F South-Central Florida Metroplex Study Team Final Report

Federal Aviation Administration

Optimization of Airspace and Procedures in the Metroplex (OAPM)

Study Team Final Report

South/Central Florida Metroplex

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1 Background

In September 2009, the Federal Aviation Administration (FAA) received the RTCA's Task Force 5 Final Report on Mid-Term NextGen Implementation containing recommendations concerning the top priorities for the implementation of NextGen initiatives. A key component of the RTCA recommendations is the formation of teams leveraging FAA and Industry Performance Based Navigation (PBN) expertise and experience to expedite implementation of optimized airspace and procedures.

Optimization of Airspace and Procedures in the Metroplex (OAPM) is a systematic, integrated, and expedited approach to implementing PBN procedures and associated airspace changes. OAPM was developed in direct response to the recommendations from RTCA's Task Force 5 on the quality, timeliness, and scope of metroplex solutions.

OAPM focuses on a geographic area, rather than a single airport. This approach considers multiple airports and the airspace surrounding a metropolitan area, including all types of operations, as well as connectivity with other metroplexes. OAPM projects will have an expedited life-cycle of approximately three years from planning to implementation.

The expedited timeline of OAPM projects centers on two types of collaborative teams:

- OAPM Study Teams (OSTs) provide a comprehensive but expeditious front-end strategic look at each major metroplex.
- Using the results of the OSTs, Design and Implementation (D&I) Teams provide a systematic, effective approach to the design, evaluation and implementation of PBN-optimized airspace and procedures.

2 Purpose of South/Central Florida Study Team Effort

The principal objective of the South/Central Florida OST is to identify operational issues and propose PBN procedures and/or airspace modifications in order to address them. This OAPM project for the South/Central Florida Metroplex seeks to optimize and add efficiency to the operations of the area. These efficiencies include making better use of existing aircraft equipage by adding Area Navigation (RNAV) procedures, optimizing descent and climb profiles to eliminate or reduce level-offs, and adding more direct RNAV routing in both the en route and terminal environments , among others.

The OST effort is intended as a scoping function. The products of the OST will be used to scope future detailed design efforts and to inform FAA decision-making processes concerning commencement of those design efforts.

3 South/Central Florida OAPM Study Team Analysis Process

3.1 Five Step Process

The South/Central Florida OST followed a five step analysis process:

1. Collaboratively identify and characterize existing issues:
   a) Review current operations
   b) Solicit input to obtain an understanding of the broad view of operational challenges in the metroplex
2. Propose conceptual procedure designs that will address the issues and optimize the operation:
   a) Use an integrated airspace and PBN "toolbox" (Appendix C)
   b) Obtain technical input from operational stakeholders
   c) Explore potential solutions to the identified issues
3. Identify the expected benefits, quantitatively and qualitatively, of the conceptual designs:
   a) Assess the Rough Order of Magnitude (ROM) impacts of conceptual designs
   b) To the extent possible, use objective and quantitative assessments
4. Identify considerations and risks associated with the proposed changes:
   a) Describe, at a high-level, considerations (e.g., if additional feasibility assessments are needed) and/or risks (e.g., if waivers may be needed)
5. Document the results from the above steps

Steps 1 and 2 are worked collaboratively with local facilities and operators through a series of outreach meetings. Step 3 is supported by the OAPM National Analysis Team (NAT). The methodology used for the quantitative analysis is described in Section 3.4. The NAT is a centralized analysis and modeling resource that is responsible for data collection, visualization, analysis, simulation, and modeling. Step 4 is conducted with the support of the OAPM Specialized Expertise Cadre (SEC). The SEC provides "on-call" expertise from multiple FAA lines of business, including environmental, safety, airports, and specific programs like Traffic Management Advisor (TMA).

The South/Central Florida OST process and schedule are shown below:

- Kickoff meeting: May 15, 2012 (at Miami International Airport)
  - Discuss concepts and proposed schedules
  - Establish facility points of contact
  - Make data requests
- Administrative weeks: May 29 – June 8
- First Outreach: Existing Operations and Planning
  - FAA Facilities:
    - June 12-13 at Miami International Airport, specifically Miami ARTCC (ZMA), Miami TRACON (MIA TRACON), Palm Beach TRACON (PBI TRACON), and Fort Myers TRACON (RSW TRACON)
    - June 19-20 at JetBlue University, specifically Jacksonville ARTCC (ZJX), ZMA, Central Florida TRACON (F11), Tampa TRACON (TPA TRACON), and Daytona Beach TRACON (DAB TRACON)
  - Industry Stakeholders:
    - June 14 at Miami International Airport
    - June 21 at JetBlue University
- OST work (focus on operational challenges): June 25 – July 27
- Second Outreach: Enhancement Opportunities
  - FAA Facilities:
    - July 31 – August 1 at JetBlue University, specifically ZJX, ZMA, F11, TPA TRACON, and DAB TRACON
    - August 7 – 8 at the International Airline Transport Association (IATA) Regional Office in Miami, specifically ZMA, MIA TRACON, PBI TRACON, and RSW TRACON
  - Industry Stakeholders:
    - August 2 at the JetBlue University
    - August 9 at the IATA Regional Office in Miami
- OST work (focus on solutions, costs, and benefits): August 13 – September 7

- Final Outreach: Summary of Recommendations
  - FAA Facilities:
    - September 11 at Miami International Airport, specifically ZMA, MIA TRACON, PBI TRACON, RSW TRACON, ZJX, F11, TPA TRACON, DAB TRACON
  - Industry Stakeholders:
    - September 13 at Miami International Airport
- Documentation: Final report, final briefing, and Study Team package
  - OST work (completing documentation): September 17 – 28
  - Report due September 28, 2012

There were three rounds of outreach meetings with local facilities, industry, and other stakeholders, including Department of Defense, business and general aviation, airports, and others. The First Outreach focused on issue identification, the Second Outreach on conceptual solutions, and the Final Outreach on summarizing the analyses of benefits, impacts, and risks. Assessments at this stage in the OAPM process are expected to be high-level. More detailed analyses of benefits, impacts, costs and risks are expected after the D&I phase has been completed.

3.2 South/Central Florida Study Area Scope

The South/Central Florida Metroplex consists of airspace in Central Florida delegated to ZJX, ZMA, F11, TPA TRACON, and DAB TRACON, and airspace in South Florida delegated to ZMA, MIA TRACON, PBI TRACON, and RSW TRACON. Operations at seven airports in Central Florida and eight airports in South Florida within the lateral confines of these facilities' airspace were examined closely due to the complexity of the interactions between these airports:

- Central Florida Airports
  - Orlando International Airport (MCO)
  - Orlando Sanford International Airport (SFB)
  - Orlando/Executive Airport (ORL)
  - Kissimmee Gateway Airport (ISM)
  - Tampa International Airport (TPA)
  - Sarasota/Bradenton International Airport (SRQ)
  - Daytona Beach International Airport (DAB)

- South Florida Airports
  - Miami International Airport (MIA)
  - Fort Lauderdale/Hollywood International Airport (FLL)
  - Palm Beach International Airport (PBI)
  - Boca Raton Airport (BCT)
  - Southwest Florida International Airport (RSW)
  - Naples Municipal Airport (APF)
  - Marco Island Airport (MKY)
  - Stuart/Witham Field Airport (SUA)

Fuel burn modeling was performed for the following six airports:

- MCO
- TPA
- MIA
- FLL
- PBI
- RSW

These airports were selected for modeling because they had the highest number of IFR filed flights in 2011.

3.3 Assumptions and Constraints

OAPM is an optimized approach to integrated airspace and procedures projects; thus, the proposed solutions center on PBN procedures and airspace redesign. The OST is expected to document those issues that cannot or should not be addressed by airspace and procedures solutions. These issues are described in Section 4 of this report.

The OAPM expedited timeline and focused scope bound airspace and procedures solutions to those that can be achieved without requiring an Environmental Impact Statement (EIS) (e.g., only requiring an Environmental Assessment [EA] or qualifying for a Categorical Exclusion [CATEX]) and are within current infrastructure and operating criteria. The OST may also identify airspace and procedures solutions that do not fit within the environmental and criteria boundaries of an OAPM project. These other recommendations then become candidates for other integrated airspace and procedures efforts.

3.4 Assessment Methodology

Both qualitative and quantitative assessments were made to gauge the potential benefits of proposed solutions.

The qualitative assessments are those that the OST could not measure but would result from the implementation of the proposed solutions. These assessments included:

- Impact on air traffic control (ATC) task complexity
- Ability to apply procedural deconfliction (e.g., laterally or vertically segregated flows)
- National Airspace System (NAS) impacts of flow segregation
- Ability to enhance safety
- Improved connectivity to en route structure
- Reduction in transmissions (flight deck and controller) and related reduction in frequency congestion
- Improved track predictability and repeatability, with associated improvements in fuel planning
- Reduced reliance on ground-based navigational aids (NAVAIDs)
- Increased throughput

Task complexity, for example, can be lessened through the application of structured PBN procedures versus the use of radar vectors, but quantifying that impact is difficult. Reduced communications between pilot and controller, as well as reduced potential for operational errors, are examples of metrics associated with controller task complexity that were not quantified.

For the quantitative assessments, the OST relied on identifying changes in track lengths, flight times, and fuel burn. Most of these potential benefits were measured by comparing a baseline case with a proposed change using both fuel burn tables based on the European Organization for the Safety of Air Navigation (EUROCONTROL) Base of Aircraft Data (BADA) fuel burn model and a flight simulator, which was used to establish a relationship between simulator fuel burn results and BADA tables. The quantitative analyses compared full-time use of current procedures under baseline conditions with full-time use of the procedures proposed by the OST.

3.4.1 Track Data Selected for Analyses

During the study process, a representative set of radar traffic data was utilized in order to maintain a standardized operational reference point.

For determining the number, length, and location of level-offs for the baseline of operational traffic, radar track data from January 2011 were utilized.

The historical radar track data were used to visualize the flows and identify where short-cuts were routinely applied, as well as where flight planned routes were more rigorously followed. The track data were also used as a baseline for the development of conceptual solutions, including PBN routes and procedures. In many cases, the OST overlaid the historical radar tracks with PBN routes or procedures to minimize the risk of significant noise impact and an associated EIS.

3.4.2 Analysis Tools

The following tools were employed by the OST and the NAT in the process of studying the South/Central Florida Metroplex:

- Performance Data Analysis and Reporting System (PDARS)
  - Historical traffic flow analysis using merged datasets to analyze multi-facility operations
  - Customized reports to measure performance and air traffic operations (i.e., fix loading, hourly breakdowns, origin-destination counts, etc.)
  - Identification and analysis of level flight segments
  - Graphical replays to understand and visualize air traffic operations
- Terminal Area Route Generation Evaluation and Traffic Simulation (TARGETS)
  - Comparison of actual flown routes to proposed routes when developing cost/benefit estimates
  - Conceptual airspace and procedure design
- Air Traffic Airspace Lab (ATALAB) National Offload Program (NOP) data queries
  - Quantification of traffic demand over time for specific segments of airspace
- Aviation System Performance Metrics
  - Identification of runway usage over time
- National Traffic Management Log (NTML)
  - Identification of occurrence and magnitude of TMIs
- Enhanced Traffic Management System (ETMS)
  - Traffic counts by aircraft group categories for annualizing benefits
  - Examination of filed flight plans to determine impact of significant re-routes
- Leviathan (A series of metrics computed for every flight in the NAS based on radar track data, weather information, and flight plans)
  - Flow analysis for reference packages
  - Data for baselines for modeling

3.4.3 Determining the Number of Operations and Modeled Fleet Mix

Due to the compressed schedule associated with this study effort, there was not sufficient time to model the entire fleet mix for each airport. A representative fleet mix consisting of eight aircraft types was developed using data from all Florida airports. The fleet mix used is shown in Table 1 below.

Table 1. South/Central Florida Modeled Fleet Mix

Aircraft Type	Weighted Distribution
E190	**3%**
E145	**3%**
MD8x	**5%**
B76x	**5%**
B712	**6%**
B75x	**15%**
A319/20/21	**23%**
B73x	**40%**

To determine the number of aircraft on each flow, four weeks of PDARS data were analyzed for each flow. One week was chosen from each season. The annual counts of aircraft on each flow were then estimated by taking the total counts for the four weeks and multiplying by 13. The percentages of time in the two primary runway configurations for each modeled airport are shown in Table 2 below.

Table 2. Primary Runway Configurations for South/Central Florida[1]

Airport	Arrival Runways	Departure Runways	% Time in Flow	Comments
MIA	8L, 9, 12	8L/R, 9, 12	77%	8L and 9 typically used for arrivals, 8R and 12 for departures
MIA	26L/R, 27 30	26L/R, 27, 30	23%	26R and 30 typically used for arrivals, 26L, 27 for departures
FLL	9L/R, 13	9L/R, 13	82%	9L is the primary arrival and departure runway
FLL	27L/R, 31	27L/R, 31	18%	27R is the primary arrival and departure runway
PBI	10L/R	10L/R	73%	10L is the primary arrival and departure runway
PBI	28L/R	28L/R	27%	28R is the primary arrival and departure runway

[1] Source: Aviation System Performance Metrics, CY2011

Airport	Arrival Runways	Departure Runways	% Time in Flow	Comments
MCO	17L/R, 18L/R	17L/R, 18L/R	67%	17L and 18R typically used for arrivals, 17R and 18L for departures
MCO	35L/R, 36L/R	35L/R, 36L/R	33%	35R and 36L typically used for arrivals, 35L and 36R for departures
TPA	19L/R, 10	19L/R, 10	58%	19L and 19R are the primary arrival and departure runways
TPA	1L/R, 10	1L/R, 10	42%	1L and 1R are the primary arrival and departure runways
RSW	6	6	70%	RSW has only runway: 6/24
RSW	24	24	30%	RSW has only runway: 6/24

3.4.4 Determining Percent of RNAV Capable Operations by Airport

The principal objective of the South/Central Florida OST was to identify operational issues and propose PBN procedures and airspace modifications in order to address them. The PBN Dashboard was used to determine the percent of operations at each airport that would benefit from these new procedures. The PBN Dashboard is an online tool that reports this percentage through analysis of two sources: the equipment suffix of instrument flight rules (IFR) flight planned operations from ETMS and the percentage of PBN-equipped aircraft by type from a Part 121 avionics database maintained by The MITRE Corporation's Center for Advanced Aviation System Development (CAASD). Due to the incomplete nature of the data sources used, the percentages of RNAV-equipped operations are assumed to be conservative.

Table 3 lists the RNAV equipage percentages assumed for the modeled South/Central Florida airports.

Table 3. RNAV Equipage by Airport

Airport	% of Total Operations RNAV-equipped
MIA	95%
FLL	99%
RSW	94%
PBI	94%
MCO	97%
TPA	96%

3.4.5 Profile Analyses

To determine the current level-offs of arrivals in the South/Central Florida Metroplex, the OST examined track data from the days discussed previously using Leviathan. The OST identified the altitudes where level-offs occurred and the average length in nautical miles (NM) that aircraft were in level flight at each altitude. The OST also used TARGETS to calculate the length of the proposed routes compared to the current published routes and actual flown tracks. The reduction in level-offs and the distance savings were then converted into fuel savings by using the BADA fuel flow model, taking into account the modeled aircraft fleet mixes at the metroplex airports. The fuel savings were then annualized, assuming a fuel price per gallon of $3.00, based on fuel costs for January 2012 through July 2012 from Research and Innovative Technology Administration (RITA) Bureau of Transportation Statistics. The resulting benefit numbers were the basis for the minimum potential fuel benefit.

Flight simulations were run on a current arrival procedure as well as the corresponding conceptual design during the Washington D.C. Metroplex prototype OST effort. The flight simulator values were obtained through a US Airways A320 flight simulator fuel burn analysis for two transitions on a proposed versus baseline arrival procedure. Derived values for fuel burn per minute in level flight, idle descent, and less-efficient descent were then used to determine and validate the relationship between the flight simulator fuel saving estimates and the BADA-based fuel burn estimates (calculated in gallons per NM). Essentially, this effort allowed for a determination of the difference between BADA's conservative aircraft performance numbers and what could be achieved with an actual pilot flying the plane. This method was applied to South/Central Florida OST results to determine a maximum fuel savings per flight. Applying both the BADA and flight simulator methods provides for a range of potential benefits:

- Lower-bound potential benefit: BADA speed/fuel burn
- Upper-bound potential benefit: Flight simulation speed/fuel burn

3.4.6 Cost to Carry (CTC)

Aircraft fuel loading is based on the planned flight distance and known level-offs. Furthermore, airlines must carry extra fuel to compensate for the weight of the total fuel required to fly a route. This extra fuel is known as the Cost-to-Carry (CTC). CTC can vary widely among airlines, generally ranging from about 2% to about 15%. For this analysis, based on feedback from multiple industry representatives, CTC was assumed to be 10%. This means that for every 100 gallons of fuel loaded, CTC is 10 gallons. This figure was chosen based on the fact that most of the aircraft in the flown in the study area are narrow-body; for heavy aircraft or international or long-haul flights, this number could be much greater.

3.4.7 Benefits Metrics

The benefits metrics were generated using the following process:

1. The radar track data from the days mentioned previously were parsed into flows into and out of South and Central Florida. These flows were then analyzed to determine geographic location, altitude, and length of level-offs in the airspace. The average overall track flow length was also estimated.
2. Baseline routes were developed that mimic the average vertical and lateral path of the tracks in the flows.
3. Proposed conceptual routes were designed by the OST.
4. The impacts of the proposed conceptual routes were estimated as compared to the current published procedure for the flow, if any, and the baseline route.
   a) Vertical savings: Compare the *baseline* vertical path with its associated level-offs with the *proposed* vertical path, which ideally has fewer and/or shorter level-offs.
   b) Lateral filed miles savings: Compare the length of the *published* procedure or route to the length of the *proposed* procedure of route.
   c) Lateral distance savings: Compare the length of the *baseline* procedure or route to the length of the *proposed* procedure of route.
5. The fuel and cost savings were then estimated based on the above impacts.
   a) Vertical profile savings accrue both fuel savings and CTC savings.
   b) Lateral *filed* miles savings accrue CTC savings *only*.
   c) Lateral *distance* savings accrue both fuel savings and CTC savings.

Figure 1 shows published, baseline, and proposed routes for a flow, with the comparisons for lateral savings highlighted, and sample vertical profiles as well.

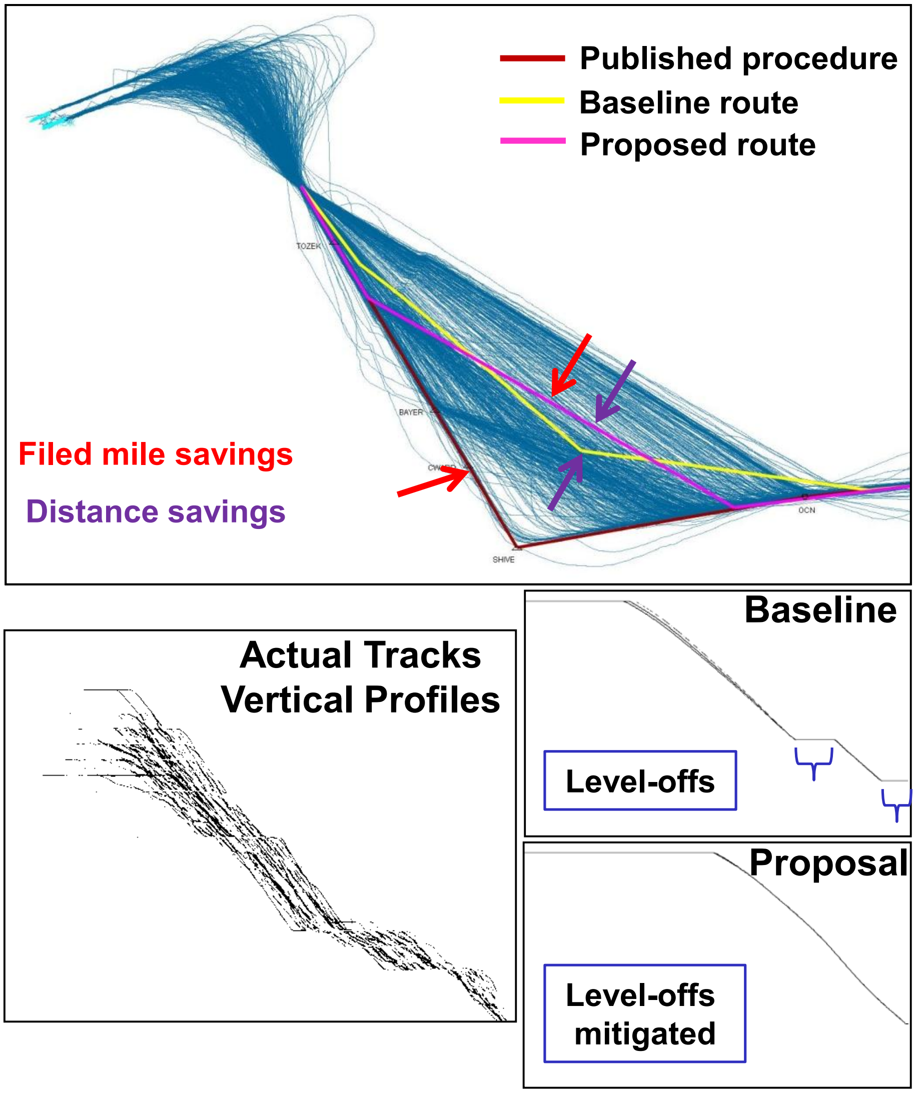


Figure 1. Sample Analysis: Lateral and Vertical Baselines

3.5 Key Considerations for Evaluation of Impacts and Risks

In addition to the quantitative and qualitative benefits assessments described in Section 3.4, the South/Central Florida OST was tasked with identifying the impacts and risks from the FAA operational and safety perspective, as well as from the airspace user perspective. For each individual issue and proposed solution throughout Section 4 of this report, specific impacts and risks are identified. However, there are a number of impacts and risks that generally apply to many proposed solutions, as described below:

- Controller and pilot training: With the increased focus on PBN and the proposed changes in airspace and procedures, controller and pilot training will be a key consideration for nearly all proposals.

- "Descend via" procedure issues: The proposed use of "descend via" clearances will similarly require controller and pilot training, and agreement must be reached during D&I on exactly how procedures will be requested, assigned, and utilized from both the FAA and user perspectives.
- Aircraft equipage: There are challenges with working in a mixed equipage environment, and these risks must be considered during D&I. While procedures have been designed to take advantage of PBN efficiencies, procedures and processes must be developed for conventional operations as well.
- Safety Risk Management (SRM): Safety is always the primary concern, and all of the proposed solutions will require an SRM assessment, which will occur during the Operational and Environmental Review phase.
- Environmental issues: All proposed solutions are subject to environmental review, and the OAPM schedule limits that review to a CATEX or EA rather than an EIS. The OST worked with environmental specialists to determine whether any of the proposed solutions has the potential for significant environmental impacts, and developed mitigation alternatives if necessary.

4 Identified Issues and Proposed Solutions

This section presents the findings and results of the South/Central Florida OST analysis. It reviews identified issues, proposed solutions, benefits/impacts/risks, and analysis results.

During the First Outreach meetings, 65 issues were identified. Of those, industry stakeholders identified 12 issues for Central and South Florida. Of the 53 issues identified by FAA Air Traffic facilities, 23 of these were Central Florida issues, and 30 were South Florida issues. Similar issues raised by all involved parties were consolidated and categorized by the OST to determine potential solutions.

Some issues required additional coordination and input and could not be addressed within the time constraints of the OST process. In addition to those issues that were addressed by the South/Central Florida OST and those that require additional coordination, the OST identified a few issues that were outside of the OAPM scope.

4.1 Design Concepts

The primary goals of the South/Central Florida OST were to use RNAV everywhere and RNP where beneficial. The use of PBN procedures will allow efficiency gains through optimized profile climbs/descents and enhanced lateral paths not reliant on ground based navigation, while allowing predictability and repeatability and reducing ATC task complexity and frequency congestion. The OST removed unused transitions to reduce chart clutter and the potential for improper flight planning. Runway transitions were used where practical, while limiting potential environmental risks. The OST recommended the use of transitional separation (3 NM increasing to 5 NM) that may increase airspace throughput for departures.

Currently, controllers rely on an assortment of conventional and RNAV departure procedures. The facilities use both vectors and route structure where necessary to maintain separation and expedite aircraft climbs into en route airspace.

The proposed departure procedures attempt to maintain unrestricted climbs as much as possible, while providing procedural deconfliction where practical from other Standard Instrument Departures (SIDs) and Standard Terminal Arrival Routes (STARs). It is fully expected that ATC will continue to tactically enable shorter routings and remove climb restrictions. Additionally, the recommended use of transitional separation between terminal and en route facilities may increase airspace throughput. Transitional separation will allow terminal facilities to provide 3 NM separation increasing to 5 NM in the en route environment. Airspace modifications that enable procedural efficiencies may need to be considered during D&I.

RNAV SIDs with flow dependent transitions were designed for repeatable, predictable paths. The OST recognizes that RNAV off-the-ground procedures may create a disbenefit in track miles flown in certain circumstances. The D&I Team may elect to further evaluate the combination of radar vectors and RNAV off-the-ground SIDs to determine the most beneficial method of departing from South/Central Florida airports.

With respect to the conceptual departure proposals, the following figure depicts benefits, impacts, and risks for the FAA and airspace users, as well as environmental considerations.

FAA Operational / Safety

Benefits	Impacts / Risks
• PBN benefits • Increased airspace throughput • Reduced delay vectoring • Reduced track miles • Optimized lateral flight paths	• LOA revisions • Training • Sectorization

Airspace User

Benefits	Impacts / Risks
• PBN benefits • Reduced fuel burn and emissions	• Chart clutter

Environmental Considerations

- Noise screening / analysis
- Emissions analysis
- Runway transition assessment

Figure 2. Benefits, Impacts, and Risks of the Departure Proposals

In general, the issues associated with the current arrival procedures to South/Central Florida were related to inefficient lateral and vertical paths, conflicts with departure traffic, and underutilized en route transitions.

In addition to optimizing vertical profiles, lateral paths were shortened; routes were segregated; unused en route transitions were removed; and flow dependent transitions were proposed. The D&I Team will need to assess the location of fixes to add additional transitions to the STARs. STARs at all major and several satellite airports in South/Central Florida were modified. These new STARs are procedurally deconflicted from SIDs and other STARs where possible.

Airspace modifications that enable procedural efficiencies will also need to be considered during D&I. Current conventional (non-RNAV) STARs may need modification during D&I. Holding patterns were not designed and, where required, will need to be addressed in D&I.

With respect to the conceptual arrival proposals, the following figure depicts benefits, impacts, and risks for the FAA and airspace users, as well as environmental considerations.

FAA Operational / Safety	
Benefits	Impacts / Risks
• PBN benefits • Increased airspace throughput • Multiple runway transitions • Reduced delay vectoring	• Runway transitions • LOA revisions • Training • Sectorization

Airspace User	
Benefits	Impacts / Risks
• PBN benefits • Reduced fuel burn and emissions	• Preferred runway assignment

Environmental Considerations
• Noise screening / analysis • Emissions analysis • Runway transition assessment

Figure 3. Benefits, Impacts, and Risks of the Arrival Proposals

4.2 MCO, SFB, ORL, ISM, and DAB Procedures

Within F11 terminal airspace, MCO is the busiest airport, with 869 daily operations on average in 2011, with 95% being either air carrier or air taxi flights. SFB, ORL, and ISM are F11 primary satellite airports. F11 airspace extends from the surface to 16,000 feet mean sea level (MSL) with some lower shelves. Airspace adjacent to F11includes: TPA TRACON to the west, JAX to the northwest, and DAB to the north. ZJX and ZMA airspace overlies F11 airspace. MCO has a north/south runway configuration, with the south flow being the predominant flow at 69%.

DAB is the primary airport within DAB TRACON airspace with 605 daily operations on average in 2011, with 96% being general aviation flights. DAB airspace is from the surface to 11,000 feet MSL with some lower shelves. ZJX airspace overlies DAB TRACON airspace. Airspace adjacent to DAB TRACON includes F11 to the south and JAX to the north and the west, with Warning Area W158 to the east.

4.2.1 MCO, SFB, ORL, ISM, and DAB Arrivals

This section describes the operational issues, solutions, and expected benefits the OST has identified for arrivals to MCO, SFB, ORL, ISM, and DAB.

Specifically, arrival issues for F11 include arrivals being too high on the "short side" STARs, requiring excessive vectors and higher rates of descent than industry prefers. Short side procedures often provide the controller with limited time and/or distance to sequence arrivals. In addition, STARs utilizing a downwind procedure frequently preclude uninterrupted climbs for departure traffic. Efficiency can also be degraded where arrivals to satellite airports are mixed with arrivals to MCO.

In en route airspace, the MCO CWRLD STAR is in close proximity to the STARs into MIA, FLL and PBI in the vicinity of OMN. This issue is complicated with limited airspace available between SAAs to the west and W158 to the east.

4.2.1.1 MCO CWRLD Arrival (OMN Transition)

The MCO CWRLD STAR (OMN Transition) accounts for approximately 38% of all MCO jet arrivals.

- Issues
    - The proximity of Special Activity Airspace (SAA) creates a narrow corridor resulting in en route congestion between MCO and south Florida (MIA/FLL/PBI) routes.
    - There are excessive level-offs and steep rates of descent when merging overland and over-water arrivals.
    - On a south flow, OMN transition arrivals to MCO are too high over LAMMA.
    - Area satellite airport arrivals, specifically SFB, ORL and DAB, conflict with MCO arrivals.
- Solutions
    - The CWRLD STAR was relocated 8 miles west of OMN to segregate from the MIA/FLL/PBI flows. The route was relocated approximately 8NM west of OMN, at waypoint CA008, to allow use of an optimized profile descent (OPD) from the top of decent (TOD) on the CWRLD STAR. This also reduced the track miles especially on a south flow because the transition feeds directly to a straight in approach.
    - A separate STAR was created for the HIBAC and GRDON transitions to address the lack of a common route on the CWRLD STAR on both the north and south flow.
    - A separate STAR was created for SFB, ORL, and DAB arrivals, providing vertical segregation from MCO arrivals.

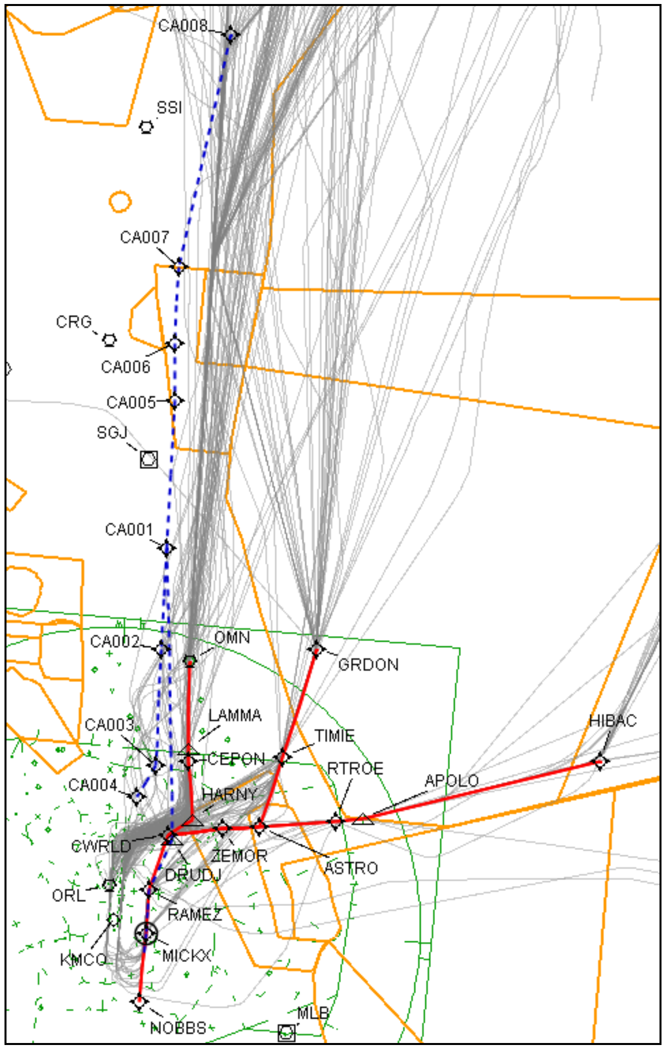


Figure 4. Current CWRLD STAR and Proposed MCO CWRLD STAR

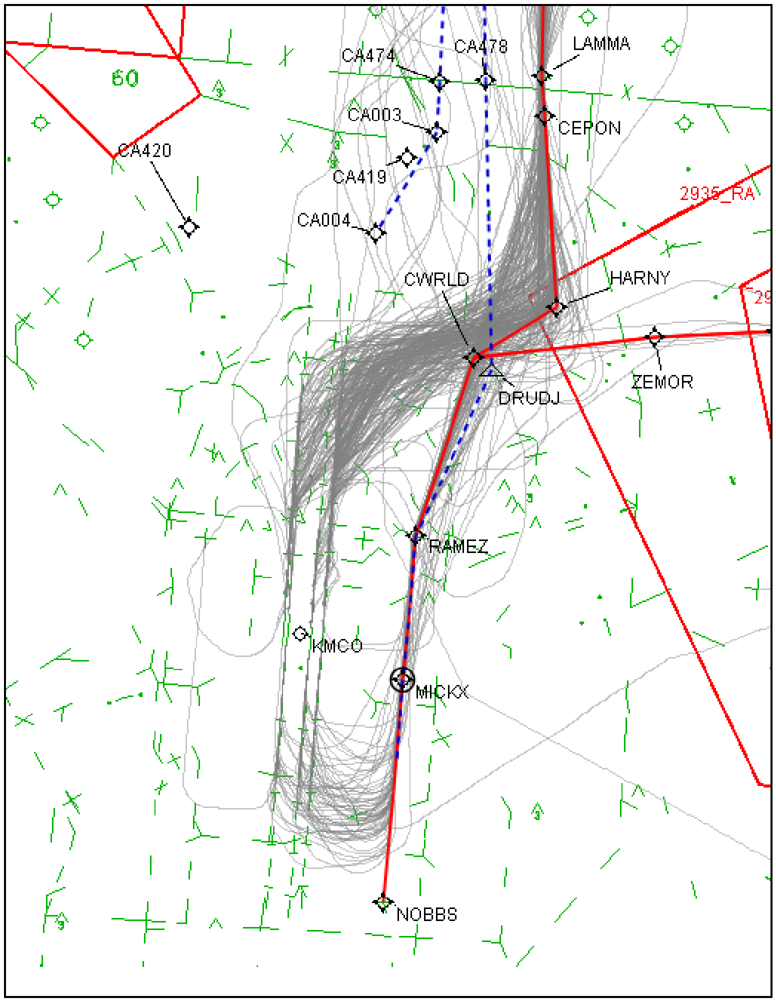


Figure 5. Current CWRLD STAR and Proposed MCO CWRLD STAR: Runway Transitions

- Notes
    - In order to optimize the vertical profile, runway transitions start in en route airspace and are not runway specific but are flow specific. The OST recognized that a procedural or airspace change involving DAB TRACON is required due to the F11 boundary crossing altitude on a south flow. An en route boundary change involving ZJX57 and ZJX58 is needed to accommodate the new procedure. The TOD point is expected to be CA007 for a south flow and CA005 for a north flow.

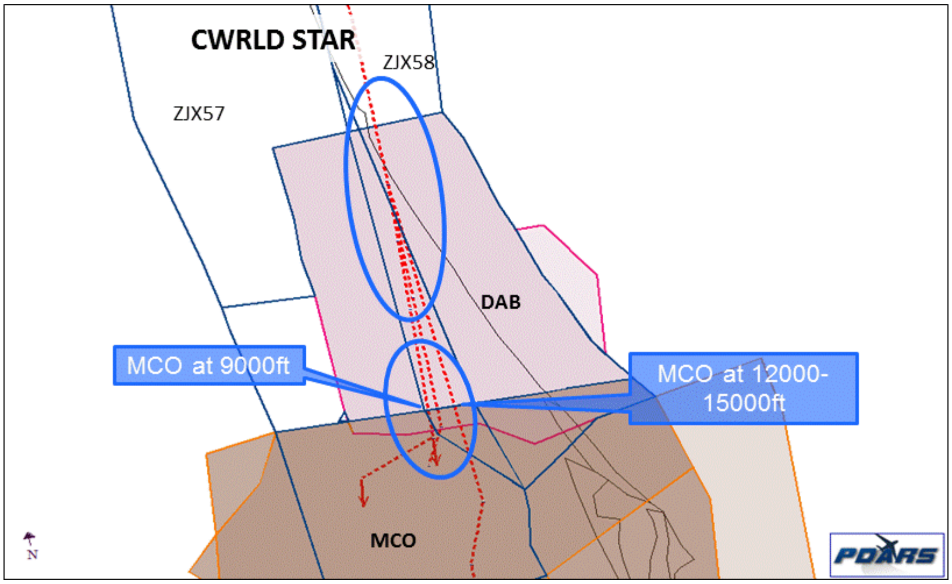


Figure 6. Proposed MCO CWRLD STAR: Airspace Affected

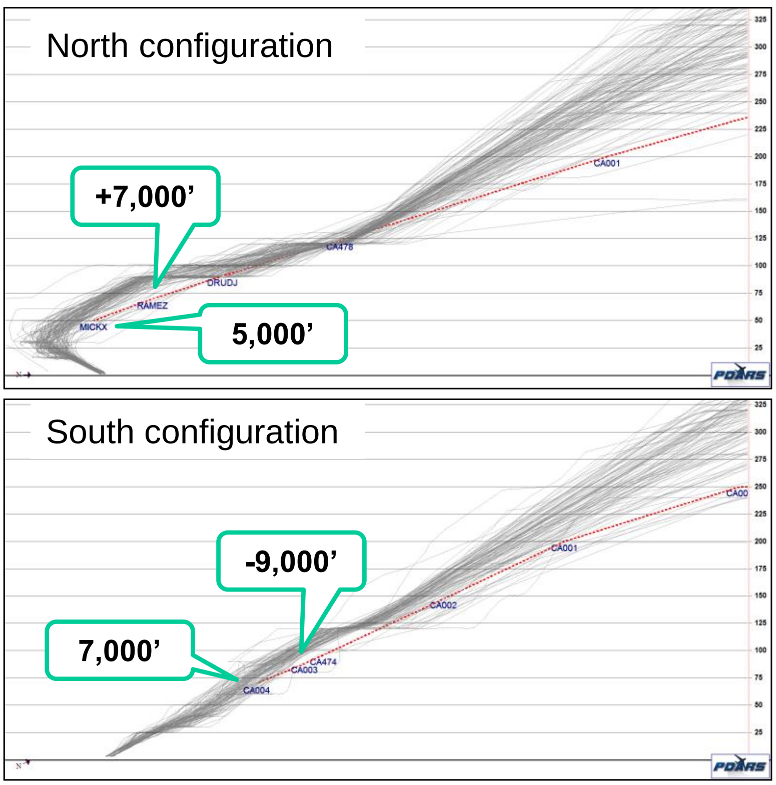


Figure 7. Proposed MCO CWRLD STAR: Current Vertical Profile of Flight Tracks and Nominal Proposed Vertical Profile

- Benefits
    - Projected annual savings for the proposed MCO CWRLD STAR are estimated in Table 4.

Table 4. Proposed MCO CWRLD STAR Annual Benefits

MCO CWRLD STAR		Low	High
Estimated Annual Fuel Savings *	Distance	$1.73M	
	Profile	$1.24M	$3.77M
	Cost to Carry (Distance and Profile)	$300K	$550K
	Cost To Carry (Filed Mileage Savings)	$340K	
Total Estimated Annual Fuel Savings (Gallons)		1.2M	2.13M
Total Estimated Annual Carbon Savings (Metric Tons)		12.4K	22K
Total Estimated Annual Fuel Savings (Dollars) *		$3.6M	$6.38M

** Based on a fuel cost of $3 per gallon*

4.2.1.2 MCO New HIBAC Arrival (Current CWRLD STAR, HIBAC and GRDON Transitions)

The HIBAC Transition on the MCO CWRLD STAR accounts for approximately 3% of all MCO jet arrivals.

- Issues
    - There are excessive level-offs and steep rates of descent when merging overland and over-water arrivals.
    - Other area airports, specifically SFB, ORL and DAB, conflict with MCO arrivals.
- Solutions
    - A separate STAR with optimized lateral and vertical guidance was created for the HIBAC and GRDON transitions to address the lack of a common route on the CWRLD STAR on both north and south flows.
    - The GRDON transition remains ATC assigned only.
    - Level-offs may be required for V3 traffic.

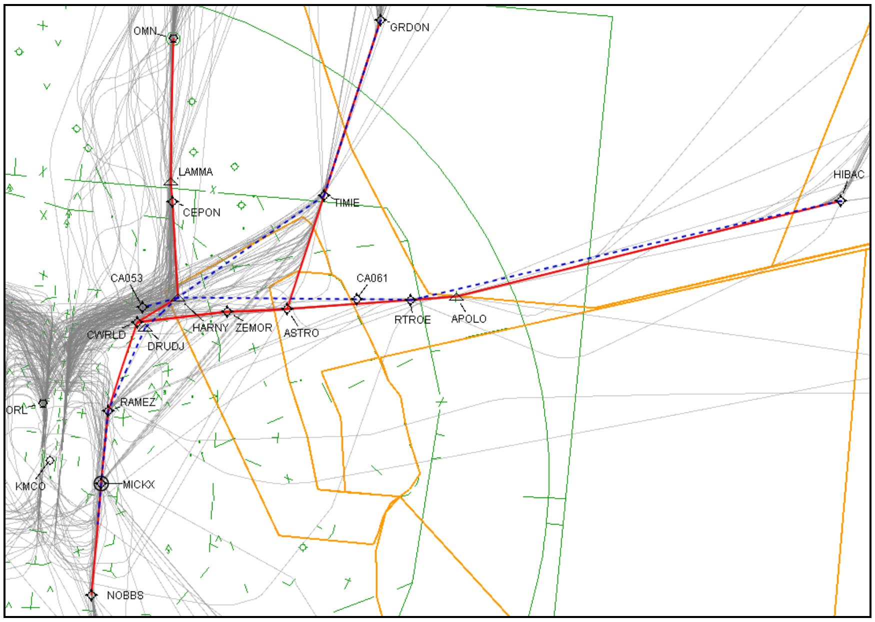


Figure 8. Current CWRLD STAR and Proposed MCO New HIBAC STAR

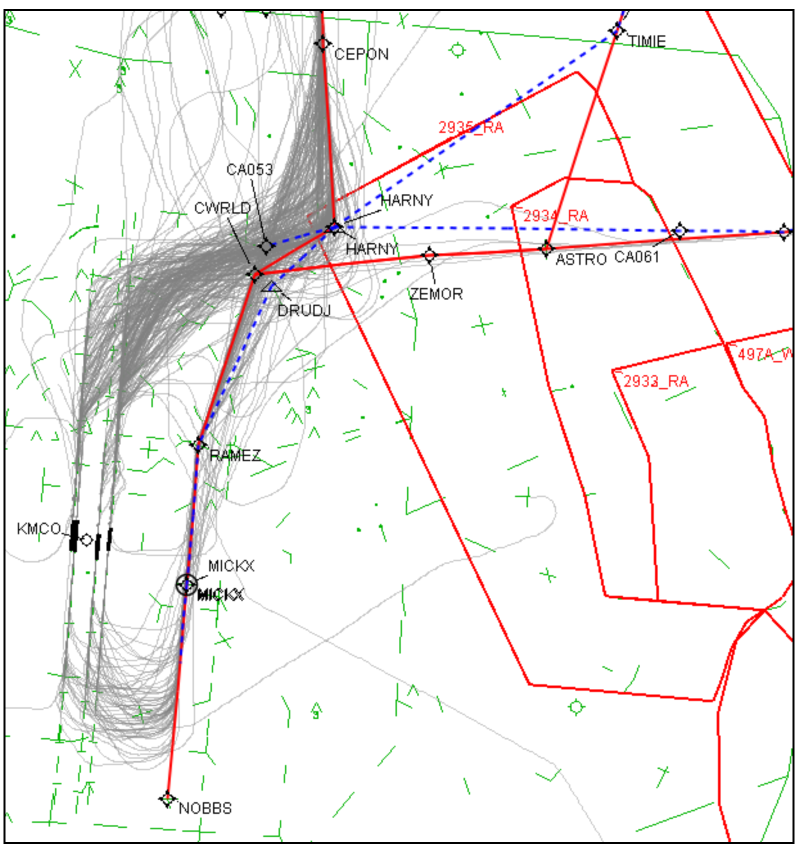


Figure 9. Current CWRLD STAR and Proposed MCO New HIBAC STAR: Runway Transitions

- Notes
  - The Second Outreach identified two concerns with the HIBAC design: proximity to W158 and lack of a metering fix. The HIBAC transition was routed over RTROE to provide separation from Special Activity Airspace (SAA); a new waypoint, CA061, was added as a meter fix abeam TIMIE. Level-offs on this transition may be required due to traffic on V3. Altitude restrictions have not been included on the STAR. Initial descent analysis indicated arrival traffic would cross V3 at approximately 8,000 feet when MCO is in a south flow and 13,000 feet when MCO is in a north flow.

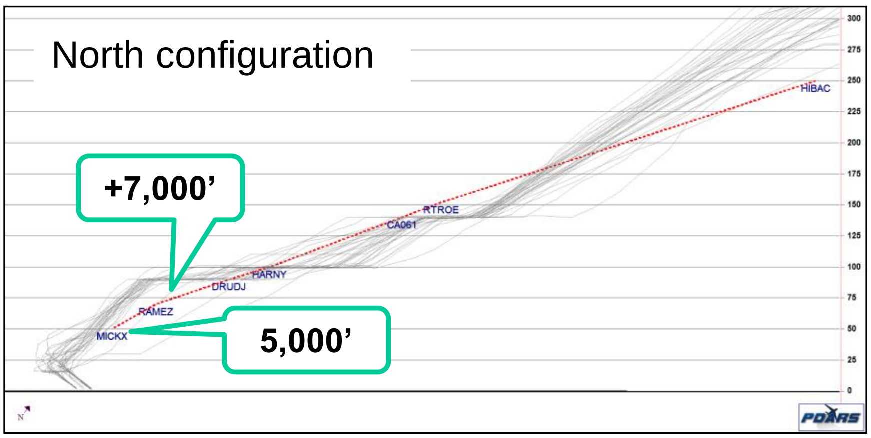


Figure 10. Proposed MCO New HIBAC STAR: Current Vertical Profile of Flight Tracks and Nominal Proposed Vertical Profile

- Benefits
  - Projected annual savings for the MCO New HIBAC STAR are estimated in Table 5.

Table 5. Proposed MCO New HIBAC STAR Annual Benefits

MCO New HIBAC STAR		Low	High
Estimated Annual Fuel Savings *	Distance	-$50K	
	Profile	$240K	$720K
	Cost to Carry (Distance and Profile)	$20K	$70K
	Cost To Carry (Filed Mileage Savings)	$190K	
Total Estimated Annual Fuel Savings (Gallons)		133K	309K
Total Estimated Annual Carbon Savings (Metric Tons)		1.4K	3.2K
Total Estimated Annual Fuel Savings (Dollars) *		$400K	$930K

** Based on a fuel cost of $3 per gallon*

4.2.1.3 MCO BUGGZ Arrival

The MCO BUGGZ STAR accounts for approximately 12% of all MCO jet arrivals.

- Issues
  - On a south flow, there is limited time to sequence the BUGGZ and PIGLT.
  - Arrivals are too high on both routes.
  - On a north flow, CAMAN departures conflict with both arrival routes.
- Solutions
  - On a south flow, two new routes were developed that are laterally and vertically deconflicted: the BUGGZ STAR and the PIGLT STAR.
  - On a north flow, BUGGZ and PIGLT merge on a track to SHBAG.
  - On a north flow, MCO CAMAN departures are vertically deconflicted from the BUGGZ and PIGLT arrivals.
  - Existing track data indicates arrival aircraft on the PIGLT and BUGGZ join the STAR well into the procedure. The STARs were shortened to begin at or near the anticipated TOD. The OPD is expected to begin at an altitude between FL280 and FL300 for both STARs.

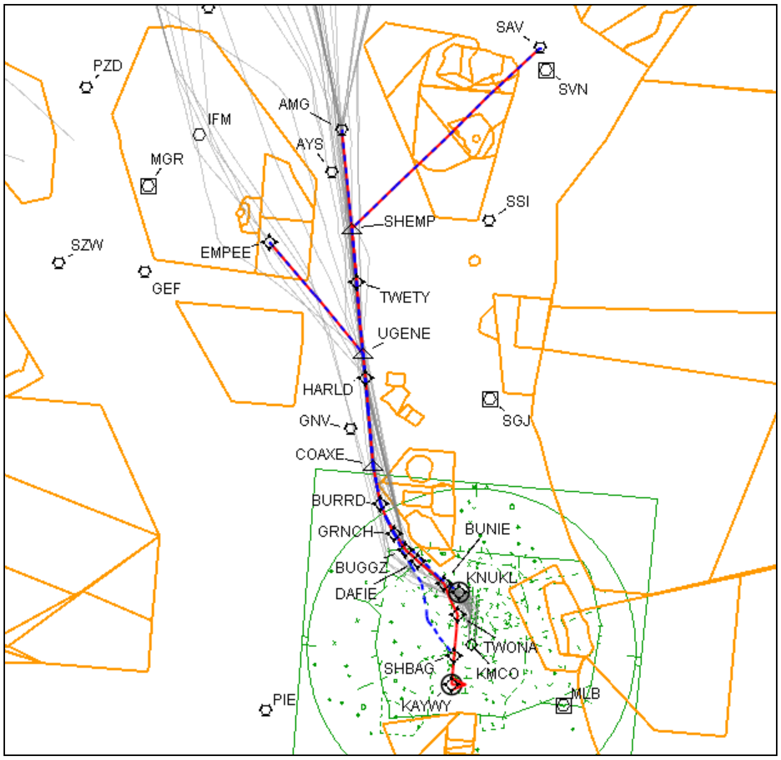


Figure 11. Current and Proposed MCO BUGGZ STAR

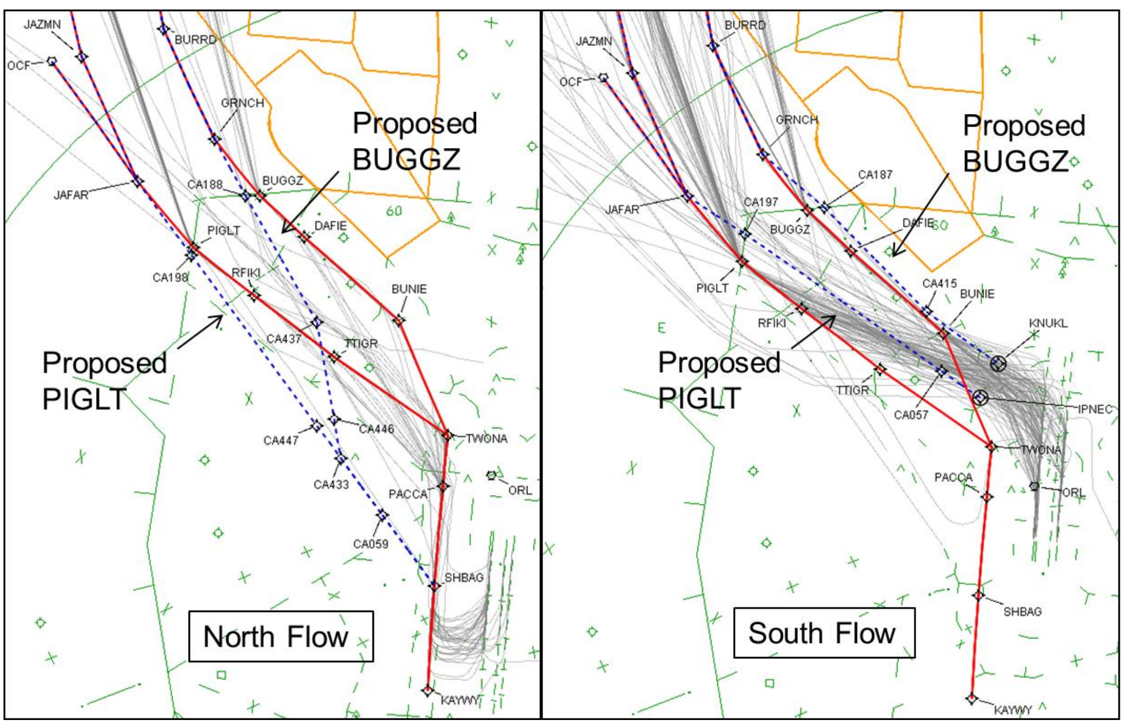


Figure 12. Current and Proposed MCO BUGGZ and PIGLT STARs: Runway Transitions

- Notes
    - Further analysis is required to determine the vertical profiles relative to the BAYPO departures and DADES arrivals. On a south flow, these procedures are deconflicted.

