Federal Aviation
Administration

Optimization of Airspace and Procedures in the Metroplex (OAPM)

Design Submission Executive Summary
Washington D. C. Metroplex

UPDATED: September 12, 2013

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1.0 Optimization of Airspace and Procedures in the Metroplex

In September 2009, the Federal Aviation Administration (FAA) received the RTCA's Task Force 5 Final Report containing recommendations concerning the top priorities for the implementation of NextGen initiatives. A key component of the FAA response to the RTCA recommendations was 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 Final Report on Mid-Term NextGen Implementation 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. The OAPM initiative is intended to enable accelerated development and implementation of beneficial PBN procedures.

2.0 Overview of the Washington DC OAPM Design Team

The Washington DC Design Team was the first OAPM Design Team deployed, and the collaborative[1] team was active from July 2011 through March 2012. The Washington DC OAPM Study Team Final Report, dated 31 March, 2011, served as the foundation for the Design Team's scope of work. The Design Team focused on finalizing the Study Team's conceptual designs in order to address identified operational and efficiency issues through the application of PBN procedures and associated airspace changes within the metroplex, with the ultimate goal of creating designs that support both FAA and Industry needs.

The Study Team identified conceptual PBN solutions that resulted in both quantitative and qualitative efficiency gains. The estimated annual fuel savings were between $6.4 million and $19.0 million.[2] These estimates were developed by the National Analysis Team (NAT) based on the Study Team's conceptual designs, and do not reflect the refinements

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[1] *An FAA manager and a NATCA Article 48 Representative acted as Co-Leads for the project with participants from the FAA Air Traffic Control (ATC) facilities, National Air Traffic Controller Association (NATCA), ATC subject matter experts (SMEs), Industry stakeholders, representatives from the Eastern Service Area, other FAA lines of business such as PBN Policy and Support and Flight Procedures, as well as the MITRE Corporation's Center for Advanced Aviation System Development (CAASD), and various support contractors.*

[2] *The estimated fuel burn savings considered a lower bound based on a conservative European Organization for the Safety of Air Navigation (EUROCONTROL) Base of Aircraft Data (BADA) fuel burn model and an upper bound based on Industry stakeholder flight simulation analysis. This analysis was performed in 2010, and assumed a fuel price of $2.52 per gallon.*

made by the Washington DC Metroplex Design Team. Quantitative benefits were derived from reductions in level segments and/or track distances, which reduce fuel burn and emissions. The qualitative benefits expected by the Study Team were reduced ATC task complexity, reduced pilot/controller communications, repeatable and predictable flight paths, and a reduction in the need for Traffic Management Initiatives.

The final designs proposed by the Washington DC Design Team refine the Study Team recommendations to increase efficiency in the metroplex. These efficiencies include maximizing the use of existing aircraft technologies and aircrew capabilities, and optimizing vertical profiles to eliminate or reduce the requirement to level-off. In addition, the team was able to create procedural changes to improve both lateral and vertical paths for Standard Terminal Arrival Routes (STARs) and Standard Instrument Departures (SIDs) to reduce fuel burn and emissions, provide earlier divergence on departures, deconflict arrival and departure procedures to enhance safety, and provide for repeatable/predictable paths to reduce ATC task complexity.

3.0 Scope and Process

The Washington DC Metroplex consists of airspace delegated to the Potomac Terminal Radar Approach Control (PCT) and the Washington DC Air Route Traffic Control Center (ZDC). Specific airports within the lateral confines of PCT airspace were selected based on their proximity and potential interaction with PCT and ZDC operations. The Washington DC OAPM Design Team focused on aircraft operations at Washington-Dulles International Airport (IAD), Ronald Reagan National Airport (DCA), and Baltimore Washington International Airport (BWI), as well as numerous satellite airports (see Table 1).

Airport ID	Airport Name		Airport ID	Airport Name
ADW	Andrews Air Force Base		JYO	Leesburg Executive Airport
CJR	Culpeper Regional Airport		MRB	Eastern WV Regional Airport / Shepherd Field
DMW	Carroll County Regional Airport / Jack B. Poage Field		MTN	Martin State Airport
EZF	Shannon Airport		NYG	Quantico Marine Corps Airfield / Turner Field
FDK	Frederick Municipal Airport		RIC	Richmond International Airport
FRR	Front Royal Warrenton County Airport		RMN	Stafford Regional Airport
GAI	Montgomery County Airport		2VG2	Upperville Airport
HEF	Manassas Regional Airport / Harry P. Davis Field		W50	Davis Airport
HWY	Warrenton-Fauquier Airport			

Table 1. DC OAPM Satellite Airports with New/Revised PBN procedures

The Washington DC OAPM Design Team consisted of participants from the FAA ATC facilities, NATCA, ATC SMEs, Industry stakeholders, representatives from the Eastern Service Area, other FAA lines of business such as PBN Policy and Support and Flight Procedures, MITRE CAASD, and various support contractors.

The Design Team began the process by reviewing the Study Team Final Report to identify all conceptual proposals. The proposals were then prioritized based on the complexity, the interdependencies, and the magnitude of the potential benefit.

The primary activities during this step will be the development of detailed final design proposals for review during the Evaluation Phase. The requirements in Airspace Management Handbook version 2.2, Order 7100.9D (Standard Terminal Arrival Program and Procedures, Appendix 5 Guidelines for Implementing Terminal RNAV Procedures) and other applicable guidance must be followed. This involves applying analysis tools to ensure procedure designs are flyable and meet current criteria. Initial validation of procedure design may also include flight simulations conducted by Lead Operators. Individual procedure and airspace design must be evaluated together as part of an integrated Metroplex proposal to ensure compatibility. The Design Team may make changes to Study Team proposals if they enhance the expected benefit or if the change(s) are operationally necessary and if they do not significantly reduce the expected benefits, increase the expected costs, or extend the project timeline.

To accomplish this the Design Team then divided into workgroups, including Industry representatives, which systematically developed more refined PBN and airspace designs that met the intent of the Study Team. The workgroup's preliminary designs were then shared with the full Design Team, allowing FAA, NATCA, SMEs and Industry to provide additional input. Numerous factors supported the refinement, including Industry flight simulations, human-in-the-loop validations, and other stakeholder feedback. Finally, the Team documented the designs and obtained signatures from all affected FAA and NATCA stakeholders indicating agreement on a proposed final design (pending environmental and safety review, and further operational validation).

4.0 Proposed Solutions

As stated above, the Design Team considered each of the conceptual solutions developed by the Study Team and refined those concepts into comprehensive designs. These designs are captured in the Proposed Final Design Submission Packages, which are included as Attachment A to this document. These Submission Packages describe the issue identified by the Study Team, their conceptual solution, and the design refinements made by the Design Team resulting in the Proposed Final Design. The Submission Packages also identify dependencies among various proposals, include graphical depictions of current conditions and the proposed final designs, identify impacted sectors, provide a broad overview of expected benefits, and identify additional concerns that should be considered.

It is important to note during this process the FAA considered numerous alternatives in the development of the final design proposals. Evolving from a preliminary identification of

measures aimed at reducing flight times, level-off segments, increasing airspace efficiencies without increasing the likelihood of adverse environmental impacts, particularly noise or other actions that would normally trigger an Environmental Impact Statement. A No-Action alternative will be part of the considerations for each of the proposals and may still be utilized by some aircraft. The actual design of each Package was an iterative process conducted over a nine month period with each version of the process documented in evolving TARGETS files and supporting documentation maintained on the OAPM SharePoint Site maintained by MITRE Corporation. This culminated into the creation of 45 Proposed Final Design Submission Packages containing 41 procedures, 7 new routes and 13 airspace redesign proposals. Four of the Study Team Proposals were discounted by the Design Team due to either scope of work or a realization of insignificant enhancement to the overall project. As identified in each Package, the Design Team was able to create procedural changes including the development of Optimized Profile Descents (OPDs), improved lateral and vertical paths for both STAR and SIDs to reduce fuel burn and emissions, and earlier divergence on departures. Where applicable, arrival and departure procedures were deconflicted and designed to create repeatable/predictable paths, reduce ATC task complexity, and enhance safety.
The Design Team created or improved STARs, SIDs, and Air Traffic Service (ATS) Routes, and made numerous airspace changes. It should be noted that the Study Team identified a number of improvements that were already underway when OAPM was initiated. While these improvements are part of OAPM, the Design Team determined that they have independent utility, and can be implemented more quickly than the rest of the Design Team proposals. The early implementation proposals are summarized in Table 2, while the bulk of the OAPM proposals, which will be examined in the Environmental Assessment, are summarized in Table 3.

Publication Date	Number of STARs	Number of SIDs	Number of Airspace Changes	Number of ATS Routes (Q/T)
2 May 2012	0	0	1	0
26 July 2012	5	2	2	0
10 January 2013	1	0	0	0
Total	**6**	**2**	**3**	**0**

Table 2. "Early Implementation" DC OAPM Proposals with Independent Utility

Publication Date	Number of STARs	Number of SIDs	Number of Airspace Changes	Number of ATS Routes (Q/T)
22 August 2013	3	2	2	3
17 October 2013	3	0	2	4
12 December 2013	11	2	6	0
6 February 2014	0	15	0	0
3 April 2014	1	6	0	0
Total	**18**	**25**	**10**	**7**

Table 3. Remaining DC OAPM Proposals to be Considered in the Environmental Assessment

In total, the Design Team has proposed 24 new STARs, 27 new SIDs, 13 airspace changes, and 7 Q/T routes. While no new quantitative benefits have been calculated as of the end of the Washington DC Metroplex Design phase, it is anticipated the benefits will meet or exceed the benefits estimates included in the Washington DC Study Team Final Report. Stakeholders will begin realizing benefits with the first major implementation in July 2012, and will realize the full benefits of all of the proposals in April 2014.

5.0 Key Deliverables and Recommendations

Per the OAPM nominal project schedule, the primary deliverables and milestones for this Design Phase of the proposed project include this Executive Summary and the attached Proposed Final Design Submission Packages. The Washington DC OAPM project is now ready to proceed with the Evaluation Phase.

Adopting the Design Team proposals will result in reduced flying miles, minimal level-offs for departures, implementation of Optimized Profile Descents, reduced fuel burn and emissions, as well as reduced controller task complexity. Considering the potential benefits and anticipated costs, it is recommended that Washington DC OAPM project proceed with the Evaluation Phase, including all applicable operational, environmental, safety, and business case analyses. Upon completion of Evaluation, a decision will be made whether to proceed with Implementation.

Attachment A: Proposed Final Design Submission Packages

OAPM Submission: Washington Metroplex

LINCN RNAV SID Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issue 36 and 50	12 December 2013
Facilities and Areas/Sectors Impacted:	**POCs:**
Potomac TRACON (PCT) - OJAAY, TYSON, KRANT, ADWAR and DCAFR	- PCT, B. Lehman - PCT, P. Carroll
Related/Dependent Proposals:	**Associated Data Files:**
Independent	LINCN1 (RNAV) 20130416.tgs

Purpose:
The Washington D.C. Metroplex Study Team identified the need for independent SID to Andrews Air Force Base (ADW).

Study Team Recommendation:
The Study Team recommended the creation of independent SIDS for ADW.

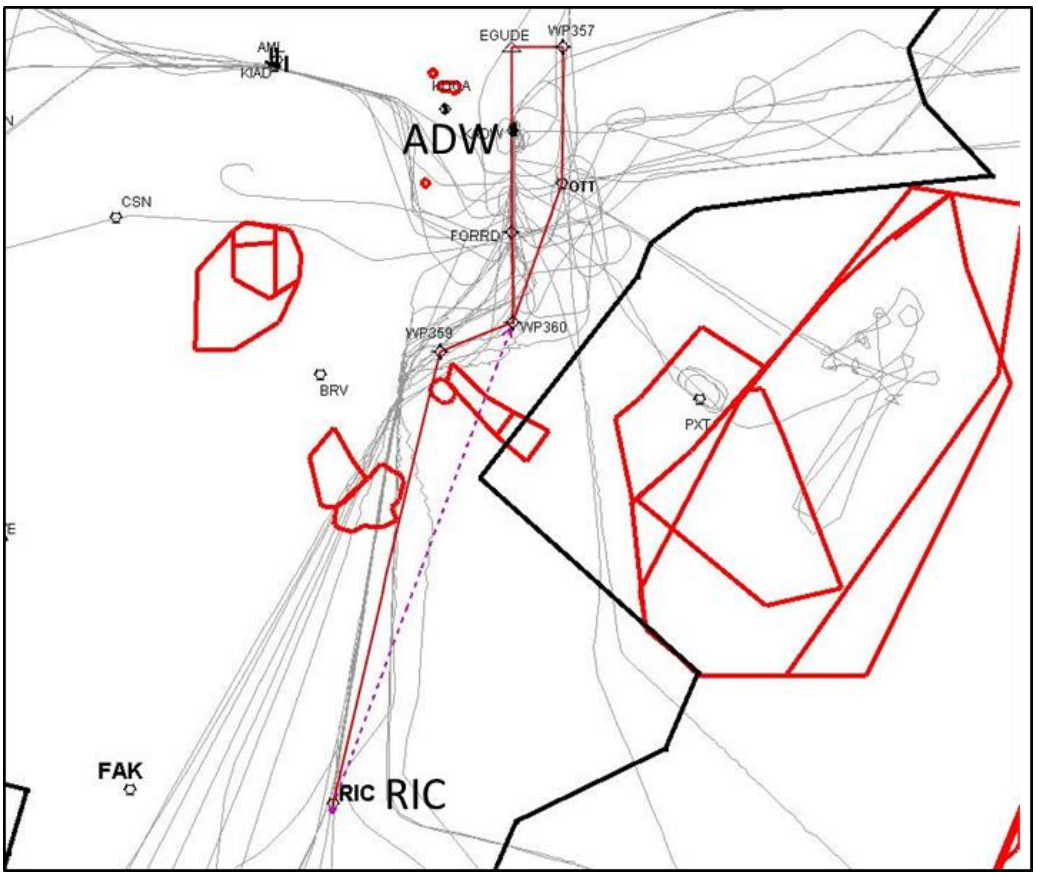


FIGURE 1. STUDY TEAM RECOMMENDATION

OAPM Submission: Washington Metroplex

LINCN RNAV SID Final Design

Proposed Design:

The Washington D.C. Metroplex Design Team is proposing the creation of a new RNAV SID named LINCN for Andrews Air Force Base (ADW). The LINCN RNAV SID will begin at the LINCN waypoint located just south of DCA VORTAC then proceed northwest to JESLE waypoint where aircraft will be assigned radar vectors or other control instructions. The LINCN RNAV SID will provide lateral guidance from the FRDMM and TRUPS RNAV STARs in a north operation. This RNAV SID is not intended to be available when Ronald Reagan Washington National Airport (DCA) is in a south configuration. The Design Team evaluated numerous options for the remaining operations at ADW. Due to the congested airspace, and greater volume of traffic on conflicting routes it was determined that additional SIDs would increase control task complexity without measurable benefits to aircraft departing ADW.

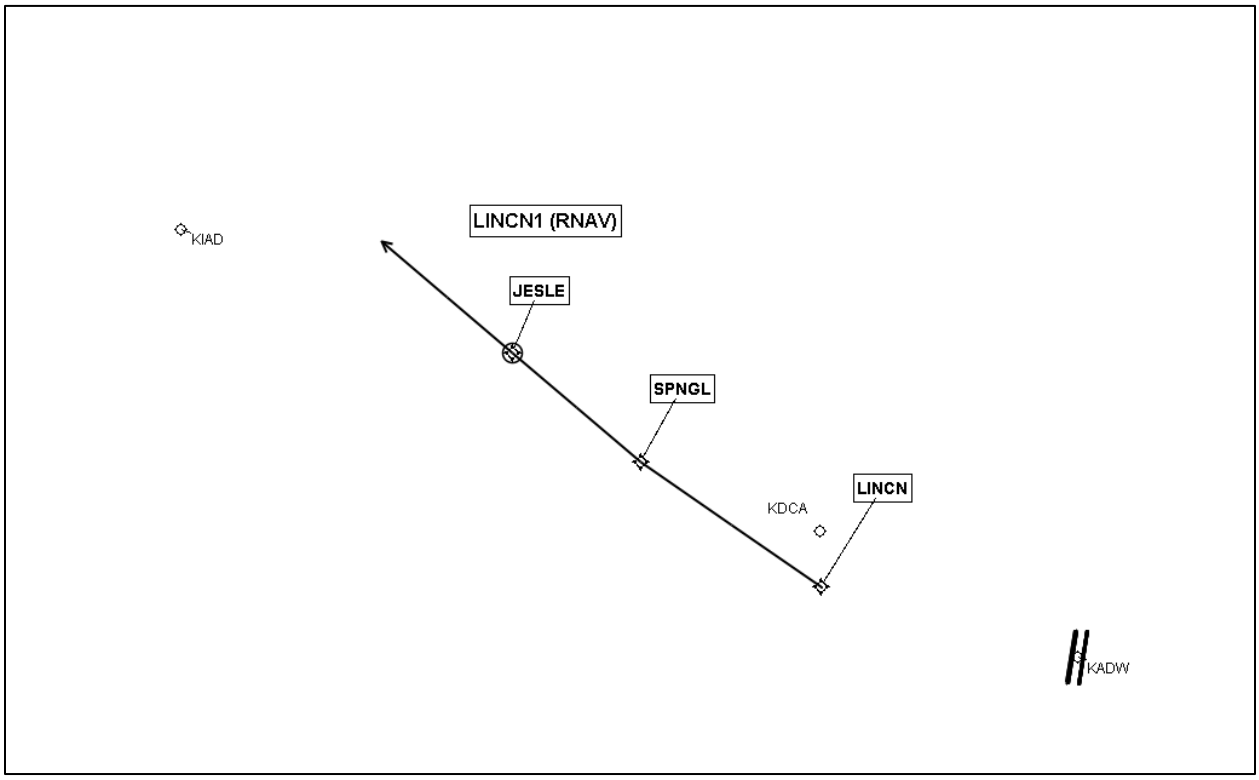


FIGURE 2. PROPOSED DESIGN

Proposed Design and Implementation Dependencies:

This proposed design is not dependent on any other designs.

Additional Design Considerations:

This proposal requires modifications to ZDC and PCT Standard Operating Procedures and Letters of Agreement. The proposed changes do not require a spectrum analysis, changes to Manpower, or Facilities and Equipment. Validation through a Human-in-the-Loop simulation is not anticipated. There is no anticipated increase of operations or a change to the hours of utilization on this procedure. The design team worked with ADW Air Traffic Control Tower to ensure the most flexibility, as well as, supporting PCT requirements.

OAPM Submission: Washington Metroplex

LINCN RNAV SID Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

04-24-13		April 24, 2013	
Dave Perkins Washington D.C. OAPM FAA Lead	Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	Date
4/24/13		4/24/13	
Bryan Lehman Potomac TRACON Facility Lead	Date	Paul Carroll Potomac TRACON NATCA Lead	Date

OAPM Submission: Washington Metroplex

SPISY RNAV STAR Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issues 36 and 50	12 December 2013
Facilities and Areas/Sectors Impacted:	**POCs:**
Washington Center (ZDC) - Sectors 11 and 14 Potomac TRACON (PCT) - DEALE, KRANT, PALEO and ADWAR	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
DEALE, VUDOO and RAVNN RNAV STARs	SPISY1 (RNAV) 20130416.tgs

Purpose:
This proposed design addresses the lack of independent SID and STAR to Andrews Air Force Base (ADW) identified by the Washington D.C. Study Team.

Study Team Recommendation:
The Study Team recommended the creation of decoupled STARs and SIDS for ADW.

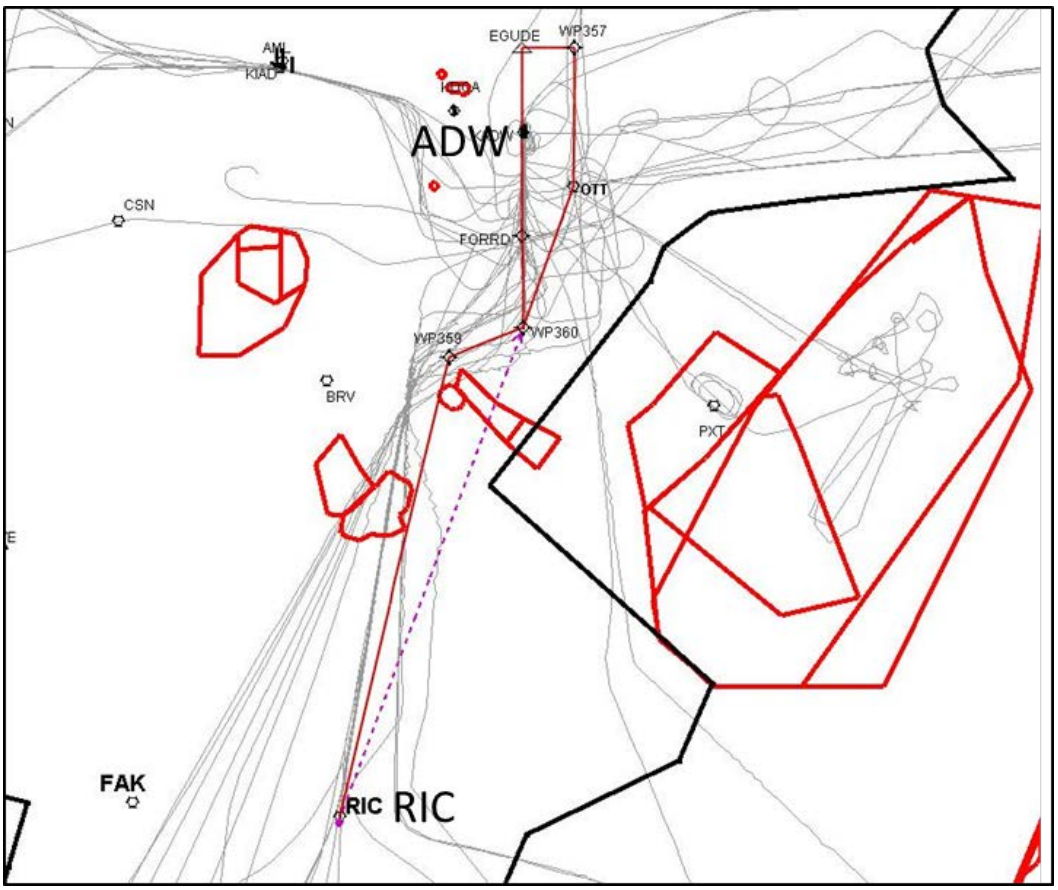


FIGURE 1. STUDY TEAM RECOMMENDATION

OAPM Submission: Washington Metroplex

SPISY RNAV STAR Final Design

Proposed Design:

The Washington D.C. Metroplex Design Team is proposing the creation of a new RNAV STAR named SPISY. Currently aircraft are filed BILIT direct OTT direct ADW and receive vectors to the downwind for Andrews Air Force Base (ADW). The new SPISY RNAV STAR will increase flight path predictability by providing RNAV guidance to the downwinds. In a north configuration, the SPISY RNAV STAR transitions over CAPKO allowing flexibility for a base leg or traditional downwind transition. In a south configuration, the arrival track will remain east of ADW over DECON waypoint enabling a reduction in flying miles. Additionally, the lateral track of this design will enable a more efficient climb for ADW departures, while reducing control complexity and potential delays.

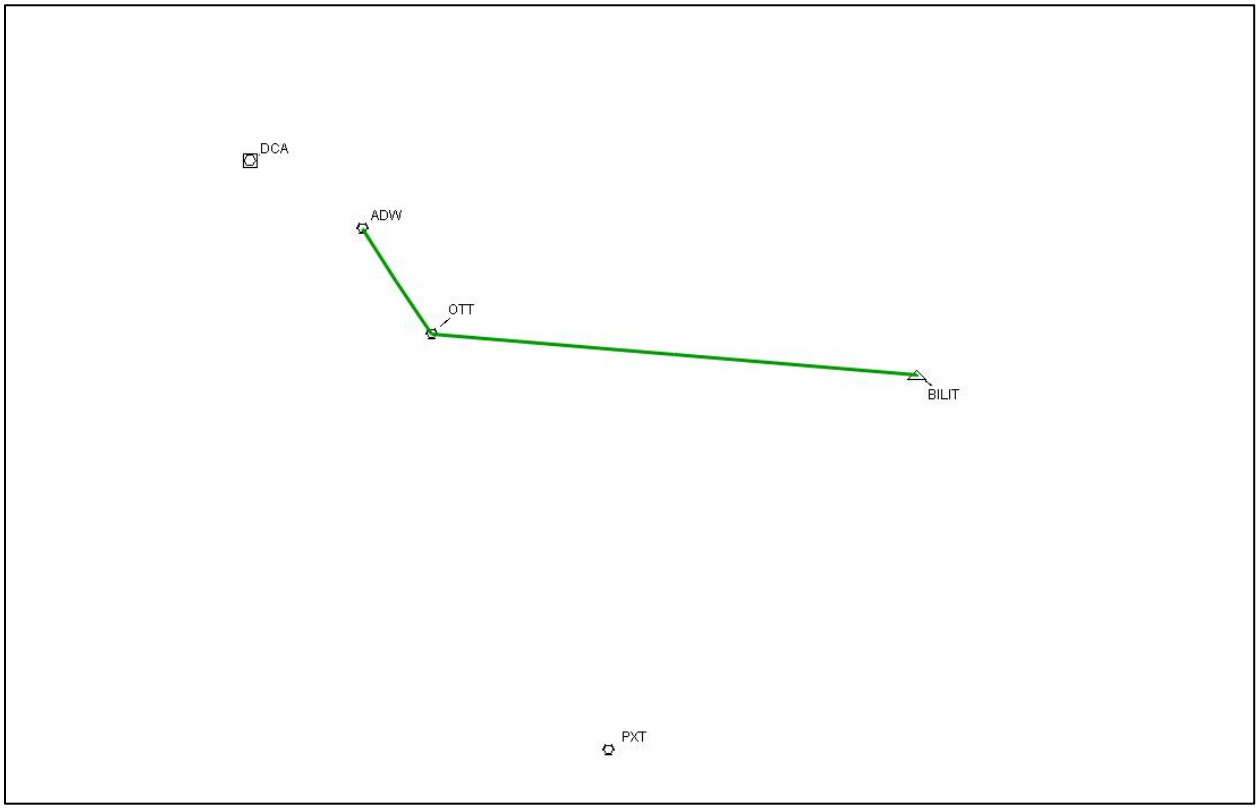


FIGURE 2. CURRENT STATE

OAPM Submission: Washington Metroplex

SPISY RNAV STAR Final Design

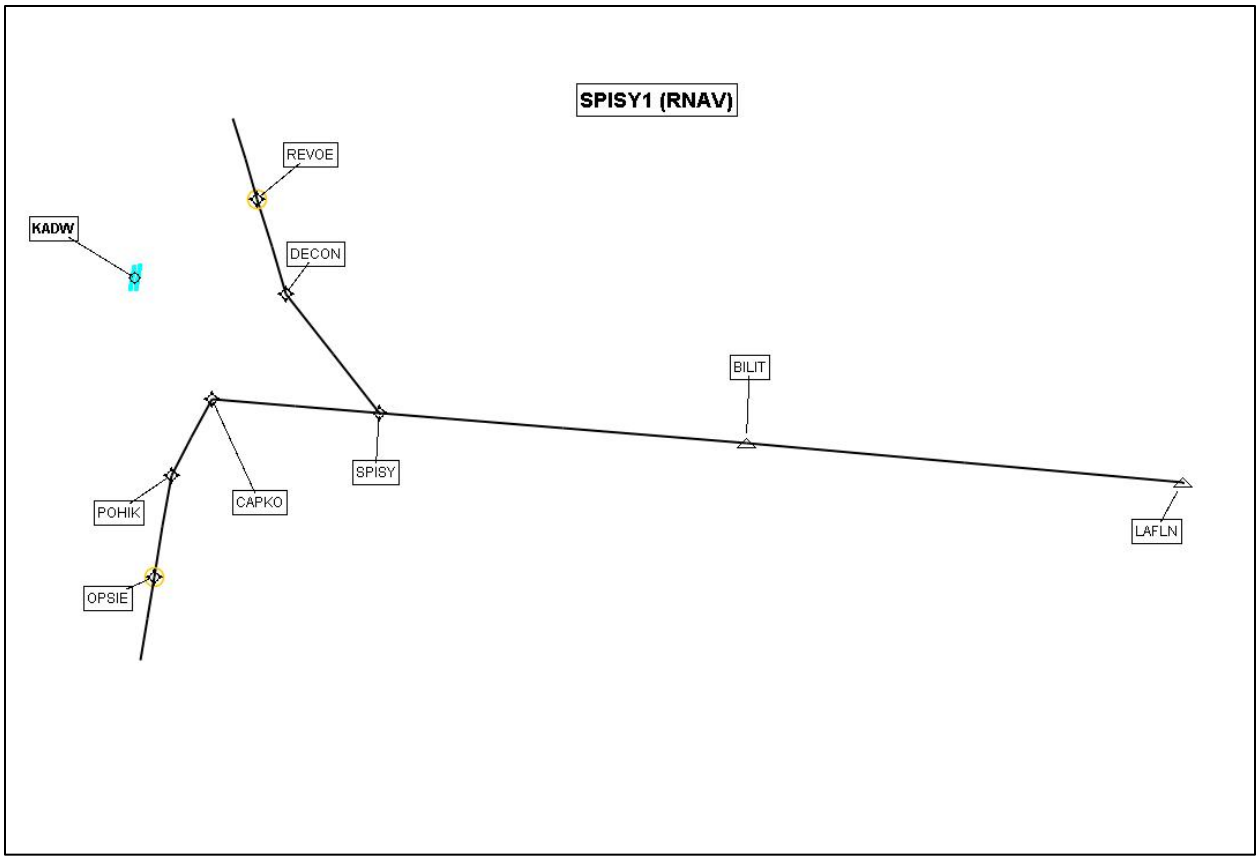


FIGURE 3. PROPOSED DESIGN

<u>Proposed Design and Implementation Dependencies</u>:
This proposed design is dependent on the DEALE, VUDOO and RAVNN RNAV STARs.

<u>Additional Design Considerations</u>:
This proposal requires modifications to ZDC and PCT Standard Operating Procedures and Letters of Agreement. The proposed changes do not require a spectrum analysis, changes to Manpower, or Facilities and Equipment. Validation through a Human-in-the-Loop simulation is not anticipated. There is no anticipated increase of operations or a change to the hours of utilization on this procedure.

OAPM Submission: Washington Metroplex

SPISY RNAV STAR Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

Dave Perkins Washington D.C. OAPM FAA Lead	04.24.13 Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	April 24, 2013 Date
Bryan Lehman Potomac TRACON Facility Lead	4/24/13 Date	Paul Carroll Potomac TRACON NATCA Lead	4/24/13 Date
Joe Keimig Washington ARTCC Facility Lead	4/18/13 Date	Curt Johnson Washington ARTCC NATCA Lead	4/18/13 Date

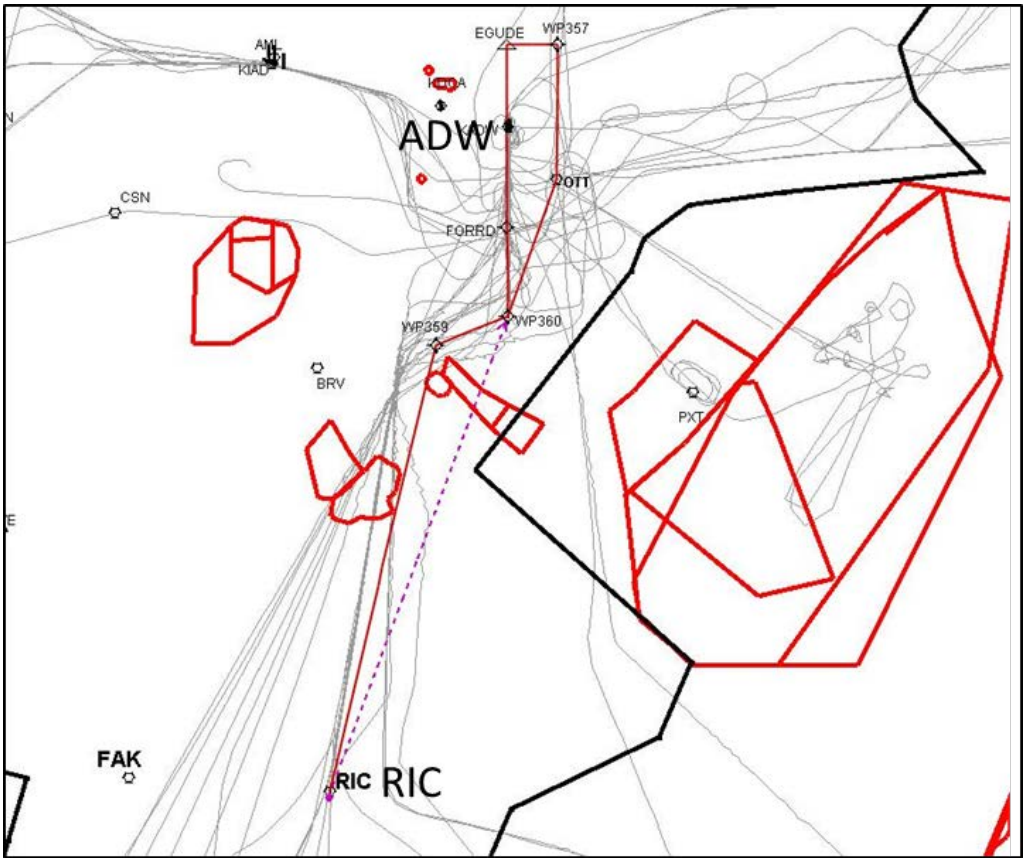
OAPM Submission: Washington Metroplex

VUDOO RNAV STAR Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issue 36 and 50	12 December 2013
Facilities and Areas/Sectors Impacted:	**POCs:**
Washington Center (ZDC) - ZDC 11 and 14 Potomac TRACON (PCT) - DEALE, ADWAR, TAPPA, and CSIDW (proposed sector)	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
SPISY and RAVNN RNAV STARs, LUCYL RNAV SID and CAPSS/CAVLR/RAVNN and James River Airspace Redesigns	VUDOO1 (RNAV) 20130416.tgs

Purpose:
This proposed design addresses the lack of independent Standard Instrument Departures (SID) and Standard Terminal Arrival Route (STAR) procedures to Andrews Air Force Base (ADW) identified by the Washington DC Study Team.

Study Team Recommendation:
The Study Team recommended the creation of decoupled STARs and SIDS for ADW.



OAPM Submission: Washington Metroplex

VUDOO RNAV STAR Final Design

FIGURE 1. STUDY TEAM RECOMMENDATION

<u>Proposed Design</u>:

The Washington D.C. Metroplex Design Team is proposing the creation of a new RNAV STAR named VUDOO. The VUDOO RNAV STAR will use two enroute transitions over the THMMP waypoint (vicinity of the RIC VORTAC) and the CIBAC waypoint to support the two arrival flows from the south. VUDOO will be laterally separated from the CAPSS and RAVNN RNAV STARs. It will be laterally separated from Restricted Areas 6611, 6612, and 6613 and provides the opportunity to hold ADW arrivals during VIP movements with minimal impact to DCA and BWI arrivals. In addition, the shift in lateral traffic will enable more efficient climbs for DCA southern configuration traffic to J61 dependent on aircraft performance capabilities.

In a north configuration, the VUDOO RNAV STAR transitions over VUDOO waypoint allowing for a direct transition to the runway. It will also allow aircraft transitioning into the terminal environment a less aggressive descent profile to the runway.

In a south configuration, the VUDOO RNAV STAR transitions to DECON waypoint where it mimics the SPISY RNAV STAR to provide consistency in flight paths. Additionally, the lateral track of this design will enable a more efficient climb for ADW departures while reducing control complexity and potential delays.

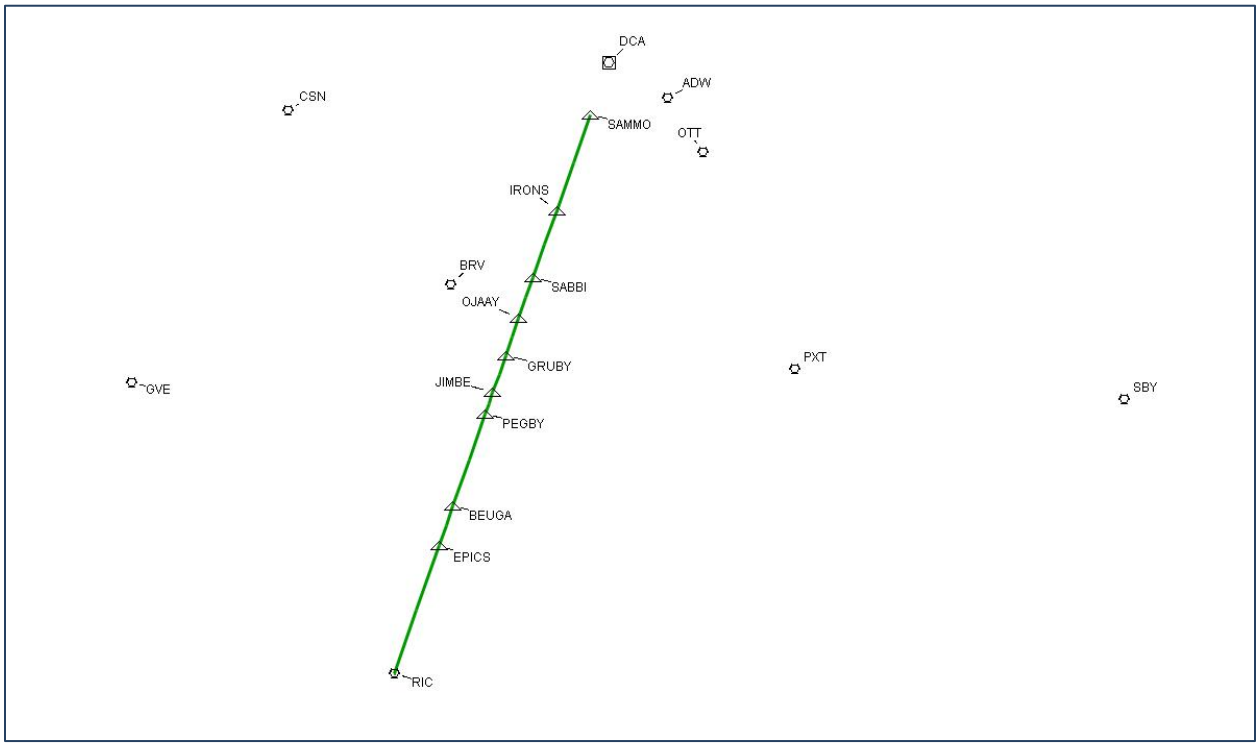


FIGURE 2. CURRENT STATE

OAPM Submission: Washington Metroplex

VUDOO RNAV STAR Final Design

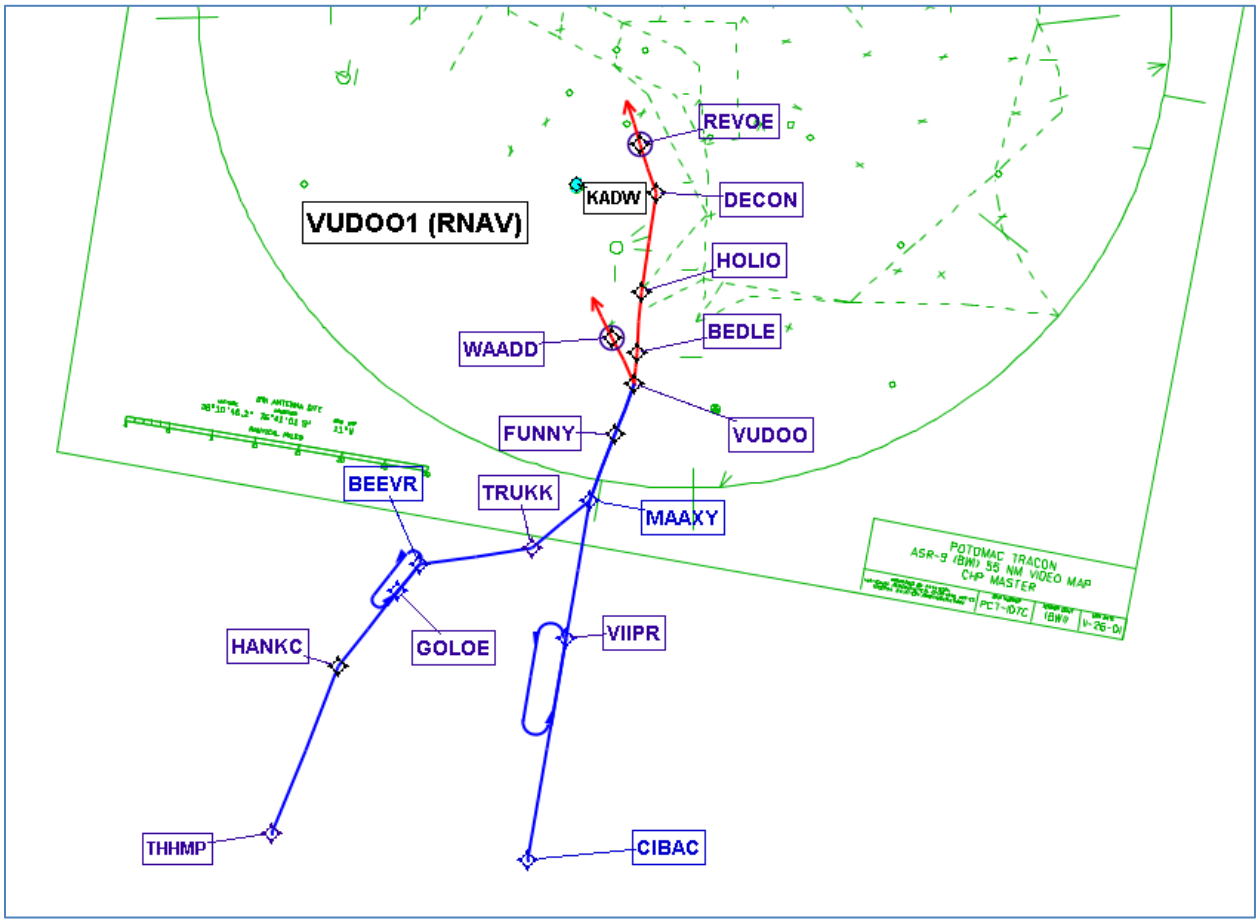


FIGURE 3. PROPOSED DESIGN

<u>Proposed Design and Implementation Dependencies</u>:
This proposed design is dependent on the SPISY and RAVNN RNAV STARs and CAPSS/HOWLL/RAVNN and James River Airspace Redesigns.

<u>Additional Design Considerations</u>:
This proposal requires modifications to ZDC and PCT Standard Operating Procedures and Letters of Agreement. The proposed changes do not require a spectrum analysis, changes to Manpower, or Facilities and Equipment. Validation through a Human-in-the-Loop simulation is not anticipated. There is no anticipated increase of operations or a change to the hours of utilization on this procedure.

OAPM Submission: Washington Metroplex

VUDOO RNAV STAR Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

04.24.13		April 24, 2013	
Dave Perkins Washington D.C. OAPM FAA Lead	Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	Date
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Bryan Lehman Potomac TRACON Facility Lead	Date	Paul Carroll Potomac TRACON NATCA Lead	Date
4/18/13		4/18/13	
Joe Keimig Washington ARTCC Facility Lead	Date	Curt Johnson Washington ARTCC NATCA Lead	Date

OAPM Submission: Washington D.C. Metroplex

CONLE RNAV SID Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issue 2 Reliance on Radar Vectors	03 April 2014
Facilities and Areas/Sectors Impacted:	**POCs:**
Washington Center (ZDC) Sector 11 Potomac TRACON (PCT) - GRACO and KRANT	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
RIGNZ, JCOBY and DIXIE RNAV SIDS. MIIDY and RAVNN RNAV STARs	CONLE1 (RNAV) 20130416.tgs

Purpose:
This proposed design addresses reliance on radar vectors contributing to ATC task complexity and flight path variability identified by the Washington D.C. Metroplex Study Team.

Study Team Recommendation:
The Study Team recommended optimizing Performance Based Navigation (PBN) departure procedure overlays to all gates.

