



**Federal Aviation  
Administration**

# **Optimization of Airspace and Procedures in the Metroplex (OAPM)**

## **Design Submission Executive Summary North Texas Metroplex**

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Attachment A: Proposed Final Design Submission Packages

## **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 which recommended 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) experience to expedite implementation of optimized airspace and procedures.

Optimization of Airspace and Procedures in the Metroplex (OAPM) was developed in direct response to the RTCA's Task Force 5 Final Report on Mid-Term NextGen Implementation which addressed the quality, timeliness, and scope of metroplex solutions. OAPM is a systematic, integrated and expedited approach to implementing PBN procedures and associated airspace changes.

OAPM focuses on a geographic area, rather than a single airport in order to consider multiple airports and airspace, all types of operations, and connectivity with other metroplexes. The OAPM initiative is intended to enable accelerated development and implementation of beneficial PBN procedures. The process is made up of five phases: Study, Design, Evaluation, Implementation, and Post Implementation. This Executive Summary describes the Design Phase, while Attachment A, Proposed Final Design Submission Packages, provides the detailed designs that will be carried forward to the Evaluation Phase.

## **2.0 Overview of the North Texas OAPM Study and Design Teams**

The North Texas Study Team was the second collaborative<sup>1</sup> OAPM team deployed and was active from September 2010 through December 2010. The Study Team consisted of participants from the FAA, the National Air Traffic Controllers Association (NATCA), Air Traffic Control (ATC) and Performance-Based Navigation (PBN) subject matter experts (SMEs), industry stakeholders, and the MITRE Corporation's Center for Advanced Aviation System Development (CAASD). These experts were tasked to identify operational and efficiency issues that could be addressed through PBN procedure and airspace design, to develop conceptual solutions that addressed the identified issues, and to make preliminary assessments of associated benefits, costs, and risks. Throughout the process, the Study Team held multiple outreach sessions with local facility and industry stakeholders. Working with those stakeholders, they identified over 80 issues, developed conceptual solutions to many of them, and performed the preliminary benefits assessment. These 80 underlying issues were then consolidated into 17 major issues (see Attachment

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<sup>1</sup> *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 Controllers Association (NATCA), ATC subject matter experts (SMEs), Industry stakeholders, representatives from the Central Service Area, other FAA lines of business such as PBN Policy and Support and Flight Procedures, as well as MITRE CAASD, and various support contractors.*

A). The 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 \$10.3 million and \$21.7 million.<sup>2</sup> These estimates were developed by the National Analysis Team (NAT) based on the Study Team's conceptual designs, and do not reflect the refinements made by the Design Team. 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 North Texas Design Team refine the Study Team recommendations to increase efficiency in the metroplex. This includes 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 develop procedural changes to improve both lateral and vertical paths for Standard Terminal Arrival Routes (STARs) and Standard Instrument Departures (SIDs). This would de-conflict arrival and departure procedures to enhance safety, and provide for repeatable/predictable paths to reduce ATC task complexity.

### **3.0 Scope and Process**

The North Texas Metroplex consists of airspace delegated to the Dallas-Fort Worth Terminal Radar Approach Control (D10) and the Fort Worth Air Route Traffic Control Center (ZFW). The North Texas OAPM Design Team focused on aircraft operations at Dallas-Fort Worth International Airport (DFW) and Dallas Love Field (DAL), as well as numerous satellite airports (see Table 1).

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<sup>2</sup> *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.*

Airport ID	Airport Name		Airport ID	Airport Name
ADS	Addison Airport		GKY	Arlington Municipal Airport
50F	Bourland Field Airport		CPT	Cleburne Municipal Airport
TKI	Collin County Regional Airport at Mc Kinney		RBD	Dallas Executive Airport
LUD	Decatur Municipal Airport		DTO	Denton Municipal Airport
F41	Ennis Municipal Airport		AFW	Fort Worth Alliance Airport
FTW	Fort Worth Meacham International Airport		NFW	Fort Worth Naval Air Station Joint Reserve Base/Carswell Field
FWS	Fort Worth Spinks Airport		GPM	Grand Prairie Municipal Airport
4T2	Kenneth Copeland Airport		LNC	Lancaster Regional Airport
HQZ	Mesquite Metro Airport		JWY	Mid-way Regional Airport
WEA	Parker County Airport		F46	Rockwall Municipal Airport

Table 1. North Texas OAPM Airports with new/revised PBN procedures

The North Texas OAPM Design Team consisted of participants from the FAA ATC facilities, NATCA, ATC SMEs, Industry stakeholders, representatives from the Central 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 remainder of the Design Phase was focused on the refinement of the Study Team conceptual solutions, with the goal of developing Proposed Final Designs that were 90 percent complete before proceeding to the Evaluation Phase, where additional operational validation, environmental review, and safety review would lead to Final Designs that could be carried forward to the Implementation Phase.

The refinement of the Study Team concepts ensured that Proposed Final Designs met the requirements in the Airspace Management Handbook, FAA Order 7100.9D (Standard Terminal Arrival Program and Procedures, Appendix 5 Guidelines for Implementing Terminal RNAV Procedures), and other applicable guidance. While the Study Team Report provided the framework, the Design Team had the flexibility to modify or adjust the Study Team proposals if the changes enhanced the expected benefit or if the changes were operationally necessary. Modifications could not significantly reduce the expected benefits, increase the expected costs, or extend the project timeline.

The Design Team evaluated all proposed designs with Industry representatives, and then systematically developed more refined PBN and airspace designs. The preliminary designs were then shared so the FAA, NATCA, SMEs and Industry could provide

additional input. Coordination with the Houston OAPM Team helped facilitate procedure development between ZFW and Houston Air Route Traffic Control Center. Numerous factors supported the refinements 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 the Proposed Final Designs (PFDs) (pending environmental and safety review, and further operational validation).

It is important to note that the Design Team considered numerous alternatives in the development of the PFDs. For each individual Study Team concept, the Design Team went through an iterative process that considered alternative lateral and vertical paths, various speed and altitude restrictions, alternative leg types, different deconfliction options, various charting considerations, etc. The Design Team evaluated the efficiency gains associated with each proposal, the potential impact to controller task complexity, and the implementation challenges, among other considerations. The process was supported by a range of tools and analyses (human-in the-loop simulations, simulator flights, flyability assessments, criteria checks, etc.), with a focus on reducing flight times, flying distances, and level-segments. The actual design refinement of each Study Team concept was an iterative process conducted over a nine month period with each version of the process recorded in evolving TARGETS files with supporting documentation (meeting summaries and various versions of Design Submission Packages) maintained on the OAPM SharePoint Site hosted by CAASD.

At the conclusion of the Design Process, the Design Team had created 42 PFD Submission Packages. These packages describe 32 RNAV STARs, 29 RNAV SIDs, 8 Conventional STARs and 6 RNP – ARs. All 17 major issues identified in Study Team recommendations were addressed by the PFDs.

#### **4.0 Proposed Solutions**

As stated above, the Design Team considered each of the conceptual solutions developed by the Study Team and refined them into comprehensive designs. These designs are captured in the PFD Submission Packages, which are included as Attachment A to this document. These Submission Packages describe the issues identified by the Study Team, their conceptual solution, and the design refinements made by the Design Team resulting in the PFD. 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.

The Design Team was able to create procedural changes, including the development of Optimized Profile Descents (OPDs) for DFW and DAL. They also improved lateral and/or vertical paths for earlier divergence for departures. Where applicable, arrival and departure procedures were de-conflicted and designed to create repeatable/predictable paths, reduce ATC task complexity, and enhance safety.

The Design Team created or improved STARs and SIDs, and made numerous airspace changes. Their proposals will be examined in the Environmental Assessment and will be implemented in either May or July 2014. It should be noted that they identified a number of improvements that were already being analyzed when OAPM was initiated. For example, an amendment to the DFW Terminal Area Chart has been submitted for publication and the revision of ZFW's Ultra High Sectors is being worked outside of the OAPM process.

<b>Publication Date</b>	<b>Number of STARs</b>	<b>Number of SIDs</b>	<b>Number of RNP-ARs</b>	<b>Number of Airspace Changes</b>
May 2014	0	29	0	32
July 2014	40	0	6	0
<b>Total</b>	<b>40</b>	<b>29</b>	<b>6</b>	<b>32</b>

**Table 1. Implementation of North Texas Proposals**

While no new quantitative benefits have been calculated for the Design phase, it is anticipated they will meet or exceed the estimates included in the North Texas Study Team Final Report.

## **5.0 Key Deliverables and Recommendations**

Per the OAPM nominal project schedule, the primary deliverables and milestones for this Design Phase include this Executive Summary and the attached PFD Submission Packages. The North Texas OAPM project is now ready to proceed with the Evaluation Phase. Upon completion of Evaluation, a decision will be made whether to proceed with Implementation.

Adopting the Design Team proposals is anticipated to result in reduced flying miles, minimal level-offs for departures, implementation of OPDs, reduced fuel burn and emissions, as well as reduced controller task complexity. Considering the potential benefits and anticipated costs, it is recommended that the North Texas OAPM project proceed with the Evaluation Phase, including all applicable operational, environmental, safety, and business case analyses.

## **Attachment A: Proposed Final Design Submission Packages**



# North Texas OAPM Design Package

## DFW SIDs, AKUNA, BLECO, GRABE and LOWGN DFW RNAV SIDs

Name of Change and Airport/s	Date
AKUNA, BLECO, GRABE and LOWGN–DFW	22 August 2013
Change Classification	Current Phase of Design
Terminal Procedure SID	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
Solution 11	29 May 2014
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>• Sector 53</li> </ul> <b>Dallas Fort-Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>• Sectors AR7, DN, DR1, DR2, DR3, DS, MN and MNH</li> </ul>	<b>ZFW</b> <ul style="list-style-type: none"> <li>• Robert Ellis</li> <li>• Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>• James Harlan</li> <li>• Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Procedure Design Package</b> <ul style="list-style-type: none"> <li>• STAR: NANDR</li> </ul>	NTEX OAPM 201309.tgs

### Purpose

After developing the NANDR RNAV STAR to Dallas Love Field (DAL), the Design Team determined they needed to provide procedural de-confliction between the NANDR RNAV STAR and the current four DFW RNAV SIDs to the north (AKUNA, BLECO, GRABE and LOWGN).

### Study Team Recommendation

The Study Team did not recommend any changes to the AKUNA, BLECO, GRABE or LOWGN RNAV SIDs.

### Proposed Design

The Design Team added waypoints to the AKUNA, BLECO, GRABE and LOWGN RNAV SIDs in north flow only to provide procedural de-confliction from arrivals on the NANDR RNAV STAR.

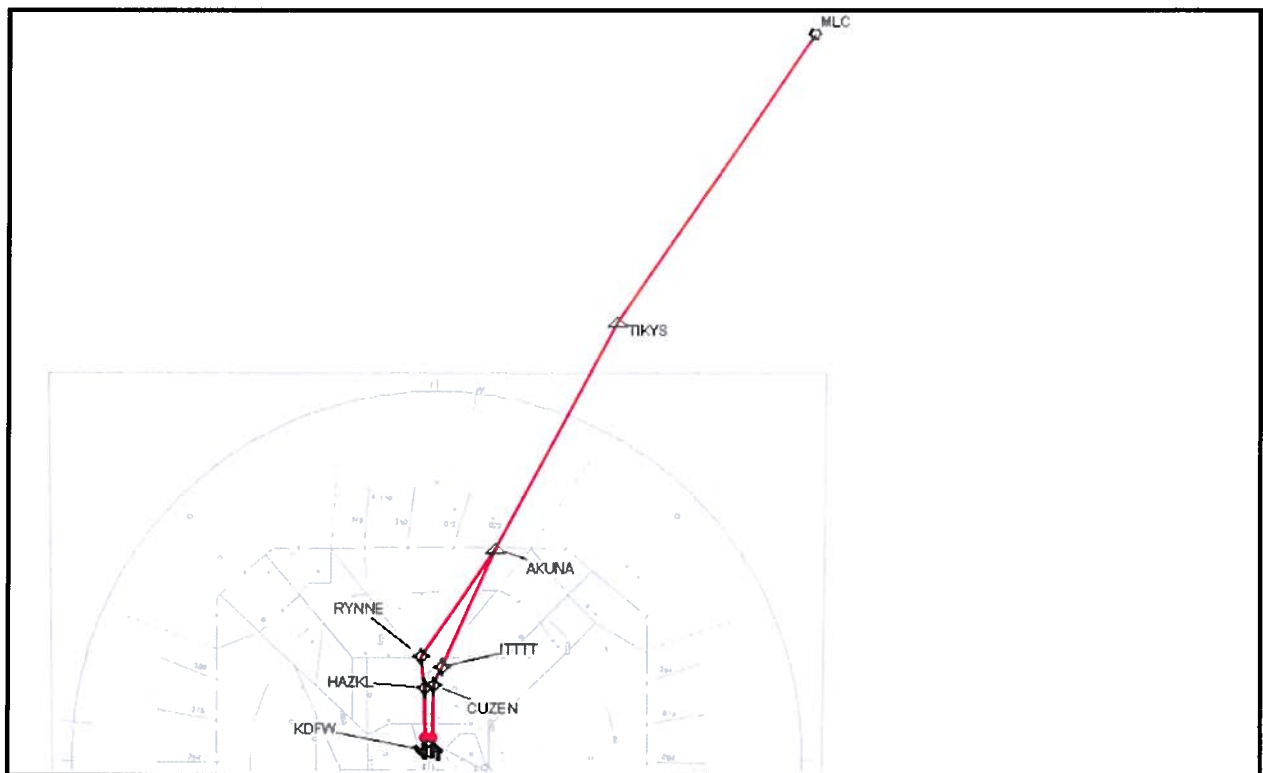
# North Texas OAPM Design Package

## DFW SIDs, AKUNA, BLECO, GRABE and LOWGN DFW RNAV SIDs

### AKUNA RNAV SID

The Design Team opted to modify the AKUNA FOUR RNAV SID by adding an altitude restriction of at or above 7,000 feet to the RYNNE waypoint for runways 36 L/R to provide procedural de-confliction from the NANDR RNAV STAR. The ITTTT waypoint was added for runways 35 L/C with an altitude restriction of at or above 6,000 feet to provide procedural de-confliction from the NANDR RNAV STAR. The new procedure will be the AKUNA FIVE RNAV SID.

Figure 1 depicts the proposed AKUNA FIVE RNAV SID.



**Figure 1. Proposed AKUNA FIVE RNAV SID**

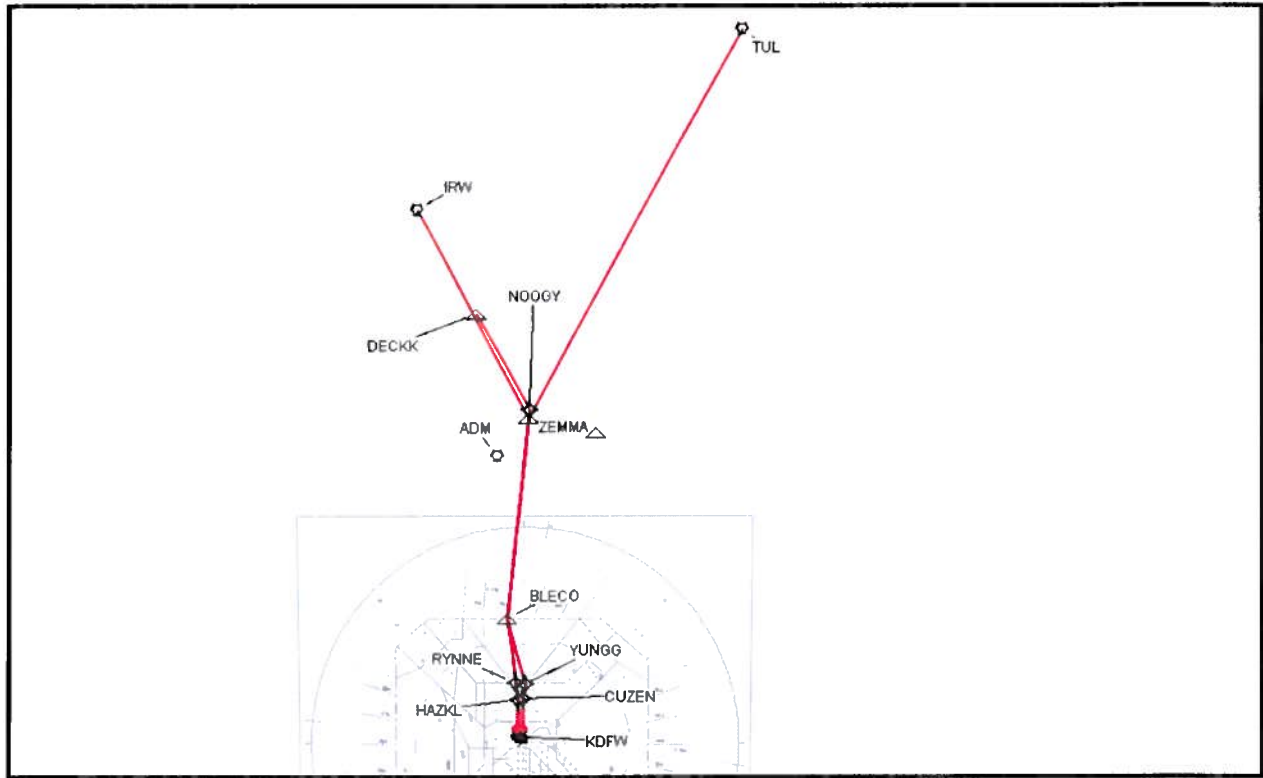
### BLECO RNAV SID

The Design Team opted to modify the BLECO FOUR RNAV SID by adding an altitude restriction of at or above 7,000 feet to the RYNNE waypoint for runways 36 L/R to provide procedural de-confliction from the NANDR RNAV STAR. The YUNGG waypoint was modified from its present position for runways 35 L/C with an altitude restriction of at or above 7,000 feet to provide procedural de-confliction from the NANDR RNAV STAR. The new procedure will be the BLECO FIVE RNAV SID.

# North Texas OAPM Design Package

## DFW SIDs, AKUNA, BLECO, GRABE and LOWGN DFW RNAV SIDs

Figure 2 depicts the proposed BLECO FIVE RNAV SID.



**Figure 2. Proposed BLECO FIVE RNAV SID**

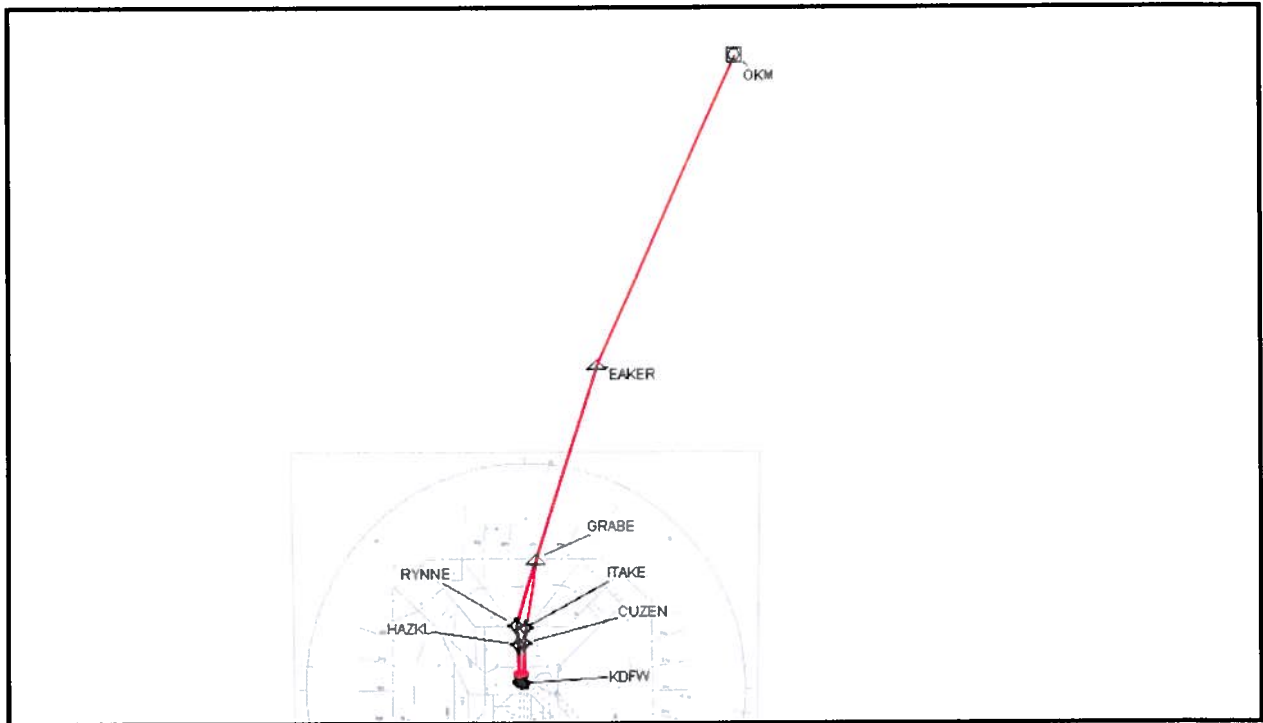
### **GRABE RNAV SID**

The Design Team opted to modify the GRABE FIVE RNAV SID by adding an altitude restriction of at or above 7,000 feet to the RYNNE waypoint for runways 36 L/R to provide procedural de-confliction from the NANDR RNAV STAR. The ITAKE waypoint was added for runways 35 L/C with an altitude restriction of at or above 7,000 feet to provide procedural de-confliction from the NANDR RNAV STAR. The new procedure will be the GRABE SIX RNAV SID.

Figure 3 depicts the proposed GRABE SIX RNAV SID.

# North Texas OAPM Design Package

## DFW SIDs, AKUNA, BLECO, GRABE and LOWGN DFW RNAV SIDs



**Figure 3. Proposed GRABE SIX RNAV SID**

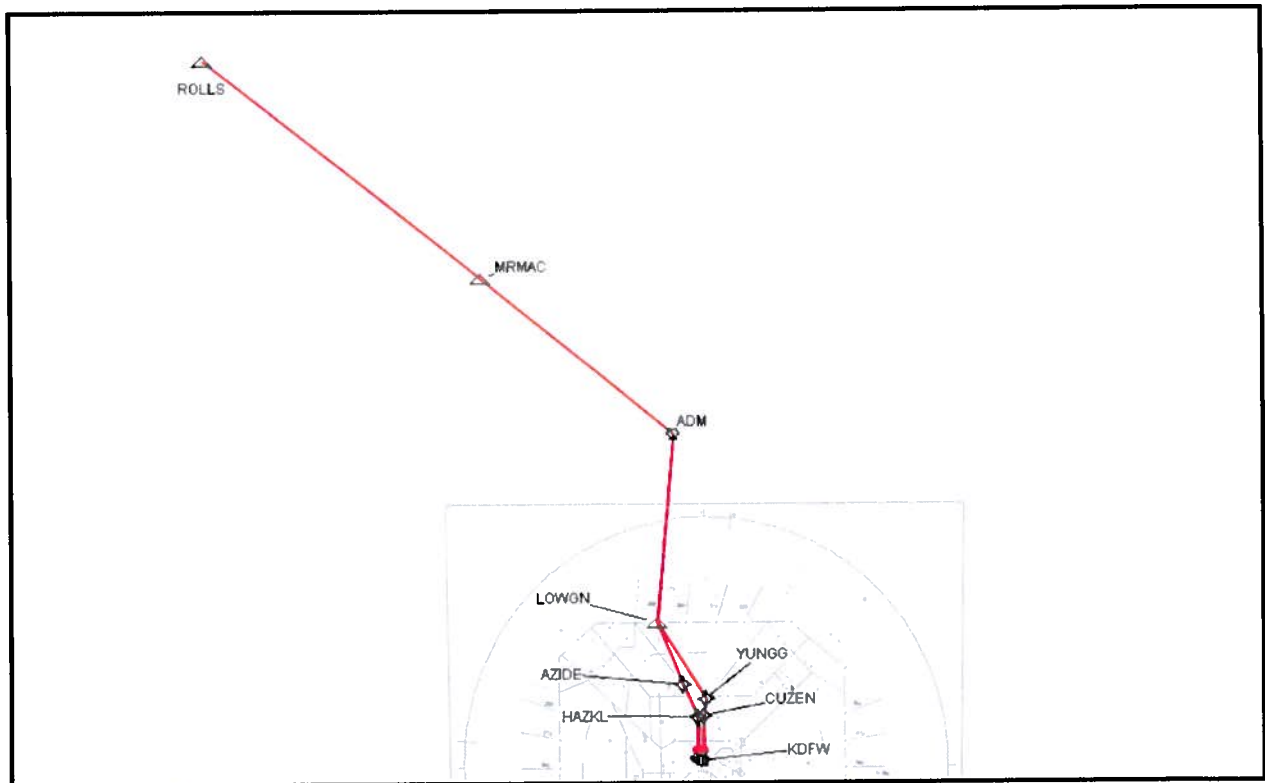
### **LOWGN RNAV SID**

The Design Team opted to modify the LOWGN FIVE RNAV SID by adding the AZIDE waypoint for runways 36 L/R with an altitude restriction of at or above 9,000 feet to provide procedural de-confliction from the NANDR RNAV STAR. The YUNGG waypoint was modified from its present position for runways 35 L/C with an altitude restriction of at or above 7,000 feet to provide procedural de-confliction from the NANDR RNAV STAR. The new procedure will be the LOWGN SIX RNAV SID.

Figure 4 depicts the proposed LOWGN SIX RNAV SID.

# North Texas OAPM Design Package

## DFW SIDs, AKUNA, BLECO, GRABE and LOWGN DFW RNAV SIDs



**Figure 4. Proposed LOWGN SIX RNAV SID**

### **Additional Design Considerations**

Human-in-the-loop simulations were not conducted.

No airspace changes are associated with the AKUNA, BLECO, GRABE or LOWGN RNAV SIDs.

These procedures will be used by all types of RNAV-equipped turbojet aircraft, are not anticipated to change runway usage, and are not anticipated to modify flight paths below 3,000 feet Above Ground Level.

### **Implementation Dependencies**

This procedure is dependent on the NANDR RNAV STAR.

No changes are anticipated for the Standard Operating Procedures or Letter of Agreement between D10 and ZFW. No changes to staffing, facilities, or equipment requirements are anticipated for this proposed design.

# **North Texas OAPM Design Package DFW SIDs, AKUNA, BLECO, GRABE and LOWGN DFW RNAV SIDs**

## **Attachments**

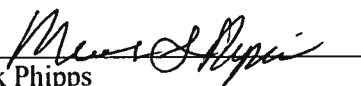



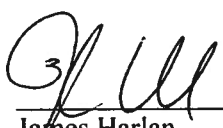

1. AKUNA TARGETS Distribution Package
2. BLECO TARGETS Distribution Package
3. GRABE TARGETS Distribution Package
4. LOWGN TARGETS Distribution Package

# North Texas OAPM Design Package

## DFW SIDs, AKUNA, BLECO, GRABE and LOWGN DFW RNAV SIDs

### Review Signatures

The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

 _____ Mark Phipps North Texas OAPM FAA Lead	<u>8/22/13</u> Date	 _____ Ed Hulse North Texas OAPM NATCA Lead	<u>8/22/13</u> Date
 _____ Robert Ellis Fort Worth Center OAPM Facility Lead	<u>8/22/13</u> Date	 _____ Jon Shedden Fort Worth Center OAPM NATCA Lead	<u>8/22/13</u> Date
 _____ James Harlan Dallas-Fort Worth TRACON OAPM Facility Lead	<u>8/22/13</u> Date	 _____ Ed Rivas Dallas-Fort Worth TRACON OAPM NATCA Lead	<u>8/22/13</u> Date

# North Texas OAPM Design Package

## DFW SIDs, ARDIA, DARTZ, JASPA and NELYN DFW RNAV SIDs

Name of Change and Airport/s	Date
ARDIA, DARTZ, JASPA and NELYN-DFW	22 August 2013
Change Classification	Current Phase of Design
Terminal Procedure SID	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
Solution 11	29 May 2014
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>• Sector 96</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>• Sectors AR7, DN, DR2, DS and MS</li> </ul>	<b>ZFW</b> <ul style="list-style-type: none"> <li>• Robert Ellis</li> <li>• Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>• James Harlan</li> <li>• Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Procedure Design Package</b> <ul style="list-style-type: none"> <li>• STAR: BACHR</li> </ul>	NTEX OAPM 201309.tgs

### Purpose

After developing the BACHR RNAV STAR to Dallas Love Field (DAL), the Design Team determined they needed to provide procedural de-confliction between the BACHR RNAV STAR and the current four DFW RNAV SIDs to the south (ARDIA, DARTZ, JASPA and NELYN).

### Study Team Recommendation

The Study Team did not recommend any changes to the ARDIA, DARTZ, JASPA or NELYN RNAV SIDs.

### Proposed Design

The Design Team added waypoints to the ARDIA, DARTZ, JASPA and NELYN RNAV SIDs in south flow only to provide procedural de-confliction from arrivals on the BACHR RNAV STAR.



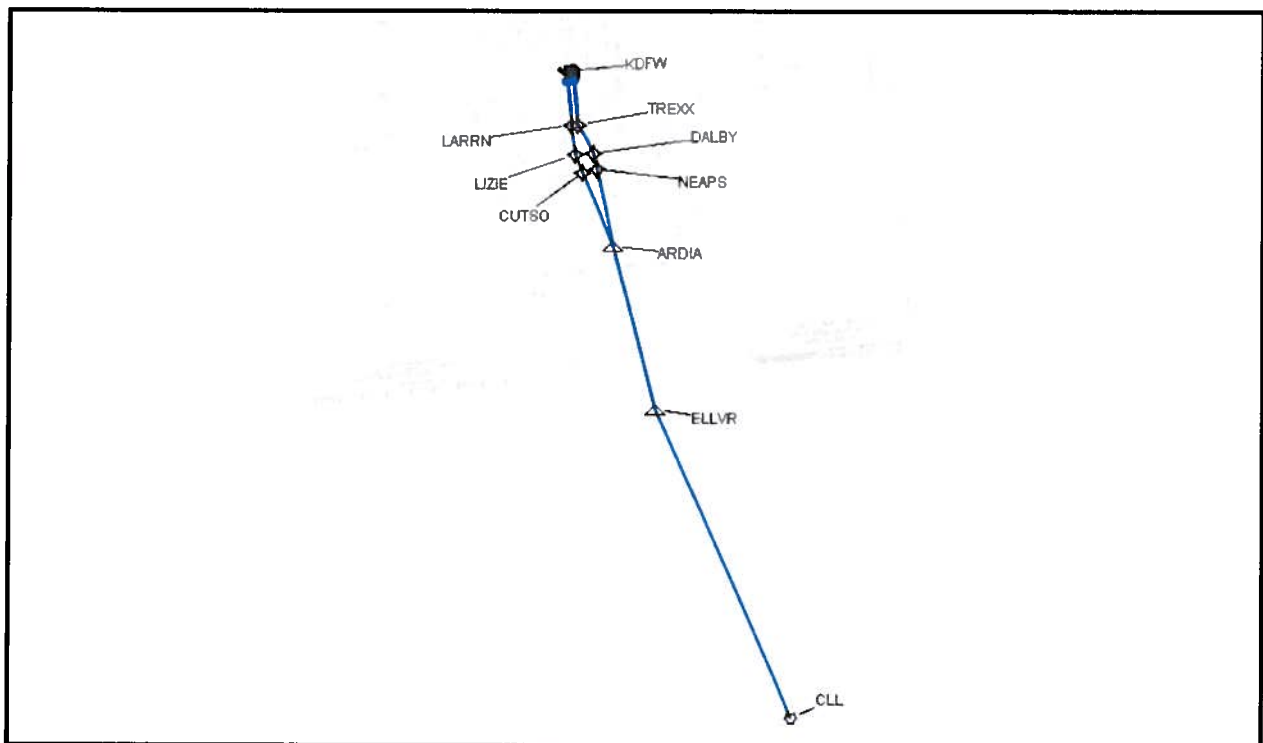
# North Texas OAPM Design Package

## DFW SIDs, ARDIA, DARTZ, JASPA and NELYN DFW RNAV SIDs

### ARDIA RNAV SID

The Design Team opted to modify the ARDIA FOUR RNAV SID by adding the CUTSO waypoint for runways 18 L/R with an altitude restriction of at or above 10,000 feet to provide procedural de-confliction from the BACHR RNAV STAR. The NEAPS waypoint was added for runways 17 C/R with an altitude restriction of at or above 10,000 feet to provide procedural de-confliction from the BACHR RNAV STAR. The new procedure will be the ARDIA FIVE RNAV SID.

Figure 1 depicts the proposed ARDIA FIVE RNAV SID.



**Figure 1. Proposed ARDIA FIVE RNAV SID**

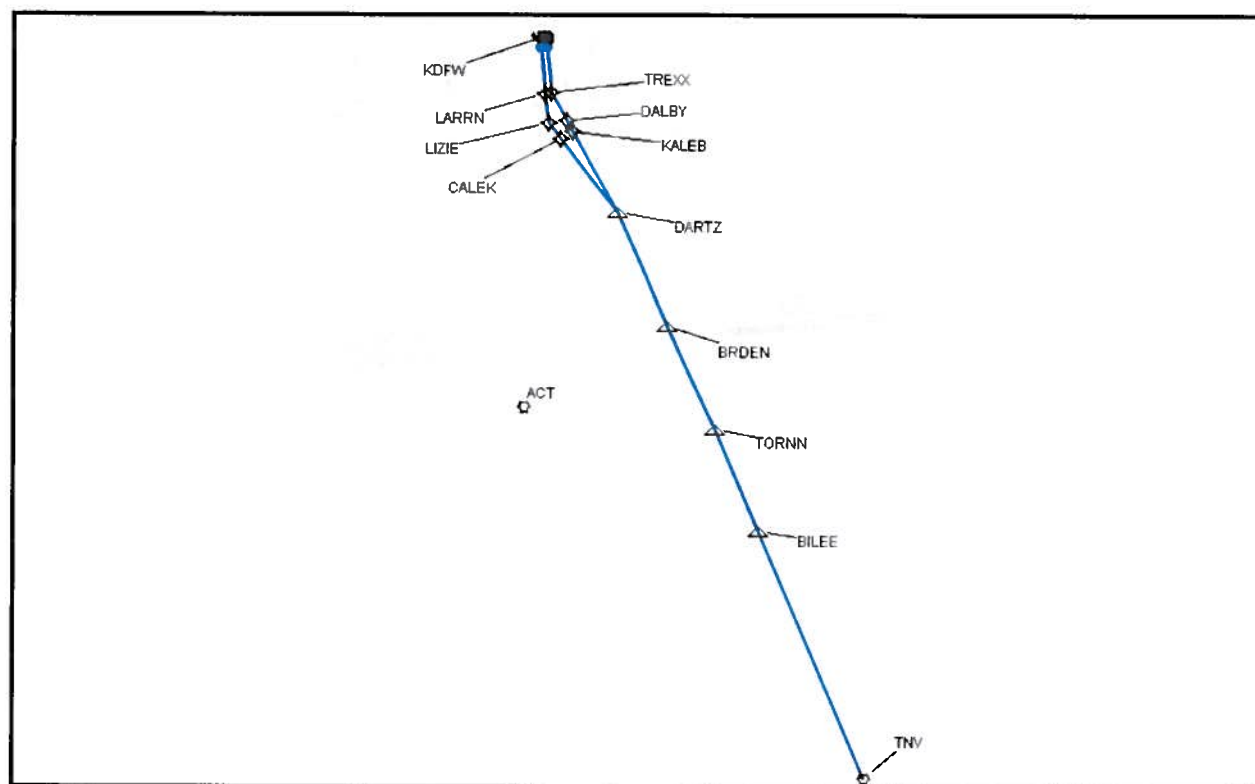
### DARTZ RNAV SID

The Design Team opted to modify the DARTZ FOUR RNAV SID by adding the CALEK waypoint for runways 18 L/R with an altitude restriction of at or above 10,000 feet to provide procedural de-confliction from the BACHR RNAV STAR. The KALEB waypoint was added for runways 17 C/R with an altitude restriction of at or above 9,000 feet to provide procedural de-confliction from the BACHR RNAV STAR. The new procedure will be the DARTZ FIVE RNAV SID.

Figure 2 depicts the proposed DARTZ FIVE RNAV SID.

# North Texas OAPM Design Package

## DFW SIDs, ARDIA, DARTZ, JASPA and NELYN DFW RNAV SIDs



**Figure 2. Proposed DARTZ FIVE RNAV SID**

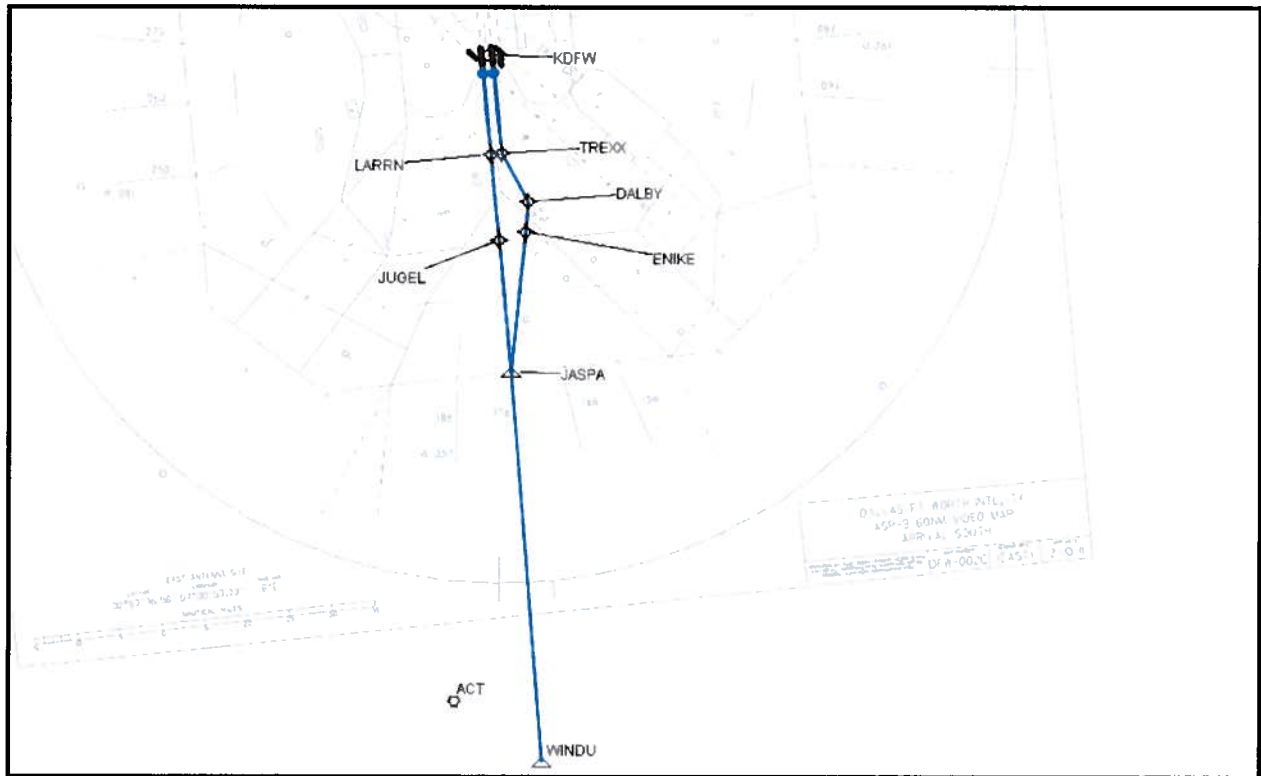
### **JASPA RNAV SID**

The Design Team opted to modify the JASPA THREE RNAV SID by adding the JUGEL waypoint for runways 18 L/R with an altitude restriction of at or above 10,000 feet to provide procedural de-confliction from the BACHR RNAV STAR. The ENIKE waypoint was added for runways 17 C/R with an altitude restriction of at or above 10,000 feet to provide procedural de-confliction from the BACHR RNAV STAR. The new procedure will be the JASPA FOUR RNAV SID.

Figure 3 depicts the proposed JASPA FOUR RNAV SID.

# North Texas OAPM Design Package

## DFW SIDs, ARDIA, DARTZ, JASPA and NELYN DFW RNAV SIDs



**Figure 3. Proposed JASPA FOUR RNAV SID**

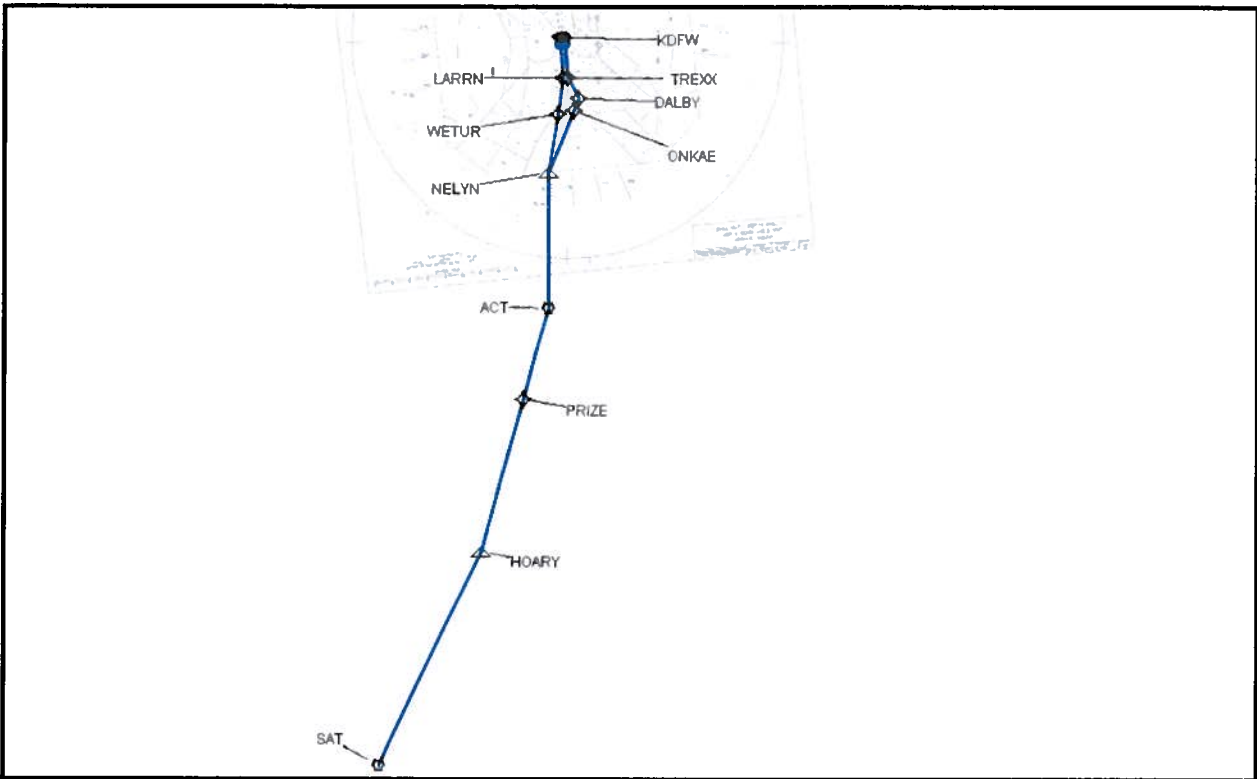
### **NELYN RNAV SID**

The Design Team opted to modify the NELYN THREE RNAV SID by adding the WETUR waypoint for runways 18 L/R with an altitude restriction of at or above 10,000 feet to provide procedural de-confliction from the BACHR RNAV STAR. The ONKAE waypoint was added for runways 17 C/R with an altitude restriction of at or above 10,000 feet to provide procedural de-confliction from the BACHR RNAV STAR. The new procedure will be the NELYN FOUR RNAV SID.

Figure 4 depicts the proposed NELYN FOUR RNAV SID.

# North Texas OAPM Design Package

## DFW SIDs, ARDIA, DARTZ, JASPA and NELYN DFW RNAV SIDs



**Figure 4. Proposed NELYN FOUR RNAV SID**

### **Additional Design Considerations**

Human-in-the-loop simulations were not conducted.

No airspace changes are associated with the ARDIA, DARTZ, JASPA and NELYN RNAV SIDs.

These procedures will be used by all types of RNAV-equipped turbojet aircraft, are not anticipated to change runway usage, and are not anticipated to modify flight paths below 3,000 feet Above Ground Level.

### **Implementation Dependencies**

This procedure is dependent on the BACHR RNAV STAR.

No changes are anticipated for the Standard Operating Procedures or Letter of Agreement between D10 and ZFW. No changes to staffing, facilities, or equipment requirements are anticipated for this proposed design.

# **North Texas OAPM Design Package**

## **DFW SIDs, ARDIA, DARTZ, JASPA and NELYN DFW RNAV SIDs**

### **Attachments**

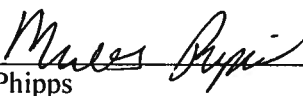
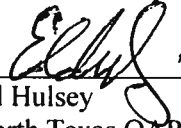
1. ARDIA TARGETS Distribution Package
2. DARTZ TARGETS Distribution Package
3. JASPA TARGETS Distribution Package
4. NELYN TARGETS Distribution Package


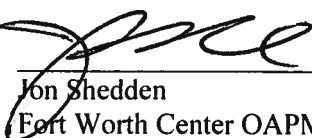
# North Texas OAPM Design Package



## DFW SIDs, ARDIA, DARTZ, JASPA and NELYN DFW RNAV SIDs

### Review Signatures

The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

	<u>8/22/13</u>		<u>8/22/13</u>
Mark Phipps	Date	Ed Hulse	Date
North Texas OAPM		North Texas OAPM	
FAA Lead		NATCA Lead	

	<u>8/22/13</u>		<u>8/22/13</u>
Robert Ellis	Date	Jon Shedden	Date
Fort Worth Center OAPM		Fort Worth Center OAPM	
Facility Lead		NATCA Lead	

	<u>8/22/13</u>		<u>8/22/13</u>
James Harlan	Date	Ed Rivas	Date
Dallas-Fort Worth TRACON OAPM		Dallas-Fort Worth TRACON OAPM	
Facility Lead		NATCA Lead	

# North Texas OAPM Design Package

## DFW SIDs, HUDAD (RYNOE), HRPER, KATZZ, ALIAN and WSTEX DFW RNAV SIDs

Name of Change and Airport/s	Date
HUDAD (RYNOE), HRPER, KATZZ, ALIAN and WSTEX – DFW	22 August 2013
Change Classification	Current Phase of Design
Terminal Procedure SID	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
Solution 11	29 May 2014
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 32, 39, 40, 47, 61, 63, 64 and 94</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sector DR3</li> </ul> <b>Albuquerque ARTCC (ZAB)</b>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Airspace Design Packages</b> <ul style="list-style-type: none"> <li>En Route Airspace Design</li> </ul> <b>Procedure Design Package</b> <ul style="list-style-type: none"> <li>STARs: BOWIE, BOOVE, GIBBI, GLEN ROSE, JOVEM, TILLA and WESAT</li> <li>SIDs: ALIAN, DAMNS, HRPER, HUDAD, KATZZ, KKITY, SNSET, SWABR and WSTEX</li> </ul>	NTEX OAPM 201309.tgs

### Purpose

DFW east bound and west bound published departures contain doglegs that are typically short-cut by ATC on a consistent basis. This creates a concern as aircraft must load fuel amounts based on the filed route. Redesigning the SIDs to reflect the route that is actually flown results in airlines reducing fuel-loading on aircraft, which translates to an overall fuel savings.

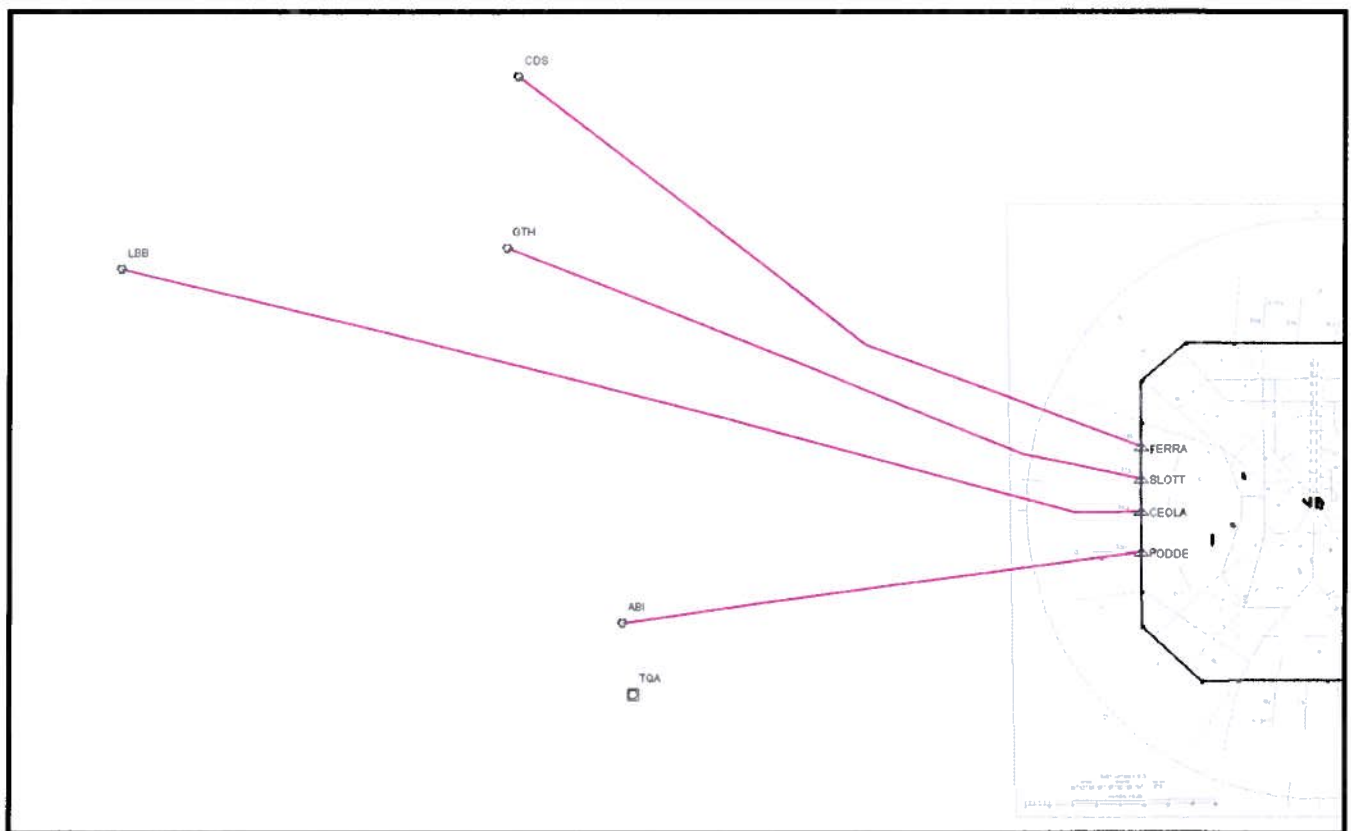
# North Texas OAPM Design Package

## DFW SIDs, HUDAD (RYNOE), HRPER, KATZZ, ALIAN and WSTEX DFW RNAV SIDs

### Study Team Recommendation

Both of the proposed alternatives for DFW RNAV SIDs in ZFW airspace reflect the routes that are flown the majority of the time and eliminate most doglegs in ZFW airspace. The Study Team came up with two alternatives; the first using the present departure fixes and the second use a “floating fix” concept.

Figure 1 depicts alternative 1 showing the DFW west bound RNAV SIDs departing the D10/ZFW boundary at the present departure fixes. The purple lines depict the published SIDs. These proposed RNAV SIDs are separated by a minimum of 8 NM.



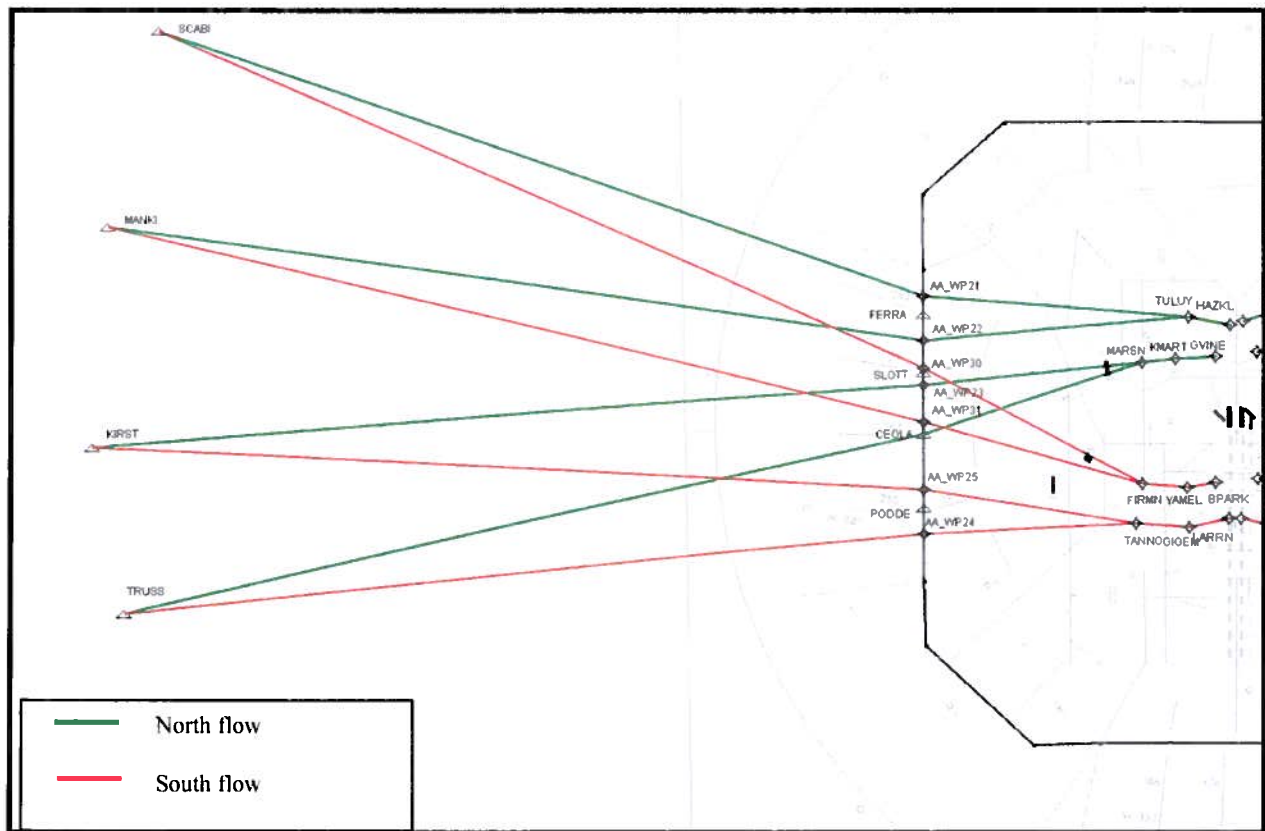
**Figure 1. Study Team Recommendation – Alternative 1**

Figure 2 depicts alternative 2 showing the proposed DFW west bound RNAV SIDs departing the D10/ZFW boundary floating departure fixes, depending upon the flow in use at DFW. The use of the floating fix concept reduces flying mileage as aircraft will fly a shorter route to the common fix in ZFW’s airspace, depending upon the DFW flow. The green lines depict the proposed north flow SIDs and the red lines the proposed south flow SIDs. The proposed SIDs are separated by a minimum of 8 NM.



# North Texas OAPM Design Package

## DFW SIDs, HUDAD (RYNOE), HRPER, KATZZ, ALIAN and WSTEX DFW RNAV SIDs



**Figure 2. Study Team Recommendation – Alternative 2**

### **Proposed Design**

At the request of Industry Representatives, a fifth RNAV SID (ALIAN) was added to allow for more direct routing through the Lancer Military Operations Area (MOA) and Air Traffic Control Assigned Airspace (ATCAA) when this airspace complex is inactive. The Design Team determined that five RNAV SIDs should be created to address the Study Team Solution:

- WSTEX
- ALIAN (ATC Assigned Only)
- HUDAD
- KATZZ
- HRPER

The Design Team chose Alternative 2 as the floating fix concept reduces flying mileage. Additionally, ZFW and D10 agreed to create waypoints 25 NM west of D10's airspace boundary to allow for more direct routings when traffic permits to further reduce flying mileage. West bound turbojet aircraft departing from the eastern satellite airports may be stacked above the DFW/DAL west bound departures, and west bound turbojet aircraft departing from the

# **North Texas OAPM Design Package**

## **DFW SIDs, HUDAD (RYNOE), HRPER, KATZZ, ALIAN and WSTEX DFW RNAV SIDs**

western satellite airports may be stacked below the DFW/DAL departures. ZFW will have control for turns and climb.

### **WSTEX RNAV SID and ALIAN RNAV SID**

The Design Team kept the north flow routing to WSTEX identical to the routing proposed by the Study Team in Alternative 2. The south flow routing was amended from GIGEM waypoint to RBBIT waypoint. The rest of the route remains as proposed by the Study Team. The Design Team proposal was extended in length when compared to today's PODDE THREE RNAV SID, with transitions to CIKAN waypoint and a second transition terminating at DOSXX waypoint. The CIKAN transition was added to keep civil traffic south of the LANCER MOA/ATCAA Complex when it is active. This SID serves traffic for ELP, PHX, TUS, Southern California and Mexico.

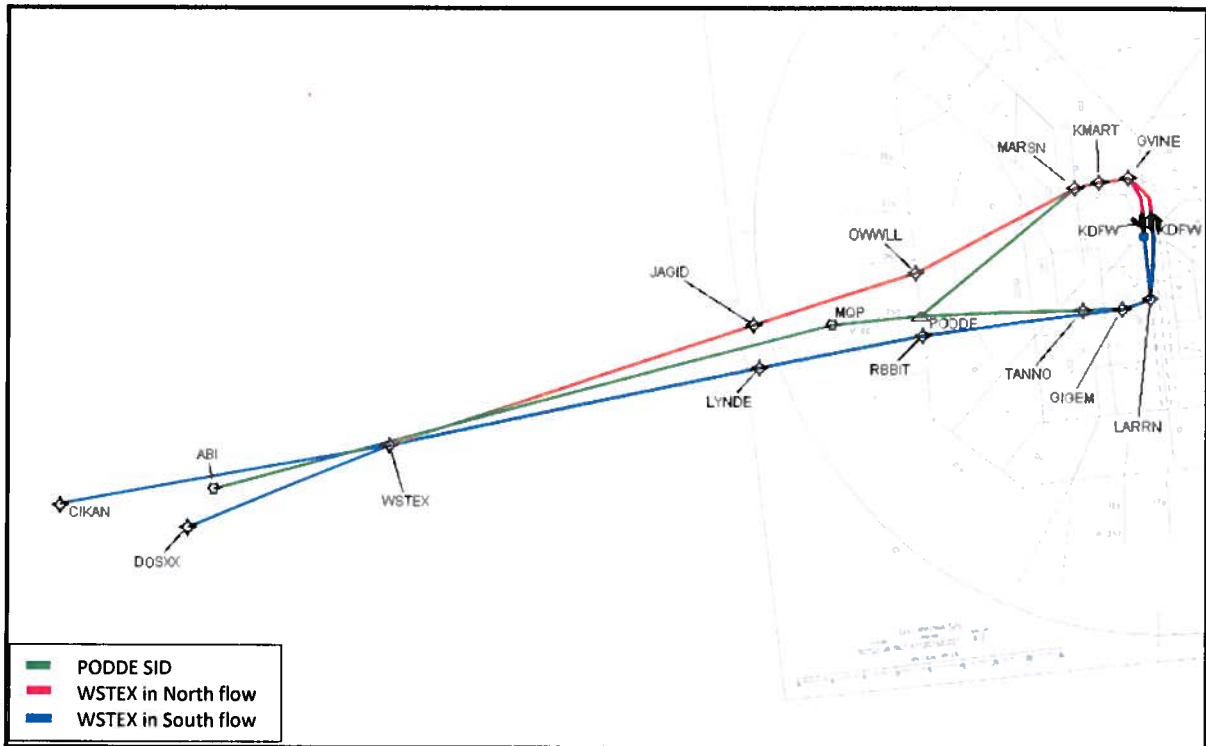
The Design Team amended the WSTEX RNAV SID to create the ALIAN RNAV SID. This SID will be ATC assigned only; the ALIAN RNAV SID will only be available when both the Lancer MOA/ATCAA and the White Sands Missile Range Airspace Complex are inactive. ZFW will confirm the active status through the Special Use Airspace Management System (SAMS). If the ALIAN transition is not available, traffic will be routed via the proposed WSTEX RNAV SID. This SID will serve traffic for ELP, PHX, TUS, Southern California and Mexico.

Figure 3 depicts the proposed WSTEX RNAV SID.

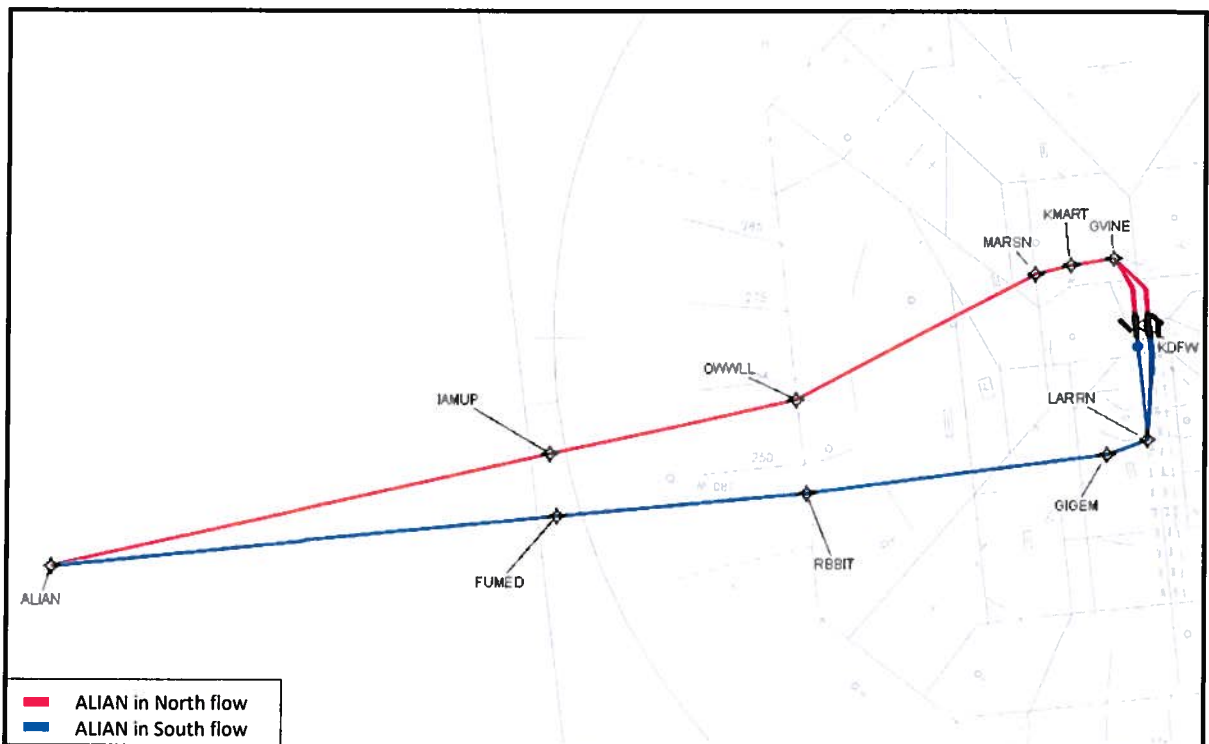
Figure 4 depicts the proposed ALIAN RNAV SID.

# North Texas OAPM Design Package

## DFW SIDs, HUDAD (RYNOE), HRPER, KATZZ, ALIAN and WSTEX DFW RNAV SIDs



**Figure 3. Proposed WSTEX RNAV SID and PODDE THREE RNAV SID**



**Figure 4. Proposed ALIAN RNAV SID**

# North Texas OAPM Design Package

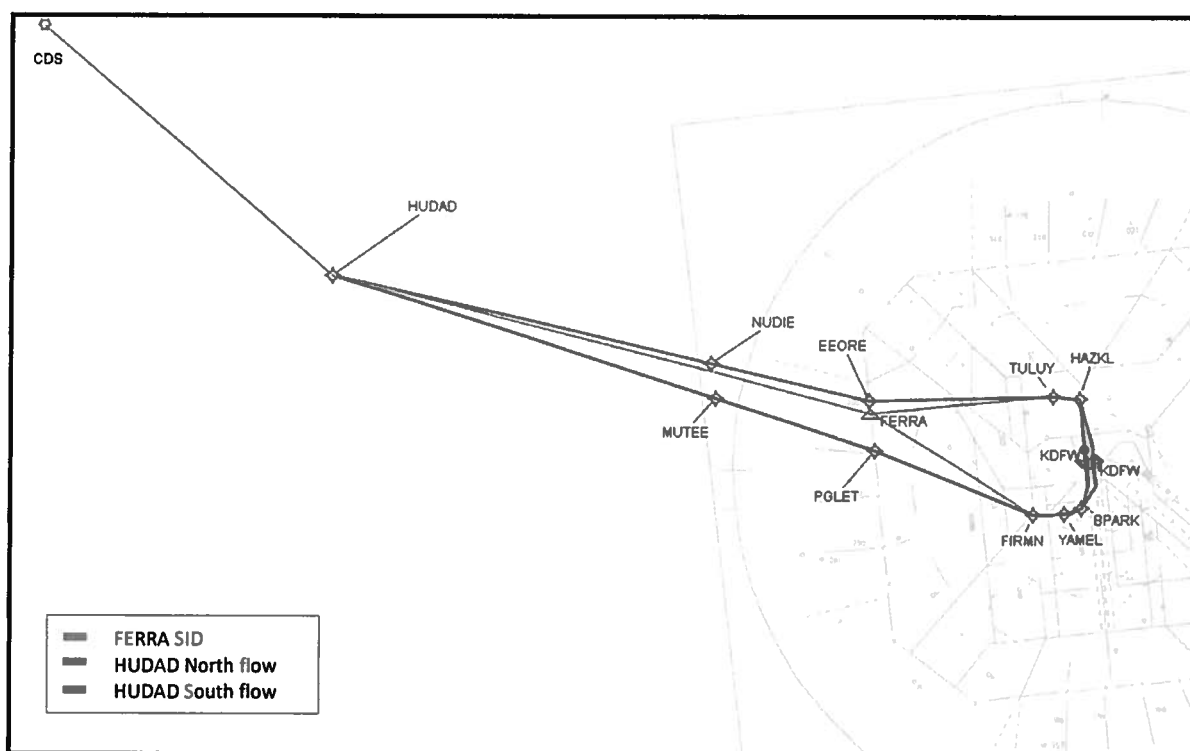
## DFW SIDs, HUDAD (RYNOE), HRPER, KATZZ, ALIAN and WSTEX DFW RNAV SIDs

### HUDAD RNAV SID

The Design Team kept the north and south flow routings to SCABI waypoint identical to the routings proposed by the Study Team in Alternative 2 except that the termination point of the route ends at HUDAD waypoint, 0.98NM east of SCABI. This was amended to shorten the distance for departure traffic for SLC and DEN, and the Pacific Northwest.

The Design Team proposal was shortened in length over today's FERRA FOUR RNAV SID, terminating at HUDAD. This will allow for more direct routing after HUDAD as opposed to being routed directly to PNH for DEN, SLC, and Pacific Northwest traffic.

Figure 5 depicts the proposed HUDAD RNAV SID.



**Figure 5. Proposed HUDAD RNAV SID and FERRA FOUR RNAV SID**

### KATZZ RNAV SID

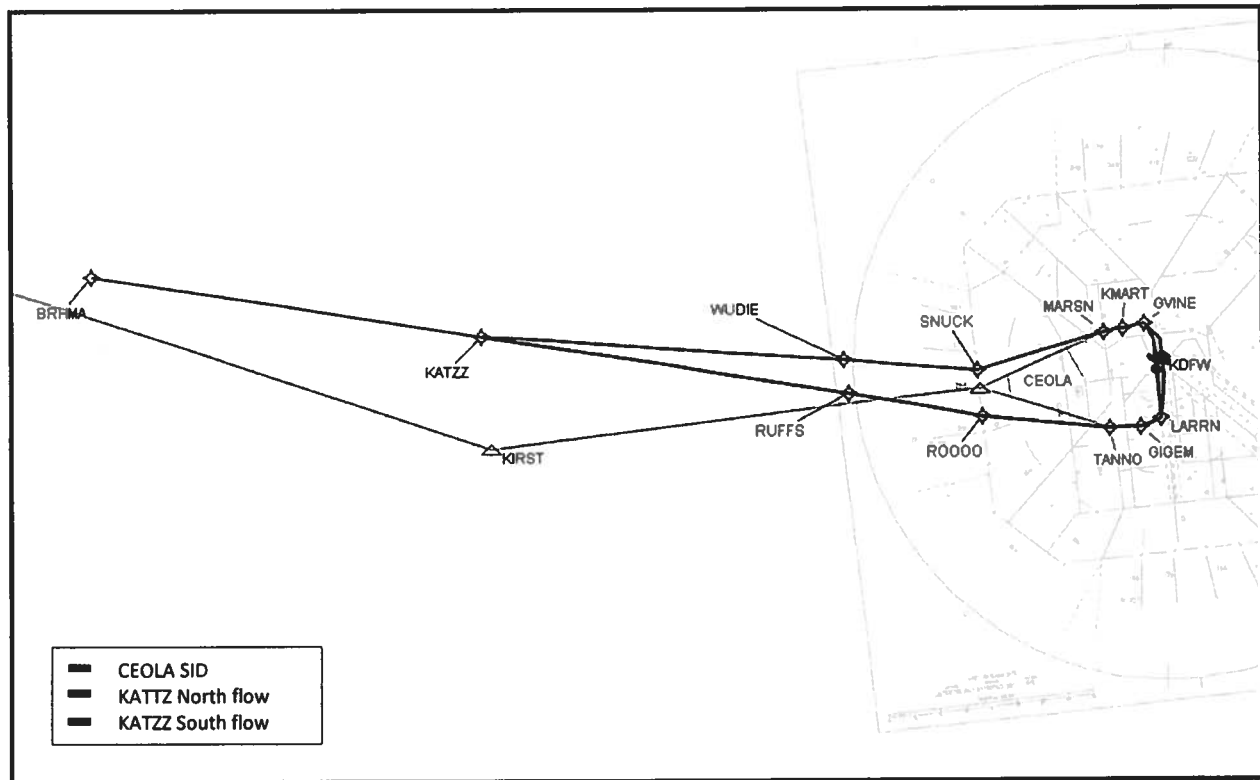
The Design Team kept the north and south flow routings to KATZZ waypoint identical to the routings proposed by the Study Team in Alternative 2.

The Design Team proposal was shortened in length over today's CEOLA FOUR RNAV SID terminating at BRHMA waypoint. This will allow for more direct routing after BRHMA as opposed to being routed directly to TXO and CNX, for Southern California, LAS, PHX, ABQ and LBB traffic.

# North Texas OAPM Design Package

## DFW SIDs, HUDAD (RYNOE), HRPER, KATZZ, ALIAN and WSTEX DFW RNAV SIDs

Figure 6 depicts the proposed KATZZ RNAV SID.



