# 3 Alternatives

The alternatives analysis was conducted pursuant to Council on Environmental Quality (CEQ) regulations and Federal Aviation Administration (FAA) guidance provided in FAA Order 1050.1E, Chg. 1, *Environmental Impacts: Policies and Procedures* (FAA Order 1050.1E). This chapter discusses the following topics:

- Alternative Development Process
- Alternatives Overview
- Comparison of Alternatives
- Listing of Federal Laws and Regulations

The technical terms and concepts discussed in this chapter are explained in Chapter 1, *Background*.

## 3.1 Alternative Development Process

The development of an alternative for the Charlotte Optimization of Airspace and Procedures in the Metroplex (CLT OAPM) Project was a multi-step process that began with the formation of the Charlotte Study Team (Study Team). The Study Team defined operational issues in the Charlotte Metroplex and recommended conceptual designs for procedures that would address these issues.[17] The recommended procedures were then given to the CLT OAPM Design and Implementation (D&I) Team. The D&I Team designed individual procedures based on the Study Team's recommendations. Each procedure designed by the D&I Team was required to meet several design criteria as well as the Project Purpose and Need. As discussed in Chapter 2, the purpose of and need for the Proposed Action is to address existing inefficiencies with the current configuration of CLT airspace and Charlotte Metroplex Standard Instrument Departure (SID) and Standard Terminal Arrival Route (STAR) procedures. The FAA rejected individual procedures if, on their own merit, they did not meet the Purpose and Need.

For purposes of the CLT OAPM Project, the Proposed Action alternative evaluated in this Environmental Assessment (EA) is a package that includes several individual air traffic procedures that when combined form one alternative. This group of procedures was considered and evaluated in combination with one another to determine whether the alternative may meet the Project's Purpose and Need. The FAA considered multiple versions of each air traffic procedure before reaching a proposed final design. Several versions were not carried forward because they failed to meet the objectives established to meet the purpose of the Project.

The following sections describe the alternative development process the FAA used to create a series of procedures that when employed together would add efficiency to the Charlotte Metroplex.

[17] CLT OAPM Metroplex Study Team Final Report, May 2011.

### 3.1.1 CLT OAPM Study Team

In February 2011, the CLT OAPM Study Team began work to define operational problems in the Charlotte Metroplex and identify potential solutions. The Study Team included experts on the Air Traffic Control (ATC) system for the Charlotte Metroplex. The Study Team's work was completed following a multi-step process that included identifying and characterizing existing issues, proposing conceptual designs and airspace changes to address these issues, and identifying the expected benefits and risks of the conceptual designs.

The Study Team held a series of outreach meetings with local facilities (e.g., air traffic control [ATC]), airspace users (e.g., pilots), and aviation industry representatives to learn more about the challenges of operating in the Charlotte Metroplex. These meetings helped identify operational challenges associated with existing procedures and potential solutions that would increase efficiency in the Charlotte Metroplex airspace.

The Study Team identified several Performance-based Navigation (PBN) solutions that could result in increased efficiency in the Charlotte Metroplex. The modifications proposed were conceptual in nature, and did not include a detailed technical assessment, which was reserved for the D&I Team to conduct.[18]

### 3.1.2 CLT OAPM Design and Implementation Team

Following completion of the Study Team's Final Report in May 2011, the D&I Team began work on the procedure designs. First, the Study Team proposals were prioritized based on complexity, interdependencies with other procedures, and degree of potential benefit to the Metroplex. Second, the D&I Team divided into workgroups to further develop and refine the Study Team proposals into preliminary designs. Finally, the preliminary designs were brought to the whole D&I Team for review and modification, if necessary. In developing the proposed procedures, the D&I Team was responsible for following regulatory and technical guidance, as well as meeting criteria and standards in three general categories:

1. **RNAV Design Criteria and Air Traffic Control Regulatory Requirements** – Flight procedure design is subject to requirements found in several FAA Orders, including FAA Order 7100.9D, *Standard Terminal Arrival Program and Procedures*; FAA Order 8260.43A, *Flight Procedures Management Program*; and FAA Order JO 7110.65U, *Air Traffic Control*. The *Guidelines for Implementing Terminal RNAV Procedures*, to be followed in conjunction with the requirements of FAA Order 8260.43A, includes an "18-Step Process" for developing, reviewing, and implementing RNAV procedures. In addition, FAA Order JO 7110.65U includes requirements governing air traffic control procedures, air traffic management, and appropriate technical terminology.
2. **Operational Criteria** – Operational criteria were consistent with the Purpose and Need for the Project. This includes increasing efficiency and flexibility, and decreasing complexity in air traffic management. These criteria were measured for all procedures using a full motion simulator, a stationary simulator, and/or flight training devices. These criteria were also measured for many procedures using real time Human-In-The-Loop Simulations (HITLs). These simulations

[18] Id.

further validated that operations in the Charlotte Metroplex would not be limited by the proposed procedures. The D&I Team also evaluated each of the procedure designs with full motion aircraft simulators. The simulations helped ensure that aircraft could fly the procedure as designed and that efficiency (e.g., pilot workload) would not be limited by the proposed procedures.

3. **Safety Factors** – Procedures were subject to evaluation using the FAA's Air Traffic Organization's (ATOs) Safety Management System (SMS). The SMS is the ATO's system for managing the safety of ATC and navigation services in the National Airspace System (NAS). In compliance with SMS requirements, the procedures were evaluated by a Safety Risk Management Panel (SRMP) following a five-step process: 1) describe the system; 2) identify the hazards in the system; 3) analyze the risks; 4) assess the risk; and, 5) treat the risk. If a procedure introduced a new hazard or increased the severity and/or likelihood of an existing hazard that is being mitigated, the design was adjusted to reduce the hazard to acceptable levels.

To ensure that procedures included in the Proposed Action were viable, the D&I team undertook validation exercises that further refined the procedures. Over a multi-month period, the D&I Team worked to meet Proposed Final Design milestones at the 25, 50, 75, 90, and 100 percent design levels. To reach each of these milestones, the D&I Team relied on stakeholder input, design solution tools (e.g., design and testing software), and the criteria and standards described above. The combined final procedure designs have been brought forward in this EA as the Proposed Action. For purposes of illustrating the alternative development process, the following sections describe the creation of two of the procedures that were carried forward as part of the Proposed Action.

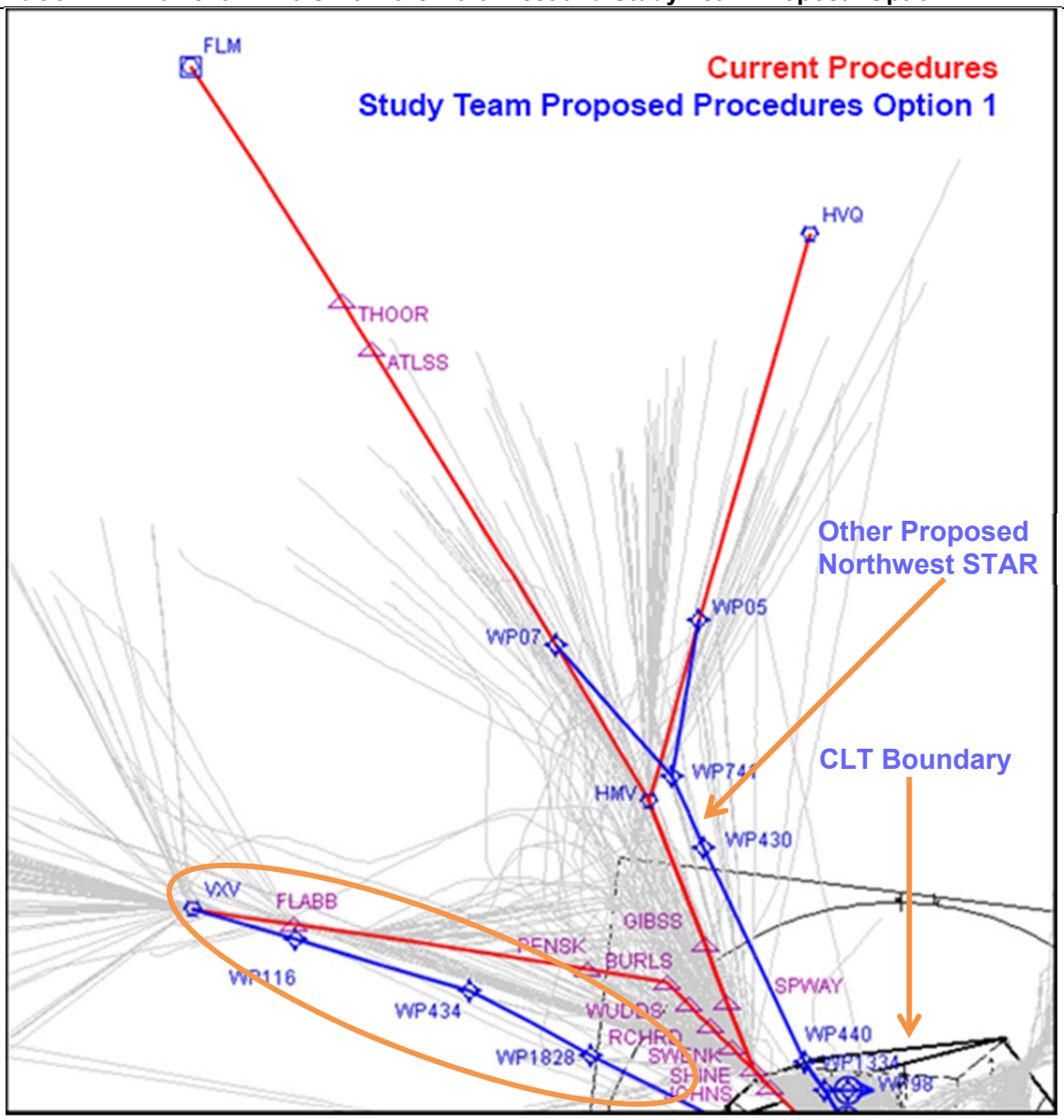
#### 3.1.2.1 Northwest Arrivals – FILPZ ONE STAR

The Study Team identified several issues with arrivals to CLT from the northwest. Analysis of flight track data indicated that aircraft arriving to CLT experience level-offs and delay vectoring in both enroute and terminal airspace. This increases both flight time and distance. In addition, a lack of published runway transitions requires controllers to vector aircraft to the runways resulting in increased workload for both controllers and pilots.

Four versions of proposed northwest STARs, including a version that became the FILPZ ONE STAR, were developed and evaluated during the procedure design process. One version was rejected early on as the design provided no benefit to northwest arrivals. The Study Team recommendations carried forward included two options for improvements to northwest arrival procedures. The fourth and final version was the proposed FILPZ ONE STAR designed by the D&I Team based on the Study Team recommendations. The following sections discuss the iterative process in greater detail.

**Exhibit 3-1** depicts the current JOHNS ONE STAR (red lines) with Option 1 of the Study Team's proposed northwest STARs (blue lines). The Study Team's proposed STAR that corresponds with the FILPZ ONE STAR is circled in orange. Option 1 provides more direct routing to the CLT boundary in comparison to the enroute transitions on the currently published STAR and eliminates level segments.