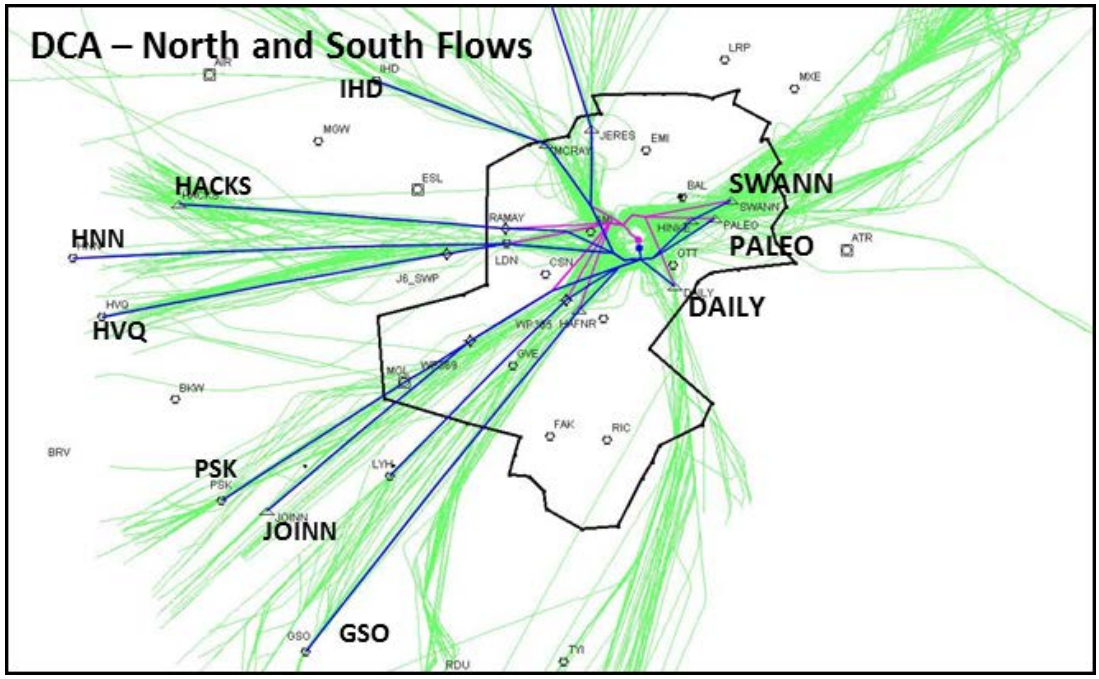


FIGURE 1. STUDY TEAM RECOMMENDATION

OAPM Submission: Washington D.C. Metroplex

CONLE RNAV SID Final Design

Proposed Design:
The Washington D.C. Metroplex Design Team is proposing the creation of a new RNAV SID named CONLE. The CONLE RNAV SID will end at the COLIN fix. The CONLE RNAV SID will increase flight path predictability, decrease the reliance on radar vectors, reduce control complexity and provide additional flexibility to sequence the aircraft sooner. Additionally it is expected to reduce mileage for departures on the procedure.

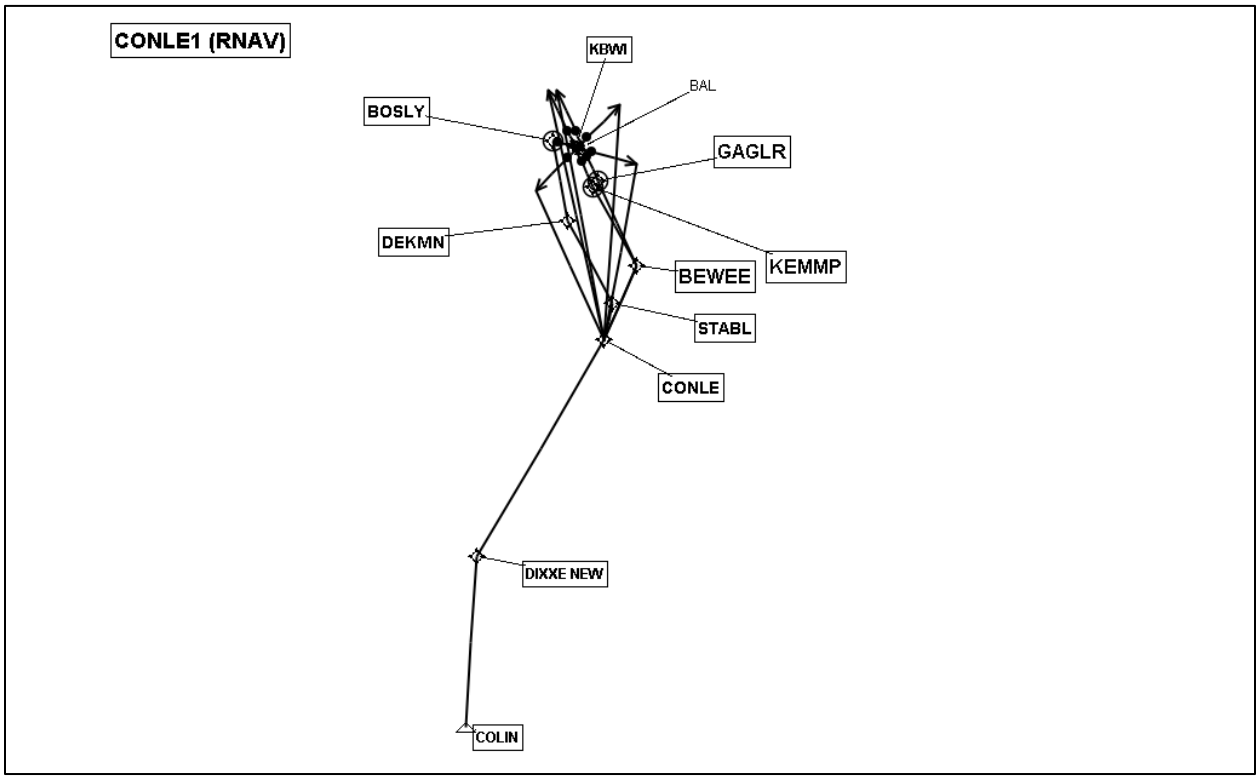


FIGURE 2. PROPOSED DESIGN

Proposed Design and Implementation Dependencies:
This proposed final design is dependent on the implementation of MIIDY and RAVNN RNAV STARs.

Additional Design Considerations:
This proposal requires modifications to PCT Standard Operating Procedures and PCT and BWI Air Traffic Control Tower Letters of Agreement. The proposed changes will not require a spectrum analysis. No changes to Manpower, or Facilities and Equipment are expected. Validation through a Human-in-the-Loop simulation is not anticipated. There is no anticipated increase of operations nor a change to the hours of utilization anticipated on this procedure.

Reviewed by Signatures

OAPM Submission: Washington D.C. Metroplex

CONLE RNAV SID Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

Dave Perkins Washington D.C. OAPM FAA Lead	Apr. 24. '13 Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	April 24, 2013 Date
Bryan Lehman Potomac TRACON Facility Lead	4/24/13 Date	Paul Carroll Potomac TRACON NATCA Lead	4/24/13 Date
Joe Keimig Washington ARTCC Facility Lead	4/18/13 Date	Curt Johnson Washington ARTCC NATCA Lead	4/18/13 Date

OAPM Submission: Washington D.C. Metroplex

FIXET RNAV SID Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issue 14	03 April 2014
Facilities and Areas/Sectors Impacted:	**POCs:**
Washington ARTCC (ZDC) - ZDC 05, 06, 07, 32, 60 Potomac TRACON (PCT) - FLUKY, GRACO, and KRANT	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
BUTRZ, HAFNR, POOCH, and BULRN RNAV SIDs, and RAVNN RNAV STAR	FIXET1 (RNAV) 20130416.tgs

Purpose:
This proposed design addresses eastbound international carriers and general aviation departing Washington Dulles International Airport (IAD) to the east over WOOLY intersection that are in a head-on situation with the TERPZ RNAV SID due to the limitations imposed by the Flight Restricted Zone (FRZ).

Study Team Recommendation:
There was no Study Team recommendation for this design.

OAPM Submission: Washington D.C. Metroplex

FIXET RNAV SID Final Design

Proposed Design:
The Washington DC Design Team is proposing the creation of an ATC assigned RNAV SID named FIXET for Severe Weather Avoidance Plan (SWAP) to support weather induced re-routes (see Figure 1). This procedure will enable Air Traffic Control to provide efficient routing for westbound and southwest bound departures from Baltimore/Washington International Thurgood Marshall Airport (BWI) when weather impacts the TERPZ RNAV SID. The FIXET creates a structured weather re-route reducing control complexity and increasing on-time efficiency for industry.

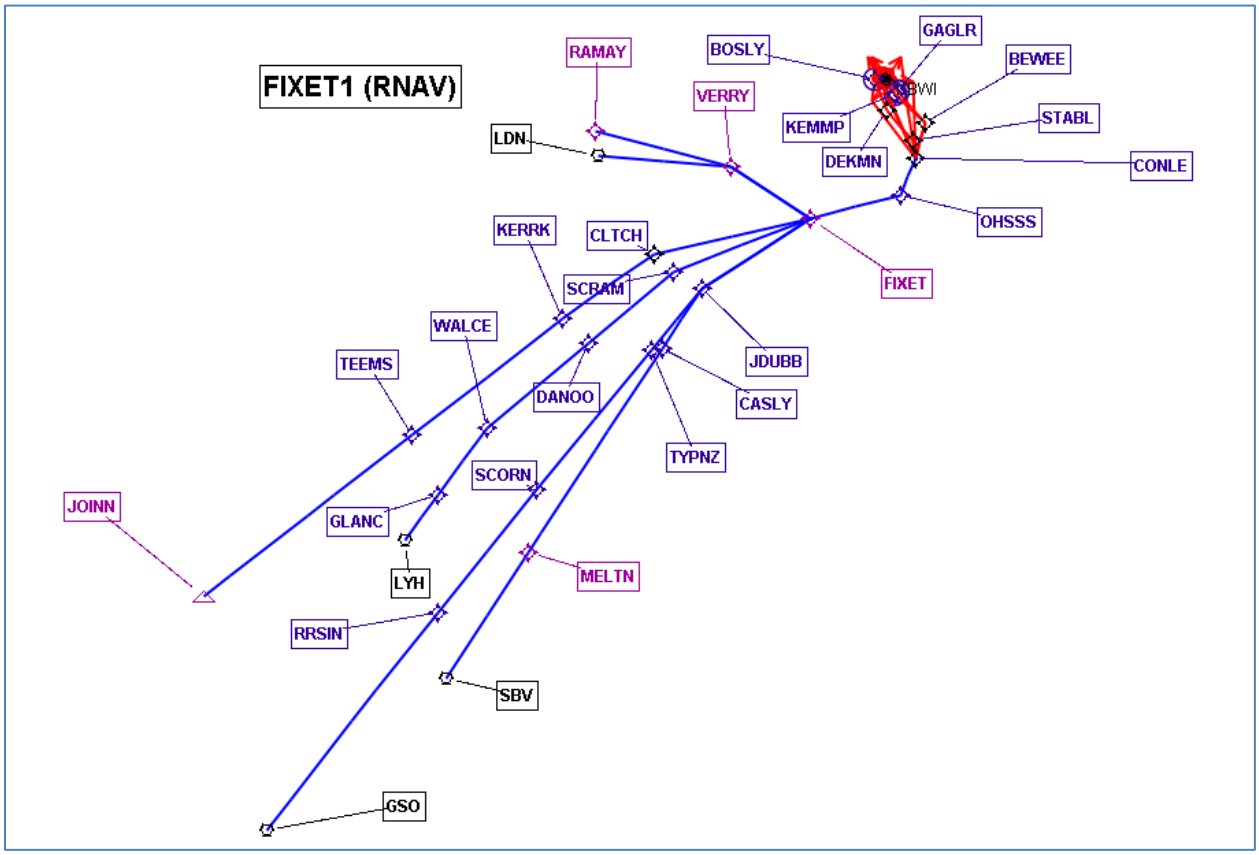


FIGURE 1. PROPOSED DESIGN

Proposed Design and Implementation Dependencies:
This proposed design is dependent on the implementation of the proposed RIGNZ/JCOBY, BUTRZ, HAFNR, POOCH, and BULRN RNAV SIDs, and RAVNN, CAPSS, and TRSTN STARs.

Additional Design Considerations:
This proposal requires modifications to ZDC and PCT Standard Operating Procedures and Letters of Agreement. The proposed changes do not require a spectrum analysis, changes to Manpower, or Facilities and Equipment. Validation through a Human-in-the-Loop simulation was conducted. There is no anticipated increase of operations nor a change to the hours of utilization anticipated on this procedure.

OAPM Submission: Washington D.C. Metroplex

FIXET RNAV SID Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

Dave Perkins Washington D.C. OAPM FAA Lead	04.24.13 Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	April 24, 2013 Date
Bryan Lehman Potomac TRACON Facility Lead	4/24/13 Date	Paul Carroll Potomac TRACON NATCA Lead	4/24/13 Date
Joe Keimig Washington ARTCC Facility Lead	4/18/13 Date	Curt Johnson Washington ARTCC NATCA Lead	4/18/13 Date

OAPM Submission: Washington D.C. Metroplex

TERPZ RNAV SID Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issues 1, 3 6, and 20	3 April 2014
Facilities and Areas/Sectors Impacted:	**POCs:**
Washington ARTCC (ZDC) - ZDC 05, 06, 07, 32, 60 Potomac TRACON (PCT) - BUFFR, FLUKY, WOOLY	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
RIGNZ/JCOBY, BUTRZ, HAFNR, POOCH, and BULRN RNAV SIDs, and RAVNN RNAV STAR	TERPZ4 (RNAV) 20130416.tgs

Purpose:

This proposed design addresses eastbound international carriers and general aviation departing Washington Dulles International Airport (IAD) to the east over WOOLY intersection are in a head-on situation with the TERPZ RNAV SID due to the limitations imposed by the Flight Restricted Zone (FRZ)

Study Team Recommendation:

The Study Team proposed to modify the Baltimore-Washington International Airport (BWI) TERPZ SID to move the WONCE waypoint to optimize departure climbs and turns, add a south exit gate, and shift the applicable parts of the TERPZ SID to support changes to the STOIC SID.

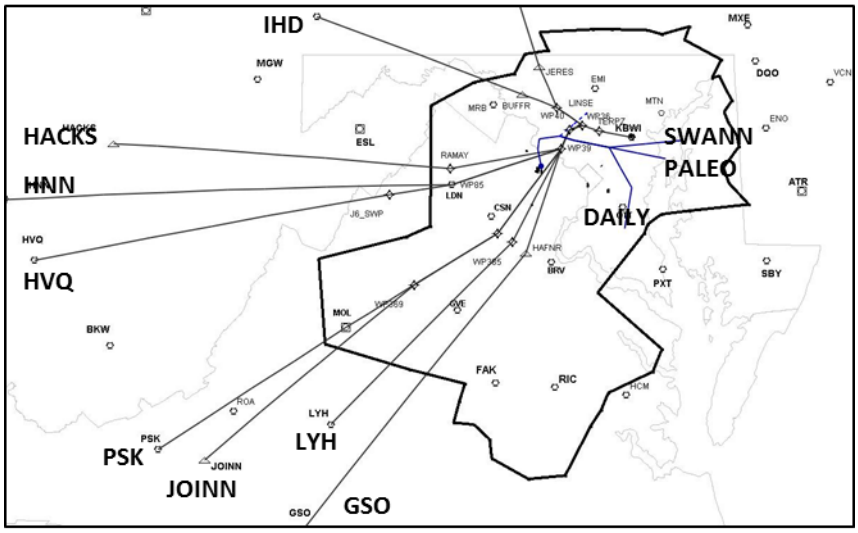


FIGURE 1. STUDY TEAM RECOMMENDATION

OAPM Submission: Washington D.C. Metroplex

TERPZ RNAV SID Final Design

Proposed Design:
The Washington D.C. Metroplex Design Team is proposing the modification of the TERPZ RNAV SID. (see Figures 2 and 3). The TERPZ RNAV SID will be modified by moving the WONCE waypoint slightly to the east to ensure lateral separation with the proposed RIGNZ/JCOBY RNAV SIDs. The westbound transition to RAMAY (Q-68) waypoint and LDN VORTAC (Q-72 & Q-80) will be moved north to allow for approximately 4 nautical mile shorter transition to the departure fixes. An exit gate will be added to the southern transitions increasing flight path predictability and reducing control task complexity. The extended distance of the southern transitions on the TERPZ RNAV SID coupled with the offset of the procedures lateral track will allow the departure climbs to be segregated from the jet route structure. The added capability for departure flow will reduce level offs, control task complexity, and could potentially lessen ground delays.

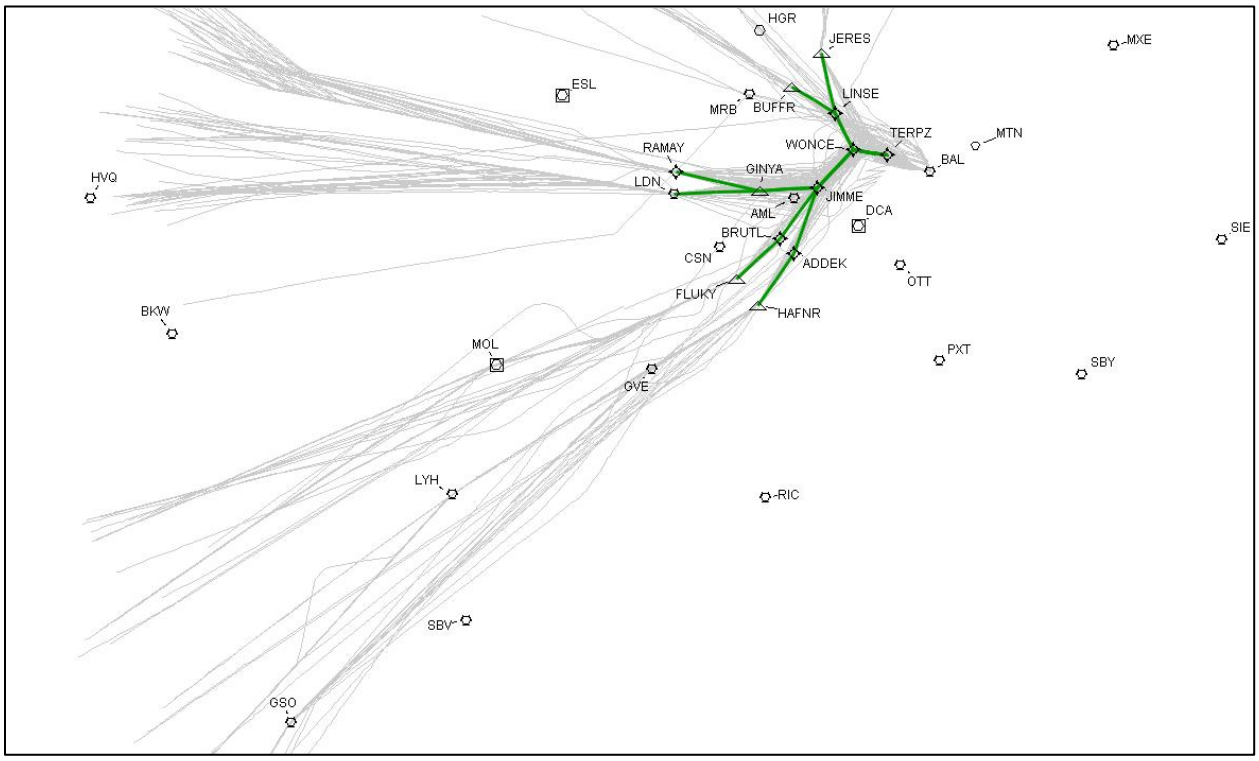


FIGURE 2. CURRENT STATE

OAPM Submission: Washington D.C. Metroplex

TERPZ RNAV SID Final Design

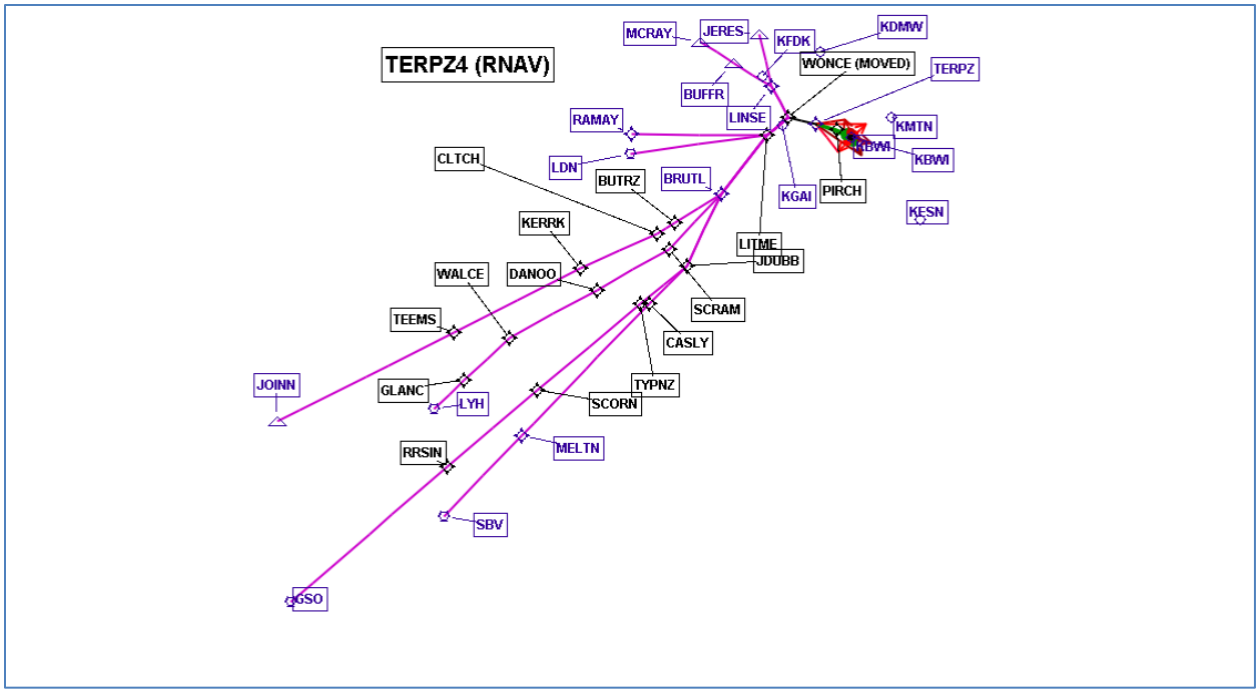


FIGURE 3. PROPOSED DESIGN

<u>Proposed Design and Implementation Dependencies</u>:
This proposed design is dependent on the implementation of the proposed RIGNZ/JCOBY, BUTRZ, HAFNR, POOCH, and BULRN RNAV SIDs, and RAVNN RNAV STAR.

<u>Additional Design Considerations</u>:
This proposal requires modifications to ZDC and PCT Standard Operating Procedures and Letters of Agreement. The proposed changes do not require a spectrum analysis, changes to Manpower, or Facilities and Equipment. Validation through a Human-in-the-Loop simulation was conducted. There is no anticipated increase of operations nor a change to the hours of utilization anticipated on this procedure.

OAPM Submission: Washington D.C. Metroplex

TERPZ RNAV SID Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

Dave Perkins Washington D.C. OAPM FAA Lead	04.24.13 Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	April 24, 2013 Date
Bryan Lehman Potomac TRACON Facility Lead	4/24/13 Date	Paul Carroll Potomac TRACON NATCA Lead	4/24/13 Date
Joe Keimig Washington ARTCC Facility Lead	4/18/13 Date	Curt Johnson Washington ARTCC NATCA Lead	4/18/13 Date

OAPM Submission: Washington D.C. Metroplex

ANTHM RNAV STAR Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issues 16, 32, 34, 35	6 February 2014
Facilities and Areas/Sectors Impacted:	**POCs:**
Washington ARTCC (ZDC) - Sector 15 Potomac TRACON (PCT) - BUFFR, BELAY, BWIFN, BWIFS, and WOOLY Cleveland ARTCC (ZOB)	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
TROYZ RNAV STAR, Airspace change for TROYZ/ANTHM	ANTHM1 (RNAV) 20130416.tgs

Purpose:

This proposed design addresses the following issues identified by the Washington DC Study Team. The conventional Westminster (EMI) STAR for the Baltimore-Washington International Airport (BWI) requires runway transitions to deliver arriving traffic closer to the runway in a more predictable flight path. Jet aircraft arriving on the EMI STAR level off at the BUBBI Fix at 15,000 Feet (FT) Mean Sea Level (MSL), and at the RUANE waypoint at 11,000FT MSL creating a less than optimal flight profile.

Study Team Recommendation:

The Study Team proposed four recommendations to the issues summarized in the purpose section of this document (see Figure 1). The first recommendation was to develop a new RNAV STAR based on the conventional STAR with modifications to bring arrivals closer to the runway. The second recommendation was to add a new altitude restriction of 5,000FT MSL on the Runway (RWY) 33 Left (L) transition west of the airport. The third recommendation was to add a new altitude constraint of 4,000FT MSL on the RWY10 transition at the COLUM waypoint. The last recommendation was to incorporate an Optimal Profile Descent (OPD) into BWI for this arrival procedure.

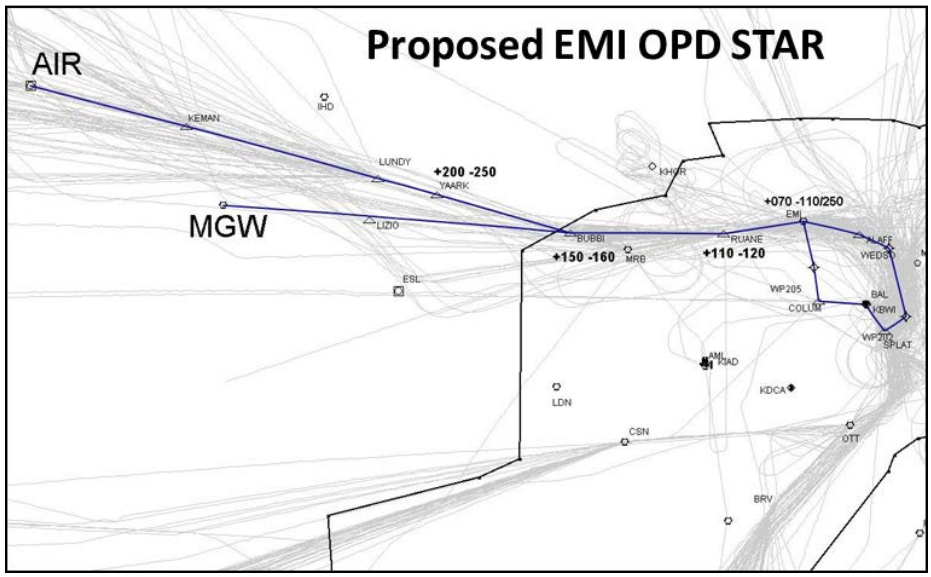


FIGURE 1. STUDY TEAM RECOMMENDATION

OAPM Submission: Washington D.C. Metroplex

ANTHM RNAV STAR Final Design

Proposed Design:

The Washington D.C. Metroplex Design Team is proposing the creation of a new RNAV STAR named ANTHM. The design of the ANTHM RNAV STAR will follow a similar path as the EMI Conventional STAR with the addition of waypoints, two runway transitions, and add an OPD from 29,000 Feet (ft) Mean Sea Level (MSL) to 4,000 ft MSL (see Figures 2 and 3). The two new runway transitions to RWY10 and RWY33L will be closer to the runway and ending at 4,000FT MSL differing from the Study Team Recommendation. The RWY10 transition will proceed south after the ANTHM waypoint to the STRPS waypoint. This transition was modified from the Study Team Recommendation to avoid potential traffic conflicts with WOOLY East airspace and to give controllers added flexibility to sequence traffic with other arrival flows. The RWY33L transition will proceed to the ANTHM waypoint then turn southeast to allow the controller the flexibility to bring an aircraft into the airport for landing or sequence them into other arrival flows when necessary. This transition was modified from the Study Team Recommendation to mitigate potential traffic complexities with the RWY 33L arrivals on the proposed RAVNN and MIIDY RNAV STARs and to de-conflict with RWY33 Right departures.

The ANTHM RNAV STAR will increase flight path predictability, reduce control complexity and will also ensure vertical separation with Victor Airway 377. Additionally it is expected to slightly reduce flight miles.

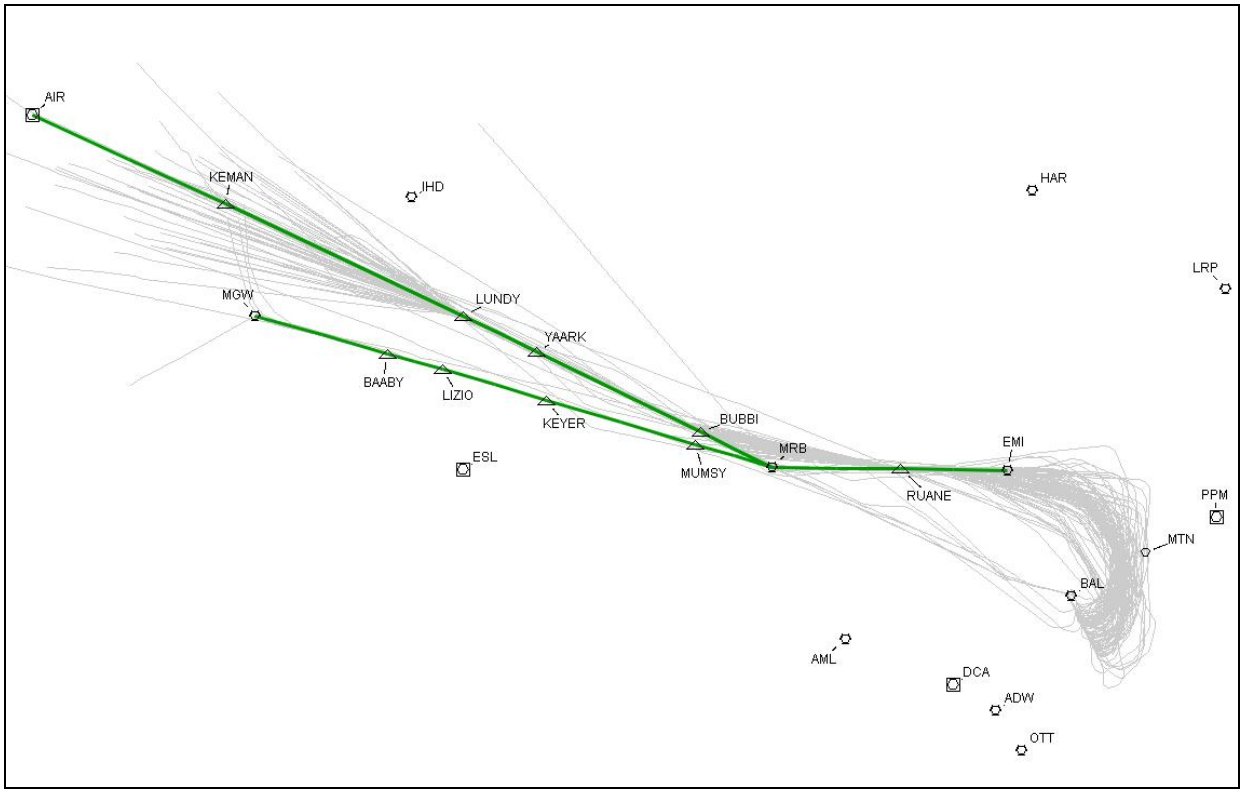


FIGURE 2. CURRENT STATE

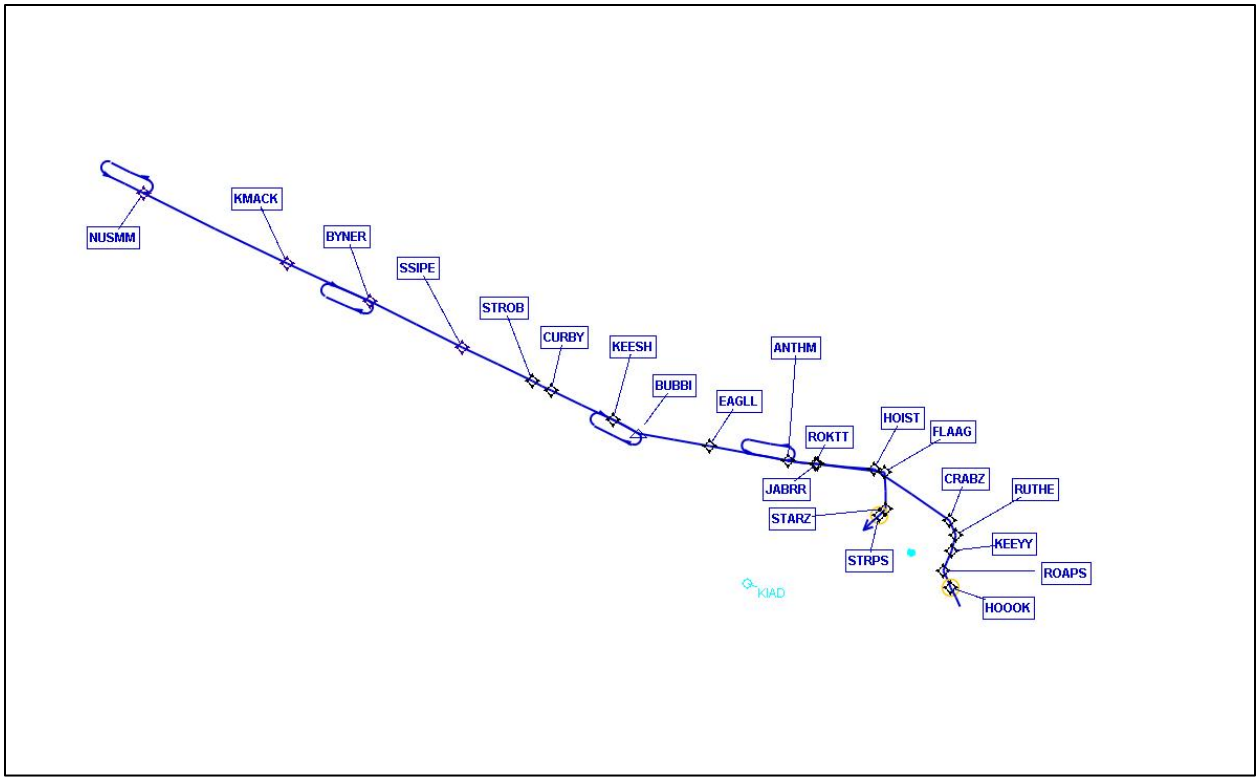


FIGURE 3. PROPOSED DESIGN

<u>Proposed Design and Implementation Dependencies</u>:
This proposed design is dependent on the implementation of the proposed TROYZ RNAV STAR and associated terminal airspace changes.

<u>Additional Design Considerations</u>:
This proposed design requires modifications to ZDC and PCT Standard Operating Procedures and ZDC, PCT, and ZOB Letters of Agreement. The proposed changes do not require a spectrum analysis, changes to Manpower, or Facilities and Equipment. Validation through a Human-in-the-Loop simulation was not conducted. There is no anticipated increase of operations nor a change to the hours of utilization anticipated on this procedure.

OAPM Submission: Washington D.C. Metroplex

ANTHM RNAV STAR Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

04.24.13		April 24 2013	
Dave Perkins Washington D.C. OAPM FAA Lead	Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	Date
4/24/13		4/24/13	
Bryan Lehman Potomac TRACON Facility Lead	Date	Paul Carroll Potomac TRACON NATCA Lead	Date
4/18/13		4/18/13	
Joe Keimig Washington ARTCC Facility Lead	Date	Curt Johnson Washington ARTCC NATCA Lead	Date

OAPM Submission: Washington D.C. Metroplex

MIIDY RNAV STAR Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issue 12	12 December 2013
Facilities and Areas/Sectors Impacted:	**POCs:**
Washington ARTCC (ZDC) - Sector 53 Potomac TRACON (PCT) - PALEO, GRACO and BWIFS	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
RAVNN RNAV STAR and MIIDY Airspace Redesign	MIIDY1 (RNAV) 20130416.tgs

Purpose:
This proposed design addresses the following issue identified by the Washington D.C. Metroplex Study Team. The Baltimore-Washington International Airport (BWI) RAVNN STAR has no established transition for arrivals between the BILIT to NAVEY waypoints causing air traffic control task complexity issues.

Study Team Recommendation:
The Study Team proposed two recommendations to the issue summarized in the purpose section of this document (see Figure 1). The first recommendation was to add a new transition to the RAVNN STAR from ZIZZI waypoint, to the BILIT waypoint, to the NAVEY waypoint with an altitude restriction of 5,000 Feet (FT) Mean Sea Level (MSL). The second recommendation was to add enroute transitions to the RAVNN STAR with start points including HVQ, BKW, GSO, RDU, and TYI NAVAIDs.

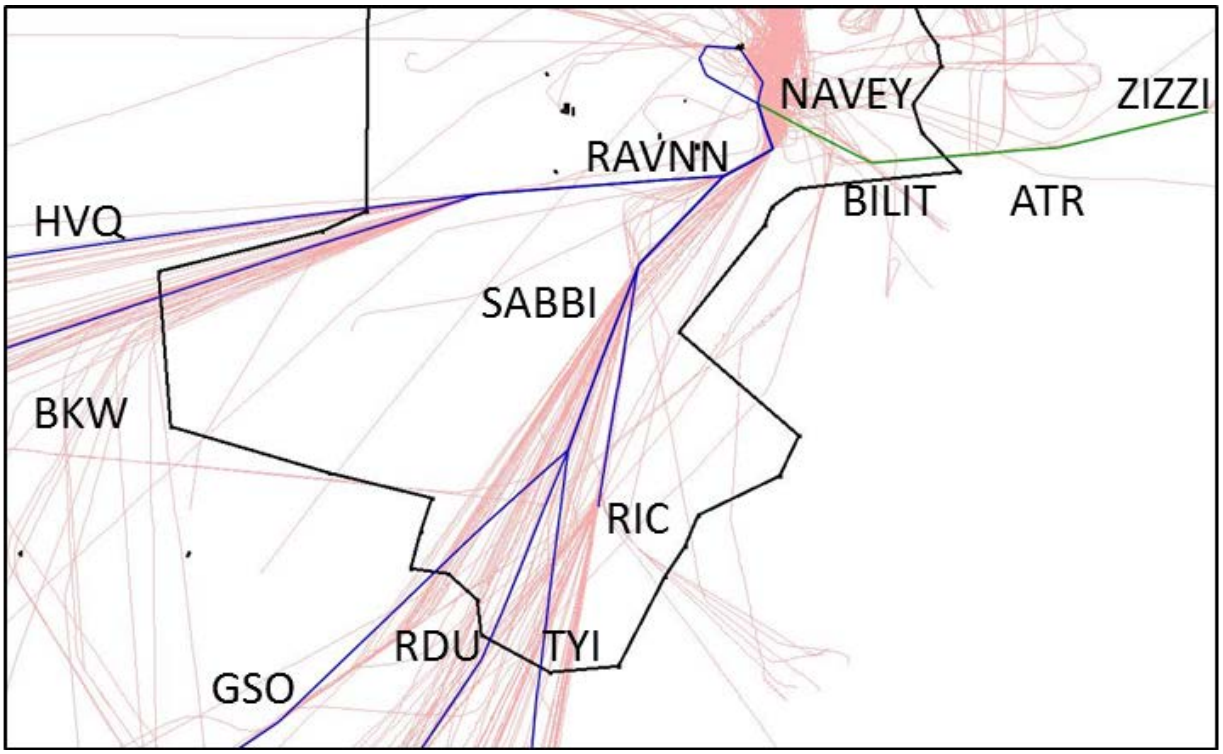


FIGURE 1. STUDY TEAM RECOMMENDATION

OAPM Submission: Washington D.C. Metroplex

MIIDY RNAV STAR Final Design

Proposed Design:
The Washington D.C. Metroplex Design Team is proposing the creation of a new RNAV STAR named MIIDY (see Figure 2). This proposed design addresses the first Study Team Recommendation to add a new transition to the RAVNN RNAV STAR. The runway transitions begin at MIIDY waypoint. The east configuration runway transition is deconflicted with RWY15 Right departure traffic and RAVNN RNAV STAR arrival traffic. The west configuration runway transition is designed to allow the availability to join the final approach procedures. The creation of the MIIDY RNAV STAR will reduce control complexity and increase flight path predictability.

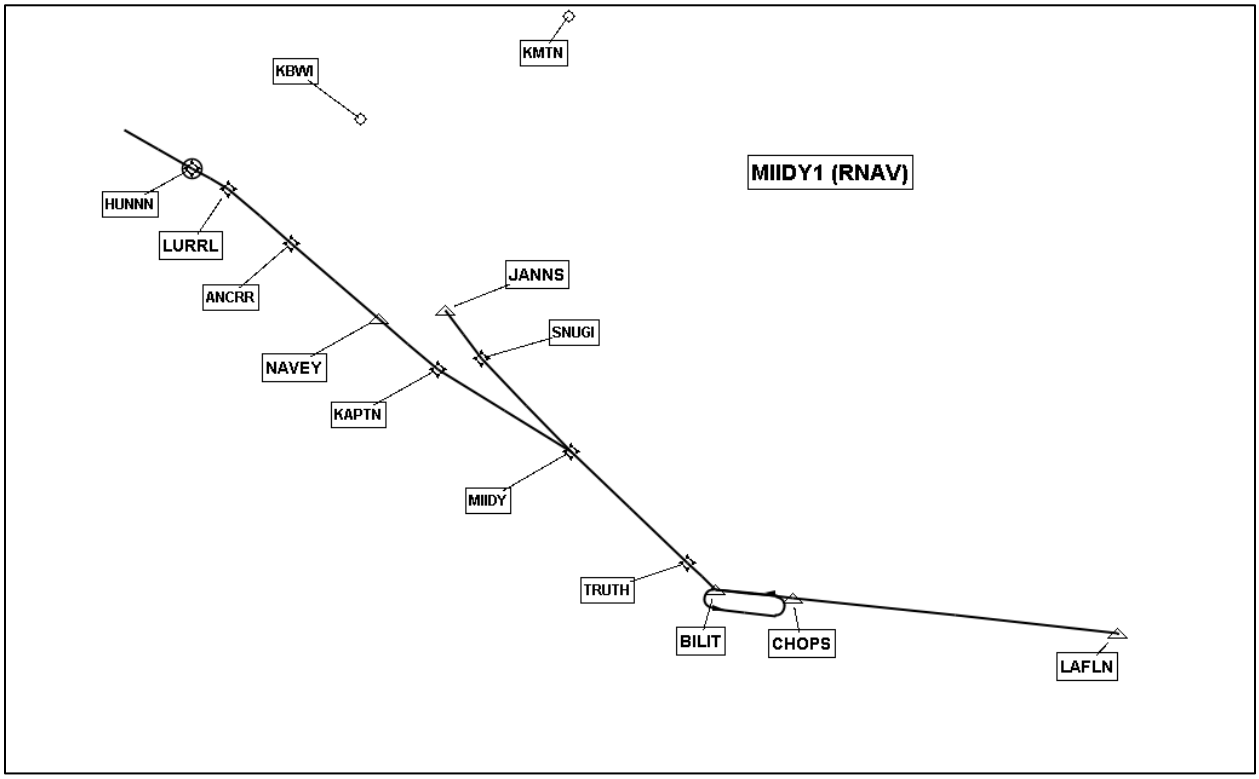


FIGURE 2. PROPOSED DESIGN

Proposed Design and Implementation Dependencies:
The MIIDY RNAV STAR implementation is dependent on the implementation of the proposed RAVNN RNAV STAR and its associated airspace changes.

Additional Design Considerations:
This proposal requires modifications to ZDC and PCT Standard Operating Procedures and Letters of Agreement. The proposed changes do not require a spectrum analysis, changes to manpower or Facilities and Equipment (F&E). Validation through a Human-in-the-Loop simulation is not anticipated. There is no anticipated increase of operations nor a change to the hours of utilization anticipated on this procedure.

OAPM Submission: Washington D.C. Metroplex

MIIDY RNAV STAR Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

04.24.13		April 24, 2013	
Dave Perkins Washington D.C. OAPM FAA Lead	Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	Date
4/24/13		4/24/13	
Bryan Lehman Potomac TRACON Facility Lead	Date	Paul Carroll Potomac TRACON NATCA Lead	Date
4/18/13		4/18/13	
Joe Keimig Washington ARTCC Facility Lead	Date	Curt Johnson Washington ARTCC NATCA Lead	Date

OAPM Submission: Washington D.C. Metroplex

RAVNN RNAV STAR Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issue 12	12 December 2013
Facilities and Areas/Sectors Impacted:	**POCs:**
Washington ARTCC (ZDC) - Sectors 2, 14, 16, 20, 32, 36, 37, 38 *Potomac* TRACON (PCT) - DEALE, ENSUE, FLUKY, KRANT, OJAAY, TYSON and BWIFS	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
MIIDY, DEALE, SPISY, VUDOO, CAVLR, CAPSS, and TRSTN RNAV STARs, BULRN, DIXXE, BUTRZ, POOCH, and HAFNR RNAV SIDs and CAPSS/HOWLL/RAVNN Airspace Redesign	RAVNN4 (RNAV) 20130416.tgs

Purpose:
This proposed design addresses the following issue identified by the Washington D.C. Metroplex Study Team. The Baltimore-Washington International Airport (BWI) RAVNN RNAV STAR has no established transition for arrivals between the BILIT to NAVEY waypoints causing air traffic control task complexity issues.

Study Team Recommendation:
The Study Team proposed to add enroute transitions to the RAVNN RNAV STAR starting at HVQ, BKW, GSO, RDU, and TYI VORTACs.

