DOT/FAA/TC-16/43

Federal Aviation Administration
William J. Hughes Technical Center
Aviation Research Division
Atlantic City International Airport
New Jersey 08405

A Study of Critical NAS Systems and Air Traffic Procedures Pertaining to Separation Minima

October 2017

Final Report

U.S. Department of Transportation
Federal Aviation Administration

NOTICE

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
DOT/FAA/TC-16/43		

4. Title and Subtitle	5. Report Date
A STUDY OF CRITICAL NAS SYSTEMS AND AIR TRAFFIC PROCEDURES PERTAINING TO SEPARATION MINIMA	October 2017
	6. Performing Organization Code: ANG-E272

7. Author(s)	8. Performing Organization Report No.
Nathan Girdner and Jennifer Lamont	

9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
Systems Enginuity, Inc. 8665 Sudley Rd #349 Manassas, VA 20110	11. Contract or Grant No.: DTFACT-11-D-00010

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
U.S. Department of Transportation Federal Aviation Administration FAA National Headquarters 800 Independence Ave SW Orville Wright Bldg (FOB10A) Washington, DC 20591	Final Report
	14. Sponsoring Agency Code: AOV-100

15. Supplementary Notes

The FAA William J. Hughes Technical Center Aviation Research Division COR was Dr. Huasheng Li.

16. Abstract

The FAA's Air Traffic Safety Oversight Service (AOV) initiated a research project, Integrated Domain Assessment (IDA), to support its Approval, Acceptance, and Concurrence process for Safety Risk Management Document (SRMD) review. The IDA prototype developed as part of this research provides decision support to AOV for SRMD evaluation, National Airspace System (NAS) change impact analysis, and other safety oversight activities by identifying and assessing potential safety concerns with legacy and future systems. The initial IDA prototype released to AOV for evaluation in fiscal year (FY) 2015 focused on eight NAS systems for a proof of concept. The next research phase not only extends the current eight systems to additional NAS systems designated as critical for IDA modeling purposes but also expands decision support for NAS system changes to air traffic procedure changes that pertain to separation minima. This report is a preliminary study intended to define the scope of future IDA development by identifying which NAS systems and separation minima-related air traffic procedures may be considered critical for IDA modeling. A set of criteria to identify NAS system criticality and air traffic procedures pertaining to separation minima is proposed and applied to recommend systems and procedures for consideration in the next phase of the IDA development. Based on this analysis, 15 NAS systems among those identified as critical and a sample of separation minima-related air traffic procedures are proposed to be addressed in FY 2016.

17. Key Words	18. Distribution Statement
NAS systems, NAS architecture, Critical Systems, ATC Procedures, Separation Minima	This document is available to the U.S. public through the National Technical Information Service (NTIS), Springfield, Virginia 22161. This document is also available from the Federal Aviation Administration William J. Hughes Technical Center at actlibrary.tc.faa.gov.

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	87	

TABLE OF CONTENTS

B—ORDER 7110.65 CHAPTERS CITED IN EQUIPMENT SAFETY RISK MANAGEMENT DOCUMENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

AAC	Approval, acceptance, and concurrence
ADS-B	Automatic Dependent Surveillance—Broadcast
AOV	FAA Air Traffic Safety Oversight Service
ASDE-X	Airport Surface Detection Equipment Model X
ASR	Airport Surveillance Radar
ATC	Air traffic control
ATCBI	Air Traffic Control Beacon Interrogator
ATO	Air Traffic Organization
ATOP	Advanced Technologies and Oceanic Procedures
CARTS	Common Automated Radar Terminal System
CERAP	Center Radar Approach Control
DCP	Document Change Proposal
ERAM	En Route Automation Modernization
FSEP	Facility, Service, and Equipment Profile
FSSS	Facility Specific Safety Standards
FY	Fiscal year
ICAO	International Civil Aviation Organization
IDA	Integrated Domain Assessment
IFR	Instrument flight rules
MEARTS	Micro-En Route Automatic Tracking System
NAS	National Airspace System
NAS EA	National Airspace System Enterprise Architecture
NextGen	Next Generation Air Transportation System
NOCC	National Operations Control Center
RD	Requirements Document
RMA	Reliability, maintainability, and availability
SG	Safety guidance
SMART	Safety Management Action Review Team
SMR	Safety Management Review
SMS	Safety Management System
SOC	Safety Oversight Circular
SRM	Safety Risk Management
SRMD	Safety Risk Management Document

EXECUTIVE SUMMARY

Ensuring the safety of the flying public is the FAA's highest priority, and managing safety risks is increasingly important during the transition to the Next Generation Air Transportation System (NextGen). Multiple changes to the National Airspace System (NAS) will take place in the same timeframe as part of NextGen implementation, in which new systems are introduced and air traffic functions become more automated and distributed between ground and airborne systems. Efforts to sustain, replace, and integrate legacy systems with NextGen technologies are also a source of major changes within the NAS. All of these changes, including the introduction of new systems and legacy system modifications, cumulatively interact to impact the safety of the NAS.

Whenever the Air Traffic Organization (ATO) proposes a change to the NAS with potential safety implications, a Safety Risk Management Document (SRMD) must be developed. In accordance with the ATO Safety Management System (SMS) manual, NAS changes must be examined for system safety risk. Initial high risk and high risk discovered within legacy systems must be mitigated to an acceptable level. The ATO prepares SRMDs to describe the safety analysis and risk mitigations for proposed changes to the NAS.

The FAA Air Traffic Safety Oversight Service (AOV) is responsible for the independent safety oversight of air traffic services provided by ATO. As part of AOV's responsibilities described in FAA Order 1100.161 Change 1, AOV reviews ATO SRMDs and approves or rejects controls that are proposed to mitigate high-risk safety hazards as well as all controls that span multiple FAA lines of business, regardless of risk level. AOV's Approval, Acceptance, and Concurrence (AAC) work instructions define a step-by-step process for AOV's review of SRMDs along with approval and rejection criteria based on ATO SMS manual compliance.

One of the major challenges that AOV faces is that the current ATO Safety Risk Management (SRM) process focuses on individual changes to the NAS, which means that SRMDs and associated risk controls do not always consider potential interactions among multiple NAS changes. Focusing only on individual changes increases the possibility that hazards due to unanticipated consequences of multiple system and NAS change interactions may not be identified before deployment.

To address this shortfall, AOV launched an Integrated Domain Assessment (IDA) research effort. The primary goal of this effort is to develop a decision support tool to assist AOV with approving controls in ATO SRMDs given the context of multiple NAS changes. The IDA tool developed as a result of this research effort identifies interactions and interdependencies among NAS systems and system safety hazards, and provides a basis for AOV's evaluation of SRMDs. Different from other SRM approaches, IDA is a data-driven and model-based safety evaluation tool. The model integrates NAS system architecture and safety hazard information to identify changes in the context of interfacing systems, service delivery points, and related hazards and risk controls that rely on specific NAS systems to effectively manage safety risk. IDA not only supports AOV's review of potential SRMD issues but also provides safety and system performance indicators to assist AOV's Safety Management Action Review Team with life cycle monitoring of NAS changes.

The first phase of IDA research was completed in fiscal year (FY) 2015, and an initial prototype was released to AOV for evaluation. The initial prototype focused on the changes associated with following eight NAS systems:

- Airport Surveillance Radar Model 11
- Standard Terminal Automation Replacement System
- Common Automated Radar Terminal System
- En Route Automation Modernization
- Advanced Technologies and Oceanic Procedures
- Airport Surface Detection Equipment Model X
- Enhanced Terminal Voice Switch
- Runway status lights

The next phase of the IDA research will extend these eight systems to additional NAS systems designated as critical for IDA modeling purposes and expand decision support for NAS system changes to air traffic procedure changes that pertain to separation minima. AOV's AAC process for SRMD evaluation applies not only to NAS system changes but also to air traffic procedure changes. Per FAA Order 1100.161 Change 1, "Air Traffic Safety Oversight," it is also AOV's responsibility to approve changes or waivers to provisions of handbooks, orders, and documents, including FAA Order 7110.65, Air Traffic Control, that pertain to separation minima prior to implementation by the ATO. Identifying the scope of critical NAS systems and air traffic procedures pertaining to separation minima—the purpose of this report—is the first step toward further IDA development.

This report is a preliminary study to identify the scope of critical NAS systems and air traffic procedures pertaining to separation minima for IDA modeling and development. A comprehensive review of FAA orders and technical operations data was conducted to determine the criteria for establishing what NAS systems and separation minima-related air traffic procedures may be considered critical for IDA development. A list of critical NAS systems and air traffic procedures pertaining to separation minima are identified based on the criteria. Fifteen systems among those identified as critical and a sample of air traffic procedures are proposed to be addressed in FY 2016.

1. INTRODUCTION

1.1 BACKGROUND

The FAA Air Traffic Safety Oversight Service (AOV) is responsible for independent safety oversight of air traffic services provided by the Air Traffic Organization (ATO). In accordance with FAA Order 1100.161 Change 1, "Air Traffic Safety Oversight," AOV reviews ATO Safety Risk Management Documents (SRMDs) and approves or rejects controls that are proposed to mitigate high-risk safety hazards and controls that cross multiple FAA lines of business. AOV's Approval, Acceptance, and Concurrence (AAC) work instructions define a step-by-step process for AOV's review of National Airspace System (NAS) equipment and air traffic control (ATC) procedure-related SRMDs along with approval and rejection criteria based on ATO Safety Management System (SMS) manual compliance.

One of the major challenges that AOV faces is that the current ATO Safety Risk Management (SRM) process focuses on individual changes to the NAS, which means that an SRMD and associated risk controls do not necessarily consider potential interactions with other changes in the NAS. Focusing only on individual changes increases the probability that hazards created by unanticipated consequences of interactions between changes may not be identified before deployment.

To support its mission, AOV launched an Integrated Domain Assessment (IDA) research effort to develop a decision support tool to assist AOV with the evaluation of ATO SRMDs for new and modified air traffic control (ATC) equipment and ATC procedures given the context of multiple NAS changes. The IDA tool will identify interactions and interdependencies among NAS systems, ATC procedures, and system safety hazards, providing a basis for AOV's evaluation of SRMDs and risk controls.

IDA will enable AOV users to more effectively and efficiently evaluate SRMDs and NAS change impacts by integrating multiple sources of system, procedure, and safety data into a single platform. Figure 1 provides an overview of the IDA concept, which includes the following key functions:

- Evaluate SRMD content – Identify SRMD issues such as potentially missing hazards and hazard causes, control vulnerabilities, and hazard monitoring plan deficiencies.
- Evaluate effectiveness of controls – Assist AOV in determining whether proposed controls can be expected to reduce the risk as indicated in the SRMD.
- Analyze system impacts – Analyze the interdependencies among NAS systems, ATC procedures, and hazards to identify other systems, procedures, hazard causes, and risk controls that may be affected by changes to the NAS.
- Track SRMD and NAS data – Maintain a model of NAS system, ATC procedure, and SRMD data and provide utilities for AOV to manage remarks and notifications regarding SRMD issues, NAS change impacts, and other safety oversight concerns [1].

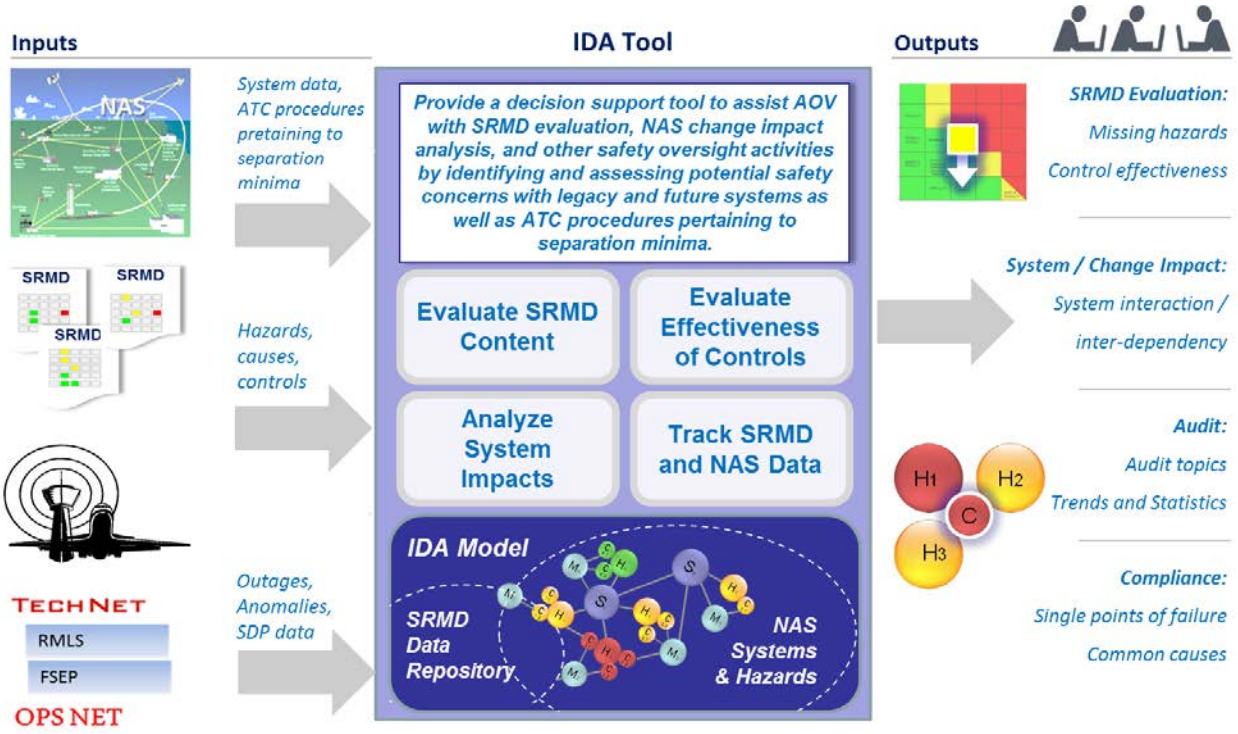

Figure 1. IDA concept diagram

As shown in figure 1, the IDA model constitutes the foundation of the tool, enabling functions to evaluate NAS impacts, hazards, and risk control effectiveness. The model includes a repository of SRMD data and NAS systems linked to hazards and corresponding causes and mitigations. To establish and maintain this model, IDA integrates NAS architecture information, system safety hazard data, and information about planned NAS changes. As the NAS evolves, system architecture changes and supporting SRMDs are used to update the IDA model. As part of future IDA development, the IDA model will be extended to integrate ATC procedure data and related SRMDs.

1.2 PURPOSE

The purpose of this report is to define the scope of future IDA development by identifying which NAS systems and separation minima-related air traffic procedures may be considered critical for IDA modeling. A set of criteria to identify NAS system criticality and air traffic procedures pertaining to separation minima is proposed and applied to recommend systems and procedures for consideration in the next phase of the IDA development. Based on this analysis, 15 NAS systems among those identified as critical and a sample of separation minima-related air traffic procedures are proposed to be addressed in fiscal year 2016 (FY 2016).

1.3 DOCUMENT STRUCTURE

Section 2 of this report discusses criteria for establishing critical NAS systems for IDA modeling purposes. A list of critical NAS systems is identified based on these criteria, and a subset of these systems are proposed for FY 2016 IDA development. Section 3 discusses FAA orders that may be used to identify what ATC procedures relate to separation minima. Specific procedure topics related to separation minima are outlined based on a review of these orders, and a subset of procedures are selected for initial modeling in FY 2016. Additional considerations for inclusion of NAS systems and ATC procedures in the IDA model are discussed in Section 4. Appendix A outlines other NAS systems that did not meet the criteria for establishing critical systems for IDA modeling. Finally, appendix B provides risk controls that cite FAA Order 7110.65 procedures as referenced in ATO equipment-related SRMDs tracked in the FY 2015 IDA prototype.