**Figure 6. Proposed KATZZ RNAV SID and CEOLA FOUR RNAV SID**

### HRPER RNAV SID

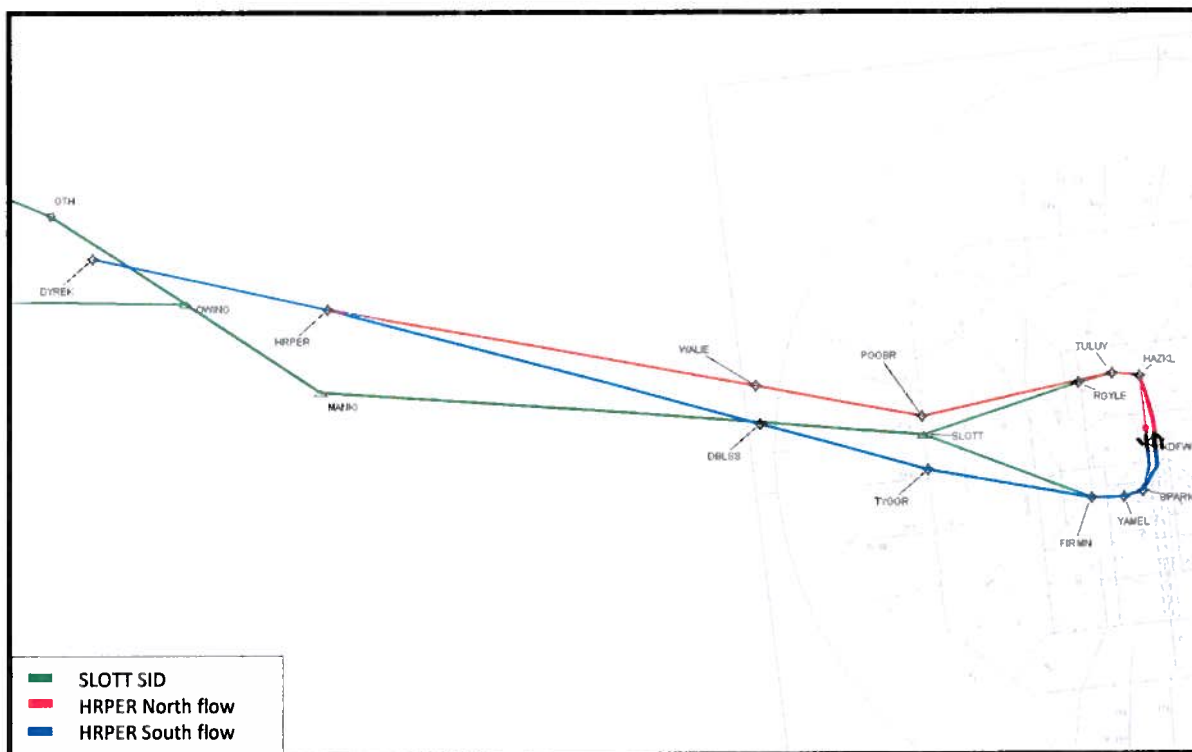
The Design Team kept the north and south flow routings to HRPER waypoint identical to the routings proposed by the Study Team in Alternative 2.

The Design Team proposal was shortened in length over today's SLOTT THREE RNAV SID terminating at DYREK waypoint. This will allow for more direct routing after DYREK as opposed to being routed directly to BOOMR waypoint or TCC. The SID serves California Bay Area and RNO traffic.

Figure 7 depicts the proposed HRPER RNAV SID.

# North Texas OAPM Design Package

## DFW SIDs, HUDAD (RYNOE), HRPER, KATZZ, ALIAN and WSTEX DFW RNAV SIDs



**Figure 7. Proposed HRPER RNAV SID and SLOTT THREE RNAV SID**

### **Additional Design Considerations**

Human-in-the-loop simulations validated these proposed designs.

Spectrum analysis will be required for the proposed airspace changes associated with the proposed ALIAN, HRPER, HUDAD, KATZZ and WSTEX RNAV SIDs.

These procedures will be used by all types of RNAV-equipped turbojet aircraft, are not anticipated to change runway usage, and are not anticipated to modify flight paths below 3,000 feet Above Ground Level.

A waiver will be required for all proposed SIDs for exceeding the maximum climb gradient and degree divergence criteria.

### **Implementation Dependencies**

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed ALIAN, HRPER, HUDAD, KATZZ and WSTEX RNAV SIDs.

These procedures are dependent on the following procedures:

# **North Texas OAPM Design Package**

## **DFW SIDs, HUDAD (RYNOE), HRPER, KATZZ, ALIAN and WSTEX DFW RNAV SIDs**

- **HUDAD:** This procedure shares waypoints with the DAMNS, HRPER, KKITY, SNSET and SWABR RNAV SIDs. It is laterally de-conflicted from the ALIAN, HRPER, KATZZ and WSTEX RNAV SIDs and the WESAT RNAV STAR. It has altitude dependencies with the GIBBI and JOVEM RNAV STARs and the BOWIE STAR in north flow and with the BOOVE and TILLA RNAV STARs and the GLEN ROSE STAR in south flow.
- **HRPER:** This procedure shares waypoints with the DAMNS, KKITY, HUDAD, SNSET and SWABR RNAV SIDs. It is laterally de-conflicted from the ALIAN, KATZZ, HUDAD and WSTEX RNAV SIDs. It has altitude dependencies with the GIBBI and JOVEM RNAV STARs and the BOWIE STAR in north flow and with the BOOVE and TILLA RNAV STARs and the GLEN ROSE STAR in south flow.
- **KATZZ:** This procedure shares waypoints with the ALIAN, DAMNS, KKITY, SNSET, SWABR and WSTEX RNAV SIDs. It is laterally de-conflicted from the ALIAN, HRPER, HUDAD and WSTEX RNAV SIDs. It has altitude dependencies with the GIBBI and JOVEM RNAV STARs and the BOWIE STAR in north flow and with the BOOVE and TILLA RNAV STARs and the GLEN ROSE STAR in south flow.
- **ALIAN:** This procedure shares waypoints with the DAMNS, KATZZ, KKITY, SNSET, SWABR and WSTEX RNAV SIDs. It is laterally de-conflicted from the HRPER, HUDAD, KATZZ and WSTEX RNAV SIDs. It has altitude dependencies with the GIBBI and JOVEM RNAV STARs and the BOWIE STAR in north flow and with the BOOVE and TILLA RNAV STARs and the GLEN ROSE STAR in south flow.
- **WSTEX:** This procedure shares waypoints with the ALIAN, DAMNS, KKITY, KATZZ, SNSET, and SWABR RNAV SIDs. It is laterally de-conflicted from the ALIAN, HRPER, KATZZ and HUDAD RNAV SIDs. It has altitude dependencies with the GIBBI and JOVEM RNAV STARs and the BOWIE STAR in north flow and with the BOOVE and TILLA RNAV STARs and the GLEN ROSE STAR in south flow.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letter of Agreement with D10 will require changes for handoff, automation, and coordination procedures. No changes to Manpower, Facilities, or Equipment requirements are anticipated for this proposed design.

### **Attachments**

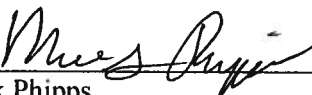
1. ALIAN TARGETS Distribution Package
2. HRPER TARGETS Distribution Package
3. HUDAD TARGETS Distribution Package
4. KATZZ TARGETS Distribution Package
5. WSTEX TARGETS Distribution Package

# North Texas OAPM Design Package

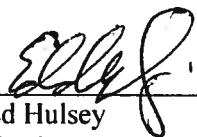
## DFW SIDs, HUDAD (RYNOE), HRPER, KATZZ, ALIAN and WSTEX DFW RNAV SIDs

### Review Signatures

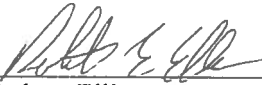
The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

  
Mark Phipps  
North Texas OAPM  
FAA Lead


8/22/13  
Date

  
Ed Hulsey  
North Texas OAPM  
NATCA Lead


8/22/13  
Date

  
Robert Ellis  
Fort Worth Center OAPM  
Facility Lead

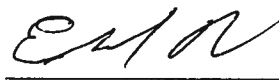
8/22/13  
Date

  
Jon Shedden  
Fort Worth Center OAPM  
NATCA Lead

8/27/13  
Date

  
James Harlan  
Dallas-Fort Worth TRACON OAPM  
Facility Lead

8/22/13  
Date

  
Ed Rivas  
Dallas-Fort Worth TRACON OAPM  
NATCA Lead

8/22/13  
Date



# North Texas OAPM Design Package

## DFW SIDs, SKTER, TRYTN, FORCK and MRSSH DFW RNAV SIDs

Name of Change and Airport/s	Date
SKTER, TRYTN, FORCK and MRSSH – DFW	01 xxxx 2013
Change Classification	Current Phase of Design
Terminal Procedure SID	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
Solution 11	29 May 2014
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 27, 28, 30, 52, 71, 83 and 90</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sector DR1</li> </ul> <b>Memphis ARTCC (ZME)</b>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Airspace Design Packages</b> <ul style="list-style-type: none"> <li>En Route Airspace Design</li> </ul> <b>Procedure Design Package</b> <ul style="list-style-type: none"> <li>STARs: CABBY, CAINE, KLNR and SEVR</li> <li>SIDs: EMMTT, ESNYE, FORCK, KUSSO, LEEAG, LNDRE, MRSSH, SKTER, SWTSR and TRYTN</li> </ul>	<b>Master TARGETS File (file extension name)</b>

### Purpose

DFW east bound and west bound published departures contain doglegs that are typically short-cut by ATC on a consistent basis. This creates a concern as aircraft must load fuel amounts based on the filed route. Redesigning the SIDs to reflect the route that is actually flown results in airlines reducing fuel-loading on aircraft, which translates to an overall fuel savings.

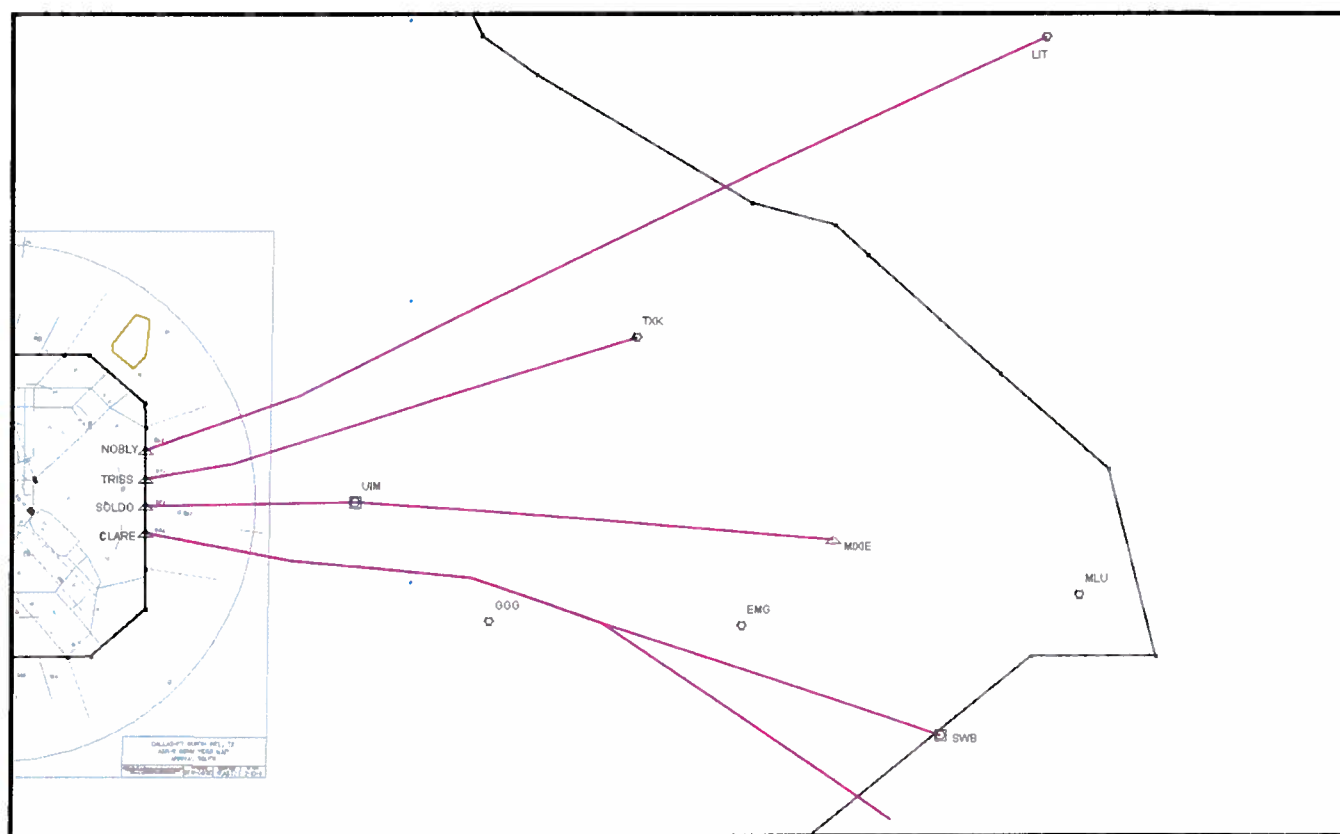
# North Texas OAPM Design Package

## DFW SIDs, SKTER, TRYTN, FORCK and MRSSH DFW RNAV SIDs

### Study Team Recommendation

Both of the proposed alternatives for DFW RNAV SIDs in ZFW airspace reflect the routes that are flown the majority of the time and eliminate most doglegs in ZFW airspace. Both alternatives also call for separating the inside DFW track on a north flow from east bound DAL departure traffic. This is accomplished by creating a DAL RNAV SID that meets airspace requirements in the area surrounding DAL and moving the DFW inside track further north to maintain procedural separation with the proposed DAL RNAV SID. Moving the inside track north requires that the outside DFW track also be moved further north to maintain separation with the proposed inside track. The Study Team came up with two alternatives; the first using the present departure fixes and the second use a “floating fix” concept.

Figure 1 depicts alternative 1 showing the DFW east bound RNAV SIDs departing the D10/ZFW boundary at the present departure fixes. The purple lines depict the published SIDs.



**Figure 1. Study Team Recommendation – Alternative 1**

Figure 2 depicts alternative 2 showing the proposed DFW east bound RNAV SIDs departing the D10/ZFW boundary floating departure fixes, depending upon the flow in use at DFW. The use of the floating fix concept reduces flying mileage as aircraft will fly a shorter route to the common

# North Texas OAPM Design Package

## DFW SIDs, SKTER, TRYTN, FORCK and MRSSH DFW RNAV SIDs

fix in ZFW's airspace, depending upon the DFW flow. The green lines depict the proposed north flow SIDs and the red lines the proposed south flow SIDs.

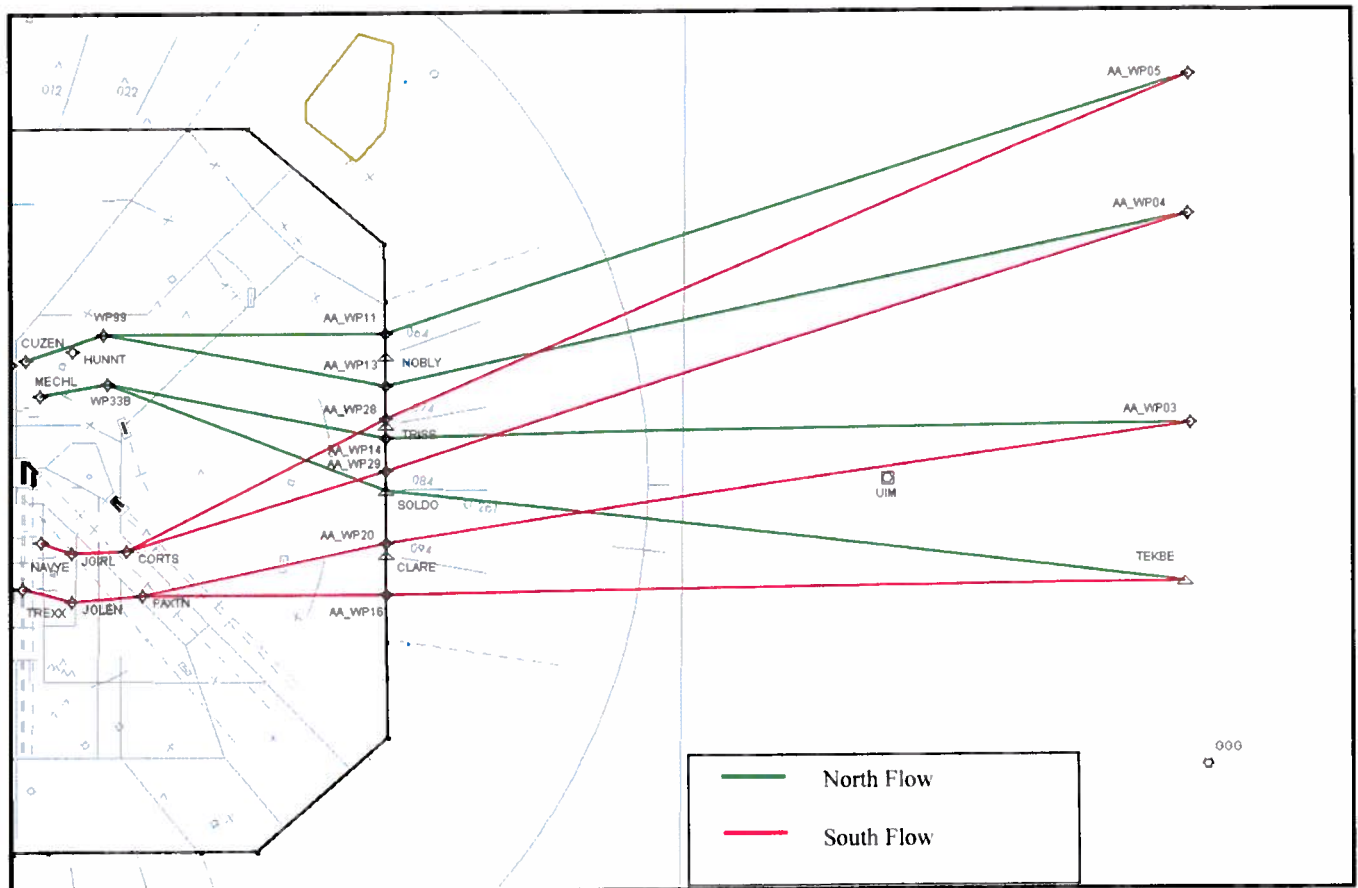


Figure 2. Study Team Recommendation – Alternative 2

### Proposed Design

The Design Team determined that four RNAV SIDs should be created to address the Study Team Solution:

- SKTER
- TRYTN
- FORCK
- MRSSH

The Design Team chose Alternative 2 as the floating fix concept reduces flying mileage. Additionally, ZFW and D10 agreed to create waypoints 25 NM east of D10's airspace boundary to allow for more direct routings when traffic permits to further reduce flying mileage.

# North Texas OAPM Design Package

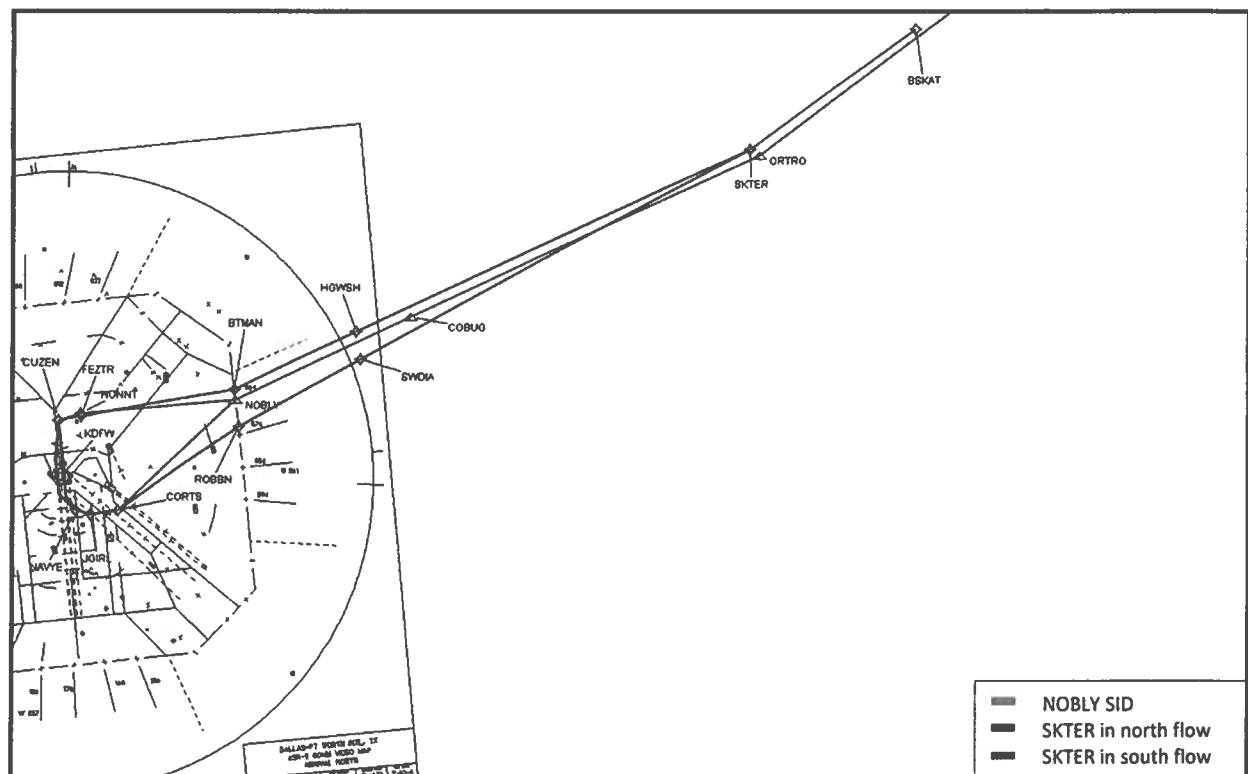
## DFW SIDs, SKTER, TRYTN, FORCK and MRSSH DFW RNAV SIDs

East bound turbojet aircraft departing from the western Satellite airports may be stacked above the DFW/DAL east bound departures, and east bound turbojet aircraft departing from the eastern Satellite airports may be stacked below the DFW/DAL departures. ZFW will have control for turns and climb.

### SKTER RNAV SID

The Design Team kept the south flow routing to SKTER waypoint identical to the routing proposed by the Study Team in Alternative 2. On the north flow, the Design Team amended the routing from CUZEN to BTMAN waypoints to shorten the distance to the D10/ZFW boundary fix (by 0.31 NM). The remaining route from BTMAN to SKTER is identical to the routing proposed by the Study Team in Alternative 2. An altitude restriction at FEZTR waypoint at or above 7,000 feet was added for procedural de-confliction from north bound DAL RNAV SIDs. The Design Team extended the routing from SKTER to BSKAT waypoint. This will allow for a more direct routing for traffic routed over LIT.

Figure 3 depicts the proposed SKTER RNAV SID.



**Figure 3. Proposed SKTER RNAV SID and NOBLY SID**

# North Texas OAPM Design Package

## DFW SIDs, SKTER, TRYTN, FORCK and MRSSH DFW RNAV SIDs

### TRYTN RNAV SID

The Design Team kept the south flow routing to TRYTN waypoint identical to the routing proposed by the Study Team in Alternative 2. On the north flow, the Design Team amended the routing from CUZEN to BLADE waypoint to shorten the distance to the D10/ZFW boundary fix (by 0.87 NM). The remaining route to TRYTN is identical to the routing proposed by the Study Team in Alternative 2. An altitude restriction at FEZTR at or above 7,000 feet was added for procedural de-confliction from north bound DAL RNAV SIDs. The Design Team extended the routing from TRYTN to LOOSE waypoint. This will allow for a more direct routing for traffic routed over TXK.

Figure 4 depicts the proposed TRYTN RNAV SID.

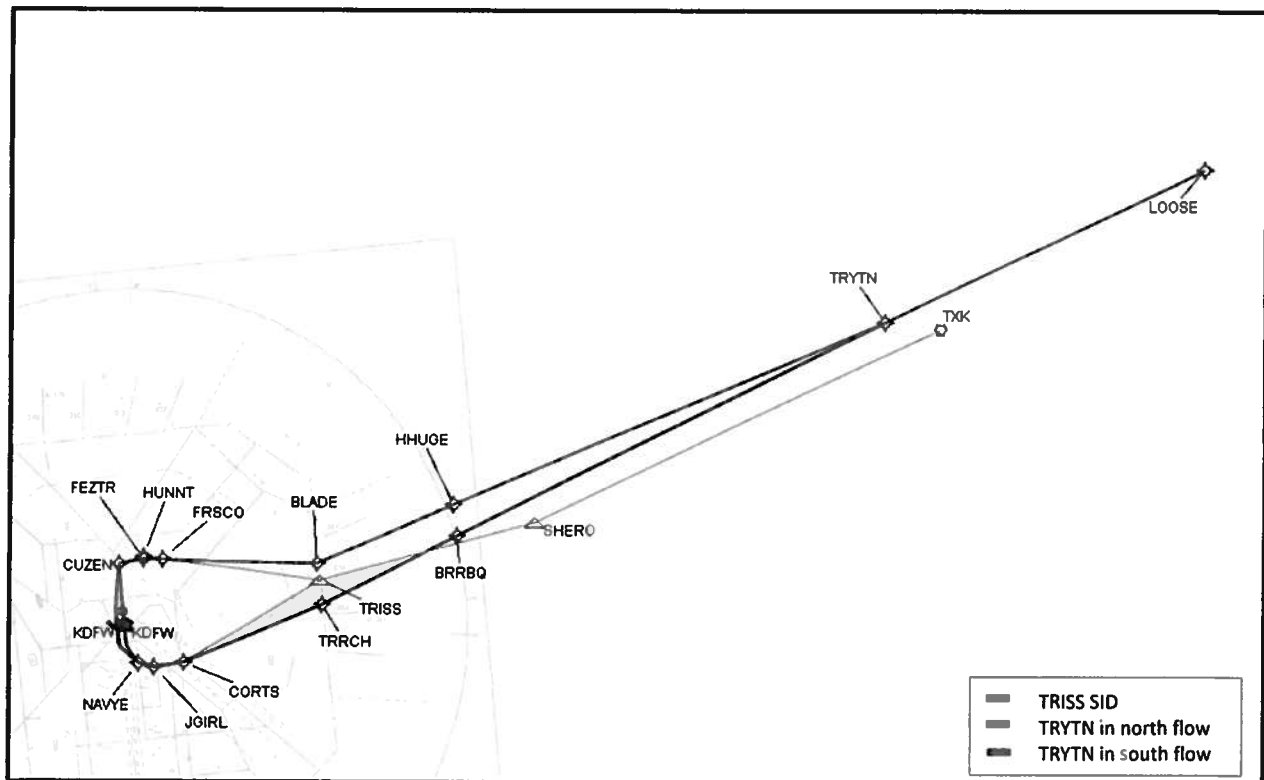


Figure 4. Proposed TRYTN RNAV SID and TRISS SID

# North Texas OAPM Design Package

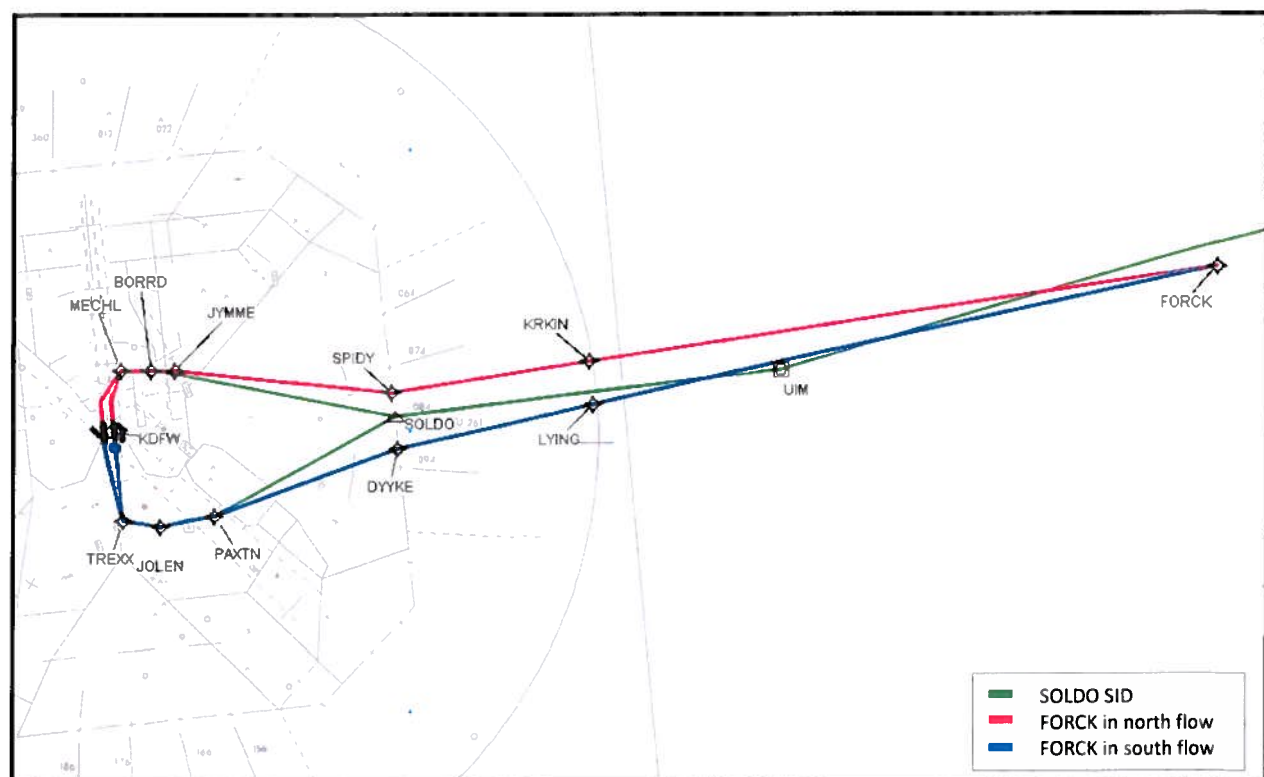
## DFW SIDs, SKTER, TRYTN, FORCK and MRSSH DFW RNAV SIDs

### FORCK RNAV SID

The Design Team kept the south flow routing to FORCK waypoint identical to the routing proposed by the Study Team in Alternative 2. On the north flow, the Design Team amended the routing from MECHL to SPIDY waypoints to shorten the distance to the D10/ZFW boundary fix (by .45 NM). The remaining route to FORCK is identical to the routing proposed by the Study Team in Alternative 2.

This SID will serve traffic for ELD, SQS, ATL, CLT and Northeast Metro Areas Airports.

Figure 5 depicts the proposed FORCK RNAV SID.



**Figure 5. Proposed FORCK RNAV SID and SOLDO SID**

### MRSSH RNAV SID

The Design Team modified the south flow routing from JOLEN to THHOR waypoints; the rest of the route remains as proposed by the Study Team in Alternative 2. On the north flow, the Design Team amended the routing from MECHL to XXMEN waypoint to shorten the distance to the D10/ZFW boundary fix (by 0.76 NM). The remaining route to MRSSH waypoint is identical to the routing proposed by the Study Team in Alternative 2.

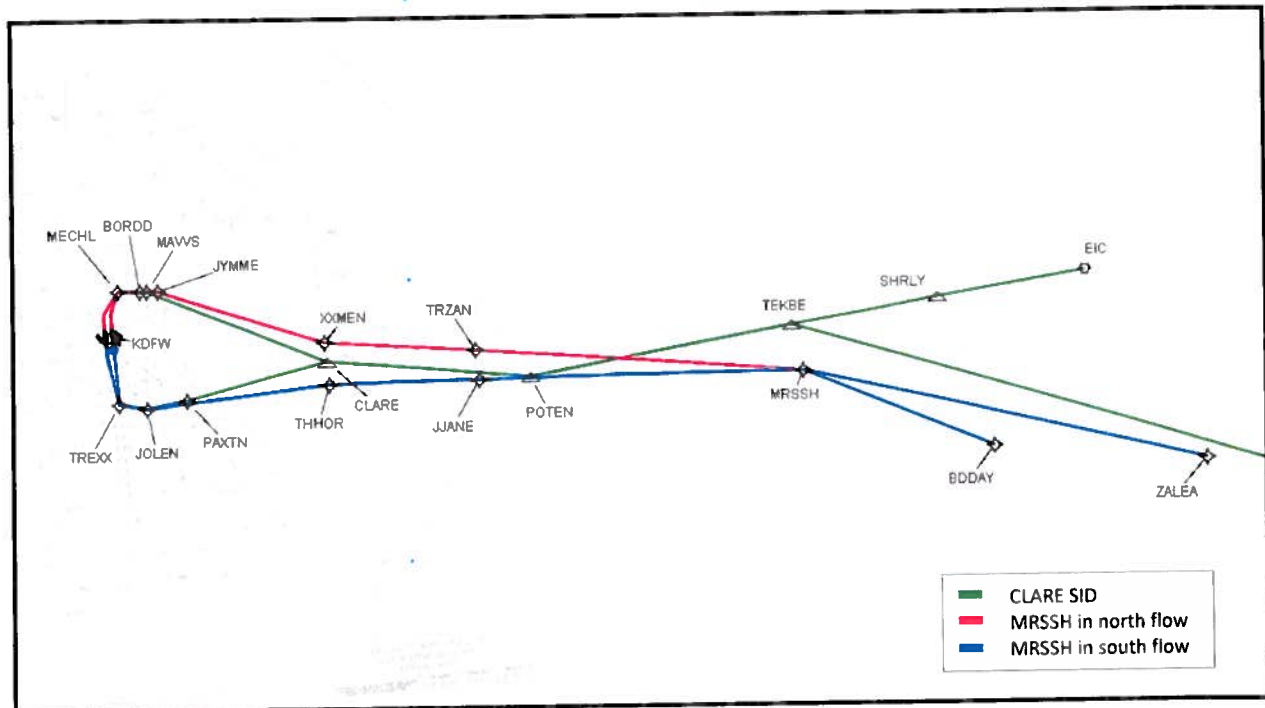
This SID serves traffic for MSY, Florida, Alabama and Mississippi.

# North Texas OAPM Design Package

## DFW SIDs, SKTER, TRYTN, FORCK and MRSSH DFW RNAV SIDs

The BDDAY transition was added as a weather routing, per coordination with ZHU ARTCC and will be ATC assigned only.

Figure 6 depicts the proposed MRSSH RNAV SID.



**Figure 6. Proposed MRSSH RNAV SID and CLARE SID**

### Additional Design Considerations

Human-in-the-loop simulations validated these proposed designs.

Spectrum analysis will be required for the proposed airspace changes associated with the proposed FORCK, MRSSH, SKTER and TRYTN RNAV SIDs.

These procedures will be used by all types of RNAV-equipped turbojet aircraft, are not anticipated to change runway usage, and are not anticipated to modify flight paths below 3,000 feet Above Ground Level.

A waiver will be required for all proposed RNAV SIDs for exceeding the maximum climb gradient and degree divergence criteria.

### Implementation Dependencies

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed FORCK, MRSSH, SKTER and TRYTN RNAV SIDs.

# North Texas OAPM Design Package

## DFW SIDs, SKTER, TRYTN, FORCK and MRSSH DFW RNAV SIDs

These procedures are dependent on the following procedures:

- **SKTER:** This procedure shares waypoints with the EMMTT, KUSSO, LEEAG, LNDRE and TRYTN RNAV SIDs. It is laterally de-conflicted from the FORCK, MRSSH and TRYTN RNAV STARs and vertically de-conflicted from the ESNYE RNAV SID. It has altitude dependencies with the SWTSR RNAV SID when DFW is in north flow and DAL is in south flow. It has altitude dependencies with the CAINE and SEEVR RNAV STARs and the WILBR STAR when DFW is in north flow and with the CABBY and KLNDR RNAV STARs and the CEDAR CREEK STAR when DFW is in south flow.
- **TRYTN:** This procedure shares waypoints with the EMMTT, KUSSO, LEEAG, LNDRE and SKTER RNAV SIDs. It is laterally de-conflicted from the FORCK, MRSSH and SKTER RNAV STARs and vertically de-conflicted from the ESNYE RNAV SID. It has altitude dependencies with the SWTSR RNAV SID when DFW is in north flow and DAL is in south flow. It has altitude dependencies with the CAINE and SEEVR RNAV STARs and the WILBR STAR when DFW is in north flow and with the CABBY and KLNDR RNAV STARs and the CEDAR CREEK STAR when DFW is in south flow.
- **FORCK:** This procedure shares waypoints with the EMMTT, ESNYE, KUSSO, LEEAG, LNDRE and MRSSH RNAV SIDs. It is laterally de-conflicted from the MRSSH, SKTER and TRYTN RNAV SIDs. It has altitude dependencies with the SWTSR RNAV SID when DFW is in north flow and DAL is in south flow. It has altitude dependencies with the CAINE and SEEVR RNAV STARs and the WILBR STAR when DFW is in north flow and with the CABBY and KLNDR RNAV STARs and the CEDAR CREEK STAR when DFW is in south flow.
- **MRSSH:** This procedure shares waypoints with the EMMTT, ESNYE, FORCK, KUSSO, LEEAG and LNDRE RNAV SIDs. It is laterally de-conflicted from the FORCK, SKTER and TRYTN RNAV SIDs. It has altitude dependencies with the SWTSR RNAV SID when DFW is in north flow and DAL is in south flow. It has altitude dependencies with the CAINE and SEEVR RNAV STARs and the WILBR STAR when DFW is in north flow and with the CABBY and KLNDR RNAV STARs and the CEDAR CREEK STAR when DFW is in south flow.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letter of Agreement with D10 will require changes for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.



# **North Texas OAPM Design Package**

## **DFW SIDs, SKTER, TRYTN, FORCK and MRSSH DFW RNAV SIDs**

### **Attachments**

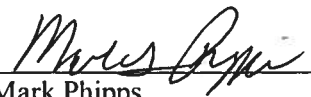
1. FORCK TARGETS Distribution Package
2. MRSSH TARGETS Distribution Package
3. SKTER TARGETS Distribution Package
4. TRYTN TARGETS Distribution Package

# North Texas OAPM Design Package

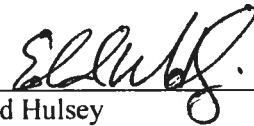
## DFW SIDs, SKTER, TRYTN, FORCK and MRSSH DFW RNAV SIDs

### Review Signatures


The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

  
\_\_\_\_\_  
Mark Phipps  
North Texas/Houston OAPM  
FAA Lead

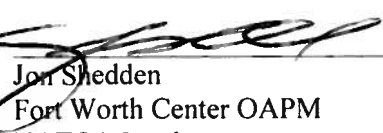
8/22/13  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Ed Hulsey  
North Texas OAPM  
NATCA Lead


8/22/13  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Robert Ellis  
Fort Worth Center OAPM  
Facility Lead

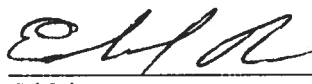
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Date

  
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Jon Shedden  
Fort Worth Center OAPM  
NATCA Lead

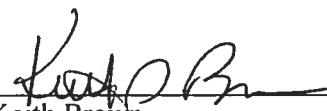
8/22/13  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
James Harlan  
Dallas-Fort Worth TRACON OAPM  
Facility Lead

8/22/13  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Ed Rivas  
Dallas-Fort Worth TRACON OAPM  
NATCA Lead

8/22/13  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Keith Brown  
Houston OAPM  
NATCA Lead

8/13/13  
\_\_\_\_\_  
Date

# North Texas OAPM Design Package

## DAL SIDs, EMMTT and LNDRE DAL RNAV SIDs

Name of Change and Airport/s	Date
<b>EMMTT and LNDRE – DAL</b>	<b>01 xxxx 2013</b>
Change Classification	Current Phase of Design
<b>Terminal Procedure SID</b>	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
<b>Solution 11</b>	<b>29 May 2014</b>
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>• Sector 27, 28, 30, 52, 71, 83 and 90</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>• Sectors DE, DN, DR1 and DS</li> </ul> <b>ARTCCs</b> <ul style="list-style-type: none"> <li>• Houston (ZHU) and Memphis (ZME)</li> </ul>	<b>ZFW</b> <ul style="list-style-type: none"> <li>• Robert Ellis</li> <li>• Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>• James Harlan</li> <li>• Ed Rivas</li> </ul> <b>ZHU</b> <ul style="list-style-type: none"> <li>• Mike McGhee</li> <li>• David Salapata</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Airspace Design Packages</b> <ul style="list-style-type: none"> <li>• DAL SIDs</li> </ul> <b>Procedure Design Package</b> <ul style="list-style-type: none"> <li>• SIDs: EMMTT, ESNYE, FORCK, KUSSO, LEEAG, LNDRE, MRSSH, SKTER, SWTSR and TRYTN</li> </ul>	<b>Master TARGETS File (file extension name)</b>

### Purpose

The Study Team identified two issues with departures from DAL. The first issue is departures from DAL in north flow operations turning right south bound fly lower altitudes and additional mileage then departures turning left. The second is complexities resulting from interactions between Dallas Fort Worth International Airport “inside track” departures and DAL east departures in north flow sometimes result in limiting DFW departures to a single vectored heading versus dual RNAV headings.

# **North Texas OAPM Design Package**

## **DAL SIDs, EMMTT and LNDRE DAL RNAV SIDs**

### **Study Team Recommendation**

The Study Team proposed four recommendations to address the issue the Team identified. The first recommendation was to create a north flow left turn DAL RNAV SID for south bound traffic to address D10 airspace and DAL arrival traffic issues. The second was to create a north flow right turn DAL RNAV SID to provide a predictable path and to procedurally separate DAL east departures and DFW “inside track” departures. The third was to create a north flow DAL RNAV SID for west bound and north bound traffic to procedurally separate DFW and DAL traffic. The fourth was to create a single south flow DAL RNAV SID for all departing traffic.

The use of RNAV SIDs for DAL departures would provide more predictable management of traffic; incorporation of PBN concepts provides user benefits; reduces phraseology for controllers; and segregates DAL and DFW departure flows during their initial climb out within D10 airspace before safely merging these departure flows at the D10/ZFW airspace boundary. DAL departures would then benefit from the modified lateral tracks in the proposed RNAV SIDs within ZFW airspace, allowing more direct routing for Dallas-Fort Worth Metroplex departures.

Figure 1 depicts version 1 of the recommended SID in a north flow.

Figure 2 depicts version 2 of the recommended SID in a north flow.

Figure 3 depicts the recommended SID in a south flow.

# North Texas OAPM Design Package

## DAL SIDs, EMMTT and LNDRE DAL RNAV SIDs

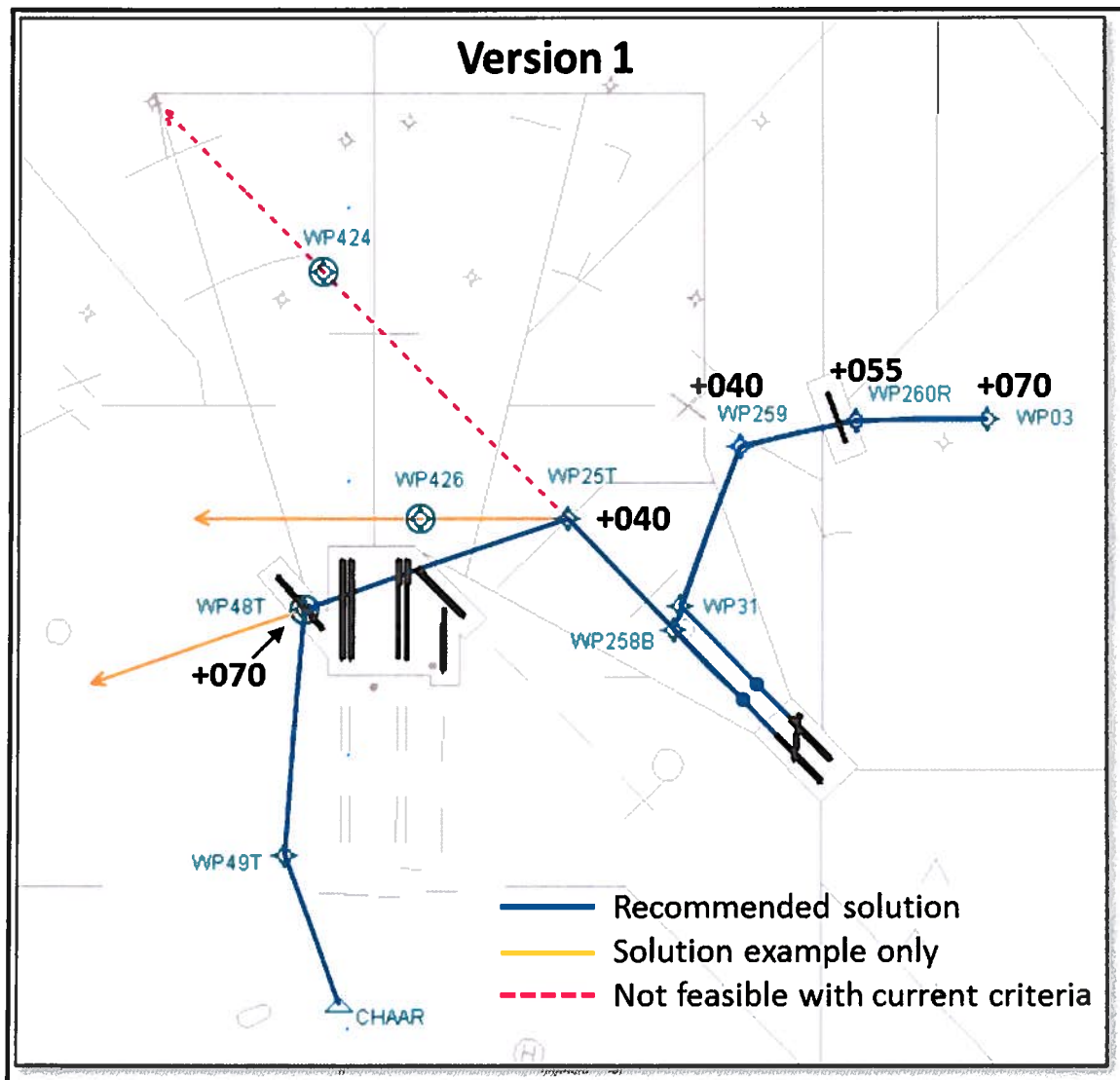


Figure 1. North Flow Version 1 Study Team Recommendation

# North Texas OAPM Design Package

## DAL SIDs, EMMTT and LNDRE DAL RNAV SIDs

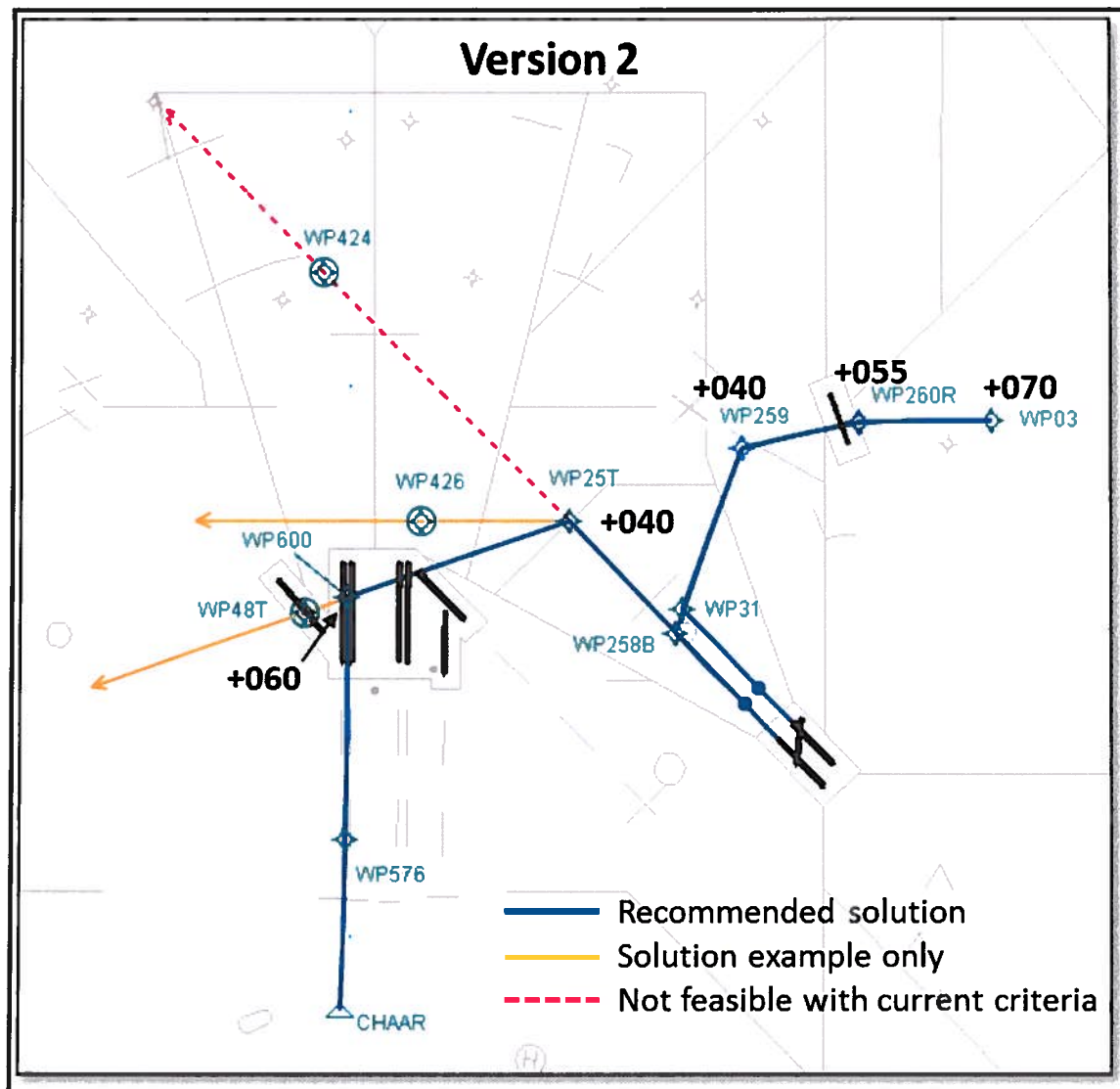
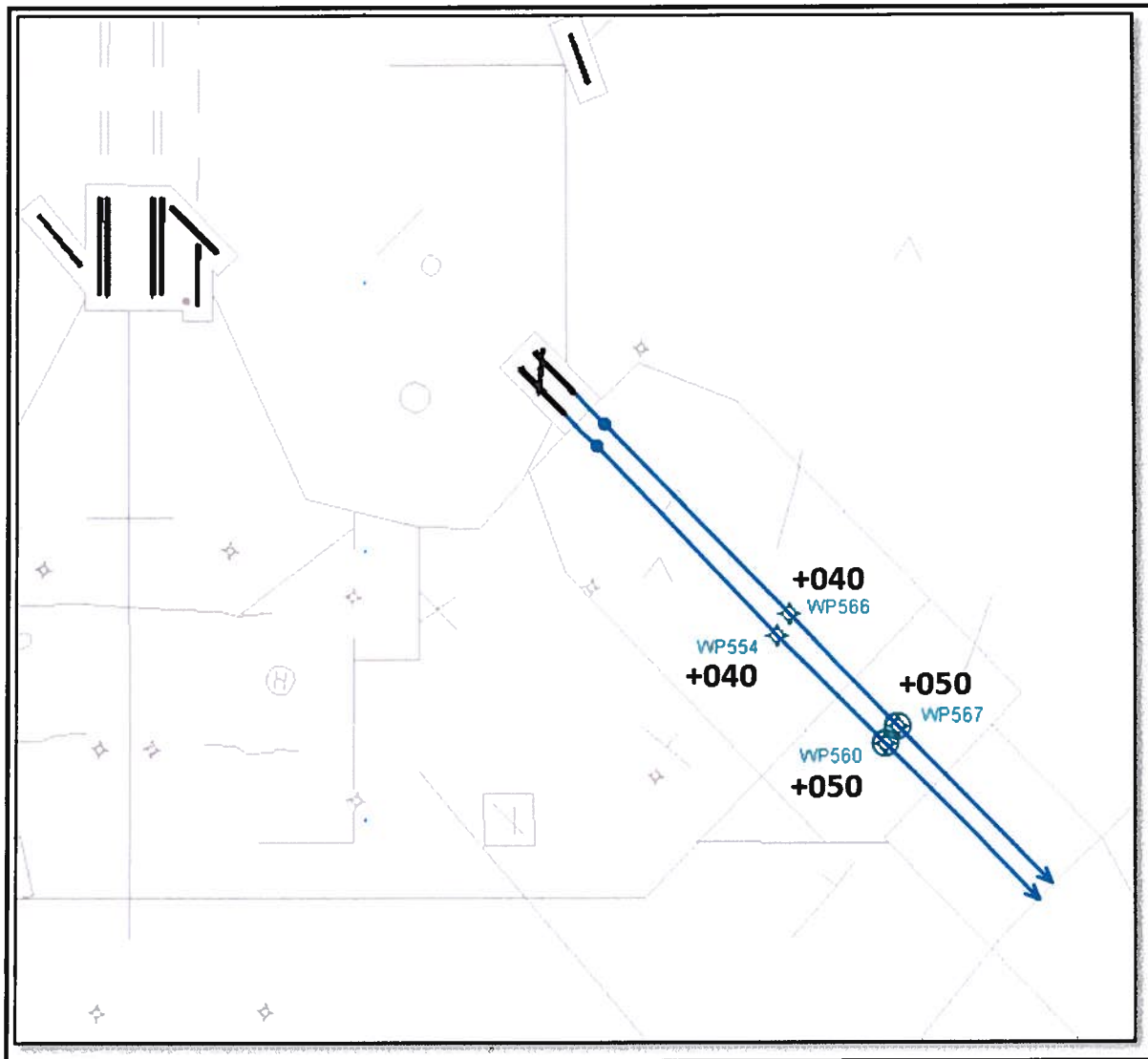


Figure 2. North Flow Version 2 Study Team Recommendation

# North Texas OAPM Design Package

## DAL SIDs, EMMTT and LNDRE DAL RNAV SIDs



**Figure 3. South Flow Study Team Recommendation**

### **Proposed Design**

The North Texas OAPM Design Team is proposing the implementation of two new RNAV SIDs named EMMTT and LNDRE. The proposed designs are for east bound departures. The proposed designs incorporate single departure routes to turn the departures east bound to either EMMTT or LNDRE then diverge to four departure routes.

The Design Team tied these proposed procedures to the same boundary fixes the proposed DFW RNAV SIDs will use to increase flight path predictability and reduce controller task complexity. In the enroute environment, per coordination with the ZHU the BDDAY transition will be ATC assigned only. These designs are slightly modified from the Study Team recommendation to provide for longitudinal de-confliction from the east bound DFW RNAV SIDs in a north flow.

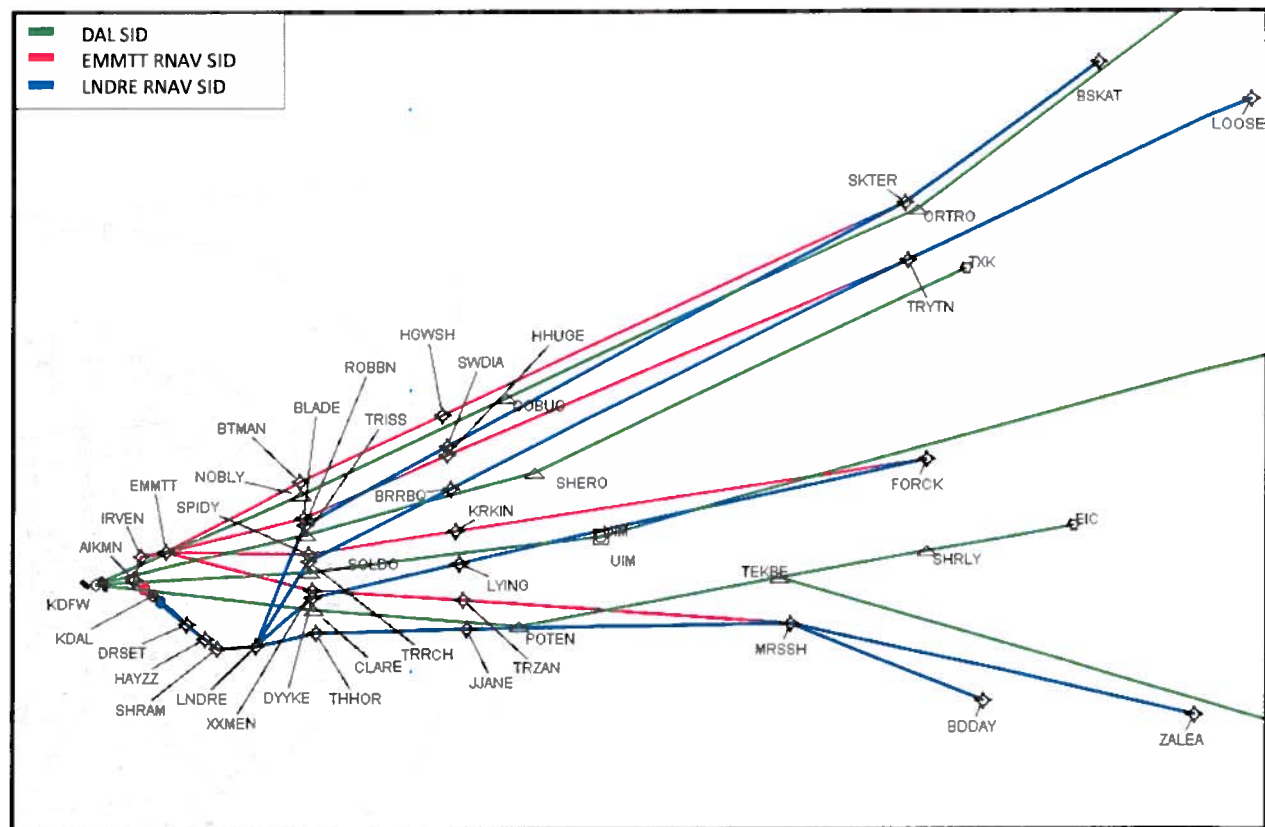
# North Texas OAPM Design Package

## DAL SIDs, EMMTT and LNDRE DAL RNAV SIDs

East bound turbojet aircraft departing from the western Satellite airports may be stacked above the DFW/DAL east bound departures, and east bound turbojet aircraft departing from the eastern Satellite airports may be stacked below the DFW/DAL departures. ZFW will have control for turns and climb.

The proposed south flow procedure is longer in distance than the today's current departure tracks to meet the minimum design criteria for segment lengths and climb gradients.

Figure 4 depicts the proposed EMMTT and LNDRE RNAV SIDs.



**Figure 4. Proposed EMMTT and LNDRE RNAV SIDs and DAL SID**

### Additional Design Considerations

Human-in-the-loop simulations validated these proposed designs.

Spectrum analysis will be required for the proposed airspace changes associated with the proposed EMMTT and LNDRE RNAV SIDs.

These procedures will be used by all types of RNAV-equipped turbojet aircraft, are not anticipated to change runway usage, and are not anticipated to modify flight paths below 3,000 feet Above Ground Level.



# **North Texas OAPM Design Package**

## **DAL SIDs, EMMTT and LNDRE DAL RNAV SIDs**

A waiver will be required for all proposed RNAV SIDs for exceeding the maximum climb gradient and degree divergence criteria.

### **Implementation Dependencies**

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed EMMTT and LNDRE RNAV SIDs.

These procedures are dependent on the following procedures:

- **EMMTT:** This procedure shares waypoints with the ESNYE, FORCK, KUSSO, LEEAG, LNDRE, MRSSH, SKTER and TRYTN RNAV SIDs.
- **LNDRE:** This procedure shares waypoints with the EMMTT, FORCK, KUSSO, LEEAG, MRSSH, SKTER, SWTSR and TRYTN RNAV SIDs.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letter of Agreement with D10 will require changes for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**

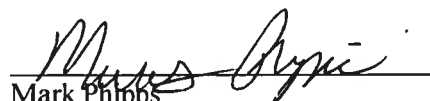
1. EMMTT TARGETS Distribution Package
2. LNDRE TARGETS Distribution Package

# North Texas OAPM Design Package


## DAL SIDs, EMMTT and LNDRE DAL RNAV SIDs

### Review Signatures


The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

  
Mark Philpps  
North Texas/Houston OAPM  
FAA Lead


8/22/13  
Date

  
Ed Hulsey  
North Texas OAPM  
NATCA Lead


8/22/13  
Date

  
Robert Ellis  
Fort Worth Center OAPM  
Facility Lead


8/22/13  
Date

  
Jon Shedden  
Fort Worth Center OAPM  
NATCA Lead

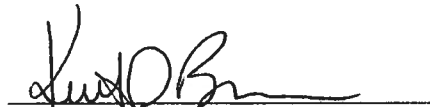
8/22/13  
Date

  
James Harlan  
Dallas-Fort Worth TRACON OAPM  
Facility Lead

8/22/13  
Date

  
Ed Rivas  
Dallas-Fort Worth TRACON OAPM  
NATCA Lead

8/22/13  
Date

  
Keith Brown  
Houston OAPM  
NATCA Lead

8/22/13  
Date

# North Texas OAPM Design Package

## DAL SIDs, ESNYE and SWTSR DAL RNAV SIDs

Name of Change and Airport/s	Date
ESNYE and SWTSR – DAL	22 August 2013
Change Classification	Current Phase of Design
Terminal Procedure SID	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
Solution 11	29 May 2014
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 48 and 53</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors DR1, DR2 and DN</li> </ul>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Airspace Design Packages</b> <ul style="list-style-type: none"> <li>DAL SIDs</li> </ul> <b>Procedure Design Package</b> <ul style="list-style-type: none"> <li>STAR: SEEVN</li> <li>SIDs: EMMTT, ESNYE, FORCK, LNDRE, MRSSH, SKTER, SWTSR and TRYTN</li> </ul>	NTEX OAPM 201309.tgs

### Purpose

The Study Team identified two issues with departures from DAL. The first issue is departures from DAL in north flow operations turning right south bound fly lower altitudes and additional mileage then departures turning left. The second is complexities resulting from interactions between Dallas Fort Worth International Airport “inside track” departures and DAL east departures in north flow sometimes result in limiting DFW departures to a single vectored heading versus dual RNAV headings.

### Study Team Recommendation

The Study Team proposed four recommendations to address the issue the Team identified. The first recommendation was to create a north flow left turn DAL RNAV SID for south bound traffic to address D10 airspace and DAL arrival traffic issues. The second was to create a north

# **North Texas OAPM Design Package**

## **DAL SIDs, ESNYE and SWTSR DAL RNAV SIDs**

flow right turn DAL RNAV SID to provide a predictable path and to procedurally separate DAL east departures and DFW “inside track” departures. The third was to create a north flow DAL RNAV SID for west bound and north bound traffic to procedurally separate DFW and DAL traffic. The fourth was to create a single south flow DAL RNAV SID for all departing traffic.

The use of RNAV SIDs for DAL departures would provide more predictable management of traffic; incorporation of PBN concepts provides user benefits; reduces phraseology for controllers; and segregates DAL and DFW departure flows during their initial climb out within D10 airspace before safely merging these departure flows at the D10/ZFW airspace boundary. DAL departures would then benefit from the modified lateral tracks in the proposed RNAV SIDs within ZFW airspace, allowing more direct routing for Dallas-Fort Worth Metroplex departures.

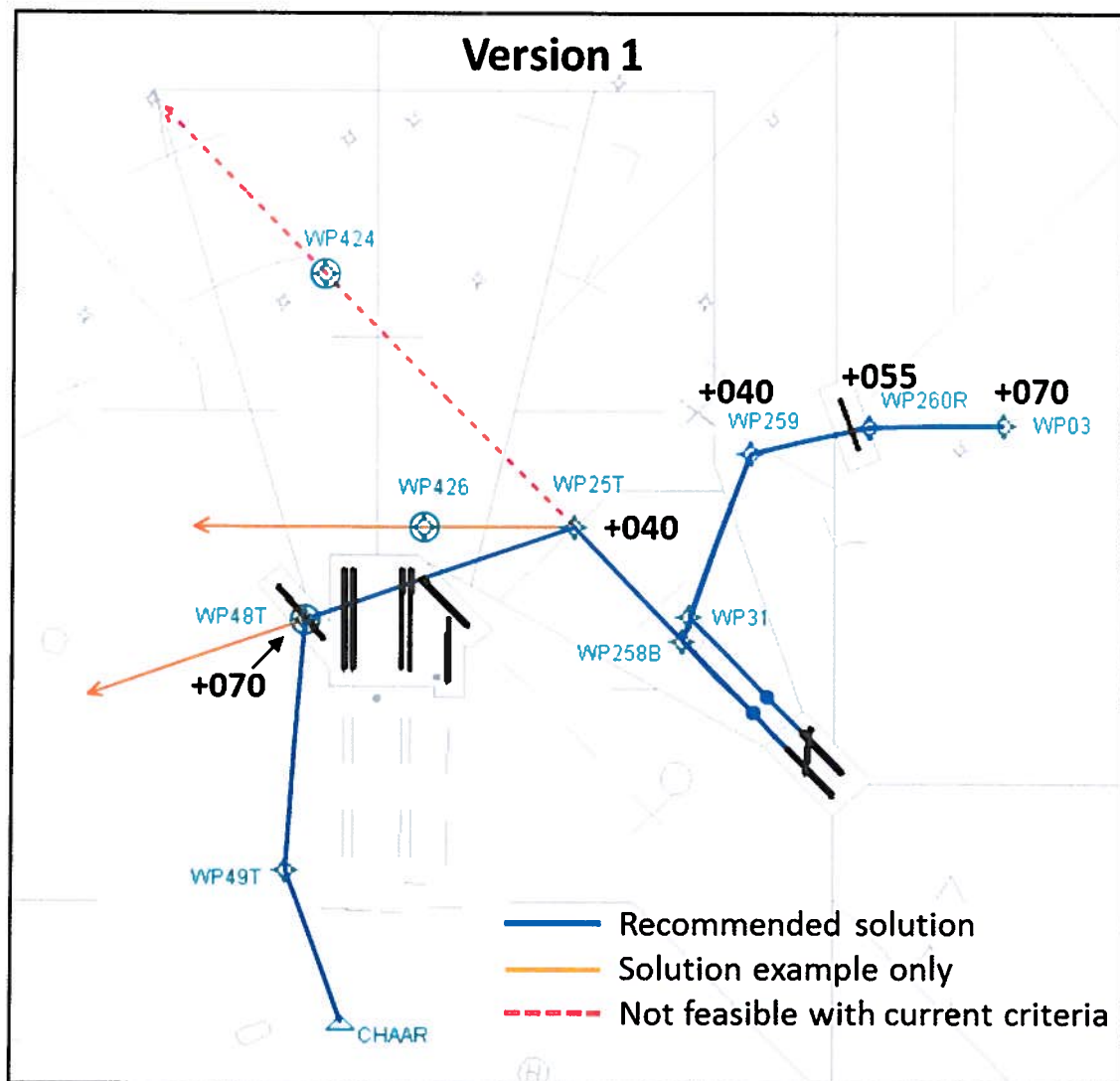
Figure 1 depicts version 1 of the recommended SID in a north flow.

Figure 2 depicts version 2 of the recommended SID in a north flow.

Figure 3 depicts the recommended SID in a south flow.

