



Federal Aviation
Administration



NATIONAL AIRSPACE AND PROCEDURES PLAN

2010

Table of Contents

	Page
Forward	1
National Airspace and Procedures Plan Overview	1
National Airspace and Procedures Plan Organization	2
Integrated Transition to NextGen Airspace and Procedures	3
Metroplex	6
Summary of Metroplex Milestones and Deliverables	10
Cruise	10
Summary of Cruise Milestones and Deliverables	12
Research and Transition Efforts	12
Summary	14
Appendix A: Legacy Airspace Management Program Projects and 2009 Airspace Reviews	15
Appendix B: PBN Procedures and Routes	19
Appendix C: High Altitude Airspace Performance-Based Routing and National Special Activity Airspace Program	33
Appendix D: Process Descriptions	35
Appendix E: National Operational Airspace Council	37
Appendix F: Acronyms	38

Forward

Over the next two decades the Federal Aviation Administration (FAA) will face major challenges meeting future demand while improving safety, reducing delays, and protecting the environment. The Next Generation Air Transportation System (NextGen) is the FAA's primary means to transform the national air transportation system. NextGen is a highly complex, multilayered, long-term process, developing and implementing new technologies and changing the operating environment.¹ Modern airspace and Performance-Based Navigation (PBN) are key building blocks for NextGen.

The need for modern, performance-based airspace has been voiced unanimously by all members of the aviation community. Groups representing specific constituents, such as Air Transport Association and the National Air Traffic Controllers Association, as well as broader consensus groups such as RTCA Inc., have recognized the importance of well-planned, evolutionary airspace improvements. The Department of Transportation's Inspector General states in both the September 2008 Report and March 2009 Testimony that the FAA's airspace redesign projects and performance-based initiatives are required steps to move forward with NextGen and are key programs that will enhance system capacity.²

This initial version of the *National Airspace and Procedures Plan* will provide a comprehensive accounting of the "current" state of airspace and PBN procedures enhancements. Over the next two years, the *National Airspace and Procedures Plan* will change significantly, broadening to include additional details on NextGen Metroplex airspace and procedures efforts, expanding to integrate all procedure production, and including the FAA's NextGen facilities plans. In time, the *National Airspace and Procedures Plan* will contain a listing of all ongoing and planned airspace projects and associated procedures. This inaugural version is the first important step in a strategically managed National Airspace that meets NextGen safety, efficiency and capacity goals.

National Airspace and Procedures Plan Overview

Modernizing the nation's airspace and procedures requires a cohesive, high-level evolutionary strategy paired with specific tactics to deliver the desired products. The purpose of the *National Airspace and Procedures Plan* is to articulate the FAA's system-level strategy concerning airspace and procedures in order to deliver NextGen's safety, efficiency and capacity goals in the near-, mid-, and far-term.

The *National Airspace and Procedures Plan* is a compilation of current and future activities supporting NextGen's goals. These enhancements in airspace and procedures provide their own benefits but also form the foundation for the other technological improvements in NextGen. The *National Airspace and Procedures Plan* offers a narrative description and visual depiction of current and future airspace, along with PBN activities that will evolve the National Airspace towards NextGen. The plan outlines the scope and expected impacts of each effort, lays out specific schedules, and supports multi-year funding.

National Airspace and Procedures Plan will be maintained by a cross-agency collaborative process and will be produced under the concurrence of existing NextGen managing bodies. The lead Air Traffic Organization Operations group feeding the plan will be the National

¹ Cox, March 2009 Testimony.

² Department of Transportation's Inspector General Testimony (AV-2008-087 and March 2009).

Operational Airspace Council (NOAC). The NOAC is a Director-level planning body, chartered to provide an integrated, systems approach for airspace projects and associated PBN. Along with the NOAC, input from the FAA's NextGen Planning, Airports, Policy and Safety organizations will ensure that *National Airspace and Procedures Plan* projects are benefits-based and that they deliver results that are consistent with NextGen and other FAA modernization policies.

In order to meet the overarching NextGen goals, the *National Airspace and Procedures Plan* must support other national aviation and aerospace planning efforts. At its most basic level, the *National Airspace and Procedures Plan* provides descriptions of airspace and procedures efforts that form a narrative to further explain the *National Airspace System Enterprise Architecture (NAS EA) Airspace and Procedures Roadmap*. The plan reflects the principles of the FAA's *Flight Plan* and also is consistent with the *Mid-Term Operations Concept*.

The most pivotal document describing NextGen is the *NextGen Implementation Plan*. The *National Airspace and Procedures Plan* reflects and informs the *NextGen Implementation Plan*, see Figure 1. The *NextGen Implementation Plan* provides a description of NextGen, illustrates the expected benefits of NextGen, lays out the aircraft avionics equipage needs, summarizes the FAA's commitments and plans to deliver future capabilities. On the release of the *NextGen Implementation Plan* in January 2009, the FAA requested that RTCA establish a government-industry Task Force to "forge community-wide consensus on the recommended NextGen operational improvements to be implemented during the transition between now and 2018.³" The findings and recommendations of the Task Force were delivered to the FAA in September 2009. Several of the recommendations have direct relevance to airspace and procedures implementation across the National Airspace System (NAS). The contents of the *National Airspace and Procedures Plan* will address the Task Force's recommendations and will provide an additional level of detail concerning the FAA's response plans.

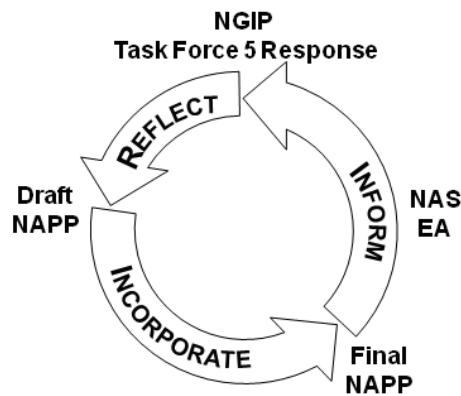


Figure 1. NGIP/NAPP/NAS EA Relationships.

National Airspace and Procedures Plan Organization

The first part of the *National Airspace and Procedures Plan* provides an overarching summary of the progress of the National Airspace to NextGen through the near- and mid-term. This overview sets the framework for the remainder of the plan, describing the integrated transition of operations currently supported by conventional navigation and static airspace to performance-based operations supported by dynamic airspace design and management.

³ Task Force 5 Final Report, September 2009.

The primary content of the plan is organized into two subsections, each addressing one of two problem areas, Metroplex and Cruise. The definition of these two problem “hemispheres” is taken from the *RTCA NextGen Mid-Term Implementation Task Force Report*.⁴ Within each of the hemispheres are solutions, made up of specific airspace and PBN procedures activities. These solutions represent the FAA’s agreements to modernize airspace and associated procedures. The milestones listed reflect three types of FAA agreements:

- **Commitments:** Milestones which are fully sanctioned and resourced. For these mainly Operations resourced efforts, Commitments will be those milestones that have current fiscal year (FY) resources.
- **Targets:** Milestones which are part of a sanctioned or chartered project, but that may not have all the necessary resources or potential risks (operational, technical, environmental, or other) mitigated.
- **Proposals:** Milestones which are associated with planned activities. These milestones have not been approved, sanctioned or resourced, but represent the potential schedule for an effort.

The final section of the plan includes transition efforts such as applied research activities, concepts and demonstrations related to airspace and procedures to solve problems in key areas. The appendices of the *National Airspace and Procedures Plan* include additional project details for each effort highlighted in the plan. There are various guidelines and orders that are used to develop and maintain the life-cycle of these efforts. A summary of those resources is included in Appendix D.

Figure 2 highlights the structural elements of the plan.



Figure 2. National Airspace and Procedures Plan Layout.

Integrated Transition to NextGen Airspace and Procedures

The evolution described in this plan spans the near- and mid-term time periods, 2010 through 2018. Figure 3 contains a snapshot taken from the NASEA Airspace and Procedures Roadmap, covering 2010 through 2018. This evolution is a key part of the FAA’s overall plans to meet safety, efficiency and capacity goals. An overarching consideration for the FAA is the commitment to conduct the appropriate level of environmental review and preparation

⁴ Task Force 5 Final Report, September 2009.

of the associated documentation in transition to the NextGen Airspace and Procedures. The potential environmental impact will be evaluated and tracked, along with operational changes of airspace and procedures enhancements. This continued commitment is a key tactic to address environmental constraints and noise abatement procedure challenges.

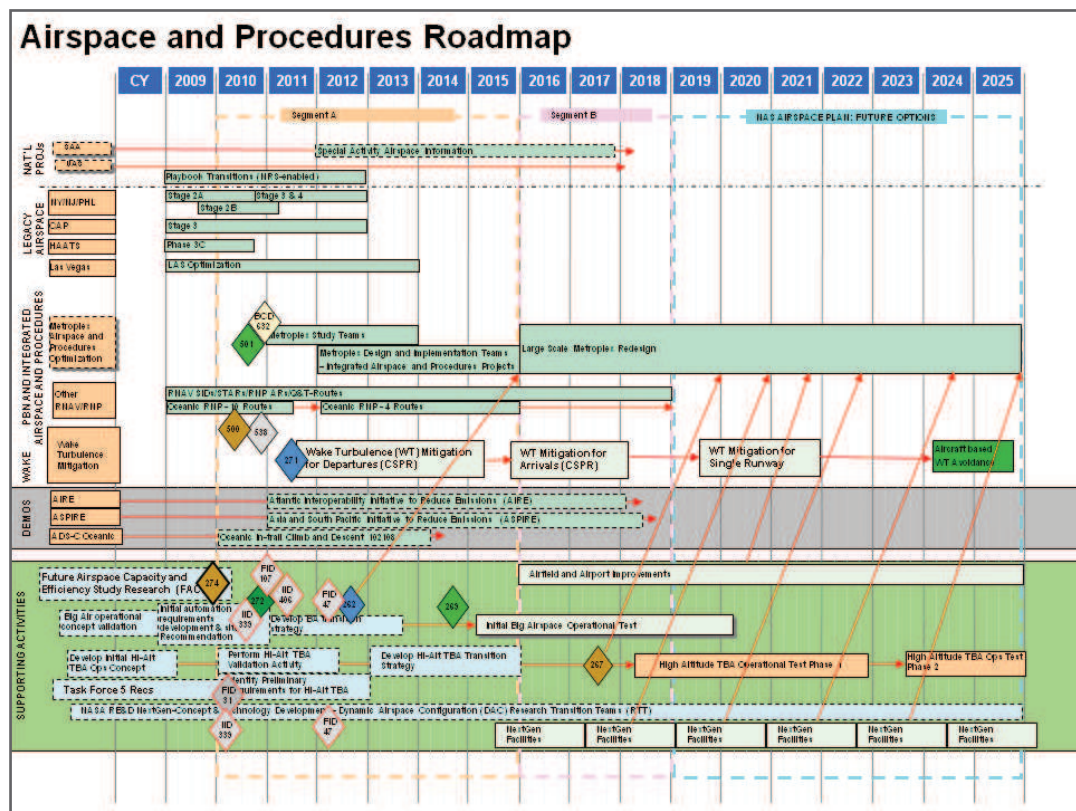


Figure 3. Excerpt from NAS EA Airspace and Procedures Roadmap.⁵

Through 2012, the focus will be on continuing the legacy Airspace Management Program (AMP) airspace projects and meeting the PBN procedure and route commitments in the FAA's Flight Plan. The AMP legacy projects include the New York/New Jersey/Philadelphia (NY/NJ/PHL) Metropolitan Area Airspace Redesign, the Chicago Airspace Project (CAP), the Houston Area Air Traffic System (HAATS) Airspace project, and the Las Vegas Optimization project.

In 2010, the annual procedure development goals from the FAA Flight Plan are 50 Required Navigation Performance (RNP) Authorization Required (AR) approach procedures, 50 area navigation (RNAV) Standard Instrument Departure/Standard Terminal Arrival (SID/STAR) procedures, and 12 RNAV routes. Throughout 2010, the focus on production goals will be transitioned to benefits-based service goals that will better support NextGen goals. One of the first steps to maximizing operational benefits is the emphasis on optimizing altitude profiles for planned procedures. In the near-term, Optimized Profile Descents (OPDs) which minimize the level segments on arrivals allowing a continuous, descending path, will be pursued as a priority in PBN procedures development.