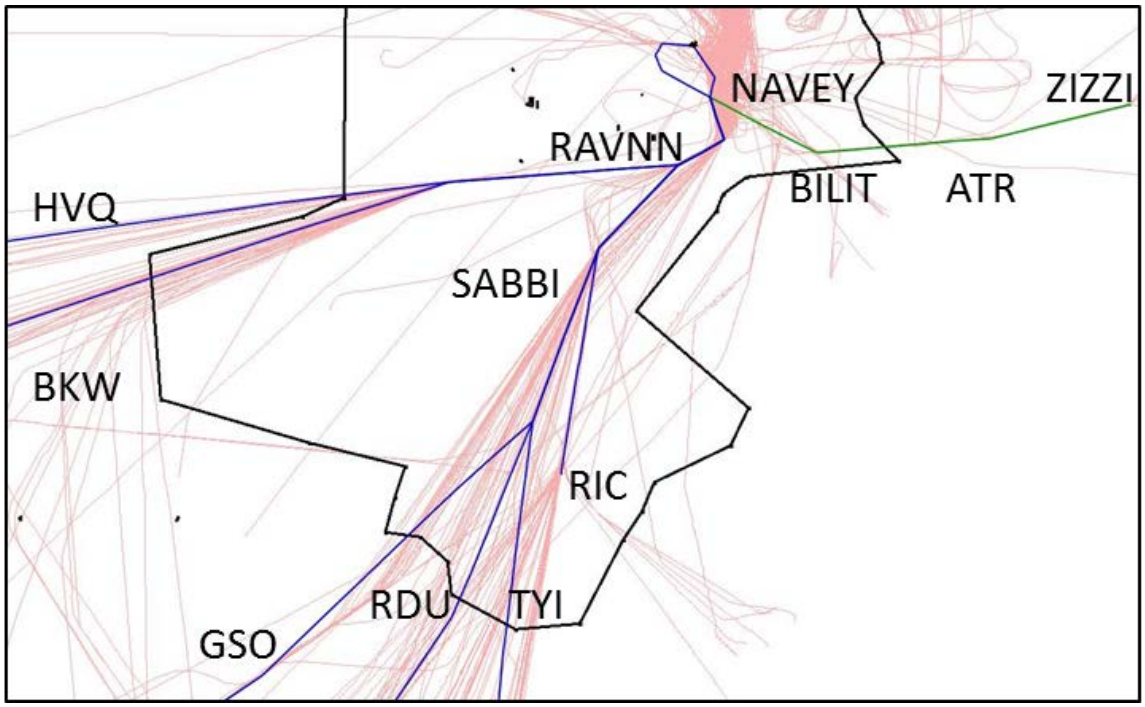


FIGURE 1. STUDY TEAM RECOMMENDATION

OAPM Submission: Washington D.C. Metroplex

RAVNN RNAV STAR Final Design

<u>Proposed Design</u>:

The Washington D.C. Design Team is proposing the modification of the RAVNN RNAV STAR to include four enroute transitions (see Figures 2 and 3). The proposed design is procedurally separated from Washington Dulles International (IAD) and Ronald Reagan Washington National Airport (DCA) arrivals.

The runway transitions will begin at the RAVNN waypoint. The east configuration runway transition is deconflicted with RWY15 Right departure traffic and MIIDY RNAV STAR arrival traffic. The west configuration runway transition is designed to allow the availability to join the final approach procedures. These changes will reduce control complexity, increase flight path predictability, enable the Optimized Profile Descent (OPD), and reduce fuel burn and CO2 emissions.

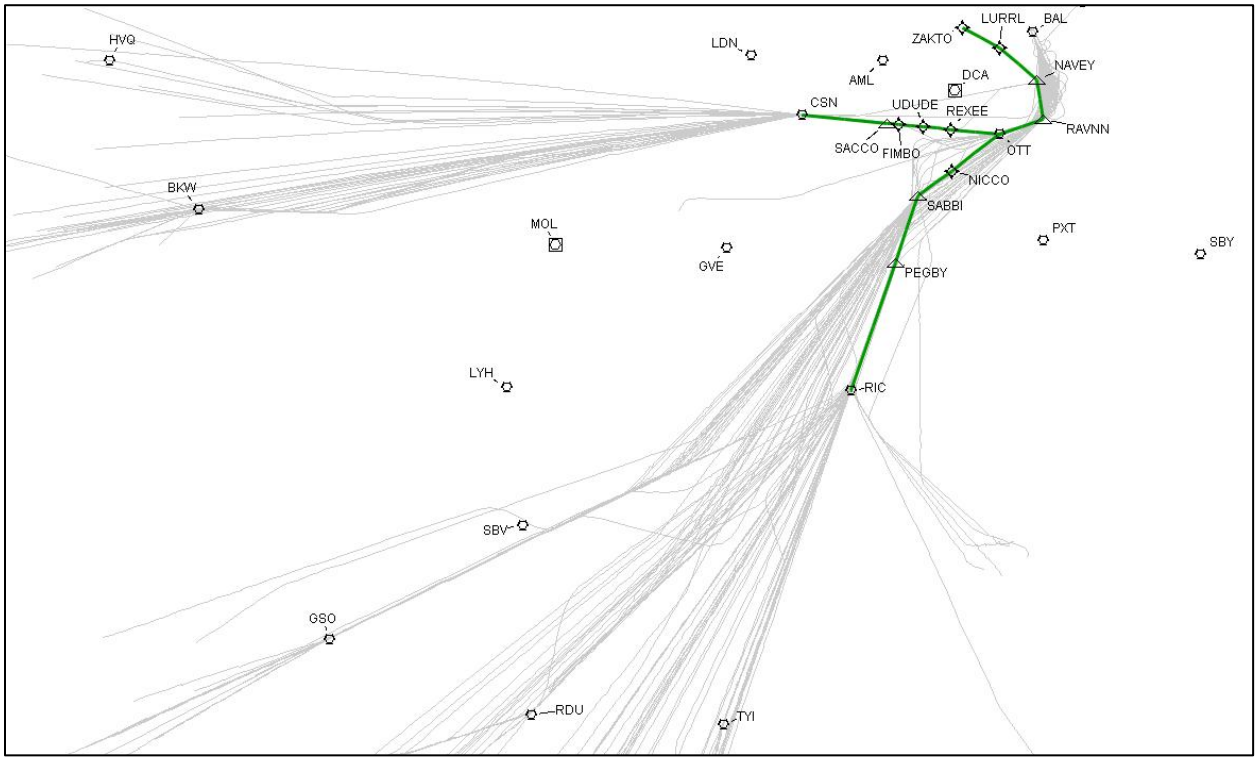


FIGURE 2. CURRENT STATE

OAPM Submission: Washington D.C. Metroplex

RAVNN RNAV STAR Final Design

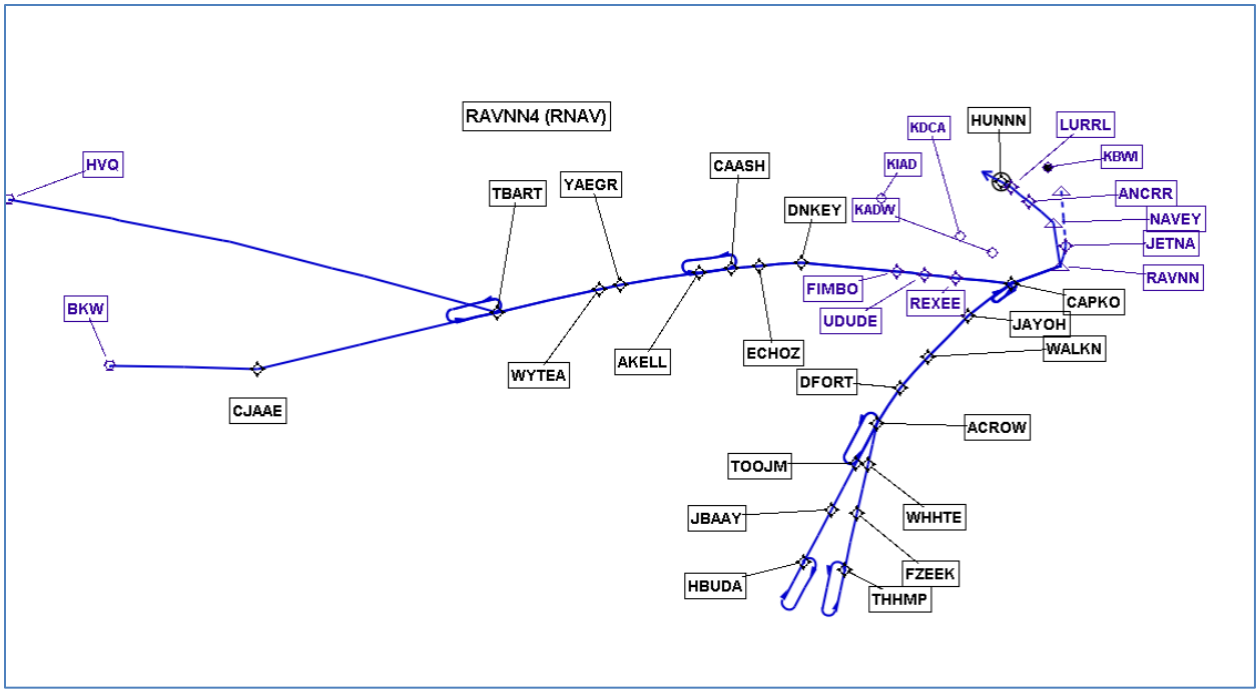


FIGURE 3. PROPOSED DESIGN

<u>Proposed Design and Implementation Dependencies</u>:
This proposed design is dependent on the implementation of the proposed MIIDY, DEALE, SPISY, VUDOO, CAVLR, CAPSS, and TRSTN RNAV STARs, BULRN, DIXXE, BUTRZ, POOCH, and HAFNR RNAV SIDs and CAPSS/HOWLL/RAVNN Airspace Redesign.

<u>Additional Design Considerations</u>:
ZDC and PCT Standard Operating Procedures and Letters of Agreement will need to be modified. The proposed changes do not require a spectrum analysis, changes to Manpower, or Facilities and Equipment. Validation through a Human-in-the-Loop simulation was conducted. There is no anticipated increase of operations or a change to the hours of utilization on this procedure.

OAPM Submission: Washington D.C. Metroplex

RAVNN RNAV STAR Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

04/24/13		April 24, 2013	
Dave Perkins Washington D.C. OAPM FAA Lead	Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	Date
4/24/13		4/24/13	
Bryan Lehman Potomac TRACON Facility Lead	Date	Paul Carroll Potomac TRACON NATCA Lead	Date
4/18/13		4/18/13	
Joe Keimig Washington ARTCC Facility Lead	Date	Curt Johnson Washington ARTCC NATCA Lead	Date

OAPM Submission: Washington D.C. Metroplex

TROYZ RNAV STAR Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issues 17, 47	06 February 2013
Facilities and Areas/Sectors Impacted:	**POCs:**
New York ARTCC (ZNY) - Sector 25 Potomac TRACON (PCT) - BELAY, BWIFS, BWIFN, WOOLY, and GRACO	- PCT, B. Lehman - PCT, P. Carroll - ZNY
Related/Dependent Proposals:	**Associated Data Files:**
ANTHM RNAV STARs and Airspace Change ANTHM/TROYZ	TROYZ1 (RNAV) 20130416.tgs

Purpose:
This proposed design addresses the following issues identified by the Washington DC Study Team. The Baltimore-Washington International Airport (BWI) arrivals need to decrease dependency on ground-based navigation aids and decrease the use of routine radar vectors and "direct-to" clearances by the air traffic controller over Modena (MXE) VORTAC.

Study Team Recommendation:
The Study Team proposed one recommendation to develop a new Performance Based Navigation (PBN) STAR beginning in ZNY airspace at MXE, transition into PCT airspace by connecting to TROYZ waypoint, then BELAY waypoint (see Figure 1). The development of this PBN STAR would reduce the need for air traffic control to provide manual routing of arrivals over MXE and reduce reliance on ground-based navigational aids.

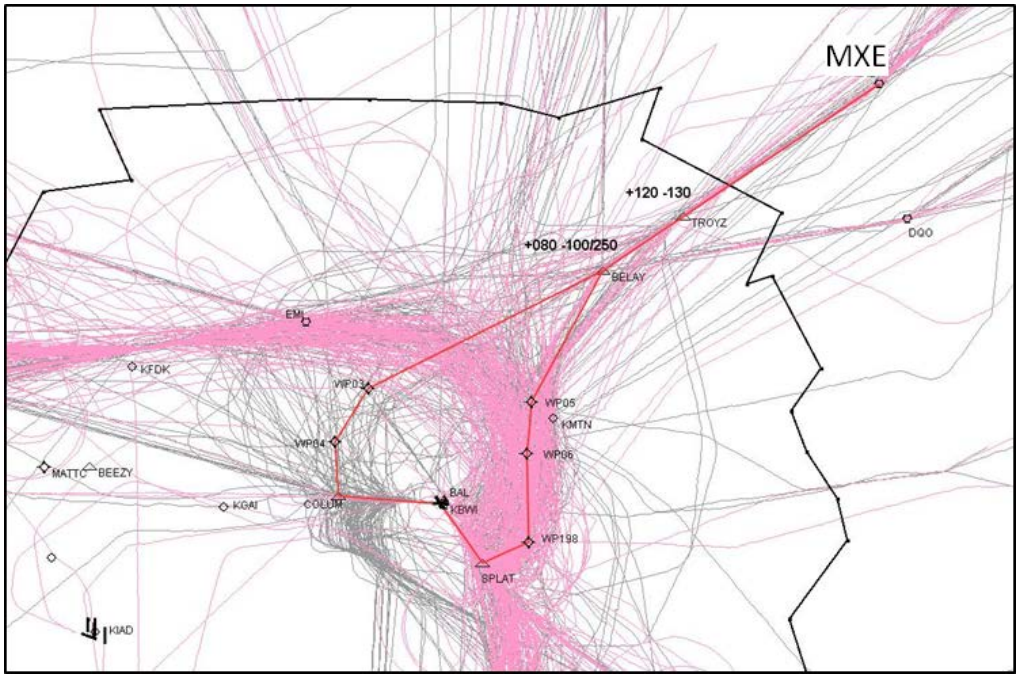


FIGURE 1. STUDY TEAM RECOMMENDATION

OAPM Submission: Washington D.C. Metroplex

TROYZ RNAV STAR Final Design

<u>Proposed Design</u>:

The Washington D.C. Metroplex Design Team is proposing the creation of a new RNAV STAR named TROYZ (see Figure 2 and 3). The creation of the TROYZ RNAV STAR will change the flow of traffic from V378 to the RNAV Procedure. This change will increase flight path predictability and reduce control complexity. The runway transitions will begin at the FREEE waypoint and the procedure is designed to allow the availability to join the final approach procedures. The west configuration transition will allow the controller the flexibility to bring an aircraft into the airport for landing or sequence them into other arrival flows when necessary.

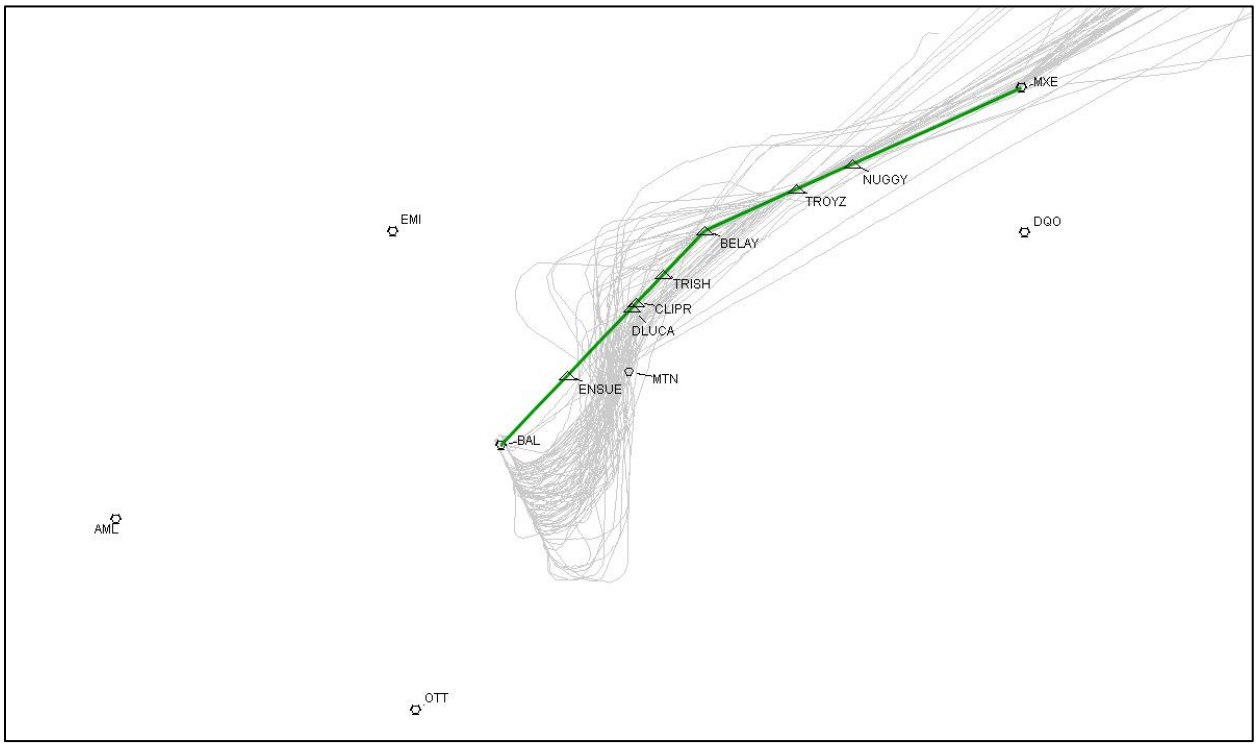


FIGURE 2. CURRENT STATE (V-378)

OAPM Submission: Washington D.C. Metroplex

TROYZ RNAV STAR Final Design

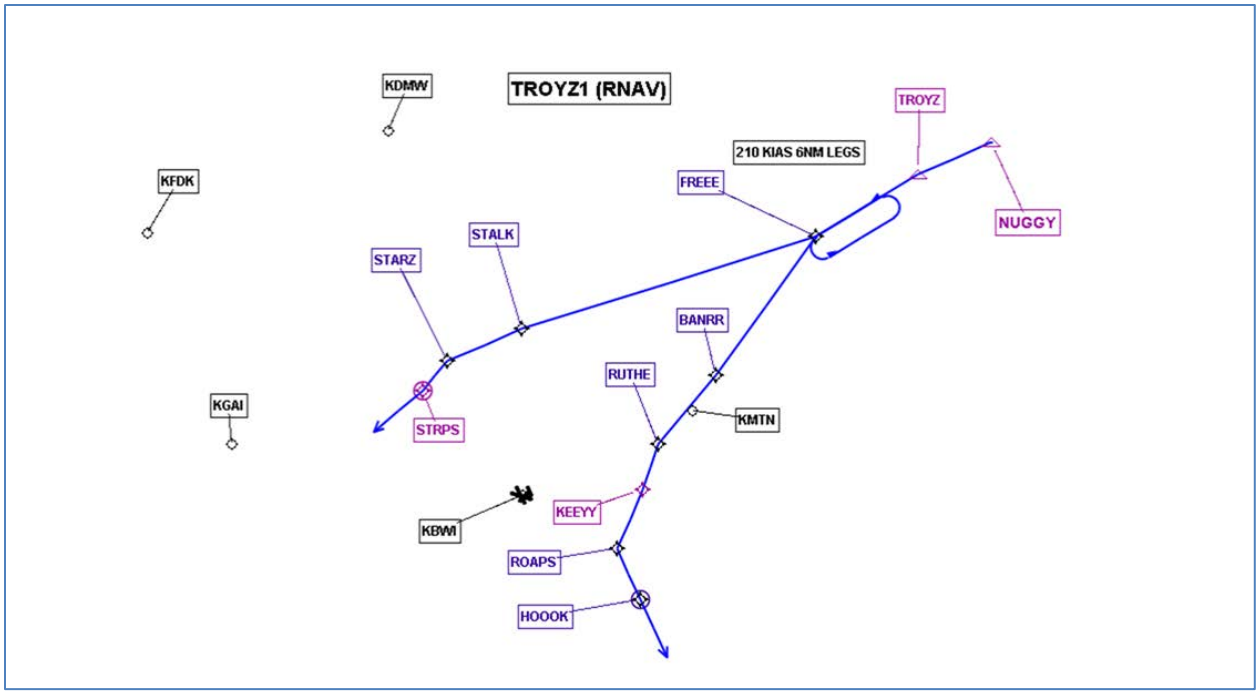


FIGURE 3. PROPOSED DESIGN

<u>Proposed Design and Implementation Dependencies</u>:

The TROYZ STAR implementation is the dependent of the implementation of the proposed new ANTHM RNAV STAR and associated airspace changes.

<u>Additional Design Considerations</u>:

This proposed design requires modifications to ZNY and PCT Standard Operating Procedures and Letters of Agreement. The proposed changes will not require a spectrum analysis. No changes to Manpower, or Facilities and Equipment are expected. Validation through a Human-in-the-Loop simulation was conducted. There is no anticipated increase of operations nor a change to the hours of utilization anticipated on this procedure.

OAPM Submission: Washington D.C. Metroplex

TROYZ RNAV STAR Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

Dave Perkins Washington D.C. OAPM FAA Lead	04.24.13 Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	April 24, 2013 Date
Bryan Lehman Potomac TRACON Facility Lead	4/24/13 Date	Paul Carroll Potomac TRACON NATCA Lead	4/24/13 Date
New York ARTCC Facility Rep	Date	New York ARTCC NATCA Rep	Date

OAPM Submission: Washington D.C. Metroplex

BUTRZ, DIXXE, DOCTR, HAFNR, HORTO, POOCH, REBLL, SOOKI, WYNGS RNAV SIDs

Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issue 2 Reliance on Radar Vectors	3 April 2014
Facilities and Areas/Sectors Impacted:	**POCs:**
Washington ARTCC (ZDC) - 5, 6, 7, 11, 14, 17, 19, 22, 31, 32, 52, 53, 58, 59, 60, 72 Potomac TRACON (PCT) - KRANT, TYSON, LURAY, FLUKY, ENSUE, DEALE, BUFFR and OJAAY	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
DEALE, RAVNN, CAPSS, TRUPS, ANTHM, VUDOO and FRDMM RNAV STARs, BULRN, TERPZ, BLUES and RNLDI RNAV SIDs and CAPPS/CAVLR/RAVNN airspace redesign	BUTRZ1 (RNAV) 20130416.tgs DIXXE1 (RNAV) 20130416.tgs DOCTR1 (RNAV) 20130416.tgs HAFNR1 (RNAV) 20130416.tgs HORTO1 (RNAV) 20130416.tgs POOCH1 (RNAV) 20130416.tgs REBLL1 (RNAV) 20130416.tgs SOOKI1 (RNAV) 20130416.tgs WYNGS1 (RNAV) 20130416.tgs

Purpose:

The purpose of this design addresses a reliance on radar vectors contributing to ATC task complexity and flight path variability identified by the Washington D.C. Metroplex Study Team.

Study Team Recommendation:

The Study Team recommended the development of optimized Performance Based Navigation (PBN) departure procedures and extensions to the LAZIR and HAMMI RNAV Standard Instrument Departures (SID).

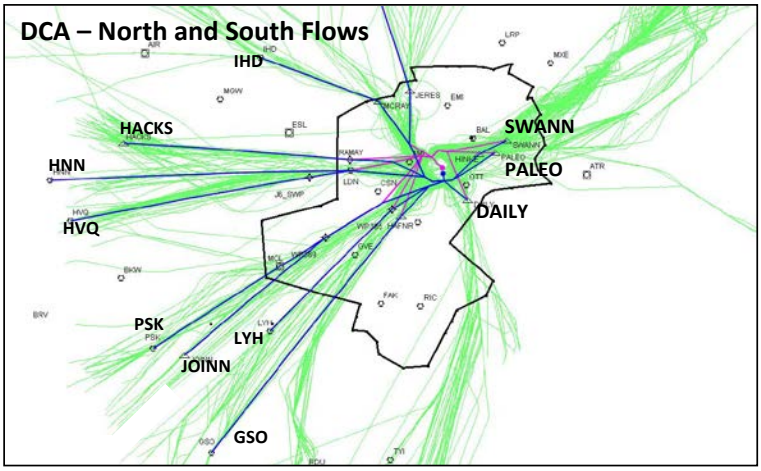


FIGURE 1. STUDY TEAM RECOMMENDATION

OAPM Submission: Washington D.C. Metroplex

BUTRZ, DIXXE, DOCTR, HAFNR, HORTO, POOCH, REBLL, SOOKI, WYNGS RNAV SIDs

Final Design

Proposed Design:

The Washington D.C. Metroplex Design Team is proposing the creation of nine RNAV SIDS departing Ronald Reagan Washington National Airport (DCA). These SIDS replace the LAZIR RNAV SID and will extend further into the enroute environment. The HAMMI was discontinued due to procedural flaws and expected flight path discontinuity. The proposed SIDs are named as follows:

1. BUTRZ RNAV SID
2. DIXXE RNAV SID
3. DOCTR RNAV SID
4. HAFNR RNAV SID
5. HORTO RNAV SID
6. POOCH RNAV SID
7. REBLL RNAV SID
8. SOOKI RNAV SID
9. WYNGS RNAV SID

Each SID will be integrated into the automated preferential departure routing system to reduce control complexity for DCA tower and for the potential erroneous SID assignment. The design team analyzed combining the SIDs to reduce the number of procedures, however determined that it would decrease the efficiency of flight tracks. This analysis led to the determination that nine unique RNAV SIDS would provide greater benefits and efficiencies. The designs use the same initial coding and waypoints as the current LAZIR4 RNAV SID to COVTO waypoint and provide a consistent departure track over the Potomac River utilizing PBN procedures to avoid Prohibited Area (P-56A and P-56B).

Refer to Figure 2 for the current state of the SIDs at DCA.

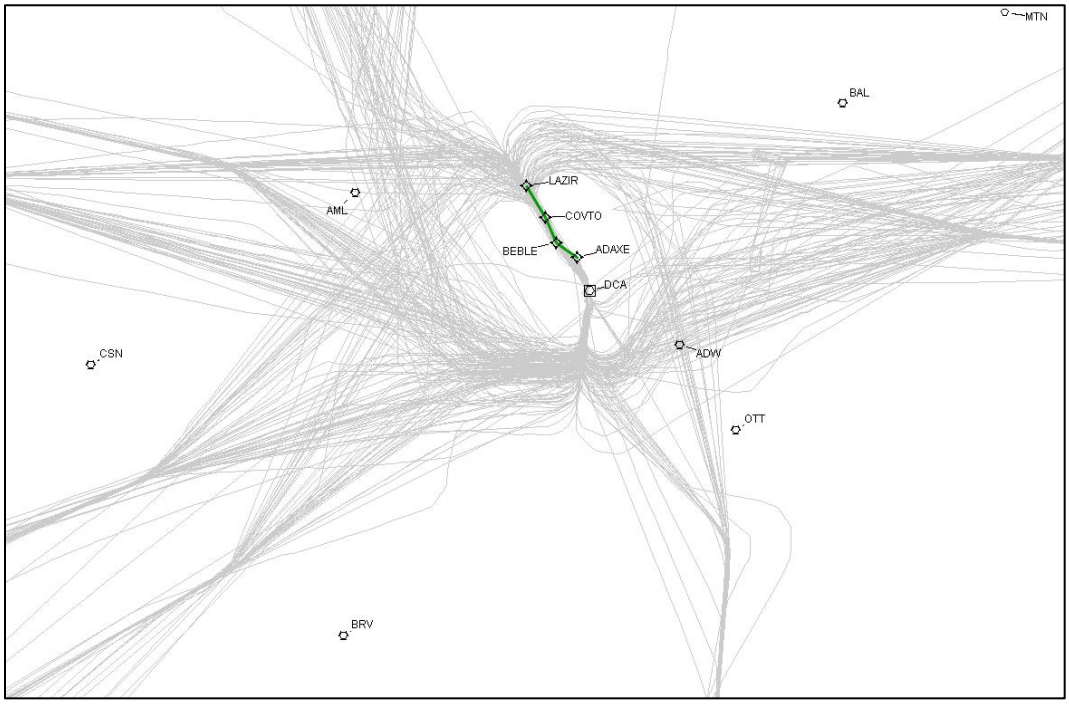


FIGURE 2 CURRENT STATE

OAPM Submission: Washington D.C. Metroplex

BUTRZ, DIXXE, DOCTR, HAFNR, HORTO, POOCH, REBLL, SOOKI, WYNGS RNAV SIDs

Final Design

A brief description of each SID is described in the following paragraphs.

BUTRZ RNAZ SID

The BUTRZ RNAV SID will service departures filed over J48 and J22 via JOINN waypoint. In a north operation the procedure will mimic the LAZIR4 until COVTO waypoint. At COVTO waypoint the procedure turns southwest and joins the enroute transitions at BUTRZ waypoint. In a south operation the runway transitions place the departures over the Potomac River before proceeding westbound. The procedure will then track west to BUTRZ waypoint and joins the enroute transitions. The proposed design allows for the sequencing of this SID with the IAD BULRN SID. The BUTRZ RNAV STAR will reduce control task complexity and increase flight path predictability. The BUTRZ, POOCH and HAFNR RNAV SIDs join new departure RNAV routes through ZDC60 sector.

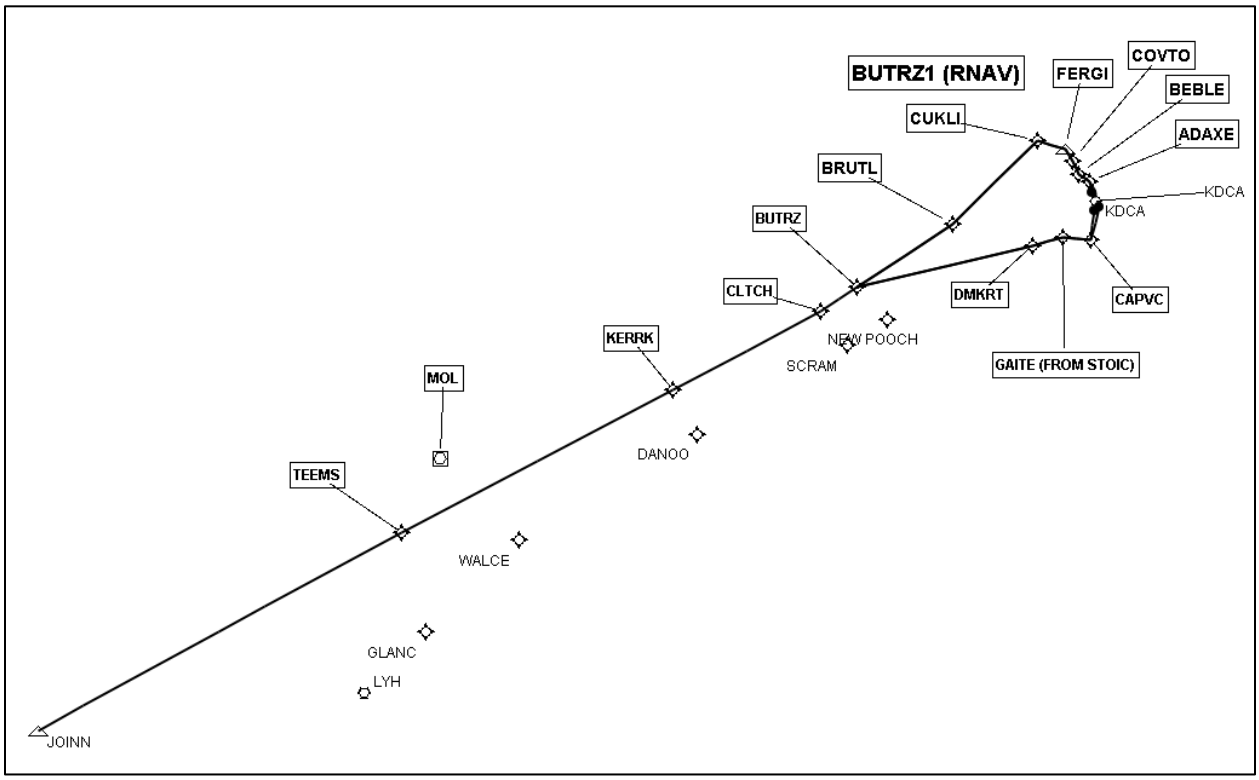


FIGURE 3. PROPOSED DESIGN - BUTRZ

OAPM Submission: Washington D.C. Metroplex

BUTRZ, DIXXE, DOCTR, HAFNR, HORTO, POOCH, REBLL, SOOKI, WYNGS RNAV SIDs

Final Design

DIXXE RNAV SID

The DIXXE RNAV SID will service departures filed over J61 and V33. In a north operation the procedure will mimic the LAZIR4 until COVTO waypoint. At COVTO the procedure turns southeast and joins the enroute transition at DIXXE waypoint. In a south operation the runway transition places the departure over the Potomac River before proceeding southeast. The proposed design allows for the sequencing of this SID with the IAD RIGNZ RNAV SID and the BWI CONLE RNAV SID. The DIXXE RNAV SID will reduce control task complexity and increase flight path predictability.

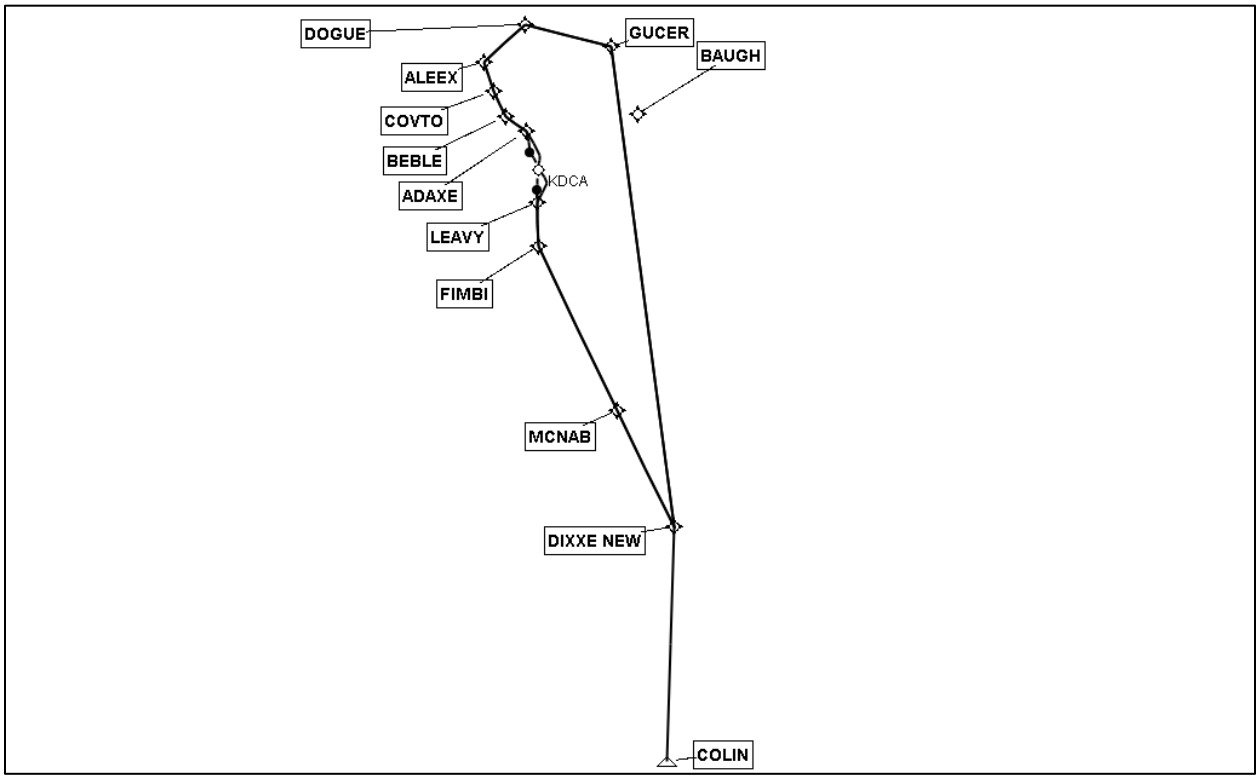


FIGURE 4. PROPOSED DESIGN - DIXIE

OAPM Submission: Washington D.C. Metroplex

BUTRZ, DIXXE, DOCTR, HAFNR, HORTO, POOCH, REBLL, SOOKI, WYNGS RNAV SIDs

Final Design

DOCTR RNAV SID

The DOCTR RNAV SID will service departures filed over PALEO fix. In a north operation the procedure will mimic the LAZIR4 until COVTO waypoint. At COVTO the procedure turns east and joins the enroute transition at DOCTR waypoint. The procedure will then track northeast to DOCTR waypoint and joins the enroute transition. In a south operation the runway transition places the departure over the Potomac River before proceeding eastbound. The proposed design allows for the sequencing of this SID with the IAD RIGNZ RNAV SID. The DOCTR RNAV SID will reduce control task complexity, increase flight path predictability and was developed to work in tandem with the proposed SOOKI RNAV SID.

This design incorporates a new Preferred Routing to join V44 at AGARD fix in lieu of PALEO fix.

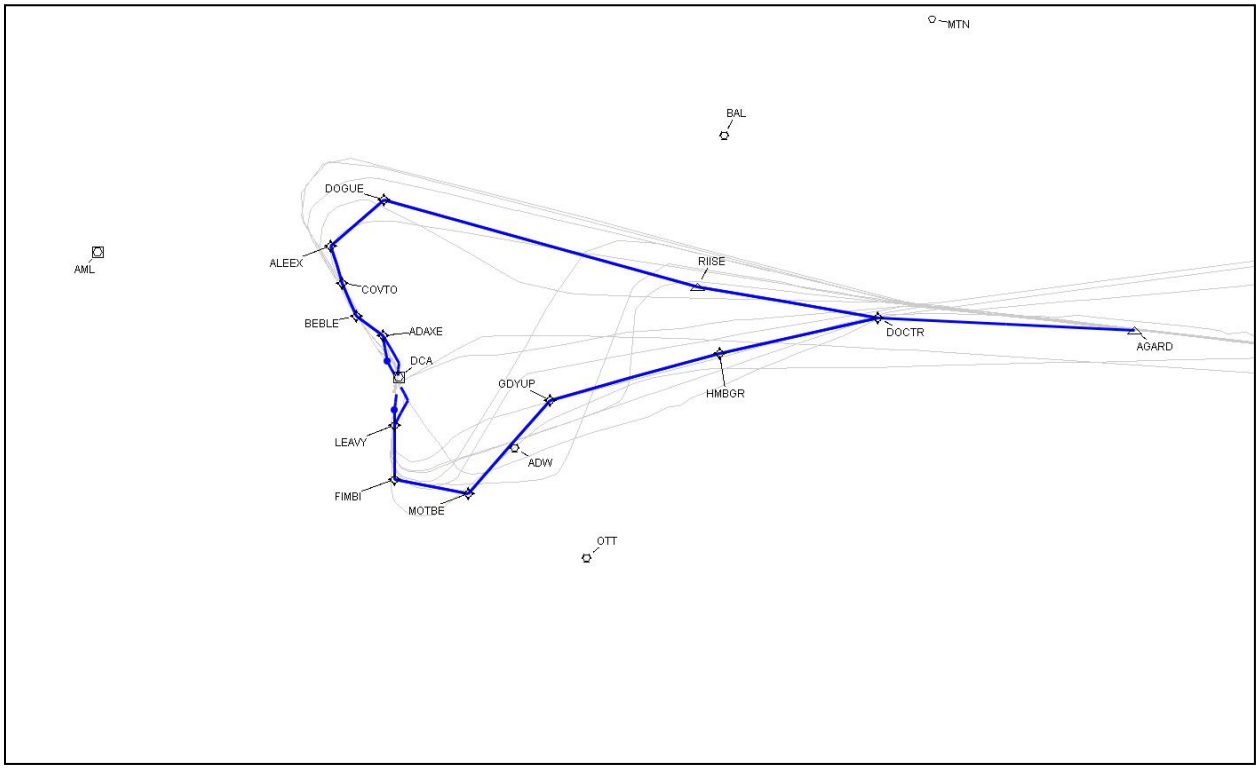


FIGURE 5. PROPOSED DESIGN - DOCTR

OAPM Submission: Washington D.C. Metroplex

BUTRZ, DIXXE, DOCTR, HAFNR, HORTO, POOCH, REBLL, SOOKI, WYNGS RNAV SIDs

Final Design

HAFNR RNAV SID

The HAFNR RNAV SID will service departures filed over Greensboro (GSO) and South Boston (SBV) VORTACs. In a north operation the procedure will mimic the LAZIR4 until COVTO waypoint. At COVTO waypoint the procedure turns southwest and joins the enroute transitions at HAFNR waypoint. In a south operation the runway transitions place the departures over the Potomac River before proceeding westbound. The procedure will then track west to HAFNR waypoint and joins the enroute transitions. The proposed design allows for the sequencing of this SID with the IAD BULRN SID. The HAFNR RNAV STAR will reduce control task complexity and increase flight path predictability. The BUTRZ, POOCH and HAFNR RNAV SIDs join new departure RNAV routes through ZDC60 sector.

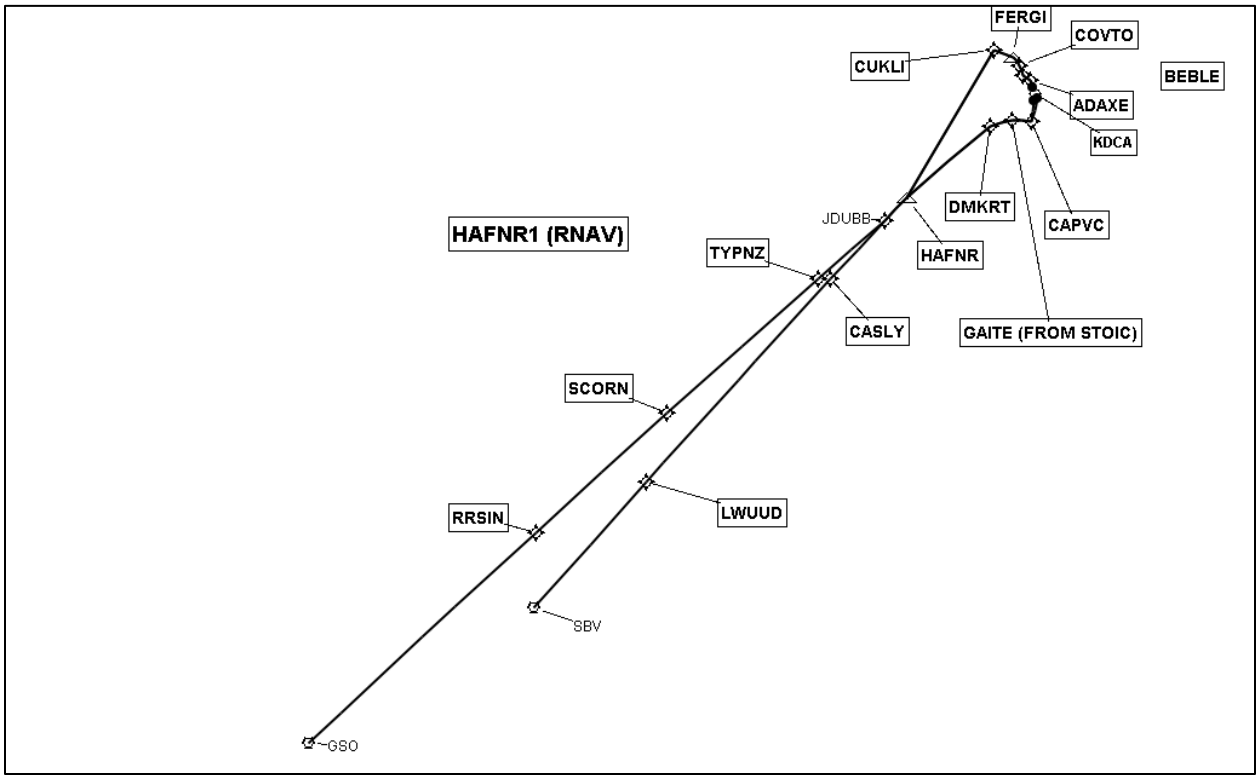


FIGURE 6. PROPOSED DESIGN - HAFNR

OAPM Submission: Washington D.C. Metroplex

BUTRZ, DIXXE, DOCTR, HAFNR, HORTO, POOCH, REBLL, SOOKI, WYNGS RNAV SIDs

Final Design

HORTO RNAV SID

The HORTO RNAV SID will service departures filed over J220, J211 and J518. In a north operation the procedure will mimic the LAZIR4 until COVTO waypoint. At COVTO waypoint the procedure turns northwest and joins the enroute transitions at HORTO waypoint. In a south operation the runway transitions place the departures over the Potomac River before proceeding westbound. The procedure will then track northwest to HORTO waypoint and joins the enroute transitions. The HORTO RNAV SID will reduce control task complexity and increase flight path predictability.