2. CRITICAL NAS SYSTEMS

IDA is intended to provide decision support for AOV's evaluation of SRMDs related to new and modified NAS equipment and eventually ATC procedures related to separation minima. The initial IDA proof-of-concept prototype developed in the first phase of IDA research focused on eight NAS systems and associated SRMDs. To identify what NAS systems are a priority for IDA modeling purposes, it is necessary to understand what NAS systems are already an integral part of AOV's safety oversight portfolios and what additional systems may be incorporated into AOV's oversight activities over time based on system criticality and planned system changes. A review of AOV guidance, FAA technical operations orders, and FAA NAS requirements was conducted to understand how the FAA establishes system criticality given safety and other operational considerations.

2.1 SELECTION CRITERIA

Ultimately, it was concluded that there is no standard FAA definition of a critical NAS system. Guidance on NAS system criticality in various FAA orders and documents is a function of the intent and scope of that particular order or document. For IDA modeling purposes, the following set of criteria is proposed for classifying which NAS systems may be considered as critical systems:

1. A system is tracked in one of the five AOV Safety Management Action Review Team (SMART) portfolios including automation, communications, navigation, surveillance, and weather and facilities.

2. A system, or its associated facility type, requires a critical (i.e., 30-minute) response time in the FAA's Facility, Service, and Equipment Profile (FSEP) (ref. Order 6030.31F) and is not primarily environmental or building infrastructure (e.g., tower buildings, air conditioning units, etc.).

3. A system is identified in the list of National Operations Control Center (NOCC) "high impact" facilities (ref. Order 6030.41H) and is not primarily environmental or building infrastructure.

4. A system can be linked to a service identified as having a worst credible safety risk severity of catastrophic or hazardous in Order 1000.43.

5. A system can be associated with a service designated as "safety critical" in NAS-RD-2013.

As the primary purpose of the IDA tool is to provide decision support to AOV, the systems listed under AOV SMART portfolios must be included into the IDA tool. For IDA purposes, systems which meet the first criterion or at least two other criteria are considered to be critical NAS systems. Based on this rule, 69 NAS systems may be classified as critical as detailed in Section 2.2. From these systems, 15 are selected as focus systems for IDA development in FY 2016 as discussed in Section 2.3. Appendix A lists additional NAS systems that were reviewed but which did not meet the aforementioned rule and the criteria above.

It is worth to note that 69 NAS systems identified in this report are in fact 69 facility types by FAA's FSEP terminology, because FSEP facility type and NAS system are not always one-to-one mapped with each other. For simplicity, these two terms are interchanged in this report.

The following sections summarize the results of a survey of AOV portfolio systems and FAA guidance on what may be considered as a critical NAS system.

2.1.1 Systems in AOV SMART Portfolios

AOV's SMART classifies NAS systems into five portfolios: surveillance, communication, automation, navigation, and weather and facilities. Per AOV research objectives, IDA should include systems from each of these portfolios. Table 1 below lists systems (or FAA program names) identified in AOV portfolios based on a sample of AOV Safety Management Review (SMR) presentations in 2014 and 2015. Note that this is not necessarily an exhaustive list of systems in AOV portfolios but rather a representative sample of those that AOV is actively tracking.

Table 1. Systems/programs in AOV portfolios

Portfolio	Example System / Program
Surveillance	Airport Surface Detection Equipment Model X (ASDE-X)* Airport Surface Surveillance Capability (ASSC) Air Traffic Control Beacon Interrogator (ATCBI-6) Airport Surveillance Radar (ASR) ASR-9 / ASR-9 SLEP ASR-11 / ASR-11* Mobile ASR Automatic Dependent Surveillance—Broadcast (ADS-B) Runway status lights (RWSL)* Wide Area Augmentation System (WAAS)
Communication	Data communications NAS Voice System Next Generation Air/Ground Communication (NEXCOM) System Wide Information Management (SWIM)
Automation	Advanced Technologies Oceanic Procedures (ATOP)* Advanced Electronic Flight Strip (AEFS) System Aeronautical Information Management Modernization (AIMM) Automated Maintenance Management System (AMMS) Collaborative Air Traffic Management—Technologies (CATM-T) En Route Automation Modernization (ERAM)* Flight and Inter-Facility Data Interface (FIDI) Instrument Flight Procedures Automation (IFPA) Micro-En Route Automatic Tracking System (MEARTS) Remote Monitoring and Logging System (RMLS) Terminal Automation Modernization and Replacement (TAMR)* Terminal Flight Data Manager (TFDM) Time-Based Flow Management (TBFM)
Weather / Facilities	Next Generation Weather Radar (NEXRAD) Integrated Terminal Weather System (ITWS) Next Generation Air Transportation System (NextGen) Weather Processor (NWP) Common Support Services—Weather (CSS-Wx) Terminal Doppler Weather Radar (TDWR)
Navigation	Very High Frequency (VHF) Omnidirectional Range (VOR) Minimum Operational Network (MON) Distance measuring equipment (DME) Performance-based navigation (PBN) Satellite-based augmentation system (SBAS) Ground-based augmentation system (GBAS)

* Systems that were modeled during the first phase of IDA development

2.1.2 Critical System Restoral Time per Order 6030.31F

FAA Order 6000.30F, "National Airspace System Maintenance Policy," defines the role of technical operations in implementing NAS maintenance policy. The policy defines "critical service" as "a service that if lost would raise the operational risk associated with providing safe and efficient local NAS operations to an unacceptable level" [2]. It does not, however, specify any particular system or service as being critical. Related maintenance orders, Orders 6030.31 and 6030.41, addressed in this section, and Section 2.1.3, respectively, provide guidance that can be used to identify critical systems for IDA modeling.

Order 6030.31F, "National Airspace System Infrastructure Failure Response," establishes Technical Operations policy for responding to system failures within the NAS [3]. Details are provided on required response times for tech ops personnel whenever system outages and malfunctions occur. Section 10 of this order specifies that a response time of up to 30 minutes applies to facilities that are continually critical to NAS operations and where a system failure at any time would significantly impact NAS users. This required response time is captured via a restoral code for each NAS system in the FAA's FSEP database.

The FSEP database was filtered to identify critical facility types with a 30-minute restoral code (see Section 2.2 and appendix A). It should be noted that FSEP facility types may correspond to one or more NAS systems. For example, the facility type ASR includes ASR-9 and ASR-11 systems, which have separate system architectures and SRMDs. Conversely, certain systems map to multiple FSEP facility types—e.g., automation systems tracked by separate facility types for display versus processing equipment.

A review of the FSEP database version current as of November 2015 finds that there are 183 unique facility types. Of these, 153 have a restoral code of 30 minutes (Code 00), corresponding to systems critical for NAS operations. As noted in table 11 of appendix A, this subset includes facility types that are building or environmental infrastructure such as air conditioning units. It is assumed that system architecture and/or SRMDs are not available for such infrastructure, and therefore, these facility types are excluded from IDA modeling.

2.1.3 NOCC High Impact List per Order 6030.41H

Order 6030.41H, "Notification of Facility and Service Interruptions and Other Significant Events," establishes the criteria for notifying the NOCC of events that have the potential to cause impact to the NAS [4]. The purpose of the order is primarily to provide the procedures and criteria for notifying the NOCC on outages and events that may impact air traffic facilities or the public, and to reduce the duration and impact of unscheduled interruptions and reductions in service to NAS users.

This order references the High Impact Facilities List published by the NOCC on TechNet. It does not, however, give any guidance regarding particular NAS equipment considered safety critical.

The complete list of NOCC event scope facilities is available on the FAA's TechNet website and contains 2,076 facilities (system/location combinations). There are 73 unique equipment types

represented in this inventory. FSEP facility types that map to one or more of these equipment types on the NOCC list are noted in Section 2.2 and appendix A.

2.1.4 System Risk Severity Per Technical Operations Order 1000.43

FAA Order 1000.43, "Technical Operations Safety Risk Management Standard Severity Table," was published by the ATO in 2012. The order is directed toward tech ops personnel who participate in SRM related to tech ops equipment changes. The Technical Operations Severity Tables contained in the order "are intended to provide a worst credible severity of NAS changes in SRM assessments" [5].

As summarized in table 2, the order lists various NAS services and functions and the worst credible severity rating assigned to each one in Order 1000.43. Some example system equipment is listed for each service, but the list of equipment contributing to each service is not exhaustive.

For IDA purposes, it is assumed that critical NAS systems provide services classified as having a hazardous or catastrophic severity for loss of function or malfunction as specified in Order 1000.43. FSEP facility types that can be reasonably mapped to one or more of these services—specifically navigation, communication, and surveillance—are noted in Section 2.2 and appendix A.

Table 2. Order 1000.43 worst credible severities by service

Service	Function	Hazard Type	Worst Credible Severity	Example Systems per Order 1000.43
Navigation	Instrument approach guidance	Malfunction	Catastrophic	• Localizer • Glide slope • GBAS • Approach Lights • Runway visual range (RVR)
Navigation	En route guidance	Malfunction	Hazardous	• VOR • Tactical air navigation (TACAN) • DME • WAAS
Communication	Air-to-ground	Simultaneous loss of multiple frequencies	Hazardous	• Headsets/mics • Voice switches • Radio control equipment (RCE) • Radios
Surveillance	Aircraft/vehicle position	Malfunction	Hazardous	• Automatic Dependent Surveillance (ADS) • AMASS • ASDE • Air Route Surveillance Radar (ARSR) • Wide area multilateration (WAM)
Weather	Adverse weather information	Malfunction —Failure to detect	Major	• Automated Surface Observing System (ASOS) • Automated Weather Observing System (AWOS) • NEXRAD • TDWR • Weather and Radar Processor (WARP) • Weather Message Switching Center Replacement (WMSCR)

2.1.5 Safety-Critical Service Availability per NAS-RD-2013

NAS-RD-2013, the FAA's NAS Requirements Document (RD), is a compilation of enterprise-level requirements for the operating NAS. The NAS-RD-2013 represents the as-is set of ATC requirements for NAS equipment [6]. Section 3.3.1 of this RD defines reliability, maintainability, and availability (RMA) requirements for NAS services and threads. The requirements in table 3 define Safety-Critical, Efficiency-Critical, Essential, and Routine services.

Table 3. NAS-RD-2013 RMA requirements

Section / Ref. No.	Requirement
3.3.1.1.0-1	Safety-Critical NAS services shall have a minimum availability of .99999.
3.3.1.1.0-2	Efficiency-Critical NAS services shall have a minimum availability of .9999.
3.3.1.1.0-3	Essential NAS services shall have a minimum availability of .999.
3.3.1.1.0-4	Routine NAS services shall have a minimum availability of .99.
3.3.1.1.0-5	The NAS shall restore efficiency-critical services within 6 seconds of failure.
3.3.1.1.0-6	The NAS shall restore essential services within 10 minutes of failure.
3.3.1.1.0-7	The NAS shall restore routine services within 72 hours of failure.
3.3.1.2.0-2	Efficiency-Critical service threads shall have availability equal to or greater than .9999.
3.3.1.2.0-3	Essential service threads shall have availability equal to or greater than .999
3.3.1.2.0-4	Routine service threads shall have availability equal to or greater than .99.
3.3.1.2.0-5	The Mean time to restore for non-routine service thread components shall be less than or equal to 0.5 hours.
3.3.1.2.0-6	The Mean time between failure for efficiency-critical service threads shall be equal to or greater than 50,000 hours.

Services, and by extension systems supporting those services, may be categorized according to its highest required availability based on a review of NAS-RD-2013 as shown in table 4. Systems associated with Safety-Critical services are considered as candidates for IDA modeling.

Table 4. NAS-RD-2013 required availability by service

Service	Highest Required Service Availability
Aeronautical information management	Essential
Flight and state data management	Efficiency-Critical
Surveillance information management	Safety-Critical
Weather information management	Essential
Separation management	Safety-Critical
Trajectory management	Efficiency-Critical
Flow contingency management	Efficiency-Critical
Short-term capacity management	Efficiency-Critical
Long-term capacity management	Routine
System and service analysis	Essential
System and service management	Essential
Safety management	Essential
Surveillance data collection	Safety-Critical
Weather data collection	Essential
Navigation support	Efficiency-Critical
Communications	N/A
Security	Essential
Spectrum management	Routine

According to table 4, the three NAS services that are Safety-Critical are surveillance information management, separation management, and surveillance data collection. FSEP facility types that can be reasonably mapped to one or more of these Safety-Critical services are noted in Section 2.2.

2.2 CRITICAL NAS SYSTEMS

As shown in table 5 below, 69 FSEP facility types meet the criteria used to identify critical NAS systems for IDA modeling purposes. It should be noted that this list of facility types and associated systems needs further examination for availability of system architecture information, SRMDs, and historical performance data before a final decision is made to include or exclude each system in further IDA development. Moreover, this list does not preclude AOV from adding any system to IDA in the future—particularly those systems that may be new acquisitions in future segments of the FAA's Next Generation Air Transportation System (NextGen) Implementation Plan.

Facility types in table 5 are organized by NAS Enterprise Architecture (EA) roadmap name (where applicable) or related system type—automation, communication, enterprise, navigation, surveillance, and weather. Reference numbers cited in the first column of table 5 are only used to establish a count of facility types. These reference numbers are not associated with IDs in the FSEP database. The second and third columns identify FESP facility types that may correspond to one or more NAS systems. For example, the facility type ASR includes ASR-9 and ASR-11 systems that have separate system architectures and SRMDs. Also, certain systems may map to multiple FSEP facility types—e.g., automation systems tracked by separate facility types for display versus processing equipment. The fourth column of table 5 identifies the FAA's National Airspace System Enterprise Architecture (NAS EA) roadmap name (if given) or the system type corresponding to the facility type. Planned system decommissionings per the NAS EA are noted in column 4. These systems, which are planned to be decommissioned, may be included or excluded from further IDA development at AOV's discretion and/or based on whether those systems are linked to existing safety risk controls in the NAS. Finally, columns 7–9 identify which criteria each facility type meets, and column 10 identifies the total number of criteria met.
Fifteen out of the 69 facility types in table 5 are proposed as focus systems for FY 2016 IDA modeling (see table 5, rows highlighted in blue). These 15 systems, discussed further in section 2.3, were selected based on a preliminary review of FAA data sources, such as the ATO's Technical Operations Digital Library and Web Configuration Management, to confirm accessibility of system architecture documentation.

FSEP facility types that do not meet the criteria and rules for establishing critical systems are omitted from table 5. See appendix A for a list of equipment, such as building infrastructure and environmental systems, excluded from IDA development.

Table 5. Candidate critical NAS systems / facility types

Ref. No.	Facility Type	Facility / System Name	NAS EA Roadmap Name (or System Type)	In AOV Portfolio per SMR Sample	Order 6030.31F 30-Min Restoral	Order 6030.41H NOCC Event	Order 1000.43 Severity = Catastrophic or Hazardous	NAS-RD-2013 Safety Critical	No. Criteria Met
Automation (15)									
1	ARTS[1]	Automated Radar Terminal System	Automation		X	X		X	3
2	ATOP[3]	Advanced Technologies and Ocean Procedures	Automation	X	X	X		X	4
3	ECG[2]	En Route Communications Gateway	Automation		X	X			2
4	FDRS	Flight Data Remoting System	Automation	X	X				2
5	MEART	Micro En Route Automated Radar Tracking System	Automation	X	X	X		X	4
6	STARS[2,3]	Standard Terminal Automation Replacement System	Automation	X	X	X		X	4
7	TBFM	Time-Based Flow Management	Automation	X	X	X			3
8	TFMS	Traffic Flow Management System	Automation		X	X			2
9	DSR	Display System Replacement	Automation (decommissioned by 2017 per roadmap)	X	X	X		X	4
10	URET	User Request Evaluation Tool	Automation (decommissioned by 2017 per roadmap)		X	X			2
11	EADS	En Route Automation Display Subsystem	Automation (not in roadmap; TBD if equivalent to ERAM)	X	X	X		X	4
12	EAS	En Route Automation System	Automation (not in roadmap; TBD if equivalent to ERAM)	X	X	X		X	4
13	FDIOC	Flight Data Input/Output (FDIO) Center	Automation (see FDIO)	X	X				2

[1] Common ARTS (CARTS) and other ARTS equipment are tracked under the same FSEP code (ARTS). Only CARTS was modeled in IDA initial R&D. The FAA is replacing or has already replaced certain ARTS equipment with the Terminal Automation Modernization Replacement (TAMR).

