at that point you've spent a lot of money on it. He suggested that the decision be made before the 18-step process. S. Smith added that the 18-step process includes an environmental step and J. Bellabona said that they are now required to do a safety management system analysis. Gail Lattrell said that she would put the 18 steps up on their website.

G. Wellman reminded the group that the decision today was whether they should go forward with noise analysis for Alternative 5. If consensus reflects "yes," then the PC and IC will begin the noise analysis. S. Kelly said that the noise results on Alternative 5 will be reported back at the same time as the other alternatives.

S. Lathrop said he didn't understand why they would have to move to noise analysis prior to determining what the before/after conditions were. He said that this work had been done for all other procedures under consideration. G. Wellman replied that S. Lathrop was asking for the team to come back with one of the outputs provided by INM. He said the point of having the IC is to confirm that the PC has the inputs there that are necessary for the analysis. As soon as the inputs are verified, INM runs are conducted that will produce some of the output Mr. Lathrop is interested in. G. Wellman said that the work program is based on the needs of the BOS/TAC, and if they want the PC to come back with all of the inputs to be used in the noise analysis before it is run, then that can be done.

F. Leo suggested that the consultant team be allowed to do the work and then have the discussion after its done. His recommendation is for the PC to do the noise analysis.

S. Lathrop said to assume they get the noise analysis back and there are no impacts to Hull, and benefits for everyone else, so the procedure moves into the 18-step process. He asked if there were problems at that point in the 18-step would they be allowed to stop it. G. Lattrell said that if the procedure can't meet the intent of the alternative then it will not proceed. Moving the procedure south would not result in a benefit to Hull, so it would not be considered as a modification during the 18-step process.

S. Kunz suggested that Alternative 5 should just be put into Phase II if BOS/TAC cannot come to a consensus on proceed to noise analysis. S. Lathrop said he couldn't have open discussions with consultants by himself, and that 1/3 of the time there isn't a 27 arrival to cope with; therefore does not understand why the Runway 22 departures cannot be moved further north of Hull. F. Leo said that this was not accurate and that the preponderance of those flights are Runway 22 departures while 27 arrivals are being conducted. S. Lathrop said he was not convinced of this statement.

G. Wellman asked the group if PC may go ahead with Alternative 5. S. Lathrop stated his position that it is apparent that there are no benefits from this RNAV. G. Wellman asked if there were any other comments.

Jerry Falbo asked if Jon Woodward could provide him with IC's comments on S. Lathrop's discounting of the RNAV benefits. J. Woodward stated that nearly all of the benefits can be achieved by utilizing the conventional procedure. He said that he feels the RNAV procedure may benefit Hull, and that is why he believes the group should move forward with the noise analysis.

R. Fama asked what the alternative does for Weymouth. J. Woodward stated there would be no impact. It would be the same for Weymouth as with the conventional alternative design.

G. Wellman asked if there were any concerns with proceeding with the analysis. S.

Lathrop said that given what J. Woodward had just said, he doesn't know why anyone would want to move forward with it. J. Woodward provided further clarification to S. Lathrop regarding IC's position. G. Wellman asked again for the group's consensus. Members except Ron Fama and Steve Lathrop agreed to proceed with noise analysis. Based on the general consensus, PC was instructed to proceed with noise analysis which will provide specific items S. Lathrop requested (slant range distance for two grid points for existing and alternative conditions).

3. Closing Remarks

G. Wellman said that the PC will now start work on Alternative 5. He stated that work has begun on other alternatives, and PC will report back to the group on a date for a meeting to review the results.

S. Lathrop asked if closing remarks could be submitted in writing. G. Wellman said that they would absolutely be accepted.

No one offered any additional closing remarks. G. Wellman thanked everyone for their patience.

4. Submitted Remarks

Commenter: Mr. Steve Lathrop

Received: 4/14/06

Delivered to: Greg Wellman, Project Consultant

Format Received: email

April 14, 2006

Greg,

This is a comment from the Town of Hull with regard to the proposed noise analysis of the departure route mitigations being considered for Phase 1 of the noise study.

There is one general comment, and a few specifics.

First, generally, the quality of the analytical process used to do a noise analysis for RNAV departures on Rwy 22 (left and right), and for Rwy 15, will depend on the creation of new objective information with regard to where airplanes navigating under RNAV procedures are expected to fly. Our telephone conference on this subject made it clear that that information does not now exist in sufficient detail to assess noise impacts in northern Hull.