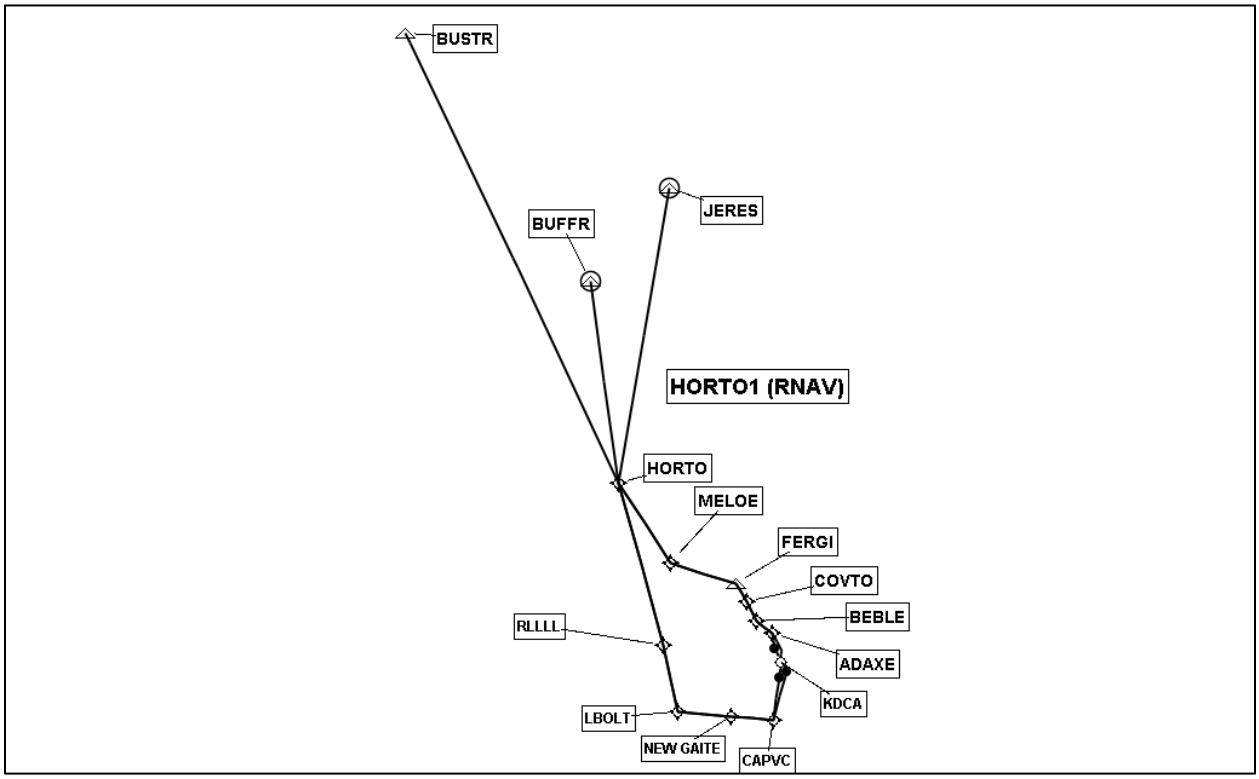


FIGURE 7. PROPOSED DESIGN - HORTO

OAPM Submission: Washington D.C. Metroplex

BUTRZ, DIXXE, DOCTR, HAFNR, HORTO, POOCH, REBLL, SOOKI, WYNGS RNAV SIDs

Final Design

POOCH RNAV SID

The POOCH RNAV SID will service departures filed over Lynchburg (LYH) VORTAC. In a north operation the procedure will mimic the LAZIR4 until COVTO waypoint. At COVTO waypoint the procedure turns southwest and joins the enroute transitions at POOCH waypoint. In a south operation the runway transitions place the departures over the Potomac River before proceeding westbound. The procedure will then track west to POOCH waypoint and joins the enroute transitions. The proposed design allows for the sequencing of this SID with the IAD BULRN SID. The POOCH RNAV STAR will reduce control task complexity and increase flight path predictability. The BUTRZ, POOCH and HAFNR RNAV SIDs join new departure RNAV routes through ZDC60 sector.

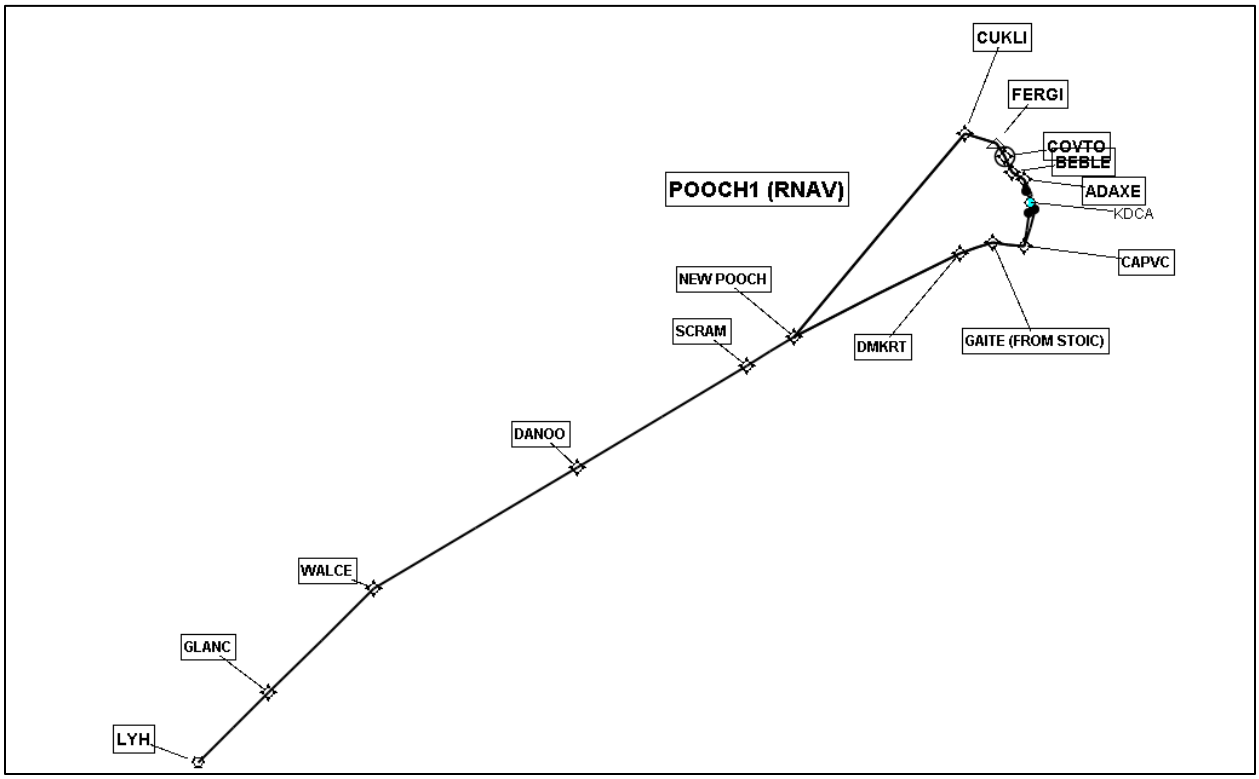


FIGURE 8. PROPOSED DESIGN - POOCH

OAPM Submission: Washington D.C. Metroplex

BUTRZ, DIXXE, DOCTR, HAFNR, HORTO, POOCH, REBLL, SOOKI, WYNGS RNAV SIDs

Final Design

REBLL RNAV SID

The REBLL RNAV SID will service departures filed over J134 and J6. In a north operation the procedure will mimic the LAZIR4 until COVTO waypoint. At COVTO waypoint the procedure turns west and joins the enroute transitions at REBLL waypoint. In a south operation the runway transitions place the departures over the Potomac River before proceeding westbound. The procedure will then track west to REBLL waypoint and joins the enroute transitions. The proposed design allows for the sequencing of this SID with the IAD BLUES and BUNZZ SIDs. The REBLL RNAV SID will reduce control task complexity and increase flight path predictability.

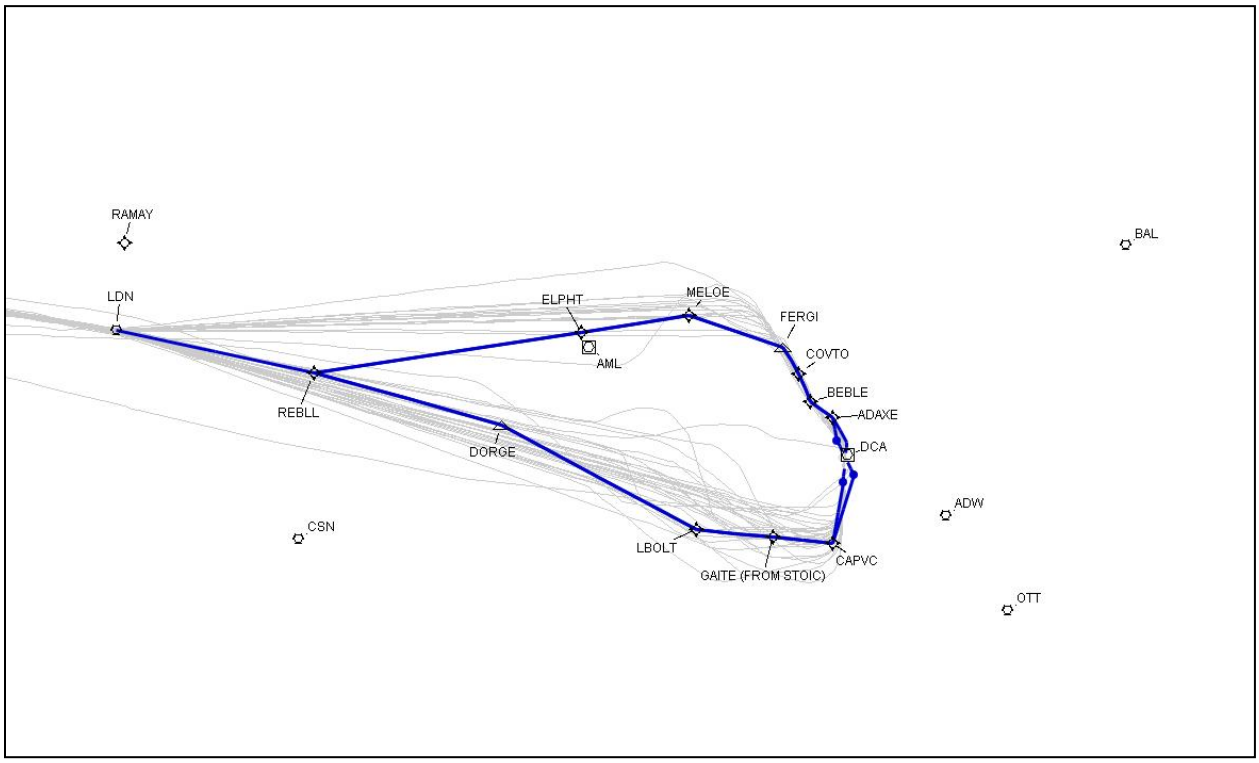


FIGURE 9. PROPOSED DESIGN - REBEL

OAPM Submission: Washington D.C. Metroplex

BUTRZ, DIXXE, DOCTR, HAFNR, HORTO, POOCH, REBLL, SOOKI, WYNGS RNAV SIDs

Final Design

SOOKI RNAV SID

The SOOKI RNAV SID will service departures filed over SWANN. In a north operation the procedure will mimic the LAZIR4 until COVTO waypoint. At COVTO the procedure turns east and joins the enroute transition at SOOKI waypoint. In a south operation the runway transition places the departures over the Potomac River before proceeding eastbound. The procedure will then track northeast to SOOKI waypoint and joins the enroute transition. The proposed design allows for the sequencing of this SID with the IAD RIGNZ SID. The SOOKI RNAV SID will reduce control task complexity, increase flight path predictability and was developed to work in tandem with the proposed DOCTR RNAV SID.

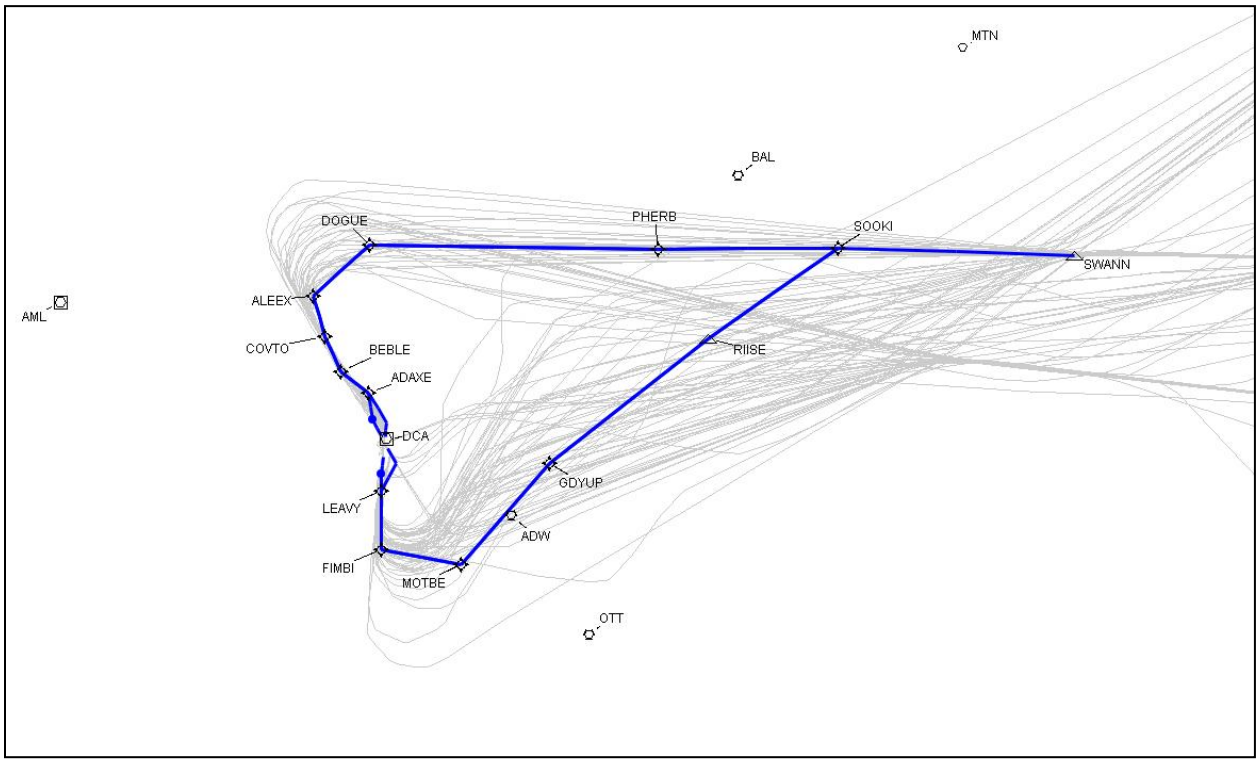


FIGURE 10. PROPOSED DESIGN - SOOKI

OAPM Submission: Washington D.C. Metroplex

BUTRZ, DIXXE, DOCTR, HAFNR, HORTO, POOCH, REBLL, SOOKI, WYNGS RNAV SIDs

Final Design

WYNGS RNAV SID

The WYNGS RNAV SID will service departures filed over J149. In a north operation the procedure will mimic the LAZIR4 until COVTO waypoint. At COVTO waypoint the procedure turns west and joins the enroute transitions at WYNGS waypoint. In a south operation the runway transitions place the departures over the Potomac River before proceeding westbound. The procedure will then track west to WYNGS waypoint and joins the enroute transitions. The proposed design allows for the sequencing of this SID with the IAD BLUES and BUNZZ SIDs. The WYNGS RNAV SID will reduce control task complexity and increase flight path predictability.

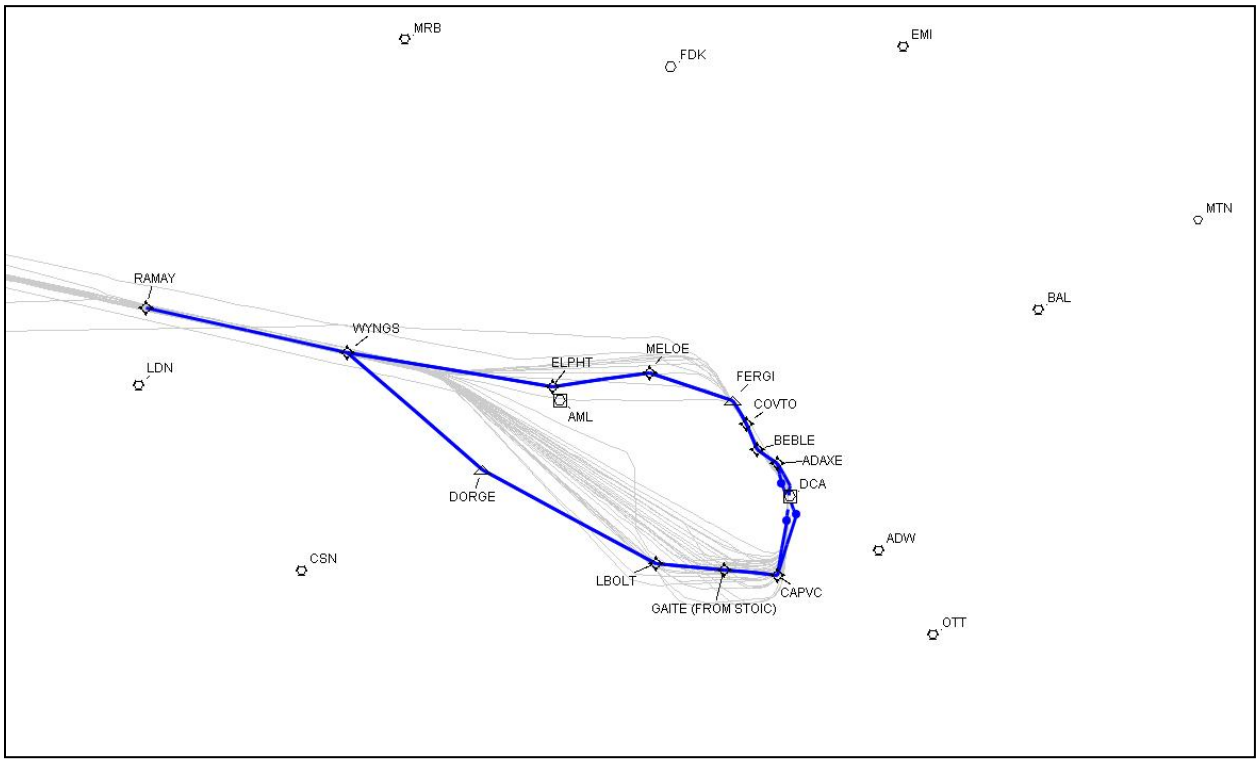


FIGURE 11. PROPOSED DESIGN - WYNGS

OAPM Submission: Washington D.C. Metroplex

BUTRZ, DIXXE, DOCTR, HAFNR, HORTO, POOCH, REBLL, SOOKI, WYNGS RNAV SIDs

Final Design

Proposed Design and Implementation Dependencies:
These designs are dependent on the implementation of the proposed DEALE, RAVNN, CAPSS, TRUPS, ANTHM, VUDOO and FRDMM RNAV STARs, BULRN, TERPZ, BLUES and BUNZZ RNAV SIDs and CAPPS/CAVLR/RAVNN airspace redesign.

Additional Design Considerations:
This proposal requires modifications to ZDC and PCT Standard Operating Procedures and ZDC, PCT, DCA ATCT Letters of Agreement. This proposed change does not require a spectrum analysis, changes to Manpower, or Facilities and Equipment. Validation through a Human-in-the-Loop simulation is not anticipated. There is no anticipated increase of operations or a change to the hours of utilization anticipated on this procedure.

Any future changes to leg coding or fix locations associated with the LAZIR4 RNAV SID will require integration into all of the proposed RNAV SIDs prior to implementation.

OAPM Submission: Washington D.C. Metroplex

BUTRZ, DIXXE, DOCTR, HAFNR, HORTO, POOCH, REBLL, SOOKI, WYNGS RNAV SIDs

Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

Dave Perkins Washington D.C. OAPM FAA Lead	04.24.13 Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	Apr. 24, 2013 Date
Bryan Lehman Potomac TRACON Facility Lead	4/24/13 Date	Paul Carroll Potomac TRACON NATCA Lead	4/24/13 Date
Joe Keimig Washington ARTCC Facility Lead	4/18/13 Date	Curt Johnson Washington ARTCC NATCA Lead	4/18/13 Date

OAPM Submission: Washington D.C. Metroplex

CAPSS RNAV STAR Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issue 30, 32, 33	12 December 2013
Facilities and Areas/Sectors Impacted:	POCs:
Washington (ZDC) - Sectors 20 and 14 Potomac TRACON (PCT) - OJAAY, DEALE, BARIN, TYSON, TAPPA and DCAFR	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
RAVNN, CAVLR, VUDOO and TRSTN RNAV STARs and the CAPSS/CAVLR/RAVNN airspace redesign	CAPSS1 (RNAV) 20130416.tgs

Purpose:
The existing OJAAY arrival has numerous altitude level offs at Flight Level 27,000 (FL270), FL220, and 10,000 Feet (FT) identified by the Washington D.C. Study Team.

Study Team Recommendation:
The Study Team proposed two recommendations to resolve the airspace and procedure design constraints (see Figure 1). The first was to create an Optimal Profile Descent (OPD) in the procedure and the second was to change the airspace in the following sectors; ZDC16, 20, 14 and 12.

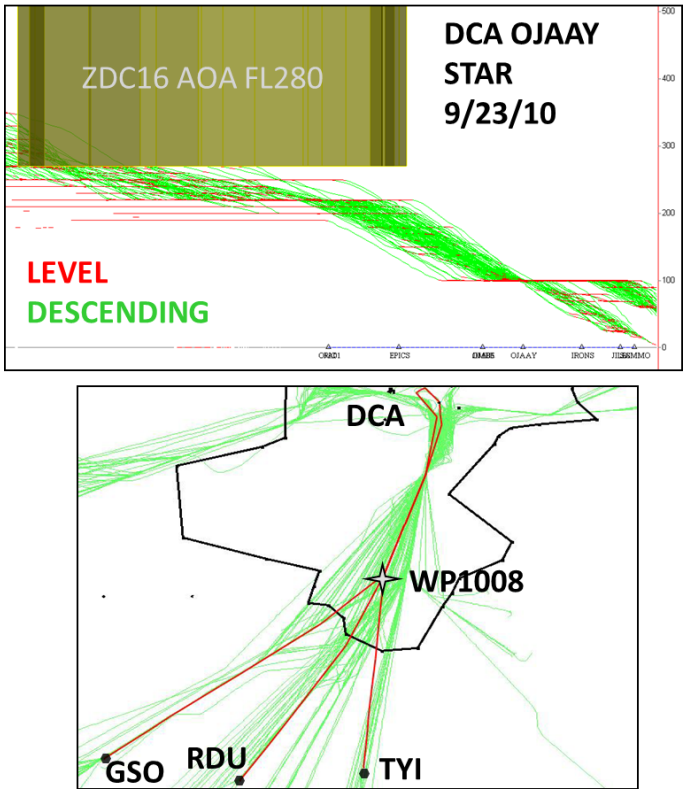


FIGURE 1. STUDY TEAM RECOMMENDATION

OAPM Submission: Washington D.C. Metroplex

CAPSS RNAV STAR Final Design

Proposed Design:

The Washington D.C. Metroplex Design Team is proposing the creation of a new RNAV STAR named CAPSS to replace the OJAAY RNAV STAR (see Figures 2 and 3). A transition from THHMP waypoint allows for the traffic originating in the vicinity of the Richmond and Norfolk Airports access to the new RNAV STAR.

Holding patterns are incorporated at WAVES, BULII, and CAPSS waypoints. These are optional holding patterns to reduce control task complexity and cockpit workload. A runway transition was added to support a north configuration at Ronald Reagan Washington National Airport (DCA).

These changes will laterally and/or vertically separate DCA arrivals from the Andrews Air Force Base and Baltimore/Washington International Thurgood Marshall Airport (BWI) arrivals enabling an OPD without restructuring enroute airspace. Industry support and the analysis of industry flight simulations determined the CAPSS RNAV STAR could be utilized as an OPD. The overall benefits from this procedure are anticipated to be reduced fuel burn and CO2 emissions, less level offs, increased flight path predictability and reduced control task complexity.

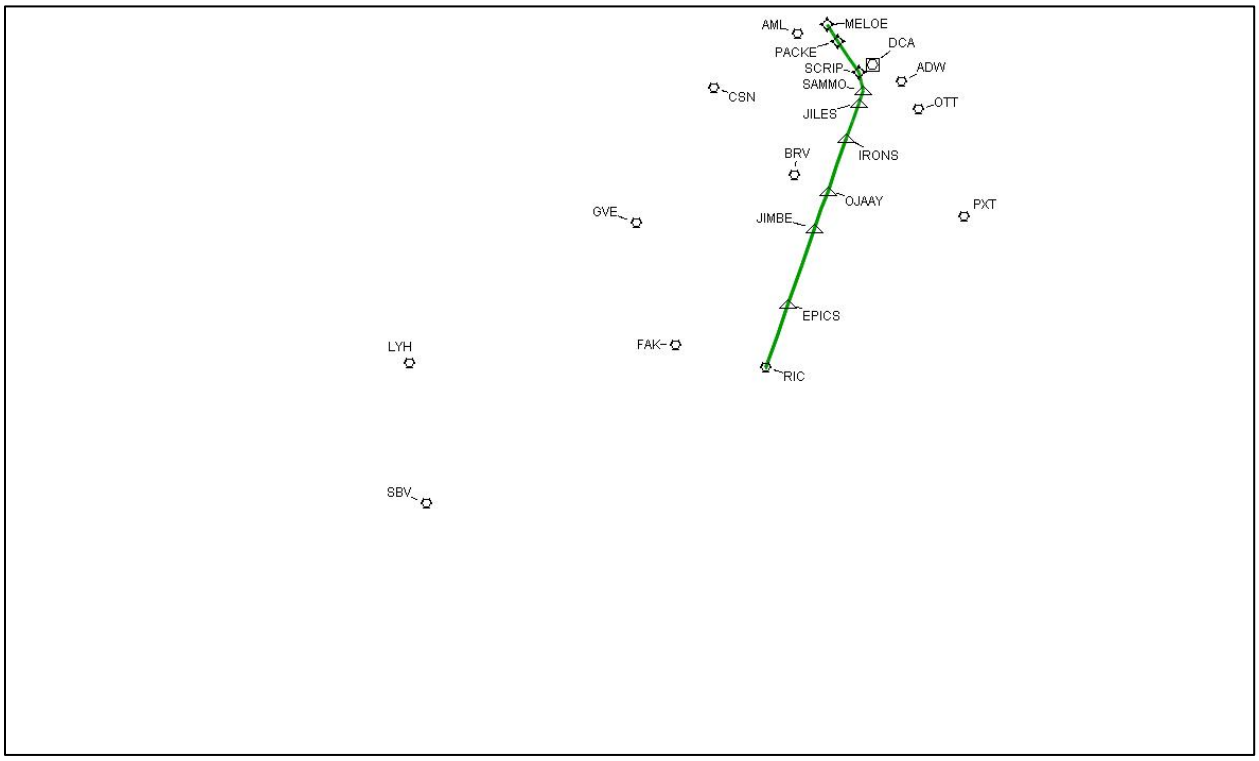


FIGURE 2. CURRENT STATE

OAPM Submission: Washington D.C. Metroplex

CAPSS RNAV STAR Final Design

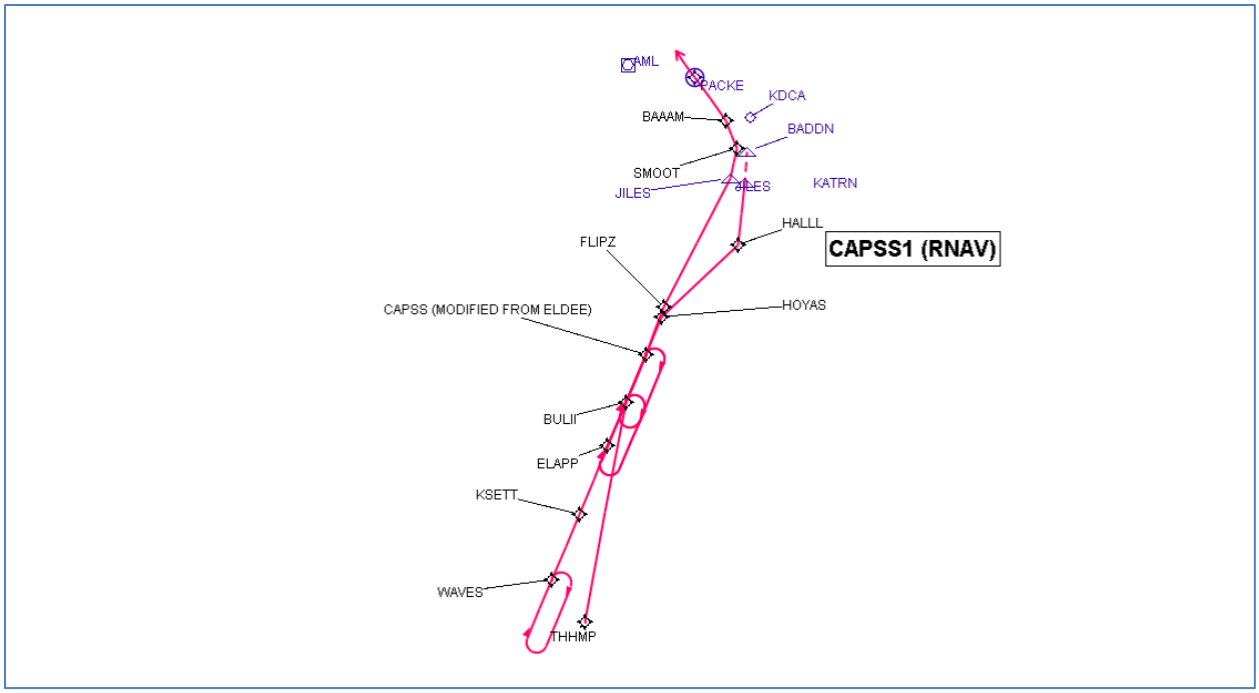


FIGURE 3. PROPOSED DESIGN

<u>Proposed Design and Implementation Dependencies</u>:
This proposed is dependent on the implementation of the RAVNN, CAVLR, VUDOO and TRSTN RNAV STARs and the CAPSS/HOWLL/RAVNN airspace redesign

<u>Additional Design Considerations</u>:
This proposal requires modifications to ZDC and PCT Standard Operating Procedures and Letters of Agreement. The proposed changes do not require a spectrum analysis, changes to Manpower, or Facilities and Equipment are expected. Validation through a Human-in-the-Loop simulation was conducted. In addition, flight simulation modeling by AFS of this procedure was conducted to ensure vertical separation from the RAVNN RNAV STAR.

OAPM Submission: Washington D.C. Metroplex

CAPSS RNAV STAR Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

Dave Perkins Washington D.C. OAPM FAA Lead	04.24.13 Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	April 24, 2013 Date
Bryan Lehman Potomac TRACON Facility Lead	4/24/13 Date	Paul Carroll Potomac TRACON NATCA Lead	4/24/13 Date
Joe Keimig Washington ARTCC Facility Lead	4/18/13 Date	Curt Johnson Washington ARTCC NATCA Lead	4/18/13 Date

OAPM Submission: Washington DC Metroplex

DEALE RNAV STAR Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issue 23	12 December 2013
Facilities and Areas/Sectors Impacted:	**POCs:**
Washington ARTCC (ZDC) - Sector 53 Potomac TRACON (PCT) - ENSUE, PALEO, DCAFR	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
DOCTR and SOOKI SIDs, RAVNN RNAV STAR and CAPSS/CAVLR/RAVNN Airspace Redesign	DEALE1 (RNAV) 20130416.tgs

Purpose:
This proposed design addresses the lack of Runway (RWY) 01 transitions on the BILIT RNAV STAR at Ronald Reagan Washington National Airport (DCA) identified by the Washington D.C. Study Team.

Study Team Recommendation:
The Study Team recommended the development of a transition for RWY01 starting at EDDGY be added to the BILIT STAR (see Figure 1).

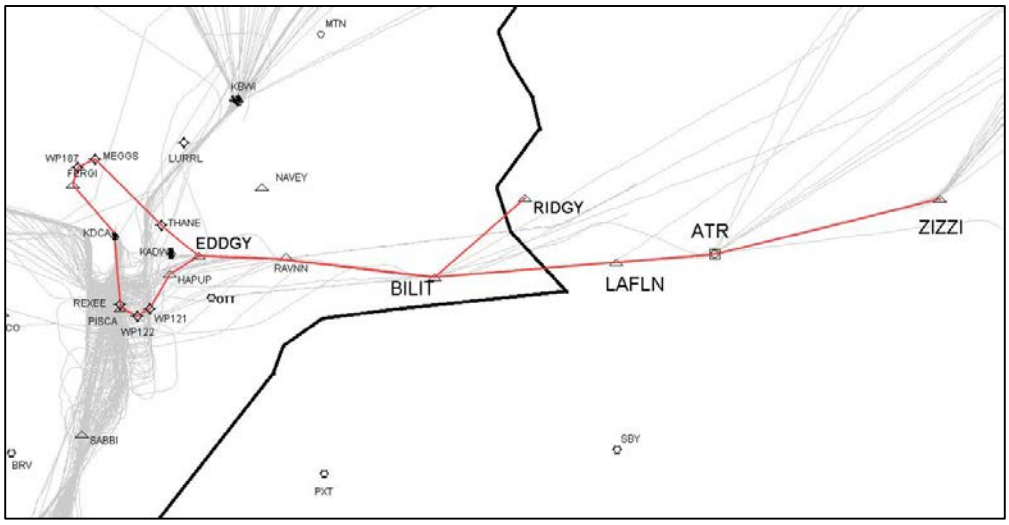


FIGURE 1. STUDY TEAM RECOMMENDATION

OAPM Submission: Washington DC Metroplex

DEALE RNAV STAR Final Design

Proposed Design:
The Washington D.C. Metroplex Design Team is proposing the creation of a new RNAV STAR named DEALE to replace the BILIT RNAV STAR (see Figures 2 and 3). This procedure will integrate runway transitions to support north and south operations at DCA. A runway transition was added to support a north configuration at Ronald Reagan Washington National Airport (DCA) will eliminate the need to vector arrivals to the downwind reducing control task complexity for this arrival flow. The new runway transition will provide both lateral and vertical separation with the RAVNN RNAV STAR into Baltimore/Washington International Thurgood Marshall Airport.

Industry requested a lateral track change to NACCO waypoint to support a more efficient climb profile for aircraft utilizing the proposed SOOKI and DOCTR RNAV SIDs. The new RNAV STAR will reduce controller task complexity and increase flight path predictability.

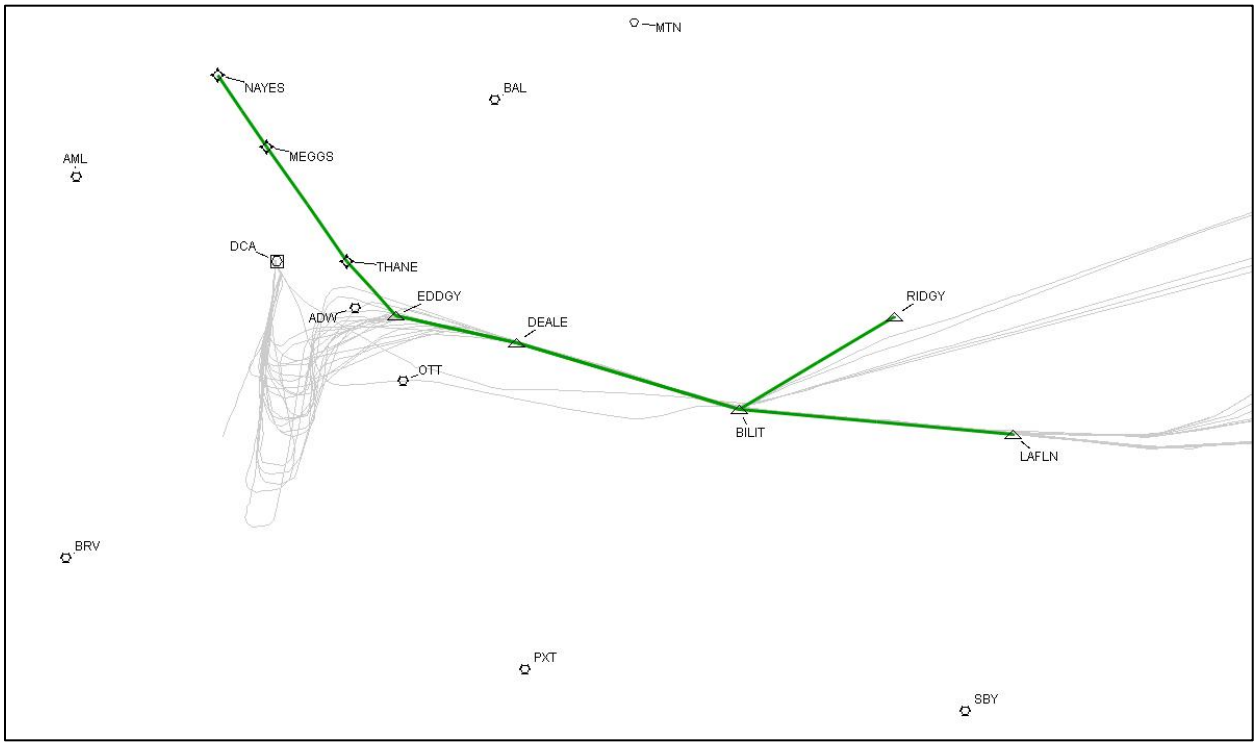


FIGURE 2. CURRENT STATE

OAPM Submission: Washington DC Metroplex

DEALE RNAV STAR Final Design

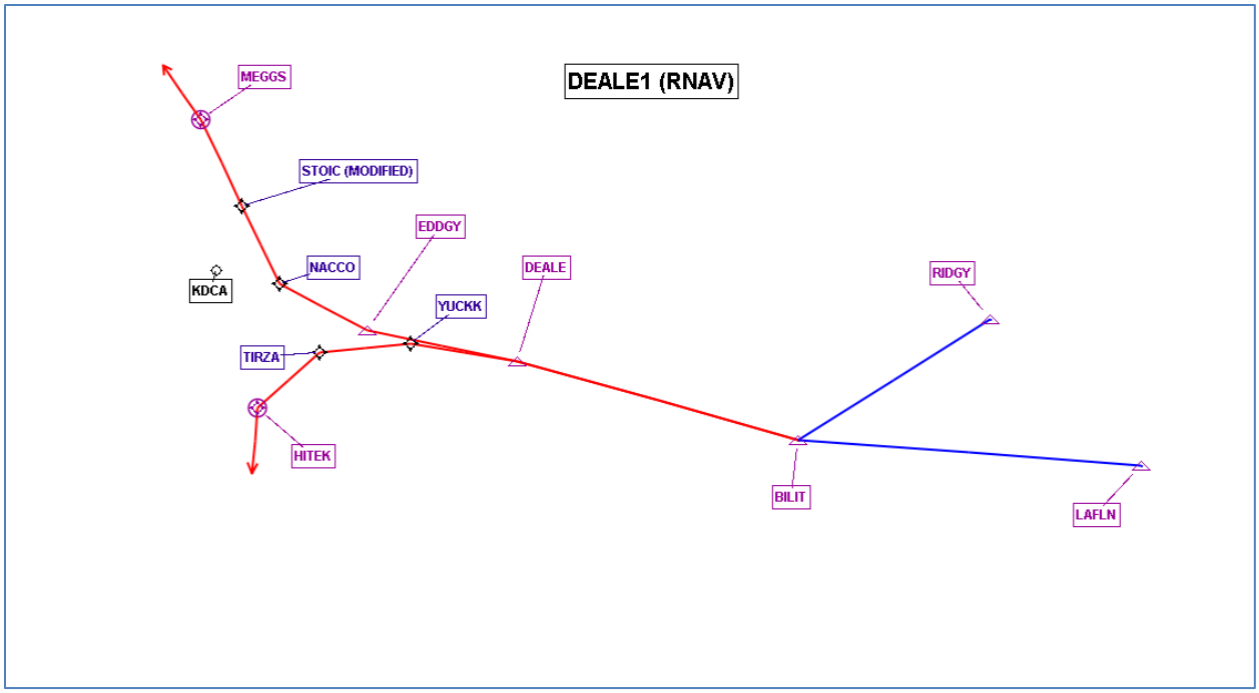


FIGURE 3. PROPOSED DESIGN

<u>Proposed Design and Implementation Dependencies</u>:

This proposed design is dependent on the proposed DOCTR and SOOKI RNAV SIDs, and RAVNN STAR, and the CAPSS/CAVLR/RAVNN airspace redesign.

<u>Additional Design Considerations</u>:

This proposal requires modifications to PCT Standard Operating Procedures. This proposed change does not require a spectrum analysis, changes to Manpower, or Facilities and Equipment. Validation through a Human-in-the-Loop simulation is not anticipated. There is no anticipated increase of operations nor a change to the hours of utilization anticipated on this procedure.

OAPM Submission: Washington DC Metroplex

DEALE RNAV STAR Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

Dave Perkins Washington D.C. OAPM FAA Lead	04.24.13 Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	April 24, 2013 Date
Bryan Lehman Potomac TRACON Facility Lead	4/24/13 Date	Paul Carroll Potomac TRACON NATCA Lead	4/24/13 Date
Joe Keimig Washington ARTCC Facility Lead	4/18/13 Date	Curt Johnson Washington ARTCC NATCA Lead	4/18/13 Date

OAPM Submission: Washington D.C. Metroplex

BULRN RNAV SID Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issue 2 and 4	3 April 2014
Facilities and Areas/Sectors Impacted:	**POCs:**
Washington Center (ZDC) - 07, 22, 31, 32, 52, 60, 72 Potomac TRACON (PCT) - BARIN, TILLY and FLUKY	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
TERPZ, HAFNR, BUTRZ and POOCH RNAV SIDs, and RAVNN RNAV STAR	BULRN1 (RNAV) 20130416.tgs

Purpose:
The purpose of this design is to address reliance on radar vectors for departures and the Southwest Gate Operations documented by the Washington D.C. Study Team. All of the proposed Washington Dulles International Airport (IAD) Baltimore-Washington, International Airport (BWI), Ronald Reagan Washington National Airport (DCA) SIDs use the same extended exit routes into ZDC airspace. All these southwest en route transitions have connectivity to either a jet route or an arrival procedure.

Study Team Recommendation:
The Study Team proposed several southwest gate recommendations to include the development of new RNAV SIDs and optimized PBN departure procedure overlays. The Study Team also recommended to provide additional departure gates to the southwest and suggested airspace boundary changes within ZDC (see Figures 1-3).