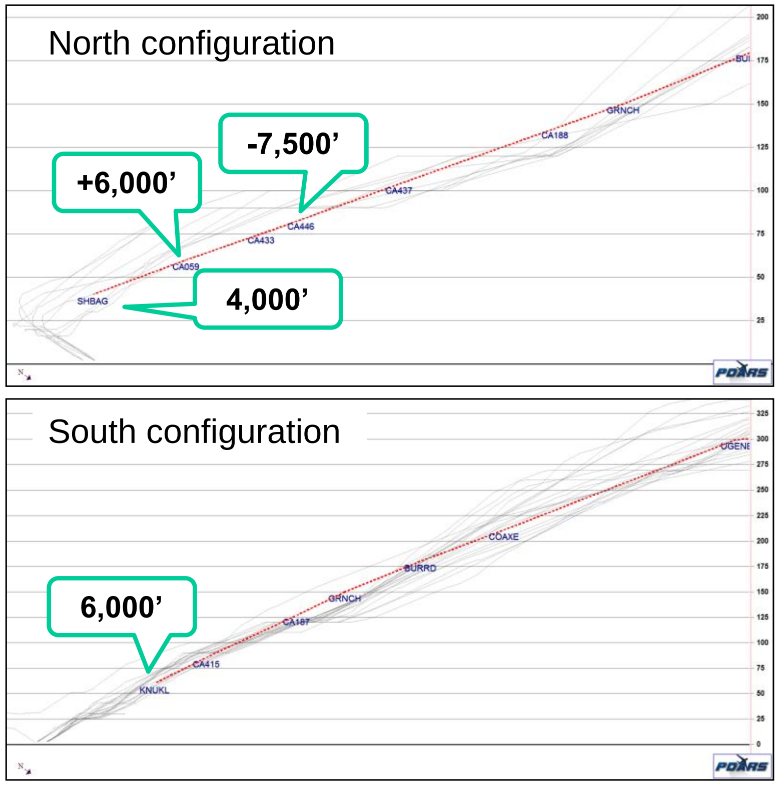


Figure 13. Current and Proposed MCO BUGGZ STAR: Current Vertical Profile of Flight Tracks and Nominal Proposed Vertical Profile

- Benefits
    - Projected annual savings for the MCO New BUGGZ STAR are estimated in Table 6.

Table 6. Proposed MCO BUGGZ STAR Annual Benefits

MCO BUGGZ STAR		Low	High
Estimated Annual Fuel Savings *	Distance	-$180K	
	Profile	$500K	$1.51M
	Cost to Carry (Distance and Profile)	$30K	$130K
	Cost To Carry (Filed Mileage Savings)	$200K	
Total Estimated Annual Fuel Savings (Gallons)		182K	555K
Total Estimated Annual Carbon Savings (Metric Tons)		1.9K	5.7K
Total Estimated Annual Fuel Savings (Dollars) *		$540K	$1.66M

** Based on a fuel cost of $3 per gallon*

4.2.1.4 MCO PIGLT Arrival

The MCO PIGLT STAR accounts for approximately 26% of all MCO jet arrivals.

- Issues
  - On a south flow, there is limited time to sequence the BUGGZ and PIGLT.
  - Arrivals are too high on both routes.
  - On a north flow, CAMAN departures conflict with both arrival routes.
- Solutions
  - On a south flow, two new routes were developed that are laterally and vertically deconflicted.
  - On a north flow, BUGGZ and PIGLT merge on a track to SHBAG.
  - On a north flow, MCO CAMAN departures are vertically deconflicted from the BUGGZ and PIGLT arrivals.
  - Existing track data indicates arrival aircraft on the PIGLT and BUGGZ join the STAR well into the procedure. The STARs were shortened to begin at or near the anticipated TOD. The OPD is expected to begin at an altitude between FL280 and FL300 for both STARs.

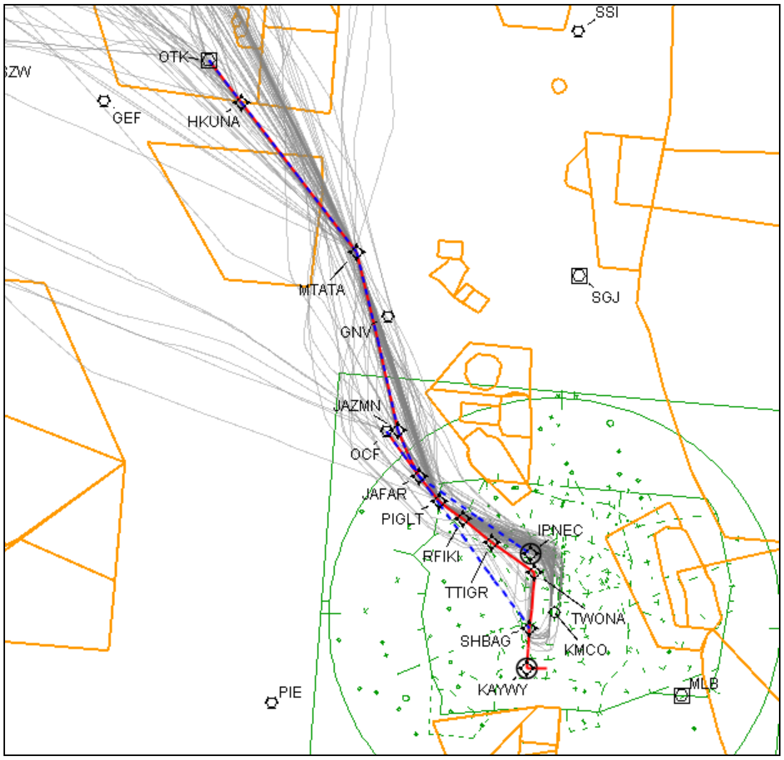


Figure 14. Current and Proposed MCO PIGLT STAR

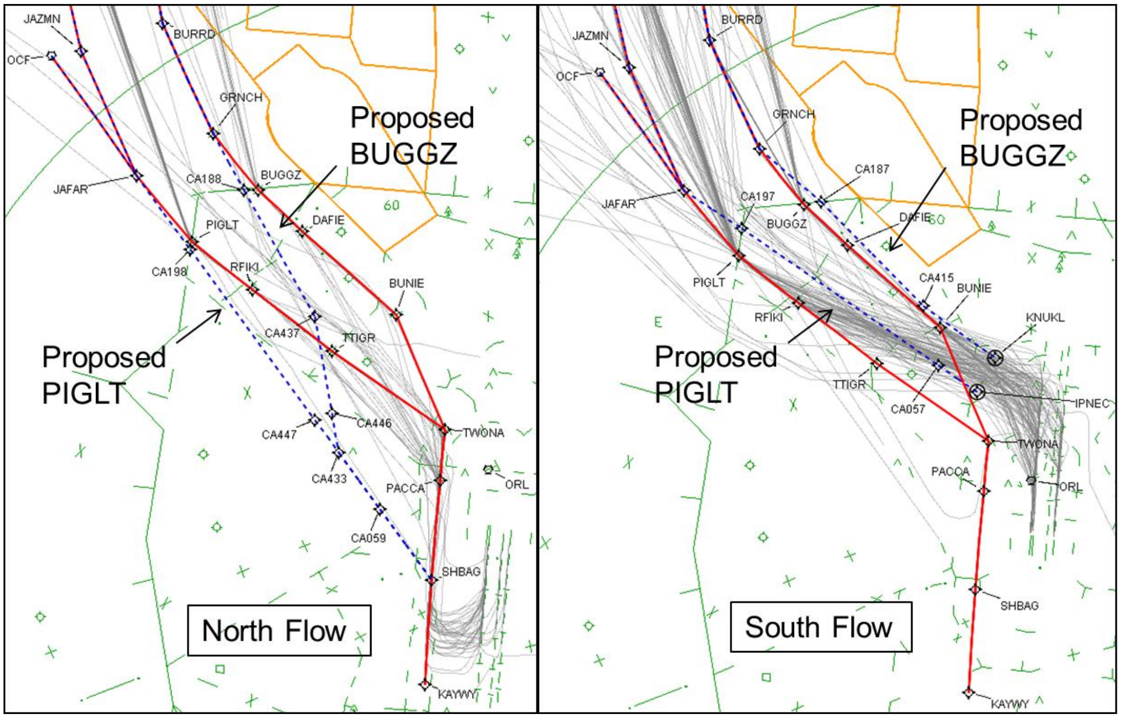


Figure 15. Current and Proposed MCO BUGGZ and PIGLT STARs: Runway Transitions

- Notes
    - Further analysis is required to determine the vertical profiles relative to the BAYPO departures and DADES arrivals. On a south flow, these procedures are deconflicted.

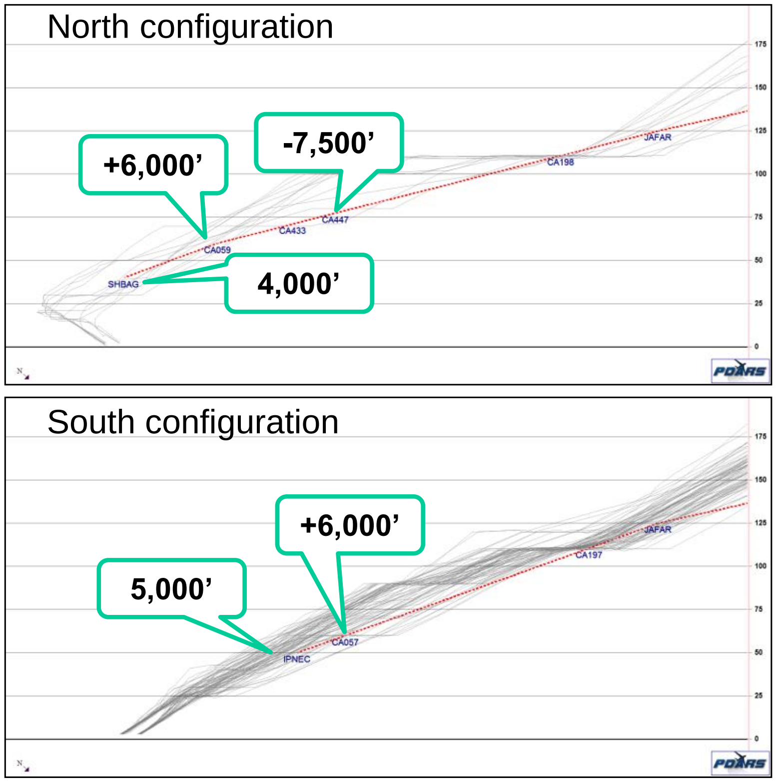


Figure 16. Proposed MCO PIGLT STAR: Current Vertical Profile of Flight Tracks and Nominal Proposed Vertical Profile

- Benefits
    - Projected annual savings for the MCO New PIGLT STAR are estimated in Table 7.

Table 7. Proposed MCO PIGLT STAR Annual Benefits

MCO PIGLT STAR		Low	High
Estimated Annual Fuel Savings *	Distance	$220K	
	Profile	$2.06M	$6.16M
	Cost to Carry (Distance and Profile)	$230K	$640K
	Cost To Carry (Filed Mileage Savings)	$220K	
Total Estimated Annual Fuel Savings (Gallons)		912K	2.41M
Total Estimated Annual Carbon Savings (Metric Tons)		9.4K	25K
Total Estimated Annual Fuel Savings (Dollars) *		$2.73M	$7.24M

** Based on a fuel cost of $3 per gallon*

4.2.1.5 MCO COSTR Arrival

The MCO COSTR STAR accounts for approximately 13% of all MCO jet arrivals.

- Issues
  - MCO arrivals are too high on a north flow.
  - ORL arrivals are too high.
  - CAMAN and JAG departures conflict with COSTR arrivals on a south flow.
- Solutions
  - The proposed COSTR STAR was procedurally deconflicted below the proposed CAMAN and JEEMY SIDs on a south flow.
  - The COSTR STAR utilizes the same route as the TPA BLOND STAR and is expected to be vertically deconflicted.
  - The COSTR STAR was laterally deconflicted from the TPA SYKES SID.
  - The COSTR STAR was vertically deconflicted above the SRQ TRAPR STAR.
  - The initial fix waypoint for the PIE transition is to be determined.
  - The current COSTR STAR parallels the ZJX and ZMA boundary, adding track miles to the procedure. The proposed COSTR STAR was optimized resulting in a reduction in track miles.

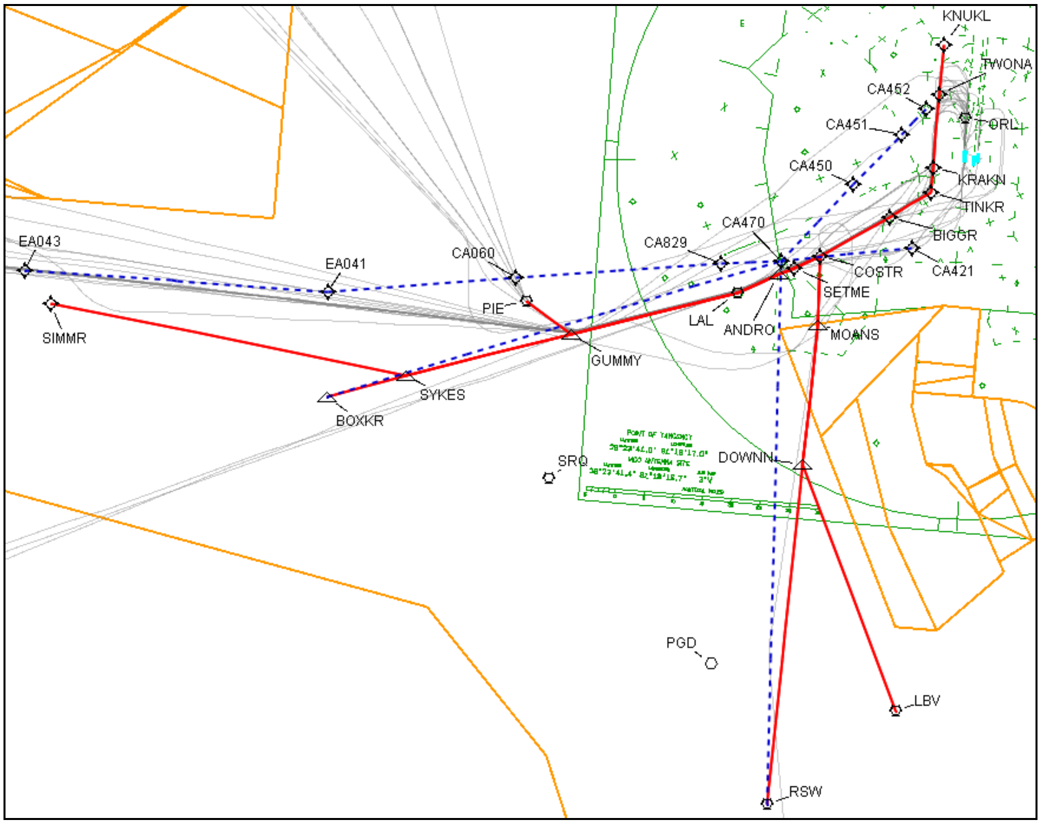


Figure 17. Current and Proposed MCO COSTR STAR

- Notes
  - Realignment of airspace is required between ZJX and ZMA and potentially TPA TRACON.

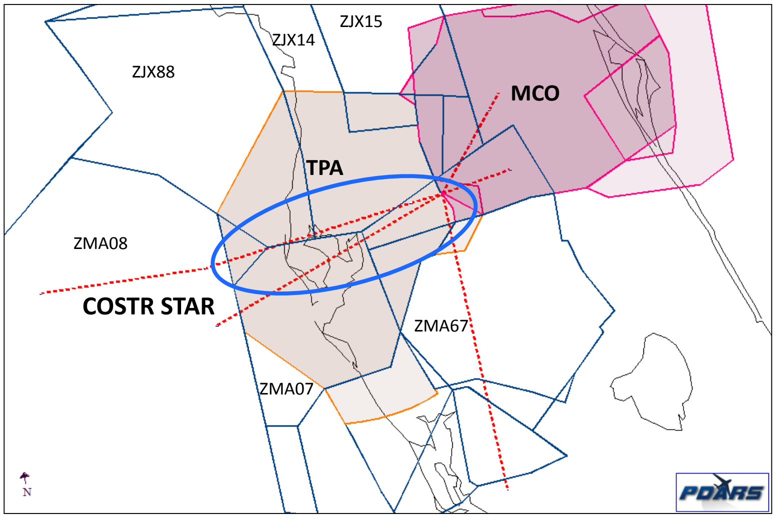


Figure 18. Proposed MCO COSTR STAR: Airspace Affected

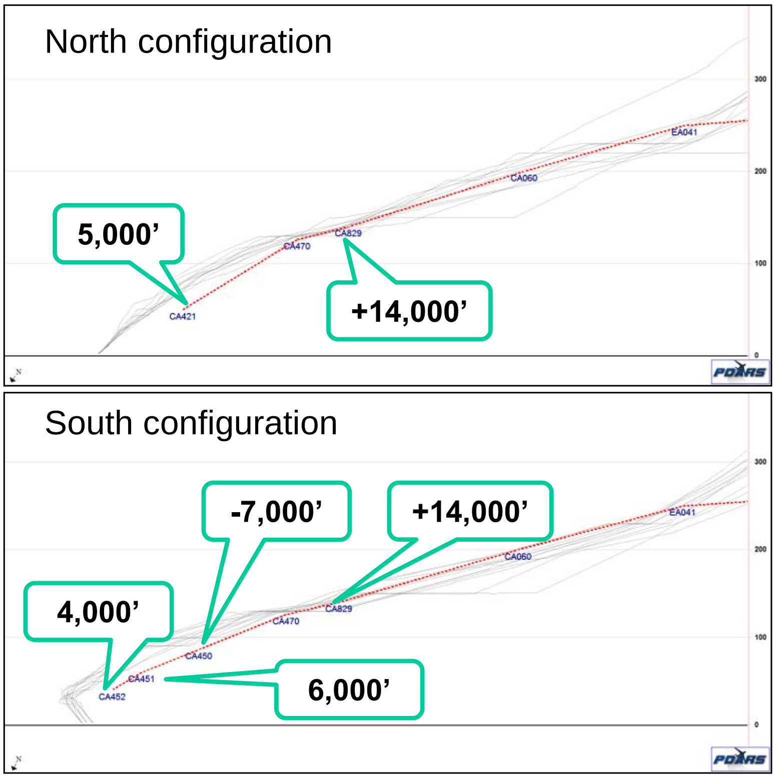


Figure 19. Proposed MCO COSTR STAR: Current Vertical Profile of Flight Tracks and Nominal Proposed Vertical Profile

- Benefits
    - Projected annual savings for the MCO New COSTR STAR are estimated in Table 8.

Table 8. Proposed MCO COSTR STAR Annual Benefits

MCO COSTR STAR		Low	High
Estimated Annual Fuel Savings *	Distance	$470K	
	Profile	$420K	$1.27M
	Cost to Carry (Distance and Profile)	$90K	$170K
	Cost To Carry (Filed Mileage Savings)	$210K	
Total Estimated Annual Fuel Savings (Gallons)		397K	709K
Total Estimated Annual Carbon Savings (Metric Tons)		4.1K	7.3K
Total Estimated Annual Fuel Savings (Dollars) *		$1.19M	$2.13M

** Based on a fuel cost of $3 per gallon*

4.2.1.6 MCO BAIRN Arrival

The MCO BAIRN STAR accounts for approximately 8% of all MCO jet arrivals.

- Issues
  - On a south flow, BAIRN arrivals to MCO conflict with WORMS/DEARY departures.
  - The current Caribbean routes are not vertically optimized.
  - More direct routes are needed from San Juan.
- Solutions
  - The downwind for BAIRN arrivals on a south flow was moved east from MCO, allowing FATHE SID departures to remain laterally separated and top BAIRN traffic at the base leg segment.
  - More direct routing and vertical guidance was developed for arrivals from the Caribbean, reducing flight track miles and optimizing the descent profile.

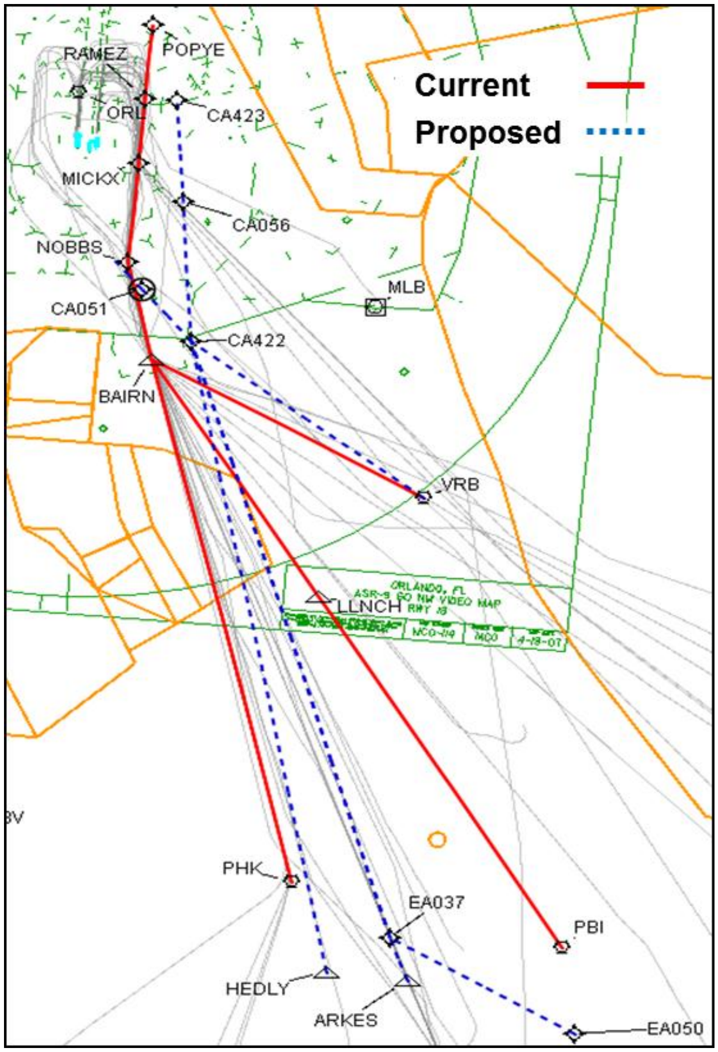


Figure 20. Current and Proposed MCO BAIRN STAR

- Notes
  - The BAIRN STAR is a relatively light flow but conflicts with the much more heavily used FATHE SID on a south flow. At the First Outreach, the concept of tightening the FATHE SID south flow route to remain inside the BAIRN arrivals was discussed. The BAIRN STAR downwind on a south flow was then laterally deconflicted to remain east of the FATHE SID. The BAIRN arrivals were not deconflicted with GUASP departures due to limited volume on the departure route.

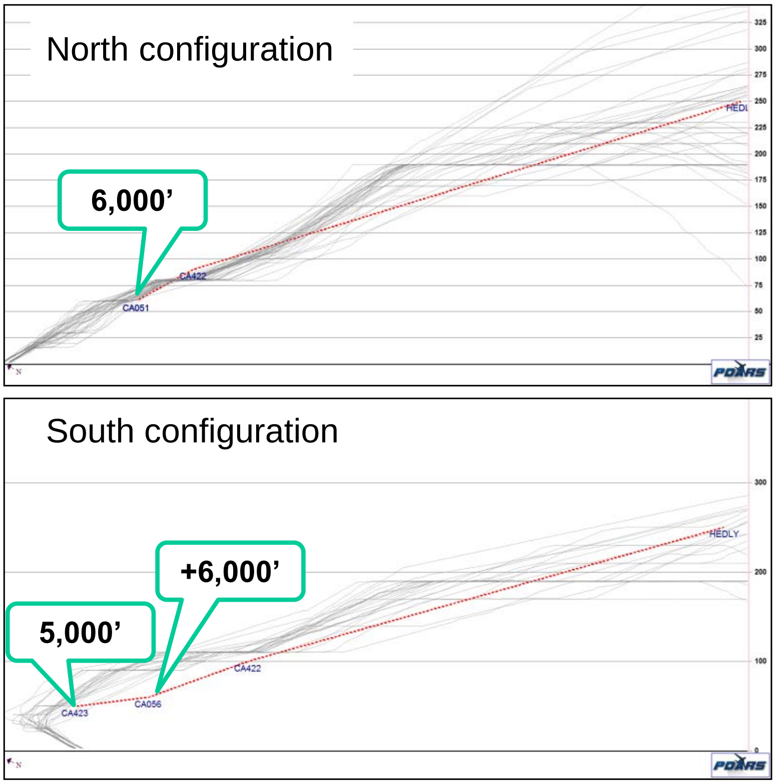


Figure 21. Proposed MCO BAIRN STAR: Current Vertical Profile of Flight Tracks and Nominal Proposed Vertical Profile

- Benefits
    - Projected annual savings for the MCO BAIRN STAR are estimated in Table 9.

Table 9. Proposed MCO BAIRN STAR Annual Benefits

MCO BAIRN STAR		Low	High
Estimated Annual Fuel Savings *	Distance	$110K	
	Profile	$240K	$730K
	Cost to Carry (Distance and Profile)	$30K	$80K
	Cost To Carry (Filed Mileage Savings)	$90K	
Total Estimated Annual Fuel Savings (Gallons)		157K	336K
Total Estimated Annual Carbon Savings (Metric Tons)		1.6K	3.5K
Total Estimated Annual Fuel Savings (Dollars) *		$470K	$1.01M

** Based on a fuel cost of $3 per gallon*

4.2.1.7 SFB/ORL and DAB New NORTH Arrival

- Issues
    - DAB, SFB, and ORL arrivals from the northeast currently interact with the MCO arrivals.
- Solutions
    - The proposed STAR permits secondary airports' arrivals to be decoupled from MCO arrivals in order to allow optimization of the MCO CWRLD STAR.
    - The proposed STAR mirrors the CWRLD STAR outside of F11 airspace and requires vertical segregation of SFB and ORL arrivals from MCO arrivals. Crossing restrictions of at or below 7,000 feet at CA473 and a hard altitude of 5,000 feet at CA419 provide vertical segregation with the CWRLD STAR. An altitude window of 8,000 feet to 9,000 feet is still needed on the CWRLD STAR at CA003 to ensure vertical segregation.
    - Separate transitions service DAB (CA473), SFB (CA419), and ORL (CA420).

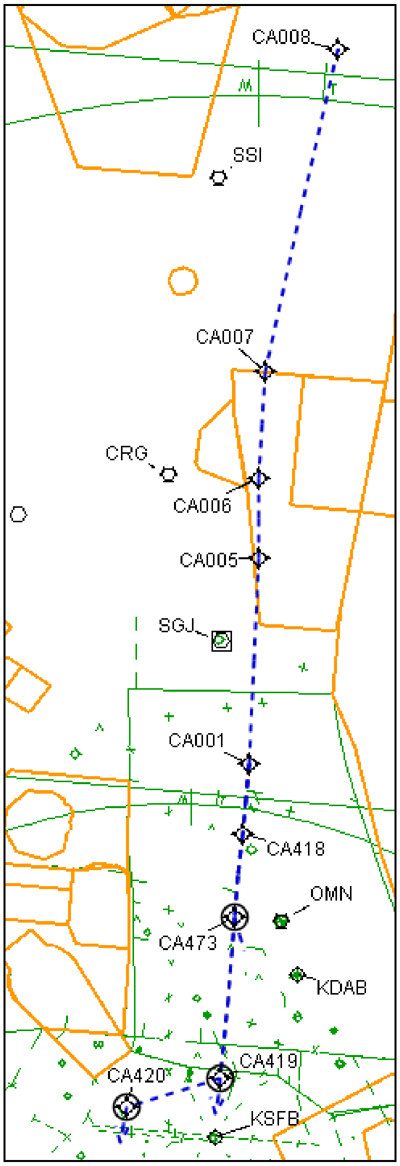


Figure 22. Proposed SFB, ORL and DAB New NORTH STAR

- Notes
  - The most appropriate starting altitude for this procedure is yet to be determined.
- Benefits
  - This procedure was not modeled due to the limited number of jet arrivals to SFB, ORL, and DAB.

4.2.1.8 SFB and ORL New Northwest Arrival (BUGLT)

- Issues
  - SFB/ORL arrivals from the northwest are currently mixed with MCO arrivals.

- Solutions
  - The proposed STAR mirrors the BUGGZ outside of F11 airspace.
  - The proposed STAR requires vertical segregation of SFB and ORL arrivals from MCO arrivals.

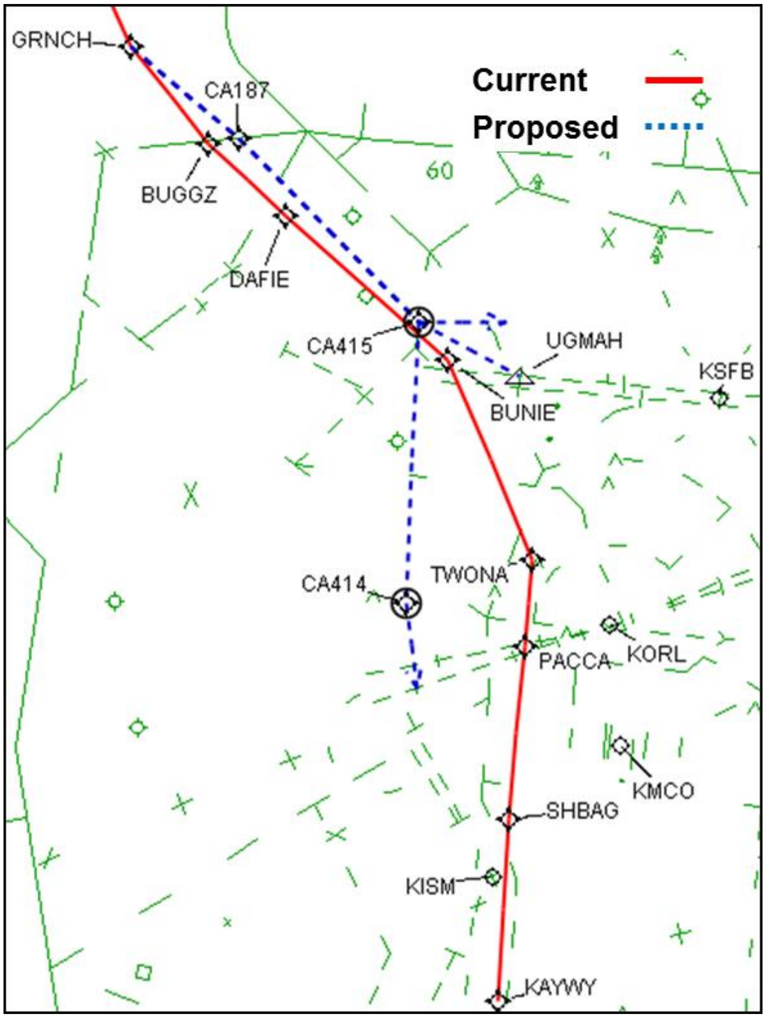


Figure 23. Proposed SFB and ORL New Northwest (BUGLT) STAR

- Notes
  - Satellite arrival traffic must be vertically segregated from MCO arrivals in order to utilize this procedure. The altitudes required to maintain vertical segregation with MCO arrivals must be determined.
- Benefits
  - This procedure was not modeled due to the limited number of jet arrivals to SFB and ORL.

4.2.1.9 ISM New Northwest Arrival (PIGZZ)

- Issues
  - o ISM arrivals from the northwest are currently mixed with MCO arrivals.
- Solutions
  - o The proposed STAR mirrors the PIGLT outside of F11 airspace.
  - o The proposed STAR requires vertical segregation of ISM arrivals from MCO arrivals.

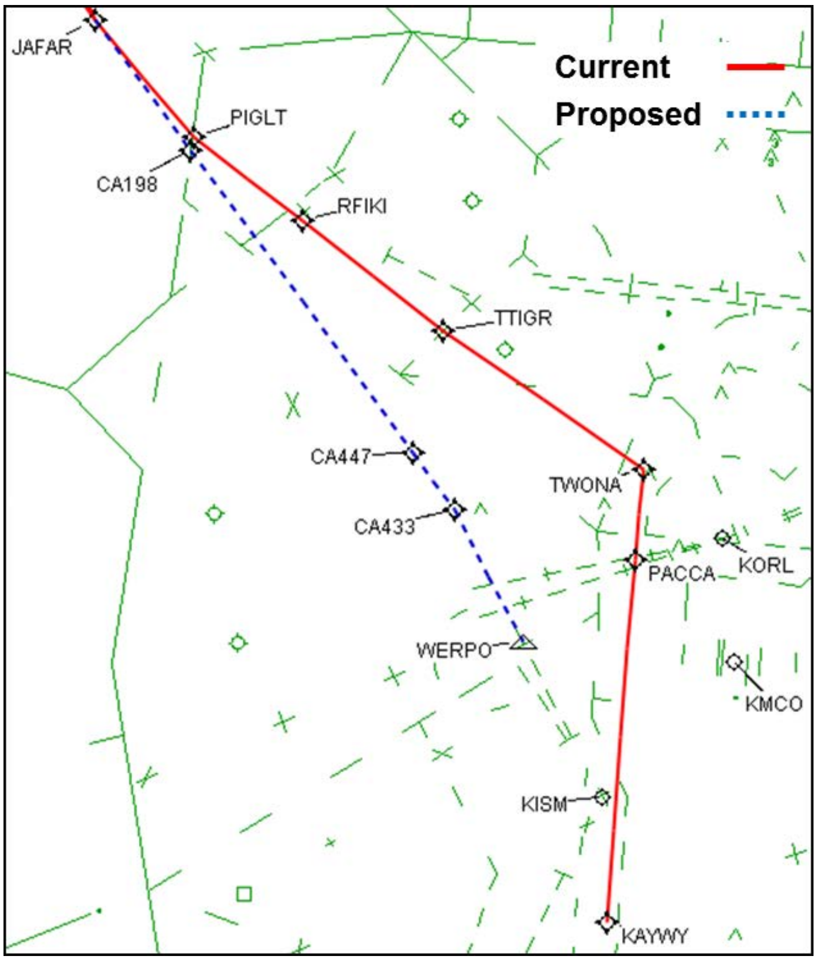


Figure 24. Current Procedure and Proposed ISM New Northwest (PIGGZ) STAR

- Notes
  - o ISM arrival traffic must be vertically segregated from MCO arrivals in order to utilize this procedure. The altitudes required to maintain vertical segregation with MCO arrivals must be determined.
- Benefits
  - o This procedure was not modeled due to the limited number of jet arrivals to ISM.

4.2.2 MCO and SFB Departures

This section describes the operational issues, solutions, and expected benefits the OST has identified for departures from MCO and SFB.

There are two conventional SIDs serving MCO, both for northbound traffic, and two radar vector SIDs. New RNAV procedures were developed for MCO in early 2012 and, although the publication date was uncertain at the time of this study, these procedures were used as the starting point for procedures developed by the OST. One of the major departure issues for F11 is that one their two northbound departure transition areas (DTAs), MICKI, is closed when the Palatka Military Operations Area (MOA) is active. This restricts northbound departures to a single stream via the WORMS DTA. To the west and northwest, departure climbs for traffic transitioning from F11 to ZJX are impacted by interaction with TPA TRACON operations to the north. In addition, departures from satellite airports often experience delayed climbs when trapped below MCO traffic. A parachute jumping zone near DeLand, FL, just north of F11 airspace, can be an issue for arrival and departure traffic.

In en route airspace during transition to or from cruising altitudes, conflicts exist between departures and arrivals. This issue is compounded in the area to the northwest of F11 and north of TPA TRACON due to the interaction of traffic from the two TRACONs. To the north of F11, departures and arrivals are in close proximity when W158 and the Palatka MOA are active at the same time.

4.2.2.1 MCO New FATHE SID Departure

The current MCO MCCOY SID accounts for approximately 46% of all MCO jet departures.

- Issues
    - When the Palatka MOA is active, the north departure routes are restricted to a single stream. The MICKI DTA closes and all traffic is routed out the WORMS DTA.
    - The departure route conflicts with the DeLand Jump Zone on a north flow.
- Solutions
    - The OST developed dual departure routes to the north, both useable when Palatka is active: the FATHE SID and the JEEMY SID.
    - The north flow departures were deconflicted with the DeLand Jump Zone. The JEEMY SID is laterally deconflicted from the DeLand Jump Zone. The FATHE SID is vertically deconflicted from the DeLand Jump Zone with a crossing restriction of at or above 15,000 feet at waypoint CD003.
    - The OST recommends charting MICKI as a stand-alone waypoint on this procedure for use when Palatka is not active.
    - The initial routing on a south operation for JEEMY follows existing tracks to the west.
    - On a south flow, the FATHE SID turns east and remains inside the BAIRN arrivals. The BAIRN STAR downwind was moved east to allow for this turn.

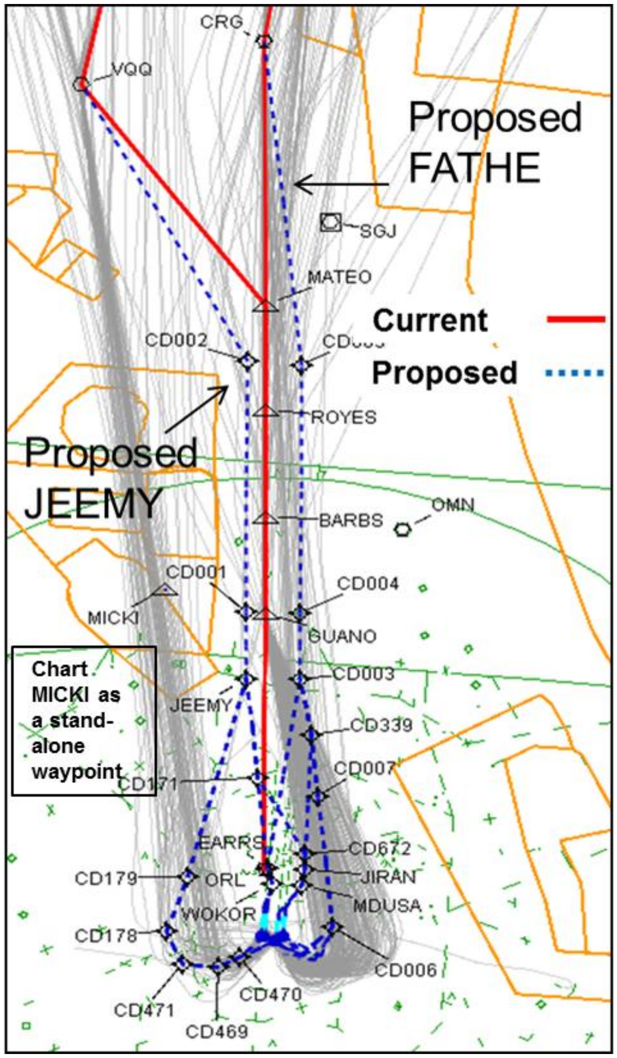


Figure 25. Current MCCOY/JAGUAR and Proposed MCO New FATHE SID

- Benefits
  - Projected annual savings for the MCO New FATHE SID are estimated in Table 10.

Table 10. Proposed MCO New FATHE SID Annual Benefits

MCO New FATHE SID		Low	High
Estimated Annual Fuel Savings *	Distance	$100K	
	Profile	N/A	N/A
	Cost to Carry (Distance and Profile)	$10K	$10K
	Cost To Carry (Filed Mileage Savings)	N/A	
Total Estimated Annual Fuel Savings (Gallons)		35K	35K
Total Estimated Annual Carbon Savings (Metric Tons)		0.4K	0.4K
Total Estimated Annual Fuel Savings (Dollars) *		$110K	$110K

** Based on a fuel cost of $3 per gallon*

4.2.2.2 MCO New JEEMY Departure

The current MCO JAGUAR accounts for approximately 12% of all MCO jet departures.

- Issues
  - When Palatka MOA is active, the north departure routes are restricted to a single stream. The MICKI DTA closes and all traffic is routed out the WORMS DTA.
  - The departure route conflicts with the DeLand Jump Zone on a north flow.
- Solutions
  - The OST developed dual departure routes to the north, both useable when Palatka is active: the FATHE SID and the JEEMY SID.
  - The north flow departures were deconflicted with the DeLand Jump Zone. The JEEMY SID is laterally deconflicted from the DeLand Jump Zone. The FATHE SID is vertically deconflicted from the DeLand Jump Zone with a crossing restriction of at or above 15,000 feet at waypoint CD003.
  - The OST recommends charting MICKI as a stand-alone waypoint on this procedure for use when Palatka is not active.
  - The initial routing on a south operation for JEEMY follows existing tracks to the west.
  - On a south flow, the FATHE SID turns east and remains inside the BAIRN arrivals. The BAIRN STAR downwind was moved east to allow for this turn.

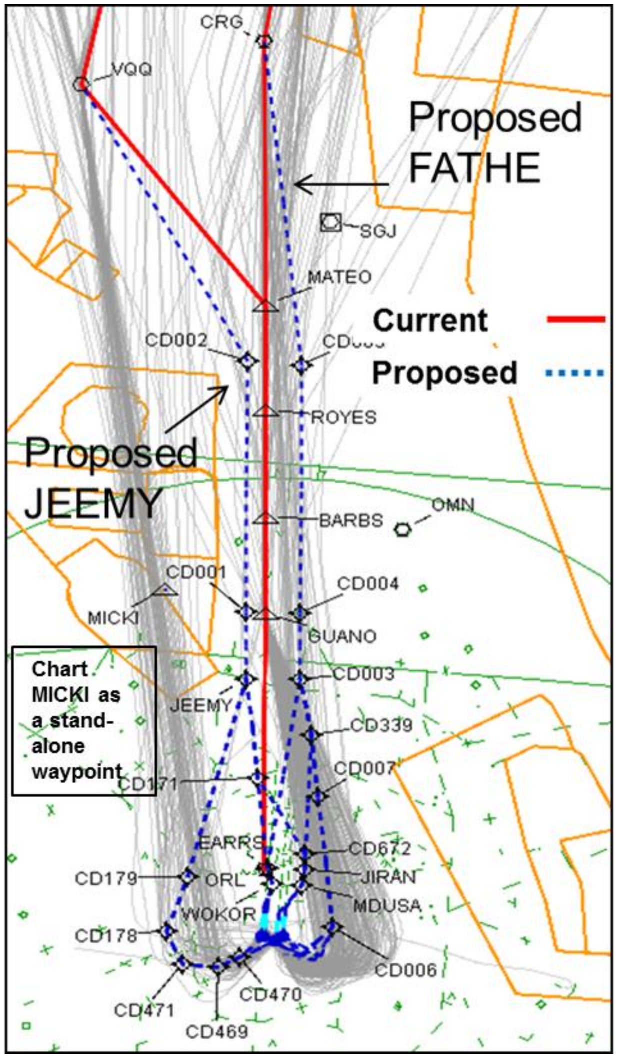


Figure 26. Current MCCOY/JAGUAR and Proposed MCO New FATHE SID

- Benefits
  - Projected annual savings for the MCO New JEEMY SID are estimated in Table 11.

Table 11. Proposed MCO New JEEMY SID Annual Benefits

MCO New JEEMY SID		Low	High
Estimated Annual Fuel Savings *	Distance	-$380K	
	Profile	N/A	N/A
	Cost to Carry (Distance and Profile)	-$40K	-$40K
	Cost To Carry (Filed Mileage Savings)	N/A	
Total Estimated Annual Fuel Savings (Gallons)		-138K	-138K
Total Estimated Annual Carbon Savings (Metric Tons)		-1.4K	-1.4K
Total Estimated Annual Fuel Savings (Dollars) *		-$410K	-$410K

** Based on a fuel cost of $3 per gallon*

4.2.2.3 MCO New CAMAN Departure

The current MCO ORLANDO SID (west/northwest) accounts for approximately 27% of all MCO jet departures.

- Issues
  - Currently there are no RNAV departure procedures serving MCO.
  - On a north flow, MCO west departures conflict with the BUGGZ and PIGLT arrival routes.
  - CAMAN departures are held down below COSTR arrivals and do not always remain clear of TPA TRACON airspace.
  - CAMAN departures conflict with overflight traffic routed from MOANS direct GNV/OCF.

- Solutions
  - CAMAN departures were vertically deconflicted above the COSTR/BUGGZ/PIGLT arrivals. TPA DADES arrivals are anticipated to be below CAMAN departures; therefore, no altitude restrictions were included for deconfliction between these two procedures.
  - The new vertical profile remains clear of TPA TRACON airspace.
  - CAMAN departures are vertically deconflicted with the SRQ TRAPR STAR.
  - Two en route transitions were developed to provide routing to the northwest and over the Gulf. The northwest transition ends at CD497, allowing flexible on course routing. The west transition was extended to an end point near REMIS at ED022 to provide lateral deconfliction from SAAs and COSTR arrivals.
  - A T-Route was developed in TPA TRACON and ZJX airspace from LAL north to OCF to resolve the MOANS direct GNV/OCF conflict.

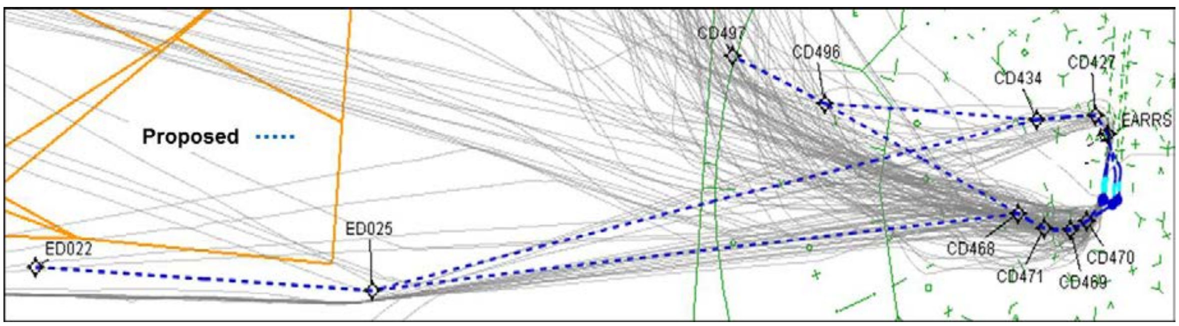


Figure 27. Current Procedure and Proposed MCO New CAMAN SID

- Benefits
  - Projected annual savings for the MCO New CAMAN SID are estimated in Table 12.

Table 12. Proposed MCO New CAMAN SID Annual Benefits

MCO New CAMAN SID		Low	High
Estimated Annual Fuel Savings *	Distance	-$90K	
	Profile	N/A	N/A
	Cost to Carry (Distance and Profile)	-$10K	-$10K
	Cost To Carry (Filed Mileage Savings)	N/A	
Total Estimated Annual Fuel Savings (Gallons)		-32K	-32K
Total Estimated Annual Carbon Savings (Metric Tons)		-0.3K	-0.3K
Total Estimated Annual Fuel Savings (Dollars) *		-$100K	-$100K

** Based on a fuel cost of $3 per gallon*

4.2.2.4 MCO New FSHUN Departure

The MCO ORLANDO SID (southwest) accounts for approximately 3% of all MCO jet departures.

- Issues
  - When all or a portion of the Lake Placid complex is active, Fort Myers DTA (FMYDT) departures require vectors and coordination.
- Solutions
  - SHFTY was included on the procedure to provide routing clear of Lake Placid airspace, not including Lake Placid North.
  - When Lake Placid North is active above 15,000 feet, the Fort Myers DTA is closed. The proposed GUASP SID provides alternate routing.

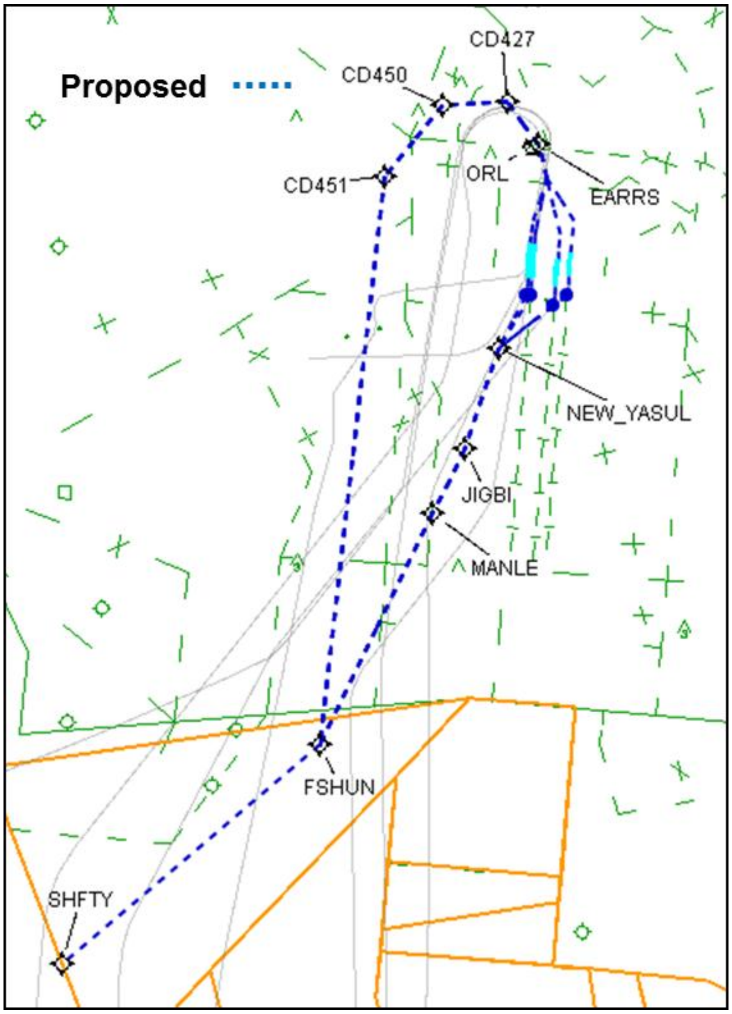


Figure 28. Proposed MCO New FSHUN SID

- Benefits
  - This procedure was not modeled due to the limited number of jet departures anticipated to utilize this route.

4.2.2.5 MCO New GUASP Departure

The MCO ORLANDO SID (east/southeast) accounts for approximately 12% of all MCO jet departures.

- Issues
  - On a south operation DEARY departures conflict with the BAIRN arrivals.

- Solutions
  - A floating waypoint CD467 was developed which would allow direct routing when Warning Area 497 is not active and laterally segregate GUASP traffic from the HIBAC STAR.
  - The lateral path was optimized to mimic current flight tracks.

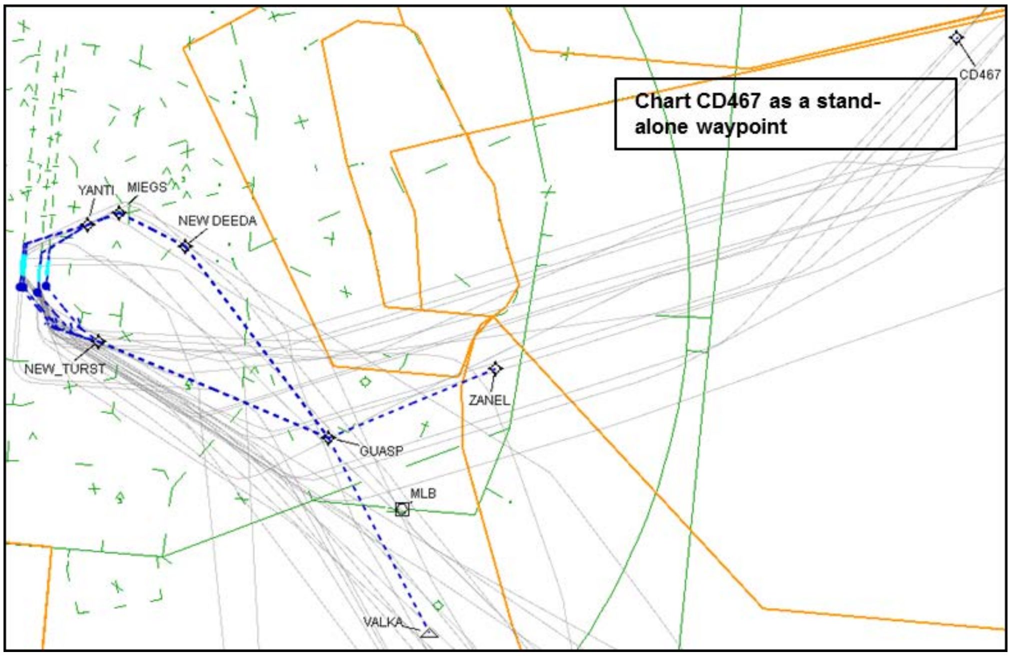


Figure 29. Proposed MCO New GUASP SID

- Notes
  - There are no RNAV procedures using the COMET/DEARY/VALKA DTAs. Due to the limited number of departure aircraft, the proposed GUASP was not deconflicted with the BAIRN STAR or CWRLD STAR.
- Benefits
  - Projected annual savings for the new MCO GUASP SID are estimated in Table 13.