Introduced in 2010 will be Integrated Airspace and Procedures projects – the future direction for all large-scale airspace and procedures efforts. The Integrated Airspace

⁵ NAS Enterprise Architecture, working draft June 2010.

and Procedures approach provides a geographic focus to problem solving with a systems view of performance-based navigation initiatives and the design of airspace. This approach moves RNAV/RNP procedure design away from individual overlays into multi-airport, arrival/departure, and city pair networks, and moves airspace design towards NextGen with an emphasis on PBN procedures design. The key characteristics of this unified approach are that it:


- Utilizes additional transition access/egress points that are not tied to ground-based navigational aids
- Considers concurrent development and implementation of SIDs and STARs to ensure an integrated approach to procedural optimization
- Decouples operations between primary and secondary/satellite airports serviced by complex terminal airspace
- Develops high-altitude routes and procedures through congested airspace that better connect metropolitan areas

The first trial of an Integrated Airspace and Procedures project was initiated in 2010 in Denver. Additional Integrated Airspace and Procedures projects will be determined and prioritized by a process consistent with the recommendations from RTCA's Task Force 5. The Metroplex Airspace and Procedures Optimization effort is an expedited approach for Integrated Airspace and Procedures projects and will initiate optimization efforts targeting operational beneficial PBN procedures and effective airspace to support those enhancements. Metroplex Airspace and Procedures Optimization sites will also be influenced by projections of airfield and airspace capacity needs, environmental constraints/concerns, plans for new runways and customer recommendations of areas of interest.

Also in direct response to Task Force 5 recommendations, the near-term will shepherd in the first large scale implementation of PBN routes into the en route environment since the mid-2000s. Q-routes are high-altitude RNAV routes that start and end at a point in space. Their development and implementation initiates the transition from conventionally-based en route routing to performance-based en route routing, replacing the existing Jet and Victor airway system with RNAV/RNP routing systems.

Q-routes implemented within the near-term will address immediate en route chokepoints and will tie together terminal improvements associated with the legacy AMP projects (e.g., Q-routes connecting the NY/NJ/PHL Metropolitan Area Airspace Redesign and the CAP). En route flexibility will continue to be supported by RNAV point to point routing. The near-term will include collaboratively determined uses for the existing Navigational Reference System (NRS) waypoints. The NRS is a grid of RNAV waypoints that were implemented across the NAS in 2003/2004. Use of the NRS waypoints will also support the transition of the National Playbooks from conventional ground-based-navigation to PBN in the near-term.

A key component of 2012-2015 is pervasive use of PBN to improve flight operations. By 2015, all expected deliverables for the legacy AMP airspace projects should be completed. The transition to the Integrated Airspace and Procedures approach should be complete and all major large scale airspace projects will be employing this method of design and development. Integrated Airspace and Procedures projects will include the concurrent implementation of RNAV STARs and SIDs, utilization of PBN procedures (including RNP where beneficial) to deconflict airport operations within a metropolitan area, and optimized



vertical profiles to expedite departures and support efficient arrivals. Efficiencies gained in the terminal environment will be continued into the en route domain with the next increment of en route PBN routes, providing additional interconnectivity between metropolitan areas and key city pairs.

By the end of 2012, results of demonstration efforts and concept exploration experiments should be available to inform decisions about inclusion of future concepts (e.g., High Density Integrated Arrival and Departure Operations and High Altitude Trajectory Based Airspace) in design and development work planned for the second half of the mid-term.

Benefits from the deliverables associated with the Integrated Airspace and Procedures projects started in the 2012 will materialize between 2015 and 2018. Integrated Airspace and Procedures projects will continue to proliferate across the NAS, addressing operational issues in all the major metropolitan areas and at the top commercial airports. In this timeframe, airspace and procedures changes will incorporate the validated concepts tested in the early mid-term, possibly including High Density Integrated Arrival and Departure Operations, High Altitude Trajectory Based Airspace, and Tailored Arrivals (depending upon programmatic decisions associated with each of these concepts).

By 2018, several additional airfield enhancements may be commissioned. These airports with new runways in planning or environmental stages include Philadelphia International Airport, George Bush Houston Intercontinental Airport, and Denver International Airport. By 2018, NextGen will have implemented several enabling capabilities (e.g., Relative Position Indicator) that will provide improvements in collaborative decision-making, routing options, surveillance accuracy, data communications, flight path accuracy, sector design, and the distribution of aeronautical information. Airspace and procedures changes in this period will leverage these operational enhancements. Features inherent to these new systems, in particular automation and communications systems, will enable more dynamic design and management of airspace. In the event these features are delayed, any changes to the airspace or PBN procedures that are dependent on those features will also be delayed. Additionally, it is expected that all airspace will be performance-based by 2018.⁶ Under this assumption, while most airspace will provide service to all aircraft, some airspace is envisioned to have such high demand that it will have exclusionary performance requirements, e.g., requiring aircraft to be capable of adhering to four-dimensional trajectories.

Metroplex

The Metroplex Section of this plan addresses airspace and procedures supporting the major metropolitan areas including operations at the major, reliever and satellite airports and ingress and egress airspace. Metroplex activities are not restricted to terminal efforts, as successful efficient operations require smooth transition to and from the en route environment. There are over two dozen major metropolitan areas that cover the 35 Operational Evolution airports defined by the *FAA Flight Plan* and the *Future Airport Capacity Task Force* (FACT). Figure 4 shows these important metropolitan areas and airports.

The Task Force 5 Report identified several challenges in current and future busy metroplex areas. A summary of these issues include:

- Volume and projected growth across all airports in a metropolitan area, not limited to the major carrier airports

⁶ Mid-term Operations Concept, 2010.

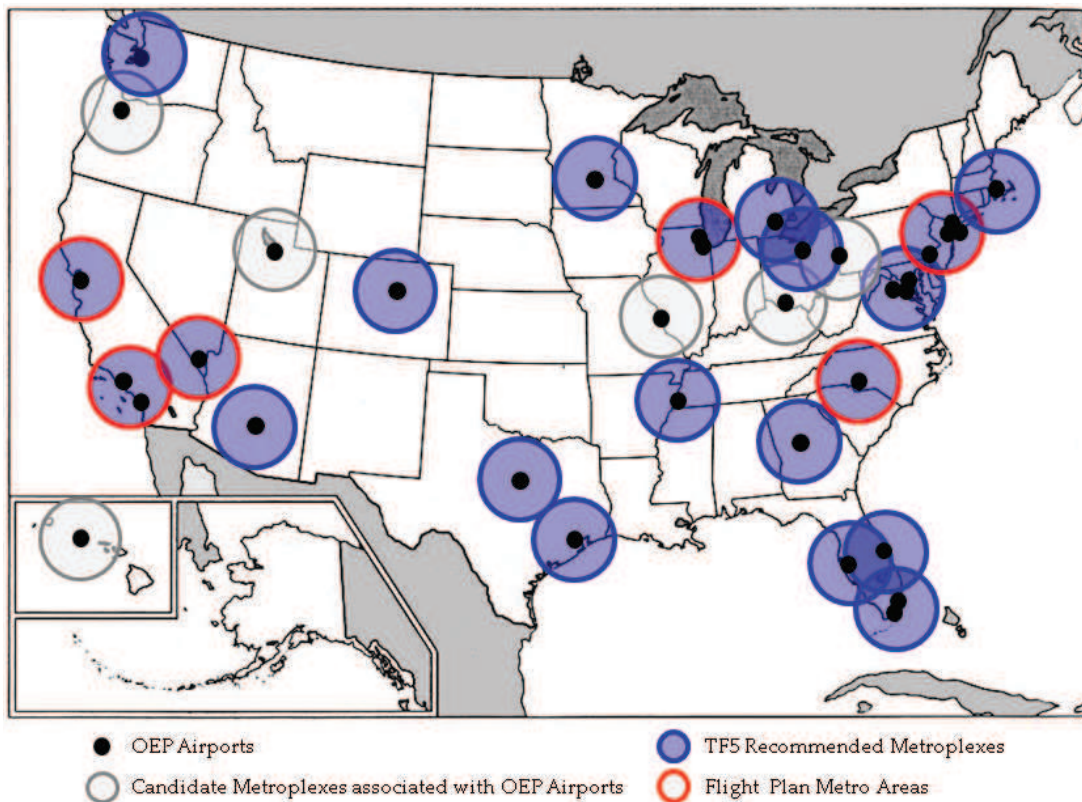
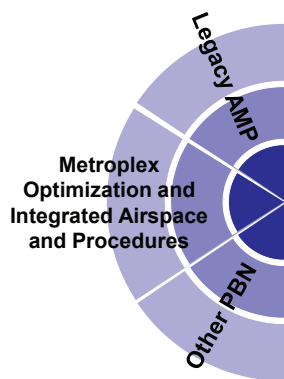


Figure 4. Major NAS Metroplexes.

- Complexity associated with diverse operations and mixed equipage
- Reduced-visibility conditions and severe weather that limits flexibility and throughput
- Adjacent airports in close proximity that share the same airspace
- Imbalance of traffic flows across ingress and egress points that hinder best use of available capacity
- Environmental constraints and noise abatement procedures

The Task Force 5 Report documented two specific recommendations for Metroplex airspace and procedures. To paraphrase, the Task Force recommended that the FAA, in collaboration and partnership with operators (e.g., airlines, general aviation, military, etc.):

- Optimize PBN procedures, focusing on the quality and emphasizing benefit.
- Implement integrated PBN-based airspace that uses the most efficient separation standards and procedures.



There is a three-pronged approach that will be used to address these recommendations:

- Completion of legacy AMP airspace projects.
- Introduction of Integrated Airspace and Procedures projects and Metroplex Optimization of Airspace and Procedures.
- Implementation and optimization of PBN procedures outside Metroplex and AMP efforts.

The remainder of this section lists the commitments, targets and proposals addressing Metroplex problems.

Legacy AMP Projects: The AMP legacy projects include projects started prior to the formation of the NOAC in August 2009: the NY/NJ/PHL Metropolitan Area Airspace Redesign, CAP, HAATS Airspace project, and the Las Vegas Optimization project. The majority of milestones in these projects should be completed by 2013, and all of them completed by 2015.

Metroplex Optimization of Airspace and Procedures: These efforts are a form of Integrated Airspace and Procedures projects, but with an expedited life-cycle of two to three years from planning to implementation. The focus of these efforts is on implementation of optimized PBN arrivals and departures and airspace changes to support optimal routings. This concept is based on a two-team approach:

- **Study Teams:** Provide a comprehensive but expeditious front-end strategic look at each major metroplex. The Study Teams will analyze the operational challenges and situations, assesses current/planned airspace and procedures efforts, explore new solution opportunities in a consistent manner, and provide recommendations to the FAA's collaborative decision process.
- **Design and Implementation Teams:** Provide a systematic, effective approach to the design, evaluation and implementation of PBN-optimized airspace and procedures. Using the results of the Study Teams, the Design and Implementation teams will execute the procedure optimization and Integrated Airspace and Procedures projects. The activity will cover a wide range of potential solutions and their execution time could be several months to over a year. Design and Implementation Teams will be responsible for the design, evaluation and implementation portions of these projects, including conducting all appropriate operational, safety and environmental analyses and assessments.

Each on-site Study Team will have access to a set of centralized analysis and expertise. The National Analysis Team will be focused on data analysis, modeling and evaluations supporting on-site teams. The Specialized Expertise Cadre will provide input in key areas such as airports, safety, environmental, policy, certification, standards, rulemaking and military issues.

In FY10, the initial set of Study Teams will be charged. Two prototype Study Teams will be started in FY10. These two initial teams, deployed in the Dallas-Fort Worth and DC metroplexes, will have two objectives, to conduct study reports and to continue the learning process. Lessons learned from the prototype Study Teams will form the foundation of the remaining efforts. In subsequent years, it is assumed that six to eight additional metroplexes

per year will undergo Study Teams. The first Design and Implementation Teams are expected to start in FY11. All major metroplexes are expected to be studied by the end of FY13, and a majority of Design and Implementation Teams are expected to be underway or completed by 2016.

The number of metroplexes that will be included in this effort is a subset of those identified in Figure 4. The order in which the metroplexes will be studied will be determined using an understandable and repeatable prioritization process, focusing on use of objective criteria, but including subjective considerations as appropriate. The objective criteria will include indicators and metrics describing operational need, metroplex connectivity, site readiness/potential, and other factors of interest. A wide range of FAA and industry input has been solicited for final determination of the prioritization criteria. The prioritization of metroplexes will be influenced by the priorities identified by industry in the Task Force 5 Final Report and by other FAA planning efforts such as the FACT. Future airport capacity planning and the Metroplex Optimization efforts are closely coupled. Going forward, Study Team recommendations will be incorporated into the next iteration of FACT. Similarly, any potential airspace and procedures optimization opportunities that are identified in FACT will be provided to the ongoing Study Teams for consideration.

The Metroplex Airspace and Procedures Optimization efforts will receive guidance and governance from two overarching FAA teams. Operational review and planning will be provided through the NOAC and the management structure that it reports through. Cross-agency coordination and collaboration will be provided by the Metroplex Core Team, consisting of representatives from FAA lines of business determined by the NextGen Management Board.

Integrated Airspace and Procedures Projects: While there are no officially chartered Integrated Airspace and Procedures Projects at this time, the initiatives started in 2010 in Denver are a best representation of what this type of effort will bring. The integrated RNAV SID/STAR implementation will include optimization and concurrent procedure development, two of the key characteristics of the Integrated Airspace and Procedures approach. The effort that was started in late January will target the removal of 6-8 level offs per RNAV STAR and increase terminal ingress and egress access. This will require complex negotiations with operators, and all levels of facilities. The Metroplex Team concept will be the main source for the initiation of Integrated Airspace and Procedures Projects. It is expected that the results of the FY10 and FY11 Metroplex Study Teams will translate into the start of three or more Integrated Airspace and Procedures Design and Implementation teams in FY11.