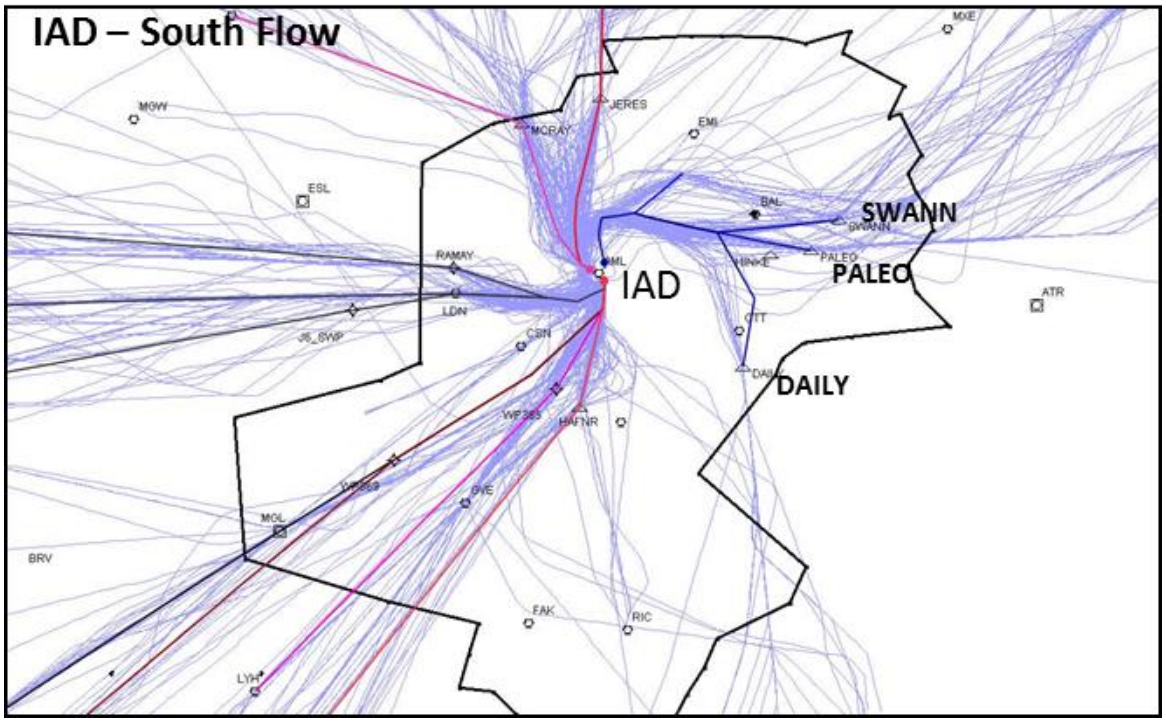


FIGURE 2. STUDY TEAM RECOMMENDATIONS

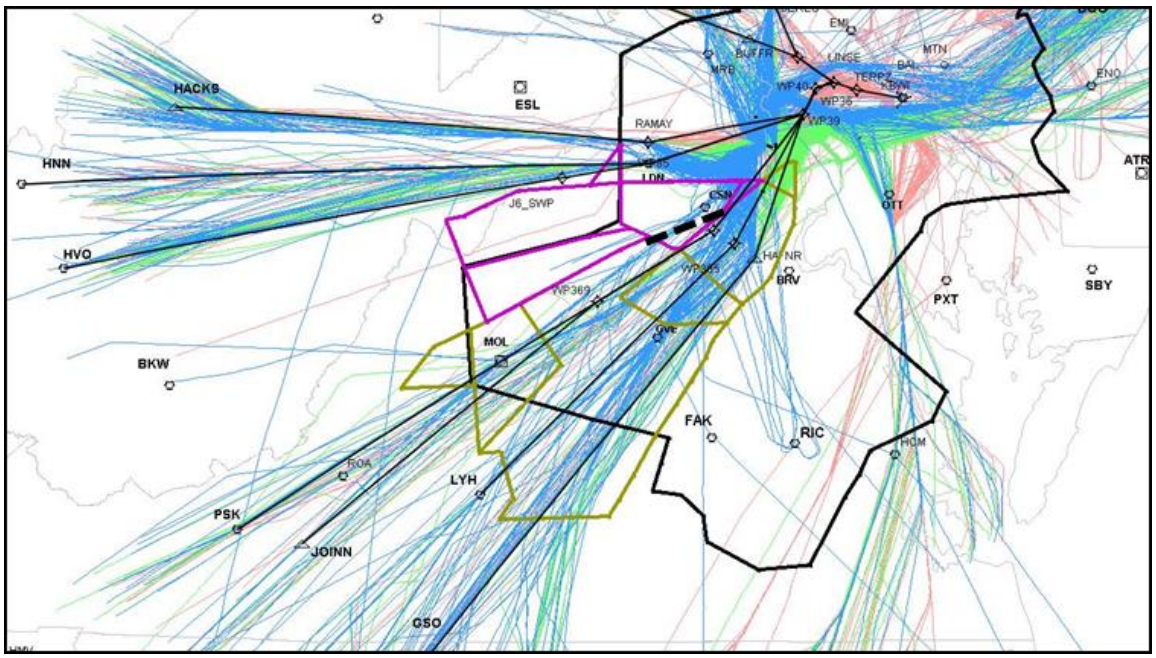


FIGURE 2. STUDY TEAM RECOMMENDATIONS

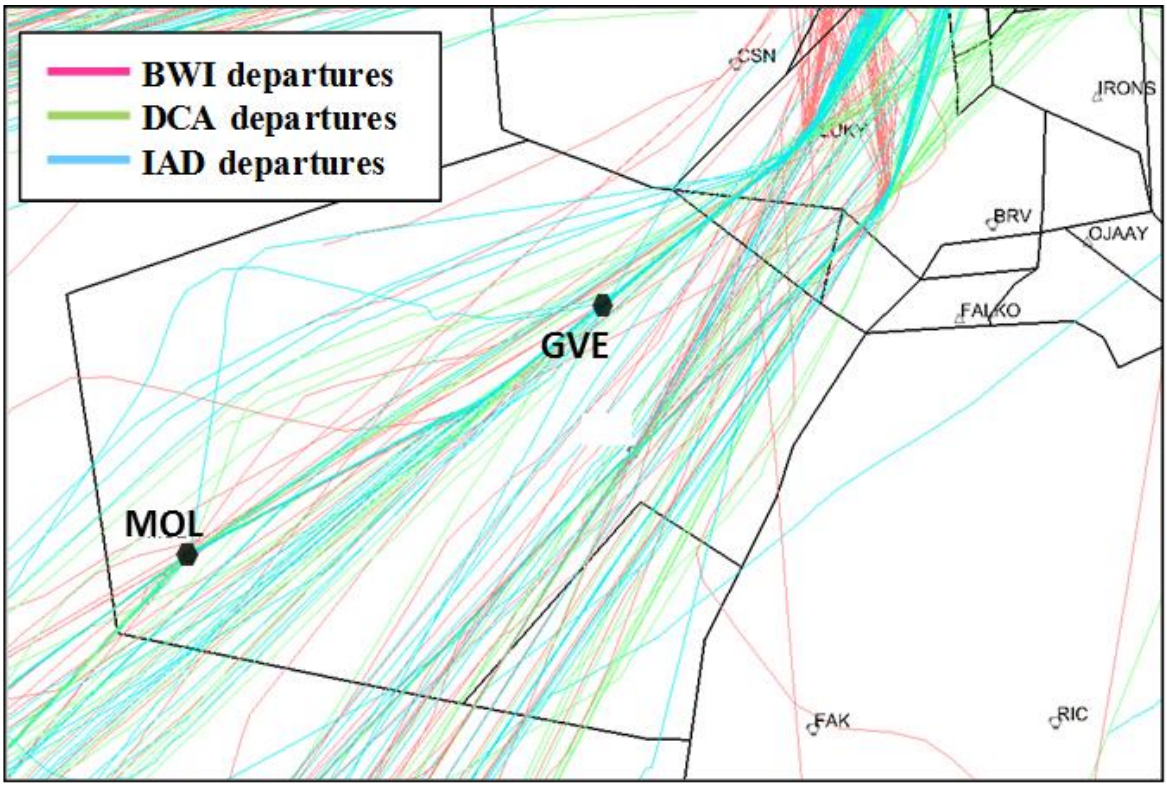


FIGURE 3. STUDY TEAM RECOMMENDATIONS

OAPM Submission: Washington D.C. Metroplex

BULRN RNAV SID Final Design

Proposed Design:
The Washington D.C. Metroplex Design Team is proposing the creation of a new RNAV SID named BULRN. In the current condition, PCT issues radar vectors and extended speed restrictions. This new procedure joins the new southwest bound DCA and BWI SIDs. This design will reduce control task complexity, enroute level-offs and increase flight path predictability. The BULRN RNAV SID joins new departure RNAV routes through ZDC60 sector.

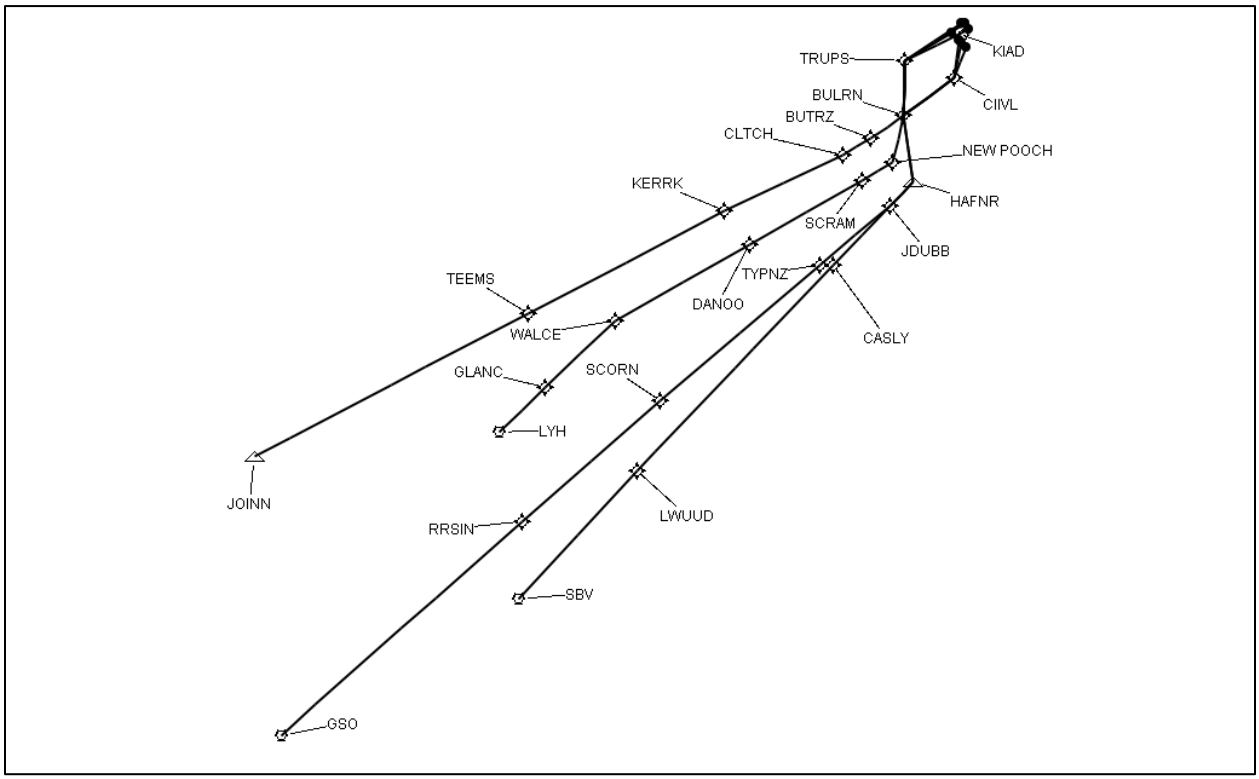


FIGURE 4. PROPOSED DESIGN

Proposed Design and Implementation Dependencies:
This proposed design is dependent on the RAVNN RNAV STAR and TERPZ, HAFNR, BUTRZ and POOCH RNAV SIDs.

Additional Design Considerations:
This proposal requires modifications to ZDC and PCT Standard Operating Practices and Letters of Agreement. The proposed changes do not require a spectrum analysis. There are no anticipated changes to Manpower, or Facilities and Equipment. Validation through a Human-in-the-Loop simulation was conducted. There is no anticipated increase of operations nor a change to the hours of utilization on this procedure.

OAPM Submission: Washington D.C. Metroplex

BULRN RNAV SID Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

04.24.13		April 24, 2013	
Dave Perkins Washington D.C. OAPM FAA Lead	Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	Date
4/24/13		4/24/13	
Bryan Lehman Potomac TRACON Facility Lead	Date	Paul Carroll Potomac TRACON NATCA Lead	Date
4/18/13		4/18/13	
Joe Keimig Washington ARTCC Facility Lead	Date	Curt Johnson Washington ARTCC NATCA Lead	Date

OAPM Submission: Washington D.C. Metroplex

JERES and MCRAY RNAV SIDs Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issue 2	6 February 2014
Facilities and Areas/Sectors Impacted:	**POCs:**
Washington ARTCC (ZDC) - Sector 06 Potomac TRACON (PCT) - BUFFR and ASPER	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
None	JERES1 (RNAV) 20130416.tgs, MCRAY1 (RNAV) 20130416.tgs

Purpose:
The purpose of this design addresses a reliance on radar vectors contributing to ATC task complexity and flight path variability identified by the Washington D.C. Metroplex Study Team.

Study Team Recommendation:
The Study Team recommended designing an optimized PBN departure procedure to address the issue identified in the purpose section of this document. (Figure 1).

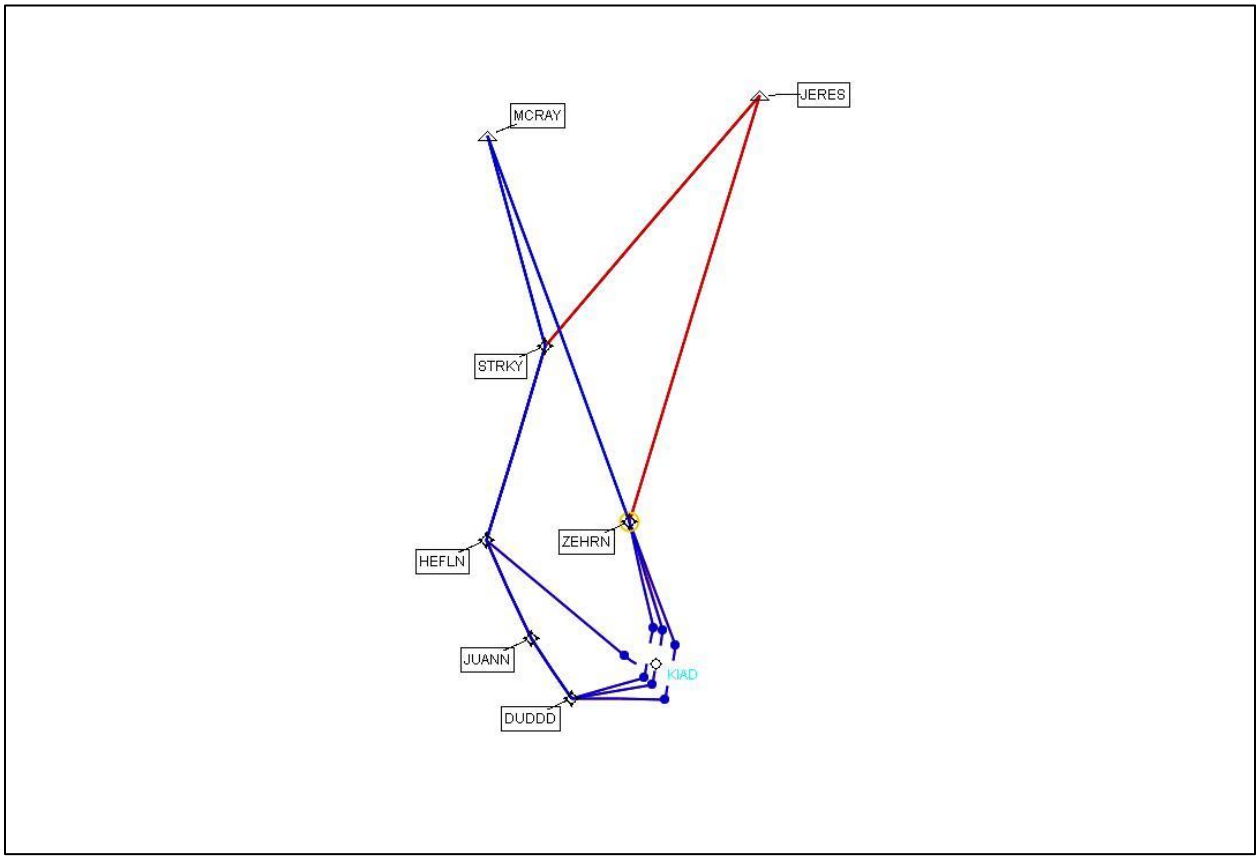


Figure 1. JERES/MCRAY SID

OAPM Submission: Washington D.C. Metroplex

JERES and MCRAY RNAV SIDs Final Design

Proposed Design:
The Washington D.C. Metroplex Design Team is proposing the implementation of two RNAV SIDs to provide repeatable and predictable routing. This procedural change supports the design of Area Navigation (RNAV) Standard Instrument Departures as well as the reduction of controller and pilot complexities. During the DC OAPM Safety Risk Management (SRM) process, IAD Tower requested RNAV SID off the ground procedures to the north to have similar type SIDs for all directions.

Proposed Design and Implementation Dependencies:
This proposal is an independent design.

Additional Design Considerations:
This proposal requires modifications to the PCT Standard Operating Procedures (SOP). There are no anticipated changes to Manpower, or Facilities and Equipment. These proposed changes do not require spectrum analysis. Validation through a Human-in-the-Loop simulation is not anticipated. There is no anticipated increase of operations or a change to the hours of utilization anticipated on this procedure.

OAPM Submission: Washington D.C. Metroplex

JERES/MCRAY RNAV SIDs Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

04.24.13		April 24, 2013	
Dave Perkins Washington D.C. OAPM FAA Lead	Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	Date
4/24/13		4/24/13	
Bryan Lehman Potomac TRACON Facility Lead	Date	Paul Carroll Potomac TRACON NATCA Lead	Date
4/18/13		4/18/13	
Joe Keimig Washington ARTCC Facility Lead	Date	Curt Johnson Washington ARTCC NATCA Lead	Date

OAPM Submission: Washington D.C. Metroplex

RIGNZ and JCOBY RNAV SIDs Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issue 1, 2, 3, 6, 20 IAD/BWI Departure Interactions TERPZ/STOIC SID	3 April 2014
Facilities and Areas/Sectors Impacted:	**POCs:**
Washington ARTCC (ZDC) - Sectors 11 and 17 Potomac TRACON (PCT) - ASPER, KRANT	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
TERPZ RNAV SID	RIGNZ1 (RNAV) 20130416.tgs JCOBY1 (RNAV) 20130416.tgs

Purpose:

This proposed design addresses the following issues identified by the Washington D.C. Metroplex Study Team. The STOIC Standard Instrument Departure (SID) Procedure is not effectively utilized because of the 15 Nautical Mile (NM) initial departure fix from the runway. The Flight Restricted Zone (FRZ) surrounding Washington Reagan Nation Airport (DCA) created restrictions for international air carriers and general aviation departures on the STOIC SID procedure restricting them to fly over the WOOLY intersection. This departure transition places the IAD eastbound departure flow into a head-on situation with the Baltimore-Washington International (BWI) westbound departures and conflicts with the DCA SKILS and CLIPR STAR traffic.

Study Team Recommendation:

The Study Team proposed to redesign the STOIC SID to remain clear of the FRZ, move the initial departure waypoint farther east and closer to the runway on the STOIC, and maintain the WOOLY transition for propeller and Tower En Route Clearance (TEC) traffic.

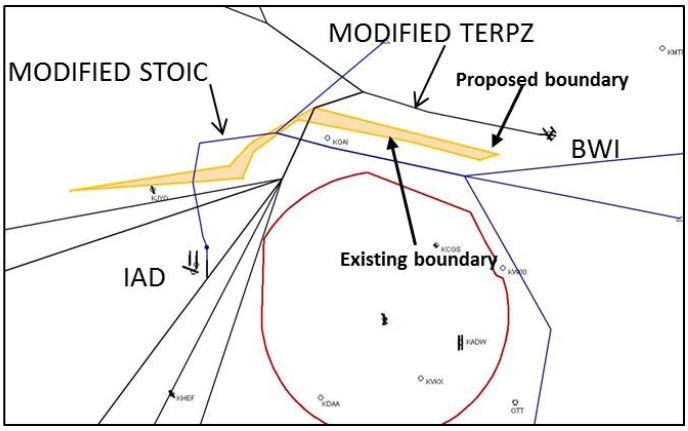


FIGURE 1. STUDY TEAM RECOMMENDATION

OAPM Submission: Washington D.C. Metroplex

RIGNZ and JCOBY RNAV SIDs Final Design

Proposed Design:

The Washington D.C. Metroplex Design Team is proposing the creation of two new RNAV SIDs named RIGNZ and JCOBY to replace the STOIC (see Figures 2-4). Runway transitions from all runways were developed. The JCOBY RNAV SID provides a short-cut through the FRZ for Federal Aviation Regulation PART 121 aircraft. It is anticipated that PART 129 will be allowed to use the JCOBY RNAV SID in the future. The RIGNZ and JCOBY RNAV SIDs will reduce control task complexity, increase flight path predictability and allows for the sequencing of this SID with the proposed DIXIE, CONLE, DOCTR and SOOKI RNAV SIDs. The lateral track for the RIGNZ procedure mirrors the DOCTR RNAV SID after RIISE on the AGARD transition.

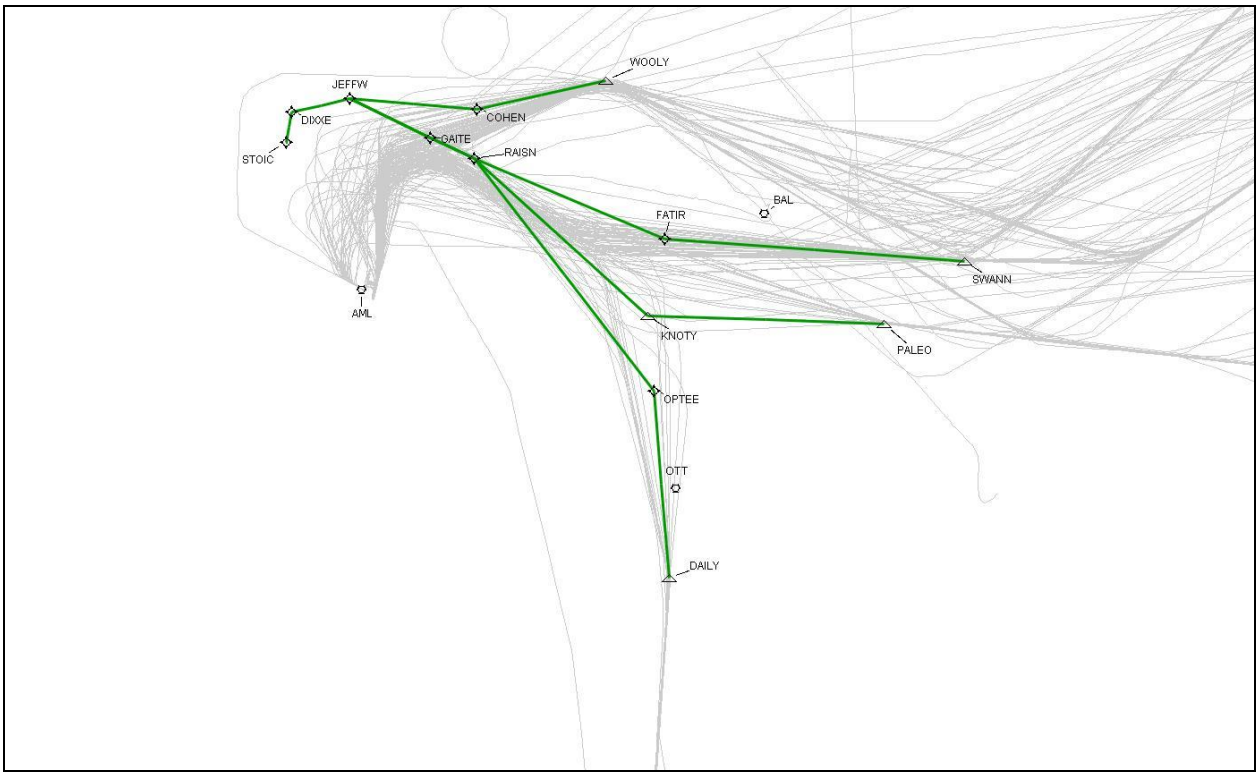


FIGURE 2. CURRENT STATE

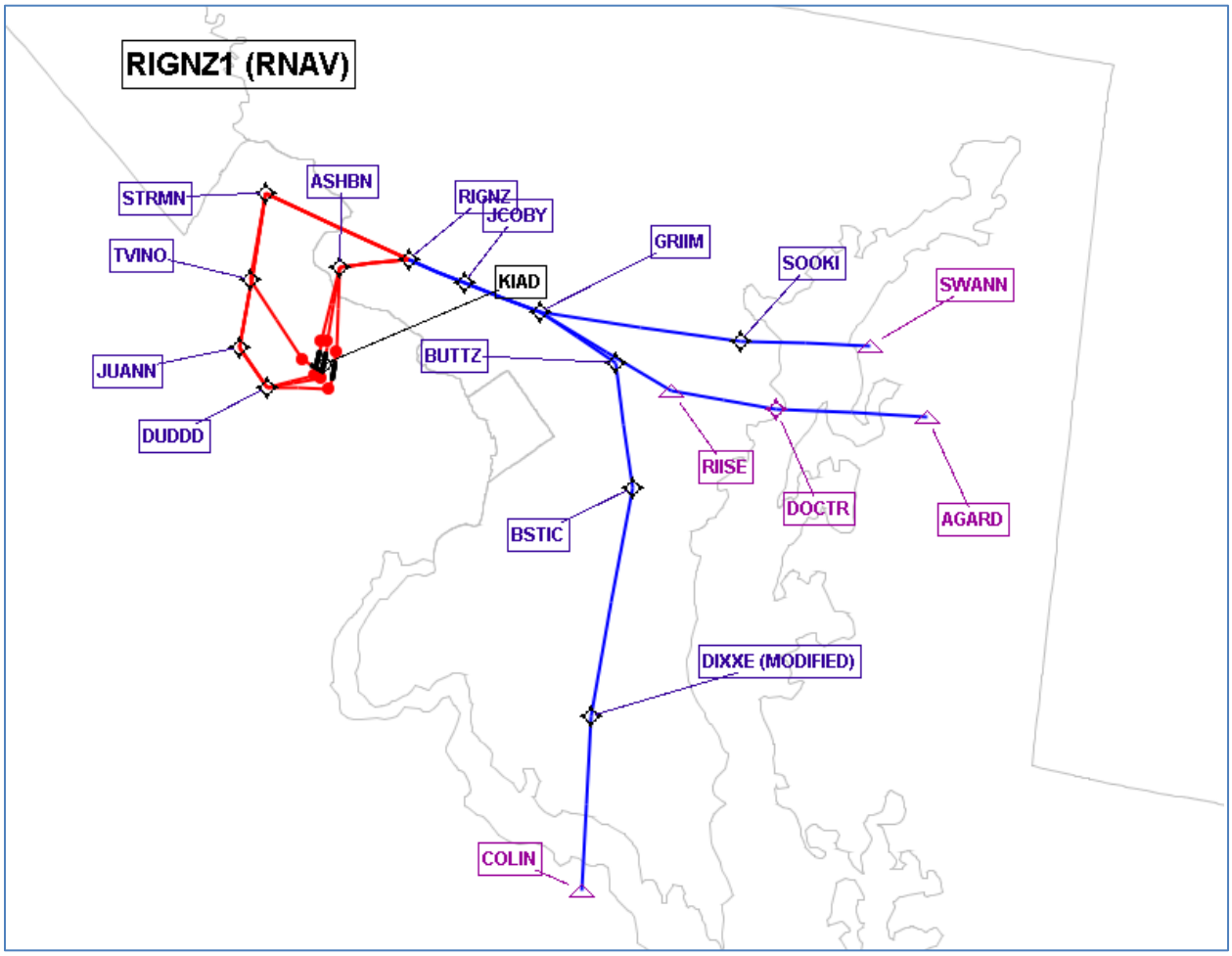


FIGURE 3. PROPOSED DESIGN - RIGNZ

OAPM Submission: Washington D.C. Metroplex

RIGNZ and JCOBY RNAV SIDs Final Design

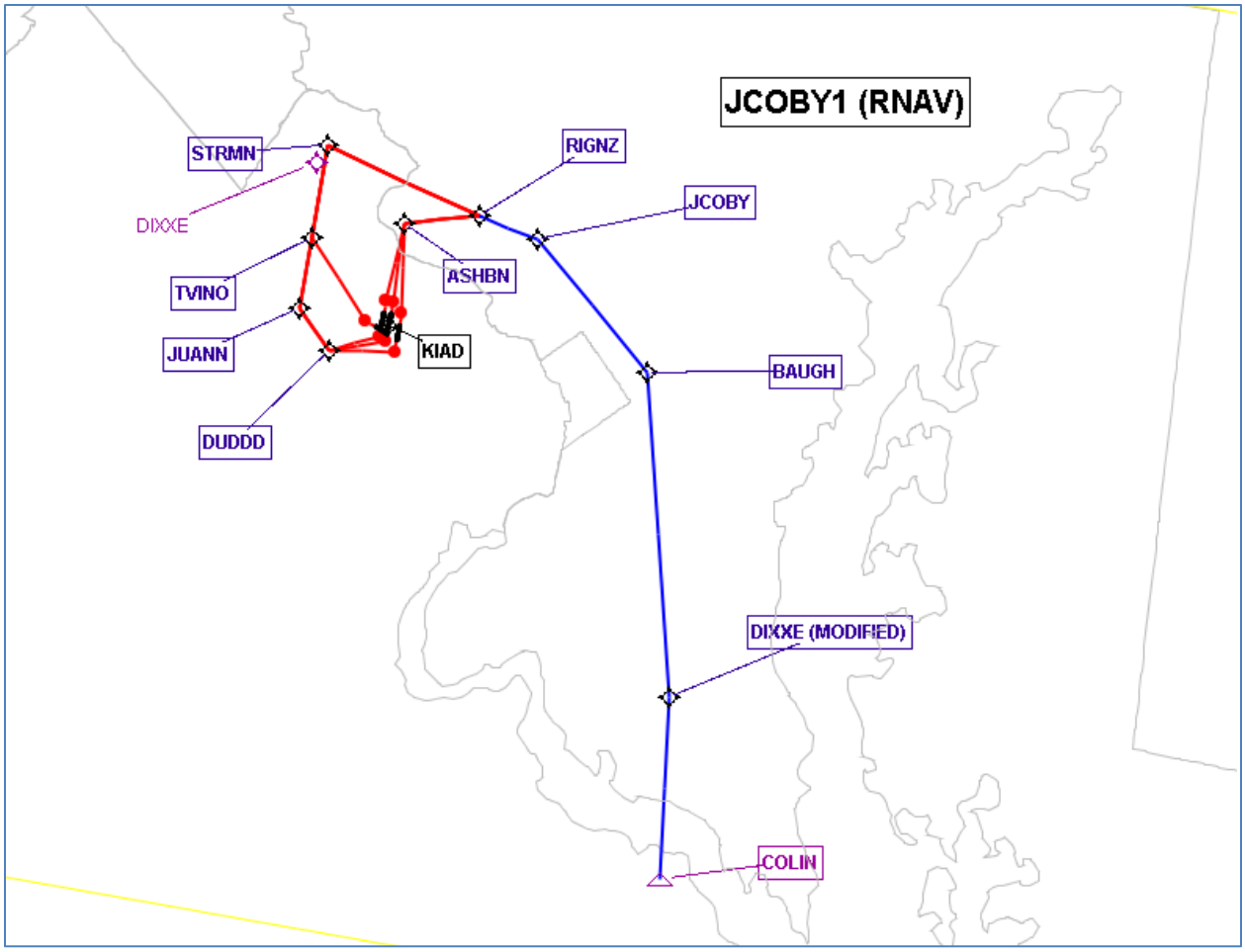


FIGURE 4. PROPOSED DESIGN - JCOBY

<u>Proposed Design and Implementation Dependencies</u>:
This proposed design is dependent on the implementation of the proposed TERPZ RNAV SID.

<u>Additional Design Considerations</u>:
ZDC and PCT Standard Operating Procedures and PCT and IAD Air Traffic Control Tower Letters of Agreement will need to be modified. The proposed changes do not require a spectrum analysis, changes to Manpower, or Facilities and Equipment. Validation through a Human-in-the-Loop simulation was not conducted. There is no anticipated increase of operations nor a change to the hours of utilization on this procedure.

OAPM Submission: Washington D.C. Metroplex

RIGNZ/JCOBY RNAV SIDs Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

	04.24.13		April 24, 2013
Dave Perkins Washington D.C. OAPM FAA Lead	Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	Date
	4/24/13		4/24/13
Bryan Lehman Potomac TRACON Facility Lead	Date	Paul Carroll Potomac TRACON NATCA Lead	Date
	4/18/13		4/18/13
Joe Keimig Washington ARTCC Facility Lead	Date	Curt Johnson Washington ARTCC NATCA Lead	Date

OAPM Submission: Washington DC Metroplex

CAVLR RNAV STAR Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issue 29, 31, 32	12 December 2013
Facilities and Areas/Sectors Impacted:	**POCs:**
Washington (ZDC) - Sectors 14, 16, 20, 32, 36, and 38 Potomac (PCT) - BARIN, IADFE, IADFC, IADFW, FLTRK, and TYSON	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
CAPSS, RAVNN, WIGOL, and TRSTN RNAV STARs, CAPSS/CAVLR/RAVNN AIRSPACE change	CAVLR1 (RNAV) 20130416.tgs

Purpose:
This proposed design addresses the level off issue identified by the Washington D.C. Metroplex Study Team. The BARIN RNAV STAR creates level-offs at Flight Level 27,000 Feet Mean Sea Level (FL270), FL220, and 10,000Feet (FT) Mean Sea Level (MSL).

Study Team Recommendation:
The Study Team recommended the implementation of an Optimal Profile Descent (OPD) on the BARIN RNAV STAR to reduce the potential for level-offs (see Figure 1).

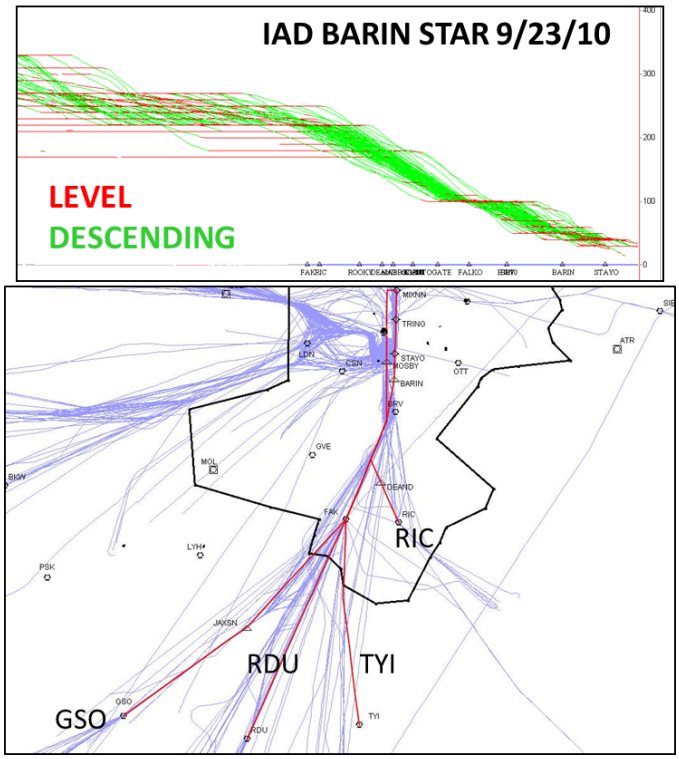


FIGURE 1. STUDY TEAM RECOMMENDATION

OAPM Submission: Washington DC Metroplex

CAVLR RNAV STAR Final Design

Proposed Design:

The Washington D.C. Metroplex Design Team is proposing the creation of a new RNAV STAR named CAVLR to replace the BARIN RNAV STAR (see Figures 2 and 3). This proposed procedure will add three new enroute transitions allowing for earlier access to the STAR. These transitions, along with the waypoints added to the STAR, will provide greater flexibility by introducing numerous options for sequencing and direct routing from multiple points to join the procedure.

Holding patterns will be incorporated at DORRN and BNTLY waypoints. These are optional holding patterns to reduce control task complexity and cockpit workload. A runway transition was added to support a north configuration at Washington Dulles International Airport (IAD).

The proposed CAVLR will laterally and/or vertically separate the IAD arrivals from the Ronald Reagan Washington National (DCA), Joint Base Andrews and Baltimore/Washington International Thurgood Marshall arrivals enabling an OPD without restructuring enroute airspace.

The overall benefits from this procedure are anticipated to be reduced fuel burn and CO2 emissions, decreased level offs, increased flight path predictability and reduced control task complexity.

This procedure was designed to facilitate connectivity with future Q-routes being established by the ATL OAPM team.

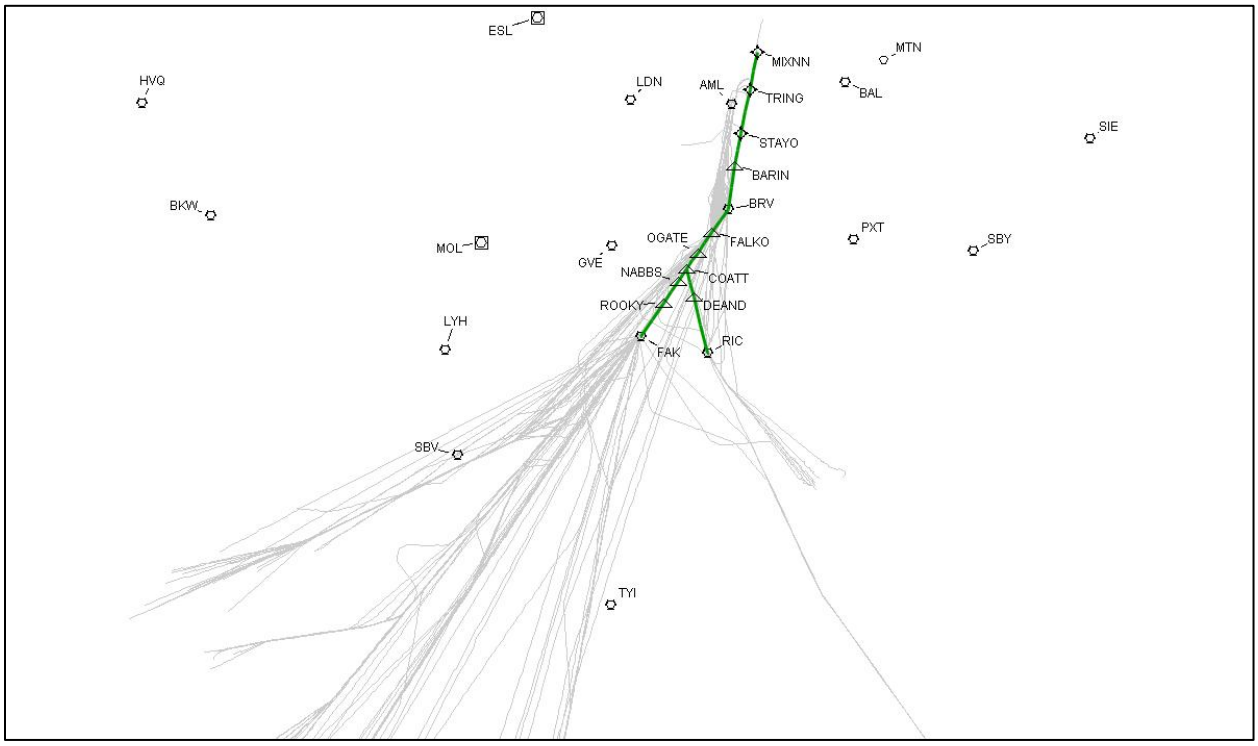


FIGURE 2. CURRENT STATE

OAPM Submission: Washington DC Metroplex

CAVLR RNAV STAR Final Design

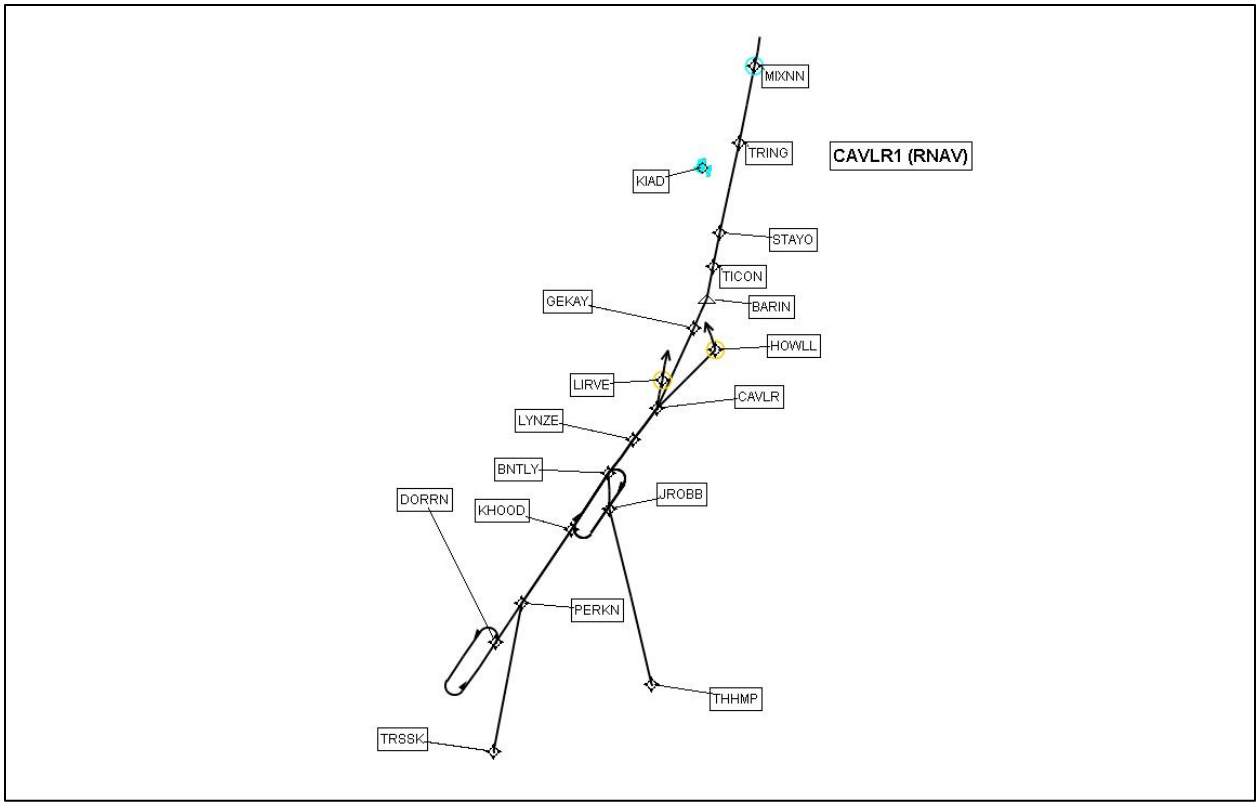


FIGURE 3. PROPOSED DESIGN

<u>Proposed Design and Implementation Dependencies</u>:
This proposed design is dependent on the implementation of the proposed CAPSS, RAVNN, WIGOL, and TRSTN RNAV STARs and CAPSS/HOWLL/RAVNN AIRSPACE change.

<u>Additional Design Considerations</u>:
This proposal requires modifications to ZDC and PCT Standard Operating Practices and Letters of Agreement. The proposed changes do not require a spectrum analysis, changes to Manpower, or Facilities and Equipment. Validation through a Human-in-the-Loop simulation was conducted. There is no anticipated increase of operations nor a change to the hours of utilization anticipated on this procedure.

OAPM Submission: Washington DC Metroplex

CAVLR RNAV STAR Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

Dave Perkins Washington D.C. OAPM FAA Lead	04-24-13 Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	April 24, 2013 Date
Bryan Lehman Potomac TRACON Facility Lead	4/24/13 Date	Paul Carroll Potomac TRACON NATCA Lead	4/24/13 Date
Joe Keimig Washington ARTCC Facility Lead	4/18/13 Date	Curt Johnson Washington ARTCC NATCA Lead	4/18/13 Date

OAPM Submission: Washington D.C. Metroplex

FSTER Conventional STAR Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issue 11	6 February 2014
Facilities and Areas/Sectors Impacted:	**POCs:**
NEW York Center (ZNY) - Sectors 27 and 73 Potomac TRACON(PCT) - BINNS, MULLR, IADFW, IADFE and IADFC	- PCT, B. Lehman - PCT, P. Carroll ZNY
Related/Dependent Proposals:	**Associated Data Files:**
HYPER and GRAVZ STARs, HYPER and GRAVZ Airspace Redesign	FSTER1 (Conv) 20130916.tgs

Purpose:
This proposed design addresses the multiple flows of Washington Dulles International (IAD) arrivals from ZNY and New York TRACON (N90) into PCT BINNS sector with no speed or altitude restrictions specified in procedures identified by the Washington D.C. Study Team.

Study Team Recommendation:
The Washington D.C. Study Team recommended redesigning the BINNS sector to the west by acquiring additional airspace from ZDC Sector 06 within the 7,000 through 14,000 feet altitudes. This airspace redesign would allow PCT to keep the GRAVZ/LEGGO flow segregated from the HYPER flow. The two parallel routes, one through new airspace, and the existing flow providing a more manageable feed for IAD arrivals.

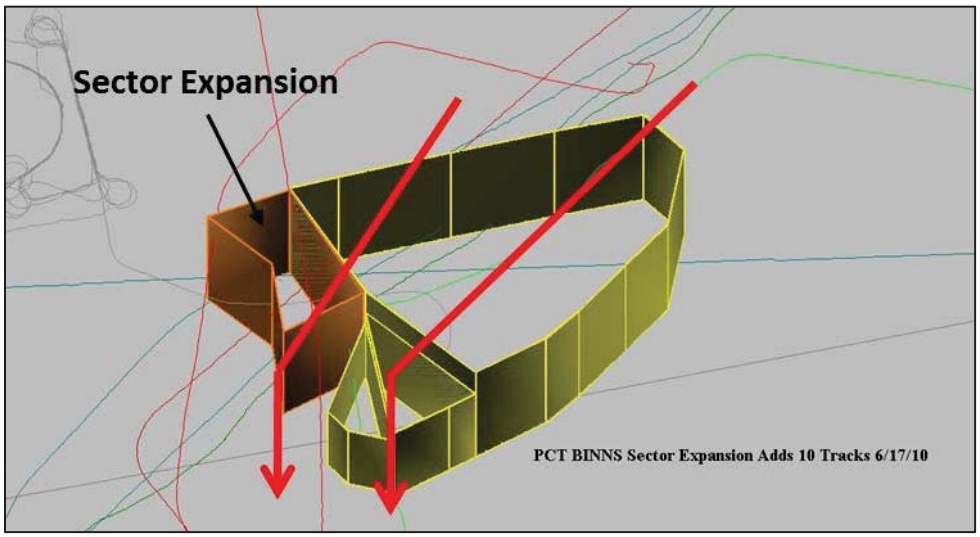


FIGURE 1. STUDY TEAM RECOMMENDATION

OAPM Submission: Washington D.C. Metroplex

FSTER Conventional STAR Final Design

Proposed Design:

The Washington D.C. Metroplex Design Team is proposing the creation of a new conventional STAR named FSTER to replace the Philipsburg conventional STAR (see Figures 2 and 3). The addition of this STAR will provide a conventional route starting at the Phillipsburg VORTAC and mirrors the lateral track of the proposed GRAVZ RNAV STAR. This design will reduce control task complexity and increase flight path predictability for non-RNAV enabled aircraft.