Table 13. Proposed MCO New GUASP SID Annual Benefits

MCO New GUASP SID		Low	High
Estimated Annual Fuel Savings *	Distance	-$120K	
	Profile	N/A	N/A
	Cost to Carry (Distance and Profile)	-$10K	-$10K
	Cost To Carry (Filed Mileage Savings)	N/A	
Total Estimated Annual Fuel Savings (Gallons)		-43K	-43K
Total Estimated Annual Carbon Savings (Metric Tons)		-0.4K	-0.4K
Total Estimated Annual Fuel Savings (Dollars) *		-$130K	-$130K

** Based on a fuel cost of $3 per gallon*

4.2.2.6 SFB New North Departure

- Issues
  - SFB departure traffic to the north conflicts with MCO traffic and the DeLand Jump Zone.
- Solutions
  - The new SFB SID was laterally deconflicted from the new SFB/ORL North STAR and utilizes the JEEMY route to permit unrestricted climbs.
  - The SID was laterally deconflicted from the DeLand Jump Zone.

Figure 30. Proposed SFB New North SID

- Benefits
    - This procedure was not modeled due to the limited number of jet departures from SFB.

4.2.3 T-Route in the Vicinity of MCO and DAB

4.2.3.1 F11 South (BAIRN) T-Route

- Issues
    - An overflight route is needed to allow transition through F11 airspace to keep aircraft clear of MCO traffic.
- Solutions
    - Overflights are currently vectored around both BAIRN arrivals and the final box. The new T-Route remains clear of the final box and provides alternate routing.

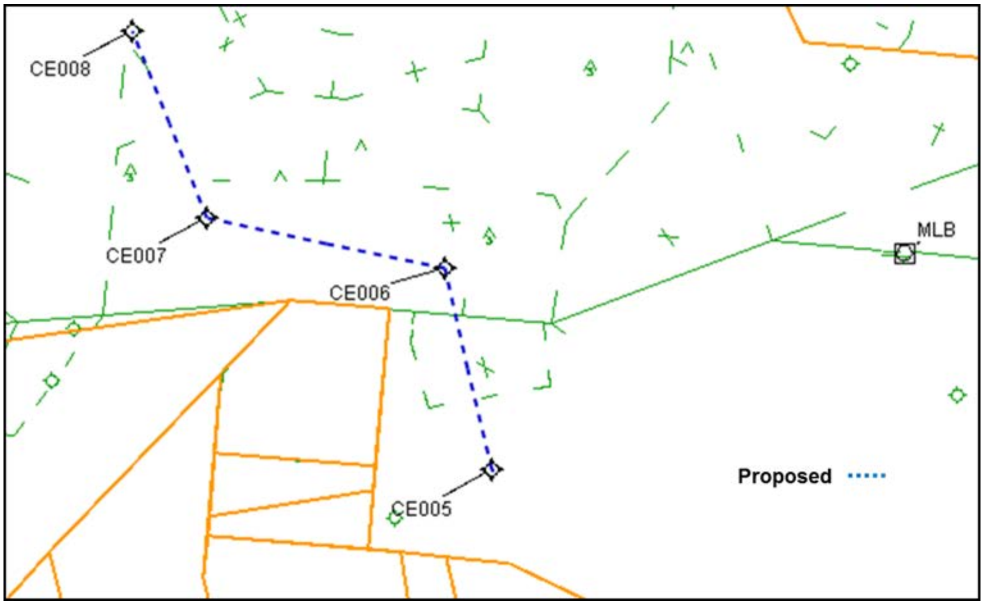


Figure 31. Proposed F11 South (BAIRN) T-Route

- Benefits
    - This procedure was not modeled due to undetermined loading.

4.2.4 Summary of Potential Benefits for MCO

As shown in Table 14 below, the proposed MCO STARs and SIDs are estimated to provide between $8.4 million and $18.8 million annually in fuel savings.

Table 14. Total Annual Fuel Burn Benefits for MCO

MCO STARS and SIDS		MCO Low	MCO High
Estimated Annual Fuel Savings *	Distance	$1.82M	
	Profile	$4.69M	$14.15M
	Cost to Carry (Distance and Profile)	$650K	$1.6M
	Cost To Carry (Filed Mileage Savings)	$1.25M	
Total Estimated Annual Fuel Savings (Gallons)		$2.8M	$6.27M
Total Estimated Annual Carbon Savings (Metric Tons)		29.1K	65K
Total Estimated Annual Fuel Savings (Dollars) *		$8.41M	$18.82K

** Based on a fuel cost of $3 per gallon*

4.3 TPA and SRQ Procedures

Within TPA TRACON airspace, TPA is the primary airport and had 524 daily operations on average in 2011, with 86% being either air carrier or air taxi flights. SRQ is the major satellite airport within TPA TRACON airspace and has TRACON/Center departure and arrival transition procedures independent from those of TPA. TPA TRACON airspace is from the surface to 12,000 feet MSL with some lower shelves. ZJX airspace and ZMA airspace overlie TRACON airspace. Airspace adjacent to TPA TRACON includes F11 to the east, RSW TRACON to the south and JAX TRACON to the north. TPA has a north/south runway configuration, with the south flow being the predominant flow at 55%.

4.3.1 TPA and SRQ Arrivals

This section describes the operational issues, solutions, and expected benefits the OST has identified for arrivals to TPA and SRQ.

Within TPA TRACON airspace, arrivals often conflict with TPA departure procedures, arrival procedures to the SRQ airport, and overflights on airway Victor 7 (V7). When on a north flow STARs from the west and northwest converge on the downwind leg. A parachute jumping area (PAJA) near Zephyrhills (ZPH) is an issue for arrival and overflight traffic.

When TPA is on a north operation SRQ arrivals from the north must be descended in reference to TPA arrivals and can be affected by the ZPH PAJA. Additionally, they conflict with Tampa arrivals from the southeast.

No en route transition exists to connect to the TPA BLOND STAR.

4.3.1.1 TPA DADES Arrival

The TPA DADES STAR accounts for 44% of all TPA jet arrivals.

- Issues
  - Interaction between DADES arrival aircraft and V7 overflights on a south operation increases complexity in TRACON airspace.
- Solutions
  - The STAR was moved west to reduce track miles.
  - A T-Route was developed northeast of V7 to deconflict overflight traffic from arrivals.
  - The proposed STAR provides lateral segregation with the SRQ TRAPR STAR.
  - The proposed procedure incorporates direct routing from JAYJA to CA475 intercepting the base leg on a south flow.
  - Waypoint EA044 is the initial fix for a new en route transition and is anticipated to be at or near the top of descent.

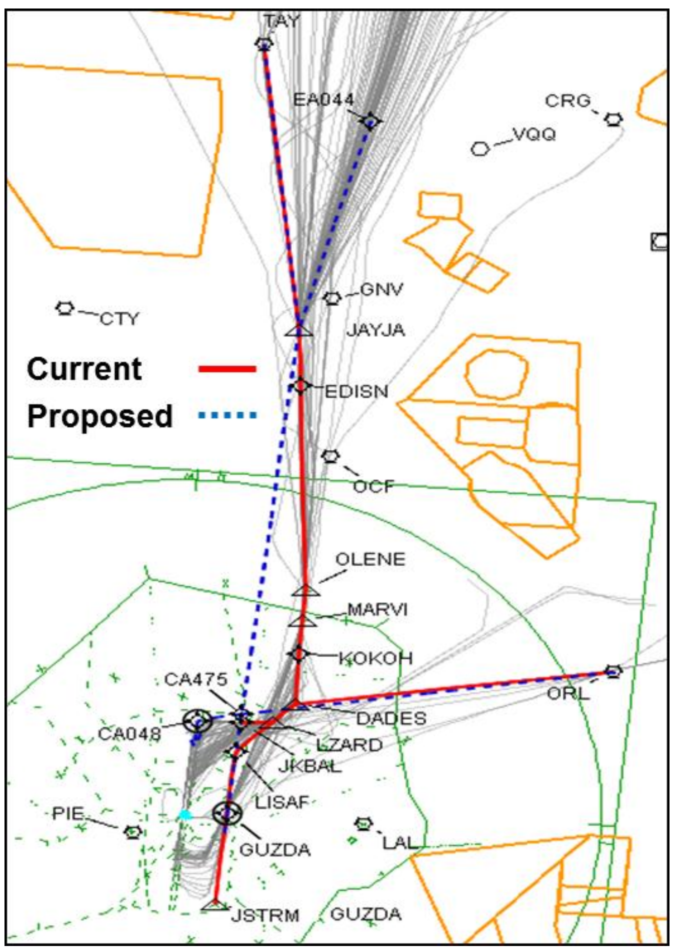


Figure 32. Current and Proposed TPA DADES STAR

- Notes
  - The TAY and ORL transitions are also included in the procedure.
  - The proposed TPA DADES STAR will impact boundaries between ZJX sectors 14 and 15. TPA TRACON sector boundaries and vertical limits also need to be reviewed.

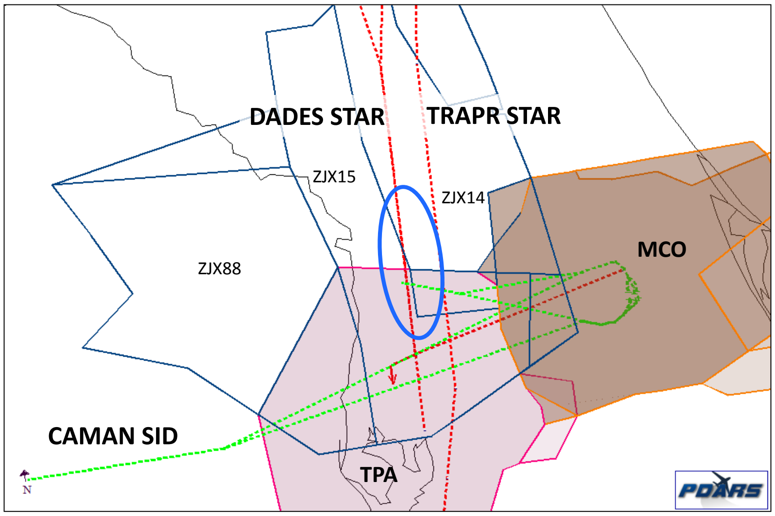
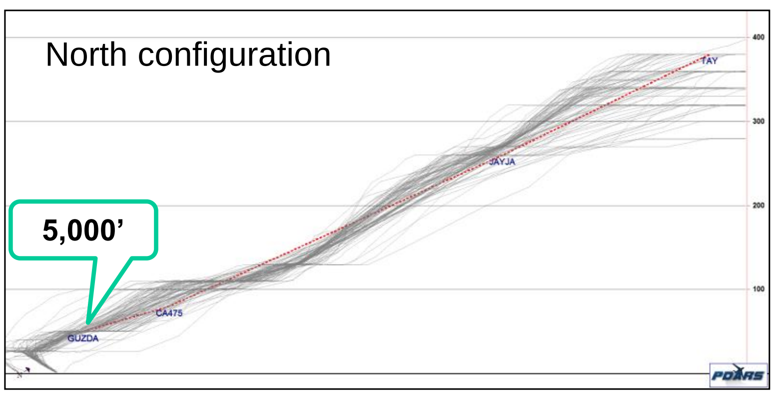


Figure 33. Proposed TPA DADES STAR: Airspace Affected



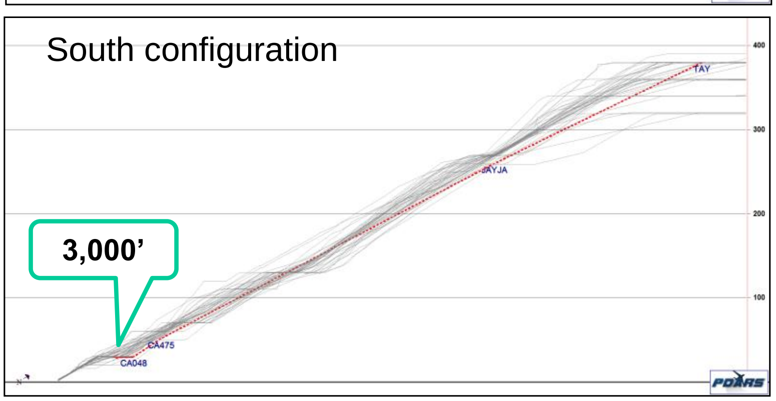


Figure 34. Proposed TPA DADES STAR: Current Vertical Profile of Flight Tracks and Nominal Proposed Vertical Profile

- Benefits
  - Projected annual savings for the TPA DADES STAR are estimated in Table 15.

Table 15. Proposed TPA DADES STAR Annual Benefits

TPA DADES STAR		Low	High
Estimated Annual Fuel Savings *	Distance	$90K	
	Profile	$800K	$2.39M
	Cost to Carry (Distance and Profile)	$90K	$250K
	Cost To Carry (Filed Mileage Savings)	$200K	
Total Estimated Annual Fuel Savings (Gallons)		391K	975K
Total Estimated Annual Carbon Savings (Metric Tons)		4K	10.1K
Total Estimated Annual Fuel Savings (Dollars) *		$1.17M	$2.92M

** Based on a fuel cost of $3 per gallon*

4.3.1.2 TPA FOOXX Arrival

The TPA FOOXX STAR accounts for 33% of all TPA jet arrivals.

- Issues
  - On a south flow FOOXX arrivals conflict with ENDED departures.
  - On a north flow FOOXX arrivals conflict with BLOND arrivals.
- Solutions
  - The FOOXX STAR and ENDED SID were laterally and vertically optimized to provide a greater opportunity to obtain vertical segregation with departures topping arrivals.
  - The new flight path of the BLOND STAR allows for more efficient spacing with FOOXX arrivals.

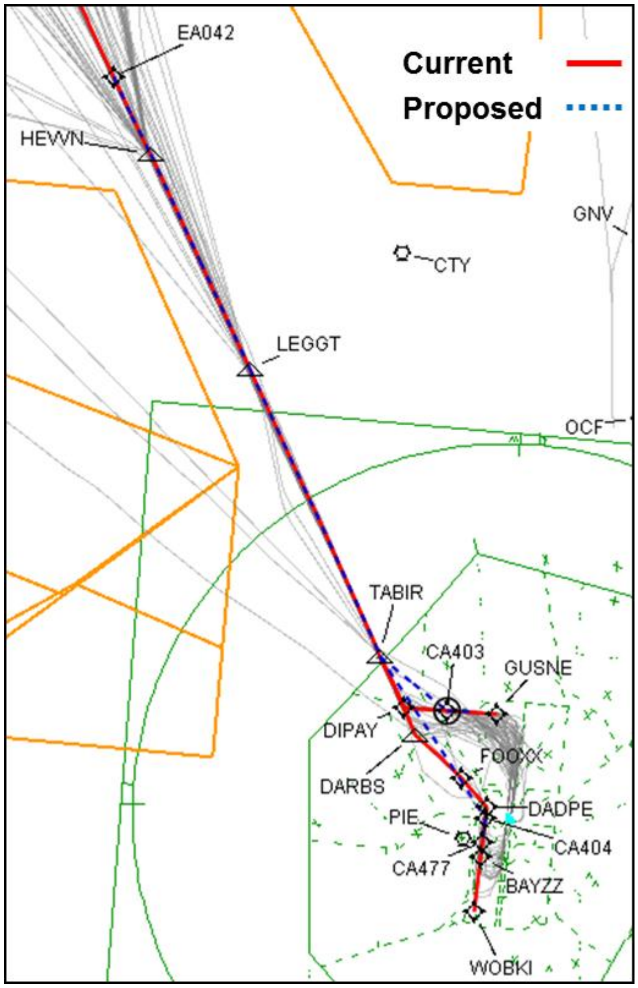


Figure 35. Current and Proposed TPA FOOXX STAR

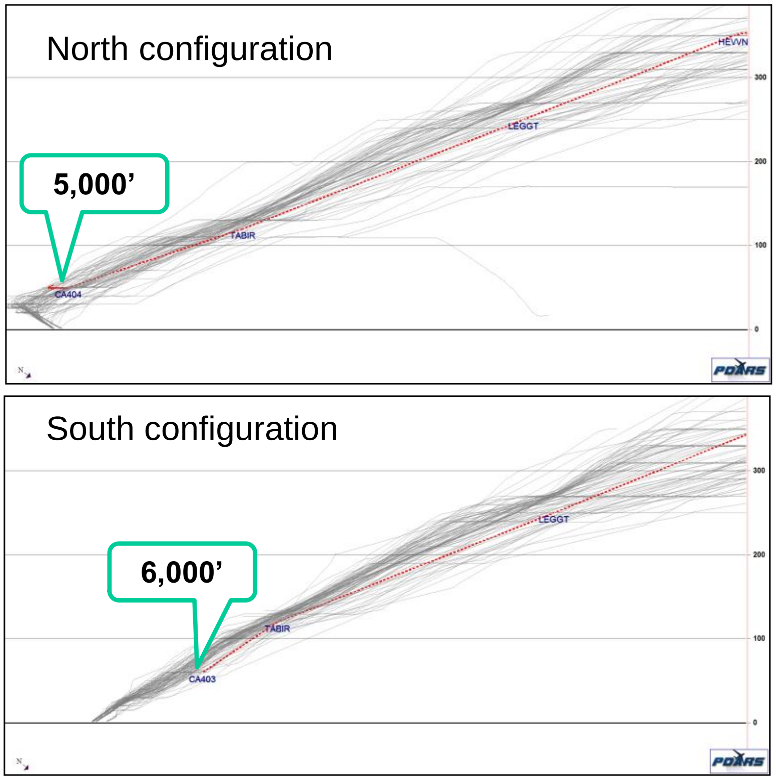


Figure 36. Proposed TPA FOOXX STAR: Current Vertical Profile of Flight Tracks and Nominal Proposed Vertical Profile

- Benefits
  - Projected annual savings for the TPA FOOXX STAR are estimated in Table 16.

Table 16. Proposed TPA FOOXX STAR Annual Benefits

TPA FOOXX STAR		Low	High
Estimated Annual Fuel Savings *	Distance	$120K	
	Profile	N/A	N/A
	Cost to Carry (Distance and Profile)	$10K	$10K
	Cost To Carry (Filed Mileage Savings)	$220K	
Total Estimated Annual Fuel Savings (Gallons)		118K	118K
Total Estimated Annual Carbon Savings (Metric Tons)		1.2K	1.2K
Total Estimated Annual Fuel Savings (Dollars) *		$350K	$350K

** Based on a fuel cost of $3 per gallon*

4.3.1.3 TPA BLOND Arrival

The TPA BLOND STAR accounts for 8% of all TPA jet arrivals.

- Issues
  - On a north flow, BLOND arrivals conflict with FOOXX arrivals.
  - No transition exists on the BLOND STAR for arrival traffic filed over REMIS.
- Solutions
  - The new flight path for the BLOND arrivals to a common point west of the airport allows for more efficient spacing with FOOXX arrivals.
  - The procedure was extended to REMIS. The OST expects top of descent for the STAR to be at or near REMIS. The transition also provides a Gulf route tie-in.
  - The proposed BLOND STAR was laterally deconflicted from the proposed SYKES SID for both flows.
  - The proposed BLOND STAR utilizes the same route as the COSTR STAR and can be vertically deconflicted below it.

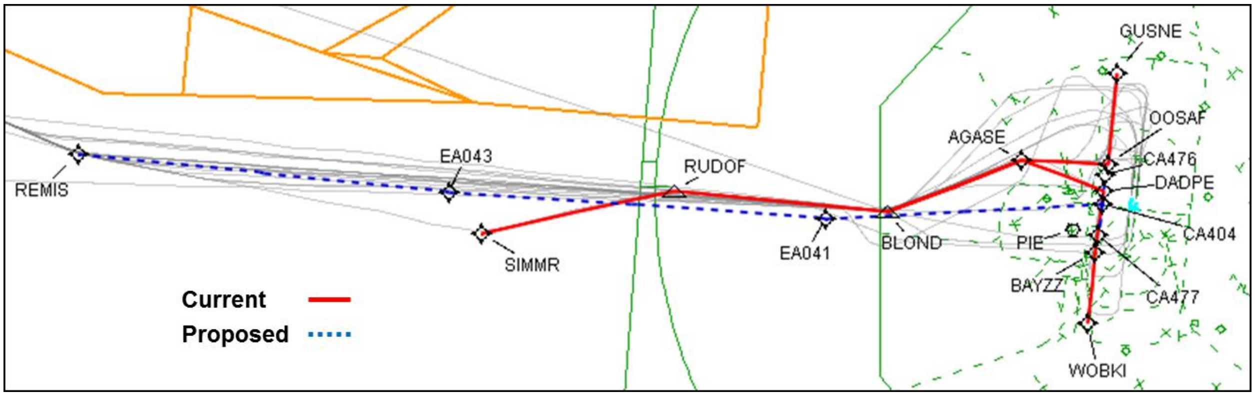


Figure 37. Current and Proposed TPA BLOND STAR

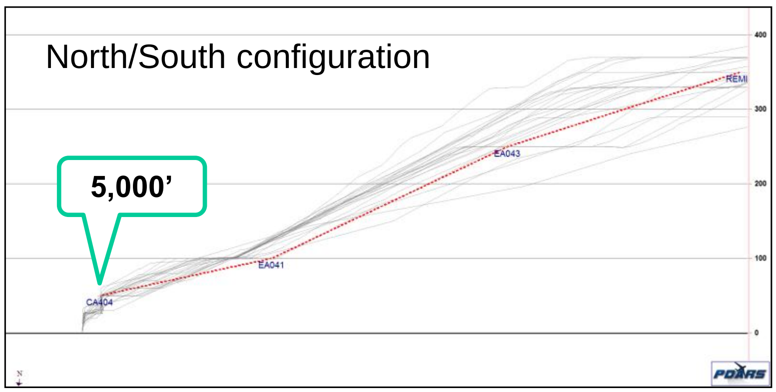


Figure 38. Proposed TPA BLOND STAR: Current Vertical Profile of Flight Tracks and Nominal Proposed Vertical Profile

- Benefits
    - Projected annual savings for the TPA BLOND STAR are estimated in Table 17.

Table 17. Proposed TPA BLOND STAR Annual Benefits

TPA BLOND STAR		Low	High
Estimated Annual Fuel Savings *	Distance	N/A	
	Profile	$170K	$490K
	Cost to Carry (Distance and Profile)	$20K	$50K
	Cost To Carry (Filed Mileage Savings)	$60K	
Total Estimated Annual Fuel Savings (Gallons)		82K	199K
Total Estimated Annual Carbon Savings (Metric Tons)		0.8K	2.1K
Total Estimated Annual Fuel Savings (Dollars) *		$240K	$600K

** Based on a fuel cost of $3 per gallon*

4.3.1.4 TPA DEAKK Arrival

The TPA DEAKK STAR accounts for 15% of all TPA jet arrivals.

- Issues
    - On a north flow DEAKK arrivals conflict with the SRQ TRAPR arrivals.
    - Current flight tracks do not follow the existing DEAKK STAR.
- Solutions
    - The DEAKK STAR was relocated southwest to vertically deconflict arrivals from the SRQ TRAPR arrivals and PBI WLACE STARs.
    - The OST expects that aircraft on a south flow will be at 4,000 feet at LAGOO intersection based on a 2.7 degree descent gradient and at 7,000 feet at CA405 intersection on a north flow. Waypoint CA410 is located on the Tampa TRACON boundary and has a proposed altitude window between 11,000 feet and 15,000 feet.
    - Although the profile allows for vertical deconfliction with the SRQ TRAPR STAR, additional crossing altitudes must be added to ensure separation.

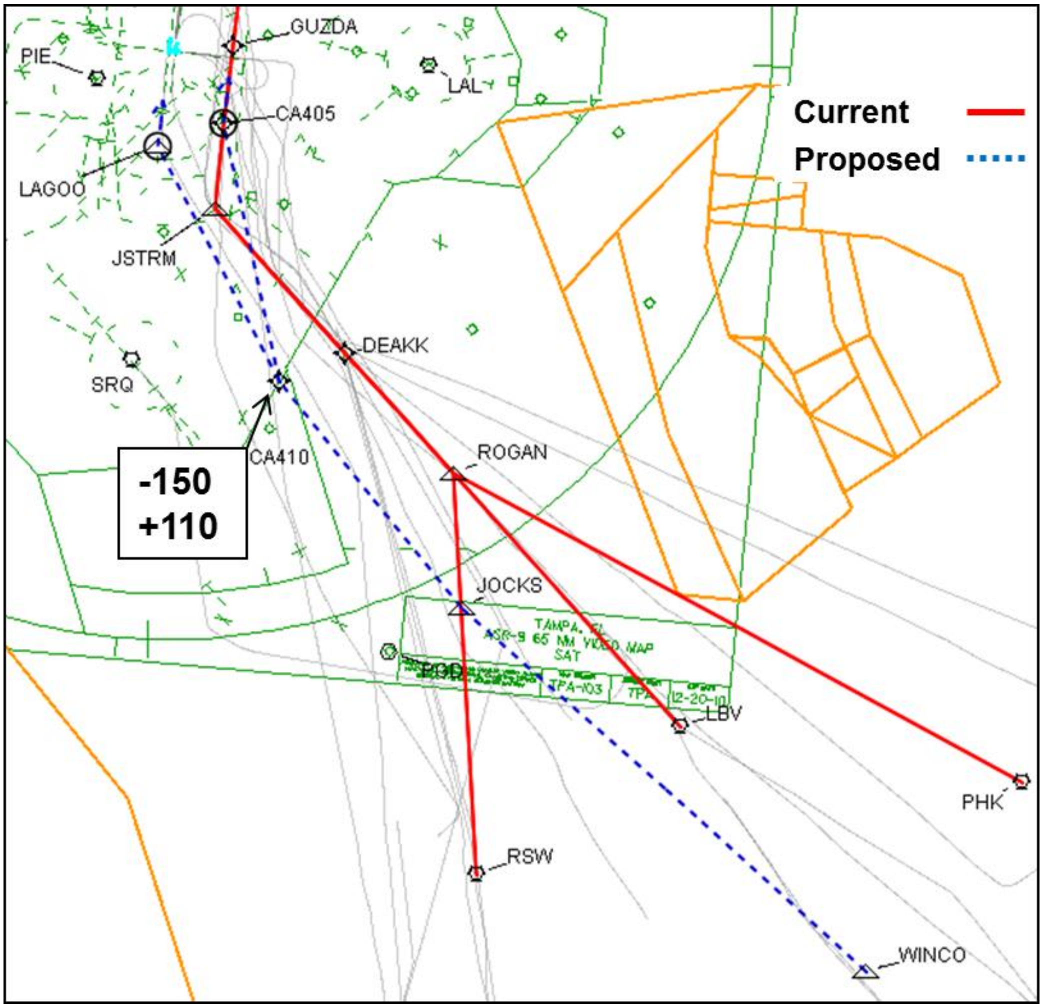


Figure 39. Current and Proposed TPA DEAKK STAR

- Notes
  - The proposed TPA DEAKK STAR will impact ZMA sectors 67, 47 and 24 boundaries.

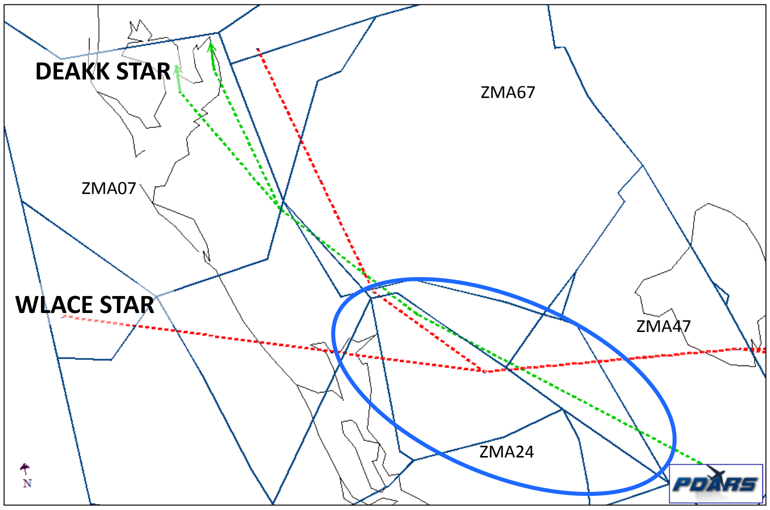


Figure 40. Proposed TPA DEAKK STAR: Airspace Affected

- Benefits
  - This procedure was not modeled due to the limited number of jet arrivals anticipated to utilize this route to TPA.

4.3.1.5 SRQ TRAPR Arrival

- Issues
  - The SRQ TRAPR STAR conflicts with the MCO COSTR STAR and the ZPH PAJA.
  - The SRQ TRAPR STAR conflicts with the DEAKK STAR when TPA is on a north flow.
  - Currently TRAPR arrivals are descended to lower altitudes as far as 50NM from the airport, causing interaction with other low altitude traffic.
- Solutions
  - The proposed TRAPR STAR is laterally deconflicted with the proposed TPA DADES STAR and ZPH PAJA.
  - The proposed TRAPR STAR is vertically deconflicted with the proposed MCO COSTR STAR and the MCO CAMAN SID. Simulation of the proposed CAMAN SID supported a crossing altitude at CD425 of at or below 17,000 feet for the proposed TRAPR STAR. Waypoint CA830 with a restriction of at or below 12,000 feet vertically segregates from the MCO COSTR STAR.
  - The proposed TRAPR STAR can be vertically deconflicted with the proposed TPA DEAKK STAR. The crossing restrictions of at or below 5,000 feet and at or above 4,000 feet at LYFIE provide vertical segregation from the DEAKK arrivals for both north and south flows to TPA.
  - The proposed vertical profile allows arrivals to remain higher, reducing interaction with low altitude traffic.

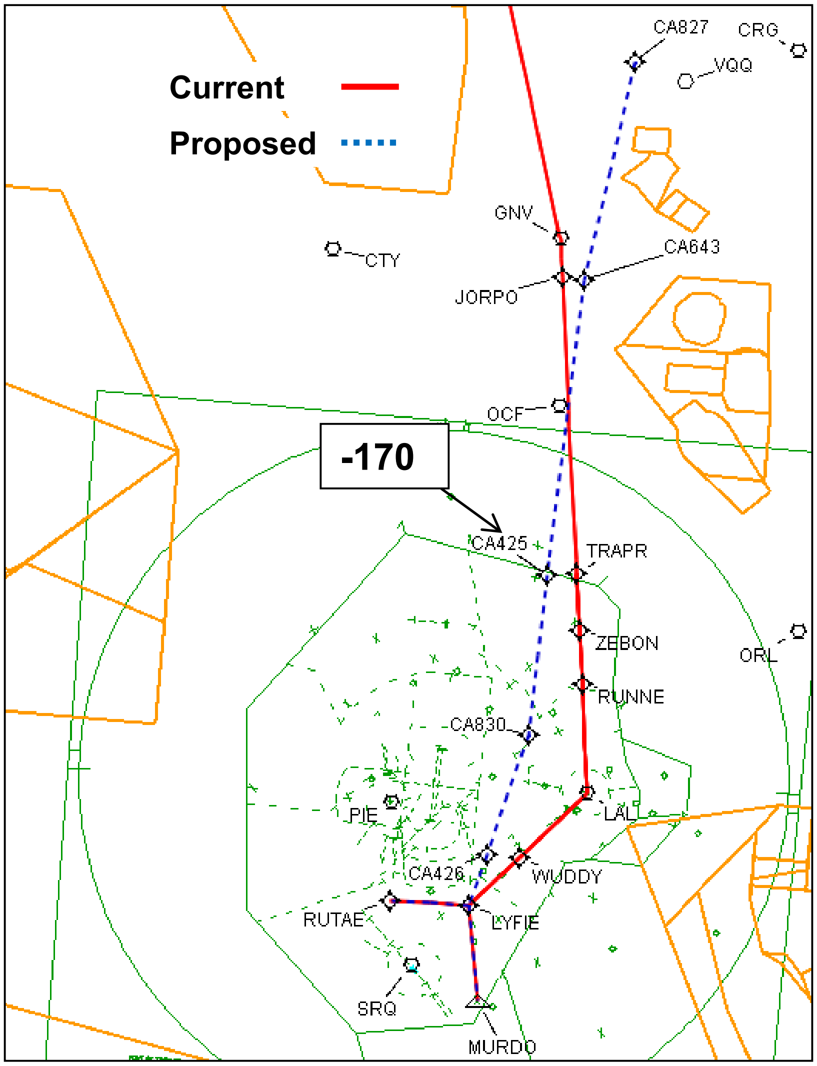


Figure 41. Current and Proposed SRQ TRAPR STAR

- Benefits
  - This procedure was not modeled due to the limited number of jet arrivals to SRQ.

4.3.1.6 SRQ TEEGN Arrival

- Issues
  - Current flight tracks do not follow the existing SRQ TEEGN STAR.
- Solutions
  - The lateral and vertical profiles were optimized to reduce flight track miles and to provide deconfliction with the SRQ SRKUS SID. Currently, north arrivals are typically cleared direct to LINKN or to the IAFs of FIVDO or PASOE. The proposed procedure was designed to mimic these tracks.

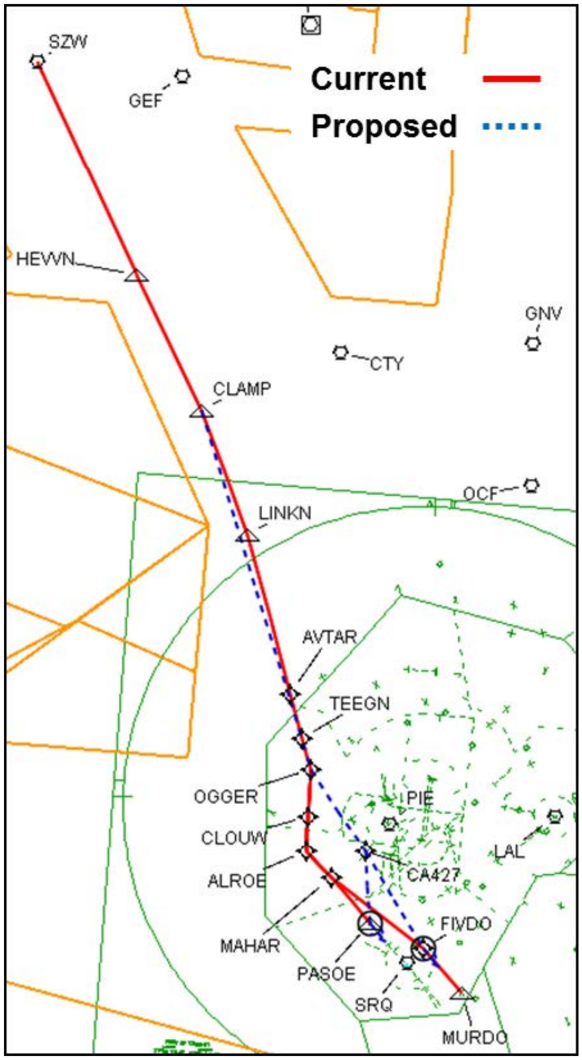


Figure 42. Current and Proposed SRQ TEEGN STAR

- Benefits
  - This procedure was not modeled due to the limited number of jet arrivals to SRQ.

4.3.2 TPA and SRQ Departures

This section describes the operational issues, recommendations, and derived benefits the OST has identified for departures from TPA and SRQ.

There are five RNAV SIDs, one serving each of TPA's primary departure routes, and one radar vector SID. One of the departure issues for TPA is level-offs due to the location of the ZMA/ZJX boundary, just south of the TPA airport. Departing south and turning north, departures occasionally level at 12,000 feet prior to reaching the appropriate ZJX sector. On a north flow, the same occurs 20% to 30% for departures that will enter ZMA airspace. When TPA is on a south flow, TPA departures northbound make a right turn over Tampa Bay to avoid residential areas and create a crossing situation between departures and arrivals from the northwest.

In en route airspace during transition to or from cruising altitudes, conflicts exist between departures and arrivals. This issue is compounded in the area to the northwest of F11 and north of TPA TRACON due to the interaction of traffic from the two TRACONs. The TPA SYKES SID, serving departures to the west across the Gulf of Mexico, does not connect with an en route structure, e.g. Q100.

No issues were identified with the CROWD and GANDY SIDs, and no proposed changes were identified by the OST. These two procedures account for approximately 19% of all TPA jet departures.

The SRQ SRKUS SID was amended to accommodate the redesign of the SRQ TEEGN STAR and the TPA SYKES SID.

4.3.2.1 TPA BAYPO Departure

The TPA BAYPO SID accounts for approximately 41% of all TPA jet departures.

- Issues
  - The current procedure includes a dogleg at WILON.
- Solutions
  - The proposed procedure eliminates unnecessary waypoints.
  - The FOOXX STAR and BAYPO SID were laterally and vertically optimized to provide a greater opportunity to obtain vertical segregation with departures topping arrivals.

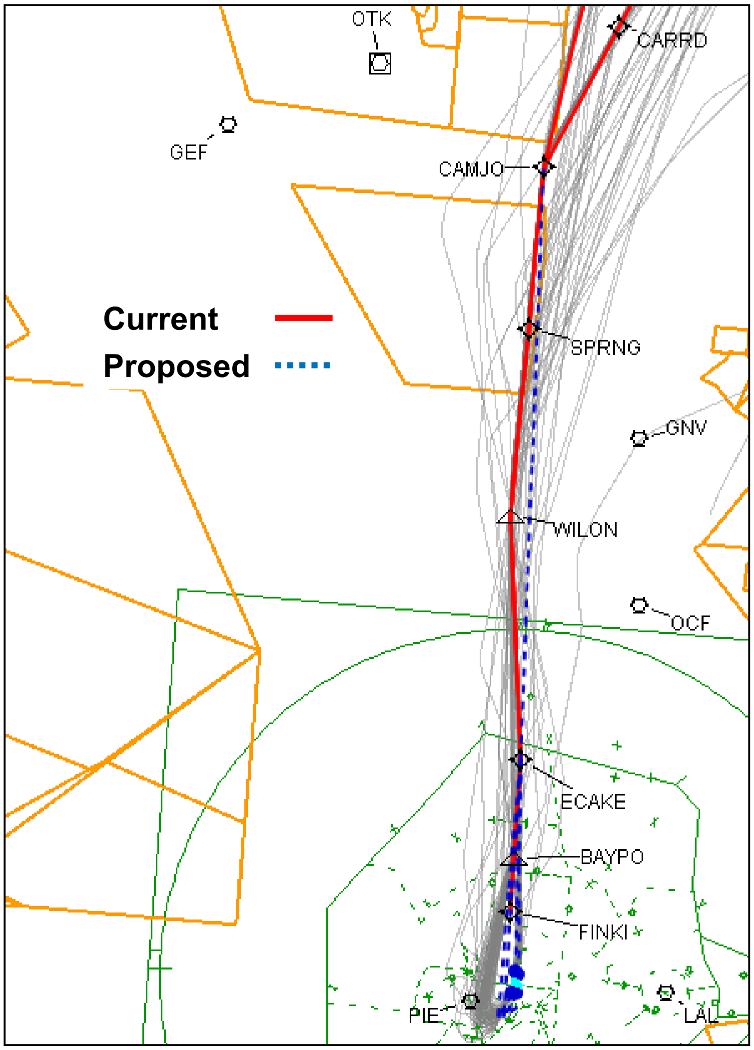


Figure 43. Current and Proposed TPA BAYPO SID

- Notes
    - The OST recognizes that current airspace delegation restricts BAYPO departures' ability to climb during a south runway configuration. The airspace boundary between ZJX and ZMA, along with the vertical limits of TPA TRACON, should be reviewed.

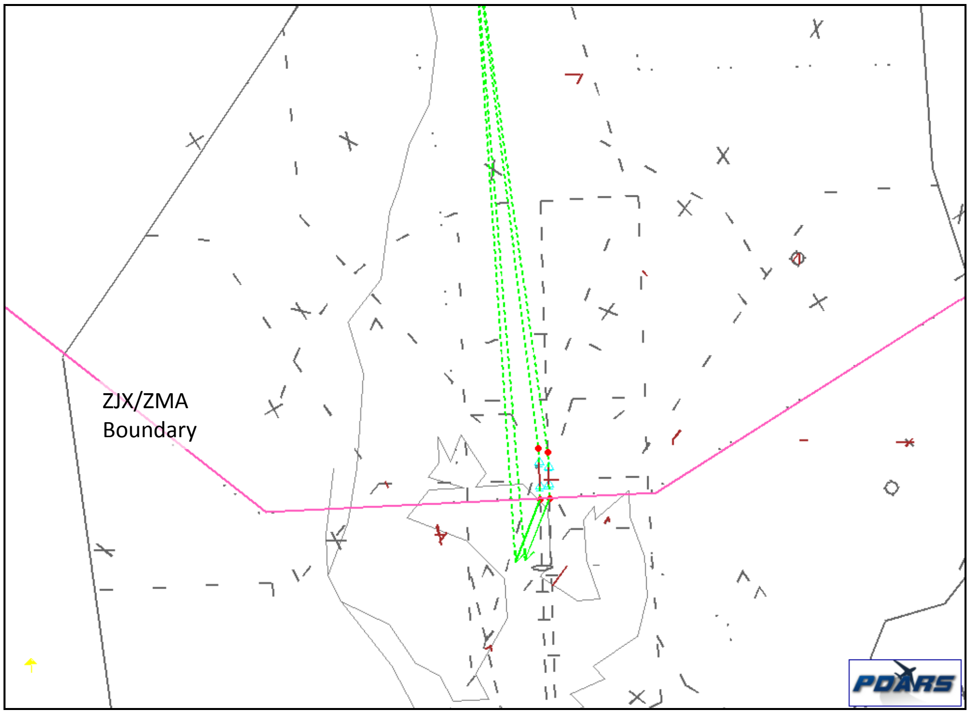


Figure 44. Proposed TPA BAYPO SID: Airspace Affected

- Benefits
  - This procedure was not modeled due to limited anticipated profile/distance benefits.

4.3.2.2 TPA ENDED Departure

The TPA ENDED SID accounts for approximately 32% of all TPA jet departures.

- Issues
  - Track data indicates that aircraft do not use the existing departure procedure.
  - On a south flow ENDED departures conflict with FOOXX arrivals.
- Solutions
  - The proposed procedure was designed to align with current flight tracks and eliminates unnecessary waypoints to enable more flexible routing.
  - The FOOXX STAR and ENDED SID were laterally and vertically optimized to provide a greater opportunity to obtain vertical segregation with departures topping arrivals.

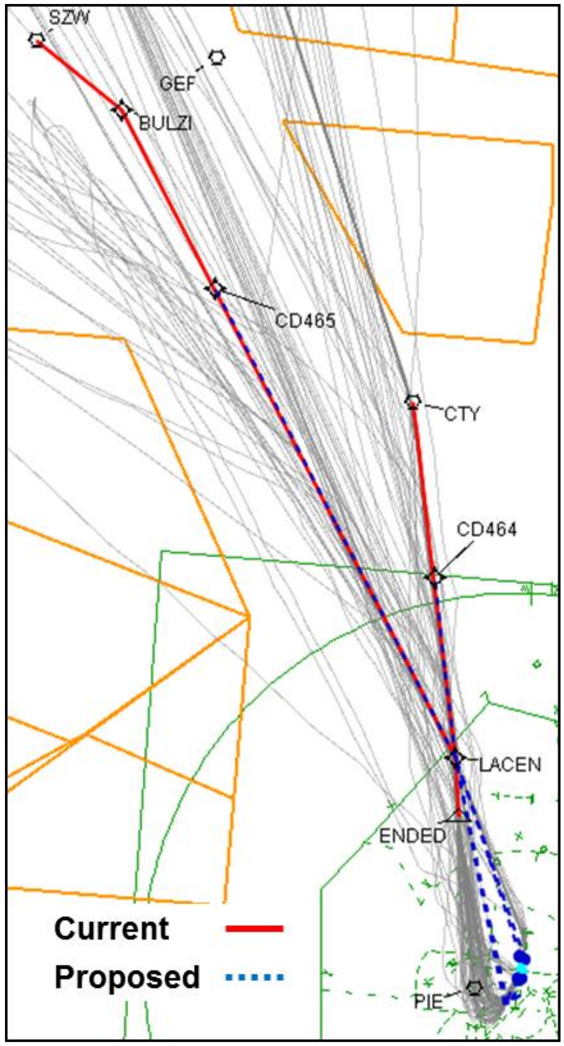


Figure 45. Current and Proposed TPA ENDED SID

- Notes
  - The OST recognizes that current airspace delegation restricts ENDED departures' ability to climb during a south runway configuration. The airspace boundary between ZJX and ZMA, along with the vertical limits of TPA TRACON, should be reviewed.
- Benefits
  - This procedure was not modeled due to limited anticipated profile/distance benefits.

4.3.2.3 TPA SYKES Departure

The TPA SYKES SID accounts for approximately 8% of all TPA jet departures.

- Issues
    - There is currently no route structure for departure aircraft to join Q100.
    - SYKES departures conflict with the BLOND arrivals.
    - Current flight tracks indicate the route does not follow the most efficient lateral path.
- Solutions
    - The proposed SYKES SID is laterally deconflicted from the proposed BLOND STAR for both flows.
    - Optimized lateral paths based on runway configuration provide reduction in track miles. Aircraft departing north are routed over waypoint ED025, and aircraft departing south are routed over waypoint ED028. The transitions merge at ED030 and proceed to REMIS to join Q100. These transitions enable departures to remain laterally segregated from the BLOND and COSTR STARs.

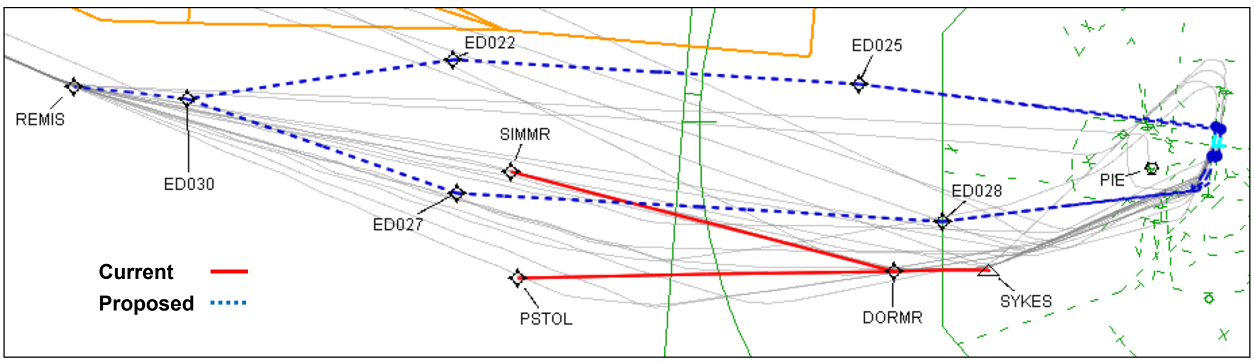


Figure 46. Current and Proposed TPA SYKES SID

- Benefits
    - Projected annual savings for the TPA SYKES SID are estimated in Table 18.

Table 18. Proposed TPA SYKES SID Annual Benefits

TPA SYKES SID		Low	High
Estimated Annual Fuel Savings *	Distance	$200K	
	Profile	N/A	N/A
	Cost to Carry (Distance and Profile)	$20K	$20K
	Cost To Carry (Filed Mileage Savings)	$230K	
Total Estimated Annual Fuel Savings (Gallons)		151K	151K
Total Estimated Annual Carbon Savings (Metric Tons)		1.6K	1.6K
Total Estimated Annual Fuel Savings (Dollars) *		$450K	$450K

** Based on a fuel cost of $3 per gallon*

4.3.2.4 SRQ SRKUS Departure

- Issues
  - Current flight tracks do not follow the existing SRQ SRKUS SID.
- Solutions
  - The lateral and vertical profiles were optimized to reduce flight track miles and to provide deconfliction with the SRQ TEEGN SID.
  - The SIMMR transition was modified to terminate at a fix on the proposed TPA SYKES SID south transition.

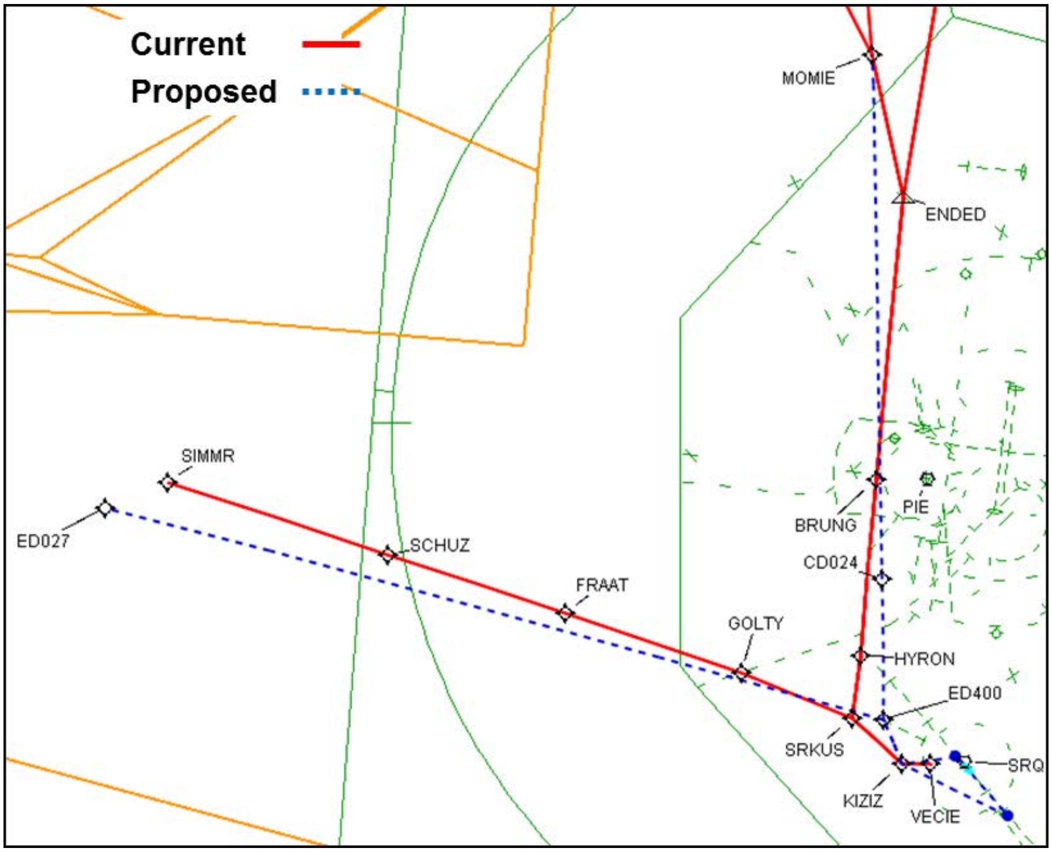


Figure 47. Current and Proposed SRQ SRKUS SID

- Benefits
  - This procedure was not modeled due to the limited number of jet departures from SRQ.

4.3.3 LAL T-Routes

- Issues
  - V7 overflights conflict with DADES arrivals on a south flow.
  - The CAMAN departures conflict with aircraft routed via MOANS to GNV/OCF.
- Solutions
  - T-Routes were developed between LAL and CTY northeast of V7, and between LAL and OCF to provide segregation from the proposed TPA DADES STAR.
  - These new routes also provide an alternative for the MOANS direct OCF/GNV traffic splitting at waypoint CE001, which may allow MCO CAMAN departures to climb above this traffic.

