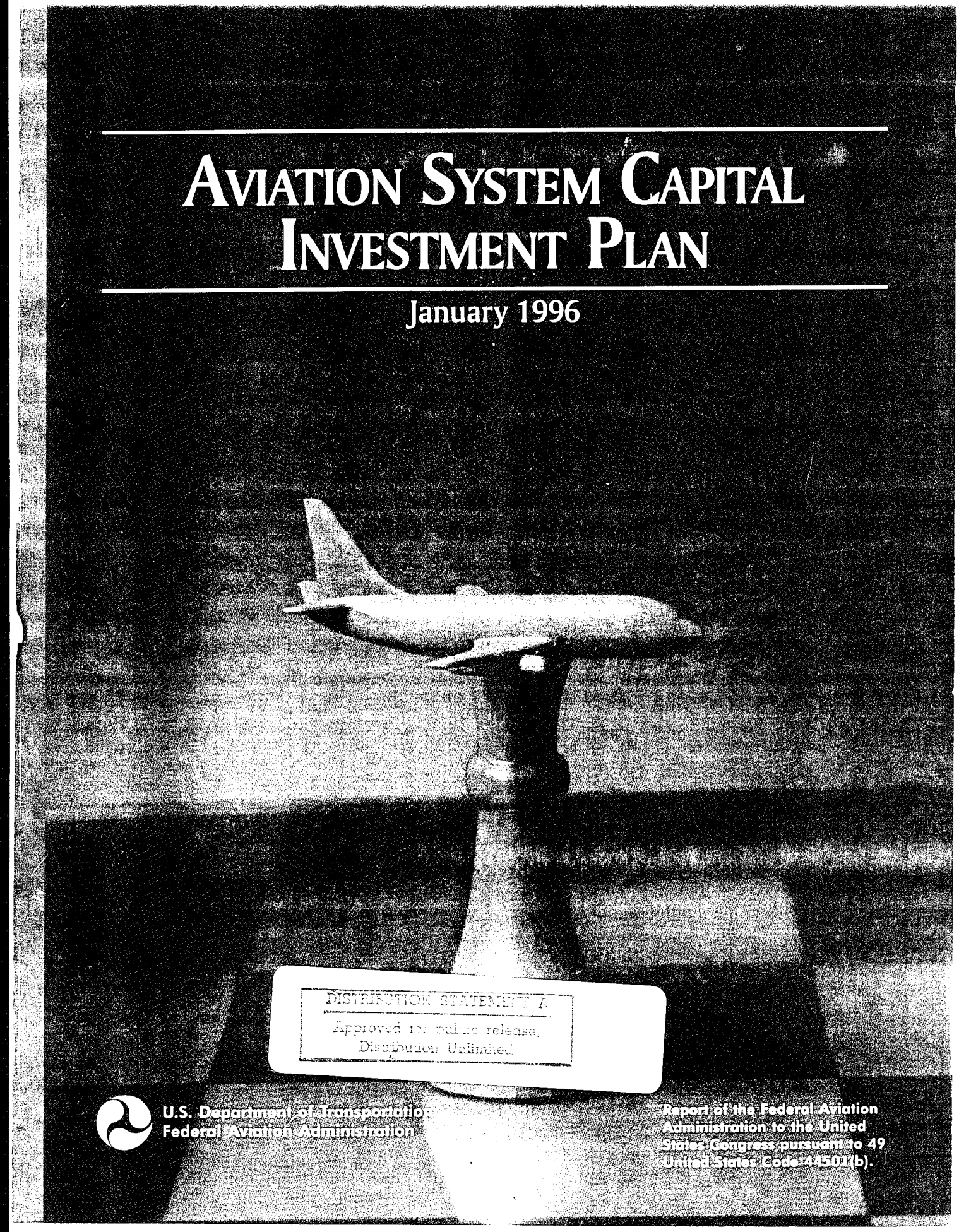
AVIATION SYSTEM CAPITAL INVESTMENT PLAN

January 1996



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CHAPTER 1
INTRODUCTION

Overview

The national airspace system (NAS) is the largest, busiest, most complex, and most technologically advanced aviation operation in the world. The Federal Aviation Administration (FAA) has the principal responsibility for providing the NAS infrastructure to support all air operations within the United States and certain oceanic areas. This responsibility extends from air traffic control to system security and from safety to international coordination; it must be met 24 hours a day, 365 days a year, with a requirement for excellence that is unmatched in virtually any other undertaking. The FAA is committed to carrying out these tasks in an efficient, cost–effective manner.

Through the cooperative and dedicated efforts of the FAA and the aviation community, the NAS has compiled an outstanding record of operational safety and efficiency. To maintain the current record in the face of growing demand, the FAA has instituted a capital investment planning process based on mission needs and future concepts. The Aviation System Capital Investment Plan (CIP) is the result of this planning effort. Projects in the CIP will systematically improve and expand the current system by capitalizing on new technologies and procedures, and make the most effective use of available resources.

Systematic implementation of the projects defined in this CIP will improve safety and efficiency, while accommodating spiraling demands. The plan supports a more complex system and creates a foundation for continued evolution that uses modern technologies and capabilities. The CIP also recognizes that continuing upgrades and enhancements are necessary to meet evolving NAS user needs. Chapter 2 describes the services provided by the following areas: aircraft and aircrew, flight service stations, airport, terminal, en route, and internal support. Chapter 3 contains individual project narratives grouped by functional areas.

Evolutionary Nature of the CIP

Due to its size and complexity, the NAS cannot be described in terms of a final end–state system that can satisfy the Nation's aviation demands for the next 50 years. For this reason, the FAA has characterized change in the NAS as evolutionary because improvements made over time are more manageable and less resource intensive. Additionally, evolutionary improvements permit greater flexibility as both requirements and technology change.

NAS Architecture

Changes in requirements and evolution of technology must be integrated into the aviation system consistent with a NAS architecture. The needs of the users must be translated into a structured approach for providing the service. This is the function of the NAS architecture currently being developed by the FAA. The architecture provides the framework for investment decision making and is based on analysis of needs, system performance, and forecasted aviation demand for services.

The architecture is service–based, meaning that it is structured with a focus on providing service functions within the NAS. The architecture includes both those services provided by the FAA, as well as services provided by others who use the NAS.

A service–based architecture provides a road map for transition from one program to another, replacement of existing infrastructure, introduction of new capabilities, and the decommissioning of NAS components being replaced by improved capabilities. The road map provides the timing for these transitions and provision of improved capabilities.

The NAS architecture will be used as a planning and decision making tool in the CIP. It will provide descriptions of project transitions, interdependencies, and a longer–term overview of the NAS. Version 1.0 of the architecture is scheduled to be used in executing the FY 1997 facilities and equipment budget and planning for the FY 1998 budget submittal.

Developing a CIP project is a multistage process that begins with the development of a mission need statement (MNS). The MNS describes a NAS deficiency, alternatives for satisfying the deficiency, and an approximate cost. Requirements offices throughout the FAA submit proposed MNSs as soon as a deficiency is identified and understood. These are validated through a review process that results in the best possible mix of projects that meet authorization levels and reflect management priorities. As a result, CIP projects change to reflect the evolving environment. This is accomplished by regular revalidation of mission needs and continuous project oversight. NAS requirements and technology both evolve as projects mature.

NAS Requirements for Radio Spectrum

U.S. air safety depends on the NAS communications, navigation, and surveillance (CNS) infrastructure. Since reliable information transmission to or from aircraft in flight requires the use of radio signals, the FAA must have adequate radio spectrum allocations for all of its air/ground (A/G) communications, and for most of its navigation and surveillance capabilities as well. Radio spectrum is also important for communications among fixed and mobile ground facilities that support NAS operations.

By its very nature, aeronautical CNS requires relatively large amounts of radio spectrum because of several factors that limit frequency reuse in aeronautical systems. First, co–channel interference involving high–altitude aircraft can occur at very long distances. Second, the mobility and variable orientations of aircraft in flight greatly restrict the use of spectrum–conserving directional antennas for air/ground communications. Finally, most aeronautical CNS systems support critical safety–of–life operations whose reliability requirements necessitate very low probabilities of radio interference that are achievable only if spectrum allocations are fully adequate.

As U.S. air traffic continues to grow, imposing additional burdens on the CNS infrastructure, the need for aeronautical spectrum grows with it. Intense competition from other users, and the Government's new policy of enhancing its revenues by selling blocks of spectrum formerly reserved for Government use, are making it increasingly difficult to meet the expanding NAS spectral requirements.

For all these reasons, the radio spectrum must be regarded as a scarce and essential resouce for all aeronautical CNS systems that depend on the propagation of radio signals through the atmosphere. In all FAA projects that develop or sustain such systems, it is important to ensure that the systems are designed to perform their functions while consuming as little spectrum as possible, and that sufficient spectrum is allocated to perform those functions reliably throughout the NAS.

The FAA is currently conducting a comprehensive evaluation of its requirements for spectrum. This strategic spectrum analysis will identify and prioritize the FAA's needs for spectrum to operate its existing and future CNS systems. The study provides the FAA's requirements for retaining aeronautical

spectrum needed to ensure the safe, efficient, and economical operation of the nation's air traffic services.

Table 1–1 identifies the principal frequency bands comprising the radio spectrum, and the major characteristics determining their suitability to various aeronautical applications.

Table 1–1 Characteristics of Radio Spectrum Bands

Band	Freq. (MHz)	Antenna Gain	Propagation Modes	Coverage	Susceptibility	Predictability	Typical Aeronautical Applications
VLF	0.003–0.03	Low	Groundwave skywave	Up to 5000 nmi	Noise, skywave multipath	High	Narrowband Navigation Systems
LF	0.03–0.3	Low	Groundwave skywave	Up to 1000 nmi	Noise, skywave multipath	High	
MF	0.3–3	Low	Groundwave skywave	Up to 1000 nmi	Noise, skywave multipath	Medium	
HF	3–30	Low–Med.	Skywave, groundwave	World-wide	Noise, ionospheric activity	Low	Narrowband Longrange Communications
VHF	30–300	Low–Med.	Line–of–sight (LOS)	Line–of–sight (LOS)	Terrain multipath	High	LOS Communications and Navigation
UHF	300–3000	Low–High	Freespace	LOS	Terrain multipath	High	
SHF	3000–30000	Med.–Very High	Freespace	LOS	Weather, terrain multipath	Medium	Wideband LOS Communications and Navigation; High Resolution Surveillance
EHF	30000–300000	High–Very High	Freespace	Limited LOS	Weather, gaseous absorption	Medium	Wideband Short–Range CNS Systems

National Priorities and FAA Goals

The FAA's infrastructure improvements described in this document contribute to the five national priorities: safety and security; technological leadership and competitiveness; economic health and productivity; environmental protection; and fostering intermodalism. For example, new controller automation and navigation/landing aids will help increase NAS capacity and decrease delays, enabling the aviation system to keep pace with growth while reducing fuel consumption. Reduced fuel consumption contributes to both energy conservation and environmental protection. Improved weather information will increase aviation safety. The FAA's NAS modernization program will help ensure that the United States maintains its position as the world leader in aviation technology.

In response to the challenges faced in today's air transportation system, the FAA is developing a set of ambitious goals and objectives for the NAS. These goals and objectives, derived from the FAA Strategic Plan, are designed to support the overall FAA mission and provide a clear direction for improving NAS operations. It must be emphasized that these are FAA goals and not CIP goals. This distinction is important because other FAA plans (such as the Research, Engineering and Development Plan and the Airport Improvement Program) contribute to achieving the FAA goals along with the CIP.

In developing goals that are specific, measurable, and attainable, the FAA is seeking to achieve safety, capacity, and efficiency for NAS users (Table 1–2). These goals will be refined continually through a validation process to ensure they fully address mission needs, meet customer requirements, and can be supported at minimal risk with available technology.

Table 1–2. FAA Strategic Plan Goals and Supporting CIP Projects (derived from the 1995 FAA Strategic Plan)

Goal 1: Safety—Eliminate accidents and incidents in the aviation system with a strategy that targets the most critical areas.

1. Objective 1A. Establish Agency policy on safety risk assessment and risk management.
2. Objective 1B. Improve the effectiveness of FAA safety inspection resources through risk assessment and operational indicators.
   - A–17 Aviation Safety Analysis System (ASAS)
     –Provides safety workforce with automation tools.
   - A–18 Safety Performance Analysis System (SPAS)
     –Allows safety inspectors to access FAA and industry data.
   - A–19 Portable Performance Support System (PPSS)
     –Provides safety inspectors with pen–based technology to access data bases.
   - A–20 Integrated Flight Quality Assurance
     –Allows FAA to use digital flight data to accomplish safety surveillance.
3. Objective 1C. Minimize aging aircraft hazards.
4. Objective 1D. Minimize the risk of collisions and increase the efficiency of aircraft movements on the airport surface.
   - A–12 Airport Surface Target Identification (ATIDS)
     –Augments airport surface detection equipment (ASDE–3) radar to prevent runway incursion.
   - F–11 Power System Sustained Support
     –Provides optimum main and standby electrical power.
   - S–01 Airport Surface Detection Equipment (ASDE)
     –Allows radar surveillance of aircraft and vehicles on the airport surface.
   - S–01 Airport Movement Area Safety System (AMASS)
     –Provides runway incursion prevention system at airports with ASDE–3 radar.
5. Objective 1E. Improve FAA oversight of industry performance based on shared use of safety–related data and development of trend indicators.
   - A–18 Safety Performance Analysis System (SPAS)
     –Allows safety inspectors to access FAA and industry data.
   - A–19 Portable Performance Support System (PPSS)
     –Provides safety inspectors with pen–based technology to access data bases.
   - A–20 Integrated Flight Quality Assurance
     –Allows FAA to use digital flight data to accomplish safety surveillance.
6. Objective 1F. Encourage the aviation industry to maintain high levels of safety through incentive–base programs.
7. Objective 1G. Reduce the likelihood of weather–related accidents by improving access and delivery of weather information, and by improving technology.
   - C–03 Weather Message Switching Center Replacement
     –Processes data and distributes notices to airmen (NOTAMs) from facilities in Salt Lake City and Atlanta.

Table 1–2. FAA Strategic Plan Goals and Supporting CIP Projects (derived from the 1995 FAA Strategic Plan) (Continued)

W–01 Automated Weather Observing System (AWOS)
–Collects weather data from automated sensors at airports; provides data to pilots via computer generated voice. W–02 Weather Radar Program
–Long range Doppler weather radar for en route applications.
W–03 Terminal Doppler Weather Radar (TDWR)
–Provides windshear and microburst warnings at 45 major airports.
W–04 Weather and Radar Processor (WARP)
–Installs automated workstations for meteorologists.
W–05 Low–Level Windshear Alert System (LLWAS)
–Sensors at 110 airports alert controllers of hazardous wind conditions.
W–07 Integrated Terminal Weather System (ITWS)
–Integrates all terminal weather sensor data and provides 30 minute forecast.
W–09 Airport Surveillance Radar Weather Processor
–Enhances weather detection of ASR–8/9 radars.