# North Texas OAPM Design Package

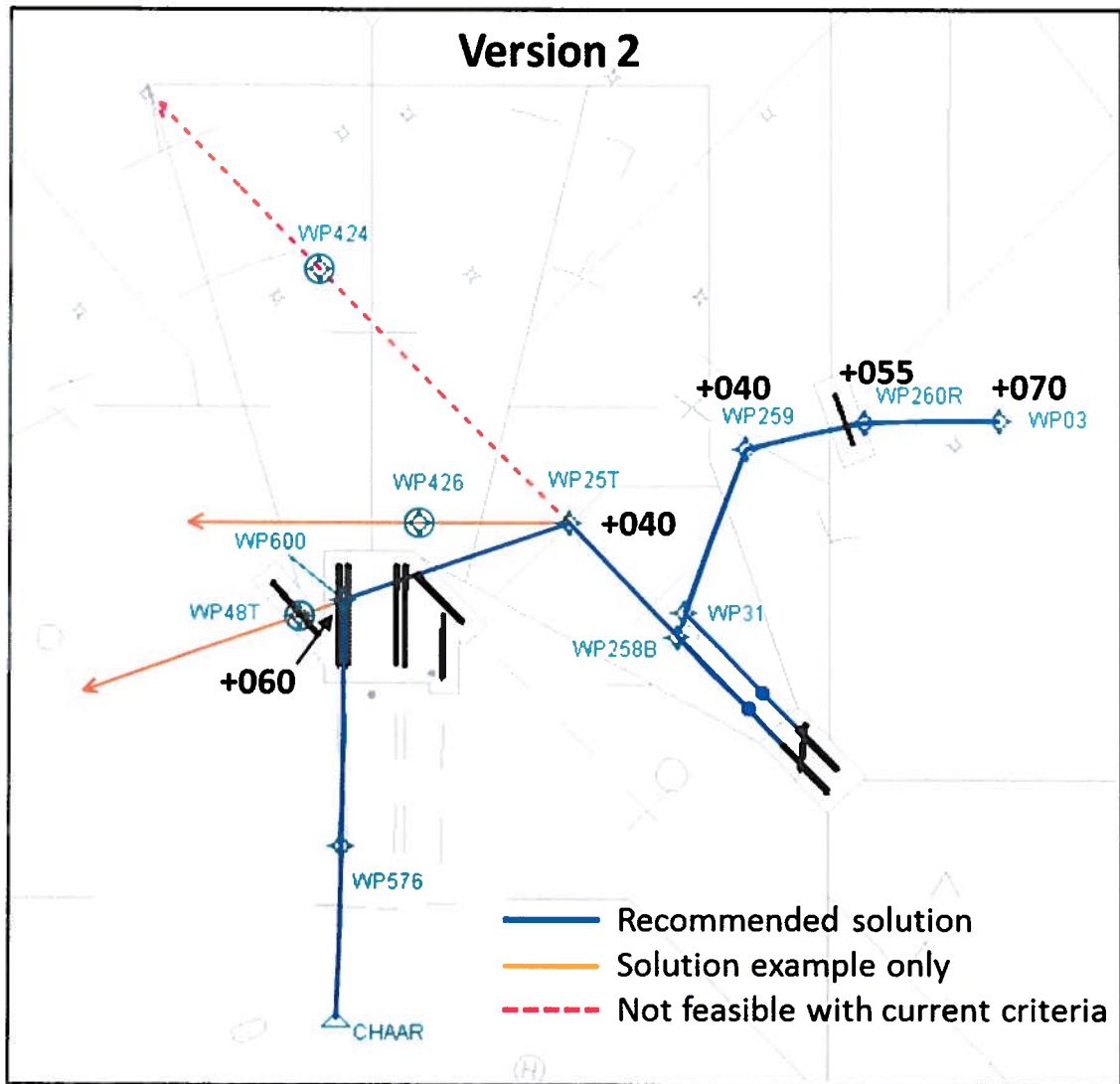
## DAL SIDs, ESNYE and SWTSR DAL RNAV SIDs



**Figure 1. North Flow Version 1 Study Team Recommendation**

# North Texas OAPM Design Package

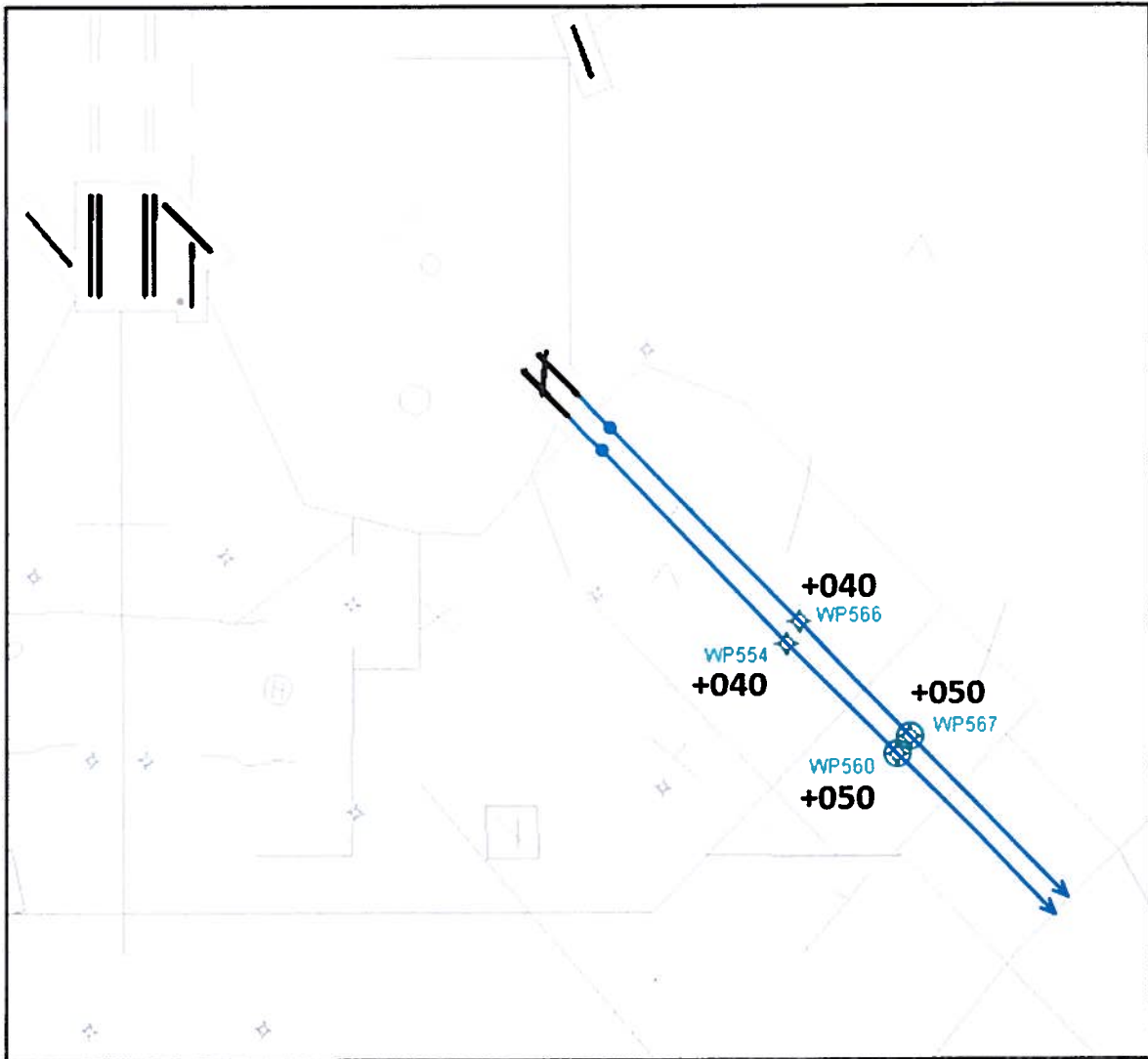
## DAL SIDs, ESNYE and SWTSR DAL RNAV SIDs



**Figure 2. North Flow Version 2 Study Team Recommendation**

# North Texas OAPM Design Package

## DAL SIDs, ESNYE and SWTSR DAL RNAV SIDs



**Figure 3. South Flow Study Team Recommendation**

### **Proposed Design**

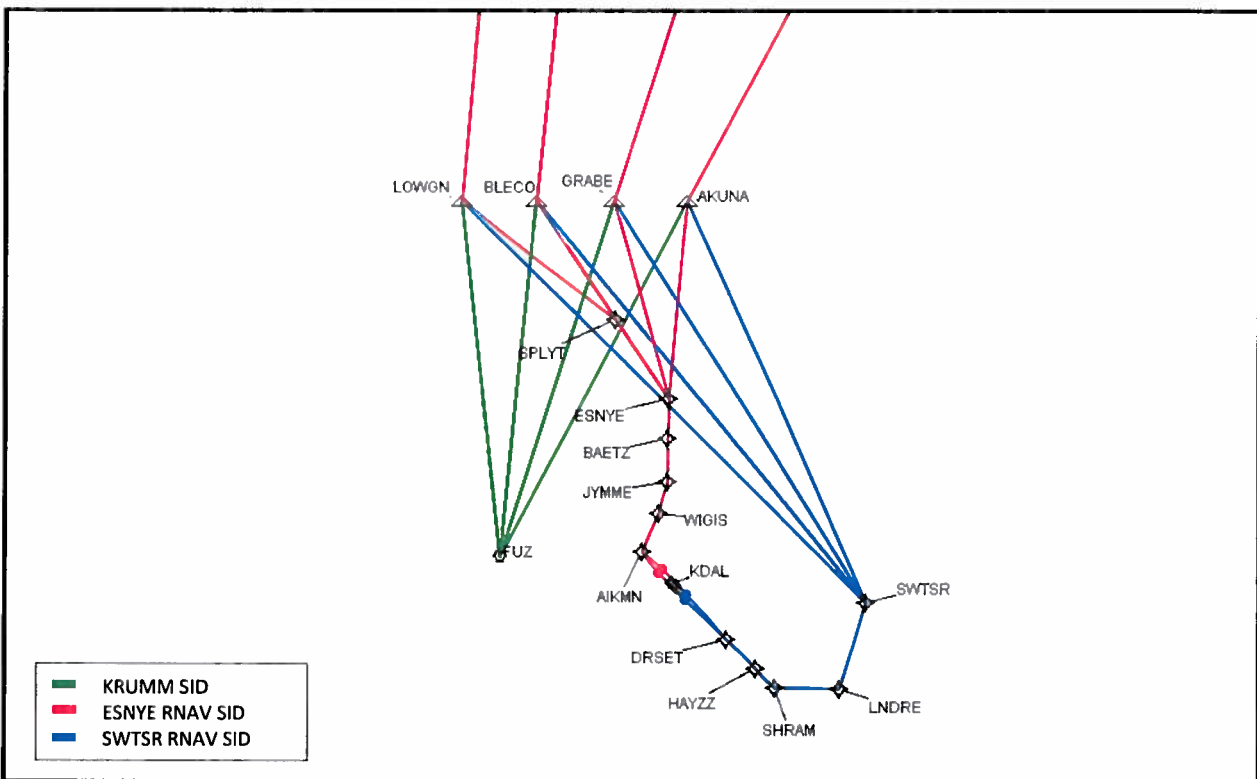
The North Texas OAPM Team is proposing the implementation of two new RNAV SIDs, ESNYE and SWTSR for northern departures from DAL. The proposed designs incorporate single departure routes to turn the departures north bound then to ESNYE waypoint in north flow and to SWTSR waypoint in south flow then diverge to four departure routes. The Design Team tied these proposed procedures to the same boundary fixes the DFW SIDs use to increase flight path predictability and reduce controller and pilot task complexity.

The proposed procedures are longer in distance than the today's current departure tracks to meet the minimum design criteria for segment lengths and climb gradients.

# North Texas OAPM Design Package

## DAL SIDs, ESNYE and SWTSR DAL RNAV SIDs

Figure 4 depicts the proposed ESNYE and SWTSR RNAV SIDs.



**Figure 4. Proposed ESNYE and SWTSR RNAV SIDs and KRUMM SID**

### **Additional Design Considerations**

Human-in-the-loop simulations validated these proposed designs.

Spectrum analysis will be required for the proposed airspace changes associated with the proposed ESNYE and SWTSR RNAV SIDs.

These procedures will be used by all types of RNAV-equipped turbojet aircraft, are not anticipated to change runway usage, and are not anticipated to modify flight paths below 3,000 feet Above Ground Level.

A waiver will be required for all proposed SIDs for exceeding the maximum climb gradient.

### **Implementation Dependencies**

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed ESNYE and SWTSR RNAV SIDs.



# **North Texas OAPM Design Package**

## **DAL SIDs, ESNYE and SWTSR DAL RNAV SIDs**

These procedures are dependent on the following procedures:

- **ESNYE:** This procedure shares waypoints with the EMMTT, FORCK and MRSSH and SWTSR RNAV SIDs. It is vertically de-conflicted from the SKTER and TRYTN RNAV SIDs.
- **SWTSR:** This procedure shares waypoints with the ESNYE and LNDRE RNAV SIDs. It has altitude dependencies with the FORCK, MRSSH, SKTER and TRYTN RNAV SIDs when DFW is in north flow and DAL is in south flow. It has altitude dependencies with the SEEVN RNAV STAR when DFW and DAL are in north flow.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letter of Agreement with D10 will require changes for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**

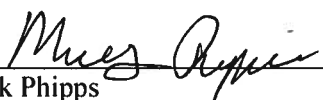
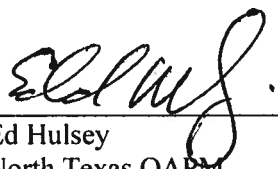
1. ESNYE TARGETS Distribution Package
2. SWTSR TARGETS Distribution Package

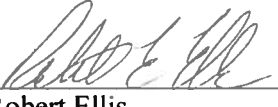

# North Texas OAPM Design Package


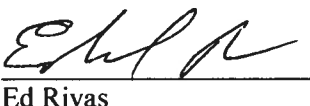
## DAL SIDs, ESNYE and SWTSR DAL RNAV SIDs

### Review Signatures

The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

	8/22/13		8/22/13
Mark Phipps	Date	Ed Hulse	Date
North Texas OAPM		North Texas OAPM	
FAA Lead		NATCA Lead	

	8/22/13		8/22/13
Robert Ellis	Date	Jon Shedden	Date
Fort Worth Center OAPM		Fort Worth Center OAPM	
Facility Lead		NATCA Lead	

	8/22/13		8/22/13
James Harlan	Date	Ed Rivas	Date
Dallas-Fort Worth TRACON OAPM		Dallas-Fort Worth TRACON OAPM	
Facility Lead		NATCA Lead	

# North Texas OAPM Design Package

## DAL SIDs, RAMBL and CURLO DAL RNAV SIDs

Name of Change and Airport/s	Date
RAMBL and CURLO – DAL	22 August 2013
Change Classification	Current Phase of Design
Terminal Procedure SID	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
Solution 11	29 May 2014
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 46 and 96</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors AR1, AR2, AR3, FE1, FE2, FW1, FW2, DR1, DR2, DR3 and DS</li> </ul>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Airspace Design Packages</b> <ul style="list-style-type: none"> <li>DAL SIDs</li> </ul> <b>Procedure Design Package</b> <ul style="list-style-type: none"> <li>SIDs: SNSSET and KKITY</li> </ul>	NTEX OAPM 201309.tgs

### Purpose

The Study Team identified two issues with departures from DAL. The first issue is departures from DAL in north flow operations turning right south bound fly lower altitudes and additional mileage then departures turning left. The second is complexities resulting from interactions between Dallas Fort Worth International Airport “inside track” departures and DAL East departures in north flow sometimes result in limiting DFW departures to a single vectored heading versus dual RNAV headings.

### Study Team Recommendation

The Study Team proposed four recommendations to address the issue the Team identified. The first recommendation was to create a north flow left turn DAL RNAV SID for south bound traffic to address D10 airspace and DAL arrival traffic issues. The second was to create a north flow right turn DAL RNAV SID to provide a predictable path and to procedurally separate DAL east departures and DFW “inside track” departures. The third was to create a north flow DAL

# **North Texas OAPM Design Package**

## **DAL SIDs, RAMBL and CURLO DAL RNAV SIDs**

RNAV SID for west bound and north bound traffic to procedurally separate DFW and DAL traffic. The fourth was to create a single south flow DAL RNAV SID for all departing traffic.

The use of RNAV SIDs for DAL departures would provide more predictable management of traffic; incorporation of PBN concepts provides user benefits; reduces phraseology for controllers; and segregates DAL and DFW departure flows during their initial climb out within D10 airspace before safely merging these departure flows at the D10/ZFW airspace boundary. DAL departures would then benefit from the modified lateral tracks in the proposed RNAV SIDs within ZFW airspace, allowing more direct routing for Dallas-Fort Worth Metroplex departures.

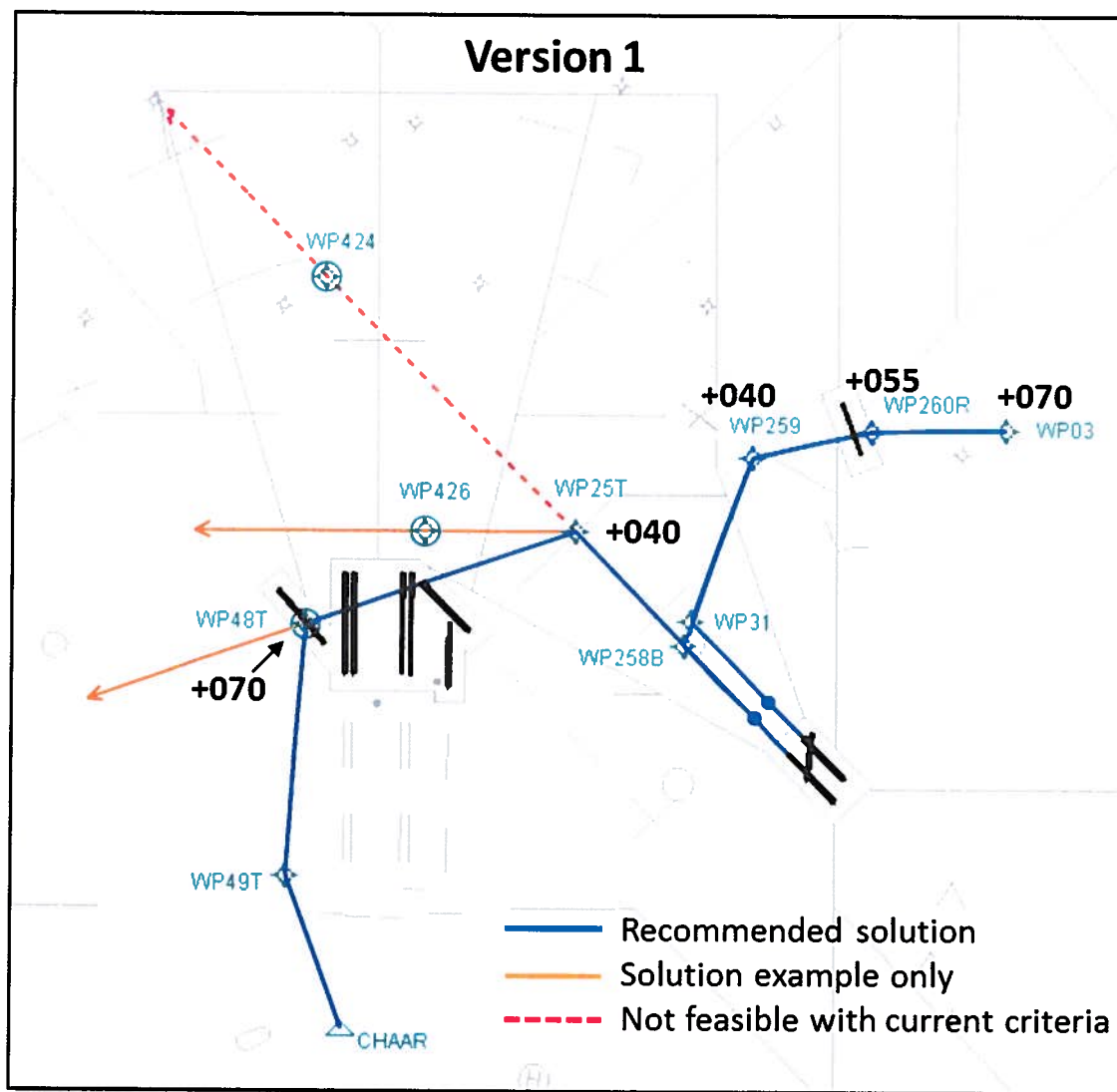
Figure 1 depicts version 1 of the recommended SID in a north flow.

Figure 2 depicts version 2 of the recommended SID in a north flow.

Figure 3 depicts the recommended SID in a south flow.

# North Texas OAPM Design Package

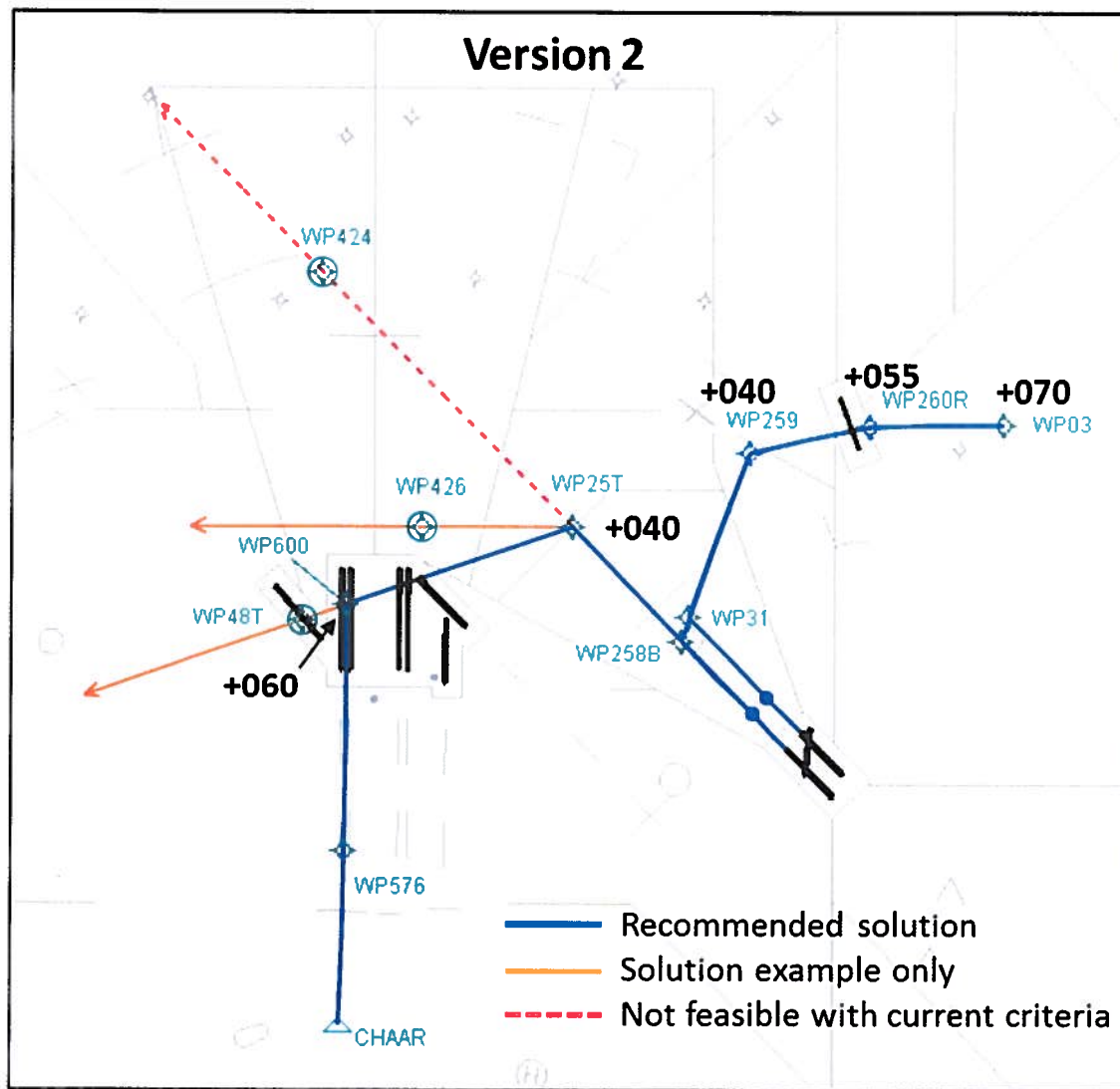
## DAL SIDs, RAMBL and CURLO DAL RNAV SIDs



**Figure 1. North Flow Version 1 Study Team Recommendation**

# North Texas OAPM Design Package

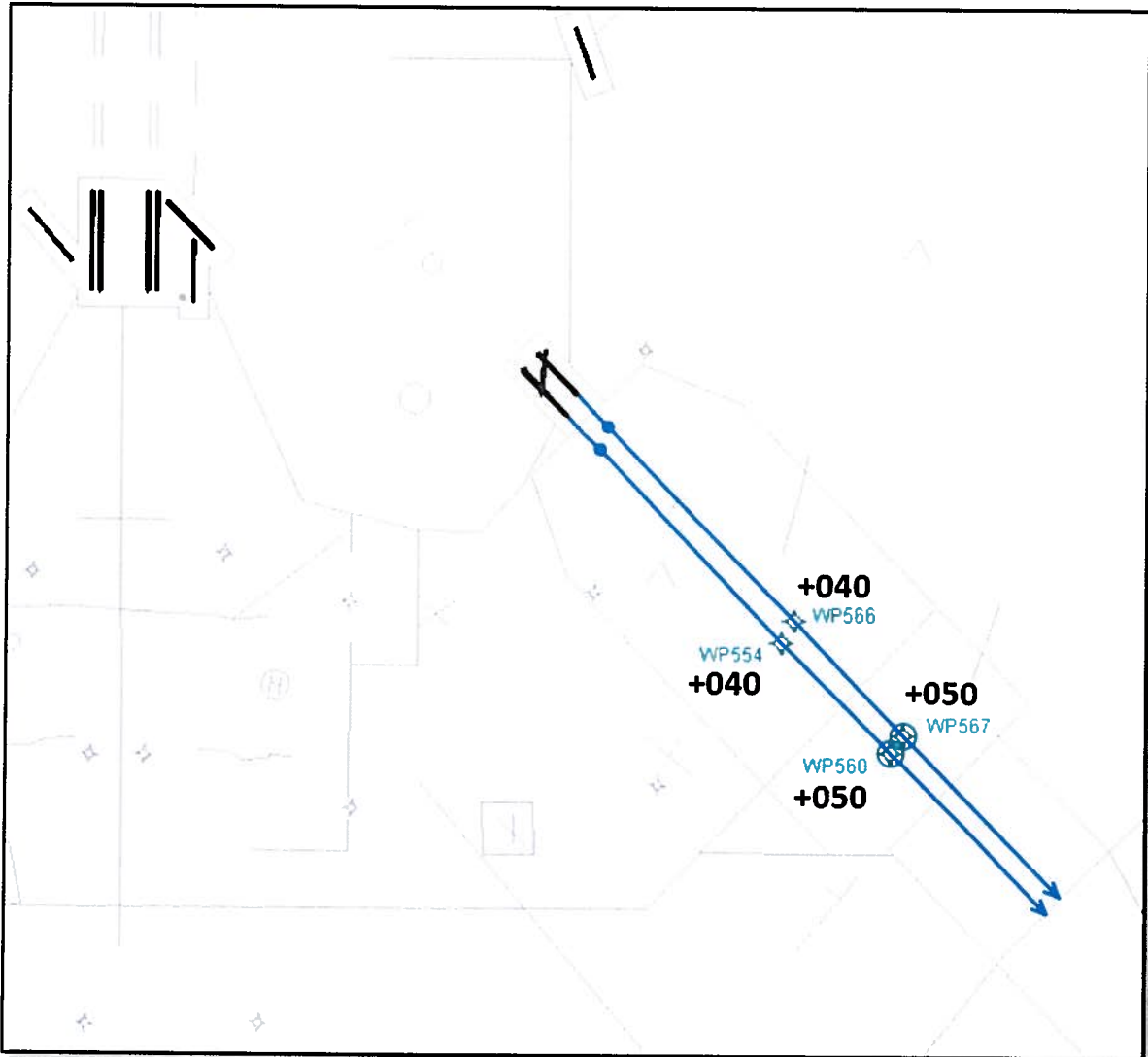
## DAL SIDs, RAMBL and CURLO DAL RNAV SIDs



**Figure 2. North Flow Version 2 Study Team Recommendation**

# North Texas OAPM Design Package

## DAL SIDs, RAMBL and CURLO DAL RNAV SIDs



**Figure 3. South Flow Study Team Recommendation**

### **Proposed Design**

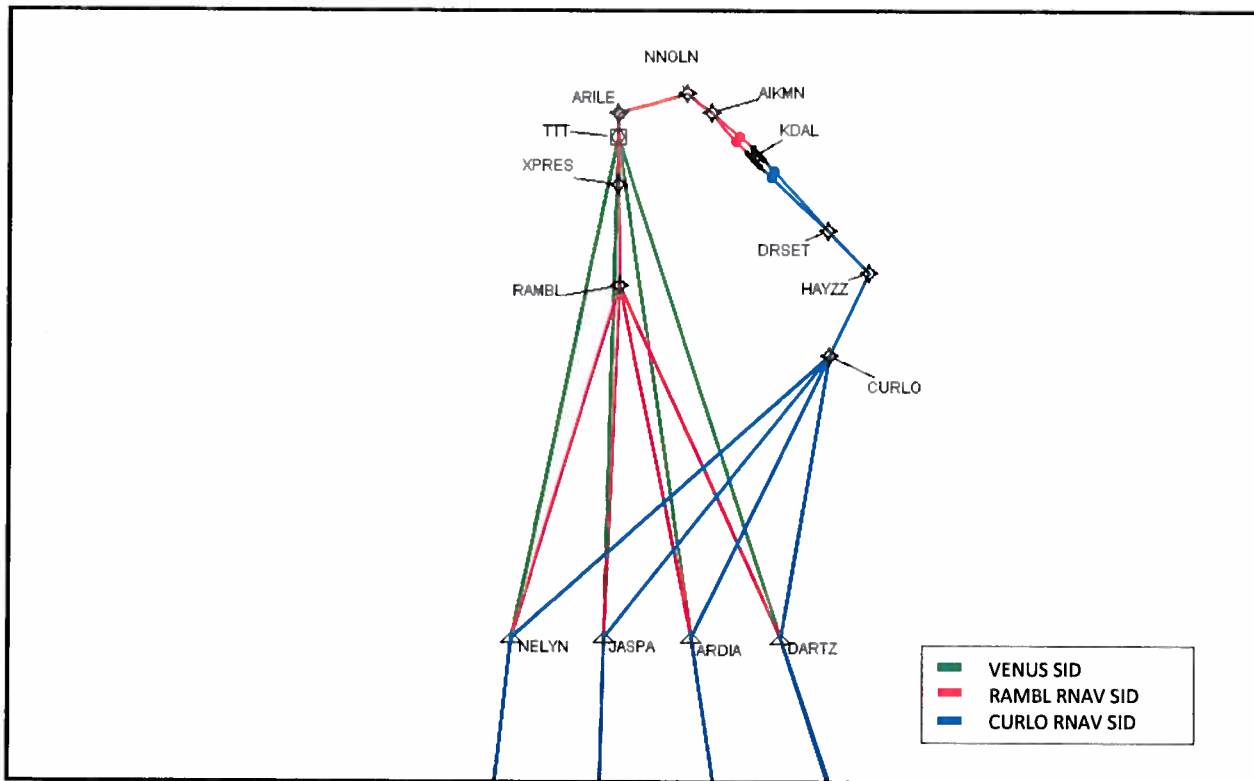
The North Texas OAPM Team is proposing the implementation two new RNAV SIDs, named RAMBL and CURLO for south bound DAL departures. The proposed designs incorporate single departure routes to turn the departures south bound to RAMBL waypoint in north flow and to CURLO waypoint in south flow then diverge to four departure routes. The Design Team tied these proposed procedures to the same boundary fixes the DFW SIDs use to increase flight path predictability and reduce controller and pilot task complexity.

The proposed south flow procedure is longer in distance than the today's current departure tracks to meet the minimum design criteria for segment lengths and climb gradients.

# North Texas OAPM Design Package

## DAL SIDs, RAMBL and CURLO DAL RNAV SIDs

Figure 4 depicts the proposed RAMBL and CURLO RNAV SIDs.



**Figure 4. Proposed RAMBL and CURLO RNAV SIDs and VENUS SID**

### **Additional Design Considerations**

Human-in-the-loop simulations validated these proposed designs.

Spectrum analysis will be required for the proposed airspace changes associated with the proposed CURLO and RAMBL RNAV SIDs.

These procedures will be used by all types of RNAV-equipped turbojet aircraft, are not anticipated to change runway usage, and are not anticipated to modify flight paths below 3,000 feet Above Ground Level.

A waiver will be required for all proposed RNAV SIDs for exceeding the maximum climb gradient.

### **Implementation Dependencies**

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed RAMBL and CURLO RNAV SIDs.



# **North Texas OAPM Design Package**

## **DAL SIDs, RAMBL and CURLO DAL RNAV SIDs**

These procedures are dependent on the following procedures:

- **RAMBL:** This procedure shares waypoints with the SNSET RNAV SID
- **CURLO:** This procedure shares waypoints with the KKITY RNAV SID

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letter of Agreement with D10 will require changes for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**

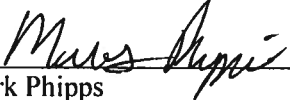
1. CURLO TARGETS Distribution Package
2. RAMBL TARGETS Distribution Package

# North Texas OAPM Design Package

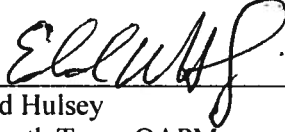
## DAL SIDs, RAMBL and CURLO DAL RNAV SIDs

### Review Signatures

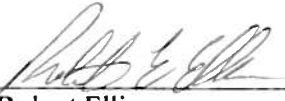
The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

  
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Mark Phipps  
North Texas OAPM  
FAA Lead

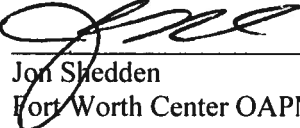
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Ed Hulsey  
North Texas OAPM  
NATCA Lead


8/22/13  
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Robert Ellis  
Fort Worth Center OAPM  
Facility Lead

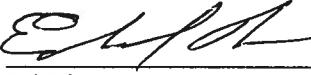
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Jon Shedden  
Fort Worth Center OAPM  
NATCA Lead

8/22/13  
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James Harlan  
Dallas-Fort Worth TRACON OAPM  
Facility Lead

8/22/13  
Date

  
\_\_\_\_\_  
Ed Rivas  
Dallas-Fort Worth TRACON OAPM  
NATCA Lead

8/22/13  
Date

# North Texas OAPM Design Package

## DAL SIDs, SNSET and KKITY DAL RNAV SIDs

Name of Change and Airport/s	Date
<b>SNSET and KKITY – DAL</b>	<b>22 August 2013</b>
Change Classification	Current Phase of Design
<b>Terminal Procedure SID</b>	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
<b>Solution 11</b>	<b>29 May 2014</b>
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 32, 39, 47, 61, 63, 93 and 94</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors AR1, AR2, AR3, FE1, FE2, FW1, FW2, DS, DR1, DR2 and DR3</li> </ul> <b>Albuquerque ARTCC (ZAB)</b>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Airspace Design Packages</b> <ul style="list-style-type: none"> <li>DAL SIDs</li> </ul> <b>Procedure Design Package</b> <ul style="list-style-type: none"> <li>SIDs: ALIAN, CURLO, DAMNS, HRPER, HUDAD, KATZZ, KKITY, RAMBL, SNSET, SWABR and WSTEX</li> </ul>	<b>NTEX OAPM 201309.tgs</b>

### Purpose

The Study Team identified two issues with departures from DAL. The first issue is departures from DAL in north flow operations turning right south bound fly lower altitudes and additional mileage then departures turning left. The second is complexities resulting from interactions between Dallas Fort Worth International Airport “inside track” departures and DAL East departures in north flow sometimes result in limiting DFW departures to a single vectored heading versus dual RNAV headings.

# **North Texas OAPM Design Package**

## **DAL SIDs, SNET and KKITY DAL RNAV SIDs**

### **Study Team Recommendation**

The Study Team proposed four recommendations to address the issue the Team identified. The first recommendation was to create a north flow left turn DAL RNAV SID for south bound traffic to address D10 airspace and DAL arrival traffic issues. The second was to create a north flow right turn DAL RNAV SID to provide a predictable path and to procedurally separate DAL east departures and DFW “inside track” departures. The third was to create a north flow DAL RNAV SID for west bound and north bound traffic to procedurally separate DFW and DAL traffic. The fourth was to create a single south flow DAL RNAV SID for all departing traffic.

The use of RNAV SIDs for DAL departures would provide more predictable management of traffic; incorporation of PBN concepts provides user benefits; reduces phraseology for controllers; and segregates DAL and DFW departure flows during their initial climb out within D10 airspace before safely merging these departure flows at the D10/ZFW airspace boundary. DAL departures would then benefit from the modified lateral tracks in the proposed RNAV SIDs within ZFW airspace, allowing more direct routing for Dallas-Fort Worth Metroplex departures.

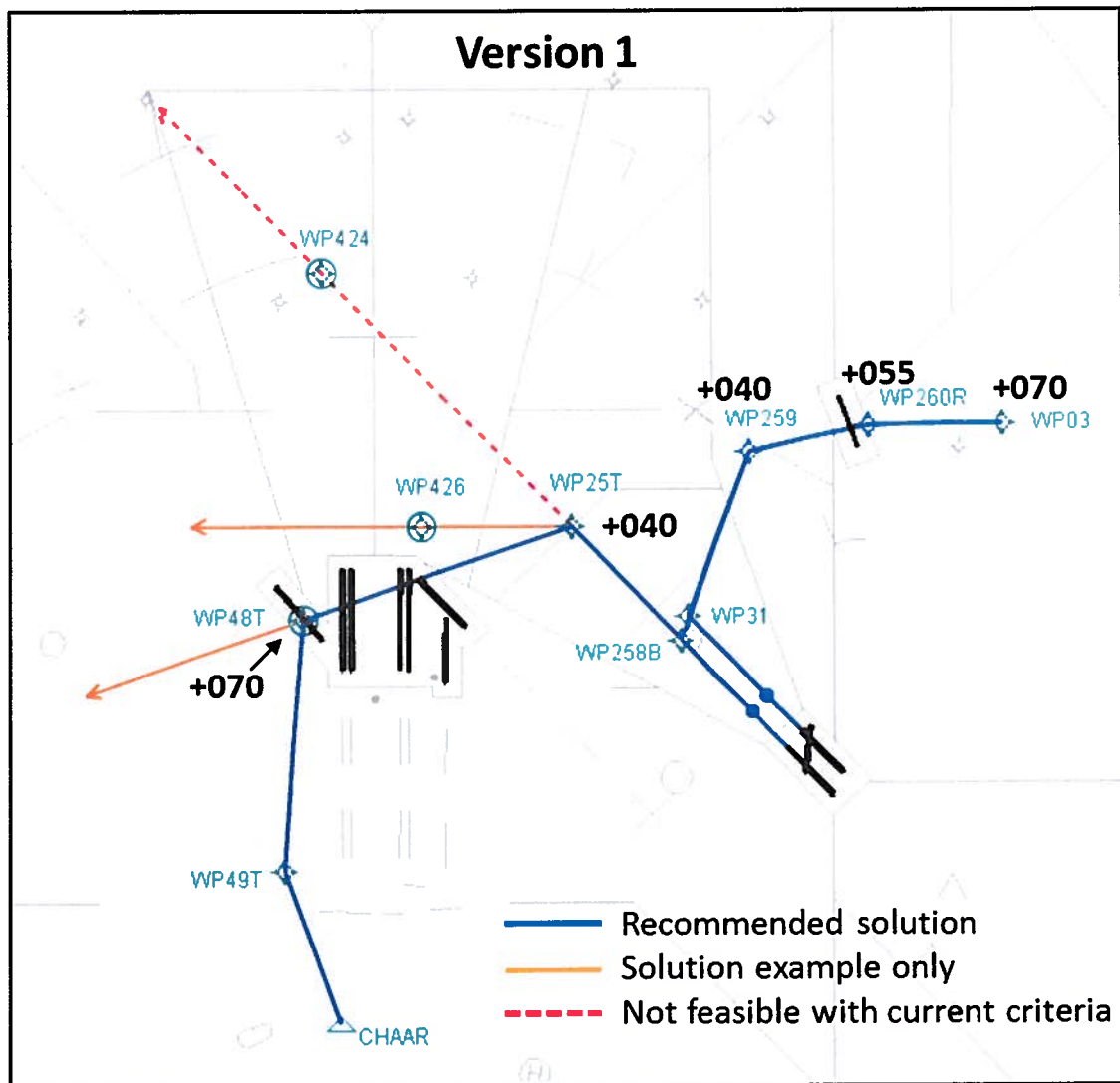
Figure 1 depicts version 1 of the recommended SID in a north flow.

Figure 2 depicts version 2 of the recommended SID in a north flow.

Figure 3 depicts the recommended SID in a south flow.

# North Texas OAPM Design Package

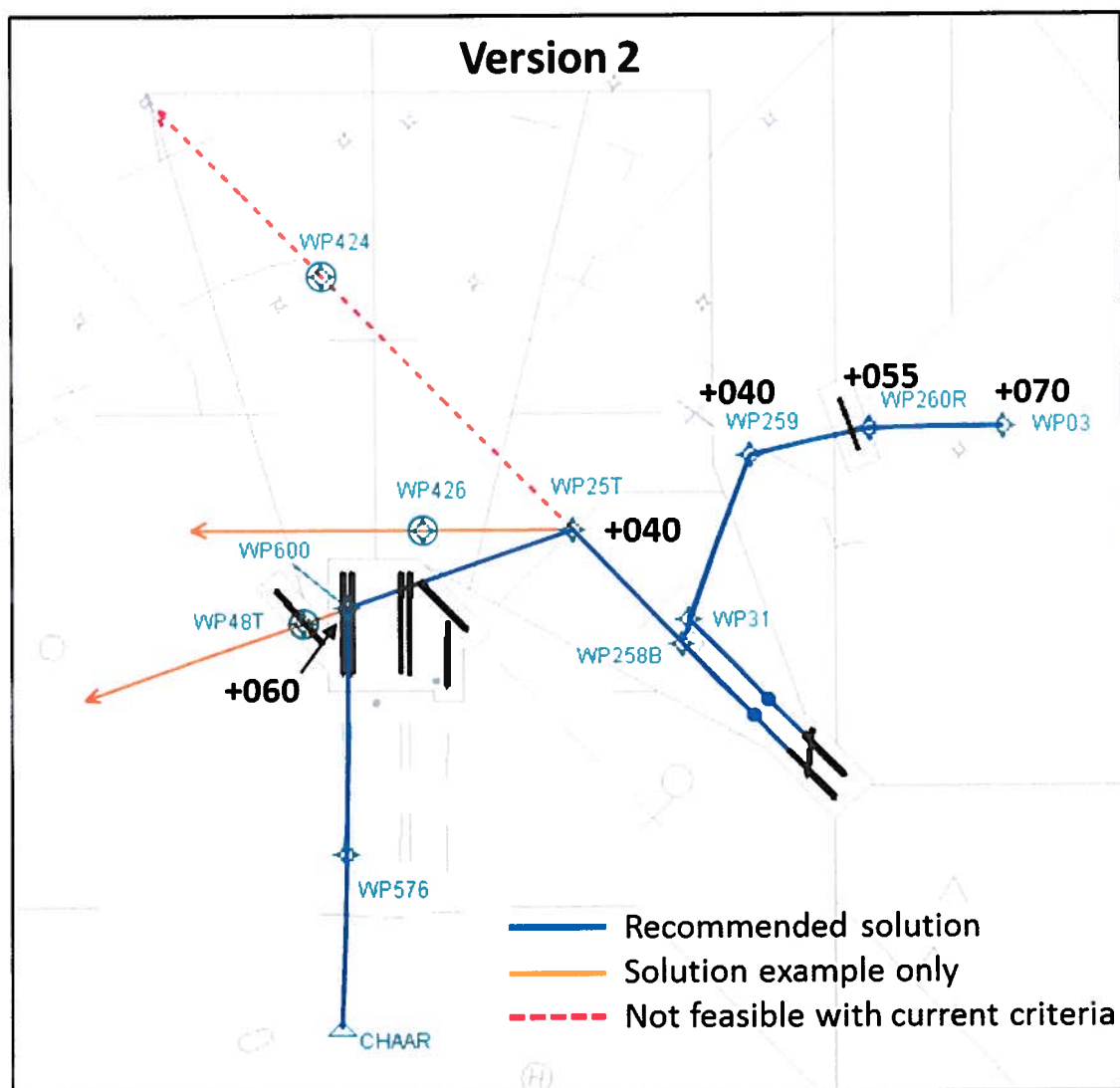
## DAL SIDs, SNET and KKITY DAL RNAV SIDs



**Figure 1. North Flow Version 1 Study Team Recommendation**

# North Texas OAPM Design Package

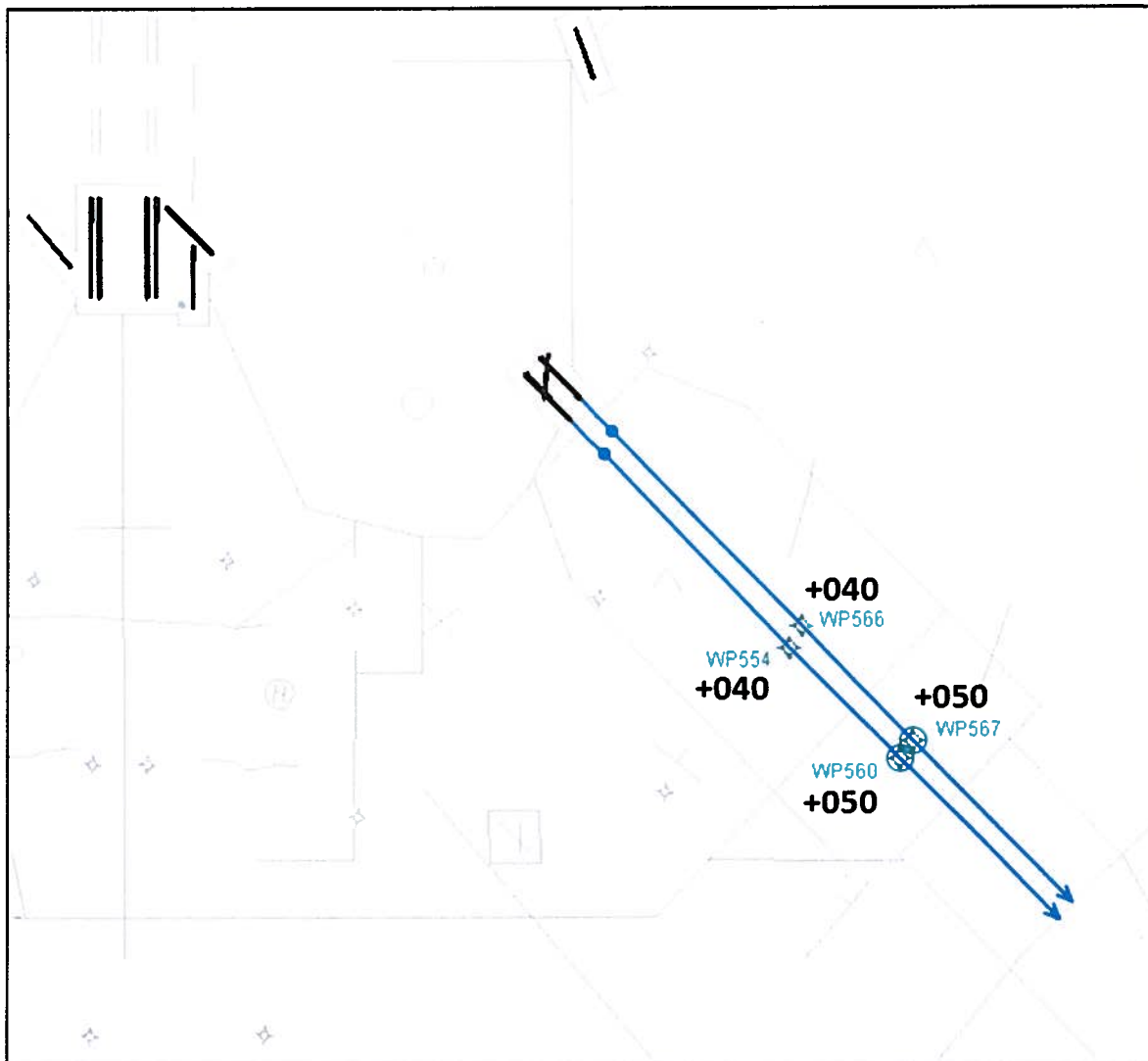
## DAL SIDs, SNSET and KKITY DAL RNAV SIDs



**Figure 2. North Flow Version 2 Study Team Recommendation**

# North Texas OAPM Design Package

## DAL SIDs, SNSET and KKITY DAL RNAV SIDs



**Figure 3. South Flow Study Team Recommendation**

### **Proposed Design**

The North Texas OAPM Team is proposing the implementation of two new RNAV SIDs, named SNSET and KKITY for west bound DAL departures. The proposed designs incorporate single departure routes to turn the departures south bound to SNSET waypoint in north flow and to KKITY waypoint in south flow then diverge to four departure routes. The Design Team tied these proposed procedures to the same boundary fixes the proposed DFW SIDs will use to increase flight path predictability and reduce controller and pilot task complexity.

West bound turbojet aircraft departing from the eastern Satellite airports may be stacked above the DFW/DAL west bound departures and west bound turbojet aircraft departing from the

# North Texas OAPM Design Package

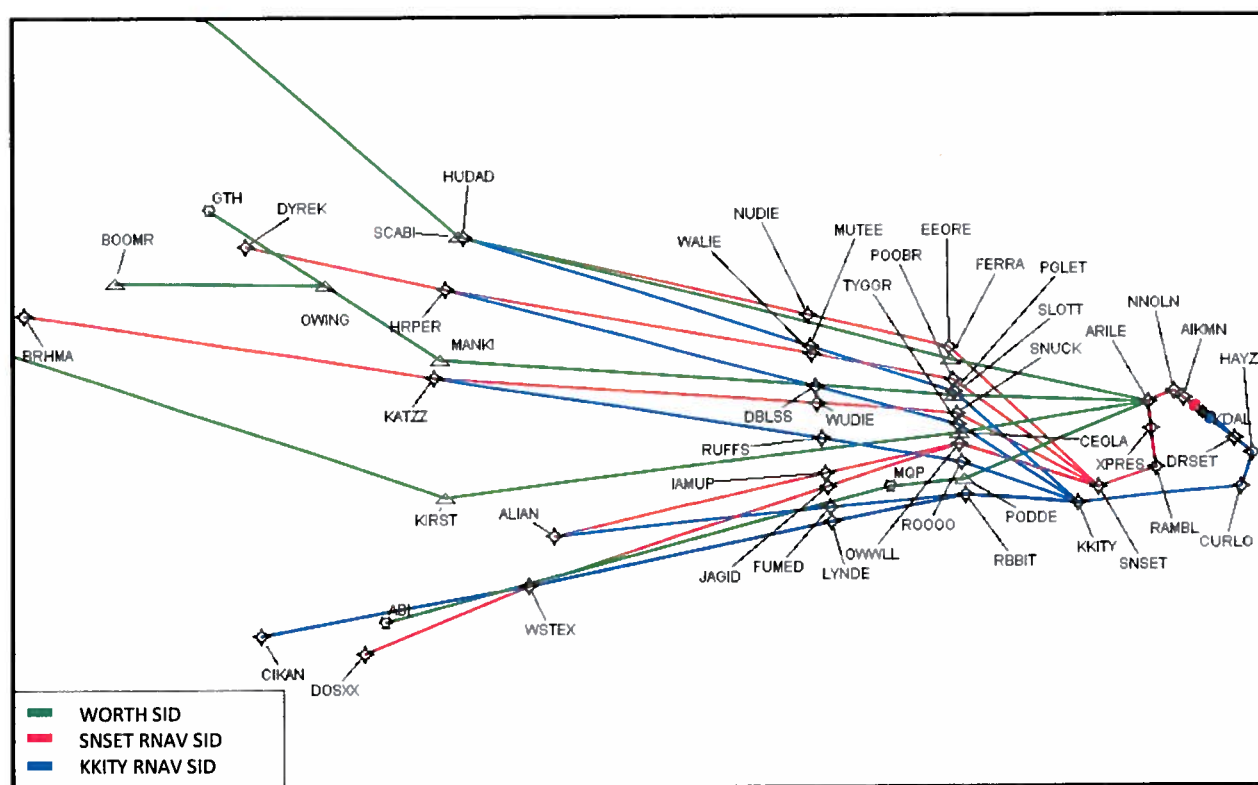
## DAL SIDs, SNET and KKITY DAL RNAV SIDs

western Satellite airports may be stacked below the DFW/DAL departures. ZFW will have control for turns and climb.

The ALIAN transition will be an ATC assigned only. The transition will only be available when both the Lancer Military Operations Area and Air Traffic Control Assigned Airspace and the White Sands Missile Range Airspace Complex are inactive.

The proposed procedures are longer in distance than the today's current departure tracks to meet the minimum design criteria for segment lengths and climb gradients.

Figure 4 depicts the proposed SNET and KKITY RNAV SIDs.



**Figure 4. Proposed KKITY and SNET RNAV SIDs and WORTH SID**

### Additional Design Considerations

Human-in-the-loop simulations validated these proposed designs.

Spectrum analysis will be required for the proposed airspace changes associated with the proposed SNET and KKITY RNAV SIDs.



# **North Texas OAPM Design Package**

## **DAL SIDs, SNET and KKITY DAL RNAV SIDs**

These procedures will be used by all types of RNAV-equipped turbojet aircraft, are not anticipated to change runway usage, and are not anticipated to modify flight paths below 3,000 feet Above Ground Level.

A waiver will be required for all proposed RNAV SIDs for exceeding the maximum climb gradient and degree divergence criteria.

### **Implementation Dependencies**

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed SNET and KKITY RNAV SIDs.

These procedures are dependent on the following procedures:

- **SNET:** This procedure shares waypoints with the ALIAN, DAMNS, HRP, KATZ, KKITY, HUDAD, RAMBL, SWABR and WSTEX RNAV SIDs.
- **KKITY:** This procedure shares waypoints with the ALIAN, CURLO, DAMNS, HRP, HUDAD, KATZ, SNET, SWABR and WSTEX RNAV SIDs.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letter of Agreement with D10 will require changes for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**


1. KKITY TARGETS Distribution Package
2. SNET TARGETS Distribution Package

# North Texas OAPM Design Package

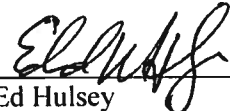
## DAL SIDs, SNSET and KKITY DAL RNAV SIDs

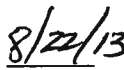
### Review Signatures


The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

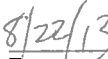
  
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Mark Phipps  
North Texas OAPM  
FAA Lead

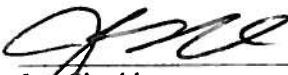
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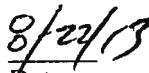
  
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Ed Hulsey  
North Texas OAPM  
NATCA Lead


  
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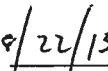
  
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Robert Ellis  
Fort Worth Center OAPM  
Facility Lead

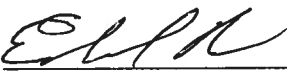
  
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NATCA Lead

  
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James Harlan  
Dallas-Fort Worth TRACON OAPM  
Facility Lead

  
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Date

  
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Ed Rivas  
Dallas-Fort Worth TRACON OAPM  
NATCA Lead

  
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8/28/13  
Date

# North Texas OAPM Design Package

## Satellite SIDs, DAMNS and SWABR SAT RNAV SIDs

Name of Change and Airport/s	Date
DAMNS and SWABR-Satellite Airports	22 August 2013
Change Classification	Current Phase of Design
Terminal Procedure SID	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
Solution 11	29 May 2014
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 32, 39, 40, 47, 61, 63, 64 and 94</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors DR3, MN, MS and MW</li> </ul> <b>Albuquerque ARTCC (ZAB)</b>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<ul style="list-style-type: none"> <li>SIDs: ALIAN, DAMNS, HRPER, HUDAD, KATZZ, KKITY, SNSET, SWABR and WSTEX</li> </ul>	NTEX OAPM 201309.tgs

### Purpose

The Study Team identified an issue with D10 turbojet traffic departing over the same exit point being placed in-trail regardless of departure airport leading to delay vectoring, miles in trail restrictions, hold for releases, and/or suspension of dual RNAV departure tracks at DFW.

### Study Team Recommendation

The Study Team recommended the Design Team evaluate the trade-offs between stacking, in trail delivery and separation of departure fixes for departures from within the metroplex.

### Proposed Design

The North Texas OAPM Team is proposing the implementation of DAMNS and SWABR RNAV SIDs for west bound departures from the following Satellite airports:

# North Texas OAPM Design Package

## Satellite SIDs, DAMNS and SWABR SAT RNAV SIDs

Airport Name	Airport ID
Addison Airport	ADS
Arlington Municipal Airport	GKY
Bourland Field Airport	50F
Cleburne Municipal Airport	CPT
Collin County Regional Airport at McKinney	TKI
Dallas Executive Airport	RBD
Decatur Municipal Airport	LUD
Denton Municipal Airport	DTO
Ennis Municipal Airport	F41
Fort Worth Alliance Airport	AFW
Fort Worth Meacham International Airport	FTW
Fort Worth Naval Air Station Joint Reserve Base/Carswell Field	NFW
Fort Worth Spinks Airport	FWS
Grand Prairie Municipal Airport	GPM
Kenneth Copeland Airport	4T2
Lancaster Regional Airport	LNC
Mesquite Metro Airport	HQZ
Mid-way Regional Airport	JWY
Rockwall Municipal Airport	F46
Parker County Airport	WEA

**Table 1. Satellite Airports**

The Design Team created a radar vector RNAV SID for all D10 Satellite airports which merge with the DFW western SIDs at the four associated boundary fixes. According to the rules governing RNAV SIDs, a radar vector RNAV SID must have an initial common fix, DECCK or BOWTT waypoints, followed by a common route to a transition fix, from which the four transition legs branch. Aircraft that are assigned this SID must be within a ninety degree “cone” east of the initial common fix before being allowed to proceed direct to DECCK. If they don’t depart from an airport that lies within the cone they must be vectored into it. West bound turbojet aircraft departing from the eastern Satellite airports may be stacked above the DFW/DAL west bound departures, and west bound turbojet aircraft departing from the western Satellite airports may be stacked below the DFW/DAL departures. ZFW will have control for turns and climb.

Although the routing indicates a mileage increase over today’s conventional departures, the actual mileage flown is anticipated to be less for all four transitions based on historical track data for turns to the boundary fixes.

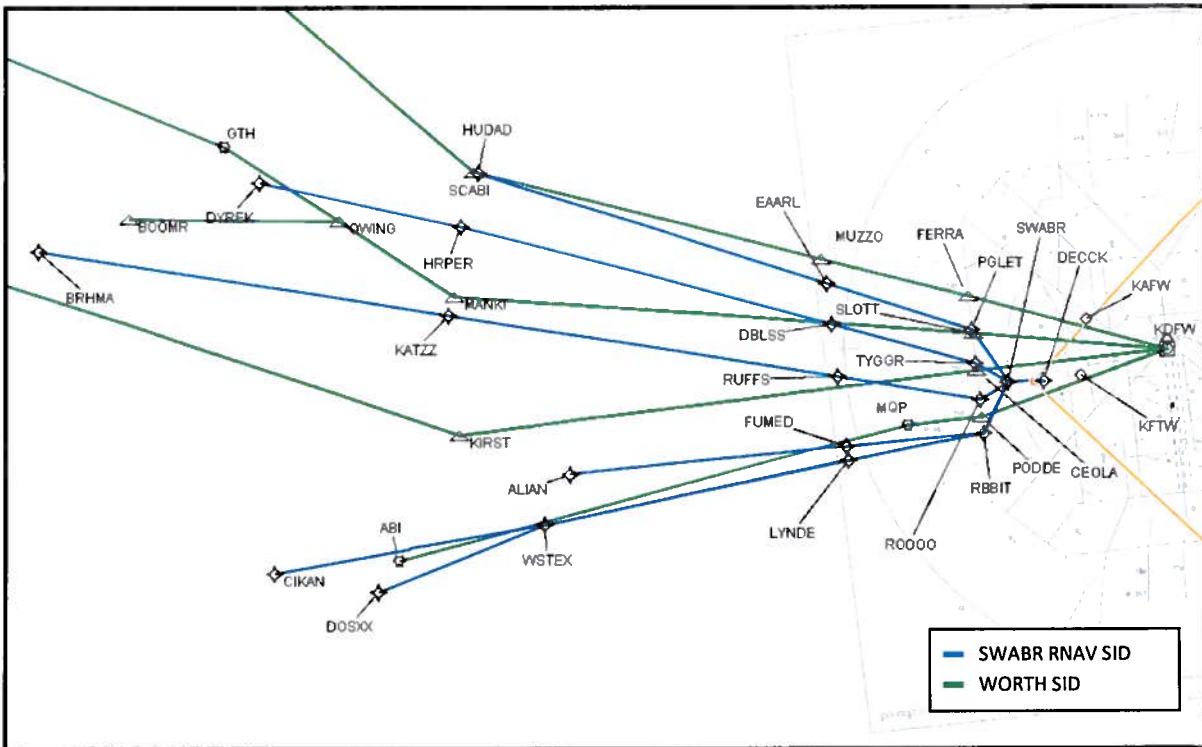
The ALIAN transition will be an ATC assigned only. The transition will only be available when both the Lancer Military Operations Area and Air Traffic Control Assigned Airspace and the White Sands Missile Range Airspace Complex are inactive.

# North Texas OAPM Design Package

## Satellite SIDs, DAMNS and SWABR SAT RNAV SIDs

Figure 1 depicts the proposed SWABR RNAV SID.

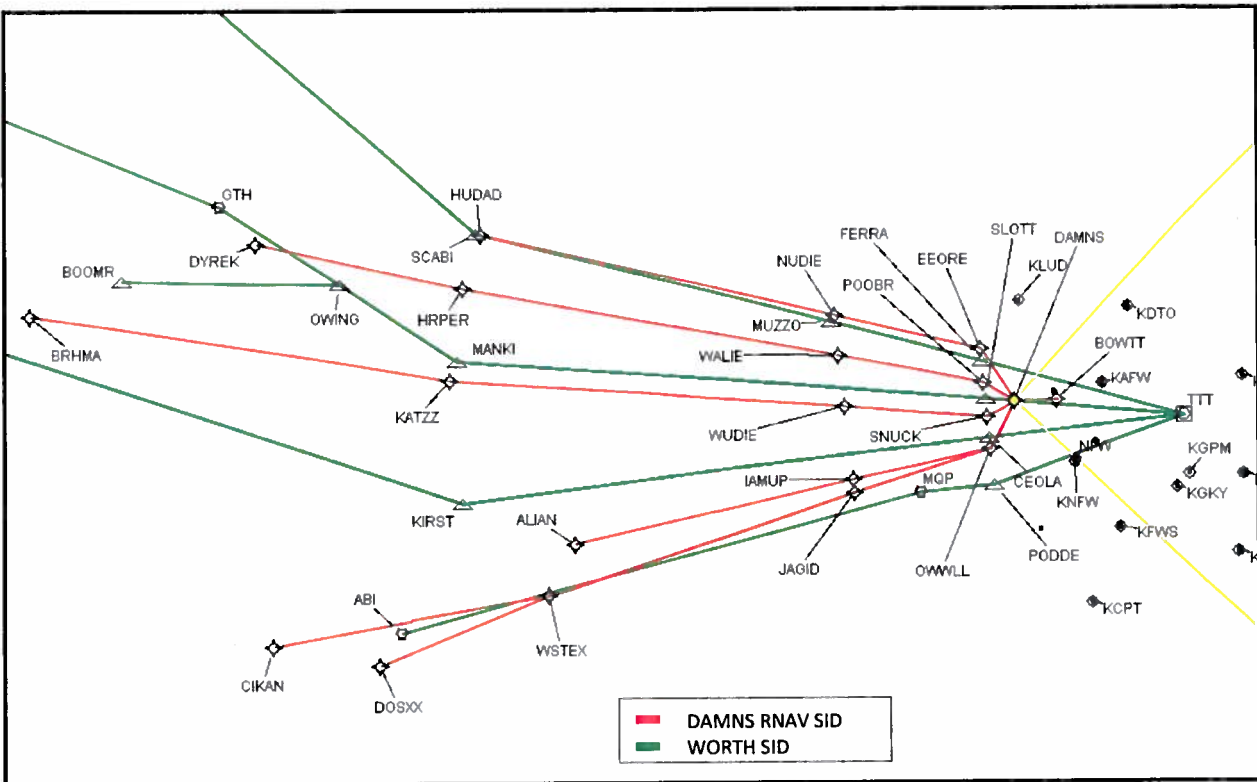
Figure 2 depicts the proposed DAMNS RNAV SID.



**Figure 1. Proposed SWABR RNAV SID and WORTH SID**

# North Texas OAPM Design Package

## Satellite SIDs, DAMNS and SWABR SAT RNAV SIDs



**Figure 2. Proposed DAMNS RNAV SID and WORTH SID**

### Additional Design Considerations

Human-in-the-loop simulations validated these proposed designs.

No airspace changes are associated with the DAMNS and SWABR RNAV SIDs.

These procedures will be used by all types of RNAV-equipped turbojet aircraft, are not anticipated to change runway usage, and are not anticipated to modify flight paths below 3,000 feet Above Ground Level.

### Implementation Dependencies

These procedures are dependent on the following procedures:

- **DAMNS:** This procedure shares waypoints with the ALIAN, HAILY, HRPER, HUDAD, KATZZ, SNET, SWABR and WSTEX RNAV SIDs.
- **SWABR:** This procedure shares waypoints with the ALIAN, DAMNS, HRPER, HUDAD, KATZZ, KKITY, SNET and WSTEX RNAV SIDs.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letter of Agreement with D10 will require changes for handoff, automation and coordination procedures.

# **North Texas OAPM Design Package**

## **Satellite SIDs, DAMNS and SWABR SAT RNAV SIDs**

No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**

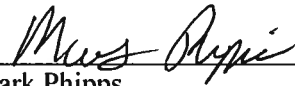
1. DAMNS TARGETS Distribution Package
2. SWABR TARGETS Distribution Package

# North Texas OAPM Design Package

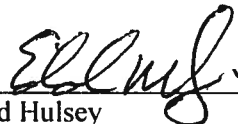
## Satellite SIDs, DAMNS and SWABR SAT RNAV SIDs

### Review Signatures


The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

  
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Mark Phipps  
North Texas OAPM  
FAA Lead

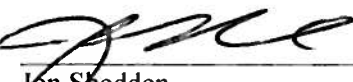
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North Texas OAPM  
NATCA Lead

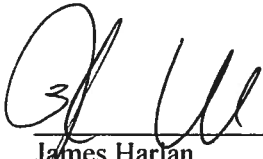
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Dallas-Fort Worth TRACON OAPM  
Facility Lead

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Ed Rivas  
Dallas-Fort Worth TRACON OAPM  
NATCA Lead

8/22/13  
Date



# North Texas OAPM Design Package

## Satellite SIDs, KUSSO and LEEAG SAT RNAV SIDs

Name of Change and Airport/s	Date
LEEAG and KUSSO-Satellite Airports	22 August 2013
Change Classification	Current Phase of Design
Terminal Procedure SID	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
Solution 11	29 May 2014
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 27, 28, 30, 52, 71, 83 and 90</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors DE, DN, DR1 and DS</li> </ul> <b>Memphis ARTCC (ZME)</b>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<ul style="list-style-type: none"> <li>SIDs: EMMTT, FORCK, KUSSO, LEEAG, LNDRE, MRSSH, SKTER and TRYTN</li> </ul>	NTEX OAPM 201309.tgs

### Purpose

The Study Team identified an issue with D10 turbojet traffic departing over the same exit point being placed in-trail regardless of departure airport leading to delay vectoring, miles in trail restrictions, hold for releases, and/or suspension of dual RNAV departure tracks at DFW.

### Study Team Recommendation

The Study Team recommended the Design Team evaluate the trade-offs between stacking, in trail delivery and separation of departure fixes for departures from within the metroplex.

### Proposed Design

The North Texas OAPM Team is proposing the implementation of the KUSSO and LEEAG RNAV SIDs for east bound departures from the following Satellite airports:

# North Texas OAPM Design Package

## Satellite SIDs, KUSSO and LEEAG SAT RNAV SIDs

Airport Name	Airport ID
Addison Airport	ADS
Arlington Municipal Airport	GKY
Bourland Field Airport	50F
Cleburne Municipal Airport	CPT
Collin County Regional Airport at McKinney	TKI
Dallas Executive Airport	RBD
Decatur Municipal Airport	LUD
Denton Municipal Airport	DTO
Ennis Municipal Airport	F41
Fort Worth Alliance Airport	AFW
Fort Worth Meacham International Airport	FTW
Fort Worth Naval Air Station Joint Reserve Base/Carswell Field	NFW
Fort Worth Spinks Airport	FWS
Grand Prairie Municipal Airport	GPM
Kenneth Copeland Airport	4T2
Lancaster Regional Airport	LNC
Mesquite Metro Airport	HQZ
Mid-way Regional Airport	JWY
Rockwall Municipal Airport	F46
Parker County Airport	WEA

**Table 1. Satellite Airports**

The Design Team created a radar vector RNAV SID for all D10 Satellite airports in a north and south flow. According to the rules governing RNAV SIDs, a radar vector RNAV SID must have an initial common fix, LEGIN and JSTIS waypoints, followed by a common route to a transition fix, from which the four transition legs branch. Aircraft that are assigned this SID must be within a ninety degree “cone” west of the initial common fix before being allowed to proceed direct to it. If they don’t depart from an airport that lies within the cone they must be vectored into it. East bound turbojet aircraft departing from the western Satellite airports may be stacked above the DFW/DAL east bound departures, and east bound turbojet aircraft departing from the eastern Satellite airports may be stacked below the DFW/DAL departures. ZFW will have control for turns and climb.

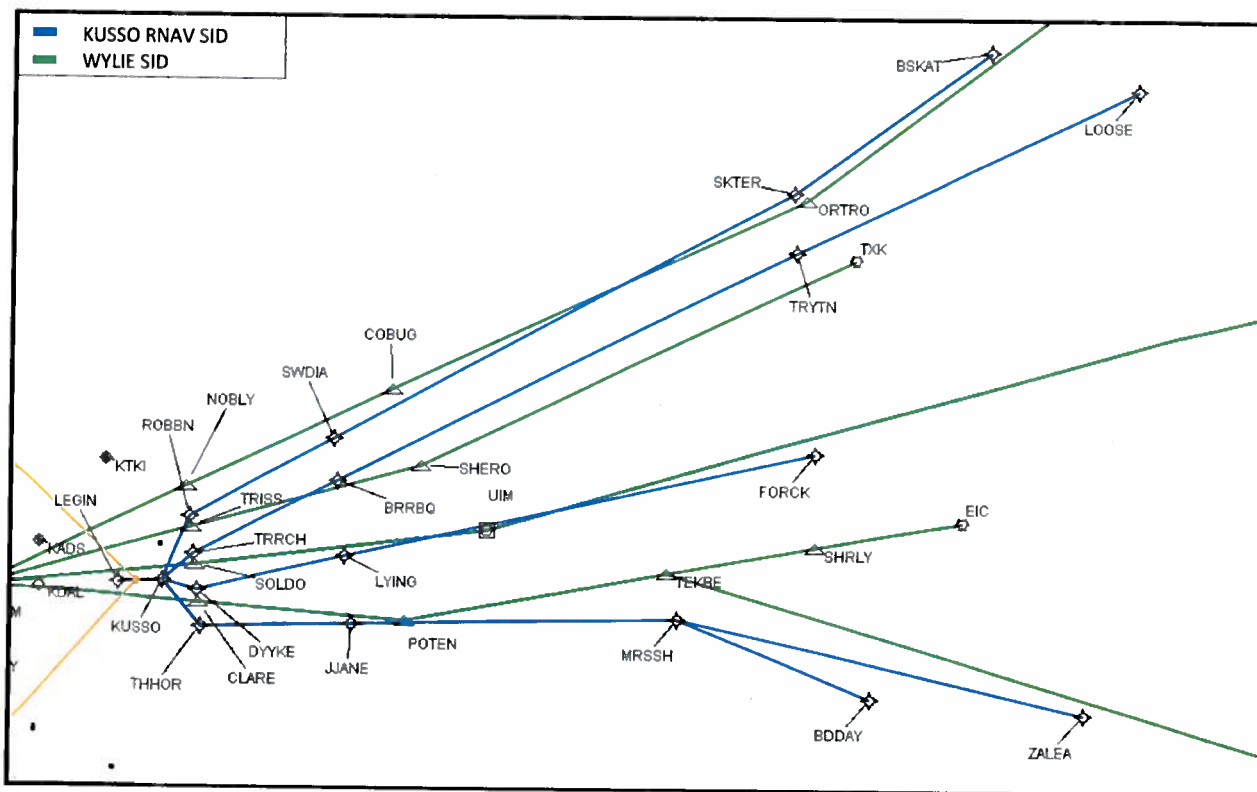
Although the routing indicates a mileage increase over today’s conventional departures, the actual mileage flown is anticipated to be less for all four transitions based on historical track data for turns to the boundary fixes.

Figure 1 depicts the proposed KUSSO RNAV SID.

Figure 2 depicts the proposed LEEAG RNAV SID.

# North Texas OAPM Design Package

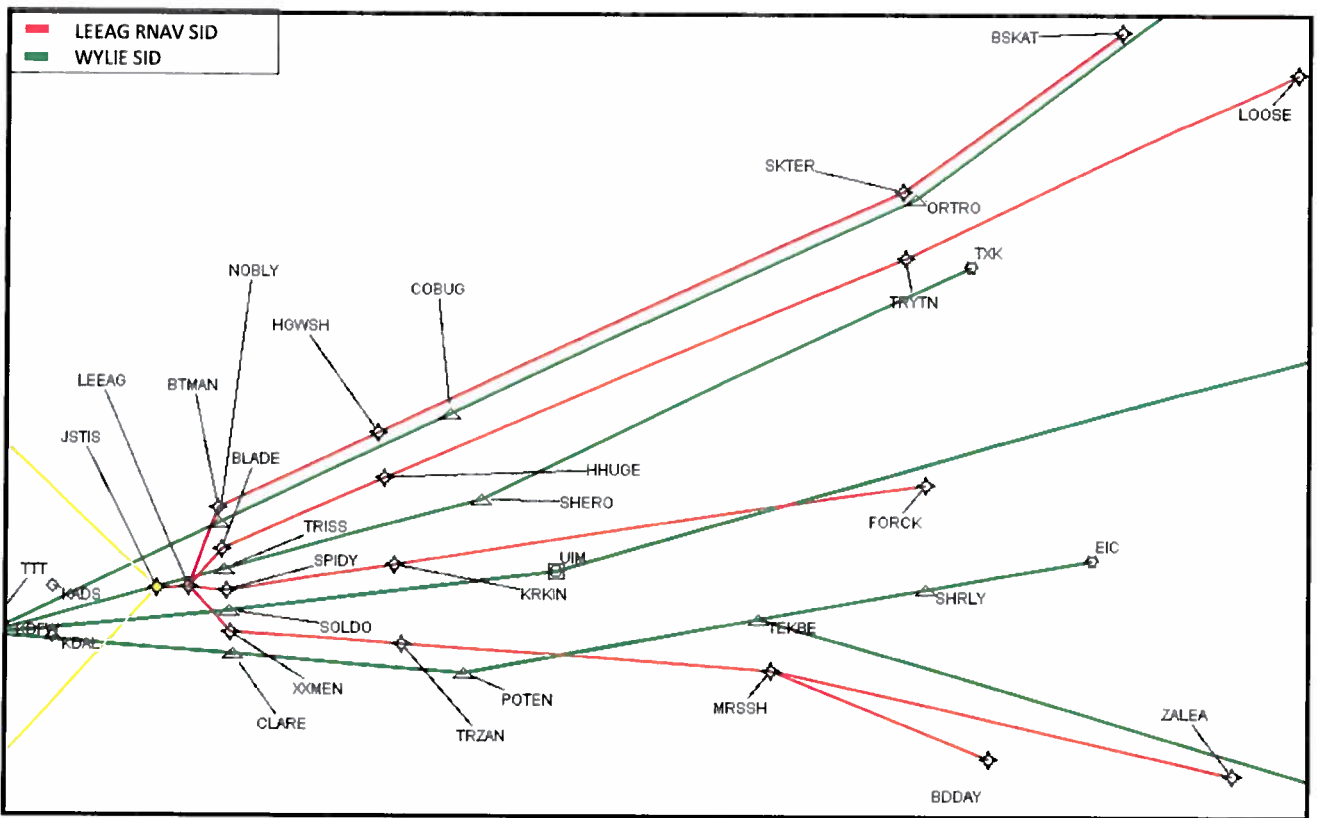
## Satellite SIDs, KUSSO and LEEAG SAT RNAV SIDs



**Figure 1. Proposed KUSSO RNAV SID and WYLIE SID**

# North Texas OAPM Design Package

## Satellite SIDs, KUSSO and LEEAG SAT RNAV SIDs



**Figure 2. Proposed LEEAG RNAV SID and WYLIE SID**

### **Additional Design Considerations**

Human-in-the-loop simulations validated these proposed designs.