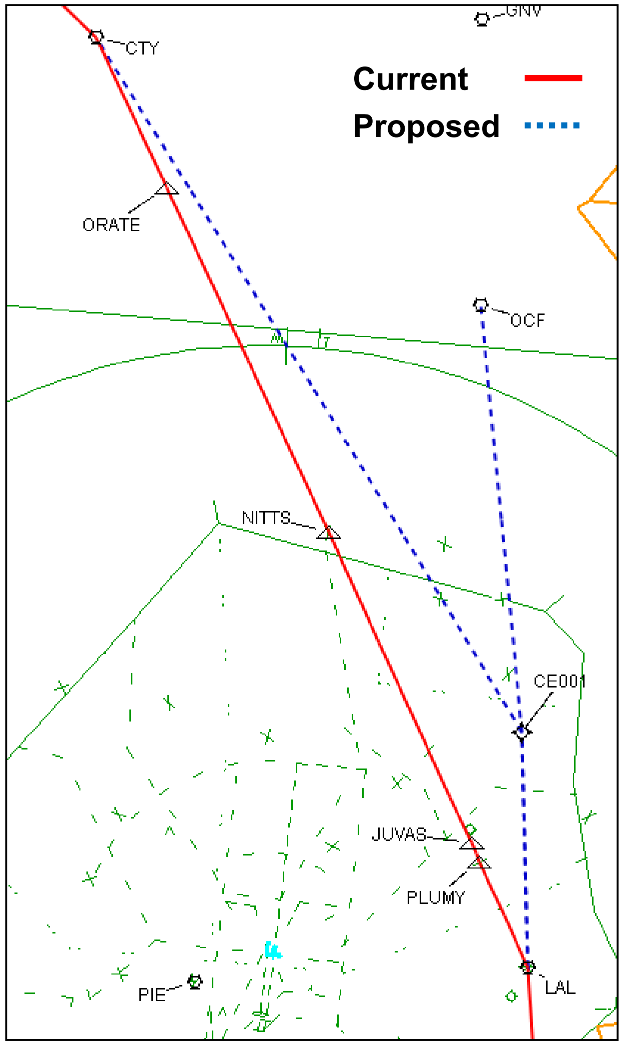


Figure 48. Proposed LAL T-Routes

- Notes
    - Vertical guidance may be added to the TPA DADES STAR during D&I to provide segregation with the new T-Routes.
- Benefits
    - This procedure was not modeled due to undetermined route loading.

4.3.4 Summary of Potential Benefits for TPA

As shown in Table 19 below, the proposed TPA STARs and SIDs are estimated to provide between $2.2 million and $4.3 million annually in fuel savings.

Table 19. Total Annual Fuel Burn Benefits for TPA

		TPA	
TPA STARS and SIDS		Low	High
Estimated Annual Fuel Savings *	Distance	$410K	
	Profile	$960K	$2.88M
	Cost to Carry (Distance and Profile)	$140K	$330K
	Cost To Carry (Filed Mileage Savings)	$710K	
Total Estimated Annual Fuel Savings (Gallons)		740K	1.44M
Total Estimated Annual Carbon Savings (Metric Tons)		7.7K	15K
Total Estimated Annual Fuel Savings (Dollars) *		$2.23M	$4.33M

** Based on a fuel cost of $3 per gallon*

4.4 MIA and FLL Procedures

Within MIA TRACON airspace, MIA is the busiest airport, with daily operations of 1,081 on average in 2011, with 95% being either air carrier or air taxi flights. FLL is a satellite airport within MIA TRACON airspace. MIA TRACON airspace is from the surface to 16,000 feet mean sea level (MSL) with some lower shelves. ZMA airspace overlies MIA TRACON airspace. PBI TRACON airspace is adjacent to MIA TRACON airspace to the north.

MIA has an east/west runway configuration, with the east flow being the predominant flow at 77%.

FLL is an airport within MIA TRACON airspace with daily operations of 732 on average in 2011, with 85% being either air carrier or air taxi flights. FLL has an east/west runway configuration, with the east flow being the predominant flow at 82%. Existing runway 9R is being lengthened and widened to accommodate air carrier operations and is expected to be commissioned in 2014. A runway utilization plan was not available for future runway configurations.

One of the assumptions of the OST was that both MIA and FLL would operate in an east or west configuration but not one east and the other west. While the OST recognizes opposite direction operations occasionally occur, special procedures were not developed to allow for those situations. It is expected those operations will be addressed during D&I.

4.4.1 MIA and FLL Arrivals

This section describes the operational issues, recommendations, and derived benefits the OST has identified for arrivals to MIA and FLL.

MIA has nine STARs, four of which are RNAV procedures. FLL also has nine STARs, four of which are RNAV. Arrival issues include lack of deconfliction of arrival and departure procedures, causing frequent level-offs. FLL arrivals from the west are difficult to deliver to MIA TRACON 8000 feet due to inefficient vertical profiles. In addition, flight tracks do not follow current procedures, with flights frequently receiving more direct routes.

4.4.1.1 MIA FLIPR Arrival

The MIA FLIPR STAR accounts for approximately 27% of all MIA jet arrivals.

- Issues
  - There are inefficient vertical profiles and lateral paths on the existing procedure.
  - Current flight tracks do not follow the existing procedure; they are frequently cleared direct FLIPR partly due to the volume experienced in ZMA's sectors 40 and 41.
- Solutions
  - A southern transition was added for weather reroutes.
  - The northern transition was aligned to parallel the designed FLL WAVUN STAR.
  - The ZFP transition was retained to accommodate weather reroutes.
  - Sector complexity is managed through the controller's issuance of clearing aircraft direct to FLIPR as soon as practical. The proposed FLIPR transitions were designed to overlay existing tracks, thereby creating the most efficient routes.

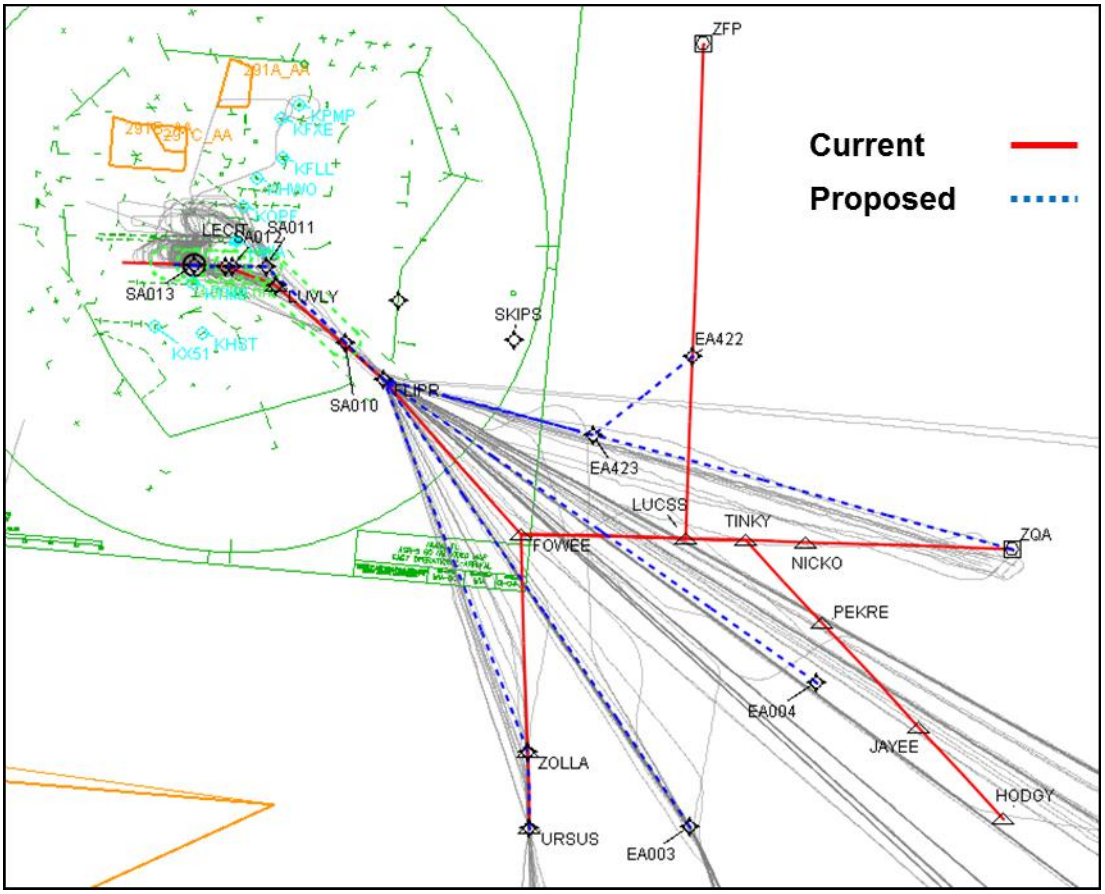


Figure 49. Current and Proposed MIA FLIPR STAR

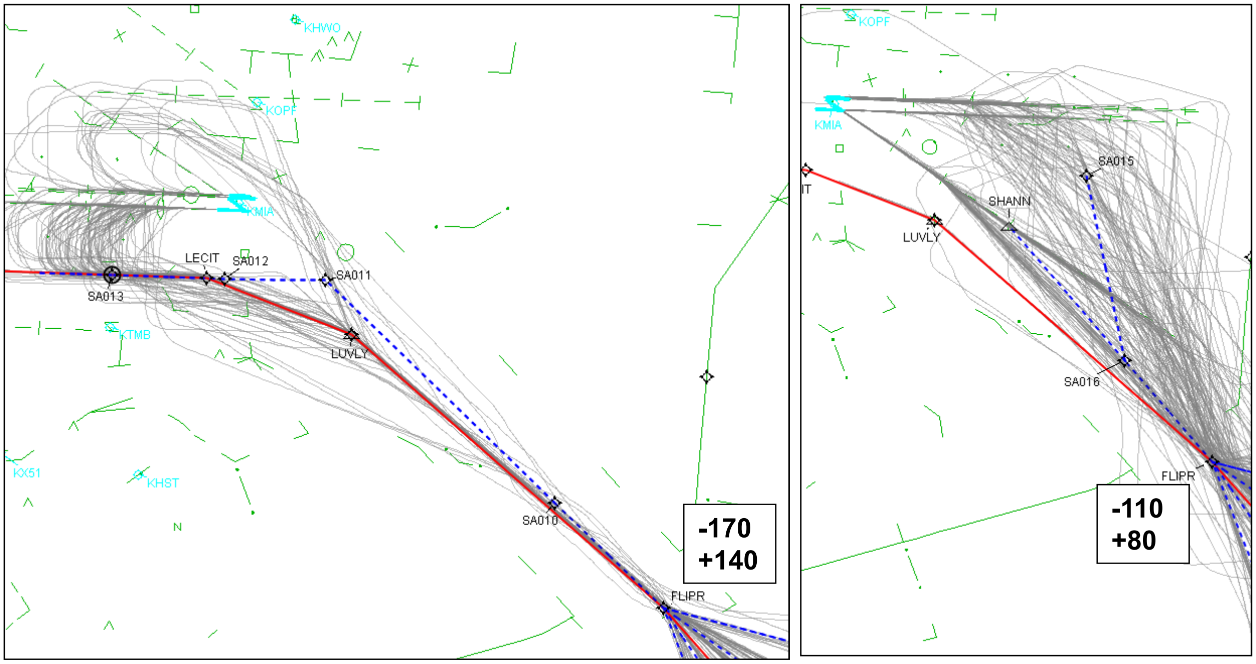


Figure 50. Current and Proposed MIA FLIPR STAR: Runway Transitions

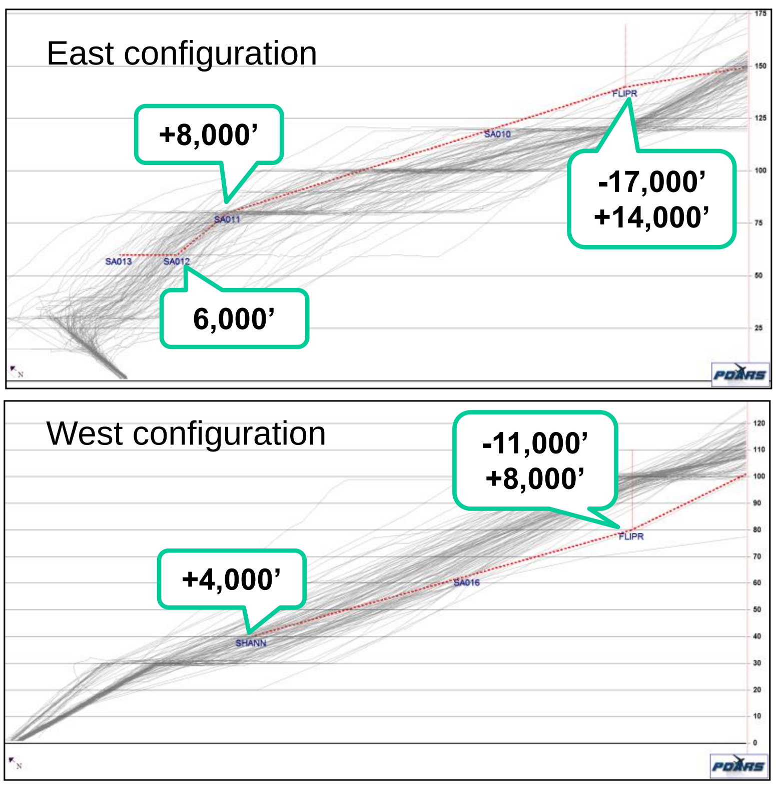


Figure 51. Proposed MIA FLIPR STAR: Current Vertical Profile of Flight Tracks and Nominal Proposed Vertical Profile

- Benefits
  - Projected annual savings for the FLIPR STAR are estimated in Table 20.

Table 20. Proposed MIA FLIPR STAR Annual Benefits

MIA FLIPR STAR		Low	High
Estimated Annual Fuel Savings *	Distance	-$180K	
	Profile	$440K	$1.34M
	Cost to Carry (Distance and Profile)	$30K	$120K
	Cost To Carry (Filed Mileage Savings)	$150K	
Total Estimated Annual Fuel Savings (Gallons)		145K	474K
Total Estimated Annual Carbon Savings (Metric Tons)		1.5K	4.9K
Total Estimated Annual Fuel Savings (Dollars) *		$440K	$1.42M

** Based on a fuel cost of $3 per gallon*

4.4.1.2 MIA CURSO Arrival

The MIA CURSO STAR accounts for approximately 16 % of all MIA jet arrivals.

- Issues
  - The CURSO STAR currently serves 10 different airports.
  - MIA STARs do not have runway transitions.
  - There are inefficient vertical profiles and lateral paths on the existing procedure.
  - Current flight tracks do not overfly the existing procedure.

- Solutions
  - Runway transitions were incorporated into the STAR to facilitate the creation of tighter downwinds.
  - The proposed STAR was designed to serve MIA and MIA South satellites.
  - FLL and MIA north satellites will be served on a separately designed STAR that is offset from the proposed CURSO.
  - Segregated en route transitions were designed to deconflict arrivals and departures between W174 and W465.
  - The concept for the proposed MIA CURSO STAR was to segregate MIA arrivals from other traffic using this STAR. The proposed CURSO procedure was shifted12 miles south of the current STAR, allowing for reduced track miles and a separate laterally segregated STAR for arrival traffic north of MIA, specifically FLL and satellites.
  - The proposed transitions were designed to decouple arrivals from land based navigational aids (MTH and EYW). The transitions utilize initial waypoints that laterally segregate arrival and departure routes through the W174 and W465 SAA channels.

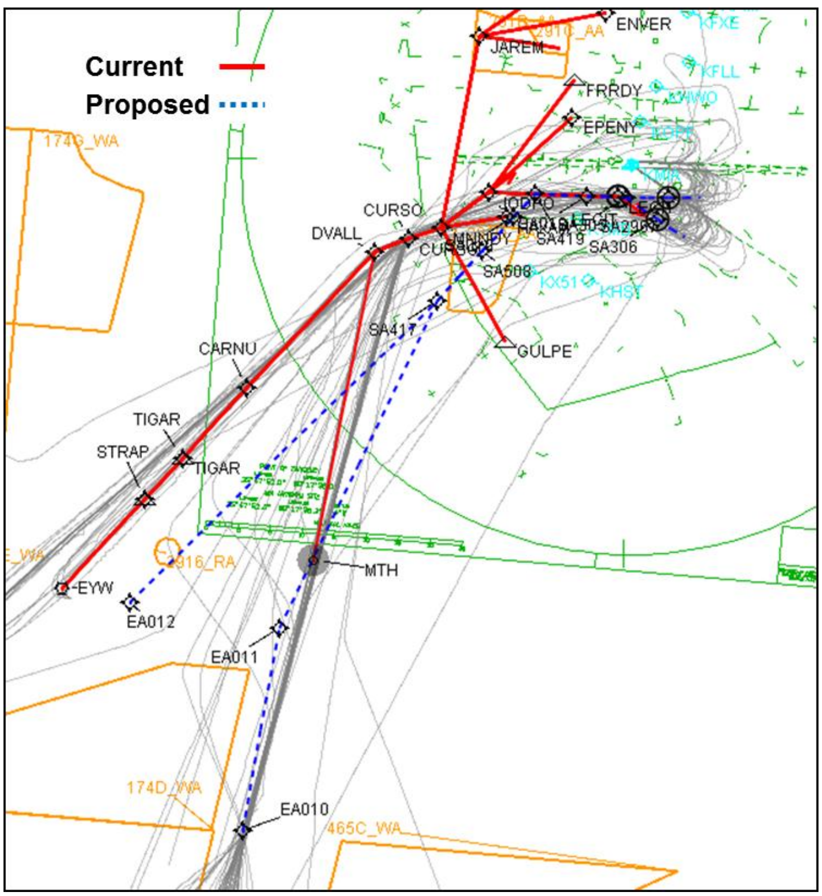


Figure 52. Current and Proposed MIA CURSO STAR

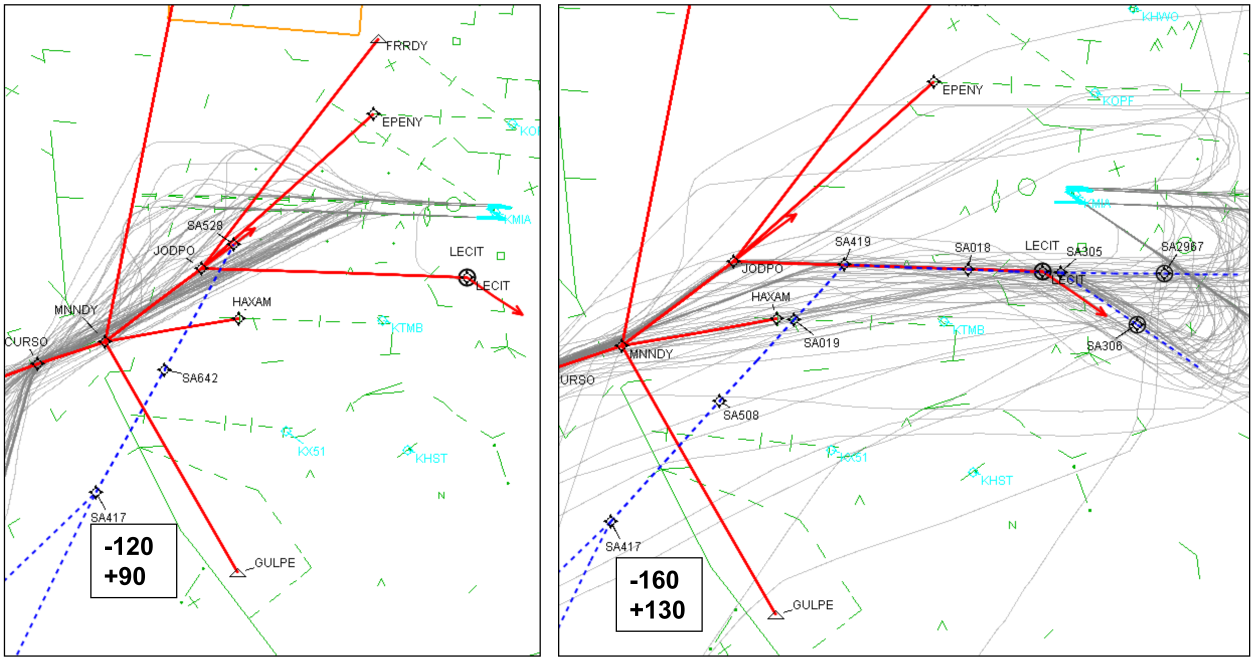


Figure 53. Current and Proposed MIA CURSO STAR: Runway Transitions

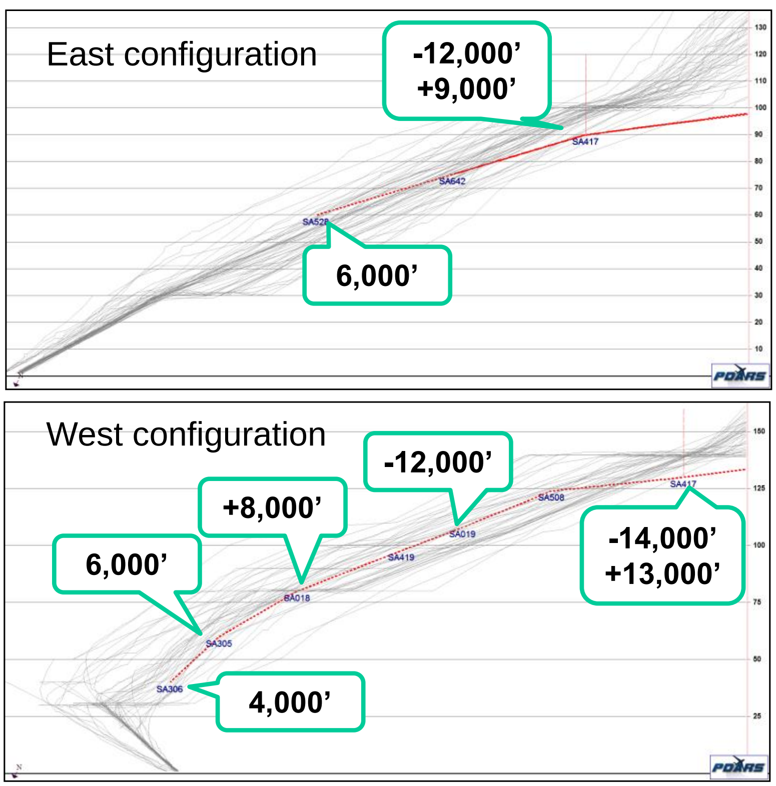


Figure 54. Proposed MIA CURSO STAR: Current Vertical Profile of Flight Tracks and Nominal Proposed Vertical Profile

- Notes
    - Post analysis request from facilities: MIA requested to move waypoint SA035 on the new MIA CURSO 8 miles SW of the OST's proposal and to move waypoint SA036 on the FLL New SW STAR 12 miles west of OST's recommended procedure; the corresponding waypoints on these procedures would follow these new tracks.
- Benefits
    - Table 21 shows the annual savings of the MIA CURSO STAR.

Table 21. Proposed MIA CURSO STAR Annual Benefits

MIA CURSO STAR		Low	High
Estimated Annual Fuel Savings *	Distance	$210K	
	Profile	$250K	$730K
	Cost to Carry (Distance and Profile)	$50K	$90K
	Cost To Carry (Filed Mileage Savings)	$50K	
Total Estimated Annual Fuel Savings (Gallons)		182K	360K
Total Estimated Annual Carbon Savings (Metric Tons)		1.9K	3.7K
Total Estimated Annual Fuel Savings (Dollars) *		$550K	$1.08M

** Based on a fuel cost of $3 per gallon*

4.4.1.3 MIA SSCOT Arrival

The MIA SSCOT STAR accounts for approximately 25% of all MIA jet arrivals.

- Issues
    - There are inefficient vertical profiles and lateral paths on the existing procedure.
    - Current flight tracks do not overfly the existing procedure.

- Solutions
  - Runway transitions were incorporated into the STAR to facilitate the creation of tighter downwinds.
  - The proposed procedure was designed to align with current tracks.
  - The current STAR is over 400 miles long and is not followed at its outermost navigational points; therefore the en route transitions were shortened to accommodate flexibility.
  - These routes also provide lateral clearance from Special Activity Airspace (SAA). An en route transition beginning at EA016 was incorporated to accommodate more direct routing when W168 is inactive.

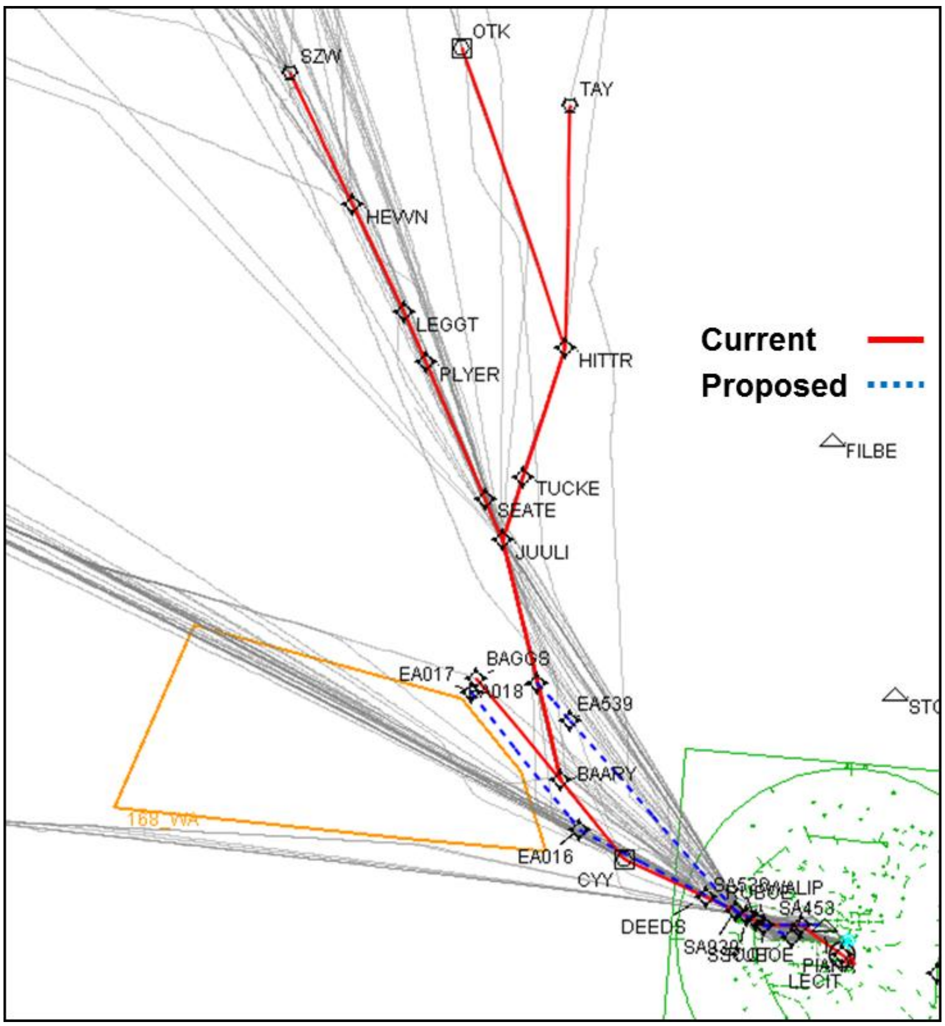


Figure 55. Current and Proposed MIA SSCOT STAR

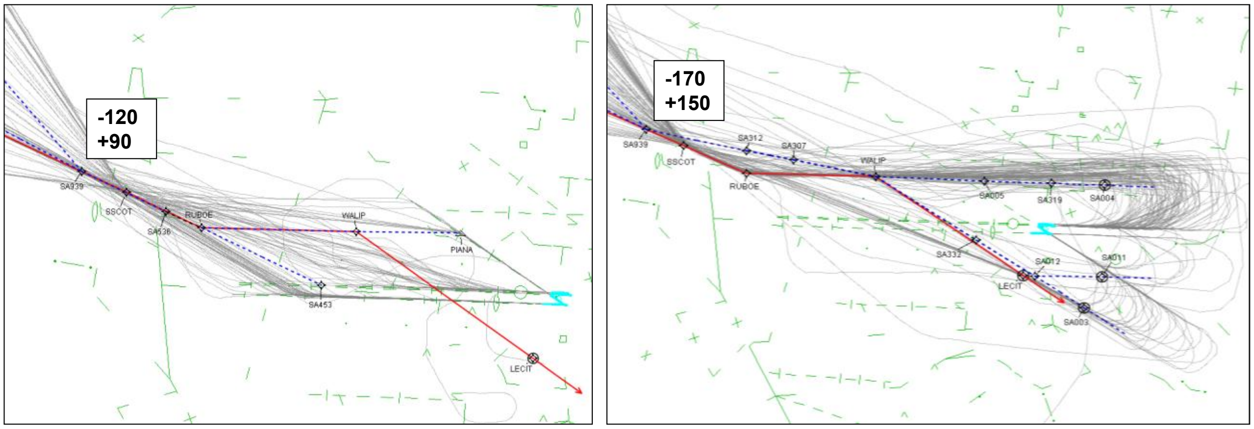


Figure 56. Current and Proposed MIA SSCOT STAR: Runway Transitions

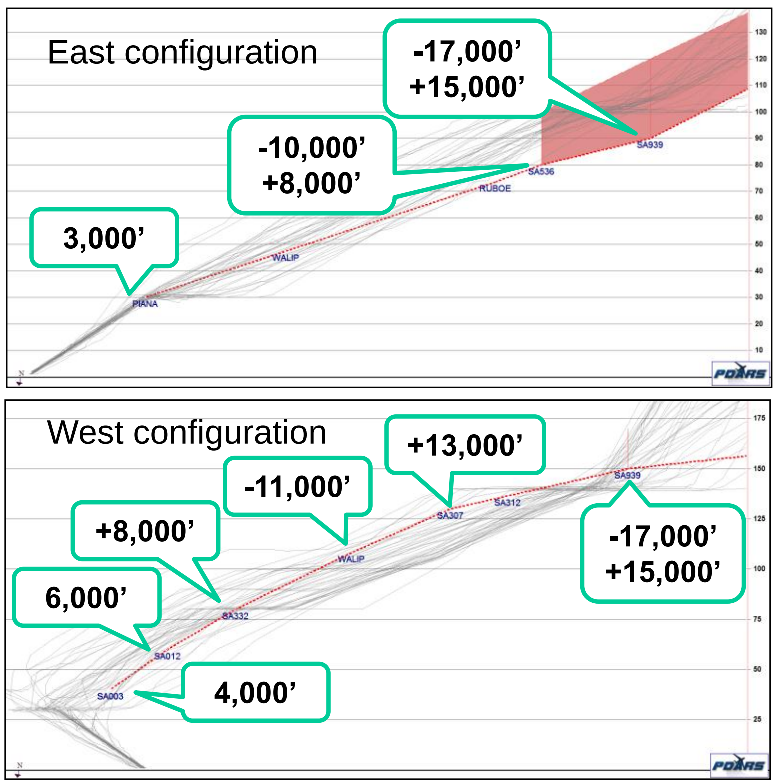


Figure 57. Proposed MIA SSCOT STAR: Current Vertical Profile of Flight Tracks and Nominal Proposed Vertical Profile

- Benefits
  - Table 22 shows the annual savings of the MIA SSCOT STAR.

Table 22. Proposed MIA SSCOT STAR Annual Benefits

MIA SSCOT STAR		Low	High
Estimated Annual Fuel Savings *	Distance	$120K	
	Profile	$670K	$1.83M
	Cost to Carry (Distance and Profile)	$80K	$200K
	Cost To Carry (Filed Mileage Savings)	$140K	
Total Estimated Annual Fuel Savings (Gallons)		334K	761K
Total Estimated Annual Carbon Savings (Metric Tons)		3.5K	7.9K
Total Estimated Annual Fuel Savings (Dollars) *		$1M	$2.28M

** Based on a fuel cost of $3 per gallon*

4.4.1.4 MIA HILEY Arrival

The MIA HILEY STAR accounts for approximately 32% of all MIA jet arrivals.

- Issues
  - MIA downwind operations are too far north, restricting MIA departures' climbs.
  - MIA STARs do not have runway transitions for a west operation.
  - The current northeast inland STARs serving PBI, FLL, and MIA all commence over OMN causing congestion.
- Solutions
  - Runway transitions were incorporated into the STAR to facilitate the creation of tighter downwinds.
  - The HILEY, FRWAY, and FISEL STARs are now laterally segregated in the vicinity of OMN through the use of separate en route transitions.
  - A stand-alone waypoint (SA441) was created to accommodate west operations.
  - The ZFP transition was retained to accommodate weather reroutes.
  - The proposed inland route for the HILEY commences north of MALET and has been straightened and shifted slightly to the west.

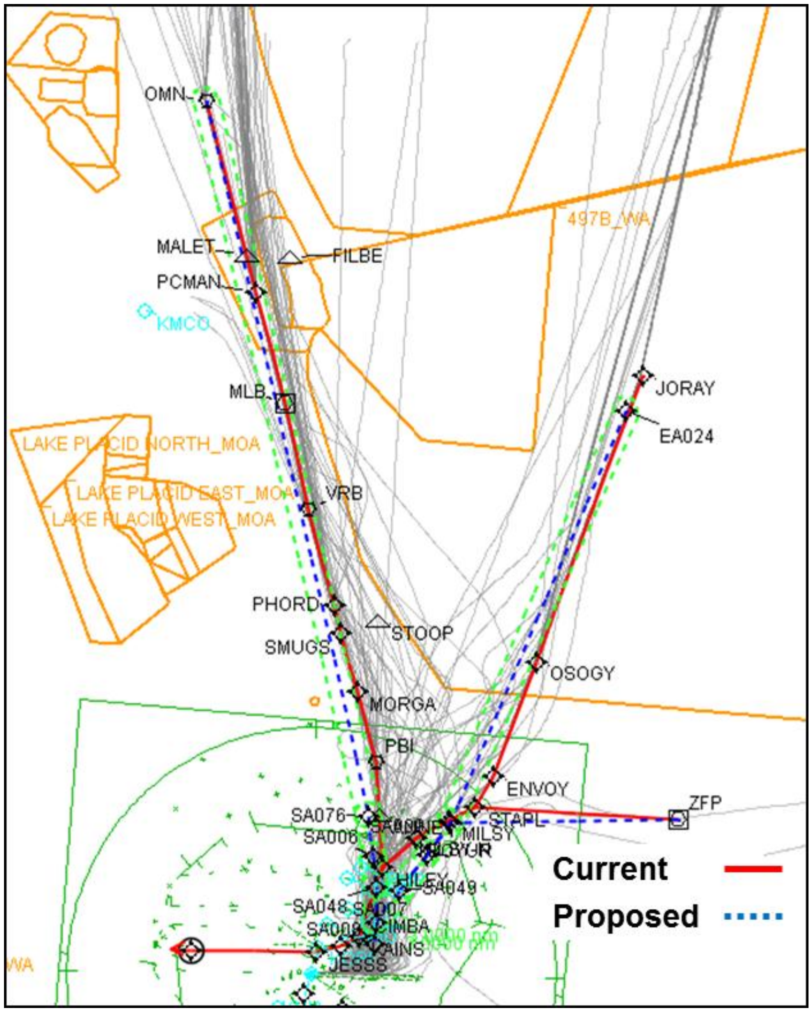


Figure 58. Current and Proposed MIA HILEY STAR

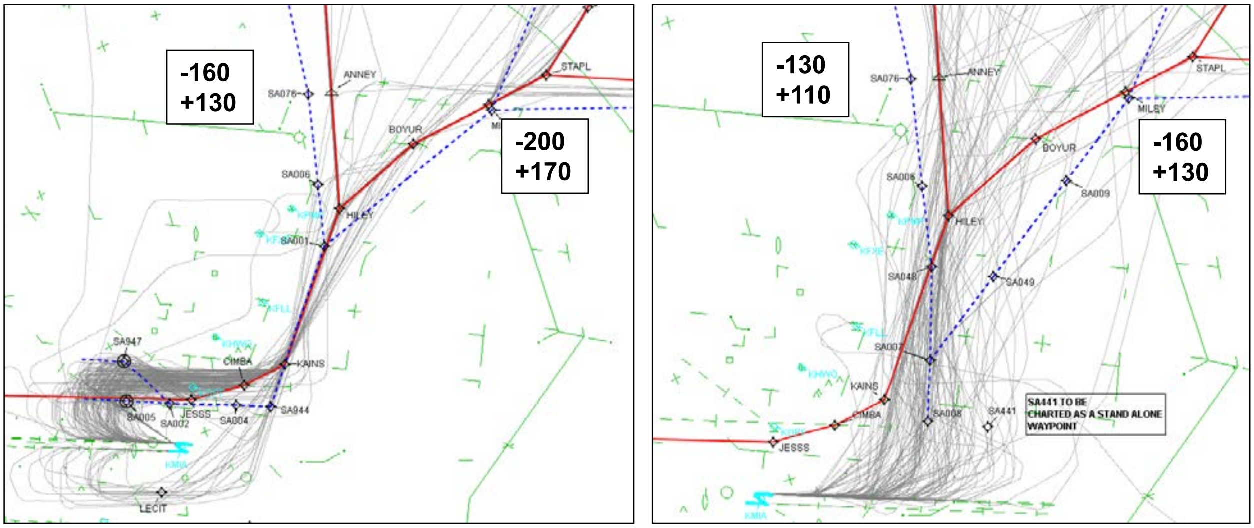


Figure 59. Current and Proposed MIA HILEY STAR: Runway Transitions

- Notes
    - The proposed en route transitions reflect present day handling of MIA arrival aircraft. This design requires two STARs due to the lack of a common lateral path or fix.
    - Procedural or airspace changes will likely be needed for PBI TRACON airspace. The proposed FISEL STAR crosses the PBI TRACON shelf north of MIA TRACON airspace between 8,000 and 10,000 feet depending on the operation. Boundaries in ZMA sectors 46 and 20 and 02 will also be impacted due to the MIA HILEY/FLL FISEL STARs.

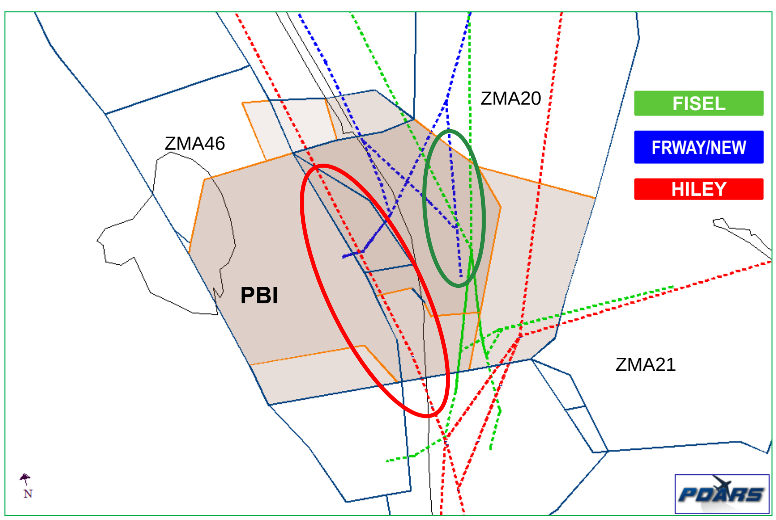


Figure 60. Proposed MIA HILEY/FLL FISEL STAR Airspace Affected

- Notes

- The proposed MIA HILEY STAR will impact ZMA sector 65, 68, 02, and 17 boundaries.

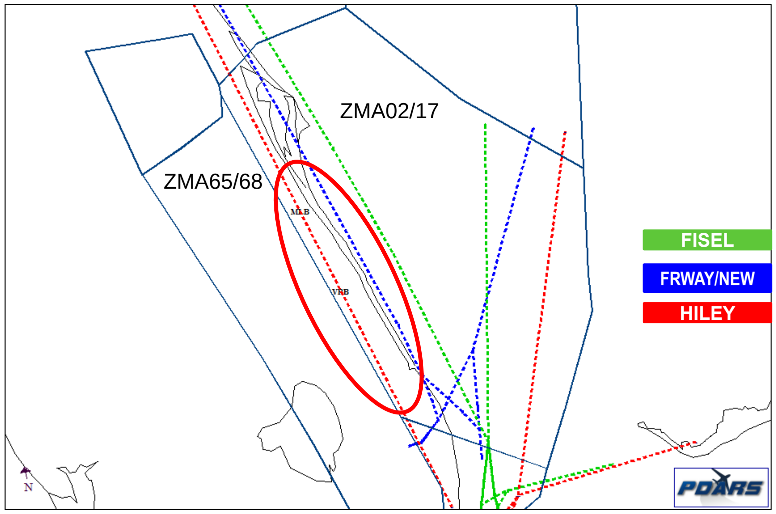


Figure 61. Proposed MIA HILEY STAR Airspace Affected

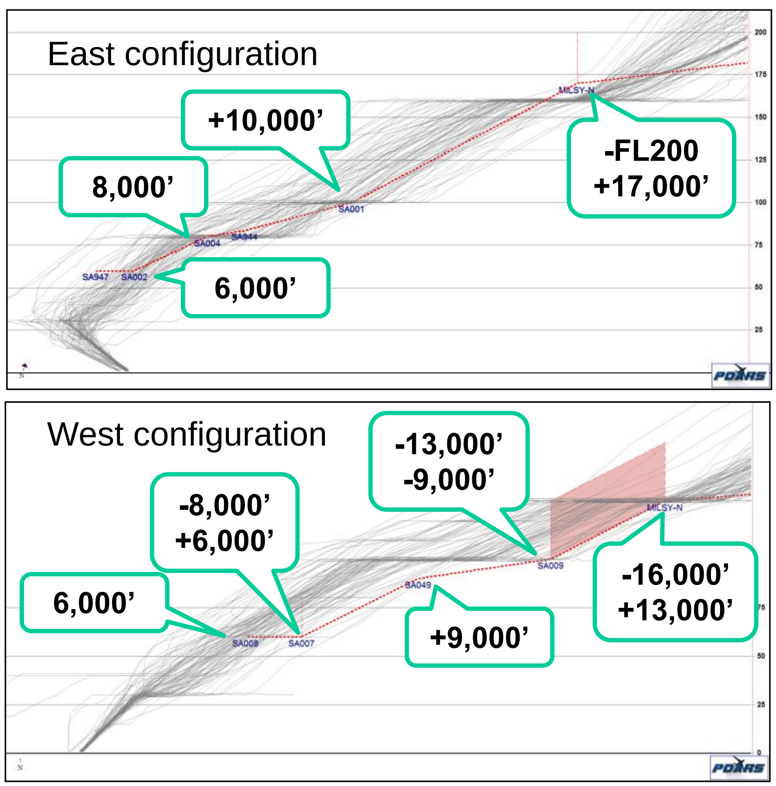


Figure 62. Proposed MIA HILEY STAR: Current Vertical Profile of Flight Tracks and Nominal Proposed Vertical Profile

- Benefits
  - Table 23 shows the annual savings of the MIA HILEY STAR.

Table 23. Proposed MIA HILEY STAR Annual Benefits

MIA HILEY STAR		Low	High
Estimated Annual Fuel Savings *	Distance	-$380K	
	Profile	$1.64M	$4.9M
	Cost to Carry (Distance and Profile)	$130K	$450K
	Cost To Carry (Filed Mileage Savings)	$20K	
Total Estimated Annual Fuel Savings (Gallons)		467K	1.66M
Total Estimated Annual Carbon Savings (Metric Tons)		4.8K	17.2K
Total Estimated Annual Fuel Savings (Dollars) *		$1.4M	$4.99M

** Based on a fuel cost of $3 per gallon*

4.4.1.5 FLL WAVUN Arrival

The FLL WAVUN STAR accounts for approximately 15% of all FLL jet arrivals.

- Issues
  - There are inefficient vertical profiles and lateral paths on the existing procedure.
  - Current flight tracks do not follow the existing procedure; arrivals are frequently cleared direct DEKAL, partly due to the volume experienced in ZMA's sectors 40 and 42.
  - FLL DEKAL arrivals (props/jets) are not vertically separated from the WAVUN arrival.
- Solutions
  - This procedure was designed to align with current tracks.
  - The ZFP weather reroute transition was retained by request of the facilities.
  - The URSUS transition was retained.
  - North and south runway transitions were developed for an east operation.
  - This procedure is deconflicted from MIA and FLL procedures.

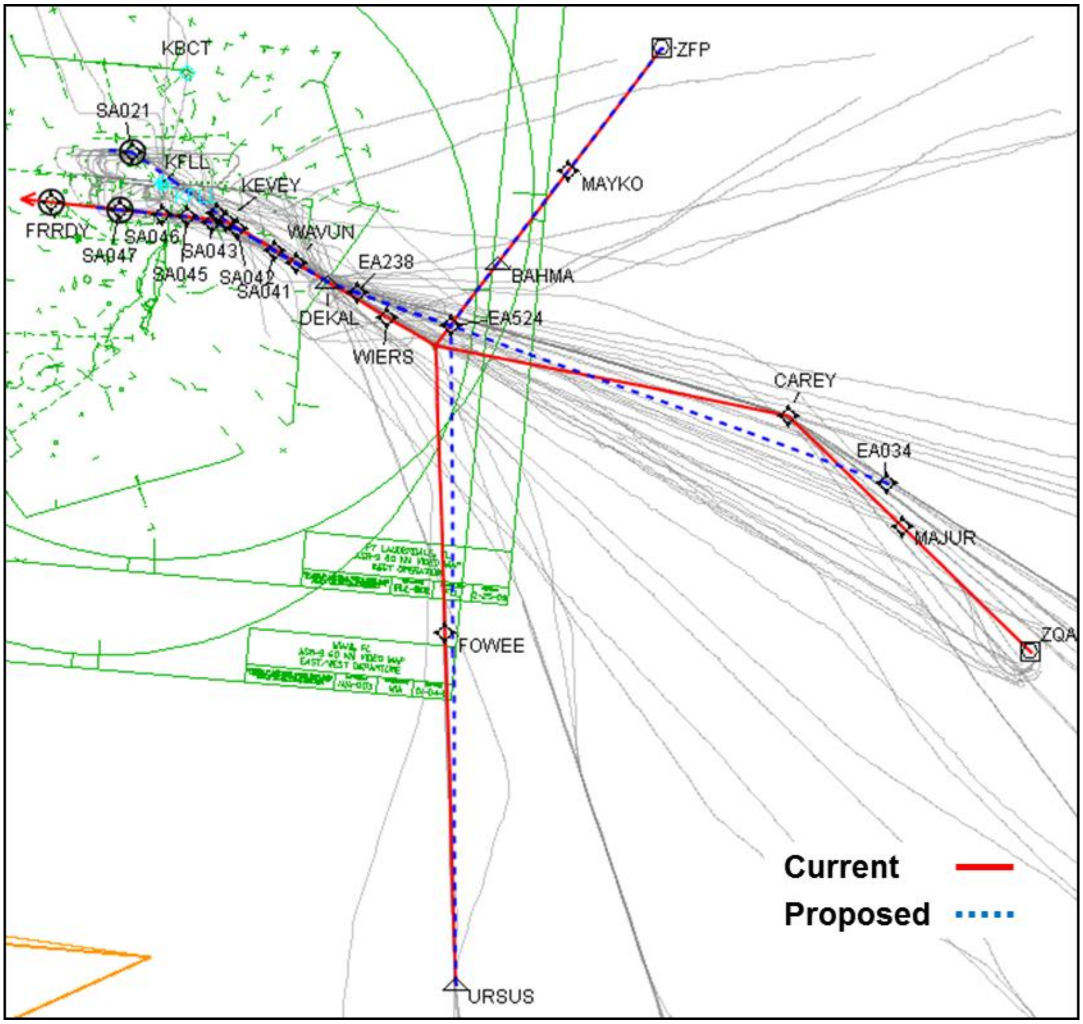


Figure 63. Current and Proposed FLL WAVUN STAR

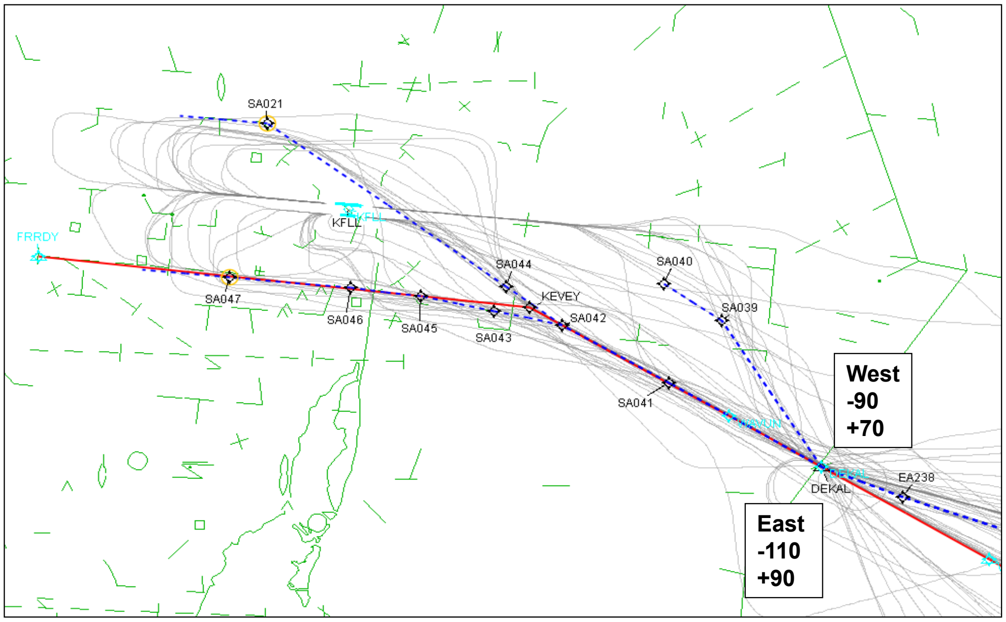


Figure 64. Current and Proposed FLL WAVUN STAR: Runway Transitions

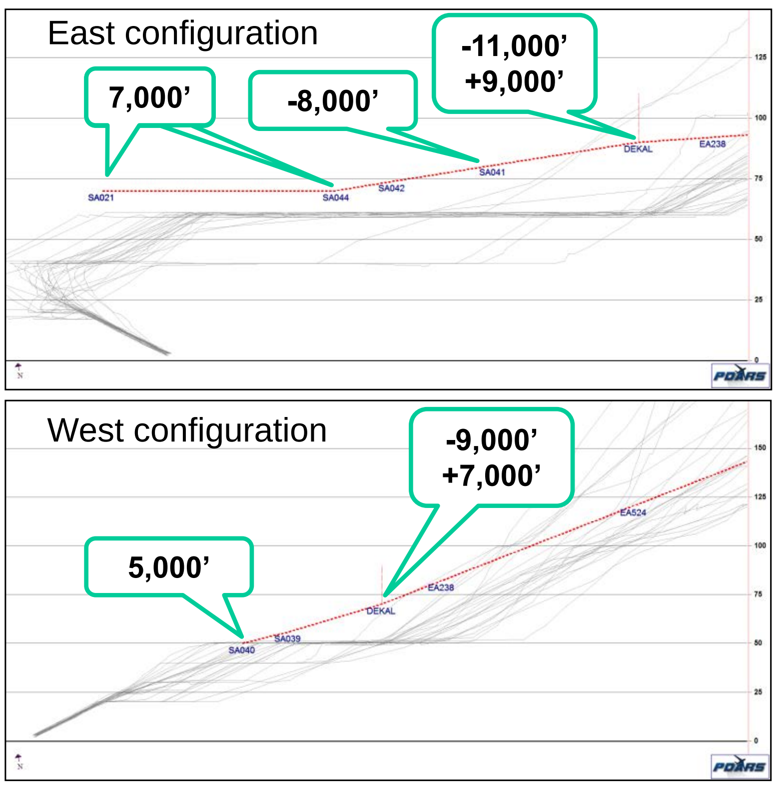


Figure 65. Proposed FLL WAVUN STAR: Current Vertical Profile of Flight Tracks and Nominal Proposed Vertical Profile

- Benefits
  - Projected annual savings for the FLL WAVUN STAR are estimated in Table 24.

Table 24. Proposed FLL WAVUN STAR Annual Benefits

FLL WAVUN STAR		Low	High
Estimated Annual Fuel Savings *	Distance	-$10K	
	Profile	$230K	$710K
	Cost to Carry (Distance and Profile)	$20K	$70K
	Cost To Carry (Filed Mileage Savings)	$60K	
Total Estimated Annual Fuel Savings (Gallons)		101K	274K
Total Estimated Annual Carbon Savings (Metric Tons)		1.1K	2.8K
Total Estimated Annual Fuel Savings (Dollars) *		$300K	$820K

** Based on a fuel cost of $3 per gallon*

4.4.1.6 FLL New Southwest Arrival (Current CURSO STAR)

The FLL CURSO STAR accounts for approximately 5% of all FLL jet arrivals.

- Issues
  - The CURSO STAR currently serves 10 different airports.
  - FLL STARs do not have runway transitions.
  - There are inefficient vertical profiles and lateral paths on the existing procedure.
  - Current flight tracks do not overfly the existing procedure.

- Solutions
  - The concept for the proposed FLL New SW STAR is to segregate FLL and MIA north satellite arrivals from other traffic using the proposed CURSO STAR in order to optimize operations for all affected traffic. The proposed SW STAR's terminal entry point is 6.3 miles north of the existing entry point, which reduces track miles and segregates from the proposed MIA CURSO STAR. This allows for the design and development of a laterally segregated STAR which can also be vertically deconflicted from MIA procedures.
  - MIA and identified satellites will be served on a separately designed STAR that is offset from the proposed FLL SW STAR.
  - Segregated en route transitions were designed to deconflict arrivals and departures between W174 and W465. The proposed transitions were designed to decouple arrivals from land based navigational aids (MTH and EYW). The transitions utilize initial waypoints that laterally segregate arrival and departure routes through the W174 and W465 SAA channels.
  - Runway transitions were incorporated into the proposed procedure.
  - The proposed STAR is deconflicted from the MIA SSCOT STAR.