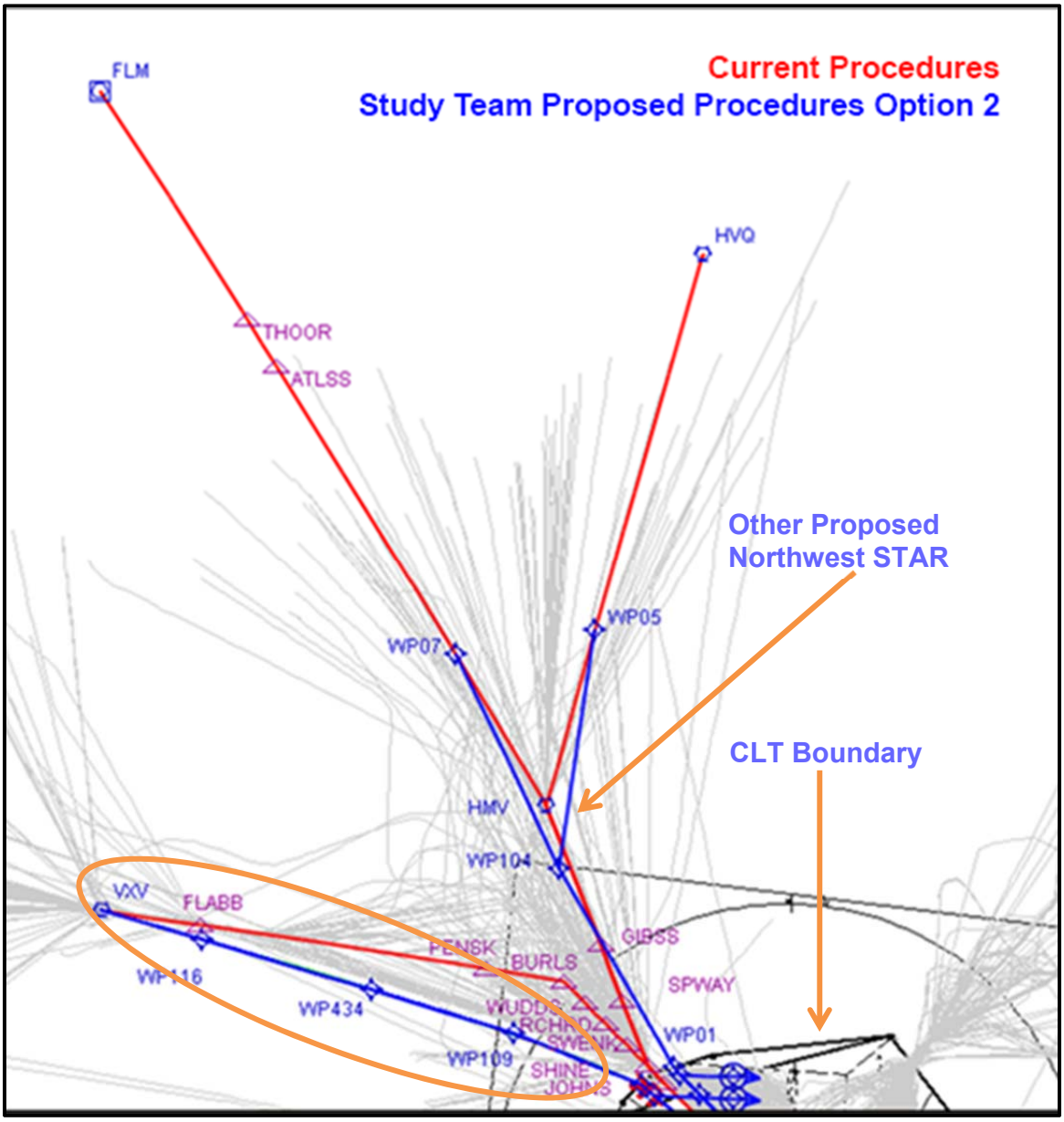
**Exhibit 3-1 Current Arrivals from the Northwest and Study Team Proposal Option 1**




Source: CLT OAPM Study Team, June 2011.
Prepared by: ATAC Corporation, October 2014.

**Exhibit 3-2** depicts the current JOHNS ONE STAR (red lines) with Option 2 of the Study Team's proposed northwest STARs (blue lines). The Study Team's proposed STAR corresponding with the FILPZ ONE STAR is circled in orange. Similar to Option 1, Option 2 provides more direct routing to the CLT boundary in comparison to the enroute transitions on the currently published STAR and eliminates level segments. However, distance traveled to each runway end varies between Option 1 and Option 2.

**Exhibit 3-2 Current Arrivals from the Northwest and Study Team Proposal Option 2**




Source: CLT OAPM Study Team, June 2011.
Prepared by: ATAC Corporation, October 2014.

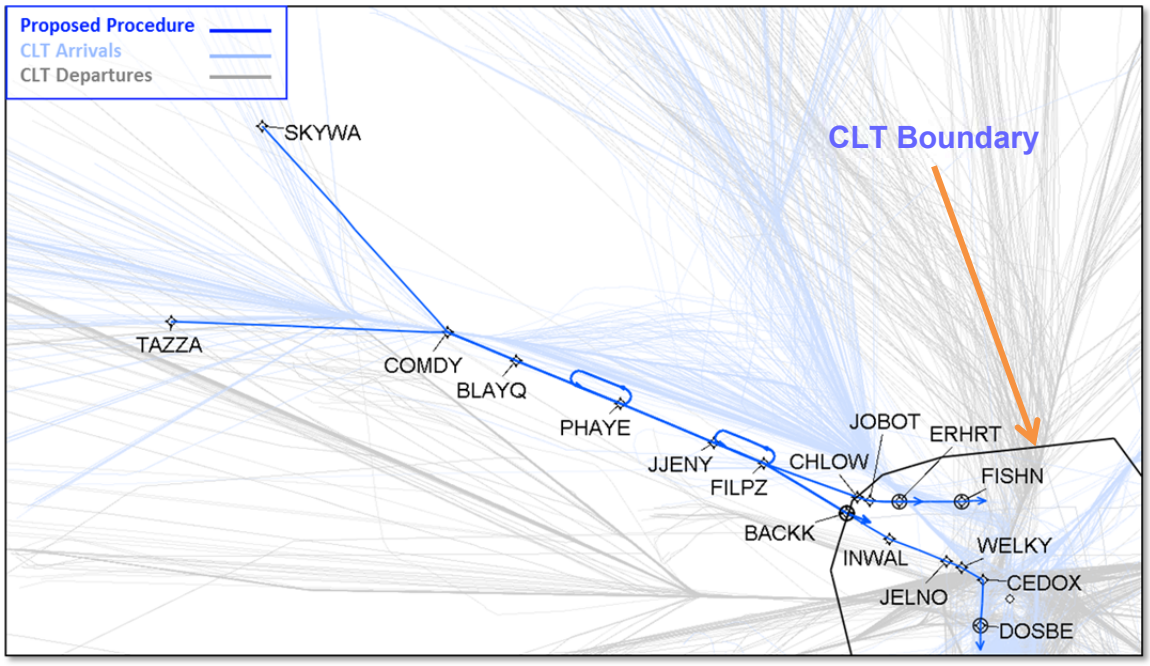
### 3.1.2.2 D&I Team Proposed Northwest STAR - FILPZ ONE

**Exhibit 3-3** depicts the proposed FILPZ ONE STAR. Based on the Study Team recommendations, the Design Team developed the FILPZ STAR to replace the existing SHINE STAR (in conjunction with the PARQR STAR). The FILPZ STAR includes an optimized profile descent (OPD) that provides more efficient lateral paths and a reduction in miles flown.[19] The proposed procedure includes two enroute transitions to better segregate

[19] In comparison to the Study Team recommendations, there is a slight increase in miles flown during south flow but an overall reduction in miles flown when combined with all northwest SIDs and STARs.

arrival flows and multiple transitions to all runways at CLT. The FILPZ STAR would also serve several satellite airports including Rowan County Airport (RUQ), Charlotte-Monroe Executive Airport (EQY), and Rock Hill/York County Airport (UZA).

**Exhibit 3-3 Proposed Procedure – FILPZ STAR**



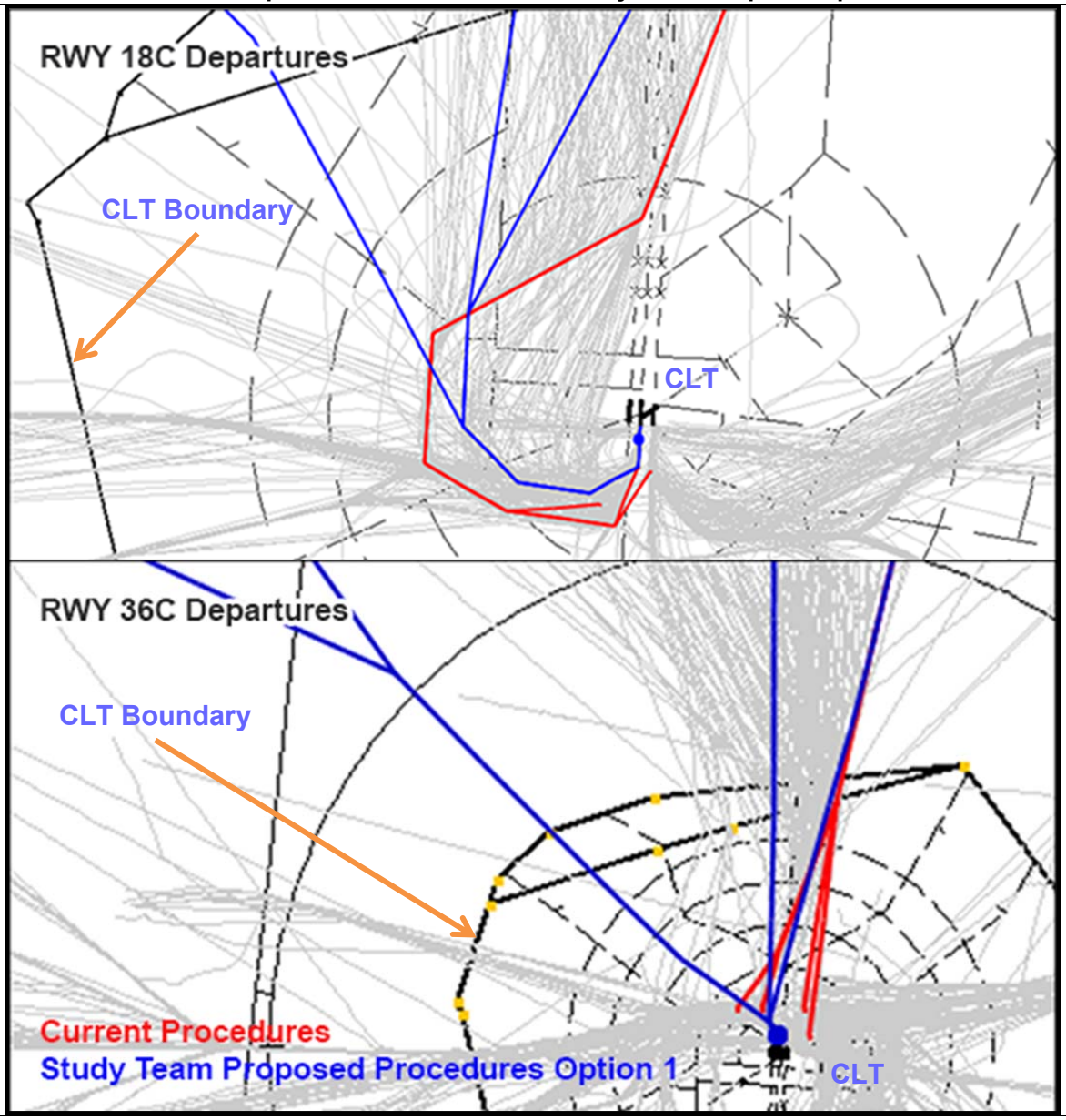

Source: CLT OAPM D&I Team, October 2014.
Prepared by: ATAC Corporation, October 2014.

### 3.1.2.3 Northwest Departures – JOJJO ONE SID

The Study Team identified several issues with departures from CLT to the northwest. These issues included level-offs in both terminal and enroute airspace and unnecessarily lengthy common paths requiring increased departure in-trail spacing,

Three versions of proposed northwest SIDs, including the proposed JOJJO SID were developed and evaluated during the procedure design process. **Exhibit 3-4** depicts the current JACAL SIX SID (red lines) with Option 1 of the Study Team's proposed northwest SIDs (blue lines). The proposed procedure formalizes some of the shortcuts currently employed, providing course divergence as close to the airport as possible and minimizing in-trail separation requirements and total miles flown.