8. Objective 1H. Provide one level of safety to all passengers traveling on regularly scheduled commercial aircraft with more than nine seats.

Goal 2: Security—Eliminate security incidents in the aviation system with a strategy that targets the most critical areas.

1. Objective 2A. Reduce the risk of security incidents by addressing specific vulnerabilities in the aviation system identified through risk assessment and data analysis.
M–15 NAS Spectrum Engineering Management
–Provides frequency management support to regions.

Goal 3: Eliminate accidents and incidents caused by human error.

1. Objective 3A. Support safety and other Agency goals by providing for systematic integration of human performance considerations across all Agency functions (e.g., certification, regulation, and management of the NAS during all phases of NAS design, development, and operation).

Goal 4. Implement an operational concept for the future that matches new technology and procedures with user needs.

1. Objective 4A. Refine and implement the FAA Operational Concept.

Goal 5. Meet system capacity needs with long–term solutions and real–time resolutions of today's targeted problems.

1. Objective 5A. System Capacity Measurement—Identify and define, in concert with the aviation community, standards of success and national capacity indicators which will better target areas for reducing delays and increasing capacity.

Table 1–2. FAA Strategic Plan Goals and Supporting CIP Projects (derived from the 1995 FAA Strategic Plan) (Continued)

2. Objective 5B. Near–Term Capacity Initiatives—Reduce constraints/limitations at the top 40 delay/operationally impacted airports by timely implementation of system enhancements and capacity increasing technologies and procedures.

A–01 En Route Automation Program
–Provides automated equipment including controller workstations.

A–02 Tower Automation Program
–Develops automation platforms which integrate multiple systems for airport traffic control towers (ATCTs).

A–03 Automated Radar Terminal System (ARTS) Improvements
–ARTS provides air traffic controllers with a computer aided radar display of aircraft position.

A–04 Standard Terminal Automation Replacement System (STARS)
–Replaces ARTS equipment.

A–05 Traffic Management System (TMS)
–Upgrades the traffic management computer complex.

A–06 En Route Software Development
–Provides contractor support at FAA Technical Center for en route software changes to correct operational problems.

A–07 Flight Service Automation System
–Upgrades 61 automated flight service stations by replacing hardware.

A–10 Oceanic Automation Program
–Meets demand of oceanic air traffic control by developing automation systems to replace manual handling.

A–11 Terminal Air Traffic Control Automation (TATCA)
–Increases air traffic flow and permits full use of airspace capacity.

A–12 Airport Surface Target Identification System (ATIDS)
–Automation enhancements augment ASDE–3 radar to prevent runway incursions.

C–01 Voice Switching and Control System (VSCS)
–New, large air/ground voice switch for centers.

C–20 Aeronautical Data–link
–Provides pilots and controllers with data link for weather and air traffic control services.

3. Objective 5C. Air Traffic Control (ATC)—Improve the automated infrastructure through replacement and enhancement to provide the platform for capacity–enhancing technologies and procedures.

A–01 En Route Automation Program
–Provides automated equipment including controller workstations.

A–02 Tower Automation Program
–Develops automation platforms which integrate multiple systems in airport traffic control towers (ATCTs).

A–03 Automated Radar Terminal System (ARTS) Improvements
–ARTS provides air traffic controllers with a computer aided radar display of aircraft position.

Table 1–2. FAA Strategic Plan Goals and Supporting CIP Projects (derived from the 1995 FAA Strategic Plan) (Continued)

A–04 Standard Terminal Automation Replacement System (STARS)
–Replaces ARTS equipment.

A–05 Traffic Management System (TMS)
–Upgrades the traffic management computer complex.

A–06 En Route Software Development
–Provides contractor support at FAA Technical Center for en route software changes to correct operational problems.

A–07 Flight Service Automation System
–Upgrades 61 automated flight service stations by replacing hardware.

A–10 Oceanic Automation Program
–Meets demand of oceanic air traffic control by developing automation systems to replace manual handling.

A–11 Terminal Air Traffic Control Automation (TATCA)
–Increases air traffic flow and permits full use of airspace capacity.

A–12 Airport Surface Target Identification System (ATIDS)
–Automation enhancements augment ASDE–3 radar to prevent runway incursions.

C–01 Voice Switching and Control System (VSCS)
–New, large air/ground voice switch for centers.

C–20 Aeronautical Data–link
–Provides pilots and controllers with data link for weather and air traffic control services.

F–08 Sustain San Juan CERAP
–Upgrade equipment until CERAP refurbished by project F–01.

M–08 Continued General Support
–Regional projects and small, nonrecurring projects not in the CIP projects.

N–03 Instrument Landing System (ILS)
–Establishes new ILS sites, replaces older systems, extends Mark 1B and 1C systems, and assumes responsibility for AIP/ADAP systems.

N–12 Augmentations for the Global Positioning System (GPS)
–Will allow GPS to be used as radio navigation system for all phases of flight.

S–02 Mode S
–Improves radar beacon surveillance capability

W–02 Weather Radar Program
–Long range Doppler weather radar for en route applications.

W–03 Terminal Doppler Weather Radar (TDWR)
–Provides windshear and microburst warnings at 45 major airports.

W–04 Weather and Radar Processor (WARP)
–Installs automated workstations for meteorologists.

W–05 Low–Level Windshear Alert System (LLWAS)
–Sensors at 110 airports alert controllers of hazardous wind conditions.

W–07 Integrated Terminal Weather System (ITWS)
–Integrates all terminal weather sensor data and provides 30 minute forecast.

Table 1–2. FAA Strategic Plan Goals and Supporting CIP Projects (derived from the 1995 FAA Strategic Plan) (Continued)

W–09 Airport Surveillance Radar Weather Processor
–Enhances weather detection of ASR–8/9 radars.
–Provides automated equipment including controller workstations.

4. Objective 5D. Traffic Flow Management—Create the necessary capabilities to permit the air traffic control system to ensure safe separation while imposing minimum constraints on system users and aircraft movement.

A–01 En Route Automation Program
A–02 Tower Automation Program
–Develops automation platforms which integrate multiple systems for airport traffic control towers (ATCTs).
A–03 Automated Radar Terminal System (ARTS) Improvements
–ARTS provides air traffic controllers with a computer aided radar display of aircraft position.
A–04 Standard Terminal Automation Replacement System (STARS)
–Replaces ARTS equipment.
A–05 Traffic Management System (TMS)
–Upgrades the traffic management computer complex.
A–10 Oceanic Automation Program
–Meets demand of oceanic air traffic control by developing automation systems to replace manual handling.
A–11 Terminal Air Traffic Control Automation (TATCA)
–Increases air traffic flow and permits full use of airspace capacity.
A–12 Airport Surface Target Identification System (ATIDS)
–Automation enhancements augments ASDE–3 radar to prevent runway incursions.
A–13 Digital Brite Radar Indicator Tower Equipment (DBRITE)
–Provides tower controllers with visual display (TV) of aircraft position.
C–06 Communications Facilities Enhancement
–Interim project, adds modern equipment, to be replaced by next generation communication system.
C–15 FAA Telecommunications Satellite (FAATSAT)
–Provides alternative communication link to avoid single point of failure.
F–02 Metroplex Control Facility (MCF)
–Consolidates terminal radar approach control (TRACON) facilities.
F–03 Austin–Bergstrom International Airport Program
–Establishes air traffic control facilities and equipment for new airport.
F–11 Power Systems Sustain Support
–Provides optimum main and standby electrical power.
M–11 Aircraft Fleet Modernization
–Replaces outmoded, multitype aircraft with modern aircraft.
M–12 Aircraft Related Equipment Program
–Upgrades obsolete electronic equipment in FAA aircraft fleet.
M–13 Precision Automated Tracking System (PATS)
–Replaces laser–tracker at FAA Technical Center.

Table 1–2. FAA Strategic Plan Goals and Supporting CIP Projects (derived from the 1995 FAA Strategic Plan) (Continued)

N–03 Instrument Landing System (ILS)
–Establishes new ILS sites, replaces older systems, extends Mark 1B and 1C systems, and assumes responsibility for AIP/ADAP systems.

N–04 Visual Navaids
–Provides frangible airport lighting systems and remote radio control equipment.

N–06 VORTAC
–Upgrades national navigation network.

N–08 Runway Visual Range (RVR)
–Establishes new RVR systems to support airport operations.

N–09 Sustain Distance Measuring Equipment (DME)
–Replaces outdated DMEs with solid–state units that have remote maintenance monitoring.

N–10 Sustain Nondirectional Beacon (NDB)
–Maintains or replaces NDBs with modern equipment.

N–11 Loran–C Monitors and Transmitter Enhancements
–Provides stations and monitors to fill the mid–continent gap in Loran–C coverage.

N–12 Augmentations for the Global Positioning System (GPS)
–Will allow GPS to be used as radio navigation system for all phases of flight.

S–04 Long Range Radar Program
–Long–range 3–dimensional radars for en route airspace.

S–08 Precision Runway Monitor
–Allows use of closely spaced parallel runways during poor weather.

W–02 Weather Radar Program
–Long range Doppler weather radar for en route applications.

W–03 Terminal Doppler Weather Radar (TDWR)
–Provides windshear and microburst warnings at 45 major airports.

W–04 Weather and Radar Processor (WARP)
–Installs automated workstations for meteorologists.

W–07 Integrated Terminal Weather System (ITWS)
–Integrates all terminal weather sensor data and provides 30 minute forecast.

W–09 Airport Surveillance Radar (ASR) Weather Systems Processor
–Enhances weather detection of ASR–8/9 radars.

5. Objective 5E. Oceanic Control—Change, in concert with the international aviation community, oceanic air traffic control from its current non–radar control to a tactical control environment much like the current domestic radar control.

A–10 Oceanic Automation Program
–Meets demands of oceanic air traffic control by developing automation systems to replace manual handling.

C–20 Aeronautical Data–link
–Provides pilots and controllers with data link for weather and air traffic control services.

Table 1–2. FAA Strategic Plan Goals and Supporting CIP Projects (derived from the 1995 FAA Strategic Plan) (Continued)

C–21 Next–Generation Air/Ground Communications System
–Replaces analog system with digital communication system.

C–22 Gulf of Mexico
–Increases aircraft system capacity in Gulf of Mexico by improvements to communications, navigation, and surveillance.

N–12 Augmentations for the Global Positioning System (GPS)
–Will allow GPS to be used as radio navigation system for all phases of flight.

6. Objective 5F. Weather Forecasting, Detection, and Communication—Reduce the capacity–impacting consequences of weather phenomena by improved weather forecasts and increased accuracy, resolution, and dissemination of observations on the ground and in the air.

W–01 Automated Weather Observing System (AWOS)
–Collects weather data from automated sensors at airports; provides data to pilots via computer generated voice.

W–02 Weather Radar Program
–Long range Doppler weather radar for en route applications.

W–03 Terminal Doppler Weather Radar (TDWR) System
–Provides windshear and microburst warnings at 45 major airports.

W–04 Weather and Radar Processor (WARP)
–Installs automated workstations for meteorologists.

W–05 Low–Level Windshear Alert System (LLWAS)
–Sensors at 110 airports alert controllers of hazardous wind conditions.

W–07 Integrated Terminal Weather System (ITWS)
–Integrates all terminal weather sensor data and provides 30–minute forecast.

W–09 Airport Surveillance Radar (ASR) Weather Systems Processor
–Enhances weather detection of ASR–8/9 radars.

7. Objective 5G. Communications, Navigation and Surveillance (CNS) and Satellite Navigation—Implement CNS and satellite navigation capabilities through an aggressive industry/government partnership that achieves user benefits in all phases of aviation operations.

A–10 Oceanic Automation Program
–Meets demands of oceanic air traffic control by developing automation systems to replace manual handling.

C–22 Gulf of Mexico
–Increases aircraft system capacity in Gulf of Mexico by improvements to communications, navigation, and surveillance.

N–12 Augmentations for the Global Positioning System (GPS)
–Will allow GPS to be used as radio navigation system for all phases of flight.

S–03 Terminal Radar Program
–Replace ASR–4/5/6s as primary airport surveillance radar.

S–08 Precision Runway Monitor
–Allows use of closely spaced parallel runways during poor weather.

8. Objective 5H. Communications/Data–link—Provide a cost–effective communications infrastructure to enhance the safety and effectiveness of air traffic management operations.

C–01 Voice Switching and Control System (VSCS)
–New, large air/ground voice switch for centers.

Table 1–2. FAA Strategic Plan Goals and Supporting CIP Projects (derived from the 1995 FAA Strategic Plan) (Continued)

C–02 Multichannel Voice Recorders
–Replaces voice recorders that record all pilot and controller communications.
C–04 Radio Control Equipment
–Provides equipment used to control air/ground radios from a remote location.
C–05 Voice Switches
–Replaces voice switches at ATCTs, TRACONs, and MCFs.
C–06 Commuications Facilities Enhancement
–Interim project, adds modern equipment, to be replaced by next generation communication system.
C–09 Sustaining Backup Emergency Communications
–Replaces backup radios at centers.
C–10 Emergency Transceiver Replacement
–Replaces obsolete emergency transceivers in ATCTs and TRACONs.
C–11 Data Multiplexing Network (DMN) Continuation
–Allows independent transmissions to be consolidated on a single circuit.
C–12 Expansion/Reconfiguration of Low Density Radio Communications Link (LDRCL)
–Replaces radar microwave link with a low density radio communication link.
C–14 Critical Telecommunications Support
–Funds small communication projects.
C–15 FAA Telecommunications Satellite (FAATSAT)
–Provides alternative communication link to avoid single point of failure.
C–17 Establish Alaskan NAS Interfacility Communications System Satellite Network
–Establishes an interfacility satellite communication system for Alaskan region.
C–20 Aeronautical Data–link
–Provides pilots and controllers with data link for weather and air traffic control services.
C–22 Gulf of Mexico
–Increases aircraft system capacity in Gulf of Mexico by improvements to communications, navigation, and surveillance.
C–23 Digital Voice Recorder System (DVRS)
–Replaces analog recorders with COTS digital recorders.
F–10 Airport Cable Loop Systems Sustained Support
–Upgrades power and distribution systems at Level III, IV, and V airports.

9. Objective 5I. Airport Planning—Improve the national airport planning process by: adding a method for priortizing projects; linking the national plan to the grant program through an Airports Capital Improvement Program; and developing the Airports Research, Engineering and Development Plan.

10. Objective 5J. Human Factors—Implementing new automation technologies and associated functional improvements in a manner that fully accounts for the proper role of people in the system.

A–01 En Route Automation Program
–Provides automated equipment including controller workstations.

Table 1–2. FAA Strategic Plan Goals and Supporting CIP Projects (derived from the 1995 FAA Strategic Plan) (Continued)

A–02 Tower Automation Program
–Develops automation platforms which integrate multiple systems for airport traffic control towers (ATCTs).

A–03 Automated Radar Terminal System (ARTS) Improvements
–ARTS provides air traffic controllers with a computer aided radar display of aircraft position.

A–04 Standard Terminal Automation Replacement System (STARS)
–Replaces ARTS equipments.