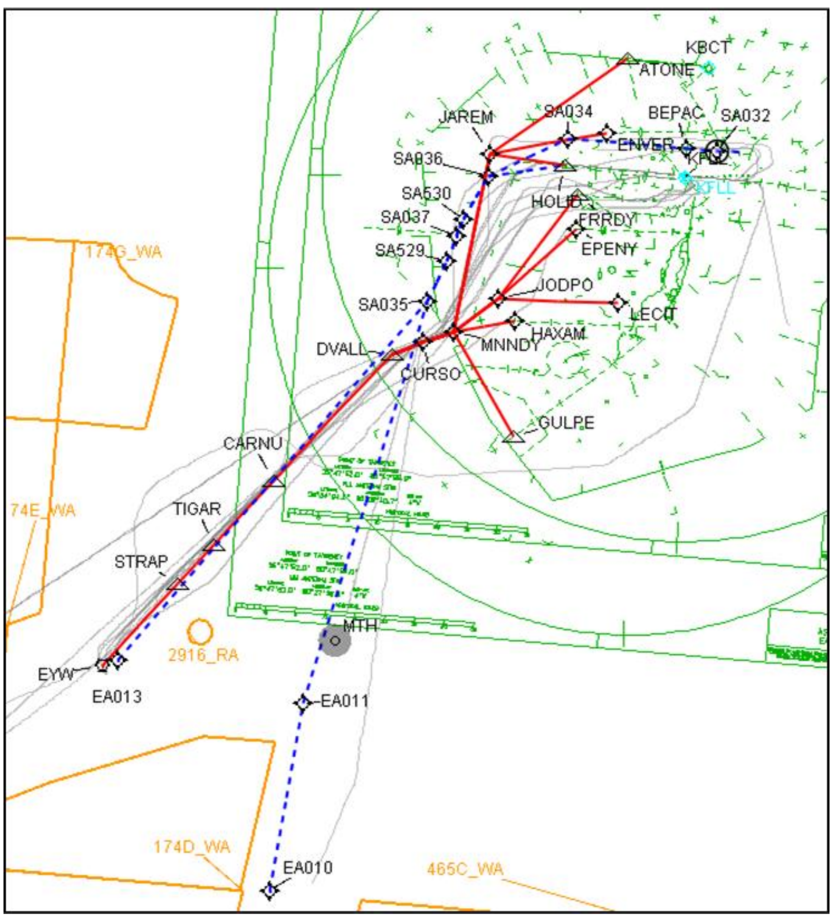


Figure 66. Current and Proposed FLL New Southwest STAR (CURSO)

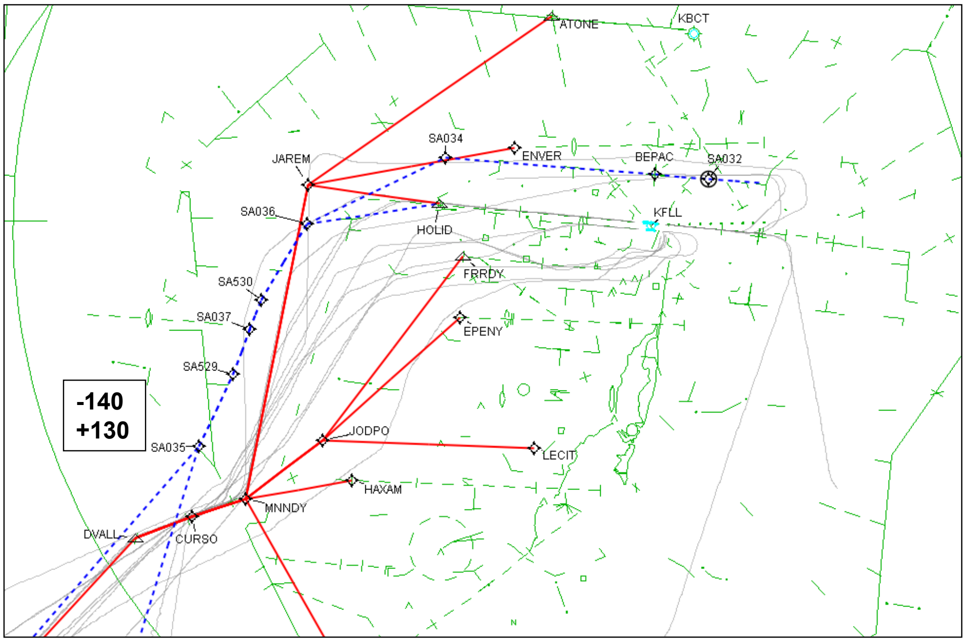


Figure 67. Current and Proposed FLL New Southwest STAR (CURSO): Runway Transitions

- Notes
  - Post analysis request from facilities: MIA TRACON requested to move waypoint SA035 on the proposed MIA CURSO 8 miles SW of the OST's proposal and to move waypoint SA036 on the FLL New SW STAR 12 miles west of OST's recommended procedure.
- Benefits
  - This procedure was not modeled due to the limited number of jet arrivals anticipated to utilize this route.

4.4.1.7 FLL JINGL Arrival

The FLL JINGL STAR accounts for approximately 33% of all FLL jet arrivals.

- Issues
  - There are inefficient vertical profiles and lateral paths on the existing procedure.
  - Current flight tracks do not overfly the existing procedure.
  - It is difficult for ZMA to deliver FLL arrivals at 8,000 feet over JINGL.

- Solutions
    - Runway transitions were designed.
    - The proposed procedure was designed to align with current tracks. Examination of current flight tracks shows that the vast majority of JINGL assigned traffic is cleared direct to intersections located near the ZMA/TRACON boundary. The proposed JINGL enters the TRACON's airspace at waypoint SA031, 3.5 miles north of the JINGL intersection.
    - The current STAR is over 400 miles long and is not followed at its outermost navigational points; therefore the en route transitions were shortened to accommodate flexibility.
    - An en route transition beginning at EA019 was incorporated to accommodate more direct routing when W168 is inactive.
    - Crossing altitudes abeam the center/TRACON boundary are higher than today's LOA requirement. The proposed procedure was designed for optimal descent in en route airspace.

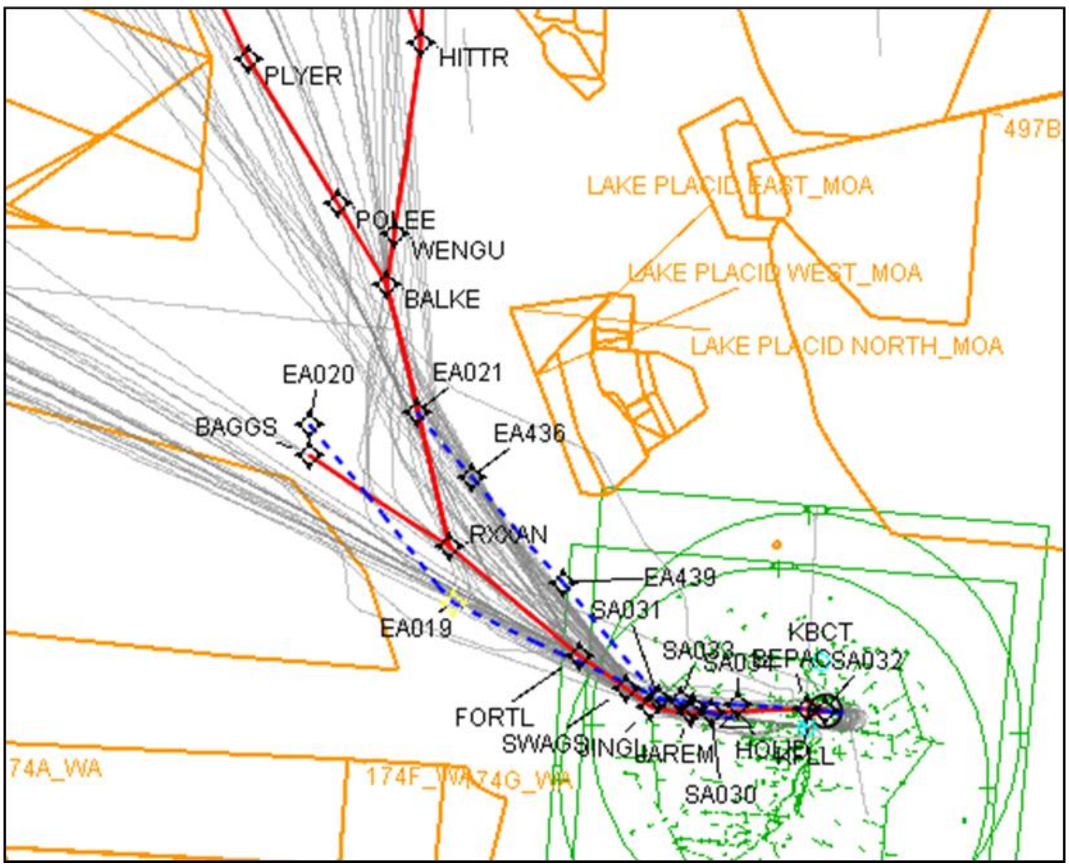


Figure 68. Current and Proposed FLL JINGL STAR

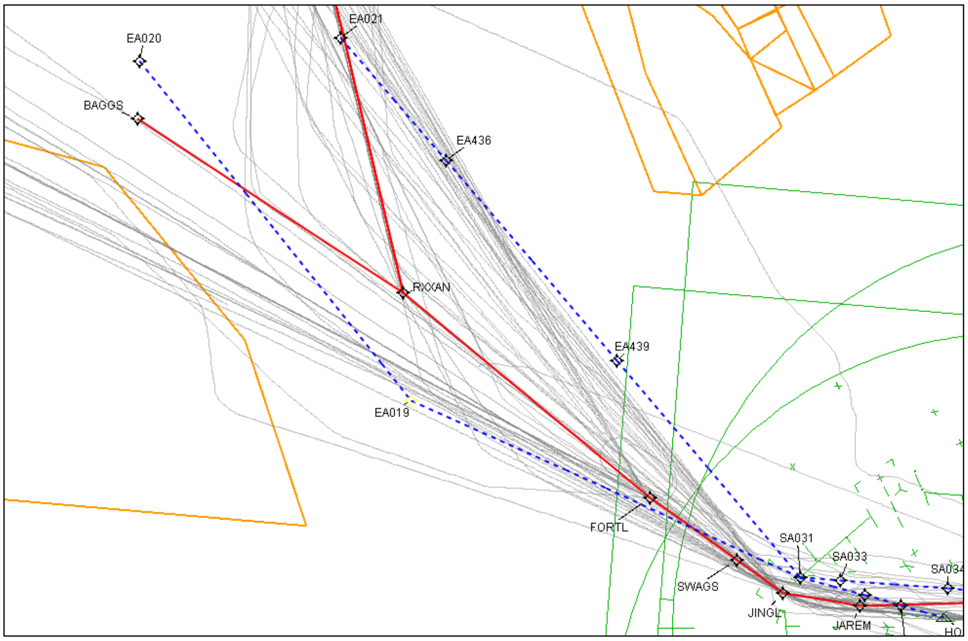


Figure 69. Current and Proposed FLL JINGL STAR: En Route Transitions

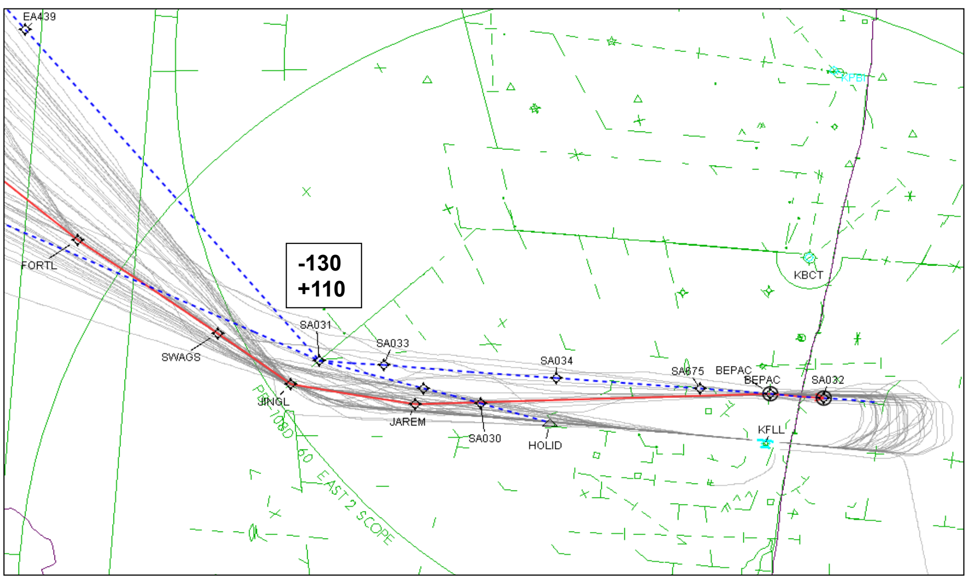


Figure 70. Current and Proposed FLL JINGL STAR: Runway Transitions

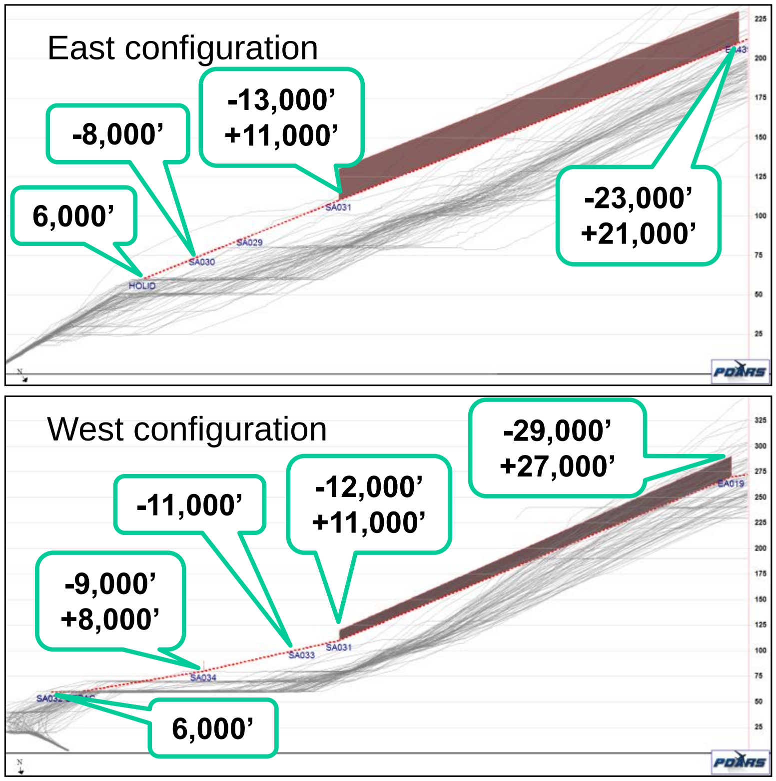


Figure 71. Proposed FLL JINGL STAR: Current Vertical Profile of Flight Tracks and Nominal Proposed Vertical Profile

- Benefits
  - Projected annual savings for the FLL JINGL STAR are estimated in Table 25.

Table 25. Proposed FLL JINGL STAR Annual Benefits

FLL JINGL STAR		Low	High
Estimated Annual Fuel Savings *	Distance	$290K	
	Profile	$1.01M	$3.11M
	Cost to Carry (Distance and Profile)	$130K	$340K
	Cost To Carry (Filed Mileage Savings)	$90K	
Total Estimated Annual Fuel Savings (Gallons)		509K	1.28M
Total Estimated Annual Carbon Savings (Metric Tons)		5.3K	13.2K
Total Estimated Annual Fuel Savings (Dollars) *		$1.53M	$3.83M

** Based on a fuel cost of $3 per gallon*

4.4.1.8 FLL FISEL Arrival

The FLL FISEL STAR accounts for approximately 47% of all FLL jet arrivals.

- Issues
  - FLL STARs do not have runway transitions for a west operation.
  - The current northeast inland STARs serving PBI, FLL, and MIA all commence over OMN causing congestion.
  - There are inefficient vertical profiles and lateral paths on the existing procedure.
  - Current flight tracks do not overfly the existing procedure.
  - ZMA is required to deliver a single flow of FLL inbound traffic to the TRACON from the northeast merging two flows from over OMN and oceanic traffic via the Atlantic routes.

- Solutions
    - The HILEY, FRWAY, and FISEL STARs were laterally segregated in the vicinity of OMN through the use of separate en route transitions. The proposed inland portion of the FISEL STAR now commences at the DIINO intersection south of OMN and parallels the proposed HILEY and FRWAY STARs to the TRACON boundary. In comparison to the existing FISEL STAR, this route was shifted east and a new waypoint south of FATHR will be the single merge point for the inland and ocean legs of this arrival.
    - Single flow sequencing is retained into terminal airspace due to the complexity and the proximity of MIA and FLL procedures.
    - Runway transitions were designed.
    - The ZFP transition was retained to accommodate traffic currently on the route and also provides a weather reroute option.
    - The over-water transition of the FISEL begins over the CRANS intersection and is direct to the new tie-in waypoint, EA027, which is south of the FATHR intersection.

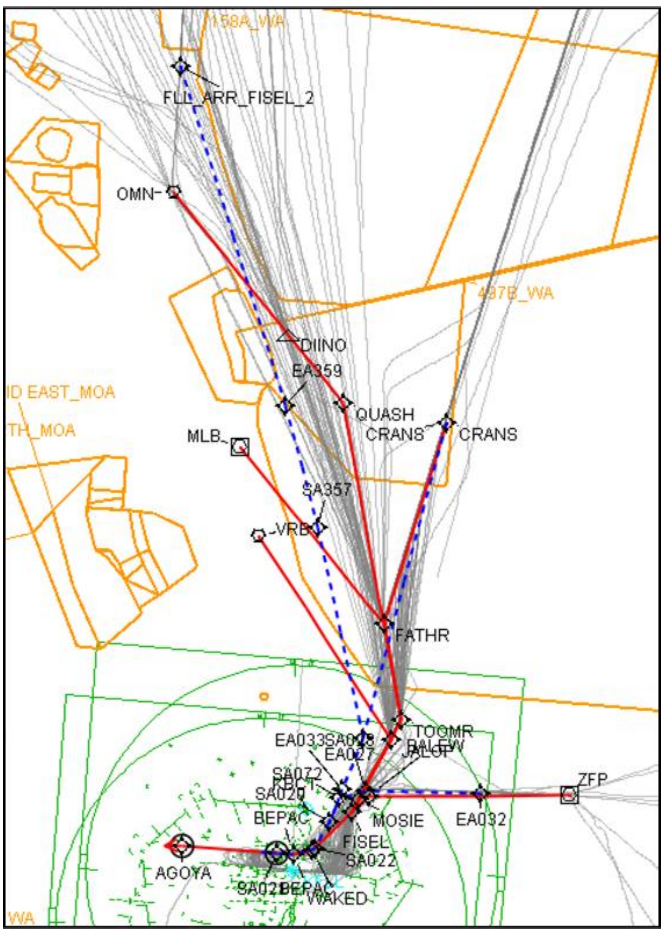


Figure 72. Current and Proposed FLL FISEL STAR

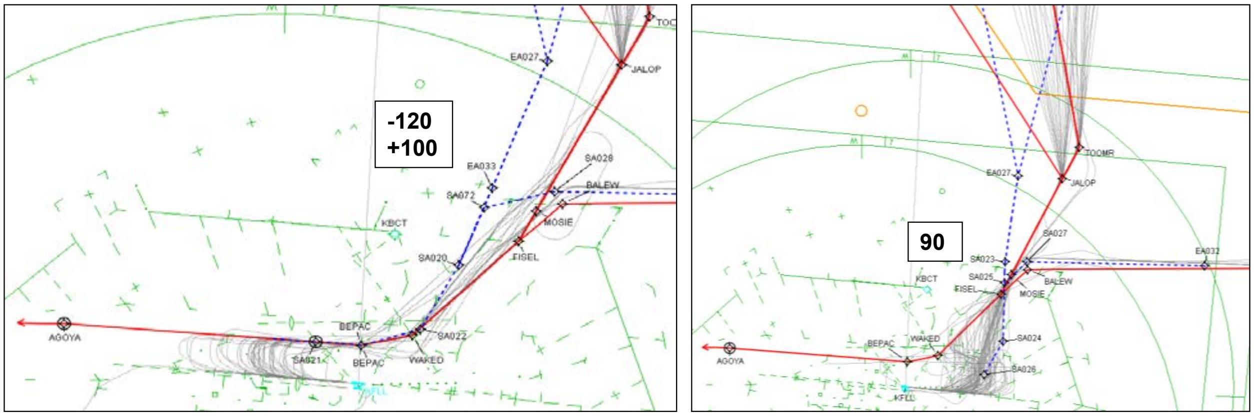


Figure 73. Current and Proposed FLL FISEL STAR: Runway Transitions

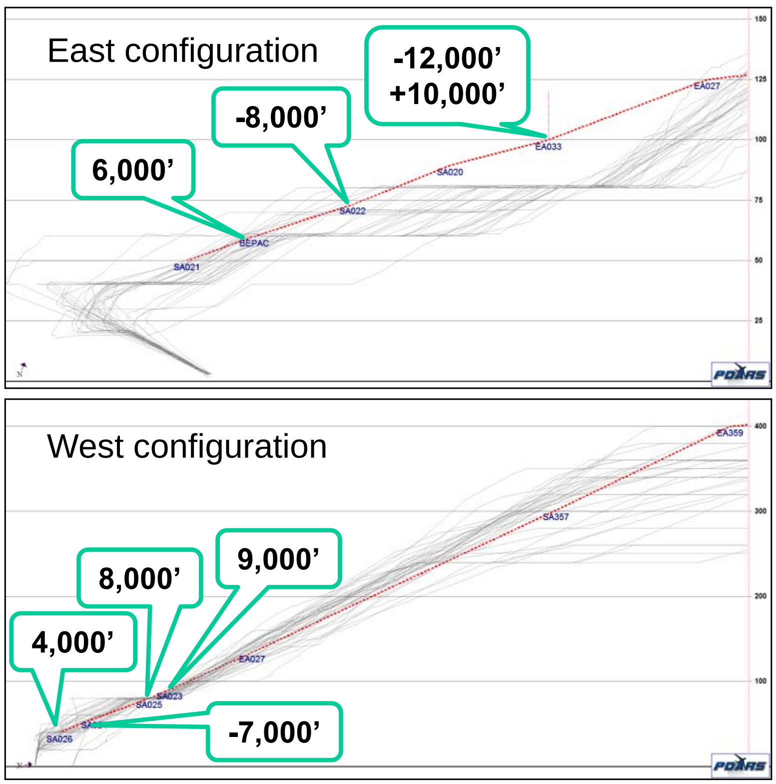


Figure 74. Proposed FLL FISEL STAR: Current Vertical Profile of Flight Tracks and Nominal Proposed Vertical Profile

- Benefits
    - Projected annual savings for the FLL FISEL STAR are estimated in Table 26.

Table 26. Proposed FLL FISEL STAR Annual Benefits

FLL FISEL STAR		Low	High
Estimated Annual Fuel Savings *	Distance	$1.5M	
	Profile	$1.62M	$4.93M
	Cost to Carry (Distance and Profile)	$310K	$640K
	Cost To Carry (Filed Mileage Savings)	$300K	
Total Estimated Annual Fuel Savings (Gallons)		1.25M	2.46M
Total Estimated Annual Carbon Savings (Metric Tons)		12.9K	25.5K
Total Estimated Annual Fuel Savings (Dollars) *		$3.74M	$7.38M

** Based on a fuel cost of $3 per gallon*

4.4.2 MIA and FLL Departures

This section describes the operational issues, recommendations, and derived benefits the OST has identified for departures from MIA and FLL.

There are eleven RNAV SIDs, including four midnight SIDs for noise abatement, serving MIA airport departure routes. There are six RNAV SIDs serving FLL departure routes. There is no RNAV SID for FLL departures routed via the MNATE DTA. One of the major departure issues for FLL is departure level-offs due to potential conflicts with other departure and arrival traffic flows, both for MIA and FLL. For example, FLL departures utilizing the THNDR DTA experience multiple level-offs due to FLL arrivals from the northeast and MIA departures utilizing the HEDLY DTA. An inefficient route for FLL west flow departures using the BAHMA and BEECH SIDs is an issue. Another issue for FLL traffic is inefficient routing for FLL MNATE departures and the absence of a westbound weather route from FLL.

Issues identified with the interactions between the MIA HEDLY, FLL ARKES, and FLL THNDR SIDs and options prepared by the OST can be found in Section 4.7.1 of this document.

4.4.2.1 MIA SKIPS Departure

The MIA SKIPS SID accounts for approximately 16% of all jet MIA departures.

- Issues
  - There are inefficient vertical profiles and lateral paths on the existing procedure.
  - Current flight tracks do not overfly the existing procedure.

- Solutions
  - The proposed SKIPS SID was deconflicted from MIA proposed procedures within the TRACON airspace.
  - A southern en route transition was added.
  - The northern transition was aligned to parallel the proposed FLL WAVUN STAR.
  - The proposed SKIPS SID splits into two different routes from CRABI that mimic current flight tracks departing the MIA area.
  - Runway transitions were laterally optimized.

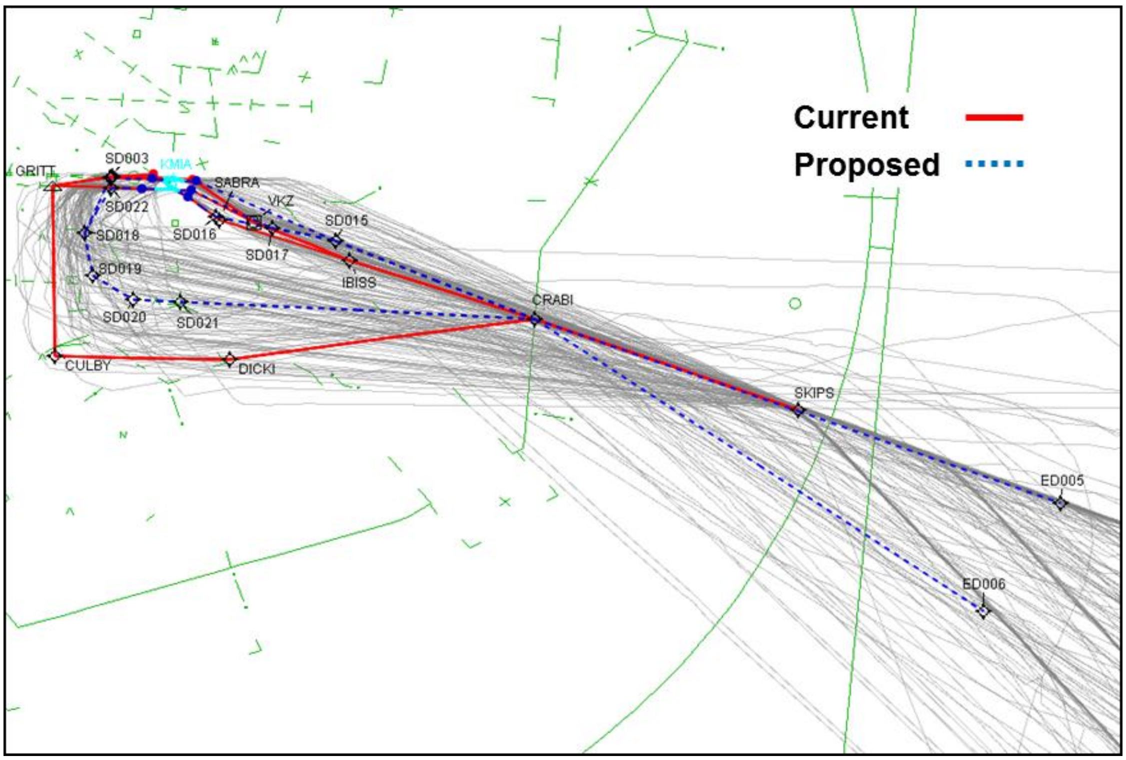


Figure 75. Current and Proposed MIA SKIPS SID

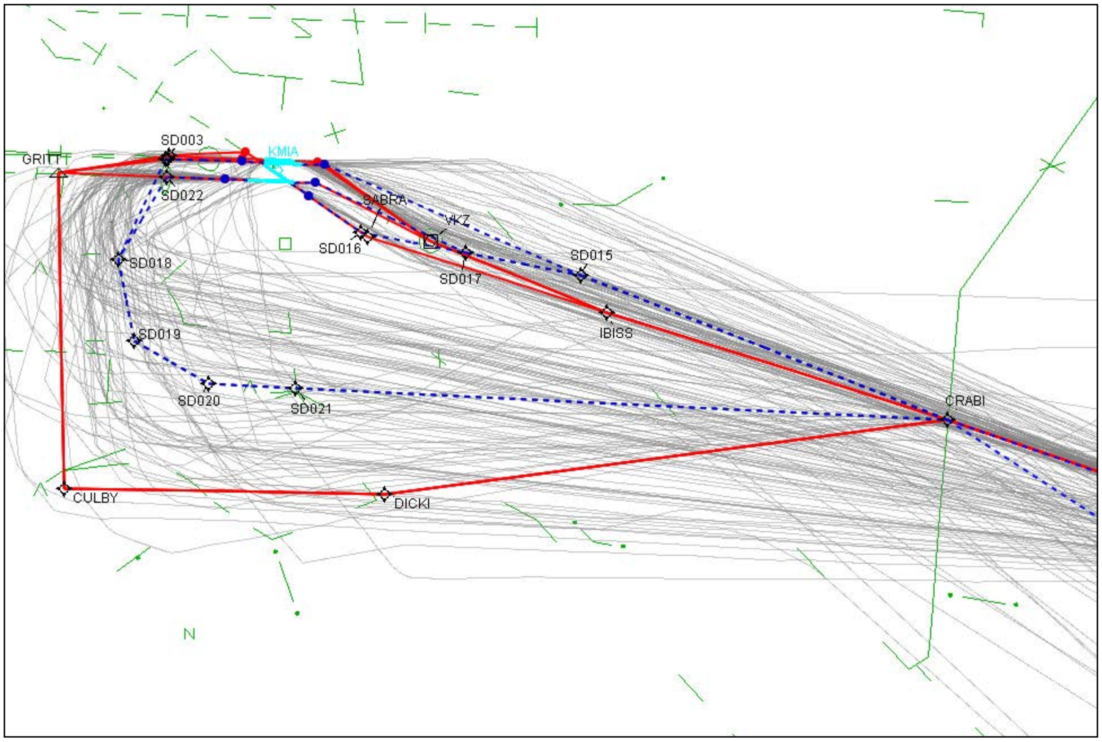


Figure 76. Current and Proposed MIA SKIPS SID: Runway Transitions

- Notes
  - The outbound routes flown by most of this traffic are dependent upon pre-coordinated routes negotiated with other air traffic service providers and are therefore out of scope for the OST.
- Benefits
  - Projected annual savings for the MIA SKIPS SID are estimated in Table 27.

Table 27. Proposed MIA SKIPS SID Annual Benefits

MIA SKIPS SID		Low	High
Estimated Annual Fuel Savings *	Distance	$70K	
	Profile	N/A	N/A
	Cost to Carry (Distance and Profile)	$10K	$10K
	Cost To Carry (Filed Mileage Savings)	$40K	
Total Estimated Annual Fuel Savings (Gallons)		40K	40K
Total Estimated Annual Carbon Savings (Metric Tons)		0.4K	0.4K
Total Estimated Annual Fuel Savings (Dollars) *		$120K	$120K

** Based on a fuel cost of $3 per gallon*

4.4.2.2 MIA EONNS Departure

The MIA EONNS SID accounts for approximately 13% of all MIA jet departures.

- Issues
  - There are inefficient vertical profiles and lateral paths on the existing procedure.
  - Current flight tracks do not overfly the existing procedure.
- Solutions
  - The proposed EONNS was deconflicted from MIA proposed procedures.
  - The lateral paths were optimized to reduce flight track miles.
  - Runway transitions were laterally optimized. The EONNS SID terminates at waypoint ED003. The OST recognizes that there may be benefits gained by terminating the procedure shortly after EONNS in order to allow for enhanced en route/operator routing flexibility when W465 is inactive.

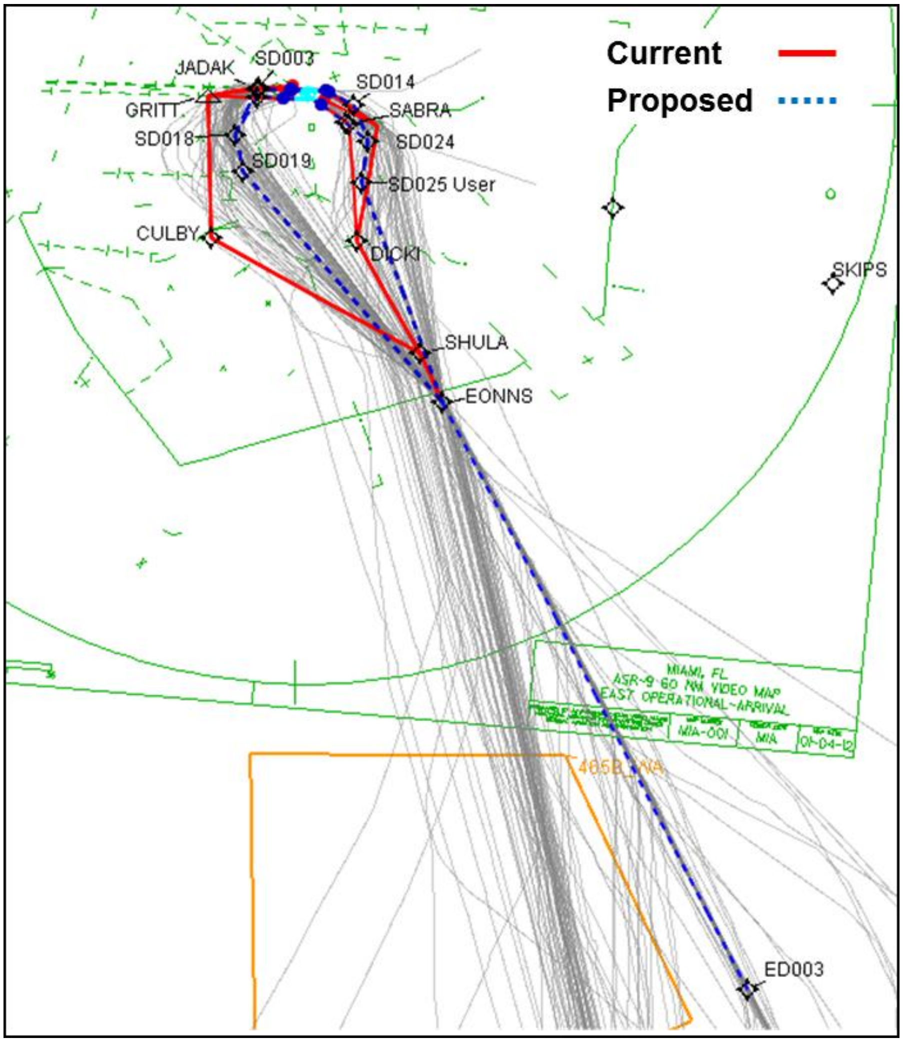


Figure 77. Current and Proposed MIA EONNS SID

- Notes
  - The outbound routes flown by most of this traffic are dependent upon pre-coordinated routes negotiated with other air traffic service providers and are therefore out of scope for the OST.
- Benefits
  - This procedure was not modeled due to limited anticipated profile/distance benefits.

4.4.2.3 MIA MNATE Departure

The MIA MNATE SID accounts for approximately 15% of all MIA jet departures.

- Issues
  - MIA MNATE departures and CURSO arrivals interact in en route airspace and are not procedurally deconflicted.

- Solutions
  - The proposed MNATE was deconflicted from MIA and FLL proposed CURSO procedures between W465 and W174 and is procedurally deconflicted within the TRACON's airspace. Waypoint ED007 was placed to ensure this procedural confliction.
  - Runway transitions were optimized and join at the FENIR intersection.
  - The lateral paths were optimized to reduce flight track miles.
  - By mitigating conflictions between traffic operating within this southern quadrant, the climb and descent profiles of these procedures were optimized.

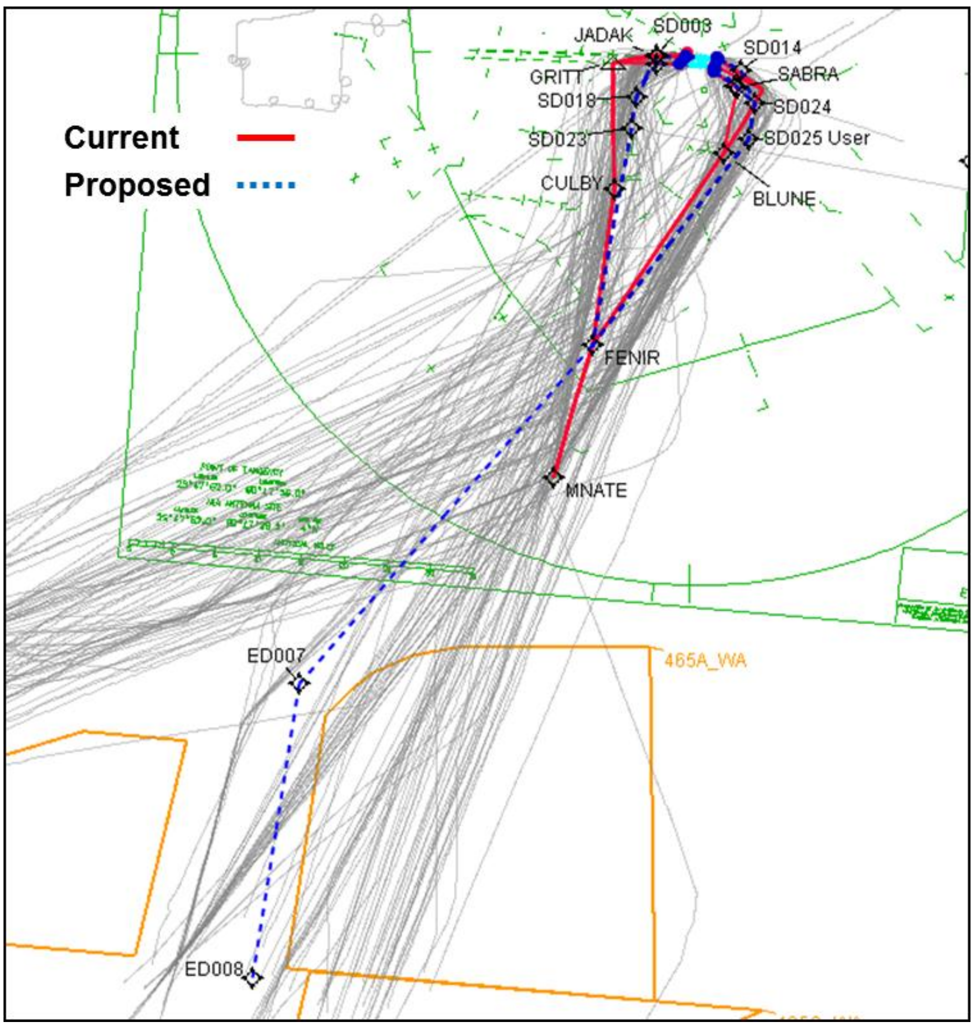


Figure 78. Current and Proposed MIA MNATE SID

- Notes
  - The OST recognizes that there may be benefits gained by an additional transition for aircraft filed over EWY, MAXIM and CANOA; this transition could begin at FENIR.

- Benefits
    - o This procedure was not modeled due to limited anticipated profile/distance benefits.

4.4.2.4 MIA New VEGIE Departure

- Issues
    - o There is no departure procedure westbound out of MIA TRACON.
- Solutions
    - o The proposed procedure provides an additional westbound option for city pairs/routes that would benefit from shorter routing.
    - o A westbound RNAV SID was created for weather re-routes.
    - o The proposed procedure was laterally segregated from inbound traffic through the EYW channel and W174.
    - o Transition routes were incorporated from VEGIE direct to SHAQQ, CANOA, and EA018.

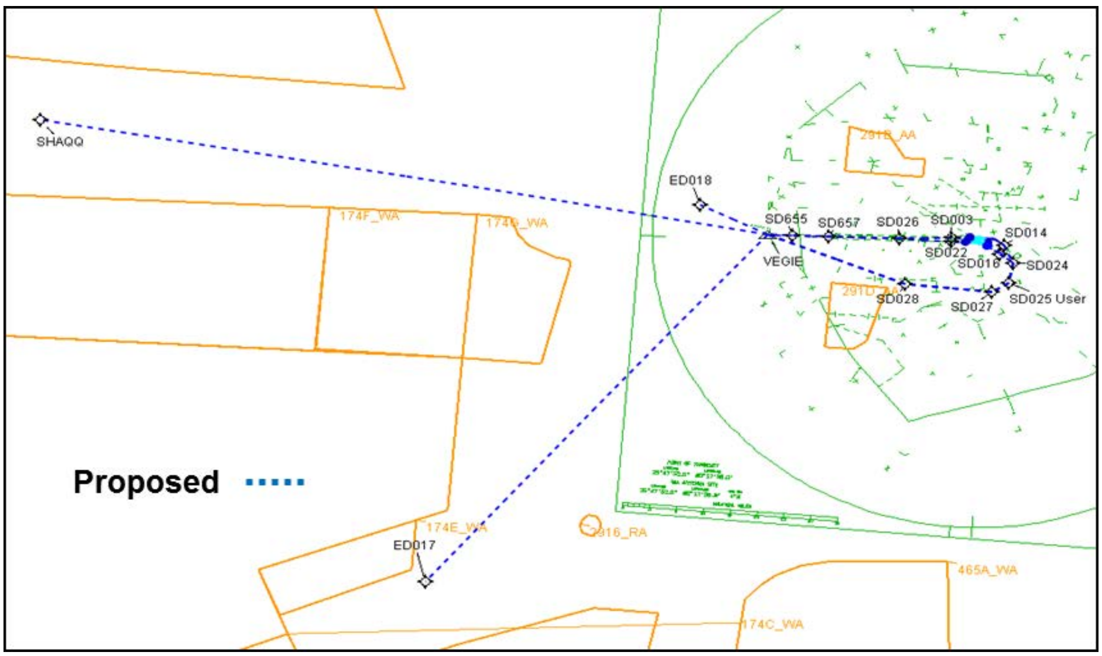


Figure 79. Proposed MIA New VEGIE SID

- Notes
    - The OST evaluated the potential benefits of a west DTA near the VEGIE intersection and recommends the proposed VEGIE SID. Analysis has determined that there may be value in increasing options for departures in Miami terminal airspace. The anticipated use for this SID is to accommodate RSW TRACON area arrivals and west/southwest bound departure traffic. The proposed VEGIE SID can be procedurally deconflicted within the TRACON's airspace from interacting SIDs and STARs. Industry partners expressed concern over the potential extra cost associated with the use of this DTA. Routes under consideration for this DTA must be fully evaluated for benefits vs. flexibility gains in D&I.
- Benefits
    - This procedure was not modeled due to undetermined loading and routing.

4.4.2.5 MIA WINCO Departure

The MIA WINCO SID accounts for approximately 19% of all MIA jet departures.

- Issues
    - There is a lack of procedural deconfliction between MIA WINCO departures and FLL JINGL arrivals.
- Solutions
    - FLL JINGL arrivals and MIA WINCO departures were procedurally deconflicted.
    - The lateral profile was optimized.

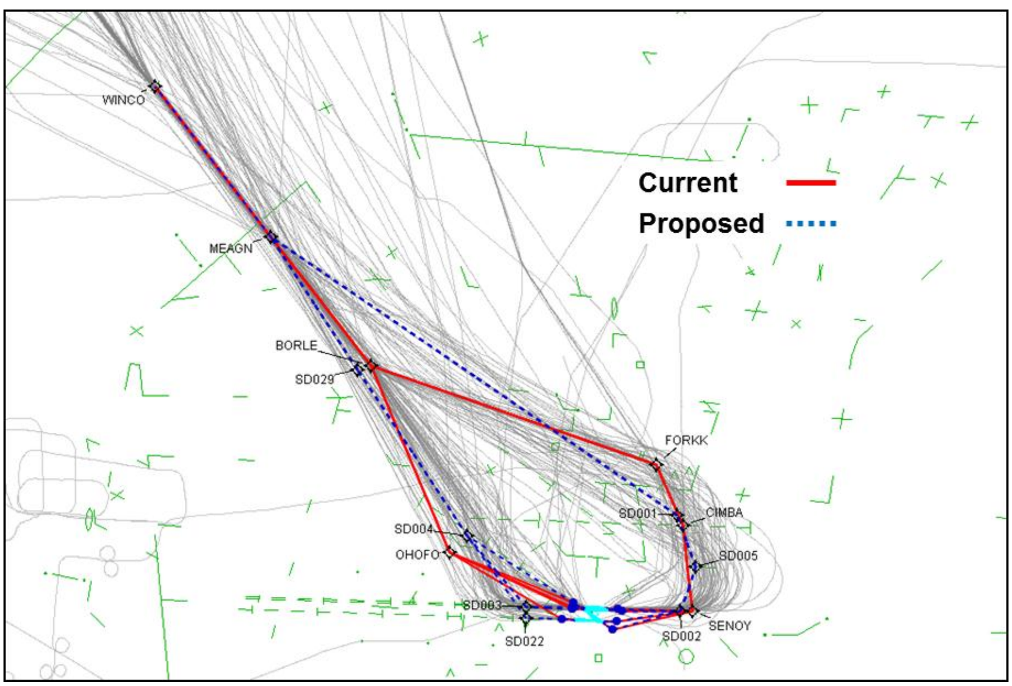


Figure 80. Current and Proposed MIA WINCO SID

- Notes
    - The WINCO SID termination point is still established just outside of the ZMA/TRACON boundary as this provides the best solution to maintain the departure route flexibility.
- Benefits
    - This procedure was not modeled due to limited anticipated profile/distance benefits.

4.4.2.6 MIA VALLY Departure

The MIA VALLY SID accounts for approximately 10% of all MIA jet departures.

- Issues
    - MIA departures are forced to level off due to the location of arrival traffic.
- Solutions
    - The profile was optimized to facilitate unrestricted climbs.
    - A T-Route was developed to segregate overflight traffic from this departure.
    - The proposed VALLY SID includes the establishment of procedural deconfliction from other SIDs/STARs within the TRACON boundary.
    - The VALLY SID runway transitions are joined at SD008 and terminate at SD1243 in order to allow for enhanced en route/operator routing flexibility.
    - This procedure was designed to parallel the proposed PREDA SID.

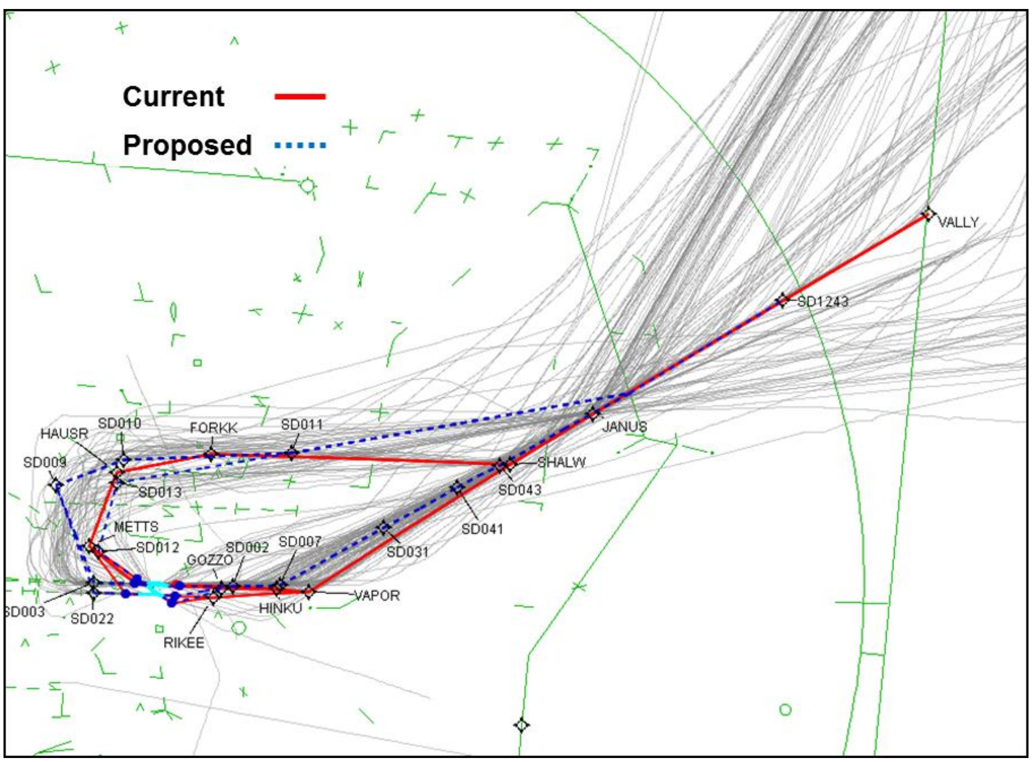


Figure 81. Current and Proposed MIA VALLY SID

- Benefits
    - This procedure was not modeled due to limited anticipated profile/distance benefits.

4.4.2.7 FLL New EONNS Departure

The FLL New EONNS SID will support current BEECH/BAHMA departures routed over EONNS and should account for approximately 3% of all FLL jet departures.

- Issues
    - There is no southbound RNAV SID serving FLL.
- Solutions
    - A new southbound FLL RNAV departure procedure was designed.
    - On an east operation, the proposed EONNS was deconflicted from MIA and FLL proposed procedures.
    - On an east operation, the lateral paths were designed to enable unrestricted climbs.
    - The EONNS SID terminates at waypoint ED003.

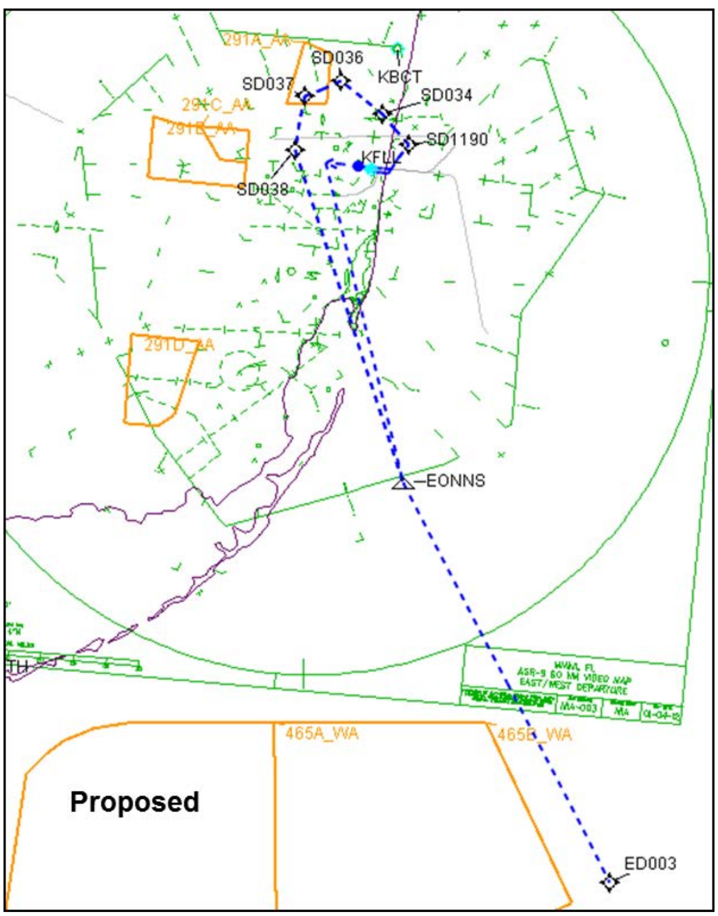


Figure 82. Current and Proposed FLL New EONNS SID

- Notes
  - The proposal for FLL traffic utilizing this SID on an east operation is the establishment of a “loop” procedure that allows for deconfliction and an unrestricted climb to exit terminal airspace. On a west operation, procedural deconfliction was not designed. This procedure on a west operation must be evaluated to determine benefits gained using the proposed EONNS SID versus using the proposed BEECH SID. The OST recognizes that there may be benefits gained by terminating the procedure shortly after EONNS in order to allow for enhanced en route/operator routing flexibility when W465 is inactive. The outbound routes flown by most of this traffic are dependent upon pre-coordinated routes negotiated with other air traffic service providers and are therefore out of scope for the OST in the exploration of further enhancement.
- Benefits
  - This procedure was not modeled due to a lack of current traffic.