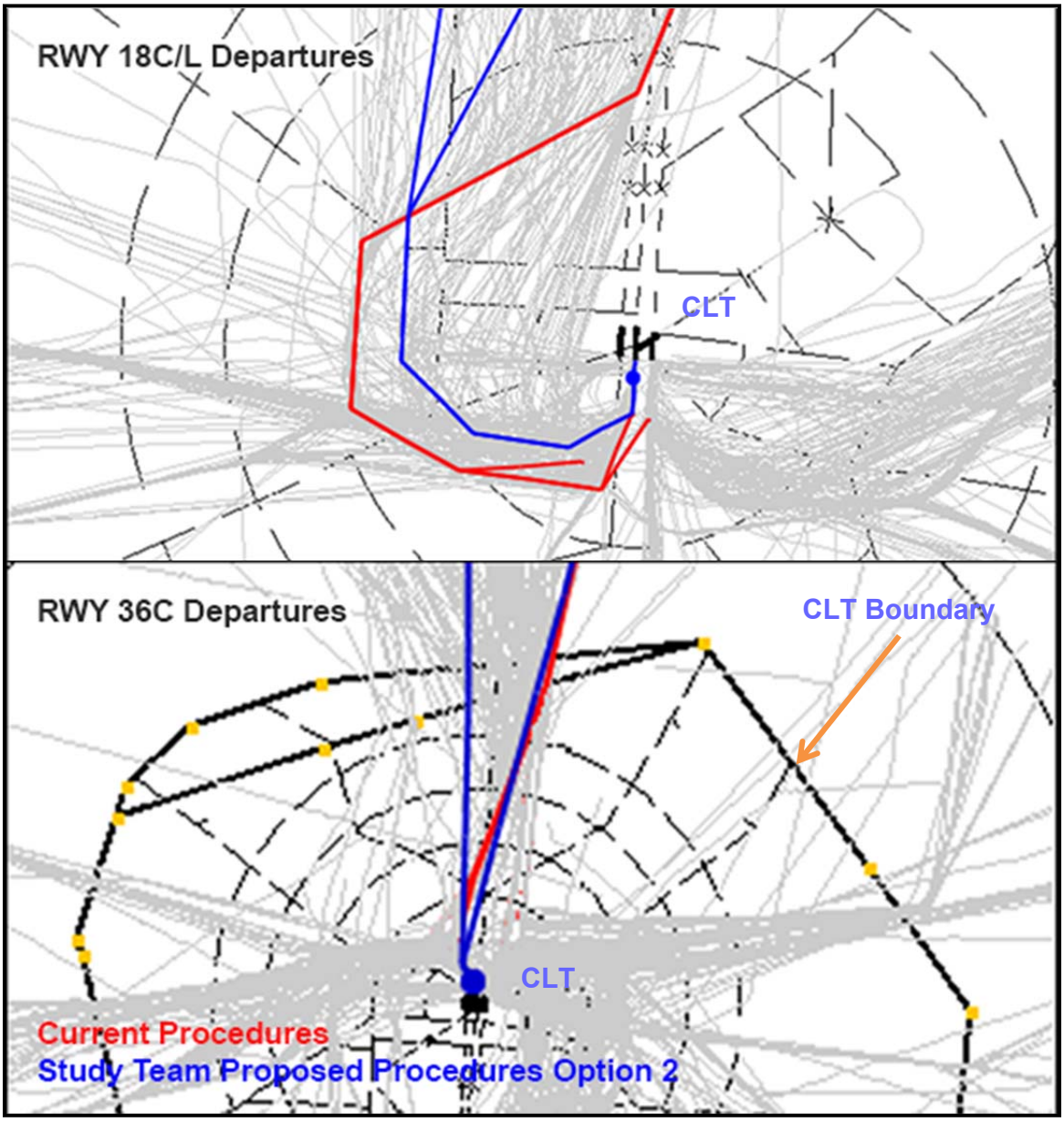
**Exhibit 3-4 Current Departures to the North and Study Team Proposal Option 1**




Source: CLT OAPM Study Team, June 2011.
Prepared by: ATAC Corporation, October 2014.

**Exhibit 3-5** depicts the current JACAL SIX SID (red lines) with Option 2 of the Study Team's proposed northwest SIDs (blue lines). Similar to Option 1, the proposed procedure formalizes some of the shortcuts currently employed, providing course divergence as close to the airport as possible and minimizing in-trail separation requirements and total miles flown.

**Exhibit 3-5 Current Departures to the North and Study Team Proposal Option 2**

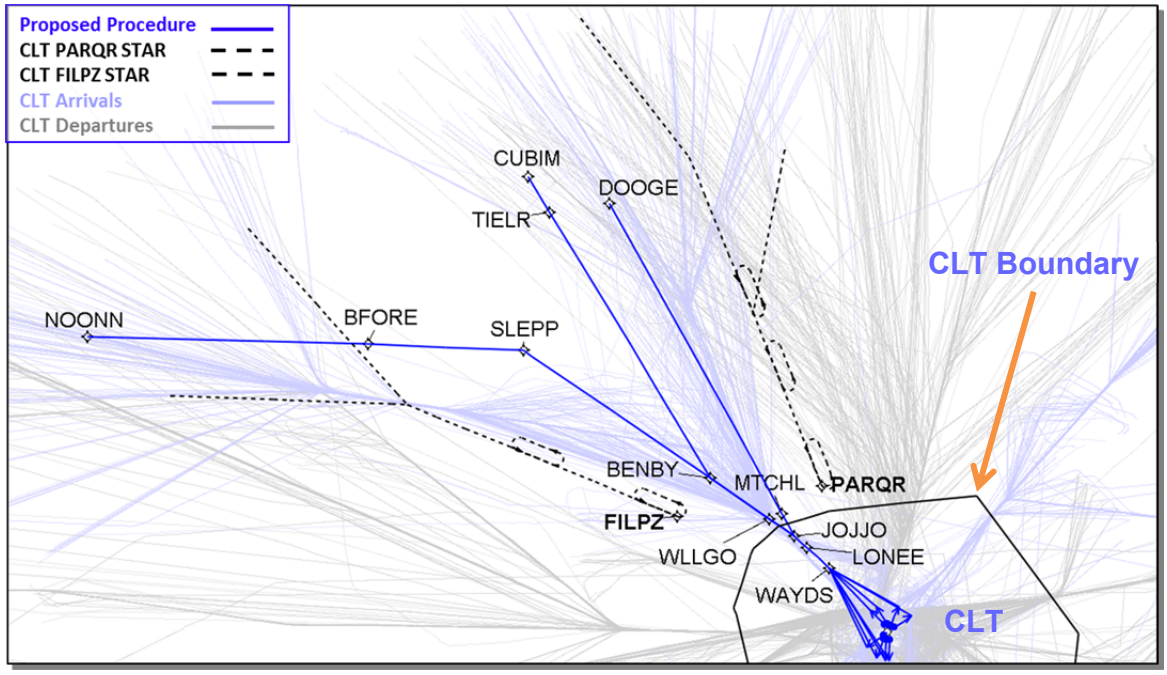



Source: CLT OAPM D&I Team, June 2011.
Prepared by: ATAC Corporation, October 2014.

### 3.1.2.4 D&I Team Proposed North SID - JOJJO ONE

**Exhibit 3-6** depicts the proposed JOJJO ONE SID. Based on the Study Team's recommendations, the JOJJO SID was designed to incorporate earlier route divergence, decrease track miles flown, reduce level-offs and departure delays, increase departure efficiency, and create "destination specific" routings. The proposed procedure would serve CLT as well as several satellite airports, including RUQ, EQY, and UZA.

**Exhibit 3-6 Proposed Procedure – JOJJO SID**




Source: CLT OAPM D&I Team, October 2014.
Prepared by: ATAC Corporation, October 2014.

## 3.2 Alternatives Overview

The following sections discuss the Proposed Action and the No Action Alternative, the alternatives carried forward for analysis in the EA.

### 3.2.1 No Action Alternative

Under the No Action Alternative, the FAA would maintain existing arrival/departure procedures. The related routes and flows currently in use in the Charlotte Metroplex as of 2011 (representing existing conditions) would remain largely the same. However, some procedure modifications independent of those recommended for the Proposed Action are included in the No Action Alternative. These modifications would be implemented prior to the Proposed Action to deal with specific issues not related to this Project. These changes are taken into account in the analysis of impacts associated with the No Action Alternative (see Chapter 5, *Environmental Consequences*).

The causal factors limiting FAA's ability to increase efficiency are identified in Section 2.1.2. In summary, the causal factors are:

- Lack of predictable standard routes defined by procedures to/from airport runways to/from en route airspace;
- Complex converging interactions between arrival and departure flight paths; and,
- Lack of flexibility in the efficient transfer of traffic between the enroute and terminal area airspace.

### 3.2.1.1 No Action Alternative Procedures

**Table 3-1** lists the names of the No Action Alternative procedures; the procedure type (i.e., SID or STAR); the basis of design (indicated by the type of navigational aid the procedures are based on: NAVAID (shown as VHF Omnidirectional Range [VOR]), RNAV, or radar vectors; the airports served; and the number of runway and enroute transitions for each procedure. Each of these characteristics address the objectives identified under the purpose and need for the Project (predictability, flexibility, and/or segregation). As discussed in Section 2.2, predictability can be measured by the count of procedures with altitude controls and enroute/runway transitions. Segregation can be measured by number of airports served. Finally, flexibility can be measured by the number of procedures with OPDs, the count of enroute/runway transitions, and number of SIDs/STARs from/to the Study Airports. These criteria are further discussed and evaluated in Section 3.3.

**Table 3-1 No Action Alternative SIDs and STARS (1 of 4)**

| Airport | Procedure Type | No Action Procedure | Basis of Design | Transitions (enroute/runway) | Other Study Airports on Procedure |
|---|---|---|---|---|---|
| CLT | STAR | ADENA THREE | RNAV | 3/0 | |
| CLT | STAR | CHESTERFIELD THREE | VOR/DME radar vectors | 4/0 | EQY, UZA |
| CLT | STAR | HUSTN TWO | RNAV | 4/0 | |
| CLT | STAR | IVANE FOUR | RNAV | 2/3 | |
| CLT | STAR | JOHNS THREE | RNAV | 4/0 | |
| CLT | STAR | MAJIC ONE | VOR/DME radar vectors | 3/0 | EQY, UZA |
| CLT | STAR | SHINE SIX | VOR/DME radar vectors | 4/0 | EQY, UZA |
| CLT | STAR | SUDSY FOUR | RNAV | 3/0 | |
| CLT | STAR | UNARM THREE | VOR/DME radar vectors | 2/0 | EQY, JQF, RUQ, UZA |
| CLT | SID | ANDYS SEVEN | RNAV | 1/8 | |
| CLT | SID | BOBCAT FIVE | VOR/DME radar vectors | 3/0 | EQY, JQF, RUQ, UZA |
| CLT | SID | BUCKL SEVEN | RNAV | 1/8 | |
| CLT | SID | DEBIE SEVEN | RNAV | 1/8 | |
| CLT | SID | HORNET SEVEN | VOR/DME radar vectors | 3/0 | EQY, JQF, RUQ, UZA |
| CLT | SID | HUGO TWO | VOR/DME radar vectors | 7/0 | EQY, JQF, RUQ, UZA |
| CLT | SID | JACAL SIX | RNAV | 1/8 | |
| CLT | SID | LILLS SIX | RNAV | 1/8 | |
| CLT | SID | MERIL SIX | RNAV | 1/8 | |
| CLT | SID | PANTHER TWO | VOR/DME radar vectors | 4/0 | EQY, JQF, RUQ, UZA |
| CLT | SID | ZAVER THREE | RNAV | 1/8 | |
| CLT | SID | CHARLOTTE ONE | VOR/DME radar vectors | 6/0 | |
| EQY | STAR | CHESTERFIELD THREE | VOR/DME radar vectors | 4/0 | CLT, UZA |