Other PBN Procedures: The National Airspace and Procedures Team (NAPT)⁷ maintains a list of all the PBN procedures scheduled for publication in the NAS. This list is used to manage and track the publication of new PBN procedures as well as amendments to existing procedures. Currently, the NAPT list includes procedures planned through 2012. Currently many of the NAPT list procedures are singular site procedures. For example, these PBN procedures address location-specific requirements stemming from safety concerns (e.g., conflict alerts), infrastructure constraints (e.g., terrain, runway closure, constructions and crane operations, runway ends not serviced by precision approach systems, etc.) and other needs that must be addressed in the immediate term. These legacy procedures also seek to add efficiency with new PBN procedures and to optimize existing initial capability PBN

⁷ The NAPT was established by Order 8260.43A Flight Procedures Management Program.



procedures. In the future, the percentage of procedures on the NAPT list associated with Integrated Airspace and Procedures projects and Metroplex Optimization of Airspace and Procedures efforts will increase.

Summary of Metroplex Milestones and Deliverables

Table 1 contains a summary of the major milestones. Additional details are included in Appendix A (legacy AMP projects) and Appendix B (NAPT procedures). For the PBN procedures shown in the table:

- Commitments are those procedures with chart dates on or before the second charting date in FY11 (procedures that are assumed to be funded with FY10 monies).
- Targets are those procedures with chart dates on or before the last charting date in calendar year (CY11) (procedures that are assumed to be funded with FY11 monies).
- Proposals are all other procedures included in the last NAPT list of February 2010.

Table 1. Metroplex Milestones.

	COMMITMENT	TARGET	PROPOSAL
NY/NJ/PHL Metropolitan Area Airspace Redesign		Stage 2A and 2B	Stage 3 Stage 4
Chicago Airspace Project		Stage 3	
HAATS Airspace	Stage 3C		
Las Vegas Optimization		EA completion Henderson procedures	Implementation
PBN: Major Metroplexes	57 PBN procedures	191 PBN procedures	37 PBN procedures
PBN: Other Areas	82 PBN procedures	178 PBN procedures	28 PBN procedures
Metroplex Study Teams	2 prototype teams	6-8 teams per year	
Metroplex Design and Implementation Teams for Integrated Airspace and Procedures		2-4 teams per year	

Cruise

The Cruise section of this plan addresses airspace and procedures supporting national cross-cutting operational issues. This includes the design and management of routes and structures, such high altitude performance-based routing and national airspace policies. The Cruise activities are primarily focused in the en route domain, but have strong interconnectivity with the terminal and oceanic operational environments.

The Task Force 5 Report identified several challenges in cruise operations. A summary of these issues include:

- Chronically congested or complex airspace
- Congestion created by a largely conventionally-based routing system that unnecessarily concentrates traffic flows over some waypoints

- Circuitous routings that increase flight times and miles flown resulting in inefficiencies and increased emissions
- Static airspace and manual procedures with an inability to adapt to rapidly changing conditions, including increased access to Special Activity Airspace (SAA)
- Inefficient information about changing airspace information, including availability of SAA

The Task Force 5 Report documented several recommendations to address Cruise problems, but identified two specific recommendations for airspace and procedures. To paraphrase, the Task Force recommended that the FAA:

- Implement an RNAV-based en route system, building structure only where it is needed and balancing flexibility and predictability.
- Implement real-time status and scheduling of SAA to increase awareness and predictability of SAA usage.



There are two specialized efforts to address these recommendations: High Altitude Airspace Performance-based Routing and the National Special Activity Airspace Project (NSAAP). The remainder of this section describes these two efforts and lists the commitments, targets and proposals addressing Cruise problems.

High Altitude Airspace Performance-based Routing: This effort reinitiates a national, top-down effort to redesign high altitude airspace and procedures, providing overarching connectivity between regional airspace and procedures efforts. The work is generated from a dissection of airspace concepts implemented under the High Altitude Redesign (HAR) project from 2003-2005. High Altitude Airspace Performance-based Routing covers two constructs: continued development and implementation of Q-routes as the national routing backbones and instantiation of the NRS as a key transitional element in NextGen evolution.

Special Activity Airspace: One of the key national airspace efforts is the development of the NSAAP. SAA is defined as any airspace with defined dimensions within the NAS wherein limitations may be imposed upon aircraft operations. SAA may be restricted areas, prohibited areas, military operations areas, air traffic control (ATC) assigned airspace, and any other designated airspace areas. The NSAAP is committed to developing increased cooperation and operational partnerships between the identified SAA Community of Interest (COI), which includes FAA and NAS customers, both civilian and Department of Defense (DoD). NSAAP has a diverse set of stakeholders and intersects with many NextGen efforts, including the Joint Planning and Development Office (JPDO).

Summary of Cruise Milestones and Deliverables

Table 2 contains a summary of the major milestones and additional details are included in Appendix C.

Table 2. Cruise Milestones.

	COMMITMENT	TARGET	PROPOSAL
Q-Routes		13 new routes	Additional routes to provide national coverage
Playbook Transition to PBN	New York Wind Route Options Playbook		Additional Playbook transitions
NSAAP	Operations Concept Functional Requirements		

Research and Transition Efforts

The activities described in this section include concept evaluation efforts, demonstrations, or research studies. These efforts are yet to be directly chartered as solution approaches to either Metroplex or Cruise problem areas, but have other associated decisions that will impact policies or processes governing airspace or procedure design. For this version of the *National Airspace and Procedures Plan*, concept exploration and demonstrations are discussed at a high-level and a listing of additional research activities is provided. Additional information on the research efforts are provided in other reference material.⁸ Also included in this section of the plan is a description of a subset emerging tools and capabilities that may have impacts on future airspace and procedures.

Concept Exploration Efforts: Air Traffic Organization (ATO) Planning has two major concepts concerning airspace and procedure evolution: High Density Integrated Arrival and Departure Operations and High Altitude Trajectory Based Airspace.

High Density Integrated Arrival and Departure Operations is a mid-term operational concept for super density integrated arrival/departure operations in major metropolitan areas. The concept calls for improving operational efficiencies in major metropolitan areas by expanding the lateral and vertical limits of arrival and departure airspace, including transition airspace. High Density Integrated Arrival and Departure Operations completed concept validation experiments and cost/benefit analyses in September 2007. Automation requirements, surveillance requirements, site selection analyses and safety studies started in FY08 and FY09. Results and associated executive level decisions are planned in FY10.

High Altitude Trajectory Based Airspace: This concept blends the principles of Ultra High Altitude Airspace with Trajectory Based Operations. A key enabling technology is Segment 2 Data Communications and two key principles are generic airspace and flexible airspace. High Altitude Trajectory Based Airspace is just entering the concept validation portion of the effort. Studies are underway in FY10 to understand the implications on airspace design, procedures, and human roles and responsibilities. Experimental design and factor analysis is planned for FY10 and experiments are planned for FY11.

⁸ Metron National Airspace and Procedures research descriptions and CAASD National Airspace and Procedures documentation.

Demonstrations and Trials: This section includes demonstrations or operational trials that support the future NextGen implementation.

There are several FAA sponsored NextGen demonstration projects, exploring many research elements related to future Integrated Airspace and Procedures efforts. Some of these topics include 3D RNAV/RNP with Required Time of Arrival and seamless integration of Unmanned Aircraft Systems/Remotely Piloted Aircraft into the NAS. One of the most relevant set of demonstrations involves International Air Traffic Interoperability and Oceanic Trajectory Based Operations. These demonstrations directly related to a number of PBN routing and procedures advancements including procedures developed under Atlantic Interoperability Initiative to Reduce Emissions (AIRE) and Asia and South Pacific Initiative to Reduce Emissions (ASPIRE).

There are also two externally sponsored demonstration efforts.

- Greener Skies over Seattle: Alaska Air Group, in partnership with the Port of Seattle and the Boeing Company is seeking to improve efficiency through shorter flight paths and reduced fuel burn; and to reduce the environmental impact of aircraft approaches at Seattle-Tacoma International Airport. Alaska Airlines has developed an initial design of RNAV and RNP OPDs and has completed one set of operational trials.
- Early RNP Adoption Project: Southwest Airlines has made a commitment to fully operate their fleet with RNP by the end of 2013. As part of that commitment, Southwest Airlines has invested in necessary equipage and pilot training efforts, and contracted for the third-party development of RNP procedures. The initial focus has been on the Dallas Love airport to Houston Hobby airport corridor with planned expansion throughout the Southwest Airlines system (64 airports in 8 regions).


The FAA is engaged at both the local and headquarters levels on these demonstration efforts. It is expected that the outcome of these efforts will have a direct impact on mid-term airspace and procedures efforts.

Research Efforts: JPDO's Dynamic Airspace Configuration (DAC) program is a collection of research efforts and concepts with the goal of enabling service providers to supply needed airspace capacity in the NAS. There are several research components in DAC:

- Generic Airspace targets resource flexibility by determining information needed to manage generic airspace and by prototyping automation to provide that needed information.
- Dynamic Airspace targets temporal flexibility. This research includes pre-coordinated dynamic airspace constructs such as airspace playbooks and dynamic airspace units.
- Restructured Airspace targets structural flexibility by exploring multiple classes of airspace operations including delegated separation, mixed operations, flow corridors, and dynamic Special Use Airspace

These research efforts target operational changes in the far-term NextGen timeframe, at the earliest 2019-2020. The results of this research will have a high level of relevance to future airspace and procedures efforts.





Emerging Capabilities: In the near- and mid-term timeframe, there are a number of emerging capabilities and technologies that will be implemented. It is expected that these capabilities may enable new airspace and procedural constructs, and may provide additional efficiencies to currently planned airspace and procedural enhancements. These capabilities reinforce basic infrastructure, enhance controller abilities to use new procedures, and encourage new concepts in airspace management. The *NextGen Implementation Plan*, the *NAS Enterprise Architecture Infrastructure Roadmaps* and other resources provide a comprehensive listing of tools and associated detailed descriptions.

Summary

The *National Airspace and Procedures Plan* provides a descriptive outline for the evolution of performance-based airspace, concentrating on domestic terminal and en route domains. The plan presents a depiction of the major airspace and procedures efforts, categorized based on the progress of each effort. By examining efforts in three categories, this version of the plan presents an accurate rendering of the ongoing airspace projects and PBN procedure development efforts, and provides a glimpse into the future of Integrated Airspace and Procedure projects. Later versions of the plan will include additional information about oceanic airspace, international harmonization efforts, and outyear planning through the full NextGen implementation time.

Appendix A Legacy Airspace Management Program Projects and 2009 Airspace Reviews

The *National Airspace and Procedures Plan* is built on a foundation of many years of experience in airspace and procedures design, development, and implementation. In the mid 1990s, as part of the reorganization of the Air Traffic Headquarters and Regional offices, a national airspace review effort was initiated. Upon completion of that activity, the National Airspace Redesign (NAR) was created in 1998. NAR was the Federal Aviation Administration (FAA) initiative to review, redesign, and restructure the nation's airspace. NAR included domestic and oceanic airspace, and addressed operational problems from small regional optimizations to large-scale high altitude redesign. In mid 2005, based on FAA organization changes and in response to a series of recommendations from the Department of Transportation's Inspector General, the FAA re-scoped and restructured NAR into the Airspace Management Program (AMP). Smaller and redefined, AMP has focused on completing the highest priority legacy NAR projects. Between 1998 and 2008, NAR and AMP completed approximately four dozen full or partial airspace projects, which have produced savings of over \$700M in direct operating costs to the aviation community.

The AMP legacy projects include projects started prior to the formation of the National Operational Airspace Council in August 2009. These projects are the New York/New Jersey/Philadelphia (NY/NJ/PHL) Metropolitan Area Airspace Redesign, the Chicago Airspace Project (CAP), the Houston Area Air Traffic System (HAATS) Airspace project, and the Western Corridor Southern Nevada Airspace project.

NY/NJ/PHL Metropolitan Area Airspace Redesign: This project was started in 1998 and encompasses a complete redesign of the airspace in the New York and Philadelphia metropolitan areas. The project capitalizes on Performance-Based Navigation (PBN), higher downwind segments for arrival aircraft, unrestricted departure climbs, fanned departure headings, and holding in terminal airspace. The purpose of the project is to increase efficiency and reliability of the airspace structure and Air Traffic Control (ATC) system to accommodate growth while enhancing safety, reducing delay and taking advantage of new technologies. There were four alternatives in the New York/New Jersey/Philadelphia Metropolitan Area Airspace Redesign: Future No Action, Modifications of Existing Airspace, Ocean Routing, and Integrated Airspace. The Integrated Airspace alternative was being examined with and without an associated facility. The alternatives addressed the baseline requirements of the National Environmental Policy Act (NEPA), the recommendations from the aviation community, and the input from the local communities gained during the environmental scoping process.