[2] It is assumed that TAMR, which is proposed for FY 2016 IDA modeling, is also tracked under the STARS facility type code.

Table 5. Candidate critical NAS systems / facility types (continued)

Ref. No.	Facility Type	Facility / System Name	NAS EA Roadmap Name (or System Type)	In AOV Portfolio per SMR Sample	Order 6030.31F 30-Min Restoral	Order 6030.41H NOCC Event	Order 1000.43 Severity = Catastrophic or Hazardous	NAS-RD-2013 Safety Critical	No. Criteria Met
14	FDIOR	FDIO Remote	Automation (see FDIO)	X	X				2
15	TBFMR	Time-Based Flow Management Remote Display	Automation (see TBFM)	X	X				2
Communication (14)									
16	RCLR	Radio Communications Link Repeater	Communication (in EA but roadmap but not identified)		X		X		2
17	RCLT	Radio Communications Link Terminal	Communication (in EA but roadmap but not identified)		X		X		2
18	NDRR	NAS Defense Radar Reformatter	Communication (see NADIN)		X			X	2
19	NMR	NAS Messaging Replacement	Communication (see NADIN)		X	X			2
20	PSN	Packet Switching Node	Communication (see NADIN; NADIN PSN decommissioned by 2016 per roadmap)		X	X			2
21	BUEC	Backup Emergency Communication System	Communications	X	X				2
22	BWM	Bandwidth Manager	Communications		X	X			2
23	FOTS	Fiber Optics Transmission System	Communications		X	X			2
24	RCE	Radio Control Equipment	Communications		X		X		2
25	TVS[3,4]	Terminal Voice Switch	Communications	X	X	X	X		4
26	VSBP	Voice Switch Bypass	Communications		X		X		2
27	VSCS	Voice Switching and Control System	Communications	X	X	X	X		4
28	VTABS	VSCS Training and Backup Switch	Communications		X		X		2

Table 5. Candidate critical NAS systems / facility types (continued)

[3] Enhanced TVS (ETVS), Interim Voice Switch Replacement (IVSR), and legacy terminal voice switch equipment may be tracked under the same FSEP facility type (i.e., TVS). ETVS but not TVS was modeled as part of IDA initial R&D. IVSR is proposed for FY 2016 IDA modeling.

[4] ETVS, ASDE-X, ATOP, Common ARTS (CARTS), RWSL, STARS, and ERAM (which corresponds to the facility type, ECG) were modeled as part of IDA initial R&D.

Ref. No.	Facility Type	Facility / System Name	NAS EA Roadmap Name (or System Type)	In AOV Portfolio per SMR Sample	Order 6030.31F 30-Min Restoral	Order 6030.41H NOCC Event	Order 1000.43 Severity = Catastrophic or Hazardous	NAS-RD-2013 Safety Critical	No. Criteria Met
29	DTAP	Data Communication Trials Automation Platform	Communications (Data Communications in roadmap)	X					1
Enterprise (2)									
30	STDDS	SWIM Terminal Data Distribution System (STDDS)	Enterprise Services	X	X				2
31	WMSCS	Weather Message Switching Center Replacement (WMSCR) Service	Enterprise Services (NAS EA identifies the WMSCR service in the Enterprise roadmap and WMSCR in the Weather roadmap)	X		X			2
Navigation (19)									
32	WMS	WAAS Master Stations	Facilities (in roadmap as Facilities; as a WAAS subsystem, may be considered as Navigation for IDA purposes)	X	X	X			3
33	ALS	Approach Light System	Navigation		X	X	X		3
34	DME	Distance Measuring Equipment	Navigation	X	X	X	X		4
35	GS	Glide Slope	Navigation		X	X	X		3
36	IM	Inner Marker	Navigation		X	X			2
37	LOC	Localizer	Navigation		X	X	X		3
38	MALS	Medium Intensity Approach Lighting System	Navigation			X	X		2
39	MALSF	Medium Intensity Approach Lighting System with Sequenced Flashing Lights	Navigation		X	X	X		3
40	MALSR	Medium Intensity ALS w/Runway Alignment Indicator Lights	Navigation		X	X	X		3
41	PAPI	Precision Approach Path Indicator	Navigation		X	X			2

Table 5. Candidate critical NAS systems / facility types (continued)

Ref. No.	Facility Type	Facility / System Name	NAS EA Roadmap Name (or System Type)	In AOV Portfolio per SMR Sample	Order 6030.31F 30-Min Restoral	Order 6030.41H NOCC Event	Order 1000.43 Severity = Catastrophic or Hazardous	NAS-RD-2013 Safety Critical	No. Criteria Met
42	RVR[5]	Runway Visual Range	Navigation	X	X	X	X		4
43	RWSL[2]	Runway Status Light System	Navigation	X	X				2
44	VOR[6]	VHF Omnidirectional Range	Navigation	X	X	X	X		4
45	VOT	VHF Omnidirectional Range Test	Navigation	X	X				2
46	WAASS	Wide-Area Augmentation System (Satellite-Based Augmentation System)	Navigation	X		X	X		3
47	GBAS	Ground-Based Augmentation System	Navigation (LAAS / GBAS)	X			X		2
48	SGS	Signal Generation Subsystem	Navigation (part of WAAS)		X	X			2
49	TACR	Tactical Air Navigation	Navigation (see TACAN)		X		X		2
50	WCN	WAAS Communications Node	Navigation (see WAAS)	X	X	X			3
Surveillance (13)									
51	ADSS	Automatic Dependent Surveillance System	Surveillance	X			X	X	3
52	ASDE[7,3]	Airport Surface Detection Equipment	Surveillance	X	X	X	X	X	5
53	ASR[8]	Airport Surveillance Radar	Surveillance		X	X	X		3
54	ATCBI	Air Traffic Control Beacon Interrogator	Surveillance	X		X	X	X	4
55	ATCRB	Air Traffic Control Radar Beacon	Surveillance	X	X	X	X	X	5
56	MODES	Mode S/Data Link	Surveillance		X	X		X	3
57	PRM	Precision Runway Monitor	Surveillance		X	X			2
58	WAM	Wide Area Multilateration	Surveillance	X				X	2

[5] The RVR replacement is proposed for FY 2016 IDA modeling.
[6] Certain VOR equipment may be decommissioned as part of the VOR Minimum Operating Network (VOR-MON) program.
[7] ASDE-X, ASDE-3X, and ASDE-3 may be tracked under the same FSEP facility type (i.e., ASDE). ASDE-X but neither ASDE-3X nor ASDE-3 was modeled in IDA initial R&D.
[8] ASR-9 and ASR-11 are tracked under the same FSEP facility type (i.e., ASR). ASR-11 but not ASR-9 was modeled in IDA initial R&D.

Table 5. Candidate critical NAS systems / facility types (continued)

Ref. No.	Facility Type	Facility / System Name	NAS EA Roadmap Name (or System Type)	In AOV Portfolio per SMR Sample	Order 6030.31F 30-Min Restoral	Order 6030.41H NOCC Event	Order 1000.43 Severity = Catastrophic or	NAS-RD-2013 Safety Critical	No. Criteria Met
59	ARSR	Air route Surveillance Radar	Surveillance (ARSR-1/2/3 decommissioned by 2015; ARSR-4 is in service per roadmap)	X		X		X	3
60	TSEC	Terminal Secondary Radar Service	Surveillance (radar data feed per FSEP; see ASR-11, ATCRB / MODE-S (IBI mode))			X		X	2
61	TRAD	Terminal Radar Service	Surveillance (see ASR)			X		X	2
62	CD	Common Digitizer	Surveillance (see CD-2; CD-2 decommissioned by 2017 per roadmap)		X			X	2
63	MDAT	Mode-S Data Service	Surveillance (see MODE-S)			X		X	2
Weather (6)									
64	ADAS	AWOS Data Acquisition System	Weather		X	X			2
65	ITWS	Integrated Terminal Weather System	Weather	X	X				2
66	NEXRAD[9]	Next Generation Weather Radar	Weather	X					1
67	TDWR[10]	Terminal Doppler Weather Radar	Weather	X	X				2
68	WMSCR	Weather Message Switching Center Replacement	Weather (NAS EA identifies the WMSCR service in the Enterprise roadmap and WMSCR in the Weather roadmap)	X	X	X			3
69	WDS	Weather Display Sub-System	Weather (display for multiple weather systems; see ASR-WSP, ITWS, JAWS LLWAS, TDWR)	X	X				2

[9] The NEXRAD SLEP is proposed for FY 2016 IDA modeling.
[10] The TDWR Service Life Extension Program (SLEP) is proposed for FY 2016 IDA modeling.

2.3 FY 2016 FOCUS SYSTEMS

Of the 69 critical NAS systems listed, 15 are selected for IDA modeling in FY 2016, as outlined in table 6. These systems meet the rule for establishing critical NAS systems, as addressed in section 2.1, and cover all of the NAS EA roadmaps, except for facilities (i.e., building infrastructure and environmental equipment). In selecting these focus systems for FY 2016, FAA data sources, such as the ATO's Technical Operations Digital Library and Web Configuration Management, were surveyed to confirm accessibility of system architecture documentation.

The FY 2016 focus systems in table 6 are organized by NAS EA roadmap name (where applicable) or related system type (i.e., automation, communication, enterprise, navigation, surveillance, and weather). Each system is annotated to identify which criteria for critical NAS systems are met and any other relevant information from the NAS EA. Twelve of these systems meet all of the criteria for critical NAS systems defined in section 2.1. The other three systems (i.e., SWIM, Automatic Dependent Surveillance—Broadcast (ADS-B), and WAM) are part of AOV's safety oversight portfolios and are integral to the FAA's NextGen effort, although, as of November 2015, they do not have a critical restoral time or designation as an NOCC high-impact facility.

Table 6. Candidate critical systems for FY 2016 IDA modeling

Proposed System	FSEP Facility Type(s)	In AOV Portfolio per SMR Sample	Order 6030.31F 30-Min Restoral	Order 6030.41H NOCC Event	Order 1000.43 Severity = Catastrophic or Hazardous	NAS-RD-2013 Safety Critical	Notes
Automation (3)							
Micro-En Route Automated Radar Tracking System (MEARTS)	MEART	X	X	X		X	Used in Anchorage, Alaska Air Route Traffic Control Center (ARTCC) and in Center Radar Approach Control (CERAP) environments.
Terminal Automation Modernization and Replacement (TAMR)	STARS	X	X	X		X	STARS is a legacy facility type. Its assumed replacement will meet same criteria.
Time-Based Flow Management (TBFM)	TBFM	X	X	X			TBFM to provide messages to SWIM. Ongoing TBFM work package development 2015-2025.
Enterprise (1)							
System Wide Information Management (SWIM)	STDDS	X	X				Key part of the FAA's NAS EA Services Roadmap. STDDS applies to terminal domain. SWIM in en route domain may have one or more facility type codes or NAS EA system references (e.g., CATMT)
Communication (2)							
Data Communications	DTAP	X					DTAP is prototype facility type. It is assumed system acquisition will meet same criteria. System has ground and avionics components. Controls may cross FAA lines of business and, therefore, fall under AOV AAC.
Interim Voice Switch Replacement (IVSR)	TVS		X	X	X		TVS is legacy facility type. It is assumed replacement will meet same criteria.
Navigation (1)							
Runway Visual Range Replacement (RVR-R)	RVR		X	X	X		RVR is legacy facility type. It is assumed replacement will meet same criteria. RVR replacement to feed data to SWIM.

Table 6. Candidate critical systems for FY 2016 IDA modeling (continued)

Proposed System	FSEP Facility Type(s)	In AOV Portfolio per SMR Sample	Order 6030.31F 30-Min Restoral	Order 6030.41H NOCC Event	Order 1000.43 Severity = Catastrophic or Hazardous	NAS-RD-2013 Safety Critical	Notes
Surveillance (4)							
Automatic Dependent Surveillance—Broadcast (ADS-B)	ADSS	X			X	X	Key part of FAA NextGen Implementation Plan. System has ground and avionics components. Controls may cross FAA lines of business and thus fall under AOV AAC.
Wide Area Multilateration (WAM)	WAM	X				X	WAM is in AOV portfolio. However, NAS EA notes potential WAM decommissioning based on ADS-B assumption that certain legacy surveillance may be replaced sometime between FY 2016 and 2023.
Air Traffic Control Beacon Interrogator (ATCBI)	ATCRB, ATCBI	X	X	X	X	X	ATCBI-6 tech refresh through 2016; transition to NextGen Backup Surveillance Capability in 2026. ATCBI-5 decommissioned by 2024.
Precision Runway Monitor Replacement (PRM-R)	PRM		X	X			PRM is legacy facility type. It is assumed replacement will meet same criteria. PRM Electronically Scanned (E-SCAN) to be phased out for PRM-R 2016-2018.
Weather (4)							
Integrated Terminal Weather System (ITWS)	ITWS, WDS	X	X				ITWS merges into Common Support Services – Weather (CSS-WS) and NexGen Weather Processor (NWP) 2016-2018.
Terminal Doppler Weather Radar (TDWR) Service Life Extension Program (SLEP)	TDWR	X	X				TDWR is a legacy facility type. It is assumed SLEP will meet same criteria. TDWR SLEP 2 runs 2014-2020.
Weather Message Switching Center Replacement (WMSCR)	WMSCR	X	X	X			Merges into CSS-Wx Tech Refresh, FY 2021. Provides data inputs to SWIM. NAS EA identifies the WMSCR service in the Enterprise roadmap and WMSCR in the Weather roadmap.
Next Generation Weather Radar (NEXRAD) SLEP	NEXRAD	X					NEXRAD is legacy facility type. It is assumed the SLEP will meet same criteria. NEXRAD SLEP Phase 1 runs 2014-2022.

3. ATC PROCEDURES PERTAINING TO SEPARATION MINIMA

IDA is intended to provide decision support for AOV's evaluation of SRMDs for new and modified ATC procedures pertaining to separation minima. A review of AOV guidance and FAA orders was conducted to identify the scope of ATC procedures (specifically those related to separation minima) that may be modeled during the next phase of IDA development. A proposed list of separation-minima-related air traffic procedures to be addressed in a future IDA R&D (i.e., after FY 2016) is provided in section 3.2. A subset of these procedures selected for preliminary modeling in FY 2016 is addressed in section 3.3.

FAA Order 1100.161 Change 1 details the scope of AOV's responsibilities in performing safety oversight of the ATO. Section 2-1g of this order specifies that AOV is responsible for approving "changes or waivers to provisions of handbooks, orders, and documents, including FAA Order 7110.65, ATC, current edition, that pertains to separation minima" [7].

FAA Order 7110.65 prescribes ATC procedures and phraseology for use by personnel providing ATC services [8]. Order 7110.65 applies to all ATO personnel and anyone using ATO directives, and is a primary source of guidance for Air Traffic Controllers. Order 7110.65 is organized into the following chapters and sections, with one or more paragraphs in each section that provide specific guidance, procedures, and requirements.