**Table 3-1 No Action Alternative SIDs and STARS (2 of 4)**

| Airport | Procedure Type | No Action Procedure | Basis of Design | Transitions (enroute/runway) | Other Study Airports on Procedure |
|---|---|---|---|---|---|
| EQY | STAR | MAJIC ONE | VOR/DME radar vectors | 3/0 | CLT, UZA |
| EQY | STAR | SHINE SIX | VOR/DME radar vectors | 4/0 | CLT, UZA |
| EQY | STAR | UNARM THREE | VOR/DME radar vectors | 2/0 | CLT, JQF, RUQ, UZA |
| EQY | SID | BOBCAT FIVE | VOR/DME radar vectors | 3/0 | CLT, JQF, RUQ, UZA |
| EQY | SID | HORNET SEVEN | VOR/DME radar vectors | 3/0 | CLT, JQF, RUQ, UZA |
| EQY | SID | HUGO TWO | VOR/DME radar vectors | 7/0 | CLT, JQF, RUQ, UZA |
| EQY | SID | PANTHER TWO | VOR/DME radar vectors | 4/0 | CLT, JQF, RUQ, UZA |
| GMU | STAR | UNMAN THREE | RNAV | 3/0 | GSP, GYH, SPA |
| GMU | STAR | WHTTL TWO | RNAV | 1/0 | GSP, GYH, SPA |
| GMU | SID | No SIDS | N/A | N/A | |
| GSO | STAR | BLOCC ONE | VOR/DME radar vectors | 1/0 | INT |
| GSO | STAR | BROOK THREE | VOR/DME radar vectors | 2/0 | INT |
| GSO | STAR | HENBY TWO | VOR/DME radar vectors | 2/0 | INT |
| GSO | STAR | SMOKN THREE | VOR Radar vectors | 1/0 | INT |
| GSO | SID | QUAKER THREE | VOR/DME radar vectors | 5/0 | INT |
| GSO | SID | TRIAD SIX | VOR/DME radar vectors | 4/0 | INT |
| GSP | STAR | UNMAN TWO | RNAV | 3/0 | GMU, GYH, SPA |
| GSP | STAR | WHTTL TWO | RNAV | 1/0 | GMU, GYH, SPA |
| GSP | SID | No SIDS | N/A | N/A | |
| GYH | STAR | UNMAN TWO | RNAV | 3/0 | GMU, GSP, SPA |
| GYH | STAR | WHTTL TWO | RNAV | 1/0 | GMU, GSP, SPA |
| GYH | SID | No SIDS | N/A | N/A | |
| HKY | SID | HKY3 | radar vectors | 0/4 | |
| INT | STAR | BLOCC ONE | VOR/DME radar vectors | 1/0 | GSO |
| INT | STAR | BROOK TWO | VOR/DME radar vectors | 2/0 | GSO |
| INT | STAR | HENBY TWO | VOR/DME radar vectors | 2/0 | GSO |
| INT | STAR | SMOKN THREE | VOR Radar vectors | 1/0 | GSO |
| INT | SID | QUAKER THREE | VOR/DME radar vectors | 5/0 | GSO |
| INT | SID | TRIAD SIX | VOR/DME radar vectors | 4/0 | GSO |
| INT | SID | WINSTON ONE | radar vectors | 0/0 | |

**Table 3-1 No Action Alternative SIDs and STARS (3 of 4)**

| Airport | Procedure Type | No Action Procedure | Basis of Design | Transitions (enroute/runway) | Other Study Airports on Procedure |
|---|---|---|---|---|---|
| JQF | STAR | UNARM THREE | VOR/DME radar vectors | 4/0 | CLT, EQY, RUQ, UZA |
| JQF | SID | BOBCAT FIVE | VOR/DME radar vectors | 2/0 | CLT, EQY, RUQ, UZA |
| JQF | SID | HORNET SEVEN | VOR/DME radar vectors | 3/0 | CLT, EQY, RUQ, UZA |
| JQF | SID | HUGO TWO | VOR/DME radar vectors | 3/0 | CLT, EQY, RUQ, UZA |
| JQF | SID | PANTHER TWO | VOR/DME radar vectors | 7/0 | CLT, EQY, RUQ, UZA |
| RUQ | STAR | NASCR ONE | VOR/DME radar vectors | 4/0 | JQF |
| RUQ | STAR | UNARM TWO | VOR/DME radar vectors | 2/0 | CLT, EQY, JQF, UZA |
| RUQ | SID | BOBCAT FIVE | VOR/DME radar vectors | 3/0 | CLT, EQY, JQF, UZA |
| RUQ | SID | HORNET SEVEN | VOR/DME radar vectors | 3/0 | CLT, EQY, JQF, UZA |
| RUQ | SID | HUGO TWO | VOR/DME radar vectors | 7/0 | CLT, EQY, JQF, UZA |
| RUQ | SID | PANTHER TWO | VOR/DME radar vectors | 4/0 | CLT, EQY, JQF, UZA |
| SPA | STAR | UNMAN TWO | RNAV | 3/0 | GMU, GSP, GYH |
| SPA | STAR | WHTTL TWO | RNAV | 1/0 | GMU, GSP, GYH |
| SPA | SID | No SIDS | N/A | N/A | |
| SVH | STAR | No STARS | N/A | N/A | |
| SVH | SID | No SIDS | N/A | N/A | |
| UZA | STAR | CHESTERFIELD THREE | VOR/DME radar vectors | 4/0 | CLT, EQY |
| UZA | STAR | MAJIC ONE | VOR/DME radar vectors | 3/0 | CLT, EQY |
| UZA | STAR | SHINE SIX | VOR/DME radar vectors | 4/0 | CLT, EQY |
| UZA | STAR | UNARM THREE | VOR/DME radar vectors | 2/0 | CLT, EQY, JQF, RUQ |
| UZA | SID | BOBCAT FIVE | VOR/DME radar vectors | 3/0 | CLT, EQY, JQF, RUQ |
| UZA | SID | HORNET SEVEN | VOR/DME radar vectors | 3/0 | CLT, EQY, JQF, RUQ |
| UZA | SID | HUGO TWO | VOR/DME radar vectors | 7/0 | CLT, EQY, JQF, RUQ |

**Table 3-1 No Action Alternative SIDs and STARS (4 of 4)**

| Airport | Procedure Type | No Action Procedure | Basis of Design | Transitions (enroute/runway) | Other Study Airports on Procedure |
|---|---|---|---|---|---|
| UZA | SID | PANTHER TWO | VOR/DME radar vectors | 4/0 | CLT, EQY, JQF, RUQ |

*Notes:*
*N/A=Not Applicable*
*DME=Distance Measuring Equipment*
*STAR=Standard Terminal Arrival Route*
*VOR=VHF Omnidirectional Range*
*RNAV=Area Navigation*
*VORTAC=VHF Omnidirectional Range/Tactical Aircraft Control*
*SID=Standard Instrument Departure*

***Airports***
*CLT: Charlotte/Douglas International Airport*
*EQY: Charlotte-Monroe Executive Airport*
*GMU: Greenville Downtown Airport*
*GSO: Piedmont Triad International Airport*
*RUQ: Rowan County Airport*
*GSP: Greenville Spartanburg International Airport*
*GYH: Donaldson Center Airport*
*INT: Smith Reynolds Airport*
*JQF: Concord Regional Airport*
*JZI: Charleston Executive Airport*
*RDU: Raleigh-Durham International Airport*
*SVH: Statesville Regional Airport*
*UZA: Rock Hill Airport-Bryant Field*

Sources: National Flight Data Center National Airspace System Resources database, accessed January, 2013. Department of Transportation, Federal Aviation Administration Operational Procedure Files October 2014.
Prepared by: ATAC Corporation, October 2014.

For all of the Study Airports, the final approach to and initial departure flows from the runways remain similar under the No Action Alternative as under Existing Conditions.

### 3.2.1.2 Airspace Control Structure under the No Action Alternative

When aircraft depart or arrive on the assigned route or SID/STAR in the Charlotte Metroplex, transfer of control occurs between ZTL, ZJX, and ZDC Centers and Charlotte TRACON (CLT) airspace. In the Charlotte Metroplex, inefficient vertical profiles are an identified issue in all CLT STARs (northeast, northwest, southeast, and southwest). Level-offs are occurring to prevent aircraft from entering adjacent airspace and to avoid conflicting traffic. In addition, aircraft arriving from the en route transitions are required to level at the Transfer of Control Point (TCP), resulting in extended level-off segments in CLT. The transfer area between CLT and neighboring Centers would remain the same under the No Action Alternative as under Existing Conditions. For purposes of this EA, the areas where transfers occur are defined based on entry/exit gates. The gates are based on information provided in the Letter of Agreements (LOAs) between CLT and the adjacent Centers. The gates are purposely located to segregate arrivals and departures where possible.

The most efficient way to transfer aircraft to/from an airport from/to a transfer gate is a “four-corner post” manner. In a typical four-corner post system, departing aircraft exit the terminal airspace through departure gates to the north, east, south, and west, and arriving aircraft enter the terminal airspace through arrival gates to the northeast, southeast, southwest, and northwest. The locations of the CLT gates exemplify this arrangement.

**Exhibit 3-7** shows all arrival and departure flows to the Study Airports associated with the No Action Alternative for North Flow conditions. Similarly, **Exhibit 3-8** depicts the No Action Alternative under South Flow conditions. Corridors are grouped by Study Airport and sorted by arrival and departure. The flows are based on No Action Alternative standard procedures or radar vectors entering/exiting the CLT airspace by runway operating configuration.

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## No Action - North Flow

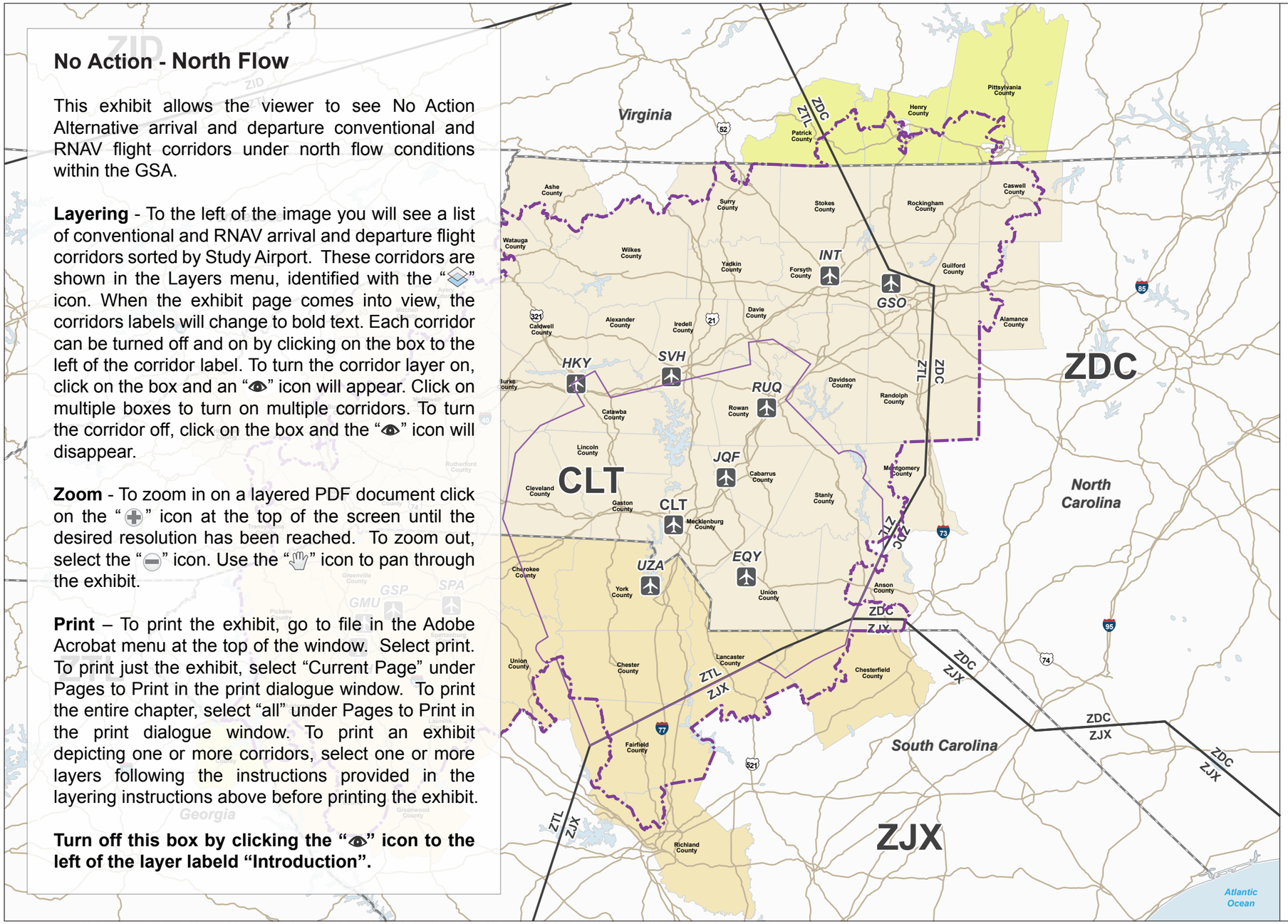
This exhibit allows the viewer to see No Action Alternative arrival and departure conventional and RNAV flight corridors under north flow conditions within the GSA.