In September 2007, after an extensive environmental review process, the FAA signed a Record of Decision (ROD) selecting the Integrated Airspace alternative with the Integrated Control Complex with Noise Mitigation Strategy. The implementation phase of the project was started in December 2007 with initial fanned headings at Newark Liberty International Airport and Philadelphia International Airport. Implementation is segmented into four stages:

- Stage 1 includes procedural changes within the project's core facilities.
- Stage 2 concentrates on the Westgate departures. Stage 2 has two sub-stages, 2A focused on New York changes and 2B focused on Philadelphia changes.
- Stage 3 focuses on Northgate departures.
- Stage 4 completes the project with full integration of the airspace.

Each stage projected to overlap and take 12-18 months to complete. When implementation is completed, a 20% reduction in delay (compared to the No Action alternative) resulting in \$300M of direct operating cost savings is expected, as is a net reduction in noise levels for over 600,000 residents.

Upcoming milestones for the NY/NJ/PHL Metropolitan Area Airspace Redesign:

- Stage 2A and 2B implementation – Mid/Late 2011 (target)
- Stage 3 implementation – Late 2011 (proposal)
- Stage 4 implementation – Late 2012 (proposal)

Chicago Airspace Project: CAP was originally part of the Great Lakes Corridor project chartered in 1999. In its initial state, the project had several new departure routes planned (east, west and south) and proposed a doubling of the en route departure capacity. In 2001, when the O'Hare Modernization Project (OMP) was initiated, CAP expanded to include the need for new airspace to support the planned new runways and associated triple arrivals. CAP now includes three stages:

- Stage 1 East Enhancements: Two additional departure routes to the east (new total of four). Stage 1 was completed in March 2007.
- Stage 2 South Enhancements: Two additional departure routes to the south (new total of five), and High and Wide arrival procedures for ORD west flow (supporting the first OMP runway). Stage 2 was completed in November 2008.
- Stage 3 West Enhancements: Two additional departure routes to the west (new total of four), and High and Wide arrival procedures for ORD east flow (supporting the second OMP runway)

Benefits analysis indicates that the CAP airspace changes will provide a 10% reduction in delay in the east flow and a 20% reduction in the west flow (in terms of weighted arrival and departure delays). The addition of new runways under the OMP, in combination with the airspace changes, will enable triple simultaneous approaches capable of supporting balanced departure and arrival capacity during all weather conditions. The combination of the CAP airspace changes and the OMP airfield changes will produce a 66% decrease in average annual delays.

Upcoming milestone for CAP:

- Stage 3 implementation – Late 2012/Early 2013 (coincident with OMP Runway 10C/28C completion) (target)

HAATS Airspace Project: The project was originally chartered in 2000 as the Houston Gulf Coast Airspace Project and renamed to align with associated infrastructure efforts. The HAATS Airspace Project will revamp Houston terminal and surrounding en route airspace. The objectives of this project are to accommodate growth and airport expansion, increase efficiencies in managing the co-mingled DFW, DAL, IAH, and HOU flows, and to address the growth in traffic and leverage enhancements over the Gulf of Mexico. The project has three phases:

- Phase 1 incorporated changes that could be implemented prior to major infrastructure enhancement and was completed with the opening of IAH 15R in 2002.
- Phase 2 included changes required to service the new IAH Runway 08L/26R complex including triple approaches, and was completed in 2004.

- Phase 3 will be implemented over a three-year period and includes three sub-phases. Phase 3A (completed in June 2008) included an additional departure route to the northeast and associated airspace realignment and new sectors. Phase 3B (completed in March 2009) included an additional eastbound departure route and expanded airspace to the east by consolidating Beaumont TRACON (BPT) into Houston TRACON (I90). Phase 3C includes an additional westbound departure route and expands airspace to the west by establishing College Station approach control services at I90. Initial Phase 3C routing and procedural changes were implemented in July 2010. Airspace changes are planned for September 2010.

Customer benefits of \$4M-\$11M annually from additional arrival and departure airspace throughput are expected once the project is completed. There is an overall reduction in system delay in both years studied for the HAATS Enterprise Architecture. If no HAATS airspace improvements were implemented, delays would increase by roughly 50 percent between 2006 and 2015.

Upcoming milestone for the HAATS Airspace Project:

- Stage 3C completion – September 2010 (commitment)

Las Vegas Optimization Project: This airspace project is a result of airspace redesign work that was started in April 2008. In 2005 the Clark County Department of Aviation (CCDOA) announced plans for the Southern Nevada Supplemental Airport (SNSA) project to develop a new airport in the Ivanpah Valley to provide supplemental commercial service for Las Vegas and the surrounding area. In early 2008, Air Traffic began an airspace design process that would cover all feasible runway construction options, as determined by FAA's Airports Organization, and incorporated existing concepts/ideas to address the operational problems in the Las Vegas metropolitan area as an optimization alternative without any airfield construction. However, in June 2010 as a result of the national economic downturn, CCDOA announced a suspension of the Environmental Impact Statement (EIS) for SNSA and resulting delay to airfield effort. CCDOA and operational stakeholders stated that there was a strong need to provide interim operational enhancements for the Las Vegas aviation community, even with the suspension of the new airport. In verifying the need for interim airspace changes, FAA leadership sanctioned an independent airspace effort that will provide near-term modification of airspace and procedures supporting the Las Vegas Valley. This effort, named the Las Vegas Optimization project, is developing new departure and arrival routes and realigning airspace to increase efficiency at McCarran International Airport and surrounding satellite airports.

The proposed Las Vegas Optimization changes are expected to provide an overall positive impact. Initial modeling results indicate improvements in fuel efficiency and an overall decrease in flying miles

Upcoming milestones for the Las Vegas Optimization project:

- Las Vegas Optimization EA completion – Late 2011 (target)
- Henderson procedure optimization – June 2011 (target)
- Las Vegas Optimization implementation – 2013 (target)

Initial Airspace Evaluations: An initial airspace evaluation is the preliminary study that is carried out to characterize any operational issues or problems and result in an initial assessment of the airspace.¹ The initial evaluation is conducted to inform the second key decision point, to assess if an airspace study could assist in mitigating any identified problems and indicate whether a solution can be reached that is cost beneficial. The primary goals of an initial airspace review are to:

- Identify specific airspace issues that negatively impact operational performance
- Apply analysis tools and standardized metrics to the extent practical in order to validate and quantify identified issues
- Provide recommendations on whether further study is needed in order to develop and analyze mitigation alternatives

In 2009, airspace reviews were undertaken concerning the airspace serving Denver, Southern California, and North Texas (primarily the Dallas/Fort Worth metropolitan area). The review of Denver and Southern California were started in April 2009 and the report was delivered to the FAA in September 2009. The review of North Texas was started in September 2009 and the report was delivered to the FAA in May 2010. In summary, the reports cited:

- Southern California: Three primary problem areas were identified. Route inefficiencies included increased route lengths, flow interdependencies, and complex vertical interactions. Multi-function sectors caused added miles-in-trail, speed and altitude restrictions. Constrained airspace due to high proportions of special activity airspace limited flexibility and efficiency.
- Denver: Of the operational problem areas identified in the Denver metropolitan area, five showed direct relationship to airspace solution options. More efficient airspace is needed to deliver aircraft through the terminal airspace and to make more efficient use of Standard Terminal Arrivals (STARs) and altitudes.
- North Texas: Of the almost 20 operational problems identified in the North Texas area, 12 showed a direct relationship to airspace solution options. Routing efficiencies (shorter and more efficient profiles), limited flexibility, and corner-post capacity balancing issues could be addressed with better airspace and procedures.

¹ Airspace Management Handbook, 2005 Edition.

Appendix B PBN Procedures and Routes

In the late 1990s, in concert with the national focus on airspace design, efforts were directed on development of a national program office that would advance area navigation (RNAV) procedures. Aviation stakeholders invested in RNAV capabilities, a technology available since the 1970s, but until the formation of the RNAV Program Office, very few procedures were actually available for use. In the first decade of its existence, the national office, along with its sister offices in the FAA, made significant advances¹ in criteria, standards and tools supporting PBN capabilities, including RNAV Standard Instrument Departures (SIDs), RNAV STARs, RNAV Routes (e.g., Q-routes and T-routes) and Required Navigation Performance (RNP) Authorization Required (AR) procedures. In 2003, and again in 2006, the FAA published the Roadmap for Performance-Based Navigation, outlining the high-level plan for RNAV and RNP evolution in the NAS.² Hundreds of procedures and routes have been implemented as part of the Roadmap for Performance-Based Navigation and have provided significant safety and efficiency benefits. For example, RNAV departure procedures in Atlanta alone have produced an estimated \$105M savings in operator benefits. Furthermore, commitments outlined in the Roadmap for Performance-Based Navigation have been incorporated in the NextGen Implementation Plan.

RNAV and RNP commitments are captured in the proceedings of the National Airspace and Procedures Team (NAPT). In 2010, the annual procedure development goals are 50 RNAV SID/STAR procedures and 50 RNP AR approach procedures. In order to meet this production demand, a list of industry and FAA requests has been compiled. These requests are coordinated with Flight Standards and AeroNav Services and are reviewed to determine the relative importance of requests by applying a set of priority guidelines.³ Priorities may be adjusted when justified to accommodate an urgent or safety related requirement or national initiative. The NAPT PBN production list⁴ is included in Table B-1.

¹ Appendix D contains a full list of orders, etc.

² The PBN Roadmap last published in 2006 has since been incorporated into the NAS Enterprise Architecture Airspace and Procedures Roadmap..

³ Ten priority levels of priority used by core Regional Airspace and Procedures Team (RAPT) members.

⁴ Based on July 2010 NAPT List and FY10 RNAV/RNP Work Plan.

Table B-1. NAPT Production List

AIRPORT NAMES	STATE	PROCEDURE NAME	CHART DATE
Albany (KALB)	NY	RNAV (RNP) RWY 1, ORIG	8/25/2011
Albuquerque International (KABQ)	NM	COLTR 1 (RNAV STAR)	8/25/2011
		ENCIA 1 (RNAV STAR)	8/25/2011
		KRKEE 1 (RNAV STAR)	8/25/2011
		LOWBO 1 (RNAV STAR)	8/25/2011
		SNDIA 1 (RNAV STAR)	8/25/2011
		ADYOS 1 (RNAV SID)	8/25/2011
		ATOMK 1 (RNAV SID)	8/25/2011
		BOSQE 1 (RNAV SID)	8/25/2011
		FYSTA 1 (RNAV SID)	8/25/2011
		GRIZZ 1 (RNAV SID)	8/25/2011
		MNZNO 1 (RNAV SID)	8/25/2011
RDRNR 1 (RNAV SID)	8/25/2011		
Anchorage (PANC)	AK	MCKNZ 1 (RNAV SID)	7/29/2010
		SNDLK 1 (RNAV SID)	7/29/2010
		TERYT 1 (RNAV SID)	7/29/2010
		TLEFT 1 (RNAV SID)	7/29/2010
		WNFRM 1 (RNAV SID)	7/29/2010
		KROTO 1 (RNAV STAR)	7/29/2010
		OTTRR 1 (RNAV STAR)	7/29/2010
		PORTJ 1 (RNAV STAR)	7/29/2010
		TYOWN 1 (RNAV STAR)	7/29/2010
		NEELL 1 (RNAV STAR)	7/29/2010
		GASTO 3 (RNAV STAR)	6/30/2011
		KELYE 2 (RNAV STAR)	6/30/2011
MUDIE 2 (RNAV STAR)	6/30/2011		
Aspen-Pitkin Co (KASE)	CO	PITKN 2 (RNAV SID)	11/18/2010
Atka (PAAK)	AK	INOTY 1 (RNAV SID)	7/29/2010
		HIMKI 1 (RNAV SID)	7/29/2010