A–14 Instrument Approach Procedures Automation (IAPA)
–Provides an automated tool which allows procedure specialists to quickly develop standard instrument approach procedures.

A–15 Civil Aviation Registry Modernization
–Modernizes the airmen certification and aircraft registration system.

A–17 Aviation Safety Analysis System (ASAS)
–Provides safety workforce with automation tools.

A–18 Safety Performance Analysis System (SPAS)
–Allows safety inspectors to access FAA and industry data.

A–19 Portable Performance Support System (PPSS)
–Provides safety inspectors with pen–based technology to access data bases.

F–09 Replacement of Controller Chairs
–Replaces controller chairs at centers, towers, and flight service stations.

F–17 Computer Aided Engineering Graphics (CAEG) Enhancement
–Replaces current workstations and provides additional automated graphics workstations at regions and centers.

M–07 NAS Infrastructure Management System (NIMS)
–Automates FAA maintenance operations.

M–10 Distance Learning
–Expands training at workstations, reduces need to travel to central facility.

M–18 Computer Resources Nucleus (CORN)
–Created an FAA–wide computer resource.

M–20 National Airspace System Training
–Procures and installs modern training media systems at FAA Academy.

Goal 6: Promote United States aviation and United States preeminence in the global aviation system.

1. Objective 6A. Promote international harmonization through cooperative efforts to align certification, operational, and maintenance standards, practices, and procedures.

A–10 Oceanic Automation Program
–Meets demands of oceanic air traffic control by developing automation systems to replace manual handling.

C–21 Next–Generation Air/Ground Communications System
–Replaces analog system with digital communication system.

Table 1–2. FAA Strategic Plan Goals and Supporting CIP Projects (derived from the 1995 FAA Strategic Plan) (Continued)

C–22 Gulf of Mexico
–Increases aircraft system capacity in Gulf of Mexico by improvements to communications, navigation, and surveillance.
N–12 Augmentations for the Global Positioning System (GPS)
–Will allow GPS to be used as radio navigation system for all phases of flight.

Goal 7: Increase, with a sense of urgency, the efficiency of the air transportation system.

1. Objective 7A. Implement a comprehensive, Agency–wide general aviation program that demonstrates the FAA's commitment to preserve and revitalize the general aviation industry.
2. Objective 7B. Revitalize the regulatory process, using industry and public input, to expedite rule–making development and reduce economic burden while maintaining the highest level of safety and environmental protection.
3. Objective 7C. FAA will help aviation reduce the cost of flying by making the air traffic management system more efficient to use and avoiding the imposition of undue regulatory costs on all categories of aviation.

Goal 8: Achieve, through United States leadership, international standardization of a safe and efficient global air transportation system.

1. Objective 8A. Provide world leadership in the enhancement of global aviation safety and efficiency by collaborating with the international community on policy and operational initiatives.
2. Objective 8B. Reduce international regulatory costs to industry through harmonization, regulatory cooperation, and joint research and implementation of new technologies.
A–10 Oceanic Automation Program
–Meets demands of oceanic air traffic control by developing automation systems to replace manual handling.
C–21 Next–Generation Air/Ground Communications System
–Replaces analog system with digital communication system.
C–22 Gulf of Mexico
–Increases aircraft system capacity in Gulf of Mexico by improvements to communications, navigation, and surveillance.
N–12 Augmentations for the Global Positioning System (GPS)
–Will allow GPS to be used as radio navigation system for all phases of flight.
3. Objective 8C. Provide technical assistance and training to enhance international aviation safety and security (see System Safety goal).
4. Objective 8D. Contribute to the efforts of the International Civil Aviation Organization (ICAO) to become more efficient and responsive to the needs of its members in today's dynamic technological environment, and ensure that the interests of the United States Government are well represented within the organization.
A–10 Oceanic Automation Program
–Meets demands of oceanic air traffic control by developing automation systems to replace manual handling.

Table 1–2. FAA Strategic Plan Goals and Supporting CIP Projects (derived from the 1995 FAA Strategic Plan) (Continued)

C–21 Next–Generation Air/Ground Communications System
–Replaces analog system with digital communication system.
C–22 Gulf of Mexico
–Increases aircraft system capacity in Gulf of Mexico by improvements to communications, navigation, and surveillance.
N–12 Augmentations for the Global Positioning System (GPS)
–Will allow GPS to be used as radio navigation system for all phases of flight.

5. Objective 8E. Ensure that foreign air carriers operating to the United States comply with ICAO minimum standards.

6. Objective 8F. In cooperation with industry and other Federal agencies, promote United States aviation system technologies, products, and services.

A–10 Oceanic Automation Program
–Meets demands of oceanic air traffic control by developing automation systems to replace manual handling.
C–21 Next–Generation Air/Ground Communications System
–Replaces analog system with digital communication system.
C–22 Gulf of Mexico
–Increases aircraft system capacity in Gulf of Mexico by improvements to communications, navigation, and surveillance.
F–14 System Support Laboratory Sustained Support
–Provides facilities and equipment at FAA Technical Center for test, evaluation, and integration of new systems.
F–15 General Support Laboratory Sustained Support
–Provides facilities, equipment, aircraft, and general computer systems to support engineering, development, and testing programs at the Technical Center.
F–16 FAA Technical Center Building and Plant Support
–Funds FAA Technical Center building lease and improvement of physical plant equipment.
F–18 Aeronautical Center NAS Support Facilities
–Provides training complexes and support buildings for FAA training at the Aeronautical Center.
F–19 Aeronautical Center Leases
–Provides funds for leasing the FAA Aeronautical Center.
N–12 Augmentations for the Global Positioning System (GPS)
–Will allow GPS to be used as radio navigation system for al phases of flight.

Goal 9: Provide strong leadership in mitigating the adverse environmental impact of aviation.

1. Objective 9A. Reduce the impact of aircraft noise by 80 percent (based on population) by 2000, through an optimal mix of new aircraft certification standards, operating procedures, land use initiatives, and technology.

2. Objective 9B. Define and minimize the impact of aircraft emissions, through an optimal mix of new aircraft certification standards, operational procedures, and technology.

Table 1–2. FAA Strategic Plan Goals and Supporting CIP Projects (derived from the 1995 FAA Strategic Plan) (Continued)

3. Objective 9C. Create an environmentally effective and responsive FAA both domestically and internationally.

F–13 Environmental Cleanup

–Ensures all FAA facilities comply with all regulations and statutes regarding environmental protection, occupational health and safety, and conservation.

Goal 10: Operate the FAA like a business. FAA's business focus will address a shift toward practicing and valuing:

- **Customer Service**
- **Cost reduction and containment; and**
- **Accountability for results**

1. Objective 10A. Make FAA a customer–focused organization that anticipates and meets customer needs.

F–23 Relocate Honolulu Combined CERAP

–Moves Honolulu CERAP from Diamond Head Crater to a new site.

2. Objective 10B. Reduce the overall costs of operating FAA without reducing safety.

M–17 Test Equipment Modernization and Replacement

–Replaces sector test equipment that cannot be repaired or supported by the Logistics Center.

M–21 Logistics Support Systems and Facilities

–Identifies and provides support equipment and facilities required for life–cycle support.

M–25 Independent Operational Test and Evaluation

–Provides oversight of major acquisitions to ensure operational readiness.

M–27 National Airspace Integrated Logistics Support (NAILS)

–Ensures pre–deployment supportability planning is included in all acquisitions.

M–30 Integrated Communications Switching System (ICSS) Logistics Support

–Transfers site and depot level logistics support from the manufacturer to the FAA.

N–05 Low–Power TACAN Antennas

–Replaces old antennas with low power antennas, eliminating need for engine generator backup.

S–05 Long–Range Radar Radome Replacement

–Replaces radomes at long–range radar sites and those not compatible with Mode S antenna.

W–06 Digital Altimeter Setting Indicator (DASI) Replacement

–Replaces aging altimeters at airport traffic control towers.

3. Objective 10C. Achieve significant relief from existing personnel, acquisition, and budget constraints.

M–02 Technical Support Services

–Provides contractor support during peak implementation periods.

Table 1–2. FAA Strategic Plan Goals and Supporting CIP Projects (derived from the 1995 FAA Strategic Plan) (Continued)

M–03 CIP System Engineering and Technical Assistance
–Provides support in system engineering and program management.
M–04 National Airspace System In–Plant Contract Support Services
–Provides in–plant contract support services that represent FAA interests on major contracts.
M–05 National Airspace System Regional/Center Logistics Support Services
–Provides procurement, real estate, and data processing support for regional/center personnel.
M–07 NAS Infrastructure Management System (NIMS)
–Provides a system to automate FAA maintenance operations.
M–22 National Airspace System Implementation Support
Contractor support assists in transition of systems to operational environment.

4. Objective 10D. Use information technology to ensure access to information needed for decision–making.

A–08 Operational Data Management System (ODMS)
–Modernizes NOTAMs and aeronautical information system (AIS) data bases.
A–17 Aviation Safety Analysis System (ASAS)
–Provides FAA safety workforce with computers.
A–18 Safety Performance Analysis System (SPAS)
–Permits FAA inspectors to access FAA and industry data.
A–19 Portable Performance Support System (PPSS)
–Provides aviation safety inspectors with computers to access safety databases.
C–18 National Airspace System Reovery Communications (RCOM)
–Ensures FAA national radio communication system (NARACS) exists during national emergency.
M–18 Computer Resources Nucleus (CORN)
–Created an FAA–wide computer resource.
M–24 National Aviation Safety Data Analysis Center (NASDAC)
–Consolidates safety information from several data bases into a standard format.
M–26 NAS Management Automation Program (NASMAP)
–Provides a nationwide office automation system for administrative tasks.
M–28 FAA Corporate Systems Architecture
–Supports all aspects of automated data processing development.
M–29 Air Traffic Operational Management System (ATOMS) Local Area/Wide Area Network
–Collects real–time air traffic control operational data for analysis purposes.

Goal 11: Transform FAA into the model Federal workplace.

1. Objective 11A. Create a workforce that mirrors the Nation's diversity.
2. Objective 11B. Eliminate discrimination and harassment in the workplace.
3. Objective 11C. Optimize workforce productivity through communication, innovation, and alternative work systems.
4. Objective 11D. Ensure a safe and healthful workplace for FAA employees.

F–01 Airport Traffic Control Tower/Terminal Radar Approach Control Facility Establishment/Sustainment/Replacement
–Establishes/improves facilities to meet air traffic requirements.

Table 1–2. FAA Strategic Plan Goals and Supporting CIP Projects (derived from the 1995 FAA Strategic Plan) (Conclusion)

F–05 Flight Service Facilities
–Provides operational support space and battery backup at 59 automated flight service facilities.
F–06 Air Route Traffic Control Center Plant Modernization/Expansion
–Adds more room to centers and rehabilitates physical plant equipment.
F–12 Modernize and Improve FAA Buildings and Equipment Sustained Support
–Funds building modifications and develops standard facility designs.
F–13 Environmental Cleanup
–Ensures all FAA facilities meet environmental regulations.
F–20 Provide FAA Housing
–Establishes FAA housing at remote locations.
F–22 Child Care Centers
Establishes child care centers at air route traffic control centers.
F–23 Relocate Honolulu Combined Center Radar Approach Control (CERAP)
Moves Honolulu CERAP from Diamond Head Crater to a new site.

Free Flight

New concepts designed to remove restrictions and improve flexibility in the NAS are being developed which offer many challenges and potential benefits for all elements of the aviation community. The RTCA Task Force 3 on free flight will deliver their technical report to the FAA Administrator October 30, 1995. This report will emphasize:

- The removal of constraints and restrictions to flight planning and scheduling,
- Better exchange of information among the users and managers of the airspace,
- Collaborative decision making between the airspace users and managers,
- More efficient management of airspace and airport resources, and
- Provide tools and models to support improved airspace management.

Changing how airspace is managed will require the FAA to shift emphasis on certain projects in the CIP. Greater emphasis will need to be placed on traffic flow management activities, data link, modeling and simulation, and the necessary studies and analysis supporting safety and efficiency.

Work will continue through FY 1996 in realigning priorities to meet the new challenge of implementing free flight.

International Focus

CIP investments encourage global innovation and improvements in the air transportation system through standardized systems that are deployed by all International Civil Aviation Organization (ICAO) member states. The FAA is working with the ICAO Future Air Navigation Subcommittee (FANS) in formulating plans for a worldwide air traffic management system. Recognition of changing operating environments, including opportunities to beneficially use new technologies, has led the ICAO and the FAA to develop new concepts for the future aviation system support infrastructure.

The global positioning system (GPS) highlights the increasing international aspect of aviation. For instance, the differential global positioning system can provide nonprecision and Category I precision approach capability to any runway end in the world, and possibly Category II/III precision landing guidance. However, the FAA's work with the FANS must encompass improvements in communications, navigation, surveillance, and controller automation to derive the greatest air traffic management benefits. A recent economic analysis indicates that there will be a positive benefit–to–cost ratio of 3.5/1.0 from implementing augmentations to the global positioning system.

Relationship to Other Plans

The evolving NAS design, and consequently the elements of this document, support goals set by the FAA Strategic Plan. The projects in the CIP implement the new equipment, environmental, and human resource programs needed to obtain the required capabilities that help achieve the goals set by the FAA Strategic Plan.

The relationship between the FAA's Plan for Research, Engineering and Development (R,E&D) and the CIP is unique. The R,E&D Plan and the CIP comprise the FAA's implementation pipeline to take a project from initial concept exploration to deployment. During the 1960's and 1970's, the FAA R,E&D organization developed a variety of innovative programs. These became the foundation in the 1980's for the original NAS Plan for Facilities and Equipment.

Currently, R,E&D is developing new technology systems required for the FAA to meet its mission in the 21st century. The R,E&D organization will accomplish concept exploration and demonstration of new technology initiatives. After prototype systems have proved operationally beneficial and technologically low–risk, the responsibility for actual operational acquisition will move to the CIP. Thus, through the interrelated CIP and R,E&D Plan, the FAA will develop and deliver new technology to achieve operational benefits for the entire aviation community.

The National Plan for Integrated Airport Systems (NPIAS) and the Airport Capacity Enhancement Plan, are two sources that generate CIP requirements. These plans are used to provide information on building, expanding, or enhancing airports, and the CIP provides support through construction of airport traffic control towers, radars, and other facilities and equipment. Also, changes made through the Airport Improvement Program (AIP) can precipitate requirements for facilities and equipment programs in the CIP. CIP relationships to other plans are shown in Figure 1–1.

The CIP also supports other plans. These include the Future FAA Telecommunications Plan which correlates the telecommunications network requirements with NAS implementation strategies. Another is the Human Resources Management (HRM) Plan, which identifies human resources required for the projects reflected in the CIP. The National Airspace Integrated Logistics Support (NAILS) Master Plan establishes a formal mechanism to ensure that supportability planning is included in all phases of NAS project development and implementation.

The FAA Strategic Plan is the umbrella that ensures the documents described above are executed in a coordinated manner.