**Layering** - To the left of the image you will see a list of conventional and RNAV arrival and departure flight corridors sorted by Study Airport. These corridors are shown in the Layers menu, identified with the "◈" icon. When the exhibit page comes into view, the corridors labels will change to bold text. Each corridor can be turned off and on by clicking on the box to the left of the corridor label. To turn the corridor layer on, click on the box and an "👁" icon will appear. Click on multiple boxes to turn on multiple corridors. To turn the corridor off, click on the box and the "👁" icon will disappear.

**Zoom** - To zoom in on a layered PDF document click on the "⊕" icon at the top of the screen until the desired resolution has been reached. To zoom out, select the "⊖" icon. Use the "✋" icon to pan through the exhibit.

**Print** – To print the exhibit, go to file in the Adobe Acrobat menu at the top of the window. Select print. To print just the exhibit, select "Current Page" under Pages to Print in the print dialogue window. To print the entire chapter, select "all" under Pages to Print in the print dialogue window. To print an exhibit depicting one or more corridors, select one or more layers following the instructions provided in the layering instructions above before printing the exhibit.

**Turn off this box by clicking the "👁" icon to the left of the layer labeld "Introduction".**




## LEGEND

- General Study Area Boundary
- Study Airport
- North Carolina County in Study Area
- South Carolina County in Study Area
- Virginia County in Study Area
- State Boundary
- U.S. and Interstate Highways
- Water
- Charlotte TRACON (CLT) Boundary
- ARTCC Boundary
- Conventional Arrival
- Conventional Departure
- RNAV Arrival
- RNAV Departure
- Radar Vectors Arrival
- Radar Vectors Departure

Notes:

| | |
|---|---|
| **CLT** | Charlotte Douglas International Airport |
| **EQY** | Charlotte-Monroe Executive Airport |
| **GMU** | Greenville Downtown Airport |
| **GSO** | Piedmont Triad International Airport |
| **GSP** | Greenville Spartanburg International Airport |
| **GYH** | Donaldson Center Airport |
| **HKY** | Hickory Regional Airport |
| **INT** | Smith Reynolds Airport |
| **JQF** | Concord Regoinal Airport |
| **RUQ** | Rown County Airport |
| **SPA** | Spartanburg Downtown Memorial Airport |
| **SVH** | Statesville Regional Airport |
| **UZA** | Rock Hill/York County/Bryant Field Airport |

Projection: Lambert Conformal Conic
Scale: 1:1,750,000

0 40 nm N

Sources: National Atlas of the United States of America: U.S. County Boudaries, 2005; U.S. State Boundaries, 2005; and Water Bodies, 2005; Bureau of Transportation Statistics: National Transportation Atlas Database National Highway Planning Network, 2012; FAA: NFDC Airport Database, 2012; ATAC Corporation: Study Area Boundary, 2014.
Prepared By: ATAC Corporation, October 2014.

**Exhibit 3-7**

**No Action - North Flow**

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## No Action - South Flow

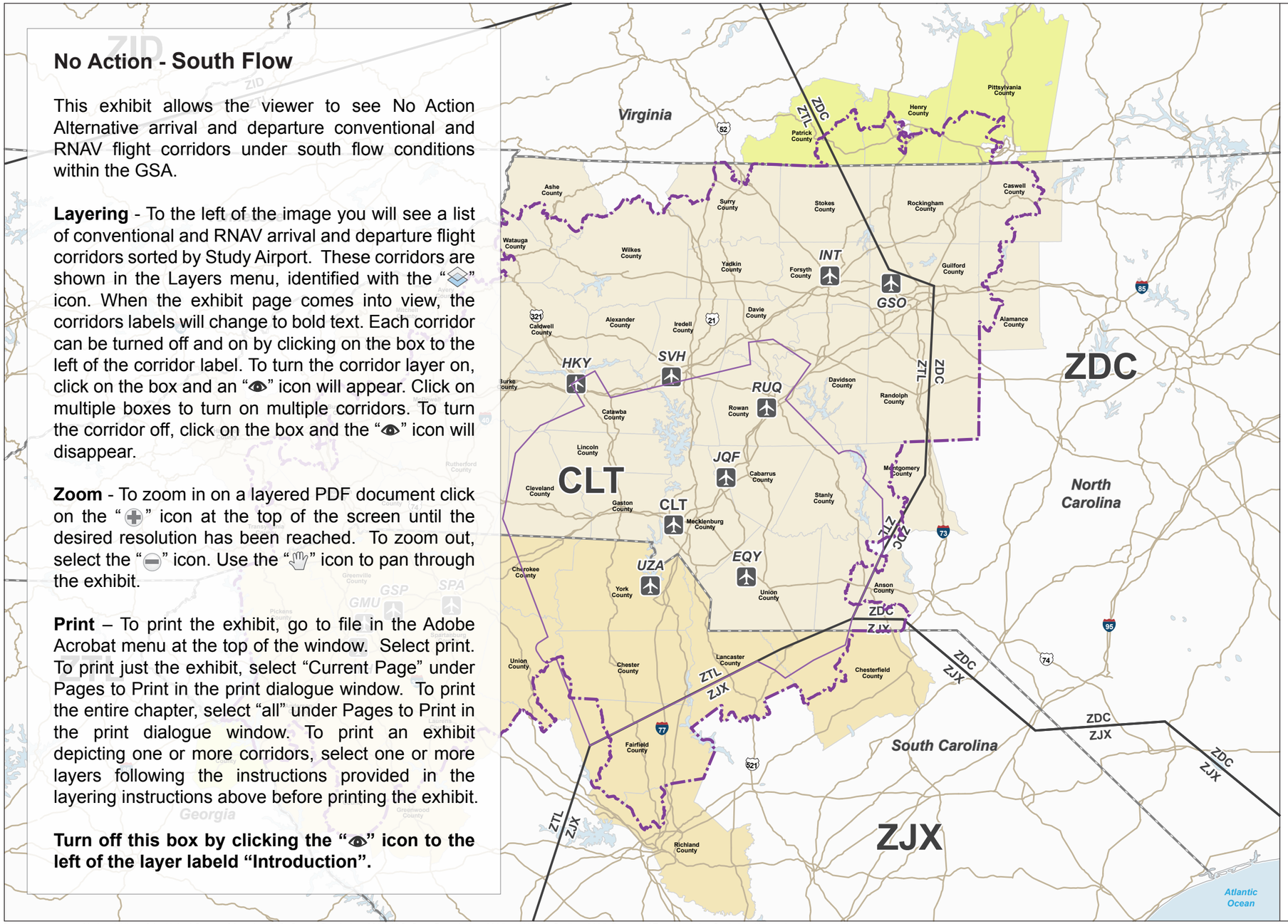
This exhibit allows the viewer to see No Action Alternative arrival and departure conventional and RNAV flight corridors under south flow conditions within the GSA.

**Layering** - To the left of the image you will see a list of conventional and RNAV arrival and departure flight corridors sorted by Study Airport. These corridors are shown in the Layers menu, identified with the "" icon. When the exhibit page comes into view, the corridors labels will change to bold text. Each corridor can be turned off and on by clicking on the box to the left of the corridor label. To turn the corridor layer on, click on the box and an "" icon will appear. Click on multiple boxes to turn on multiple corridors. To turn the corridor off, click on the box and the "" icon will disappear.

**Zoom** - To zoom in on a layered PDF document click on the "" icon at the top of the screen until the desired resolution has been reached. To zoom out, select the "" icon. Use the "" icon to pan through the exhibit.

**Print** – To print the exhibit, go to file in the Adobe Acrobat menu at the top of the window. Select print. To print just the exhibit, select "Current Page" under Pages to Print in the print dialogue window. To print the entire chapter, select "all" under Pages to Print in the print dialogue window. To print an exhibit depicting one or more corridors, select one or more layers following the instructions provided in the layering instructions above before printing the exhibit.

**Turn off this box by clicking the "" icon to the left of the layer labeld "Introduction".**




**LEGEND**

- General Study Area Boundary
- Study Airport
- North Carolina County in Study Area
- South Carolina County in Study Area
- Virginia County in Study Area
- State Boundary
- U.S. and Interstate Highways
- Water
- Charlotte TRACON (CLT) Boundary
- ARTCC Boundary
- Conventional Arrival
- Conventional Departure
- RNAV Arrival
- RNAV Departure
- Radar Vectors Arrival
- Radar Vectors Departure

Notes:

| | |
|---|---|
| **CLT** | Charlotte Douglas International Airport |
| **EQY** | Charlotte-Monroe Executive Airport |
| **GMU** | Greenville Downtown Airport |
| **GSO** | Piedmont Triad International Airport |
| **GSP** | Greenville Spartanburg International Airport |
| **GYH** | Donaldson Center Airport |
| **HKY** | Hickory Regional Airport |
| **INT** | Smith Reynolds Airport |
| **JQF** | Concord Regoinal Airport |
| **RUQ** | Rown County Airport |
| **SPA** | Spartanburg Downtown Memorial Airport |
| **SVH** | Statesville Regional Airport |
| **UZA** | Rock Hill/York County/Bryant Field Airport |

Projection: Lambert Conformal Conic
Scale: 1:1,750,000

0 40 nm N

Sources: National Atlas of the United States of America: U.S. County Boudaries, 2005; U.S. State Boundaries, 2005; and Water Bodies, 2005; Bureau of Transportation Statistics: National Transportation Atlas Database National Highway Planning Network, 2012; FAA: NFDC Airport Database, 2012; ATAC Corporation: Study Area Boundary, 2014.
Prepared By: ATAC Corporation, October 2014.

**Exhibit 3-8**

**No Action - South Flow**

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### 3.2.2 Proposed Action Alternative

The Proposed Action includes the combined proposed final designs for all procedures developed by the D&I Team as well as existing procedures that have been carried forward for continued use. This alternative is expected to add efficiency to airspace usage in the Charlotte Metroplex by increasing the number of RNAV procedures, flexibility in transitioning aircraft, segregating arrivals and departures, and improving the predictability of air traffic flows.

There are 46 procedures included in the Proposed Action. This includes 28 new RNAV procedures (15 new RNAV SIDs and 13 new RNAV STARs.) In addition, there are eight new conventional procedures (three conventional SIDs and five conventional STARs). Four existing conventional SIDs and six existing conventional STARs are carried forward as part of the Proposed Action. **Table 3-2** lists the names of the Proposed Action alternatives, the No Action Alternative procedure the Proposed Action alternative would replace (if applicable), the procedure type, and the basis of design (indicated by the type of navigational aid the procedures are based on (shown as VOR, RNAV, or radar vectors.) The table also shows the Study Airports served by the Proposed Action procedures and the number of runway and enroute transitions for each procedure. Each of these characteristics address the objectives identified under the purpose and need for the Project (predictability, flexibility, and/or segregation). As discussed in Section 2.2, predictability can be measured by the count of procedures with altitude controls and enroute/runway transitions. Segregation can be measured by number of airports served. Finally, flexibility can be measured by the number of procedures with OPDs, the count of enroute/runway transitions, and number of SIDs/STARs from/to the Study Airports. These criteria are further discussed and evaluated in Section 3.3. New or updated SIDs and STARs are shaded in gray.