- Chapter 1 covers general instructions and background information
  - Introduction
  - Terms of reference
- Chapter 2 covers general ATC procedures
  - General
  - Flight plans
  - Flight progress strips
  - Radio and interphone communications
  - Route and navaid description
  - Weather information
  - Altimeter settings
  - Runway visibility reporting
  - Automatic Terminal Information Service procedures
  - Team position responsibilities

- Chapter 3 covers terminal ATC procedures

  – General
  – Visual signals
  – Airport conditions
  – Airport lighting
  – Runway selection
  – Airport surface-detection procedures
  – Taxi and ground movement procedures
  – Spacing and sequencing
  – Departure procedures and separation
  – Arrival procedures and separation
  – Helicopter operations
  – Sea lane operations

- Chapter 4 covers instrument flight rules (IFR)

  – Navaid use limitations
  – Clearances
  – Departure procedures
  – Route assignment
  – Altitude assignment and verification
  – Holding aircraft
  – Arrival procedures
  – Approach clearance procedures

- Chapter 5 covers radar systems and rules

  – General
  – Beacon systems
  – Radar identification
  – Transfer of radar identification
  – Radar separation
  – Vectoring
  – Speed adjustment
  – Radar departures
  – Radar arrivals
  – Radar approaches—terminal
  – Surveillance approaches—terminal
  – Performance and Accountability (PAR) approaches—terminal
  – Use of PAR for approach monitoring
  – Automation—en route
  – ARTS—terminal
  – TPX-42—terminal

- Chapter 6 covers nonradar procedures

  - General
  - Initial separation of successive departing aircraft
  - Initial separation of departing and arriving aircraft
  - Longitudinal separation
  - Lateral separation
  - Vertical separation
  - Timed approaches

- Chapter 7 covers visual flight rules (VFR)

  - General
  - Visual separation
  - VFR-on-top
  - Approaches
  - Special VFR
  - Basic radar service to VFR aircraft—terminal
  - Terminal radar service area—terminal
  - Class C service area—terminal
  - Class B service area—terminal

- Chapter 8 covers offshore and oceanic procedures

  - General
  - Coordination
  - Longitudinal separation
  - Lateral separation
  - Offshore/oceanic transition procedures
  - Separation from airspace reservations
  - North Atlantic International Civil Aviation Organization (ICAO) region
  - Caribbean ICAO region
  - Pacific ICAO region
  - North American ICAO region

- Chapter 9 covers special flights

  - General
  - Special operations
  - Special use, ATC-assigned airspace and stationary altitude reservations (ALTRV)
  - Fuel dumping
  - Jettisoning of external stores
  - Unmanned free balloons
  - Parachute operations
  - Unidentified flying object (UFO) reports

- Chapter 10 covers emergency procedures
  - General
  - Emergency assistance
  - Overdue aircraft
  - Control actions
  - Miscellaneous operations
  - Oceanic emergency procedures
  - Ground missile emergencies
- Chapter 11 covers traffic management procedures
- Chapter 12 covers Canadian airspace procedures
- Chapter 13 covers decision-support tools
  - User Request Evaluation Tool—en route
  - Ocean21—Oceanic

Chapters 3, 5, 6, 7, and 8 contain the majority of procedures that relate directly to separation minima, but other chapters may also fall under AOV's oversight purview, as discussed in the following sections.

3.1 SELECTION CRITERIA

AOV representatives provided input to clarify that AOV has effective oversight over the Order 7110.65 ATC handbook. However, given time and resource constraints, it is not practical to model every Order 7110.65 air traffic procedure paragraph as part of the IDA R&D. The following criteria are considered for scoping the air traffic procedures.

1. An ATC procedure can be mapped to in AOV Safety Oversight Circular (SOC) 09-11 on Safety Oversight Standards,
2. An ATC procedure is cited as a risk control for one or more hazards in NAS equipment SRMDs already modeled in IDA.
3. An ATC procedure is cited in ATO's safety guidance (SG) ATO-SG-15-05, which identifies which Order 7110.65 paragraph changes must be coordinated with AOV.
4. An ATC procedure is cited in a waiver or Facility Specific Safety Standards (FSSS) tracked in the ATO's waivergram.
5. An ATC procedure is addressed in a national Document Change Proposal (DCP) for updates to Order 7110.65.

As a result, the criteria proposed to select a subset of Order 7110.65 procedures for IDA modeling are that air traffic procedures must meet criterion 1 and at least one of the remaining criteria (2, 3, 4, and 5) listed above.

3.1.1 Order 7110.65 Procedures Cited in SOC 09-11

SOC 09-11, "Safety Oversight Standards," provides guidance to the ATO on complying with the requirements of Order 1100.161. The SOC identifies ATC processes and procedures pertaining to separation minima and that fall under AOV AAC as a result. Below is an excerpt from SOC 09-11 Section 4, *System-Oriented Safety Standards*, subsection B, *Air Traffic Control*, paragraph iv, *AOV Oversight Focus*, item (2) *Approvals and Acceptance*:

> FAA Order 1100.161, *Air Traffic Oversight*, paragraph 2-1g (2) states that changes or waivers to provisions of handbooks, orders and documents, including FAA Order 7110.65, Air Traffic Control, current edition, that pertain to separation minima requires AOV approval. We have determined that, as a general rule, any changes of process or procedure that fall into the Traffic Control Area (see Figure [2]) affect separation minima and therefore require AOV approval. It should be recognized that any changes to a process of procedure that falls into the *Flight Services* area has a high potential to affect separation minima and should be thoroughly reviewed by each Safety Risk Management Panel... [9].

As the SOC indicates the Traffic Control area specifically affects separation minima, this report focuses on air traffic procedures corresponding to that area. Procedures related to the Flight Services area may or may not impact separation minima according to the SOC and are consequently not evaluated for inclusion in the IDA model at this time. SOC 09-11 breaks down the Traffic Control area into ATC procedure topics related to separation minima (see leftmost box in figure 2).

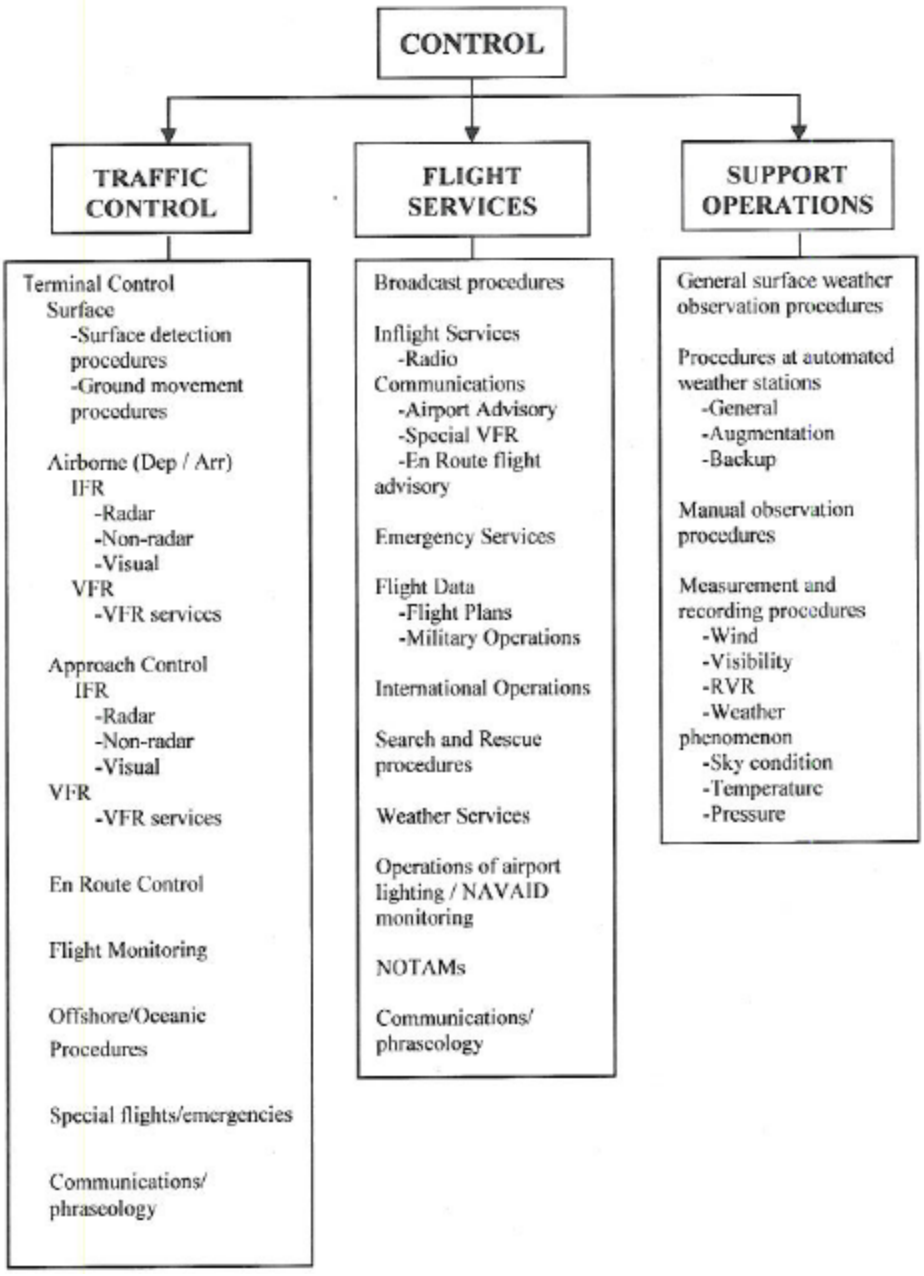

Figure 2. ATC control categories from SOC 09-11

SOC 09-11 references several FAA orders that address various ATC functions. The SOC cites Order 7110.65 in the context of the overall "Control" function at the top of figure 2. Additional FAA orders are referenced in SOC appendix 1—i.e., Order 7110.10 Flight Services and Order 7930.2P Notices to Airmen (NOTAM), which can be mapped to the Flight Services area, and Order 7900.5 Surface Weather Observing, which can be mapped to the Support Operations area. The SOC does not call out Order 7210.3 in the context of separation minima, but it does cite that order in the context of "Administrative Requirements" for ATC functions [11].

Table 7 maps the Traffic Control topics identified in SOC 09-11 to particular chapters of Order 7110.65. Many procedures apply to more than one environment and, therefore, map to multiple Order 7110.65 sections (e.g., radar separation minima for Terminal versus En Route). Most SOC 09-11 Traffic Control topics are mapped to Order 7110.65, chapters 2–7.

Table 7. SOC 09-11 traffic control topic mapped to Order 7110.65

SOC 09-11 Traffic Control Topic	1 General/Intro.	2 General Control	3 Terminal ATC	4 IFR	5 Radar	6 Nonradar	7 Visual Flight Rules	8 Offshore/Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
Terminal Control		X	X	X	X	X	X						
Surface			X										
Surface Detection			X										
Ground Movement			X										
Airborne (dep./arrivals)		X	X										
IFR				X	X	X							
Radar					X								
Nonradar						X							
Visual							X						
VFR							X						
Approach Control		X	X	X								X	
IFR				X	X	X							
Radar					X								
Nonradar						X							
Visual							X						
VFR							X						

Table 7. SOC 09-11 traffic control topic mapped to Order 7110.65 (continued)

SOC 09-11 Traffic Control Topic	1 General/Intro.	2 General Control	3 Terminal ATC	4 IFR	5 Radar	6 Nonradar	7 Visual Flight Rules	8 Offshore/Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
En Route Control		X		X	X	X	X					X	
Flight Monitoring					X						X		X
Offshore/Oceanic Procedures								X					
Special Flights/Emergencies									X	X			
Communications/ Phraseology	X	X	X	X	X	X	X	X	X	X			X
Number of Topics by Chapter	1	5	7	6	8	7	7	2	2	2	1	2	2

3.1.2 Order 7110.65 Procedures Cited in Equipment SRMDs

During the first phase of IDA development through FY 2015, 57 SRMDs collected for 8 NAS systems were modeled. Appendix B contains 107 risk controls from these SRMDs that can be mapped to one or more chapters of Order 7110.65. Some of these controls cite more than one chapter from Order 7110.65. Table 8 below summarizes the number of risk controls mapped to each Order 7110.65 chapter. Besides Chapter 2 General Control, Chapters 5 and 6 for Radar and Nonradar Procedures, respectively, comprise the majority of Order 7110.65 ATC procedure risk controls cited in the sampled equipment SRMDs.

Table 8. Number of Order 7110.65 procedures cited as equipment risk controls

Order 7110.65 Chapter	No. Risk Controls Cited in Equipment SRMDs
1. General/Intro	0
2. General Control	37
3. Terminal ATC	4
4. IFR	8
5. Radar	43
6. Non-Radar	28
7. Visual Flight Rules	2
8. Offshore/Oceanic	0
9. Special Flights	0
10. Emergency	3
11. Traffic Management	1
12. Canada Airspace	0
13. Decision Support Tools	8

3.1.3 Order 7110.65 ATC Procedures Cited in ATO-SG-15-05

This ATO SG policy is a governing document developed to support the ATO's compliance with the current version of FAA Order 1100.161, Air Traffic Oversight, Paragraph 4-2d(3). It identifies the paragraphs in FAA Order 7110.65 that "contain measurable criteria in time and/or space that pertain to separation minima" [8]. This list of paragraphs clarifies which proposed changes to the Order 7110.65 must be coordinated with AOV for approval from the ATO's perspective, although it may not include all possible procedures under AOV's purview. Section 7 of this SG states that "any proposed change to FAA Order 7110.65 that has the potential to change the measurable criteria in the identified paragraphs" is to be coordinated with AOV for approval [10].

The SG calls out each Order 7110.65 paragraph that ATO believes meets the criteria for pertaining to separation minima. These paragraphs are found in chapters 3, 4, 5, 6, 7, 8, and 12 of Order 7110.65, with most references under chapters 3, 5, 6, and 8.

It should be noted that the guidance in ATO-SG-15-05 applies specifically to Version V of Order 7110.65 (the current version). Chapter and paragraph numbers may change between versions, which could potentially desynchronize the applicable sections.

3.1.4 ATC Procedures Cited in Waivergram

ATO tracks ATC procedure waiver status as part of the ATO waivergram spreadsheet. Historical waivergrams are maintained on AOV's AOV Connect website. The waiver tracker applies to terminal facilities and provides data about each waiver, including the waiver number, facility identifier, order number(s), paragraph number(s), and paragraph title (waiver subject). Waivers are categorized in the spreadsheet as: renewal, new, fly-in, approved and active, or disapproved and closed.

A review of the waivergram dated January 30, 2015 found 58 waivers, including new, renewal, approved and active, and closed or disapproved waivers as well as 35 FSSS. Twenty-one of these FSSS overlap with approved and active waivers. Of the total set of waivers and FSSS, the majority apply to Order 7110.65 chapter 5 (Radar) followed by chapters 3 and 7 (Terminal ATC and Visual Flight Rules, respectively).

3.2 ATC PROCEDURES CITED IN DCPS

AOV maintains certain ATO DCPs submitted for AAC on the AOV Connect website. A review of 17 DCPs dated between 2012 and 2015 indicates that most address Order 7110.65, chapter 5 (especially Sections 5-5 Radar Separation and 5-9 Radar Arrivals) and chapter 8 (Offshore/Oceanic) procedures. Other DCPs on AOV Connect are related to draft 7110.xxx notices and 7110.65 chapters 3 (Terminal ATC), 6 (Non-Radar), and 7 (Visual Flight Rules). Additional research is needed to identify the complete list of historical air traffic procedure DCPs submitted to AOV.