4.4.2.8 FLL New MNATE Departure

The FLL New MNATE SID will account for approximately 5% of all FLL jet departures.

- Issues
  - There is no southbound RNAV SID serving FLL.
- Solutions
  - A new southbound FLL RNAV departure procedure was designed.
  - On an east operation, the proposed MNATE was deconflicted from MIA and FLL proposed procedures.
  - On an east operation, the lateral paths were designed to enable unrestricted climbs.
  - The proposed MNATE was deconflicted from MIA and FLL proposed CURSO procedures between W465 and W174. Waypoint ED007 was placed to ensure this procedural confliction.
  - By mitigating conflictions between traffic operating within this southern quadrant, the climb and descent profiles of these procedures were optimized.

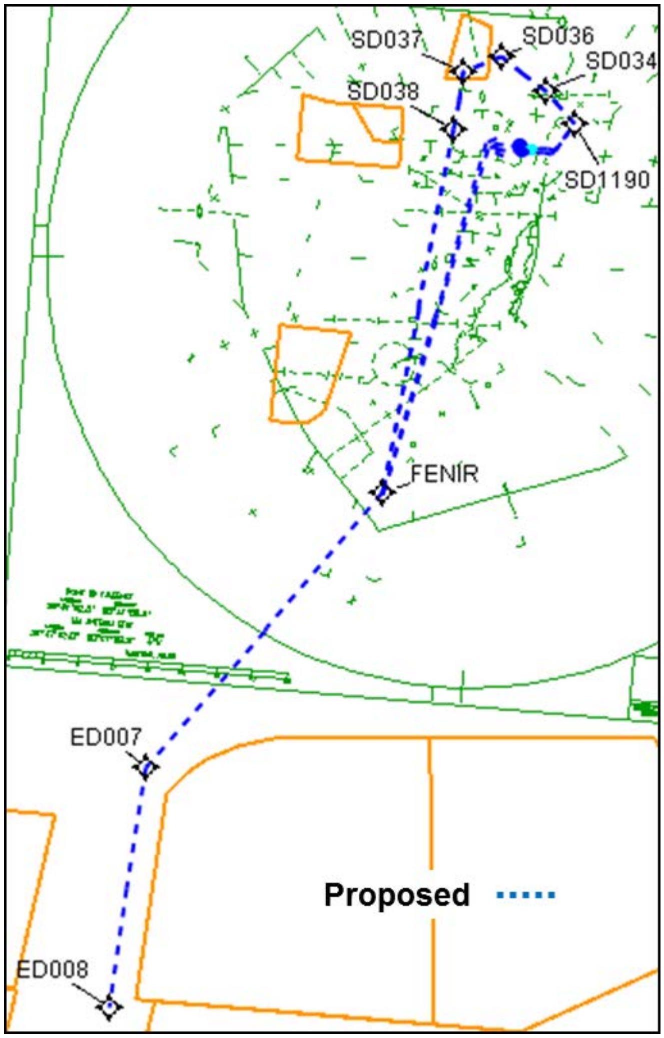


Figure 83. Current and Proposed FLL New MNATE SID

- Notes
  - The proposal for FLL traffic utilizing this SID on an east operation is the establishment of a "loop" procedure that allows for deconfliction and an unrestricted climb to exit terminal airspace. On a west operation, procedural deconfliction was not designed. This procedure on a west operation must be evaluated to determine benefits gained using the proposed MNATE versus using the proposed BEECH SID. The OST recognizes that there may be benefits gained by an additional transition for aircraft filed over EWY, MAXIM and CANOA; this transition could begin at FENIR.
- Benefits
  - This procedure was not modeled due to undetermined loading and routing.

4.4.2.9 FLL New VEGIE Departure

- Issues
  - There is no departure procedure westbound out of MIA TRACON.
- Solutions
  - The proposed procedure provides an additional westbound option for city pairs/routes that would benefit from shorter routing.
  - A westbound RNAV SID was created for weather re-routes.
  - The proposed procedure was laterally segregated from inbound traffic through the EYW channel and W174.
  - Transition routes were incorporated from VEGIE direct to SHAQQ, CANOA, and EA018.

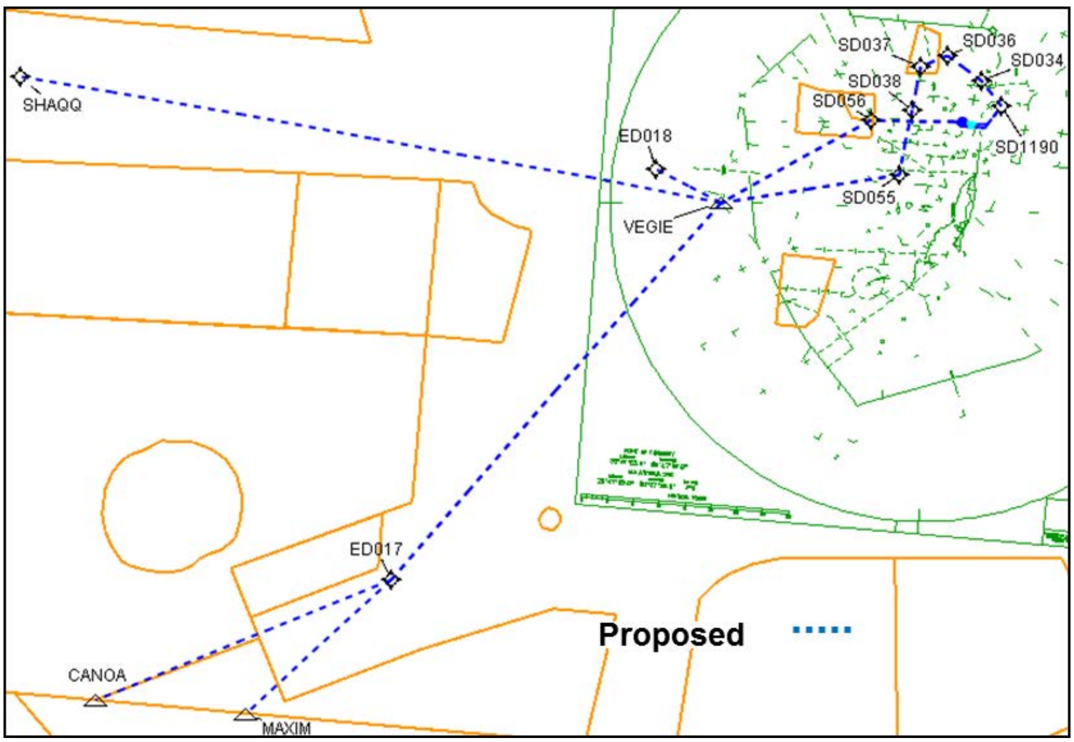


Figure 84. Proposed FLL New VEGIE SID

- Notes
    - The OST evaluated the potential benefits of a west DTA near the VEGIE intersection and recommends the proposed VEGIE SID. Analysis has determined that there may be value in increasing options for departures in Miami terminal airspace. On an east operation, the proposed VEGIE SID is procedurally deconflicted within the TRACON's airspace from interacting SIDs and STARs. On a west operation, procedural deconfliction was not designed. Industry partners expressed concern over the potential extra cost associated with the use of this DTA. Routes under consideration for this DTA must be fully evaluated for benefits vs. flexibility gains in D&I.
- Benefits
    - This procedure was not modeled due to undetermined loading and routing.

4.4.2.10 FLL PREDA Departure

The FLL PREDA SID accounts for approximately 23% of all FLL jet departures.

- Issues
    - FLL departures are forced to level off due to the location of MIA arrival traffic.
- Solutions
    - The proposed PREDA SID was deconflicted from MIA and FLL proposed procedures in the TRACON airspace.
    - The PREDA SID was combined with the ZAPPA SID.

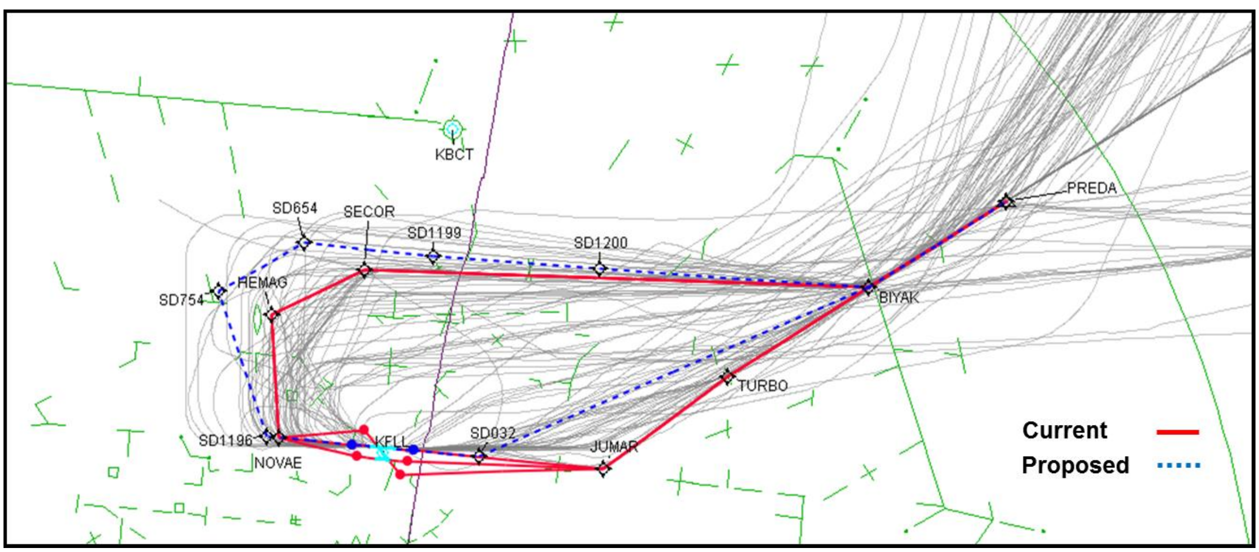


Figure 85. Current and Proposed FLL PREDA SID

- Notes
    - The ZAPPA SID has been eliminated as track data indicated that a single eastbound SID is sufficient.

- Benefits
  - Projected annual savings for the FLL PREDA SID are estimated in Table 28.

Table 28. Proposed FLL PREDA SID Annual Benefits

FLL PREDA SID		Low	High
Estimated Annual Fuel Savings *	Distance	-$180K	
	Profile	$200K	$570K
	Cost to Carry (Distance and Profile)	$0K	$40K
	Cost To Carry (Filed Mileage Savings)	N/A	
Total Estimated Annual Fuel Savings (Gallons)		4K	141K
Total Estimated Annual Carbon Savings (Metric Tons)		0K	1.5K
Total Estimated Annual Fuel Savings (Dollars) *		$10K	$420K

** Based on a fuel cost of $3 per gallon*

4.4.2.11 FLL BEECH Departure

The FLL BEECH SID currently accounts for approximately 14% of all FLL jet departures. Based on PDARS data, approximately 3% of all FLL jet departures currently utilizing the BEECH SID are expected to use the New EONNS SID.

- Issues
  - The BAHMA and BEECH SIDs are direction dependent.
  - FLL departures are forced to level off due to the location of MIA arrival traffic.
- Solutions
  - The proposed BEECH SID was deconflicted from MIA and FLL proposed procedures in the TRACON airspace.
  - The BAHMA SID was combined with the BEECH SID.

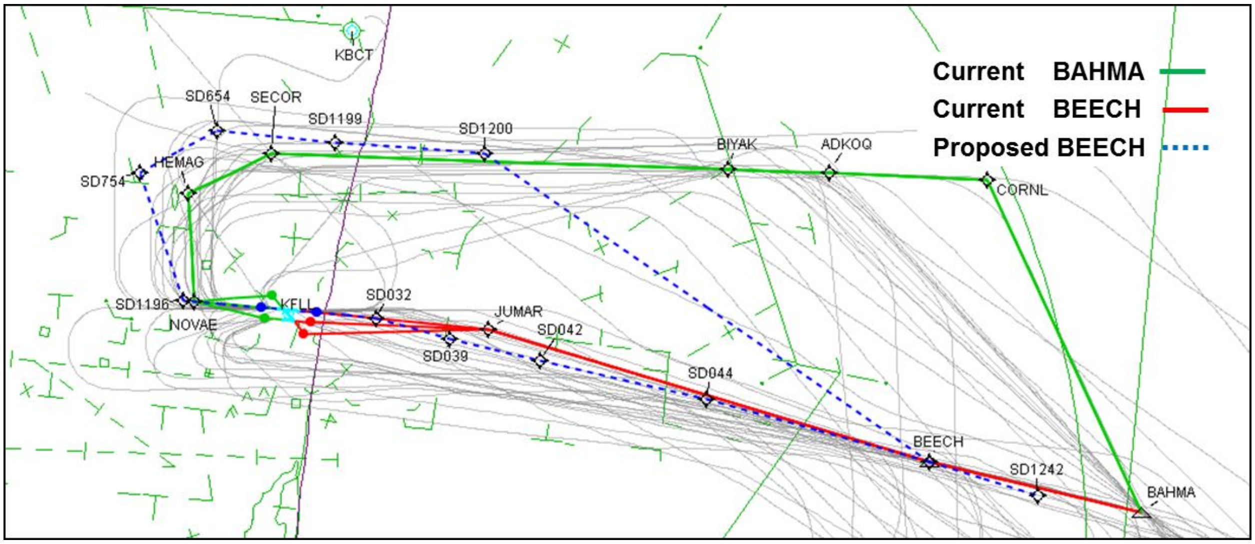


Figure 86. Current and Proposed FLL BEECH SID

- Notes
  - The BAHMA SID has been eliminated as track data indicated that a single eastbound SID is sufficient.
- Benefits
  - Projected annual savings for the FLL BEECH SID are estimated in Table 29.

Table 29. Proposed FLL BEECH SID Annual Benefits

FLL BEECH SID		Low	High
Estimated Annual Fuel Savings *	Distance	N/A	
	Profile	-$360K	-$10K
	Cost to Carry (Distance and Profile)	-$40K	$0K
	Cost To Carry (Filed Mileage Savings)	-$20K	
Total Estimated Annual Fuel Savings (Gallons)		-137K	-9K
Total Estimated Annual Carbon Savings (Metric Tons)		-1.4K	-0.1K
Total Estimated Annual Fuel Savings (Dollars) *		-$410K	-$30K

** Based on a fuel cost of $3 per gallon*

4.4.3 MIA T-Route

- Issues
  - There is no PBN procedure for east/west transition traffic through MIA TRACON airspace.
- Solutions
  - A T-Route was designed just north of MIA airport from waypoint TR1, 5 miles northwest of OPF, to waypoint TR4, which is 12 miles off the coast of FL and two miles east of the KEVEY intersection. This route was developed as a request from the facilities to accommodate east/west overflight and departure traffic via a predictable and segregated route.

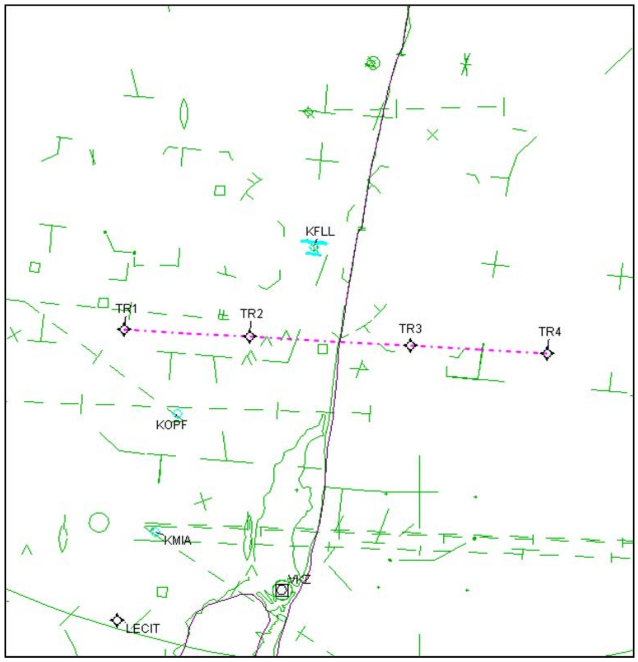


Figure 87. Proposed MIA T-Route

- Benefits
  - This procedure was not modeled due to undetermined loading.

4.4.4 Summary of Potential Benefits for MIA and FLL

As shown in Table 30, the proposed MIA and FLL STARs and SIDs are estimated to total between $8.79 million and $22.33 million annually in fuel savings.

Table 30. Total Annual Fuel Burn Benefits for MIA and FLL

		MIA		FLL		Total MIA and FLL	
		Low	High	Low	High	Low	High
Estimated Annual Fuel Savings *	Distance	-$160K		$1.61M		$1.45M	
	Profile	$2.99M	$8.81M	$2.81M	$9.3M	$5.8M	$18.11M
	Cost to Carry (Distance and Profile)	$280K	$860K	$450K	$1.09M	$730K	$1.95M
	Cost To Carry (Filed Mileage Savings)	$390K		$430K		$820K	
Total Estimated Annual Fuel Savings (Gallons)		1.17M	3.3M	1.77M	4.13M	2.94M	7.43M
Total Estimated Annual Carbon Savings (Metric Tons)		12.1K	34.2K	18.2K	43K	30.3K	77.2K
Total Estimated Annual Fuel Savings (Dollars) *		$3.51M	$9.9M	$5.28M	$12.43M	$8.79M	$22.33M

** Based on a fuel cost of $3 per gallon*

4.5 PBI, BCT, and SUA Procedures

PBI is the primary airport within PBI TRACON airspace with 392 daily operations on average in 2011 with 55% being either air carrier or air taxi flights. BCT and SUA are satellite airports within PBI TRACON airspace. PBI TRACON airspace is from the surface to 12,000 feet mean sea level (MSL) with some lower shelves. ZMA airspace overlies PBI TRACON airspace in all directions except MIA TRACON airspace is adjacent to PBI TRACON airspace to the south.

4.5.1 PBI, BCT, and SUA Arrivals

This section describes the operational issues, solutions, and expected benefits the OST has identified for arrivals to PBI, BCT, and SUA.

No issues were identified with arrival procedures from the east associated with the WALIK ATA and no proposed changes were identified by the OST. Jets arriving through this ATA account for approximately 3% of all PBI jet arrivals.

4.5.1.1 PBI FRWAY Arrival (OMN Transition)

The PBI FRWAY STAR (OMN Transition) accounts for approximately 28% of all PBI jet arrivals.

- Issues
  - There are inefficient vertical profiles and lateral paths on the existing procedure.
  - Current flight tracks do not overfly the existing procedure.
  - The current northeast inland STARs serving PBI, FLL, and MIA all commence over OMN causing congestion.
- Solutions
  - Runway transitions were incorporated into this design.
  - The HILEY, FRWAY, and FISEL STARs are now laterally segregated in the vicinity of OMN through the use of separate en route transitions.
  - This is an inland STAR only with the current AR traffic utilizing the proposed PBI NE STAR.
  - The proposed STAR was lowered to allow optimization of the New NE PBI STAR.
  - This route is shifted west and a new waypoint, SA062, southwest of STOOP will be the arrival entry route with runway transitions commencing at SA075.

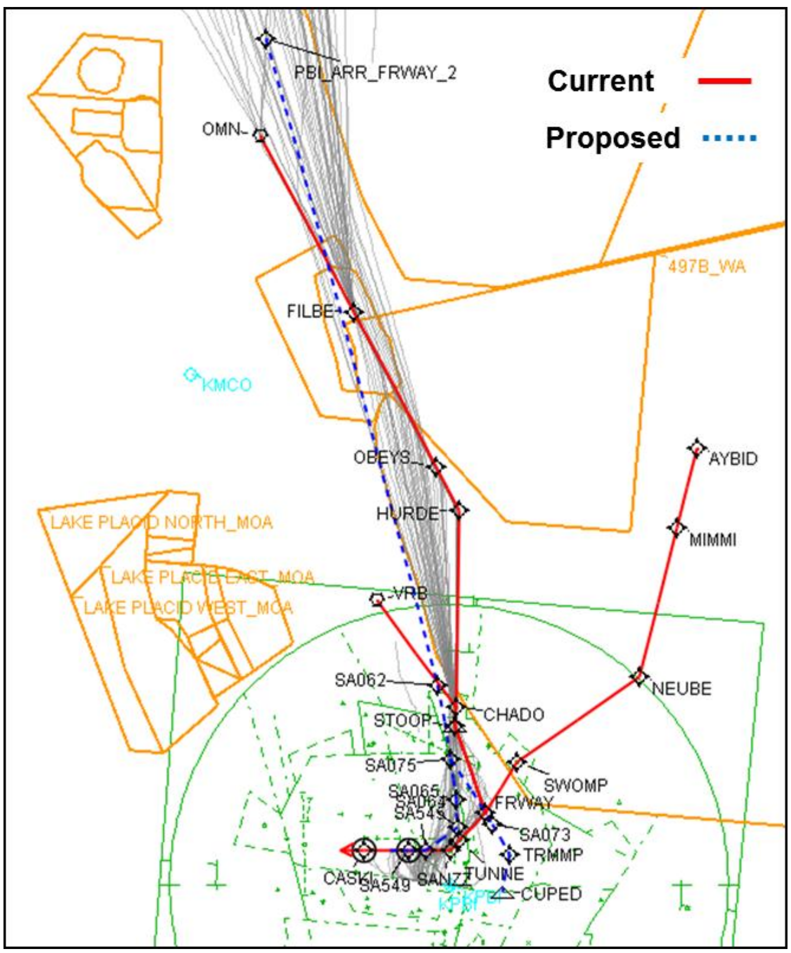


Figure 88. Current and Proposed PBI FRWAY STAR (OMN Transition)

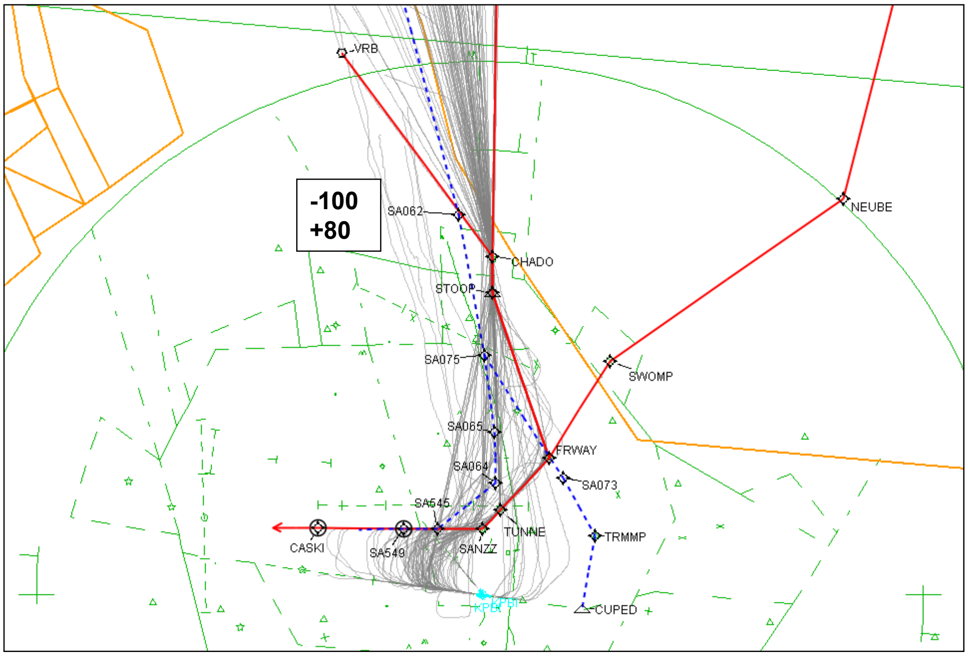


Figure 89. Current and Proposed PBI FRWAY STAR (OMN Transition): Runway Transitions

- Notes
  - The over-water portion of the current FRWAY STAR will be developed as a separate arrival due to the lack of a common route/fix with the inland STAR. Deconfliction for this procedure can be vertically established from the FLL FISEL. Recommended windows/altitudes are anticipated to be finalized to accomplish this in D&I.

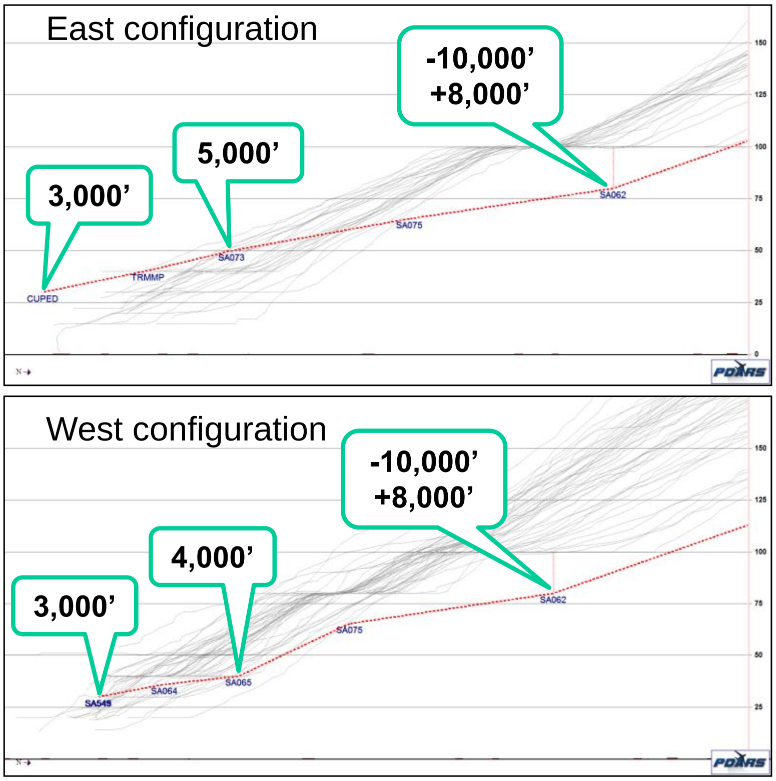


Figure 90. Proposed PBI FRWAY STAR (OMN Transition): Current Vertical Profile of Flight Tracks and Nominal Proposed Vertical Profile

- Benefits
  - Projected annual savings for the PBI FRWAY STAR (OMN Transition) are estimated in Table 31.

Table 31. Proposed PBI FRWAY STAR (OMN Transition) Annual Benefits

PBI FRWAY STAR		Low	High
Estimated Annual Fuel Savings *	Distance	$10K	
	Profile	-$170K	-$50K
	Cost to Carry (Distance and Profile)	-$20K	N/A
	Cost To Carry (Filed Mileage Savings)	$90K	
Total Estimated Annual Fuel Savings (Gallons)		-25K	19K
Total Estimated Annual Carbon Savings (Metric Tons)		-0.3K	0.2K
Total Estimated Annual Fuel Savings (Dollars) *		-$80K	$60K

** Based on a fuel cost of $3 per gallon*

4.5.1.2 PBI New Northeast Arrival (Current FRWAY STAR, AYBID Transition)

The PBI FRWAY STAR (AYBID Transition) accounts for approximately 21% of all PBI jet arrivals.

- Issues
  - There are inefficient vertical profiles and lateral paths on the existing procedure.
  - Current flight tracks do not overfly the existing procedure.
- Solutions
  - Runway transitions were incorporated into this design.
  - This is an over-water STAR with the current inland traffic utilizing the proposed PBI FRWAY STAR.
  - This STAR commences at a waypoint just south of the AYBID intersection and proceeds to a waypoint just abeam the SWOMP intersection, SA063, where this procedure enters terminal airspace.

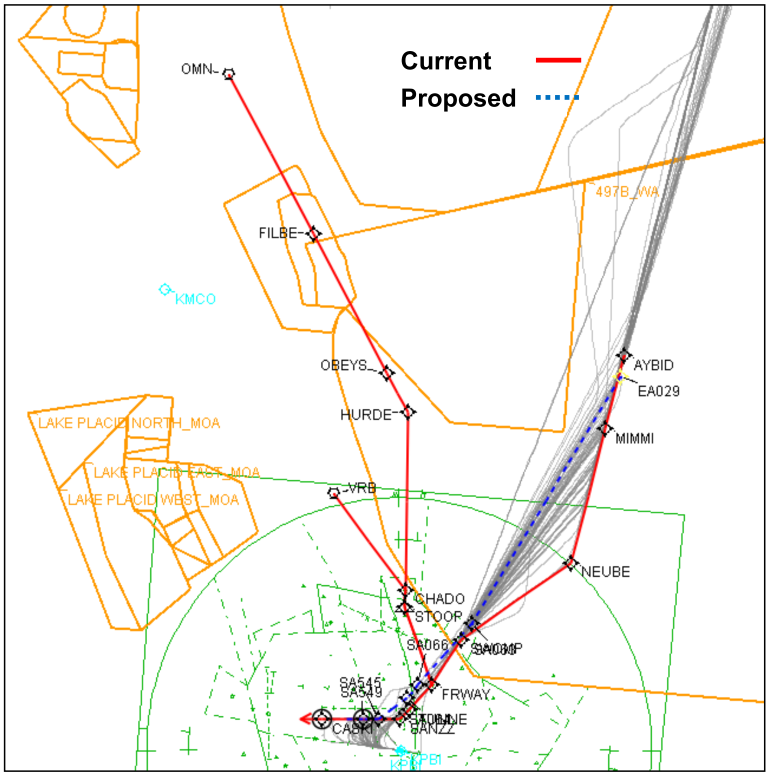


Figure 91. Current FRWAY STAR and Proposed PBI New NE STAR

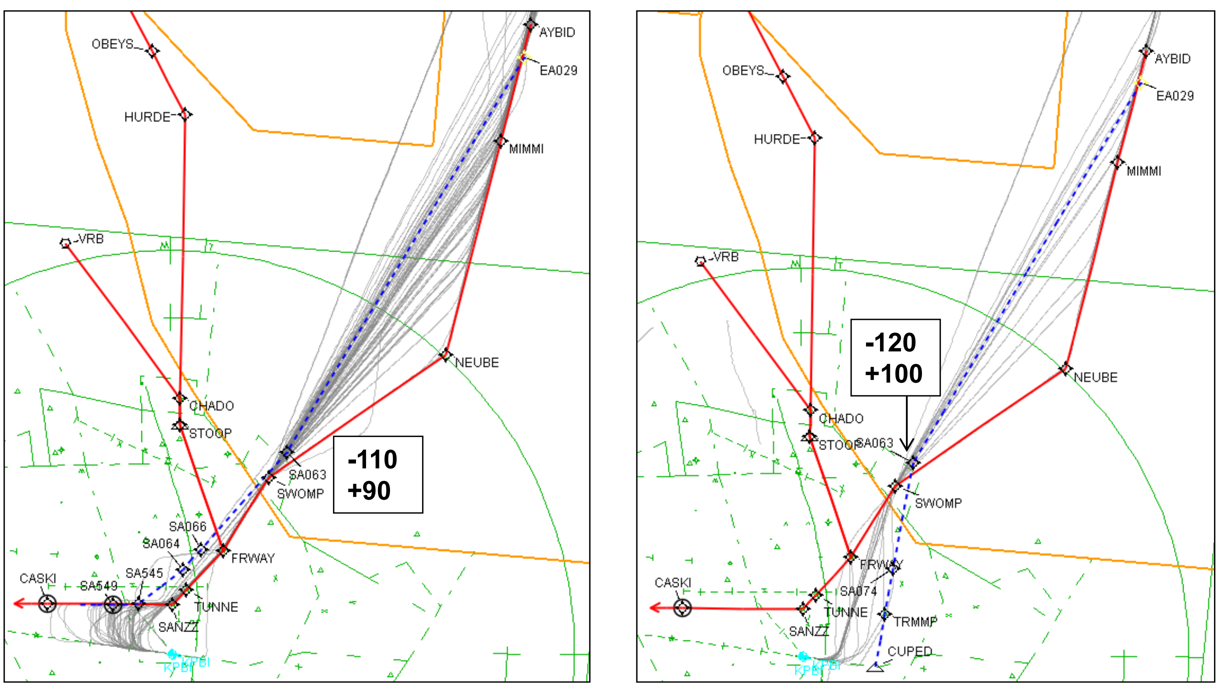


Figure 92. Current FRWAY STAR (AYBID Transition) and Proposed PBI New NE STAR: Runway Transitions

- Notes
    - The PBI NE STAR is required to be a separate procedure from the proposed FRWAY STAR due to the lack of a common route/fix. Dual arrivals flows were still designed as the current published FRWAY STAR provides. Deconfliction was established vertically from PBI SIDs through recommended windows/altitudes that are anticipated to be finalized in D&I.

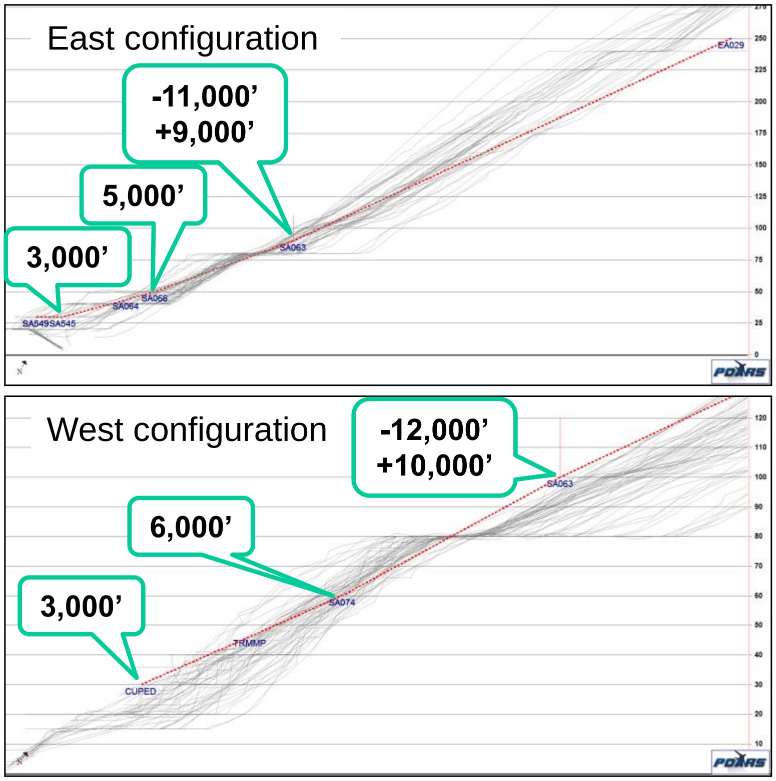


Figure 93. Proposed PBI New NE STAR: Current Vertical Profile of Flight Tracks and Nominal Proposed Vertical Profile

- Benefits
    - Projected annual savings for the PBI New NE STAR are estimated in Table 32.

Table 32. Proposed PBI New NE STAR Annual Benefits

PBI New NE STAR		Low	High
Estimated Annual Fuel Savings *	Distance	$260K	
	Profile	$380K	$1.24M
	Cost to Carry (Distance and Profile)	$60K	$150K
	Cost To Carry (Filed Mileage Savings)	$240K	
Total Estimated Annual Fuel Savings (Gallons)		317K	632K
Total Estimated Annual Carbon Savings (Metric Tons)		3.4K	6.4K
Total Estimated Annual Fuel Savings (Dollars) *		$950K	$1.9M

** Based on a fuel cost of $3 per gallon*

4.5.1.3 PBI New SE Arrival

The PBI New SE STAR will account for 8% of all PBI jet arrivals.

- Issues
  - o There is currently no PBI RNAV arrival procedure from the southeast.
- Solutions
  - o A PBI RNAV STAR was designed from the southeast over ISAAC.

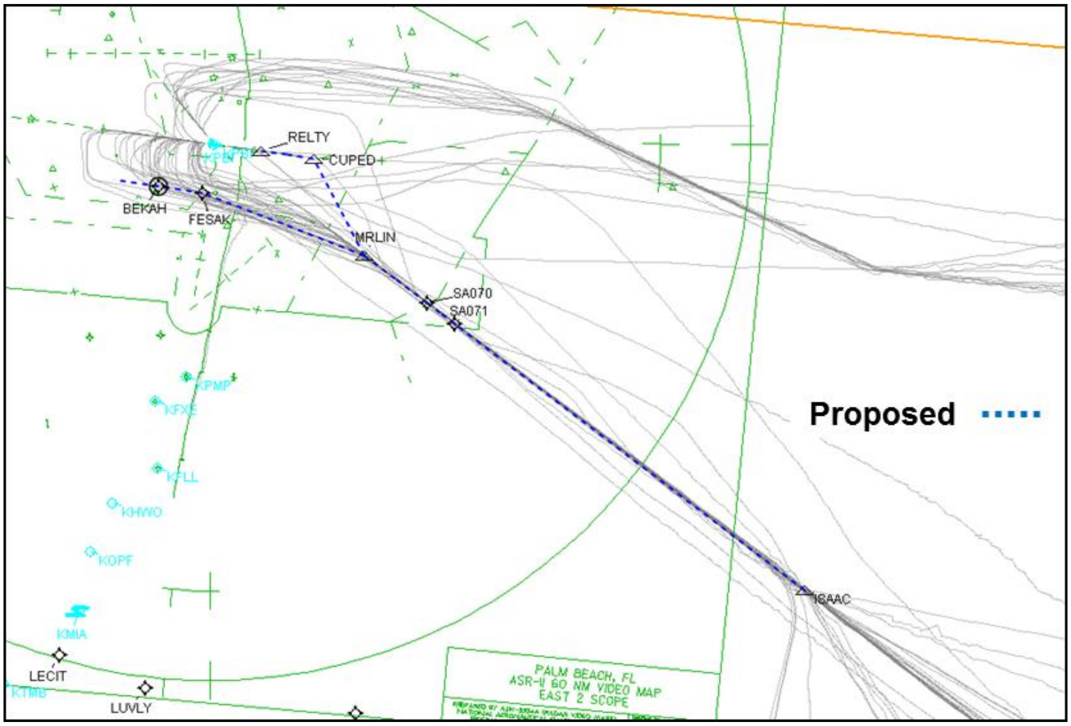


Figure 94. Proposed PBI New SE STAR

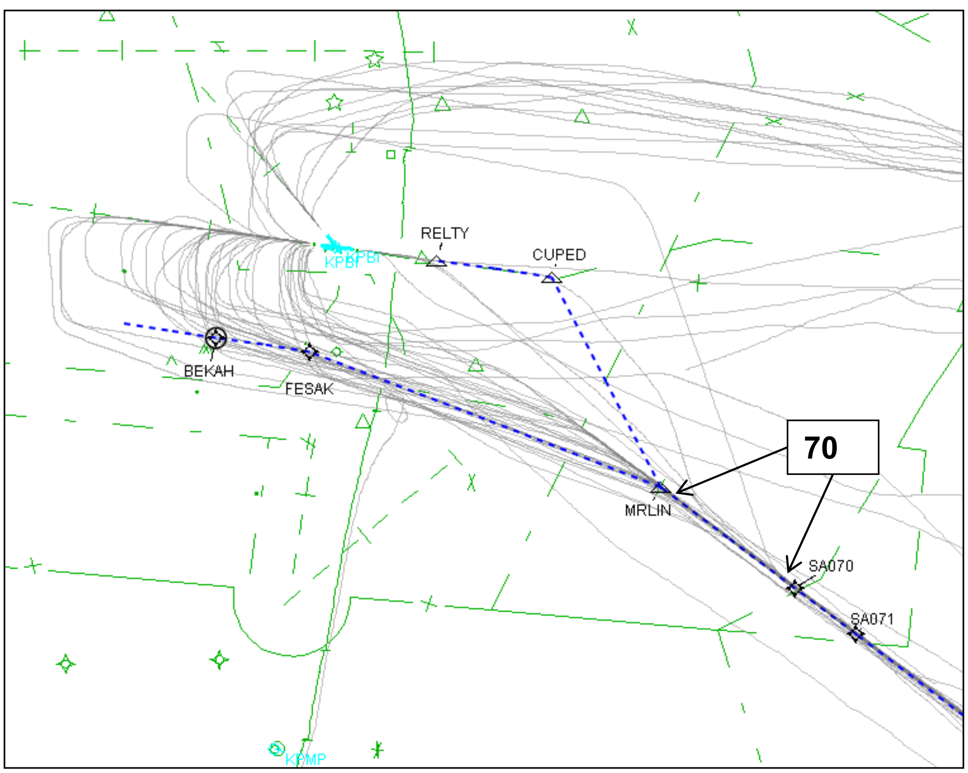


Figure 95. Proposed PBI New SE STAR: Runway Transitions

- Notes
    - Traffic is projected to increase into PBI, and this necessitates the development of a PBI Southeast STAR. Deconfliction for this procedure can be vertically established from other procedures. Recommended windows/altitudes are anticipated to be finalized to accomplish this in D&I.

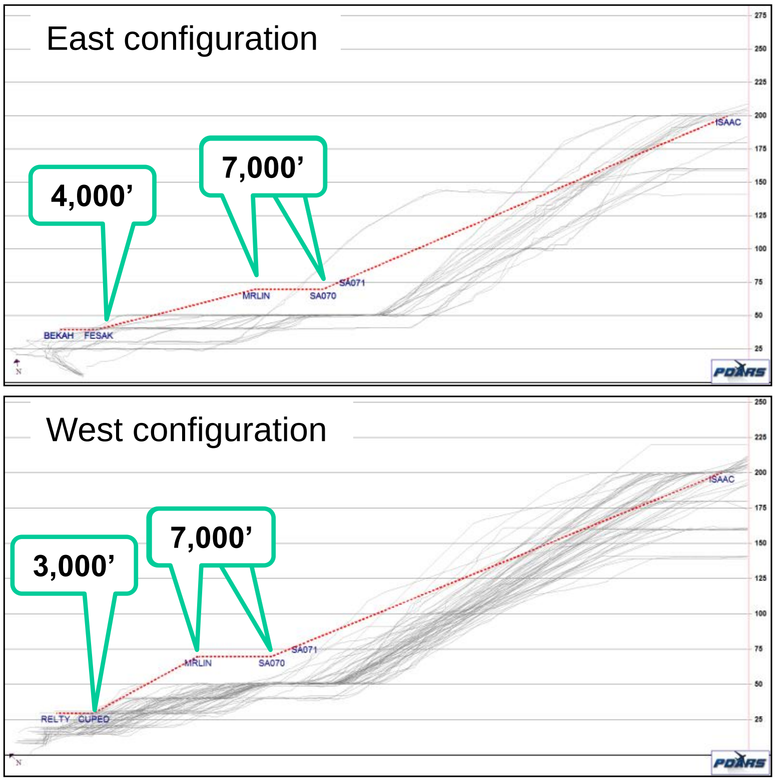


Figure 96. Proposed PBI New SE STAR: Current Vertical Profile of Flight Tracks and Nominal Proposed Vertical Profile

- Benefits
    - Projected annual savings for the PBI New SE STAR are estimated in Table 33.

Table 33. Proposed PBI New SE STAR Annual Benefits

PBI New SE STAR		Low	High
Estimated Annual Fuel Savings *	Distance	-$10K	
	Profile	$190K	$560K
	Cost to Carry (Distance and Profile)	$20K	$50K
	Cost To Carry (Filed Mileage Savings)	N/A	
Total Estimated Annual Fuel Savings (Gallons)		65K	201K
Total Estimated Annual Carbon Savings (Metric Tons)		0.7K	2.1K
Total Estimated Annual Fuel Savings (Dollars) *		$190K	$600K

** Based on a fuel cost of $3 per gallon*

4.5.1.4 PBI WLACE Arrival

The PBI WLACE STAR accounts for approximately 41% of all PBI jet arrivals.

- Issues
  - There are inefficient vertical profiles and lateral paths on the existing procedure.
  - Current flight tracks do not overfly the existing procedure.
  - There is a lack of procedural deconfliction from the JINGL RNAV STAR.
- Solutions
  - This proposed procedure shares a partial route with the proposed JINGL RNAV STAR.
  - The vertical profile will be established when the JINGL vertical profile is finalized.
  - Runway transitions were incorporated into this design.
  - The length of this proposed STAR was shortened to increase flexibility.
  - Route sharing with the JINGL STAR occurs between waypoints EA436 and EA435. The proposed altitudes between these waypoints vertically deconflict the procedures: the WLACE profile falls below the JINGL profile.
  - The proposed vertical profile was designed to deconflict with the FLL and MIA departure procedures filed over LAL.
  - Due to realignment of the proposed DEAKK STAR, JINGL STAR, and CSHEL SID, the proposed WLACE STAR will significantly reduce track miles flown.

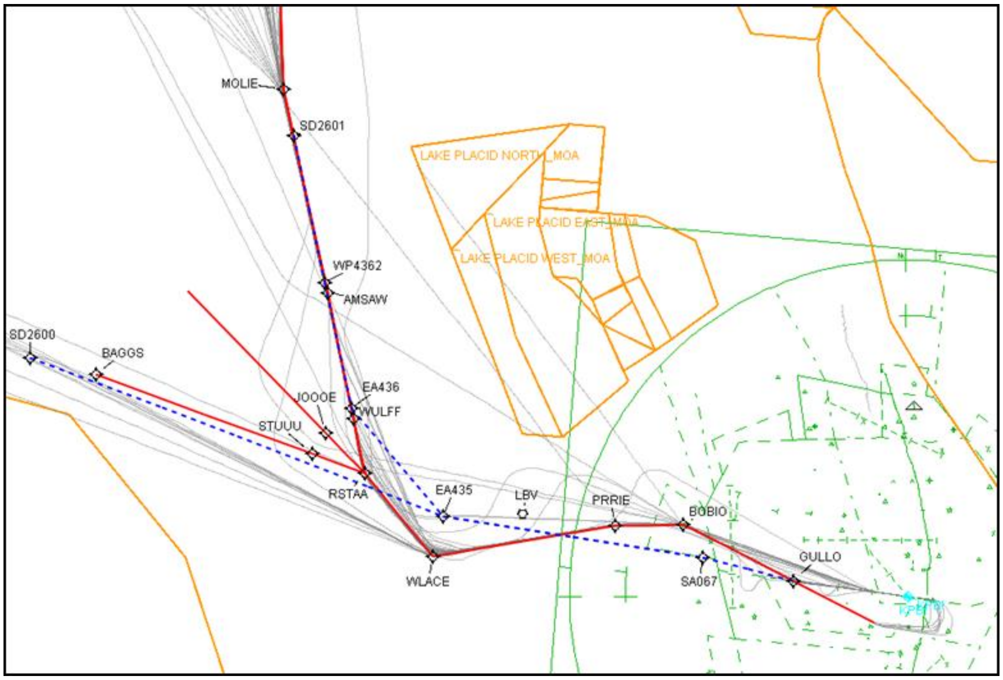


Figure 97. Current and Proposed PBI WLACE STAR

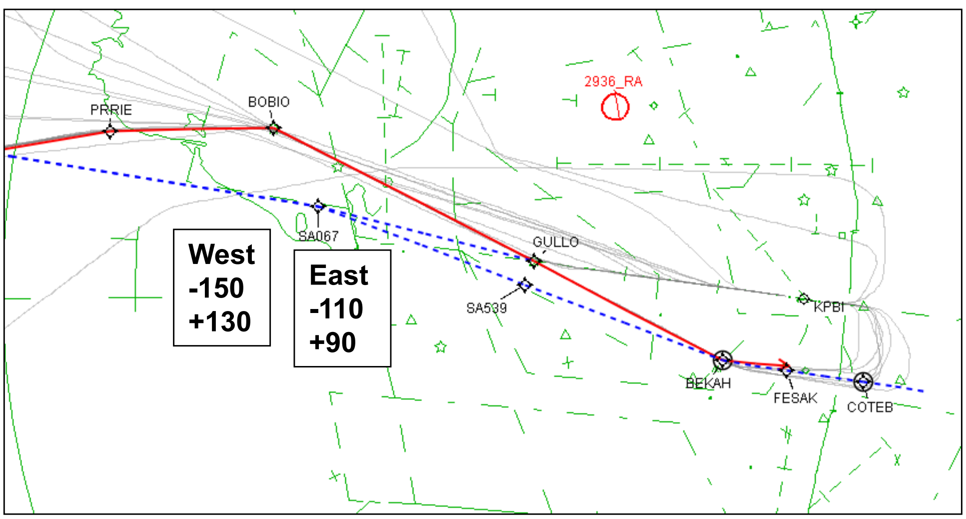


Figure 98. Current and Proposed PBI WLACE STAR: Runway Transitions

- Notes
  - The proposed PBI WLACE STAR will impact ZMA sector 67, 47 and 24 boundaries

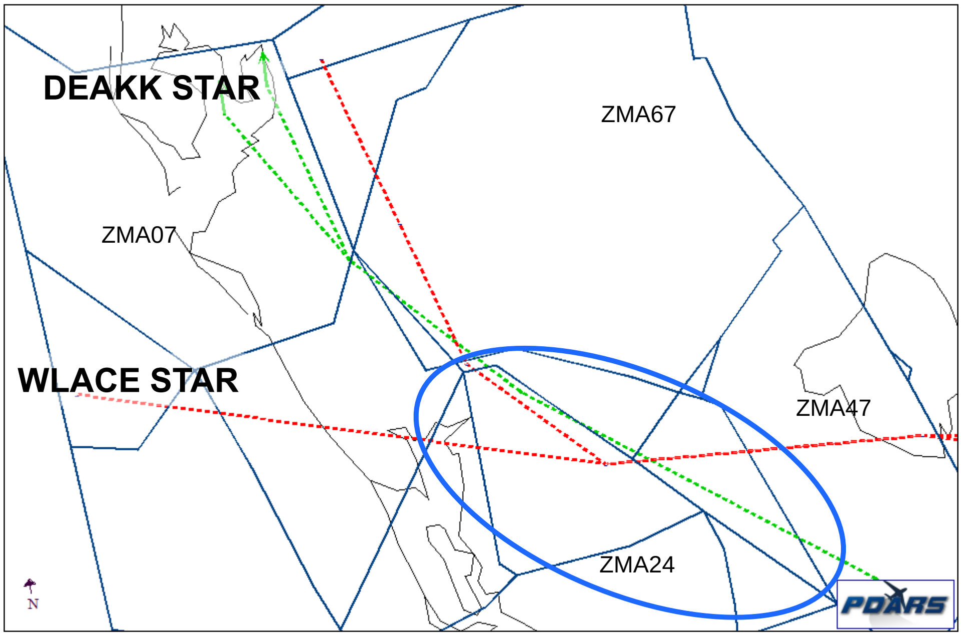


Figure 99. Proposed PBI WLACE STAR Airspace Affected

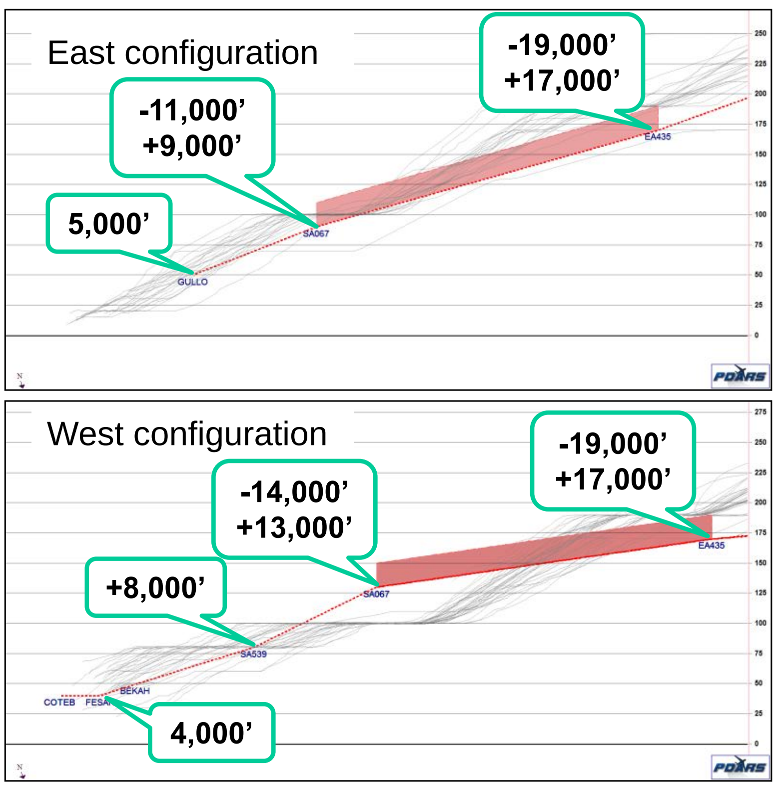


Figure 100. Proposed PBI WLACE STAR: Current Vertical Profile of Flight Tracks and Nominal Proposed Vertical Profile

- Benefits
  - Projected annual savings for the PBI WLACE STAR are estimated in Table 34.