AIRPORT NAMES	STATE	PROCEDURE NAME	CHART DATE
Atlanta Hartsfield International (KATL)	GA	JRAMS 1 (RNAV STAR)	7/29/2010
		UGAAA 3 (RNAV SID)	3/10/2011
		NUGGT 5 (RNAV SID)	3/10/2011
		RMBLN 6 (RNAV SID)	3/10/2011
		THRSR 6 (RNAV SID)	3/10/2011
		NOVSS 4 (RNAV SID)	3/10/2011
		MUNSN 5 (RNAV SID)	3/10/2011
		PNUTT 6 (RNAV SID)	3/10/2011
		JOGOR 4 (RNAV SID)	3/10/2011
		CADIT 6 (RNAV SID)	3/10/2011
		JCKTS 6 (RNAV SID)	3/10/2011
		COKEM 5 (RNAV SID)	3/10/2011
		GEETK 6 (RNAV SID)	3/10/2011
		SUMMT 5 (RNAV SID)	3/10/2011
		BRAVS 6 (RNAV SID)	3/10/2011
		DOOLY 5 (RNAV SID)	3/10/2011
		DAWGS 5 (RNAV SID)	3/10/2011
		DIRTY 1 (RNAV STAR)	12/31/2020
NOTRE 1 (RNAV STAR)	12/31/2020		
Atlantic City International (KACY)	NJ	RNAV (RNP) Z RWY 13, ORIG	9/23/2010
		RNAV (RNP) Z RWY 31, ORIG	9/23/2010
Aurora State (KUAO)	OR	TBD 1 (RNAV SID)	3/10/2011
		TBD 1 (RNAV SID)	3/10/2011
		TBD 1 (RNAV SID)	3/10/2011
Austin-Bergstrom International (KAUS)	TX	BEVOH 1 (RNAV SID)	9/23/2010
		WLEEE 1 (RNAV STAR)	9/23/2010
Baltimore International (KBWI)	MD	TERPZ 2 (RNAV SID)	9/23/2010
		RNAV (RNP) Z RWY 10, AMDT 1	5/5/2011
		RNAV (RNP) Z RWY 15R, AMDT 1	5/5/2011
		RNAV (RNP) Z RWY 28, AMDT 1	5/5/2011
		RNAV (RNP) Z RWY 33L, AMDT 1	5/5/2011
		SWICH 1 (RNAV STAR)	5/5/2011
SEVRN 1 (RNAV SID)	12/31/2020		
Bellingham (BLI)	WA	MADEE 1 (RNAV STAR)	11/18/2010
Birmingham International (KBHM)	AL	RNAV (RNP) Z RWY 24, ORIG	9/23/2010
		RNAV (RNP) Z RWY 6, ORIG	9/23/2010
		CRIMSON 1 (RNAV STAR)	12/15/2011
		CHOOK 1 (RNAV STAR)	12/15/2011
		WENDO 1 (RNAV STAR)	12/15/2011
		KYLEE 1 (RNAV STAR)	12/15/2011
		BOUNT 1 (RNAV SID)	12/15/2011
		FIBER 1 (RNAV SID)	12/15/2011
		GUMPY 1 (RNAV SID)	12/15/2011
		TALLEDEGA 1 (RNAV SID)	12/15/2011
Bob Hope (KBUR)	CA	RNAV (RNP) RWY 15, ORIG	3/10/2011
		RNAV (RNP) RWY 26, ORIG	3/10/2011
		RNAV (RNP) RWY 33, ORIG	3/10/2011
		RNAV (RNP) Z RWY 8, AMDT 1	3/10/2011
		JANNY 1 (RNAV STAR)	6/30/2011
		FLMOR 1 (RNAV STAR)	6/30/2011

AIRPORT NAMES	STATE	PROCEDURE NAME	CHART DATE
Boca Raton (KBCT)	FL	RNAV (RNP) RWY 5, ORIG	5/31/2012
		RNAV (RNP) RWY 23, ORIG	5/31/2012
Boundary County (K65S)	ID	KARPS 1 (RNAV SID)	7/29/2010
Bradley International, Windsor-Locks (KBDL)	CT	RNAV (RNP) RWY 6, ORIG	8/25/2011
		RNAV (RNP) RWY 24, ORIG	8/25/2011
		RNAV (RNP) RWY 33, ORIG	8/25/2011
Carlsbad - McClellan (KCRQ)	CA	RNAV (RNP) Z RWY 24, ORIG	3/10/2011
Carson City (KCXP)	NV	JIMPA 2 (RNAV SID)	9/23/2010
Centennial (KAPA)	CO	RNAV (RNP) RWY 17R, ORIG	12/31/2020
		RNAV (RNP) RWY 35L, ORIG	12/31/2020
		RNAV (RNP) RWY 17L, ORIG	12/31/2020
		RNAV (RNP) RWY 28, ORIG	12/31/2020
		RNAV (RNP) RWY 35R, ORIG	12/31/2020
Charleston AFB/ International (KCHS)	SC	LGRHD 1 (RNAV SID)	10/20/2011
		MLTRE 1 (RNAV SID)	10/20/2011
		PLFMD 1 (RNAV SID)	10/20/2011
		PLMTO 1 (RNAV SID)	10/20/2011
		SWPFX 1 (RNAV SID)	10/20/2011
		AMYLU 1 (RNAV STAR)	10/20/2011
		BAGGY 1 (RNAV STAR)	10/20/2011
		MKNZI 1 (RNAV STAR)	10/20/2011
		OSPRI 1 (RNAV STAR)	10/20/2011
Charleston Executive (KJZI)	SC	MILTRE 1 (RNAV SID)	10/20/2011
		SWPFX 1 (RNAV SID)	10/20/2011
Charlotte/Douglas International (KCLT)	NC	SUDSY 4 (RNAV STAR)	11/15/2012
Chicago Executive Airport (KPWK)	IL	RNAV (RNP) RWY 16, ORIG	8/25/2011
Chicago Midway International (KMDW)	IL	RNAV (RNP) Y RWY 22L, ORIG	TBD
Cincinnati (KCVG)	KY	LOVEY 4 (RNAV SID)	9/23/2010
		BNGLE 3 (RNAV SID)	11/15/2012
		HAGOL 3 (RNAV SID)	11/15/2012
		KENLN 3 (RNAV SID)	11/15/2012
City of Colorado Springs Municipal (KCOS)	CO	RNAV (RNP) Z RWY 17L, ORIG	9/23/2010
		RNAV (RNP) Z RWY 17R, ORIG	9/23/2010
		RNAV (RNP) Z RWY 35L, ORIG	9/23/2010
		RNAV (RNP) Z RWY 35R, ORIG	9/23/2010
		OZZZY 1 (RNAV STAR)	2/9/2012
Cleveland-Hopkins International (KCLE)	OH	ALPHE 2 (RNAV SID)	11/18/2010
Corpus Christi International (KCRP)	TX	RNAV (RNP) Z RWY 13, ORIG	9/23/2010
		RNAV (RNP) Z RWY 31, ORIG	9/23/2010
		RNAV (RNP) Z RWY 35, ORIG	9/23/2010
Dallas-Ft Worth International (KDFW)	TX	RNAV (RNP) Z RWY 13R, AMDT 1	1/10/2013
		RNAV (RNP) Z RWY 31L, AMDT 1	1/10/2013
		RNAV (RNP) Z RWY 31R, AMDT 1	1/10/2013
Dekalb-Peachtree (KPDK)	GA	RNAV (RNP) RWY 02R	TBD

AIRPORT NAMES	STATE	PROCEDURE NAME	CHART DATE
Denver International (KDEN)	CO	EEONS 1 (RNAV SID)	2/9/2012
		EMMYS 1 (RNAV SID)	2/9/2012
		EXTAN 1 (RNAV SID)	2/9/2012
		EPKEE 1 (RNAV SID)	2/9/2012
		GYPSM 1 (RNAV STAR)	2/9/2012
		TELLR 1 (RNAV STAR)	2/9/2012
Detroit Metropolitan Wayne County (KDTW)	MI	RNAV (RNP) RWY 03R, ORIG	5/5/2011
		RNAV (RNP) RWY 04L, ORIG	5/5/2011
		RNAV (RNP) RWY 04R, ORIG	5/5/2011
		RNAV (RNP) RWY 21L, ORIG	5/5/2011
		RNAV (RNP) RWY 22L, ORIG	5/5/2011
		RNAV (RNP) RWY 22R, ORIG	5/5/2011
		RNAV (RNP) RWY 27L, ORIG	5/5/2011
		RNAV (RNP) RWY 27R, ORIG	5/5/2011
Driggs-Reed Mem (KDIJ)	ID	LAMON 3 (RNAV SID)	5/5/2011
Eagle County (KEGE)	CO	RNAV (RNP) RWY 25, ORIG+	1/13/2011
Eastern Sierra Regional (KBIH)	CA	RNAV (RNP) RWY 30, AMDT 1	8/25/2011
El Paso International (KELP)	TX	BEARH 1 (RNAV STAR)	8/25/2011
		HSKNS 1 (RNAV STAR)	8/25/2011
		MOLLY 1 (RNAV STAR)	8/25/2011
		SAMMR 1 (RNAV STAR)	8/25/2011
		ATKIN 1 (RNAV SID)	8/25/2011
		JCOXX 1 (RNAV SID)	8/25/2011
		BUSEY 1 (RNAV SID)	8/25/2011
		LATVE 1 (RNAV SID)	8/25/2011
		NEVUE 1 (RNAV SID)	8/25/2011
Eugene - Mahlon Sweet Field (KEUG)	OR	RNAV (RNP) Z RWY 16L, ORIG	5/5/2011
		RNAV (RNP) Z RWY 16R, ORIG	5/5/2011
		RNAV (RNP) Z RWY 34L, ORIG	5/5/2011
		RNAV (RNP) Z RWY 34R, ORIG	5/5/2011
Fairbanks International (PAFA)	AK	CILAX 1 (RNAV STAR)	3/10/2011
		ELACA 1 (RNAV STAR)	3/10/2011
		BIMVE 1 (RNAV SID)	3/10/2011
		CACHE 1 (RNAV SID)	3/10/2011
		RNAV (RNP) Z RWY 2L, ORIG	8/25/2011
		RNAV (RNP) Z RWY 20R, ORIG	8/25/2011
Falcon Field (KFFZ)	AZ	MESA 1 (RNAV SID)	7/29/2010
		SACAT 1 (RNAV SID)	7/29/2010
Farmingdale/Republic Airport (KFRG)	NY	RNAV (RNP) RWY 14, ORIG	6/30/2011
		RNAV (RNP) RWY 32, ORIG	6/30/2011
Forrest Shermard Field (KNPA)	FL	TBD 1 (RNAV SID)	4/5/2012
		TBD 1 (RNAV SID)	4/5/2012
		TBD 1 (RNAV STAR)	4/5/2012
		TBD 1 (RNAV STAR)	4/5/2012
Gallatin Field (KBZN)	MT	RNAV (RNP) Z RWY 12, ORIG	7/29/2010
		RNAV (RNP) RWY 30, ORIG	7/29/2010

AIRPORT NAMES	STATE	PROCEDURE NAME	CHART DATE
Garfield County Regional (KRIL)	CO	EDUKY 3 (RNAV SID)	11/18/2010
		SQUAT 3 (RNAV SID)	11/18/2010
		UYRIG 2 (RNAV SID)	11/18/2010
		RNAV (RNP) Y RWY 26, AMDT 1	11/18/2010
		RNAV (RNP) Z RWY 26, AMDT 1	11/18/2010
		RNAV (RNP) Z RWY 8, AMDT 1	11/18/2010
George Bush Intercontinental (KIAH)	TX	WALIN 1 (RNAV SID)	7/29/2010
		GUSTI 2 (RNAV SID)	7/29/2010
		SABINE PASS 2 (RNAV SID)	7/29/2010
		AGGEE 2 (RNAV STAR)	7/29/2010
		DYNMO 1 (RNAV STAR)	7/29/2010
		HAMMU 1 (RNAV STAR)	7/29/2010
		KABOY 2 (RNAV STAR)	7/29/2010
		BAZBL 1 (RNAV STAR)	7/29/2010
		BOWFN 1 (RNAV SID)	9/23/2010
		ROKIT 2 (RNAV STAR)	11/18/2010
		TXMEX 2 (RNAV STAR)	11/18/2010
		RNAV (RNP) RWY 9	TBD
		RNAV (RNP) RWY 33	TBD
		RNAV (RNP) RWY 26L	TBD
		RNAV (RNP) RWY 26R	TBD
		RNAV (RNP) RWY 8R	TBD
		RNAV (RNP) RWY 8L	TBD
RNAV (RNP) RWY 27	TBD		
RNAV (RNP) RWY 15R	TBD		
Grand Junction (KGJT)	CO	RNAV (RNP) RWY 11, ORIG	5/5/2011
Great Falls International (GTF)	MT	RNAV (RNP) RWY 16, ORIG	5/5/2011
		RNAV (RNP) RWY 21, ORIG	5/5/2011
		RNAV (RNP) RWY 3, ORIG	5/5/2011
		RNAV (RNP) RWY 34, ORIG	5/5/2011
Greenee County (KCFT)	AZ	SAN SIMON 1 (RNAV SID)	7/29/2010
Greer (KGSP)	SC	UNMAN 1 (RNAV STAR)	7/29/2010
		WHTTL 1 (RNAV STAR)	7/29/2010
Gunnison/Butte Regional (KGUC)	CO	RNAV (RNP) RWY 24, ORIG	9/23/2010
Hana (PHHN)	HI	LINDBERG 2 (RNAV SID)	3/10/2011
Heber City (K36U)	UT	COOLI 2 (RNAV SID)	9/23/2010
		RNAV (RNP) Z RWY 3, ORIG	6/30/2011
Henderson Executive (KHND)	NV	RNAV (RNP) RWY 17R, ORIG	1/13/2011
		RNAV (RNP) RWY 35L, ORIG	1/13/2011
		CHIPZ 1 (RNAV SID)	6/30/2011
		FLAMZ 1 (RNAV SID)	6/30/2011
		JAPRI 1 (RNAV SID)	6/30/2011
		LIDDL 1 (RNAV SID)	6/30/2011
		PALLY 1 (RNAV SID)	6/30/2011
		BOZER 1 (RNAV STAR)	6/30/2011
		DUBRE 1 (RNAV STAR)	6/30/2011
		HABEN 1 (RNAV STAR)	6/30/2011
RHIKI 1 (RNAV STAR)	6/30/2011		
Hobby (KHOU)	TX	STROS 1 (RNAV STAR)	7/29/2010
		COACH 1 (RNAV STAR)	7/29/2010