3.3 SEPARATION MINIMA-RELATED ATC PROCEDURES

Table 9 contains a list of 94 paragraphs in Order 7110.65 mapped to one or more of the criteria described in section 3.1. All of these paragraphs are associated with a topic in AOV's SOC 09-11, and a subset is associated with one or more equipment SRMDs as a risk control, waivers, FSSS, or DCPs dated between 2013 and 2015. This list is not exhaustive but provides a scope of paragraphs that relate to separation minima for potential future IDA research. Note that this table counts only FSSS, waivers, and risk controls in SRMDs that could be traced to a specific air traffic procedure paragraph number. If the FSSS, waiver, or risk control only cites a chapter or section of Order 7110.65, those references are not noted in table 9.

The procedures in table 9 are organized by Order 7110.65 chapter. Reference numbers cited in the first column of table 9 are used only to establish a count of procedures. These reference numbers are not associated with paragraph or any other numbering in any FAA order. The second and third columns of table 9 identify specific paragraphs within Order 7110.65. The fourth column identifies one more AOV SOC 09-11 topic that can be mapped to the given Order 7110.65 paragraph. The fifth column indicates whether the procedure is identified in the ATO SG-15-05 Finally, columns 6–8 identify the number of waivers/FSSS, DCPs, and equipment risk controls associated with a given procedure. Appendix B provides further details regarding equipment risk controls that cite Order 7110.65 procedures.

Two of the procedures in table 9—i.e., 5-5-4 Minima and 5-9-7 Simultaneous Independent Approaches (dual and triple)—are proposed as focus procedures for FY 2016 IDA modeling (see rows highlighted in blue). These procedures, discussed further in section 3.3, were selected based on meeting multiple criteria in section 3.1 and coverage of the surface, terminal, and en route ATC domains. It is assumed that AOV has access to at least one SRMD accompanying the waivers, FSSS, and DCPs associated with these procedures.

Table 9. ATC procedures pertaining to separation minima

Ref. No.	Order 7110.65 Paragraph No.	Order 7110.65 Paragraph Title	SOC 09-11 Topic(s)	In ATO-SG-15-05	No. Waiver/ FSSS Refs.	No. DCP Refs.	No. Equip. SRMD Refs
Chapter 2 General Control							
1	2-1-1	ATC SERVICE	Traffic Control				2
2	2-1-2	DUTY PRIORITY	Traffic Control				2
3	2-1-6	SAFETY ALERT	Traffic Control, Phraseology				3
4	2-1-14	COORDINATE USE OF AIRSPACE	Traffic Control				1
5	2-1-19	WAKE TURBULENCE	Terminal, IFR				1
6	2-1-21	TRAFFIC ADVISORIES	IFR, VFR, Phraseology				1
7	2-1-28	RVSM OPERATIONS	En Route Control				1
8	2-3-8	AIRCRAFT EQUIPMENT SUFFIX	IFR, VFR, Phraseology				1
Chapter 3 Airport Traffic Control−Terminal							
9	3–7–2	TAXI AND GROUND MOVEMENT OPERATIONS	Surface, Ground Movement		1		
10	3–8–3	SIMULTANEOUS SAME-DIRECTION OPERATION	Surface	X	4		
11	3–8–4	SIMULTANEOUS OPPOSITE-DIRECTION OPERATION	Surface	X	1		
12	3–9–4	LINE UP AND WAIT	Surface, Airborne (departure/arrival)		2		
13	3–9–6	SAME RUNWAY SEPARATION	Surface, Airborne (departure/arrival)	X			
14	3–9–7	WAKE TURBULENCE SEPARATION FOR INTERSECTION DEPARTURES	Surface, Airborne (departure/arrival)	X	1	1	

RVSM = Reduced Vertical Separation Minimum

Table 9. ATC procedures pertaining to separation minima (continued)

Ref. No.	Order 7110.65 Paragraph No.	Order 7110.65 Paragraph Title	SOC 09-11 Topic(s)	In ATO-SG-15-05	No. Waiver/ FSSS Refs.	No. DCP Refs.	No. Equip. SRMD Refs
15	3–9–8	INTERSECTING RUNWAY/INTERSECTING FLIGHT PATH OPERATIONS	Surface, Airborne (departure/arrival)	X	2	1	
16	3–9–9	NONINTERSECTING CONVERGING RUNWAY OPERATIONS	Surface, Airborne (departure/arrival)	X	5		
17	3–10–3	SAME RUNWAY SEPARATION	Surface	X			
18	3–10–4	INTERSECTING RUNWAY/INTERSECTING FLIGHT PATH SEPARATION	Surface, Airborne (departure/arrival)	X	3	1	
19	3–11–3	HELICOPTER DEPARTURE SEPARATION	Surface, Airborne (departure/arrival)	X			
20	3–11–4	HELICOPTER ARRIVAL SEPARATION	Airborne (departure/arrival)	X			
21	3–11–5	SIMULTANEOUS LANDINGS OR TAKEOFFS	Airborne (departure/arrival)	X			
22	3–12–2	DEPARTURE SEPARATION	Airborne (departure/arrival)	X			
23	3–12–3	ARRIVAL SEPARATION	Airborne (departure/arrival)	X			
Chapter 4 IFR							
24	4–5–1	VERTICAL SEPARATION MINIMA	IFR	X			1
Chapter 5 Radar							
25	5-1-1	PRESENTATION AND EQUIPMENT PERFORMANCE	IFR, Radar				1
26	5-1-2	ALIGNMENT ACCURACY CHECK	IFR, Radar				1
27	5-1-8	MERGING TARGET PROCEDURES	IFR, Radar				2
28	5-2-10	ALTIMETER SETTINGS	IFR, Radar				1

Table 9. ATC procedures pertaining to separation minima (continued)

Ref. No.	Order 7110.65 Paragraph No.	Order 7110.65 Paragraph Title	SOC 09-11 Topic(s)	In ATO-SG-15-05	No. Waiver/ FSSS Refs.	No. DCP Refs.	No. Equip. SRMD Refs
29	5–3–1	APPLICATION	IFR, Radar			1	
30	5-3-2	PRIMARY RADAR IDENTIFICATION METHODS	IFR, Radar				1
31	5–5–1	APPLICATION	IFR, Radar	X		3	
32	5-5-2	TARGET SEPARATION	IFR, Radar				5
33	5–5–4	MINIMA	IFR, Radar	X	2	3	2
34	5–5–5	VERTICAL APPLICATION	IFR, Radar	X			
35	5–5–6	EXCEPTIONS	IFR, Radar	X			
36	5-5-7	PASSING OR DIVERGING	IFR, Radar				5
37	5–5–8	ADDITIONAL SEPARATION FOR FORMATION FLIGHTS	IFR, Radar	X			
38	5–5–9	SEPARATION FROM OBSTRUCTIONS	IFR, Radar	X	1		
39	5–5–10	ADJACENT AIRSPACE	IFR, Radar	X	2		
40	5–5–11	EDGE OF SCOPE	IFR, Radar	X			
41	5-6-3	VECTORS BELOW MINIMUM ALTITUDE	IFR, Radar		1		
42	5-7-2	METHODS	IFR, Radar				5
43	5–8–3	SUCCESSIVE OR SIMULTANEOUS DEPARTURES	IFR, Radar	X	9		
44	5–8–4	DEPARTURE AND ARRIVAL	IFR, Radar	X			
45	5–8–5	DEPARTURES AND ARRIVALS ON PARALLEL OR NONINTERSECTING DIVERGING RUNWAYS	IFR, Radar	X	3		
46	5–9–1	VECTORS TO FINAL APPROACH COURSE	IFR, Radar		2		
47	5–9–6	SIMULTANEOUS DEPENDENT APPROACHES	IFR, Radar	X	4*		

Table 9. ATC procedures pertaining to separation minima (continued)

Ref. No.	Order 7110.65 Paragraph No.	Order 7110.65 Paragraph Title	SOC 09-11 Topic(s)	In ATO-SG-15-05	No. Waiver/ FSSS Refs.	No. DCP Refs.	No. Equip. SRMD Refs
48	5–9–7	SIMULTANEOUS INDEPENDENT APPROACHES —DUAL & TRIPLE	IFR, Radar	X	4	1	
49	5–9–8	SIMULTANEOUS INDEPENDENT CLOSE PARALLEL APPROACHES— HIGH UPDATE RADAR	IFR, Radar	X		1	
50	5–9–9	SIMULTANEOUS INDEPENDENT CLOSE PARALLEL APPROACHES— HIGH UPDATE RADAR NOT REQUIRED	IFR, Radar	X		3	
51	5–9–10	SIMULTANEOUS OFFSET INSTRUMENT APPROACHES (SOIA)—HIGH UPDATE RADAR	IFR, Radar	X	1	1	
51	5–9–11	SIMULTANEOUS INDEPENDENT APPROACHES TO WIDELY SPACED PARALLEL RUNWAYS WITHOUT FINAL MONITORS	IFR, Radar	X	1	1	
Chapter 6 Nonradar							
53	6–1–4	ADJACENT AIRPORT OPERATION	IFR, Nonradar	X			
54	6–1–5	ARRIVAL MINIMA	IFR, Nonradar	X			
55	6–2–1	MINIMA ON DIVERGING COURSES	IFR, Nonradar	X			
56	6–2–2	MINIMA ON SAME COURSE	IFR, Nonradar	X			
57	6–3–1	SEPARATION MINIMA	IFR, Nonradar	X			
58	6–4–2	MINIMA ON SAME, CONVERGING, OR CROSSING COURSES	IFR, Nonradar	X			
59	6–4–3	MINIMA ON OPPOSITE COURSES	IFR, Nonradar	X		1	
60	6–4–4	SEPARATION BY PILOTS	IFR, Nonradar	X			

Table 9. ATC procedures pertaining to separation minima (continued)

Ref. No.	Order 7110.65 Paragraph No.	Order 7110.65 Paragraph Title	SOC 09-11 Topic(s)	In ATO-SG-15-05	No. Waiver/ FSSS Refs.	No. DCP Refs.	No. Equip. SRMD Refs
61	6–5–2	MINIMA ON DIVERGING RADIALS	IFR, Nonradar	X			
62	6–5–3	DME ARC MINIMA	IFR, Nonradar	X			
63	6–5–4	MINIMA ALONG OTHER THAN ESTABLISHED AIRWAYS OR ROUTES	IFR, Nonradar	X		1	
64	6–5–5	RNAV MINIMA— DIVERGING/CROSSING COURSES	IFR, Nonradar	X		1	
65	6–6–1	APPLICATION	IFR, Nonradar	X			
66	6–6–2	EXCEPTIONS	IFR, Nonradar	X			
67	6–7–5	INTERVAL MINIMA	IFR, Nonradar	X			
Chapter 7 Visual							
68	7–2–1	VISUAL SEPARATION	Visual	X	3	1	
69	7-4-2	VECTORS FOR VISUAL APPROACH	Visual		1		
70	7–4–4	APPROACHES TO MULTIPLE RUNWAYS.	Visual	X	2		
71	7–5–3b	SEPARATION	Visual	X			
72	7-9-1	APPLICATION	Visual				1
73	7-9-4	SEPARATION	Visual				1
Chapter 8 Offshore/Oceanic							
74	8–3–2	SEPARATION METHODS	Offshore/Oceanic	X			
75	8–3–3	MACH NUMBER TECHNIQUE	Offshore/Oceanic	X			
76	8–4–2	SEPARATION METHODS	Offshore/Oceanic	X			
77	8–4–3	REDUCTION OF ROUTE PROTECTED AIRSPACE	Offshore/Oceanic	X			

RNAV = Area navigation

Table 9. ATC procedures pertaining to separation minima (continued)

Ref. No.	Order 7110.65 Paragraph No.	Order 7110.65 Paragraph Title	SOC 09-11 Topic(s)	In ATO-SG-15-05	No. Waiver/ FSSS Refs.	No. DCP Refs.	No. Equip. SRMD Refs
78	8–4–4	TRACK SEPARATION	Offshore/Oceanic	X			
79	8–5–2	COURSE DIVERGENCE	Offshore/Oceanic	X			
80	8–5–3	OPPOSITE DIRECTION	Offshore/Oceanic	X			
81	8–5–4	SAME DIRECTION	Offshore/Oceanic	X			
82	8-5-5	RADAR IDENTIFICATION APPLICATION	Offshore/Oceanic			1	
83	8–6–1	TEMPORARY STATIONARY AIRSPACE RESERVATIONS	Offshore/Oceanic	X			
84	8–6–3	TEMPORARY MOVING AIRSPACE RESERVATIONS	Offshore/Oceanic	X			
85	8–7–3	LONGITUDINAL SEPARATION	Offshore/Oceanic	X		1	
86	8–7–4	LATERAL SEPARATION	Offshore/Oceanic	X		1	
87	8–8–3	LONGITUDINAL SEPARATION	Offshore/Oceanic	X			
88	8–8–4	LATERAL SEPARATION	Offshore/Oceanic	X		1	
89	8–9–3	LONGITUDINAL SEPARATION	Offshore/Oceanic	X			
90	8–9–4	LATERAL SEPARATION	Offshore/Oceanic	X			
91	8–9–5	COMPOSITE SEPARATION MINIMA	Offshore/Oceanic	X			
92	8–10–3	LONGITUDINAL SEPARATION	Offshore/Oceanic	X			
93	8–10–4	LATERAL SEPARATION	Offshore/Oceanic	X			
Chapter 12 Canadian Airspace							
94	12–1–4	SEPARATION	Terminal, En Route	X			

* Excludes 2 FSSS denoted as duplicate or deleted in January 2015 ATO waivergram

3.4 FY 2016 FOCUS PROCEDURES

Based on the review of the FAA orders and guidance above, Order 7110.65 Sections 5-5-4 Minima and 5-9-7 Simultaneous Independent Approaches—Dual and Triple are proposed for IDA modeling during FY 2016. Other procedures may be selected based on AOV sponsor feedback or the results of additional research, but these paragraphs are traceable to multiple criteria outlined in section 3.1 and provide a representative sample of procedures from the surface, terminal, and en route environments.

3.4.1 5-5-4 Minima

Order 7110.65, paragraph 5-5-4 addresses required radar separation between aircraft in terminal and en route environments and criteria to minimize wake turbulence hazards. This paragraph was chosen because of its applicability to both the terminal and en route ATC environments. It also appears to address separation minima related to particular equipment that may be modeled in IDA (e.g., radar). Because of its length and the number of provisions, this paragraph may be very complex to model in its entirety, but this complexity should provide a good proof-of-concept for the IDA procedure model.

5−5−4. MINIMA
Separate aircraft by the following minima:
a. *TERMINAL*. Single Sensor ASR or Digital Terminal Automation System (DTAS):
NOTE−
Includes single sensor long range radar mode.
1. When less than 40 miles from the antenna−*3 miles*.
2. When 40 miles or more from the antenna−*5 miles*.
3. For single sensor ASR−9 with Mode S, when less than 60 miles from the antenna− *3 miles*.
4. For single sensor ASR−11 MSSR Beacon, when less than 60 miles from the antenna−*3 miles*.
NOTE−
Wake turbulence procedures specify increased separation minima required for certain classes of aircraft because of the possible effects of wake turbulence.
b. *TERMINAL*. FUSION:
1. Fusion target symbol – *3 miles.*
2. When displaying ISR in the data block- *5 miles.*
3. If TRK appears in the data block, handle in accordance with Paragraph 5-3-7, Identification Status, subparagraph b, and take appropriate steps to establish nonradar separation.
c. Stage A/DARC, Terminal Mosaic/ Multi-Sensor Mode:
NOTE−
Mosaic/Multi−Sensor Mode combines radar input from 2 to 16 sites into a single picture utilizing a mosaic grid composed of radar sort boxes.
1. Below FL 600−*5 miles.*
2. At or above FL 600−*10 miles.*
3. For areas meeting all of the following conditions:
(a) Radar site adaptation is set to single sensor.
(b) Significant operational advantages can be obtained.
(c) Within 40 miles of the antenna.
(d) Below FL 180.
(e) Facility directives specifically define the area where the separation can be applied. Facility directives may specify 3 miles.
REFERENCE
FAAO Order 7210.3, Para 8−2−1, Single Site Coverage Stage A Operations.
FAAO Order 7210.3, Para 11−8−15, Single Site Coverage ATTS Operations.