**Table 3-2 Proposed Action SIDs and STARs (1 of 5)**

| Proposed Action Procedure | No Action Procedure | Procedure Type | Basis of Design | Airports Served | Transitions (enroute/runway) | OPD | Altitude Controls |
|---|---|---|---|---|---|---|---|
| BANKR ONE | ADENA THREE | STAR | RNAV | CLT, EQY, JQF, RUQ, UZA | 1/4 | Yes | Yes |
| BANKR ONE | N/A | STAR | RNAV | EQY, CLT, JQF, RUQ, UZA | 1/0 | Yes | Yes |
| BANKR ONE | UNARM THREE | STAR | RNAV | JQF, CLT, EQY, RUQ, UZA | 1/0 | Yes | Yes |
| BARMY ONE | LILLS SIX | SID | RNAV | CLT, EQY, JQF, RUQ, UZA | 3/8 | No | Yes |
| BARMY ONE | HORNET SEVEN | SID | RNAV | UZA, CLT, EQY, JQF, RUQ | 3/0 | No | No |
| BEAVY ONE | ANDYS SEVEN | SID | RNAV | CLT, EQY, JQF, RUQ, UZA | 2/8 | No | Yes |
| BEAVY ONE | PANTHER TWO | SID | RNAV | UZA, CLT, EQY, JQF, RUQ | 2/0 | No | No |
| BIMMR ONE | N/A | SID | RNAV | SPA, GMU, GSP, GYH | 2/0 | No | No |
| BLOCC ONE | BLOCC ONE | STAR | VOR/DME radar vectors | GSO, INT | 1/0 | No | No |

**Table 3-2 Proposed Action SIDs and STARs (2 of 5)**

| Proposed Action Procedure | No Action Procedure | Procedure Type | Basis of Design | Airports Served | Transitions (enroute/runway) | OPD | Altitude Controls |
|---|---|---|---|---|---|---|---|
| BOBZY ONE | ZAVER TWO | SID | RNAV | CLT, EQY, JQF, RUQ, UZA | 8/2 | No | Yes |
| BOBZY ONE | BOBCAT FIVE | SID | RNAV | UZA, CLT, EQY, JQF, RUQ | 2/0 | No | No |
| BOLLT ONE | TRIAD SIX | SID | RNAV | GSO, INT | 1/6 | No | Yes |
| BROOK THREE | BROOK THREE | STAR | VOR/DME radar vectors | GSO, INT | 2/0 | No | No |
| BTSEY ONE | SHINE SIX | STAR | VOR/DME radar vectors | CLT, EQY, UZA | 1/0 | No | Yes |
| BWALL ONE | N/A | SID | RNAV | GMU, GSP, GYH, SPA | 1/0 | No | Yes |
| CHARLOTTE ONE | CHARLOTTE ONE | SID | VOR/DME radar vectors | CLT, EQY, GYH, JQF, RUQ, UZA | 10/0 | No | No |
| CHPTR ONE | UNARM THREE | STAR | VOR/DME radar vectors | CLT, EQY, UZA | 2/2 | No | No |
| CHSLY ONE | SUDSY FOUR | STAR | RNAV | CLT, EQY, UZA | 2/4 | Yes | Yes |
| CHSLY ONE | IVANE FOUR | STAR | RNAV | CLT, EQY, UZA | 2/0 | Yes | Yes |
| CHSLY ONE | MAJIC ONE | STAR | RNAV | EQY, CLT, UZA | 2/0 | Yes | Yes |
| ESTRR ONE | DEBIE SIX | SID | RNAV | CLT, EQY, JQF, RUQ, UZA | 1/8 | No | Yes |
| ESTRR ONE | BOBCAT FIVE | SID | RNAV | UZA, CLT, EQY, JQF, RUQ | 1/0 | No | No |
| FILPZ ONE | JOHNS THREE | STAR | RNAV | CLT, EQY, UZA | 1/2 | Yes | Yes |
| FILPZ ONE | SHINE SIX | STAR | RNAV | UZA, CLT, EQY | 1/0 | Yes | Yes |
| HENBY TWO | HENBY TWO | STAR | VOR/DME radar vectors | GSO, INT | 2/0 | No | No |
| HICKORY THREE | HICKORY THREE | SID | Radar vectors | HKY | 0/4 | No | No |
| ICONS ONE | BUCKL SEVEN | SID | RNAV | CLT, EQY, JQF, RUQ, UZA | 1/8 | No | Yes |
| ICONS ONE | PANTHER TWO | SID | RNAV | UZA, CLT, EQY, JQF, RUQ | 1/0 | No | No |
| JOJJO ONE | ZAVER TWO | SID | RNAV | CLT, EQY, JQF, RUQ, UZA | 3/8 | No | Yes |
| JOJJO ONE | JACAL SIX | SID | RNAV | CLT, EQY, JQF, RUQ, UZA | 3/0 | No | Yes |
| JOJJO ONE | HORNET SEVEN | SID | RNAV | UZA, CLT, EQY, JQF, RUQ | 3/0 | No | No |
| JONZE ONE | ADENA THREE | STAR | RNAV | CLT, EQY, JQF, RUQ, UZA | 1/4 | Yes | Yes |

**Table 3-2 Proposed Action SIDs and STARs (3 of 5)**

| Proposed Action Procedure | No Action Procedure | Procedure Type | Basis of Design | Airports Served | Transitions (enroute/runway) | OPD | Altitude Controls |
|---|---|---|---|---|---|---|---|
| JONZE ONE | UNARM THREE | STAR | RNAV | UZA, CLT, EQY, JQF, RUQ | 1/0 | Yes | Yes |
| JUNNR ONE | WHTTL TWO | STAR | RNAV | GMU, GSP, GYH, SPA | 1/0 | No | No |
| KABEE ONE | NASCR ONE | STAR | RNAV | JQF, RUQ, SVH | 1/0 | No | No |
| KABEE ONE | N/A | STAR | RNAV | SVH, JQF, RUQ | 1/0 | No | No |
| KERMIT ONE | CHARLOTTE ONE | SID | VOR/DME radar vectors | CLT, EQY, GYH, JQF, RUQ, UZA | 10/0 | No | No |
| KERMIT ONE | PANTHER TWO | SID | VOR/DME radar vectors | CLT, EQY, GYH, JQF, RUQ, UZA | 10/0 | No | No |
| KERMIT ONE | BOBCAT FIVE | SID | VOR/DME radar vectors | CLT, EQY, GYH, JQF, RUQ, UZA | 10/0 | No | No |
| KERMIT ONE | HORNET SEVEN | SID | VOR/DME radar vectors | CLT, EQY, GYH, JQF, RUQ, UZA | 10/0 | No | No |
| KERMIT ONE | PANTHER TWO | SID | VOR/DME radar vectors | EQY, CLT, GYH, JQF, RUQ, UZA | 10/0 | No | No |
| KERMIT ONE | N/A | SID | VOR/DME radar vectors | GYH, CLT, EQY, JQF, RUQ, UZA | 10/0 | No | No |
| KILNS ONE | MERIL SIX | SID | RNAV | CLT, EQY, JQF, RUQ, UZA | 1/8 | No | Yes |
| KILNS ONE | HORNET SEVEN | SID | RNAV | UZA, CLT, EQY, JQF, RUQ | 1/0 | No | No |
| KNIGHTS ONE | HUGO TWO | SID | VOR/DME radar vectors | EQY, CLT, GHY, JQF, RUQ, UZA | 8/0 | No | No |
| KNIGHTS ONE | N/A | SID | VOR/DME radar vectors | GYH, CLT, EQY, JQF, RUQ, UZA | 8/0 | No | No |
| KNIGHTS ONE | HUGO TWO | SID | VOR/DME radar vectors | JQF, CLT, EQY, GYH, RUQ, UZA | 8/0 | No | No |
| KRITR ONE | JACAL SIX | SID | RNAV | CLT, EQY, JQF, RUQ, UZA | 8/2 | No | Yes |
| KRITR ONE | HORNET SEVEN | SID | RNAV | UZA, CLT, EQY, JQF, RUQ | 2/0 | No | No |
| KWEEN ONE | BUCKL SEVEN | SID | RNAV | CLT, EQY, JQF, RUQ, UZA | 1/8 | No | Yes |
| KWEEN ONE | PANTHER TWO | SID | RNAV | UZA, CLT, EQY, JQF, RUQ | 1/0 | No | No |
| LIINN ONE | SHINE SIX | STAR | VOR/DME radar vectors | CLT, EQY, UZA | 3/1 | No | No |
| LILLS SEVEN | LILLS SIX | SID | RNAV | CLT, EQY, JQF, RUQ, UZA | 1/8 | No | Yes |

**Table 3-2 Proposed Action SIDs and STARs (4 of 5)**

| Proposed Action Procedure | No Action Procedure | Procedure Type | Basis of Design | Airports Served | Transitions (enroute/runway) | OPD | Altitude Controls |
|---|---|---|---|---|---|---|---|
| LILLS SEVEN | PANTHER TWO | SID | RNAV | EQY, CLT, JQF, RUQ, UZA | 1/0 | No | No |
| MAJIC ONE | MAJIC ONE | STAR | VOR/DME radar vectors | CLT, EQY, UZA | 3/0 | No | No |
| MCHLN ONE | N/A | STAR | RNAV | SPA, GMU, GSP, GYH | 1/0 | No | No |
| MLLET ONE | HUSTN TWO | STAR | RNAV | CLT, EQY, UZA | 2/3 | No | No |
| MLLET ONE | CHESTER FIELD THREE | STAR | RNAV | EQY, CLT, UZA | 2/0 | No | No |
| NASCR ONE | NASCR ONE | STAR | VOR/DME radar vectors | RUQ, JQF | 4/0 | No | No |
| No SIDS | N/A | SID | N/A | SVH | N/A | N/A | N/A |
| No STARS | No STARS | STAR | N/A | HKY | N/A | N/A | N/A |
| PARQR ONE | JOHNS THREE | STAR | RNAV | CLT, EQY, UZA | 2/3 | Yes | Yes |
| PARQR ONE | SHINE SIX | STAR | RNAV | UZA, CLT, EQY | 2/0 | Yes | Yes |
| QUAKER THREE | QUAKER THREE | SID | VOR/DME radar vectors | GSO, INT | 5/0 | No | No |
| RASLN ONE | CHESTER FIELD THREE | STAR | VOR/DME radar vectors | UZA, CLT, EQY | 1/0 | No | No |
| RCTOR ONE | UNMAN TWO | STAR | RNAV | GMU, GSP, GYH, SPA | 1/0 | No | No |
| SMOKN THREE | SMOKN THREE | STAR | VOR Radar vectors | GSO, INT | 1/0 | No | No |
| STOCR ONE | HUSTN TWO | STAR | RNAV | CLT, EQY, UZA | 3/3 | Yes | Yes |
| STOCR ONE | CHESTER FIELD THREE | STAR | RNAV | EQY, CLT, UZA | 3/0 | Yes | Yes |
| TRAKS ONE | BROOK TWO | STAR | RNAV | INT, GSO | 2/0 | No | No |
| TRIAD SEVEN | TRIAD SIX | SID | VOR/DME radar vectors | GSO, INT | 4/0 | No | No |
| TRSHA ONE | TRIAD SIX | SID | RNAV | INT, GSO | 2/4 | No | Yes |
| UNARM FOUR | UNARM THREE | STAR | VOR/DME radar vectors | UZA, CLT, EQY, JQF, RUQ | 2/0 | No | No |
| WEAZL ONE | JACAL SIX | SID | RNAV | CLT, EQY, JQF, RUQ, UZA | 1/8 | No | Yes |
| WEAZL ONE | HORNET SEVEN | SID | RNAV | EQY, CLT, JQF, RUQ, UZA | 1/0 | No | No |

**Table 3-2 Proposed Action SIDs and STARs (5 of 5)**

| Proposed Action Procedure | No Action Procedure | Procedure Type | Basis of Design | Airports Served | Transitions (enroute/runway) | OPD | Altitude Controls |
|---|---|---|---|---|---|---|---|
| WINSTON ONE | WINSTON ONE | SID | Radar vectors | INT | 0/0 | No | No |
| WORXS ONE | N/A | STAR | RNAV | GMU, GSP, GYH, SPA | 1/0 | No | No |

*N/A=Not Applicable*
*DME=Distance Measuring Equipment*
*STAR=Standard Terminal Arrival Route*
*VOR=VHF Omnidirectional Range*
*RNAV=Area Navigation*
*VORTAC=VHF Omnidirectional Range/Tactical Aircraft Control*
*SID=Standard Instrument Departure*

***Airports***
*CLT: Charlotte/Douglas International Airport*
*EQY: Charlotte-Monroe Executive Airport*
*GMU: Greenville Downtown Airport*
*GSO: Piedmont Triad International Airport*
*RUQ: Rowan County Airport*
*GSP: Greenville Spartanburg International Airport*
*GYH: Donaldson Center Airport*
*INT: Smith Reynolds Airport*
*JQF: Concord Regional Airport*
*JZI: Charleston Executive Airport*
*RDU: Raleigh-Durham International Airport*
*SVH: Statesville Regional Airport*
*UZA: Rock Hill Airport-Bryant Field*

Source: National Flight Data Center National Airspace System Resources database, accessed January, 2013. Department of Transportation, Federal Aviation Administration Operational Procedure Files October 2014.
Prepared by: ATAC Corporation, October 2014.

