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Air Traffic Control Officer Long-Term Planning
USTDA Activity Number 2010-31046A

Prepared for:
The Airports Authority of India

FINAL REPORT PART 2

December 2011



This report was funded by the U.S. Trade and Development Agency (USTDA), an agency of the U.S. Government. The opinions, findings, conclusions, or recommendations expressed in this document are those of the author(s) and do not necessarily represent the official position or policies of USTDA. USTDA makes no representation about, nor does it accept responsibility for, the accuracy or completeness of the information contained in this report.

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Acronyms

AAI	Airports Authority of India
ACC	Area Control Center
ACP	US-India Aviation Cooperative Program
ANSP	Air Navigation Service Provider
APP	Approach Control
ASM	Air Space Management
ATCO	Air Traffic Control Officer
ATC	Air Traffic Control
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
ATMTP	US-India Air Traffic Management Training Program
ATS	Air Traffic Services
CANSO	Civil Air Navigation Services Organization
CATC	Civil Aviation Training College
CDM	Collaborative Decision Making
CMD	Control and Monitoring Display
CNS	Communication, Navigation and Surveillance
DGCA	Directorate General Civil Aviation
DGM	Deputy General Manager
DRVSM	Domestic Reduced Vertical Separation Minimum
ETD	Expected Time of Departure
EUROCONTROL	European Organization for the Safety of Air Navigation
FAA	Federal Aviation Administration
FIC	Flight Information Center
FIR	Flight Information Region
FIS	Flight Information Service
FDSP	Flight Data Processing System
GM	General Manager
GOI	Government of India
HQ	Headquarters
HR	Human Resources
IAF	Indian Air Force
ICAO	International Civil Aviation Organization
IPT	Integrated Product Team
JCAC	Joint Control and Analysis Center
JRCC	Joint Rescue Coordination Center
LWOP	Leave Without Pay
MAP	Monitor Alert Parameter

NM	Nautical Mile
NOTAM	Notice To Airmen
OJT	On-the-job training
OJTI	On-the-job training Instructor
PBN	Performance Based Navigation
PDC	Pre-Departure Clearance
PELA	Proficiency Test in English Language for Air Traffic Controllers
R&D	Research and Development
RCAG	Remote Communications Air-Ground
RNP	Required Navigation Performance
RVSM	Reduced Vertical Separation Minimum
Rwy	Runway
SAR	Search and Rescue
SDAT	Sector Design Analysis Tool
SESAR	Single European Sky ATM Research Program
SID	Standard Instrument Departure
SMC	Surface Movement Control
SMS	Safety Management System
SOP	Standard Operating Procedure
STAR	Standard Terminal Arrival Route
STP	Standardized Training Packages
TAAM	Total Airspace and Airport Modeler
TARGETS	Terminal Area Route Generation Evaluation & Traffic Simulation
TOP	Time on Position
VHF	Very High Frequency
VIP	Very Important Person
WCG	The Washington Consulting Group, Inc
WSO	Watch Supervisory Officer

Part 2

Executive Summary

1. The basic airspace, procedures and regulations already exist in India today. However, India's Civil Aviation Sector is experiencing the learning curve that more mature aviation systems have already encountered. This is not a negative view of India's Civil Aviation Sector, but instead a reality of what occurs as traffic increases dramatically in a short span of time. It occurs worldwide throughout the aviation community. As traffic has increased, India has made changes to manpower requirements and training, airspace and procedures, and equipment. Lessons have been learned and changes made, but lessons will continue to be learned and acted upon as India's Civil Aviation Sector continues to grow.
2. The Airports Authority of India (AAI) recognized the potential for airport infrastructure constraints to curb the aviation industry, and in 2005 began an airport upgrade and modernization program. As a result of this program, Delhi, Mumbai, Bangalore, Hyderabad, and Cochin have new expansive terminals capable of significant civil aviation growth. The AAI also identified 35 non-metro airports for upgrade and modernization and is expected to complete the modernization by 2012. In addition to the 35 non-metro airports, the AAI plans to modernize 13 other airports and operate another 12 facilities that are currently not being used.
3. The foundation is being set for India civil aviation to grow tremendously at a fast pace. Modernization of airports is nearly complete and airlines are purchasing aircraft to transport the passengers. This network of airports and aircraft needs to be supported by a cadre of well trained air traffic control officers (ATCO) to ensure a safe system with sufficient capacity and efficiency.
4. The Airports Authority of India is entrusted with ensuring the manpower requirements necessary to maintain a safe, orderly and efficient air traffic operational system capable of growth. Aviation growth in the last few years, and the anticipated aviation growth of the future, mandates that the development of ATCO human resources is a critical element in advancing system capacity. Recruitment, hiring, training and ensuring both the number of ATCOs and their preparation, is essential to the continued growth of aviation in India.
5. The Terms of Reference of The Washington Consulting Group, Inc. (WCG) was to assist the AAI to plan for the adequate staffing of air traffic control officers in order to ensure the safe and efficient management of Indian airspace. The hiring and training of new air traffic control officers and expansion of the existing officer capacity, is essential in order to manage the current and anticipated growth in air traffic and to prepare for a major air traffic control modernization program.
6. In order to plan for the extensive requirements for highly skilled manpower, the AAI prepared the Long-Term Manpower Plan for Air Traffic Control Officers in India, the first of its kind. WCG conducted an objective, expert review of this Manpower Plan to ensure compliance