No airspace changes are associated with the KUSSO and LEEAG RNAV SIDs.

These procedures will be used by all types of RNAV-equipped turbojet aircraft, are not anticipated to change runway usage, and are not anticipated to modify flight paths below 3,000 feet Above Ground Level.

### **Implementation Dependencies**

These procedures are dependent on the following procedures:

- **LEEAG:** This procedure shares waypoints with the KUSSO, EMMTT, FORCK, LNDRE, MRSSH, SKTER and TRYTN RNAV SIDs
- **DOOOM:** This procedure shares waypoints with the EMMTT, FORCK, LEEAG, LNDRE, MRSSH, SKTER and TRYTN RNAV SIDs

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letter of Agreement with D10 will require changes for handoff, automation and coordination procedures.

# **North Texas OAPM Design Package**

## **Satellite SIDs, KUSSO and LEEAG SAT RNAV SIDs**

No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**

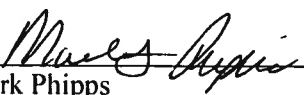
1. KUSSO TARGETS Distribution Package
2. LEEAG TARGETS Distribution Package

# North Texas OAPM Design Package

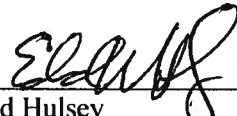
## Satellite SIDs, KUSSO and LEEAG SAT RNAV SIDs

### Review Signatures

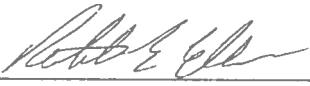
The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

  
\_\_\_\_\_  
Mark Phipps  
North Texas OAPM  
FAA Lead


8/22/13  
Date

  
\_\_\_\_\_  
Ed Hulse  
North Texas OAPM  
NATCA Lead


8/22/13  
Date

  
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Robert Ellis  
Fort Worth Center OAPM  
Facility Lead

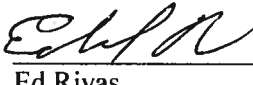
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Date

  
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Jon Shedden  
Fort Worth Center OAPM  
NATCA Lead

8/22/13  
Date

  
\_\_\_\_\_  
James Harlan  
Dallas-Fort Worth TRACON OAPM  
Facility Lead

8/22/13  
Date

  
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Ed Rivas  
Dallas-Fort Worth TRACON OAPM  
NATCA Lead

8/22/13  
Date

# North Texas OAPM Design Package

## DFW STARs, BOOVE and SOCKK DFW RNAV STARs

Name of Change and Airport/s	Date
<b>BOOVE and SOCKK - DFW</b>	<b>01 xxxx 2013</b>
Change Classification	Current Phase of Design
<b>Terminal Procedure STAR</b>	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> <b>Final Design (FD)</b>
OAPM Study Team Reference(s)	Publication Date
<b>Solution 3</b>	<b>24 July 2014</b>
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 61, 62, 63 and 65</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors FW1, FW2, DR3, AR1, AR2 and AR3</li> </ul> <b>ARTCCs</b> <ul style="list-style-type: none"> <li>Albuquerque (ZAB) and Houston (ZHU)</li> </ul> <b>TRACONs</b> <ul style="list-style-type: none"> <li>Abilene (ABI), Midland (MAF), San Angelo (SJT) and Waco (ACT)</li> </ul> <b>Gray (GRK) RAPCON</b>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul> <b>ZHU</b> <ul style="list-style-type: none"> <li>Mike McGhee</li> <li>David Salapata</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Airspace Design Packages</b> <ul style="list-style-type: none"> <li>Southwest Corner Post</li> </ul> <b>Procedure Design Packages</b> <ul style="list-style-type: none"> <li>STARs: BACHR, BOOVE, GLEN ROSE, KNEAD, LIKES, NRTAY, PAWLZ, SOCKK, WAVY and TILLA</li> <li>SIDs: ALIAN, HRPER, HUDAD, KATZZ and WSTEX</li> </ul>	<b>Master TARGETS File (file extension name)</b>

# North Texas OAPM Design Package

## DFW STARs, BOOVE and SOCKK DFW RNAV STARs

### Purpose

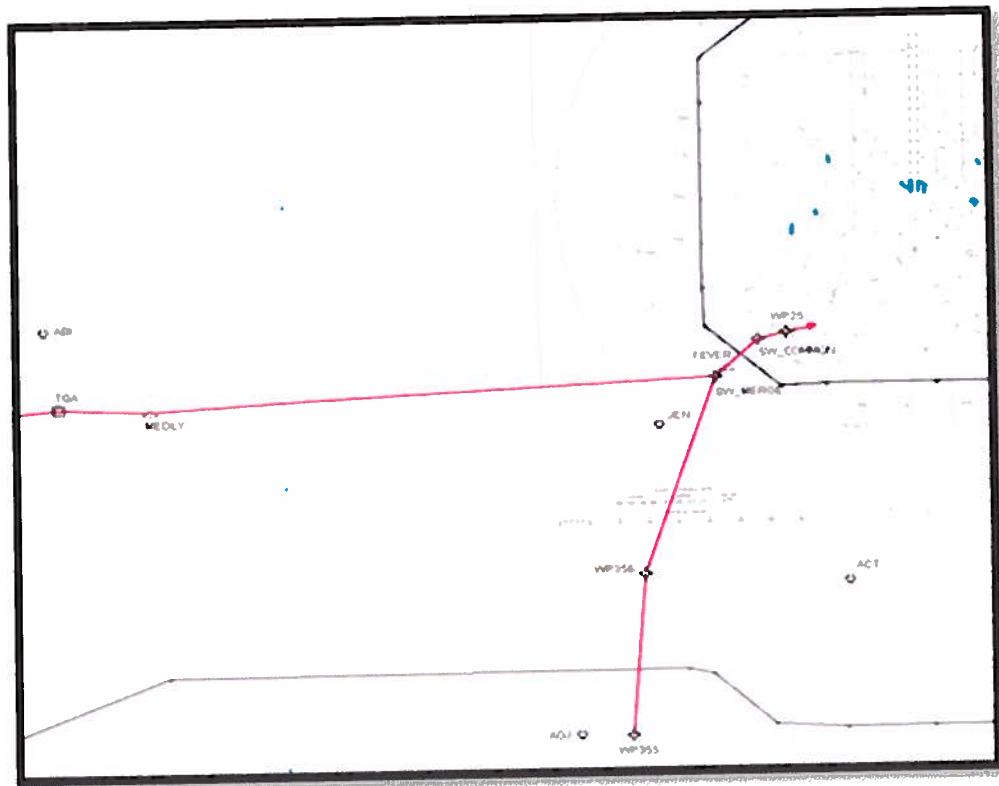
The North Texas Study Team identified three issues related to the descent profiles of DFW arrivals; high-side arrivals fly a downwind segment with a level-off at 11,000 feet for approximately five minutes at each corner post; this arrival profile creates inefficient departure profiles for DFW turbojet departures headed east and west on the departure track furthest from the airport; and arriving aircraft experience level-offs in ZFW airspace at Flight Level (FL) 240.

### Study Team Recommendation

The Study Team recommended the creation of RNAV STARs with Optimal Profile Descents (OPD) for all primary DFW arrival flows at each corner post. In addition, the Study Team proposed individual solutions for each corner post arrival flow. For the Southwest Corner Post an RNAV STAR was created similar to the JEN STAR with more direct routing to the D10 boundary, similar to shortcuts that are often given today. This design would reduce miles flown, fuel burn and CO2 emissions.

Figure 1 depicts the recommended RNAV STAR, north flow.

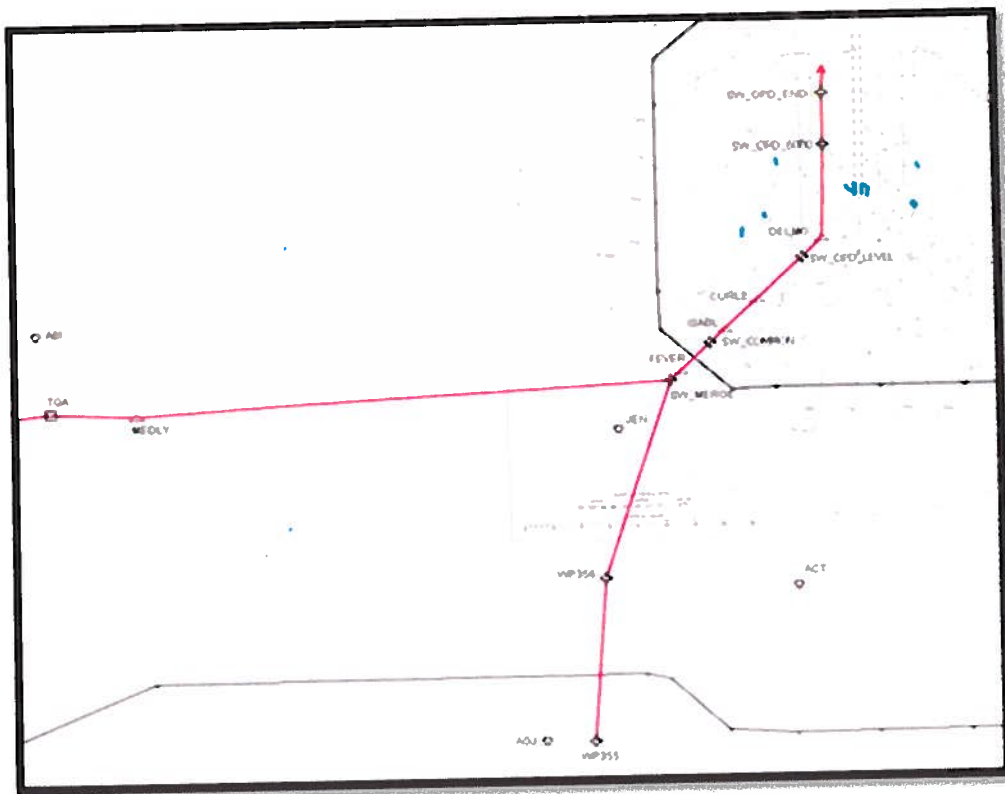
Figure 2 depicts the recommended RNAV STAR, south flow.



**Figure 1. Study Team Recommendation, North Flow**



## DFW STARS, BOOVE and SOCKK DFW RNAV STARS



**Figure 2. Study Team Recommendation, South Flow**

### Proposed Design

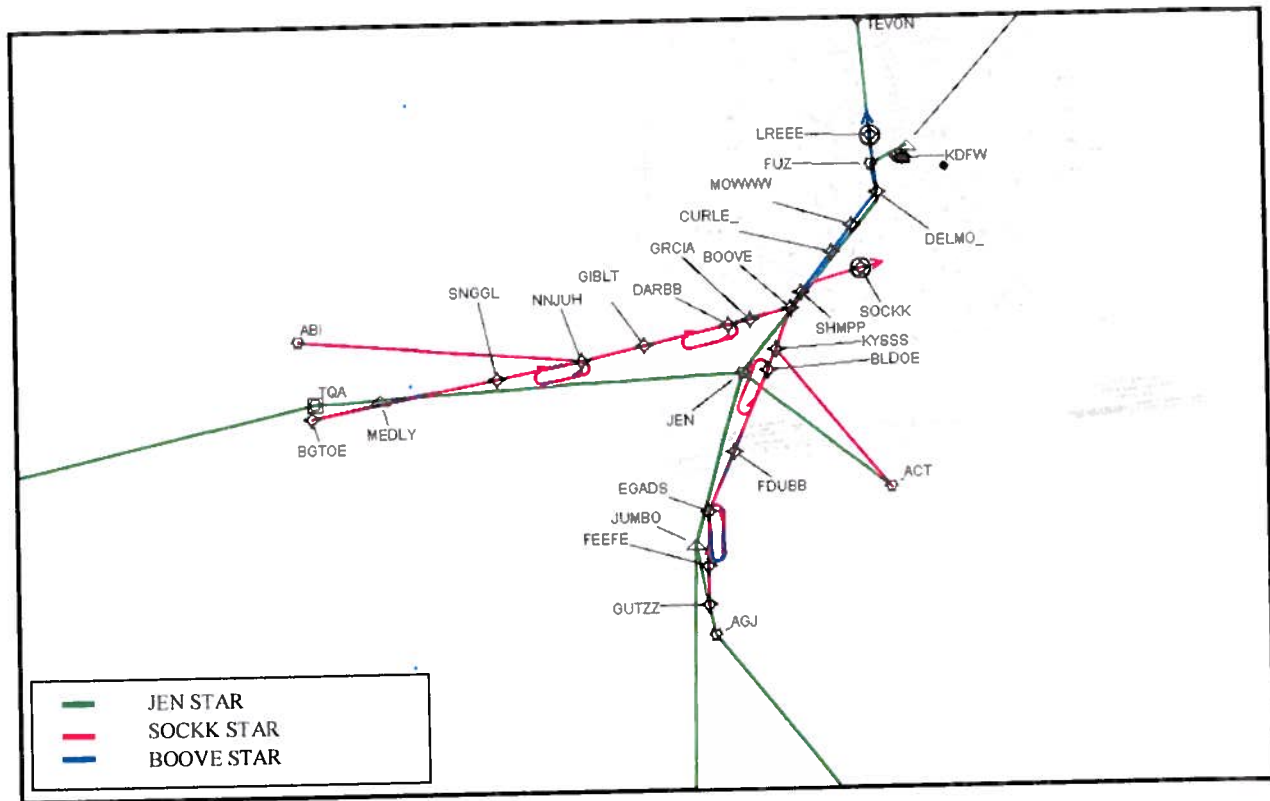
The North Texas OAPM Design Team is proposing the implementation of two new RNAV STARS, named BOOVE and SOCKK. The proposed designs merge at BOOVE waypoint, as compared to the conventional merge point at JEN, allowing a more direct routing to the D10 boundary. After BOOVE, arrivals on the WISPR RNAV STAR will join the base at SOCKK waypoint and arrivals on BOOVE RNAV STAR will turn downwind at DELMO waypoint. These designs were modified vertically from the Study Team recommendation to extend the OPD further optimizing the RNAV STARS and providing the SOCKK RNAV STAR procedural de-confliction from the REEKO RNAV STAR. Aircraft departing ACT TRACON and GRK RAPCON will be routed over BILDO waypoint and aircraft departing ABI and SJT TRACON will go over NNJUH waypoint.

The proposed design will increase flight path predictability, reduce controller and pilot task complexity, and reduce overall fuel burn and CO2 emissions.

Figure 3 depicts the proposed BOOVE and SOCKK RNAV STARs

# North Texas OAPM Design Package

## DFW STARs, BOOVE and SOCKK DFW RNAV STARs



**Figure 3. Proposed BOOVE and SOCKK RNAV STARs and JEN STAR**

### Additional Design Considerations

Human-in-the-loop simulations validated these proposed designs.

Spectrum analysis will be required for the proposed airspace changes associated with the proposed BOOVE and SOCKK RNAV STARs.

These procedures will be used by all RNAV-equipped turbojet aircraft, are not anticipated to change runway usage, and do not modify flight paths below 3,000 feet Above Ground Level.

### Implementation Dependencies

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed BOOVE and SOCKK RNAV STARs.

These procedures are dependent on the following procedures:

- **BOOVE:** This procedure shares waypoints with the BACHR, NRTAY, PAWLZ, SOCKK, SWVAY and TILLA RNAV STARs and the KNEAD STAR. It is procedurally

# **North Texas OAPM Design Package**

## **DFW STARs, BOOVE and SOCKK DFW RNAV STARs**

de-conflicted from the LIKES, PAWLZ, SWVAY and TILLA RNAV STARs and GLEN ROSE and KNEAD STARs. It has altitude dependencies with the ALIAN, HRPER, KATZZ, HUDAD and WSTEX RNAV SIDs in south flow.

- **SOCKK:** This procedure shares waypoints with the BACHR, BOOVE, NRTAY, PAWLZ, SWVAY and TILLA RNAV STARs and the KNEAD STAR. It is procedurally de-conflicted from the LIKES, PAWLZ, SWVAY and TILLA RNAV STARs and GLEN ROSE and KNEAD STARs.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letters of Agreement with D10, ZHU, ZAB, ABI, ACT, MAF and SJT TRACONS and GRK RAPCON will require changes for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**


1. BOOVE TARGETS Distribution Package
2. SOCKK TARGETS Distribution Package

# North Texas OAPM Design Package

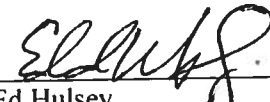
## DFW STARs, BOOVE and SOCKK DFW RNAV STARs

### Review Signatures


The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

  
Mark Phipps  
North Texas OAPM  
FAA Lead


8/22/13  
Date

  
Ed Hulsey  
North Texas OAPM  
NATCA Lead

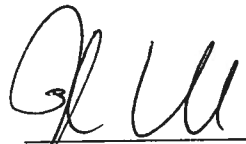
8/22/13  
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Robert Ellis  
Fort Worth Center OAPM  
Facility Lead


8/22/13  
Date

  
Jon Shedden  
Fort Worth Center OAPM  
NATCA Lead


8/22/13  
Date

  
James Harlan  
Dallas-Fort Worth TRACON OAPM  
Facility Lead

8/22/13  
Date

  
Ed Rivas  
Dallas-Fort Worth TRACON OAPM  
NATCA Lead

8/22/13  
Date

  
Keith Brown  
Houston OAPM  
NATCA Lead

8/13/13  
Date

# North Texas OAPM Design Package

## DFW STARs, BRDJE and SEEVR DFW RNAV STARs

Name of Change and Airport/s	Date
<b>BRDJE and SEEVR - DFW</b>	<b>22 August 2013</b>
Change Classification	Current Phase of Design
<b>Terminal Procedure STAR</b>	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
<b>Solutions 3 and 5</b>	<b>24 July 2014</b>
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 27, 37, 38, 42, 50, 53, 83 and 90</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors AR1, AR2, AR3, DN, DR1, FE1 and FE2</li> </ul> <b>ARTCCs</b> <ul style="list-style-type: none"> <li>Memphis (ZME) and Kansas City (ZKC)</li> </ul> <b>TRACONs</b> <ul style="list-style-type: none"> <li>Oklahoma City (OKC), Tulsa (TUL) and Razorback (RZC)</li> </ul>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Airspace Design Packages</b> <ul style="list-style-type: none"> <li>Northeast Corner Post</li> <li>En Route Airspace Design</li> </ul> <b>Procedure Design Package</b> <ul style="list-style-type: none"> <li>STARs: BRDJE, CAINE, DAWGZ, FINGR, HIBIL, SANGR, SASIE, SEEVR, SLANT, TRYST and WILBR</li> <li>SIDs: FORCK, MRSSH, SKTER, SWTSR and TRYTN</li> </ul>	<b>NTEX OAPM 201309.tgs</b>

# North Texas OAPM Design Package

## DFW STARs, BRDJE and SEEV R DFW RNAV STARs

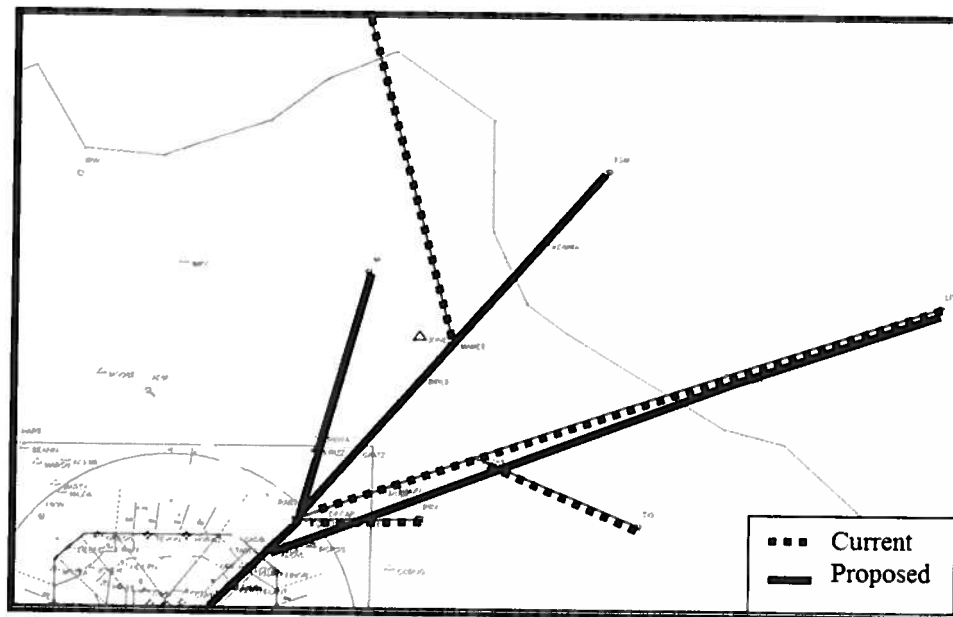
### Purpose

The North Texas Study Team identified three issues related to the descent profiles of DFW arrivals; high-side arrivals fly a downwind segment with a level-off at 11,000 feet for approximately five minutes at each corner post; this arrival profile creates inefficient departure profiles for DFW turbojet departures headed east and west on the departure track furthest from the airport; and arriving aircraft experience level-offs in ZFW airspace at Flight Level (FL) 240. In addition, to the three related issues the Study Team identified ZFW is required to change STAR assignments at the northeast corner post during parachute activity increasing controller task complexity on pilots and controllers.

### Study Team Recommendation

The Study Team recommended the creation of RNAV STARs with Optimal Profile Descents (OPD) for all primary DFW arrival flows at each corner post and proposed individual solutions for each of the corner post arrival flows. The Northeast Corner Post solution was to overlay the lateral path of the BONHAM STAR Fort Smith (FSM), Little Rock (LIT) and McAlester (MLC) transitions with an RNAV STAR incorporating an OPD, while minimizing the additional distance to avoid the Sky Diving Area. This proposed solution would reduce miles flown, time in level flight, fuel burn and CO2 emissions.

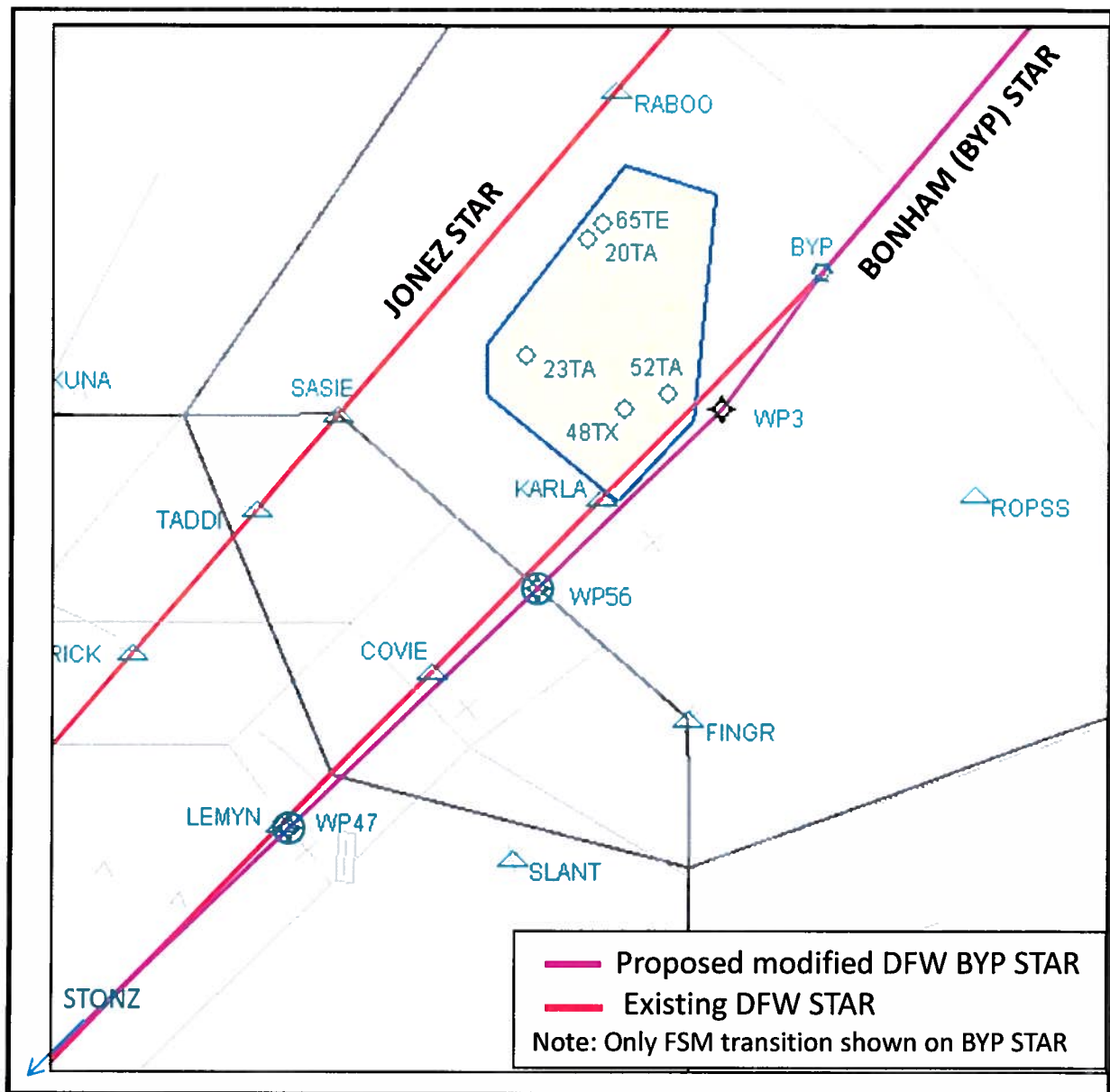
Figures 1 and 2 depict the recommended RNAV STARs.



**Figure 1. Study Team Recommendation**

# North Texas OAPM Design Package

## DFW STARs, BRDJE and SEEVR DFW RNAV STARs



**Figure 2. Study Team Recommendation**

### Proposed Design

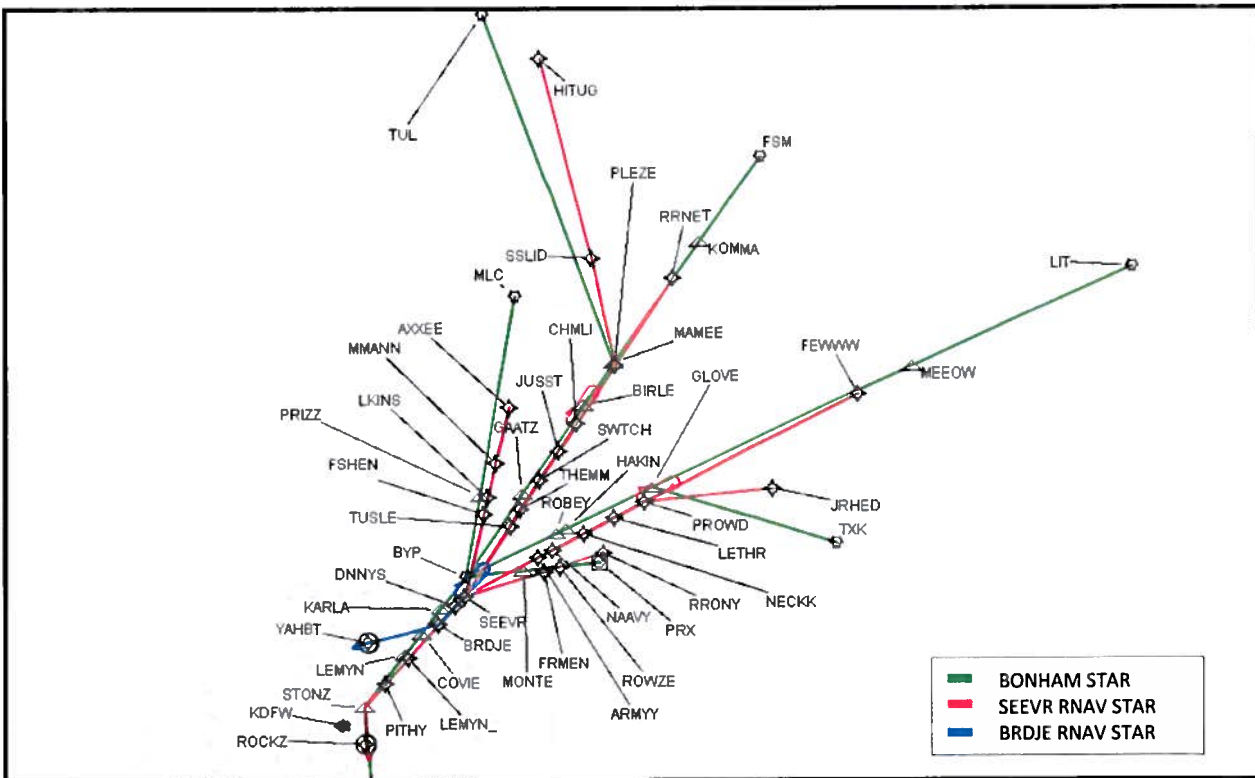
The North Texas OAPM Design Team is proposing the creation of two new RNAV STARs, named BRDJE and SEEVR. The proposed design is similar to the Study Team recommendation with a different common merge point at the SEEVR waypoint and a different D10/ZFW boundary fix at BRDJE waypoint. After BRDJE in north flow, arriving aircraft will continue to STONZ waypoint before turning south on downwind. In south flow, after BRDJE, arriving traffic will turn west to YAHBT waypoint on a base leg. This design bypasses the Dallas Skydive Area described in the Study Team Recommendation, increases flight path predictability,

# North Texas OAPM Design Package

## DFW STARs, BRDJE and SEEVR DFW RNAV STARs

reduces miles flown, fuel burn and CO2 emission overall and reduces controller and pilot task complexity.

Figure 3 depicts the proposed BRDJE and SEEVR RNAV STARs.



**Figure 3. Proposed BRDJE and SEEVR RNAV STARs and BONHAM STAR**

### Additional Design Considerations

Human-in-the-loop simulations validated these proposed designs.

Spectrum analysis will be required for the proposed airspace changes associated with the proposed BRDJE and SEEVR RNAV STARs.

These procedures will only be used by turbojet traffic, are not anticipated to change runway usage, and do not modify flight paths below 3,000 feet Above Ground Level.

### Implementation Dependencies

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed BRDJE and SEEVR RNAV STARs.

These procedures are dependent on the following procedures:



# **North Texas OAPM Design Package**

## **DFW STARs, BRDJE and SEEVR DFW RNAV STARs**

- **SEEVR:** This procedure shares waypoints with the BRDJE, CAINE, DAWGZ, SANGR, SLANT, HIBIL and TRYST RNAV STARs and the SASIE and WILBR STARs. It is procedurally de-conflicted from the HIBIL, TRYST, SLANT, SANGR RNAV STARs and the FINGR STAR. It has altitude dependencies with the FORCK, MRSSH, SKTER and TRYTN RNAV SIDs in north flow. It has altitude dependencies with the SEEVR RNAV STAR in north flow.
- **BRDJE:** This procedure shares waypoints with the CAINE, DAWGZ, SANGR, SEEVR, SLANT, HIBIL and TRYST RNAV STARs and the SASIE and WILBR STARs. It is procedurally de-conflicted from the HIBIL, TRYST, SLANT, SANGR RNAV STARs and the FINGR STAR.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letters of Agreement with D10, ZME, ZKC and TUL, RZC and OKC TRACONs will need to be modified for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**

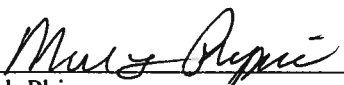
1. BRDJE TARGETS Distribution Package
2. SEEVR TARGETS Distribution Package

# North Texas OAPM Design Package

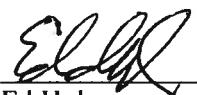
## DFW STARs, BRDJE and SEEVR DFW RNAV STARs

### Review Signatures


The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

  
\_\_\_\_\_  
Mark Phipps  
North Texas OAPM  
FAA Lead


8/22/13  
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Date

  
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Ed Hulse  
North Texas OAPM  
NATCA Lead

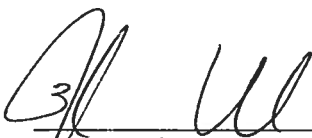
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Robert Ellis  
Fort Worth Center OAPM  
Facility Lead


8/22/13  
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NATCA Lead

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\_\_\_\_\_  
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Dallas-Fort Worth TRACON OAPM  
NATCA Lead

8/22/13  
\_\_\_\_\_  
Date

# North Texas OAPM Design Package

## DFW STARs, DEBBB and JOVEM DFW RNAV STARs

Name of Change and Airport/s	Date
DEBBB and JOVEM - DFW	22 August 2013
Change Classification	Current Phase of Design
Terminal Procedure STAR	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
Solution 4	24 July 2014
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 34,47, 48, 53, 75, 93 and 94</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors AR1, AR2, AR3, AR5, FW1, FW2 and MN</li> </ul> <b>ARTCCs</b> <ul style="list-style-type: none"> <li>Albuquerque (ZAB) and Kansas City (ZKC)</li> </ul> <b>TRACONs</b> <ul style="list-style-type: none"> <li>Lubbock (LBB) and Oklahoma City(OKC)</li> </ul> <b>RAPCONs</b> <ul style="list-style-type: none"> <li>Fort Sill (FSI) and Sheppard (SPS)</li> </ul>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
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<b>Airspace Design Packages</b> <ul style="list-style-type: none"> <li>Northwest Corner Post</li> <li>En Route Airspace Design</li> </ul> <b>Procedure Design Package</b> <ul style="list-style-type: none"> <li>STARs: BOWIE, DEBBB, GIBBI, GREGS, JFRYE, JOVEM, NANDR, SHAAM and WESAT</li> <li>SIDs: ALIAN, HRPER, HUDAD, KATZZ and WSTEX</li> </ul>	NTEX OAPM 201309.tgs

# **North Texas OAPM Design Package**

## **DFW STARs, DEBBB and JOVEM DFW RNAV STARs**

### **Purpose**

The North Texas Study Team identified three issues related to the descent profiles of DFW arrivals; high-side arrivals fly a downwind segment with a level-off at 11,000 feet for approximately five minutes at each corner post; this arrival profile creates inefficient departure profiles for DFW turbojet departures headed east and west on the departure track furthest from the airport; and arriving aircraft experience level-offs in ZFW airspace at Flight Level (FL) 240.

### **Study Team Recommendation**

The Study Team recommended the creation of RNAV STARs with Optimal Profile Descents (OPD) for all primary DFW arrival flows at each corner posts. In addition, the Study Team proposed individual solutions for each corner post arrival flow. At the Northwest Corner Post the proposed UKW RNAV OPD STAR provides a more direct routing to the D10 boundary, similar to shortcuts that are often given today. Compared to the currently published STAR transitions, the proposed OPD STAR is 0.8 NM shorter from TEXICO (TXO), 0.2 NM shorter from BORGER (BGD), and 3.6 NM shorter from Will Rogers (IRW) and Tulsa (TUL). As many aircraft today are given shortcuts off the published route, the reduction in distance from the proposed procedure compared to flown tracks is smaller, resulting in an estimated annual fuel burn savings of \$22K.

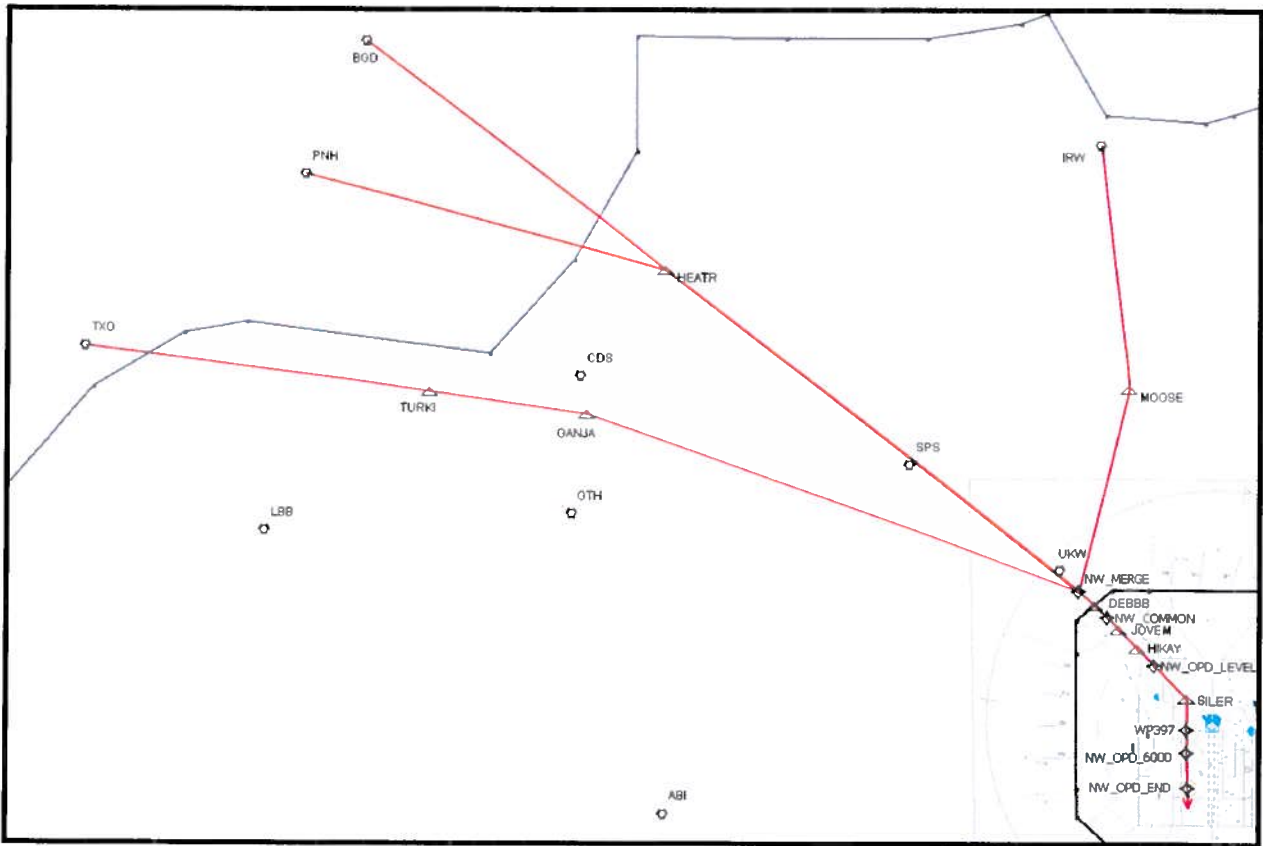
In addition to the savings from reduction in distance flown, the elimination of level segments on the UKW OPD RNAV STAR is estimated to result in a savings of \$400K – 1.2M per year. This results in a total estimated annual savings of \$422K – 1.2M from the Northwest Corner Post, and an estimated annual reduction in CO2 emissions of 1.6 – 4.8K metric tons.

Figure 1 depicts the recommended RNAV STAR, north flow.

Figure 2 depicts the recommended RNAV STAR, south flow.

# North Texas OAPM Design Package

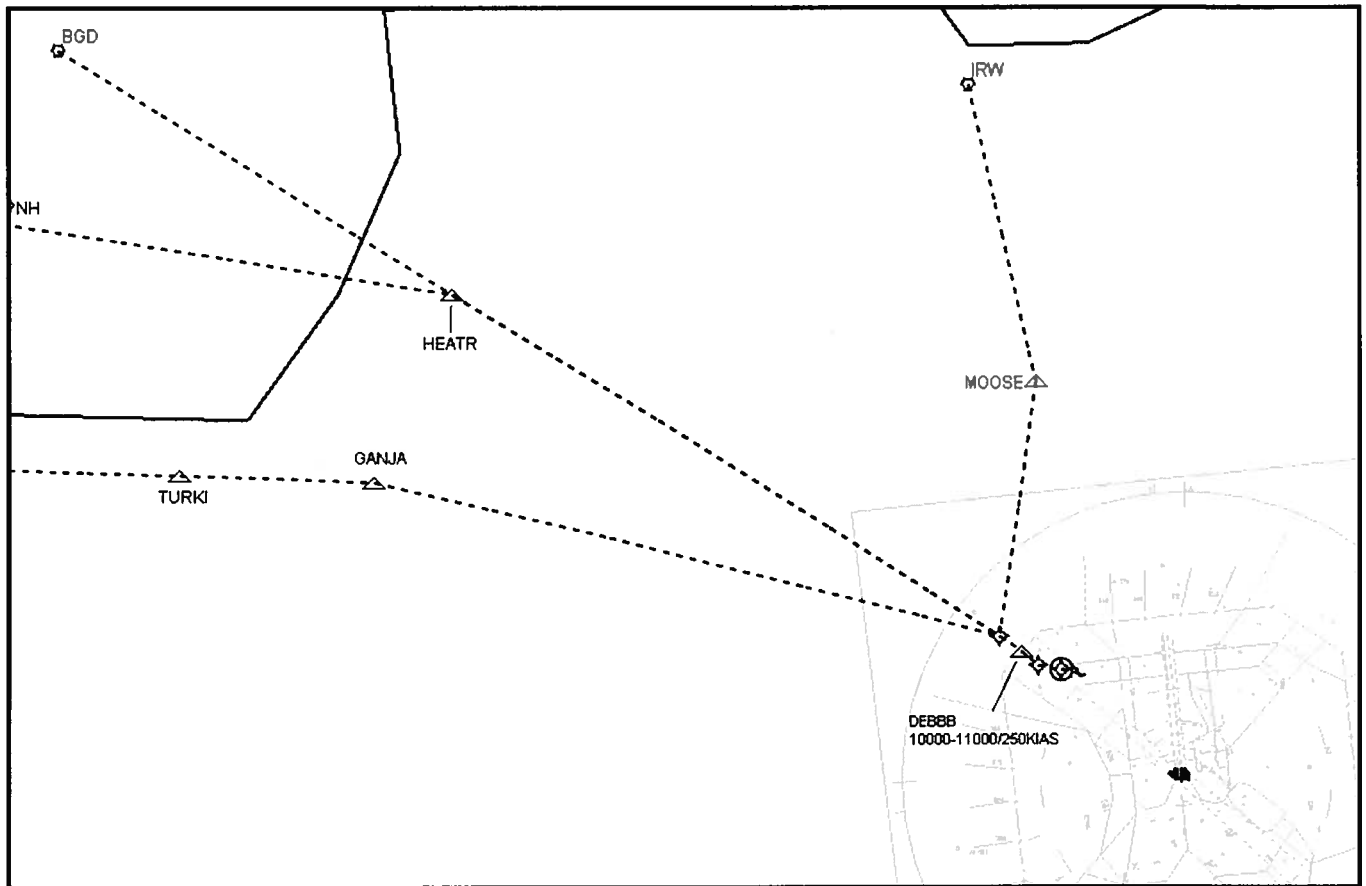
## DFW STARs, DEBBB and JOVEM DFW RNAV STARs



**Figure 1. Study Team Recommendation, North Flow**

# North Texas OAPM Design Package

## DFW STARs, DEBBB and JOVEM DFW RNAV STARs



**Figure 2. Study Team Recommendation, South flow**

### **Proposed Design**

The North Texas OAPM Design Team is proposing the implementation of two new RNAV STARs, named DEBBB and JOVEM. The proposed designs will merge at the DEBBB waypoint and incorporate a transition from IRW beginning at the WUNPI waypoint to allow a more direct routing to the TRACON boundary. These designs are slightly modified from the Study Team's design to enable the more direct routing.

In the enroute environment RNAV arrivals over BGD or PNH NAVAIDs will transition over MDANO and SULTA waypoints. Arrivals from OKC TRACON will transition over FAWNT waypoint; from FSI and SPS TRACONs will transition over LETNN waypoint; and from LBB TRACON will transition over HNKER waypoint. A slightly modified vertical profile of the Study Team's recommended runway transitions was incorporated into the design to allow aircraft to stay on the Optimal Profile Descents (OPD) longer and reduce the amount of vectoring.

After merging at DEBBB, arrivals in north flow will continue to the SILER waypoint turn south to KABOOM waypoint for the Runways (RWY) 36 Left (L)/Right(R) and 35L/R/Center (C).

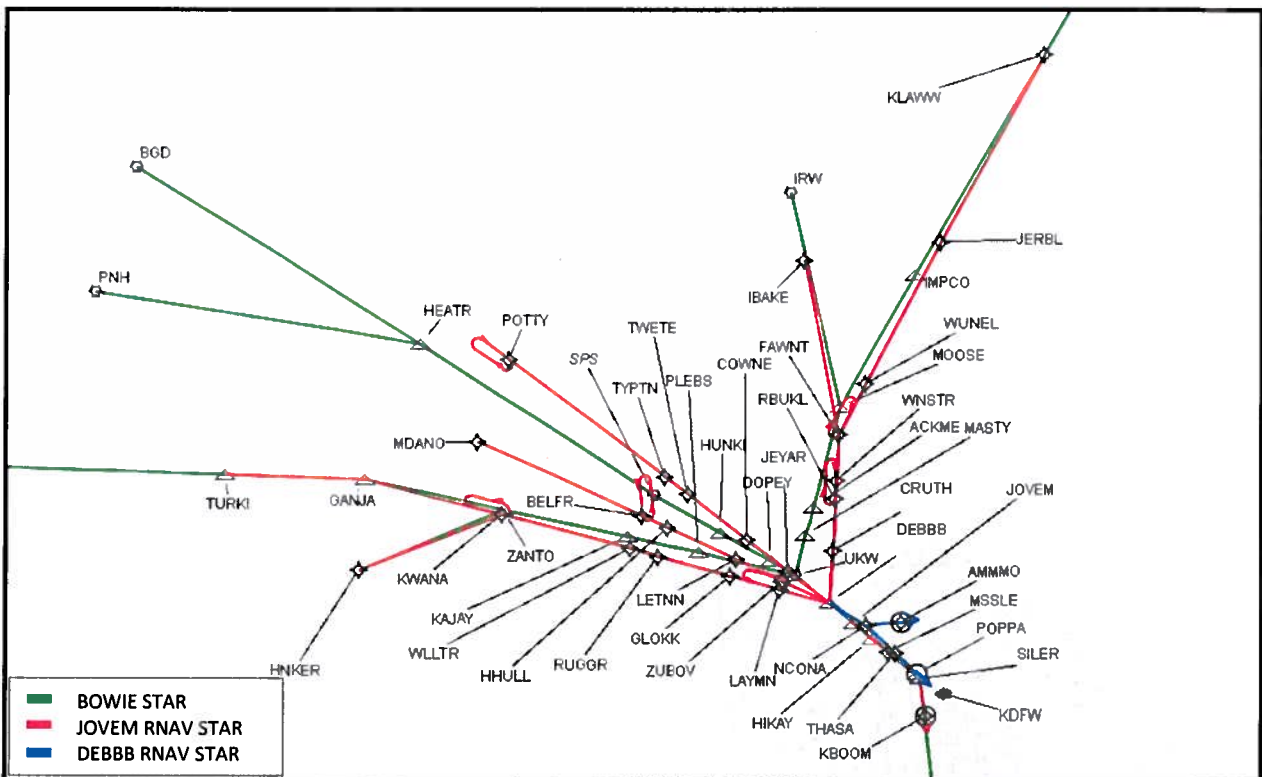
# North Texas OAPM Design Package

## DFW STARs, DEBBB and JOVEM DFW RNAV STARs

After merging at DEBBB, arrivals in south flow will continue to NCONA waypoint turn east to AMMMO waypoint for the Runways (RWY) 18 Left (L)/Right (R) and 17L/R/Center (C) or continue to POPPA waypoint for the DFW RWY13R.

The proposed designs will enable OPDs, increase flight path predictability, reduce miles flown, fuel burn and CO2 emissions and decrease controller and pilot task complexity.

Figure 3 depicts the proposed DEBBB and JOVEM RNAV STARs.



**Figure 3. Proposed DEBBB and JOVEM RNAV STARs and BOWIE STAR**

### Additional Design Considerations

The Design Team validated the OPD designs with industry partners American Airlines simulators. Human-in-the-loop simulations validated these proposed designs.

Spectrum analysis will be required for the proposed airspace changes associated with the proposed DEBBB and JOVEM RNAV STARs.

These procedures will only be used by turbojet traffic, are not anticipated to change runway usage, and do not modify flight paths below 3,000 feet Above Ground Level.

### Implementation Dependencies

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed DEBBB and JOVEM RNAV STARs.

# **North Texas OAPM Design Package**

## **DFW STARs, DEBBB and JOVEM DFW RNAV STARs**

These procedures are dependent on the following procedures:

- **DEBBB:** This procedure shares waypoints with the GIBBI, JFRYE, JOVEM, NANDR, SHAAM and WESAT RNAV STARs and the BOWIE and GREGS STARs. It is procedurally de-conflicted from the GIBBI, JFRYE, NANDR, SHAAM and WESAT RNAV STARs and GREGS STAR.
- **JOVEM:** This procedure shares waypoints with the DEBBB, GIBBI, JFRYE, NANDR, SHAAM and WESAT RNAV STARs and the BOWIE and GREGS STARs. It is procedurally de-conflicted from the GIBBI, JFRYE, NANDR, SHAAM and WESAT RNAV STARs and GREGS STAR. It has altitude dependencies with the ALIAN, HRPER, KATZZ, HUDAD and WSTEX RNAV SIDs in north flow.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letters of Agreement with D10, ZAB and ZKC, FSI and SPS RAPCONs and LBB and OKC TRACONs will need to be modified for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**

1. DEBBB TARGETS Distribution Package
2. JOVEM TARGETS Distribution Package


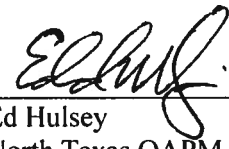



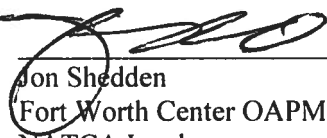
# North Texas OAPM Design Package

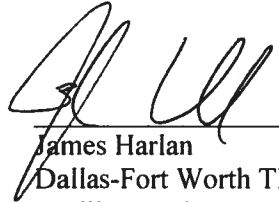

## DFW STARs, DEBBB and JOVEM DFW RNAV STARs

### Review Signatures

The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

 _____ Mark Phipps North Texas OAPM FAA Lead	<u>8/22/13</u> Date	 _____ Ed Hulsey North Texas OAPM NATCA Lead	<u>8/22/13</u> Date
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 _____ Robert Ellis Fort Worth Center OAPM Facility Lead	<u>8/24/13</u> Date	 _____ Jon Shedden Fort Worth Center OAPM NATCA Lead	<u>8/27/13</u> Date
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 _____ James Harlan Dallas-Fort Worth TRACON OAPM Facility Lead	<u>8/24/13</u> Date	 _____ Ed Rivas Dallas-Fort Worth TRACON OAPM NATCA Lead	<u>8/22/13</u> Date
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# North Texas OAPM Design Package

## DFW STARs, KLNR and WHINY DFW RNAV STARs

Name of Change and Airport/s	Date
KLNR and WHINY - DFW	01 xxxx 2013
Change Classification	Current Phase of Design
Terminal Procedure STAR	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
Solution 3	24 July 2014
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 29, 30, 52, 83, 86, 89 and 96</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors FE1, FE2, AR1, AR2, AR3, AR6, DR1, DS and DE</li> </ul> <b>ARTCCs</b> <ul style="list-style-type: none"> <li>Houston (ZHU) and Memphis (ZME)</li> </ul> <b>TRACONs</b> <ul style="list-style-type: none"> <li>Longview (GGG), Monroe (MLU), Shreveport (SHV) and Waco (ACT)</li> </ul> <b>Fort Polk (POE) RAPCON</b>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul> <b>ZHU</b> <ul style="list-style-type: none"> <li>Mike McGhee</li> <li>David Salapata</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Airspace Design Packages</b> <ul style="list-style-type: none"> <li>Southeast Corner Post</li> <li>En Route Airspace</li> </ul> <b>Procedure Design Packages</b> <ul style="list-style-type: none"> <li>STARs: BAWLZ, CABBY, CEDAR CREEK, CHUKK, EESAT, KLNR, MNND, REDDN, REEKO and WHINY</li> <li>SIDs: FORCK, MRSSH, SKTER and TRYTN</li> </ul>	<b>Master TARGETS Files (file extension name)</b>

# North Texas OAPM Design Package

## DFW STARs, KLNDR and WHINY DFW RNAV STARs

### Purpose

The North Texas Study Team identified three issues related to the descent profiles of DFW arrivals; high-side arrivals fly a downwind segment with a level-off at 11,000 feet for approximately five minutes at each corner posts; this arrival profile creates inefficient departure profiles for DFW turbojet departures headed east and west on the departure track furthest from the airport; and arriving aircraft experience level-offs in ZFW airspace at Flight Level (FL) 240.

### Study Team Recommendation

The Study Team recommended the creation of RNAV STARs with Optimal Profile Descents (OPD) for all primary DFW arrival flows at each corner post and proposed individual solutions for each of the corner post arrival flows. The Southeast Corner Post solution was to create an RNAV STAR similar to the CEDAR CREEK STAR with more direct routing to the D10 boundary, similar to shortcuts that are often given today. This design would reduce miles flown, fuel burn and CO2 emissions.

Figure 1 depicts recommended RNAV STAR, north flow.

Figure 2 depicts recommended RNAV STAR, south flow.

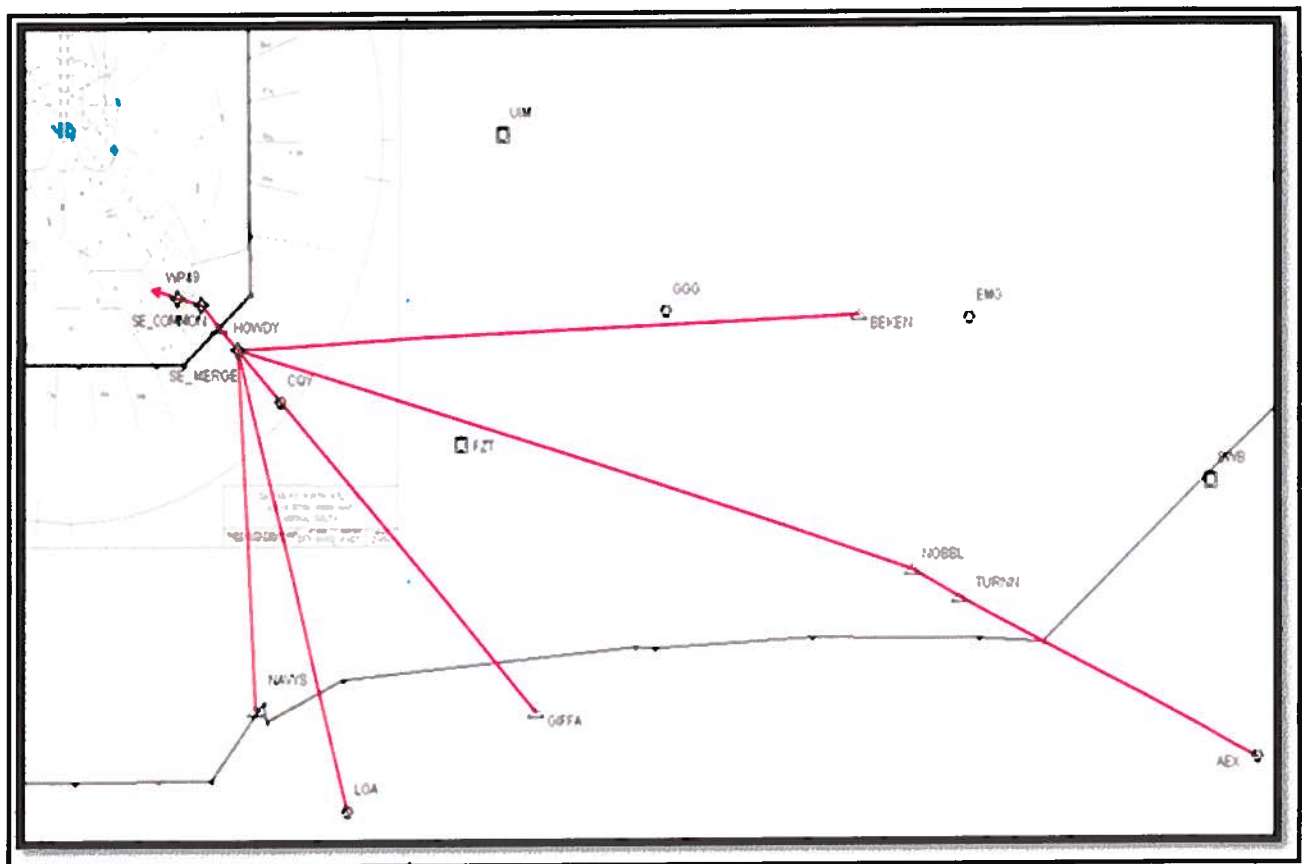
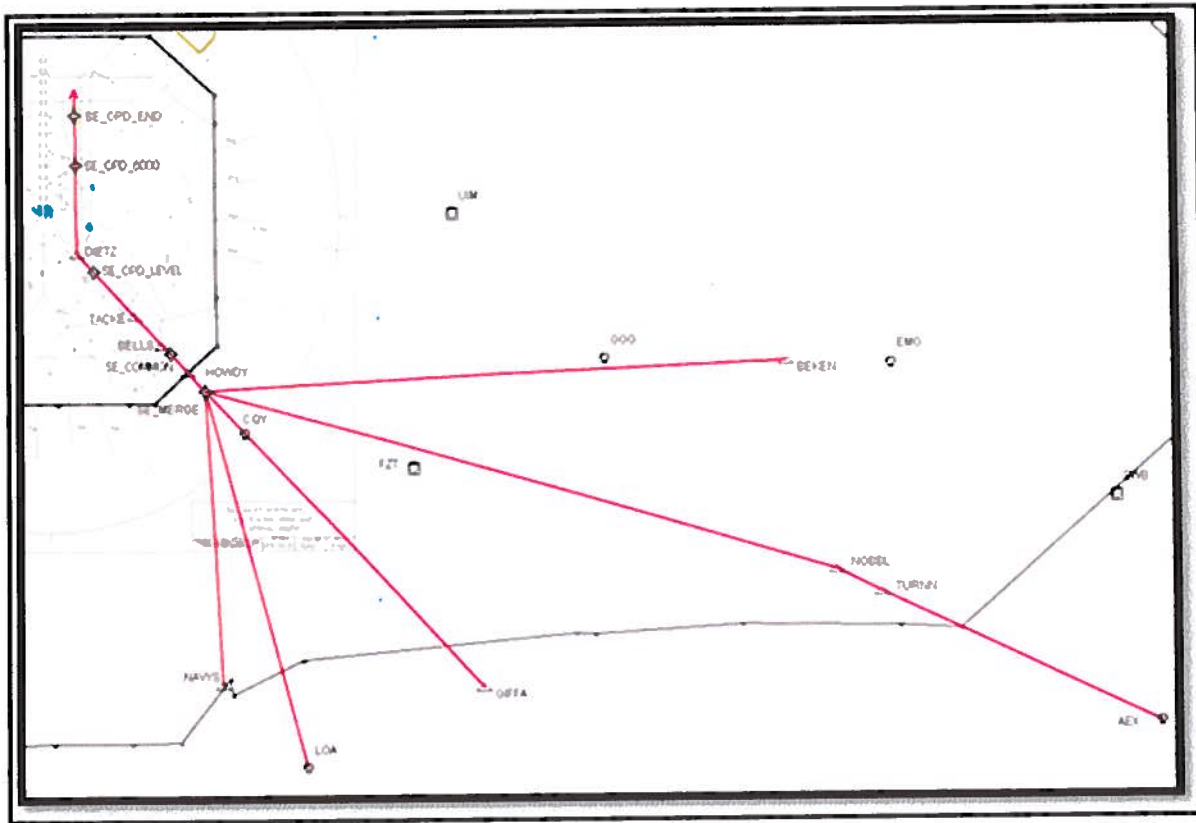


Figure 1. Study Team Recommendation, North Flow

# North Texas OAPM Design Package

## DFW STARs, KLNR and WHINY DFW RNAV STARs



**Figure 2. Study Team Recommendation, South Flow**

### **Proposed Design**

The North Texas OAPM Design Team is proposing the implementation of two RNAV STARs over the Southeast Corner Post named KLNR and WHINY. The proposed design has a merge point at KLNR waypoint, as compared to the conventional merge point at CQY, to allow a more direct routing to the D10 boundary. After merging at KLNR, arrivals in north flow will continue to the HOWDY waypoint then turn west to HLZZZ waypoint for the Runways (RWY) 36 Left (L)/Right(R) and 35L/R/Center (C) or continue to GACHO waypoint for the DFW RWY31R. In south flow operations, arrivals will continue after KLNR to DIETZ waypoint before turning north to the downwind. These designs were modified vertically from the Study Team recommendation to extend the OPD further optimizing the RNAV STAR.

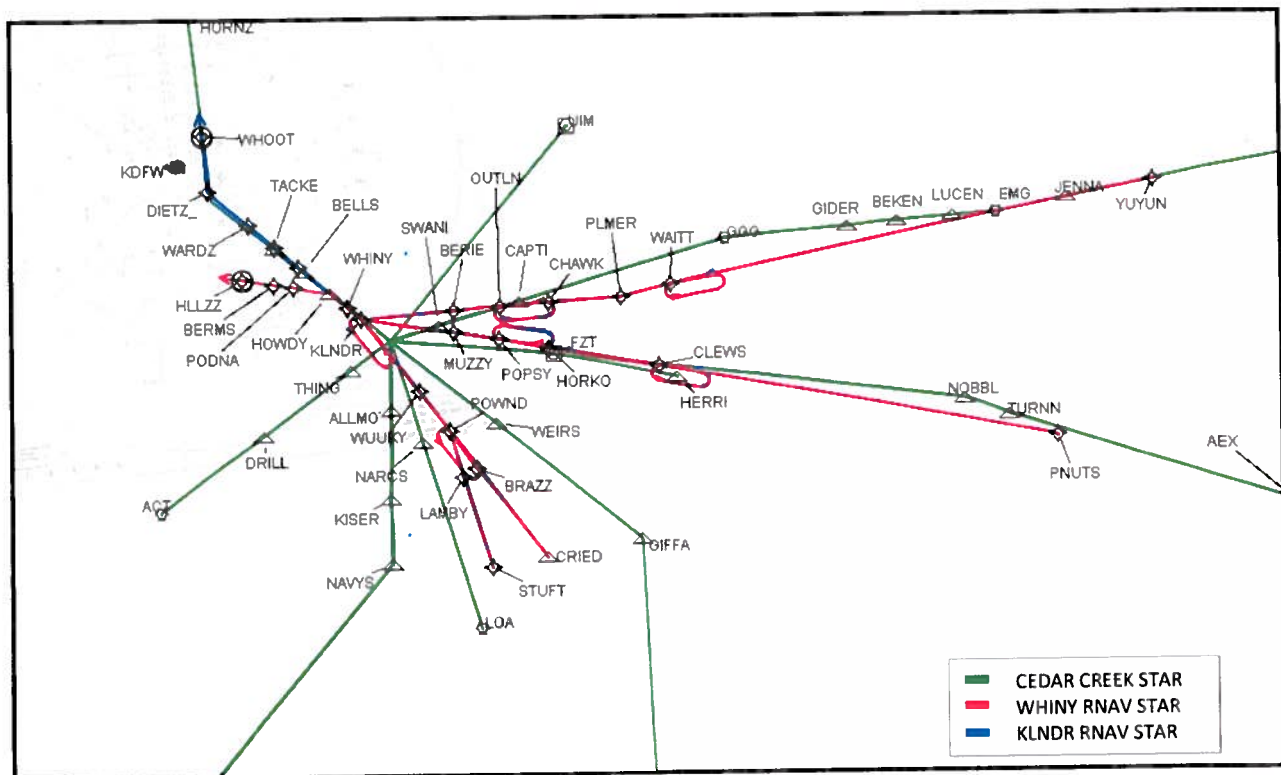
Aircraft departing ACT TRACON will be routed over BRITE waypoint; aircraft departing GGG, SHV, and MLU TRACONS will be routed over CHAWK waypoint; aircraft routed from POE TRACON will be routed over BAYES waypoint; ZHU will route CLL TRACON traffic direct to KLNR.

The proposed design will increase flight path predictability, reduce controller task complexity and reduce overall fuel burn and CO2 emissions.

Figure 3 depicts the proposed KLNR and WHINY RNAV STARs

# North Texas OAPM Design Package

## DFW STARs, KLNDR and WHINY DFW RNAV STARs



**Figure 3. Proposed KLNDR and WHINY RNAV STARs and CEDAR CREEK STAR**

### Additional Design Considerations

Human-in-the-loop simulations validated these proposed designs.

Spectrum analysis will be required for the proposed airspace changes associated with the proposed KLNDR and WHINY RNAV STARs.

These procedures will only be used by turbojet traffic, are not anticipated to change runway usage, and do not modify flight paths below 3,000 feet Above Ground Level.

### Implementation Dependencies

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed KLNDR and WHINY RNAV STARs.

These procedures are dependent on the following procedures:

- **KLNDR:** This procedure shares waypoints with the BAWLZ, CABBY, CHUKK, EESAT, MNND, REDDN, REEKO and WHINY RNAV STARs. It is procedurally de-conflicted from the BAWLZ, CABBY, CHUKK, EESAT, MNND, REDDN and REEKO RNAV STARs and the CEDAR CREEK STAR. It has altitude dependencies with the FORCK, MRSSH, SKTER and TRYTN RNAV SIDs in south flow.

# **North Texas OAPM Design Package**

## **DFW STARs, KLNR and WHNY DFW RNAV STARs**

- **WHNY:** This procedure shares waypoints with the BAWLZ, CABBY, CHUKK, EESAT, KLNR, MNND, REDDN and REEKO RNAV STARs. It is procedurally de-conflicted from the BAWLZ, CABBY, CHUKK, EESAT, MNND, REDDN and REEKO RNAV.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letters of Agreement with D10, ZME, ZHU, and GGG, MLU, POE, SHV, and ACT TRACONS will require changes for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**


1. KLNR TARGETS Distribution Package
2. WHNY TARGETS Distribution Package

# North Texas OAPM Design Package

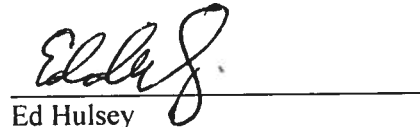
## DFW STARs, KLNDR and WHINY DFW RNAV STARs

### Review Signatures


The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

  
Mark Phipps  
North Texas/Houston OAPM  
FAA Lead


8/22/13  
Date

  
Ed Hulse  
North Texas OAPM  
NATCA Lead

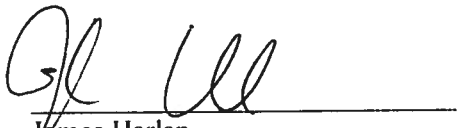
8/22/13  
Date

  
Robert Ellis  
Fort Worth Center OAPM  
Facility Lead


8/22/13  
Date

  
Jon Shedden  
Fort Worth Center OAPM  
NATCA Lead

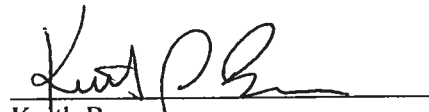
8/22/13  
Date

  
James Harlan  
Dallas-Fort Worth TRACON OAPM  
Facility Lead

8/22/13  
Date

  
Ed Rivas  
Dallas-Fort Worth TRACON OAPM  
NATCA Lead

8/22/13  
Date

  
Keith Brown  
Houston OAPM  
NATCA Lead

8/13/13  
Date

# North Texas OAPM Design Package

## DFW STARs, CAINE and DAWGZ DFW RNAV STARs

Name of Change and Airport/s	Date
CAINE and DAWGZ - DFW	22 August 2013
Change Classification	Current Phase of Design
Terminal Procedure STAR	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
Solution 4	24 July 2014
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 37, 38 and 42</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors FE1, FE2, FW1, FW2 AR1, AR2, AR3, DR2 and DN</li> </ul>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Airspace Design Packages</b> <ul style="list-style-type: none"> <li>Northeast Corner Post</li> </ul> <b>Procedure Design Package</b> <ul style="list-style-type: none"> <li>STARs: BRDJE, CAINE, DAWGZ, FINGR, HIBIL, SANGR, SASIE, SEEVR, SLANT and TRYST</li> </ul>	NTEX OAPM 201309.tgs

### Purpose

The Study Team identified an issue with the limited use of low-side dual/offload routes due to confined vectoring airspace. High-side dual/offload arrival routes were typically not in use due to the complexity for DAL departures trying to climb above the dual/offload routes and the sequencing of dual/offloads into one arrival stream if dual/offloads are not feeding separate runways.