Table 34. Proposed PBI WLACE STAR Annual Benefits

PBI WLACE STAR		Low	High
Estimated Annual Fuel Savings *	Distance	$340K	
	Profile	$260K	$760K
	Cost to Carry (Distance and Profile)	$60K	$110K
	Cost To Carry (Filed Mileage Savings)	$110K	
Total Estimated Annual Fuel Savings (Gallons)		252K	438K
Total Estimated Annual Carbon Savings (Metric Tons)		2.6K	4.5K
Total Estimated Annual Fuel Savings (Dollars) *		$760K	$1.31M

** Based on a fuel cost of $3 per gallon*

4.5.1.5 BCT PRRIE Arrival

- Issues
  - There are inefficient vertical profiles and lateral paths on the existing procedure.
  - Current flight tracks do not overfly the existing procedure.
  - There is a lack of procedural deconfliction from the JINGL RNAV STAR.
- Solutions
  - This proposed procedure shares a partial route with the proposed JINGL RNAV STAR.
  - The vertical profile will be established when the JINGL vertical profile is finalized.
  - The proposed PRRIE mimics the proposed WLACE STAR to EA435. After EA435, the procedure diverges from the WLACE STAR and terminates at CAYSL.
  - The length of this proposed STAR was shortened to increase flexibility.
  - Due to realignment of the proposed DEAKK STAR, JINGL STAR, and CSHEL SID, the proposed PRRIE STAR will significantly reduce track miles flown.
  - Route sharing with the JINGL STARs occurs between waypoints EA436 and EA435. The proposed altitudes between these waypoints vertically deconflict the procedures; the PRRIE profile below the JINGL profile.

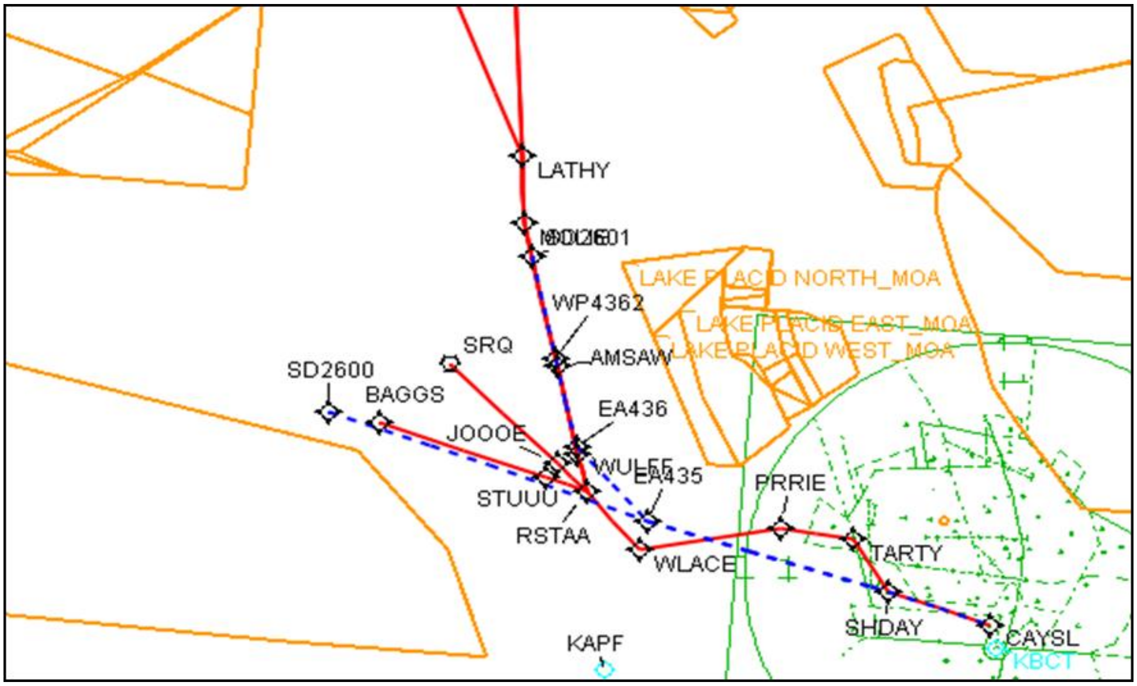


Figure 101. Current and Proposed BCT PRRIE STAR

- Benefits
  - This procedure was not modeled due to the limited number of jet arrivals to BCT.

4.5.1.6 BCT CAYSL Arrival

- Issues
  - There are inefficient vertical profiles and lateral paths on the existing procedure.
  - Current flight tracks do not overfly the existing procedure.
  - The current northeast inland STARs serving PBI, FLL, and MIA all commence over OMN causing congestion.
- Solutions
  - The CAYSL inland route is shared with the proposed FRWAY STAR and New PBI NE STAR.
  - This route was shifted west and a new waypoint, SA064, southwest of STOOP will be the arrival entry route with runway transitions commencing at SA544. The transitions of the proposed CAYSL STAR merge at waypoint SA064.
  - Runway transitions were incorporated into this design.
  - The HILEY, CAYSL and FISEL STARs are now laterally segregated in the vicinity of OMN through the use of separate en route transitions.

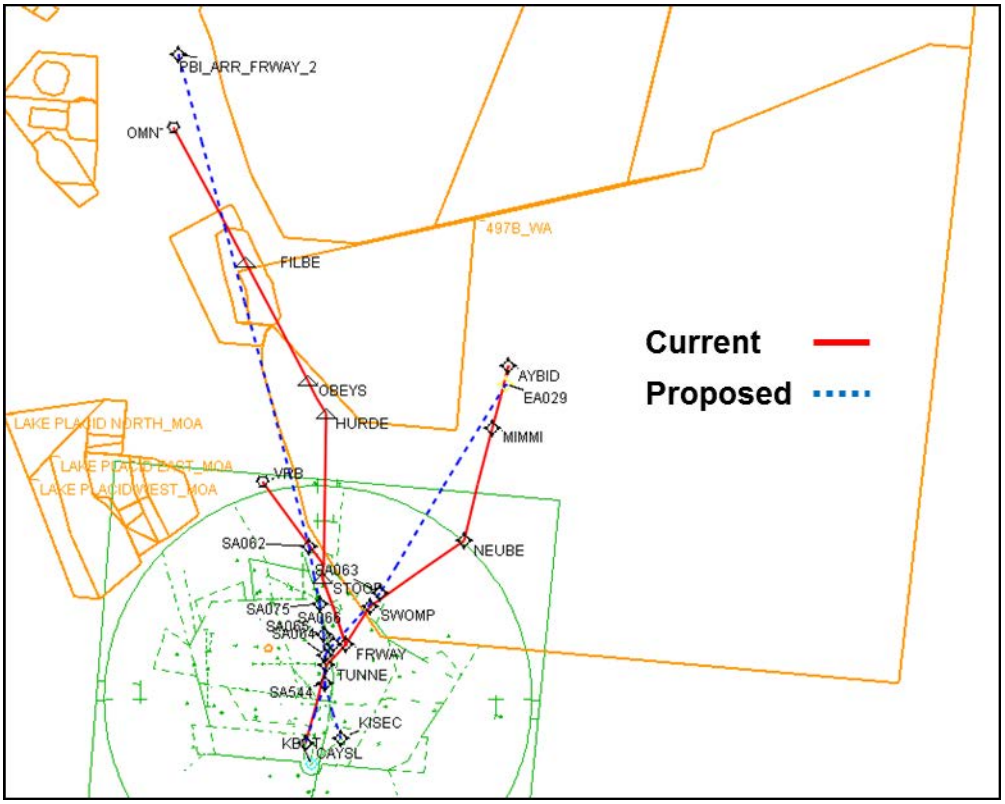


Figure 102. Current and Proposed BCT CAYSL STAR

- Notes
  - o Deconfliction for this procedure can be vertically established from the FLL FISEL. Recommended windows/altitudes are anticipated to be finalized to accomplish this in D&I.
- Benefits
  - o This procedure was not modeled due to the limited number of jet arrivals to BCT.

4.5.1.7 SUA New North Arrival

- Issues
  - o There is currently no RNAV arrival procedure for SUA.
- Solutions
  - o A North RNAV STAR was designed for SUA.
  - o The proposed RNAV STAR begins at SUA01 and terminates at SA551.
  - o This procedure is segregated laterally from the proposed FRWAY STAR.

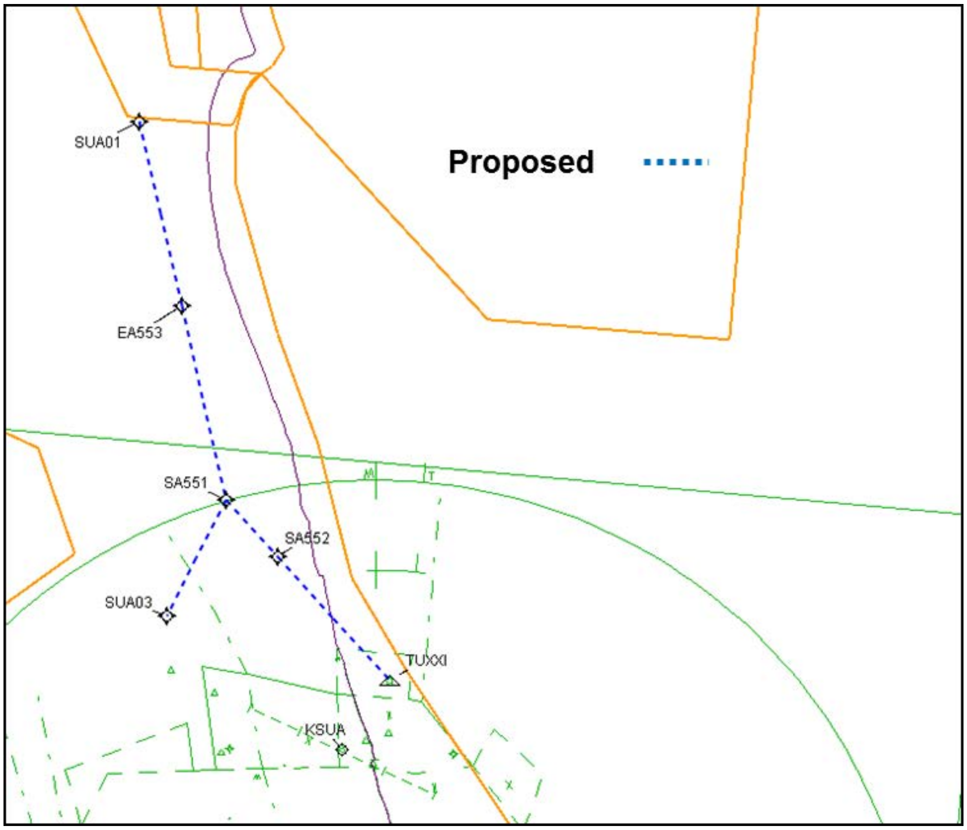


Figure 103. Current Procedure and Proposed SUA New North STAR

- Notes
  - During the OST process, the PBI TRACON and stakeholder community requested development of PBN procedures serving SUA. Recommended windows/altitudes for this procedure are anticipated to be finalized in D&I.
- Benefits
  - This procedure was not modeled due to the limited number of jet arrivals to SUA.

4.5.2 PBI and BCT Departures

This section describes the operational issues, recommendations, and derived benefits the OST has identified for departures from PBI and BCT.

A significant issue for PBI is that PBI departures to the east and northeast must often be held down below FLL arrivals. In addition, PBI departures conflict with SUA arrivals. Also, PBI departures filed to the west and northwest experience delays are sequenced with PBI TBIRD departures, often causing delays.

No issues were identified with the BUFIT, LMORE, or MIXAE SIDs, and no proposed changes were identified by the OST. These three procedures account for approximately 14% of all PBI jet departures.

4.5.2.1 PBI TBIRD Departure

The PBI TBIRD SID currently accounts for approximately 62% of all PBI jet departures. Based on PDARS data, approximately 11% of all PBI jet departures currently utilizing the TBIRD SID are expected to use the New WNW SID.

- Issues
  - PBI departures filed over LAL are routed via the TBIRD SID which creates delays and minimizes departure flexibility.
- Solutions
  - A new westbound SID for traffic filed over LAL was designed in order to segregate departure sequencing.
  - The proposed TBIRD RNAV SID is deconflicted from PBI arrival procedures.
  - Runway transitions were laterally optimized.

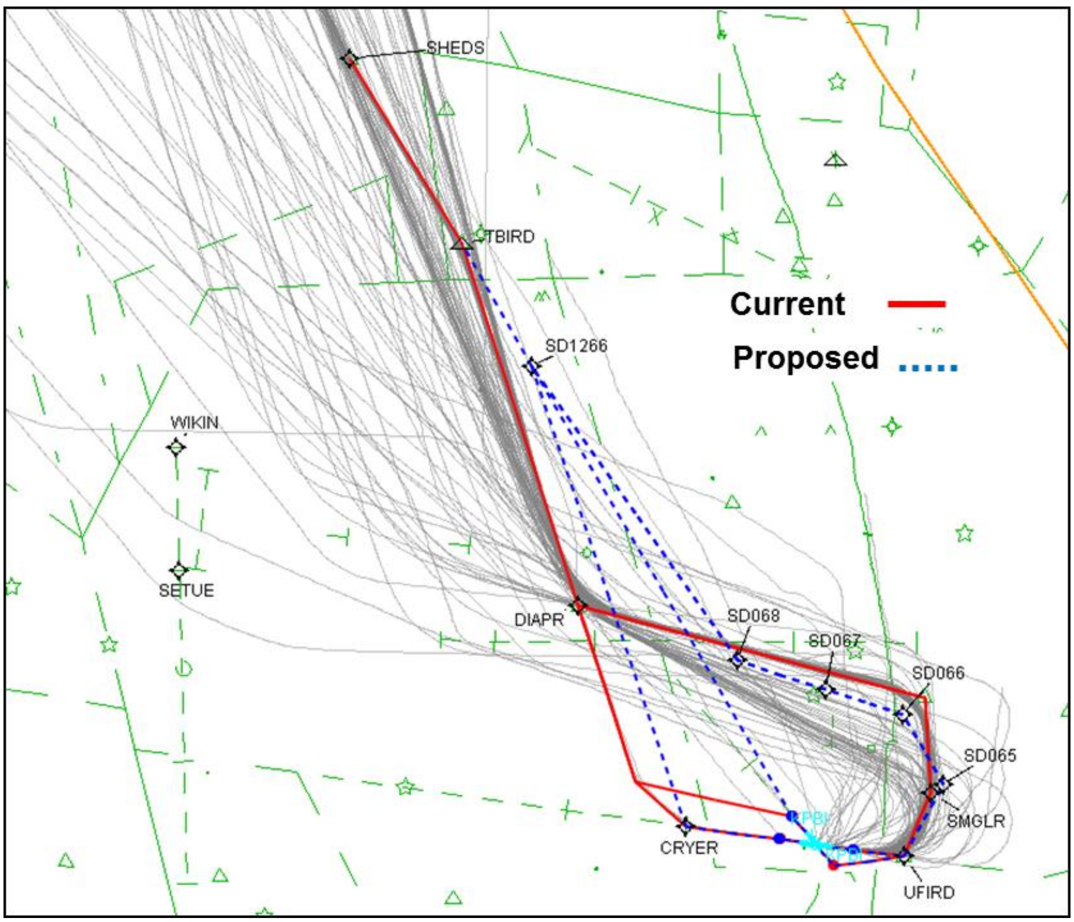


Figure 104. Current and Proposed PBI TBIRD SID

- Notes
  - The proposed TBIRD SID terminates at TBIRD.

- Benefits
    - Projected annual savings for the PBI TBIRD SID are estimated in Table 35.

Table 35. Proposed PBI TBIRD SID Annual Benefits

PBI TBIRD SID		Low	High
Estimated Annual Fuel Savings *	Distance	$40K	
	Profile	N/A	N/A
	Cost to Carry (Distance and Profile)	N/A	N/A
	Cost To Carry (Filed Mileage Savings)	$20K	
Total Estimated Annual Fuel Savings (Gallons)		20K	20K
Total Estimated Annual Carbon Savings (Metric Tons)		0.2K	0.2K
Total Estimated Annual Fuel Savings (Dollars) *		$60K	$60K

** Based on a fuel cost of $3 per gallon*

4.5.2.2 PBI New West/Northwest Departure

The PBI New West/Northwest SID will likely account for approximately11% of all PBI jet departures.

- Issues
    - PBI departures filed over LAL are routed via the TBIRD SID which creates delays and minimizes departure flexibility.
- Solutions
    - A new West/Northwest SID for traffic filed over LAL was designed in order to segregate departure sequencing.
    - The proposed West/Northwest RNAV SID is deconflicted from PBI arrival procedures.
    - Runway transitions were laterally optimized.
    - The West/Northwest SID terminates at WP1344.

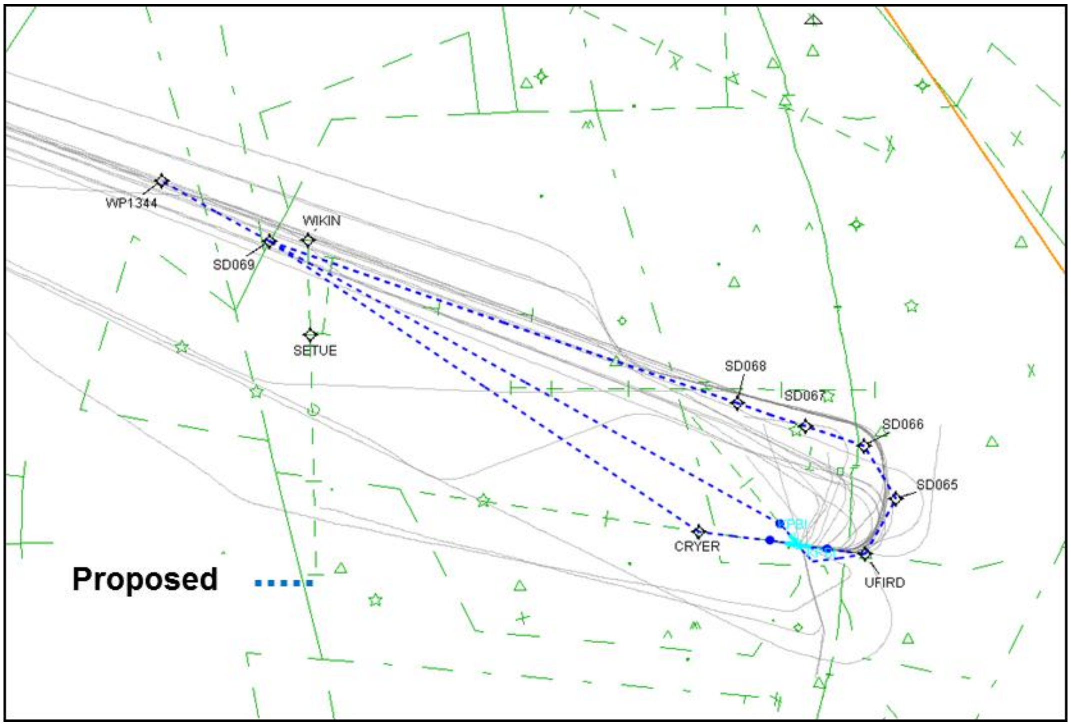


Figure 105. Proposed PBI New West/Northwest SID

- Benefits
  - This procedure was not modeled due to limited anticipated profile/distance benefits.

4.5.2.3 PBI IVNKA Departure

The PBI IVNKA SID accounts for approximately 24% of all PBI jet departures.

- Issues
  - PBI departures are forced to level off due to the location of FLL FISEL arrival traffic.
- Solutions
  - The proposed IVNKA RNAV SID is deconflicted from PBI arrival procedures.
  - Moving the lateral profile of the proposed FISEL west, mitigates level-offs.
  - Lateral paths were optimized to reduce flight track miles.
  - The IVNKA SID terminates at SD1244.

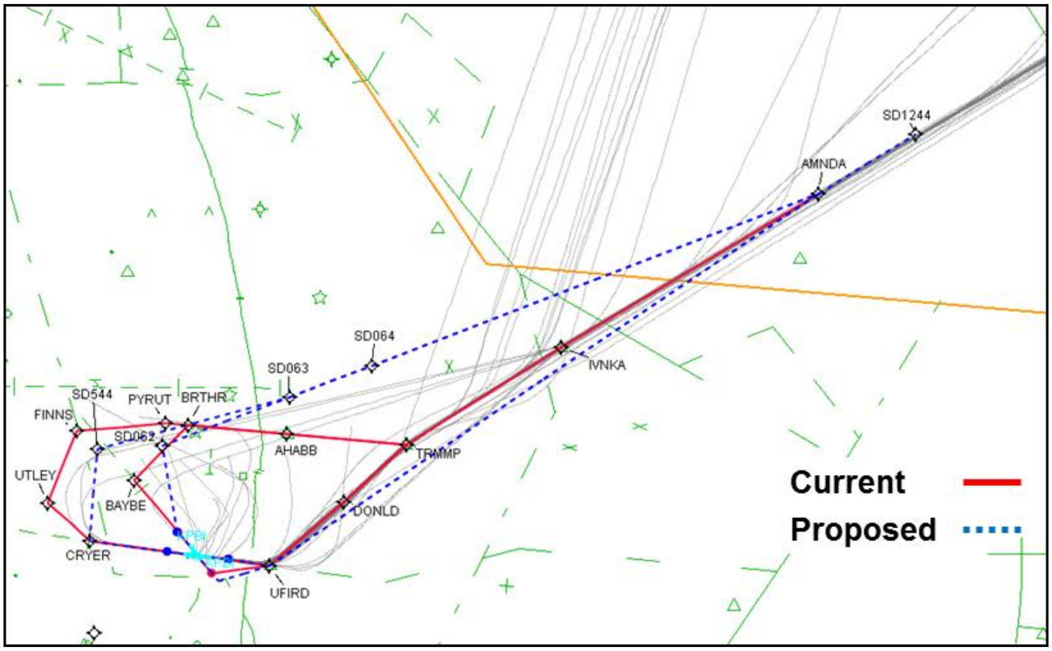


Figure 106. Current and Proposed PBI IVNKA SID

- Notes
  - The OST recognizes that there may be benefits gained by terminating the procedure abeam AMNDA in order to allow for enhanced en route/operator routing flexibility and shortened filed track miles.
- Benefits
  - This procedure was not modeled due to limited anticipated profile/distance benefits.

4.5.2.4 BCT New Northeast Departure

- Issues
  - BCT departure traffic share many routes with PBI departure traffic creating dependencies and delays.
- Solutions
  - A BCT New Northeast SID was created to mitigate the BCT/PBI dependencies.

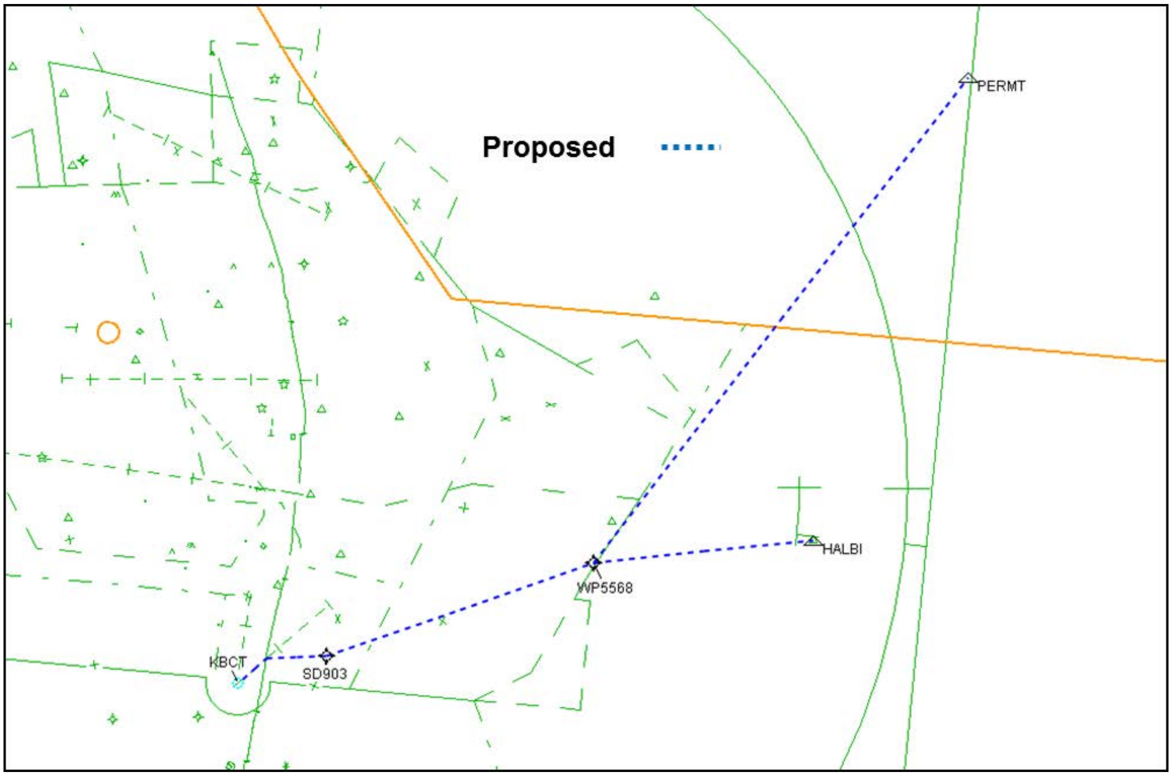


Figure 107. Proposed BCT New Northeast SID

- Notes
  - The OST recognizes the complexity of the competing traffic flows that this proposed SID traverses. Runway transitions will need to be further evaluated in D&I.
- Benefits
  - This procedure was not modeled due to the limited number of jet departures from BCT.

4.5.3 PBI T-Route

- Issues
  - There is currently no PBN procedure for east/west transition traffic through PBI TRACON airspace.
- Solutions
  - A T-Route was designed to facilitate predictable throughput in PBI TRACON airspace.
  - This T-Route was designed just north of MIA TRACON airspace from waypoint TR6, just east of GILBI intersection, to waypoint TR7 which is 12 miles off the coast of FL abeam the FISEL intersection.

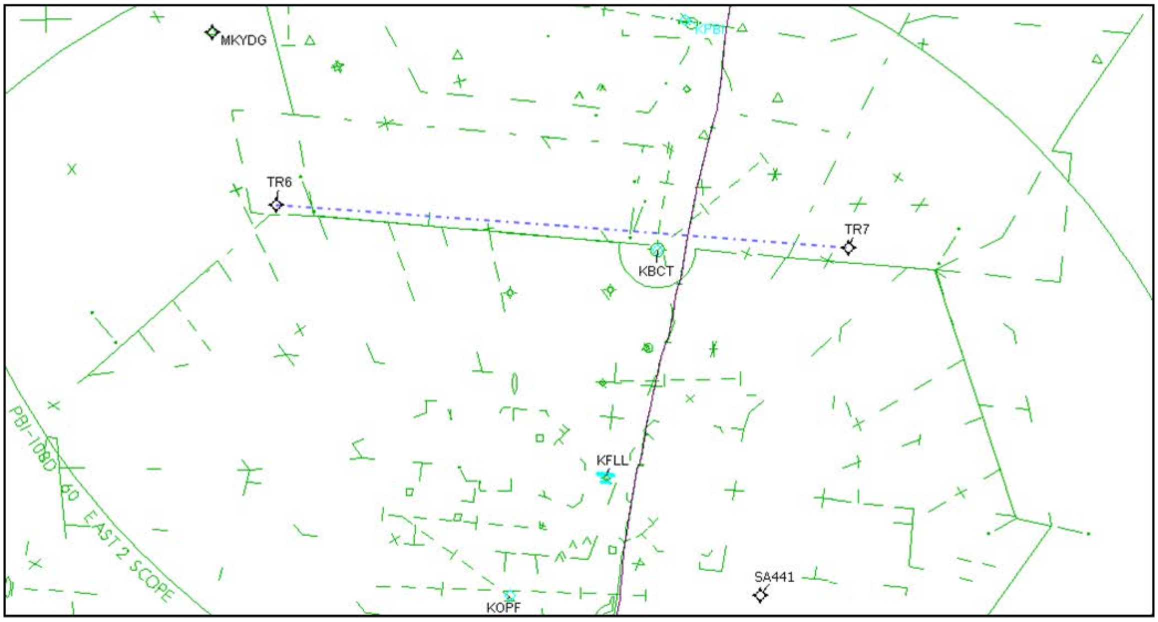


Figure 108. Proposed PBI T-Route

- Benefits
  - This procedure was not modeled due to undetermined loading.

4.5.4 Summary of Potential Benefits for PBI

As shown in Table 36 below, the proposed PBI STARs and SIDs are estimated to provide between \$1.95 million and \$3.99 million annually in fuel savings.

Table 36. Total Annual Fuel Burn Benefits for PBI

		PBI	
		Low	High
Estimated Annual Fuel Savings *	Distance	$683K	
	Profile	$660K	$2.52M
	Cost to Carry (Distance and Profile)	$138K	$318K
	Cost To Carry (Filed Mileage Savings)	$480K	
Total Estimated Annual Fuel Savings (Gallons)		649.3K	1.32M
Total Estimated Annual Carbon Savings (Metric Tons)		6.9K	13.6K
Total Estimated Annual Fuel Savings (Dollars) *		$1.95M	$3.99M

** Based on a fuel cost of $3 per gallon*

4.6 RSW, APF, and MKY Procedures

RSW is the primary airport within RSW TRACON airspace with 228 daily operations on average in 2011 with 89% being either air carrier or air taxi flights. APF and MKY are satellite airports within RSW TRACON airspace. RSW TRACON airspace is from the surface to 10,000 feet mean sea level (MSL). ZMA airspace overlies and surrounds RSW TRACON airspace in all directions except TPA TRACON airspace is adjacent to RSW TRACON airspace to the northwest.

4.6.1 RSW, APF, and MKY Arrivals

This section describes the operational issues, solutions, and expected benefits the OST has identified for arrivals to RSW, APF, and MKY.

No issues were identified with arrival procedures from the east and no proposed changes were identified by the OST. Jets arriving from the east account for approximately 4% of all RSW jet arrivals.

4.6.1.1 RSW SHFTY Arrival

The RSW SHFTY STAR accounts for approximately 52% of all RSW jet arrivals.

- Issues
  - The location of the WRTRS intersection in relation to the Lake Placid MOA does not provide adequate sequencing space.
  - The SHFTY STAR does not have runway transitions.
- Solutions
  - A new waypoint (CA406) was added west of the current WRTRS intersection to ensure Lake Placid MOA separation.
  - A RSW north downwind was proposed.
  - This STAR serves RSW and FMY only.
  - A separate STAR was designed to serve APF and MKY.
  - The length of this proposed STAR was shortened to increase flexibility.

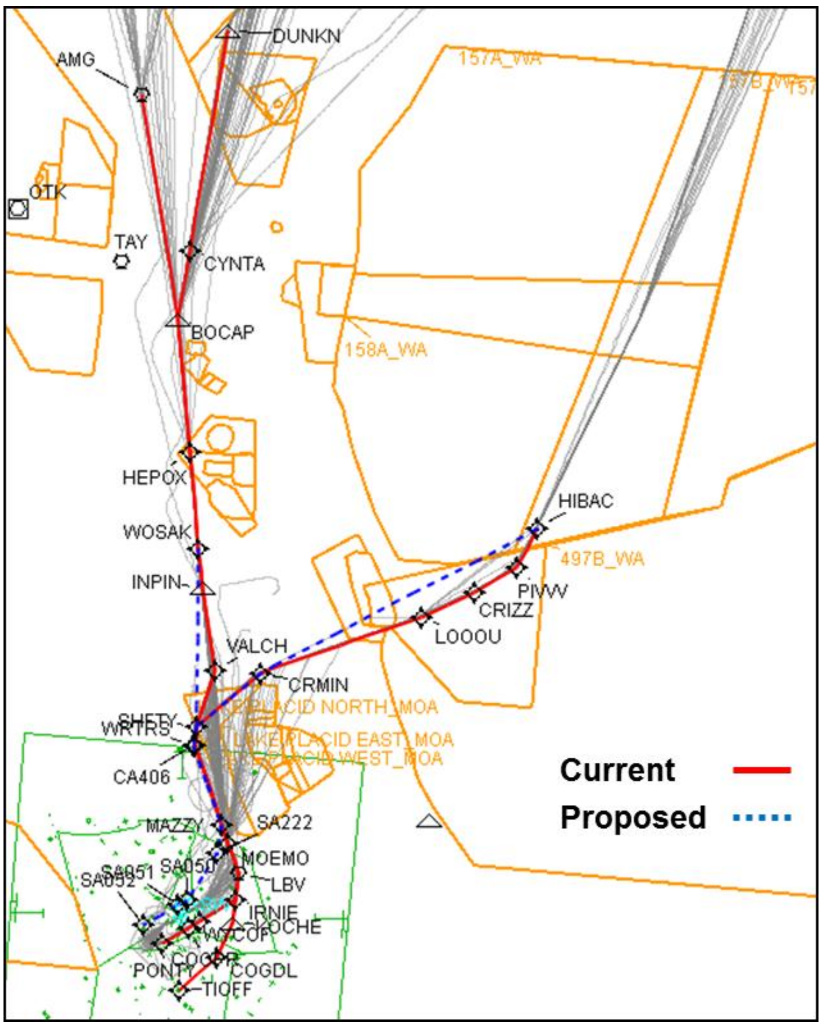


Figure 109. Current and Proposed RSW SHFTY STAR

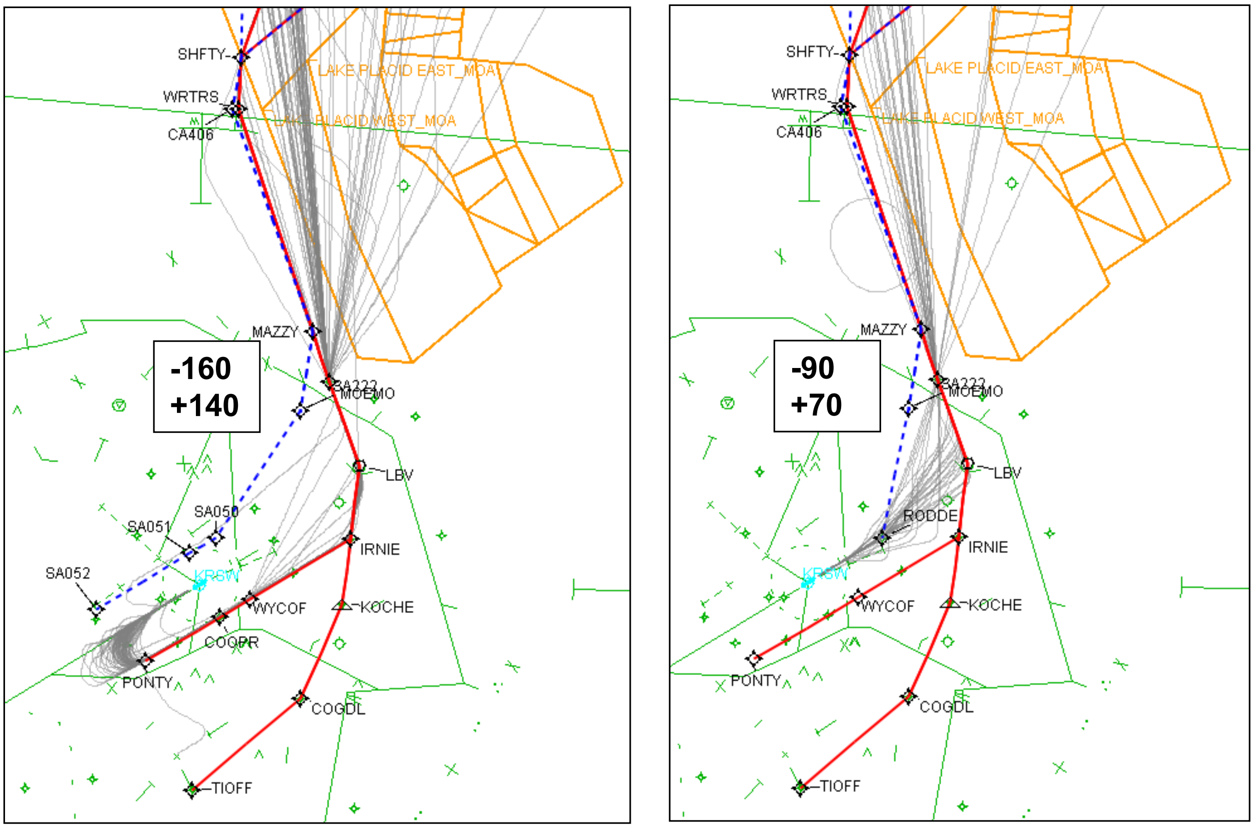


Figure 110. Current and Proposed RSW SHFTY STAR: Runway Transitions

- Notes
  - The proposed procedure accommodates the flexibility for the D&I Team to develop a north and/or south downwind on a northeast operation.

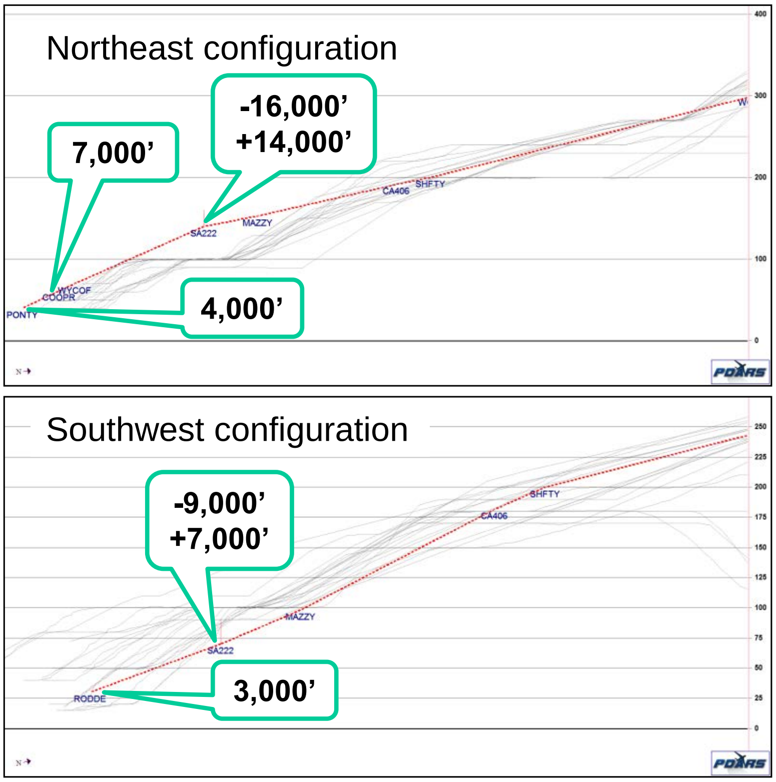


Figure 111. Proposed RSW SHFTY STAR: Current Vertical Profile of Flight Tracks and Nominal Proposed Vertical Profile

- Benefits
  - Projected annual savings for the RSW SHFTY STAR are estimated in Table 37.

Table 37. Proposed RSW SHFTY STAR Annual Benefits

RSW SHFTY STAR		Low	High
Estimated Annual Fuel Savings *	Distance	$390K	
	Profile	$1.01M	$3M
	Cost to Carry (Distance and Profile)	$140K	$340K
	Cost To Carry (Filed Mileage Savings)	$90K	
Total Estimated Annual Fuel Savings (Gallons)		541K	1.27M
Total Estimated Annual Carbon Savings (Metric Tons)		5.6K	13.2K
Total Estimated Annual Fuel Savings (Dollars) *		$1.62M	$3.82M

** Based on a fuel cost of $3 per gallon*

4.6.1.2 RSW TYNEE Arrival

The RSW TYNEE STAR accounts for approximately 44% of all RSW jet arrivals.

- Issues
  - There are inefficient vertical profiles and lateral paths on the existing procedure.
  - Current flight tracks do not overfly the existing procedure.
  - RSW STARs do not have runway transitions.
- Solutions
  - The proposed STAR is significantly shorter than the current STAR to increase flexibility.
  - The TYNEE STAR today is mainly a two-pronged route that accommodates most tracks inside of EGAME from the north and JOSFF from the west. The proposed TYNEE transitions begin at a waypoint north of EGAME and at a waypoint west of BAGGS.
  - A north downwind option for RSW was designed. Runway transitions have been added at the TYNEE intersection to support northeast and southwest configuration.

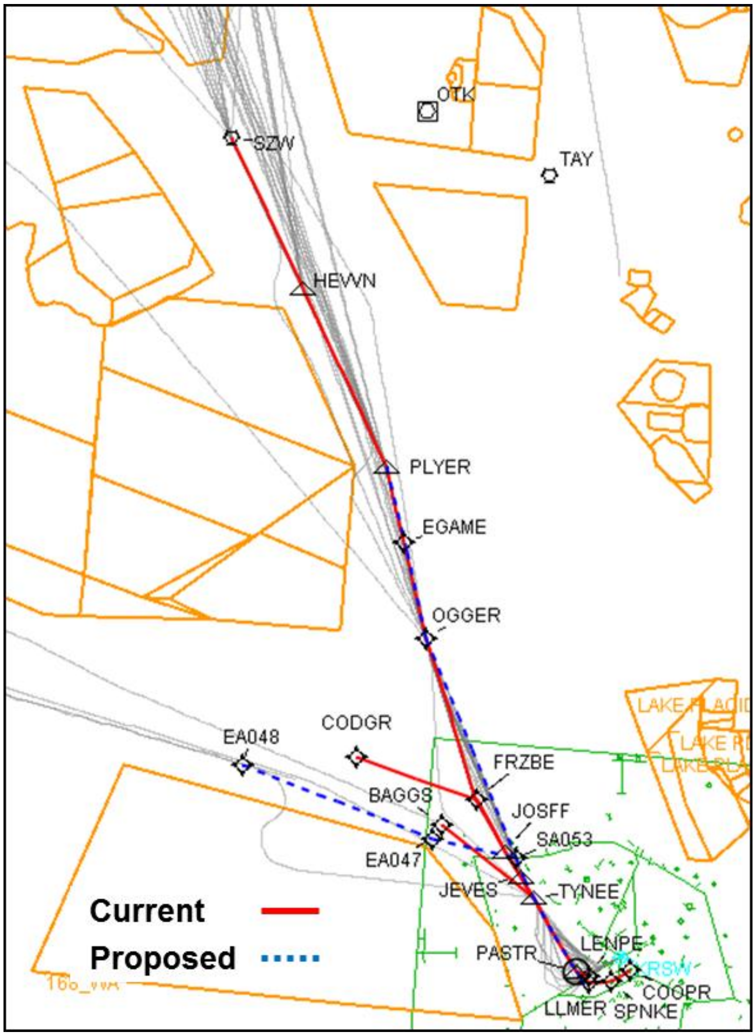


Figure 112. Current and Proposed RSW TYNEE STAR

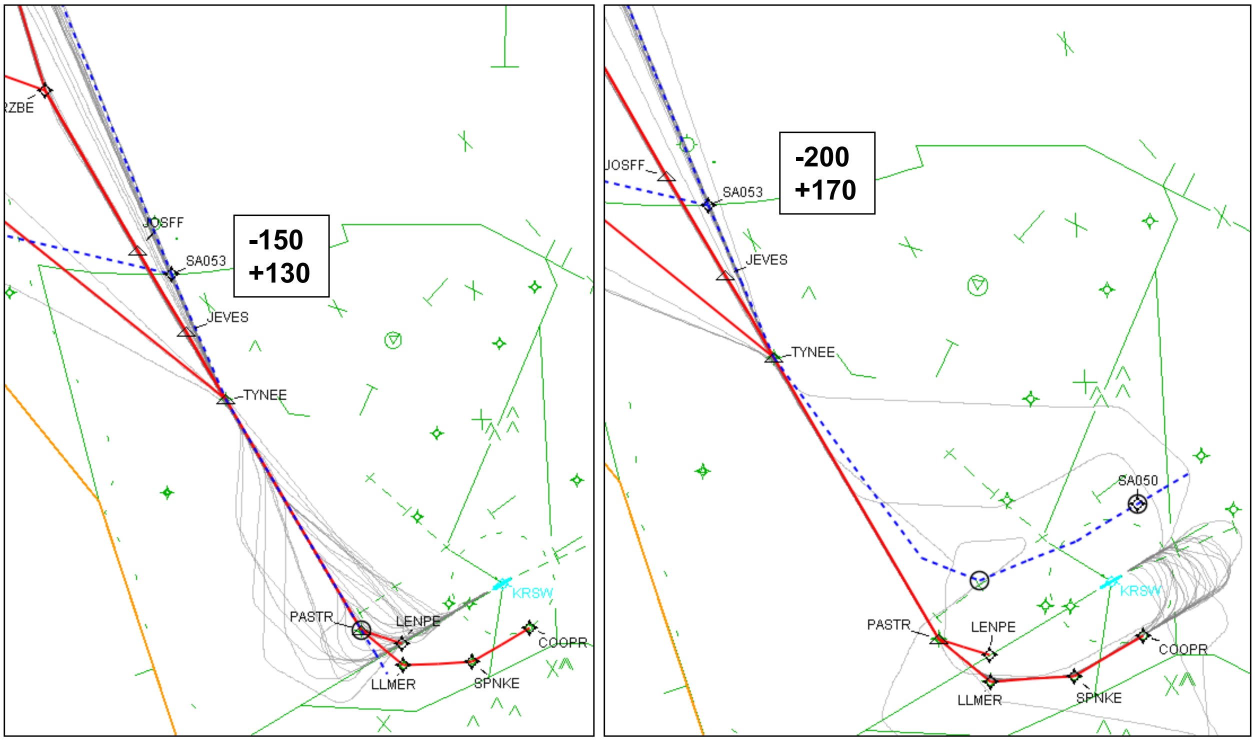


Figure 113. Current and Proposed RSW TYNEE STAR: Runway Transitions

- Notes
    - This procedure is not deconflicted from the PIKKR in the en route environment but is expected to be through the development of vertical profiles.

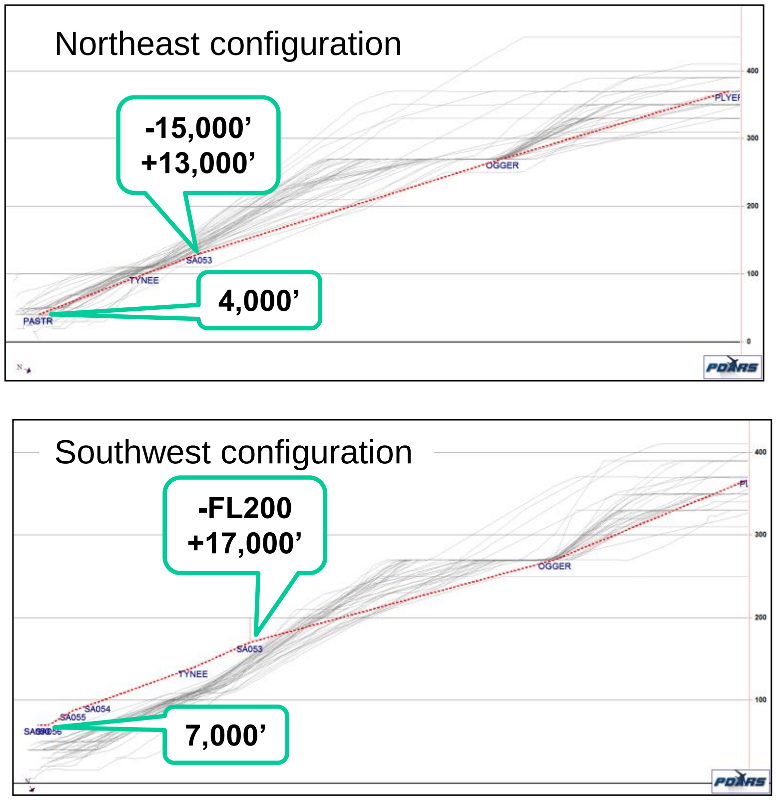


Figure 114. Proposed RSW TYNEE STAR: Current Vertical Profile of Flight Tracks and Nominal Proposed Vertical Profile

- Benefits
    - Projected annual savings for the RSW TYNEE STAR are estimated in Table 38.

Table 38. Proposed RSW TYNEE Annual Benefits

RSW TYNEE STAR		Low	High
Estimated Annual Fuel Savings *	Distance	$90K	
	Profile	$80K	$230K
	Cost to Carry (Distance and Profile)	$20K	$30K
	Cost To Carry (Filed Mileage Savings)	$10K	
Total Estimated Annual Fuel Savings (Gallons)		65K	120K
Total Estimated Annual Carbon Savings (Metric Tons)		0.7K	1.2K
Total Estimated Annual Fuel Savings (Dollars) *		$190K	$360K

** Based on a fuel cost of $3 per gallon*

4.6.1.3 APF and MKY SHFTY Arrival

- Issues
  - The location of the WRTRS intersection in relation to the Lake Placid MOA does not provide adequate sequencing space.
- Solutions
  - A new waypoint (CA406) was added west of the current WRTRS intersection to ensure Lake Placid MOA separation.
  - This STAR serves APF and MKY only. This will be a separate STAR from the current and proposed RSW procedures to allow for more efficient altitudes and routes in order to better accommodate these airports.
  - The length of this proposed STAR was shortened inside of the MAZZY intersection to increase flexibility.
  - This arrival mirrors the proposed RSW SHFTY STAR to MAZZY. This STAR then continues south to MOEMO and then proceeds southbound to accommodate the APF and MKY airports.
  - Airport transitions were designed to allow for separate termination points to APF and MKY. In response to input, the airport transitions on this STAR were terminated without runway transitions to allow for maximum flexibility.

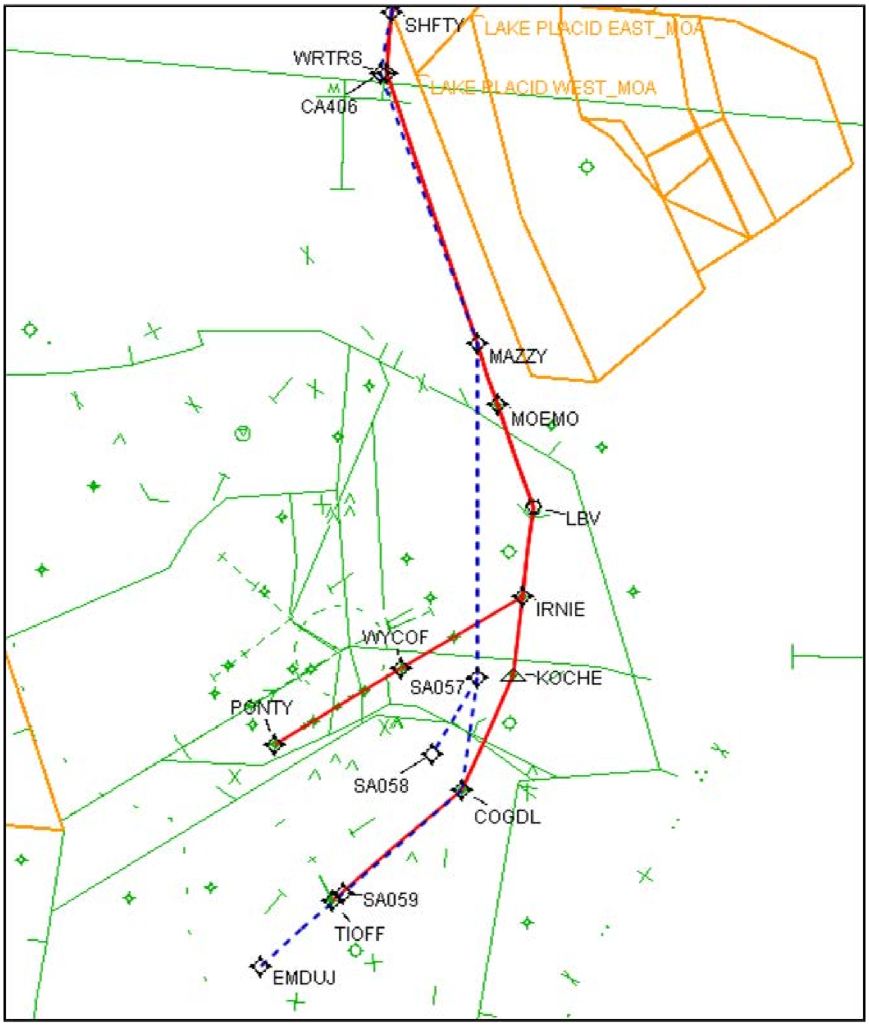


Figure 115. Current and Proposed APF and MKY SHFTY STAR

- Benefits
  - This procedure was not modeled due to the limited number of jet arrivals to APF and MKY.

4.6.1.4 APF and MKY PIKKR Arrival

- Issues
  - There are inefficient vertical profiles and lateral paths on the existing procedure.
  - Current flight tracks do not overfly the existing procedure.

- Solutions
    - This arrival has been shifted east to accommodate a new APF/MKY west SID.
    - The PIKKR STAR today is a two-pronged route that accommodates most tracks inside of HILTI from the north and CODGR from the west. The proposed PIKKR transitions begin at PLYER and at waypoint EA048 west of BAGGS.
    - A single termination transition was designed to allow for maximum flexibility.
    - The proposed STAR is significantly shorter than the current STAR to increase flexibility.
    - This proposal mimics current flight tracks and allows for a greater probability of OPD clearances into APF/MKY.