**Exhibit 3-9** shows all arrival and departure flows to the Study Airports associated with the Proposed Action during North Flow conditions. Similarly, **Exhibit 3-10** depicts the Proposed Action Alternative under South Flow conditions. Corridors are grouped by Study Airport and sorted by arrival and departure.

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## Proposed Action - North Flow

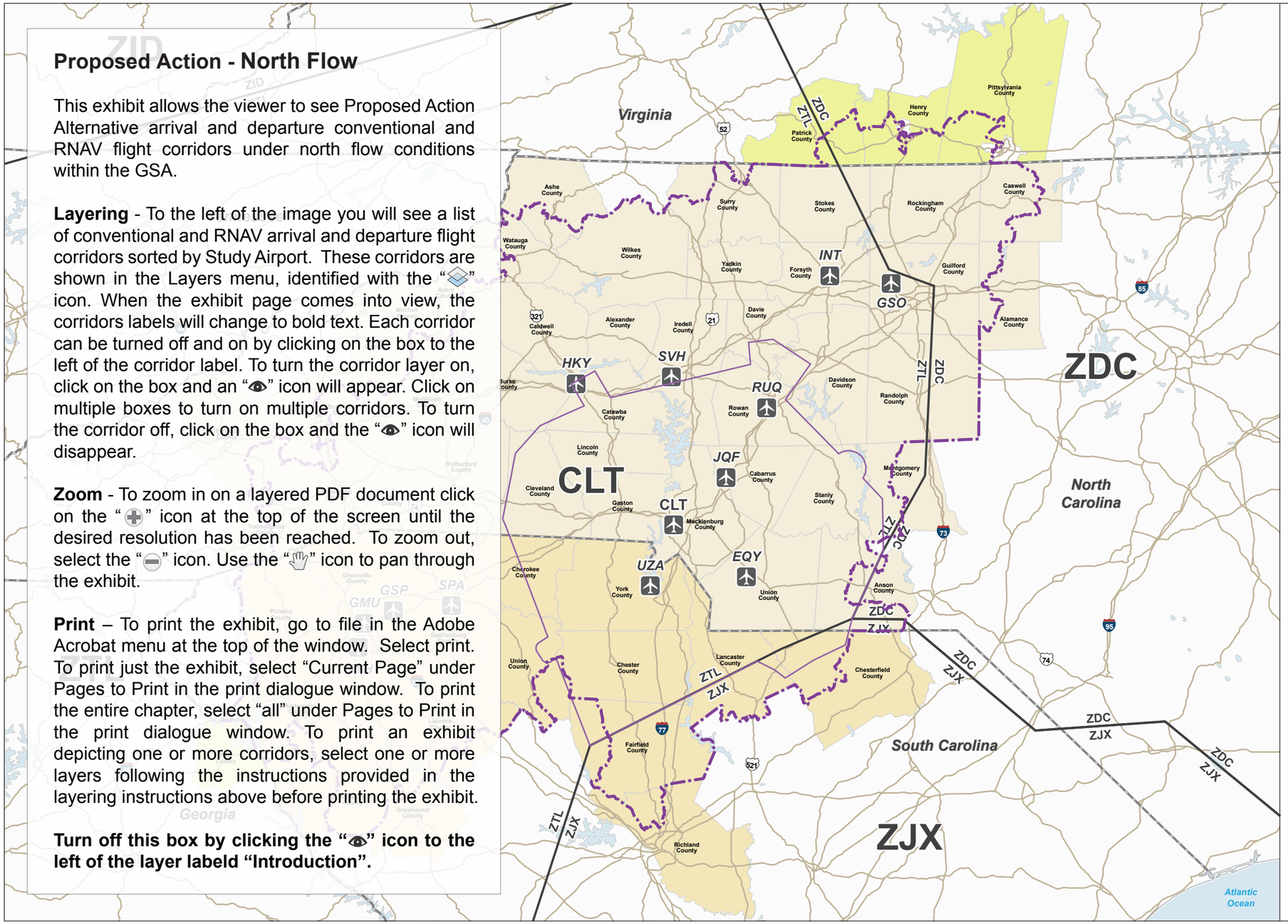
This exhibit allows the viewer to see Proposed Action Alternative arrival and departure conventional and RNAV flight corridors under north flow conditions within the GSA.

**Layering** - To the left of the image you will see a list of conventional and RNAV arrival and departure flight corridors sorted by Study Airport. These corridors are shown in the Layers menu, identified with the "◈" icon. When the exhibit page comes into view, the corridors labels will change to bold text. Each corridor can be turned off and on by clicking on the box to the left of the corridor label. To turn the corridor layer on, click on the box and an "👁" icon will appear. Click on multiple boxes to turn on multiple corridors. To turn the corridor off, click on the box and the "👁" icon will disappear.

**Zoom** - To zoom in on a layered PDF document click on the "⊕" icon at the top of the screen until the desired resolution has been reached. To zoom out, select the "⊖" icon. Use the "✋" icon to pan through the exhibit.

**Print** – To print the exhibit, go to file in the Adobe Acrobat menu at the top of the window. Select print. To print just the exhibit, select "Current Page" under Pages to Print in the print dialogue window. To print the entire chapter, select "all" under Pages to Print in the print dialogue window. To print an exhibit depicting one or more corridors, select one or more layers following the instructions provided in the layering instructions above before printing the exhibit.

**Turn off this box by clicking the "👁" icon to the left of the layer labeld "Introduction".**




LEGEND

- General Study Area Boundary
- Study Airport
- North Carolina County in Study Area
- South Carolina County in Study Area
- Virginia County in Study Area
- State Boundary
- U.S. and Interstate Highways
- Water
- Charlotte TRACON (CLT) Boundary
- ARTCC Boundary
- Conventional Arrival
- Conventional Departure
- RNAV Arrival
- RNAV Departure

Notes:

| | |
|---|---|
| **CLT** | Charlotte Douglas International Airport |
| **EQY** | Charlotte-Monroe Executive Airport |
| **GMU** | Greenville Downtown Airport |
| **GSO** | Piedmont Triad International Airport |
| **GSP** | Greenville Spartanburg International Airport |
| **GYH** | Donaldson Center Airport |
| **HKY** | Hickory Regional Airport |
| **INT** | Smith Reynolds Airport |
| **JQF** | Concord Regoinal Airport |
| **RUQ** | Rown County Airport |
| **SPA** | Spartanburg Downtown Memorial Airport |
| **SVH** | Statesville Regional Airport |
| **UZA** | Rock Hill/York County/Bryant Field Airport |

Projection: Lambert Conformal Conic
Scale: 1:1,750,000

0 40 nm N

Sources: National Atlas of the United States of America: U.S. County Boudaries, 2005; U.S. State Boundaries, 2005; and Water Bodies, 2005; Bureau of Transportation Statistics: National Transportation Atlas Database National Highway Planning Network, 2012; FAA: NFDC Airport Database, 2012; ATAC Corporation: Study Area Boundary, 2014.
Prepared By: ATAC Corporation, October 2014.

**Exhibit 3-9**

**Proposed Action - North Flow**

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## Proposed Action - South Flow

This exhibit allows the viewer to see Proposed Action Alternative arrival and departure conventional and RNAV flight corridors under south flow conditions within the GSA.

**Layering** - To the left of the image you will see a list of conventional and RNAV arrival and departure flight corridors sorted by Study Airport. These corridors are shown in the Layers menu, identified with the "" icon. When the exhibit page comes into view, the corridors labels will change to bold text. Each corridor can be turned off and on by clicking on the box to the left of the corridor label. To turn the corridor layer on, click on the box and an "" icon will appear. Click on multiple boxes to turn on multiple corridors. To turn the corridor off, click on the box and the "" icon will disappear.

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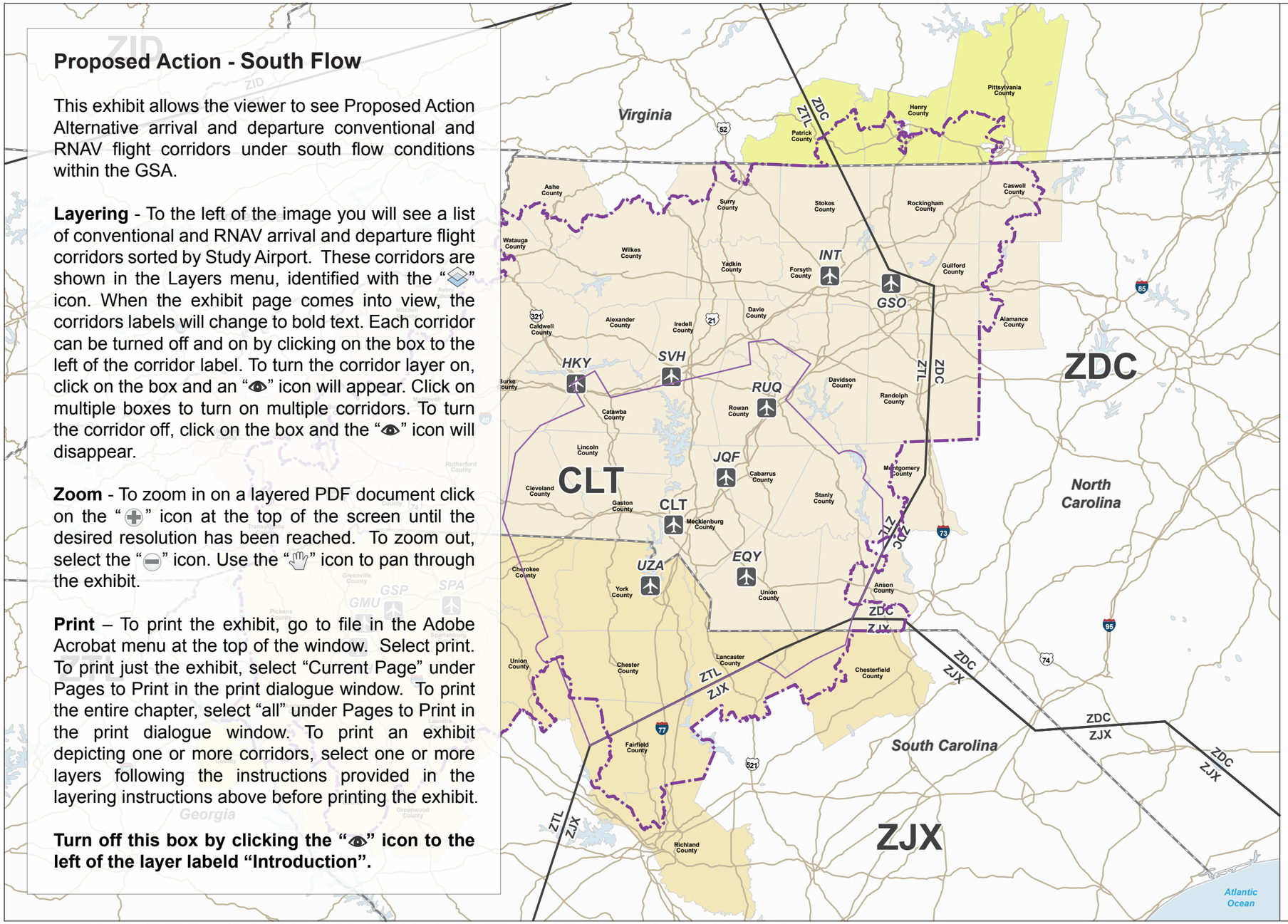
**Turn off this box by clicking the "" icon to the left of the layer labeld "Introduction".**




**LEGEND**

- General Study Area Boundary
- Study Airport
- North Carolina County in Study Area
- South Carolina County in Study Area
- Virginia County in Study Area
- State Boundary
- U.S. and Interstate Highways
- Water
- Charlotte TRACON (CLT) Boundary
- ARTCC Boundary
- Conventional Arrival
- Conventional Departure
- RNAV Arrival
- RNAV Departure

Notes:

| | |
|---|---|
| **CLT** | Charlotte Douglas International Airport |
| **EQY** | Charlotte-Monroe Executive Airport |
| **GMU** | Greenville Downtown Airport |
| **GSO** | Piedmont Triad International Airport |
| **GSP** | Greenville Spartanburg International Airport |
| **GYH** | Donaldson Center Airport |
| **HKY** | Hickory Regional Airport |
| **INT** | Smith Reynolds Airport |
| **JQF** | Concord Regoinal Airport |
| **RUQ** | Rown County Airport |
| **SPA** | Spartanburg Downtown Memorial Airport |
| **SVH** | Statesville Regional Airport |
| **UZA** | Rock Hill/York County/Bryant Field Airport |

Projection: Lambert Conformal Conic
Scale: 1:1,750,000

0 40 nm N

Sources: National Atlas of the United States of America: U.S. County Boudaries, 2005; U.S. State Boundaries, 2005; and Water Bodies, 2005; Bureau of Transportation Statistics: National Transportation Atlas Database National Highway Planning Network, 2012; FAA: NFDC Airport Database, 2012; ATAC Corporation: Study Area Boundary, 2014.
Prepared By: ATAC Corporation, October 2014.