### Study Team Recommendation

The Study Team recommended creating RNAV STARs, for both primary and offload (dual) DFW arrivals, with runway transitions to facilitate more predictable management of dual STARs and crossing aircraft from east side to west side and west side to east side. The Study Team proposed the introduction of runway transitions on the proposed RNAV OPD STARs in order to more effectively manage high-side dual routes. The RNAV routes and transitions provide more



# **North Texas OAPM Design Package**

## **DFW STARs, CAINE and DAWGZ DFW RNAV STARs**

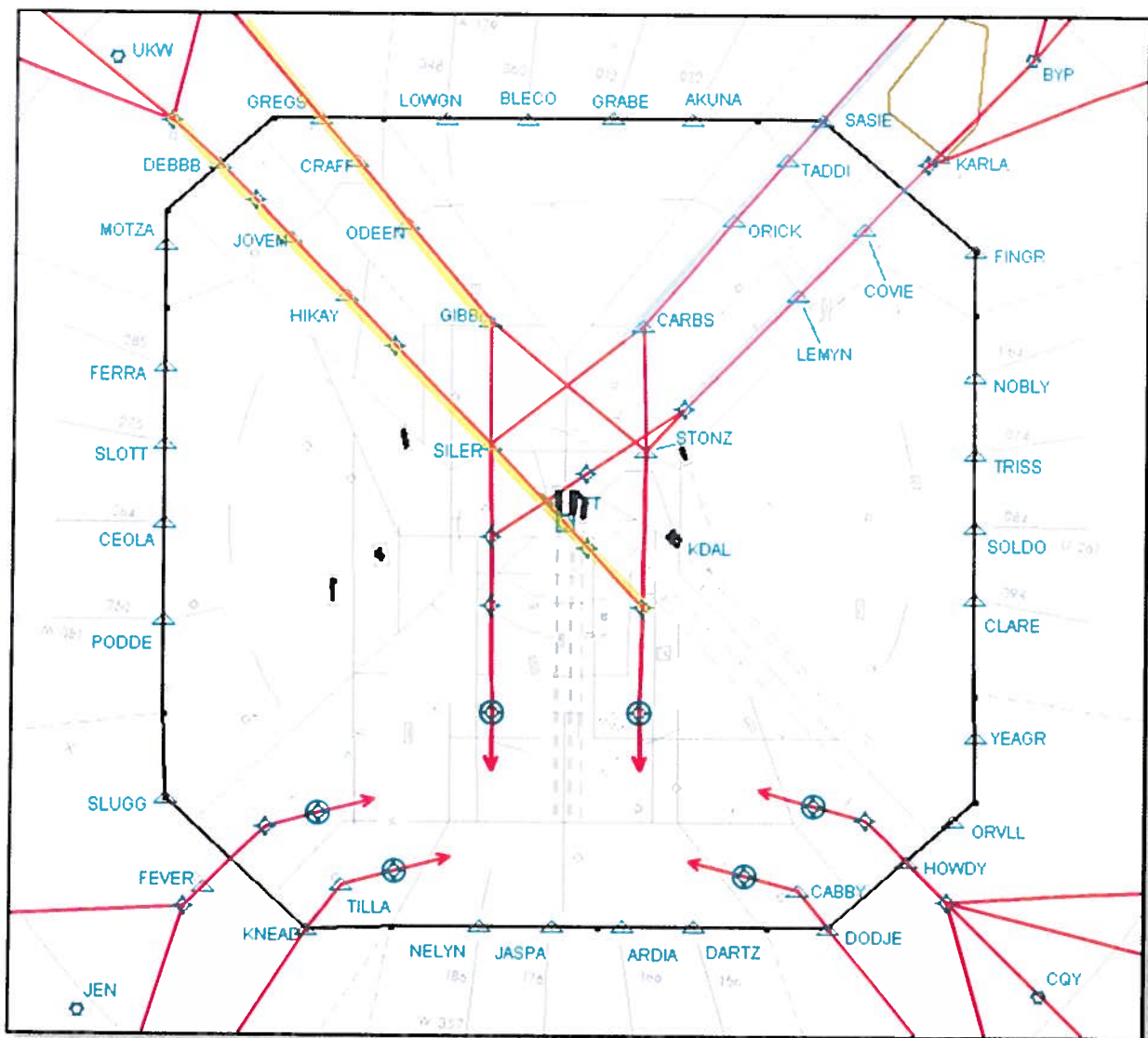
predictable routing, thereby facilitating more predictable management of dual STARs and crossing aircraft from east side to west side and west to east; incorporate PBN concepts for the stakeholders; result in a reduction in phraseology for controllers; and should allow optimization of TMA on the dual routes.

Figure 1 depicts the recommended RNAV STAR, north flow.

Figure 2 depicts the recommended RNAV STAR, south flow.

# North Texas OAPM Design Package

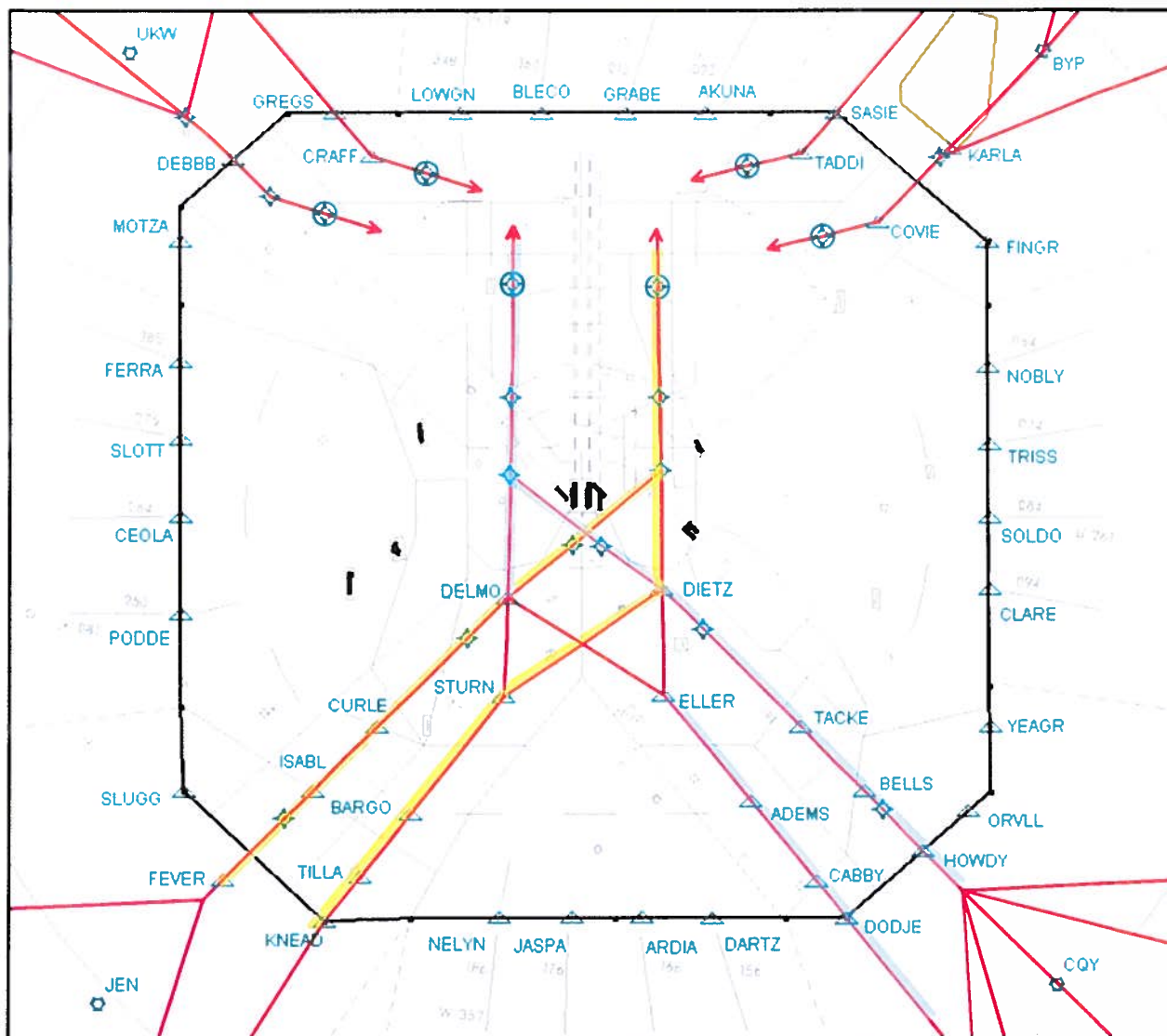
## DFW STARS, CAINE and DAWGZ DFW RNAV STARS



**Figure 1. Study Team Recommendation, North Flow**

# North Texas OAPM Design Package

## DFW STARs, CAINE and DAWGZ DFW RNAV STARs



**Figure 2. Study Team Recommendation, South Flow**

### **Proposed Design**

The North Texas OAPM Design Team is proposing the creation of two new RNAV STARs, named CAINE and DAWGZ to replace the JONEZ STAR. The proposed designs are slightly modified from the Study Team design by moving a transition to start at PONNY waypoint to align with the ZFW Sector 50 boundary and with the addition of enroute transitions at RIDDE and AXXEE waypoints. After crossing SASIE waypoint, north flow arrivals will transition to CARBS waypoint for the downwind, and in south flow DAWGZ waypoint for the base leg.

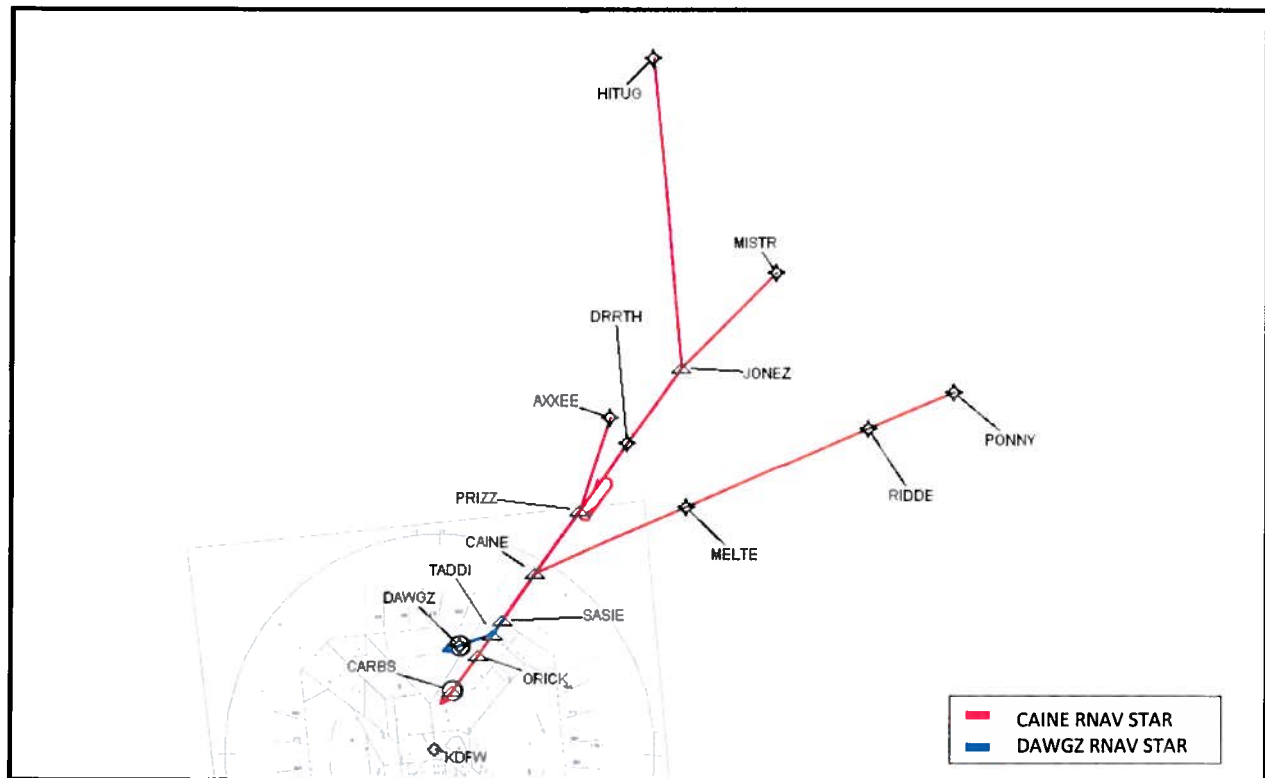
# North Texas OAPM Design Package

## DFW STARs, CAINE and DAWGZ DFW RNAV STARs

The Design Team did not include the crossover procedure to the west side of DFW as proposed by the Study Team. Industry partners suggested it would not be beneficial to publish this as the procedure is seldom used today. Additionally, based on current FAA Order 7110.65 guidance dated February 9, 2012, the use of runway transitions is not practical for this procedure.

These proposed RNAV STARs will reduce miles flown, reduce controller and pilot task complexity, and increase flight path predictability.

Figure 3 depicts the proposed CAINE and DAWGZ RNAV STARs.



**Figure 3. CAINE and DAWGZ RNAV STARs**

### Additional Design Considerations

ZFW identified periods when the use of dual STARs was not permitted by D10, which led to in-trail vectoring in their airspace. D10 advised that the use of dual STARs was often dictated by departure demand. It is difficult to climb above the arrivals using pre-coordinated climb areas when there are two streams of traffic in this area. D10 also identified the difficulty of merging a dual arrival stream into a single arrival stream in their airspace, which is required if the two streams are not feeding separate runways.

Human-in-the-loop simulations validated these proposed designs.

# **North Texas OAPM Design Package**

## **DFW STARs, CAINE and DAWGZ DFW RNAV STARs**

Spectrum analysis will be required for the proposed airspace changes associated with the proposed CAINE and DAWGZ RNAV STARs.

The DAWGZ RNAV STAR will have a crossing restriction at 9,000 feet and 250 knots at SASIE.

The CAINE RNAV STAR will have a crossing restriction at 12,000 feet at SASIE.

These procedures will only be used by turbojet traffic, are not anticipated to change runway usage, and do not modify flight paths below 3000 feet Above Ground Level.

### **Implementation Dependencies**

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed CAINE and DAWGZ RNAV STARs.

This procedure is dependent on the following procedures:

- **CAINE:** This procedure shares waypoints with BRDJE, DAWGZ, HIBIL, SANGR, SEEVR, SLANT and TRYST RNAV STARs. It is procedurally de-conflicted from the SASIE STAR at SASIE. It has altitude dependencies with the FORCK, MRSSH, SKTER and TRYTN RNAV SIDs in north flow.
- **DAWGZ:** This procedure shares waypoints with BRDJE, CAINE, HIBIL, SANGR, SEEVR, SLANT and TRYST RNAV STARs. It is procedurally de-conflicted from the FINGR and SASIE STARs at SASIE.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letter of Agreement with D10 will require changes for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**

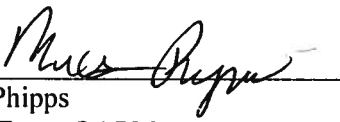
1. CAINE TARGETS Distribution Package
2. DAWGZ TARGETS Distribution Package

# North Texas OAPM Design Package

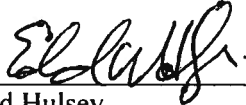
## DFW STARs, CAINE and DAWGZ DFW RNAV STARs

### Review Signatures


The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

  
Mark Phipps  
North Texas OAPM  
FAA Lead

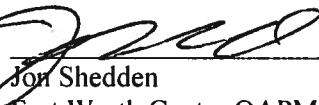
8/22/13  
Date

  
Ed Hulsey  
North Texas OAPM  
NATCA Lead


8/22/13  
Date

  
Robert Ellis  
Fort Worth Center OAPM  
Facility Lead

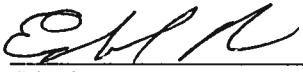
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NATCA Lead

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Dallas-Fort Worth TRACON OAPM  
Facility Lead

8/22/13  
Date

  
Ed Rivas  
Dallas-Fort Worth TRACON  
OAPM  
NATCA Lead

8/22/13  
Date

# North Texas OAPM Design Package

## DFW STARs, GIBBI and SHAAM DFW RNAV STARs

Name of Change and Airport/s	Date
<b>GIBBI and SHAAM - DFW</b>	<b>22 August 2013</b>
Change Classification	Current Phase of Design
<b>Terminal Procedure STAR</b>	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
<b>Solution 4</b>	<b>24 July 2014</b>
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 47 and 75</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors AR1, AR2, AR3, AR5, FE1, FE2, FW1, FW2, MN and MNH</li> </ul> <b>Albuquerque ARTCC (ZAB)</b>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Airspace Design Packages</b> <ul style="list-style-type: none"> <li>Northwest Corner Post</li> </ul> <b>Procedure Design Package</b> <ul style="list-style-type: none"> <li>STARs: BOWIE, DEBBB, GIBBI, GREGS, JFRYE, JOVEM, NANDR, SHAAM and WESAT</li> <li>SIDs: ALIAN, HRPER, HUDAD, KATZZ and WSTEX</li> </ul>	<b>NTEX OAPM 201309.tgs</b>

### Purpose

The Study Team identified an issue with the limited use of low-side dual/offload routes due to confined vectoring airspace. High-side dual/offload arrival routes were typically not in use due to the complexity for DAL departures trying to climb above the dual/offload routes and the sequencing of dual/offloads into one arrival stream if dual/offloads are not feeding separate runways.

# **North Texas OAPM Design Package**

## **DFW STARs, GIBBI and SHAAM DFW RNAV STARs**

### **Study Team Recommendation**

The Study Team recommended creating RNAV STARs, for both primary and offload (dual) DFW arrivals, with runway transitions to facilitate more predictable management of dual STARs and crossing aircraft from east side to west side and west side to east side. The Study Team proposed the introduction of runway transitions on the proposed RNAV OPD STARs in order to more effectively manage high-side dual routes. The RNAV routes and transitions provide more predictable routing, thereby facilitating more predictable management of dual STARs and crossing aircraft from east side to west side and west to east; incorporate PBN concepts for the stakeholders; result in a reduction in phraseology for controllers; and should allow optimization of traffic management advisor on the dual routes.

Figure 1 depicts the recommended RNAV STAR, north flow.

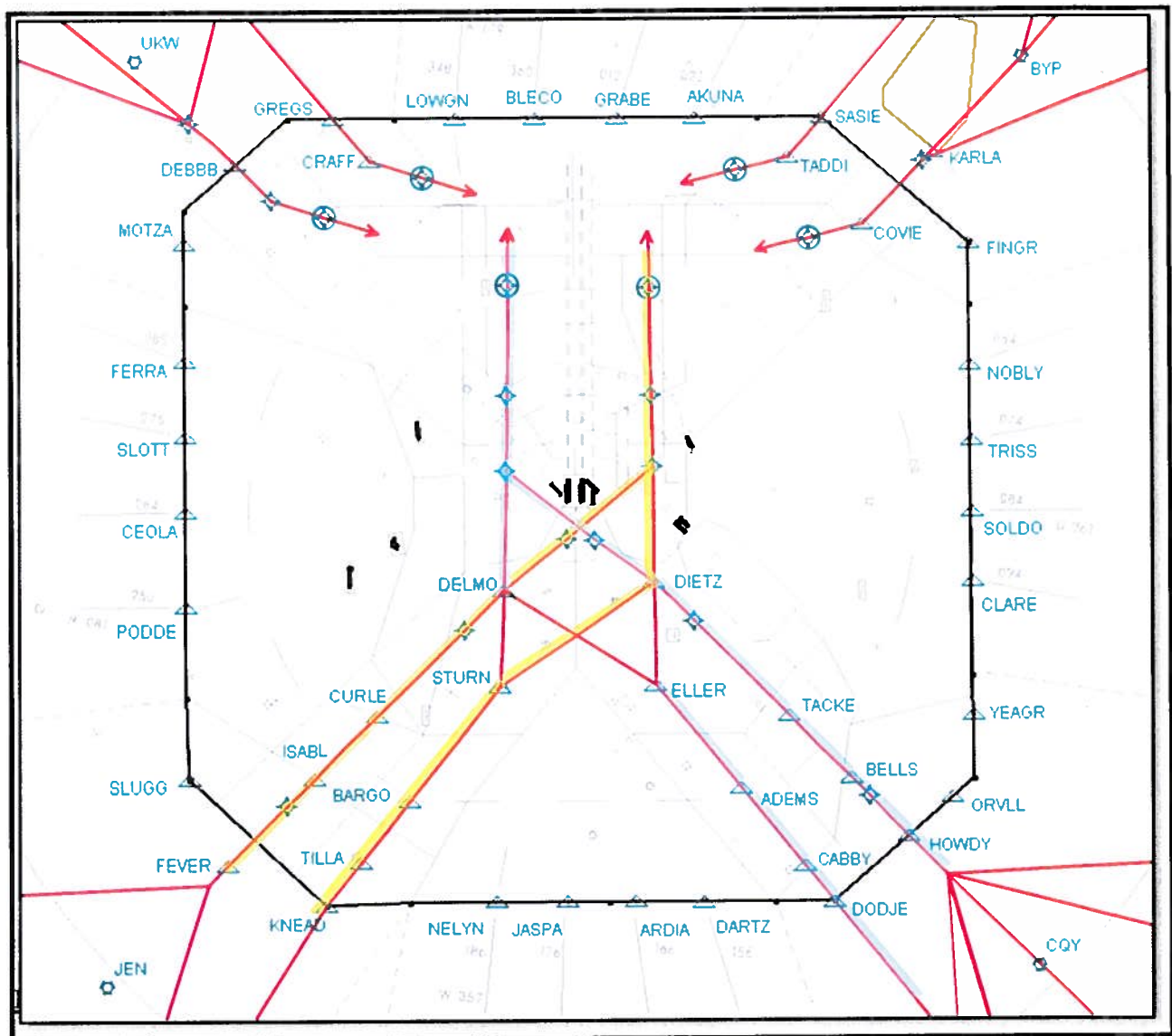
Figure 2 depicts the recommended RNAV STAR, south flow.



3

# North Texas OAPM Design Package

## DFW STARs, GIBBI and SHAAM DFW RNAV STARs



**Figure 2 Study Team Recommendation, South Flow**

### **Proposed Design**

The North Texas Design Team is proposing the creation of two new RNAV STARs, named GIBBI and SHAAM to replace the MASTY STAR. The proposed designs are similar in design to the MASTY STAR, incorporating additional enroute transitions, merging at GREGS waypoint and incorporating a more direct route from the FAWNT and LUDWG waypoints. In south flow on the SHAAM RNAV STAR after GREGS aircraft will proceed to ROWDI waypoint before turning east on to the base leg. In north flow on the GIBBI RNAV STAR after GREGS aircraft will continue to GIBBI waypoint then expect vectors to the downwind. The addition of the enroute transitions will provide a more predictable routing for traffic arriving from ZAB.

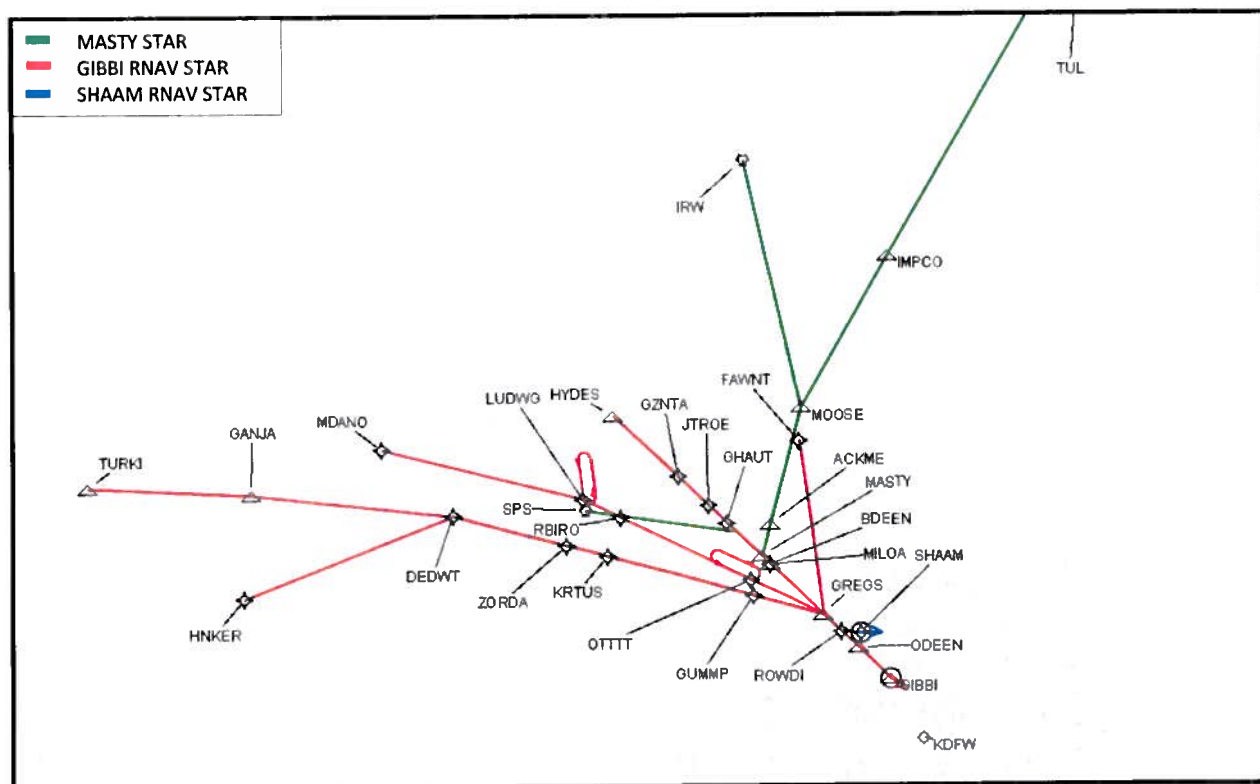
# North Texas OAPM Design Package

## DFW STARS, GIBBI and SHAAM DFW RNAV STARS

The Design Team did not include the crossover procedure to the east side of DFW as proposed by the Study Team. Industry partners suggested it would not be beneficial to publish this as the procedure is seldom used today. Additionally, based on current FAA Order 7110.65 guidance dated February 9, 2012, the use of runway transitions is not practical for this procedure.

These procedures will reduce controller and pilot task complexity.

Figure 3 depicts the proposed GIBBI and SHAAM RNAV STARS.



**Figure 3. Proposed GIBBI and SHAAM RNAV STARS and MASTY STAR**

### Additional Design Considerations

ZFW identified periods when the use of dual STARS was not permitted by D10, which led to in-trail vectoring in their airspace. D10 advised that the use of dual STARS was often dictated by departure demand. It is difficult to climb above the arrivals using pre-coordinated climb areas when there are two streams of traffic in this area. D10 also identified the difficulty of merging a dual arrival stream into a single arrival stream in their airspace, which is required if the two streams are not feeding separate runways.

Human-in-the-loop simulations validated these proposed designs.

Spectrum analysis will be required for the proposed airspace changes associated with the proposed GIBBI and SHAAM RNAV STARS.

# **North Texas OAPM Design Package**

## **DFW STARs, GIBBI and SHAAM DFW RNAV STARs**

GIBBI will have a crossing restriction at 12,000 feet and 280 knots at GREGS established via Letter of Agreement. The crossing restriction on the primary STAR will not change when the GIBBI RNAV STAR is in use.

SHAAM will have a crossing restriction at 9,000 feet and 250 knots at GREGS established via Letter of Agreement.

These procedures will only be used by turbojet traffic, are not anticipated to change runway usage, and do not modify flight paths below 3,000 feet Above Ground Level.

### **Implementation Dependencies**

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed GIBBI and SHAAM RNAV STARs.

These procedures are dependent on the following procedures:

- **GIBBI:** This procedure shares waypoints with the DEBBB, JFRYE, JOVEM, NANDR, SHAAM and WESAT RNAV STARs and the BOWIE and GREGS STARs. It is procedurally de-conflicted from the DEBBB, JOVEM and WESAT RNAV STARs and the BOWIE STAR. It has altitude dependencies with the ALIAN, HRPER, KATZZ, HUDAD and WSTEX RNAV SIDs in north flow.
- **SHAAM:** This procedure shares waypoints with the DEBBB, GIBBI, JFRYE, JOVEM, NANDR and WESAT RNAV STARs and the BOWIE and GREGS STARs. It is procedurally de-conflicted from the DEBBB, JOVEM and WESAT RNAV STARs and the BOWIE STAR.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letters of Agreement with D10 and ZAB will require changes for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**


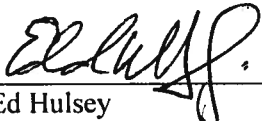
1. GIBBI TARGETS Distribution Package
2. SHAAM TARGETS Distribution Package


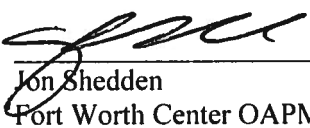
# North Texas OAPM Design Package

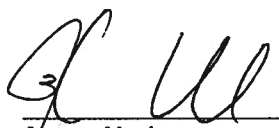

## DFW STARs, GIBBI and SHAAM DFW RNAV STARs

### Review Signatures

The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

	<u>8/22/13</u>		<u>8/22/13</u>
Mark Phipps	Date	Ed Hulse	Date
North Texas OAPM		North Texas OAPM	
FAA Lead		NATCA Lead	

	<u>8/22/13</u>		<u>8/22/13</u>
Robert Ellis	Date	Jon Shedden	Date
Fort Worth Center OAPM		Fort Worth Center OAPM	
Facility Lead		NATCA Lead	

	<u>8/24/13</u>		<u>8/22/13</u>
James Harlan	Date	Ed Rivas	Date
Dallas-Fort Worth TRACON OAPM		Dallas-Fort Worth TRACON OAPM	
Facility Lead		NATCA Lead	

# North Texas OAPM Design Package

## DFW STARs, PAWLZ and TILLA DFW RNAV STARs

Name of Change and Airport/s	Date
PAWLZ and TILLA - DFW	22 August 2013
Change Classification	Current Phase of Design
Terminal Procedure STAR	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
Solution 4	24 July 2014
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 62 and 65</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors MS, FW1, FW2, DR2, AR1, AR2 and AR3</li> </ul>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Airspace Design Packages</b> <ul style="list-style-type: none"> <li>Southwest Corner Post</li> </ul> <b>Procedure Design Packages</b> <ul style="list-style-type: none"> <li>STARs: BACHR, BOOVE GLEN ROSE, KNEAD, LIKES, NRTAY, PAWLZ, SOCKK, SWAVY and TILLA</li> <li>SIDs: ALIAN, HUDAD, HRPER, KATZZ and WSTEX</li> </ul>	NTEX OAPM 201309.tgs

### Purpose

The Study Team identified an issue with the limited use of low-side dual/offload routes due to confined vectoring airspace. High-side dual/offload arrival routes were typically not in use due to the complexity for DAL departures trying to climb above the dual/offload routes and the sequencing of dual/offloads into one arrival stream if dual/offloads are not feeding separate runways.

### Study Team Recommendation

The Study Team recommended creating RNAV STARs, for both primary and offload (dual) DFW arrivals, with runway transitions to facilitate more predictable management of dual STARs and crossing aircraft from east side to west side and west side to east side. The Study Team

# North Texas OAPM Design Package

## DFW STARs, PAWLZ and TILLA DFW RNAV STARs

proposed the introduction of runway transitions on the proposed RNAV OPD STARs in order to more effectively manage high-side dual routes. The RNAV routes and transitions provide more predictable routing, thereby facilitating more predictable management of dual STARs and crossing aircraft from east side to west side and west to east; incorporate PBN concepts for the stakeholders; result in a reduction in phraseology for controllers; and should allow optimization of traffic management advisor on the dual routes.

Figure 1 depicts the recommended RNAV STAR, north flow.

Figure 2 depicts the recommended RNAV STAR, south flow.

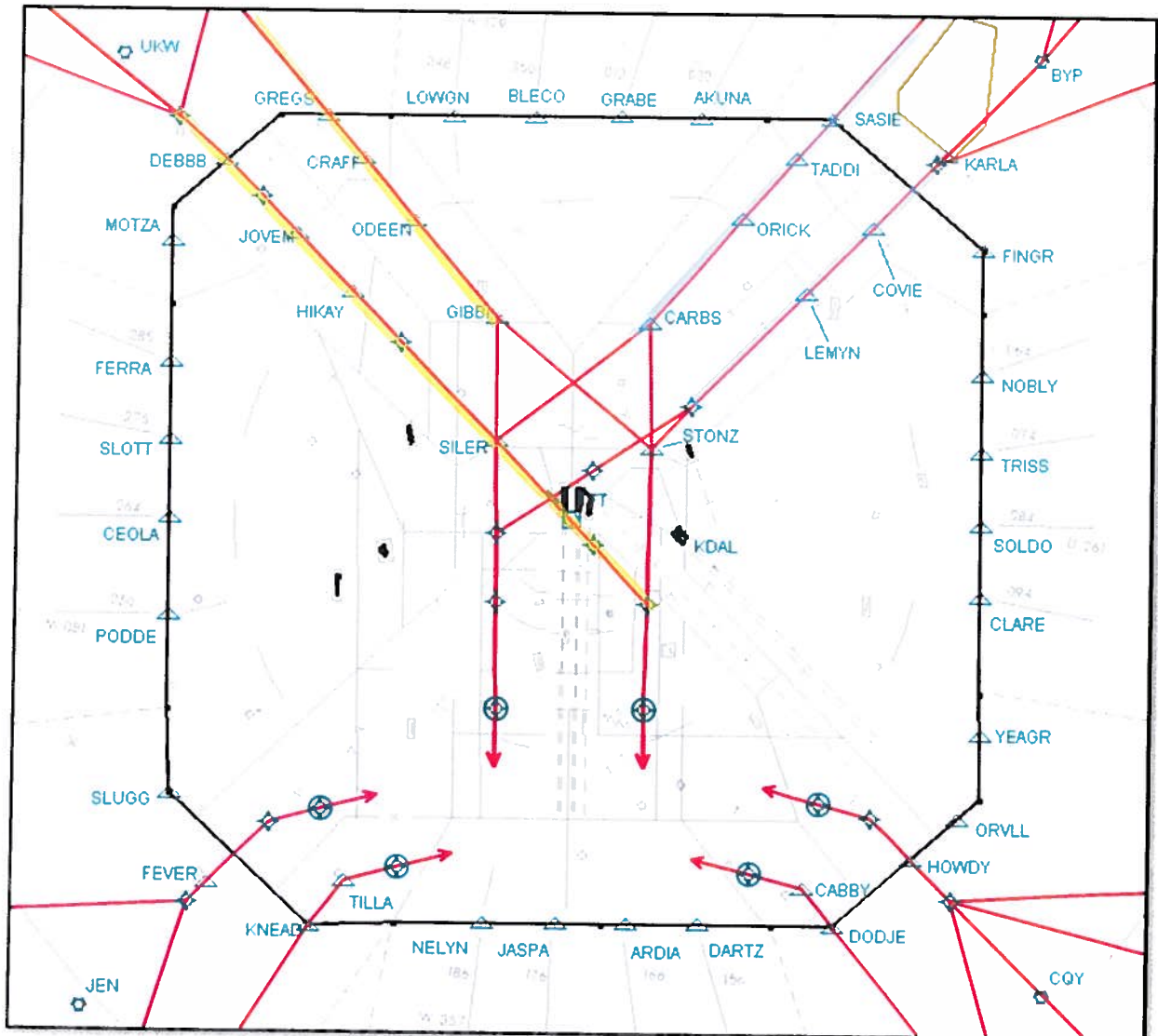
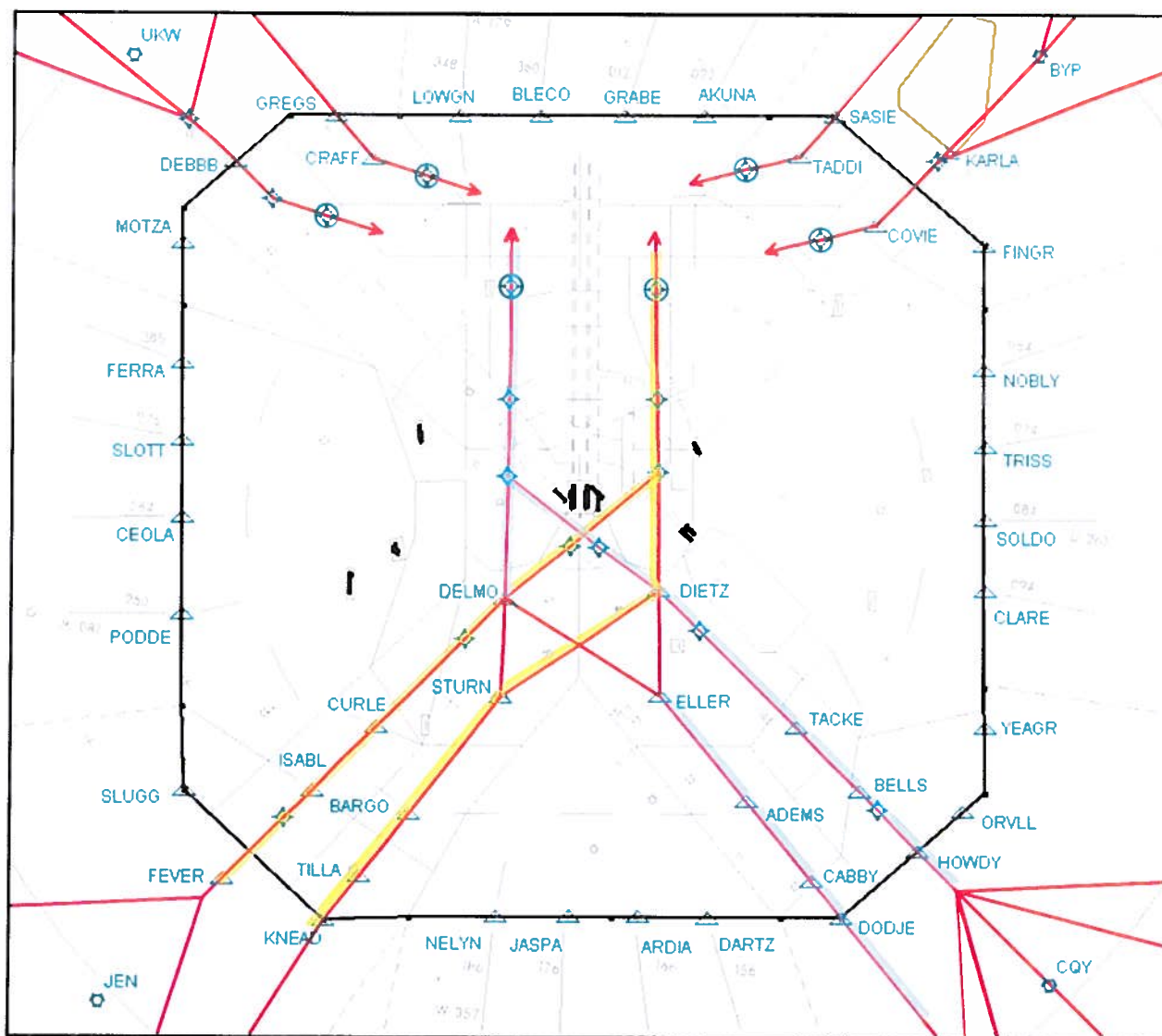


Figure 1. Study Team Recommendation, North Flow



# North Texas OAPM Design Package

## DFW STARs, PAWLZ and TILLA DFW RNAV STARs



**Figure 2. Study Team Recommendation, South Flow**

### **Proposed Design**

The North Texas Design Team is proposing the creation of two new RNAV STARs, named PAWLZ and TILLA replacing the JUMBO STAR. The proposed designs incorporate two enroute transitions starting at BIGTO and DITSY waypoints. The enroute transitions will join at KNEAD waypoint, where arrivals on the PAWLZ RNAV STAR will continue to PAWLZ waypoint to join the base in north flow, or arrivals on the TILLA RNAV STAR will continue to STURN waypoint to join the downwind in south flow. The enroute transition at BIGTO will allow for all traffic arriving from ZAB and ZHU to have a predictable route of flight when using this dual arrival route. The transition from the south was shortened to start at DITSY to allow for arrivals from the south to fly a more direct route towards DFW.

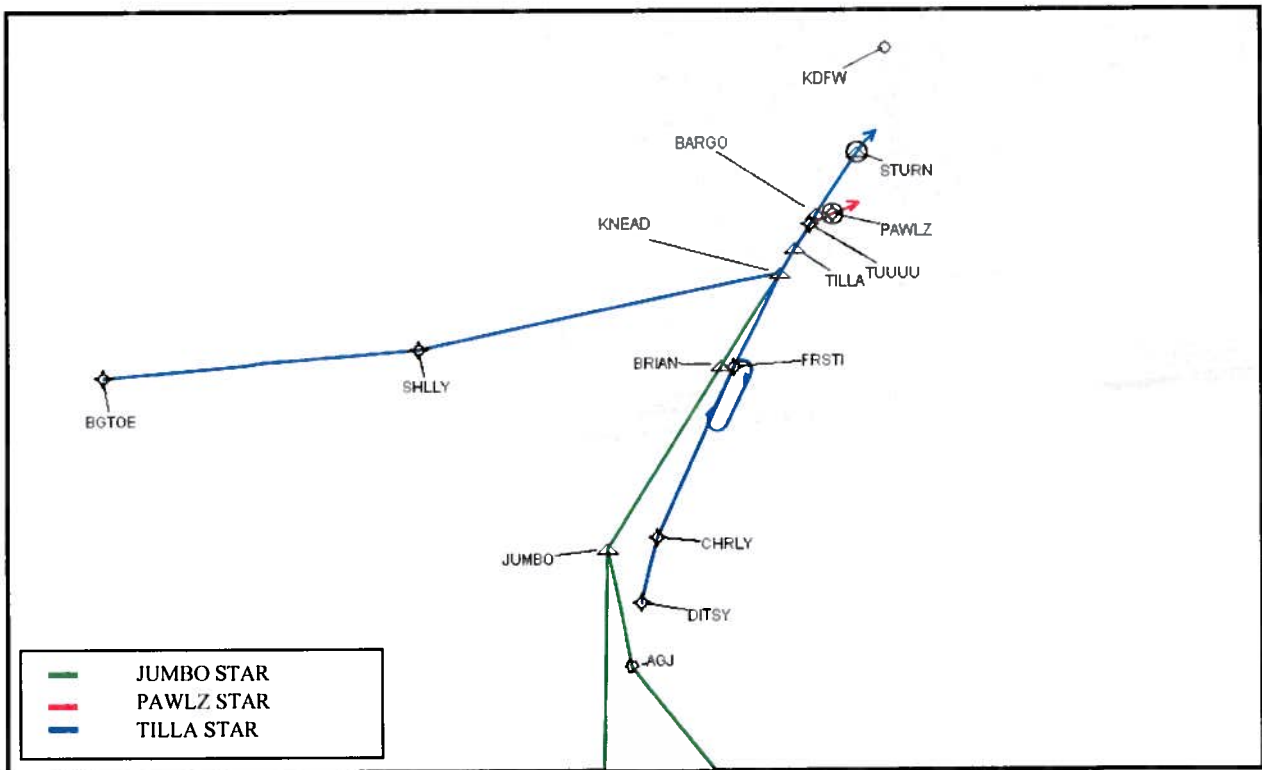


# North Texas OAPM Design Package

## DFW STARs, PAWLZ and TILLA DFW RNAV STARs

The Design Team did not include the crossover procedure to the east side of DFW as proposed by the Study Team. Industry partners suggested it would not be beneficial to publish this as the procedure is seldom used today. Additionally, based on current FAA Order 7110.65 guidance dated February 9, 2012, the use of runway transitions is not practical for this procedure.

Figure 3 depicts the proposed PAWLZ and TILLA RNAV STARs.



**Figure 3. Proposed PAWLZ and TILLA RNAV STARs and JUMBO STAR**

### Additional Design Considerations

Human-in-the-loop simulations validated these proposed designs.

Spectrum analysis will be required for the proposed airspace changes associated with the proposed PAWLZ and TILLA RNAV STARs.

PAWLZ will have a crossing restriction at 11,000 feet at KNEAD waypoint established via Letter of Agreement.

TILLA will have a crossing restriction at 12,000 feet at KNEAD established via Letter of Agreement.

These procedures will only be used by turbojet traffic, are not anticipated to change runway usage, and do not modify flight paths below 3,000 feet Above Ground Level.

# **North Texas OAPM Design Package**

## **DFW STARs, PAWLZ and TILLA DFW RNAV STARs**

### **Implementation Dependencies**

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed PAWLZ and TILLA RNAV STARs.

These procedures are dependent on the following procedures:

- **PAWLZ:** This procedure shares waypoints with the BACHR, BOOVE, NRTAY, SOCKK, SWVAY and TILLA RNAV STARs and the KNEAD STAR. It is procedurally de-conflicted from the BOOVE, LIKES and SOCKK RNAV STARs and GLEN ROSE STAR.
- **TILLA:** This procedure shares waypoints with the BACHR, BOOVE, NRTAY, PAWLZ, SOCKK and SWVAY RNAV STARs and the KNEAD STAR. It is procedurally de-conflicted from the BOOVE, LIKES and SOCKK RNAV STARs and GLEN ROSE STAR. It has altitude dependencies with the ALIAN, HRPER, HUDAD, KATZZ and WSTEX RNAV SIDs in south flow.

The ZFW and D10 Standard Operating Procedures will require changes for transfer of control points. The ZFW Letters of Agreement with D10 will require changes for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**

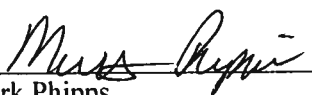
1. PAWLZ TARGETS Distribution Package
2. TILLA TARGETS Distribution Package

# North Texas OAPM Design Package

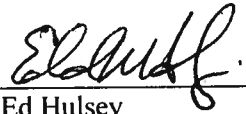
## DFW STARs, PAWLZ and TILLA DFW RNAV STARs

### Review Signatures


The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

  
\_\_\_\_\_  
Mark Phipps  
North Texas OAPM  
FAA Lead


8/22/13  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Ed Hulsey  
North Texas OAPM  
NATCA Lead

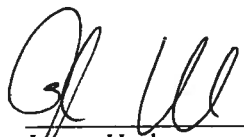
8/22/13  
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Date

  
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Robert Ellis  
Fort Worth Center OAPM  
Facility Lead

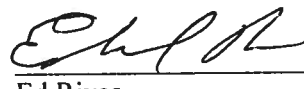
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Jon Shedden  
Fort Worth Center OAPM  
NATCA Lead

8/22/13  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
James Harlan  
Dallas-Fort Worth TRACON OAPM  
Facility Lead

8/22/13  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Ed Rivas  
Dallas-Fort Worth TRACON OAPM  
NATCA Lead

8/22/13  
\_\_\_\_\_  
Date

# North Texas OAPM Design Package

## DFW STARs, BAWLZ and CABBY DFW RNAV STARs

Name of Change and Airport/s	Date
<b>BAWLZ and CABBY - DFW</b>	<b>22 August 2013</b>
Change Classification	Current Phase of Design
<b>Terminal Procedure STAR</b>	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
<b>Solution 4</b>	<b>24 July 2014</b>
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 29 and 89</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors FW1, FW2, FE1, FE2, AR1, AR2, AR3, AR5, AR6 and DE</li> </ul>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Airspace Design Packages</b> <ul style="list-style-type: none"> <li>Southeast Corner Post</li> </ul> <b>Procedure Design Packages</b> <ul style="list-style-type: none"> <li>STARs: BAWLZ , CABBY, CEDAR CREEK , CHUKK, EESAT, KLNDR, MNND0, REDDN, REEKO, WHINY and YEAGR</li> <li>SIDs: FORCK, MRSSH, SKTER and TRYTN</li> </ul>	<b>NTEX OAPM 201309.tgs</b>

### Purpose

The Study Team identified an issue with the limited use of low-side dual routes due to confined vectoring airspace. High-side dual arrival routes were typically not in use due to the complexity for DAL departures trying to climb above the dual routes and the sequencing of duals into one arrival stream if duals are not feeding separate runways.

### Study Team Recommendation

The Study Team recommended creating RNAV STARs, for both primary and dual DFW arrivals, with runway transitions to facilitate more predictable management of dual STARs and crossing aircraft from east side to west side, and west side to east side. The Study Team proposed

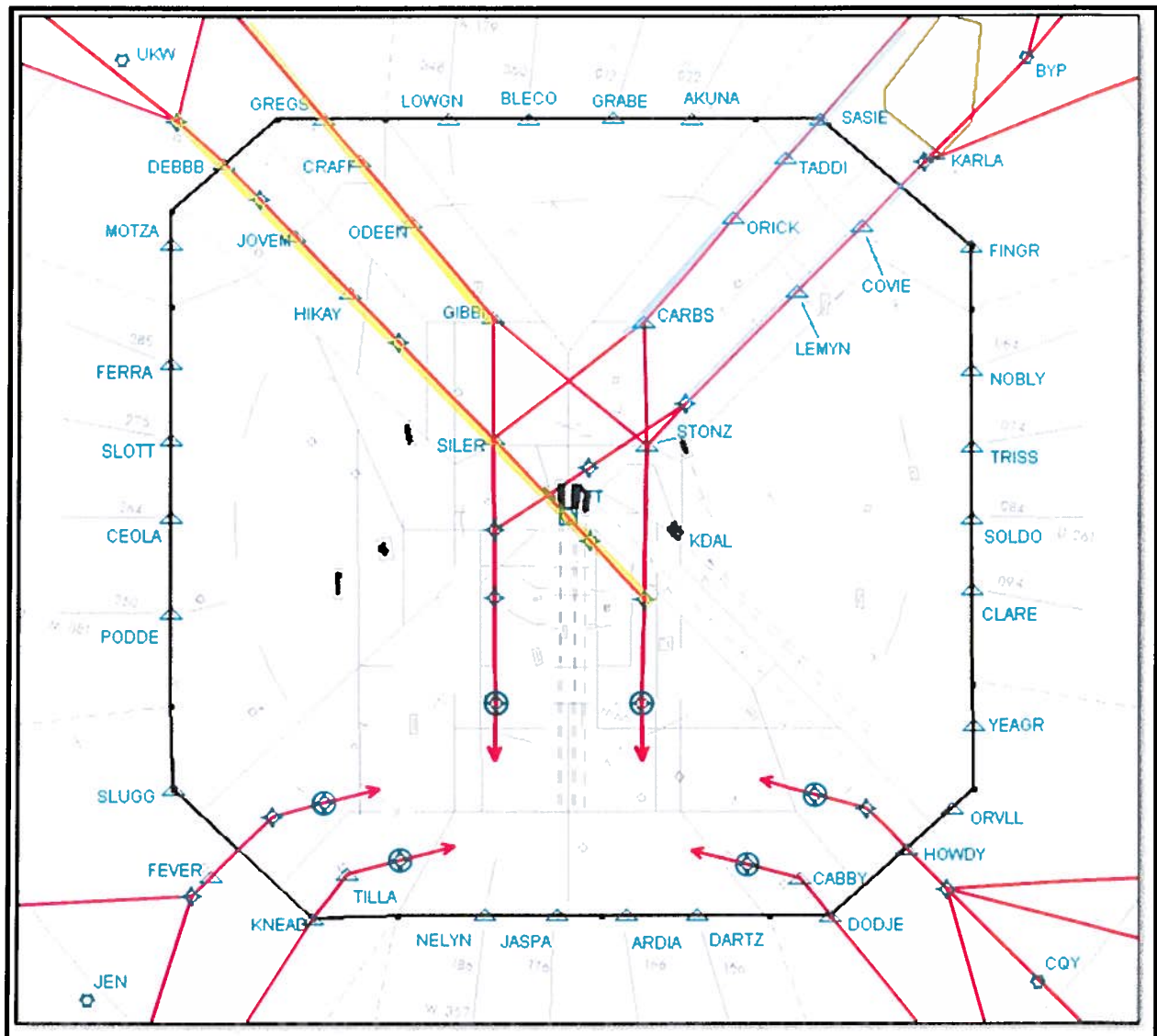
# North Texas OAPM Design Package

## DFW STARS, BAWLZ and CABBY DFW RNAV STARs

the introduction of runway transitions on the proposed RNAV OPD STARs in order to more effectively manage high-side dual routes. The RNAV routes and transitions provide more predictable routing, thereby facilitating more predictable management of dual STARs and crossing aircraft from east side to west side, and west to east; incorporate PBN concepts for the stakeholders; result in a reduction in phraseology for controllers; and should allow optimization of TMA on the dual routes.

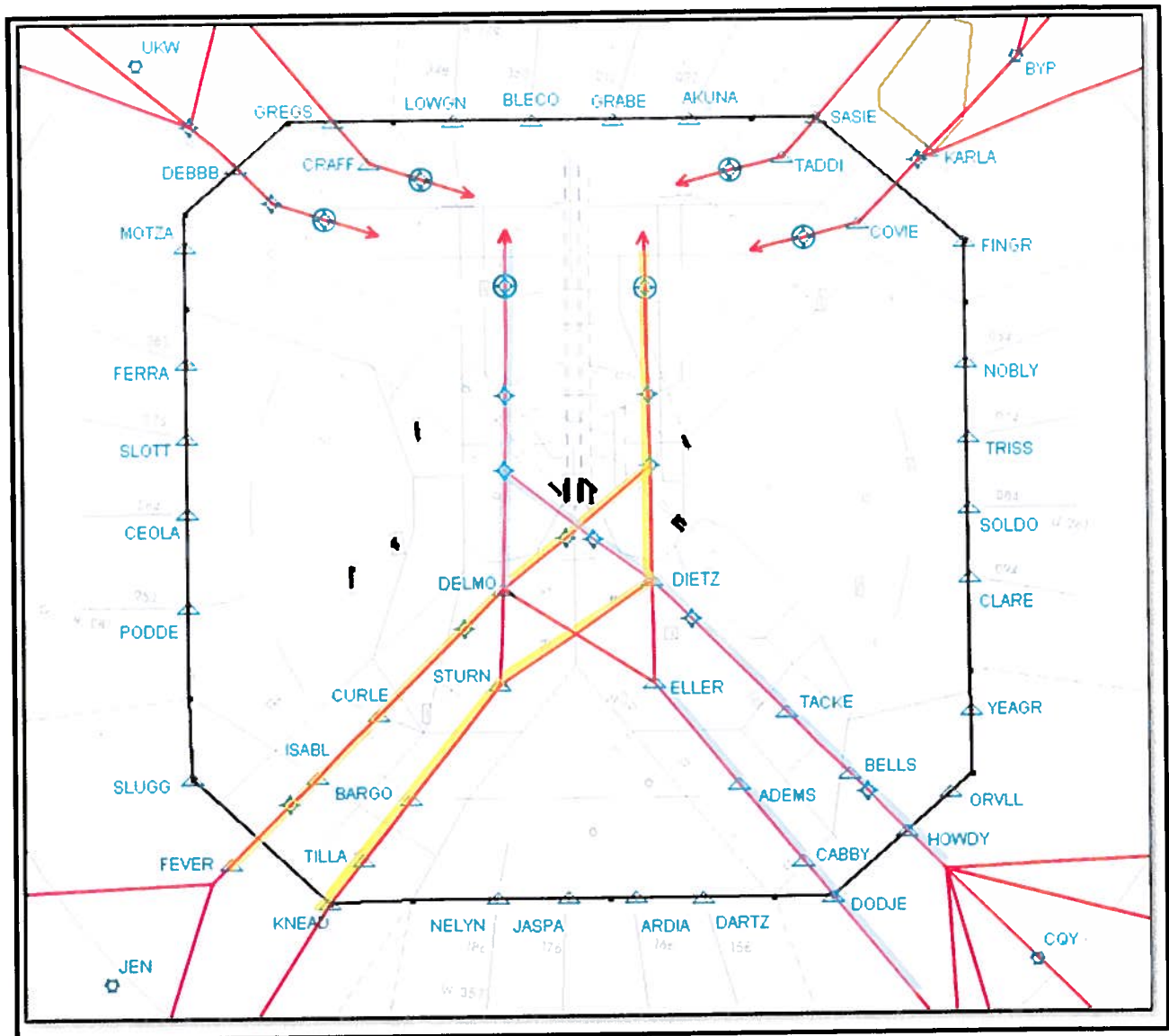
Figure 1 depicts recommended RNAV routes, north flow.

Figure 2 depicts recommended RNAV routes, south flow



# North Texas OAPM Design Package

## DFW STARS, BAWLZ and CABBY DFW RNAV STARS



**Figure 2. Study Team Recommendation, South Flow**

### **Proposed Design**

The North Texas OAPM Design Team is proposing the implementation of two new RNAV STARS named BAWLZ and CABBY for traffic offloaded from the KLNDR and WHINY RNAV STARS during times of high traffic volume. These procedures will be ATC-assigned only. These procedures will replace the JAGGO STAR. A total of four enroute transitions starting at PUDJE, MERKK, CRIED and CHEVE waypoints are incorporated into the RNAV STARS. The proposed procedure design is similar to the JAGGO STAR and procedurally de-conflicted from the proposed KLNDR and WHINY RNAV STARS. The Design Team did not include the crossover procedure to the west side of DFW as proposed by the Study Team. Industry partners suggested it would not be beneficial to publish this as the procedure is seldom

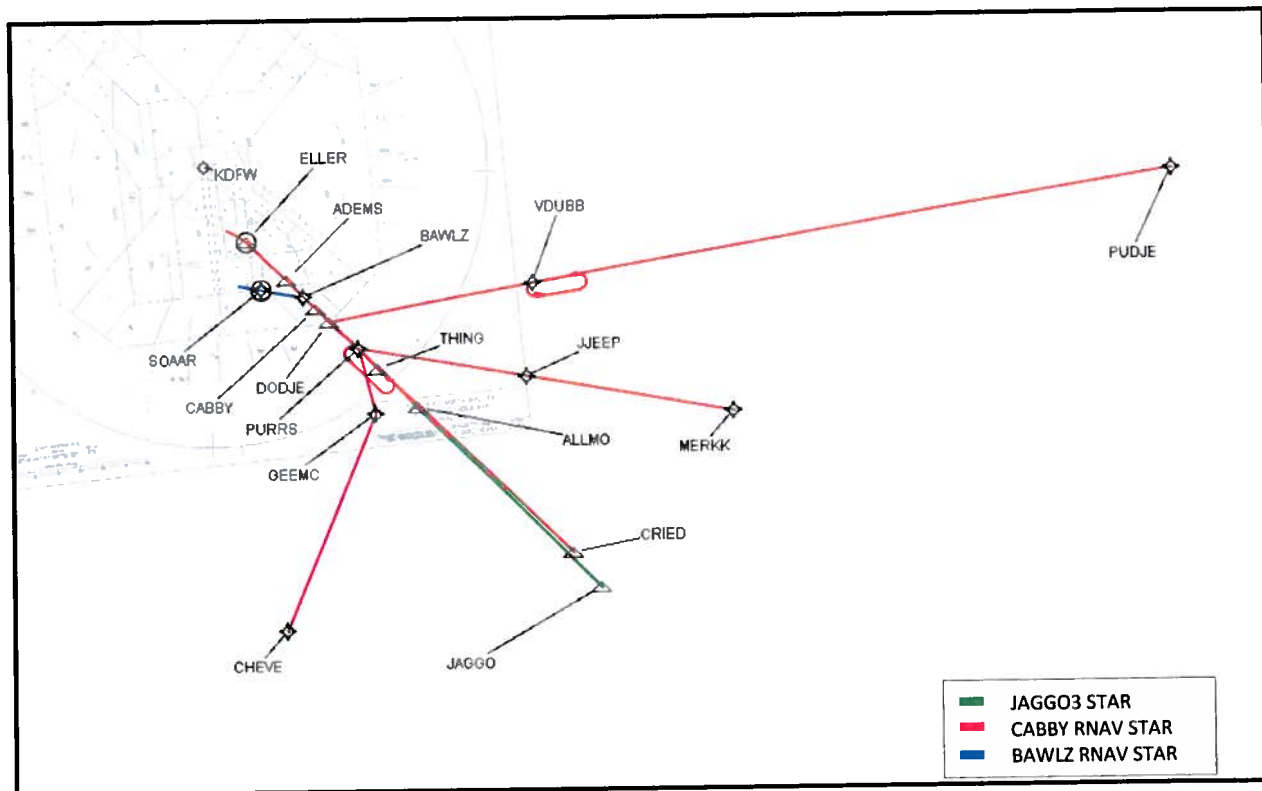
# North Texas OAPM Design Package

## DFW STARs, BAWLZ and CABBYP DFW RNAV STARs

used today. Additionally, based on current FAA Order 7110.65 guidance dated February 9, 2012, the use of runway transitions is not practical for this procedure.

These proposed RNAV STARs will reduce miles flown, increase flight path predictability and decrease controller and pilot task complexity.

Figure 3 depicts the proposed BAWLZ and CABBYP RNAV STARs.



**Figure 3. Proposed BAWLZ and CABBYP RNAV STARs and JAGGO THREE STAR**

### Additional Design Considerations

ZFW identified periods when the use of dual STARs was not permitted by D10, which led to in-trail vectoring in their airspace. D10 advised that the use of dual STARs was often dictated by departure demand. It is difficult to climb above the arrivals using pre-coordinated climb areas when there are two streams of traffic in this area. D10 also identified the difficulty of merging a dual arrival stream into a single arrival stream in their airspace, which is required if the two streams are not feeding separate runways.

Human-in-the-loop simulations validated these proposed designs.

Spectrum analysis will be required for the proposed airspace changes associated with the proposed CABBYP and BAWLZ RNAV STARs.

# **North Texas OAPM Design Package**

## **DFW STARs, BAWLZ and CABBY DFW RNAV STARs**

The CABBY RNAV STAR will have a crossing restriction at 14,000 feet and 280 knots at DODJE waypoint. The crossing restriction on the primary STAR will not change when the CABBY RNAV STAR is in use.

The BAWLZ RNAV STAR will have a crossing restriction of 11,000 feet and 250 knots at DODJE in a north flow.

These procedures will be used by turbojet traffic, are not anticipated to change runway usage, and do not modify flight paths below 3,000 feet Above Ground Level.

### **Implementation Dependencies**

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed BAWLZ and CABBY RNAV STARs.

These procedures are dependent on the following procedures:

- **CABBY:** This procedure shares waypoints with the BAWLZ, CHUKK, EESAT, KLNDR, MNND0, REDDN, REEKO and WHINY RNAV STARs. It is procedurally de-conflicted from the KLNDR and WHINY RNAV STARs and the CEDAR CREEK and YEAGR STARs. It has altitude dependencies with the FORCK, MRSSH, SKTER and TRYTN RNAV SIDs in south flow.
- **BAWLZ:** This procedure shares waypoints with the CABBY, CHUKK, EESAT, KLNDR, MNND0, REDDN, REEKO and WHINY RNAV STARs. It is procedurally de-conflicted from the KLNDR and WHINY RNAV STARs and the CEDAR CREEK and YEAGR STARs.

The ZFW and D10 Standard Operating Procedures will need to be modified. The ZFW Letter of Agreement with D10 will need to be modified for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**

1. BAWLZ TARGETS Distribution Package
2. CABBY TARGETS Distribution Package

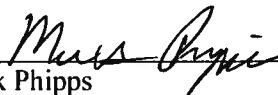
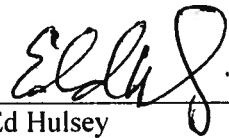


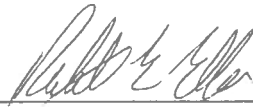
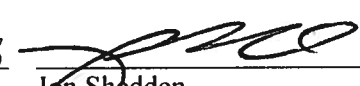
# North Texas OAPM Design Package



## DFW STARs, BAWLZ and CABBY DFW RNAV STARs

### Review Signatures

The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

	<u>8/22/13</u>		<u>8/22/13</u>
Mark Phipps	Date	Ed Hulse	Date
North Texas OAPM		North Texas OAPM	
FAA Lead		NATCA Lead	

	<u>8/22/13</u>		<u>8/22/13</u>
Robert Ellis	Date	Jon Shedden	Date
Fort Worth Center OAPM		Fort Worth Center OAPM	
Facility Lead		NATCA Lead	

	<u>8/22/13</u>		<u>8/22/13</u>
James Harlan	Date	Ed Rivas	Date
Dallas-Fort Worth TRACON OAPM		Dallas-Fort Worth TRACON OAPM	
Facility Lead		NATCA Lead	

# North Texas OAPM Design Package

## DAL STARs, BACHR and NRTAY DAL RNAV STARs

Name of Change and Airport/s	Date
BACHR and NRTAY - DAL	22 August 2013
Change Classification	Current Phase of Design
Terminal Procedure STAR	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
Solutions 1, 7 and 9	24 July 2014
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 61, 62, 63 and 65</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors MS, DR2, DS, DN and AR7</li> </ul> <b>ARTCCs</b> <ul style="list-style-type: none"> <li>Albuquerque (ZAB) and Kansas City (ZKC)</li> </ul> <b>TRACONS</b> <ul style="list-style-type: none"> <li>Abilene (ABI), Midland (MAF), San Angelo (SJT) and Waco (ACT)</li> </ul> <b>Gray RAPCON (GRK)</b>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Airspace Design Packages</b> <ul style="list-style-type: none"> <li>Southwest Corner Post</li> </ul> <b>Procedure Design Packages</b> <ul style="list-style-type: none"> <li>STARs: BACHR, BOOVE, CHUKK, EESAT, GLEN ROSE, KNEAD, LIKES, NRTAY, PAWLZ, REEKO, SOCKK, WAVY and TILLA</li> <li>DAL RNP-AR Approaches</li> </ul>	NTEX OAPM 201309.tgs

# North Texas OAPM Design Package

## DAL STARs, BACHR and NRTAY DAL RNAV STARs

### Purpose

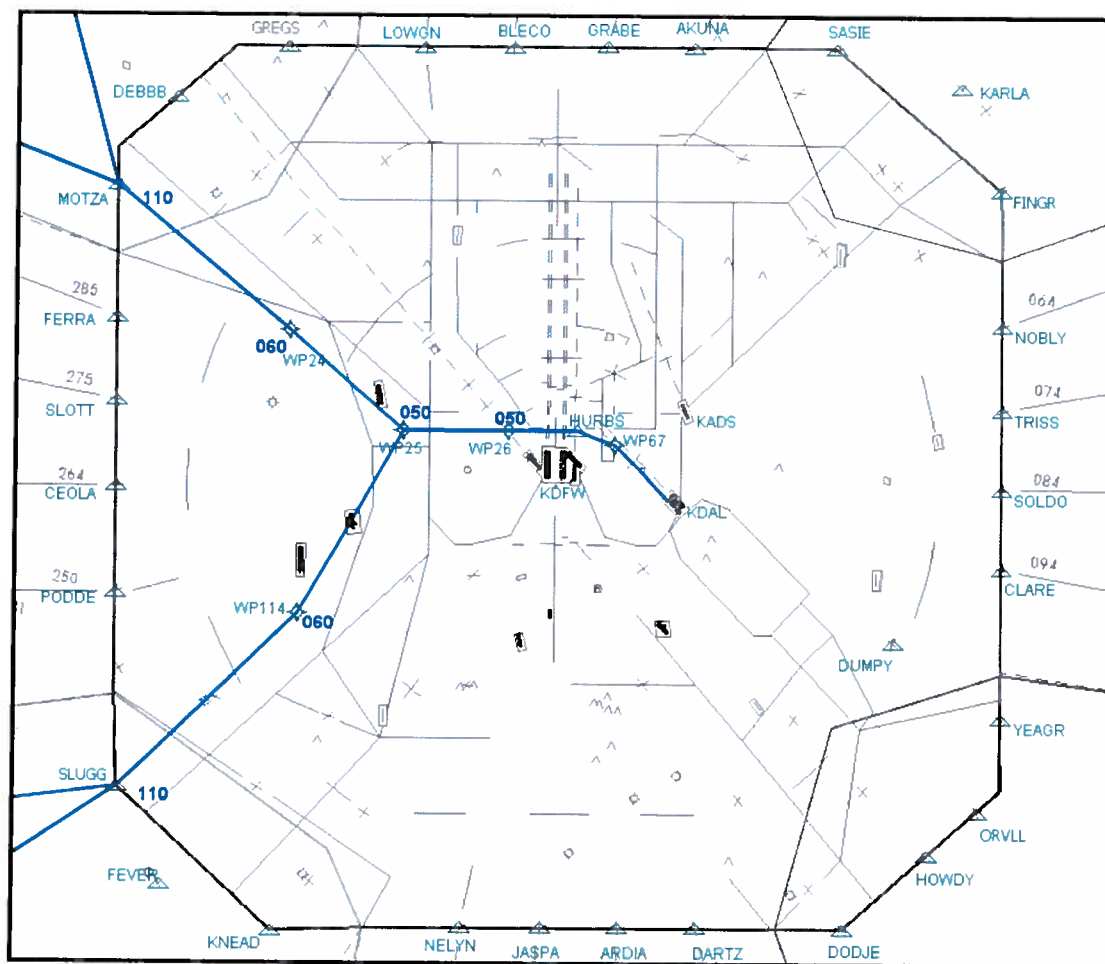
The Study Team identified two issues that impact DAL. The first issue was in-trail delivery of jet arrivals to Dallas Love Field (DAL) does not allow full benefit of Traffic Management Advisor. The second issue was low altitude level segments on arrival.

### Study Team Recommendation

The Study Team recommended the segregation of DFW primary arrival flows from DAL turbojet arrival traffic at all corner posts by creating RNAV STARs with the creation of the SLUGG RNAV STAR.

Figure 1 depicts the SLUGG RNAV STAR, south flow.

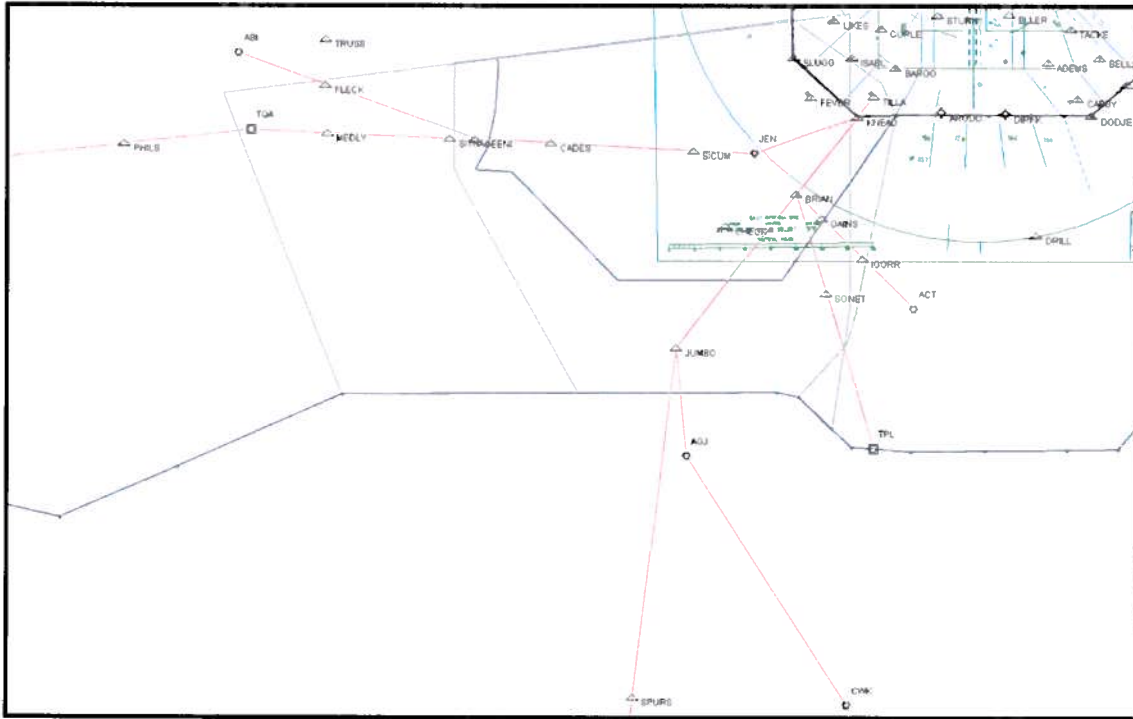
Figure 2 depicts the SLUGG RNAV STAR, north flow.



**Figure 1. Study Team Recommendation, South Flow**

# North Texas OAPM Design Package

## DAL STARs, BACHR and NRTAY DAL RNAV STARs



**Figure 2. Study Team Recommendation, North Flow**

### **Proposed Design**

The North Texas OAPM Design Team is proposing the implementation of two new RNAV STARs, BACHR and NRTAY, as an alternative to the Study Team's recommendation to implement the SLUGG RNAV STAR. Both BACHR and NRTAY RNAV STARs will be Optimized Profile Descents (OPDs). After extensive examination and analysis of the Study Team's SLUGG RNAV STAR recommendation the Design Team concluded it was not operationally or procedurally feasible to implement it for DAL. A transition from ACT was added for low sector arrivals.

The BACHR RNAV STAR merges over KNEAD waypoint. The procedure continues past KNEAD to the northeast tying into the REDDN RNAV STAR to enter a left downwind for DAL Runway (RWY) 13 Right (R) and Left (L). This route will deliver the DAL arrivals into the DFW Class B airspace sooner than today's current conventional procedure when arriving over KNEAD, enhancing safety. The Design Team's proposal will segregate the DFW and DAL arrivals. This procedure terminates in an FM leg associated with the proposed Required Navigation Performance-Authorization Required (RNP-AR) procedure or aircraft will receive vectors for sequencing.