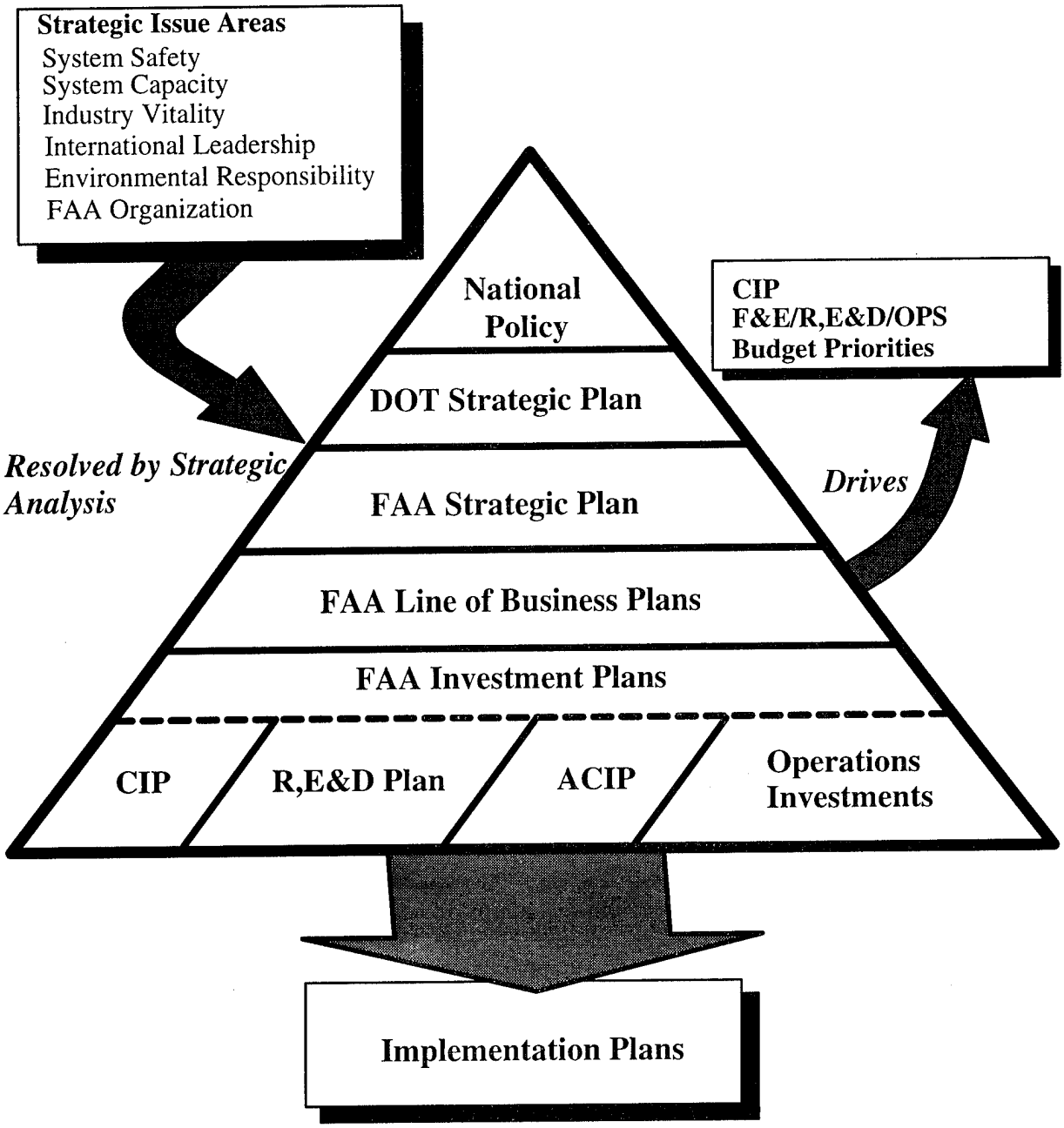


Figure 1-1. CIP Relationship to Other Plans

CIP Benefits

Increasing air traffic growth requires that NAS modernization take place; otherwise the system will be inadequate to handle the growth. Benefits derived from fielding CIP projects to handle expected traffic increases are far greater than the costs associated with implementing them. Examples of user benefits are enhanced safety, more efficient routing, reduced delay, and improvements in flight services.

To estimate these benefits, the FAA uses an investment process with four key decision points (KDPs). This overall process uses cost–benefit analyses as recommended by the Office of Management and Budget. Cost–benefit analyses are conducted when a program reaches the second key decision point and updated throughout the remaining process. **Therefore, this Plan contains some programs whose cost–benefit analyses are not yet completed and are not accounted for in the cost–benefit charts.**

Modernizing the NAS is an aviation community undertaking, and all community members have a stake in the outcome. Aviation community categories include general aviation aircraft, sophisticated business aircraft, helicopters, and a range of commercial and military aircraft.

Table 1–3 summarizes the operational diversity of total NAS activity for 1994, as well as anticipated demand for 2000, 2005, and 2010.

Cost–benefit analyses are conducted using engineering data, parametric modeling, and functionality determination. In the early stages of a project, the cost–benefit analysis uses assumptions when quantitative data is unavailable. As the project matures and more information is acquired, the confidence in the results increases.

Benefits realized since 1981 total $80.3 billion in 1995 dollars. These benefits are accruing from completed projects, as well as from ongoing CIP programs. Benefits of completing existing and planned projects in the CIP are estimated to be $151.6 billion in constant 1995 dollars. Users of the system realize 12 percent of these total benefits from improved safety and 71 percent from delay reduction and increased efficiency. For example, 65 million aircraft flight hours and over 39 billion gallons of fuel can be saved due to reduced delays and improved efficiency. FAA savings are 17 percent of the total benefits, primarily from a reduction in controller and maintenance workload. A breakout by percentage of CIP benefits are shown in Figures 1-2 and 1–3, which give examples of projects that contribute to the individual areas.

Table 1–3. Total National Airspace System Activity

	1994	2000	2005	2010	Avg. Annual % Growth 1994–2010	Total % Growth 1994–2010
NPIAS Airports	3,660 1/					
Airport Operations (Millions)						
Aircraft Operations	131.2	141.9	150.5	158.2	1.2	20.6
Itinerant Operations	79.1	86.7	92.2	98.0	1.3	23.9
Towered Airport Operations 2/	60.3	62.8	67.2	71.3	1.1	18.2
Military Airport Operations	2.5	2.1	1.9	1.9	(1.7)	(24.0)
ARTCC Operations (Millions)						
IFR Aircraft Handled	38.8	44.1	48.0	51.5	1.8	32.7
MCF Operations (Millions) 3/						
IFR Aircraft Handled	46.7	52.6	56.3	59.8	1.6	28.1
FSS Services (Millions)						
Flight Plans, Radio Contact						
Briefing	35.8	32.9	31.8	30.1	(1.1)	(15.9)
Hours Flown (Millions)						
Air Carrier	11.2	13.9	17.1	19.7	3.6	75.9
General Aviation	24.1	25.9	26.8	27.5	0.8	14.1
Military	4.8	4.4	4.6	4.6	(0.3)	(4.2)
Domestic Passengers (Millions)						
Air Carrier	472.0	625.5	732.0	856.9	3.8	81.5
Commuter	53.6	81.5	109.4	141.0	6.2	163.1
Aircraft Fleet (000)						
Air Carrier	4.4	5.2	6.3	7.1	3.0	61.4
Commuter	2.2	2.8	3.2	3.7	3.3	68.2
Total General Aviation	176.0	170.1	174.0	176.6	0.0	0.3
Civil Helicopter	4.5	5.0	5.5	6.0	1.8	33.3
Total Military	17.0	14.2	14.2	14.2	(1.1)	(16.5)
Military Helicopter	7.2	5.3	5.3	5.3	(1.9)	(26.4)
Pilots						
Instruments Rated	305.5	329.8	350.8	365.1	1.1	19.5
Total Pilots	665.1	701.1	732.2	754.5	0.8	13.4

1994= ACTUAL

2000, 2005= FAA Aviation Forecasts Fiscal Years 1995–2006 (March 1995)

2010= FAA Long Range Forecasts Fiscal Years 2006–2020 (August 1995)

1/As of January 1993, National Plan of Integrated Airport Systems (April 1995)

2/FAA Towered Airports= 402 in 1994, 352 thereafter

3/Instrument Operations at FAA Towered Airports

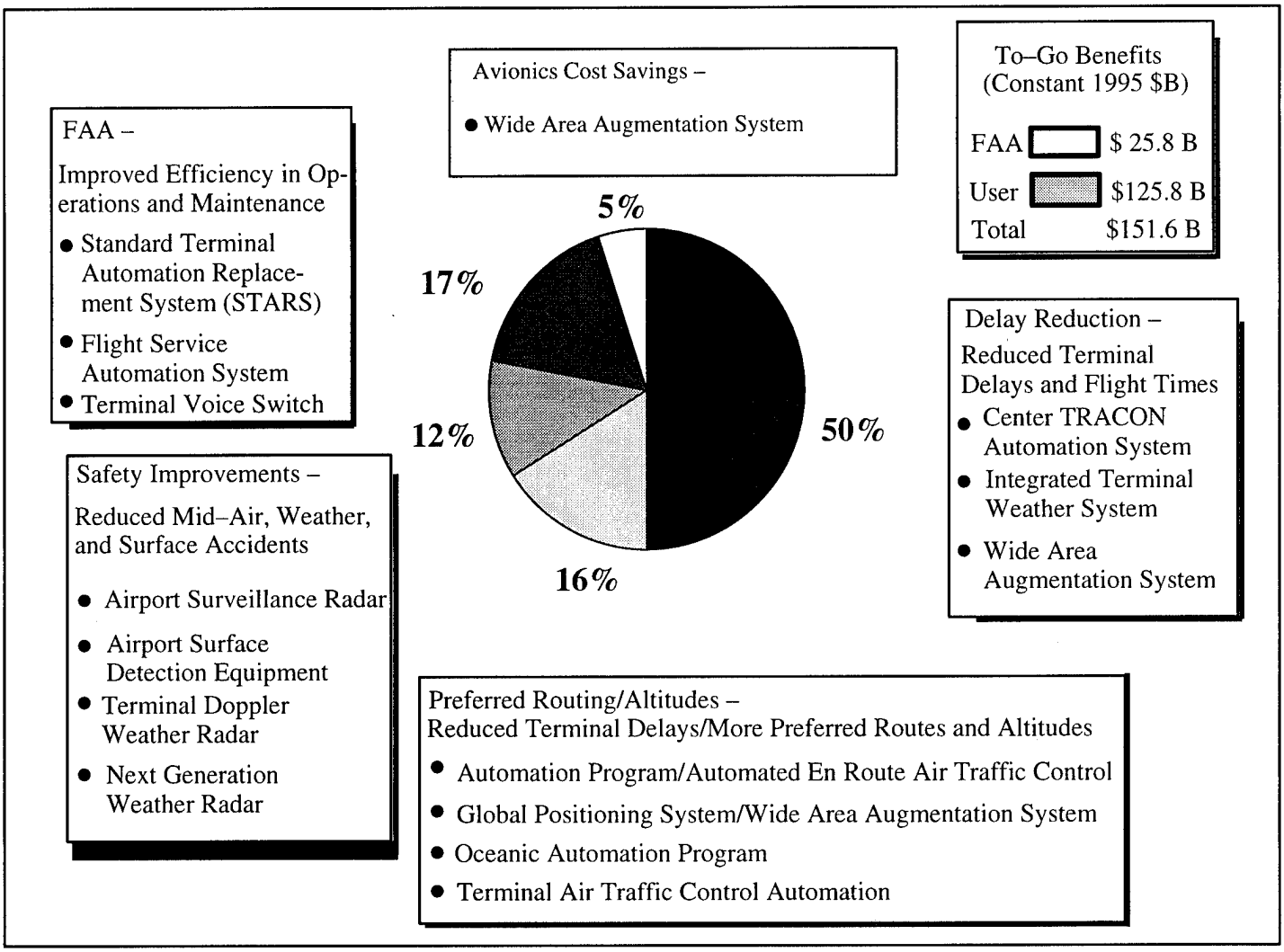


Figure 1-2. CIP Benefits by Category

CIP project analysis uses two measures to compare benefits and costs: net present value and benefit–cost ratio. To compute net present value, we first discount future values of benefits and costs into today's dollars. These computations create the present value of future benefits, the present value of future costs, and their difference is the net present value. Another commonly used measure is present value benefits divided by present value costs which creates a benefit–cost ratio. The present value of future CIP benefits is $68.2 billion, and the present value of future costs is $23.2 billion, resulting in an overall benefit–cost ratio of 2.9 with a net present value of $45.0 billion (Figure 1–3).

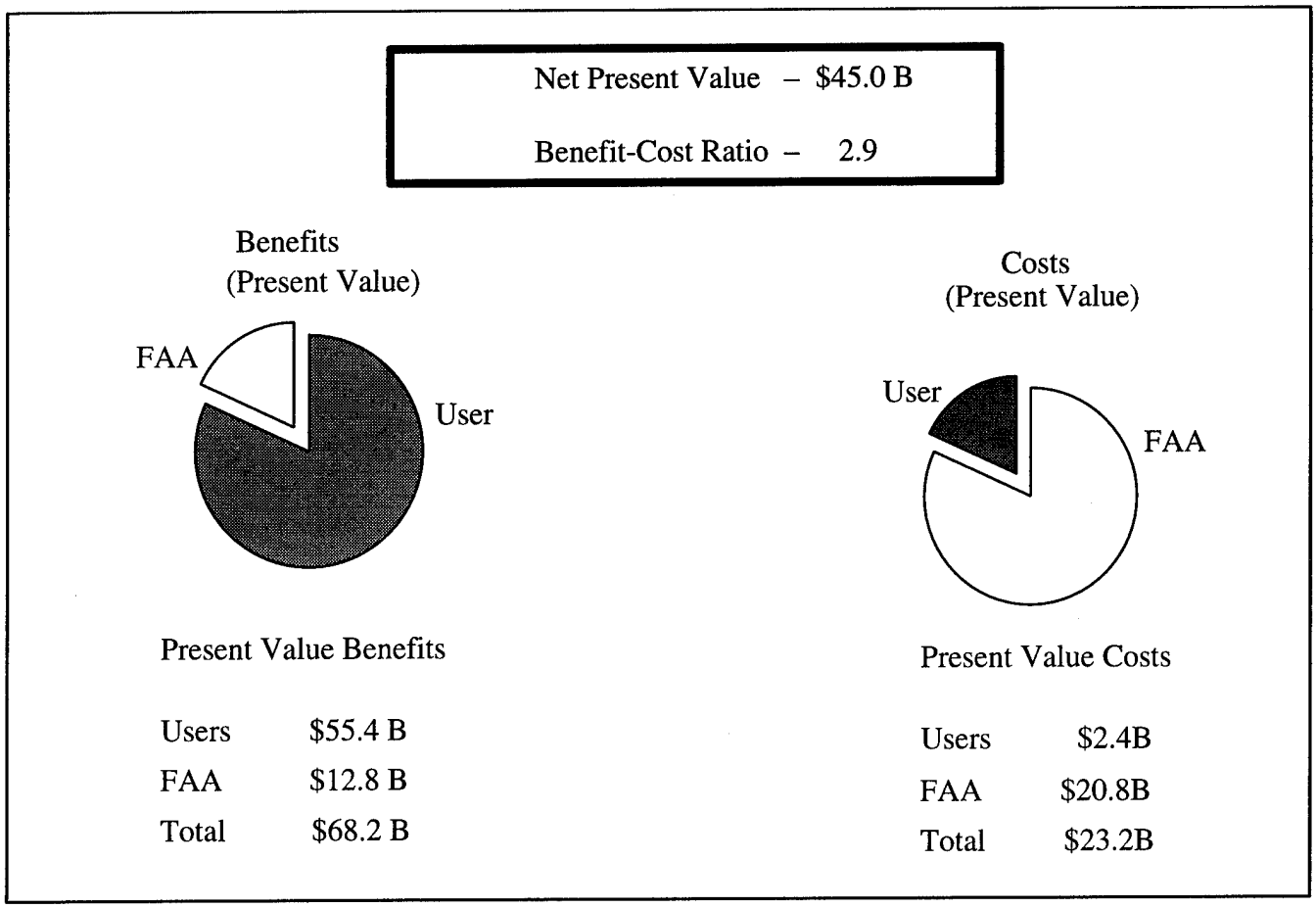


Figure 1-3. Return on Future Investment from 1995 to 2025

Figures 1–4 and 1–5 show operations per Air Traffic (AT) controller and Airway Facilities (AF) staffing levels as measures of productivity. Operations per controller show that the overall productivity trend is rising, and projections indicate that operations will increase faster than staffing levels. Controller staffing levels generally respond to changes in traffic operation counts, although they sometimes lag because abnormal conditions arise that can not be predicted. An example is the 1990 to 1994 time frame when the Gulf War and recession depressed traffic levels. The Airway Facilities staffing chart, figure 1–5, projects the overall number of workers should decline slightly. Investing in new facilities, infrastructure, and equipment through the CIP would relieve maintenance requirements because new equipment is less maintenance–intensive than old equipment.