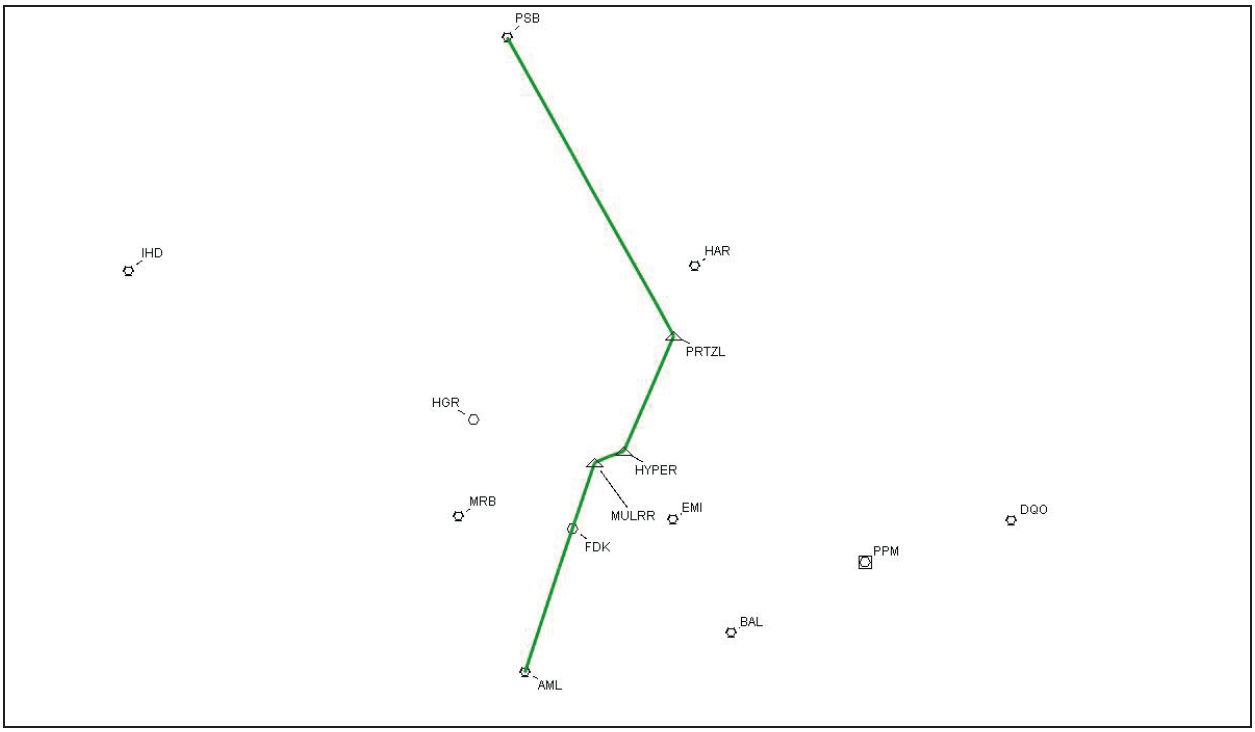


FIGURE 2. CURRENT STATE

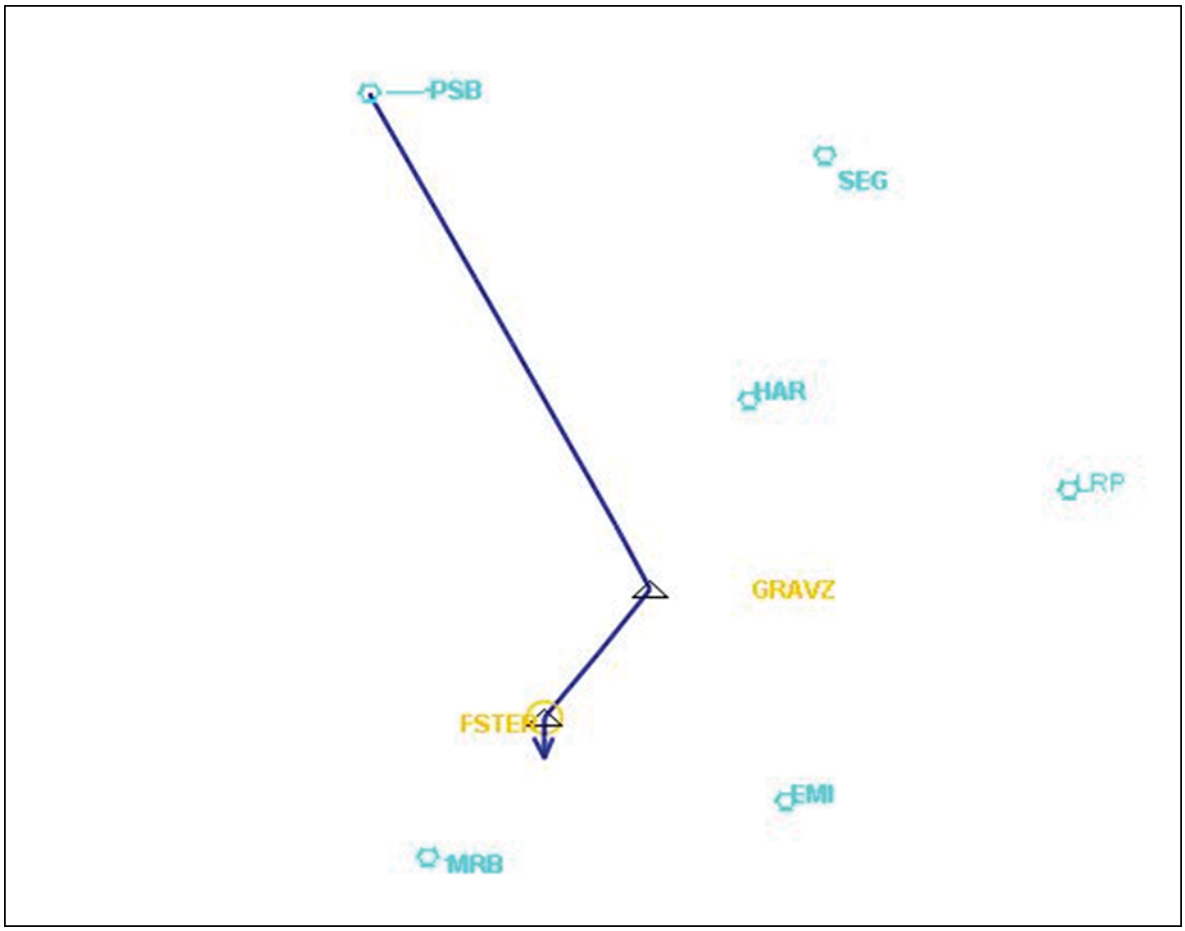


Figure 3. PROPOSED DESIGN

After further coordination with ZNY, ZNY requested the FSTER conventional STAR include a transition from the HAR VORTAC to provide a more efficient lateral track from the northeast to IAD. The remaining portions of the route remain the same as the original design depicted in Figure 3.

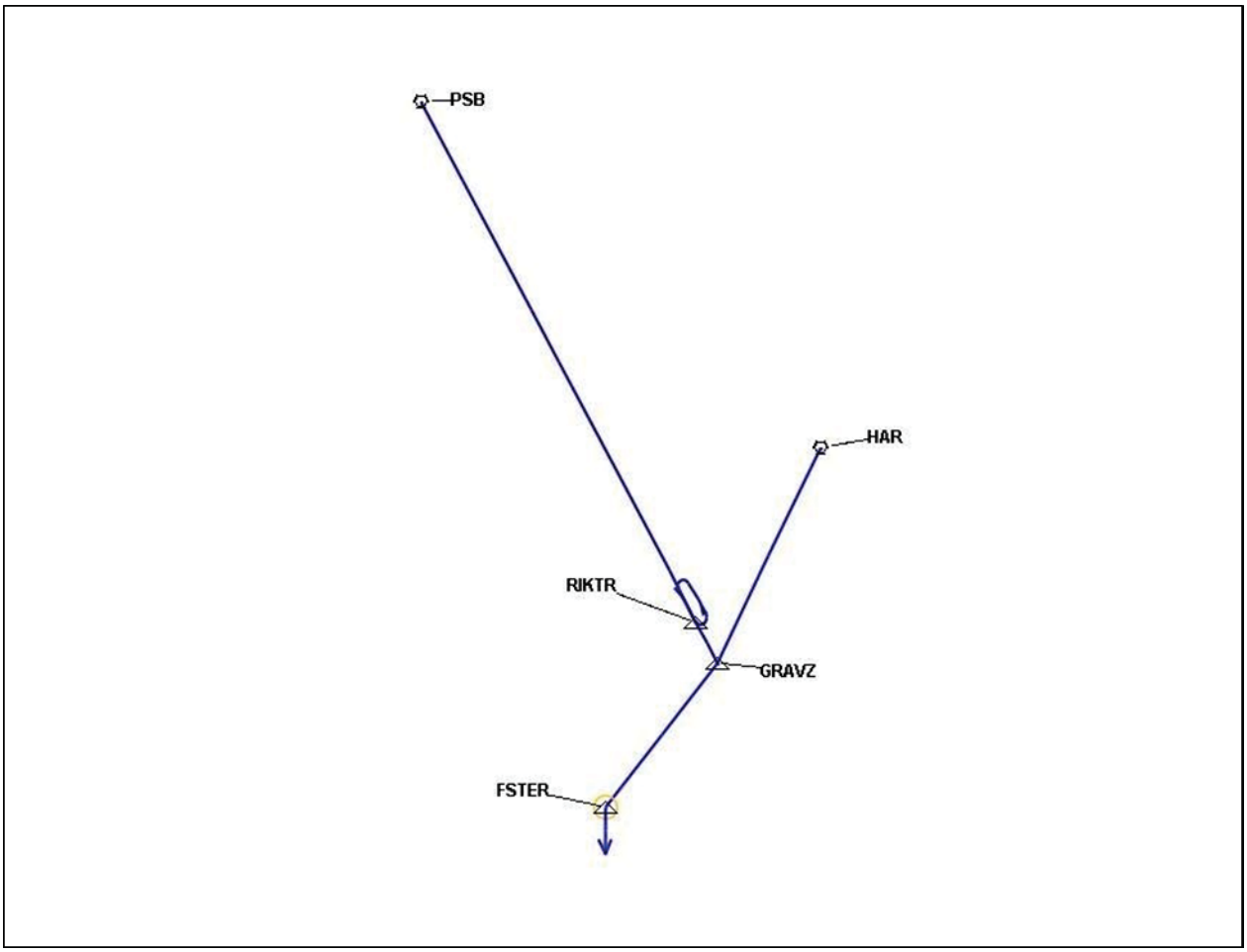


Figure 4. PROPOSED DESIGN with AMMENDMENTS

Proposed Design and Implementation Dependencies:
This proposed design is dependent on the HYPER and GRAVZ RNAV STARs and the BINNS Airspace Redesign.

Additional Design Considerations:
The adjusted GRAVZ RNAV was proposed after the Draft Environmental Assessment (EA) was released to the public. The additional enroute transition takes place outside of the EA Study area and above 7,000 ft. AGL. In addition, there are no National Parks or Wildlife Refuges underneath the proposed route. Therefore, the change is not expected to cause a cumulative impact when considering as part of the Proposed Action alternative. An update to the EA environmental analysis is not necessary.

This proposal requires modifications to ZDC and PCT Standard Operating Practices and Letters of Agreement. The proposed changes do not require a spectrum analysis. There are no anticipated changes to Manpower, or Facilities and Equipment. Validation through a Human-in-the-Loop simulation was completed. There is no anticipated increase of operations nor a change to the hours of utilization on this procedure.

OAPM Submission: Washington D.C. Metroplex

FSTER Conventional STAR Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

04.24.13		April 24, 2013	
Dave Perkins Washington D.C. OAPM FAA Lead	Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	Date
4/24/13		4/24/13	
Bryan Lehman Potomac TRACON Facility Lead	Date	Paul Carroll Potomac TRACON NATCA Lead	Date
9/12/13		9/12/13	
New York ARTCC Facility Representative	Date	New York ARTCC NATCA Representative	Date

OAPM Submission: Washington D.C. Metroplex

HYPER and GRAVZ RNAV STARs Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issue 11	6 February 2014
Facilities and Areas/Sectors Impacted:	**POCs:**
New York ARTCC (ZNY) - Sector 26,27, and 73 Potomac TRACON (PCT) - BINNS, MULLR, ASPER, IADFE, IADFC, and IADFW	- PCT, B. Lehman - PCT, P. Carroll ZNY
Related/Dependent Proposals:	**Associated Data Files:**
FSTER STAR and HYPER/GRAVZ Airspace redesign	HYPER5 (RNAV) 20130920.tgs GRAVZ1 (RNAV) 20130915.tgs

Purpose:
This proposed design addresses the multiple flows of Washington Dulles International Airport (IAD) arrivals from ZNY and New York TRACON (N90) into PCT BINNS sector with no speed or altitude restrictions specified in procedures identified by the Washington DC Study Team.

Study Team Recommendation:
The Washington DC Study Team recommended redesigning the BINNS sector to the west by acquiring additional airspace from ZDC Sector 06 within the 7,000 through 14,000 Feet altitudes. This airspace redesign would allow PCT to keep the GRAVZ/LEGGO flow segregated from the HYPER flow. Creation of two parallel routes, one through new airspace, and the existing flow will provide a more manageable feed for IAD arrivals.

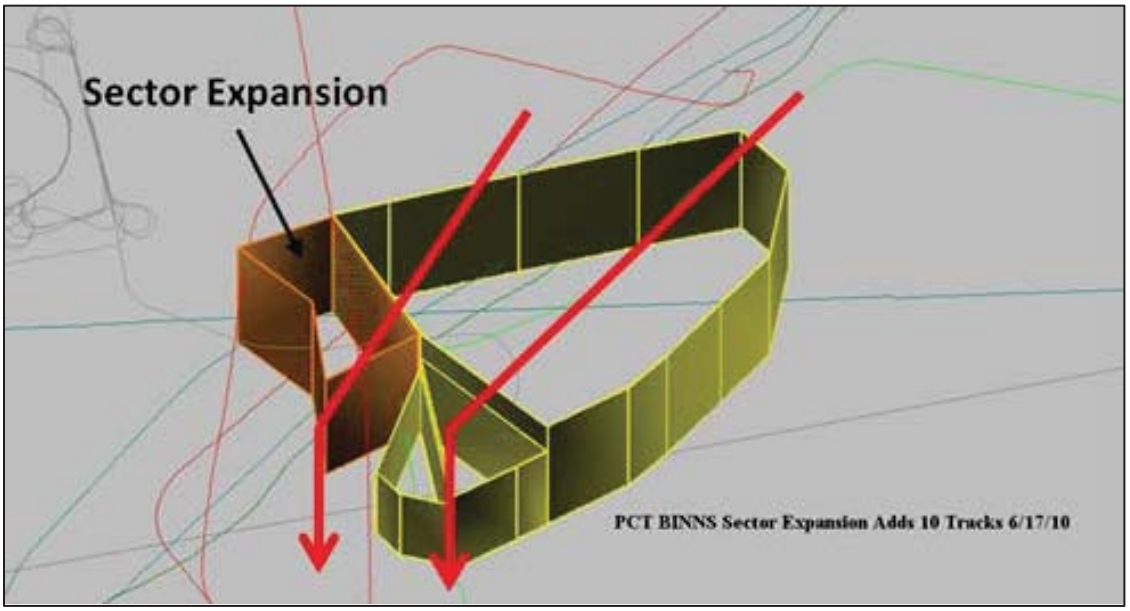


FIGURE 1. STUDY TEAM RECOMMENDATION

OAPM Submission: Washington D.C. Metroplex

HYPER and GRAVZ RNAV STARs Final Design

Proposed Design:

The Washington DC Design Team is proposing the modification of HYPER RNAV STAR and the creation of a new STAR replacing the PRTZL RNAV STAR named GRAVZ (see figures 2-4). The implementation of these STARs in conjunction with a new ZNY/PCT Letter of Agreement (LOA) will reduce control task complexity in blending the multiple flows of traffic from ZNY. The LOA will establish a single flow of traffic to each RNAV STAR instead of the current vertically stacked traffic flows. The HYPER and GRAVZ RNAV STARs will be laterally separated enabling independent runway transitions for North and South operations. The HYPER RNAV STAR is modified with speed and crossing altitude restrictions to reduce the excessive speed and high altitudes discussed in the Study Team issue. The HYPER RNAV STAR was not modified outside of Lancaster VORTAC (LRP) per ZNY request.

The GRAVZ RNAV STAR is laterally separated to the west of Prohibited Area 40 and incorporates speed and altitude restrictions to address the Study Team identified issues. The independent design of the HYPER and GRAVZ include the added flexibility for air traffic control to transition traffic between the RNAV STARs when necessary to balance the traffic flows.

This design will reduce control task complexity and increase flexibility to sequence the multiple traffic flows from ZNY.

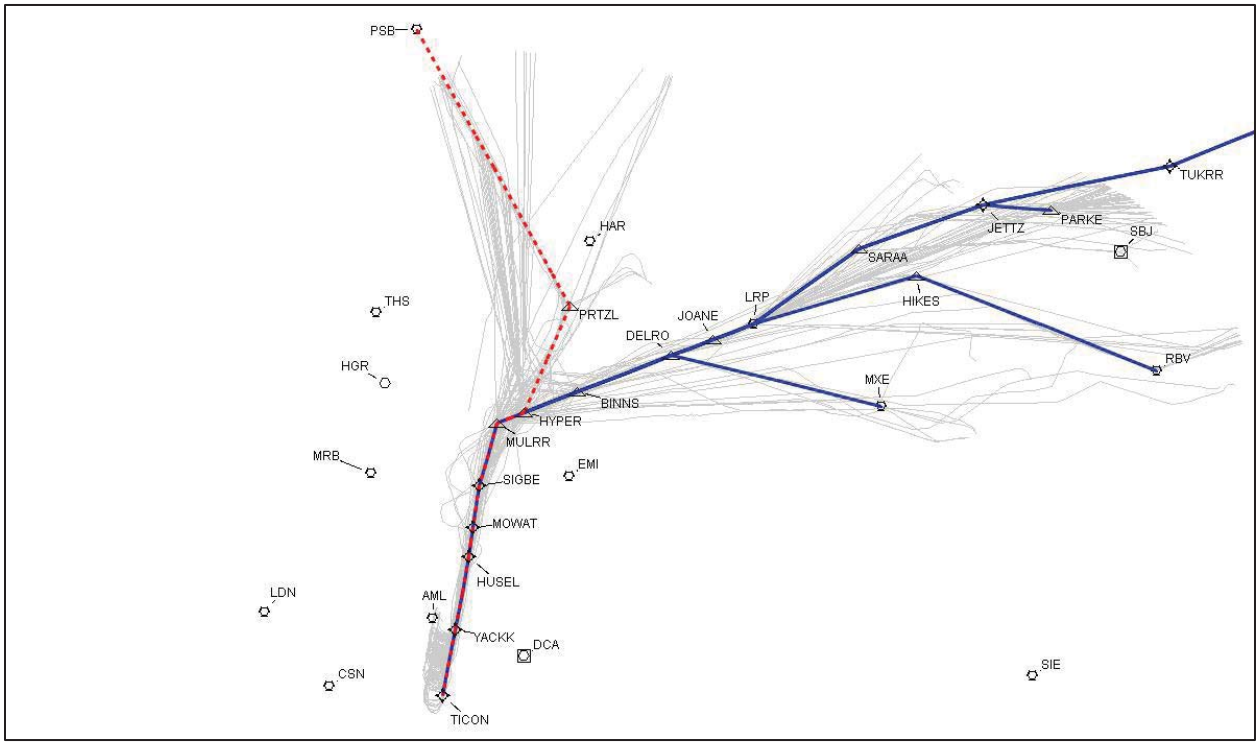


FIGURE 2. CURRENT HYPER AND GRAVZ RNAV STARS

OAPM Submission: Washington D.C. Metroplex

HYPER and GRAVZ RNAV STARs Final Design

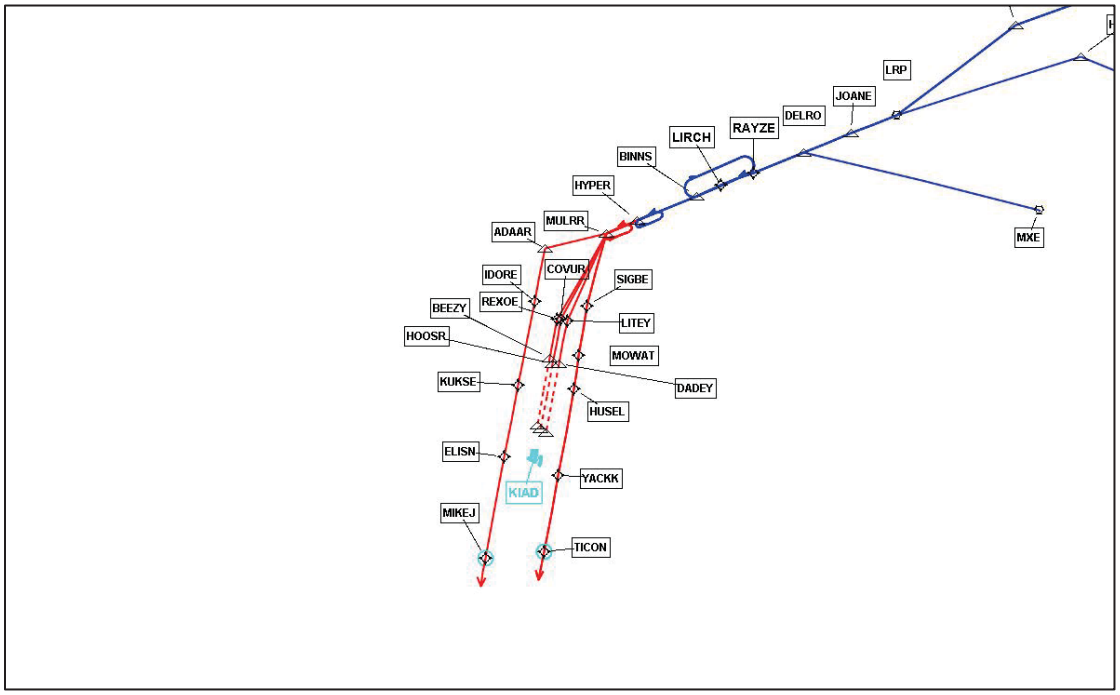


FIGURE 3. PROPOSED DESIGN - HYPER

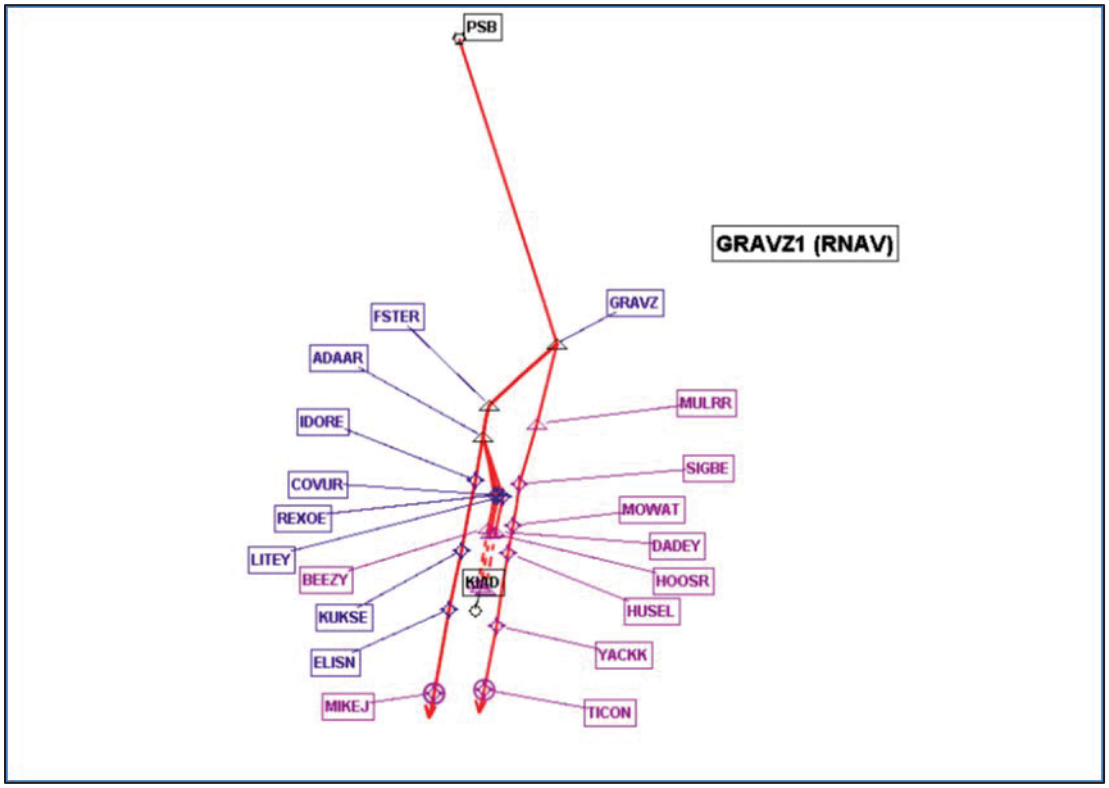


FIGURE 4. PROPOSED DESIGN – GRAVZ

OAPM Submission: Washington D.C. Metroplex

HYPER and GRAVZ RNAV STARs Final Design

After further operation evaluation of the GRAVZ RNAV, the D&I Team determined an adjustment to the Runway 01R transition was necessary in order to meet FAA Order 7110.65 related to assigning runway transitions. A runway transition needs to be issued 10 miles prior to starting the transition. In order to accomplish this within the PCT airspace, the transition to Runway 01R starts at GRAVZ waypoint (12,000) then continues like all other runway transitions to FSTER waypoint (10,000) (instead of starting at GRAVZ waypoint then to MULLR waypoint), then proceed to SIGBE waypoint (7,000) (instead of proceeding to SIGBE from the MULLR waypoint) then continuing as originally designed. Figure 5 depicts the updated GRAVZ RNAV design.

In addition to the Runway 01R transition, the D&I Team added an enroute transition starting at the LEGGO waypoint then to the GRAVZ waypoint. ZNY requested this additional transition. The GRAVZ waypoint altitude restriction was removed. The RIKTR waypoint was moved to added six miles southwest of GRAVZ to add a 12,000-10,000 foot window. The holding was moved from RIKTR to GRAVZ waypoint. ZNY agreed to issue an altitude restriction of 12,000 on the new waypoint. See Figure 5 below.

ZNY requested a minor change to the HYPER RNAV STAR. The LIRCH waypoint altitude restriction was raised to 14,000. No new graphic was included.

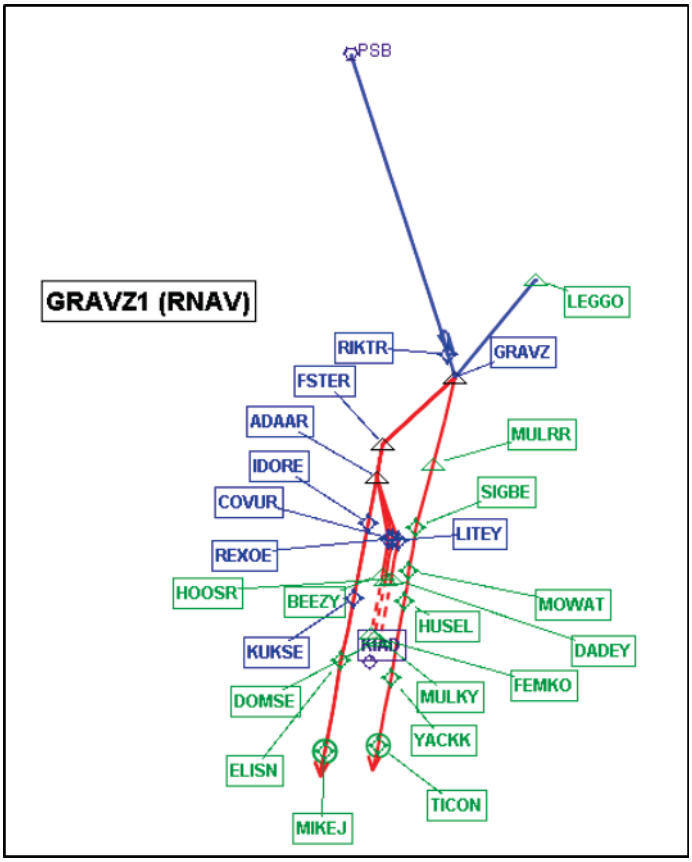


FIGURE 5. PROPOSED DESIGN – GRAVZ AMMENDED

OAPM Submission: Washington D.C. Metroplex

HYPER and GRAVZ RNAV STARs Final Design

Proposed Design and Implementation Dependencies:

This proposed design is dependent on the FSTER STAR and BINNS Airspace redesign

Additional Design Considerations:
The adjusted GRAVZ RNAV was proposed after the Draft Environmental Assessment (EA) was released to the public. The additional enroute transition takes place outside of the EA Study area and above 7,000 ft. AGL. In addition, there are no National Parks or Wildlife Refuges underneath the proposed route. For the adjusted Runway 01R transition, the FAA conducted a noise screening analysis to determine if the change may have to potential to cause reportable changes in Day/Night Noise Leve (DNL) levels. The analysis indicated "no chance" of causing reportable changes. In addition, the adjuste Runway 01R transition adds approximately 7 miles; therefore a fuel burn analysis was conducted. The analysis indicated an increase of approximately 0.3 Mega Tons (MT). With this small increase, the overall Proposed Action fuel burn still indicates a decrease compared to the No Action Alternative. In summary, the change is not expected to cause a cumulative impact when considering as part of the Proposed Action alternative. Therefore, an update to the EA environmental analysis is not necessary.

PCT Standard Operating Procedures and ZNY and PCT Letters of Agreement will need to be modified. The proposed changes will not require a spectrum analysis. No changes to Manpower or Facilities and Equipment are anticipated. Validation through a Human-in-the-Loop simulation was completed. There is no anticipated increase of operations nor a change to the hours of utilization anticipated on this procedure.

OAPM Submission: Washington D.C. Metroplex

HYPER & GRAVZ RNAV STARs Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

04-24-13		April 24, 2013	
Dave Perkins Washington D.C. OAPM FAA Lead	Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	Date
4/24/13		4/24/13	
Bryan Lehman Potomac TRACON Facility Lead	Date	Paul Carroll Potomac TRACON NATCA Lead	Date
9/12/13		9/12/13	
New York ARTCC Facility Representative	Date	New York ARTCC NATCA Representative	Date

UPDATED: September 12, 2013

OAPM Submission: Washington D.C. Metroplex

WIGOL RNAV STAR Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
N/A	29 May 2014
Facilities and Areas/Sectors Impacted:	**POCs:**
Washington ARTCC (ZDC) - Sector 2, 5, 14, 15, 20, 21, 29, 31, and 60 Potomac TRACON (PCT) - CHOEA, CHOWE, BARIN, BRSTO	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
CAVLR RNAV STARs	WIGOL1 (RNAV) 20130416.tgs

Purpose:
This proposed design will enhance the Washington DC Design Team's proposed GIBBZ and HOWLL RNAV STARs and James River Airspace Redesign.

Study Team Recommendation:
There was no Study Team recommendation for this design.

OAPM Submission: Washington D.C. Metroplex

WIGOL RNAV STAR Final Design

Proposed Design:
The Washington DC Design Team is proposing the creation of an ATC assigned RNAV STAR named WIGOL for Severe Weather Avoidance Plan (SWAP) to support weather induced re-routes (see Figure 1). This procedure will enable Air Traffic Control to provide efficient routing at ZUMBR, CCHIP, and DORRN waypoints to Washington Dulles International Airport (IAD) when weather impacts the GIBBZ or CAVLR RNAV STARs. The WIGOL creates a structured weather re-route reducing control complexity and increase on-time efficiency for industry.

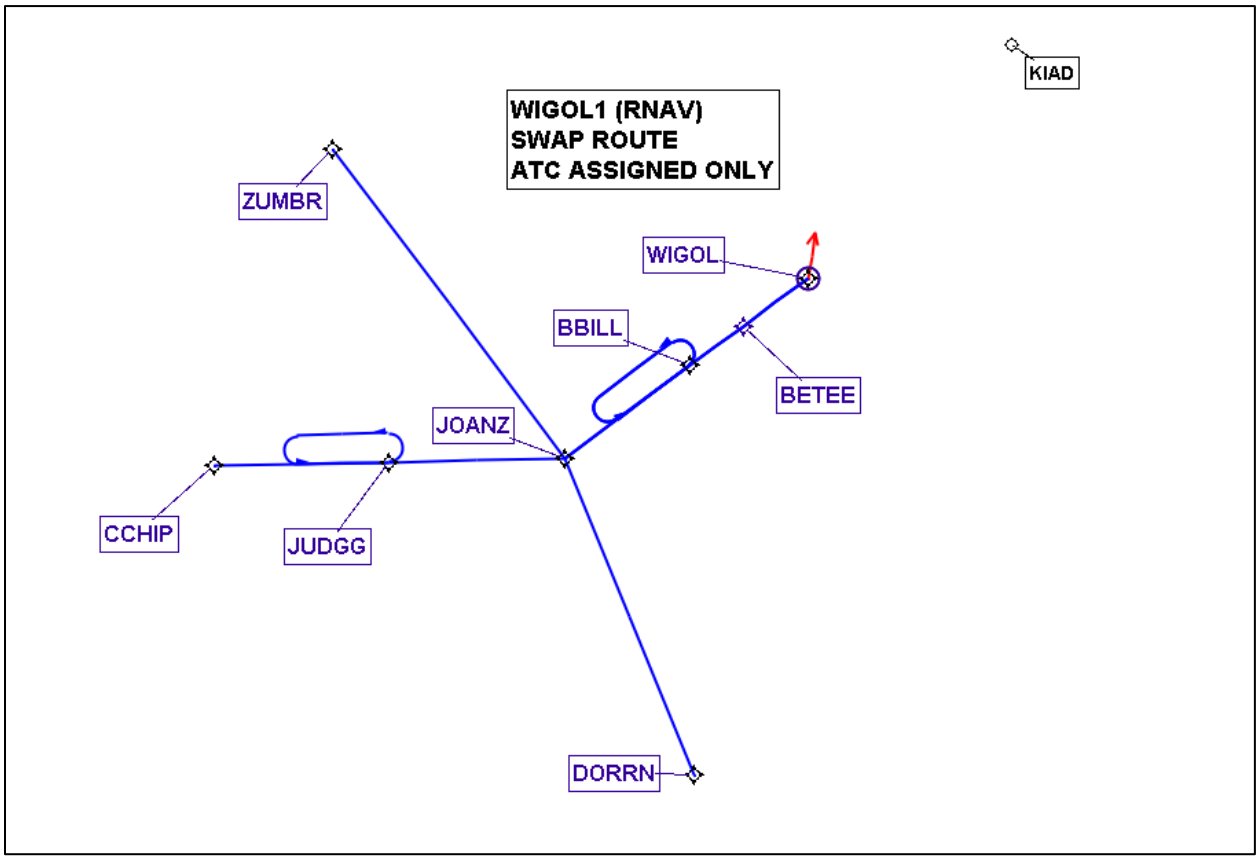


FIGURE 1. PROPOSED DESIGN

Proposed Design and Implementation Dependencies:
This design is dependent on the implementation of the CAVLR RNAV STAR.

Additional Design Considerations:
This proposal requires modifications to ZDC and PCT Standard Operating Practices and Letters of Agreement. The proposed changes do not require a spectrum analysis, changes to Manpower, or Facilities and Equipment. Validation through a Human-in-the-Loop simulation is not anticipated. There is no anticipated increase of operations nor a change to the hours of utilization anticipated on this procedure.

OAPM Submission: Washington D.C. Metroplex

WIGOL RNAV STAR Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

Dave Perkins Washington D.C. OAPM FAA Lead	04.24.13 Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	April 24, 2013 Date
Bryan Lehman Potomac TRACON Facility Lead	4/24/13 Date	Paul Carroll Potomac TRACON NATCA Lead	4/24/13 Date
Joe Keimig Washington ARTCC Facility Lead	4/18/13 Date	Curt Johnson Washington ARTCC NATCA Lead	4/18/13 Date

OAPM Submission: Washington D.C. Metroplex

LUCYL and KALLI RNAV SIDs Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issue 14 PBN Procedures	12 December 2013
Facilities and Areas/Sectors Impacted:	POCs:
Washington ARTCC (ZDC) - Sector 11 and 21 Potomac TRACON (PCT) - TAPPA, FLTRK and CSIDW	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
SPIDR, DUCXS, POWTN and VUDOO RNAV STARs	LUCYL1 (RNAV) 20130416.tgs KALLI1 (RNAV) 20130416.tgs

Purpose:

This proposed design addresses the lack of Procedures Based Navigation (PBN) procedures at satellite airports within PCT. Richmond Airport (RIC) was not initially identified by the Washington D.C. Study Team as a satellite airport which could benefit from the development of PBN procedures.

Study Team Recommendation:

The Study Team's recommendation was to design and optimize procedures at satellite airports including the development of RNAV SIDs and STARs, RNAV/Global Positioning System (GPS) approaches to most runways, and the addition of departure procedures for airports.

OAPM Submission: Washington D.C. Metroplex

LUCYL and KALLI RNAV SIDs Final Design

Proposed Design:

The Washington D.C. Metroplex Design Team is proposing the creation of two new RNAV SIDs named LUCYL and KALLI for RIC. Both SIDs will have runway transitions to all runways. The runway transitions on the KALLI SID will proceed west to join at the KALLI waypoint, then later splitting into 3 enroute transitions. The runway transitions on the LUCYL RNAV SID will proceed northeast to join at the LUCYL waypoint, and end at the PXT VORTAC. These new SIDs will increase flight path predictability and reduce control task complexity as well as procedurally separating departure and arrival traffic (see Figures 1 through 4).

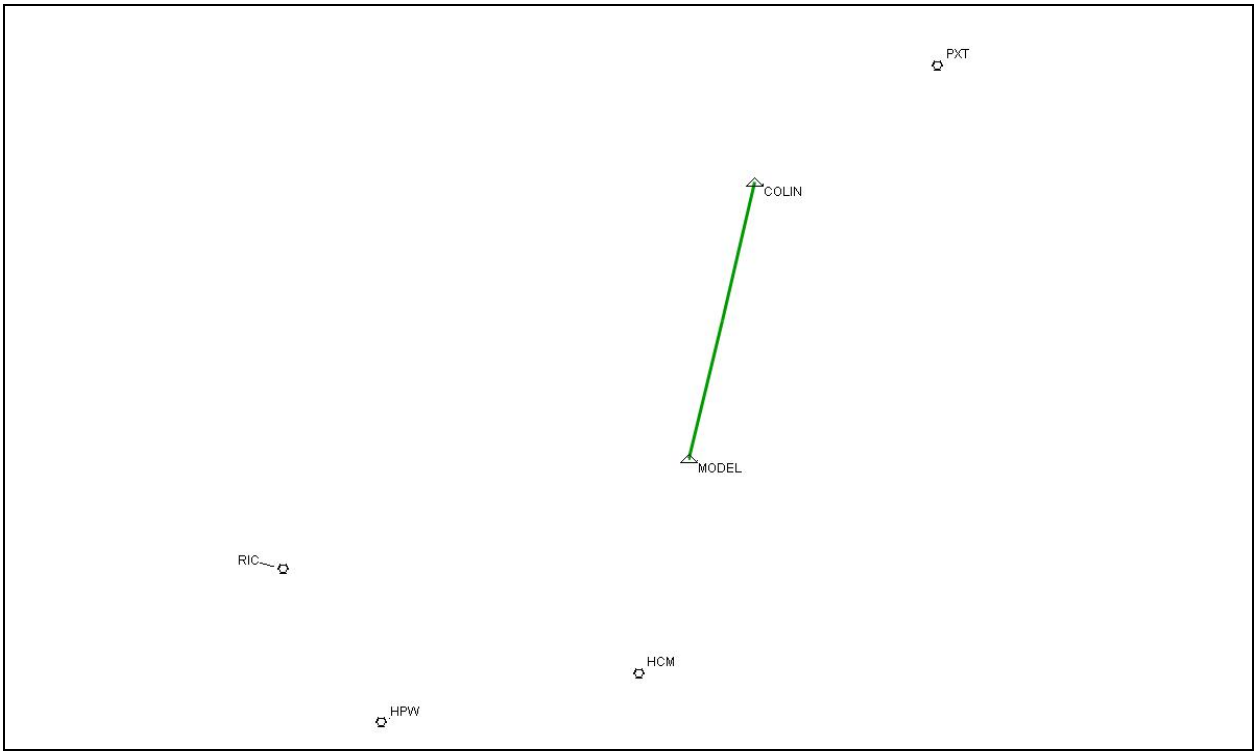


FIGURE 1. CURRENT STATE (COLIN CONVENTIONAL SID)

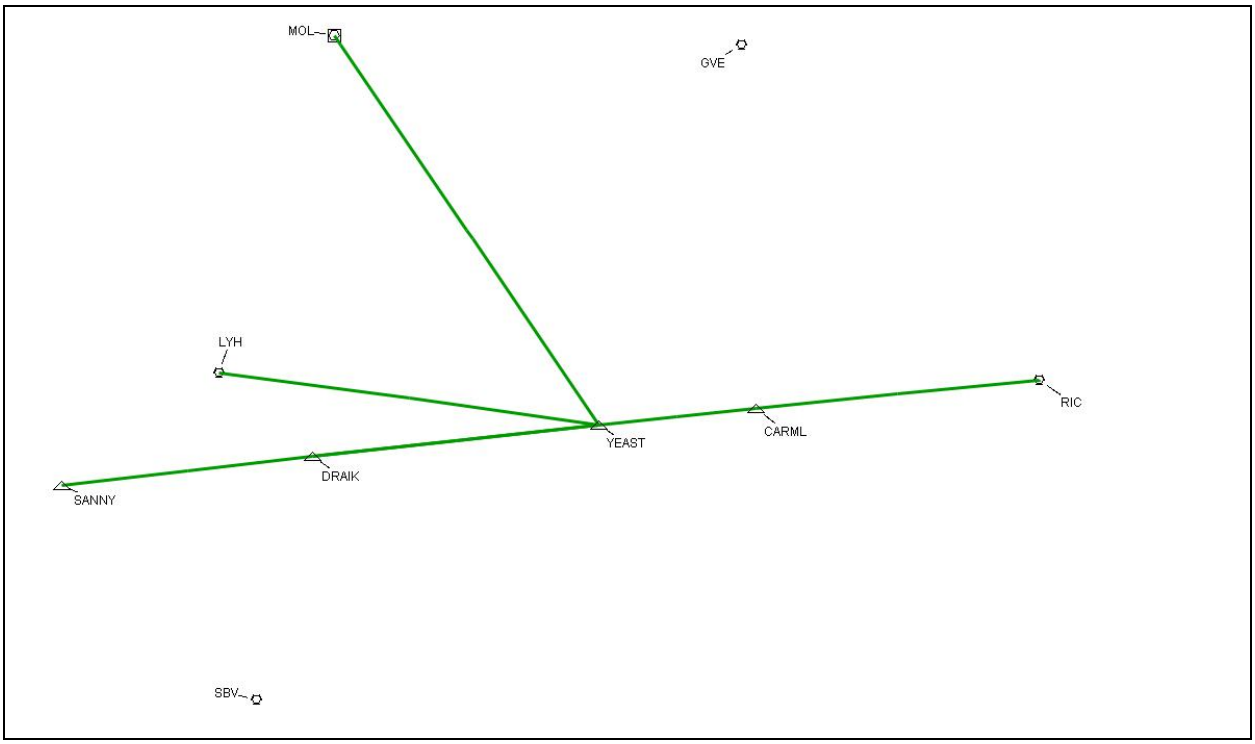


FIGURE 2. CURRENT STATE (YEAST CONVENTIONAL SID)

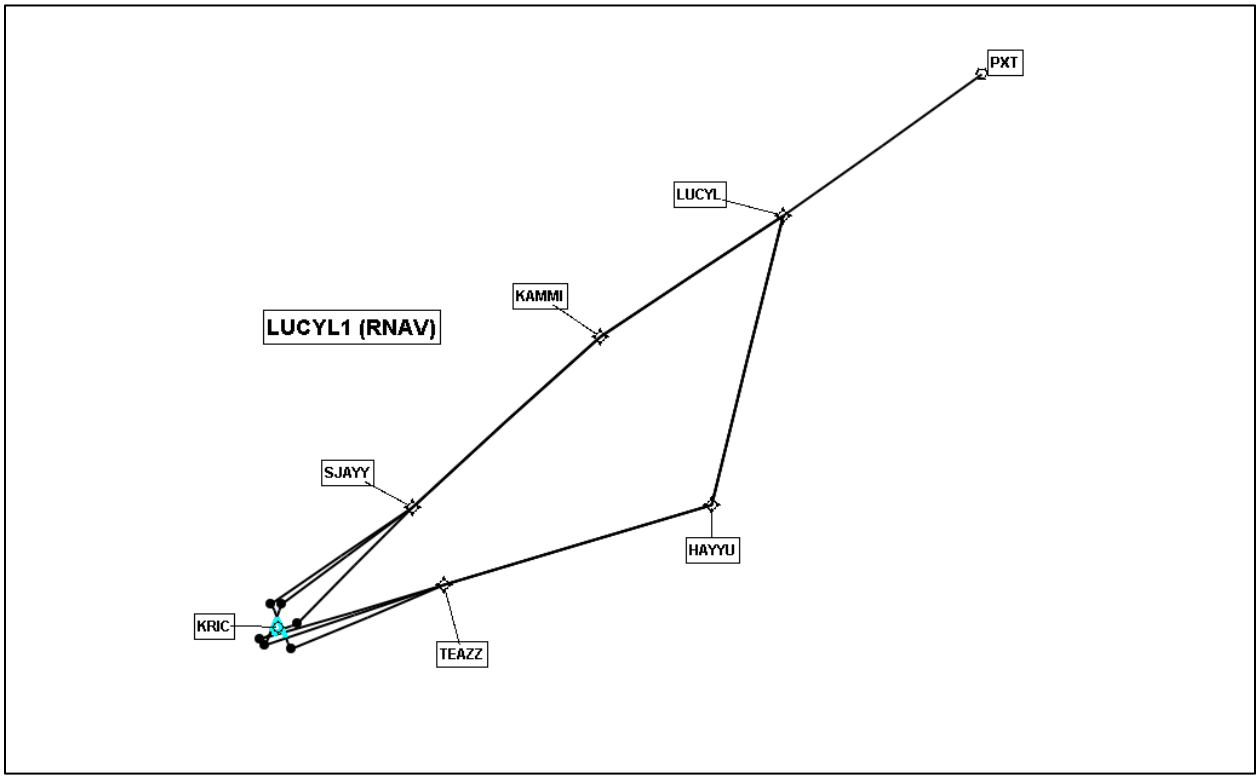


FIGURE 3. LUCYL PROPOSED DESIGN

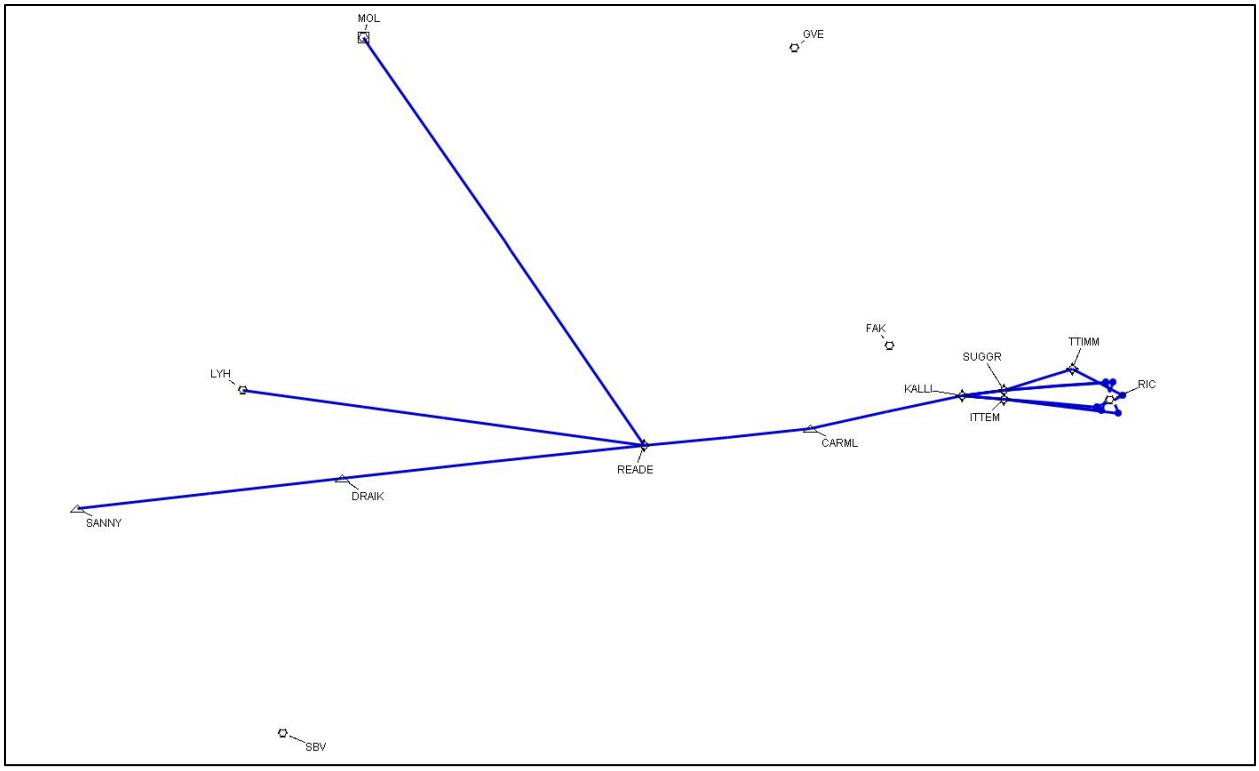


FIGURE 4. KALLI PROPOSED DESIGN

<u>Proposed Design and Implementation Dependencies</u>:
This proposed design is dependent on the SPIDR, POWTN, DUCXS and VUDOO RNAV STARs.