The NRTAY RNAV STAR continues past KNEAD to the northeast and then turns north bound, ending at WASDI waypoint on the base leg to DAL RWY31L/R. D10 controllers will then vector aircraft and sequence them with DAL arrival traffic from the southeast corner from ORVLL waypoint. This route closely follows today's current conventional route that DAL

# North Texas OAPM Design Package

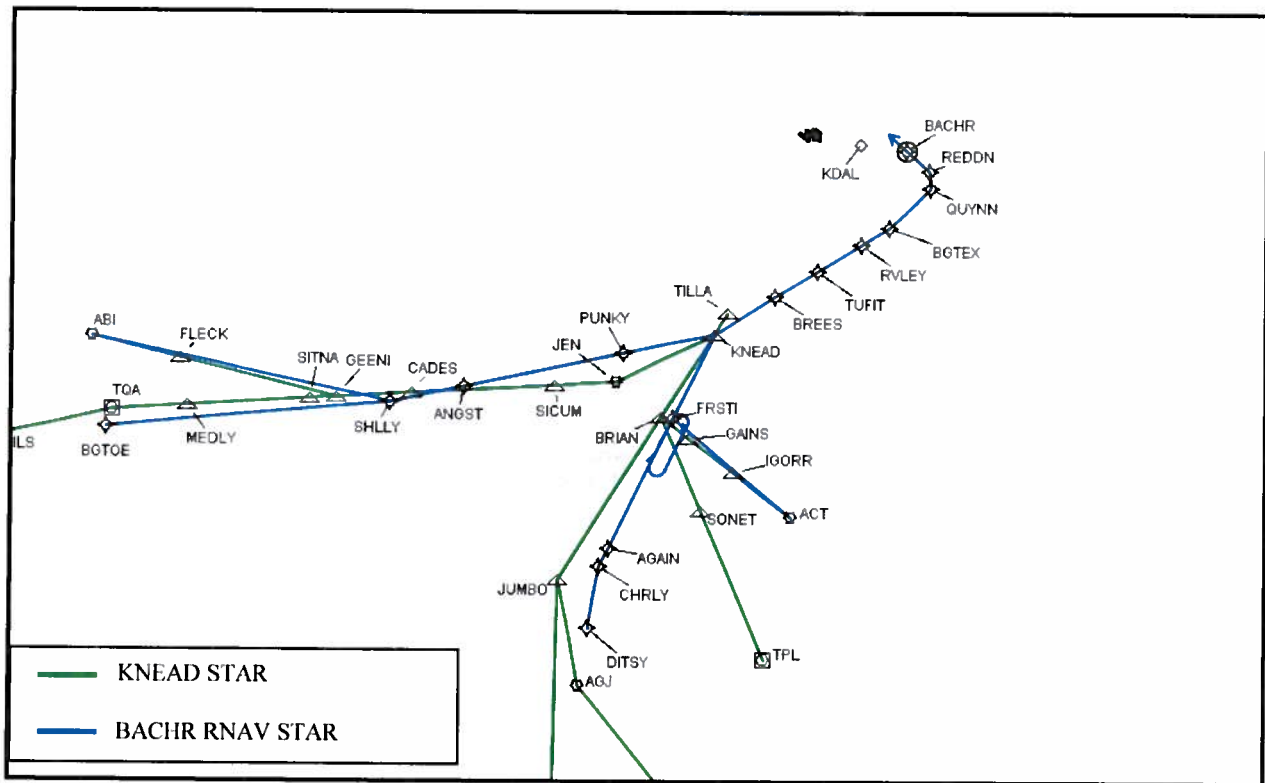
## DAL STARs, BACHR and NRTAY DAL RNAV STARs

aircraft are frequently vectored to when arriving over KNEAD in a north flow. This procedure terminates in an FM leg associated with the proposed Required Navigation Performance-Authorization Required (RNP-AR) procedure or aircraft will receive vectors for sequencing.

The proposed designs will segregate the DFW and DAL arrivals over the southwest corner, increase flight path predictability, and reduce controller task complexity.

Figure 3 depicts the proposed BACHR RNAV STAR.

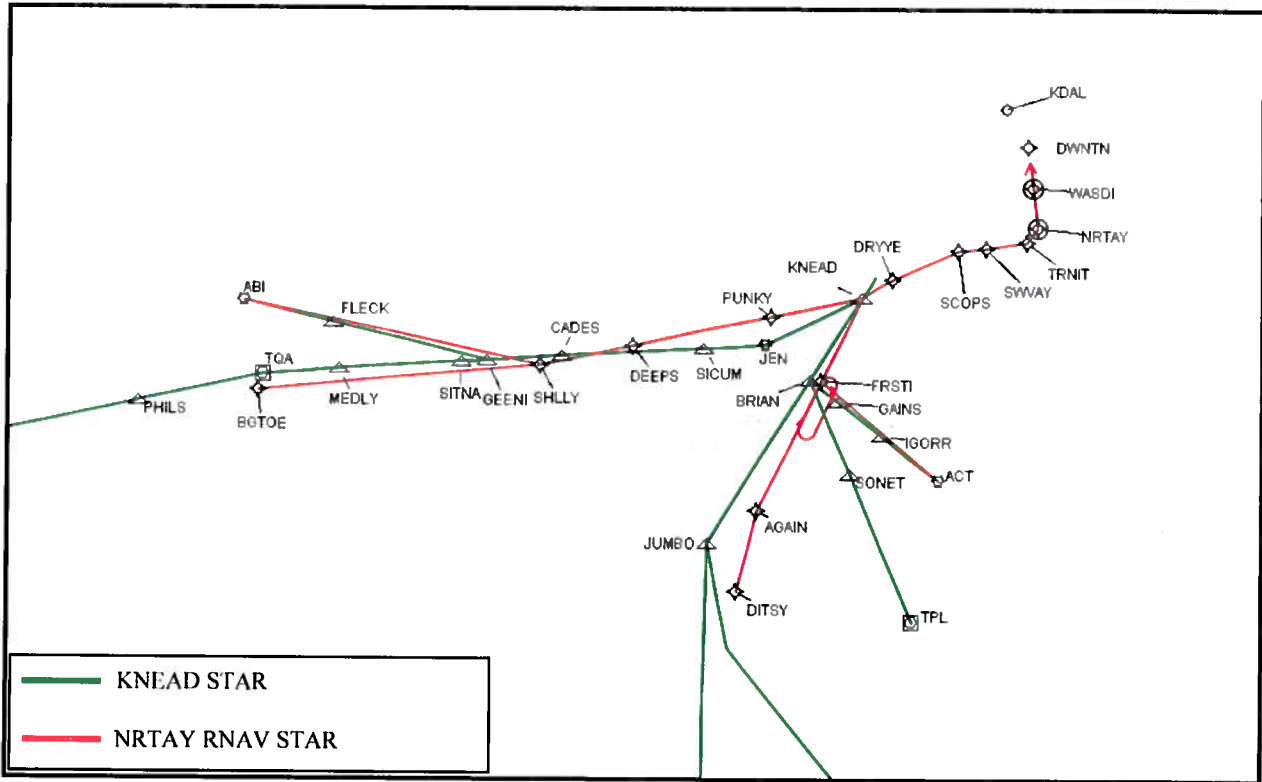
Figure 4 depicts the proposed NRTAY RNAV STAR.



**Figure 3. Proposed BACHR RNAV STAR and KNEAD STAR**

# North Texas OAPM Design Package

## DAL STARs, BACHR and NRTAY DAL RNAV STARs



**Figure 4. Proposed NRTAY RNAV STAR and KNEAD STAR**

### Additional Design Considerations

Human-in-the-loop simulations validated these proposed designs.

Spectrum analysis will be required for the proposed airspace changes associated with the proposed BACHR and NRTAY RNAV STARs.

A crossing restriction at KNEAD between 10,000 and 11,000 feet at 250 knots will be established on the BACHR RNAV STAR.

A crossing restriction at KNEAD at 12,000 feet at 250 knots will be established on the NRTAY RNAV STAR.

These procedures will only be used by turbojet traffic, are not anticipated to change runway usage, and do not modify flight paths below 3,000 feet Above Ground Level.

# **North Texas OAPM Design Package**

## **DAL STARs, BACHR and NRTAY DAL RNAV STARs**

### **Implementation Dependencies**

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed BACHR and NRTAY RNAV STARs

These procedures are dependent on the following procedures:

- **BACHR:** This procedure shares waypoints with the BOOVE, NRTAY, PAWLZ, SOCKK, SWVAY and TILLA RNAV STARs and the KNEAD STAR. It is procedurally de-conflicted from the BOOVE, CHUKK, LIKES and SOCKK RNAV STARs and GLEN ROSE STAR. It ties into the DAL RNP-AR Approach to Runway 13 L/R.
- **NRTAY:** This procedure shares waypoints with the BACHR, BOOVE, PAWLZ, REEKO, SWVAY, TILLA and SOCKK RNAV STARs and the KNEAD STAR. It is procedurally de-conflicted from the BOOVE, LIKES and SOCKK RNAV STARs and GLEN ROSE STAR. It ties into the DAL RNP-AR Approach to Runway 31 L/R.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letters of Agreement with D10, ZHU, ZAB, MAF, ACT, SJT and ABI TRACONS and GRK RAPCON will require changes for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**

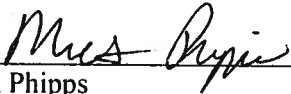
1. BACHR TARGETS Distribution Package
2. NRTAY TARGETS Distribution Package

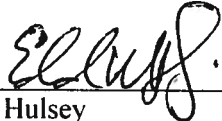
# North Texas OAPM Design Package

## DAL STARs, BACHR and NRTAY DAL RNAV STARs

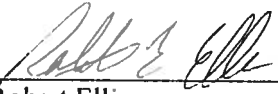
### Review Signatures


The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

  
\_\_\_\_\_  
Mark Phipps  
North Texas OAPM  
FAA Lead


8/22/13   
Date \_\_\_\_\_  
Ed Hulse  
North Texas OAPM  
NATCA Lead


8/22/13  
Date

  
\_\_\_\_\_  
Robert Ellis  
Fort Worth Center OAPM  
Facility Lead

8/22/13   
Date \_\_\_\_\_  
Jon Shedden  
Fort Worth Center OAPM  
NATCA Lead

8/22/13  
Date

  
\_\_\_\_\_  
James Harlan  
Dallas-Fort Worth TRACON OAPM  
Facility Lead

8/22/13   
Date \_\_\_\_\_  
Ed Rivas  
Dallas-Fort Worth TRACON OAPM  
NATCA Lead

8/22/13  
Date



# North Texas OAPM Design Package

## DAL STARs, HIBIL and TRYST DAL RNAV STARs

Name of Change and Airport/s	Date
<b>HIBIL and TRYST - DAL</b>	<b>22 August 2013</b>
Change Classification	Current Phase of Design
<b>Terminal Procedure STAR</b>	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
<b>Solution 1</b>	<b>24 July 2014</b>
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 27, 37, 38, 42, 50, 53, 83 and 90</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors AR7, DE and DN</li> </ul> <b>ARTCCs</b> <ul style="list-style-type: none"> <li>Memphis (ZME) and Kansas City (ZKC)</li> </ul> <b>TRACONs</b> <ul style="list-style-type: none"> <li>Oklahoma City (OKC), Tulsa (TUL) and Razorback (RZC)</li> </ul>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Airspace Design Packages</b> <ul style="list-style-type: none"> <li>Northeast Corner Post</li> </ul> <b>Procedure Design Package</b> <ul style="list-style-type: none"> <li>STARs: BRDJE, CAINE, DAWGZ, FINGR, HIBIL, SANGR, SASIE, SEEVR, SLANT, TRYST and WILBR</li> <li>DAL RNP-AR Approaches</li> </ul>	<b>NTEX OAPM 201309.tgs</b>

### Purpose

The Study Team identified an issue with in-trail delivery of turbojet arrivals to Dallas Love Field (DAL) as it does not allow full benefit of traffic management advisor.

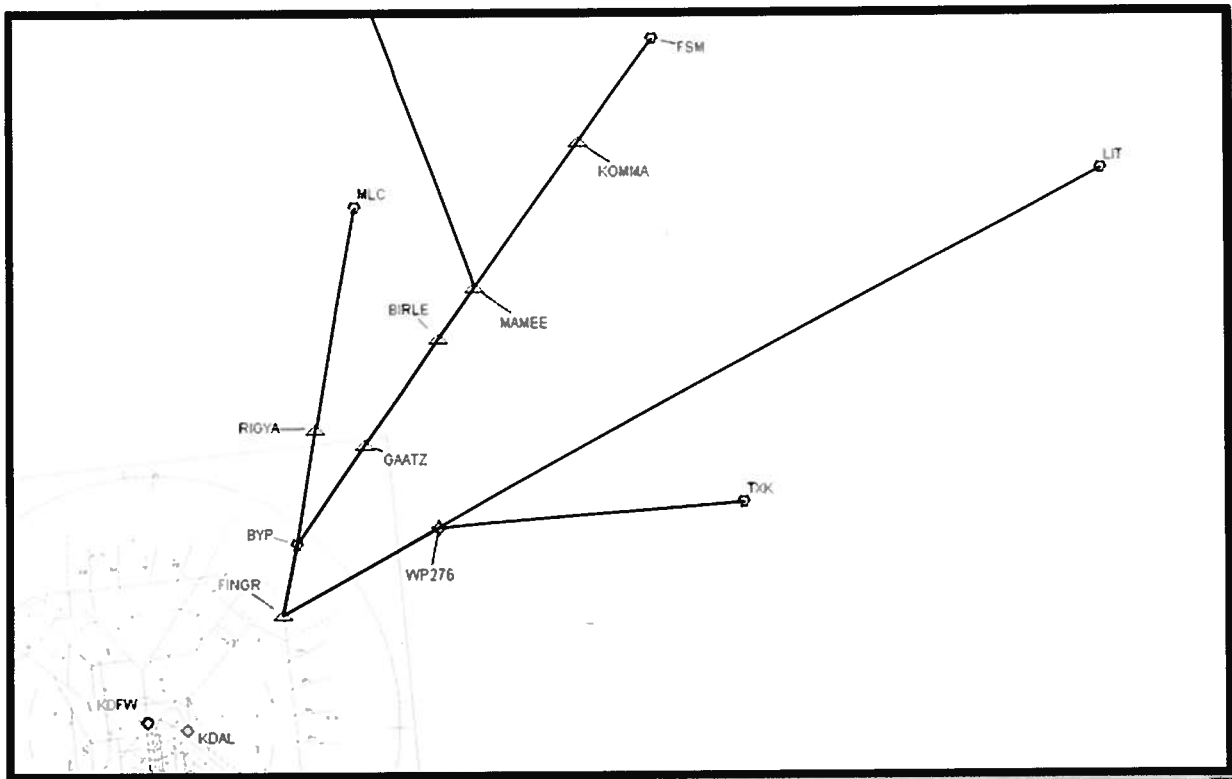
# North Texas OAPM Design Package

## DAL STARs, HIBIL and TRYST DAL RNAV STARs

### Study Team Recommendation

The Study Team recommends the segregation of DFW primary arrival flows from DAL turbojet arrival traffic at all corner posts by creating RNAV STARs. Those STARs would also be designed to attempt to reduce flying miles for users.

Figure 1 depicts the recommended RNAV STAR.



**Figure 1. Study Team Recommendation, North and South Flow**

### Proposed Design

The North Texas OAPM Design Team is proposing the implementation of two new RNAV STARs named HIBIL and TRYST. Both HIBIL and TRYST RNAV STARs will be Optimized Profile Descents (OPDs). The proposed procedures provide more direct routing from the existing Fort Smith (FSM), Little Rock (LIT) and Will Rogers (IRW) enroute transitions. It is anticipated that arrivals over TUL will be given more direct routes to FINGR waypoint as they frequently are today. This routing will also allow arrivals over HITUG waypoint to remain higher longer rather than being descended to a lower altitude below the DFW arrivals.

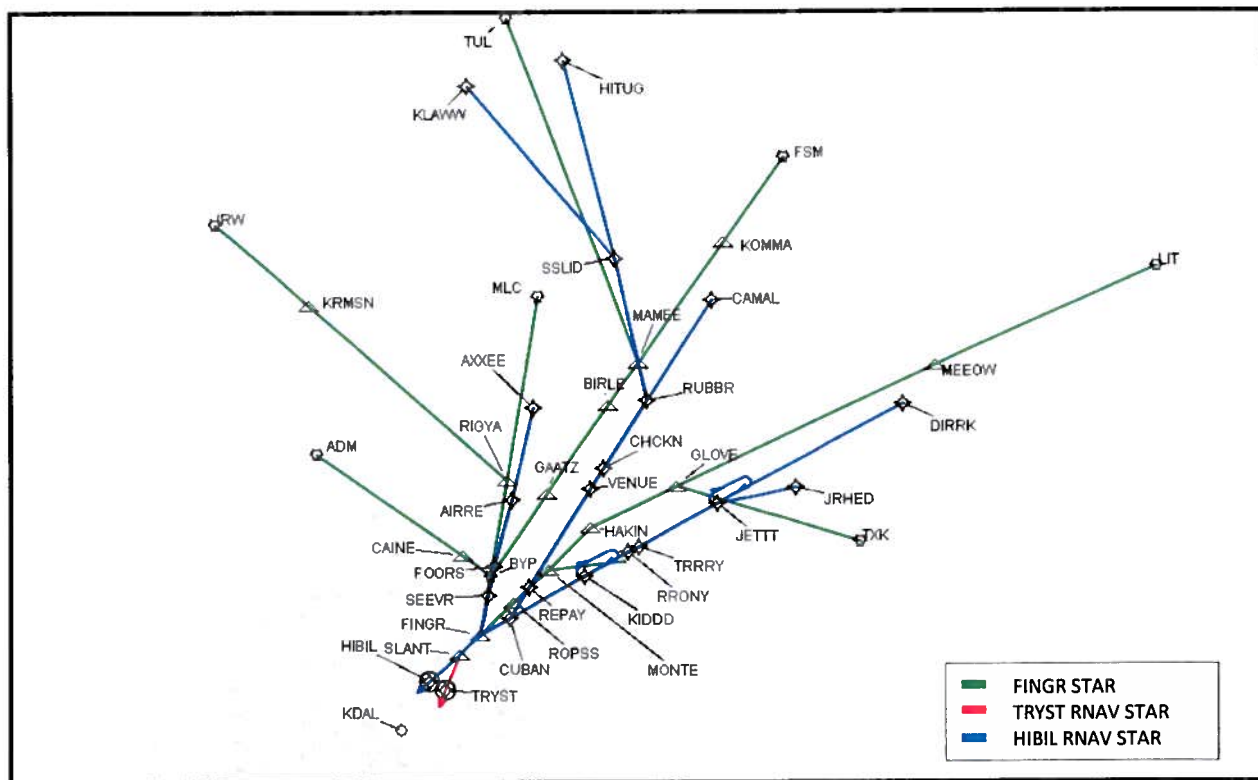
The proposed design continues past FINGR to SLANT waypoint, and then to waypoints TRYST or HIBIL, depending on the flow. After TRYST or HIBIL, aircraft will join the Required Navigation Performance-Authorization Required (RNP-AR) procedure or receive vectors for sequencing. The Design Team's proposal will segregate the DFW and DAL arrival turbojets and will procedurally separate the DAL turbojets from the DFW Primary and Dual routes over the northeast corner in a north or south flow. The JETTT and VENUE waypoints will be used to get

# North Texas OAPM Design Package

## DAL STARs, HIBIL and TRYST DAL RNAV STARs

DAL arrivals under DFW arrivals. This route closely follows today's conventional route for DAL aircraft being vectored to arrive over FINGR in a north or south flow. Aircraft coming from Sector 53 to 37 at FL 190 - FL230 will be routed on the AIRRE transition. Aircraft coming from Sector 27 to 37 at or below FL230 will be routed on the RRONY transition. Aircraft coming from Sector 38 to 37 at FL 190 - FL230 will be routed on the AXXEE transition.

Figure 2 depicts the proposed HIBIL and TRYST RNAV STARs.



**Figure 2. Proposed HIBIL and TRYST RNAV STARs and FINGR STAR**

## Additional Design Considerations

Human-in-the-loop simulations validated these proposed designs.

Spectrum analysis will be required for the proposed airspace changes associated with the proposed HIBIL and TRYST RNAV STARs.

These procedures will only be used by turbojet traffic, are not anticipated to change runway usage, and do not modify flight paths below 3,000 feet Above Ground Level.

# **North Texas OAPM Design Package**

## **DAL STARs, HIBIL and TRYST DAL RNAV STARs**

### **Implementation Dependencies**

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed HIBIL and TRYST RNAV STARs.

These procedures are dependent on the following procedures:

- **TRYST:** This procedure shares waypoints with the BRDJE, CAINE, DAWGZ, HIBIL, SANGR, SEEVR and SLANT RNAV STARs and the SASIE and WILBR STARs. It is laterally separated from the BRDJE and SEEVR RNAV STARs and the FINGR, SASIE and WILBR STARs. It ties into the DAL RNP-AR Approach to Runway 31 L/R.
- **HIBIL:** This procedure shares waypoints with the BRDJE, CAINE, DAWGZ, TRYST, SANGR, SEEVR and SLANT RNAV STARs and the SASIE and WILBR STARs. It is laterally separated from the BRDJE and SEEVR RNAV STARs and the FINGR, SASIE and WILBR STARs. It ties into the DAL RNP-AR Approach to Runway 13 L/R.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letters of Agreement with D10, ZME, ZKC and TUL, FSM, RZC, and OKC TRACONs will require changes for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**

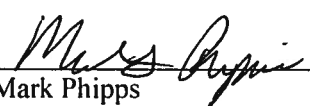
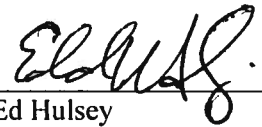
1. HIBIL TARGETS Distribution Package
2. TRYST TARGETS Distribution Package

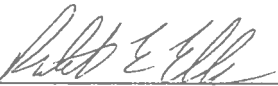
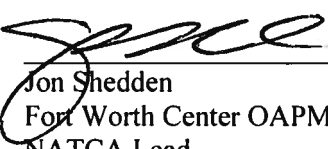
# North Texas OAPM Design Package



## DAL STARs, HIBIL and TRYST DAL RNAV STARs

### Review Signatures

The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

 _____ Mark Phipps North Texas OAPM FAA Lead	<u>8/22/13</u> Date	 _____ Ed Hulsey North Texas OAPM NATCA Lead	<u>8/22/13</u> Date
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 _____ Robert Ellis Fort Worth Center OAPM Facility Lead	<u>8/22/13</u> Date	 _____ Jon Shedden Fort Worth Center OAPM NATCA Lead	<u>8/22/13</u> Date
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 _____ James Harlan Dallas-Fort Worth TRACON OAPM Facility Lead	<u>8/22/13</u> Date	 _____ Ed Rivas Dallas-Fort Worth TRACON OAPM NATCA Lead	<u>8/22/13</u> Date
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# North Texas OAPM Design Package

## DAL STARs, MNND0 and REDDN DAL RNAV STARs

Name of Change and Airport/s	Date
MNND0 and REDDN - DAL	01 xxxx 2013
Change Classification	Current Phase of Design
Terminal Procedure STAR	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
Solutions 1 and 2	24 July 2014
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 29, 30, 52, 83, 86, 89 and 96</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors DE, DS, DN and AR-7</li> </ul> <b>ARTCCs</b> <ul style="list-style-type: none"> <li>Houston (ZHU) and Memphis (ZME)</li> </ul> <b>TRACONs</b> <ul style="list-style-type: none"> <li>Longview (GGG), Monroe (MLU), Shreveport (SHV) and Waco (ACT)</li> </ul> <b>Fort Polk (POE) RAPCON</b>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>Ed Rivas</li> <li>James Harlan</li> </ul> <b>ZHU</b> <ul style="list-style-type: none"> <li>Mike McGhee</li> <li>David Salapata</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Airspace Design Packages</b> <ul style="list-style-type: none"> <li>Southeast Corner Post</li> </ul> <b>Procedure Design Packages</b> <ul style="list-style-type: none"> <li>STARs: BAWLZ, CABBY, CEDAR CREEK, CHUKK, EESAT, KLNDR, MNND0, REDDN, REEKO, WHINY and YEAGR</li> <li>DAL RNP-AR Approaches</li> </ul>	<b>Master TARGETS Files (file extension name)</b>

### Purpose

The North Texas Study Team identified two issues associated with arrivals over the Southeast Corner Post to DAL and Satellite airports. The first issue was with the DUMPY STAR creating a merge of traffic at the DUMPY fix. ZFW is required to manage the merge of arrival flows to

# **North Texas OAPM Design Package**

## **DAL STARs, MNND0 and REDDN DAL RNAV STARs**

East Satellite airports and Dallas Love Field (DAL) at DUMPY over ORVLL and YEAGR waypoints to ensure in trail separation of aircraft at DUMPY. The mix of aircraft types and the number of different airports that are sequenced into this arrival can make it difficult to provide proper in-trail spacing over DUMPY.

The second issue was with in-trail delivery of turbojet arrivals to Dallas Fort Worth International Airport (DFW) and Dallas Love Field (DAL) as it does not allow full benefit of Traffic Management Advisor.

### **Study Team Recommendation**

The Study Team recommended the segregation of DFW primary arrival flows from DAL turbojet arrival traffic and the creation of new RNAV STARs to eliminate the merge at DUMPY fix. The first RNAV STAR was over YEAGR for east satellite turbojets and props, and in a south Flow only for DFW props. The second RNAV STAR was over ORVLL for traffic arriving to DAL. The Study Team determined the segregation of DAL arrivals over ORVLL will allow for the enhanced metering of traffic and eliminate the need for segregating traffic over DUMPY fix. The proposed YEAGR RNAV STAR was offset and parallel to the proposed ORVLL RNAV STAR.

Turbojet and propeller traffic for the satellite airports need to be segregated from the primary DFW RNAV STARs and the DAL RNAV STARs to allow for Optimized Profile Descents (OPD) for DFW turbojet traffic, and to create predictable and repeatable flight paths for all satellite arrivals. This proposed design will accomplish these requirements.

Figure 1 depicts the recommended YEAGR and ORVLL RNAV STARs

# North Texas OAPM Design Package

## DAL STARs, MNND0 and REDDN DAL RNAV STARs

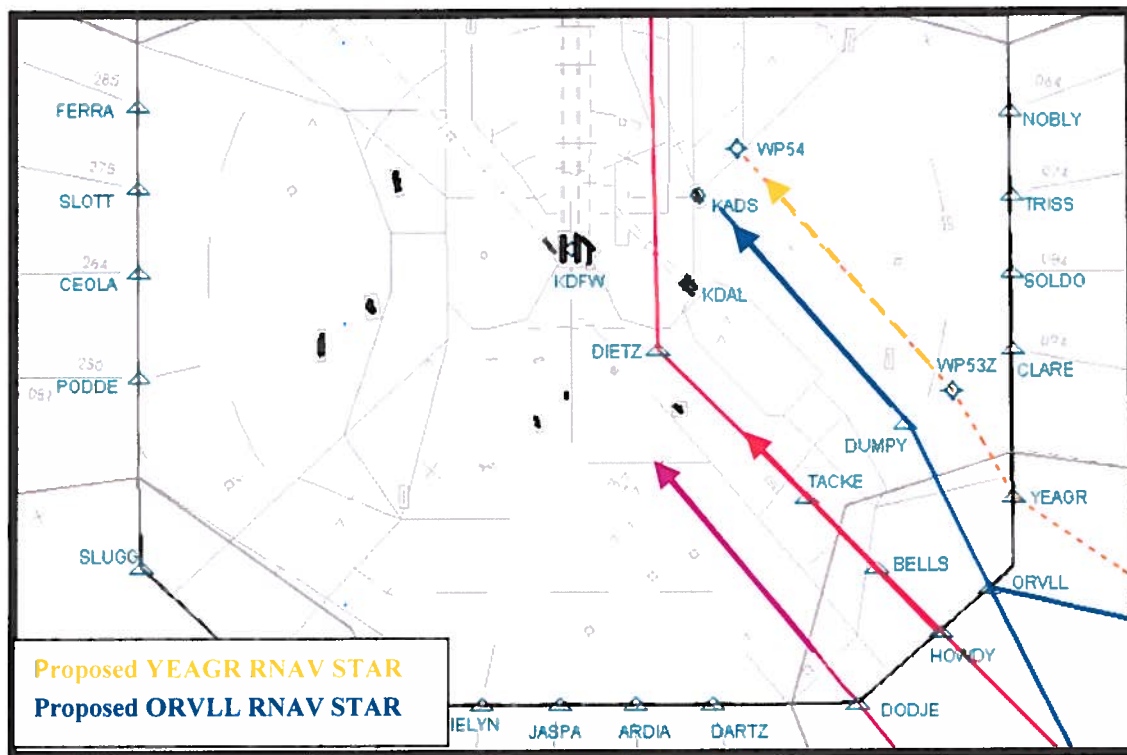


Figure 1. Study Team Recommendation

### Proposed Design

The Design Team is proposing the creation of two new RNAV STARs, named MNND0 and REDDN. Both MNND0 and REDDN RNAV STARs will be Optimized Profile Descents (OPDs). The proposed RNAV STARs will segregate the flow of traffic over the Southeast Corner Post in north and south flow eliminating the need to sequence a merge of traffic over the DUMPY waypoint. The MNND0 RNAV STAR incorporates runway transitions to Runway (RWY) 31 Left (L) and Right (R). This procedure terminates in an FM leg associated with the proposed Required Navigation Performance-Authorization Required (RNP-AR) procedure or aircraft will receive vectors for sequencing. The MNND0 RNAV STAR is procedurally de-conflicted from the YEAGR RNAV STAR, except when ATC assigns DAL arrivals the transition over YEAGR. This will be done on a non-interference basis with east satellite arrivals.

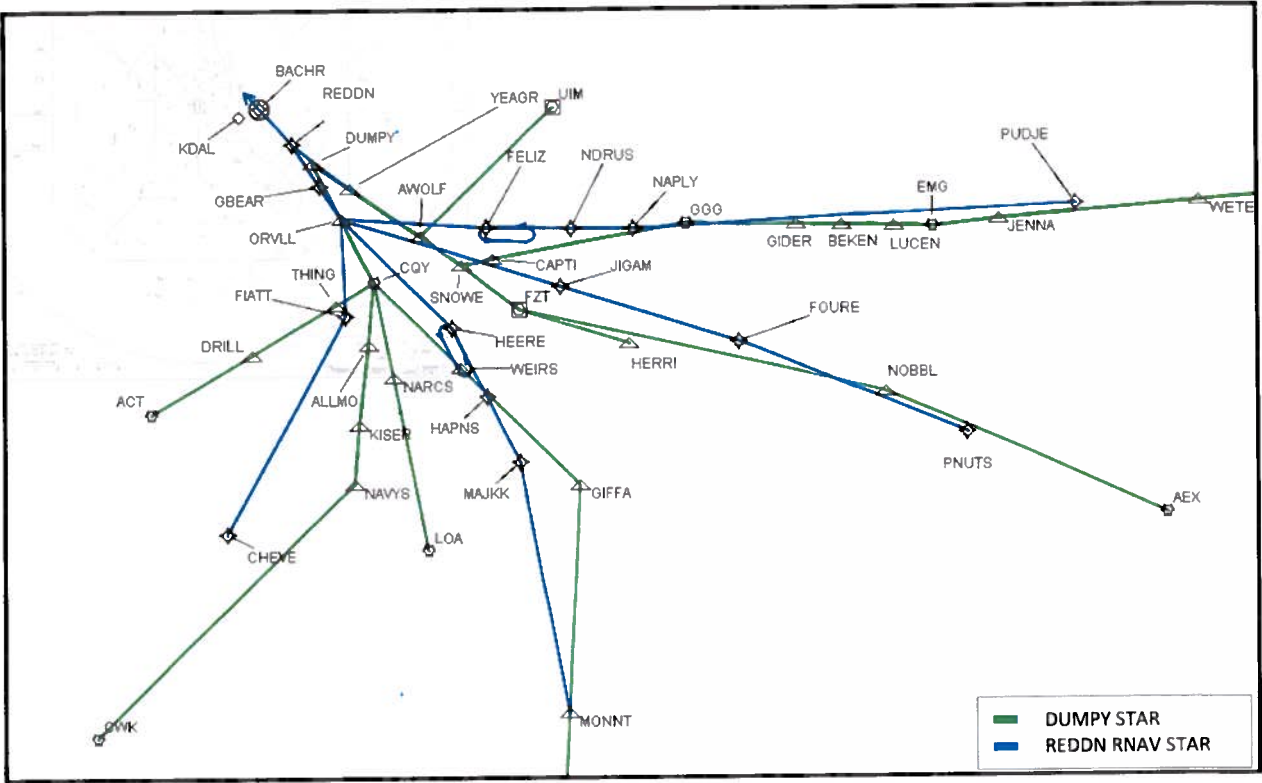
These proposed procedures are slightly modified from the Study Team recommendation to enhance traffic metering, reduce controller task complexity, increase flight path predictability and reduce miles flown.

Figure 2 depicts the proposed REDDN RNAV STAR

Figure 3 depicts the proposed MNND0 RNAV STAR



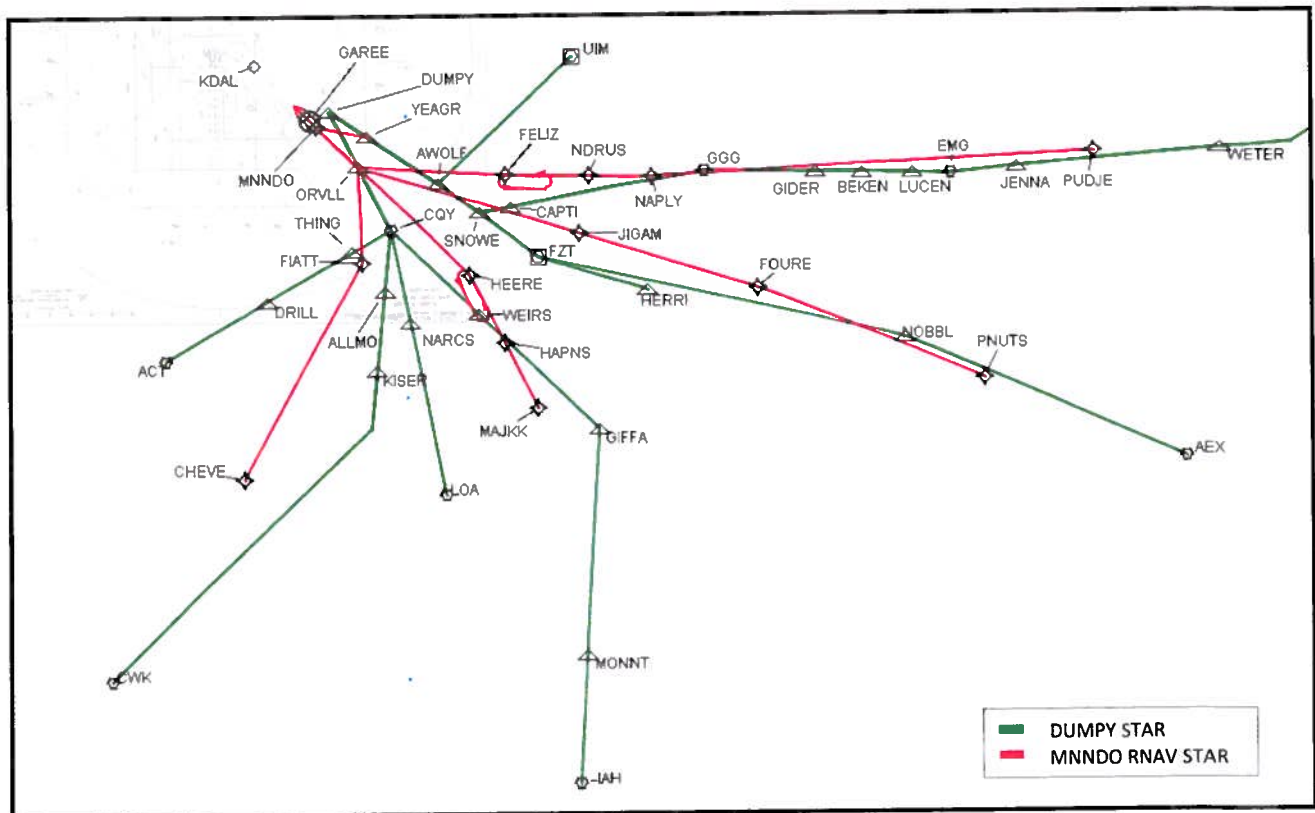
**North Texas OAPM Design Package**  
**DAL STARs, MNND0 and REDDN DAL RNAV STARs**



**Figure 2. Proposed REDDN RNAV STAR and DUMPY STAR**

# North Texas OAPM Design Package

## DAL STARs, MNND0 and REDDN DAL RNAV STARs



**Figure 3. Proposed MNND0 RNAV STAR and DUMPY STAR**

### Additional Design Considerations

Human-in-the-loop simulations validated these proposed designs.

Spectrum analysis will be required for the proposed airspace changes associated with the proposed MNND0 and REDDN RNAV STARs.

These procedures will have a crossing restriction at 9,000 feet at ORVLL waypoint. In south flow only, traffic arriving DAL may be sent direct REDDN waypoint (if there are no conflicts with East Satellite arrivals over YEAGR waypoint) at 8,000 feet. This transition will be ATC-assigned only.

For north flow only, traffic arriving DAL may be sent direct MNND0 waypoint (if there are no conflicts with East Satellite arrivals over YEAGR). Aircraft will cross YEAGR at 9,000 feet and MNND0 at 6,000 feet. This transition will be ATC-assigned only.

These procedures will only be used by turbojet traffic, are not anticipated to change runway usage, and do not modify flight paths below 3,000 feet Above Ground Level.

# **North Texas OAPM Design Package**

## **DAL STARs, MNND0 and REDDN DAL RNAV STARs**

### **Implementation Dependencies**

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed MNND0 and REDDN RNAV STARs.

These procedures are dependent on the following procedures:

- **MNND0:** This procedure shares waypoints with the BAWLZ, CABBY, CHUKK, EESAT, KLNDR, REDDN, REEKO and WHINY RNAV STARs. It is procedurally de-conflicted from the KLNDR and WHINY RNAV STARs and the CEDAR CREEK and YEAGR STARs. This procedure terminates in an FM leg associated with the DAL RNP-AR Approach to Runway 31 L/R.
- **REDDN:** This procedure shares waypoints with the BAWLZ, CABBY, CHUKK, EESAT, KLNDR, MNND0, REEKO and WHINY RNAV STARs. It is procedurally de-conflicted from the KLNDR and WHINY RNAV STARs and the CEDAR CREEK and YEAGR STARs. This procedure terminates in an FM leg associated with the DAL RNP-AR Approach to Runway 13 L/R.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letters of Agreement with D10, ZME, ZHU and GGG, MLU, SHV and ACT TRACONs and POE RAPCON will require changes for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**

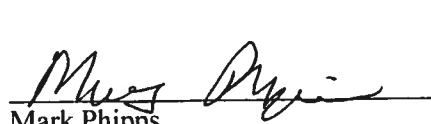
1. MNND0 TARGETS Distribution Package
2. REDDN TARGETS Distribution Package

# North Texas OAPM Design Package

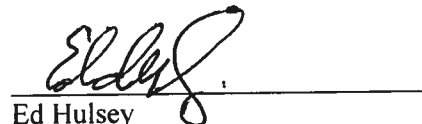
## DAL STARs, MNND0 and REDDN DAL RNAV STARs

### Review Signatures


The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

  
Mark Phipps  
North Texas OAPM  
FAA Lead


8/22/13  
Date

  
Ed Hulse  
North Texas OAPM  
NATCA Lead

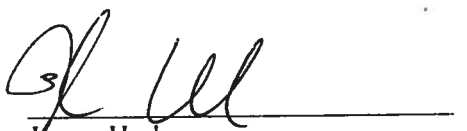
8/22/13  
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Fort Worth Center OAPM  
Facility Lead


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Date

  
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NATCA Lead

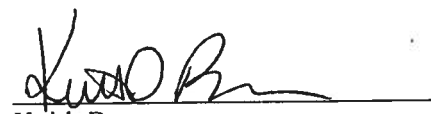
8/22/13  
Date

  
James Harlan  
Dallas-Fort Worth TRACON OAPM  
Facility Lead

8/22/13  
Date

  
Ed Rivas  
Dallas-Fort Worth TRACON OAPM  
NATCA Lead

8/22/13  
Date

  
Keith Brown  
Houston OAPM  
NATCA Lead

8/13/13  
Date

# North Texas OAPM Design Package

## DAL STARs, NANDR DAL RNAV STAR

Name of Change and Airport/s	Date
NANDR- DAL	22 August 2013
Change Classification	Current Phase of Design
Terminal Procedure STAR	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
Solutions 1 and 7	24 July 2014
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 34, 47, 48, 53, 75, 93 and 94</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors AR7, DN, DS, DR1, DR2, DR3, MN and MNH</li> </ul> <b>ARTCCs</b> <ul style="list-style-type: none"> <li>Albuquerque (ZAB) and Kansas City (ZKC)</li> </ul> <b>RAPCONs</b> <ul style="list-style-type: none"> <li>Fort Sill (FSI) and Sheppard (SPS)</li> </ul> <b>Oklahoma City (OKC) TRACON</b>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Airspace Design Packages</b> <ul style="list-style-type: none"> <li>Northwest Corner Post</li> <li>En Route Airspace Design</li> </ul> <b>Procedure Design Package</b> <ul style="list-style-type: none"> <li>STARs: BOWIE, DEBBB, GIBBI, GREGS, JFRYE, JOVEM, SHAAM and WESAT</li> <li>DAL RNP-AR Approaches</li> </ul>	NTEX OAPM 201309.tgs

# North Texas OAPM Design Package

## DAL STARs, NANDR DAL RNAV STAR

### Purpose

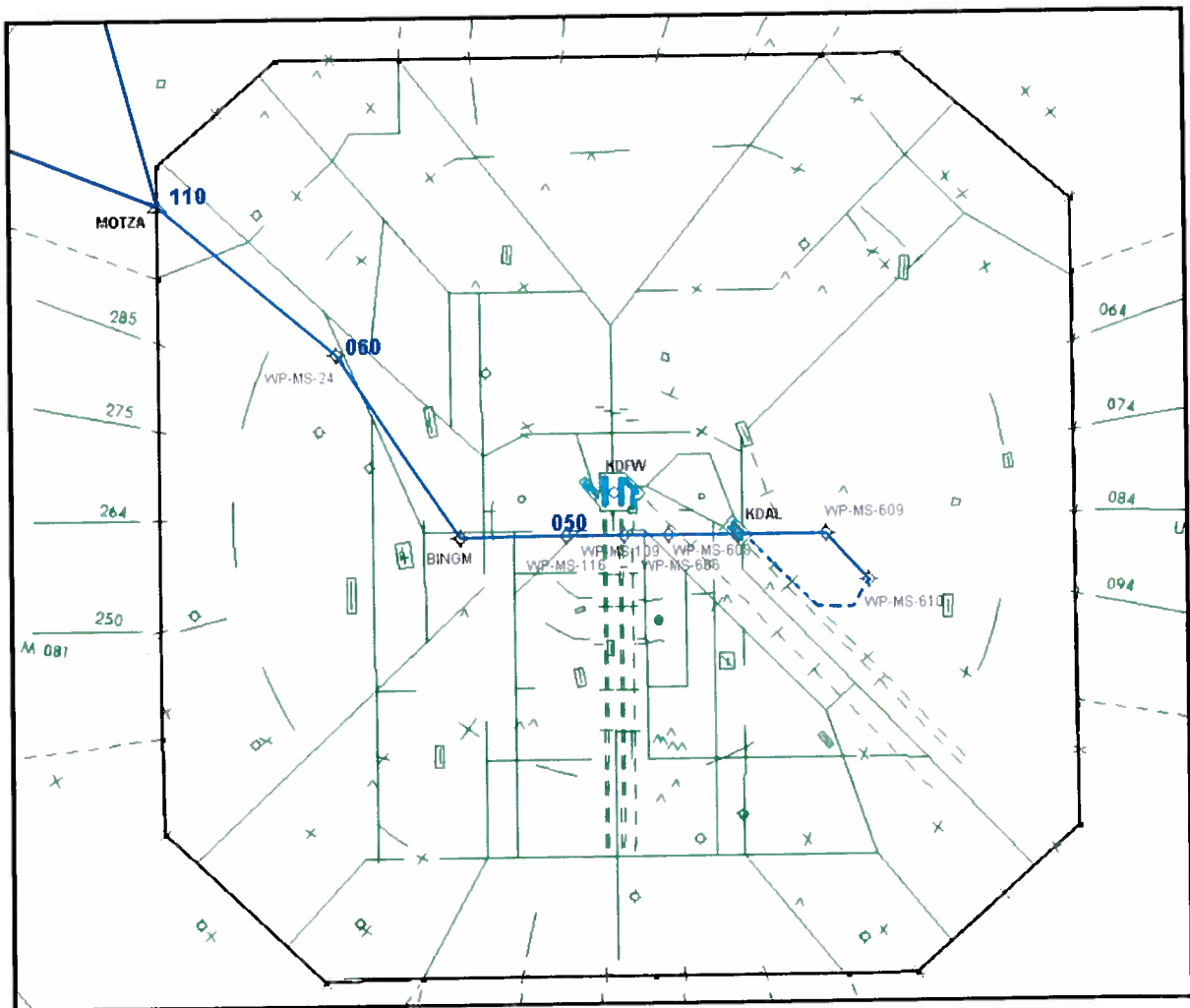
The Study Team identified two issues impacting DAL. The first issue was in-trail delivery of turbojet arrivals to Dallas Love Field (DAL) does not allow full benefit of Traffic Management Advisor. The second issue was low altitude level segments on arrival.

### Study Team Recommendation

The Study Team recommended the segregation of DFW primary arrival flows from DAL turbojet arrival traffic at all corner posts by creating RNAV STARs with the creation of MOTZA RNAV STAR.

Figure 1 depicts the recommended RNAV STAR, north flow.

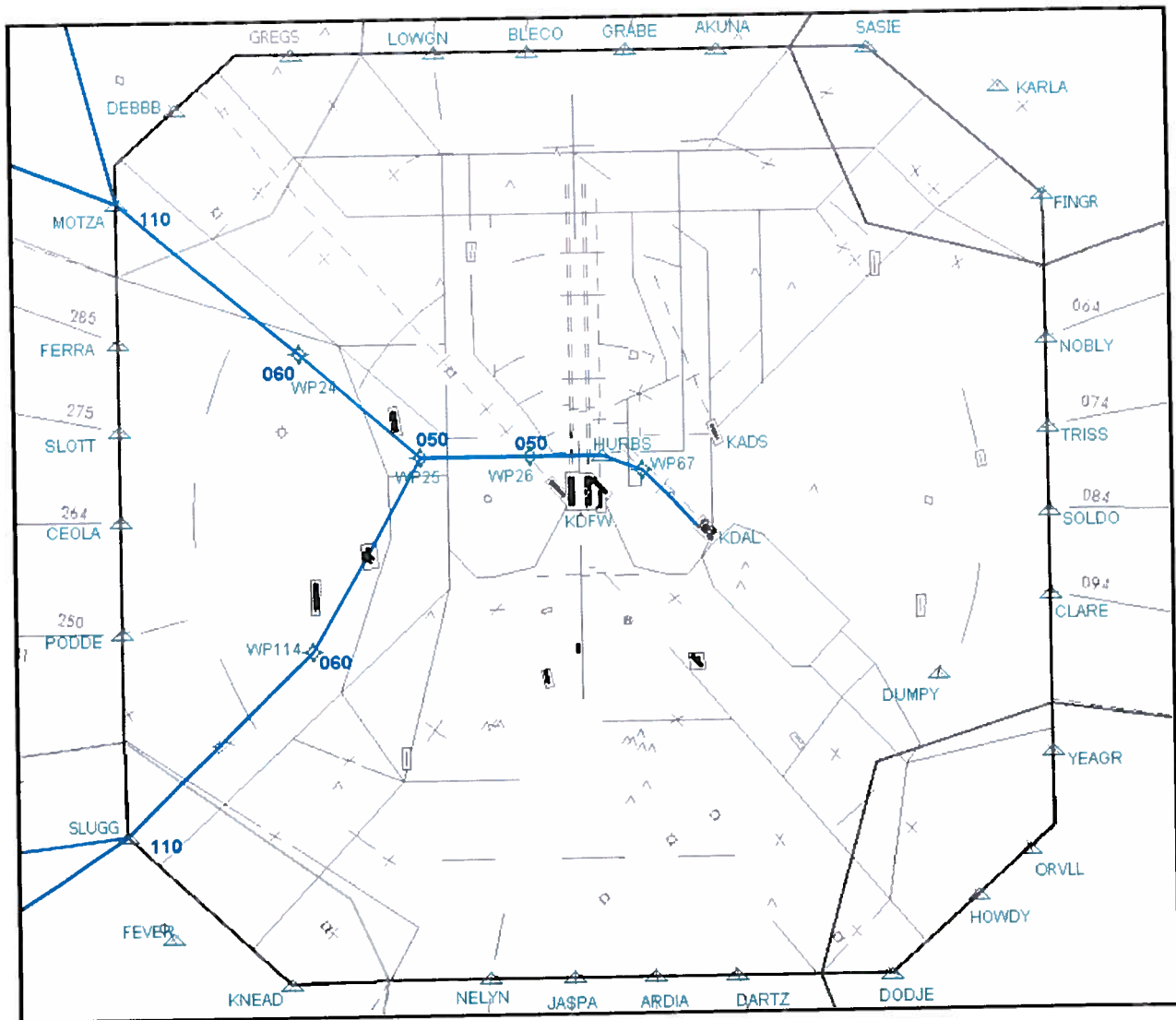
Figure 2 depicts the recommended RNAV STAR, south flow.



**Figure 1. Study Team Recommendation, North Flow**

# North Texas OAPM Design Package

## DAL STARs, NANDR DAL RNAV STAR



**Figure 2. Study Team Recommendation, South Flow**

### Proposed Design

The North Texas OAPM Design Team is proposing the implementation of the NANDR RNAV STAR to DAL, as an alternative to the Study Team's recommendation to implement the MOTZA RNAV STAR. After extensive examination and analysis of the Study Team's MOTZA RNAV STAR recommendation the Design Team concluded it was not procedurally feasible to implement it for DAL in a north or south flow. The proposed NANDR RNAV STAR will have five enroute transitions that merge over GREGS waypoint. In a north flow, arrivals on the NANDR RNAV STAR continue southeast bound after GREGS to SWYFT waypoint providing several shortcuts over the current GREGS STAR. In south flow, arrivals will fly the JFRYE RNAV STAR.

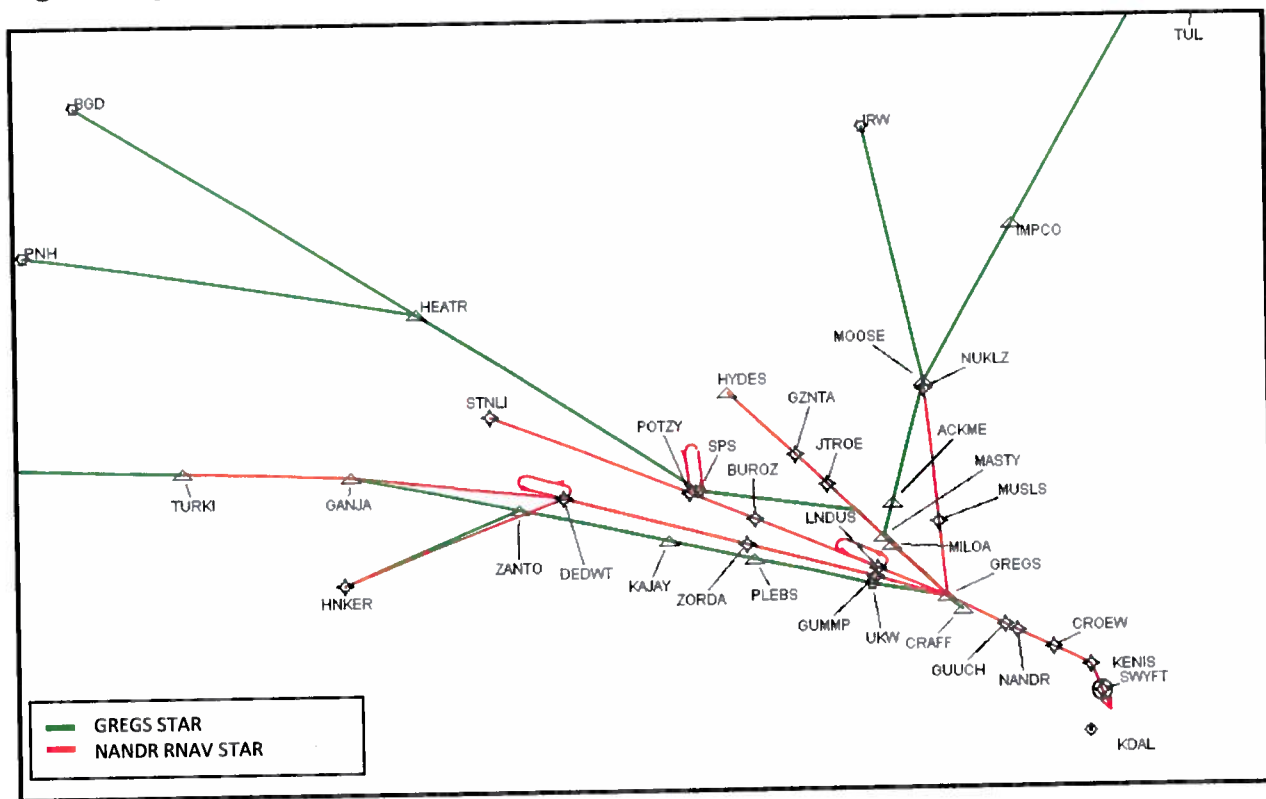
The Design Team's proposal will segregate the DFW and DAL arrival turbojets and procedurally de-conflict the DAL turbojets from the DFW Primary and Dual routes over the Northwest Corner

# North Texas OAPM Design Package

## DAL STARs, NANDR DAL RNAV STAR

Post. In a north flow, altitude restrictions at or below 7,000 feet at NANDR waypoint and crossing CROEW waypoint at 5,000 feet will procedurally de-conflict this STAR from DFW and DAL north bound departures. This route closely follows today's conventional route that DAL aircraft are frequently vectored to when arriving over GREGS in a north flow.

Figure 3 depicts the proposed NANDR RNAV STAR.



**Figure 3. Proposed NANDR RNAV STAR and GREGS STAR**

### Additional Design Considerations

Human-in-the-loop simulations validated these proposed designs.

Spectrum analysis will be required for the proposed airspace changes associated with the proposed NANDR RNAV STAR.

These procedures will only be used by turbojet traffic, are not anticipated to change runway usage, and do not modify flight paths below 3,000 feet Above Ground Level.

The NANDR RNAV STAR will have a crossing restriction at 10,000 to 11,000 feet at 250 knots at GREGS.



# **North Texas OAPM Design Package**

## **DAL STARs, NANDR DAL RNAV STAR**

### **Implementation Dependencies**

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed NANDR RNAV STAR.

This procedure is dependent on the following procedures:

- **NANDR:** This procedure shares waypoints with the DEBBB, GIBBI, JFRYE, JOVEM, SHAAM and WESAT RNAV STARs and the BOWIE and GREGS STARs. It is procedurally de-conflicted from the DEBBB and JOVEM RNAV STARs and the BOWIE STAR. This procedure terminates in an FM leg associated with the DAL RNP-AR Approach to Runway 31 L/R.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letters of Agreement with D10, ZAB, ZKC, FSI and SPS RAPCONs and OKC TRACON will need to be modified for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**

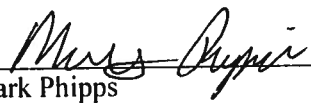
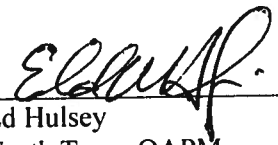
NANDR TARGETS Distribution Package

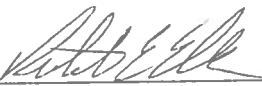
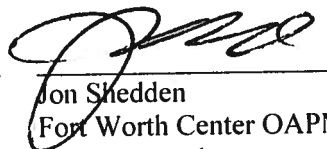
# North Texas OAPM Design Package

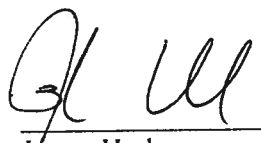

## DAL STARs, NANDR DAL RNAV STAR

### Review Signatures

The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

 _____ Mark Phipps North Texas OAPM FAA Lead	<u>8/22/13</u> Date	 _____ Ed Hulsey North Texas OAPM NATCA Lead	<u>8/22/13</u> Date
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 _____ Robert Ellis Fort Worth Center OAPM Facility Lead	<u>8/22/13</u> Date	 _____ Jon Shedden Fort Worth Center OAPM NATCA Lead	<u>8/22/13</u> Date
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 _____ James Harlan Dallas-Fort Worth TRACON OAPM Facility Lead	<u>8/22/13</u> Date	 _____ Ed Rivas Dallas-Fort Worth TRACON OAPM NATCA Lead	<u>8/22/13</u> Date
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# North Texas OAPM Design Package

## Satellite STARS, CHUKK, EESAT and REEKO SAT RNAV STARS

Name of Change and Airport/s	Date
CHUKK, EESAT and REEKO – Satellite Airports	01 xxxx 2013
Change Classification	Current Phase of Design
Terminal Procedure STAR	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
Solution 4	24 July 2014
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 29, 30, 52, 83, 86, 89 and 96</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors DE, DN, DS, AR7, AR8 and MS</li> </ul> <b>ARTCCs</b> <ul style="list-style-type: none"> <li>Houston (ZHU) and Memphis (ZME)</li> </ul> <b>TRACONs</b> <ul style="list-style-type: none"> <li>Longview (GGG), Monroe (MLU), Shreveport (SHV) and Waco (ACT)</li> </ul> <b>Fort Polk (POE) RAPCON</b>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul> <b>ZHU</b> <ul style="list-style-type: none"> <li>Mike McGhee</li> <li>David Salapata</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Airspace Design Packages</b> <ul style="list-style-type: none"> <li>Southeast Corner Post</li> <li>En Route Airspace</li> </ul> <b>Procedure Design Packages</b> <ul style="list-style-type: none"> <li>STARS: BACHR, BAWLZ, CABBY, CEDAR CREEK, CHUKK, EESAT, KLNDR, MNND0, NRTAY, REDDN, REEKO, SWAVY, WHINY and YEAGR</li> </ul>	<b>Master TARGETS File (file extension name)</b>

# **North Texas OAPM Design Package**

## **Satellite STARs, CHUKK, EESAT and REEKO SAT RNAV STARs**

### **Purpose**

The North Texas Study Team identified three issues associated to arrivals over the Southeast Corner Post to DAL and Satellite airports. The first issue was with the DUMPY STAR creating a merge of traffic at the DUMPY waypoint. ZFW is required to manage the merge of arrival flows to East Satellite airports and Dallas Love Field (DAL) at DUMPY over ORVLL and YEAGR waypoints to ensure in trail separation of aircraft at DUMPY. The mix of aircraft types and the number of different airports that are sequenced into this arrival can make it difficult to provide proper in-trail spacing over DUMPY. The second was low altitude routing for turbojets to Satellite airports, including DAL.

### **Study Team Recommendation**

The Study Team recommended the segregation of DFW primary arrival flows from DAL turbojet arrival traffic and the creation of new RNAV STARs to eliminate the merge at DUMPY (see Figure 1). The first RNAV STAR was over YEAGR for east satellite turbojets and props, and in a south flow only for DFW props. The second RNAV STAR was over ORVLL for traffic arriving to DAL. The Study Team determined the segregation of DAL arrivals over ORVLL will allow for the enhanced metering of traffic and eliminate the need for segregating traffic over DUMPY. The proposed YEAGR RNAV STAR was offset and parallel to the proposed ORVLL RNAV STAR.

Turbojet and propeller traffic for the Satellite airports need to be segregated from the primary DFW RNAV STARs and the DAL RNAV STARs to allow for Optimized Profile Descents (OPD) for DFW turbojet traffic, and to create predictable and repeatable flight paths for all satellite arrivals. This proposed design will accomplish these requirements.

The second Study Team Recommendation to create crisscrossing STARs delivering turbojet traffic inbound Satellite airports eliminating the low altitude level-offs. Initial calculations indicate that there is a small benefit in estimated fuel savings; however, over-all estimates indicate a cost is associated with this concept.

Figure 1 depicts the recommended ORVLL and YEAGR RNAV STARs

# North Texas OAPM Design Package

## Satellite STARs, CHUKK, EESAT and REEKO SAT RNAV STARs

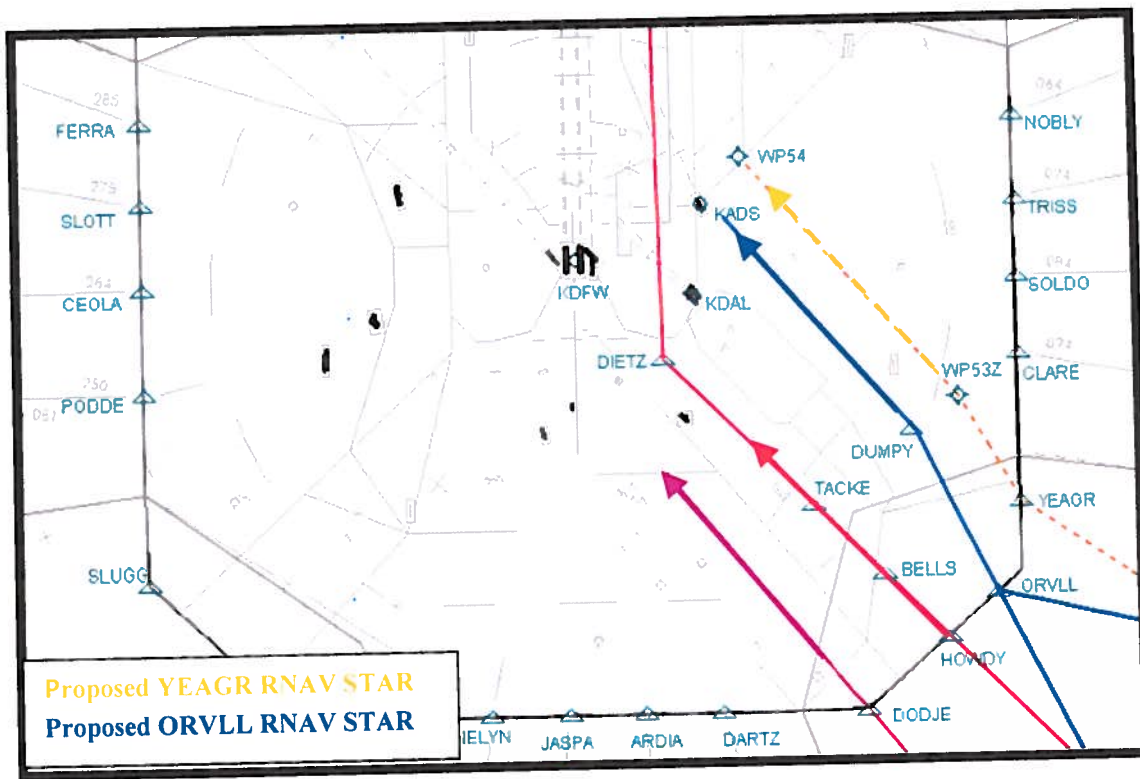


Figure 1. Study Team Recommendation

### Proposed Design

The North Texas OAPM Design Team is proposing the implementation of three new RNAV STARs, named CHUKK, REEKO, and EESAT for D10 Satellite arrivals over the Southeast Corner Post. The EESAT and CHUKK RNAV STARs will be procedurally de-conflicted from the proposed MNND0 RNAV STAR providing several shortcuts as compared to the current DUMPY STAR. These proposed designs will provide service to the following destination airports:

# North Texas OAPM Design Package

## Satellite STARS, CHUKK, EESAT and REEKO SAT RNAV STARS

Airport Name	Airport ID
Addison Airport	ADS
Collin County Regional Airport at McKinney	TKI
Dallas Executive Airport	RBD
Ennis Municipal Airport	F41
Lancaster Regional Airport	LNC
Mesquite Metro Airport	HQZ
Mid-way Regional Airport	JWY
Rockwall Municipal Airport	F46

**Table 1. East Satellite Airports**

Aircraft routed over the CHEVE transition will be at or below FL230. Aircraft routed from ACT TRACON will be routed over FIATT waypoint. Aircraft routed from GGG TRACON will be routed over ZEKKE waypoint. Aircraft routed from SHV TRACON will be routed over MRPHI waypoint. Aircraft routed from POE TRACON will be routed over YEAGR. Aircraft routed from MLU TRACON will be routed over MRPHI.

The REEKO RNAV will transition over DODJE waypoint. After DODJE the procedure continues past DODJE to SCOPS waypoint, where radar vectors will be given to the following destination airports:

Airport Name	Airport ID
Arlington Municipal Airport	GKY
Bourland Field Airport	50F
Cleburne Municipal Airport	CPT
Decatur Municipal Airport	LUD
Denton Municipal Airport	DTO
Fort Worth Alliance Airport	AFW
Fort Worth Meacham International Airport	FTW
Fort Worth Naval Air Station Joint Reserve Base/Carswell Field	NFW
Fort Worth Spinks Airport	FWS
Grand Prairie Municipal Airport	GPM
Kenneth Copeland Airport	4T2
Parker County Airport	WEA

**Table 2. West Satellite Airports**

This route closely follows the current route that West satellite arrivals are frequently vectored to when arriving over DODJE in north and south flows. Aircraft routed over the CHEVE transition will be at or below FL230. Aircraft routed from ACT TRACON will be routed over GEEMC waypoint. Aircraft routed from GGG, SHV and MLU TRACON will be routed over VEDUB waypoint. Aircraft routed from POE TRACON will be routed over DODJE.

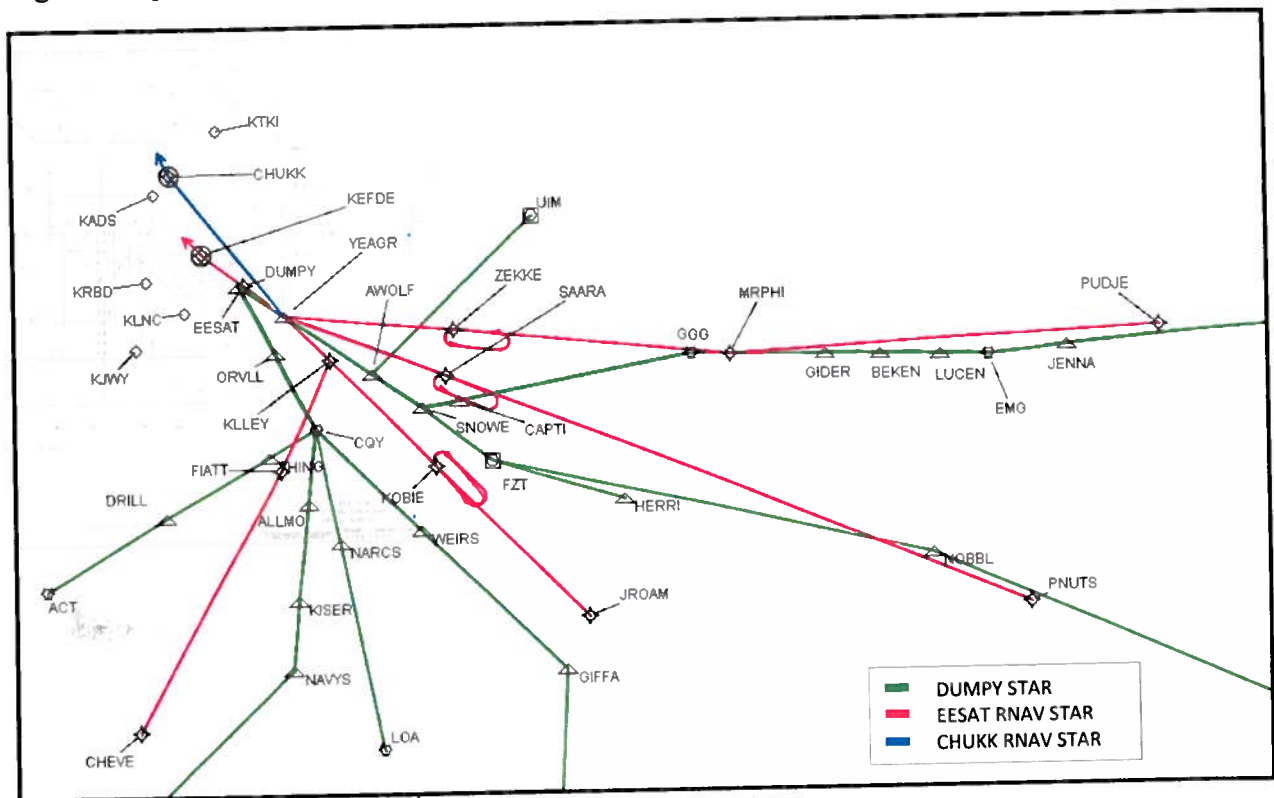
# North Texas OAPM Design Package

## Satellite STARS, CHUKK, EESAT and REEKO SAT RNAV STARS

These RNAV STARS are procedurally de-conflicted from DFW and DAL arrival flows. In addition, the designs will increase flight path predictability and reduce controller and pilot task complexity.

Figure 2 depicts the proposed EESAT and CHUKK RNAV STARS.

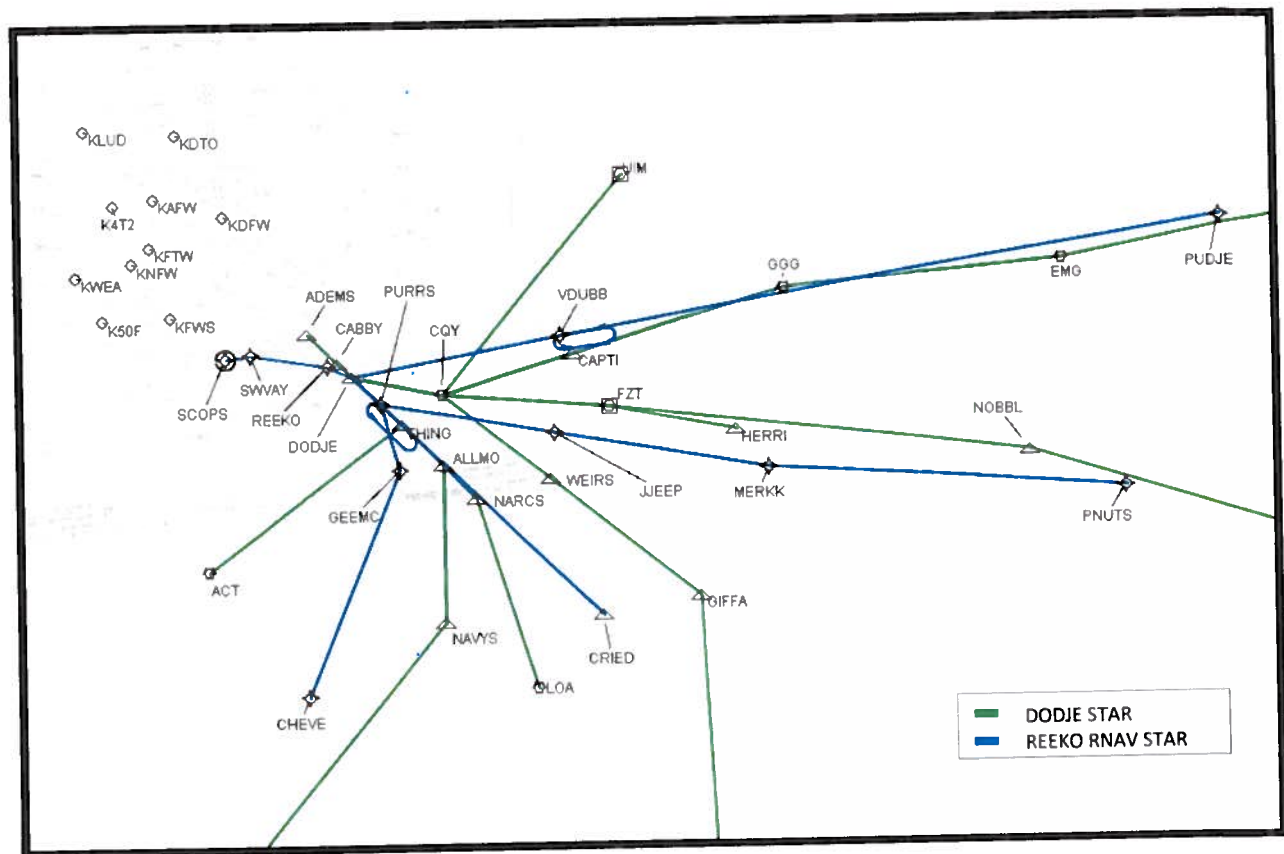
Figure 3 depicts the proposed REEKO RNAV STAR.