The danger is that the analytical team, having begun with an assumed envelope of airspace for these flights, will simply particularize their assumption with more-or-less normally distributed flight paths, and analyze the result. If that happens, we will get a logically circular analysis, because the resulting noise data will be nothing more than an

alternative expression of the original untested assumptions. Those assumptions need to be objectively tested and confirmed, or there will be no real noise analysis.

In several hours of watching Rwy 22 departures using the Passur radar tracking facility on the internet, I have not seen any airplane, among more than one hundred Rwy 22 departures, fly a route consistent with the proposed RNAV procedure. By this I mean an airplane starting within the envelope of airspace defined by the proposal, passing within one half mile of the first waypoint, and then flying onward toward the general vicinity of the second waypoint.

Two observable modes have contributed to the above observation: (Mode 1) airplanes turn eastward from the 140 degree departure heading early (or seem not to use it at all), and then fly far to the north of the first waypoint, sometimes missing it by a mile or more; (Mode 2) airplanes fly close to the first waypoint, typically by first flying north of George's Island, and then angling southeastward toward the waypoint on a heading which also brings them close to Point Allerton. This course makes it impossible for these airplanes to approach the second waypoint at all, but easy for them to turn across the Hull peninsula as they proceed westward. Other variations were also seen, but none seemed to match the proposed procedure any better than these two, which were seen repeatedly.

These observations suggest that any assumption that the described RNAV procedure will be a simple overlay of existing practice could be misplaced. If few or no airplanes are now flying courses which match the proposed RNAV procedure, why should we assume that the effects which will occur when the RNAV is turned on will match the effects which occur now?

Looking at the same question from a different direction, why shouldn't we assume that the RNAV procedure will cause airplanes to fly differently than they do now, specifically by aligning the courses they follow north of Hull with the course they expect to fly as they transit between the first and second waypoints.

As noted above, many of the present operations could not logically (and maybe could not physically) fly the courses they now do north of Hull and then also fly the segment from the first waypoint to the second. If in the airspace directly north of Hull these airplanes moved their initial course segment farther south, closer to Hull, then they could fly the segment between the two waypoints as described by the procedure, because when they passed the first waypoint they would be heading for the second, instead of away from it as is now often the case. This is one of the principal reasons I am concerned that the proposed RNAV procedure will create adverse impacts in Hull.

A few more specifics:

1. The RNAV departure from Rwy 15 seems improvable. It apparently uses the same initial waypoint as Rwy 22 departures would. This is inappropriate because the Rwy 22 waypoint has been located as far south as possible to create lateral separation from presumed Rwy 27 arrivals. Most of the time when Rwy 15 departures occur, (at night)

Rwy 27 is not in use for arrivals. Hence, reliance on the Rwy 22 waypoint risks directing Rwy 15 departures closer to Hull than there is any reason to do. Any RNAV departure procedure from Rwy 15 needs its own initial waypoint, substantially north of the one used for Rwy 22 departures.

2. The convergence of compressed RNAV departure paths from Rwy 22, 15, and 9 in the vicinity of northern Scituate and southern Cohasset will obviously produce a situation in which some residents below will experience overflights from all of these departure streams as more-or-less straight overhead. They will be higher than before, but there will be a lot of them—maybe, because of the compression and multiple flight paths, more overflights than any location in the Boston area has ever experienced.

There needs to be an analysis which compares this situation to the one now prevailing along the shore to the north, to see if any net benefit can be had from these proposals. Because the current shore crossing pattern is one of broad dispersal, simple altitude analysis will not adequately quantify the comparative impacts. Analysis should use a series of grid points along the shore, from midway along the Hull peninsula southward to northern Scituate. Slant distances and operational numbers should be computed for each grid point.

To justify these proposed changes we ought to at least be able to show some gridpoints under the dispersed conventional flow which would be more heavily affected than the ones under this notable convergence. For an apples-to-apples comparison the analysis should take place under the assumption that the Minot's Light proposal and increased shore crossing altitudes are already in place at all grid points, both for the conventional case and for the proposal. If analysis does not show that grid points under the conventional flow are more heavily affected than those under the convergence of these flight paths, then these RNAV routings should be referred to Phase 2 of this project, or dropped altogether.