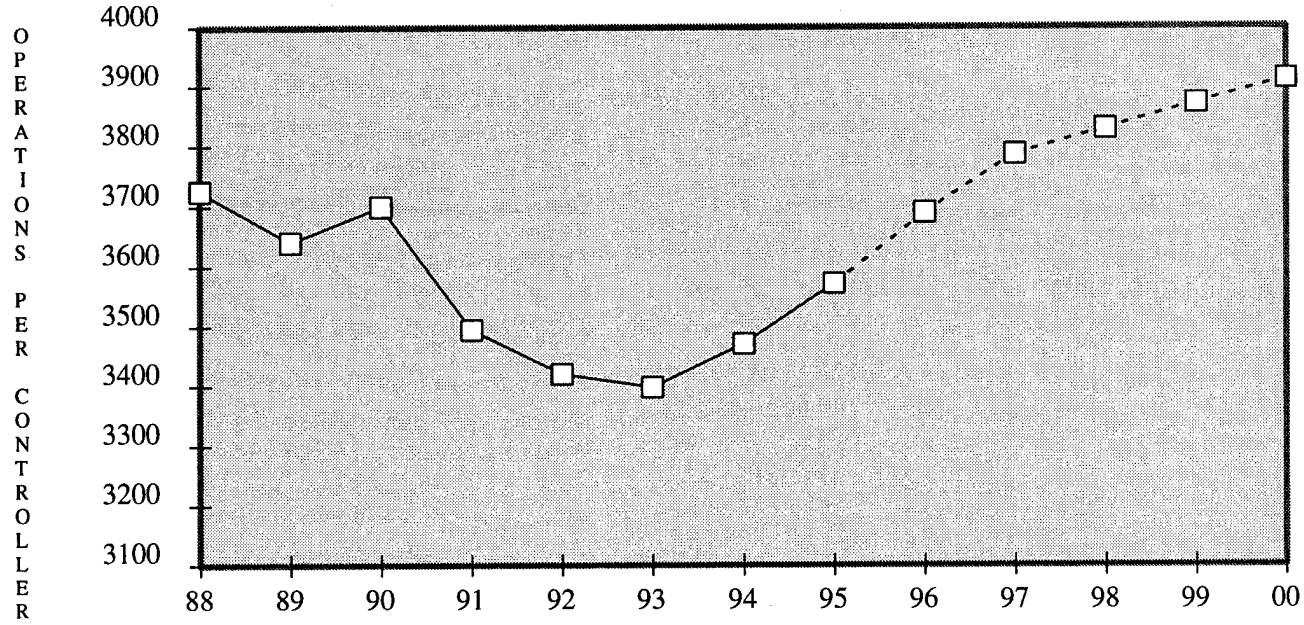


Figure 1-4. Operations per Controller (Air Traffic)

Source ATZ-16, FAA Aviation Forecasts

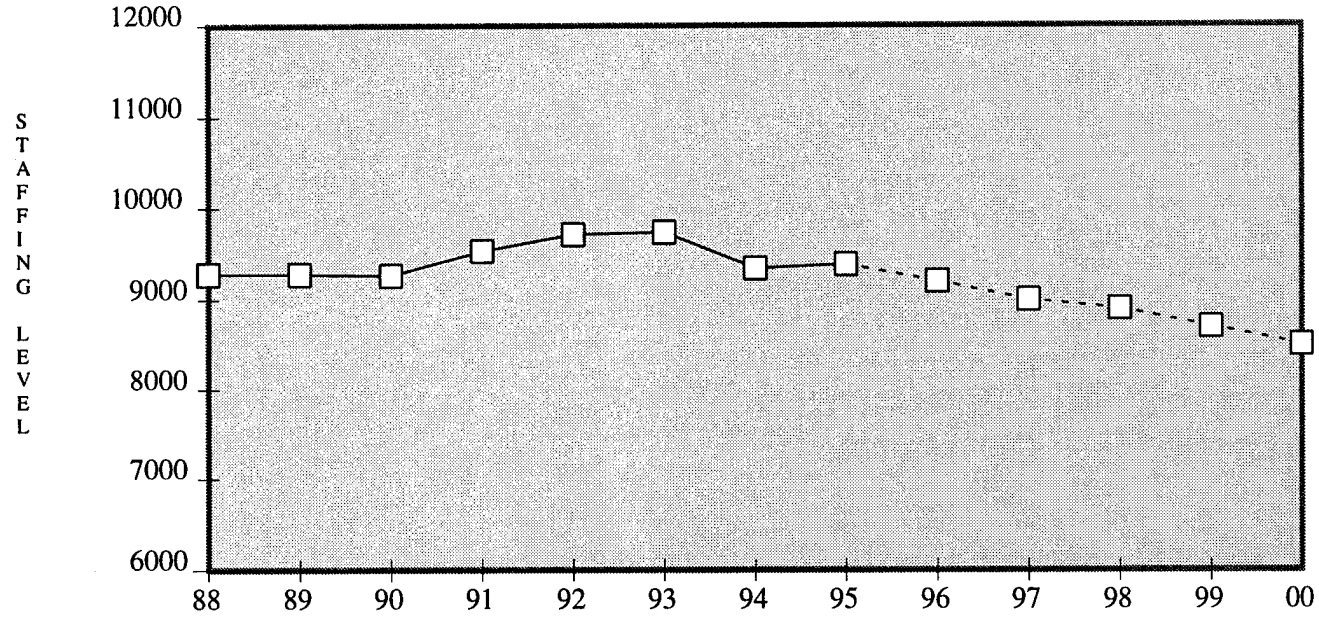


Figure 1-5. Maintenance Personnel Projections (Airway Facilities)

Source: CIP Benefits Quarterly Performance Report, October 31, 1994

CIP Impact on Gross Domestic Product

Modernizing the Nation's air transportation infrastructure is critical not only to the user community but also to the Nation's economic future. The CIP modernization program ensures that the Nation will continue to move goods and services efficiently in an increasingly competitive global economic environment. The air transportation sector has remained relatively consistent with the Nation's economic growth, constituting six percent of our Nation's gross domestic product. In 1993, civil aviation provided almost 8.8 million jobs, with total earnings over $225 billion. Economic activity generated by aviation during that same year amounted to $771 billion, composed of three major elements: passenger travel, airlines and general aviation, and aircraft/parts manufacturing (Figure 1–6). Furthermore, the aerospace industry is the country's leading exporter of manufactured goods. We are also the primary air carrier for foreign visitors, most of whom arrive by air. This provides a positive contribution to the balance of trade.

In this respect, the United States air transportation system has a major economic impact. Moreover, aviation's role is expected to continue growing throughout the 1990's and into the 21st century. Current estimates project that by 2000, aviation's total economic impact will be over $896 billion in constant 1993 dollars.

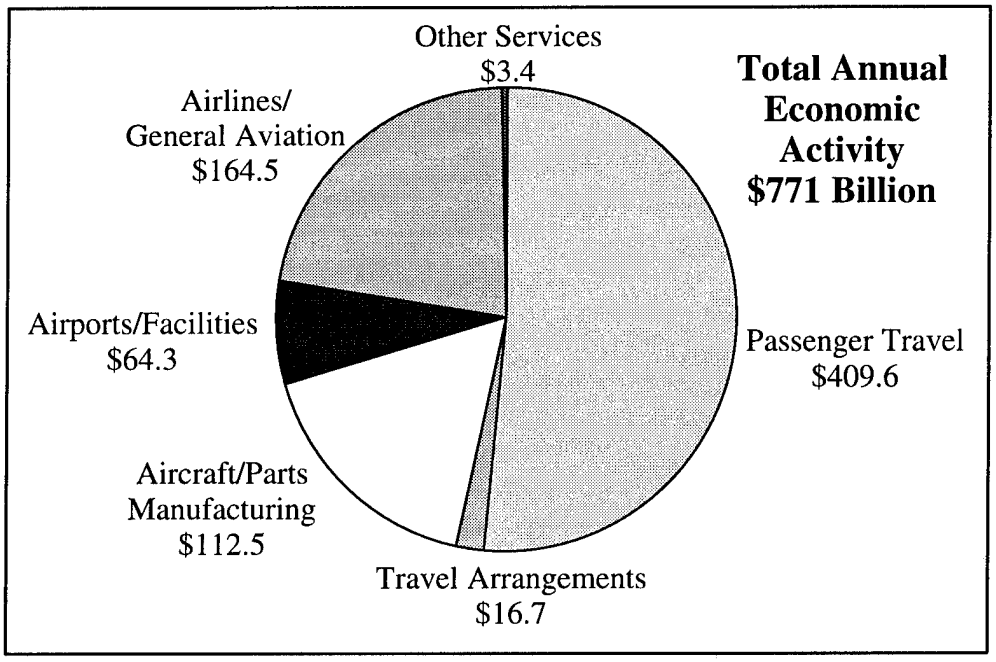


Figure 1-6. Economic Activity Generated by Aviation

Document Organization

Organization of the CIP is shown in Figure 1–7. CIP projects are organized in seven functional areas (automation, communications, facilities and associated systems, mission support, navigation and landing, surveillance, and weather). Project numbers reflect this orientation; thus, all automation projects begin with an A, projects in the communications area with a C, etc.

Several projects that have a common subject, e.g., instrument landing system, have been combined into a single project. Refer to the subparagraph "Project Information" in each project for data on project combinations.

All CIP projects are grouped in Chapter 3. Automation projects appear first, with the other functional area projects following in alphabetical order. For easy reference, refer to the sequential project numbers in the Table of Contents or review Appendix C Alphabetical Listing of Projects. There is a cross–reference between the old/new CIP numbers in Appendix B Project Status.

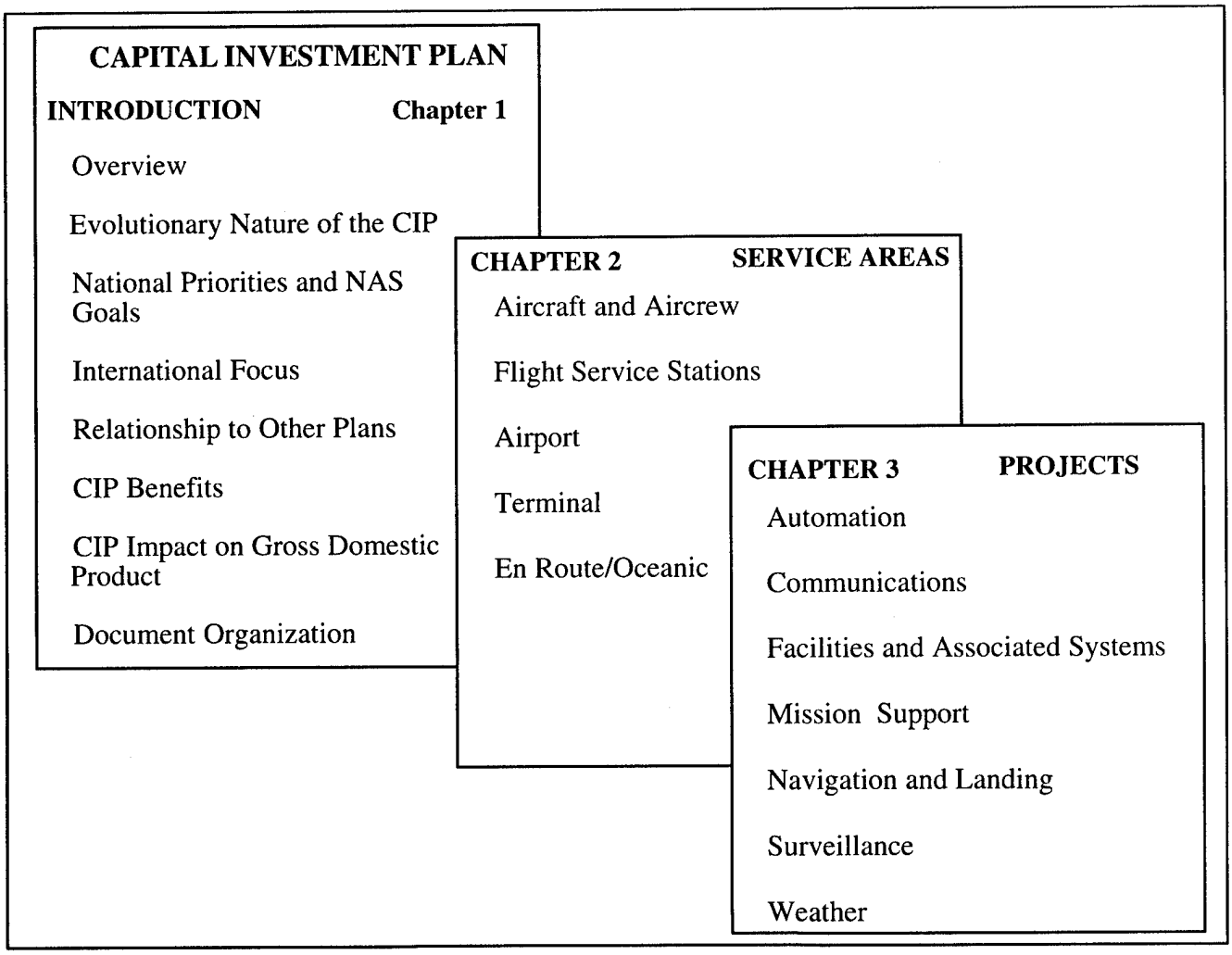


Figure 1-7. CIP Chapter Content

CHAPTER 2
SERVICE AREAS

Introduction

The Federal Aviation Administration (FAA) invests in capital improvements to accomplish its mission. This chapter highlights the five mission service areas that support the flying public. In addition, a table at the end of the chapter indicates the Capital Investment Plan (CIP) projects that contribute to these service areas, as well as those projects which support the FAA infrastructure. Service area benefits for the flying public and the FAA are also provided in a graphical format, based on the applicable projects in the service areas. This allows the reader to compare the benefits in a specific service area against the associated cost.