**Figure 2. CHUKK and EESAT RNAV STARS and DUMPY STAR**

# North Texas OAPM Design Package

## Satellite STARS, CHUKK, EESAT and REEKO SAT RNAV STARS



**Figure 3. REEKO RNAV STAR and DODJE STAR**

### Additional Design Considerations

The Team determined the Study Team's proposal to crisscross traffic was not feasible because it had the potential to increase controller task complexity and mileage flown.

Human-in-the-loop simulations validated these proposed designs.

Spectrum analysis will be required for the proposed airspace changes associated with the proposed CHUKK, EESAT and REEKO RNAV STARS.

The EESAT and CHUKK STARS will have crossing restrictions at 9,000 feet at YEAGR for turbojet aircraft, and 6,000 and 7,000 feet for all prop aircraft established via Letter of Agreement. The chart will have turbojets at 250 knots and expect 9,000 feet at YEAGR.

The REEKO STAR will have a crossing restriction of 12,000 feet and 250 knots at DODJE for turbojet aircraft in a north flow. A crossing restriction of 9,000 feet and 250 knots at DODJE for turbojet aircraft and 6,000, 7,000 and 8,000 feet for all prop aircraft at DODJE will be in place in a south flow.



# **North Texas OAPM Design Package**

## **Satellite STARs, CHUKK, EESAT and REEKO SAT RNAV STARs**

These procedures will be used by all types of RNAV-equipped aircraft, are not anticipated to change runway usage, and are not anticipated to modify flight paths below 3,000 feet Above Ground Level.

### **Implementation Dependencies**

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed CHUKK, EESAT and REEKO RNAV STARs.

These procedures are dependent on the following procedures:

- **CHUKK:** This procedure shares waypoints with the BAWLZ, CABBY, EESAT, KLNDR, NRTAY, MNND, REDDN, REEKO and WHINY RNAV STARs and the YEAGR STAR. It is procedurally de-conflicted from the BACHR, KLNDR and WHINY RNAV STARs and the CEDAR CREEK and YEAGR STARs.
- **EESAT:** This procedure shares waypoints with the BAWLZ, CABBY, CHUKK, KLNDR, NRTAY, MNND, REDDN, REEKO and WHINY RNAV STARs and the YEAGR STAR. It is procedurally de-conflicted from the KLNDR and WHINY RNAV STARs and the CEDAR CREEK and YEAGR STARs.
- **REEKO:** This procedure shares waypoints with the BAWLZ, CABBY, CHUKK, EESAT, KLNDR, NRTAY, MNND, REDDN, SWVAY and WHINY RNAV STARs. It is procedurally de-conflicted from the KLNDR and WHINY RNAV STARs and the CEDAR CREEK and YEAGR STARs.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letters of Agreement with D10, ZME, ZHU and GGG, MLU, SHV and ACT TRACONS and POE RAPCON will require changes for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**

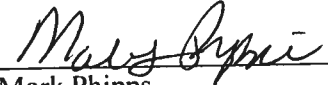
1. CHUKK TARGETS Distribution Package
2. EESAT TARGETS Distribution Package
3. REEKO TARGETS Distribution Package

# North Texas OAPM Design Package

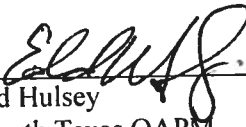
## Satellite STARS, CHUKK, EESAT and REEKO SAT RNAV STARS

### Review Signatures


The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

  
\_\_\_\_\_  
Mark Phipps  
North Texas OAPM  
FAA Lead


8/22/13  
Date

  
\_\_\_\_\_  
Ed Hulsey  
North Texas OAPM  
NATCA Lead

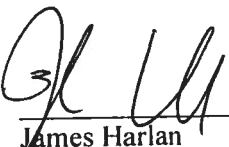
8/22/13  
Date

  
\_\_\_\_\_  
Robert Ellis  
Fort Worth Center OAPM  
Facility Lead


8/22/13  
Date

  
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Jon Shedden  
Fort Worth Center OAPM  
NATCA Lead

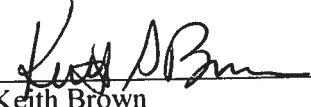
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Date

  
\_\_\_\_\_  
James Harlan  
Dallas-Fort Worth TRACON OAPM  
Facility Lead

8/22/13  
Date

  
\_\_\_\_\_  
Ed Rivas  
Dallas-Fort Worth TRACON OAPM  
NATCA Lead

8/28/13  
Date

  
\_\_\_\_\_  
Keith Brown  
Houston OAPM  
NATCA Lead

8/13/13  
Date

# North Texas OAPM Design Package

## Satellite STARs, JFRYE and WESAT SAT RNAV STARs

Name of Change and Airport/s	Date
JFRYE and WESAT– DAL/Satellites	22 August 2013
Change Classification	Current Phase of Design
Terminal Procedure STAR	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
Solution 1	24 July 2014
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 34, 47, 48, 53, 75, 93 and 94</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors AR7, AR8, DN, DS, MN and MNH</li> </ul> <b>ARTCCs</b> <ul style="list-style-type: none"> <li>Albuquerque (ZAB) and Kansas City (ZKC)</li> </ul> <b>RAPCONs</b> <ul style="list-style-type: none"> <li>Fort Sill (FSI) and Sheppard (SPS)</li> </ul> <b>TRACONs</b> <ul style="list-style-type: none"> <li>Lubbock (LBB) and Oklahoma (OKC)</li> </ul>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Airspace Design Packages</b> <ul style="list-style-type: none"> <li>Northwest Corner Post</li> <li>En Route Airspace Design</li> </ul> <b>Procedure Design Package</b> <ul style="list-style-type: none"> <li>STARs: BOWIE, DEBBB, GIBBI, GREGS, JFRYE, JOVEM, NANDR, SANGR, SHAAM and WESAT</li> <li>SID: HUDAD</li> </ul>	NTEX OAPM 201309.tgs

# **North Texas OAPM Design Package**

## **Satellite STARs, JFRYE and WESAT SAT RNAV STARs**

### **Purpose**

The Study Team identified two issues impacting the DFW Satellite airports. The first issue was with in-trail delivery of turbojet arrivals to Dallas Fort Worth International Airport (DFW) and Dallas Love Field (DAL) does not allow full benefit of Traffic Management Advisor. Satellite airport arrivals are also intermixed into this flow. The second issue was low altitude routing for turbojets to Satellite airports, including DAL.

### **Study Team Recommendation**

The Study Team recommended two solutions to address the issues identified. The first solution was to segregate DFW primary arrival flows from DAL turbojet arrival traffic at all corner posts by creating RNAV STARs. Those STARs would also be designed to attempt to reduce flying miles for users. Additional traffic in Satellite Sectors' airspace may require airspace sectors to be open more often than they are today.

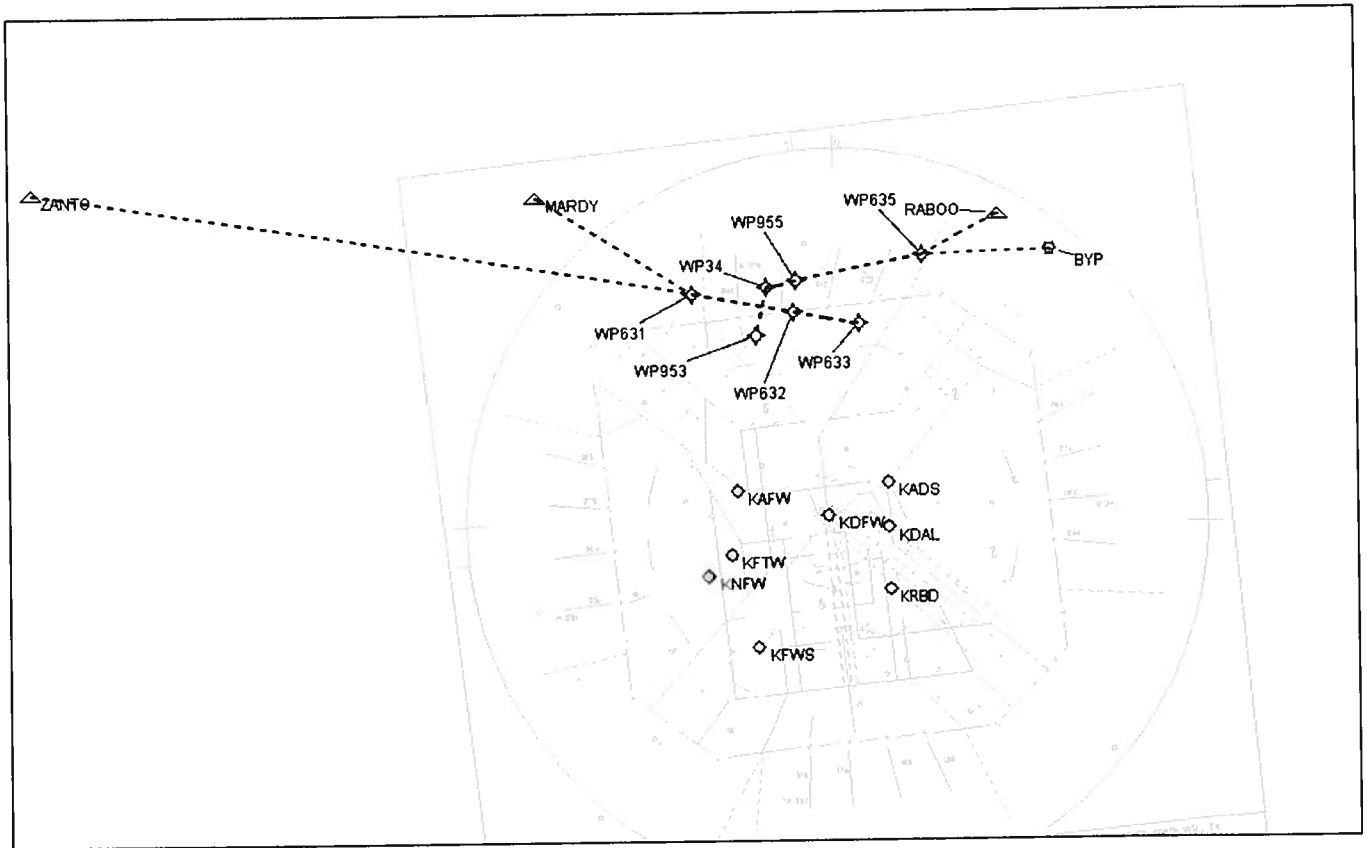
Turbojet and propeller traffic for the Satellite airports need to be segregated from the primary DFW RNAV STARs and the DAL RNAV STARs to allow for Optimized Profile Descents (OPD) for DFW turbojet traffic, and to create predictable and repeatable flight paths for all satellite arrivals. This proposed design will accomplish these requirements.

The second Study Team Recommendation is to create crisscrossing STARs delivering turbojet traffic inbound satellite airports eliminating the low altitude level offs. Initial calculations indicate that there is a small benefit in estimated fuel savings; however, over- all estimates indicate a cost is associated with this concept.

Figure 1 depicts the recommended RNAV STARs.

# North Texas OAPM Design Package

## Satellite STARs, JFRYE and WESAT SAT RNAV STARs



**Figure 1. Study Team Recommendation**

### **Proposed Design**

The North Texas OAPM Design Team is proposing the implementation of two new RNAV STARs, named JFRYE and WESAT. The WESAT RNAV STAR is over MOTZA waypoint and JFRYE RNAV STAR is over GREGS waypoint. The JFRYE RNAV STAR includes five enroute transitions merging at GREGS. After the GREGS, arrivals will continue to JFRYE waypoint, then given radar vectors to the following destination airports:

# North Texas OAPM Design Package

## Satellite STARs, JFRYE and WESAT SAT RNAV STARs

Airport Name	Airport ID
Addison Airport	ADS
Collin County Regional Airport at McKinney	TKI
Dallas Executive Airport	RBD
Dallas Love Field (props)	DAL
Dallas Love Field (turbojets – south flow)	DAL
Ennis Municipal Airport	F41
Lancaster Regional Airport	LNC
Mesquite Metro Airport	HQZ
Mid-way Regional Airport	JWY
Rockwall Municipal Airport	F46

**Table 1. East Satellite and Dallas Love Airports**

The WESAT RNAV STAR incorporates four enroute transitions merging at MOTZA waypoint. After MOTZA, arrivals will continue to WESAT, then given radar vectors to the following destination airports:

Airport Name	Airport ID
Arlington Municipal Airport	GKY
Bourland Field Airport	50F
Cleburne Municipal Airport	CPT
Decatur Municipal Airport	LUD
Denton Municipal Airport	DTO
Fort Worth Alliance Airport	AFW
Fort Worth Meacham International Airport	FTW
Fort Worth Naval Air Station Joint Reserve Base/Carswell Field	NFW
Fort Worth Spinks Airport	FWS
Grand Prairie Municipal Airport	GPM
Kenneth Copeland Airport	4T2
Parker County Airport	WEA

**Table 2. West Satellite Airports**

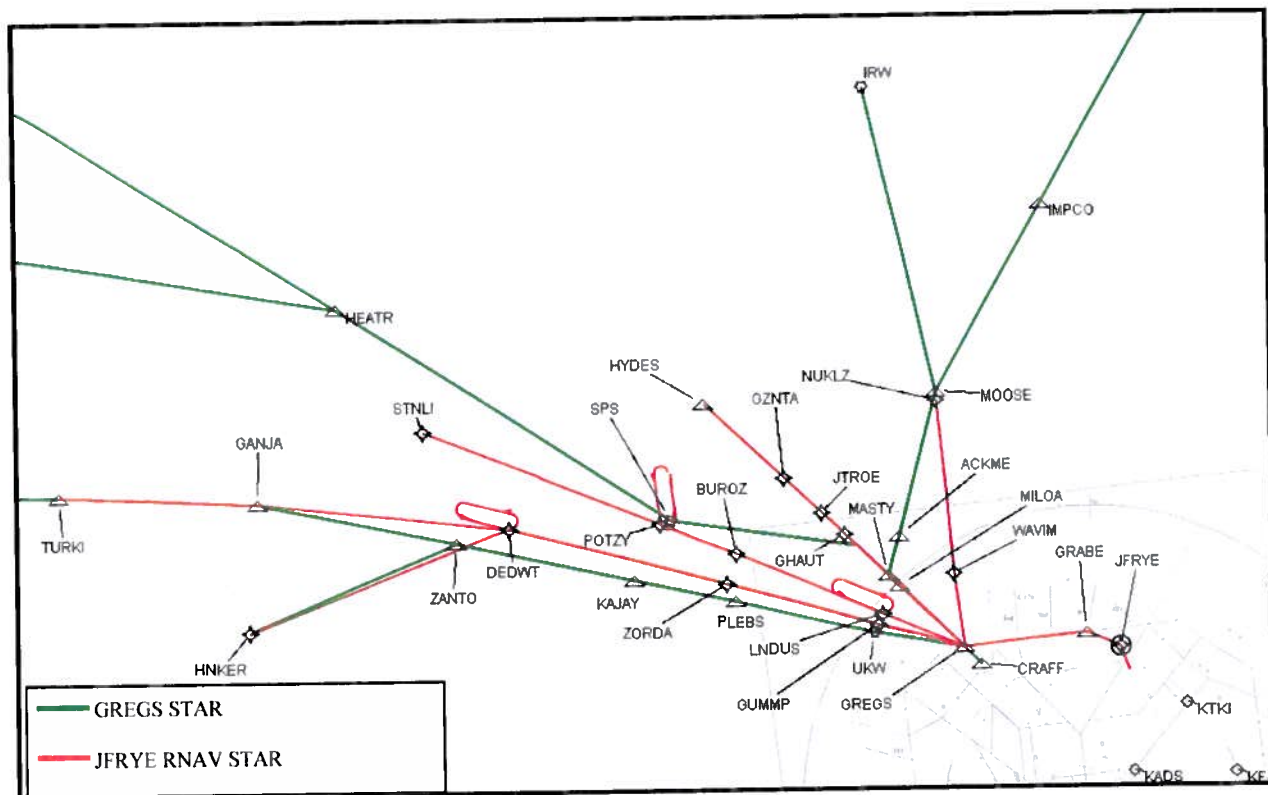
The designs will increase flight path predictability and decrease controller task complexity. Additionally, the Design Team's proposal will reduce pilot task complexity through incorporation of PBN.

Figure 2 depicts the proposed JFRYE RNAV STAR.

Figure 3 depicts the proposed WESAT RNAV STAR.

# North Texas OAPM Design Package

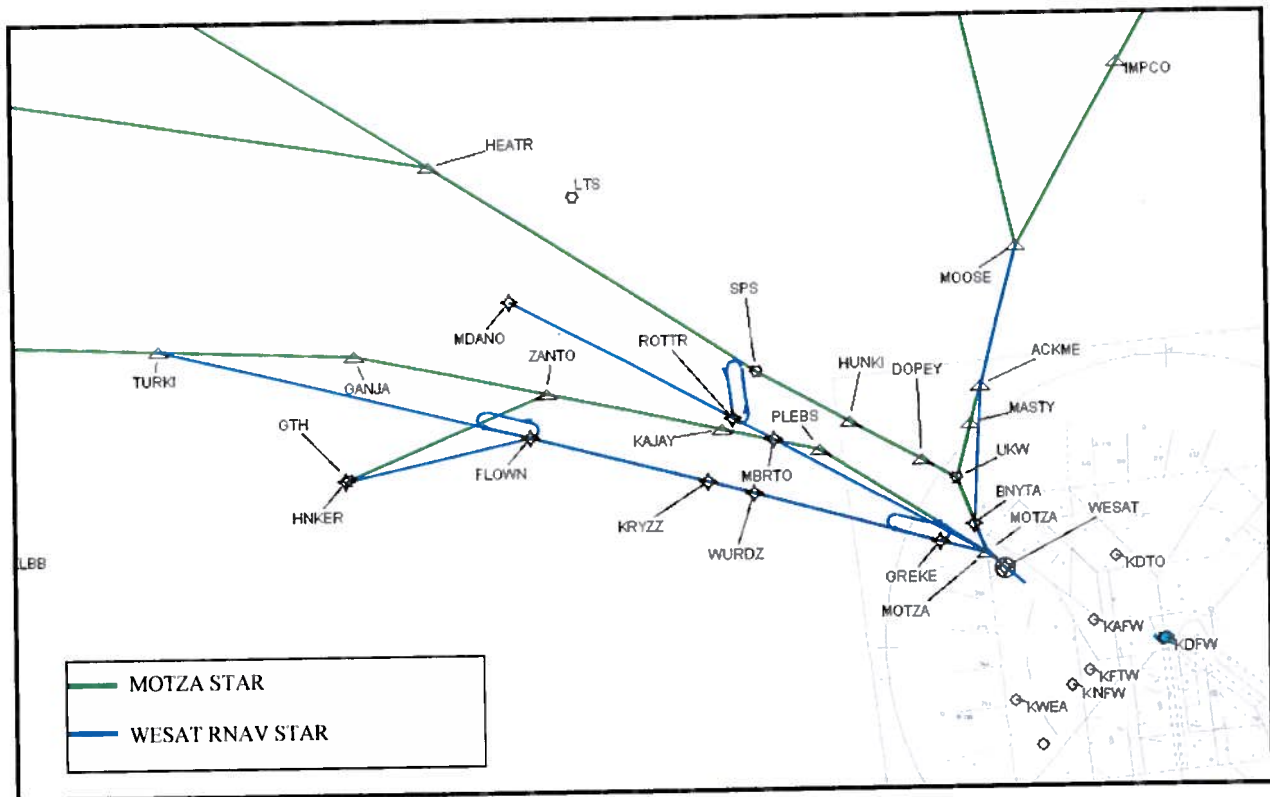
## Satellite STARs, JFRYE and WESAT SAT RNAV STARs



**Figure 2. Proposed JFRYE RNAV STAR and GREGS STAR**

# North Texas OAPM Design Package

## Satellite STARs, JFRYE and WESAT SAT RNAV STARs



**Figure 3. Proposed WESAT RNAV STAR and MOTZA STAR**

### **Additional Design Considerations**

The Team determined the Study Team's proposal to crisscross traffic was not feasible because it had the potential to increase controller task complexity and mileage flown.

Human-in-the-loop simulations validated these proposed designs.

Spectrum analysis will be required for the proposed airspace changes associated with the proposed JFRYE and WESAT RNAV STARs.

The JFRYE RNAV STAR will have a crossing restriction at 10,000 feet and 250 knots for turbojet arrivals, 6,000 and 7,000 feet for all prop arrivals, 8,000 feet for Denton Municipal Airport (DTO) turbojet arrivals and 4,000 feet for DTO all prop arrivals in a north flow at GREGS established via Letter of Agreement.

The WESAT RNAV STAR will have a crossing restriction at 8,000 feet for turbojet arrivals, 6,000 and 7,000 feet for all prop arrivals at MOTZA established via Letter of Agreement.

These procedures will be used by all types of RNAV-equipped aircraft, are not anticipated to change runway usage and do not modify flight paths below 3,000 feet Above Ground Level.



# **North Texas OAPM Design Package**

## **Satellite STARs, JFRYE and WESAT SAT RNAV STARs**

### **Implementation Dependencies**

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed JFRYE and WESAT RNAV STARs.

These procedures are dependent on the following procedures:

- **JFRYE:** This procedure shares waypoints with the DEBBB, GIBBI, JOVEM, NANDR, SANGR, SHAAM and WESAT RNAV STARs and the BOWIE and GREGS STARs. It is procedurally de-conflicted from the DEBBB, JOVEM and WESAT RNAV STARs and the BOWIE STAR.
- **WESAT:** This procedure shares waypoints with the DEBBB, SHAAM, GIBBI, JFRYE, JOVEM and NANDR RNAV STARs and the BOWIE and GREGS STARs. It is procedurally de-conflicted from the DEBBB, SHAAM, GIBBI, JFRYE and JOVEM RNAV STARs, the BOWIE STAR and the HUDAD RNAV SID.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letters of Agreement with D10, ZAB, ZKC, FSI and SPS RAPCONs and LBB and OKC TRACONs will need to be modified for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**

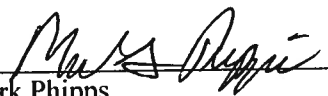
1. JFRYE TARGETS Distribution Package
2. WESAT TARGETS Distribution Package

# North Texas OAPM Design Package


## Satellite STARs, JFRYE and WESAT SAT RNAV STARs

### Review Signatures


The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

  
Mark Phipps  
North Texas OAPM  
FAA Lead

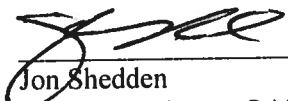
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Date

  
Ed Hulsey  
North Texas OAPM  
NATCA Lead


8/22/13  
Date

  
Robert Ellis  
Fort Worth Center OAPM  
Facility Lead

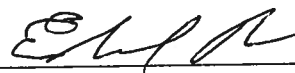
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Date

  
Jon Shedden  
Fort Worth Center OAPM  
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Date

  
James Harlan  
Dallas-Fort Worth TRACON OAPM  
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Ed Rivas  
Dallas-Fort Worth TRACON OAPM  
NATCA Lead

8/22/13  
Date

# North Texas OAPM Design Package

## Satellite STARS, LIKES and SWVAY SAT RNAV STARs

Name of Change and Airport/s	Date
<b>LIKES and SWVAY – Satellite Airports</b>	<b>01 xxxx 2013</b>
Change Classification	Current Phase of Design
<b>Terminal Procedure STAR</b>	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
<b>Solutions 1 and 8</b>	<b>24 July 2014</b>
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 61, 62, 63 and 65</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors MS, MW, DN, DS and AR7</li> </ul> <b>ARTCCs</b> <ul style="list-style-type: none"> <li>Albuquerque (ZAB) and Houston (ZHU)</li> </ul> <b>TRACONs</b> <ul style="list-style-type: none"> <li>Abilene (ABI), Midland (MAF), San Angelo (SJT) and Waco (ACT)</li> </ul> <b>Gray (GRK) RAPCON</b>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul> <b>ZHU</b> <ul style="list-style-type: none"> <li>Mike McGhee</li> <li>David Salapata</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Airspace Design Packages</b> <ul style="list-style-type: none"> <li>Southwest Corner Post</li> </ul> <b>Procedure Design Packages</b> <b>STARs: BACHR, BOOVE GLEN ROSE, KNEAD, LIKES, NRTAY PAWLZ, REEKO, SOCKK, SWAVY and TILLA</b>	<b>Master TARGETS File (file extension name)</b>

### Purpose

The Study Team identified two issues impacting the DFW Satellite airports. The first issue was in-trail delivery of turbojet arrivals to Dallas Fort Worth International Airport (DFW) and Dallas Love Field (DAL) does not allow full benefit of Traffic Management Advisor. Satellite airport

# **North Texas OAPM Design Package**

## **Satellite STARS, LIKES and SWVAY SAT RNAV STARS**

arrivals are also intermixed into this flow. The second issue was low altitude routing for turbojets to Satellite airports, including DAL.

### **Study Team Recommendation**

The Study Team recommended two solutions to address the issues identified. The first solution was to segregate DFW primary arrival flows from DAL turbojet arrival traffic at all corner posts by creating RNAV STARS. Those STARS would also be designed to attempt to reduce flying miles for users. Additional traffic in Satellite Sectors' airspace may require airspace sectors to be open more often than they are today.

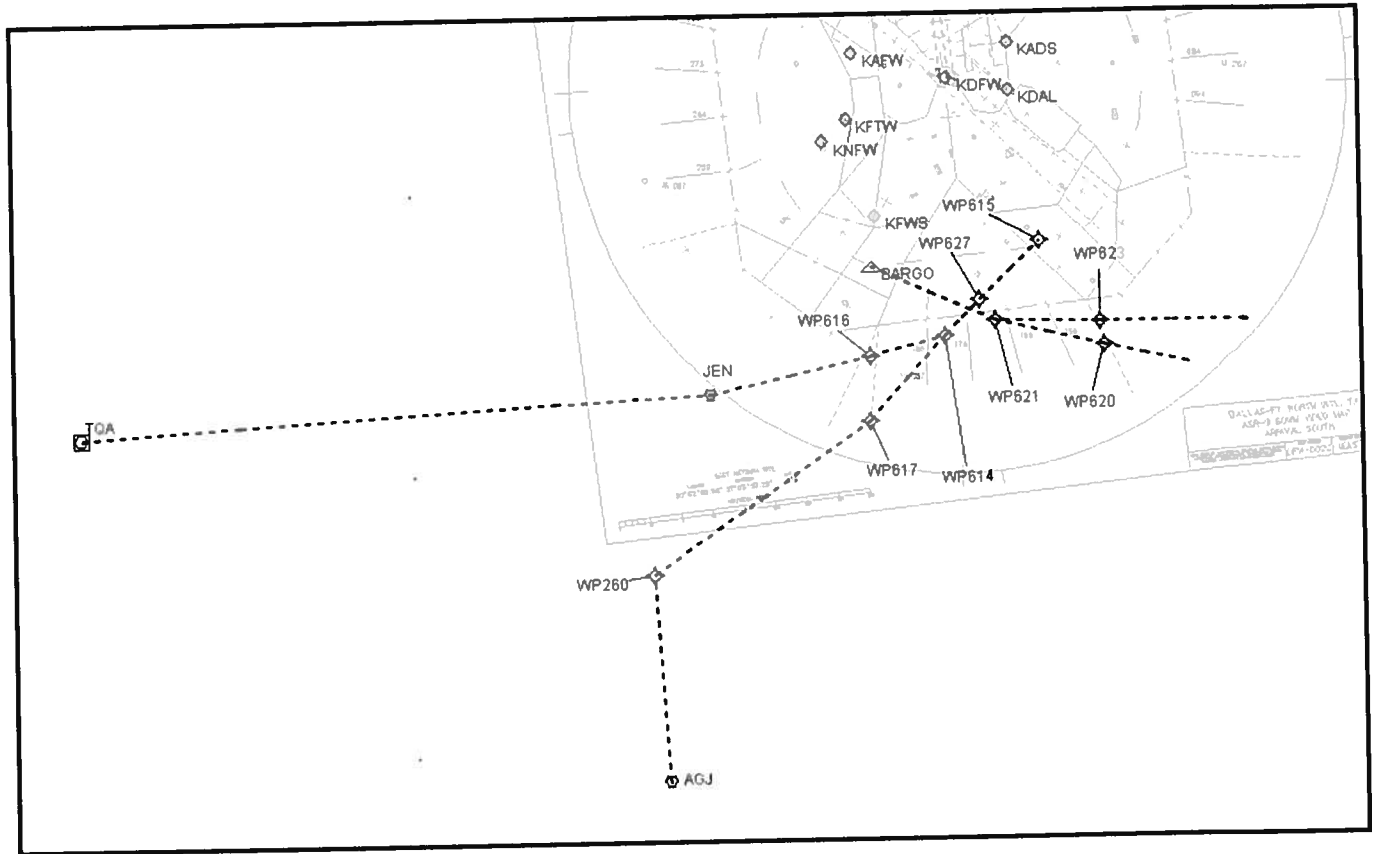
Turbojet and propeller traffic for the Satellite airports need to be segregated from the primary DFW RNAV STARS and the DAL RNAV STARS to allow for Optimized Profile Descents (OPD) for DFW turbojet traffic, and to create predictable and repeatable flight paths for all Satellite arrivals. This proposed design will accomplish these requirements.

The second Study Team Recommendation was to create crisscrossing STARS delivering turbojet traffic inbound Satellite airports and eliminating the low altitude level-offs. Initial calculations indicate that there is a small benefit in estimated fuel savings; however, over-all estimates indicate a cost is associated with this concept.

Figure 1 depicts the recommended RNAV STARS.

# North Texas OAPM Design Package

## Satellite STARS, LIKES and SWVAY SAT RNAV STARS



**Figure 1. Study Team Recommendation**

### Proposed Design

The North Texas OAPM Design Team is proposing the implementation of two new RNAV STARS for Satellite arrivals; named LIKES and SWVAY. The LIKES RNAV STAR merges at SLUGG waypoint and continues to LIKES waypoint, where radar vectors will be given to the following destination airports:

Airport Name	Airport ID
Bourland Field Airport	50F
Decatur Municipal Airport	LUD
Denton Municipal Airport	DTO
Fort Worth Alliance Airport	AFW
Fort Worth Meacham International Airport	FTW
Fort Worth Naval Air Station Joint Reserve Base/Carswell Field	NFW
Kenneth Copeland Airport	4T2
Parker County Airport	WEA

**Table 1. Satellite Airports**

# North Texas OAPM Design Package

## Satellite STARS, LIKES and SWVAY SAT RNAV STARs

The Design Team's proposal will procedurally de-conflict the DFW primary traffic over BOOVE waypoint from the Satellite arrivals and increase flight path predictability. ACT TRACON and GRK RAPCON departures will be routed over FOSSL waypoint. ABI TRACON and SJT TRACON departures will go over MESHN waypoint.

SWVAY RNAV STAR merges at KNEAD waypoint and continues to SWVAY, where radar vectors will be given to the following destination airports:

Airport Name	Airport ID
Addison Airport	ADS
Arlington Municipal Airport	GKY
Grand Prairie Municipal Airport	GPM
Collin County Regional Airport at McKinney	TKI
Dallas Executive Airport	RBD
Dallas Love Field (Props only)	DAL
Ennis Municipal Airport	F41
Fort Worth Spinks Airport	FWS
Lancaster Regional Airport	LNC
Mesquite Metro Airport	HQZ
Mid-way Regional Airport	JWY
Rockwall Municipal Airport	F46

**Table 1. Satellite Airports**

The Design Team's proposal will procedurally de-conflict the DFW Dual route traffic and DAL arrivals over KNEAD waypoint from the East Satellite arrivals in a south flow. In a north flow East Satellites and DAL arrivals over KNEAD will follow the same route. This route closely follows the current route that East Satellite arrivals are frequently vectored to when arriving over KNEAD in north and south flows. ACT TRACON and GRK RAPCON departures will be routed over FRSTI waypoint. ABI and SJT TRACON departures will go over SHLLY waypoint.

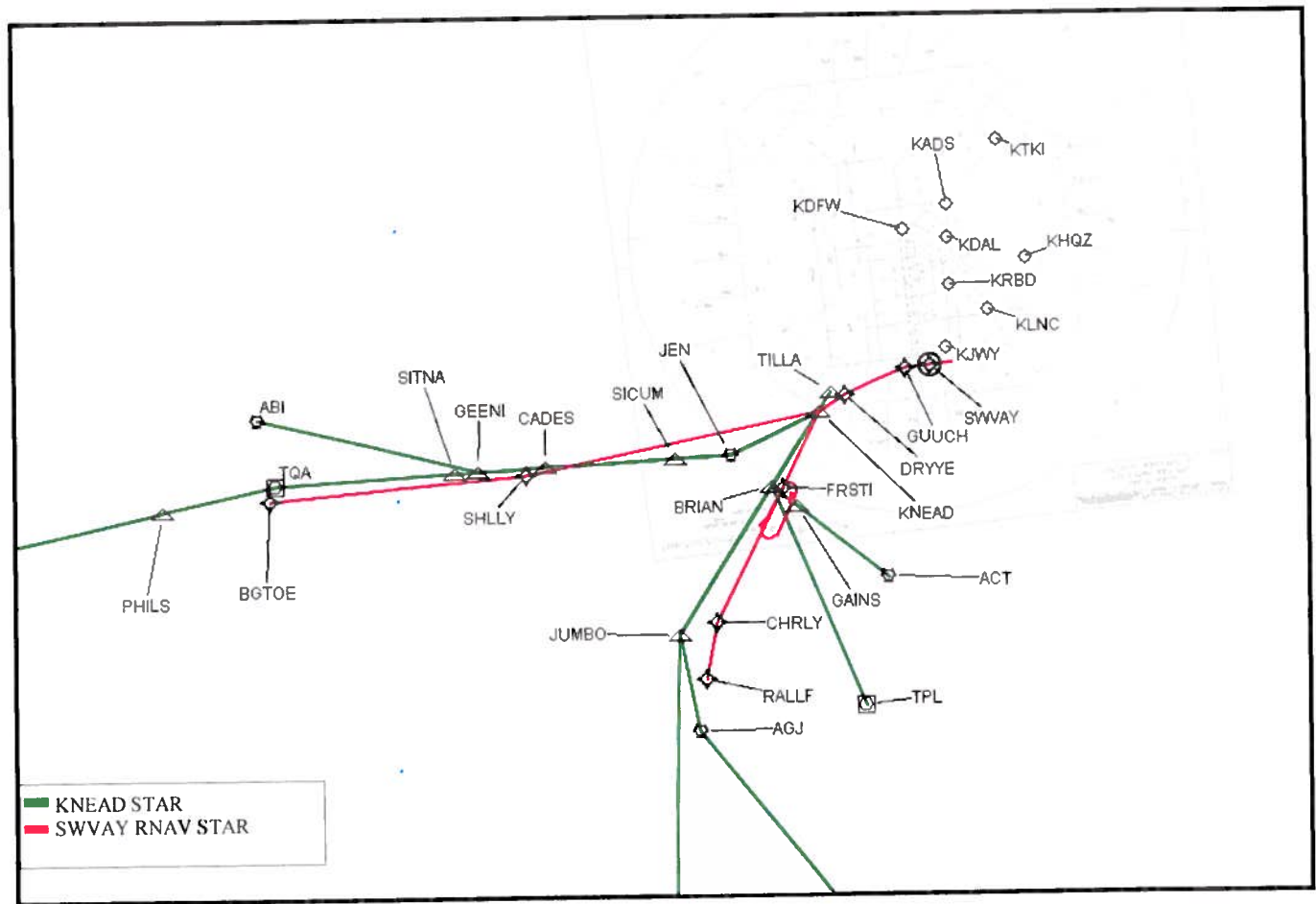
The proposed designs will assist in optimizing traffic metering at DFW and DAL, reduce controller and pilot task complexity, and increase flight path predictability.

Figure 2 depicts the proposed SWAVY RNAV STAR.

Figure 3 depicts the proposed LIKES RNAV STAR.

# North Texas OAPM Design Package

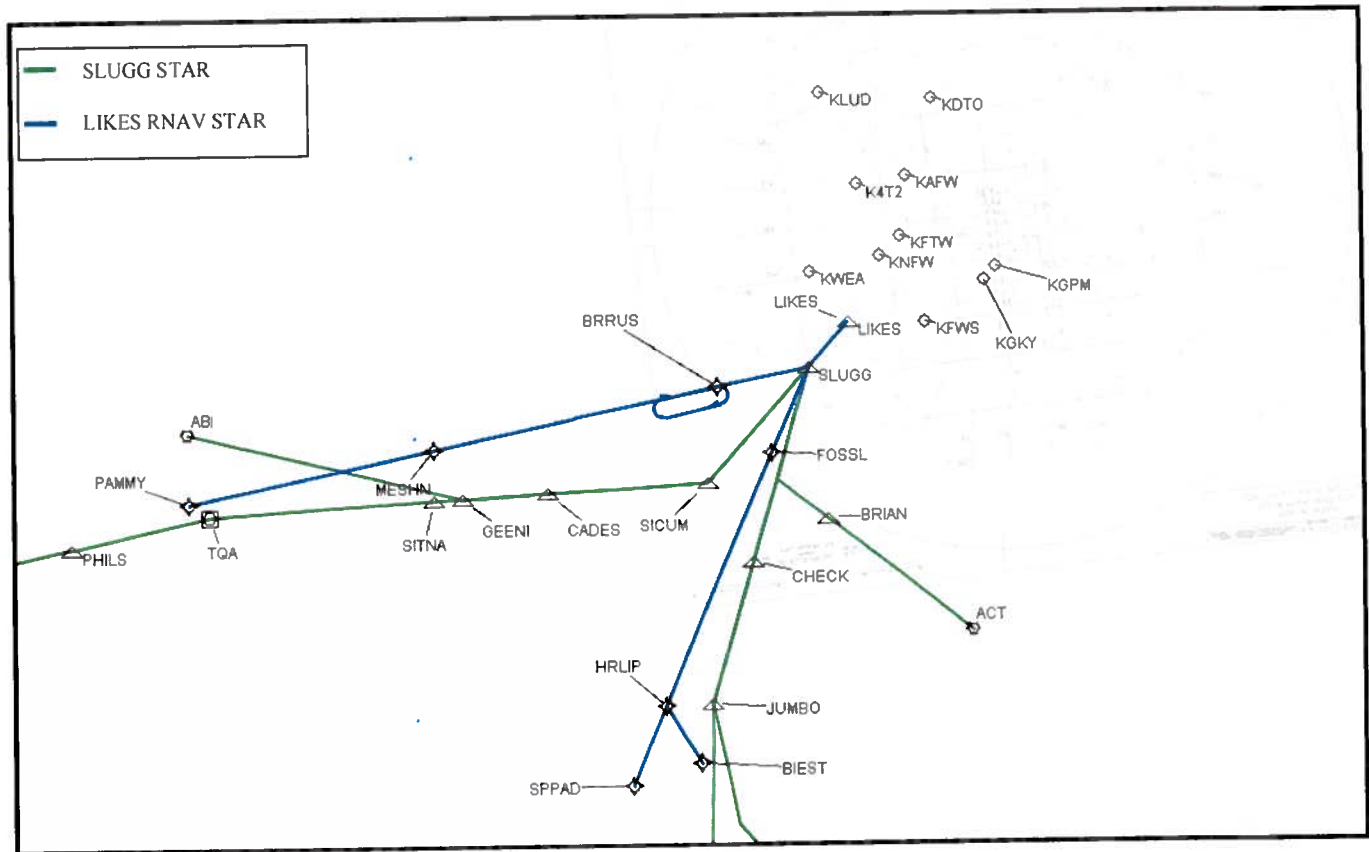
## Satellite STARS, LIKES and SWVAY SAT RNAV STARS



**Figure 2. Proposed SWVAY RNAV STAR and KNEAD STAR**

# North Texas OAPM Design Package

## Satellite STARS, LIKES and SWVAY SAT RNAV STARS



**Figure 3. Proposed LIKES RNAV STAR and SLUGG STAR**

### Additional Design Considerations

The Team determined the Study Team's proposal to crisscross traffic was not feasible because it had the potential to increase controller task complexity and mileage flown.

Human-in-the-loop simulations validated these proposed designs.

Spectrum analysis will be required for the proposed airspace changes associated with the proposed LIKES and SWAVY RNAV STARS.

The LIKES RNAV STAR will have a crossing restriction at 6,000 feet at SLUGG waypoint in both flows for turbojet aircraft and 4,000 and 5,000 feet for all prop aircraft at SLUGG.

The SWVAY RNAV STAR in a north flow will have a crossing restriction at 12,000 feet and 250 knots at KNEAD for turbojet aircraft. The south flow will have a crossing restriction at 10,000 feet and 250 knots at KNEAD for turbojet aircraft and all prop aircraft will have a crossing restriction at 6,000 and 7,000 feet at KNEAD. CPT, FWS, GKY and GPM airports will have a crossing restriction of 5,000 feet at KNEAD for turbojets and 4,000 feet for all props.



# **North Texas OAPM Design Package**

## **Satellite STARS, LIKES and SWVAY SAT RNAV STARS**

These procedures will be used by all types of RNAV- equipped aircraft, are not anticipated to change runway usage, and do not modify flight paths below 3,000 feet Above Ground Level.

### **Implementation Dependencies**

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed LIKES and SWAVY RNAV STARS.

These procedures are dependent on the following procedures:

- **SWVAY:** This procedure shares waypoints with the BACHR, BOOVE, NRTAY, PAWLZ, REEKO, SOCKK and TILLA RNAV STARS and the KNEAD STAR. It is procedurally de-conflicted from the BOOVE, LIKES and SOCKK RNAV STARS and GLEN ROSE STAR.
- **LIKES:** This procedure is procedurally de-conflicted from the BACHR, BOOVE, NRTAY, PAWLZ, SWVAY, SOCKK and TILLA RNAV STARS and GLEN ROSE and KNEAD STARS.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letters of Agreement with D10, ZHU and ZAB, ACT, MAF and SJT TRACONS and GRK RAPCON will require changes for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**


1. LIKES TARGETS Distribution Package
2. SWVAY TARGETS Distribution Package

# North Texas OAPM Design Package

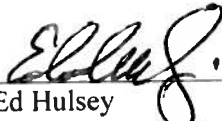
## Satellite STARS, LIKES and SWVAY SAT RNAV STARS

### Review Signatures


The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

  
\_\_\_\_\_  
Mark Phipps  
North Texas OAPM  
FAA Lead


8/22/13  
Date

  
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Ed Hulsey  
North Texas OAPM  
NATCA Lead

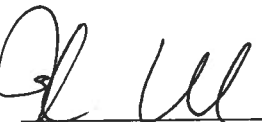
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Robert Ellis  
Fort Worth Center OAPM  
Facility Lead

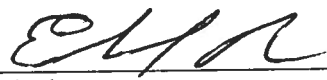
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Fort Worth Center OAPM  
NATCA Lead

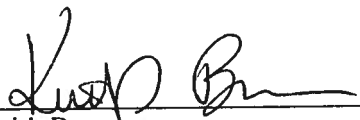
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James Harlan  
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Facility Lead

8/24/13  
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Ed Rivas  
Dallas-Fort Worth TRACON OAPM  
NATCA Lead

8/22/13  
Date

  
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Keith Brown  
Houston OAPM  
NATCA Lead

8/13/13  
Date

# North Texas OAPM Design Package

## Satellite STARS, SANGR and SLANT SAT RNAV STARS

Name of Change and Airport/s	Date
SANGR and SLANT– Satellites	22 August 2013
Change Classification	Current Phase of Design
Terminal Procedure STAR	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
Solution 8	24 July 2014
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 27, 37, 38, 42, 50, 53, 83 and 90</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors AR7, AR8, DN, DS, MN and MNH</li> </ul> <b>ARTCCs</b> <ul style="list-style-type: none"> <li>Memphis (ZME) and Kansas City (ZKC)</li> </ul> <b>TRACONs</b> <ul style="list-style-type: none"> <li>Oklahoma City (OKC), Tulsa (TUL), and Razorback (RZC)</li> </ul>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Airspace Design Packages</b> <ul style="list-style-type: none"> <li>Northeast Corner Post</li> <li>En Route Airspace Design</li> </ul> <b>Procedure Design Package</b> <ul style="list-style-type: none"> <li>STARS: BRDJE, CAINE, DAWGZ, HIBIL, JFRYE, SANGR, SASIE, SEEVR, SLANT and TRYST</li> </ul>	NTEX OAPM 201309.tgs

### Purpose

The Study Team identified issue was low altitude routing for turbojets to Satellite airports.

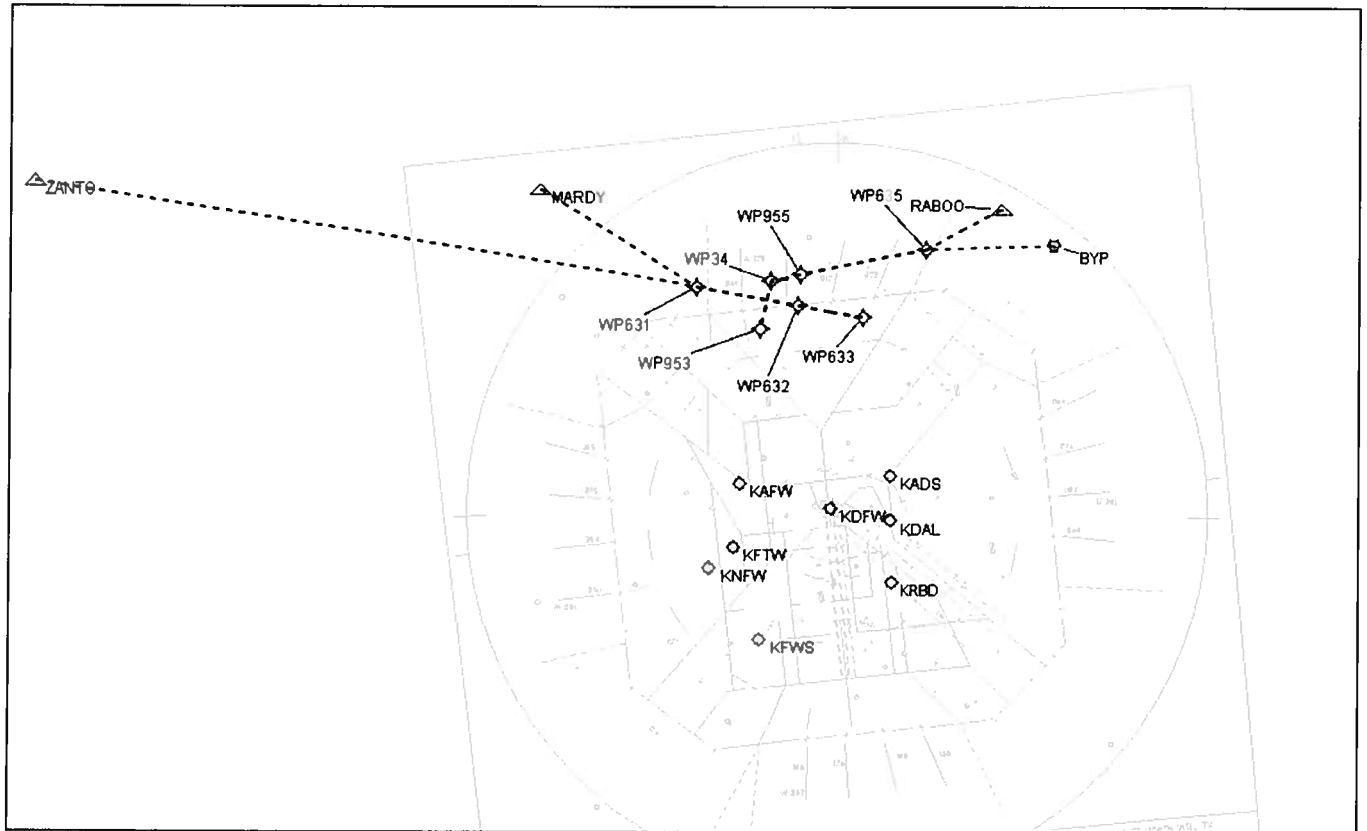
# North Texas OAPM Design Package

## Satellite STARs, SANGR and SLANT SAT RNAV STARs

### Study Team Recommendation

The Study Team recommended to create crisscrossing STARs delivering turbojet traffic inbound Satellite airports eliminating the low altitude level-offs. Initial calculations indicate that there is a small benefit in estimated fuel savings; however, over-all estimates indicate a cost is associated with this concept.

Figure 1 depicts the recommended RNAV STARs.



**Figure 1. Study Team Recommendation**

### Proposed Design

The North Texas OAPM Design Team is proposing the implementation of two new RNAV STARs, named SANGR and SLANT. The SANGR RNAV STAR will be routed over the SASIE waypoint for west satellite arrivals and the SLANT RNAV STAR will be routed over the FINGR waypoint for east satellite arrivals.

The SANGR RNAV STAR will merge over CAINE waypoint then continue to SASIE, then BLECO waypoint where radar vectors will be given to the following destination airports:

# North Texas OAPM Design Package

## Satellite STARs, SANGR and SLANT SAT RNAV STARs

Airport Name	Airport ID
Arlington Municipal Airport	GKY
Bourland Field Airport	50F
Cleburne Municipal Airport	CPT
Decatur Municipal Airport	LUD
Denton Municipal Airport	DTO
Fort Worth Alliance Airport	AFW
Fort Worth Meacham International Airport	FTW
Fort Worth Naval Air Station Joint Reserve Base/Carswell Field	NFW
Fort Worth Spinks Airport	FWS
Grand Prairie Municipal Airport	GPM
Kenneth Copeland Airport	4T2
Parker County Airport	WEA

**Table 1. West Satellite Airports**

This route is slightly north of the current route that west satellite arrivals are frequently vectored to when arriving over SASIE in north and south flows. In addition, the proposed transfer of the FRISCO Shelf airspace from ZFW to D10 will allow west satellite turbojets to enter terminal airspace sooner, resulting in additional efficiencies and benefits from terminal separation standards. Aircraft routed via the AXEE transition will be at or below FL230. Aircraft coming from Sector 27 to 37 below FL230 will be routed via the RONEY transition.

The SLANT RNAV STAR used the FINGR STAR as a baseline including seven similar enroute transitions and eliminated the IRW and ADM transitions available on the FINGR STAR. After merging at the FINGR, the procedure will follow a similar design as the FINGR STAR ending at the SLANT waypoint. After SLANT, aircraft will depart heading 230 vectors for final to the following destination airports:

Airport Name	Airport ID
Addison Airport	ADS
Collin County Regional Airport at McKinney	TKI
Dallas Executive Airport	RBD
Ennis Municipal Airport	F41
Lancaster Regional Airport	LNC
Mesquite Metro Airport	HQZ
Mid-way Regional Airport	JWY
Rockwall Municipal Airport	F46

**Table 2. East Satellite Airports**

These new STARs will procedurally de-conflict satellite arrivals from DFW arrivals, will reduce controller task complexity and increase flight path predictability. Additionally, the procedure

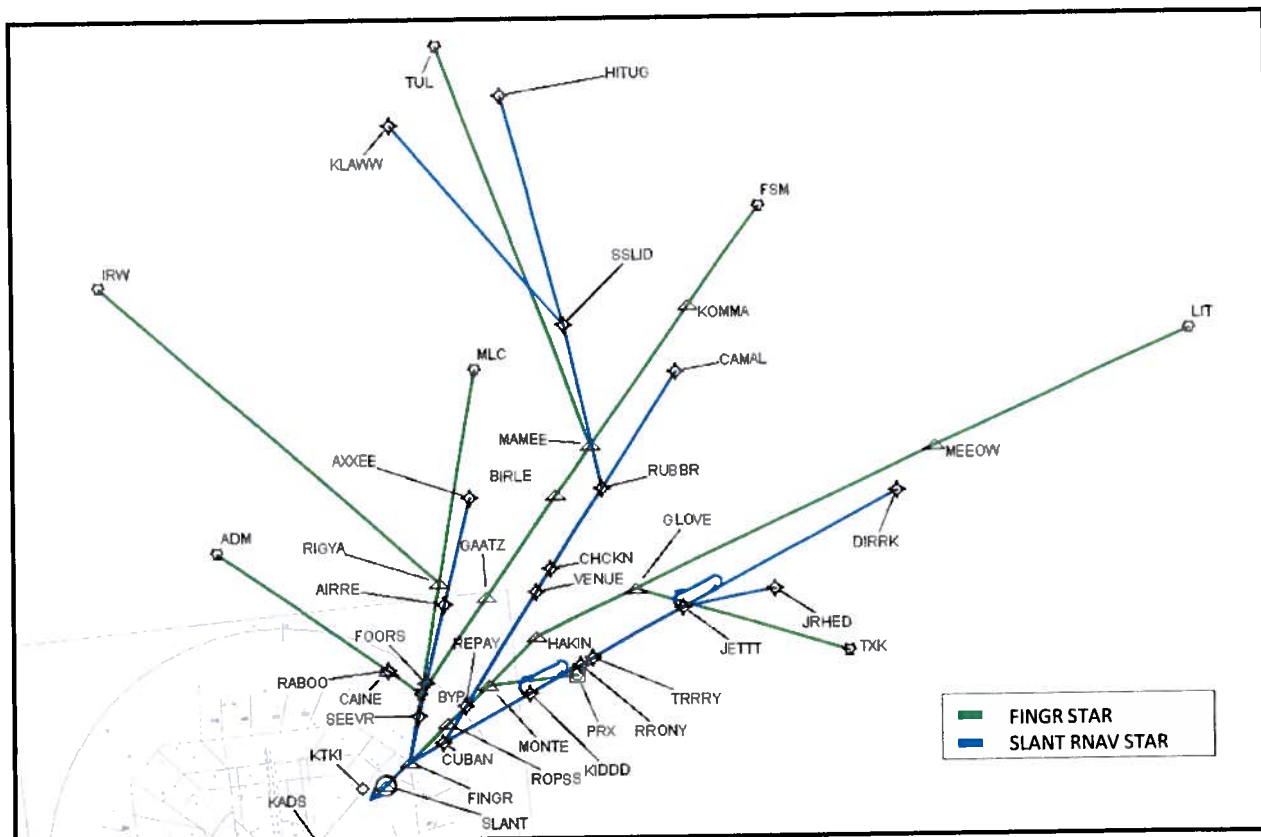
# North Texas OAPM Design Package

## Satellite STARs, SANGR and SLANT SAT RNAV STARs

will reduce task complexity in the cockpit through incorporation of Performance-Based Navigation (PBN).

Figure 2 depicts the proposed SLANT RNAV STAR.

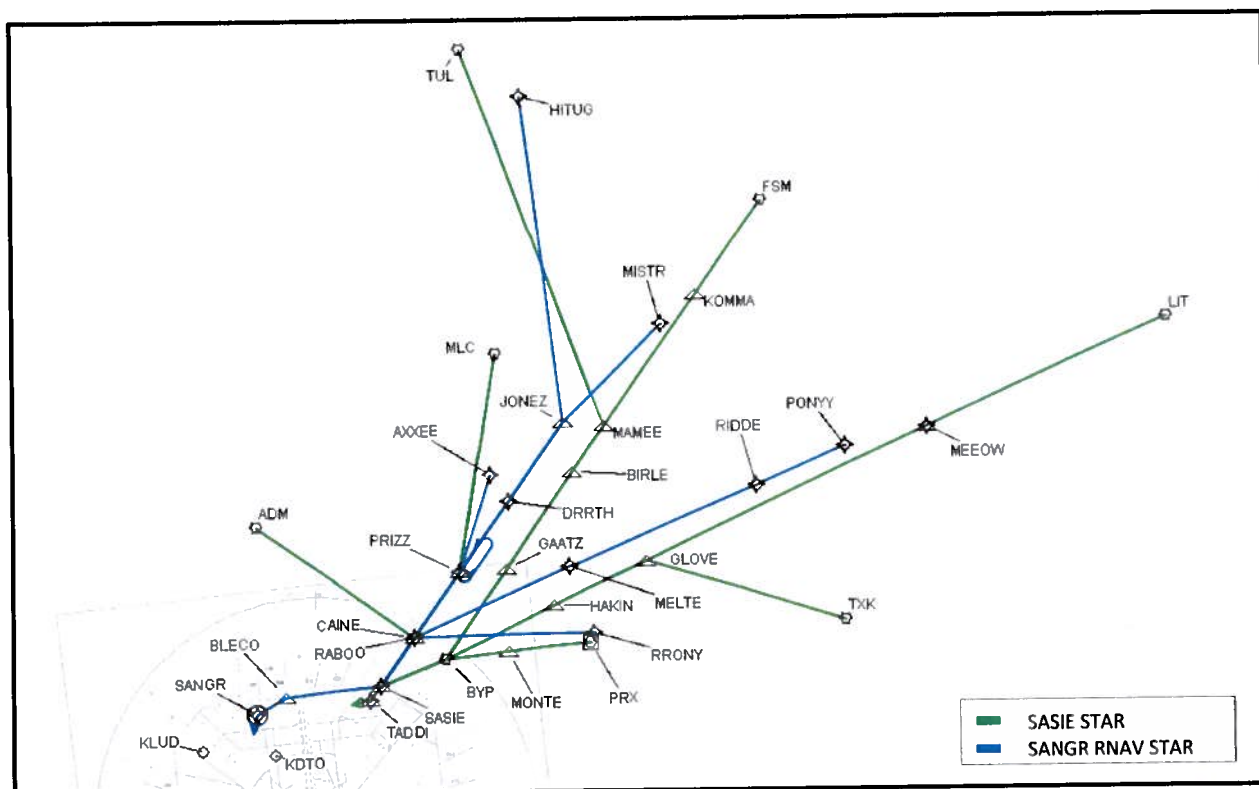
Figure 3 depicts the proposed SANGR RNAV STAR.



**Figure 2. Proposed SLANT RNAV STAR and FINGR STAR**

# North Texas OAPM Design Package

## Satellite STARs, SANGR and SLANT SAT RNAV STARs



**Figure 3. Proposed SANGR RNAV STAR and SASIE STAR**

### Additional Design Considerations

The Design Team determined the Study Team's proposal to crisscross traffic was not feasible because it had the potential to increase controller task complexity and mileage flown.

Human-in-the-loop simulations validated these proposed designs.

Spectrum analysis will be required for the proposed airspace changes associated with the proposed SANGR and SLANT RNAV STARs.

These procedures will be used by all types of RNAV-equipped aircraft, are not anticipated to change runway usage, and do not modify flight paths below 3,000 feet Above Ground Level.

The SLANT RNAV STAR will have a crossing restriction at 8,000 feet at FINGR for turbojet aircraft, and 6,000 and 7,000 feet for all prop aircraft established via Letter of Agreement.

The SANGR RNAV STAR will have a crossing restriction at 12,000 feet at SASIE for turbojet aircraft, and 5,000 and 6,000 feet for all prop aircraft established via Letter of Agreement.

# **North Texas OAPM Design Package**

## **Satellite STARs, SANGR and SLANT SAT RNAV STARs**

### **Implementation Dependencies**

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed SANGR and SLANT RNAV STARs.

These procedures are dependent on the following procedures:

- **SLANT:** This procedure shares waypoints with the BRDJE, CAINE, DAWGZ, HIBIL, SANGR, SEEVR and TRYST RNAV STARs and the SASIE STAR. It is procedurally de-conflicted from the BRDJE and SEEVR RNAV STARs at PLEZE waypoint and is laterally separated with BRDJE and SEEVR RNAV STARs and the SASIE STAR.
- **SANGR:** This procedure shares waypoints with the TRYST, BRDJE, CAINE, DAWGZ, JFREY, HIBIL, SEEVR and SLANT RNAV STARs and the SASIE STAR. It is procedurally de-conflicted with BRDJE and SEEVR RNAV STARs and the SASIE STAR.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letters of Agreement with D10, ZME, ZKC and TUL, RZC, and OKC TRACONs will need to be modified for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**

1. SANGR TARGETS Distribution Package
2. SLANT TARGETS Distribution Package

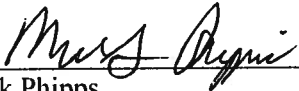


# North Texas OAPM Design Package

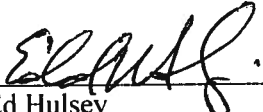
## Satellite STARS, SANGR and SLANT SAT RNAV STARS

### Review Signatures


Design Team Lead's signatures indicate the appropriate coordination with any concerned parties has been conducted with regards to the changes/amendments listed on this document.

  
\_\_\_\_\_  
Mark Phipps  
North Texas OAPM  
FAA Lead

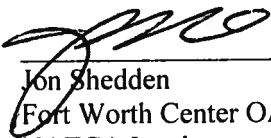
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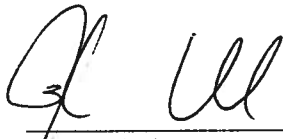
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Robert Ellis  
Fort Worth Center OAPM  
Facility Lead

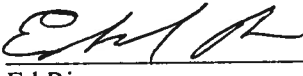
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Ed Rivas  
Dallas-Fort Worth TRACON OAPM  
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8/22/13  
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Date

# North Texas OAPM Design Package

## Conventional STARs, BOWIE CONV STAR

Name of Change and Airport/s	Date
<b>BOWIE - DFW</b>	<b>22 August 2013</b>
Change Classification	Current Phase of Design
<b>Terminal Procedure STAR</b>	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
<b>None</b>	<b>24 July 2014</b>
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 34, 47, 48, 53, 75, 93 and 94</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors FW1, FW2, DR3, MN, AR1, AR2, AR3 and AR5</li> </ul> <b>ARTCCs</b> <ul style="list-style-type: none"> <li>Albuquerque (ZAB) and Kansas City (ZKC)</li> </ul> <b>TRACONs</b> <ul style="list-style-type: none"> <li>Lubbock (LBB) and Oklahoma City (OKC)</li> </ul> <b>RAPCONs</b> <ul style="list-style-type: none"> <li>Fort Sill (FSI) and Sheppard (SPS)</li> </ul>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Procedure Design Packages</b> <ul style="list-style-type: none"> <li>STARs: DEBBB, GIBBI, GREGS, JFRYE, JOVEM, NANDR, SHAAM and WESAT</li> <li>SIDs: ALIAN, HRPER, HUDAD, KATZZ and WSTEX</li> </ul>	<b>NTEX OAPM 201309.tgs</b>

### Purpose

The main goal of the OAPM process is to design and implement RNAV procedures and airspace changes associated with them. However, there is a small percentage of aircraft that are not RNAV capable or equipped that rely on conventional navigational aids and procedures. With the

# **North Texas OAPM Design Package**

## **Conventional STARs, BOWIE CONV STAR**

introduction of new RNAV procedures proposed by the North Texas Design Team, new conventional procedures will also need to be designed and implemented to resolve conflicts with the new RNAV procedures.

### **Study Team Recommendation**

The Study Team did not recommend or design any conventional procedures.

### **Proposed Design**

The North Texas OAPM Design Team is proposing modifications to the BOWIE STAR. The proposed design will modify the current procedure after the UKW NAVAID to align with the proposed DEBBB and JOVEM RNAV STARs.

After the UKW NAVAID, in south flow, arrivals will continue to BEWTS waypoint at 10,000 feet at 250 knots and then expect radar vectors after NCONA to final. In north flow, turbojet arrivals will continue to DEBBB waypoint at 280 knots, JOVEM waypoint at 270 knots, and HIKAY waypoint at 11,000 feet at 250 knots. All DFW prop arrivals will remain the same as today whether conventional or RNAV. After HIKAY, turbojet arrivals will continue to SILER waypoint at 11,000 feet at 220 knots, then will depart on a 175 heading and expect radar vectors to final. All props will depart HIKAY on a 145 heading for vectors to final. These designs will align the conventional procedure with the proposed DEBBB and JOVEM RNAV STARs. Figure 1 depicts the proposed BOWIE STAR.

# North Texas OAPM Design Package

## Conventional STARs, BOWIE CONV STAR

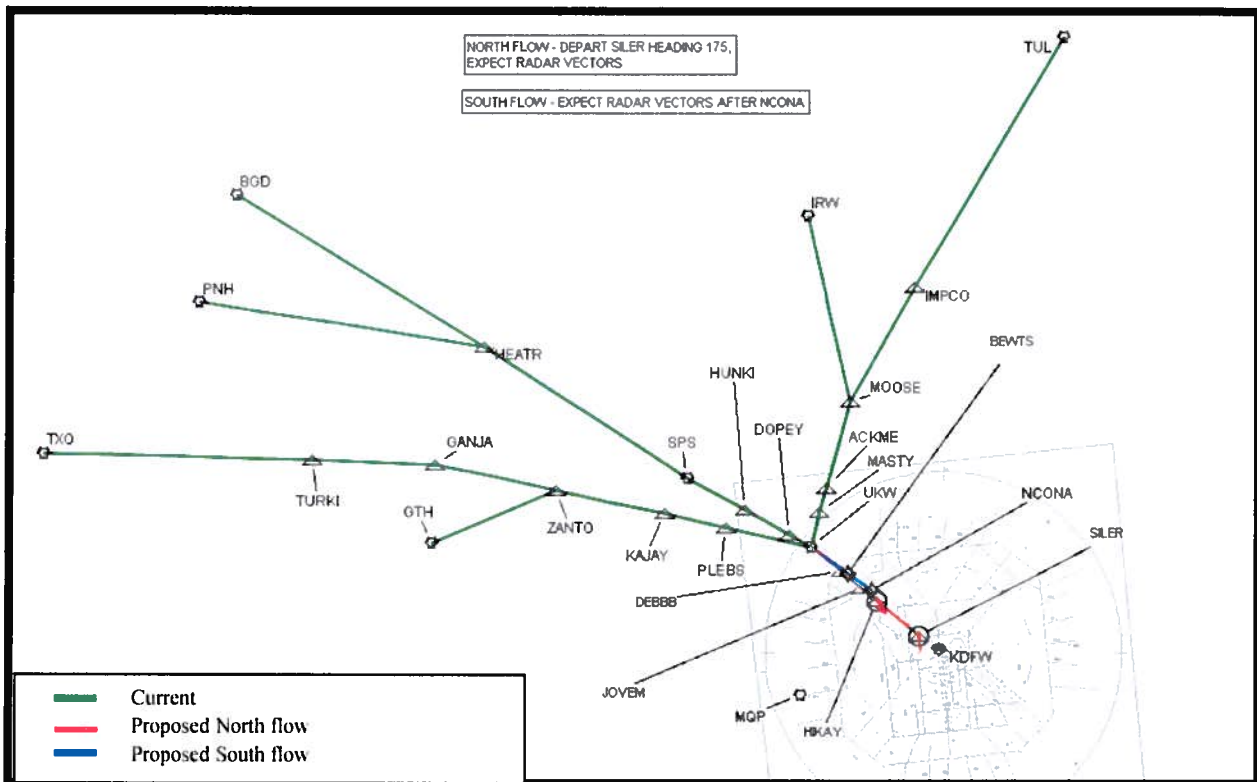


Figure 1. Proposed and Current BOWIE STARs

### Additional Design Considerations

Human-in-the-loop simulations validated these proposed designs.

This procedure will be used by all types of aircraft, are not anticipated to change runway usage, and do not modify flight paths below 3,000 feet Above Ground Level.

### Implementation Dependencies

This procedure is dependent on the following procedures:

- **BOWIE:** This procedure shares waypoints with the DEBBB, GIBBI, JFRYE, JOVEM, NANDR, SHAAM and WESAT RNAV STARs and the GREGS STAR. It is procedurally de-conflicted from the GIBBI, JFRYE, NANDR, SHAAM and WESAT RNAV STARs. It has altitude dependencies with the ALIAN, HRPER, KATZZ, HUDAD and WSTEX RNAV SIDs in north flow.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letters of Agreement with D10, ZAB, ZKC, SPS and FSI RAPCONs, and OKC and LBB TRACONs will require changes for handoffs, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

# **North Texas OAPM Design Package**

## **Conventional STARs, BOWIE CONV STAR**

### **Attachments**


BOWIE TARGETS Distribution Package

# North Texas OAPM Design Package

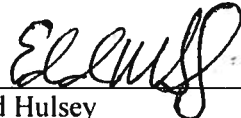
## Conventional STARs, BOWIE CONV STAR

### Review Signatures


The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

  
\_\_\_\_\_  
Mark Phipps  
North Texas OAPM  
FAA Lead

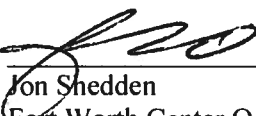
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Ed Hulsey  
North Texas OAPM  
NATCA Lead

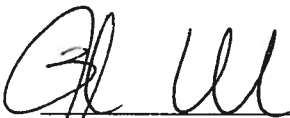
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\_\_\_\_\_  
Robert Ellis  
Fort Worth Center OAPM  
Facility Lead

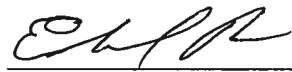
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Jon Shedden  
Fort Worth Center OAPM  
NATCA Lead

8/22/13  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
James Harlan  
Dallas-Fort Worth TRACON OAPM  
Facility Lead

8/22/13  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Ed Rivas  
Dallas-Fort Worth TRACON OAPM  
NATCA Lead

8/22/13  
\_\_\_\_\_  
Date

# North Texas OAPM Design Package

## Conventional STARs, CEDAR CREEK CONV STAR

Name of Change and Airport/s	Date
<b>CEDAR CREEK - DFW</b>	<b>01 xxxx 2013</b>
Change Classification	Current Phase of Design
<b>Terminal Procedure STAR</b>	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
<b>None</b>	<b>24 July 2014</b>
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 29 and 89</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors DS, DE, FW1, FW2, FE1, FE2, DR1, AR1, AR2, AR3, AR5 and AR6</li> </ul> <b>ARTCCs</b> <ul style="list-style-type: none"> <li>Houston (ZHU) and Memphis (ZME)</li> </ul> <b>TRACONs</b> <ul style="list-style-type: none"> <li>Longview (GGG), Monroe (MLU), Shreveport (SHV) and Waco (ACT)</li> </ul> <b>Fort Polk (POE) RAPCON</b>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul> <b>ZHU</b> <ul style="list-style-type: none"> <li>Mike McGhee</li> <li>David Salapata</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Procedure Design Packages</b> <ul style="list-style-type: none"> <li>STARs: BAWLZ, CABBY, CHUKK, EESAT, KLNDR, MNND, REDDN, REEKO and YEAGR</li> </ul>	<b>Master TARGETS File (file extension name)</b>

### Purpose

The main goal of the OAPM process is to design and implement RNAV procedures and airspace changes associated with the new procedures. However, there is still a small percentage of aircraft that are not RNAV-capable or equipped that rely on conventional navigational aids and procedures. With the introduction of new RNAV procedures proposed by the North Texas Design Team, new conventional procedures will also need to be designed and implemented to resolve conflicts with the new RNAV procedures.