<u>Additional Design Considerations</u>:
This proposed design requires modifications to ZDC and PCT Standard Operating Procedures and Letters of Agreement. The proposed changes do not require a spectrum analysis, changes to Manpower, or Facilities and Equipment. Validation through a Human-in-the-Loop simulation is not anticipated. There is no anticipated increase of operations or a change to the hours of utilization on this procedure.

OAPM Submission: Washington D.C. Metroplex

LUCYL and KALLI RNAV SIDs Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

Dave Perkins Washington D.C. OAPM FAA Lead	04.24.13 Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	April 24, 2013 Date
Bryan Lehman Potomac TRACON Facility Lead	4/24/13 Date	Paul Carroll Potomac TRACON NATCA Lead	4/24/13 Date
Joe Keimig Washington ARTCC Facility Lead	4/18/13 Date	Curt Johnson Washington ARTCC NATCA Lead	4/18/13 Date

OAPM Submission: Washington D.C. Metroplex

SPIDR, POWTN, DUCXS RNAV STARs Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issue 14 PBN Procedures	12 December 2013
Facilities and Areas/Sectors Impacted:	**POCs:**
Washington ARTCC (ZDC) - Sector 21, 31and 60 Potomac TRACON (PCT) - CHOEA, FLTRK and RICFR	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
KALLI and LUCYL SIDs	SPIDR1 (RNAV) 20130416.tgs POWTN1 (RNAV) 20130416.tgs DUCXS1 (RNAV) 20130416.tgs

Purpose:
This proposed design addresses the lack of Performance Based Navigation (PBN) procedures at satellite airports within PCT. Richmond Airport (RIC) was not initially identified by the Washington DC Study Team as a satellite airport which could benefit from the development of PBN procedures.

Study Team Recommendation:
The Study Team's recommendation was to design and optimize procedures at satellite airports including the development of RNAV SIDs and STARs, RNAV/Global Positioning System (GPS) approaches to most runways, and the addition of departure procedures for airports.

OAPM Submission: Washington D.C. Metroplex

SPIDR, POWTN, DUCXS RNAV STARs Final Design

Proposed Design:
The Washington D.C. Metroplex Design Team is proposing the creation of three new RNAV STARs named SPIDR, POWTN, and DUCXS (see Figures 1 through 3). The SPIDER RNAV STAR starts at the Montebello VOR/DME providing a lateral track from the northwest. The POWTN RNAV STAR starts at the Lynchburg VORTAC providing a lateral track from the west. The DUCXS RNAV STAR has two transitions starting at KELCE and NAVEL, providing a lateral track from the southwest. The STARs will be procedurally separated from the proposed KALLI RNAV SID and have optimized descent characteristics. The designs will reduce control task complexity and level-offs and increase flight path predictability.

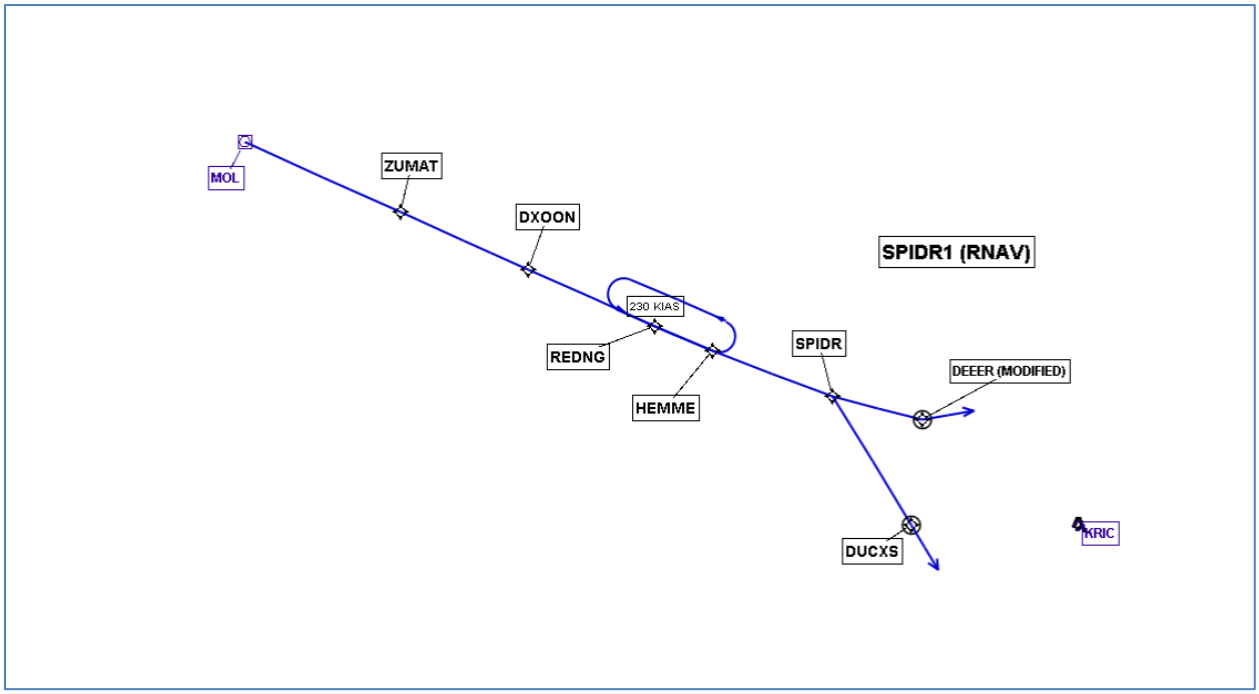


FIGURE 1. SPIDR PROPOSED DESIGN

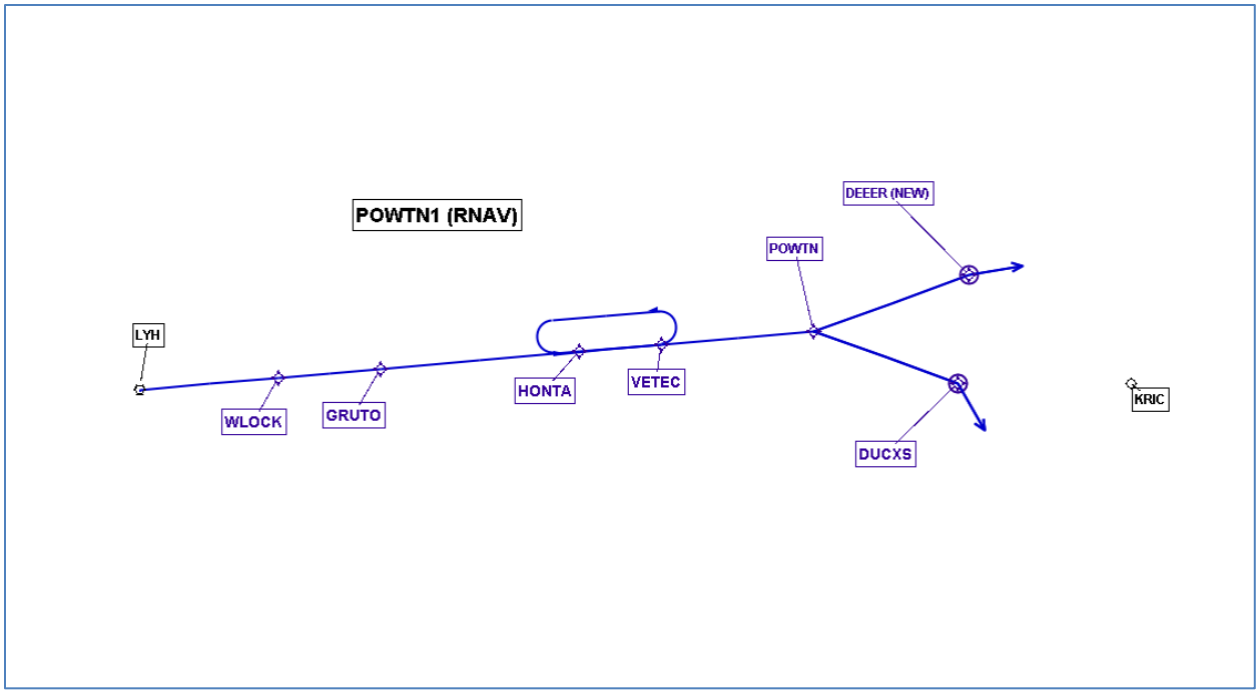


FIGURE 2. POWTN PROPOSED DESIGN

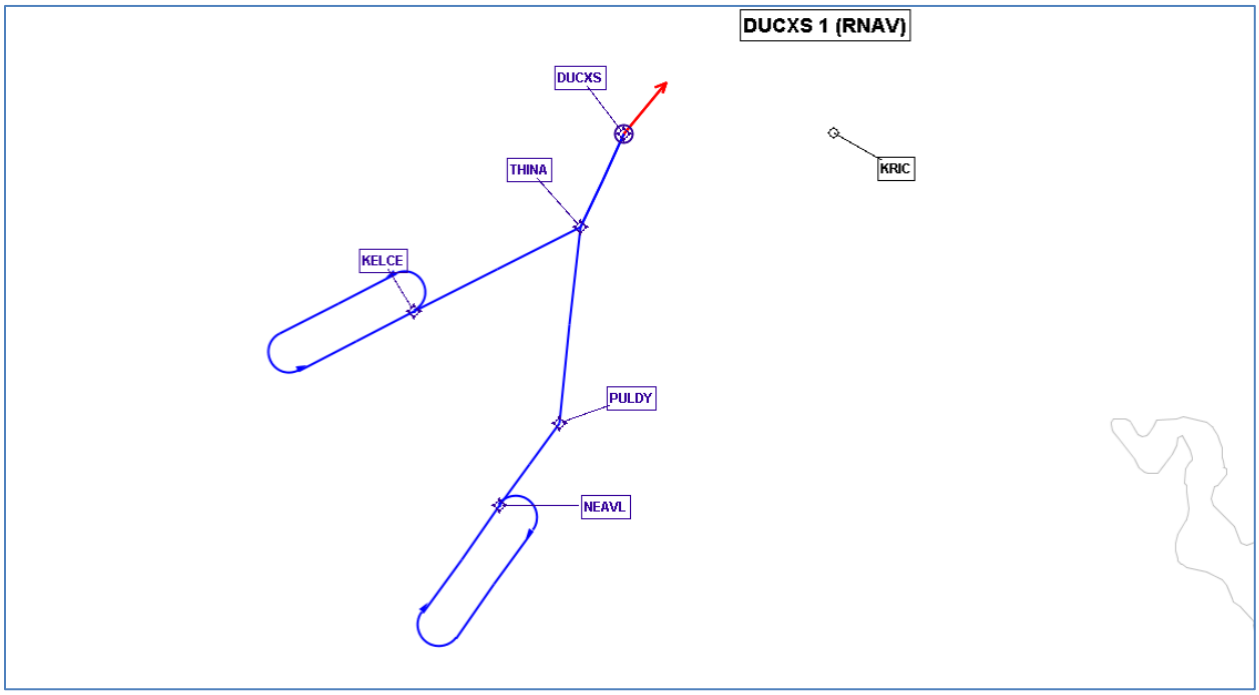


FIGURE 3. DUCXS PROPOSED DESIGN

OAPM Submission: Washington D.C. Metroplex

SPIDR, POWTN, DUCXS RNAV STARs Final Design

Proposed Design and Implementation Dependencies:
These RNAV STARs are dependent on the implementation of the LUCYL and KALLI RNAV SIDs.

Additional Design Considerations:
This proposal requires modifications to ZDC and PCT Standard Operating Procedures and Letters of Agreement. The proposed changes do not require a spectrum analysis, changes to Manpower, or changes to Facilities and Equipment. Validation through a Human-in-the-Loop simulation is not anticipated. There is no anticipated increase of operations or a change to the hours of utilization on this procedure.

OAPM Submission: Washington D.C. Metroplex

SPIDR, POWTN, DUCXS RNAV STARs Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

Dave Perkins Washington D.C. OAPM FAA Lead	04.24.13 Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	April 24, 2013 Date
Bryan Lehman Potomac TRACON Facility Lead	4/24/13 Date	Paul Carroll Potomac TRACON NATCA Lead	4/24/13 Date
Joe Keimig Washington ARTCC Facility Lead	4/18/13 Date	Curt Johnson Washington ARTCC NATCA Lead	4/18/13 Date

OAPM Submission: Washington DC Metroplex

GABBE, PTOMC, HIICH RNAV SIDs Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issue 14 PBN Procedures	29 May 2014
Facilities and Areas/Sectors Impacted:	**POCs:**
Potomac TRACON (PCT) - BARIN, ASPER, LUCKE, MULLR, IADFW, IADFC and IADFE	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
Independent	GABBE1 (RNAV) 20130416.tgs PTOMC1 (RNAV) 20130416.tgs HIICH1 (RNAV) 20130416.tgs

Purpose:
This proposed design addresses the lack of Procedure Based Navigation (PBN) procedures at satellite airports and the interaction of Leesburg Executive Airport (JYO) and Manassas Regional Airport/Harry P. Davis Field (HEF) departures with Washington Dulles International Airport (IAD) identified by the Washington D.C. Metroplex Study Team. Eastern WV Regional Airport/Shepherd Field (MRB) was added by the Washington D.C. Design Team.

Study Team Recommendation:
The Study Team recommended the design and optimize procedures at satellite airports including the addition of RNAV SIDS and STARS, RNAV/Global Positioning System (GPS) approaches to most runways, and the addition of departure procedures for airports within the Flight Restriction Zone (see Figure 1).

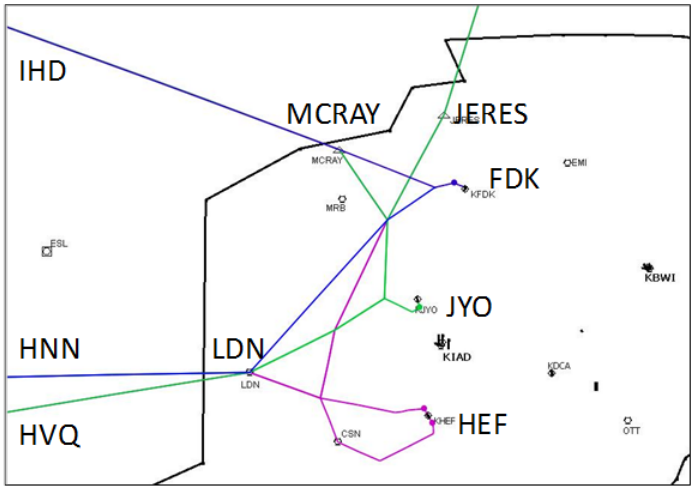


FIGURE 1. STUDY TEAM RECOMMENDATION

OAPM Submission: Washington DC Metroplex

GABBE, PTOMC, HIICH RNAV SIDs Final Design

Proposed Design:

The Washington D.C. Metroplex Design Team is proposing the creation of three new SIDs, two at HEF and one at JYO (see Figures 2-4).

The GABBE SID will be used by traffic departing Manassas Regional Airport (HEF) to the southwest. This SID will depart traffic towards the west from all runways at HEF to GABBE thence via four transitions.

The PTOMC SID will be used by traffic departing Leesburg Executive Airport (JYO). This SID departs traffic off of both JYO runways to the west away from Washington Dulles International Airport (IAD) departure and arrival flows. After crossing the PTOMC waypoint traffic will be given radar vectors to join their routes of flight.

The HIICH SID will be used by traffic departing HEF to the northwest, north, east and south. This SID will depart traffic towards the west from all runways at HEF to GABBE thence via nine transitions.

These new SIDs will reduce control complexity and increase flight path predictability on departure.

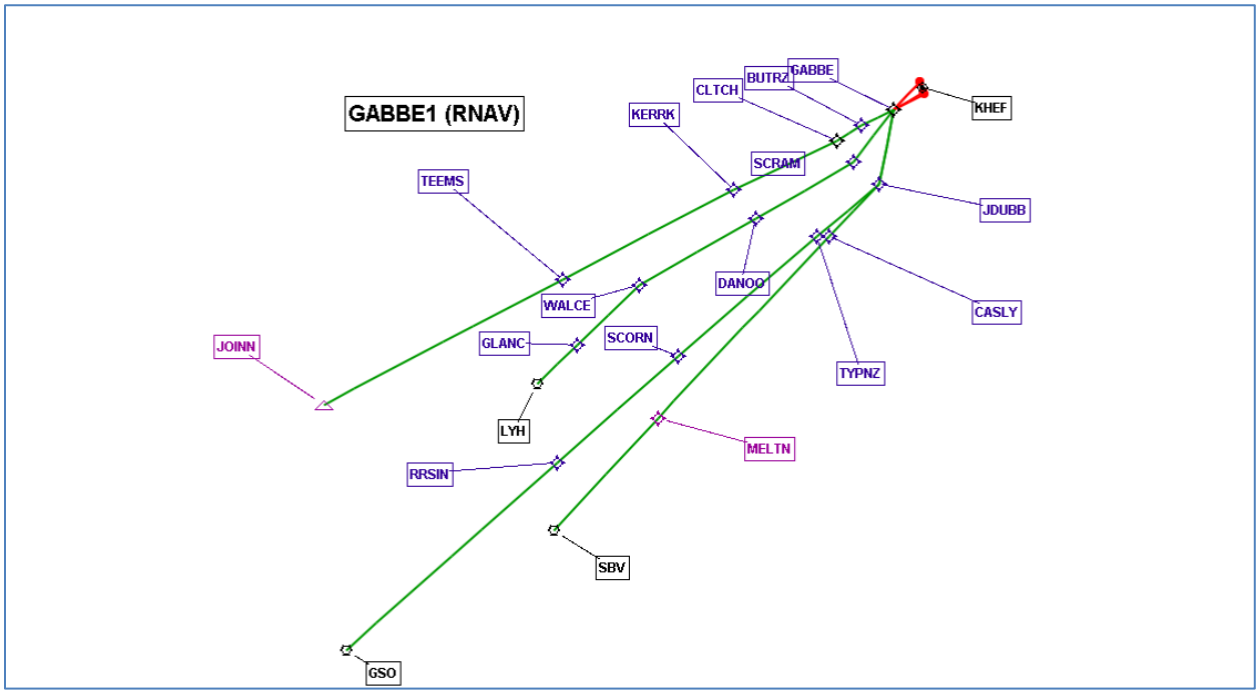


FIGURE 2. PROPOSED DESIGN – GABBE (HEF)

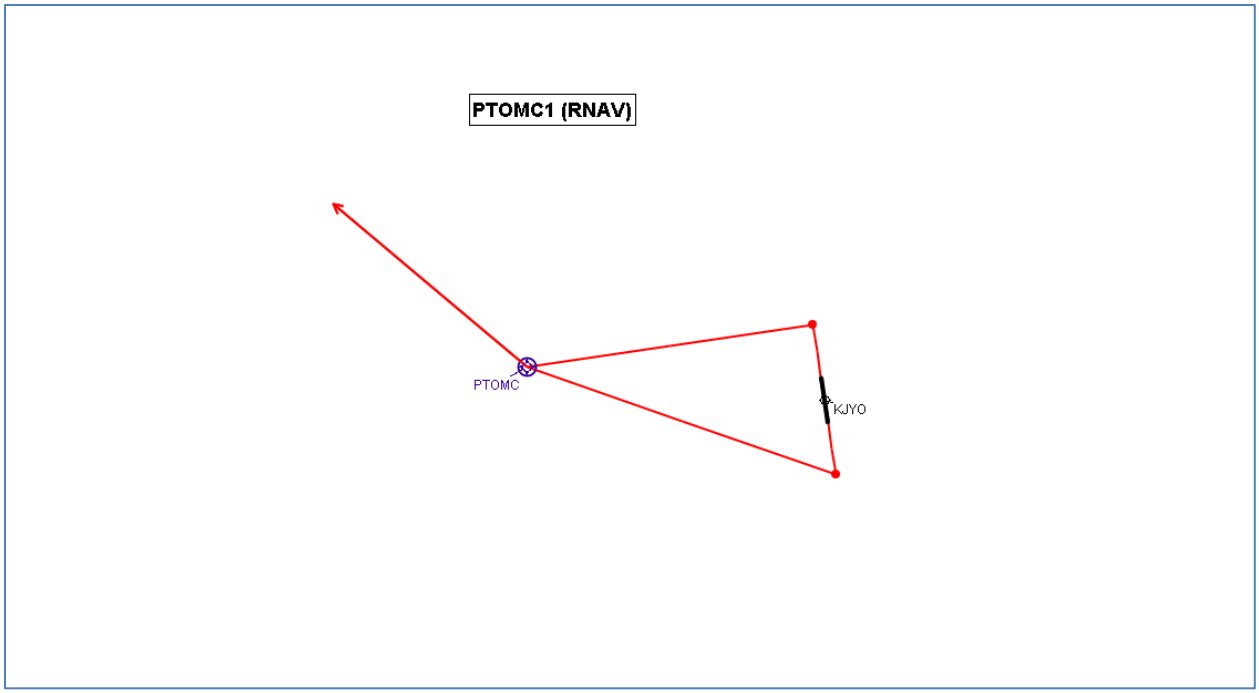


FIGURE 3. PROPOSED DESIGN – PTOMC (JYO)

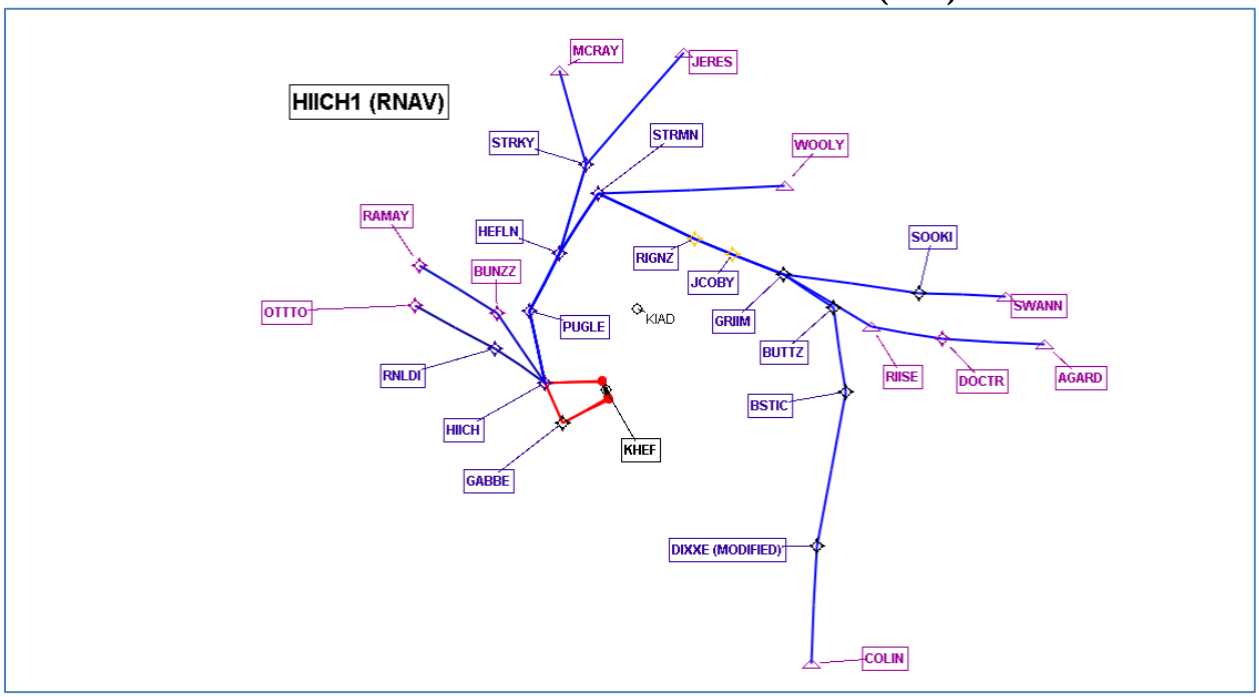


FIGURE 4. PROPOSED DESIGN – HIICH (HEF)

OAPM Submission: Washington DC Metroplex

GABBE, PTOMC, HIICH RNAV SIDs Final Design

Proposed Design and Implementation Dependencies:
This proposed design is independent of any other changes.

Additional Design Considerations:
This proposal requires modifications to PCT Standard Operating Procedures and Letters of Agreement. The proposed changes do not require a spectrum analysis, changes to Manpower, or Facilities and Equipment. Validation through a Human-in-the-Loop simulation is not anticipated. There is no anticipated increase of operations nor a change to the hours of utilization anticipated on this procedure.

The Design Team will make additional consideration during the Operational Evaluation phase to determine if the proposed designs will join the proposed IAD and DCA SIDs. In addition, there is a requirement for a Class E Surface Area for Leesburg Executive Airport (JYO) to support the implementation of the RNAV SID.

OAPM Submission: Washington DC Metroplex

GABBE, PTOMC, HIICH RNAV SIDs Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

Dave Perkins Washington D.C. OAPM FAA Lead	04.24.13 Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	April 24, 2013 Date
Bryan Lehman Potomac TRACON Facility Lead	4/24/13 Date	Paul Carroll Potomac TRACON NATCA Lead	4/24/13 Date
Joe Keimig Washington ARTCC Facility Lead	4/18/13 Date	Curt Johnson Washington ARTCC NATCA Lead	4/18/13 Date

OAPM Submission: Washington D.C. Metroplex

TIKEE RNAV STAR Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issues 14	12 December 2013
Facilities and Areas/Sectors Impacted:	**POCs:**
Washington ARTCC (ZDC) - Sectors 2, 5, and 15 Potomac TRACON (PCT) - BARIN, MANNE, BRSTO and DCAFR	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
GIBBZ, TRSTN, and TRUPS RNAV STARs, and DOCCS STAR	TIKEE1 (RNAV) 20130416.tgs

Purpose:
This proposed design addresses the lack of Performance Based Navigation procedures at satellite airports within PCT.

Study Team Recommendation:
The Study Team's recommendation was to design and optimize procedures at satellite airports including the development of RNAV SIDS and STARS, RNAV/Global Positioning System (GPS) approaches to most runways, and the addition of departure procedures for airports.

OAPM Submission: Washington D.C. Metroplex

TIKEE RNAV STAR Final Design

Proposed Design:

The Washington D.C. Metroplex Design Team is proposing the creation of a RNAV STAR named TIKEE to support aircraft transitioning from northwest of Washington Dulles International Airport (IAD) to the satellite airports west and south of IAD within PCT airspace (see Figure 1). This proposed procedure will begin at ESL VOR/DME and transition south to BBONE waypoint, then east to LURAY and TIKEE waypoints. The following satellite airports are incorporated to support the design:

1. Culpeper Regional Airport (KCJR)
2. Leesburg Executive Airport (KJYO)
3. Manassas Regional Airport/Harry P. Davis Field (KHEF)
4. Upperville Airport (2VG2)
5. Warrenton-Fauquier Airport (KHWY)
6. Stafford Regional Airport (KRMN)
7. Indian Head Airport (K2W5)
8. Davison Army Airfield (KDAA)
9. Joint Base Andrews (KADW)
10. Washington Executive/Hyde Field (KW32)
11. Potomac Airfield (KVKX)
12. Freeway Airport (KW00)
13. Shannon Airport (KEZF)
14. Quantico Marine Corps Airfield (KNYG)

The TIKEE RNAV STAR will increase flight path predictability and reduce control task complexity.

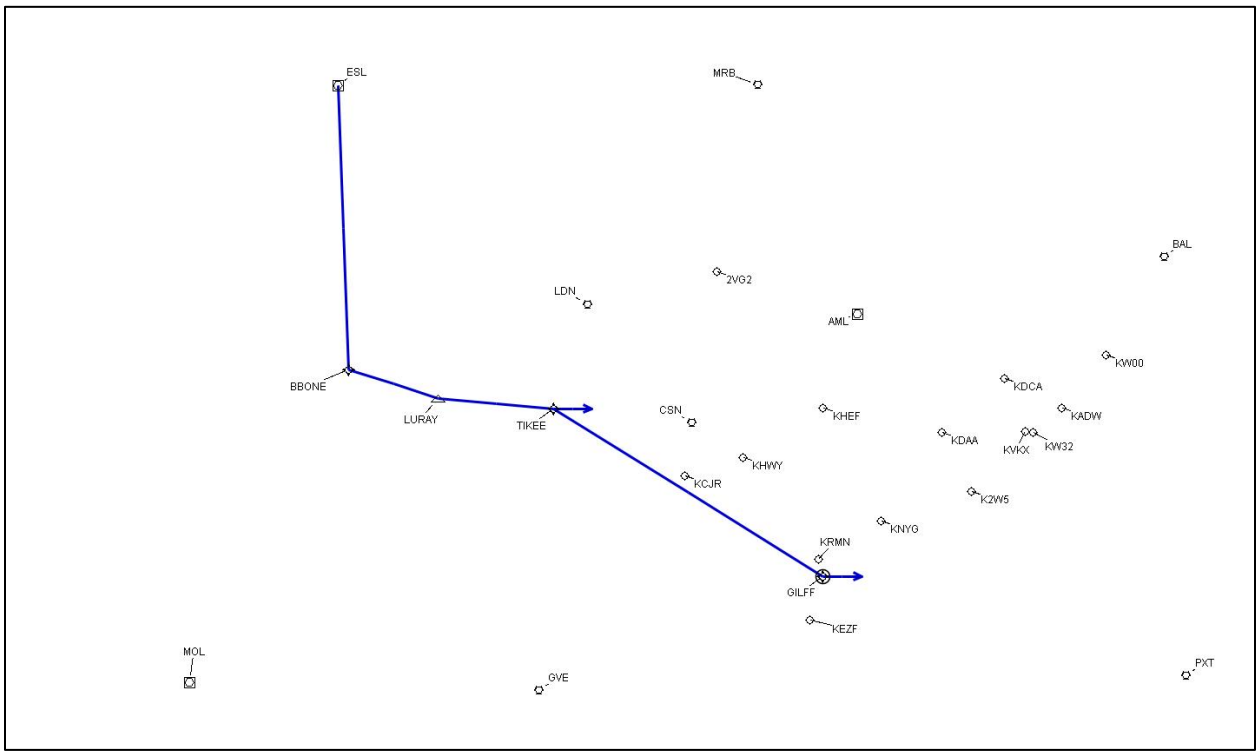


FIGURE 1. PROPOSED DESIGN

Proposed Design and Implementation Dependencies:

OAPM Submission: Washington D.C. Metroplex

TIKEE RNAV STAR Final Design

This proposed design is dependent on the GIBBZ, TRSTN and TRUPS RNAV STARs, and DOCCS STAR.

Additional Design Considerations:
This proposal requires modifications to PCT Standard Operating Procedures and Letters of Agreement. The proposed changes do not require a spectrum analysis, changes to Manpower, or Facilities and Equipment. Validation through a Human-in-the-Loop simulation is not anticipated. There is no anticipated increase of operations nor a change to the hours of utilization anticipated on this procedure.

OAPM Submission: Washington D.C. Metroplex

TIKEE RNAV STAR Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

04.24.13		April 24, 2013	
Dave Perkins Washington D.C. OAPM FAA Lead	Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	Date
4/24/13		4/24/13	
Bryan Lehman Potomac TRACON Facility Lead	Date	Paul Carroll Potomac TRACON NATCA Lead	Date
4/18/13		4/18/13	
Joe Keimig Washington ARTCC Facility Lead	Date	Curt Johnson Washington ARTCC NATCA Lead	Date

OAPM Submission: Washington D.C. Metroplex

TRSTN RNAV STAR Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
Terminal Procedures	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issues 14	12 December 2013
Facilities and Areas/Sectors Impacted:	**POCs:**
Washington ARTCC (ZDC) - Sectors 14, 16, 20, 32, 36, and 38 Potomac TRACON (PCT) - FLTRK, CHOEA, BARIN, MANNE, BRSTO, ASPER, LUCKE, BELAY, WOOLY and MULLR	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
GIBBZ, TRUPS, RAVNN, CAVLR, and CAPSS RNAV STARs, DOCCS STAR, Hagerstown T-Routes and James River Airspace Redesign	TRSTN1 (RNAV) 20130416.tgs

Purpose:
This proposed design addresses the lack of Performance Based Navigation procedures at satellite airports within PCT.

Study Team Recommendation:
The Study Team's recommendation was to design and optimize procedures at satellite airports including the development of RNAV SIDS and STARS, RNAV/Global Positioning System (GPS) approaches to most runways, and the addition of departure procedures for airports.

OAPM Submission: Washington D.C. Metroplex

TRSTN RNAV STAR Final Design

Proposed Design:

The Washington D.C. Metroplex Design Team is proposing the creation of an RNAV STAR named TRSTN to support aircraft transitioning to satellite airports south, west and north of Washington Dulles International Airport (IAD) (see Figure 1). This procedure will add five transitions from the South that will separate satellite arrivals from IAD, Ronald Reagan Washington National Airport, and Baltimore-Washington International Airport during high traffic volume hours. A transition from the THHMP waypoint allows for the traffic originating in the vicinity of the Richmond Airport access to the new RNAV STAR. After TRSTN waypoint, two runway transitions for the following satellite airports are incorporated to support the design:

1. Montgomery County Airpark (KGAI)
2. Carroll County Regional Airport/Jack B. Poage Field (KDMW)
3. Front Royal Warren County Airport (KFRR)
4. Davis Airport (KW50)
5. Eastern WV Regional Airport/Shepherd Field (KMRB)
6. Winchester Regional Airport (KOKV)
7. Leesburg Executive Airport (KJYO)
8. Frederick Municipal Airport (KFDK)
9. Martin State Airport (KMTN)
10. Hagerstown Regional Airport (KHGR)
11. Warrenton Fauquier Airport (KHWY)
12. Manassas Regional Airport (KHEF)
13. Culpeper Regional Airport (KCJR)
14. Stafford Regional Airport (KRMN)
15. Shannon Airport (KEZF)
16. Quantico Marine Corps Airfield (KNYG)

The TRSTN RNAV STAR will increase flight path predictability and reduce control task complexity.

OAPM Submission: Washington D.C. Metroplex

TRSTN RNAV STAR Final Design

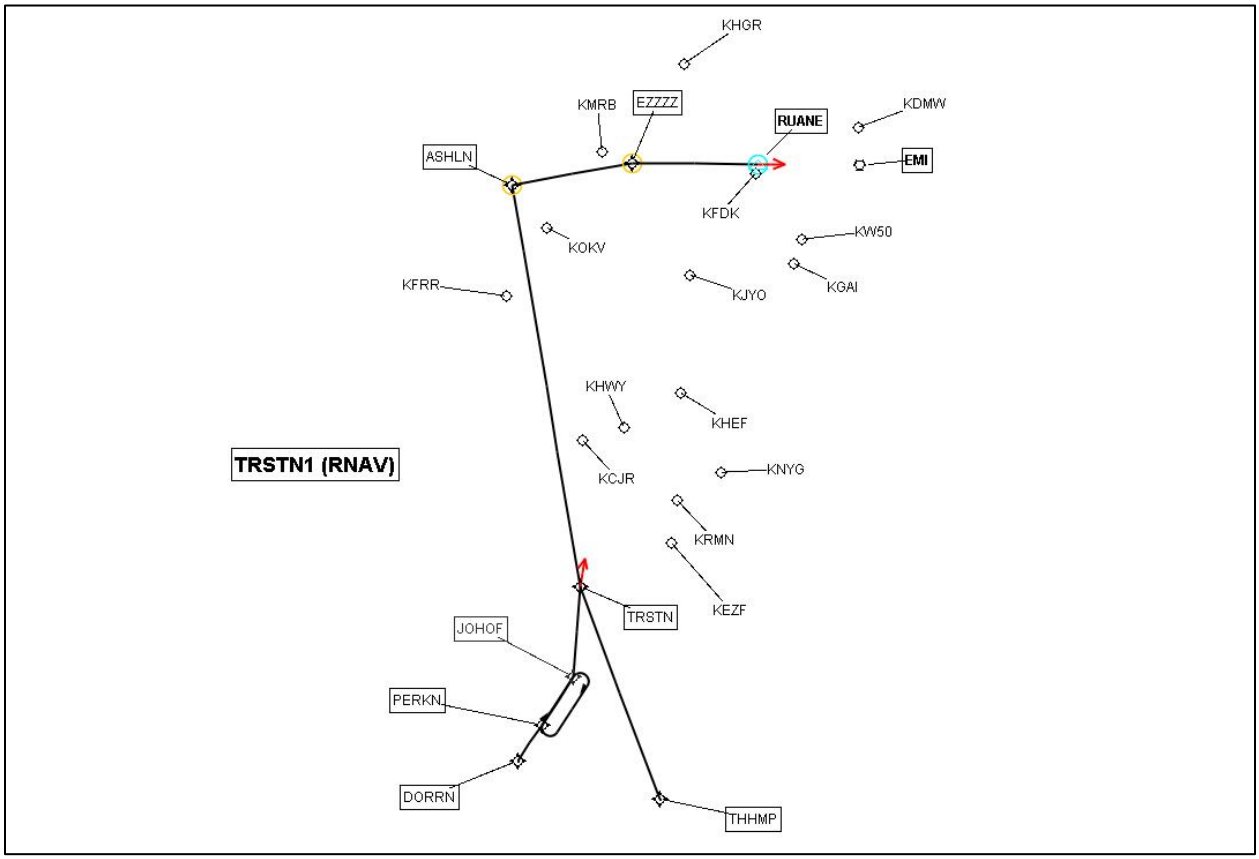


FIGURE 1. PROPOSED DESIGN

<u>Proposed Design and Implementation Dependencies</u>:
This proposed design is dependent on the GIBBZ, TRUPS, RAVNN, CAVLR, and CAPSS RNAV STARs, DOCCS STAR, Hagerstown T-Routes, and James River Airspace Redesign.

<u>Additional Design Considerations</u>:
This proposal requires modifications to ZDC and PCT Standard Operating Practices and Letters of Agreement. The proposed changes will not require a spectrum analysis. There are no anticipated changes to Manpower, or Facilities and Equipment. Validation through a Human-in-the-Loop simulation is not anticipated. There is no anticipated increase of operations nor a change to the hours of utilization on this procedure.

OAPM Submission: Washington D.C. Metroplex

TRSTN RNAV STAR Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

Dave Perkins Washington D.C. OAPM FAA Lead	04.24.13 Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	April 24, 2013 Date
Bryan Lehman Potomac TRACON Facility Lead	4/24/13 Date	Paul Carroll Potomac TRACON NATCA Lead	4/24/13 Date
Joe Keimig Washington ARTCC Facility Lead	4/18/13 Date	Curt Johnson Washington ARTCC NATCA Lead	4/18/13 Date

OAPM Submission: Washington D.C. Metroplex

T-287, T-299 (Hagerstown) T-Routes Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
ATS Route Change	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issue 53 Terminal Procedures	17 October 2013
Facilities and Areas/Sectors Impacted:	**POCs:**
Washington ARTCC (ZDC) - Sectors 02, 05, 15, 31 Potomac TRACON - LUCKE, BINNS, CHOEA, CHOWE and BELAY New York ARTCC - Sector 27	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
TRSTN RNAV STAR and Hagerstown Airspace Redesign	T287 20130416.tgs, T299 20130416.tgs

Purpose:
The purpose of this design is to optimize the airspace redesign, addressing the Washington DC Study Team identified issue that ZDC Sector 06 is working Hagerstown Approach Control and high altitude operations, with new route structure.

Study Team Recommendation:
The Washington D.C. Study Team proposed that ZDC06 delegate the airspace surrounding HGR from the surface to 8,000 feet above mean sea level (MSL) to PCT's LUCKE Sector (see Figure 1).

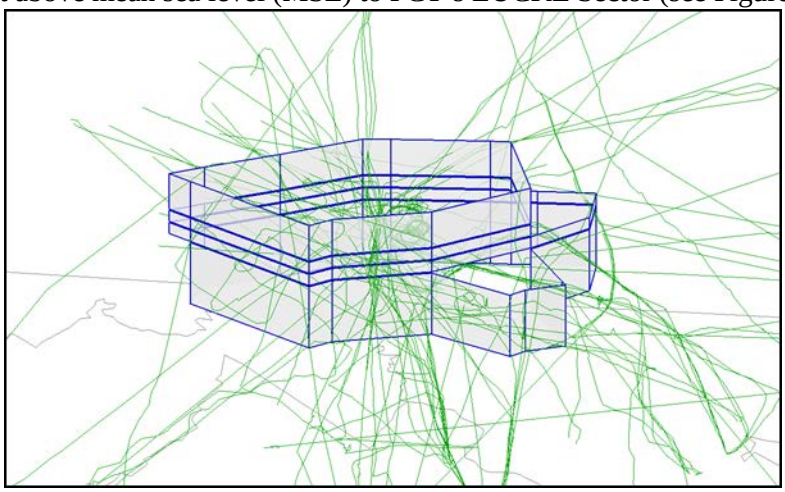


FIGURE 1. STUDY TEAM RECOMMENDATION

Proposed Design:
The Washington D.C. Design Team is proposing the implementation of two T-Routes to enhance the benefits of the proposed Hagerstown Airspace redesign identified by the Washington DC Study Team (see Figure 2-4). These T-Routes will enable aircraft in circumnavigating Dulles International Airport (IAD) arrival flows. These routes will provide service to low altitude aircraft and have a Maximum Assigned Altitude of 10,000 Feet Mean Sea Level. The routes will increase flight path predictability and reduce controller task complexity.