Many of the NAS infrastructure facilities have been in use well beyond their expected and useful life–cycle. The cost in money, time, and potential interruption of air operations is a prime consideration in setting budget priorities. This chapter provides details on the aging equipment and facilities currently in use in the FAA, the replacement of which will form the core of facility and equipment (F&E) budget expenditures for the foreseeable future. This data is presented in the form of capital stock analysis figures (refers to Figures 2–6/8/9/12/13/14/15) which display the relationship between the age of equipment, projected service life (PSL), and the number of systems for major capital assets within the NAS. Each figure can be interpreted as follows:

- The horizontal axis, Age of Equipment, represents the years the asset has been in use. The zero point is 1996, the current year for analysis. It is denoted by a vertically solid line.
- To the right of the zero point are the years prior to 1996 that an asset was procured. To the left of the zero, depicted by negative numbers, are assets to be procured in the future.
- The vertical axis, Number of Systems, represents the amount of units procured during a particular time period.
- The PSL lines, depicted by dashed vertical lines, are the points in time where a particular asset has exceeded its operational life expectancy. Studies have shown that maintenance costs increase exponentially after an asset has passed its PSL. Therefore, assets that have exceeded their PSL are candidates for replacement.
- Where applicable, the replacement equipment is shown to the left of the zero line.

These figures, which are shown in their respective service areas, indicate that the majority of existing facilities and electronic equipment has passed its projected service life and need replacement.

There are five service areas that support the flying public: aircrew and aircraft, flight service stations, airport, terminal, and en route. The aircrew and aircraft area encompasses those support activities that are flight related. Flight service stations constitute the flight planning step, where pilots gather pre–flight briefing information. The airport service area includes all activities within a four nautical mile radius of the airport, and it involves engine startup through takeoff and also landing to engine shutdown. The terminal area represents the transition from selected metropolitan airports to the en route environment. The en route area includes the airspace not in the airport and terminal areas.

This chapter describes services provided to the flying public that are related to the CIP. There are many other services provided in these areas that are not listed because they are internal to the FAA or are not related to the CIP.

Accident Investigation Leading to Dissemination of Information: An important service that the FAA provides through the Office of Accident Investigation is to help determine causes of accidents and disseminate safety information to prevent future accidents. The office maintains an independent investigation capability that enables the FAA to take corrective action.

As the FAA's focal point for accident investigations, the office also assists the National Transportation Safety Board (NTSB) in collecting and analyzing accident data to determine probable cause. A key element of the entire investigation service is sharing accident and safety information with the aviation industry, foreign governments, and the military.

Aviation Medicine: The Office of Aviation Medicine provides services to the flying public by applying medical knowledge to aviation safety. Two services supported by the CIP are aviation personnel medical qualification and aeromedical analyses and research. While the aviation personnel medical qualification service has many facets, the principal service is to ensure that pilots and controllers are medically able to perform their jobs. Airmen and air traffic controllers must meet medical standards established by the FAA. These standards are applied through a network of private physicians for non–FAA pilots and controllers, and either private physicians or FAA clinics for FAA employees. The physicians conducting the examinations are trained in aerospace medicine by the FAA. The second service provides knowledge to the FAA and aviation community through an in–house aeromedical and human factors research capability. The research and analyses provide useful information to the aviation industry in the form of technical reports, research procedures and protocols, and forensic support to the National Transportation Safety Board for accident investigations. Aeromedical analyses and research services are the FAA's focal point for information and knowledge about aerospace medicine.

Civil Aviation Registry: The Registry provides several important aircraft registration services. Two major components are issuing permanent United States civil aircraft registration certificates and operating a system for assigning aircraft identification numbers. The Registry serves as the national repository for aircraft registration, lien, and airworthiness records. Additionally, technical advice and assistance is provided to financial institutions, attorneys, title search companies, law enforcement agencies, foreign civil aviation authorities, and the aviation public. This assistance pertains to items such as aircraft registration, liens, and legal documentation.

The Registry also provides key airmen certification services. Two major services are issuing permanent certificates for civil airmen and verifying airmen certificates, ratings, and limitations. Another important service is providing complete airmen certification files in response to appropriate requests. Additionally, the Registry provides information concerning airmen certification regulatory matters to the aviation public, attorneys, law enforcement, and foreign civil aviation authorities.

Flight Inspection/Procedures: Flight inspection/procedures provide two major services, performing flight inspections and developing instrument procedures. Flight inspections are conducted using specially equipped FAA aircraft to validate navigational aids, communication coverage, and surveillance capabilities. This validation ensures that signals provided in this dynamic environment have required power and accuracy. These inspections are performed on FAA, military, and non–federal facilities. An example of how flight inspections enhance NAS safety is by checking instrument approaches and departures to verify

that the signals are accurate, and position aircraft on the appropriate flight path. Flight inspection services extend throughout the NAS and cover every phase of flight. Inspections are performed at all facilities on a regularly scheduled basis, and before new facilities are activated.

The aircraft and equipment certification service ensures that aircraft and equipment are airworthy and meet safety requirements. Inspectors follow a new aircraft or equipment design from inception to factory roll out. This service is provided to a wide range of aviation products, from experimental kit–built aircraft to the most sophisticated commercial products, including foreign–made aircraft and equipment that will operate in United States airspace.

Aviation Safety: The second major service is developing flight procedures for airways, instrument approaches, and instrument departures. These procedures permit aircrews to operate safely under instrument flight rules when weather conditions prevent visual flight operations. Added benefits derived from these procedures include noise abatement and expeditious movement of aircraft within the NAS.

Aviation safety services encompass the FAA's responsibility for aircraft and equipment certification, flight operations oversight, and maintenance oversight that is provided for both private and commercial operations. To accomplish its oversight responsibilities, the FAA sets policy and develops standards that result in operational procedures, which are monitored periodically.

The flight operations oversight services ensure that safety practices are followed in compliance with appropriate federal aviation regulations. For example, inspectors check to see that flightcrews are following FAA–approved company operating procedures and training programs. This oversight responsibility covers the spectrum from general aviation through commercial air carriers. The maintenance oversight service is provided in a similar fashion, but concentrates on airframe and avionics systems repair and maintenance management.

Increasing aviation operations, including new airlines, are driving a need to increase the FAA's safety inspection resources and provide better tools to track, document, and disseminate safety information. Replacing aging equipment and installing new automation advances will provide $730 million in efficiency savings. However, the data represents only a partial picture of the total benefits because cost–benefit analyses have not been conducted for several CIP projects in this service area.

Figure 2–1 Aircraft/Aircrew Activities per Inspector, indicates productivity as measured by average number of "activities" per aviation safety inspector. Generally, aviation safety inspector staffing responds to operational traffic demands, although it tends to lag due to abnormal and unpredictable conditions. As the chart shows, average productivity per inspector is predicted to remain relatively constant for the near future, because additional inspectors will be added to meet the expected increases in operational demand.

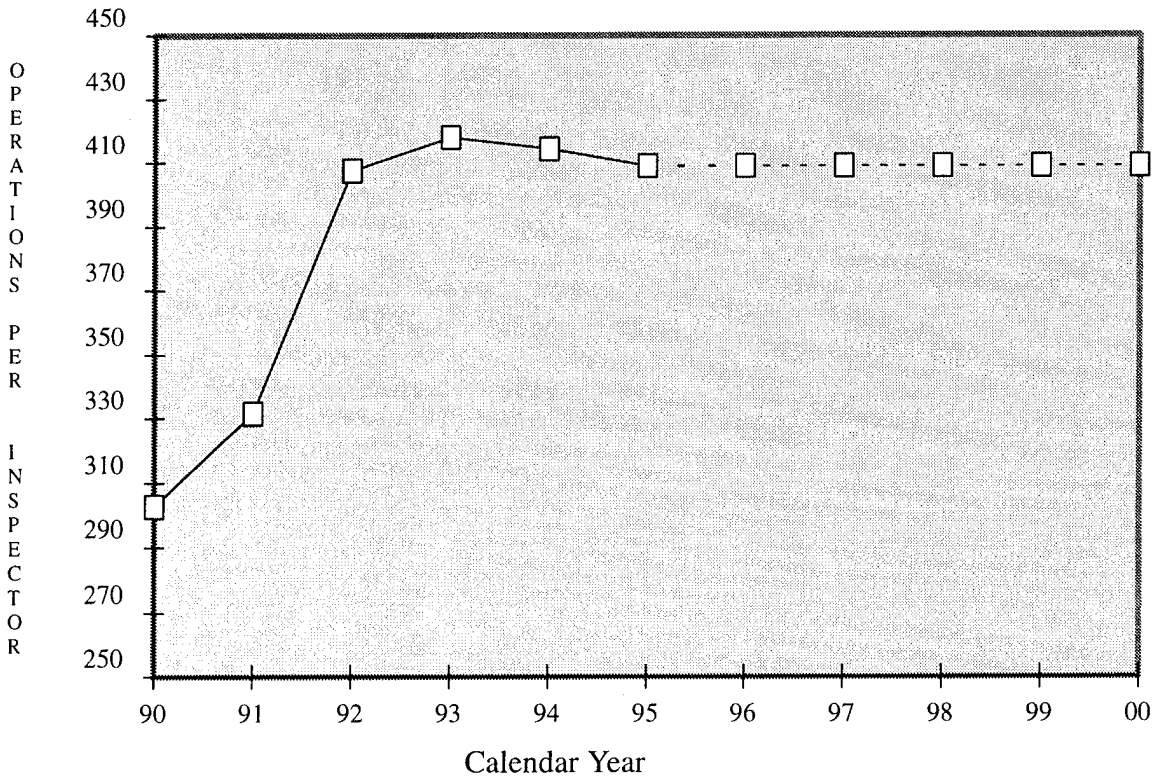


Figure 2–1. Aircraft/Aircrew: Activities per Inspector
Source: AFS–31, 1995–2000 – Estimated

Flight Service Stations

Flight service stations provide services, primarily for general aviation, in two areas: pre–flight and in–flight. Pre–flight services include briefings and assistance in filing flight plans. Pre–flight briefings provide all necessary meteorological and aeronautical information. Meteorological information contains current and forecast weather along the intended route of flight. Aeronautical information includes notices to airmen, special military operations, and preferred routes of flight.

In–flight services parallel those provided in pre–flight, except the information is time–critical because of its immediate need. The in–flight service also includes receiving and disseminating pilot reports of weather and other hazards encountered in–flight. Airport information service is provided to landing and departing aircraft at non–towered airports or at airports where the tower is closed. Civil and military flight movement messages, such as military stopovers, flight plan cancellations, and route changes, are received and disseminated. Emergency services are provided to aircraft in distress by evaluating the nature of the emergency and determining the most appropriate course of action. Arrivals of aircraft on flight plans are monitored, and search and rescue procedures may be initiated for overdue aircraft.

Several projects in the table at the end of this chapter directly or indirectly support the delivery of fight service station services. These projects

either maintain, expand, or improve the capability of delivering services currently provided. The implementation of these projects will result in significant improvements in the quality of each product, information available to the controller and pilot, and the quality and reliability of communications between the pilot and the controller. Each project is described in Chapter 3.

The existing equipment in flight service stations is at its capacity performance limits and is increasingly difficult to support. CIP projects within this service area will provide increases in efficiency to alleviate these problems (Figure 2–2 Flight Service). Examples of CIP projects that contribute to benefits in this service area include the flight service automation system (FSAS) and the automated weather observing system (AWOS).

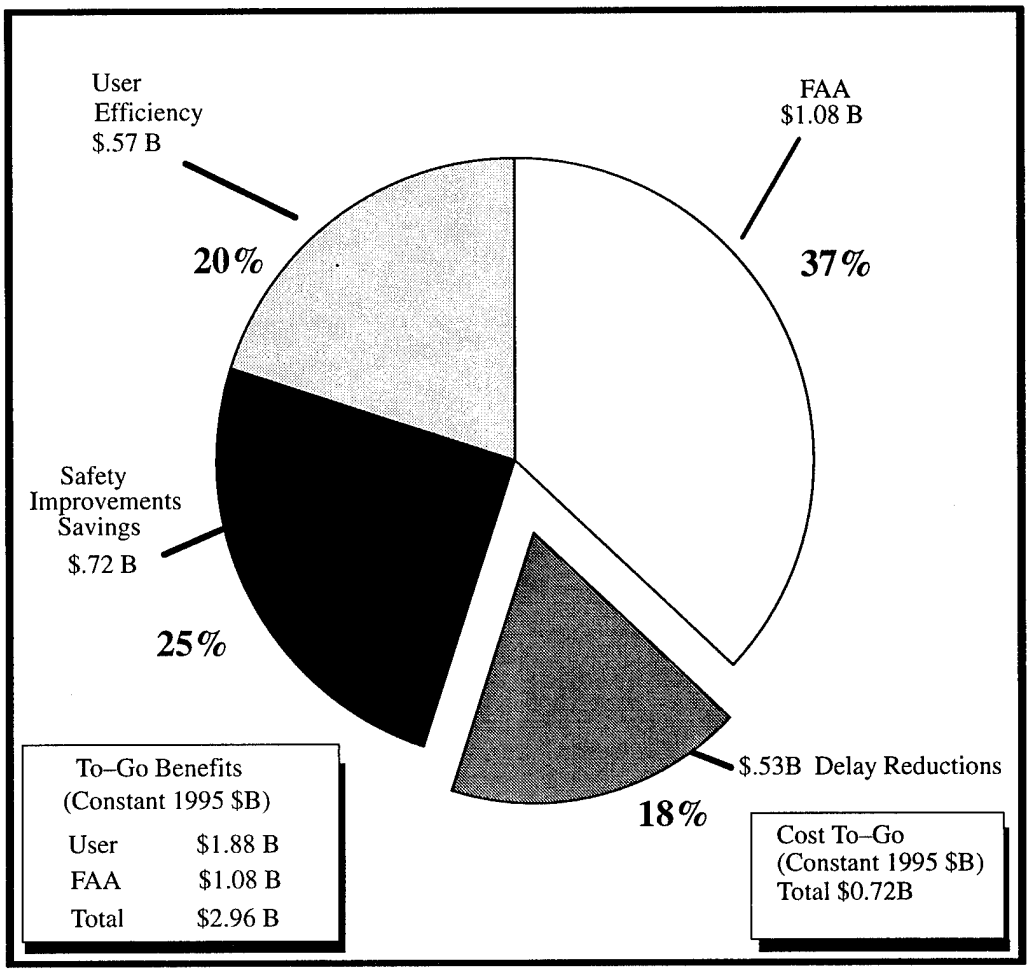


Figure 2–2. Flight Service

Flight service station specialist staffing levels generally follow operations trends, both of which are decreasing due to a decline in general aviation (GA) aircraft and an increase in the direct user access terminal service (DUATS). However, productivity, as measured by the number of operations per specialist, is projected on an upward trend because staffing levels are falling at a faster rate than operations (Figure 2–3 Flight Service Stations: Operations per Specialist).