**Exhibit 3-10**

**Proposed Action - South Flow**

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## 3.3 Summary Comparison of the Proposed Action and No Action Alternative

This section provides a comparative summary between the Proposed Action and No Action Alternative based on the objectives defined in Section 2.2:

- Improve predictability in transitioning traffic between enroute and terminal area airspace;
- Improve the segregation of arrivals and departures in the airspace; and,
- Improve flexibility in transitioning traffic between enroute and terminal area airspace and between terminal area airspace and the runways.

### 3.3.1 Improve Predictability in Transitioning Traffic between Enroute and Terminal Area Airspace

In Section 2.2.1, two criteria were established to measure the objective to improve the predictability of air traffic flow in the Charlotte Metroplex airspace:

- Increase the number of RNAV procedures with altitude controls intended to optimize descent or climb patterns (measured by the count of procedures with altitude controls.)
- Increase the number of RNAV procedures with runway transitions routes to designated runways and enroute transitions (measured by the count of runway and enroute transitions.)

**Table 3-3** provides a comparative summary of the number of RNAV procedures serving the Study Airports under both the Proposed Action and No Action Alternative. Under the Proposed Action, of the 46 procedures serving the Study Airports, 20 are RNAV-based procedures with altitude controls. In comparison, only 10 of the 34 procedures included in the No Action Alternative have altitude controls. Of the 46 procedures included in the Proposed Action, 21 include runway transitions and 28 include enroute transitions. In comparison, only eight of the 34 procedures included under the No Action Alternative have runway transitions and 14 have enroute transitions. Based on the criteria above, the Proposed Action would better improve predictability in air traffic flow compared to the No Action Alternative.

**Table 3-3 Alternatives Evaluation: Improve Predictability in Transitioning Traffic**

| Criteria | Alternative | |
|---|---|---|
| | No Action | Proposed Action |
| RNAV Procedures with Altitude Controls | 10 | 20 |
| RNAV Procedures with Runway Transitions | 8 | 21 |
| Enroute Transitions | 14 | 28 |

*Note: Blue shading indicates alternative that achieves desired criteria.*

Sources: U.S. Department of Transportation, Federal Aviation Administration, *Charlotte Design and Implementation Team Final Report*, October 2014.
Prepared by: ATAC Corporation, October 2014.

### 3.3.2 Improve the Segregation of Arrivals and Departures in Terminal Area and Enroute Airspace

In Section 2.2.2 one criterion was established to measure the objective to segregate traffic in portions of the airspace where arrival and departure flows cross, converge, or are within proximity of each other:

- Segregate Study Airport traffic (measured by the count of RNAV STARs and/or SIDs to/from Study Airports).

**Table 3-4** identifies the number of RNAV SID and STAR procedures that can be used separately to the Study Airports under both the Proposed Action and the No Action Alternative. Under the Proposed Action, of the 46 procedures serving the Study Airports, 28 are RNAV-based procedures. Twenty of those 28 procedures serve CLT; 18 serve EQY and UZA; 14 serve JQF and RUQ; six serve GMU, GSP, GYH, and SPA; three serve GSO and INT; and one serves SVH. In comparison, only 14 of the 34 procedures included in the No Action Alternative are RNAV-based. Twelve of those 14 procedures serve CLT and two serve GMU, GSP, GYH, and SPA. Therefore, the addition of RNAV STARs and SIDs under the Proposed Action indicates that this alternative would better achieve the objective to improve segregation of arrivals and departures in the Charlotte Metroplex.

**Table 3-4 Alternatives Evaluation: Segregate Arrival and Departure Flows**

| Criteria | Alternative | |
|---|---|---|
| | No Action | Proposed Action |
| Number of RNAV Procedures | | |
| CLT | 12 | 20 |
| EQY | 0 | 18 |
| GMU | 2 | 6 |
| GSO | 0 | 3 |
| GSP | 2 | 6 |
| GYH | 2 | 6 |
| HKY | 0 | 0 |
| INT | 0 | 3 |
| JQF | 0 | 14 |
| RUQ | 0 | 14 |
| SPA | 2 | 6 |
| SVH | 0 | 1 |
| UZA | 0 | 18 |
| Total | 20 | 115 |

*Note: Blue shading indicates alternative that achieves desired criteria.*

Sources: U.S. Department of Transportation, Federal Aviation Administration, *Charlotte Design and Implementation Team Final Report*, October 2014.
Prepared by: ATAC Corporation, October 2014.

### 3.3.3 Improve Flexibility in Transitioning Traffic between Enroute and Terminal Area Airspace and between Terminal Area Airspace and the Runways

Section 2.2.3 includes three criteria established to measure the objective to increase the flexibility in transitioning aircraft between the terminal and enroute airspace:

- Implement RNAV STARs with OPDs.

- Increase the number of enroute and runway transitions (measured by count of enroute and runway transitions for all SID and STAR procedures.)
- Segregate CLT traffic from satellite Study Airport traffic to/from Study Airports by increasing the number of STARs and/or SIDs to/from Study Airports.

As shown in **Table 3-5**, under the Proposed Action, RNAV procedures with OPDs would increase to 23 compared to one under the No Action Alternative. The Proposed Action includes 28 RNAV procedures compared to 14 RNAV procedures under the No Action Alternative.

The Proposed Action procedures include 110 enroute transitions and 119 runway transitions (associated with both conventional and RNAV procedures). In comparison, the No Action Alternative includes 82 enroute transitions and 59 runway transitions. Therefore, the increased number of enroute and runway transitions under the Proposed Action indicates that this alternative would achieve the objective of improving flexibility in transitioning traffic in the Charlotte Metroplex airspace.

**Table 3-5 Alternatives Evaluation: Improve Flexibility in Transitioning Aircraft**

| Criteria | Alternative | |
|---|---|---|
| | No Action | Proposed Action |
| Total RNAV STARs with OPD | 1 | 23 |
| Total RNAV Procedures | 14 | 28 |
| Total Enroute Transitions | 82 | 110 |
| Total Runway Transitions | 59 | 119 |

*Notes: Blue shading indicates alternative that achieves desired criteria.*

Sources: U.S. Department of Transportation, Federal Aviation Administration, *Charlotte Design and Implementation Team Final Report*, October 2014.
Prepared by: ATAC Corporation, October 2014.

## 3.4 Preferred Alternative Determination

Of the two alternatives carried forward for detailed analysis, the Proposed Action would better meet the Purpose and Need for the CLT OAPM Project based on the criteria discussed above. Therefore, the Proposed Action is the Preferred Alternative. Although it would not meet the Purpose and Need, the No Action Alternative was carried forward, as required by Council on Environmental Quality (CEQ) regulations, to establish a benchmark against which decision makers can compare the magnitude of environmental effects of undertaking the Proposed Action.

## 3.5 Listing of Federal Laws and Regulations Considered

**Table 3-6** lists the relevant federal laws and statutes, Executive Orders, and regulations applicable to the Proposed Action and the No Action Alternative and considered in preparation of this EA.

**Table 3-6 List of Federal Laws and Regulations Considered – CLT OAPM Project (1 of 2)**

| Federal Laws and Statutes | Citation |
|---|---|
| National Environmental Policy Act of 1969 | 42 U.S.C. § 4321 *et seq*. |
| Clean Air Act of 1970, as amended | 42 U.S.C. § 7401 *et seq.* |
| Department of Transportation Act of 1966, Section 4(f) | 49 U.S.C. § 303(c) |
| Aviation Safety and Noise Abatement Act of 1979 | 49 U.S.C. § 47501 *et seq*. |
| Federal Aviation Act of 1958, as amended | 49 U.S.C. § 40101 *et seq*. |
| Endangered Species Act of 1973 | 16 U.S.C. § 1531 *et seq*. |
| Fish and Wildlife Coordination Act of 1958 | 16 U.S.C. § 661 et seq. |
| Migratory Bird Treaty Act of 1918 | 16 U.S.C. § 703 et seq. |
| National Historic Preservation Act of 1966, as amended | 16 U.S.C. § 470 |
| Archaeological and Historic Preservation Act of 1974, as amended | 16 U.S.C. § 469 et seq. |
| **Federal Regulations** | **Citation** |
| Council for Environmental Quality Regulations | 40 C.F.R. Part 1500 to Part 1508 |
| General Conformity Regulations | 40 C.F.R. Part 93 Subpart B |
| Protection of Historic Properties Regulations | 36 C.F.R. 800 |
| Airport Noise Compatibility Planning Regulations | 14 C.F.R. Part 150 |
| Federal Aviation Regulations (FAR) Part 71: Designation of Class A, Class B, Class C, Class D, and Class E Airspace Areas; Airways; Routes; and Reporting Points, December 17, 1991. | 14 C.F.R. Part 71 |
| **Executive Orders** | **Citation** |
| 11593, Protection and Enhancement of the Cultural Environment | 36 Federal Register (FR) 8921 (May 13, 1971) |
| 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations | 59 FR 7629 (February 16, 1994) |
| 13045, Protection of Children from Environmental Health Risks and Safety Risks | 62 FR 19885 (April 23, 1997) |

**Table 3-6 List of Federal Laws and Regulations Considered – CLT OAPM Project (2 of 2)**

| FAA/U.S. Department of Transportation Orders |
|---|
| U.S. DOT Order 5680.1a: *Final Order to Address Environmental Justice in Low-Income and Minority Populations*, 2012. |
| FAA Order 1050.1E, Chng. 1: *Environmental Impacts: Policies and Procedures*, March 20, 2006. |
| FAA Order 7100.9D, *Standard Terminal Arrival Program and Procedures*, December 15, 2003. |
| FAA Order 7400.2K, *Procedures for Handling Airspace Matter*, April 3, 2014. |
| FAA Order 8260.3B, Change 20, *United States Standard for Terminal Instrument Procedures (TERPS)*, December 7, 2007. |
| FAA Order 8260.40B, *Flight Management System (FMS) Instrument Procedures Development*, December 31, 1998. |
| FAA Order 8260.44A, Chg 2, *Civil Utilization of Area Navigation (RNAV) Departure Procedures*, November 6, 2006. |
| FAA Order 8260.46D, *Departure Procedure (DP) Program*, August 20, 2009. |
| FAA Order 8260.48, *Area Navigation (RNAV) Approach Construction Criteria*, April 8, 1999. |
| FAA Order 8260.52, *United States Standard for Required Navigation Performance (RNP) Approach Procedures with Special Aircraft and Aircrew Authorization Required (SAAAR)*, June 3, 2005. |
| FAA Order 8260.54A, *The United States Standard for Area Navigation (RNAV)*, December 7, 2007. |
| FAA Order JO 7110.65U, Air Traffic Control, February 9, 2012. |
| **FAA Advisory Circulars** |
| FAA Advisory Circular 150/5020-1: *Noise Control and Compatibility Planning for Airports*, August 5, 1983. |
| FAA Advisory Circular 150/5200-33B: *Hazardous Wildlife Attractants on or near Airports*, August 28, 2007. |
| FAA Advisory Circular 36-3H: *Estimated Airplane Noise Levels in A-Weighted Decibels*, April 25, 2002. |

Source: ATAC Corporation, August 2013.
Prepared by: ATAC Corporation, December 2013.

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