AIRPORT NAMES	STATE	PROCEDURE NAME	CHART DATE
Honolulu International (PHNL)	HI	HAABR 1 (RNAV STAR)	11/18/2010
		FRTZI 1 (RNAV STAR)	3/10/2011
		RNAV (RNP) RWY 26L, AMDT 1	3/10/2011
		RNAV (RNP) Z RWY 4R, AMDT 1	3/10/2011
		RNAV (RNP) Z RWY 8L, AMDT 1	3/10/2011
Idaho Falls Regional (KIDA)	ID	RNAV (RNP) Z RWY 2, ORIG	9/23/2010
		RNAV (RNP) Z RWY 20, ORIG	9/23/2010
Jackson Hole (KJAC)	WY	RNAV (RNP) Y RWY 1, AMDT 1	10/20/2011
		RNAV (RNP) Z RWY 1, AMDT 1	10/20/2011
		RNAV (RNP) Z RWY 19, AMDT 1	10/20/2011
Jackson-Evers International (KJAN)	MS	RNAV (RNP) RWY 16L, ORIG	8/25/2011
		RNAV (RNP) RWY 34L, ORIG	8/25/2011
		RNAV (RNP) RWY 34R, ORIG	8/25/2011
Jacksonville International (KJAX)	FL	DUNTE 1 (RNAV STAR)	12/15/2011
		MULET 1 (RNAV STAR)	12/15/2011
		LUNNI 1 (RNAV STAR)	12/15/2011
		OHDEA 1 (RNAV STAR)	12/15/2011
		HOTAR 1 (RNAV STAR)	12/15/2011
		TEBOW 1 (RNAV STAR)	12/15/2011
		KRISO 1 (RNAV SID)	12/15/2011
		JETIN 1 (RNAV SID)	12/15/2011
		TRBRO 1 (RNAV SID)	12/15/2011
		WYTOK 1 (RNAV SID)	12/15/2011
		RNAV (RNP) Y RWY 25, ORIG	12/15/2011
		RNAV (RNP) Y RWY 13, ORIG	12/15/2011
		RNAV (RNP) Y RWY 7, ORIG	12/15/2011
John F Kennedy International (KJFK)	NY	RNAV (RNP) Z RWY 31L, AMDT 1	1/13/2011
		SCUBI 1 (RNAV STAR)	5/5/2011
		SKORR 3 (RNAV SID)	5/5/2011
		SCUBBY 1 (RNAV SID)	5/5/2011
		TBD 1 (RNAV SID)	5/5/2011
		TBD 1 (RNAV SID)	5/5/2011
		WRAPP 1 (RNAV SID)	5/5/2011
		SID RWY 31 (RNAV SID)	5/5/2011
John Wayne-Orange County ((KSNA)	CA	RNAV (RNP) RWY 19R, ORIG	3/10/2011
Juneau (PAJN)	AK	ALSEK 3 (RNAV SID)	6/27/2013
		CINGA 4 (RNAV SID)	6/27/2013
		ROVZU 3 (RNAV SID)	6/27/2013
Kahului (PHOG)	HI	RNAV (RNP) RWY 2, ORIG	3/10/2011
		HAIKU 1 (RNAV STAR)	3/10/2011
Klawock (PAKW)	AK	TURTY 1 (RNAV SID)	9/23/2010
Kona International (PHKO)	HI	KAIKO 1 (RNAV STAR)	3/10/2011
		RNAV (RNP) RWY 17, ORIG	3/10/2011
La Guardia (KLGA)	NY	NTHNS 2 (RNAV SID)	5/5/2011
		TREEO 2 (RNAV SID)	5/5/2011
		GLDMN 2 (RNAV SID)	5/5/2011
		TBD 1 (RNAV SID)	5/5/2011
		TBD 1 (RNAV SID)	5/5/2011
		TBD 1 (RNAV SID)	5/5/2011
		BASYE 1 (RNAV STAR)	12/31/2020

AIRPORT NAMES	STATE	PROCEDURE NAME	CHART DATE
Logan International (KBOS)	MA	LBSTA 2 (RNAV SID)	11/18/2010
		BRUWN 2 (RNAV SID)	11/18/2010
		CELTK 2 (RNAV SID)	11/18/2010
		HYLND 2 (RNAV SID)	11/18/2010
		SSOXS 2 (RNAV SID)	11/18/2010
		REVER 1 (RNAV STAR)	3/10/2011
		BRADY 1 (RNAV STAR)	3/10/2011
		TEDDY 1 (RNAV STAR)	3/10/2011
		DREEM 1 (RNAV STAR)	3/10/2011
		PATSS 2 (RNAV SID)	3/10/2011
		REVSS 1 (RNAV SID)	3/10/2011
		RNAV (RNP) Z RWY 4R, ORIG	10/20/2011
Long Beach/Daugherty Field (KLGB)	CA	RNAV (RNP) RWY 12, AMDT 1	1/13/2011
		RNAV (RNP) Y RWY 30, AMDT 1	1/13/2011
Los Angeles International (KLAX)	CA	BUFIE 1 (RNAV STAR)	1/13/2011
		RNAV (RNP) Z RWY 25L, AMDT 1	5/5/2011
		RNAV (RNP) Z RWY 25R, AMDT 1	5/5/2011
Louis Armstrong International (KMSY)	LA	RNAV (RNP) Z RWY 10, ORIG	9/23/2010
		RNAV (RNP) Z RWY 19, ORIG	9/23/2010
		RNAV (RNP) Z RWY 28, ORIG	9/23/2010
Louisville International (KSDL)	KY	DAMEN 1 (RNAV STAR)	12/15/2011
		EMAUS 1 (RNAV STAR)	12/15/2011
		FRIZN 1 (RNAV STAR)	12/15/2011
		MAUDD 1 (RNAV STAR)	12/15/2011
		NERVE 1 (RNAV STAR)	12/15/2011
		SACKO 1 (RNAV STAR)	12/15/2011
		TUPAY 1 (RNAV STAR)	12/15/2011
		APALO 1 (RNAV SID)	12/15/2011
		FEDRA 1 (RNAV SID)	12/15/2011
		MYSTIC 1 (RNAV SID)	12/15/2011
STREP 1 (RNAV SID)	12/15/2011		
Lubbock Preston Smith International (KLBB)	TX	RNAV (RNP) RWY 17R, ORIG	9/23/2010
		RNAV (RNP) RWY 35L, ORIG	9/23/2010
Luis Munoz Marin International (TJSJ)	PR	CHAKA 2 (RNAV STAR)	9/23/2010
		TROCO 2 (RNAV STAR)	9/23/2010
		BEANO 2 (RNAV STAR)	9/23/2010
		JOSHE 2 (RNAV STAR)	9/23/2010
		SAALR 2 (RNAV STAR)	9/23/2010
Marshall Don Hunter (PADM)	AK	BIBNE 2 (RNAV SID)	7/29/2010
McCarley Field (KU02)	ID	IDAHO FALLS 2 (RNAV SID)	1/13/2011
		POCATELLO 2 (RNAV SID)	1/13/2011

AIRPORT NAMES	STATE	PROCEDURE NAME	CHART DATE
McCarran International (KLAS)	NV	BOACH 3 (RNAV SID)	7/29/2010
		COWBY 3 (RNAV SID)	7/29/2010
		SHEAD 6 (RNAV SID)	7/29/2010
		TRALR 3 (RNAV SID)	7/29/2010
		BEERZ 1 (RNAV SID)	8/25/2011
		CHETR 1 (RNAV SID)	8/25/2011
		DARDN 1 (RNAV SID)	8/25/2011
		FEEEF 1 (RNAV SID)	8/25/2011
		FOLDD 1 (RNAV SID)	8/25/2011
		FRANO 1 (RNAV SID)	8/25/2011
		GUMPZ 1 (RNAV SID)	8/25/2011
		PAYUP 1 (RNAV SID)	8/25/2011
		REBAL 1 (RNAV SID)	8/25/2011
		TBD 1 (RNAV SID)	8/25/2011
		BEATY 1 (RNAV STAR)	8/25/2011
		CEJAY 1 (RNAV STAR)	8/25/2011
		DANBY 1 (RNAV STAR)	8/25/2011
		DANKE 1 (RNAV STAR)	8/25/2011
		DEUSE 1 (RNAV STAR)	8/25/2011
		GLRNO 1 (RNAV STAR)	8/25/2011
		GOFFS 1 (RNAV STAR)	8/25/2011
		HOLDM 1 (RNAV STAR)	8/25/2011
		HUGID 1 (RNAV STAR)	8/25/2011
		PGS 1 (RNAV STAR)	8/25/2011
		RUGGS 1 (RNAV STAR)	8/25/2011
ZELMA 1 (RNAV STAR)	8/25/2011		
TBD 1 (RNAV STAR)	8/25/2011		
TBD 1 (RNAV STAR)	8/25/2011		
Memphis International (KMEM)	TN	LTOWN 5 (RNAV STAR)	11/18/2010
		AUTMN 1 (RNAV SID)	5/5/2011
		AZONE 1 (RNAV SID)	5/5/2011
		BBKNG 1 (RNAV SID)	5/5/2011
		BINKY 1 (RNAV SID)	5/5/2011
		CASLN 1 (RNAV SID)	5/5/2011
		CHLDR 1 (RNAV SID)	5/5/2011
		DUCKZ 1 (RNAV SID)	5/5/2011
		FREDX 1 (RNAV SID)	5/5/2011
		GMBUD 1 (RNAV SID)	5/5/2011
		GOETZ 1 (RNAV SID)	5/5/2011
		GRRIZ 1 (RNAV SID)	5/5/2011
		HOTRD 1 (RNAV SID)	5/5/2011
		JERLE 1 (RNAV SID)	5/5/2011
		JTEEE 1 (RNAV SID)	5/5/2011
		OLEMS 1 (RNAV SID)	5/5/2011
		PIPPE 1 (RNAV SID)	5/5/2011
		SELPH 1 (RNAV SID)	5/5/2011
		WDEEE 1 (RNAV SID)	5/5/2011
		BEERT 5 (RNAV STAR)	12/15/2011
LARUE 4 (RNAV STAR)	12/15/2011		
LTOWN 6 (RNAV STAR)	12/15/2011		
TAMMY 4 (RNAV STAR)	12/15/2011		

AIRPORT NAMES	STATE	PROCEDURE NAME	CHART DATE
Metropolitan Oakland International (KOAK)	CA	RNAV (RNP) Z RWY 11, ORIG	9/23/2010
		RNAV (RNP) Z RWY 29, ORIG	9/23/2010
		RNAV (RNP) Z RWY 27L, ORIG	9/23/2010
		RNAV (RNP) Z RWY 27R, ORIG	9/23/2010
Miami International (KMIA)	FL	BSTER 1 (RNAV SID)	10/20/2011
		DIAZZ 1 (RNAV SID)	10/20/2011
		JONZI 1 (RNAV SID)	10/20/2011
		KADAN 1 (RNAV SID)	10/20/2011
		HILEY 3 (RNAV STAR)	10/20/2011
		FLIPR 3 (RNAV STAR)	4/5/2012
Morristown Municipal Airport (KMMU)	NJ	RNAV (RNP) RWY 23, ORIG	6/30/2011
		TBD 1 (RNAV SID)	12/31/2020
Moses Lake-Grant Co International (KMWH)	WA	RNAV (RNP) RWY 4, ORIG	1/13/2011
		RNAV (RNP) RWY 14L, ORIG	1/13/2011
		RNAV (RNP) RWY 22, ORIG	1/13/2011
		RNAV (RNP) RWY 32R, ORIG	1/13/2011
Napa County (KAPC)	CA	OZIEE 1 (RNAV SID)	7/29/2010
Newark Liberty International (KEWR)	NJ	RNAV (RNP) Y RWY 29, AMDT 1	1/13/2011
		PHLBO 3 (RNAV STAR)	5/5/2011
		TBD 1 (RNAV SID)	5/5/2011
		TBD 1 (RNAV SID)	5/5/2011
		PORTT SPLIT 1 (RNAV SID)	5/5/2011
		MEDDO SPLIT 1 (RNAV SID)	5/5/2011
		MEDDO 3 (RNAV SID)	5/5/2011
		PORTT 2 (RNAV SID)	5/5/2011
		TBD 1 (RNAV SID)	5/5/2011
		RNAV (RNP) Z RWY 29, AMDT 1	6/30/2011
Norfolk International (KORF)	VA	RNAV (RNP) Y RWY 5, ORIG	6/30/2011
		RNAV (RNP) Y RWY 23, ORIG	6/30/2011
Norman Y. Mineta (KSJC)	CA	RNAV (RNP) Z RWY 12R, AMDT 1	9/23/2010
		RNAV (RNP) Z RWY 30L, AMDT 1	9/23/2010
		RNAV (RNP) RWY 12L, ORIG	9/23/2010
		RNAV (RNP) RWY 30R, ORIG	9/23/2010
North Las Vegas (KVGT)	NV	BERYL 1 (RNAV SID)	12/15/2011
		BIKKR 1 (RNAV SID)	12/15/2011
		GERYU 1 (RNAV SID)	12/15/2011
		HAKID 1 (RNAV SID)	12/15/2011
		NORRA 1 (RNAV STAR)	12/15/2011
		TRAGR 1 (RNAV STAR)	12/15/2011
		WABID 1 (RNAV STAR)	12/15/2011
Omaha/Eppley Airfield (KOMA)	NE	RNAV (RNP) RWY 32L, ORIG	6/30/2011
		RNAV (RNP) RWY 32R, ORIG	6/30/2011
		RNAV (RNP) RWY 14L, ORIG	6/30/2011
		RNAV (RNP) RWY 14R, ORIG	6/30/2011
		RNAV (RNP) RWY 18, ORIG	6/30/2011
		RNAV (RNP) RWY 36, ORIG	6/30/2011
Palm Beach International (KPBI)	FL	FRWAY 4 (RNAV STAR)	10/20/2011