# North Texas OAPM Design Package

## Conventional STARs, CEDAR CREEK CONV STAR

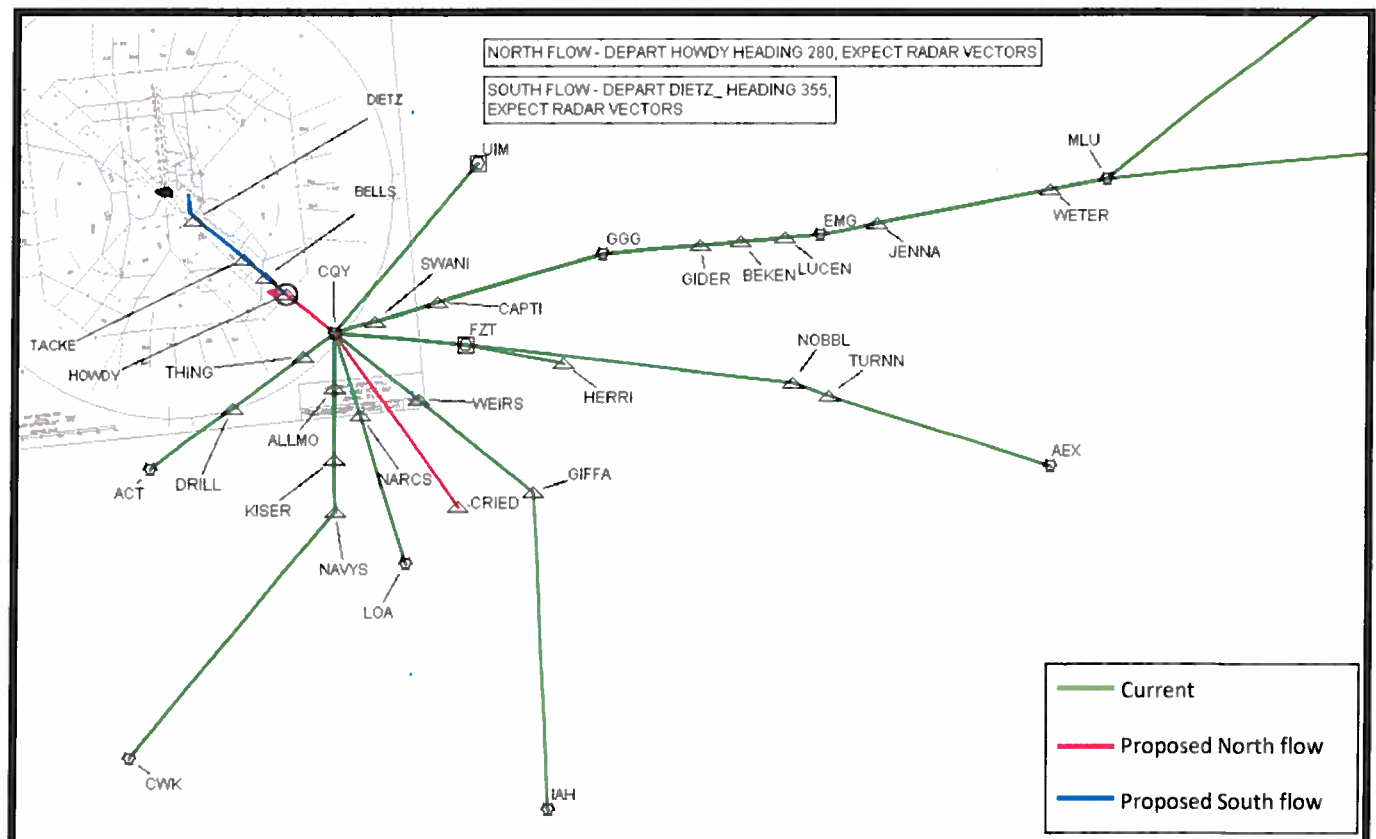
### Study Team Recommendation

The Study Team did not recommend or design any conventional procedures.

### Proposed Design

The North Texas OAPM Design Team is proposing the modification of the CEDAR CREEK STAR. In the enroute environment the GIFFA transition will be replaced by the CRIED transition. In north flow aircraft will depart HOWDY waypoint at 11,000 feet on a 280 heading and expect radar vectors to final. In south flow, aircraft will continue past HOWDY at 280 knots, cross WARDZ waypoint at 11,000 feet and 250 knots, instead of TACKE waypoint, then continue to DIETZ waypoint at 11,000 feet at 220 knots. DIETZ will be moved slightly northwest from today. After DIETZ, aircraft will depart on a 355 heading and expect radar vectors to final. Conventional arrivals will be handed off from ZFW to D10 in trail of RNAV arrivals. Conventional arrivals from ZHU Sectors 46 and 86 need to be moved to the enroute transition beginning at CRIED waypoint. All DFW prop arrivals will remain the same as today whether conventional or RNAV.

Figure 1 depicts the proposed CEDAR CREEK STAR.



**Figure 1. Proposed CEDAR CREEK STAR and Current CEDAR CREEK STAR**



# **North Texas OAPM Design Package**

## **Conventional STARs, CEDAR CREEK CONV STAR**

### **Additional Design Considerations**

Human-in-the-loop simulations validated these proposed designs.

This procedure is not anticipated to change runway usage and does not modify flight paths below 3,000 feet Above Ground Level.

### **Implementation Dependencies**

This procedure is dependent on the following procedures:

- **CEDAR CREEK:** This procedure shares waypoints with the KLNDR RNAV STAR and the YEAGR STAR. It is procedurally de-conflicted from the BAWLZ, CABBY, CHUKK, EESAT, MNND0, REDDN and REEKO RNAV STARs. It has altitude dependencies with the FORCK, MRSSH, SKTER and TRYTN RNAV SIDs in south flow.

This proposed design is dependent upon the implementation of WHINY and KLNDR RNAV STARs. The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letters of Agreement with D10, ZME, ZHU, and GGG, MLU, POE, SHV, and ACT TRACONs will require changes for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**

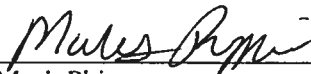
CEDAR CREEK TARGETS Distribution Package

# North Texas OAPM Design Package


## Conventional STARs, CEDAR CREEK CONV STAR

### Review Signatures


The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

  
\_\_\_\_\_  
Mark Phipps  
North Texas OAPM  
FAA Lead


8/22/13  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Ed Hulsey  
North Texas OAPM  
NATCA Lead


8/22/13  
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Date

  
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Robert Ellis  
Fort Worth Center OAPM  
Facility Lead

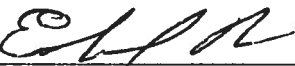
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Jon Shedden  
Fort Worth Center OAPM  
NATCA Lead


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James Harlan  
Dallas-Fort Worth TRACON OAPM  
Facility Lead

8/22/13  
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Date

  
\_\_\_\_\_  
Ed Rivas  
Dallas-Fort Worth TRACON OAPM  
NATCA Lead

8/22/13  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Keith Brown  
Houston OAPM  
NATCA Lead

8/13/13  
\_\_\_\_\_  
Date

# North Texas OAPM Design Package

## Conventional STARs, FINGR CONV STAR

Name of Change and Airport/s	Date
<b>FINGR - Satellites</b>	<b>22 August 2013</b>
Change Classification	Current Phase of Design
<b>Terminal Procedure STAR</b>	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
<b>None</b>	<b>24 July 2014</b>
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 27, 37, 38, 42, 50, 53 and 90</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors FE1, FE2, DR1, AR1, AR2 and AR3</li> </ul> <b>ARTCCs</b> <ul style="list-style-type: none"> <li>Kansas City (ZKC) and Memphis (ZME)</li> </ul> <b>TRACONs</b> <ul style="list-style-type: none"> <li>Oklahoma City (OKC), Razorback (RZC) and Tulsa (TUL)</li> </ul>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Procedure Design Packages</b> <ul style="list-style-type: none"> <li>STARs: BRDJE, DAWGZ, HIBIL, SEEV, TRYST</li> </ul>	<b>NTEX OAPM 201309.tgs</b>

### Purpose

The main goal of the OAPM process is to design and implement RNAV procedures, and airspace changes associated with them. However, there is a small percentage of aircraft that are not RNAV-capable or equipped that rely on conventional navigational aids and procedures. With the introduction of new RNAV procedures proposed by the North Texas Design Team, new conventional procedures will also need to be designed and implemented to resolve conflicts with the new RNAV procedures.

# North Texas OAPM Design Package

## Conventional STARs, FINGR CONV STAR

### Study Team Recommendation

The Study Team did not recommend or design any conventional procedures.

### Proposed Design

The North Texas OAPM Design Team is proposing the modification of the FINGR STAR for the following East Satellite airports:

<b>Airport Name</b>	<b>Airport ID</b>
Addison Airport	ADS
Collin County Regional Airport at McKinney	TKI
Dallas Executive Airport	RBD
Ennis Municipal Airport	F41
Lancaster Regional Airport	LNC
Mesquite Metro Airport	HQZ
Mid-way Regional Airport	JWY
Rockwall Municipal Airport	F46

**Table 1. East Satellite Airports**

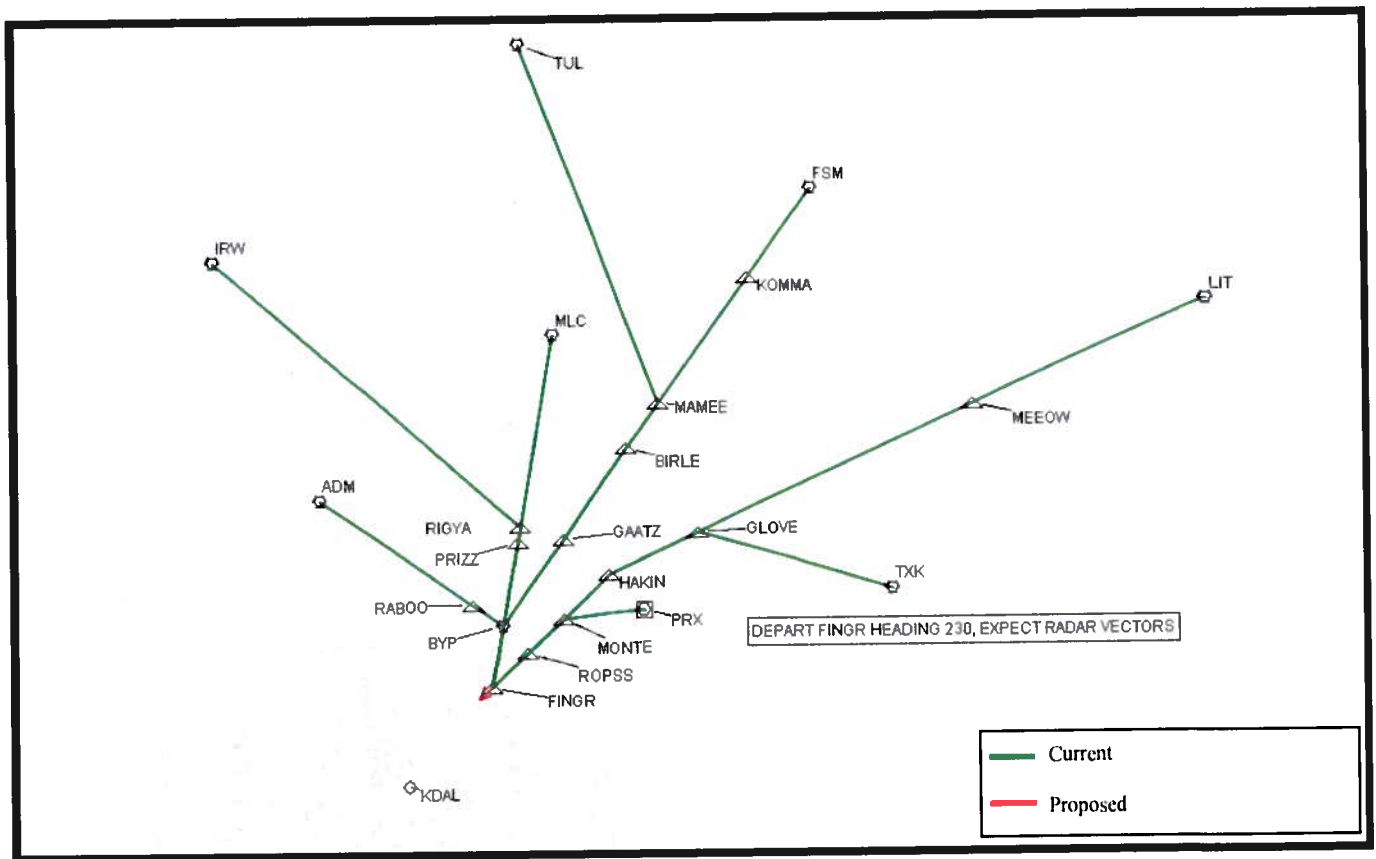
The enroute transitions will remain the same. After the transitions merge at FINGR waypoint aircraft will depart on a heading of 230 for vectors to final approach course in north and south flows.

Crossing restrictions will mirror the HIBIL, SLANT and TRYST RNAV STARs.

Figure 1 depicts the proposed FINGR STAR.

# North Texas OAPM Design Package

## Conventional STARs, FINGR CONV STAR



**Figure 1. Proposed FINGR STAR and Current FINGR STAR**

### Additional Design Considerations

Human-in-the-loop simulations validated these proposed designs.

These procedures will be used by all types of aircraft, are not anticipated to change runway usage, and do not modify flight paths below 3,000 feet Above Ground Level.

### Implementation Dependencies

This procedure is dependent on the following procedures:

- **FINGR:** This procedure is procedurally de-conflicted with the BRDJE, DAWGZ, HIBIL, SEEV, and TRYST RNAV STARs. It shares the same crossing altitude at FINGR as the HIBIL RNAV STAR.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letters of Agreement with D10, ZKC, ZME, and OKC, TUL, and RZC TRACONs will require changes for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

# **North Texas OAPM Design Package Conventional STARs, FINGR CONV STAR**

## **Attachments**

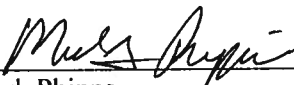
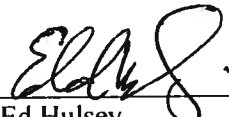
FINGR TARGETS Distribution Package



# North Texas OAPM Design Package


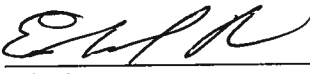
## Conventional STARs, FINGR CONV STAR

### Review Signatures

The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

 _____ Mark Phipps North Texas OAPM FAA Lead	8/22/13 Date	 _____ Ed Hulse North Texas OAPM NATCA Lead	8/22/13 Date
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 _____ Robert Ellis Fort Worth Center OAPM Facility Lead	8/22/13 Date	 _____ Jon Shedden Fort Worth Center OAPM NATCA Lead	8/24/13 Date
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 _____ James Harlan Dallas-Fort Worth TRACON OAPM Facility Lead	8/22/13 Date	 _____ Ed Rivas Dallas-Fort Worth TRACON OAPM NATCA Lead	8/22/13 Date
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# North Texas OAPM Design Package

## Conventional STARs, GLEN ROSE CONV STAR

Name of Change and Airport/s	Date
<b>GLEN ROSE - DFW</b>	<b>01 xxxx 2013</b>
Change Classification	Current Phase of Design
<b>Terminal Procedure STAR</b>	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
<b>None</b>	<b>24 July 2014</b>
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 62 and 65</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors FW1, FW2, DR3, AR1 AR2, AR3 and MS</li> </ul> <b>ARTCCs</b> <ul style="list-style-type: none"> <li>Albuquerque (ZAB) and Houston (ZHU)</li> </ul> <b>TRACONs</b> <ul style="list-style-type: none"> <li>Abilene (ABI), Midland (MAF), San Angelo (SJT) and Waco (ACT)</li> </ul> <b>Gray (GRK) RAPCON</b>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul> <b>ZHU</b> <ul style="list-style-type: none"> <li>Mike McGhee</li> <li>David Salapata</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Procedure Design Packages</b> <ul style="list-style-type: none"> <li>STARs: BACHR, BOOVE, KNEAD, LIKES, NRTAY, PAWLZ, SOCKK, SWAVY and TILLA</li> <li>SIDs: ALIAN, HRPER, HUDAD, KATZZ and WSTEX</li> </ul>	<b>Master TARGETS File (file extension name)</b>

### Purpose

The main goal of the OAPM process is to design and implement RNAV procedures and airspace changes associated with the new procedures. However, there is still a small percentage of aircraft that are not RNAV-capable or equipped that rely on conventional navigational aids and procedures. With the introduction of new RNAV procedures proposed by the North Texas



# **North Texas OAPM Design Package**

## **Conventional STARs, GLEN ROSE CONV STAR**

Design Team, new conventional procedures will also need to be designed and implemented to resolve conflicts with the new RNAV procedures.

### **Study Team Recommendation**

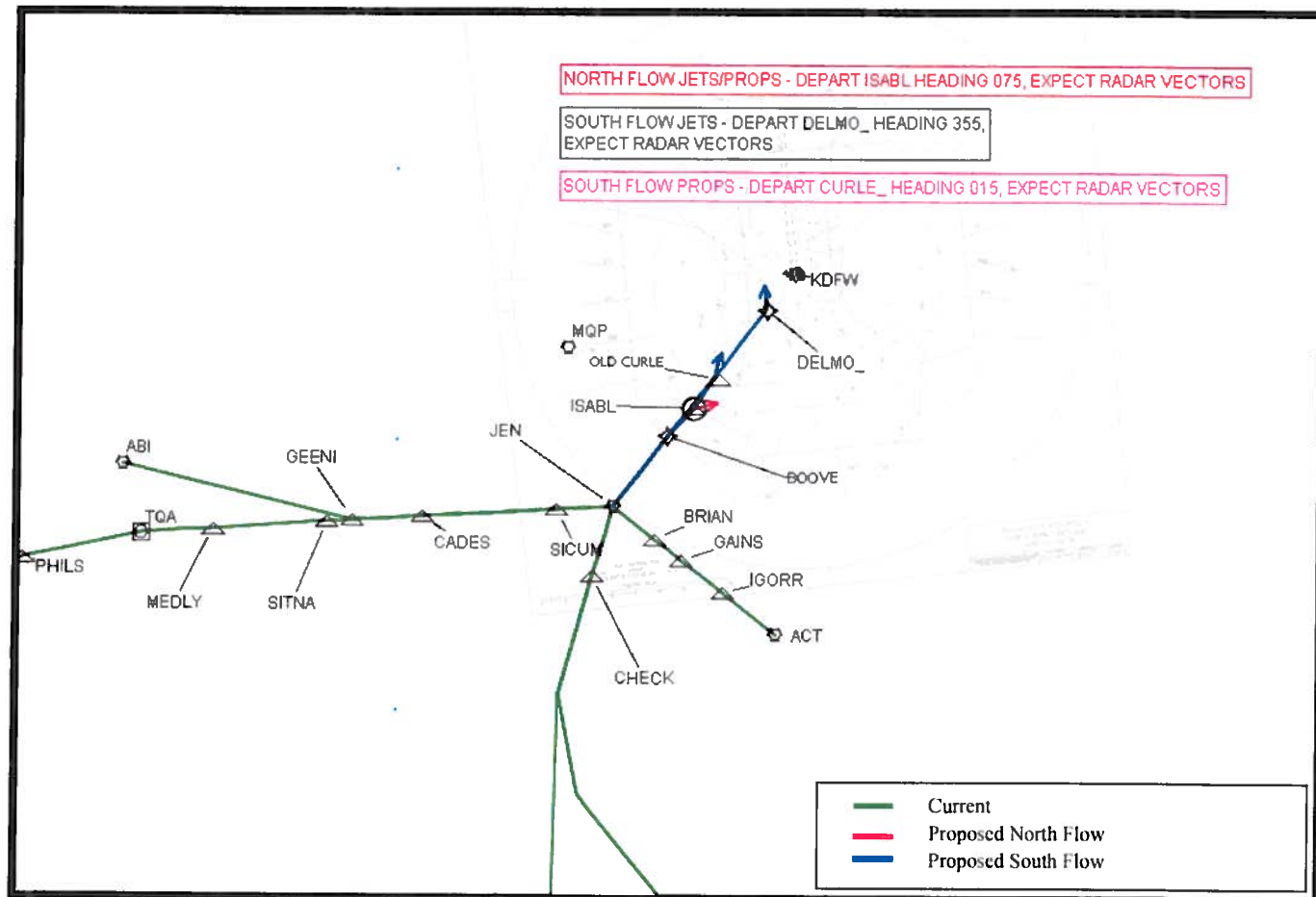
The Study Team did not recommend or design any conventional procedures.

### **Proposed Design**

The North Texas OAPM Design Team is proposing the modification of the GLEN ROSE STAR. The five enroute transitions will remain unchanged merging at the JEN NAVAID then continue to BOOVE waypoint expecting 10,000 feet and 250 knots in north flow or 280 knots and no altitude restriction in south flow for turbojets only. After BOOVE, in north flow, arrivals will continue to ISABL waypoint then depart on a 075 heading for radar vectors to final. In south flow, after BOOVE, turbojet arrivals will continue to CURLE waypoint expecting 11,000 feet and 270 knots, then MOWWW waypoint at 250 knots, DELMO waypoint at 220 knots, and then depart DELMO on a 355 heading to join downwind. All DFW prop arrivals will remain the same as today whether conventional or RNAV. Figure1 depicts the proposed GLEN ROSE STAR.

# North Texas OAPM Design Package

## Conventional STARs, GLEN ROSE CONV STAR



**Figure 1. Proposed GLEN ROSE STAR and Current GLEN ROSE STAR**

### Additional Design Considerations

Human-in-the-loop simulations validated these proposed designs.

These procedures will be used by all types of aircraft, are not anticipated to change runway usage, and do not modify flight paths below 3,000 feet Above Ground Level.

### Implementation Dependencies

This procedure is dependent on the following procedures:

- **GLEN ROSE:** This procedure shares waypoints with the KNEAD STAR. It is procedurally de-conflicted from the BACHR, BOOVE, LIKES, NRTAY, PAWLZ, SOCKK, SWVAY and TILLA RNAV STARs and the KNEAD STAR. It has altitude

# **North Texas OAPM Design Package**

## **Conventional STARs, GLEN ROSE CONV STAR**

dependencies with the ALIAN, HRPER, HUDAD, KATZZ and WSTEX RNAV SIDs in south flow.

The ZFW and D10 Standard Operating Procedures will require changes to minimize coordination between sectors for this proposed design. The ZFW Letters of Agreement with D10, ZHU, ZAB, ABI, ACT, MAF and SJT TRACONS and GRK RAPCON will require changes for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**


GLEN ROSE TARGETS Distribution Package

# North Texas OAPM Design Package


## Conventional STARs, GLEN ROSE CONV STAR

### Review Signatures


The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

  
Mark Phipps  
North Texas OAPM  
FAA Lead


8/22/13  
Date

  
Ed Hulsey  
North Texas OAPM  
NATCA Lead


8/22/13  
Date

  
Robert Ellis  
Fort Worth Center OAPM  
Facility Lead


8/22/13  
Date

  
Jon Shedden  
Fort Worth Center OAPM  
NATCA Lead

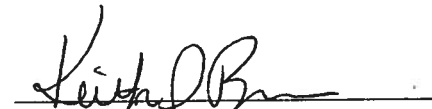
8/22/13  
Date

  
James Harlan  
Dallas-Fort Worth TRACON OAPM  
Facility Lead

8/22/13  
Date

  
Ed Rivas  
Dallas-Fort Worth TRACON OAPM  
NATCA Lead

8/22/13  
Date

  
Keith Brown  
Houston OAPM  
NATCA Lead

8/13/13  
Date

# North Texas OAPM Design Package

## Conventional STARs, GREGS CONV STAR

Name of Change and Airport/s	Date
<b>GREGS - DFW</b>	<b>22 August 2013</b>
Change Classification	Current Phase of Design
<b>Terminal Procedure STAR</b>	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
<b>None</b>	<b>24 July 2014</b>
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>• Sector 75</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>• Sectors MN, MNH and DN</li> </ul> <b>ARTCCs</b> <ul style="list-style-type: none"> <li>• Albuquerque (ZAB) and Kansas City (ZKC)</li> </ul> <b>TRACONs</b> <ul style="list-style-type: none"> <li>• Lubbock (LBB) and Oklahoma City(OKC)</li> </ul> <b>RAPCONs</b> <ul style="list-style-type: none"> <li>• Fort Sill (FSI) and Sheppard (SPS)</li> </ul>	<b>ZFW</b> <ul style="list-style-type: none"> <li>• Robert Ellis</li> <li>• Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>• James Harlan</li> <li>• Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Procedure Design Packages</b> <ul style="list-style-type: none"> <li>• STARs: BOWIE, DEBBB, GIBBI, JFRYE, JOVEM, NANDR, SHAAM and WESAT</li> </ul>	<b>NTEX OAPM 201309.tgs</b>

### Purpose

The main goal of the OAPM process is to design and implement RNAV procedures, and airspace changes associated with the new procedures. However, there is still a small percentage of aircraft that are not RNAV-capable or equipped that rely on conventional navigational aids and procedures. With the introduction of new RNAV procedures proposed by the North Texas Design Team, new conventional procedures will also need to be designed and implemented to resolve conflicts with the new RNAV procedures.

# North Texas OAPM Design Package

## Conventional STARs, GREGS CONV STAR

### Study Team Recommendation

The Study Team did not recommend or design any conventional procedures.

### Proposed Design

The North Texas OAPM Design Team is proposing the modifications of the GREGS STAR for the following East Satellite airports:

Airport Name	Airport ID
Addison Airport	ADS
Collin County Regional Airport at McKinney	TKI
Dallas Executive Airport	RBD
Dallas Love Field	DAL
Ennis Municipal Airport	F41
Lancaster Regional Airport	LNC
Mesquite Metro Airport	HQZ
Mid-way Regional Airport	JWY
Rockwall Municipal Airport	F46

**Table 1. East Satellite Airports**

In a south flow aircraft will depart GREGS waypoint on a 085 heading at 11,000 feet and 250 knots instead of continuing to the CRAFF waypoint. In a north flow aircraft will depart GREGS on a 085 heading at 10,000 feet and 250 knots. All prop aircraft have a crossing restriction of GREGS at 6,000 and 7,000 feet. DTO turbojets will have a crossing restriction at GREGS at 8,000 feet; all props will have a crossing restriction at 4,000 feet. This will ensure procedural deconfliction with the DEBBB, GIBBI, JOVEM, NANDR and SHAAM RNAV STARs.

Figure 1 depicts the proposed GREGS STAR.

# North Texas OAPM Design Package

## Conventional STARs, GREGS CONV STAR

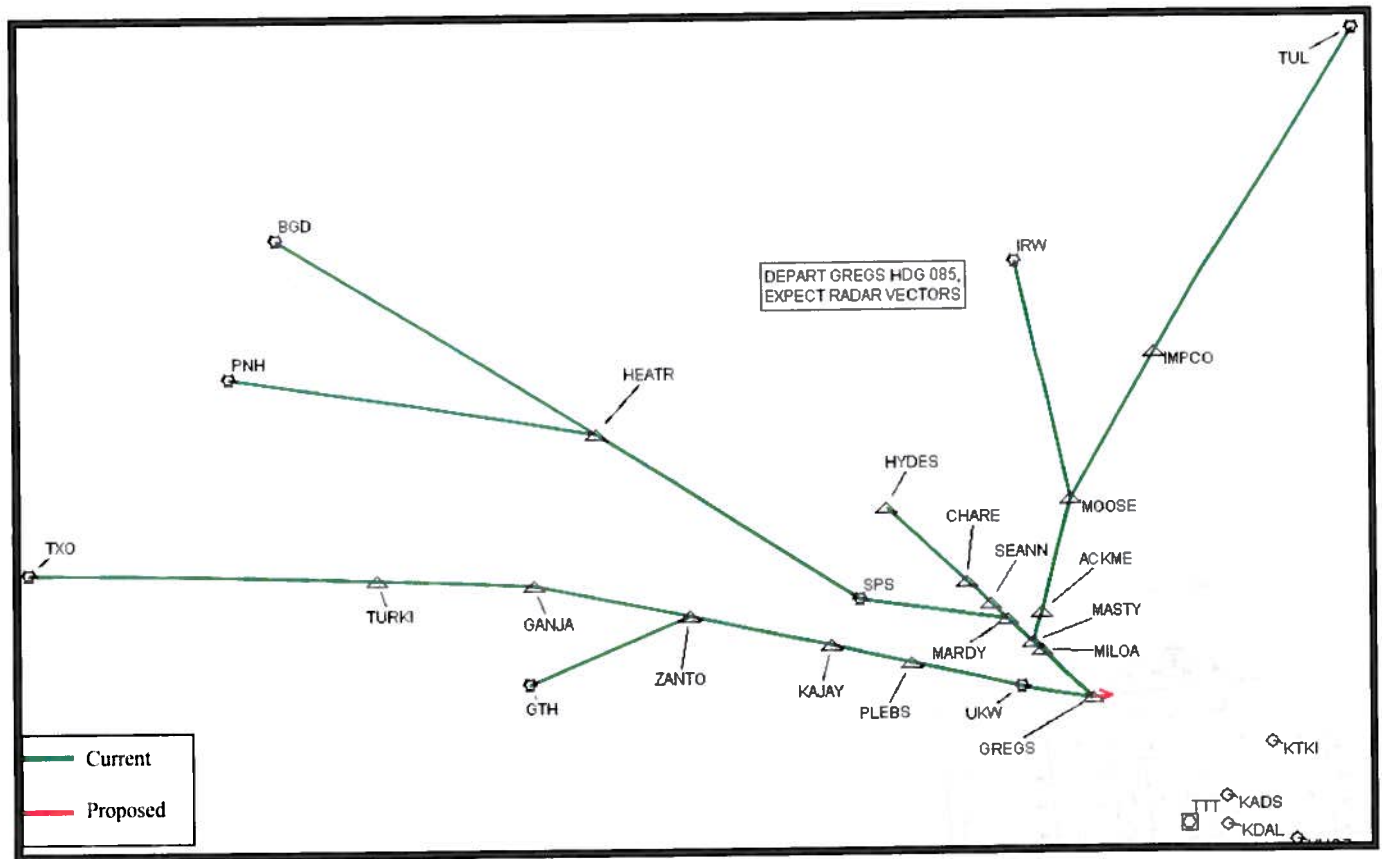


Figure 1. Proposed GREGS STAR and Current GREGS STAR

### Additional Design Considerations

Human-in-the-loop simulations validated these proposed designs.

This procedure will be used by all types of aircraft, is not anticipated to change runway usage, and does not modify flight paths below 3,000 feet Above Ground Level.

### Implementation Dependencies

The Terminal and En Route airspace changes need to be complete prior to implementation of the proposed GREGS STAR.

This procedure is dependent on the following procedures:

- **GREGS:** This procedure shares waypoints with the DEBBB, GIBBI, JOVEM, JFREY, NANDR, SHAAM and WESAT RNAV STARs and the BOWIE STAR. It is procedurally de-conflicted from the DEBBB and JOVEM RNAV STARs.

# **North Texas OAPM Design Package**

## **Conventional STARs, GREGS CONV STAR**

The ZFW and D10 Standard Operating Procedures will require changes to minimize coordination between sectors for this proposed design. The ZFW Letters of Agreement with D10, ZAB and ZKC, FSI and SPS RAPCONs and LBB and OKC TRACONs will require changes for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**

GREGS TARGETS Distribution Package

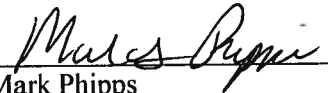


# North Texas OAPM Design Package

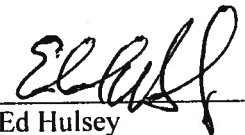
## Conventional STARS, GREGS CONV STAR

### Review Signatures

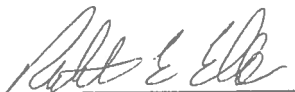
The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

  
Mark Phipps  
North Texas OAPM  
FAA Lead

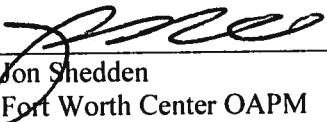
8/22/13  
Date

  
Ed Hulse  
North Texas OAPM  
NATCA Lead

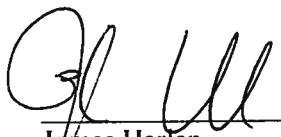
8/22/13  
Date

  
Robert Ellis  
Fort Worth Center OAPM  
Facility Lead

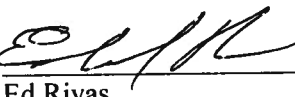
8/22/13  
Date

  
Jon Shedden  
Fort Worth Center OAPM  
NATCA Lead

8/22/13  
Date

  
James Harlan  
Dallas-Fort Worth TRACON OAPM  
Facility Lead

8/24/13  
Date

  
Ed Rivas  
Dallas-Fort Worth TRACON OAPM  
NATCA Lead

8/29/13  
Date

# North Texas OAPM Design Package

## Conventional STARs, SASIE CONV STAR

Name of Change and Airport/s	Date
SASIE - Satellites	22 August 2013
Change Classification	Current Phase of Design
Terminal Procedure STAR	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
None	24 July 2014
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 27, 37, 38, 42, 48, 50, 53, 83 and 90</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors FE1, DN, MN, MNH and AR8</li> </ul> <b>ARTCCs</b> <ul style="list-style-type: none"> <li>Kansas City (ZKC) and Memphis (ZME)</li> </ul> <b>TRACONs</b> <ul style="list-style-type: none"> <li>Oklahoma City (OKC), Razorback (RZC) and Tulsa (TUL)</li> </ul>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Procedure Design Packages</b> <ul style="list-style-type: none"> <li>STARs: BRDJE, CAINE, DAWGZ, HIBIL, SANGR, SEEV, SLANT, TRYST and WILBR</li> </ul>	NTEX OAPM 201309.tgs

### Purpose

The main goal of the OAPM process is to design and implement RNAV procedures, and airspace changes associated with the new procedures. However, there is still a small percentage of aircraft that are not RNAV-capable or equipped that rely on conventional navigational aids and procedures. With the introduction of new RNAV procedures proposed by the North Texas Design Team, new conventional procedures will also need to be designed and implemented to resolve conflicts with the new RNAV procedures.

# North Texas OAPM Design Package

## Conventional STARs, SASIE CONV STAR

### Study Team Recommendation

The Study Team did not recommend or design any conventional procedures.

### Proposed Design

The Design Team is proposing the modification of the SASIE STAR. The procedure will remain the same until SASIE waypoint. After SASIE aircraft will depart heading 255, expect radar vectors to final, removing the TADDI waypoint. In north flow, west satellite turbojets will cross SASIE at 10,000 feet. In south flow west satellite turbojets will cross SASIE at 11,000 feet. This procedure will be ATC-assigned only for aircraft landing Addison Airport (ADS). ADS turbojets will cross SASIE waypoint at 6,000 feet and all props will cross SASIE at 5,000 or 6,000 feet.

This procedure will be used for aircraft arriving to the following airports:

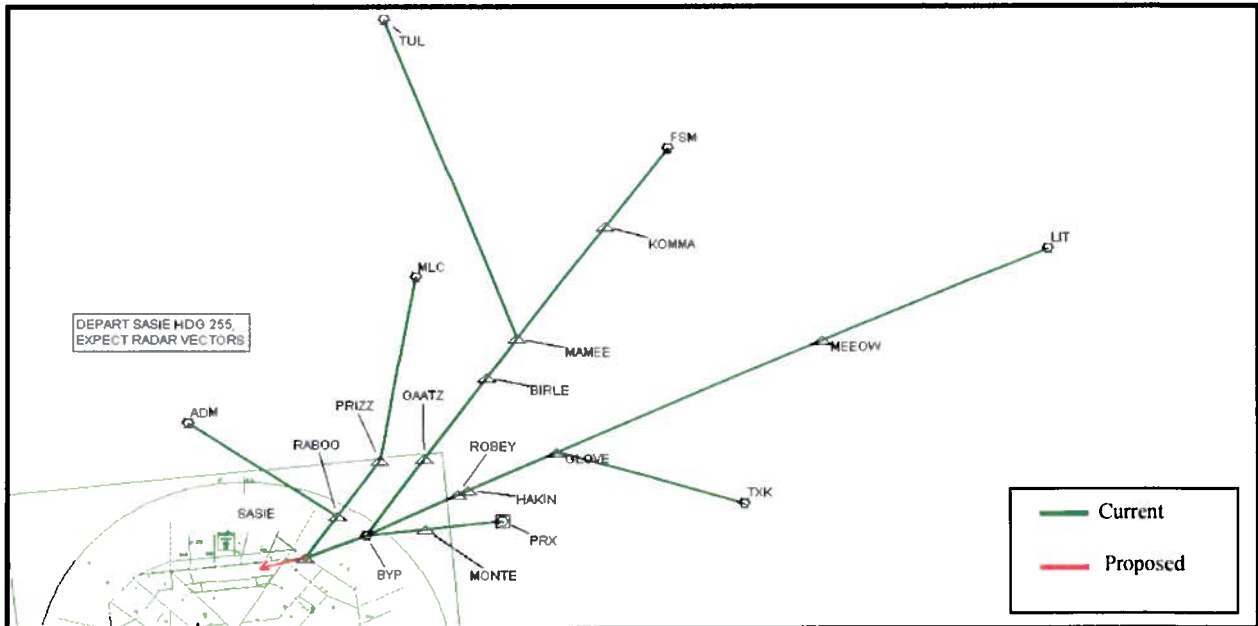
<b>Airport Name</b>	<b>Airport ID</b>
Addison Airport – ATC Assigned Only	ADS
Arlington Municipal Airport	GKY
Bourland Field Airport	50F
Cleburne Municipal Airport	CPT
Decatur Municipal Airport	LUD
Denton Municipal Airport	DTO
Fort Worth Alliance Airport	AFW
Fort Worth Meacham International Airport	FTW
Fort Worth Naval Air Station Joint Reserve Base/Carswell Field	NFW
Fort Worth Spinks Airport	FWS
Grand Prairie Municipal Airport	GPM
Kenneth Copeland Airport	4T2
Parker County Airport	WEA

**Table 1. Satellite Airports**

Figure 1 depicts the proposed SASIE STAR.

# North Texas OAPM Design Package

## Conventional STARs, SASIE CONV STAR



**Figure1. Proposed SASIE STAR and Current SASIE STAR**

### **Additional Design Considerations**

Human-in-the-loop simulations validated these proposed designs.

These procedures will be used by all types of aircraft, are not anticipated to change runway usage, and do not modify flight paths below 3,000 feet Above Ground Level.

### **Implementation Dependencies**

This procedure is dependent on the following procedures:

- **STARs:** BRDJE, CAINE, DAWGZ, HIBIL, SANGR, SEEV, SLANT, TRYST and WILBR

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letters of Agreement with D10, ZME, ZKC, and OKC, TUL, and RZC will require changes for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**


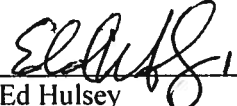
SASIE TARGETS Distribution Package



# North Texas OAPM Design Package

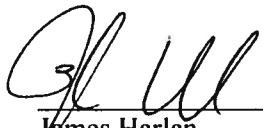

## Conventional STARs, SASIE CONV STAR

### Review Signatures

The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

	8/22/13		8/22/13
Mark Phipps	Date	Ed Hulsey	Date
North Texas OAPM		North Texas OAPM	
FAA Lead		NATCA Lead	

	8/22/13		8/22/13
Robert Ellis	Date	Jon Shedden	Date
Fort Worth Center OAPM		Fort Worth Center OAPM	
Facility Lead		NATCA Lead	

	8/22/13		8/22/13
James Harlan	Date	Ed Rivas	Date
Dallas-Fort Worth TRACON OAPM		Dallas-Fort Worth TRACON OAPM	
Facility Lead		NATCA Lead	

# North Texas OAPM Design Package

## Conventional STARs, WILBR CONV STAR

Name of Change and Airport/s	Date
WILBR - DFW	22 August 2013
Change Classification	Current Phase of Design
Terminal Procedure STAR	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
N/A	24 July 2014
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 27, 37, 38, 42, 48, 50, 53 and 90</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors FE1, FE2, DR1, AR1, AR2 and AR3</li> </ul> <b>ARTCCs</b> <ul style="list-style-type: none"> <li>Kansas City (ZKC) and Memphis (ZME)</li> </ul> <b>TRACONs</b> <ul style="list-style-type: none"> <li>Oklahoma City (OKC), Tulsa (TUL) and Razorback (RZC)</li> </ul>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Procedure Design Packages</b> <ul style="list-style-type: none"> <li>STARs: BRDJE, HIBIL, SEEVr and TRYST</li> <li>SIDs: FORCK, MRSSH, SKTER and TRYTN</li> </ul>	NTEX OAPM 201309.tgs

### Purpose

The main goal of the OAPM process is to design and implement RNAV procedures and airspace changes associated with them. However, there is a small percentage of aircraft that are not RNAV-capable or equipped that rely on conventional navigational aids and procedures. With the introduction of new RNAV procedures proposed by the North Texas Design Team, new conventional procedures will also need to be designed and implemented to resolve conflicts with the new RNAV procedures.

# North Texas OAPM Design Package

## Conventional STARs, WILBR CONV STAR

### Study Team Recommendation

The Study Team did not recommend or design any conventional procedures.

### Proposed Design

The North Texas OAPM Design Team is proposing the modification of the WILBR STAR. The enroute transitions will remain the same. After the transitions merge at WILBR waypoint the current ADDVL waypoint will be removed and replaced by BRDJE waypoint. Aircraft will cross BRDJE in south flow at 11,000 feet and 250 knots. Aircraft will depart BRDJE on a 255 heading for a base leg. In north flow, aircraft will cross BRDJE at 280 knots, turbojet aircraft will continue to PERSN waypoint at 270 knots, then cross FUNKY waypoint at 11,000 feet and 250 knots and TOWNN waypoint at 220 knots. After TOWNN, aircraft will depart on a 175 heading for downwind. All DFW prop arrivals will remain the same as today whether conventional or RNAV.

Figure 1 depicts the proposed WILBR STAR.

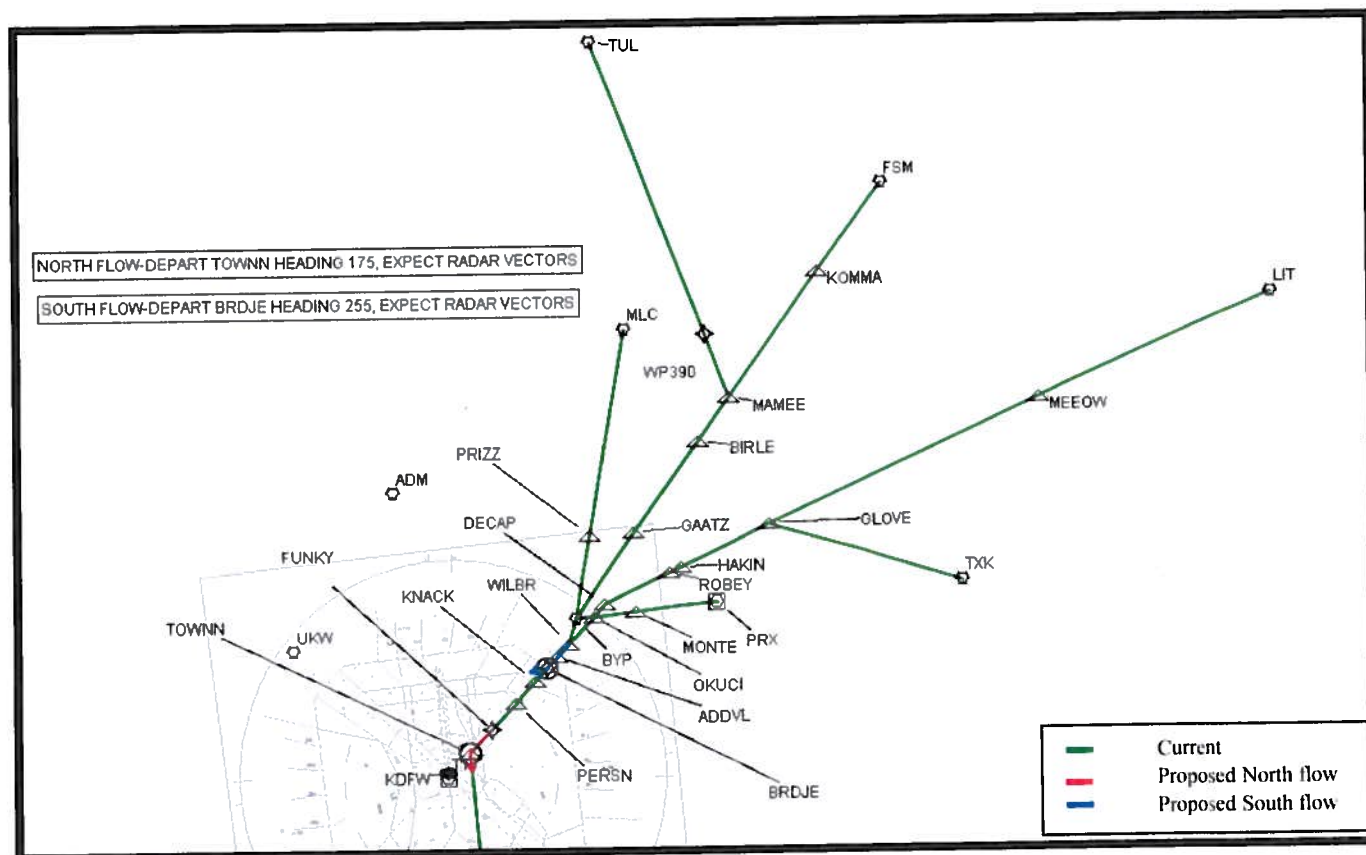


Figure 1. Proposed WILBR STAR and Current WILBR STAR

# **North Texas OAPM Design Package**

## **Conventional STARs, WILBR CONV STAR**

### **Additional Design Considerations**

Human-in-the-loop simulations validated these proposed designs.

These procedures will be used by all types of aircraft, are not anticipated to change runway usage, and do not modify flight paths below 3,000 feet Above Ground Level.

### **Implementation Dependencies**

This procedure is dependent on the following procedures:

- **WILBR:** This procedure shares waypoints with the BRDJE, HIBIL, SEEVR and TRYST RNAV STARs and the SASIE STAR. It is procedurally de-conflicted from HIBIL and TRYST STARs. It has altitude dependencies with the FORCK, MRSSH, SKTER and TRYTN RNAV SIDs in north flow.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letters of Agreement with D10, ZKC, ZME, and OKC, TUL and RZC TRACONs will require changes for handoff, automation and coordination procedures. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**

WILBR TARGETS Distribution Package

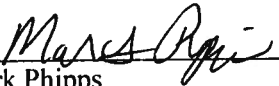


# North Texas OAPM Design Package

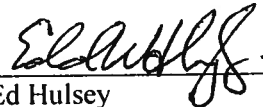
## Conventional STARs, WILBR CONV STAR

### Review Signatures

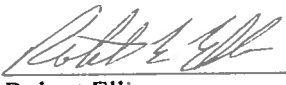
The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

  
\_\_\_\_\_  
Mark Phipps  
North Texas OAPM  
FAA Lead


8/22/13  
\_\_\_\_\_  
Date

  
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Ed Hulse  
North Texas OAPM  
NATCA Lead

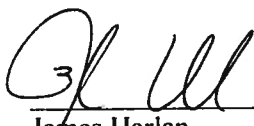
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Robert Ellis  
Fort Worth Center OAPM  
Facility Lead

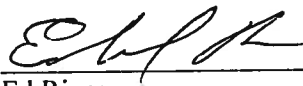
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Jon Shedden  
Fort Worth Center OAPM  
NATCA Lead

8/22/13  
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Date

  
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James Harlan  
Dallas-Fort Worth TRACON OAPM  
Facility Lead

8/22/13  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Ed Rivas  
Dallas-Fort Worth TRACON OAPM  
NATCA Lead

8/22/13  
\_\_\_\_\_  
Date

# North Texas OAPM Design Package

## Conventional STARs, YEAGR CONV STAR

Name of Change and Airport/s	Date
<b>YEAGR - Satellites</b>	<b>01 xxxx 2013</b>
Change Classification	Current Phase of Design
<b>Terminal Procedure STAR</b>	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
<b>None</b>	<b>24 July 2014</b>
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Fort Worth ARTCC (ZFW)</b> <ul style="list-style-type: none"> <li>Sectors 29, 30, 83, 89 and 96</li> </ul> <b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors DS, DN, DE, FE1, DR1, AR1, AR2 and AR3</li> </ul> <b>ARTCCs</b> <ul style="list-style-type: none"> <li>Houston (ZHU) and Memphis (ZME)</li> </ul> <b>TRACONs</b> <ul style="list-style-type: none"> <li>Longview (GGG), Monroe (MLU), Shreveport (SHV) and Waco (ACT)</li> </ul> <b>Fort Polk (POE) RAPCON</b>	<b>ZFW</b> <ul style="list-style-type: none"> <li>Robert Ellis</li> <li>Jon Shedden</li> </ul> <b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul> <b>ZHU</b> <ul style="list-style-type: none"> <li>Mike McGhee</li> <li>David Salapata</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Procedure Design Packages</b> <ul style="list-style-type: none"> <li>STARs: BAWLZ, CABBY, CEDAR CREEK, CHUKK, EESAT, MNND0, REDDN and REEKO</li> </ul>	<b>Master TARGETS File (file extension name)</b>

### Purpose

The main goal of the OAPM process is to design and implement RNAV procedures, and airspace changes associated with the new procedures. However, there is still a small percentage of aircraft that are not RNAV-capable or equipped that rely on conventional navigational aids and procedures. With the introduction of new RNAV procedures proposed by the North Texas Design Team, new conventional procedures will also need to be designed and implemented to resolve conflicts with the new RNAV procedures.

# North Texas OAPM Design Package

## Conventional STARs, YEAGR CONV STAR

### Study Team Recommendation

The Study Team did not recommend or design any conventional procedures.

### Proposed Final Design

The North Texas OAPM Design Team is proposing the implementation of a new conventional STAR named YEAGR to replace the DUMPY STAR. The proposed procedure is used for all Dallas Fort Worth International Airport south flow prop arrivals and the following destination airports:

<b>Airport Name</b>	<b>Airport ID</b>
Addison Airport	ADS
Collin County Regional Airport at McKinney	TKI
Dallas Executive Airport	RBD
Dallas Love Field	DAL
Ennis Municipal Airport	F41
Lancaster Regional Airport	LNC
Mesquite Metro Airport	HQZ
Mid-way Regional Airport	JWY
Rockwall Municipal Airport	F46

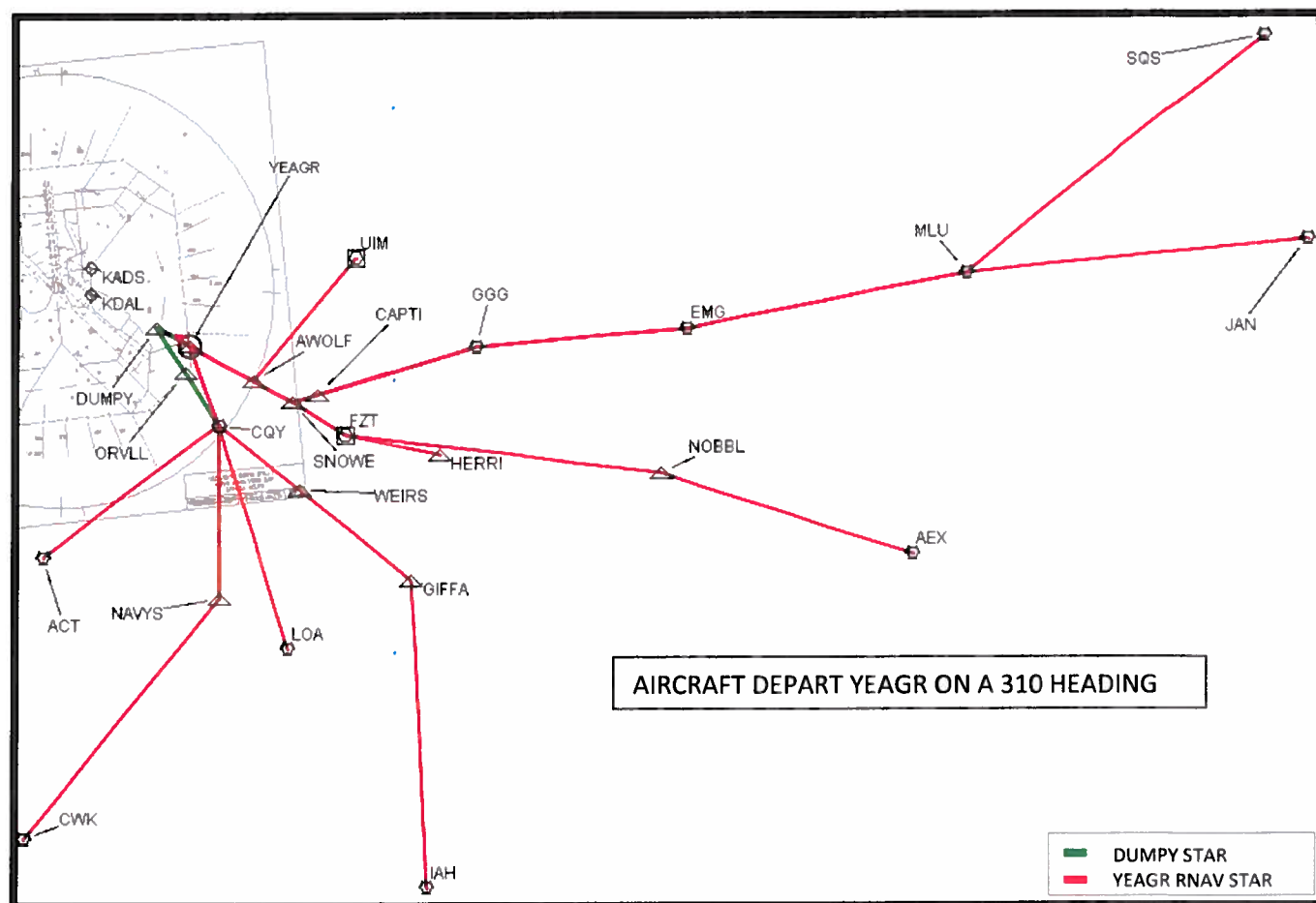
**Table 1. East Satellite Airports**

The YEAGR STAR will overlay the DUMPY STAR with one modification to the transition at CQY NAVAID. From CQY aircraft will transition to YEAGR waypoint eliminating the merge over DUMPY waypoint. After YEAGR, aircraft will depart on a 310 heading, then vectored to final. Altitudes will be the same as RNAV arrivals. The YEAGR STAR will result in the elimination of the DUMPY STAR.

Figure 1 depicts the proposed YEAGR STAR.

# North Texas OAPM Design Package

## Conventional STARs, YEAGR CONV STAR



**Figure 1. Proposed YEAGR STAR and DUMPY STAR**

### Additional Design Considerations

Human-in-the-loop simulations validated these proposed designs.

This procedure will be used by all types of aircraft, is not anticipated to change runway usage, and does not modify flight paths below 3,000 feet Above Ground Level.

### Implementation Dependencies

This procedure is dependent on the following procedures:

- **YEAGR:** This procedure shares waypoints with the CHUKK and EESAT RNAV STARs and the CEDAR CREEK STAR. It is procedurally de-conflicted from the BAWLZ, CABBY, CHUKK, EESAT, MNND, REDDN and REEKO RNAV STARs.

The ZFW and D10 Standard Operating Procedures will require changes. The ZFW Letters of Agreement with D10, ZME, ZHU and GGG, ACT, SHV and MLU TRACONs and POE RAPCON will require changes for handoff, automation and coordination procedures. No

# **North Texas OAPM Design Package**

## **Conventional STARs, YEAGR CONV STAR**

changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**


YEAGR TARGETS Distribution Package

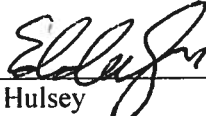
# North Texas OAPM Design Package

## Conventional STARs, YEAGR CONV STAR


### Review Signatures

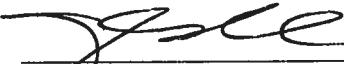
The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

  
Mark Phipps  
North Texas OAPM  
FAA Lead


8/22/13   
Date Ed Hulsey  
North Texas OAPM  
NATCA Lead

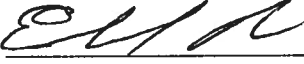
8/22/13  
Date

  
Robert Ellis  
Fort Worth Center OAPM  
Facility Lead

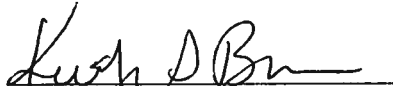
8/22/13   
Date Jon Shedden  
Fort Worth Center OAPM  
NATCA Lead

8/22/13  
Date

  
James Harlan  
Dallas-Fort Worth TRACON OAPM  
Facility Lead

8/22/13   
Date Ed Rivas  
Dallas-Fort Worth TRACON OAPM  
NATCA Lead

8/22/13  
Date

  
Keith Brown  
Houston OAPM  
NATCA Lead

8/13/13  
Date

# North Texas OAPM Design Package

## Required Navigation Performance (RNP) Authorization Required (AR) Approaches, DAL RNP AR Approaches

Name of Change and Airport/s	Date
RNP-AR Approaches - DAL	22 August 2013
Change Classification	Current Phase of Design
Terminal Procedure RNP-AR	<input type="checkbox"/> Preliminary Design (PD) <input type="checkbox"/> Operational Design (OD) <input type="checkbox"/> Operational Design Complete (ODC) <input type="checkbox"/> Proposed Final Design (PFD) <input checked="" type="checkbox"/> Final Design (FD)
OAPM Study Team Reference(s)	Publication Date
Solution 4	29 June 2014
Affected Airport(s), Facilities and Positions, Areas, and/or Sectors	Facility Points of Contact
<b>Dallas-Fort Worth TRACON (D10)</b> <ul style="list-style-type: none"> <li>Sectors DN, DS, DE, AR7, AR6 and AR8</li> </ul>	<b>D10</b> <ul style="list-style-type: none"> <li>James Harlan</li> <li>Ed Rivas</li> </ul>
Related/Dependent Submissions	Associated Data Files
<b>Procedure Design Packages</b> <ul style="list-style-type: none"> <li>STARs: BACHR, HIBIL, MNND0, NANDR, NRTAY, REDDN and TRYST</li> </ul>	NTEX OAPM 201309.tgs

### Purpose

The close proximity of the DFW Runway 17L and DAL Runway 13 final approach courses requires a waiver to permit these approaches to be conducted simultaneously. The waiver requires that a monitor position be staffed to ensure DAL arrivals do not deviate toward the DFW Runway 17L arrivals. The sector boundary is approximately 2.5 NM from the DFW Runway 17L final and DAL arrivals must remain east of this line. This turn-on area requires precise vectoring by D10 controllers and requires concentrated focus in this small area of a complex sector.

### Study Team Recommendation

The Study Team recommended the creation of RNP-AR approaches into DAL on a south flow. Aircraft performing RNP-AR approaches fly precise paths with no vectoring required. These approaches would eliminate the need for controllers to vector (qualified aircraft) in a limited area and permit them to more optimally scan traffic and perform other operational duties in this busy satellite sector. This procedure may eventually eliminate the need for the monitor controller required by the waiver.

Figure 1 depicts the recommended RNP-AR Approach, south flow.

# North Texas OAPM Design Package

## Required Navigation Performance (RNP) Authorization Required (AR) Approaches, DAL RNP AR Approaches

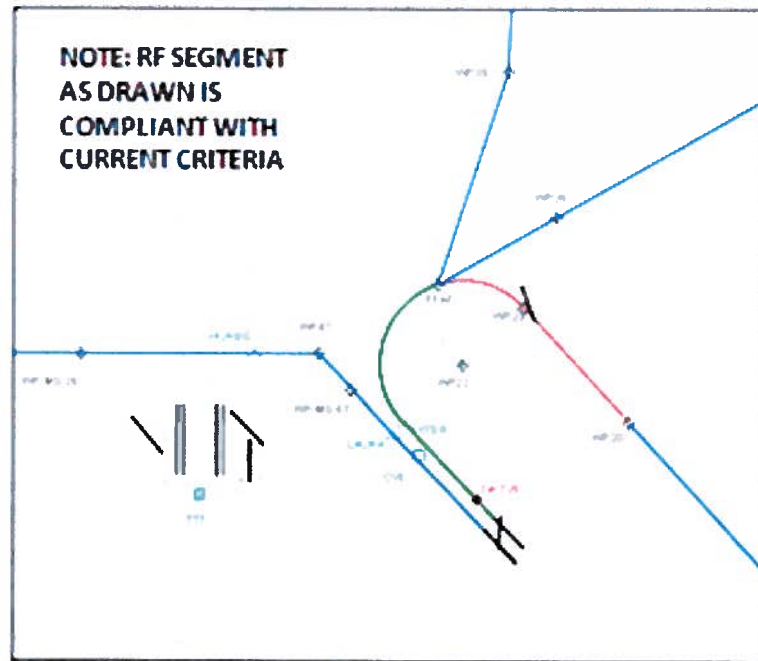


Figure 1. Study Team Recommendation

### Proposed Design

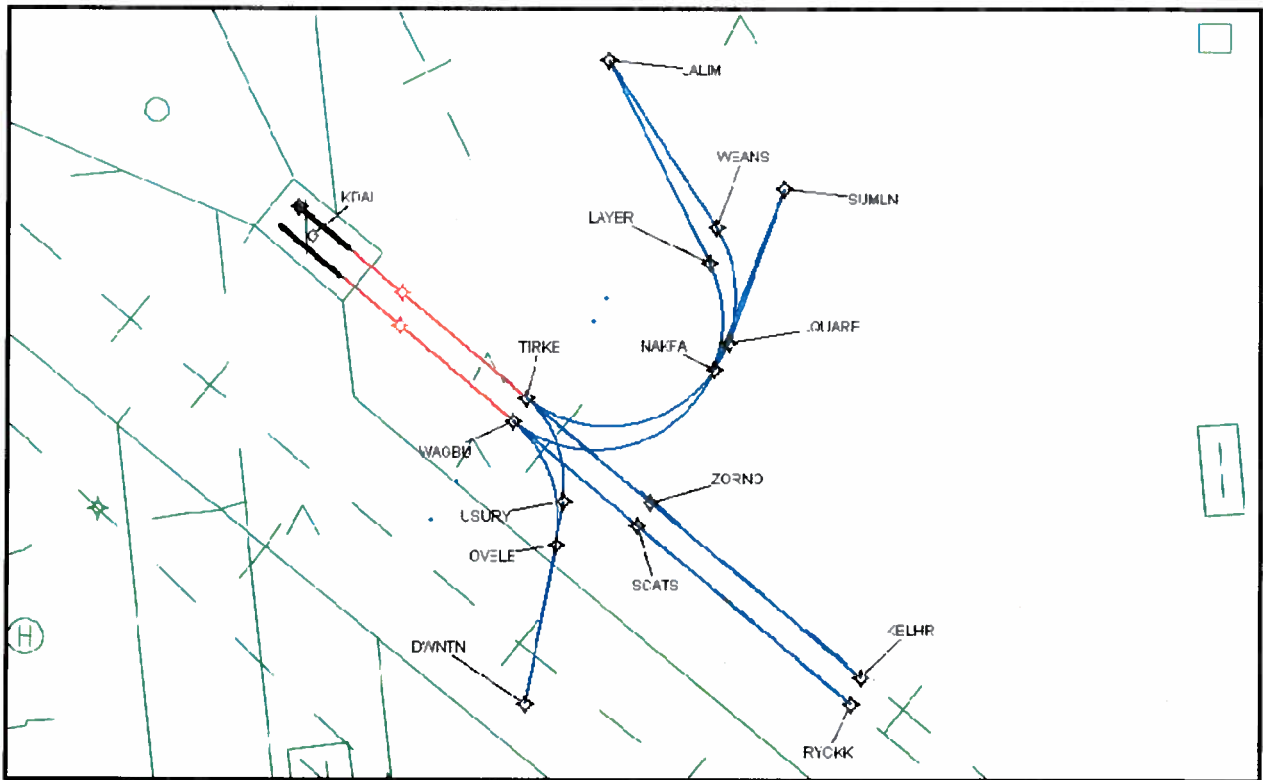
The North Texas OAPM Design Team is proposing the implementation of four RNP-AR approach procedures to DAL Runway 31 Left (L), RWY31 Right (R), RWY13L and RWY13R. The procedures will tie directly into the BACHR, HIBIL, MNND0, NANDR, NRTAY, REDDN and TRYST RNAV STARs. They will overlay the current visual arrival paths and will be an option during Instrument Meteorological Conditions (IMC). These proposed procedures will reduce controller and pilot task complexity and increases flight path predictability.

Figure 2 depicts the proposed RNP-AR Approach to Runway 31L/R.

Figure 3 depicts the proposed RNP-AR Approach to Runway 13L/R.



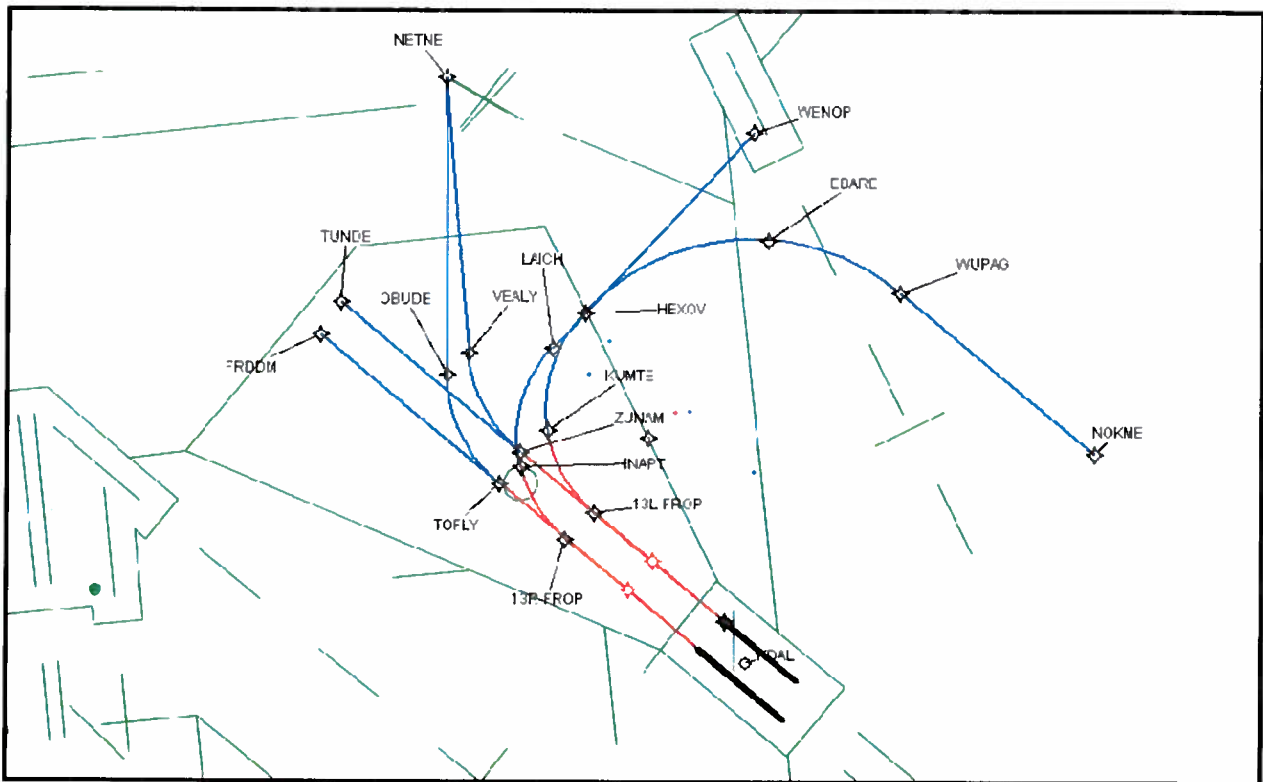
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**Figure 2. Proposed RNP-AR to RWY31L/R**

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**Figure 3. Proposed RNP-AR to RWY13L/R**

### **Additional Design Considerations**

Human-in-the-loop simulations were not conducted.

These procedures will be available to all arrivals meeting the RNP-AR certification requirements, are not anticipated to change runway usage, and could modify flight paths below 3,000 feet Above Ground Level (AGL) during IMC conditions. The changes below 3,000 feet AGL may require additional environmental analysis.

### **Implementation Dependencies**

These procedures are dependent on the following procedures:

- **Runway 31 L/R:** This procedure utilizes an FM leg associated with the NANDR, NRTAY, MNND0 and TRYST RNAV STARs
- **Runway 13 L/R:** This procedure utilizes an FM leg associated with the BACHR, HIBIL and REDDN RNAV STARs

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There are no anticipated changes to Standard Operating Procedures or Letters of Agreements. No changes to Manpower, Facilities or Equipment requirements are anticipated for this proposed design.

### **Attachments**

RNAV (RNP) Rwy 13L-W-DUMPY-D-DistributionPackage  
RNAV (RNP) Rwy 13L-W-FINGR-D-DistributionPackage  
RNAV (RNP) Rwy 13L-X-MOTZA-D-DistributionPackage  
RNAV (RNP) Rwy 13L-X-NORTH-D-DistributionPackage  
RNAV (RNP) Rwy 13R-W-DUMPY-N-DistributionPackage  
RNAV (RNP) Rwy 13R-W-FINGR-N-DistributionPackage  
RNAV (RNP) Rwy 13R-X-MOTZA-N-DistributionPackage  
RNAV (RNP) Rwy 13R-X-NORTH-N-DistributionPackage  
RNAV (RNP) Rwy 31L-Z-FINGR-5-DistributionPackage  
RNAV (RNP) Rwy 31L-Z\_MYLES-1-DistributionPackage  
RNAV (RNP) Rwy 31L-Z-NORTH-2-DistributionPackage  
RNAV (RNP) Rwy 31L-Z-WEST-N2-DistributionPackage  
RNAV (RNP) Rwy 31R-Z-FACIA-1-DistributionPackage  
RNAV (RNP) Rwy 31R-Z-FINGER-3-DistributionPackage  
RNAV (RNP) Rwy 31R-Z-NORTH-2-DistributionPackage  
RNAV (RNP) Rwy 31R-Z-WEST-N2-DistributionPackage

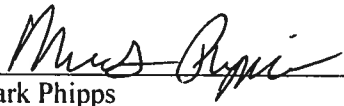
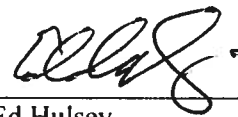
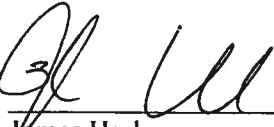

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# North Texas OAPM Design Package

## Required Navigation Performance (RNP) Authorization Required (AR) Approaches, DAL RNP AR Approaches

### Review Signatures

The D&I Team reached agreement through consensus on these procedures using the OAPM process in accordance with the OAPM Memorandum of Understanding.

 _____ Mark Phipps North Texas OAPM FAA Lead	8/22/13 _____ Date	 _____ Ed Hulse North Texas OAPM NATCA Lead	8/22/13 _____ Date
 _____ James Harlan Dallas-Fort Worth TRACON OAPM Facility Lead	8/22/13 _____ Date	 _____ Ed Rivas Dallas-Fort Worth TRACON OAPM NATCA Lead	8/22/13 _____ Date