4. When transitioning from terminal to en route control, 3 miles increasing to 5 miles or greater, provided:
(a) The aircraft are on diverging routes/ courses, and/or
(b) The leading aircraft is and will remain faster than the following aircraft; and
(c) Separation constantly increasing and the first center controller will establish 5 NM or other appropriate form of separation prior to the aircraft departing the first center sector; and
(d) The procedure is covered by a letter of agreement between the facilities involved and limited to specified routes and/or sectors/positions.
d. MEARTS Mosaic Mode:
1. Below FL 600- *5 miles.*
2. At or above FL 600- *10 miles.*
3. For areas meeting all of the following conditions – *3 miles*:
(a) Radar site adaptation is set to single sensor mode.
NOTE−
1. *Single Sensor Mode displays information from the radar input of a single site.*
2. *Procedures to convert MEARTS Mosaic Mode to MEARTS Single Sensor Mode at each PVD/MDM will be established by facility directive.*
(b) Significant operational advantages can be obtained.
(c) Within 40 miles of the antenna.
(d) Below FL 180.
(e) Facility directives specifically define the area where the separation can be applied and define the requirements for displaying the area on the controller's PVD/MDM.
4. MEARTS Mosaic Mode Utilizing Single Source Polygon (San Juan CERAP and Honolulu Control Facility only) when meeting all of the following conditions– *3 miles*:
(a) Less than 40 miles from the antenna, below FL180, and targets are from the adapted sensor.
(b) The single source polygon must be displayed on the controller's PVD/MDM.
(c) Significant operational advantages can be obtained.
(d) Facility directives specifically define the single source polygon area where the separation can be applied and specify procedures to be used
(e) Controller must commence a transition to achieve either vertical separation or 5 mile lateral separation in the event that either target is not from the adapted sensor.
e. STARS Multi−Sensor Mode:
NOTE−
1. *In Multi−Sensor Mode, STARS displays targets as filled and unfilled boxes, depending upon the target's distance from the radar site providing the data. Since there is presently no way to identify which specific site is providing data for any given target, utilize separation standards for targets 40 or more miles from the antenna.*
2. *When operating in STARS Single Sensor Mode, if TRK appears in the data block, handle in accordance with para 5−3−7, Identification Status, subpara b, and take appropriate steps to establish nonradar separation.*
3. *TRK appears in the data block whenever the aircraft is being tracked by a radar site other than the radar currently selected. Current equipment limitations preclude a target from being displayed in the single sensor mode; however, a position symbol and data block, including altitude information, will still be displayed. Therefore, low altitude alerts must be provided in accordance with para 2−1−6 , Safety Alert.*
WAKE TURBULENCE APPLICATION
f. Separate aircraft operating directly behind, or directly behind and less than 1,000 feet below, or following an aircraft conducting an instrument approach by:
NOTE−
1. *When applying wake turbulence separation criteria, directly behind means an aircraft is operating within 2,500 feet of the flight path of the leading aircraft over the surface of the earth.*
2. *Consider parallel runways less than 2,500 feet apart as a single runway because of the possible effects of wake turbulence.*
1. Heavy behind heavy− *4 miles.*
2. Large/heavy behind B757− *4 miles.*
3. Small behind B757− *5 miles.*
4. Small/large behind heavy − *5 miles.*
WAKE TURBULENCE APPLICATION

g. In addition to subpara f, separate an aircraft landing behind another aircraft on the same runway, or one making a touch-and-go, stop-and-go, or low approach by ensuring the following minima will exist at the time the preceding aircraft is over the landing threshold:
NOTE−
Consider parallel runways less than 2,500 feet apart as a single runway because of the possible effects of wake turbulence.
1. Small behind large− *4 miles*.
2. Small behind B757− *5 miles.*
3. Small behind heavy− *6 miles.*

If the landing threshold cannot be determined, apply the above minima as constant or increasing at the closest point that can be determined prior to the landing threshold.
h. *TERMINAL*. 2.5 nautical miles (NM) separation is authorized between aircraft established on the final approach course within 10 NM of the landing runway when operating in single sensor slant range mode and aircraft remains within 40 miles of the antenna and:
1. The leading aircraft's weight class is the same or less than the trailing aircraft;
2. Heavy aircraft and the Boeing 757 are permitted to participate in the separation reduction as the trailing aircraft only;
3. An average runway occupancy time of 50 seconds or less is documented;
4. CTRDs are operational and used for quick glance references;
REFERENCE−
FAAO Order 7110.65, Para 3−1−9 , Use of Tower Radar Displays.
5. Turnoff points are visible from the control tower [8].
REFERENCE−
FAAO Order 7110.65, Para 2−1−19, Wake Turbulence.
FAAO Order 7110.65, Para 3−9−6, Same Runway Separation.
FAAO Order 7110.65, Para 5−5−7, Passing or Diverging.
FAAO Order 7110.65, Para 5−5−9, Separation from Obstructions.
FAAO Order 7110.65, Para 5−8−3, Successive or Simultaneous Departures.
FAAO Order 7110.65, Para 5−9−5, Approach Separation Responsibility.
FAAO Order 7110.65, Para 7−6−7, Sequencing.
FAAO Order 7110.65, Para 7−7−3, Separation.
FAAO Order 7110.65 Para 7−8−3, Separation.
FAAO Order 7210.3, Para 10−4−8 , Reduced Separation on Final.

3.4.2 5-9-7 Simultaneous Independent Approaches—Dual and Triple

Order 7110.65, paragraph 5-9-7 addresses requirements for conducting simultaneous independent approaches in the terminal environment. This procedure was selected for IDA modeling in FY 2016, as it includes specific requirements for aircraft separation, runway configuration, and NAS ATC systems that must be operational. Paragraph 5-9-7 is referenced by several other procedures in Order 7110.65, and paragraph 5-9-7 in turn references paragraph 5-5-4 Minima, indicating potential interaction between ATC procedures that may also be explored in IDA modeling.

5−9−7. SIMULTANEOUS INDEPENDENT APPROACHES− DUAL & TRIPLE
TERMINAL
a. Apply the following minimum separation when conducting simultaneous independent approaches:
1. Provide a minimum of 1000 feet vertical or a minimum of 3 miles radar separation between aircraft during turn-on to parallel final approach.
NOTE−
1. *During triple parallel approaches, no two aircraft will be assigned the same altitude during turn-on. All three aircraft will be assigned altitudes which differ by a minimum of 1,000 feet. Example: 3,000, 4,000, 5,000; 7,000, 8,000, 9,000.*

2. *Communications transfer to the tower controller's frequency must be completed prior to losing vertical separation between aircraft.*
2. Dual parallel runway centerlines are at least 4,300 feet apart.
3. Triple parallel runway centerlines are at least 5,000 feet apart and the airport field elevation is less than 1,000 feet MSL.
4. A high-resolution color monitor with alert algorithms, such as the final monitor aid or that required in the precision runway monitor program must be used to monitor approaches where:
(a) Triple parallel runway centerlines are at least 4,300 but less than 5,000 feet apart and the airport field elevation is less than 1,000 feet MSL.
(b) Triple parallel approaches to airports where the airport field elevation is 1,000 feet MSL or more require the high resolution color monitor with alert algorithms and an approved FAA aeronautical study.
5. Provide the minimum applicable radar separation between aircraft on the same final approach course.
REFERENCE−
FAAO Order 7110.65, Para 5−5−4, Minima.
b. The following conditions are required when applying the minimum separation on adjacent dual or triple final approach courses allowed in subparagraph a:
NOTE−
Simultaneous independent approaches may only be conducted where instrument approach charts specifically authorize simultaneous approaches to adjacent runways.
REFERENCE−
FAAO Order 7210.3, Para 10-4-6, Simultaneous Approaches (Dependent/Independent)
1. Straight-in landings will be made.
2. All appropriate communication, navigation, and surveillance systems are operating normally.
3. Inform aircraft that simultaneous independent approaches are in use prior to aircraft departing an outer fix. This information may be provided through the ATIS.
4. Clear the aircraft to descend to the appropriate glideslope/glidepath intercept altitude soon enough to provide a period of level flight to dissipate excess speed. Provide at least 1 mile of straight flight prior to the final approach course intercept.
5. An NTZ at least 2,000 feet wide is established an equal distance between extended runway final approach courses and must be depicted on the monitor display. The primary responsibility for navigation on the final approach course rests with the pilot. Control instructions and information are issued only to ensure separation between aircraft and to prevent aircraft from penetrating the NTZ.
6. Monitor all approaches regardless of weather. Monitor local control frequency to receive any aircraft transmission. Issue control instructions as necessary to ensure aircraft do not enter the NTZ.
NOTE−
1. *Separate monitor controllers, each with transmit/ receive and override capability on the local control frequency, must ensure aircraft do not penetrate the depicted NTZ. Facility directives must define responsibility for providing the minimum applicable longitudinal separation between aircraft on the same final approach course.*
2. *The aircraft is considered the center of the primary radar return for that aircraft, or, if an FMA or other color final monitor aid is used, the center of the digitized target of that aircraft, for the purposes of ensuring an aircraft does not penetrate the NTZ. The provisions of para 5−5−2, Target Separation, apply also.*
c. The following procedures must be used by the final monitor controllers:
1. Instruct the aircraft to return to the correct final approach course when aircraft are observed to overshoot the turn-on or to continue on a track which will penetrate the NTZ.
PHRASEOLOGY−
YOU HAVE CROSSED THE FINAL APPROACH COURSE. TURN (left/right) IMMEDIATELY AND RETURN TO THE FINAL APPROACH COURSE,
or
TURN (left/right) AND RETURN TO THE FINAL APPROACH COURSE.
2. Instruct aircraft on the adjacent final approach course to alter course to avoid the deviating aircraft when an aircraft is observed penetrating or in the controller's judgment will penetrate the NTZ.
PHRASEOLOGY−
TRAFFIC ALERT, (call sign), TURN (right/left) IMMEDIATELY HEADING (degrees), CLIMB AND MAINTAIN (altitude).

3. Terminate radar monitoring when one of the following occurs:
(a) Visual separation is applied.
(b) The aircraft reports the approach lights or runway in sight.
(c) The aircraft is 1 mile or less from the runway threshold, if procedurally required and contained in facility directives.
4. Do not inform the aircraft when radar monitoring is terminated.
5. Do not apply the provisions of Paragraph 5-13-1, Monitor on PAR Equipment, for simultaneous independent approaches.
d. Consideration should be given to known factors that may in any way affect the safety of the instrument approach phase of flight when simultaneous independent approaches are being conducted to parallel runways. Factors include, but are not limited to, wind direction/velocity, windshear alerts/reports, severe weather activity, etc. Closely monitor weather activity that could impact the final approach course. Weather conditions in the vicinity of the final approach course may dictate a change of approach in use [8].
REFERENCE−
FAAO Order 7110.65, Para 5−1−13, Radar Service Termination.
FAAO Order 7110.65, Para 5−9−2, Final Approach Course Interception.

4. CONCLUSIONS AND FUTURE RESEARCH

The purpose of this report is to define the scope of future Integrated Domain Assessment (IDA) development by identifying National Airspace System (NAS) systems and separation minima-related air traffic procedures that may be considered critical for IDA modeling. A set of criteria to identify NAS system criticality and air traffic procedures pertaining to separation minima is discussed in sections 2 and 3, respectively. Based on these criteria, 69 NAS systems and 94 air traffic control (ATC) procedures are recommended for consideration in the next phase of the IDA development. Fifteen of these NAS systems and two of these ATC procedures are proposed as the focus for FY 2016 IDA development.

The inclusion of any system in the IDA model is subject to availability of documented system architecture information and NAS change descriptions as well as Safety Risk Management Document (SRMD) data. The initial list of 69 systems must be reviewed to determine whether documentation exists on system interfaces, system performance, service delivery points, and NAS change implementation dates, among other details. Additional factors considered in further scoping and prioritizing which systems are incorporated in the IDA model are mentioned below:

- Does the system have SRMDs that were submitted to FAA Air Traffic Safety Oversight Service (AOV) under the approval, acceptance, and concurrence (AAC) process or that are otherwise accessible to AOV?
- Does the system support air traffic separation minima or separation assurance functions?
- Does the system have potential for risk controls crossing multiple FAA lines of business, thus triggering the AAC process (e.g., system architecture includes air and ground components)?
- Does the system have a significant number of interfaces with other NAS systems or provide service to many service delivery points?
- Is the system addressed in the FAA's Capital Investment Plan (CIP), which includes NextGen initiatives and legacy system sustainment programs?
- Will the system still be operational in the NAS in the near future (e.g., within 3 years) (i.e., the system is not planned for decommissioning)?
- Is the system linked to existing safety risk controls or hazard causes in the NAS?
- Does the system have historical SRMD data that may be useful to AOV when reviewing hazards for similar NAS systems?
- Is the system designated by the AOV sponsor as a research priority?

A system does not necessarily need to meet all of the criteria in section 2 or the factors outlined above to be selected for modeling in IDA. Instead, these criteria and factors provide a framework for scoping and prioritizing systems for IDA modeling. The AOV research sponsor may also designate a system to be of particular value for modeling, even if that system does not otherwise meet the criteria for critical systems.

As part of future IDA R&D, the list of 69 critical systems presented in section 2 will be cross-checked against the FAA CIP to identify the estimated timeframe for planned system changes (and, therefore, potential SRMDs) and to prioritize IDA modeling efforts accordingly. New system acquisitions identified in the CIP may be added to IDA once NAS change details and basic system

architecture information are available. Systems not addressed in the CIP may still be undergoing changes as part of normal operations and maintenance with change details and SRMDs accessible via the FAA's web configuration management system. Also, systems that are not undergoing changes at the CIP level may still be modeled in IDA, considering the factors outlined above.

IDA will also be extended to address ATC procedures pertaining to separation minima, and further IDA development activities will explore the possibility of integrating ATC procedures into the existing IDA model of NAS systems and SRMD data. Because the approach and data requirements for extending the IDA model to address ATC procedures is to be determined as part of future IDA research and development, specific constraints on scoping which procedures to include in IDA cannot be confirmed at this time. Potential factors to consider may include the following:

- Is the procedure linked to NextGen initiatives or other NAS system changes?
- Is the procedure expected to be modified or newly implemented on a NAS-wide scale?
- Is the procedure coupled with other ATC procedures? This indicates that changes to any one procedure may need to be evaluated in the context of all associated procedures (e.g., procedures pertaining to handoffs between ATC facilities)
- Is the procedure limited to a temporary operation, such as a fly-in or airshow?
- Will the procedure be fully or partially automated as part of ATC system equipment functions?
- Is the procedure linked to existing safety risk controls or hazard causes in the NAS?
- Does the procedure have historical SRMD data that may be useful to AOV when reviewing hazards for similar procedures?
- Is the procedure designated by the AOV sponsor as a research priority?

5. REFERENCES

1. FAA. (2013) IDA-FS Concept of Operations DOT/FAA/TC-xx/xx.

2. FAA Order 6000.30F, National Airspace System Maintenance Policy (2013).

3. FAA Order 6030.31F, National Airspace System Infrastructure Failure Response (2006).

4. FAA Order 6030.41H, Notification of Facility and Service Interruptions and Other Significant Events (2009).

5. FAA Order 1000.43, Technical Operations Safety Risk Management Standard Severity Table (2012).

6. NAS-RD-2013, National Airspace System Requirements Document (2014).

7. FAA Order 1100.161, Air Traffic Safety Oversight, Change 1 (2006).

8. FAA Order 7110.65V, Air Traffic Control (2014).

9. FAA Safety Oversight Guidance SOC 09-11, Safety Oversight Standards, Air Traffic Safety Oversight Service (AOV) (2009).