AIRPORT NAMES	STATE	PROCEDURE NAME	CHART DATE
Palm Springs International (KPSP)	CA	RNAV (RNP) Z RWY 13R, AMDT 1	8/25/2011
		RNAV (RNP) Y RWY 13R, AMDT 2	8/25/2011
		RNAV (RNP) Y RWY 31L, AMDT 2	8/25/2011
Pangborn Memorial (KEAT)	WA	RNAV (RNP) RWY 12, ORIG	7/29/2010
Pasco - Tri-Cities (KPSC)	WA	RNAV (RNP) Z RWY 3L, ORIG	3/10/2011
		RNAV (RNP) Z RWY 12, ORIG	3/10/2011
		RNAV (RNP) Z RWY 21R, ORIG	3/10/2011
		RNAV (RNP) Z RWY 30, ORIG	3/10/2011
Pensacola Gulf Coast Regional (KPNS)	FL	TBD 1 (RNAV SID)	4/5/2012
		TBD 1 (RNAV SID)	4/5/2012
		TBD 1 (RNAV STAR)	4/5/2012
		TBD 1 (RNAV STAR)	4/5/2012
Petersburg James Johnson (PAPG)	AK	NAYTI 2 (RNAV SID)	6/30/2011
		NEERE 2 (RNAV SID)	6/30/2011
Philadelphia International (KPHL)	PA	SPUDS 2 (RNAV STAR)	7/29/2010
		MIFLN 2 (RNAV SID)	3/10/2011
		STADM 2 (RNAV SID)	3/10/2011
		RNAV (RNP) Z RWY 27L, ORIG	12/31/2020
		RNAV (RNP) Z RWY 27R, ORIG	12/31/2020
Phoenix Sky Harbor International (KPHX)	AZ	KOOLY 3 (RNAV STAR)	1/13/2011
		MAIER 4 (RNAV STAR)	1/13/2011
		EAGUL 4 (RNAV STAR)	1/13/2011
		GEELA 4 (RNAV STAR)	1/13/2011
		BUKEE 1 (RNAV SID)	12/15/2011
		TBD 1 (RNAV SID)	12/15/2011
		TBD 1 (RNAV SID)	12/15/2011
		GBEND 1 (RNAV SID)	12/15/2011
		FORPE 1 (RNAV SID)	12/15/2011
		FANON 1 (RNAV SID)	12/15/2011
		CHOPR 1 (RNAV SID)	12/15/2011
Phoenix-Mesa Gateway (KIWA)	AZ	HUUTY 1 (RNAV STAR)	3/10/2011
Pittsburgh International (KPIT)	PA	RNAV (RNP) Z RWY 32, AMDT 1	11/18/2011
Port Columbus International (KCMH)	OH	RNAV (RNP) Z RWY 10R, ORIG	9/23/2010
		RNAV (RNP) Z RWY 10L, ORIG	9/23/2010
		RNAV (RNP) Z RWY 28R, ORIG	9/23/2010
		RNAV (RNP) Z RWY 28L, ORIG	9/23/2010
Portland International (KPWM)	ME	CWALL 1 (RNAV SID)	3/10/2011
		CEKAY 1 (RNAV STAR)	3/10/2011
Portland-Hillsboro (KHIO)	OR	BERNI 1 (RNAV SID)	9/23/2010
		CHISM 1 (RNAV SID)	9/23/2010

AIRPORT NAMES	STATE	PROCEDURE NAME	CHART DATE
Raleigh-Durham International (KRDU)	NC	FRAZI 1 (RNAV STAR)	9/23/2010
		MEYER 1 (RNAV STAR)	9/23/2010
		ZODAS 1 (RNAV STAR)	9/23/2010
		RASKL 1 (RNAV STAR)	9/23/2010
		RNAV (RNP) Z RWY 23L, AMDT 1	9/23/2010
		RNAV (RNP) Z RWY 23R, AMDT 1	9/23/2010
		RNAV (RNP) Z RWY 5L, AMDT 1	9/23/2010
		RNAV (RNP) Z RWY 5R, AMDT 1	9/23/2010
		BEXGO 1 (RNAV SID)	11/18/2010
		BULZZ 1 (RNAV SID)	11/18/2010
		HOOKZ 1 (RNAV SID)	11/18/2010
		LWOOD 1 (RNAV SID)	11/18/2010
		OXFRD 1 (RNAV SID)	11/18/2010
		WLFFF 1 (RNAV SID)	11/18/2010
HURIC 1 (RNAV SID)	11/18/2010		
Reno/Tahoe International (KRNO)	NV	KENNO 1 (RNAV STAR)	7/29/2010
		PVINE 1 (RNAV SID)	1/13/2011
		SPLTM 1 (RNAV SID)	1/13/2011
		ZEFFR 4 (RNAV SID)	1/13/2011
		MYBAD 1 (RNAV STAR)	1/13/2011
		HARTT 1 (RNAV STAR)	1/13/2011
		EELZA 1 (RNAV STAR)	1/13/2011
		WADOL 1 (RNAV STAR)	1/13/2011
		RNAV (RNP) RWY 16L, ORIG	1/13/2011
		RNAV (RNP) RWY 16R, ORIG	1/13/2011
Rick Husband Amarillo (KAMA)	TX	RNAV (RNP) RWY 13, ORIG	11/18/2010
		RNAV (RNP) RWY 22, ORIG	11/18/2010
		RNAV (RNP) RWY 31, ORIG	11/18/2010
		RNAV (RNP) RWY 4, ORIG	11/18/2010
Rogue Valley International (KMFR)	OR	RNAV (RNP) RWY 14, ORIG	9/23/2010
		RNAV (RNP) RWY 32, ORIG	9/23/2010
Ronald Reagan Washington National (KDCA)	DC	HAMMI 1 (RNAV SID)	3/10/2011
		LAZIR 1 (RNAV SID)	3/10/2011
		CLIPER 2 (RNAV STAR)	5/5/2011
		RNAV (RNP) Y RWY 1, AMDT 1	8/25/2011
Sacramento-Mather (KMHR)	CA	TBD 1 (RNAV STAR)	5/5/2011
Salt Lake City (KSLC)	UT	RNAV (RNP) RWY 16L, ORIG	8/25/2011
		RNAV (RNP) RWY 16R, ORIG	8/25/2011
		RNAV (RNP) RWY 17, ORIG	8/25/2011
San Antonio International (KSAT)	TX	HUBEE 1 (RNAV SID)	7/29/2010
		ALISS 1 (RNAV SID)	9/23/2010
		MILET 1 (RNAV SID)	9/23/2010
		RODIO 1 (RNAV STAR)	9/23/2010
		RNAV (RNP) RWY 12R, ORIG	1/13/2011
		RNAV (RNP) RWY 21, ORIG	1/13/2011
		RNAV (RNP) RWY 30L, ORIG	1/13/2011
San Diego International (KSAN)	CA	RNAV (RNP) Z RWY 9, ORIG	9/20/2012

AIRPORT NAMES	STATE	PROCEDURE NAME	CHART DATE
San Francisco International (KSFO)	CA	RNAV (RNP) Y RWY 10R, AMDT 1	8/25/2011
		RNAV (RNP) Y 28R, AMDT 1	8/25/2011
Santa Ana (KSNA)	CA	STREL 1 (RNAV SID)	3/10/2011
		CANTA 1 (RNAV SID)	3/10/2011
		KEFFR 1 (RNAV STAR)	6/30/2011
		TBD 1 (RNAV STAR)	8/25/2011
		RAWLZ 1 (RNAV SID)	8/25/2011
Santa Monica (KSMO)	CA	TBD 1 (RNAV SID)	6/30/2011
Sarasota International (KSRO)	FL	SRKUS 1 (RNAV SID)	1/13/2011
		TRAPR 1 (RNAV STAR)	1/13/2011
		TEEGN 1 (RNAV STAR)	1/13/2011
Savannah/Hilton Head International (KSAV)	GA	CANTR 1 (RNAV SID)	12/15/2011
		FLYNT 1 (RNAV SID)	12/15/2011
		RESLR 1 (RNAV SID)	12/15/2011
		TRASV 1 (RNAV SID)	12/15/2011
		DUNNK 1 (RNAV STAR)	12/15/2011
		PANDY 1 (RNAV STAR)	12/15/2011
Scottsdale (KSDL)	AZ	TBD 1 (RNAV SID)	8/25/2011
Seattle-Tacoma International (KSEA)	WA	BANGR 7 (RNAV SID)	1/13/2011
		HAROB 4 (RNAV SID)	1/13/2011
		KMORE 3 (RNAV SID)	1/13/2011
		KTSAP 4 (RNAV SID)	1/13/2011
		RNAV (RNP) Z RWY 16L, ORIG	2/9/2012
Socatean Bay (K13ME)	ME	JAVUN 1 (RNAV SID)	9/23/2010
		SULOC 1 (RNAV SID)	9/23/2010
Southwest Florida International (KRSW)	FL	RNAV (RNP) RWY 6, ORIG	TBD
		RNAV (RNP) RWY 24, ORIG	TBD
Southwest Oregon Regional (KOTH)	OR	RNAV (RNP) Z RWY 4, ORIG	7/29/2010
Spokane International (KGEV)	WA	RNAV (RNP) RWY 25, ORIG	11/18/2010
		RNAV (RNP) Z RWY 3, ORIG	11/18/2010
		RNAV (RNP) RWY 7, ORIG	11/18/2010
		RNAV (RNP) Z RWY 21, ORIG	11/18/2010
St. Louis International (KSTL)	MO	BUSCH 1 (RNAV STAR)	TBD
		MUSIAL 1 (RNAV STAR)	TBD
		TATER 1 (RNAV STAR)	TBD
		TWAIN 1 (RNAV STAR)	TBD
		LEWIS 1 (RNAV SID)	TBD
		CLARK 1 (RNAV SID)	TBD
		BERRA 1 (RNAV SID)	TBD
JEFFERSON 1 (RNAV SID)	TBD		