3. Similarly, the overall method of analysis needs to be incremental. If it is decided that some proposals are non-controversial, then analysis of the benefits available from others which are controversial needs to be undertaken with the assumption that the non-controversial ones are in place. Specifically, benefits, or disbenefits, from RNAV departures from Rwy 22 and Rwy 15 should be analyzed based on the assumption that the Minot's Light proposal and the higher altitude shore crossings are implemented, because these latter alternatives can clearly go forward independently, and command universal approval. Their assumed implementation will logically affect the analysis of other proposals for which benefits remain in doubt.

4. There needs to be an analysis of the benefits which could be derived from a modified conventional departure procedure from Rwy 22. Thorough description of such a procedure seems not to have occurred, but perhaps the same method could be used for this as is being used for the RNAV proposal—that is the particulars will be worked out as part of the noise analysis. For instance, Passur observation, as noted above, shows that many departures, even in the absence of any arrival traffic on Rwy 27, cut the corner very

closely at Point Allerton. With more airspace available to the east, it should be easy to create a real mitigation for Hull by correcting this flaw in the existing conventional procedure.

There are other obvious steps which could be taken, which I would be happy to discuss. The point is that it would be a mistake to compare environmental effects from an optimized RNAV procedure with those from the existing conventional procedure. That would load the dice. Logic requires that both kinds of procedure be optimized before the comparison is made.

Regards,
Stephen Lathrop
Representative from Hull to the CAC and BOS/TAC



MEMORANDUM

VIA E-MAIL

Date: March 20, 2006
To: Boston Technical Advisory Committee (BOS/TAC)
From: Project Consultant (PC) _____
Subject: Alternative 5 – Runway 22R/L RNAV Departures

At the February 17, 2006 BOS/TAC meeting several issues were raised concerning the proposed Runway 22R/L RNAV Departure procedure as presented to the Committee. The BOS/TAC agreed that the PC would review the procedural design in an attempt to resolve these issues. The PC has completed this additional work in conjunction with the IC and with input from the FAA and the CAC representative from Hull. The revised procedure presented in this memo represents the best possible RNAV procedure to meet the intent of this alternative. The intent of this procedure is to avoid, to the extent practicable, overflights of the Hull peninsula (Alternative 5) and to increase shore-crossing altitudes (Alternative 14). This procedure also includes an RNAV route to keep southbound departures east of Minot's Light prior to crossing the shoreline (Alternative 15). The description of this alternative is an RNAV Standard Instrument Departure procedure for all Runway 22L/22R turbojet aircraft that keep traffic north of Hull, route aircraft over the shoreline (for northwest, northeast, west and south departure flows that provides the maximum altitude possible when crossing the shoreline, provide dispersion where possible over the shoreline, and cross over non noise-sensitive areas if able.

The PC is presenting this revised Alternative 5 and request BOS/TAC direction as to whether this alternative should be (1) advanced to noise analysis or (2) not to be advanced to noise analysis (in Phase 1). **We will be holding a web conference call at 10:00 a.m. Eastern Time on Thursday, March 30th, 2006 (see call-in instructions in email).** If you are unable to attend this conference call, you may submit your input (including recommendation) via email to Greg Wellman at gwellman@ricondo.com by end of day on Tuesday, March 28th, 2006, in order to have you input included in the conference call. The remainder of this memo provides a summary of the follow-up activity on this issue since the February BOS/TAC meeting and the PC recommended Alternative 5 definition.

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The following issues were raised at the February 17th BOS/TAC meeting:

- 1) The FAA stated that the procedure had been properly developed within the criteria established to meet the intent of this Alternative. However, the FAA pointed out that



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this procedure relies on pilot navigation to ensure separation from opposite direction arriving and departing aircraft. As such, two things may happen in the 18-step development process:

- The present lateral distance from the Runway 27 final approach course may be increased to account for dispersion to the north of the RNAV course.
 - The procedure may not pass the safety analysis that Air Traffic is required to conduct in accordance with the FAA Safety Management Systems (SMS) program because it deals with opposite direction traffic requiring precise pilot navigation to ensure separation.
- 2) The Community Advisory Committee (CAC) representative from Hull expressed concerns that the procedure may expose the northern Hull Peninsula to more noise impacts. This may occur due to the reduction in dispersion that will occur through the use of an RNAV procedure compared to existing dispersion north of Hull. In addition, he believed that the procedure would in fact be moved further south as a result of the required safety assessment, further exacerbating the potential noise impacts.