10. FAA Safety Guidance ATO-SG-15-05, Safety and Technical Training Guidance on Separation Minima (2015).

11. FAA Order 7210.3Y, Facility Operation and Administration (2014).

APPENDIX A—NON-CRITICAL NAS SYSTEMS

The Facility, Service, and Equipment Profile (FSEP) includes 83 facility types not identified in the FAA Air Traffic Safety Oversight Service Safety Management Reviews sampled. These facility types, outlined in table A-1, were either designated as having a 30-minute required restoral time or as National Operations Control Center (NOCC) reportable equipment. However, none of these facility types correspond to a safety-critical service, per NAS-RD-2013, or as a service that could produce catastrophic or hazardous faults or failures, per Order 1000.43. Therefore, the facility types in table A-1 do not satisfy the rule for critical systems established in section 2.1 and are not proposed for Integrated Domain Assessment (IDA) modeling.

Table A-1. Other noncritical NAS systems/facility types

Facility Type	Name	Order 6030.31F 30-Min Restoral	Order 6030.41H NOCC Event Equipment
CTS	Coded Time Source	X	
DSP	Departure Spacing Program		X
ERIDS	En Route Information Display System	X	
OFDPS	Oceanic Flight Data Processing System		X
SMA	Surface Movement Advisor	X	
TDLS	Tower Data Link Services	X	
RMLS	Remote Monitoring and Logging System	X	
CODAP	Composite Oceanic Display and Planning		X
RGW	Radar Gateway	X	
RTDS	Radar Tower Display System	X	
TADS	TRACON Automation Display Systems	X	
ASYNC	Asynchronous Concentrator	X	
ICSS	Integrated Communications Switching System		X
RCO	Remote Communications Outlet	X	
ECS	Emergency Communications System	X	
DMUX	Data Multiplexer	X	
CSAP	Combined Services Access Point	X	

TRACON = Terminal Radar Approach Control

Table A-1. Other noncritical NAS systems/facility types (continued)

Facility Type	Name	Order 6030.31F 30-Min Restoral	Order 6030.41H NOCC Event Equipment
NMRS	NAS Messaging Replacement Service		X
ATIS	Automatic Terminal Information System	X	
NRCS	National Radio Communications System	X	
TDDS	Terminal Data Display System	X	
EDDS	En Route Data Distribution System	X	
CCMS	Central Control Monitoring System	X	
WRS	Wide-area Reference Station	X	
BDAT	Beacon (digitized) Data Service		X
CBI	Computer-Based Instruction	X	
CFAD	Composite Flight Data Processing		X
CONS	Control Service		X
ECVEX	En Route Communication Voice Exchange		X
ERMS	Environmental Remote Monitoring Subsystem	X	
ESIS	Enhanced Status Information System	X	
ESRN	ERIT Surveillance Radar Network	X	
ETARS	En Route Terminal Automated Radar Service		X
ETVCT	En Route Training Voice Communication Tool	X	
FCPU	Facility Central Processor Unit	X	
FETS	Facility/Equipment Timing Source	X	
GOES	Geostationary Operational Environmental Satellite System	X	
LBR	LAN-Based Random Access Plan Position Indicator	X	
MDS	Master Demarcation System	X	

NAS = National Airspace System, LAN = Local area network, ERIT = Enhanced Radar Intelligent Tool

Table A-1. Other noncritical NAS systems/facility types (continued)

Facility Type	Name	Order 6030.31F 30-Min Restoral	Order 6030.41H NOCC Event Equipment
MSEC	MODE-S Secondary Radar Service		X
NDAG	NAS Defense Air-to-Ground	X	
NDGG	NAS Defense Ground-to-Ground	X	
NDRCL	NAS Defense Radio Communications Link	X	
OM	Outer Marker	X	
PDC	Pre-Departure Clearance System	X	
RBPM	Remote Beacon Performance Monitor	X	
RCIU	Remote Control Interface Unit	X	
RDAT	Radar (digitized) Data Service		X
RMCF	Remote Monitor Control Facility	X	
RTADS	Radar Tower Automation Display Service		X
RTR	Remote Transmitter/Receiver	X	
SACOM	Emergency Satellite Telephone Network	X	
SCIP	Surveillance and Communication Interface Processor	X	
SMUX	Statistical Multiplexer	X	
TARS	Terminal Automation Radar Service		X
TCE	Transceiver Communications Equipment	X	
TCOM	Terminal Communications Service		X
TDS	Telecommunications Demarcation System	X	
TELEX	Telephone Exchange	X	
TMLT	Television Microwave Link Transmitter	X	
TSNRS	Tone Suppression and Noise Reduction System	X	

Table A-1. Other noncritical NAS systems/facility types (continued)

Facility Type	Name	Order 6030.31F 30-Min Restoral	Order 6030.41H NOCC Event Equipment
VCS	Video Compression System	X	
VRS	Voice Recorder System	X	
RMSC	Remote Monitoring Subsystem Concentrator	X	
RMVC	Remote Maintenance VORTAC Concentrator	X	
MRU	Multilateration Remote Unit	X	
RCAG	Remote Center Air/Ground Communication Facility	X	
ICMS	Integrated Control and Monitor System	X	
ICMSR	Integrated Control and Monitor System Remote	X	
LOM	Compass Locator at the ILS Outer Marker	X	
REIL	Runway End Identifier Lights	X	
MM	Middle Marker	X	
WOMS	WAAS Operations and Maintenance Subsystem	X	
PRMR	Precision Runway Monitor Remote	X	
ASDES	Airport Surface Detection Equipment Service		X
TAIU	Terminal Automation Interface Unit	X	
ASI	Altimeter Setting Indicator	X	
AWOS	Automated Weather Observing System	X	
LLWAS	Low Level Wind Shear Alert System	X	
WARP	Weather and Radar Processor	X	
WME	Wind Measuring Equipment	X	
WSP	Weather Systems Processor	X	

ILS = Instrument landing system
WAAS = Wide Area Augmentation System

Table A-2 contains 31 Facility, Service, and Equipment Profile facility types that are excluded from IDA modeling because they correspond to building and environmental infrastructures that are not expected to have system architecture details or Safety Risk Management Documents. These facility types do not meet the rule for critical systems outlined in section 2.1 of the main report, though most have a required 30-minute restoral time or appear on the NOCC high-impact list (criteria 2 and 3, respectively).

Table A-2. Other NAS systems/facility types excluded from IDA modeling

Facility Type	Name	Order 6030.31F 30-Min Restoral	Order 6030.41H NOCC Event Equipment
ADM	Administrative Building	X	X
ARTCC	Air Route Traffic Control Center	X	X
ATBM	Airway/Terminal Building Maintenance	X	
ATCT	Airport Traffic Control Tower	X	X
BLDG	Building		
CCTV	Closed Circuit TV	X	
CERAP	Center Radar Approach Control	X	
CHILR	Chiller System	X	X
CLM	Control Line Maintenance	X	
CPDS	Critical Power Distribution System	X	X
CTRB	Center Building Maintenance	X	
DCBUS	DC Bus System	X	
ELD	Electrical Distribution System	X	
ELVTR	Elevator	X	X
FAB	Fan and Blower System	X	
GUARD	Guard House	X	
HEAT	Central Heating Facility—Per Unit	X	
MUPS	Mini-Uninterruptible Power Supply	X	X
NASEB	NAS Equipment Building	X	

Table A-2. Other NAS systems/facility types excluded from IDA modeling (continued)

Facility Type	Name	Order 6030.31F 30-Min Restoral	Order 6030.41H NOCC Event Equipment
MX	Mobile Engine Generator	X	
OCC	Operations Control Center	X	X
PCS	Power Conditioning System	X	
PPE	Personal Protective Equipment	X	
PX	Primary Power Engine Generator	X	
SFAS	Security and Fire Alarm System	X	
SOC	Service Operations Center	X	
SX	Standby Engine Generator	X	X
TANK	Fuel Storage Tank	X	
TOWB	Tower Building	X	X
TRACO	Terminal Radar Approach Control	X	
UIC	Universal Interlock Controller	X	

APPENDIX B—ORDER 7110.65 CHAPTERS CITED IN EQUIPMENT SAFETY RISK MANAGEMENT DOCUMENTS

Fifty-seven (57) Safety Risk Management Documents (SRMDs) collected for eight NAS systems were modeled as part of IDA research and development through FY 2015. Table B-1 contains 107 risk controls from these SRMDs that can be mapped to one or more Order 7110.65 chapters. Although some of these Order 7110.65 procedures cite specific paragraph numbers from a historical version of Order 7110.65, the same topic in the current Order 7110.65 version (i.e., version V) may not have the same paragraph-level numbering. It should be noted that the 57 equipment SRMDs include 130 additional air traffic control (ATC) procedure risk controls not identified in table B-1; these 130 controls reference Order 7110.65 or ATC procedures in general and cannot be mapped to a particular Order 7110.65 chapter.

Reference numbers cited in the first column of table B-1 are used only to establish a count of risk controls by Order 7110.65 chapter. These reference numbers are not associated with any record IDs in the IDA database.

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/ Intro.	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
1	STARS FS-2+ baseline update to include reqs to support LCM build R1a	24202a	7110.65 Chapter 2		X											
2	STARS FS-2+ baseline update to include reqs to support LCM build R1a	24202b	7110.65 Chapter 2		X											
3	SRMD STARS FS-2+ baseline update to include requirements to support LCM build R22 SRMD-T1311-STARS-1009-PHA	19545(b)	7110.65 Chapter 2 Safety Alerts		X											

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro.	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
4	SRMD STARS FS-2+ baseline update to include requirements to support LCM build R22 SRMD-T1311-STARS-1009-PHA	20476(a)	7110.65 Chapter 2 Safety Alerts		X											
5	SRMD STARS FS-2+ baseline update to include requirements to support LCM build R22 SRMD-T1311-STARS-1009-PHA	17870	7110.65 Chapter 2 2-1-28		X											
6	SRMD STARS FS-2+ baseline update to include requirements to support LCM build R22 SRMD-T1311-STARS-1009-PHA	17870	7110.65 Chapter 2 2-3-8		X											
7	SRMD STARS FS-2+ baseline update to include requirements to support LCM build R22 SRMD-T1311-STARS-1009-PHA	19545(a)	7110.65 Chapter 2 Safety Alerts		X											
8	STARS FS-2+ baseline update to include functional changes resulting from the ADS-B and miscellaneous requirement changes	21129 (a)	7110.65 Chapter 2 Safety Alerts & Chapter 5 Radar		X			X								

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro.	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
9	STARS FS-2+ baseline update to include functional changes resulting from the ADS-B and miscellaneous requirement changes	21129 (b)	7110.65 Chapter 2 Safety Alerts & Chapter 5 Radar		X			X								
10	STARS FS-2+ baseline update to include new ADS-B IOC and miscellaneous requirements	STR 20754	7110.65 Chapter 2-1-19 & 20 Chap 5-1-1 Radar Separation		X			X								
11	STARS FS-2+ baseline update to Include new ADS-B IOC and miscellaneous requirements	STR 20471 (b)	7110.65 Chapter 4				X									
12	STARS FS2+ baseline update to include 3 new ADS-B IOC requirements SRMD	STR 21632 (b)	7110.65 Chapter 4				X									
13	STARS FS2+ baseline update to include 3 new ADS-B IOC requirements SRMD	STR 21739 (b)	7110.65 Chapter 4				X									
14	STARS FS-2+ baseline update to include requirements to support LCM build E1	14810 (a)	7110.65 Chapter 4-5-1 thru 4-5-9 and Chapter 5-2-10 Altimeter Settings				X	X								

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro.	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
15	SRMD STARS FS-2+ baseline update to include requirements to support LCM build R22 SRMD-T1311-STARS-1009-PHA	17870	7110.65 Chapter 5 Section 1 Radar Separation					X								
16	STARS S4.00R25a Software Release SRMD	8240	7110.65 Chapter 6 Nonradar						X							
17	STARS FS-2+ baseline Update to include new requirements to support the STARS G4 system architecture	22436	7110.65 Chapter 6 -Nonradar						X							
18	STARS ELITE Connection to existing ASR-11 TRACON UPS at TAMRp3s2 sites	1002	7110.65 Nonradar Procedures						X							
19	STARS ELITE Connection to existing ASR-11 TRACON UPS at TAMRp3s2 sites	1002	7110.65 Nonradar Procedures						X							
20	Anchorage Airport Optimization of ASR-8 and ASR-11	FIW-2011-01	7110.65 Paragraphs 2-1-21 and 5-1-8* traffic advisories and merging targets		X			X								

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro.	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
21	Anchorage Airport Optimization of ASR-8 and ASR-11	FI-2011-02	7110.65 Paragraphs 2-1-21 and 5-1-8* traffic advisories and merging targets		X			X								
22	Terminal ATC with ADS-B and CARTS SRMD	A7	7110.65 procedures 5-1-8 for merging targets apply to VFR aircraft in Class C airspace and VFR aircraft that inadvertently enter Class B without ATC clearance. These aircraft are not assigned a discrete beacon code and are displayed with a limited data block (LDB)[E07.102].					X								
23	Terminal ATC with ADS-B and CARTS SRMD	A6	7110.65 procedures 5-5-7, 5-5-2, 5-7-2 for target resolution and vertical separation [A6]					X								

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
24	SRMD Addendum for ATC surveillance in the Gulf of Mexico with ADS-B and ERAM R2	CS ISD-6	7110.65 procedures 5-5-7, 5-5-2, 5-7-2 for target resolution and vertical separation [A6]					X								
25	Terminal ATC with ADS-B and CARTS SRMD	A7	7110.65 procedures 5-5-7, 5-5-2, 5-7-2 for target resolution and vertical separation [A7]					X								
26	Terminal ATC with ADS-B and STARS	CS6	7110.65 procedures 5-5-7, 5-5-2, 5-7-2 for target resolution and vertical separation [CS6]					X								
27	SRMD Addendum for ATC surveillance in the Gulf of Mexico with ADS-B and ERAM R2	CS ISD-7	7110.65 procedures 5-5-7, 5-5-2, 5-7-2 for target resolution and vertical separation JH 55: Use of error detecting and correction codes in ADS-B transmissions per DO-260A and DO-282A [E07.109].					X								

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
28	Terminal ATC with ADS-B and CARTS SRMD	A7	7110.65 procedures 7-9-1 require aircraft to obtain an ATC clearance to operate within Class B; aircraft are issued a discrete beacon code and are displayed with a full data block (FDB)[E07.102].							X						
29	RWSL at Los Angeles International Airport Local SRMD	LAX RWSL1	7110.65 Sec. X										X			
30	Modify CARTS SW to allow SBS DO-260B/282B interface and include updated ADS-B requirements	1004(c)	7110.65-Must issue a warning (in accordance with paragraph 2-1-6 Safety Alert) + Site feedback		X											
31	STARS FS-2+ baseline update to include reqs to support LCM build R1a	24202a	7110.65U, Section: 2-1-1 ATC service		X											

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
32	STARS FS-2+ baseline update to include reqs to support LCM build R1a	24202b	7110.65U, Section: 2-1-1 ATC Service		X											
33	STARS FS-2+ baseline update to include reqs to support LCM build R1a	24202a	7110.65U, Section: 2-1-2 Duty Priority		X											
34	STARS FS-2+ baseline update to include reqs to support LCM build R1a	24202b	7110.65U, Section: 2-1-2 Duty Priority		X											
35	STARS FS-2+ baseline update to include reqs to support LCM build R1a	24202a	7110.65U, Section: 2-1-6 Safety Alert		X											
36	STARS FS-2+ baseline update to include reqs to support LCM build R1a	24202b	7110.65U, Section: 2-1-6 Safety Alert		X											