AIRPORT NAMES	STATE	PROCEDURE NAME	CHART DATE
Tampa International (KTPA)	FL	BAYPO 4 (RNAV SID)	1/13/2011
		CROWD 4 (RNAV SID)	1/13/2011
		ENDED 4 (RNAV SID)	1/13/2011
		GANDY 4 (RNAV SID)	1/13/2011
		SYKES 4 (RNAV SID)	1/13/2011
		BLOND 3 (RNAV STAR)	1/13/2011
		DADES 3 (RNAV STAR)	1/13/2011
		DEAKK 3 (RNAV STAR)	1/13/2011
		FOOXX 3 (RNAV STAR)	1/13/2011
Teterboro (KTEB)	NJ	JAIKE 3 (RNAV STAR)	5/5/2011
		RUUDY 3 (RNAV SID)	5/5/2011
		RNAV (RNP) RWY 1, ORIG	9/10/2020
		RNAV (RNP) RWY 24, ORIG	9/10/2020
Trenton Mercer (KTTN)	NJ	RNAV (RNP) RWY 6, ORIG	6/30/2011
		RNAV (RNP) RWY 16, ORIG	6/30/2011
		RNAV (RNP) RWY 24, ORIG	6/30/2011
Tucson International (KTUS)	AZ	RNAV (RNP) Y RWY 11L, AMDT 1	8/25/2011
		RNAV (RNP) Y RWY 29R, AMDT 1	8/25/2011
Tulsa International (KTUL)	OK	RNAV (RNP) Z RWY 18R, ORIG	9/23/2010
		RNAV (RNP) Z RWY 26, ORIG	9/23/2010
Van Nuys (KVNY)	CA	TBD 1 (RNAV SID)	6/30/2011
Virginia Tech/ Montgomery Executive (BCB)	VA	BEMAR 1 (RNAV SID)	3/10/2011
Washington Dulles International (KIAD)	DC	HYPER 3 (RNAV STAR)	5/5/2011
Waukegan Regional Airport (KUGN)	IL	RNAV (RNP) RWY 05, ORIG	3/10/2011
Westchester County (KHPN)	NY	RNAV (RNP) Z RWY 16, ORIG	9/23/2010
		RNAV (RNP) Z RWY 34, ORIG	9/23/2010
Wichita Mid-Continent (KICT)	KS	RNAV (RNP) Z RWY 1L, ORIG	9/23/2010
		RNAV (RNP) Z RWY 14, ORIG	9/23/2010
		RNAV (RNP) Z RWY 19R, ORIG	9/23/2010
		RNAV (RNP) Z RWY 19L, ORIG	9/23/2010
Will Rogers World (KOKC)	OK	RNAV (RNP) RWY 17R, ORIG	3/10/2011
		RNAV (RNP) RWY 35L, ORIG	3/10/2011
		RNAV (RNP) RWY 17L, AMDT 2	1/10/2013
		RNAV (RNP) RWY 35R, AMDT 1	1/10/2013
Yakima Air Terminal (KYKM)	WA	RNAV (RNP) RWY 9, ORIG	5/5/2011
		RNAV (RNP) Z RWY 27, ORIG	5/5/2011
Yeager (KCRW)	WV	RNAV (RNP) RWY 5, ORIG	4/5/2012
		RNAV (RNP) RWY 23, ORIG	4/5/2012

Appendix C

High Altitude Airspace Performance-Based Routing and National Special Activity Airspace Program

High Altitude Airspace Performance-based Routing: This effort reinitiates a national, top-down effort to redesign high altitude airspace and procedures, providing overarching connectivity between regional airspace and procedures efforts. The work is generated from a dissection of airspace concepts implemented under the High Altitude Redesign (HAR) project from 2003-2005. High Altitude Airspace Performance-based Routing covers two constructs: continued development and implementation of Q-routes as the national routing backbones and instantiation of the Navigational Reference System (NRS) as a key transitional element in NextGen evolution.

Q-routes are high altitude performance-based routes that offer an efficient way to traverse en route airspace by removing manufactured choke-points that are created by the ground-based navigation system. Q-routes provide efficient connectivity between key metropolitan areas and can add capacity in the en route domain. They may be part of other airspace efforts or may be stand-alone routes. The implementation plan capitalizes on near-term implementation opportunities, leveraging and revalidating plans and designs started but not completed under HAR. The implementation of Q-routes will also provide a dimension of metroplex connectivity as part of the Metroplex Optimization of Airspace and Procedures efforts. Implementation of Q-routes will cover one or all of the following corridors: Northeast-Midwest, Northeast-Southeast, Midwest-Southeast, Southwest-Northeast, and West.

A second type of high altitude performance-based routings is high altitude RNAV-point-to-point routes. One key application of these point-to-point routings is transitioning conventional National Playbooks to RNAV-based routings to increase options while decreasing the total number of playbooks. Conventional playbook routing was designed based on ground-based navigation aids that do not allow flexibility to make adjustments according to winds, resulting in additional fuel burn for airspace users. The conversion of conventional playbooks is being aided by increased use of the existing NRS. The NRS is a national grid of RNAV waypoints, initially published as a grid of approximately 1,600 RNAV waypoints. Expanding and increasing usage of NRS supports flexibility in routing. There is a multi-year plan for transition of the National Playbooks to RNAV, with the focus on transcontinental routings and on the most-used playbooks.

High Altitude Performance-based Routing efforts increase airspace efficiency and capacity and relieve congestion in high density areas. Q-routes enable benefits in the form of reduced flight distances and flight times. Estimates indicate annual savings of \$4.2M for two Seattle-based Q-routes. The HAR-implemented Q-routes have delivered about \$13M in customer cost savings annually and NRS-based routing options can save an average of 30-80 nautical miles.

Upcoming milestones for High Altitude Airspace Performance-based Routing:

- Oakland Eastbound Q-routes; Denver to Bay Area Q-routes – 2011 (target).
- Seattle Center eastbound Q-routes – 2012 (proposal).
- Additional Playbook transition design and modeling complete – 2012 (proposal).
- NRS Usage and Human Factors studies (phase 2) complete – 2012 (target).

Special Activity Airspace: One of the key national airspace efforts is the development of the National Special Activity Airspace Project (NSAAP). Special Activity Airspace (SAA) is defined as any airspace with defined dimensions within the NAS wherein limitations may be imposed upon aircraft operations. SAA may be restricted areas, prohibited areas, military operations areas, ATC assigned airspace, and any other designated airspace areas. The NSAAP is committed to developing increased cooperation and operational partnerships between the identified SAA Community of Interest (COI), which includes FAA and NAS

customers, both civilian and Department of Defense (DoD). NSAAP has a diverse set of stakeholders and intersects with many NextGen efforts, including the Joint Planning and Development Office (JPDO). The general tasks associated with this effort include:

- Integrating the many organizations, operators, “types” of airspace, policies/orders, and technologies that are associated with the management and use of SAA.
- Developing cohesive policies and agreements that will set the cooperative atmosphere for this effort.
- Creating a consistent information flow that will support predictive management and use of SAA.
- Building a measurement system that can be used in all stages of decision making concerning development, management and use of SAA, which will support accessibility and transparency of data.
- Advancing the various programs and procedures governing use and management of SAA, including NextGen and other relevant FAA and DoD technology efforts.

Upcoming milestones for NSAAP include:

- Concept of Operations, initial requirements documentation, and preliminary impact and benefits assessment of the proposed concept – Late 2010 (commitment).

Appendix D Process Descriptions

Process Overview

The design of airspace and procedures is a complex process that includes many steps. There are separate defined processes for the various types of airspace and procedures that may be included in a design project. Each of these processes must also consider relevant design standards and criteria, along with specific regulations, such as environmental and safety. Finally, there are processes for the implementation, approval, and operational use of the airspace and procedures.

This appendix provides a list of references for the design process, standards and criteria, regulations, implementation and operational approval.

The process for the design of airspace and for procedures has historically been a separate endeavor. There is an effort to bring these processes together into a single integrated airspace and procedure process. This appendix also includes a description of how this integrated process is being developed.

List of Processes and Applicable References

The following is a list of relevant references, along with a brief description of the purpose of the document.

- | | |
|---------------|---|
| FAA | <u>Airspace Management Handbook –Version 2.2</u>
The handbook describes a step-by-step procedure for airspace design management where each step contains specific data requirements and defined products. The handbook distills the experience and best practices of many airspace design projects. |
| FAA | <u>SMS Manual – Version 2.1 May 2008</u>
The Safety Management System (SMS) provides a systematic and integrated method for managing safety of air traffic control (ATC) and navigation services in the National Airspace System (NAS). This manual documents the SMS, building on existing Federal Aviation Administration (FAA) safety management capabilities. |
| FAA | <u>Environmental Desk Reference for Airport Actions – October 2007</u>
As a compendium, the Desk Reference summarizes applicable special purpose laws in one location for convenience and quick reference. Its function is to help FAA integrate the compliance of NEPA and applicable special purpose laws to the fullest extent possible. This integration should ensure that all environmental review procedures applicable to an airport action run concurrently rather than consecutively. |
| Order 1050.1E | <u>Policies and Procedures for Considering Environmental Impacts</u>
This order provides FAA policy and procedures to ensure agency compliance with the requirements set forth in the Council on Environmental Quality (CEQ) regulations for implementing the provisions of the National Environmental Policy Act of 1969 (NEPA), 40 Code of Federal Regulations (CFR) parts 1500-1508; Department of Transportation Order DOT 5610.1C, Procedures for Considering Environmental Impacts; and other related statutes and directives. |

- Order 1100.161 Air Traffic Safety Oversight
This order specifies the manner by which safety oversight will be conducted by the Air Traffic Safety Oversight Service (AOV), within the Office of the Associate Administrator for Aviation Safety (AVS), on the Air Traffic Organization (ATO), and other organizations within the FAA regarding safety management of the air traffic system.
- Order 5050.4B Airport Environmental Handbook
FAA's Office of Airports (ARP) has prepared this Order to ensure ARP personnel and others interested or involved in ARP actions are able to prepare accurate, timely, and high quality environmental documents that comply with NEPA.
- Order 7100.9D Standard Terminal Program and Procedures – Appendix 5 Guidelines for Implementing Terminal RNAV Procedures
The order provides a standardized, systematic process for the development of terminal area navigation (RNAV) arrival and departures procedures (DP). The process is also known as the "18-STEP" RNAV process.
- Order 7210.3W Facility Operation and Administration
This order provides direction and guidance for the day to day operations of facilities and offices under administration of the FAA's Air Traffic Organization.
- Order 7400.2G Procedures for Handling Airspace Matters
The order specifies procedures for use by all personnel in the joint administration of the airspace program. It contains six parts; general procedures for airspace management, objects affecting navigable airspace, airport airspace analysis, terminal and Enroute airspace, special use airspace, miscellaneous procedures.
- Order 8260.3B U.S. Standard for Terminal Instrument Procedures (TERPS)
This Order prescribes standardized methods for use in design instrument flight procedures.

Appendix E

National Operational Airspace Council

The mission of the National Operational Airspace Council (NOAC) is to ensure the national operational coordination and communication of airspace and procedures efforts and align decision-making with responsibilities. The NOAC will provide an integrated, system-level National Airspace strategy, through the National Airspace and Procedures Plan.

National Operational Airspace Council is comprised of:

- Director of Airspace
- Operations Director of System Operations
- Planning Director of En route
- Planning Director of Terminal
- Safety and Operations Director of En route
- Safety and Operations Director of Technical Operations
- Safety and Operations Director of Terminal
- Director from Eastern Service Area
- Director from Central Service Area
- Director from Western Service Area

Appendix F Acronyms

A		NGIP	NextGen Implementation Plan
AMP	Airspace Management Program	NJ	New Jersey
AOV	Air Traffic Safety Oversight Service	NOAC	National Operational Airspace Council
AR	Authorization Required	NRS	Navigational Reference System
ARP	FAA's Office of Airports	NSAAP	National Special Activity Airspace Project
ASPIRE	Asia and South Pacific Initiative to Reduce Emissions	NY	New York
ATC	Air Traffic Control	O	
ATO	Air Traffic Organization	OEP	Operational Evolution Partnership
AVS	Office of the Associate Administrator for Aviation Safety	OMP	O'Hare Modernization Project
		OPD	Optimized Profile Descents
		ORD	Chicago O'Hare International Airport
B		P	
BPT	Southeast Texas Regional Airport	PBN	Performance-Based Navigation
C		PHL	Philadelphia
CAP	Chicago Airspace Project	R	
CCDOA	Clark County Department of Aviation	RAPT	Regional Airspace and Procedures Team
CEQ	Council on Environmental Quality	RNAV	Area Navigation
CFR	Code of Federal Regulations	RNP	Required Navigation Performance
COI	Community of Interest	ROD	Record of Decision
CY	Calendar Year	S	
D		SAA	Special Activity Airspace
DAC	Dynamic Airspace Configuration	SID	Standard Instrument Departure
DAL	Dallas Love Field Airport	SNSA	Southern Nevada Supplemental Airport
DFW	Dallas/Fort Worth International Airport	STAR	Standard Terminal Arrival
DoD	Department of Defense	T	
E		TERPS	Terminal Instrument Procedures
EA	Environmental Assessment	TF5	Task Force 5
EIS	Environmental Impact Statement	TRACON	Terminal Radar Approach Control
F			
FAA	Federal Aviation Administration		
FACT	Future Airport Capacity Task Force		
FY	Fiscal Year		
H			
HAATS	Houston Area Air Traffic System		
HAR	High Altitude Redesign		
HOU	Houston William P. Hobby Airport		
I			
IAH	George Bush Intercontinental Airport		
J			
JPDO	Joint Planning and Development Office		
N			
NAPP	National Airspace and Procedures Plan		
NAPT	National Airspace and Procedures Team		
NAR	National Airspace Redesign		
NAS	National Airspace System		
NAS EA	National Airspace System Enterprise Architecture		
NEPA	National Environmental Policy Act		
NextGen	Next Generation Air Transportation System		



Department of Transportation
Federal Aviation Administration

800 Independence Avenue, SW
Washington, DC 20591

www.faa.gov

For Additional Information Contact:
Director, Airspace Services
Air Traffic Operations, Mission Support
202-267-9205