BOS/TAC agreed that the PC would review the procedural design in an attempt to meet the FAA's requirements and conduct a telephone conference on February 22, 2006 with the IC and the Town of Hull representative to discuss the results of the review. The following information was provided on this conference call:

- 1) The initial waypoint may be moved 0.2 Nautical Miles (NM) south and still meet the east end (shoreline crossing) criteria to remain inside the existing TRACON and Center boundaries. However, this will not resolve the Town of Hull's concerns and will trigger additional RNAV design issues, including a turn radius above the recommended 70 degrees, and a reduced average shoreline crossing altitude (by approximately 900 ft less than previously planned average which is at 13,000 ft Mean Sea Level or MSL).
- 2) The procedure cannot be re-designed to meet the FAA's stated lateral separation requirements of 4.12 NM between the Runway 27 final approach course and RNAV center line (3.5 NM from expected edge of the corridor), and remain within the agreed upon criteria to remain within the TRACON and Center boundaries. When aircraft turn back towards the west, they are directed to a specific BOS Center sector (west of the TRACON departure sector). This BOS Center sector is responsible for the safe and expeditious movement of westbound aircraft transitioning from the terminal area to enroute. The RNAV design criteria does not allow for a sharper turn to the west in order to transition into the responsible BOS Center sector, which would



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be needed if the procedure required a 4.12 NM lateral separation between Runway 27 final approach and the RNAV centerline. In addition, the RNAV route cannot be designed within the existing TRACON departure sector.

In an attempt to meet the intent as much as practicable for this Alternative the PC proposes the following plan of action.