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
37	STARS FS-2+ baseline update to include reqs to support LCM build R1a	24202a	7110.65U, Section: 5-3-2 Primary Radar Identification Methods					X								
38	STARS FS-2+ baseline update to include reqs to support LCM build R1a	24202b	7110.65U, Section: 5-3-2 Primary Radar Identification Methods					X								
39	Terminal ATC with ADS-B and CARTS SRMD	A15	7210.3 ATC procedures for inter-facility emergency coordination (Adjacent ATC facility receives emergency indication and contacts affected facility) [A15]										X			
40	RWSL at Los Angeles International Airport Local SRMD	LAX RWSL2	ASDE-X-7110.65 Sec. X										X			
41	SRMD Addendum for ATC surveillance in the Gulf of Mexico with ADS-B and ERAM R2	CS ISD-1	Order 7110.65 Nonradar procedures[A1]						X							

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
42	SRMD Addendum for ATC surveillance in the Gulf of Mexico with ADS-B and ERAM R2	CS ISD-4	Order 7110.65 Nonradar procedures[A1]						X							
43	SRMD Addendum for ATC surveillance in the Gulf of Mexico with ADS-B and ERAM R2	CS ISD-2	Order 7110.65 Nonradar procedures[A2]						X							
44	Terminal ATC with ADS-B and CARTS SRMD	A2	Order 7110.65 Nonradar procedures[A2]						X							
45	Terminal ATC with ADS-B and CARTS SRMD	A3	Order 7110.65 Nonradar procedures[A3]						X							
46	Terminal ATC with ADS-B and CARTS SRMD	A4	Order 7110.65 Nonradar procedures[A4]						X							

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
47	SRMD Addendum for ATC surveillance in the Gulf of Mexico with ADS-B and ERAM R2	CS ISD-3	Order 7110.65 Nonradar procedures[A5]						X							
48	SRMD Addendum for ATC surveillance in the Gulf of Mexico with ADS-B and ERAM R2	CS ISD-5	Order 7110.65 Nonradar procedures[A5]						X							
49	Terminal ATC with ADS-B and CARTS SRMD	A5	Order 7110.65 Nonradar procedures[A5]						X							
50	SRMD Addendum for ATC surveillance in the Gulf of Mexico with ADS-B and ERAM R2	CS ISD-18	Order 7110.65 Nonradar procedures. If full surveillance (radar or ADS-B coverage) is not available for an entire route, nonradar procedures are in effect for areas without surveillance.						X							

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
51	SRMD Addendum for ATC surveillance in the Gulf of Mexico with ADS-B and ERAM R2	CS ISD-4	Order 7110.65 procedures for flight strip management and traffic monitoring[A1]		X											X
52	Terminal ATC with ADS-B and CARTS SRMD	A1	Order 7110.65 procedures for flight strip management and traffic monitoring[A1] Order 7110.65 nonradar procedures[A1]		X											X
53	Terminal ATC with ADS-B and CARTS SRMD	A2	Order 7110.65 procedures for flight strip management and traffic monitoring[A2]		X											X
54	SRMD Addendum for ATC surveillance in the Gulf of Mexico with ADS-B and ERAM R2	CS ISD-2	Order 7110.65 procedures for flight strip management and traffic monitoring[A2]		X											X
55	Terminal ATC with ADS-B and CARTS SRMD	A3	Order 7110.65 procedures for flight strip management and traffic monitoring[A3]		X											X

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
56	Terminal ATC with ADS-B and CARTS SRMD	A2	Order 7110.65 procedures for terminal arrivals requiring ARTCC handoff of aircraft and radio contact with aircraft[A2]		X			X								X
57	Terminal ATC with ADS-B and CARTS SRMD	A3	Order 7110.65 procedures for terminal arrivals requiring ARTCC handoff of aircraft and radio contact with aircraft[A3]					X								
58	Terminal ATC with ADS-B and CARTS SRMD	A4	Order 7110.65 procedures for terminal arrivals requiring ARTCC handoff of aircraft and radio contact with aircraft[A4]					X								

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
59	Terminal ATC with ADS-B and CARTS SRMD	A5	Order 7110.65 procedures for terminal arrivals requiring ARTCC handoff of aircraft and radio contact with aircraft[A5] (Note: This existing procedure enables ATC to detect aircraft that are never acquired by a sensor or displayed on CARTS because of a system fault or failure).					X								
60	Terminal ATC with ADS-B and CARTS SRMD	A2	Order 7110.65 procedures for terminal departures requiring tower handoff of aircraft and radio contact with aircraft[A2]					X								
61	Terminal ATC with ADS-B and CARTS SRMD	A3	Order 7110.65 procedures for terminal departures requiring tower handoff of aircraft and radio contact with aircraft[A3]					X								

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
62	Terminal ATC with ADS-B and CARTS SRMD	A4	Order 7110.65 procedures for terminal departures requiring tower handoff of aircraft and radio contact with aircraft[A4]					X								
63	Terminal ATC with ADS-B and CARTS SRMD	A5	Order 7110.65 procedures for terminal departures requiring tower handoff of aircraft and radio contact with aircraft[A5] (Note: This existing procedure enables ATC to detect aircraft that are never acquired by a sensor or displayed on CARTS because of a system fault or failure).					X								
64	SRMD Addendum for ATC surveillance in the Gulf of Mexico with ADS-B and ERAM R2	CS ISD-19	ATC follows existing procedures in 7110.65 for nonradar separation						X							
65	CARTS With ADS-B Only Addendum SBS-031C, Rev 01	CS ISD-35	ATC implements 7110.65 nonradar procedures						X							

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Nonradar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
66	CARTS With ADS-B Only Addendum SBS-031C, Rev 01	CS ISD-36b	ATC implements 7110.65 nonradar procedures						X							
67	CARTS With ADS-B Only Addendum SBS-031C, Rev 01	CS ISD-39	ATC implements 7110.65 nonradar procedures						X							
68	CARTS With ADS-B Only Addendum SBS-031C, Rev 01	CS ISD-36a	ATC implements 7110.65 nonradar procedures.						X							
69	ASR-11 Tech Refresh Segment 2 Operational Safety Assessment	TR2-H02	ATC nonradar Operational Procedures.						X							
70	ASR-11 Anchorage Build 2 Software Upgrade SSM-ASR11-026	H2	ATC performs accuracy alignment check in accordance with order 7110.65R paragraph 5-1-2					X								
71	SRMD Addendum for ATC surveillance in the Gulf of Mexico with ADS-B and ERAM R2	CS ISD-16	Controllers follow procedures in 7110.65 for nonradar separation					X								

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
72	STARS S4.00R25a Software Release SRMD	1	Existing Procedures in 7110.65 Chapters 4 & 6				X		X							
73	SRMD to Remove Obsolete Equipment From the CARTS Inventory and Documentation	1030 (a)	Existing procedures in 7110.65 Chapters 4-6 (Holding Aircraft)				X		X							
74	SRMD to Remove Obsolete Equipment From the CARTS Inventory and Documentation	1030 (b)	Existing procedures in 7110.65 Chapters 4-6 (Holding Aircraft)				X		X							
75	CARTS Software Release Revision 37a PHA	1	Existing Procedures in 7110.65 Chapters 4-6 (Holding Aircraft)				X		X							
76	STARS Case File ATO0T-STARS-1082 SRMD	19507 (a)	Existing procedures in Order 7110.65 Chapter 2		X											
77	STARS Case File ATO0T-STARS-1082 SRMD	19507 (c)	Existing procedures in Order 7110.65 Chapter 5					X								

78	SRMD-ATO-T-STARS-1083-PHA	1083(a) DDTS# 6940 STR# 18941	Existing procedures in Order 7110.65 Chapter 5 Section 5-5-4					X								

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
79	SRMD-ATO-T-STARS-1083-PHA	1083(b) DDTS# 6940 STR# 18941	Existing procedures in Order 7110.65 Chapter 5 Section 5-5-4					X								
80	Terminal ATC with ADS-B and STARS	CS7	Hazard Level Mitigations: 7110.65 procedures 5-5-7, 5-5-2, 5-7-2 for target resolution and vertical separation [CS7]					X								
81	Terminal ATC with ADS-B and STARS	CS1	Hazard Level Mitigations: Order 7110.65 nonradar procedures[CS1]						X							
82	Terminal ATC with ADS-B and STARS	CS2	Hazard Level Mitigations: Order 7110.65 nonradar procedures[CS2]						X							
83	Terminal ATC with ADS-B and STARS	CS3	Hazard Level Mitigations: Order 7110.65 nonradar procedures[CS3]						X							

84	Terminal ATC with ADS-B and STARS	CS5	Hazard Level Mitigations: Order 7110.65 nonradar procedures[CS5]						X							

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
85	Terminal ATC with ADS-B and STARS	CS2	Hazard Level Mitigations: Order 7110.65 procedures for flight strip management and traffic monitoring[CS2]		X											X
86	Terminal ATC with ADS-B and STARS	CS3	Hazard Level Mitigations: Order 7110.65 procedures for flight strip management and traffic monitoring[CS3]		X											X
87	Terminal ATC with ADS-B and STARS	CS2	Hazard Level Mitigations: Order 7110.65 procedures for terminal arrivals requiring ARTCC handoff of aircraft and radio contact with aircraft[CS2]		X			X								

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
88	Terminal ATC with ADS-B and STARS	CS3	Hazard Level Mitigations: Order 7110.65 procedures for terminal arrivals requiring ARTCC handoff of aircraft and radio contact with aircraft[CS3]		X			X								
89	Terminal ATC with ADS-B and STARS	CS4	Hazard Level Mitigations: Order 7110.65 procedures for terminal arrivals requiring ARTCC handoff of aircraft and radio contact with aircraft[CS4]		X			X								
90	Terminal ATC with ADS-B and STARS	CS5	Hazard Level Mitigations: Order 7110.65 procedures for terminal arrivals requiring ARTCC handoff of aircraft and radio contact with aircraft[CS5] (Note: This existing procedure enables ATC to detect aircraft that are never acquired by a sensor or displayed on STARS because of a system fault or failure).		X			X								

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
91	Terminal ATC with ADS-B and STARS	CS2	Hazard Level Mitigations: Order 7110.65 procedures for terminal departures requiring tower handoff of aircraft and radio contact with aircraft[CS2]		X			X								
92	Terminal ATC with ADS-B and STARS	CS3	Hazard Level Mitigations: Order 7110.65 procedures for terminal departures requiring tower handoff of aircraft and radio contact with aircraft[CS3]		X			X								
93	Terminal ATC with ADS-B and STARS	CS4	Hazard Level Mitigations: Order 7110.65 procedures for terminal departures requiring tower handoff of aircraft and radio contact with aircraft[CS4]		X			X								

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
94	Terminal ATC with ADS-B and STARS	CS5	Hazard Level Mitigations: Order 7110.65 procedures for terminal departures requiring tower handoff of aircraft and radio contact with aircraft[CS5] (Note: This existing procedure enables ATC to detect aircraft that are never acquired by a sensor or displayed on STARS because of a system fault or failure).		X			X								
95	Terminal ATC with ADS-B and CARTS SRMD	A3	Implement N Order 7110.xxx, 6c 1: Inform all appropriate positions before terminating or reinstating use of the fusion automation system at a control position. When terminating the use of fusion, all pertinent flight data of that position shall be transferred.					X								

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
96	Modify CARTS SW to Allow SBS DO-260B/282B Interface and Include Updated ADS-B Requirements	1004(b)	Implementation of Alternate Separation Standards in Order 7110.65S Chapter 7, Section 9, Paragraph 4 - SEPARATION							X						
97	RWSL SRMD SRMD-ATO-T-RWSL-ISM-2010-001	RWLS-010	Order 7110.65: Air Traffic Control (Chapter 3) Air Traffic Issues Clearance.			X										
98	RWSL SRMD SRMD-ATO-T-RWSL-ISM-2010-001	RWLS-011	Order 7110.65: Air Traffic Control (Chapter 3) Air Traffic Issues Clearance.			X										
99	RWSL SRMD SRMD-ATO-T-RWSL-ISM-2010-001	RWLS-010	Order 7110.65: Air Traffic Control (Chapter 3) Air Traffic Issues Clearance.			X										
100	RWSL SRMD SRMD-ATO-T-RWSL-ISM-2010-001	RWLS-011	Order 7110.65: Air Traffic Control (Chapter 3) Air Traffic Issues Clearance.			X										

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
101	Terminal ATC with ADS-B and STARS	CS5	N Order 7110.xxx, 6c 1: Inform all appropriate positions before terminating or reinstating use of the fusion automation system at a control position. When terminating the use of fusion, all pertinent flight data of that position shall be transferred or terminated.[11]					X								

[11] Complete text of control: "N Order 7110.xxx, 6c 1: Inform all appropriate positions before terminating or reinstating use of the fusion automation system at a control position. When terminating the use of fusion, all pertinent flight data of that position shall be transferred or terminated. 2. Inform other interfaced facilities of scheduled and unscheduled shutdowns. 3. Initiate a track/tag on all aircraft to the maximum extent possible. As a minimum, aircraft identification should be entered, and automated handoff functions should be used. 4. Assigned and reported altitude shall be displayed if available and shall be kept current at all times that the aircraft is in level flight. Climb and descent arrows, where available, shall be used to indicate other than level flight."

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
102	Terminal ATC with ADS-B and CARTS SRMD	A1	N Order 7110.xxx, 6c 1: Inform all appropriate positions before terminating or reinstating use of the fusion automation system at a control position. When terminating the use of fusion, all pertinent flight data of that position shall be transferred or terminated.[12]					X								
103	Terminal ATC with ADS-B and CARTS SRMD	A2	N Order 7110.xxx, 6c 1: Inform all appropriate positions before terminating or reinstating use of the fusion automation system at a control position. When terminating the use of fusion, all pertinent flight data of that position shall be transferred or terminated.[12]					X								

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada Airspace	13 Decision Support Tools
104	Terminal ATC with ADS-B and CARTS SRMD	A4	N Order 7110.xxx, 6c 1: Inform all appropriate positions before terminating or reinstating use of the fusion automation system at a control position. When terminating the use of fusion, all pertinent flight data of that position shall be transferred or terminated.[12]					X								
105	Terminal ATC with ADS-B and CARTS SRMD	A5	N Order 7110.xxx, 6c 1: Inform all appropriate positions before terminating or reinstating use of the fusion automation system at a control position. When terminating the use of fusion, all pertinent flight data of that position shall be transferred or terminated.[12]					X								

Table B-1. Order 7110.65 procedures cited as controls in equipment SRMDs (continued)

Ref. No.	SRMD Title	Hazard ID	Control Text	1 General/Intro.	2 General Control	3 Terminal ATC	4 Instrument Flight Rules	5 Radar	6 Non-Radar	7 Visual Flight Rules	8 Offshore/ Oceanic	9 Special Flights	10 Emergency	11 Traffic Management	12 Canada	13 Decision
106	ERAM flight plan updates not output to FDIO when strip printing fails SRMD	PR 57238-01	Nonradar coordination is required per 7110.65, paragraph 2-1- 14This coordination could be automated (sending of the strip to the FDIO facility), or manual. If the EnRoute controller is aware that the tower is not getting a strip, manual coordination is needed. A nonradar tower requires verbal coordination to perform handoff. The altitude information provided is just the cleared for approach (not an actual altitude).		X											
107	RWSL SRMD SRMD-ATO-T-RWSL-ISM-2010-001	RWLS-028	Traffic Management Initiatives											X		
			No. Controls by Order 7110.65 Chapter	**0**	**37**	**4**	**8**	**43**	**28**	**2**	**0**	**0**	**3**	**1**	**0**	**8**