OAPM Submission: Washington D.C. Metroplex

T-287, T-299 (Hagerstown) T-Routes Final Design

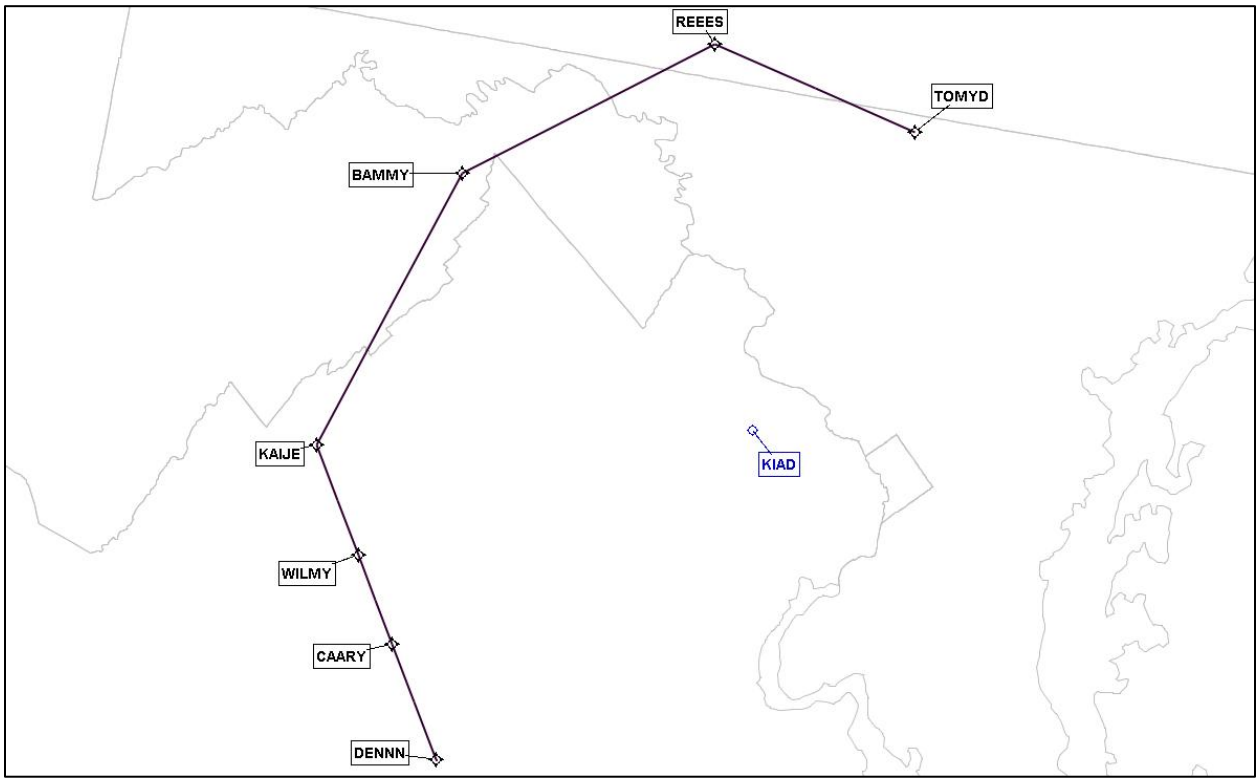


FIGURE 2. PROPOSED T-287

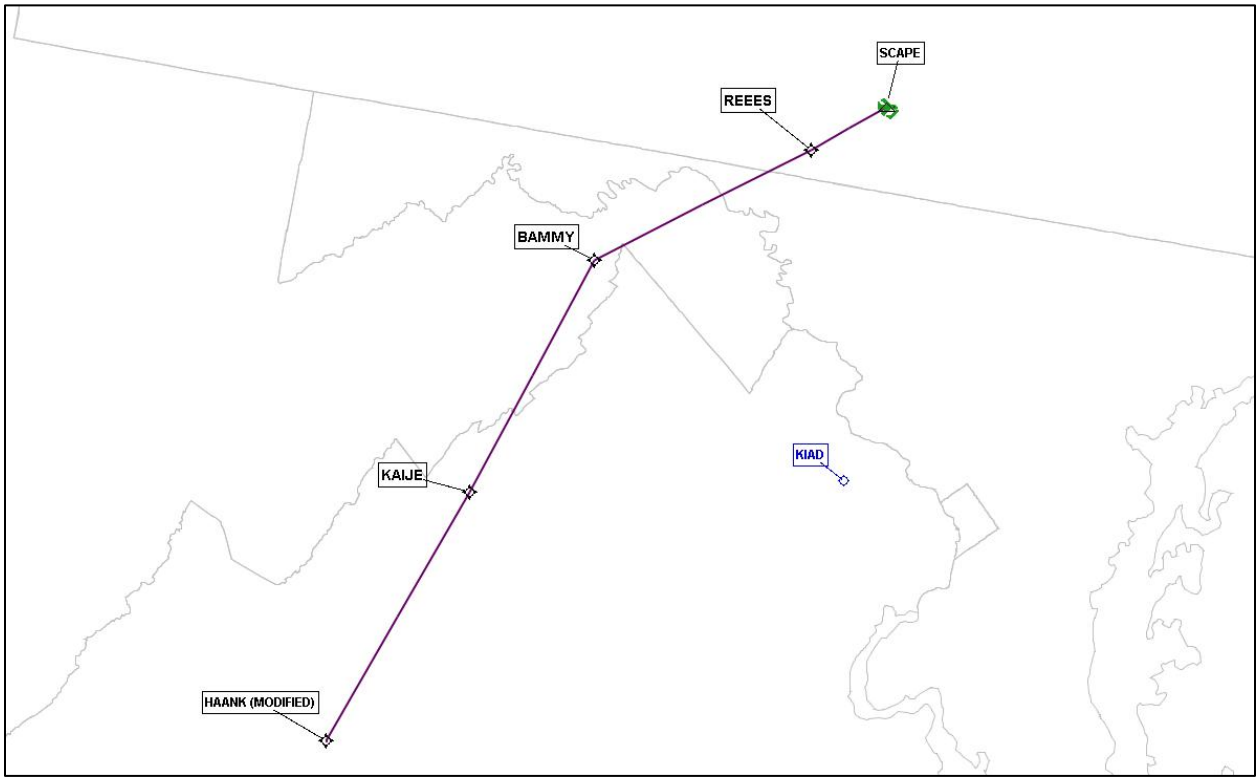


FIGURE 3. PROPOSED T-299

OAPM Submission: Washington D.C. Metroplex

T-287, T-299 (Hagerstown) T-Routes Final Design

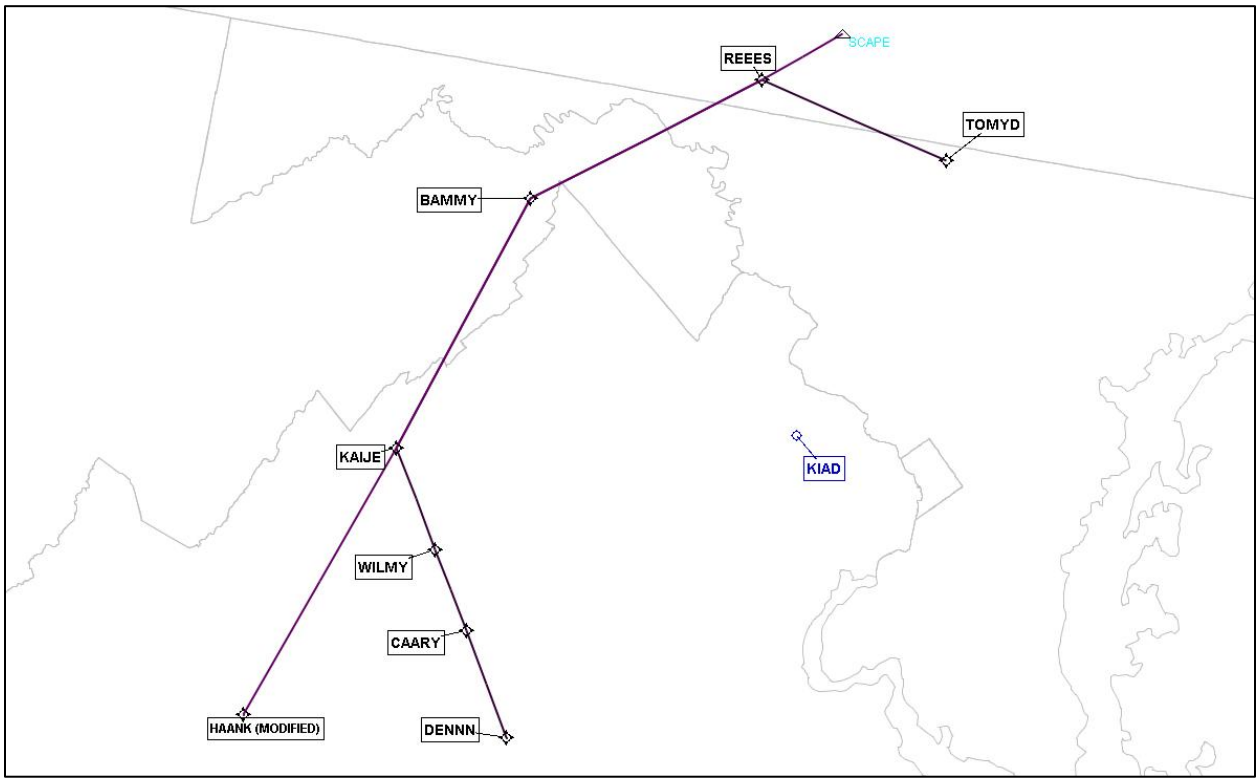


FIGURE 4. PROPOSED T-ROUTES (T287 & T299)

<u>Proposed Design and Implementation Dependencies</u>:
These proposed T-Routes are dependent upon the proposed TRSTN RNAV STAR and proposed Hagerstown airspace redesign.

<u>Additional Design Considerations</u>:
This proposal requires modifications to ZDC and PCT Standard Operating Practices and ZDC, ZNY and PCT Letters of Agreement. The proposed changes do not require a spectrum analysis. There are no anticipated changes to Manpower, or Facilities and Equipment. Validation through a Human-in-the-Loop simulation is not anticipated. There is no anticipated increase of operations or a change to the hours of utilization on this procedure. Disposition of non-participating aircraft must be addressed.

OAPM Submission: Washington D.C. Metroplex

Hagerstown T-Routes Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

04-24-13		April 24, 2013	
Dave Perkins Washington D.C. OAPM FAA Lead	Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	Date
4/24/13		4/24/13	
Bryan Lehman Potomac TRACON Facility Lead	Date	Paul Carroll Potomac TRACON NATCA Lead	Date
4/18/13		4/18/13	
Joe Keimig Washington ARTCC Facility Lead	Date	Curt Johnson Washington ARTCC NATCA Lead	Date
New York ARTCC Facility Rep	Date	New York ARTCC NATCA Rep	Date

OAPM Submission: Washington DC Metroplex

T-291, T-295 (V-93) T-Route Final Design

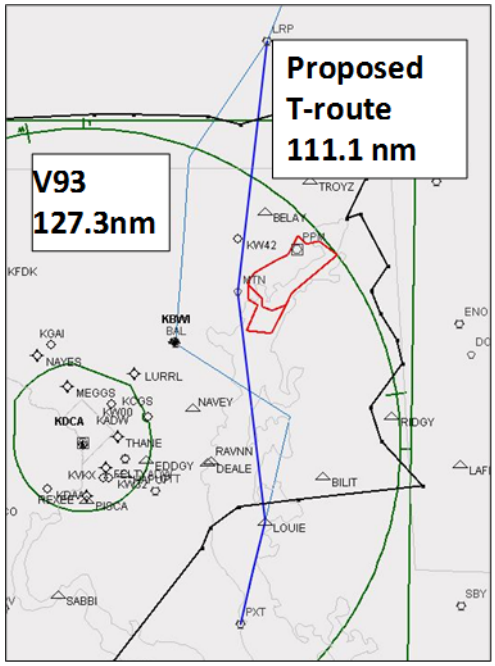
Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
ATS Route Change	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issue 36 and 50	22 August 2013
Facilities and Areas/Sectors Impacted:	**POCs:**
Washington Center (ZDC) - Sector 11 Potomac TRACON (PCT) - PALEO, GRACO, BELAY, WOOLY and CSIDW New York Center - Sectors 26 and 27 Harrisburg Approach	- PCT, B. Lehman - PCT, P. Carroll - ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
Independent	T291 20130416.tgs T295 20130416.tgs

Purpose:

Aircraft flight planned along V93 airway over Baltimore Washington International Airport (BWI) are currently manually re-routed between Lancaster (LRP) and Patuxent (PXT) VORTACs. This is necessary due to poor radar coverage (cone of silence) directly over BWI. (see Figure 1).

Study Team Recommendation:

This Study Team proposed development of a T-Route that would follow the same flight path as the current manual re-route at and below 14,000 feet above mean sea level (MSL). This simple addition will significantly reduce the need to manually clear aircraft and related communications, along with increasing predictability and repeatability of the route.



OAPM Submission: Washington DC Metroplex

T-291, T-295 (V-93) T-Route Final Design

FIGURE 1. STUDY TEAM RECOMMENDATION

Proposed Design:

The Washington D.C. Design Team is proposing the implementation of two new bi-directional T-Routes. Both T-Routes will have a Maximum Assigned Altitude (MAA) of 11,000 feet. One T-Route will follow the lateral track as proposed by the Study Team from LRP VORTAC and ends at LOUIE intersection instead of the Study Team recommended PXT VORTAC. Both procedures will enhance segregation between D.C Metro northbound arrival and eastbound departure flows. The second T-Route will follow the same lateral track between LOUIE and MTN TACAN but will continue to HAR VORTAC. This design will allow the benefit of flying a more efficient and predictable route for aircraft utilizing airports near Middletown (MDT) and the airports south of PXT. Additionally this route will ensure the avoidance of the Flight Restricted Zone (FRZ) in the Washington D.C. Area and will reduce control task complexity (Figure 2-4).

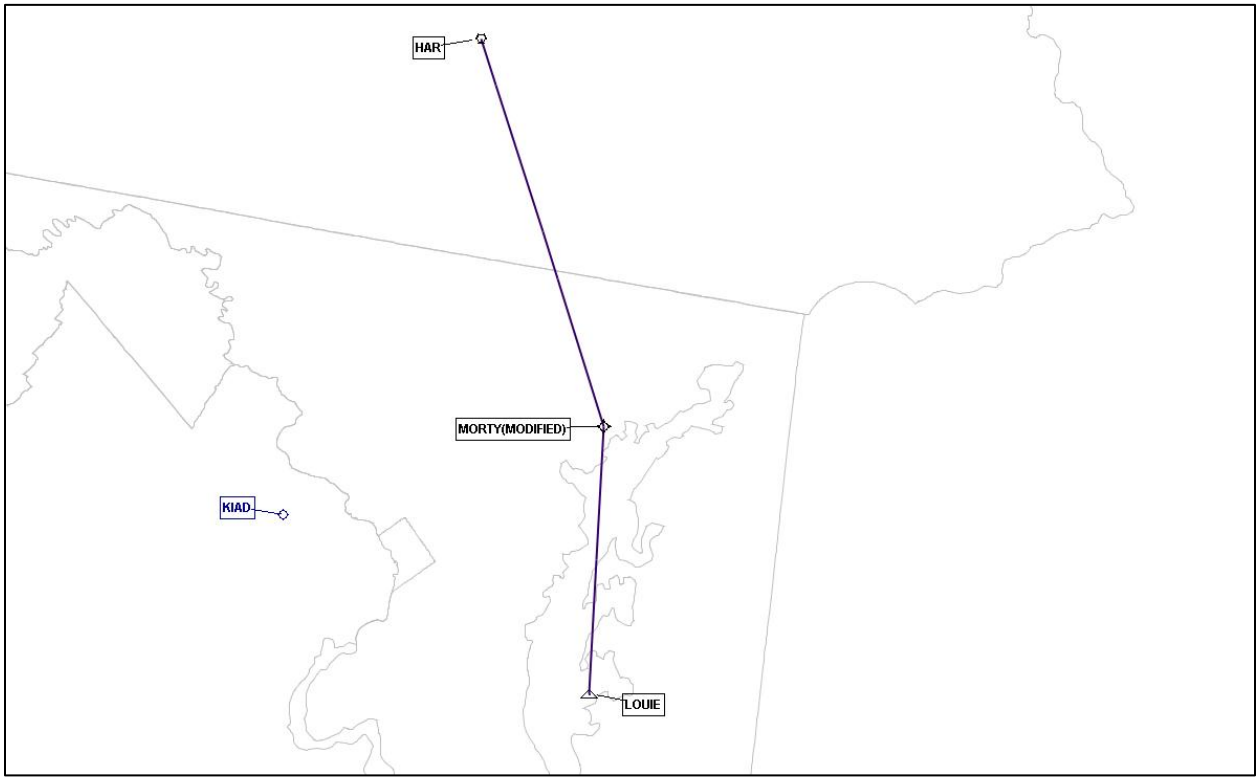


FIGURE 2. PROPOSED T-291

OAPM Submission: Washington DC Metroplex

T-291, T-295 (V-93) T-Route Final Design

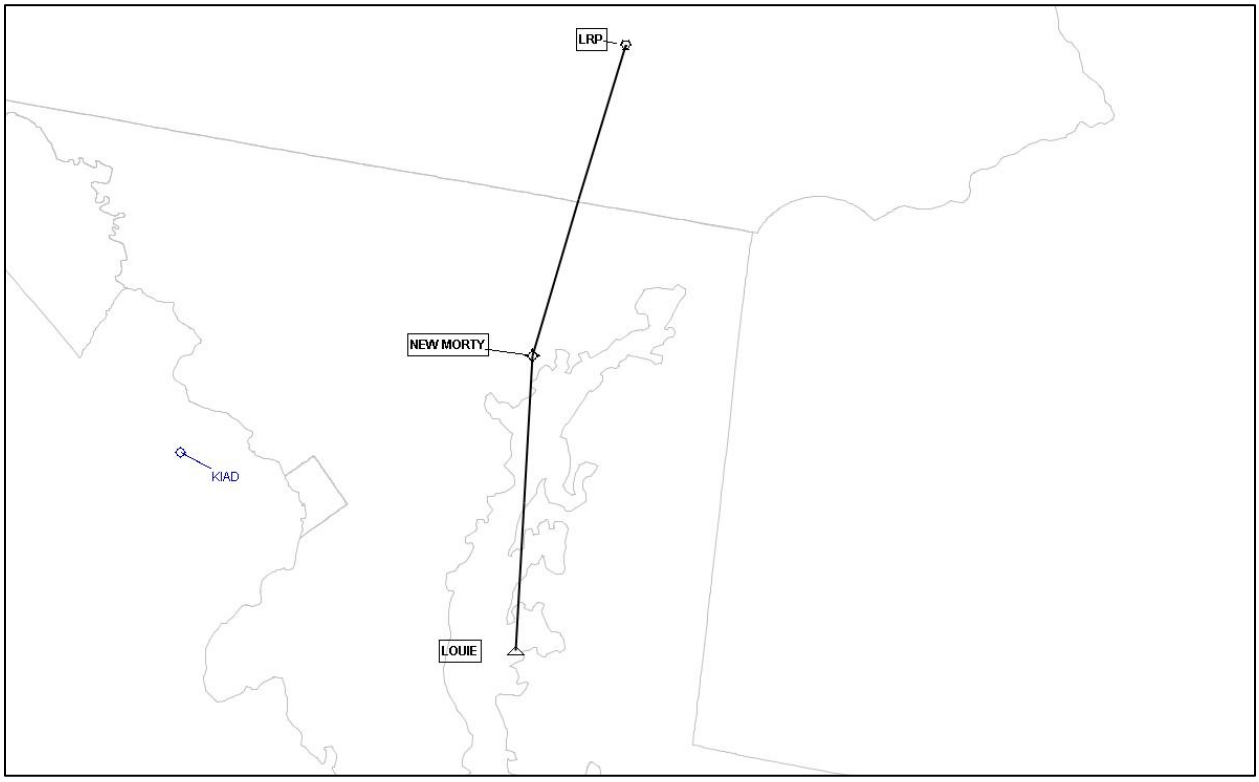


FIGURE 3. PROPOSED T-295

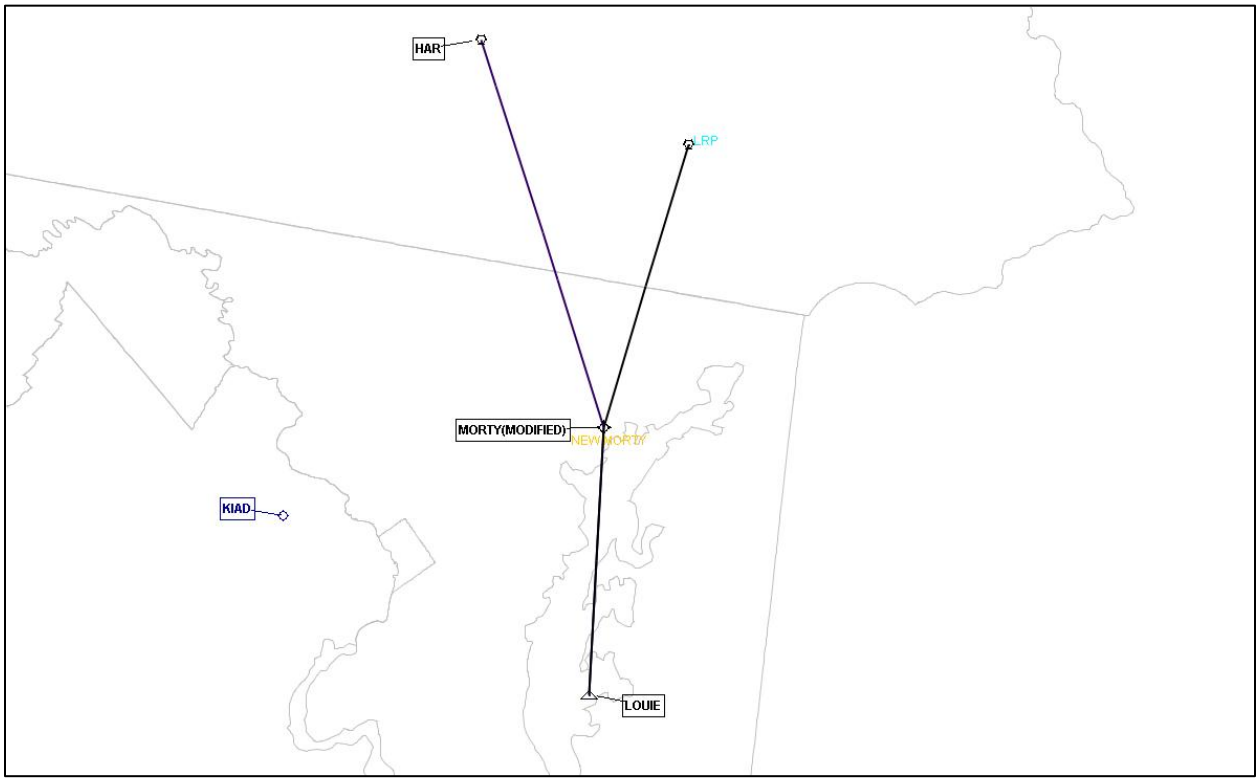


FIGURE 4. PROPOSED T-ROUTES

Proposed Design and Implementation Dependencies:
This proposed final design is independent of any other changes.

Additional Design Considerations:
This proposal requires modifications to ZDC, PCT, HAR and ZNY Letters of Agreements and ZDC, PCT Standard Operating Procedures. The proposed changes does not require a spectrum analysis. There are no anticipated changes to Manpower, or Facilities and Equipment. Validation through a Human-in-the-Loop simulation is not anticipated. There is no anticipated increase of operations or a change to the hours of utilization on this procedure.

OAPM Submission: Washington DC Metroplex

V-93 T-Route Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

Dave Perkins Washington D.C. OAPM FAA Lead	04.24.13 Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	Apr. 24, 2013 Date
Bryan Lehman Potomac TRACON Facility Lead	4/24/13 Date	Paul Carroll Potomac TRACON NATCA Lead	4/24/13 Date
Joe Keimig Washington ARTCC Facility Lead	4/18/13 Date	Curt Johnson Washington ARTCC NATCA Lead	4/18/13 Date
New York ARTCC Facility Rep	Date	New York ARTCC NATCA Rep	Date

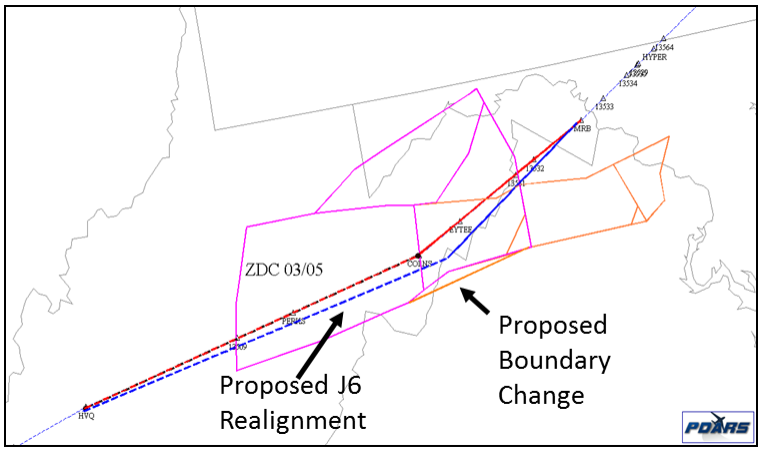
OAPM Submission: Washington DC Metroplex

LDN-HVQ Q-Route Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
ATS Route Change	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issue 40, 42, 55	22 August 2013
Facilities and Areas/Sectors Impacted:	**POCs:**
Washington ARTCC - Sectors 01, 03, and 05, 42 Indianapolis ARTCC	- ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
ZDC Sectors 01, 03, 05 Airspace Redesign	Q68 20130416.tgs, Q80 20130416.tgs

Purpose:
The westbound DC Metroplex departures are being capped to accommodate J6 traffic. This level-off requirement is having a negative impact on the climb rates of the associated traffic.

Study Team Recommendation:
The Study Team recommended making several changes to allow the enroute operations to diverge earlier for westbound traffic filed over HNN VORTAC and HACKS Fix (see Figure 1). Altering the existing J6 route, developing a Q-Route from Martinsburg (MRB) to Charleston (HVQ) and a slight alteration in ZDC 03 & 05 Sector boundaries were recommended.



OAPM Submission: Washington DC Metroplex

LDN-HVQ Q-Route Final Design

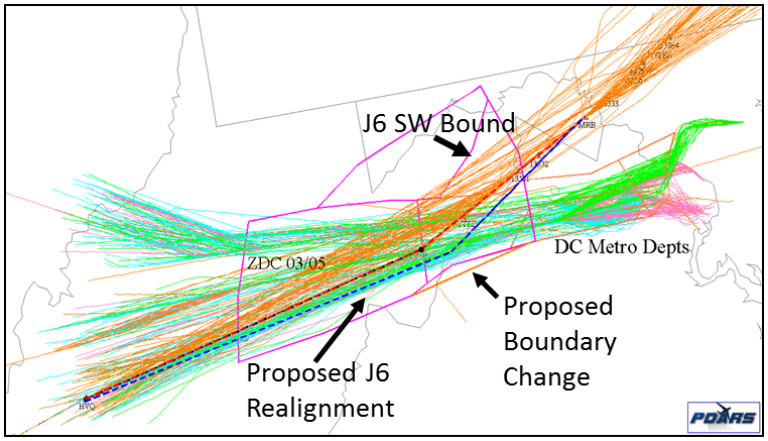


FIGURE 1. STUDY TEAM RECOMMENDATION

<u>Proposed Design</u>:

The Washington DC Design Team is proposing the implementation of a new Q-Route from the TOMCA to CAPOE waypoints. The Design Team shifted the lateral definition of the Q-Route farther south of J6 to allow for longer parallel path with J6 vice the Study Team Recommendation (see Figures 2 and 3). This lateral separation will reduce controller complexity and reduce level offs Linden and Moorefield sectors. The Q-Route will incorporate four new waypoints to support the separation from J6 and add flexibility for diverting J6 traffic to the Q-Route at any of the new waypoints. The new CAPOE waypoint will enable traffic departing west from Dulles International Airport (IAD), Ronald Reagan Washington National Airport (DCA) and Baltimore Washington International Airport (BWI) a shorter route of flight for aircraft currently routed via LDN VORTAC clearance.

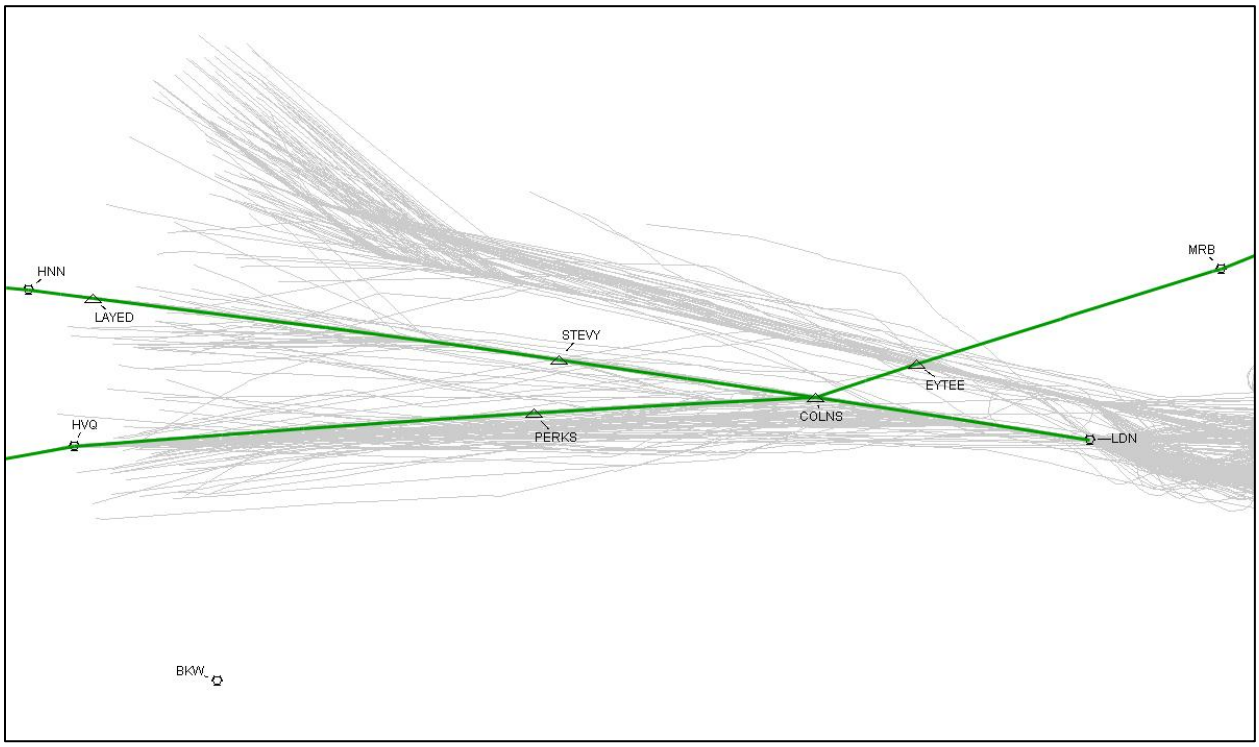


FIGURE 2. CURRENT ROUTES STRUCTURE (J134 AND J6)

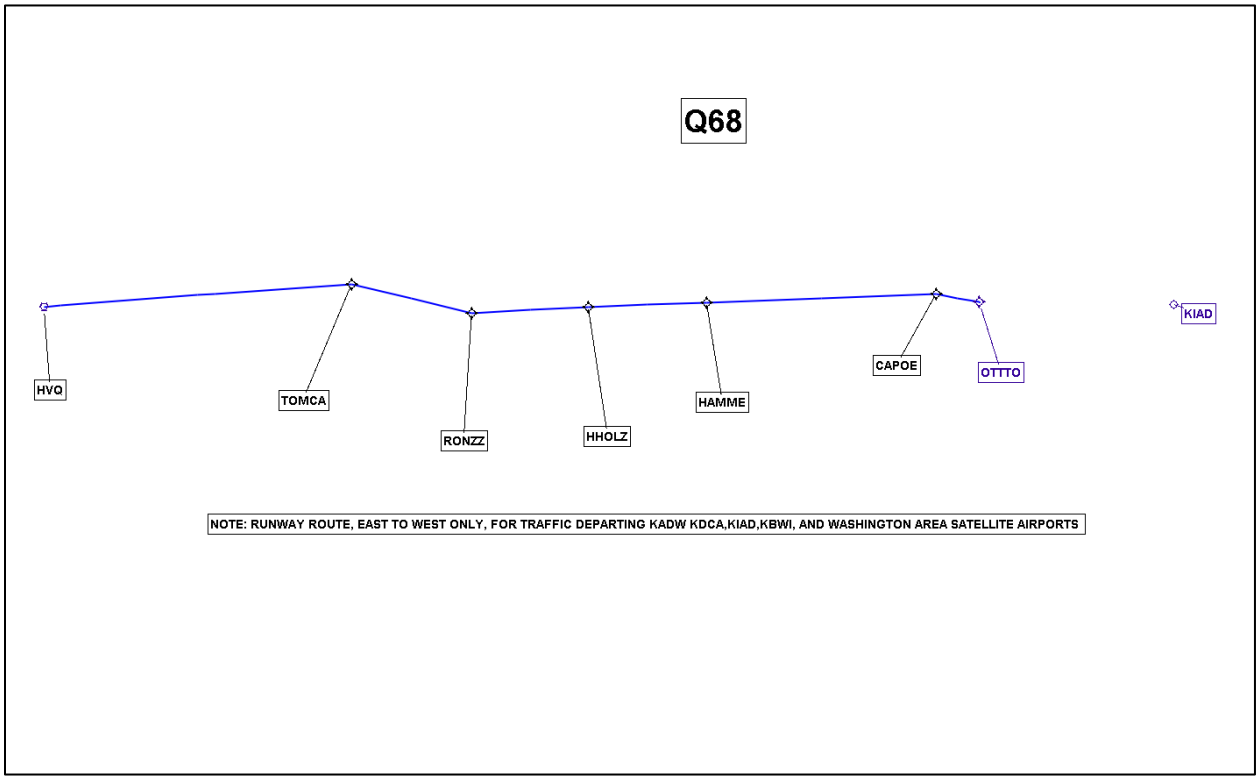


FIGURE 3. PROPOSED Q-ROUTE

OAPM Submission: Washington DC Metroplex

LDN-HVQ Q-Route Final Design

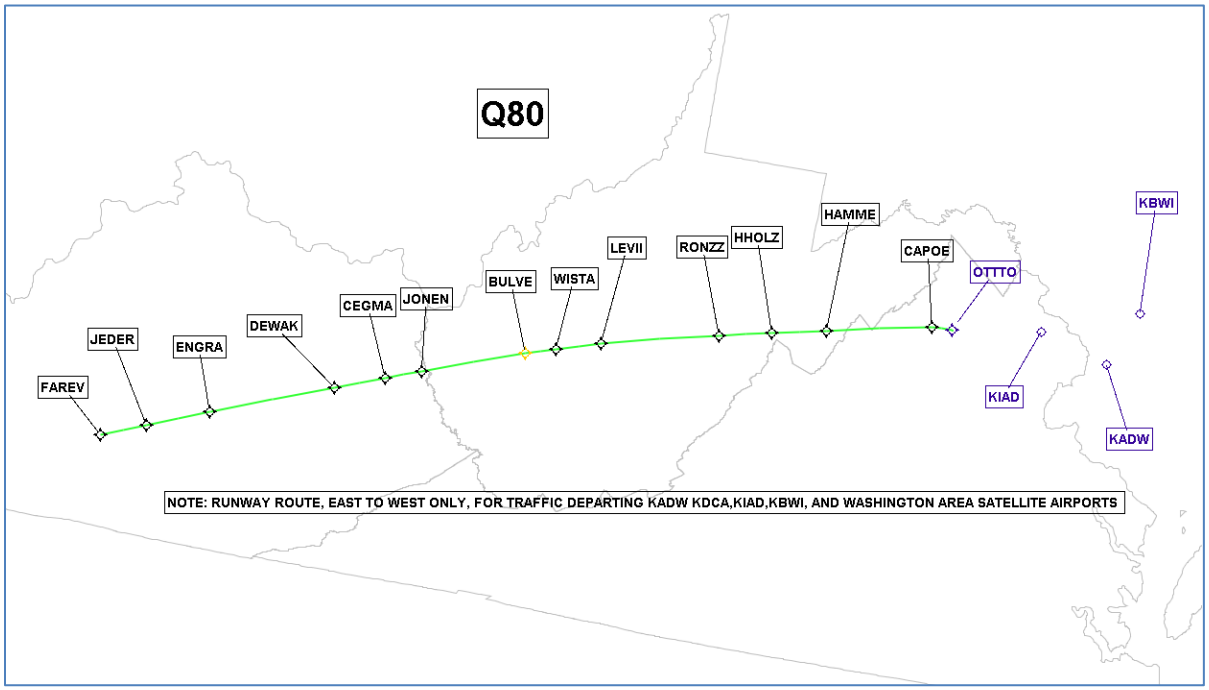


FIGURE 4. PROPOSED Q-ROUTE

<u>Proposed Design and Implementation Dependencies</u>:
This proposed design is dependent on the proposed ZDC 1/3/5 Airspace Redesign.

<u>Additional Design Considerations</u>:
This proposal requires modifications to ZDC and PCT Standard Operating Procedures and Letters of Agreement. The proposed changes will not require a spectrum analysis. There are no anticipated changes to Manpower, or Facilities and Equipment. Validation through a Human-in-the-Loop simulation was not conducted. There is no anticipated increase of operations or a change to the hours of utilization on this procedure.

OAPM Submission: Washington DC Metroplex

LDN-HVQ Q-Route Final Design

Reviewed by Signatures

NOTE: The D&I Co-Leads through the OAPM process, and in accordance with the OAPM MOU, acknowledge that this represents the 100% Design for the subject contained herein.

04-24-13		April 24, 2013	
Dave Perkins Washington D.C. OAPM FAA Lead	Date	Bennie Hutto Washington D.C. OAPM NATCA Lead	Date
4/18/13		4/18/13	
Joe Keiring Washington ARTCC Facility Lead	Date	Curt Johnson Washington ARTCC NATCA Lead	Date
5/14/13		5/15/13	
Indianapolis ARTCC Facility Rep Thomas G. Dury	Date	Indianapolis ARTCC NATCA Rep Jim Larson	Date

OAPM Submission: Washington D.C. Metroplex

RAMAY-HACKS Q-Route Final Design

Change Classification: Choose from drop-down	**Tracking:** Place check mark next to associated phase
ATS Route Change	PD ☐ OD☐ ODC☐ PFD☐ FD☒
OAPM Study Team Reference:	**Anticipated Implementation Date:**
Issue 42 & 56 RAMAY-HACKS Q-ROUTE	22 August 2013
Facilities and Areas/Sectors Impacted:	**POCs:**
Washington ARTCC (ZDC) - Sectors 01, 03, 05, and 42 Indianapolis ARTCC (ZID) - Sectors I77 and I96	- ZDC, J. Keimig - ZDC, C. Johnson
Related/Dependent Proposals:	**Associated Data Files:**
ZDC 1, 3, 5 Airspace Redesign	Q72 20130416.tgs

Purpose:
The purpose of this design is to address the distance between the RAMAY waypoint and HACKS fix identified as an issue by the Washington DC Study Team.

Study Team Recommendation:
The Study Team proposed one recommendation to create a Q-Route that will shorten the miles flown on J149 (see Figure 1).

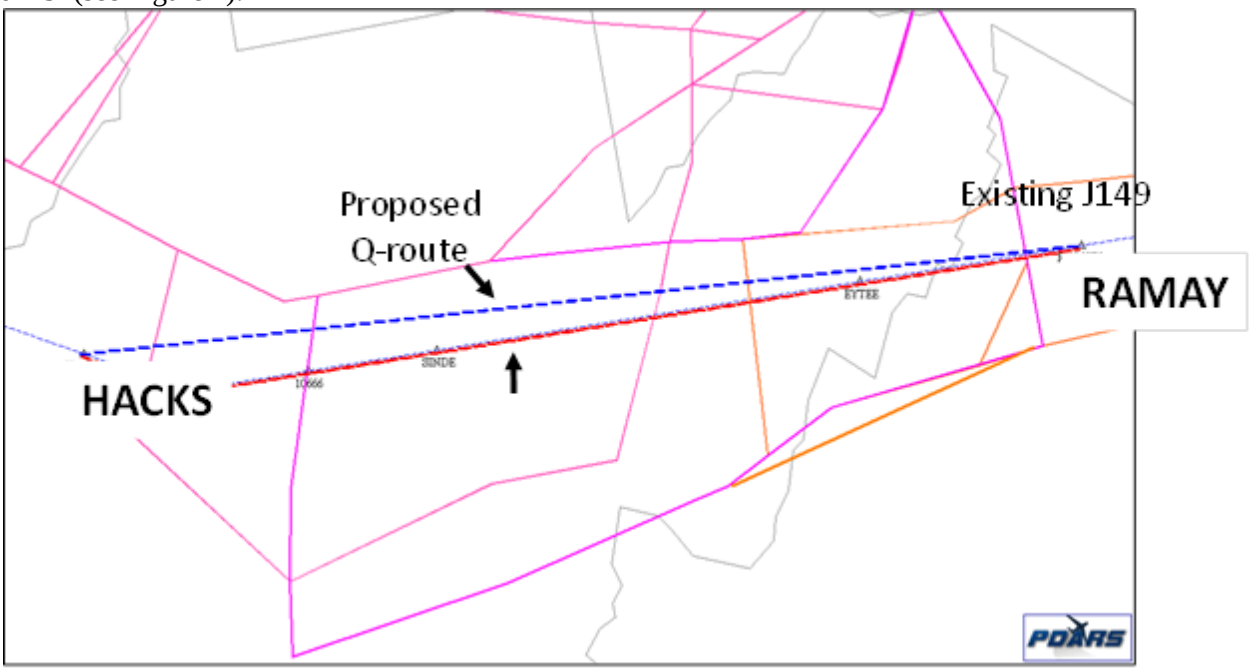


FIGURE 1. STUDY TEAM RECOMMENDATION

OAPM Submission: Washington D.C. Metroplex

RAMAY-HACKS Q-Route Final Design

Proposed Design:

The Washington D.C. Design Team is proposing the implementation of a new Q-Route between RAMAY waypoint and HACKS fix(see Figure 2). The BENSH waypoint was added to determine if a point out is required with ZDC01 in the event of a slow climbing IAD westbound departure. The GEQUE waypoint will enable holding when required along this proposed Q-route if ZID is unable to accept a handoff from ZDC. This proposed Q-Route will reduce control task complexity and miles flown, as well as increase flight path predictability.

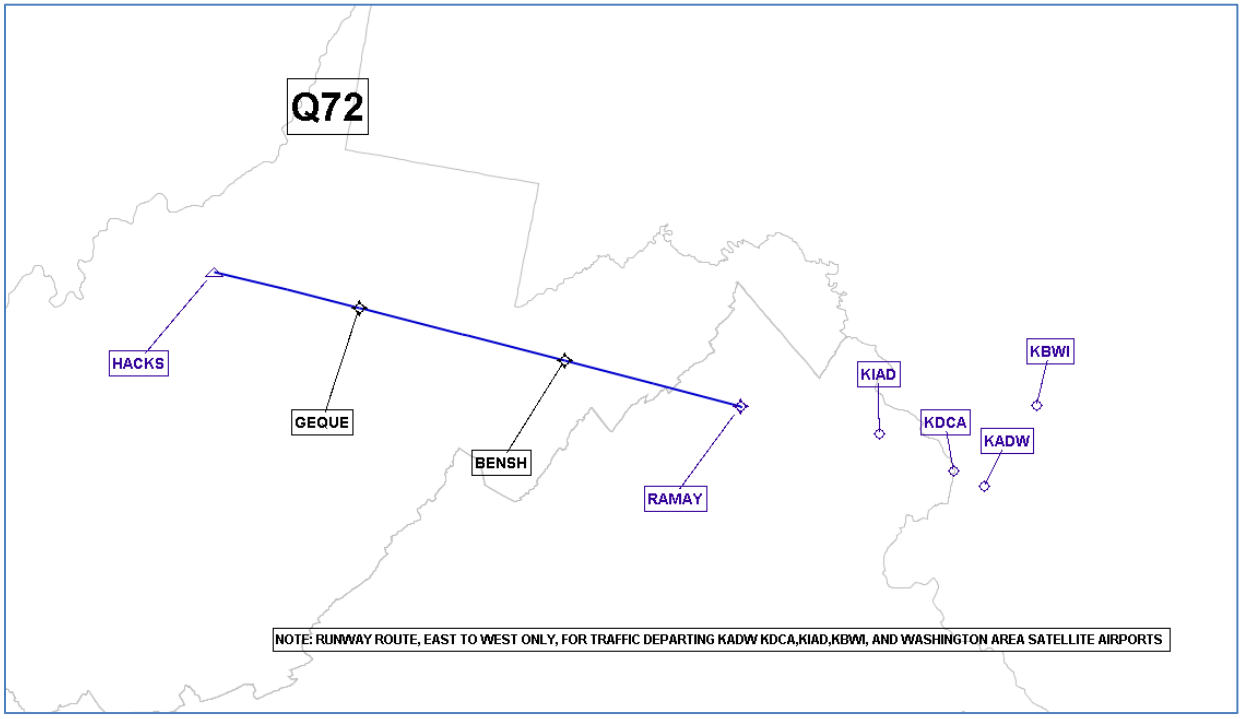


FIGURE 2. PROPOSED Q ROUTE

Proposed Design and Implementation Dependencies:

This proposed design is dependent on the ZDC Sector 01, 03, 05 Airspace Redesign.

Additional Design Considerations:

This proposal requires modifications to ZDC and PCT Standard Operating Practices and ZDC, ZID and PCT Letters of Agreement. The proposed changes will not require a spectrum analysis. There are no anticipated changes to Manpower, or Facilities and Equipment. Validation through a Human-in-the-Loop simulation is not anticipated. There is no anticipated increase of operations or a change to the hours of utilization on this procedure.

OAPM Submission: Washington D.C. Metroplex

RAMAY-HACKS Q-Route Final Design

Reviewed by Signatures

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Indianapolis ARTCC Facility Rep Thomas G. Dury	Date	Indianapolis ARTCC NATCA Rep Jim Larson	Date