with the policies and practices of the International Civil Aviation Organization (ICAO) and incorporation of international best practices into the AAI's approach for implementation. The Manpower Plan focused on field facilities and did not include an evaluation of the Civil Aviation Training College (CATC), which plays a critical role in building capacity for the development of India's air traffic control system and specifically for fulfilling the manpower requirements for air traffic control officers in India. The review included an examination and analysis of the CATC's manpower and training requirements, including human resources and systems support, to meet the staffing needs that the CATC requires to fulfill its mandate regarding air traffic control officer training.

7. This report also includes analysis and recommendations regarding the future manpower requirements for three potential elements of India's air traffic control facilities: (1) establishment of strategic Air Space Management (ASM) at regional and corporate headquarters; (2) establishment of a strategic and tactical Air Traffic Flow Management (ATFM); and (3) establishment of a research and development wing of the air traffic management (ATM). This initial evaluation is an important step forward in integrating the development of these facilities into long-term planning for the sector.

8. WCG took into consideration material available in many ICAO documents and many reference materials from other Air Navigation Service Providers (ANSP) worldwide, and documents from AAI. Specifically they were:

- i. Long-Term Manpower Plan for Air Traffic Control Officers in India
- ii. Airports Authority of India Act, 1994
- iii. AAI Standard Operating Procedures
- iv. AAI Recruitment and Promotion Guidelines
- v. Future Air Navigation System Master Plan, February 2008
- vi. Schedule of near and medium-term planned air traffic control improvements and procurements by commercial service airports and the Air Traffic Control (ATC) system as a whole
- vii. AAI ATM Strategic Plan; Volume 1 Optimising Safety, Capacity, Efficiency and Environment; Version 1 Dated April 08
- viii. AAI Review of Working Hours and Roster Of Air Traffic Controllers; Report Of The Committee and Addendum
- ix. AAI ANS Manpower deployment
- x. ICAO Doc 9426; Air Traffic Services Planning Manual
- xi. ICAO Annex I; Personnel Licensing
- xii. Indian Aviation: A Review of 2009 and Outlook for 2010; published by The Centre for Asia Pacific Aviation
- xiii. ICAO Doc 9854; global Air Traffic Management Operational Concept
- xiv. ICAO Annex 11
- xv. EUROCONTROL Air Traffic Flow and Capacity Management Strategy
- xvi. ICAO DOC 9750; Global Air Navigation Plan for CNS/ATM Systems
- xvii. EUROCONTROL; Report on Issues in ATCO Manpower Planning

xviii. FAA; A Plan for the Future - 10-Year Strategy for the Air Traffic Control Workforce

9. The Long Term Manpower Plan for Air Traffic Control Officers in India was reviewed based on the following:

- i. Number of Air Traffic Service (ATS) units existing at the largest airports and categories of smaller airports
- ii. Number of operational shifts
- iii. Traffic density and airspace complexity
- iv. Training requirements
- v. Fatigue Management (Relief)
- vi. Leave requirements
- vii. Tour requirements (such as familiarization flights)
- viii. Medical requirements to maintain the currency of licenses and ratings
- ix. Downtime due to de-rostering
- x. Refresher courses
- xi. Annual retirements and anticipated attritions

10. The review involved WCG meeting with the AAI representatives from Headquarters and site visits to the CATC and field facilities. AAI identified four facilities for the visit; (1) Delhi Airport, (2) Mumbai Airport, (3) Hyderabad Airport, and (4) Chennai Airport.

11. WCG also reviewed and incorporated the findings from the 2009 Federal Aviation Administration (FAA) Report on India's Air Traffic Management Training Program. The FAA made formal recommendations in 2009 to the Government of India after teams in 2008 and one year later in 2009 visited Delhi and Mumbai International Airports. This effort, the U.S.-India Air Traffic Management Training Program (ATMTP) was the first project under the U.S.-India Aviation Cooperation Program (ACP), a public-private partnership established by the U.S. Government (USG) and U.S. aviation companies to provide a forum for unified communication between the GOI and U.S. public and private sector entities active in India. The ACP identified air traffic and airspace management enhancements as its primary initial focus in order to support the growth of India's aviation sector. The ATMTP was designed to provide the framework for an overall air traffic management (ATM) plan and specifically provide tools to address the air space management problems at specific airports through the training of Indian air traffic controllers and/or airspace designers/planners in "high density" operations.

This effort included members of the FAA, Embry-Riddle Aeronautical University, and WCG. On-site observations, discussions and airport data provided by the Indian government and FAA was utilized. Informational meetings were also conducted with a number of ACP members, airline representatives from IndiGo, Delta Airlines, Jet Airways and Continental Airlines, controllers and management from both airports, representatives from the AAI and the Air Traffic Controllers' Guild.