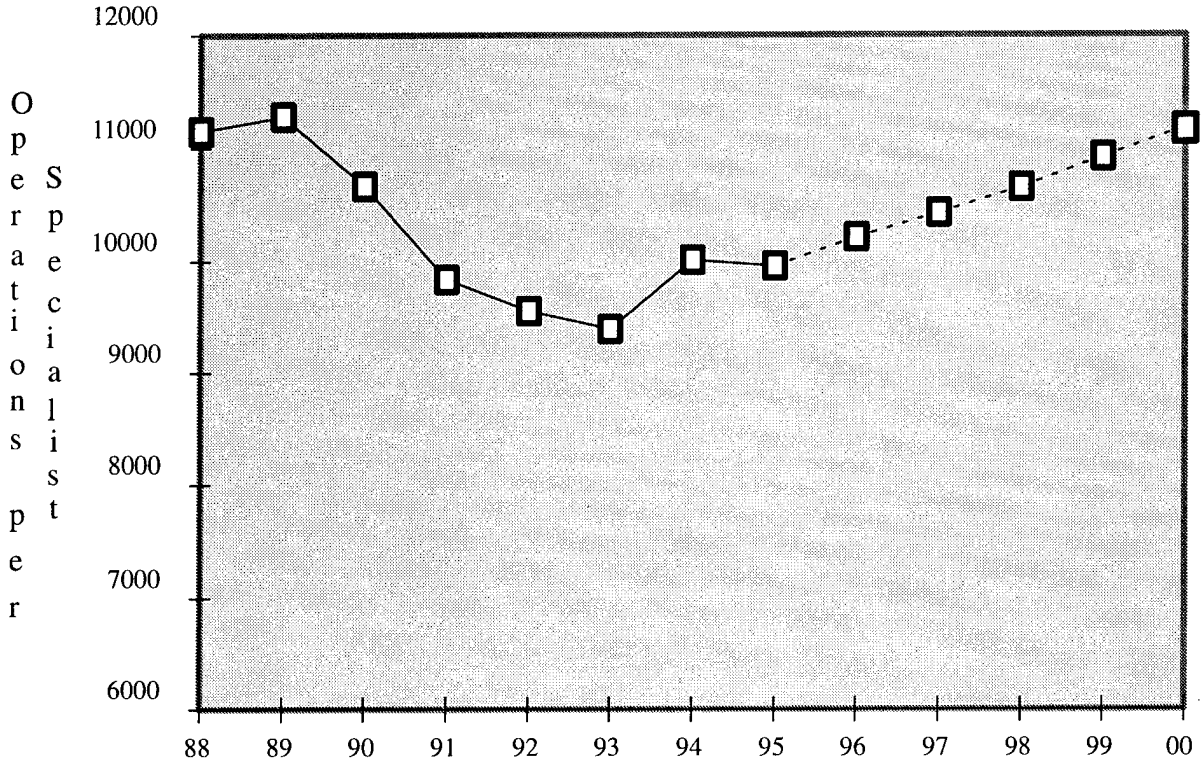


Figure 2–3. Flight Service Stations: Operations per Specialist

Airport

The FAA, existing as an airport tenant, typically provides air traffic control, airway facilities, and security services. The airport traffic control tower provides services on the ground and in the air within approximately four nautical miles of the airport. Basic airport traffic control services include clearance delivery, ground control, and local control. Clearance delivery relays flight plan information to inform the pilot about the route of flight. Ground control provides taxi instructions for aircraft and controls vehicles on the airport movement area, resulting in safe and efficient traffic flow. Local control provides landing and takeoff clearances for aircraft arriving and/or departing, as well as separation for airborne aircraft in the immediate airport area. An important function in local control is providing special weather notices such as windshear or microburst alerts. An additional service provided by the control tower is the automated terminal information service (ATIS) that transmits airport information such as active runways, winds, altimeter settings, or other special airport information. ATIS is a re-

corded message broadcast on a discrete frequency to minimize repetitious communications.

Airway Facilities personnel install, operate, and maintain facilities and equipment integral to the air traffic system at airports. Typical airport equipment includes landing and navigation aids, radars, communication networks, and automation equipment. This equipment provides pilots and controllers with the information needed to conduct air traffic operations.

The FAA has oversight responsibility for ensuring security at all airports under its jurisdiction and maintains security offices at selected major airports. Examples of the FAA's security responsibility include airport perimeter fencing, passenger and baggage screening, and aircraft ramp access control. These services are performed by airport operators but may be funded with an FAA grant.

Most of the CIP's safety benefits occur in the airport service area. In particular, safety programs in the CIP address hazardous weather conditions and runway incursion issues. Additionally, projects will focus on reducing delays at airports to meet increasing traffic demands within our existing airport infrastructure.

CIP projects supporting this service area primarily benefit users (Figure 2–4 Airport Area Benefits). The user gains in this service area are $8.5 billion from safety and $20.3 billion from reduced delays. Examples of CIP programs contributing to benefits in this service area include terminal Doppler weather radar (TDWR) to detect hazardous weather conditions and airport surface target identification system (ATIDS) to help prevent runway accidents.

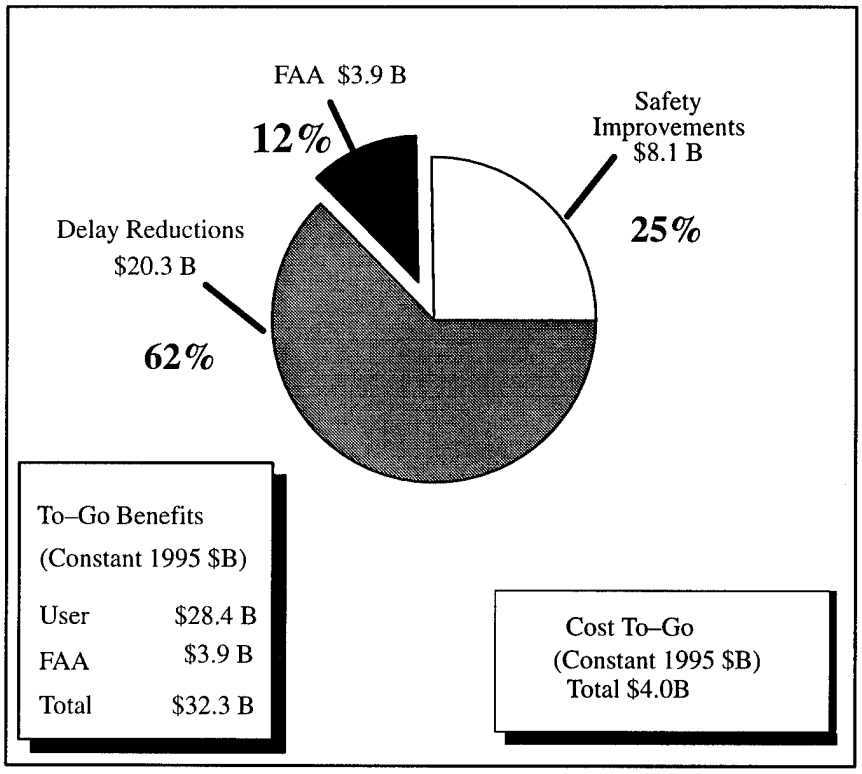


Figure 2–4. Airport Area Benefits

Figure 2–5 Airport Traffic Control Tower: Operations per Controller shows controller productivity in the airport service area measured by number of operations per controller. This service area is similar to others in that staffing levels generally follow traffic operations counts and projected trends indicate that traffic demands will increase at a faster rate than staffing levels for the near future. As with any predictions, projected trends do not always match the actual figures that occur, which is why the staffing levels may lag in responding to changes in traffic counts.

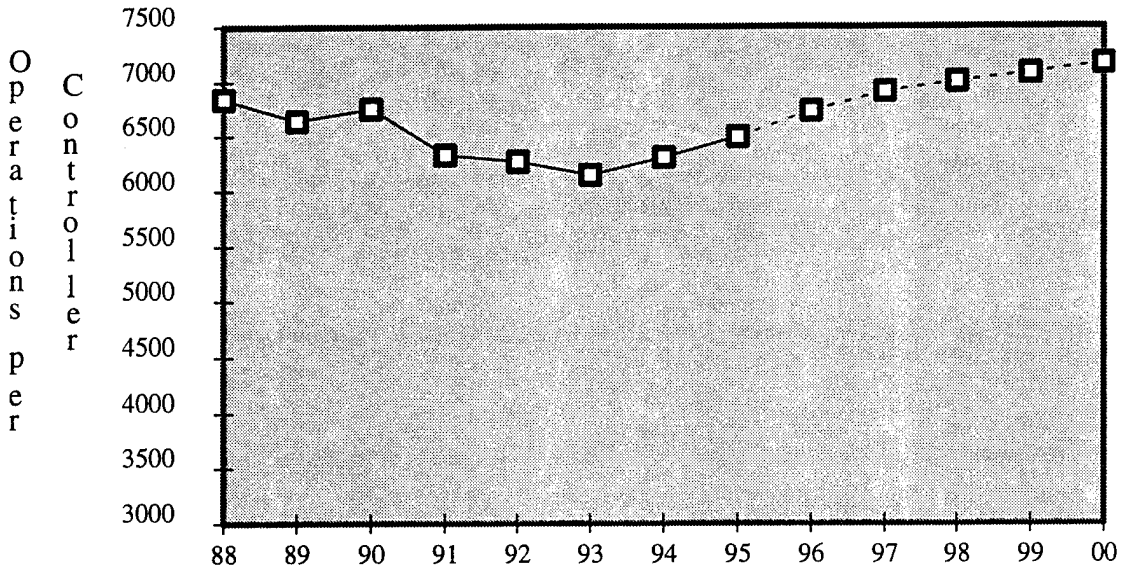


Figure 2–5. Airport Traffic Control Tower: Operations per Controller

Figure 2–6 Capital Stock Analysis–Airport Traffic Control Tower Buildings illustrates the age of the tower buildings. An explanation of how to interpret this figure was provided on page 2–1. Towers are replaced for other reasons besides age. Many of the replacements are required because they no longer meet air traffic requirement. This is primarily due to airport rebuilding that requires the FAA to relocate its facilities

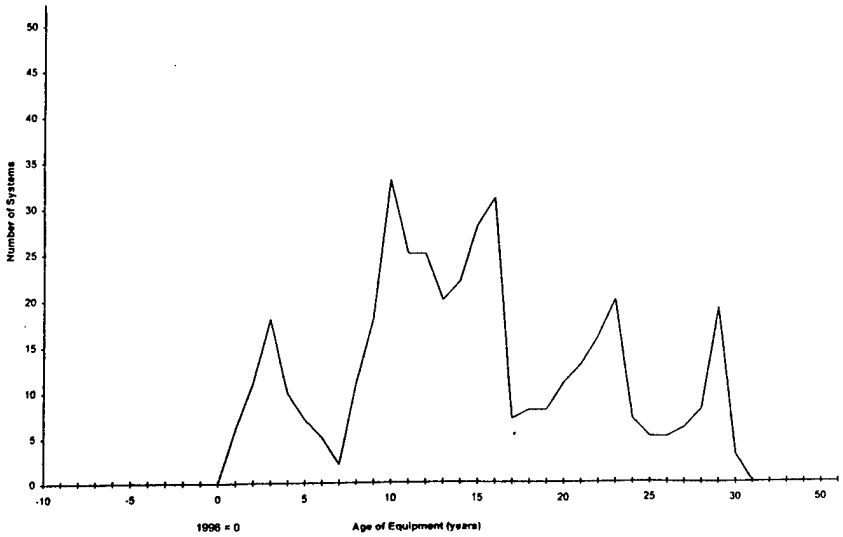


Figure 2–6. Capital Stock Analysis–Airport Traffic Control Tower Buildings

Terminal

A terminal is a geographic area containing one or more airports and a terminal radar approach control (TRACON). Airport traffic control towers (ATCTs), while located on an airport and providing services at an airport, control air traffic within the terminal airspace. The tower services were described previously in the airport section.

The terminal radar approach control facility provides services between airports and the en route environment. These services accommodate aircraft operating under both instrument flight rules and visual flight rules. Terminal radar approach control facilities can be collocated on an airport with the tower or remoted and operate as a stand–alone facility. The primary services provided are separation, sequencing, traffic advisories, traffic alerts, significant weather advisories, and radar vectoring for arriving, departing, and through traffic.

The separation service maintains the horizontal and vertical distances between aircraft. Sequencing works in conjunction with separation to establish the order in which aircraft will land and depart. Traffic advisories inform aircrews of the proximity of other aircraft in relation to their aircraft. Traffic alerts are priority messages issued by air traffic controllers to aircraft when safety of flight may be compromised. Significant weather advisories inform aircrews when a weather phenomena, such as windshear, thunderstorms, or icing may affect flight safety. Radar vectoring is a compass heading provided by controllers to facilitate the movement of air traffic.

Many terminal areas are approaching their maximum capabilities with existing facilities and equipment. The outdated technology currently in use will not be able to accommodate the increasing traffic, thus limiting airspace efficiency. Investments in infrastructure and technology will give controllers and maintenance technicians the resources they need to meet projected traffic increases. Projects in the CIP provide terminal area benefits of $35.2 billion in delay reductions and $13.0 billion in FAA efficiency gains as shown in Figure 2–7 Terminal Area Benefits. CIP projects that contribute to these benefits include limited consolidation through the metroplex control facilities (MCFs) and replacing the existing automated radar terminal system (ARTS) equipment with the standard terminal automation replacement system (STARS).