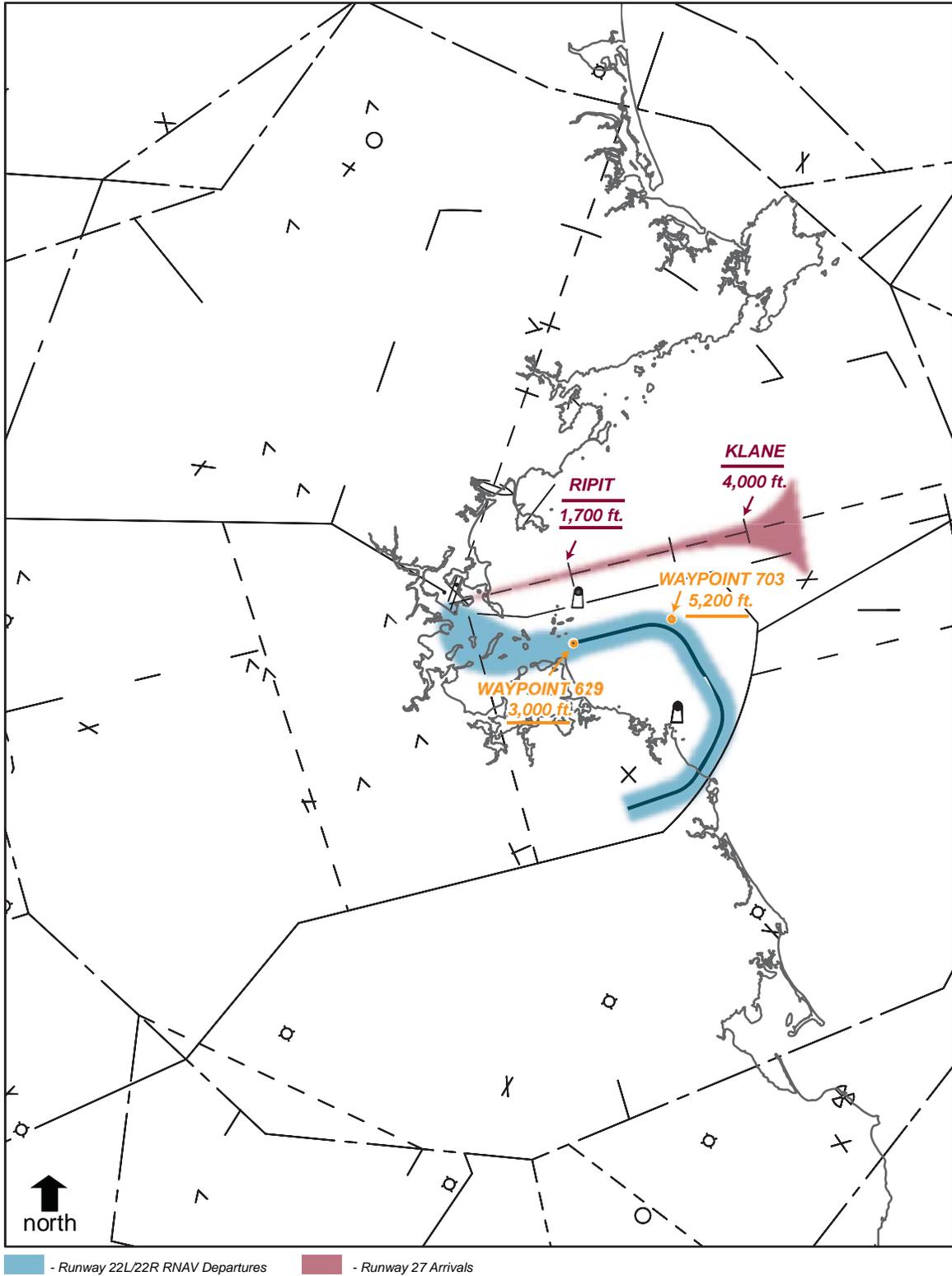
- 1) The PC will develop the original Alternative 5, as presented on February 17th, with required altitude crossings for departure aircraft. As shown in the attached exhibit, departure aircraft will cross Waypoint 629 (located 6.3 NM from the end of Runway 22L, approximately 7NM travel distance (latitude: 42° 19' 21.12"/longitude: 70° 52' 30.63")) at or above 3,000 ft. MSL, and Waypoint 703 (latitude: 42° 20' 31.05"/longitude: 70° 45' 53.99") at or above 5,200 ft. MSL. Arrival aircraft will normally be at or below 4,000 ft. MSL turning to the final approach course, and will be required to cross the RIPIT intersection at 1,700 ft. MSL on the approach to Runway 27. This will procedurally provide the required FAA altitude separation of 1,000 ft. MSL between the arrival and departure aircraft while using this procedure. Though there is no known FAA criteria to support the concept of including altitude separation for this procedure, we believe that the 3.4 NM lateral separation from the Runway 27 final approach course that our design provides, in conjunction with the altitude separation provided, would make this alternative design a better candidate to be evaluated in the FAA's 18-step process compared to the original presented February 17th at the BOS/TAC meeting.
- 2) The vector to a fix RNAV design that we propose is based on new criteria developed within the last year. It is subject to interpretation and change, based on discussions with Flight Standards (AFS 420) personnel. The variables that dictate dispersion along the vectored pattern are the same for existing conditions. Controllers will issue a heading to waypoint 629 when radar contact is established and separation is established. Due to weather conditions, piloting and the time when the controller issues the heading, the point at which the turn is conducted is expected to vary. Therefore, PC assumed that the southern dispersion in this first segment of the departure procedure will be similar to existing conditions, but the dispersion on the north side of the corridor will be reduced as the aircraft will be heading towards waypoint 629. The waypoint is a fly-by waypoint, which does not require the aircraft to fly directly over the waypoint. The PC is predicting that traffic will be within the RNAV corridor just after passing waypoint 629. Prior to waypoint 629, in the vector to a fix segment, the dispersion may be narrower than the PC has predicted, but there is no objective means to justify a narrower dispersion at this time for BOS traffic conditions. Therefore, PC has decided to use a wider dispersion to be more



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conservative noise analysis. The PC recommends this conservative estimate of dispersion, as the vector to RNAV criteria is new.

The proposed design refinements represent the best possible design based on the facts and professional opinion of the PC as well as input from the IC and FAA. We propose that the BOS/TAC review this design for Alternative 5 and decide whether it should be forwarded to the noise analysis. The difference between this design and the one proposed on February 17th is its interdependency on the proposed altitude requirements for both the Runway 22L/R departure and Runway 27 final approach procedures. If this design does not meet FAA's safety and risk assessment criteria (as part of the 18-step process) then we believe there are no further options available to meet the intent of this Alternative using RNAV procedures.



Prepared by: Ricondo & Associates, Inc.

Exhibit 1



Alternative 5 RNAV Procedure with Required Altitude Crossings