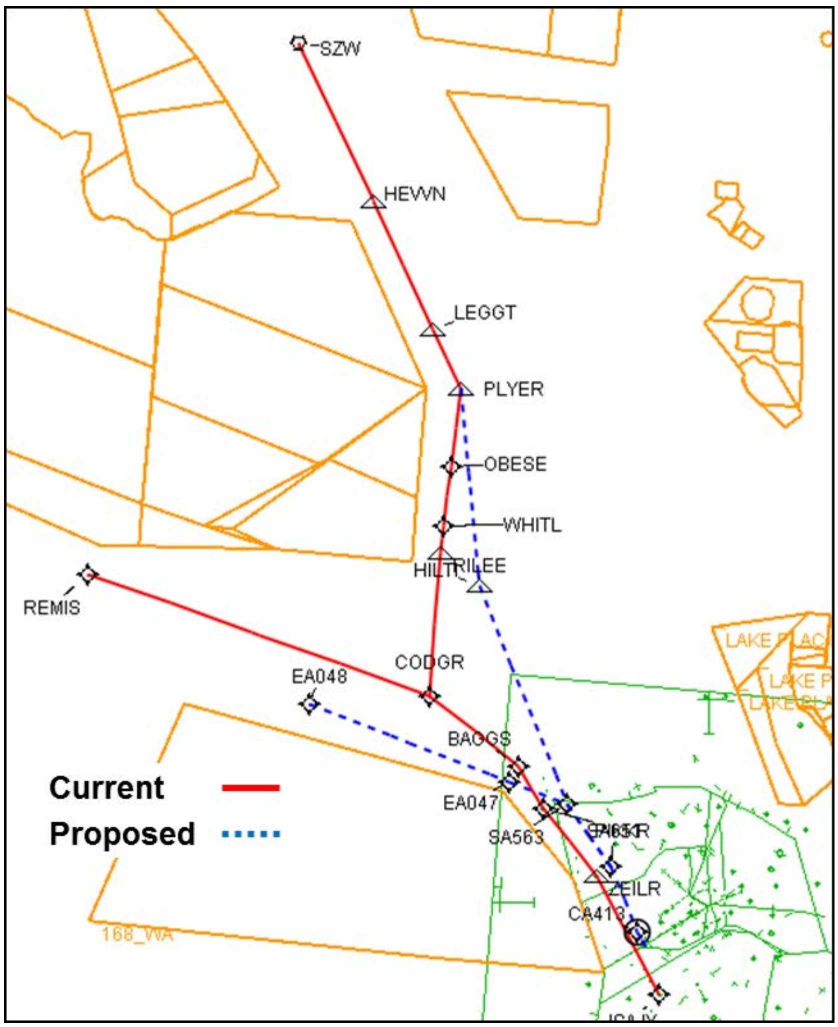


Figure 116. Current and Proposed APF and MKY PIKKR STAR

- Notes
  - This procedure is not deconflicted from the TYNEE in the en route environment, but it can be through the development of vertical profiles.
- Benefits
  - This procedure was not modeled due to the limited number of jet arrivals to APF and MKY.

4.6.2 RSW, APF, and MKY Departures

This section describes the operational issues, recommendations, and derived benefits the OST has identified for RSW, APF, and MKY departures.

A significant issue for RSW is the convergence of RSW, APF, and MKY departure traffic utilizing the same SID. Excessive reroutes are also necessary with Lake Placid SUA is active.

No issues were identified with departures procedures to the east, south, or west and no proposed changes were identified by the OST. These departures account for approximately 11% of all RSW jet departures.

4.6.2.1 RSW CSHEL Departure

The RSW CSHEL SID accounts for approximately 89% of all RSW jet departures.

- Issues
  - RSW departures are not procedurally deconflicted from FMY traffic.
- Solutions
  - Lateral paths were optimized. Mileage gains were realized by reducing the length of the procedure in the vicinity of CSHEL.
  - Procedural deconfliction with FMY traffic was achieved through the incorporation of at or above 4,000 feet at SD057.
  - This procedure will also serve APF, MKY, and FMY.

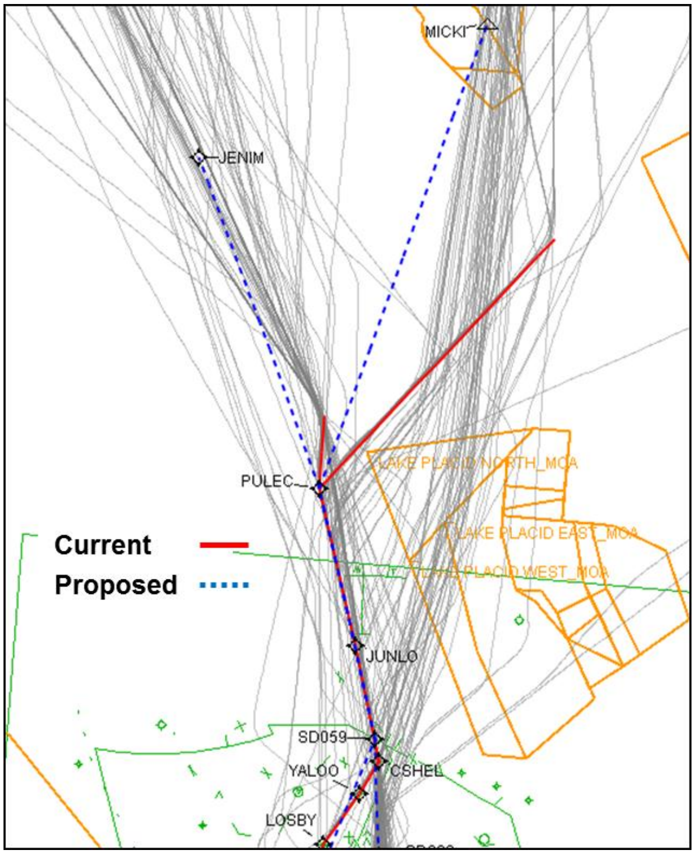


Figure 117. Current and Proposed RSW CSHEL SID

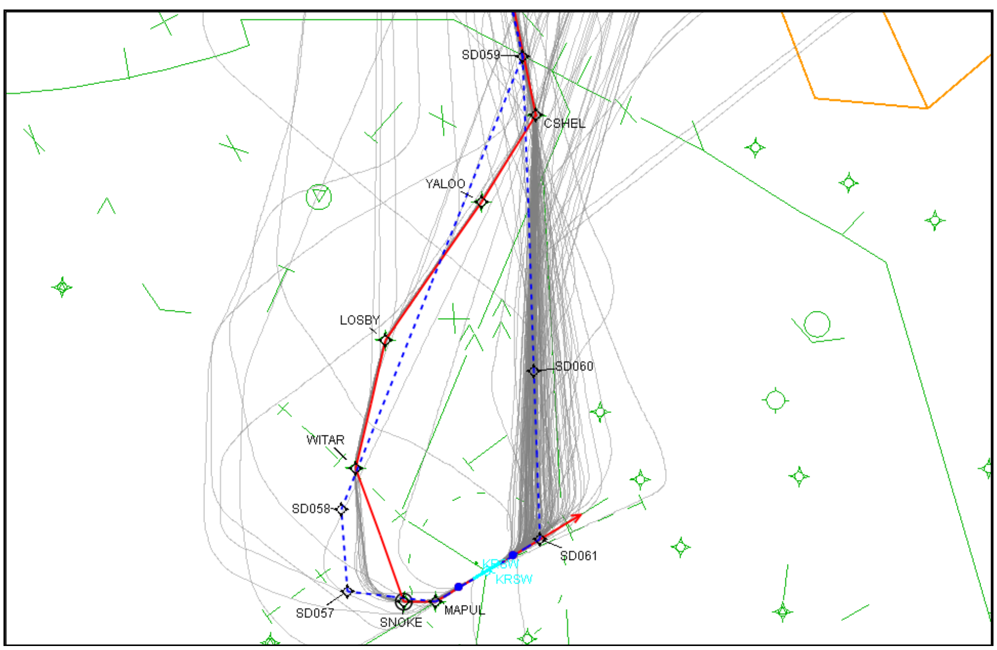


Figure 118. Current and Proposed RSW CSHEL SID: Runway Transitions

- Notes
    - The flight tracks observed from the PULEC intersection southbound indicate that there was very little leeway in lateral optimization as the tracks tightly follow the procedure. This was largely due to airspace constraints introduced by the Lake Placid MOA and the interactions with the SHFTY STAR and the complexity of transitional traffic north of RSW.
- Benefits
    - Projected annual savings for the RSW CSHEL SID are estimated in Table 39.

Table 39. Proposed RSW CSHEL SID Annual Benefits

RSW CSHEL SID		Low	High
Estimated Annual Fuel Savings *	Distance	-$140K	
	Profile	N/A	N/A
	Cost to Carry (Distance and Profile)	-$10K	-$10K
	Cost To Carry (Filed Mileage Savings)	$10K	
Total Estimated Annual Fuel Savings (Gallons)		-49K	-49K
Total Estimated Annual Carbon Savings (Metric Tons)		-0.5K	-0.5K
Total Estimated Annual Fuel Savings (Dollars) *		-$150K	-$150K

** Based on a fuel cost of $3 per gallon*

4.6.2.2 APF and MKY New Northwest Departure

- Issues
    - There is not a northwest departure procedure for APF/MKY.
- Solutions
    - A new RNAV departure procedure was designed west of the PIKKR STAR.

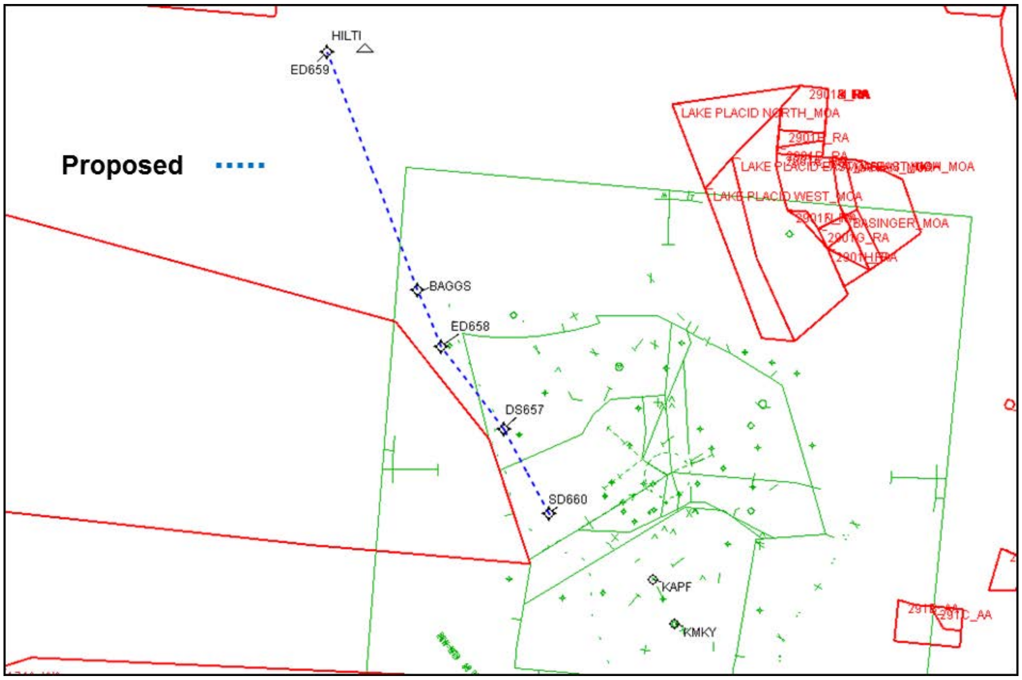


Figure 119. Current Procedure and Proposed APF and MKY New Northwest SID

- Notes
    - Due to the constraints of WA168 and the PIKKR STAR, the OST recognizes that the lateral profile of the TYNEE STAR may need to be moved one mile to the east to facilitate the development of this procedure.
- Benefits
    - This procedure was not modeled due to the limited number of jet departures to APF and MKY.

4.6.3 Summary of Potential Benefits for RSW

As shown in Table 40 below, the proposed RSW STARs and SIDs are estimated to provide between $1.67 million and $4.03 million annually in fuel savings.

Table 40. Total Annual Fuel Burn Benefits for RSW

		RSW	
		Low	High
Estimated Annual Fuel Savings *	Distance	$340	
	Profile	$1.08M	$3.23M
	Cost to Carry (Distance and Profile)	$146K	$360K
	Cost To Carry (Filed Mileage Savings)	$110K	
Total Estimated Annual Fuel Savings (Gallons)		557K	1.34M
Total Estimated Annual Carbon Savings (Metric Tons)		5.8K	13.9K
Total Estimated Annual Fuel Savings (Dollars) *		$1.67M	$4.03M

** Based on a fuel cost of $3 per gallon*

4.7 Other South/Central Florida Issues

4.7.1 HEDLY SID and ARKES SID Swap and THNDR SID

- Issue
    - The HEDLY/THNDR SIDs are not procedurally deconflicted which causes extensive level-offs on THNDR departures.
- Solutions
    - The HEDLY/ARKES SIDs were swapped in order to mitigate THNDR level-offs.
    - HEDLY/ARKES/THNDR SIDs were procedurally deconflicted.
    - The THNDR SID was laterally optimized.

At the OST's first outreach, a request was made by both ZMA and MIA TRACON to swap the MIA and FLL HEDLY/ARKES DTAs. The OST created a design incorporating this swap. The designed procedures were laterally optimized.

Figure 120, Figure 121, and Figure 122 are the original OST recommendations.

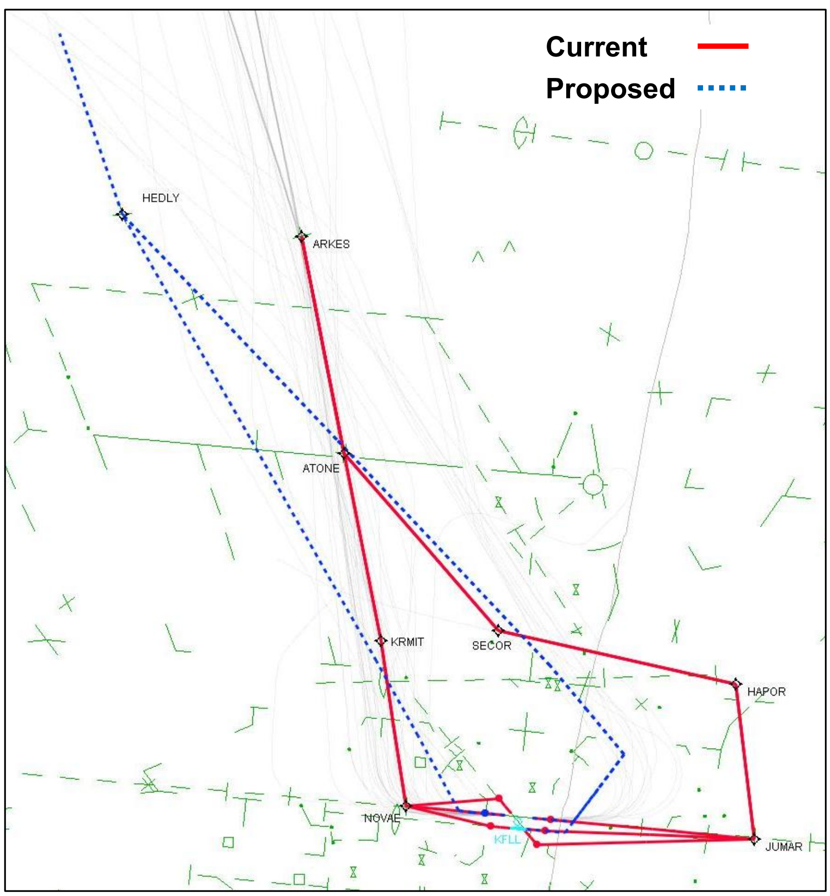


Figure 120. Current and Original OST Proposal FLL HEDLY SID

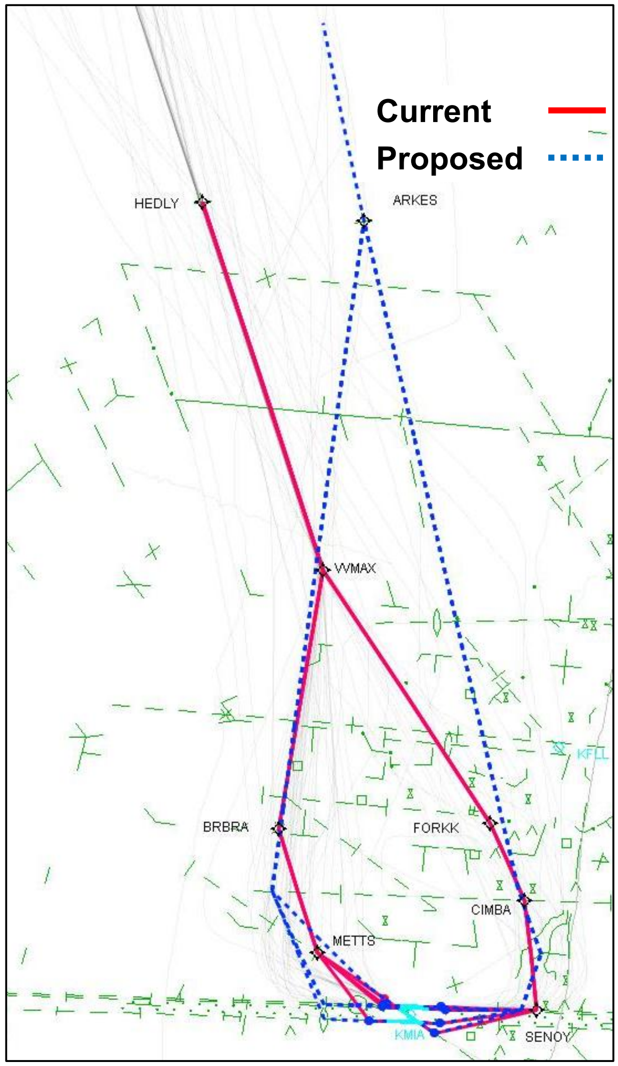


Figure 121. Current and Original OST Proposal MIA ARKES SID

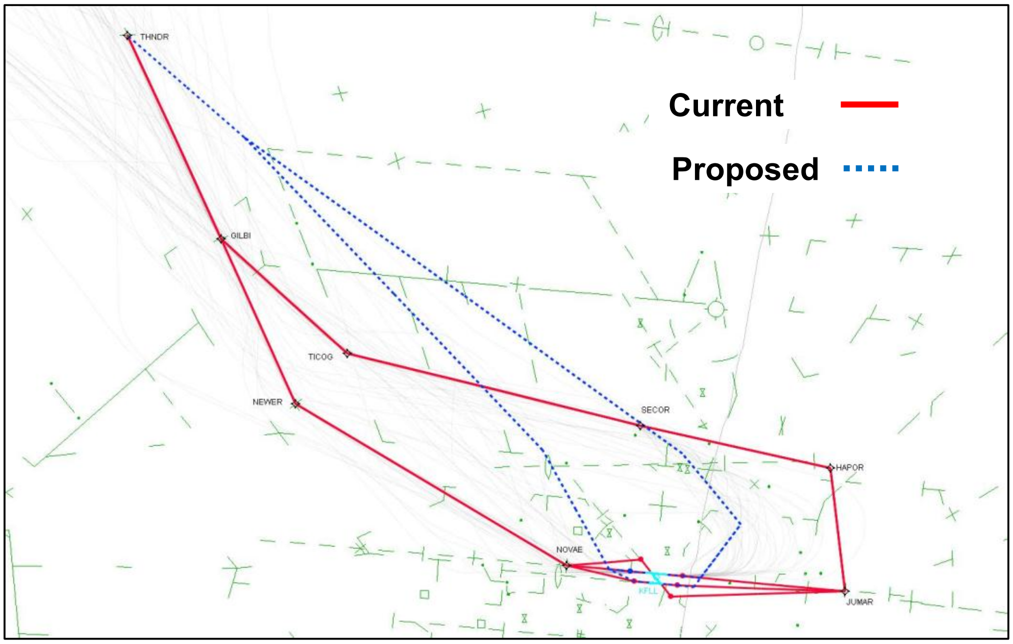


Figure 122. Current and Original OST Proposal FLL THNDR SID

During the Second Outreach, the facilities expressed concerns regarding the proposed design of these SIDs:

- Aircraft climb performance capabilities may not provide vertical deconfliction between the FLL HEDLY/THNDR SIDs and the MIA ARKES SID.
- The FLL THNDR DTA may be too close laterally to the FLL HEDLY DTA for aircraft entering the en route environment.
- The MIA ARKES SID on a west operation may be too close laterally to the FLL HEDLY SID.

The facilities requested that the OST explore a design alternative to the proposed procedures:

- Relocate the MIA ARKES east/west transitions to join at a waypoint in the vicinity of FXE.
- Relocate the FLL THNDR east transition to join the west transition in the vicinity of KRMIT.
- Relocate the FLL HEDLY east operation transition to join the west transition in the vicinity of KRMIT.

Figure 123, Figure 124, and Figure 125 show the current and facility-requested HEDLY, ARKES and THNDR procedures.

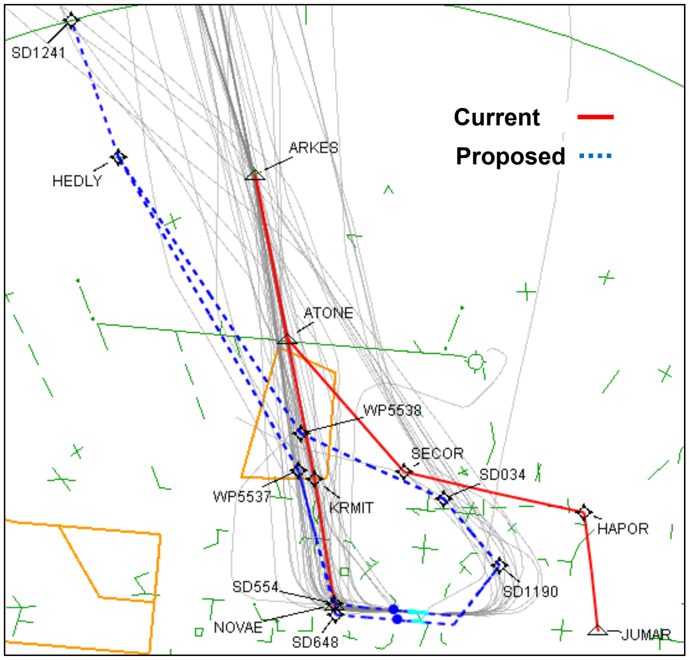


Figure 123. Current and Facility-Requested FLL HEDLY SID

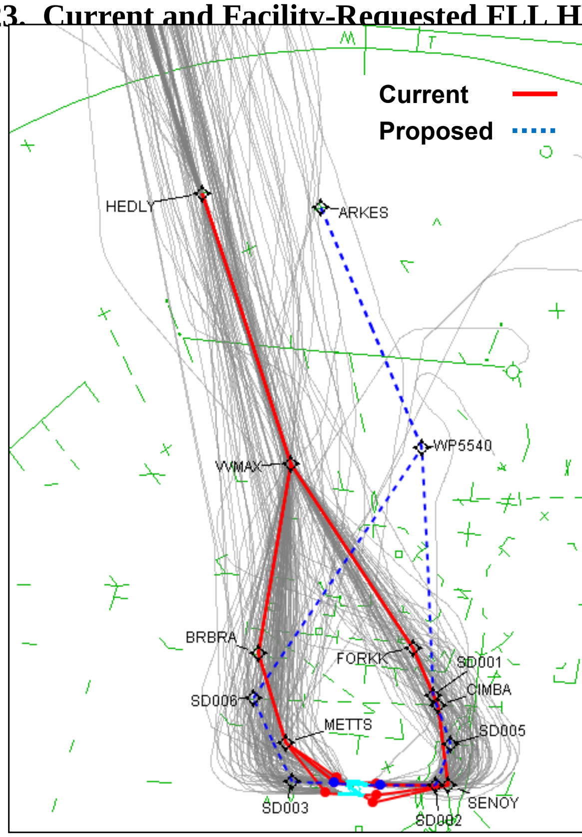


Figure 124. Current and Facility-Requested MIA ARKES SID

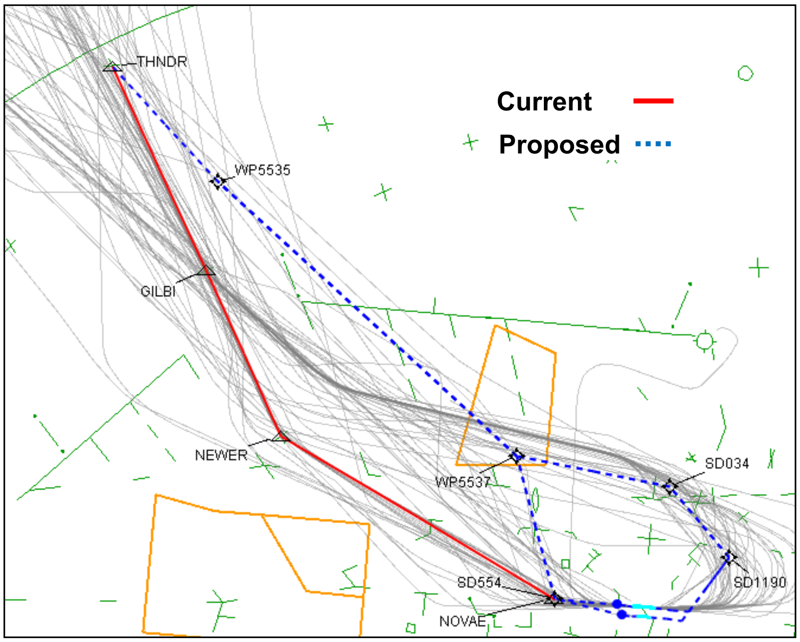


Figure 125. Current and Facility-Requested FLL THNDR SID

The OST incorporated the following modifications as a result of this input:

- Vertical profiles were added to procedurally deconflict the SIDs.
- A recommendation was made to modify the terminal airspace boundary between MIA TRACON, PBI TRACON and ZMA to resolve the lateral/vertical challenges associated with the design.

Figure 126, Figure 127, Figure 128, and Figure 129 show the OST designed procedures, as well as the possible airspace change that would accommodate them.

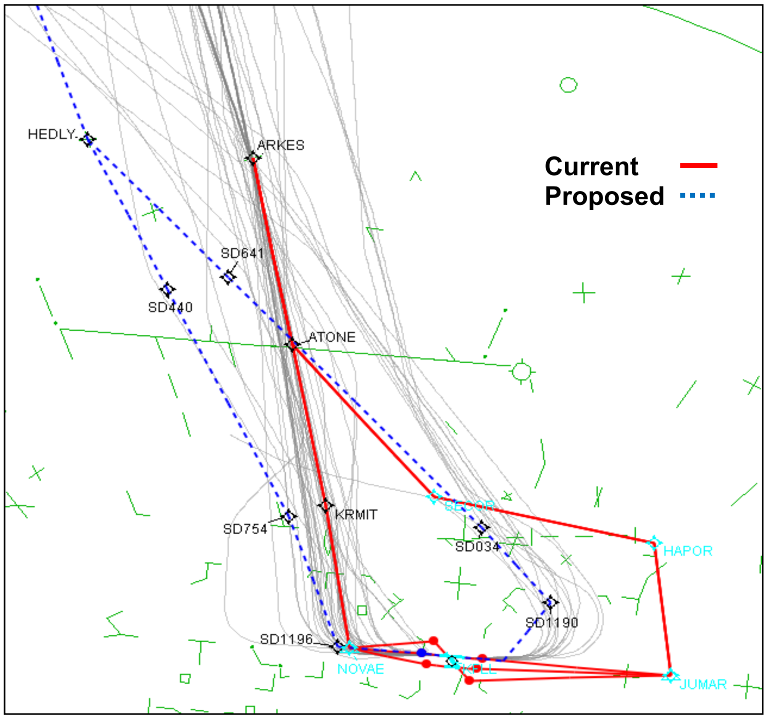


Figure 126. Current and OST-Designed FLL HEDLY SID

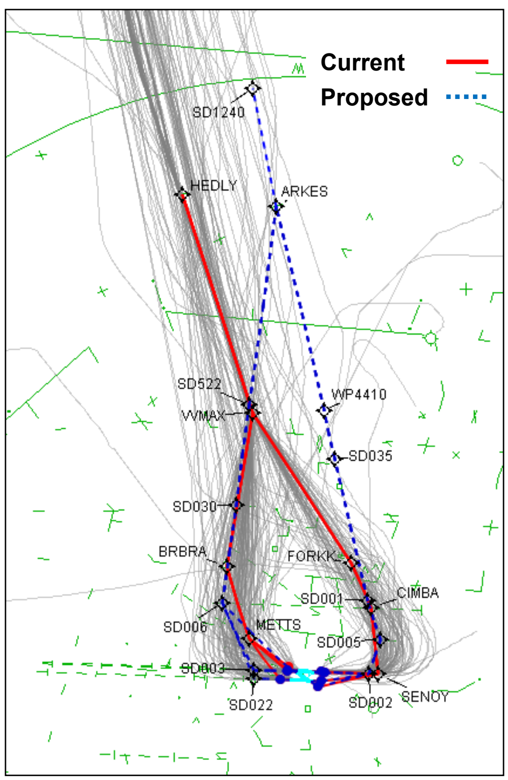


Figure 127. Current and OST-Designed MIA ARKES SID

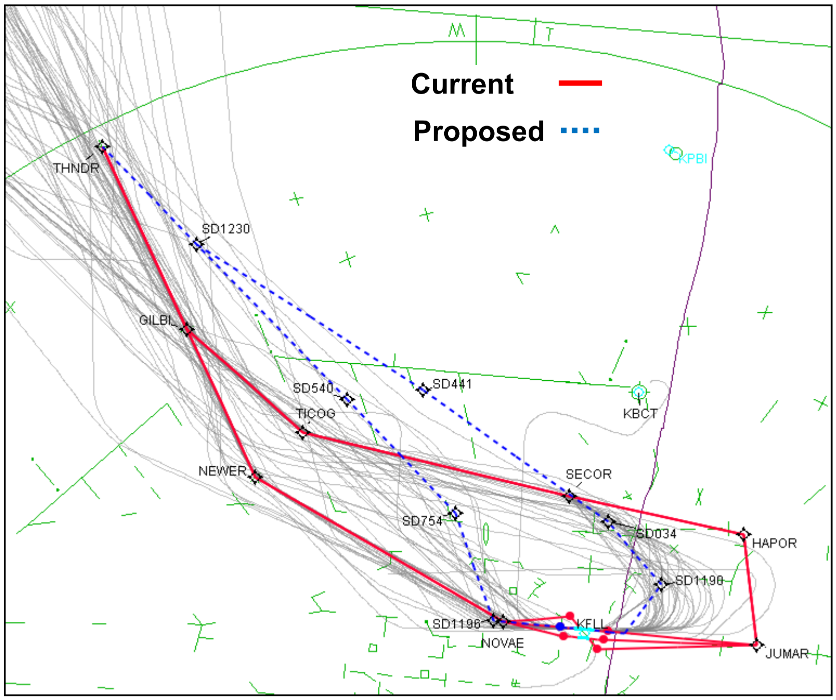


Figure 128. Current and OST-Designed FLL THNDR SID

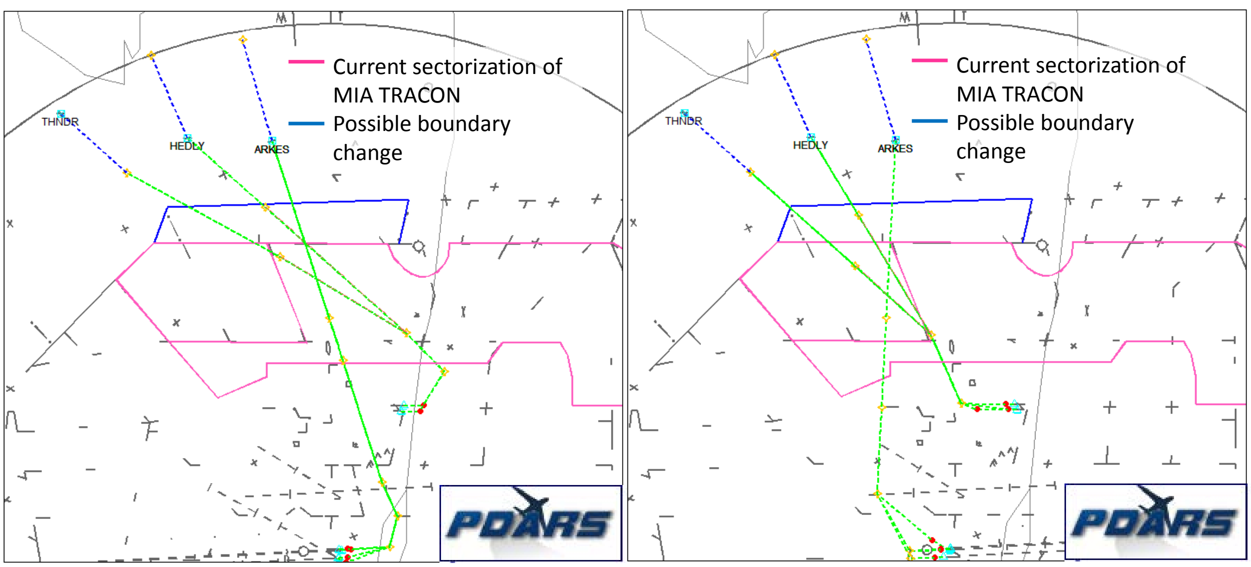


Figure 129. OST-Designed Procedures and Possible Airspace Design

Analysis was conducted on both options of each procedure. The tables below show the results:

Table 41. Total Annual Fuel Burn Benefits for Facility Requested MIA ARKES SID, FLL HEDLY SID, and FLL THNDR SID

		MIA ARKES SID Facility Requested		FLL HEDLY SID Facility Requested		FLL THNDR SID Facility Requested	
MIA New ARKES SID		Low	High	Low	High	Low	High
Estimated Annual Fuel Savings *	Distance	-$150K		-$30K		$140K	
	Profile	N/A	N/A	-$1.07M	-$340K	$150K	$390K
	Cost to Carry (Distance and Profile)	-$20K	-$20K	-$110K	-$40K	$30K	$50K
	Cost To Carry (Filed Mileage Savings)	$50K		$120K		$200K	
Total Estimated Annual Fuel Savings (Gallons)		-39K	-39K	-366K	-98K	169K	259K
Total Estimated Annual Carbon Savings (Metric Tons)		-0.4K	-0.4K	-3.8K	-1K	1.8K	2.7K
Total Estimated Annual Fuel Savings (Dollars) *		-$120K	-$120K	-$1.1M	-$290K	$510K	$780K

** Based on a fuel cost of $3 per gallon*

Table 42. Total Annual Fuel Burn Benefits for OST-Designed MIA ARKES SID, FLL HEDLY SID, and FLL THNDR SID

		MIA ARKES SID Study Team Designed		FLL HEDLY SID Study Team Designed		FLL THNDR SID Study Team Designed	
MIA New ARKES SID		Low	High	Low	High	Low	High
Estimated Annual Fuel Savings *	Distance	$240K		$70K		$260K	
	Profile	N/A	N/A	-$1.07M	-$340K	$150K	$390K
	Cost to Carry (Distance and Profile)	$20K	$20K	-$100K	-$30K	$40K	$70K
	Cost To Carry (Filed Mileage Savings)	$80K		$140K		$210K	
Total Estimated Annual Fuel Savings (Gallons)		114K	114K	-322K	-54K	221K	310K
Total Estimated Annual Carbon Savings (Metric Tons)		1.2K	1.2K	-3.3K	-0.6K	2.3K	3.2K
Total Estimated Annual Fuel Savings (Dollars) *		$340K	$340K	-$970K	-$160K	$660K	$930K

** Based on a fuel cost of $3 per gallon*

The analysis demonstrates that the OST-developed designs resulted in efficiency tradeoffs while raising facility concerns and the facility-requested designs resulted in a net disbenefit. Based on these results, the OST recommends that further design and analysis work be conducted during D&I. The OST recommends that the D&I Team evaluate these and other options to mitigate the THNDR level-offs. Modeling and/or simulation should be conducted to determine the most beneficial and operationally advantageous designs for these SIDs.

4.8 South/Central Florida OAPM Issues Not Addressed or Requiring Additional Input

The South/Central Florida OST identified and characterized a range of problems and developed a number of conceptual solutions; however, some issues require additional coordination and input and could not be addressed within the time constraints of the OST process. These issues may be explored further during D&I. Other issues were simply beyond the scope of OAPM and should be considered outside this process.

4.8.1 Issues not Addressed by the Study Team

There were issues identified that were not addressed by this OST due to time constraints, limited traffic, etc. These issues could be considered during D&I as time permits.

- F11 DEARY DTA Caribbean departures required to level off due to the FISEL and HILEY RNAV STARs
- Turbo-prop arrivals delivered at the same altitudes from the NNE on the ANNEY and HILEY
- FPR arrivals over ANGEE
- FLL and FXE share departure gates
- Lack of procedure to use north/south runway at SFB
- The following airports have over 20,000 annual operations, yet there are no RNAV instrument approach procedures. Many do not have any instrument approach procedures at all: MAI, IMM, X06, X61, X55, X04, X52, 0J8, X59, X23, X26, 2J0, 48X, CLW, 82J.
- Currently, pilots from SPG (Albert Whitfield) are vectored to intercept V152 and then cleared direct to KNEED. This is inefficient and work intensive switching between NAV sources.
- Improve access and efficiency for both general aviation and air carrier operations.

4.8.2 Issues for Consideration during Design and Implementation

There were issues identified that are designated for further consideration during the D&I phase of the South/Central Florida OAPM process. These issues were identified and recorded and are summarized below:

- Airspace and procedure impacts of FLL Runway 10R/28L opening 2014
- HEDLY SID and ARKES SID Swap and THNDR SID; see Section 4.7.1

4.8.3 Issues Outside of the Scope of OAPM

Additional issues were identified that were beyond the scope of the South/Central Florida OST and have been recorded for further consideration outside of the OAPM process. The out-of-scope issues identified and recorded are summarized below:

- FLL port expansion project may bring larger ships to Fort Lauderdale and may create a TERPS issue
- Lack of JAINS..HIBAC transition on CWRLD RNAV STAR. JAINS is located outside the geographic area of metroplex.
- No AR route between CARPX and OMALY. Both fixes are located outside the geographic area of metroplex.
- Inflexible route structure due to Special Activity Airspace

4.8.4 Limits of Design Process

The limitations placed on proposed designs by criteria for PBN procedures were brought up as an issue by facilities, stakeholders, and OST team members. The primary issue encountered is that the criteria for PBN procedures are overly restrictive, particularly for high-performing aircraft in use throughout the NAS today.

Changes in criteria are well beyond the scope of the OST and indeed the OAPM process altogether; however, these types of criteria issues limit the scope of the PBN solutions and likely guarantee some controller intervention on PBN procedures, thus negating some of the expected benefits of the PBN procedures.

5 Summary of Benefits

5.1 Qualitative Benefits

5.1.1 Near-Term Impacts

The benefits of the PBN procedures proposed by the OST include the following:

- Reduced phraseology, frequency congestion, and pilot workload:

  Reduced phraseology due to PBN will reduce the number of transmissions needed to accomplish required restrictions by combining multiple clearances into a single transmission. Prior studies have demonstrated transmission reductions on the order of 18% to 34% with 85% RNAV equipage,[2] and the OST believes it is reasonable to expect a similar level of savings. Reduced transmissions will translate into less frequency congestion which could potentially reduce "hear back/read back" errors. In addition, the consolidation of clearances associated with an RNAV procedure reduces pilot workload, which allows for more "heads-up" time and allows the crew to focus on high-workload situations.

- Repeatable, predictable flight paths and accurate fuel planning:

  The introduction of PBN ensures lateral flight path accuracy. The predictable flight paths help assure procedurally deconflicted traffic flows and allow airlines to more accurately plan for a consistent flight path. It also allows users to more accurately predict the amount of fuel required for a procedure.

- Enhanced lateral and vertical flight paths:

  Optimized climbs and descents and shorter lateral paths reduce the number and length of level-offs and total distance flown, thereby reducing fuel burn and carbon emissions. Altitude windows can vertically separate traffic flows and allow for industry-standard glide paths.

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2 Sprong, K., et al., June 2006, "Benefits Estimation of RNAV SIDs and STARs at Atlanta," F083-B06-020, (briefing), The MITRE Corporation, McLean, VA.

5.1.2 Long-Term Impacts to Industry

Implementation of these proposed procedures will have long-term effects for industry.

- Flight planning

  OAPM proposed procedures will result in reduced mileage and fuel burn in the long-term, particularly as more metroplexes are optimized. In the near-term, more direct paths that are not dependent on ground-based navigational aids, plus optimized flight profiles, will lead to reduced fuel burn only within an optimized metroplex. Reduced fuel loading will also allow for a reduction in cost to carry.

- Timetable

  Shortened, more efficient routes will necessitate timetable adjustments, particularly as more metroplexes are optimized. This will potentially benefit crew scheduling, connecting information, time on gates, ramp scheduling, etc.

5.2 Quantitative Benefits

The quantified benefits of the South/Central Florida OST recommendations are broken down into annual fuel savings in dollars, annual fuel savings in gallons, and annual carbon emissions reductions in metric tons. The primary benefit drivers are improved vertical profiles and reduced miles flown.

Benefits from conceptual arrival procedures came from:

- RNAV STARs with OPDs
- More efficient lateral paths created by adjusting terminal entry points and removing doglegs
- Removal of unused en route transitions and development of runway transitions

Benefits from conceptual departure procedures came from:

- A combination of RNAV off-the-ground procedures and radar vector procedures to join RNAV routes
- Departure procedures designed to facilitate unrestricted climbs by removing or mitigating existing level-offs
- Procedural deconfliction, where practical, from other SIDs and STARs

Table 43 breaks down the total benefits for South/Central Florida. The total potential annual fuel savings is estimated between $23.0 million and $53.4 million. These numbers were derived by comparing currently flown track miles, published procedure miles, and vertical profiles to proposed PBN procedure track miles and vertical profiles. The benefits analysis assumes aircraft will fly the specific lateral and vertical RNAV procedures. It is fully expected that ATC will continue to offer shorter routings and remove climb restrictions, when feasible, further increasing operator benefits.

Table 43. Total Annual Fuel Benefits Associated with Distance, Profile, and Filed Mile Changes

Total SIDs/STARs		Low	High
Estimated Annual Fuel Savings *	Distance	$4.7M	
	Profile	$13.19M	$40.88M
	Cost to Carry (Distance and Profile)	$1.78M	$4.55M
	Cost To Carry (Filed Mileage Savings)	$3.35M	
Total Estimated Annual Fuel Savings (Gallons)		7.66M	17.81M
Total Estimated Annual Carbon Savings (Metric Tons)		79.5K	184.4K
Total Estimated Annual Fuel Savings (Dollars) *		$22.97M	$53.4M

** Based on a fuel cost of $3 per gallon*

Appendix A Acronyms

Acronyms	
AAR	Airport Arrival Rate
ADOC	Aircraft Direct Operating Cost
AR	Authorization Required
ARTCC	Air Route Traffic Control Center
ASPM	Airport Specific Performance Metrics
ATALAB	Air Traffic Airspace Lab
ATC	Air Traffic Control
ATCT	Air Traffic Control Tower
BADA	Base of Aircraft Data
CAASD	Center for Advanced Aviation System Development
CATEX	Categorical Exclusion
CTC	Cost to Carry
CY	Calendar Year
D&I	Design and Implementation
DEP	Depart
EA	Environmental Assessment
EIS	Environmental Impact Statement
EQ	Equipment/Frequency Fail
ETMS	Enhanced Traffic Management System
EUROCONTROL	European Organization for the Safety of Air Navigation
FAA	Federal Aviation Administration
F11	Central Florida TRACON, Orlando, FL
IAP	Instrument Approach Procedure
IAS	Indicated Air Speed
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
iTRAEC	Integrated Terminal Research, Analysis, and Evaluation Capabilities
L/R	Left/Right
LOA	Letter of Agreement
MIT	Miles-in-Trail
MSL	Mean Sea Level
NAS	National Airspace System
NAT	National Analysis Team

Acronyms	
NAVAID	Navigational Aid
NM	Nautical Mile/s
NOP	National Offload Program
NTML	National Traffic Management Log
OAPM	Optimization of Airspace and Procedure in the Metroplex
OPD	Optimized Profile Descent
OST	OAPM Study Team
PBN	Performance Based Navigation
PDARS	Performance Data Analysis and Reporting System
PRM	Precision Radar Monitor
RITA	Research and Innovative Technology Administration
RNAV	Area Navigation
RNP	Required Navigation Performance
ROM	Rough Order of Magnitude
RTCA	Radio Technical Commission for Aeronautics
SEC	Specialized Expertise Cadre
SID	Standard Instrument Departure
SOP	Standard Operating Procedure
SRM	Safety Risk Management
STAR	Standard Terminal Arrival Route
SWAP	Severe Weather Avoidance Program
TAAM	Total Airport and Airspace Model
TARGETS	Terminal Area Route Generation Evaluation and Traffic Simulation
TCAS	Traffic Collision and Avoidance System
TMA	Traffic Management Advisor
TMI	Traffic Management Initiatives
TRACON	Terminal Radar Approach Control
VMC	Visual Meteorological Conditions
VOR	Very High Frequency Omnidirectional Range
WX	Weather
ZJX	Jacksonville Air Route Traffic Control Center
ZMA	Miami Air Route Traffic Control Center

Appendix B Mapping of Procedures to Issues

#	Arpt	Procedure Name	Type	New?	Facility Issues	Ind. Issues
1	MCO	New MCO FATHE SID	SID	New	AF2, AF7, AF8	
2	MCO	New MCO JEEMY SID	SID	New	AF7, AF8	
3	MCO	New MCO CAMAN SID	SID	New	AF3, AF4, AF7	
4	MCO	New MCO FISHN SID	SID	New	AF6	
5	MCO	New MCO GUASP SID	SID	New	AF2	
6	SFB	New SFB NORTH SID	SID	New	AF9	
7	TPA	TPA BAYPO SID	SID		AT2	
8	TPA	TPA ENDED SID	SID		AT2, AT3	
9	TPA	TPA SYKES SID	SID		EM1(C), EM2(C)	
10	SRQ	SRQ SRKUS SID	SID		PBN	
11	MIA	MIA SKIPS SID	SID		AM2	
12	MIA	MIA EONNS SID	SID		AM1, AM2	
13	MIA	MIA MNATE SID	SID		SW	
14	MIA	New MIA VEGIE SID	SID	New	EM2(C)	
15	MIA	MIA WINCO SID	SID		EM1, NW	
16	MIA	MIA ARKES SID	SID		AM1	IS3, IS2
17	MIA	MIA VALLY SID	SID		AM2	
18	FLL	FLL EONNS SID	SID		AM4	
19	FLL	FLL MNATE SID	SID		AM4, EM2(S), SW	
20	FLL	New FLL VEGIE SID	SID	New	EM2 (S), AM3	
21	FLL	FLL THNDR SID	SID		AM1, EM4(S)	IS2, IS1
22	FLL	FLL HEDLY SID	SID		AM1	IS2, IS1
23	FLL	FLL PREDA SID	SID		AM4	
24	FLL	FLL BEECH SID	SID		AM4, EM12(S)	
25	PBI	PBI TBIRD SID	SID		AP1, AP2	IS4
26	PBI	New PBI WNW SID	SID	New	AP1, AP2	IS4
27	PBI	PBI IVNKA SID	SID		EM8(S)	IS4
28	BCT	New BCT NE SID	SID		PBN	IS4
28	RSW	RSW CSHEL SID	SID		AR1, EJ3, EJ4, EM3(S), Other (S)	
29	APF	New APF NW SID	SID	New	AR1	

#	Arpt	Procedure Name	Type	New?	Facility Issues	Ind. Issues
30	MKY	New MKY NW SID	SID	New	AR1	
31	MCO	MCO CWRLD STAR	STAR	New	EJ1, AF1, AF9	IC4
32	MCO	New MCO HIBAC STAR	STAR	New	AF1	IC4
33	MCO	MCO BUGGZ STAR	STAR		AF4	IC4
34	MCO	MCO PIGLT STAR	STAR		AF4	IC4
35	MCO	MCO COSTR STAR	STAR		AF3, AF7	IC4
36	MCO	MCO BAIRN STAR	STAR		AF2	IC1, IC4
37	SFB	New SFB CWRLD STAR	STAR	New	AF9, AD1	
38	SFB	New SFB NW STAR	STAR	New	AF9, AD1	
39	ORL	New ORL CWRLD STAR	STAR	New	AF9, AD1	
40	ORL	New ORL NW STAR	STAR	New	AF9, AD1	
41	ISM	New ISM NW STAR	STAR	New	AF9, AD1	
42	TPA	TPA DADES STAR	STAR		AT1	
43	TPA	TPA FOXX STAR	STAR		AT3, AT4	
44	TPA	TPA BLOND STAR	STAR		AT4, EM1(C)	
45	TPA	TPA DEAKK STAR	STAR		AT5, EM5	
46	SRQ	SRQ TRAPR STAR	STAR		AT1, AT5	IC3
47	SRQ	SRQ TEEGN STAR	STAR		PBN	
48	DAB	DAB NORTH STAR	STAR		AD1	
49	MIA	MIA FLIPR STAR	STAR		AM2, AM4, SE	
50	MIA	MIA CURSO STAR	STAR		AM3, AM4, EM2(S), SW	
51	MIA	MIA SSCOT STAR	STAR		AM2, AM3, AM4, NW	
52	MIA	MIA HILEY STAR	STAR		AM1, AM2, AM4, NE, EJ1	
53	FLL	FLL WAVUN STAR	STAR		EM13(S), EM14(S), SE	
54	FLL	New FLL SW STAR	STAR		AM3, AM4, SW	
55	FLL	FLL JINGL STAR	STAR		EM1(S), EM4(S), NW	
56	FLL	FLL FISEL STAR	STAR		AM1, AM2, EM8(S), EM11(S), NE	
57	PBI	PBI FRWAY STAR	STAR		EJ1	IS4
58	PBI	New PBI NE STAR	STAR	New	EJ1	IS4
59	PBI	New PBI SE STAR	STAR	New	AP3, EM15(S)	IS4
60	PBI	PBI WLACE STAR	STAR		EJ3, NW	IS4
61	BCT	BCT PRRIE STAR	STAR		EJ3	IS4

#	Arpt	Procedure Name	Type	New?	Facility Issues	Ind. Issues
62	BCT	BCT CAYSL STAR	STAR		EJ1	IS4
63	SUA	New SUA N STAR	STAR	New	AP2	
64	RSW	RSW SHFTY STAR	STAR		EJ3, AR1, EM4(S)	IS3
65	RSW	RSW TYNEE STAR	STAR		EJ2	IS3
66	APF	APF SHFTY STAR	STAR		AR1, EJ3	IS3
67	APF	APF PIKKR STAR	STAR		EJ2, AR1	
68	MKY	MKY SHFTY STAR	STAR		AR1, EJ3	IS3
69	MKY	MKY PIKKR STAR	STAR		EJ2, AR1	
70	TPA	V7 T-Route	T-Route	New	AT1	
71	MCO	MOANS..OCF T-Route	T-Route	New	AF7	
72	ORL	F11 South T-Route	T-Route	New	AF8, AF9, AD1	
73	MIA	MIA T-Route	T-Route	New	EM6(S)	
73	PBI	PBI T-Route	T-Route	New	EM6(S)	
Inefficient vertical and lateral profiles to major airports: this issues was addressed throughout Florida						
Lack of procedural deconfliction between airports: this issues was addressed throughout Florida						

Appendix C PBN Toolbox

Sample PBN Toolbox Options
Adding an arrival route
Adding a departure route
Extend departure routes
Build in procedural separation between routes
Reduce route conflicts between airports
Changing airspace to accommodate a new runway
Adding a parallel arrival route (to a new runway)
Splitting a departure fix that serves more than one jet airway
Increased use of 3 NM separation
Increased use of terminal separation rules
Static realignment or reassignment of airspace
Adaptive realignment or reassignment of airspace
Improving sector boundaries (sector split, boundary move, new area of specialization)
Shifting aircraft routing (Avoiding re-routes, shorter routes)
Eliminating altitude restrictions
More efficient holding (design, usage and management)
Adding surveillance coverage
Adding en route access points or other waypoint changes (NRS)
Adding en route routes
Reduce restrictions due to Special Use Airspace
TMA initiatives