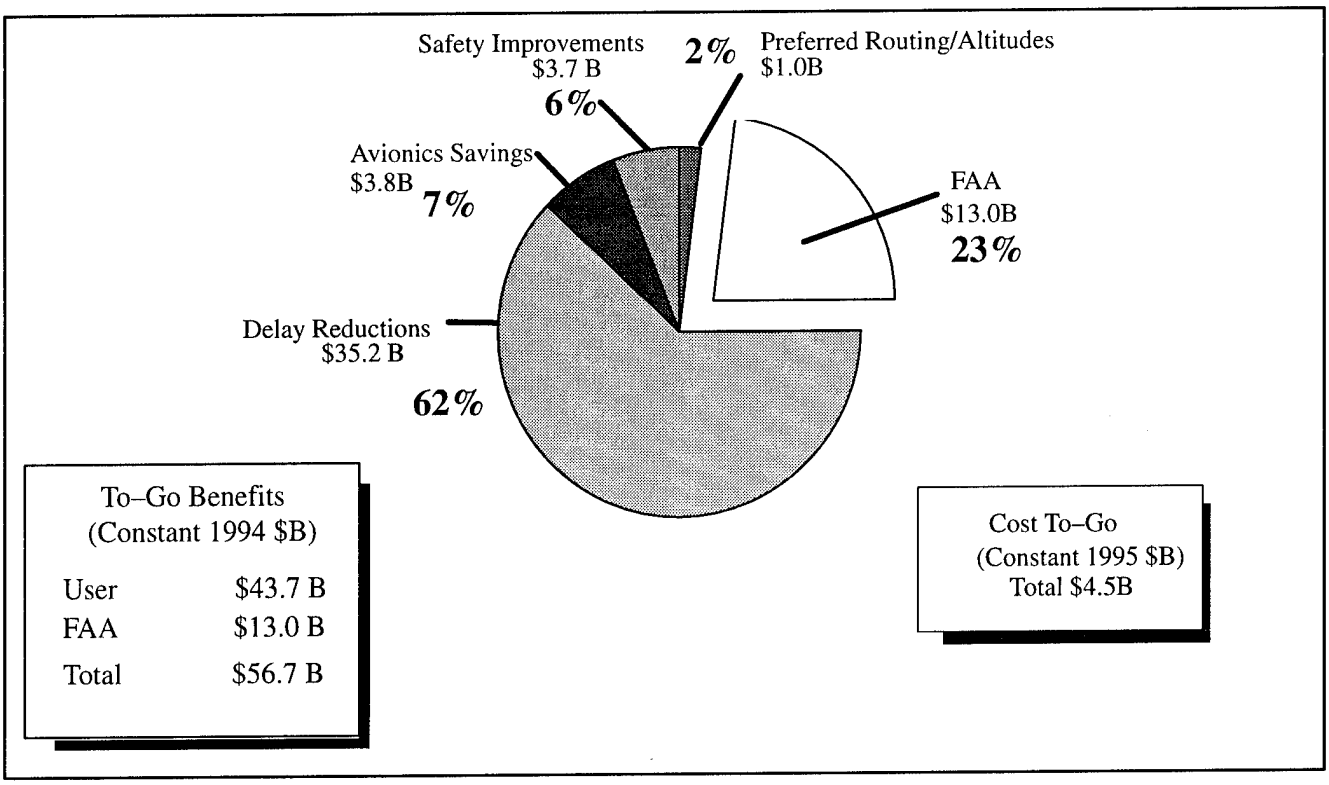


Figure 2–7 Terminal Area Benefits

To illustrate the problem of aging terminal equipment, Figure 2–8 Capital Stock Analysis–TRACON Displays indicates the status of the terminal radar approach control displays. Most of the equipment is approaching or past its projected service life (PSL); however, the standard terminal automation replacement system will replace the automated radar terminal system equipment.

Figure 2–9 Capital Stock Analysis–Instrument Landing Systems provides a macro–level view of the age of the instrument landing system equipment. The global positioning system (GPS) wide area augmentation system (WAAS) could lead to phase–out of existing instrument landing system equipment.

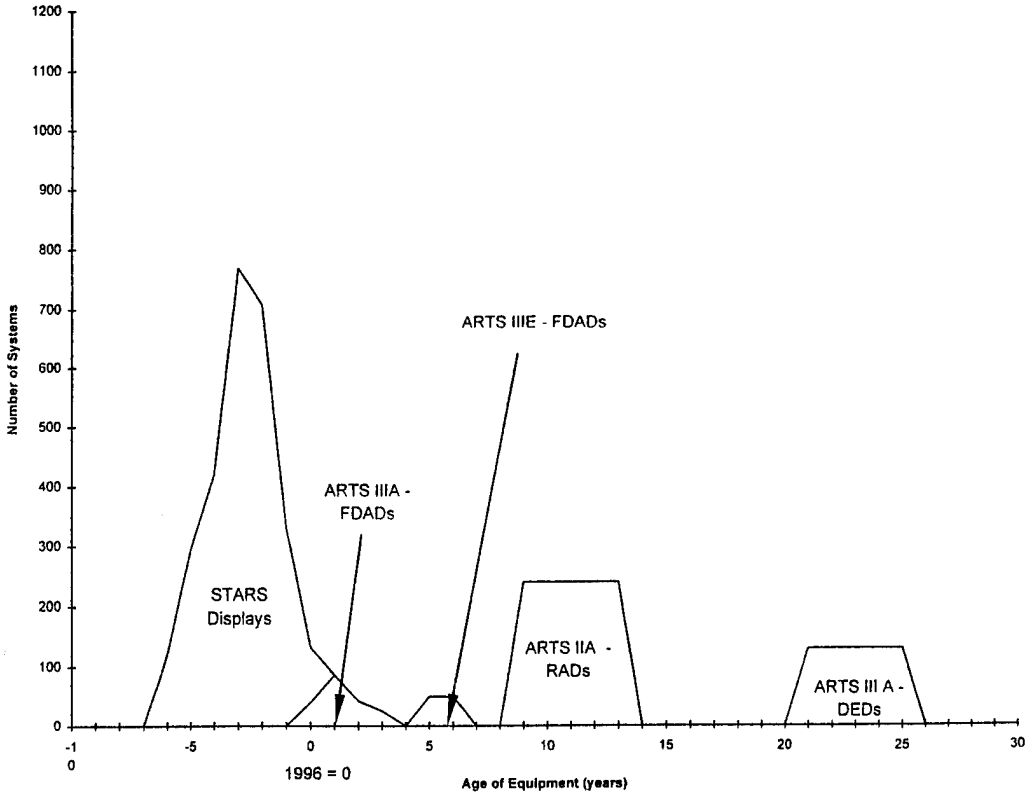


Figure 2–8. Capital Stock Analysis – TRACON Displays
(page 2–1 interprets this figure)

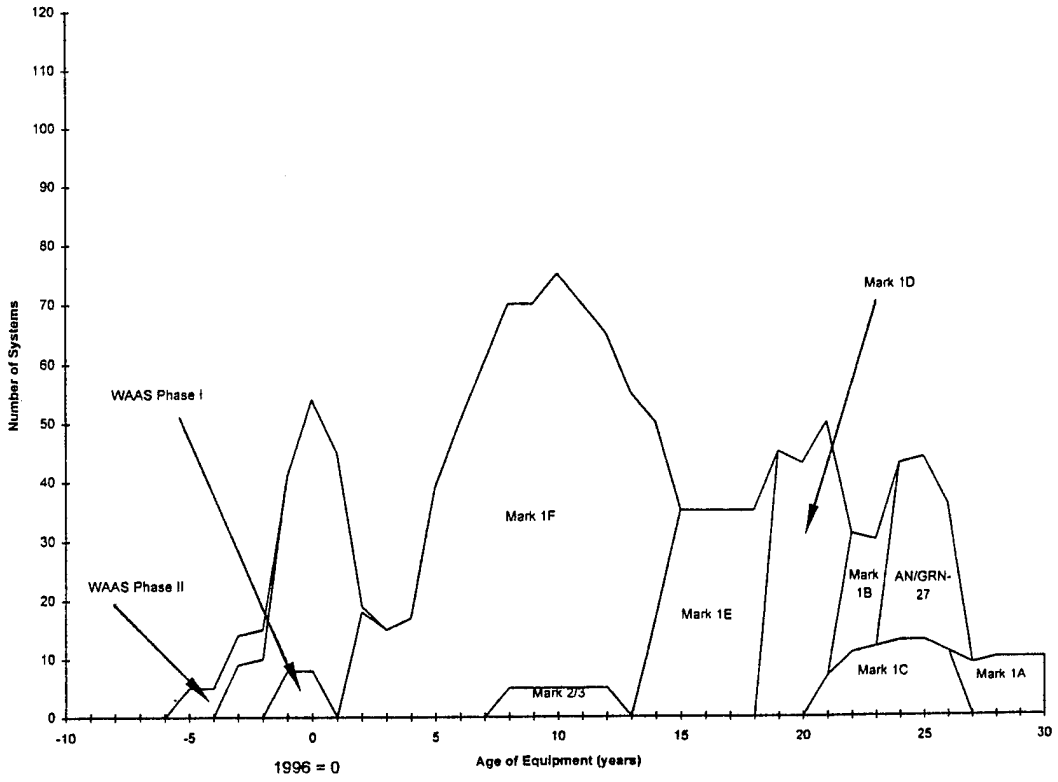


Figure 2–9. Capital Stock Analysis – Instrument Landing Systems
(page 2–1 interprets this figure)

En Route/Oceanic

Air route traffic control centers (ARTCCs) provide en route services for a large geographical area to aircraft between the departure and arrival phases of flight. The primary role of the center is to provide a safe, orderly, and expeditious traffic flow throughout the NAS. Services include separating instrument flight rules aircraft, monitoring traffic flow and implementing traffic management initiatives, issuing traffic and weather advisories, coordinating special use airspace, and providing emergency assistance. In the oceanic environment, the same general services are provided. However, due to lack of radar and direct communications between pilot and controller, the efficiency of the services is somewhat reduced. An example is the much larger oceanic aircraft separation standards than are found in domestic airspace. In addition, the center is the focal point for monitoring the NAS infrastructure status within its area of jurisdiction.

Instrument flight rules aircraft are separately provided vertical and horizontal spacing between aircraft to ensure conflict–free flight paths. Controllers provide specific route and altitude instructions by relying on a network of radar, communications, and computers. Traffic management uses various programs to control aircraft flow rates and sequencing into and out of high–density areas. This service reduces the possibility of any point in the NAS becoming overloaded by balancing demand and capacity.

Traffic advisory services are provided to all aircraft operating under instrument flight rules, and when requested, to aircraft under visual flight rules. These services consist of informing aircrews of other aircraft in the vicinity and providing flight information and navigation assistance. Another important advisory service is disseminating airport conditions and weather information such as icing, turbulence, and thunderstorms to aircrews. The weather information is generated from a variety of sources including pilot reports and weather radars.

Air route traffic control centers monitor the status of special use airspace within their boundaries. This airspace is used for operations such as military training, flight test activity, space shuttle operations, missile launches, and various special events. The service provided by the centers ensures that nonparticipating aircraft are excluded from active special use airspace, and the airspace is returned to the NAS when not in use.

Another important service provided is emergency assistance to aircraft in distress. Examples are lost aircraft, aircraft with mechanical difficulties, and medical emergencies. Controllers will do whatever is necessary to handle the incident in the most expeditious manner.

Increases in traffic demand, however, will strain the FAA's resources that provide services in the en route area. The outdated technology currently in use will not be able to accommodate the increasing traffic, thus limiting domestic airspace efficiency. The problem is even more severe in the oceanic environment. Large oceanic separation standards based on 1950's technology and procedures still exist. The gap between increasing needs and existing capabilities requires an investment to modernize facilities and equipment. The CIP projects will improve communications, navigation, surveillance, and automation capabilities to alleviate these limitations. In addition, these improvements will meet future increases in traffic growth and safely decrease oceanic separation standards.

CIP projects supporting this service area provide benefits to both the user and the FAA. As shown by Figure 2–10 En Route Area Benefits, the gains from the CIP projects are primarily in efficiency. These efficiency increases are $21.1 billion from reduced delays and $23.1 billion from using preferred routes and altitudes. The benefits to the FAA include $5.6 billion through improved equipment supportability, and through fewer new positions required to meet expected traffic

demand. Examples of CIP projects that contribute to these benefits include providing new equipment through the en route automation program and replacing ground–based navigation aids with a satellite–based navigation system.

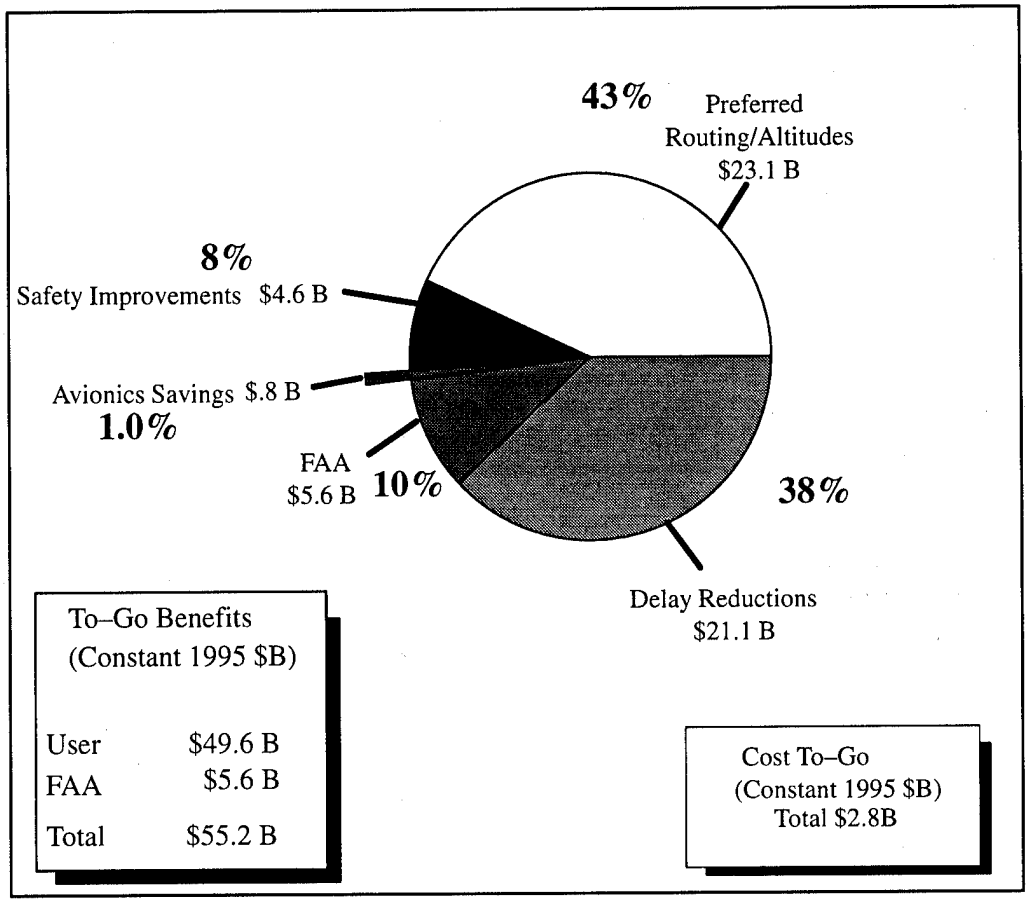


Figure 2–10. En Route Area Benefits

As shown in Figure 2–11 En Route: Operations per Controller, average controller productivity in this service area is measured by the number of operations per controller and is predicted to have an increasing trend. Overall staffing levels generally respond to changes in traffic demands but may lag if the changes vary dramatically from predictions.

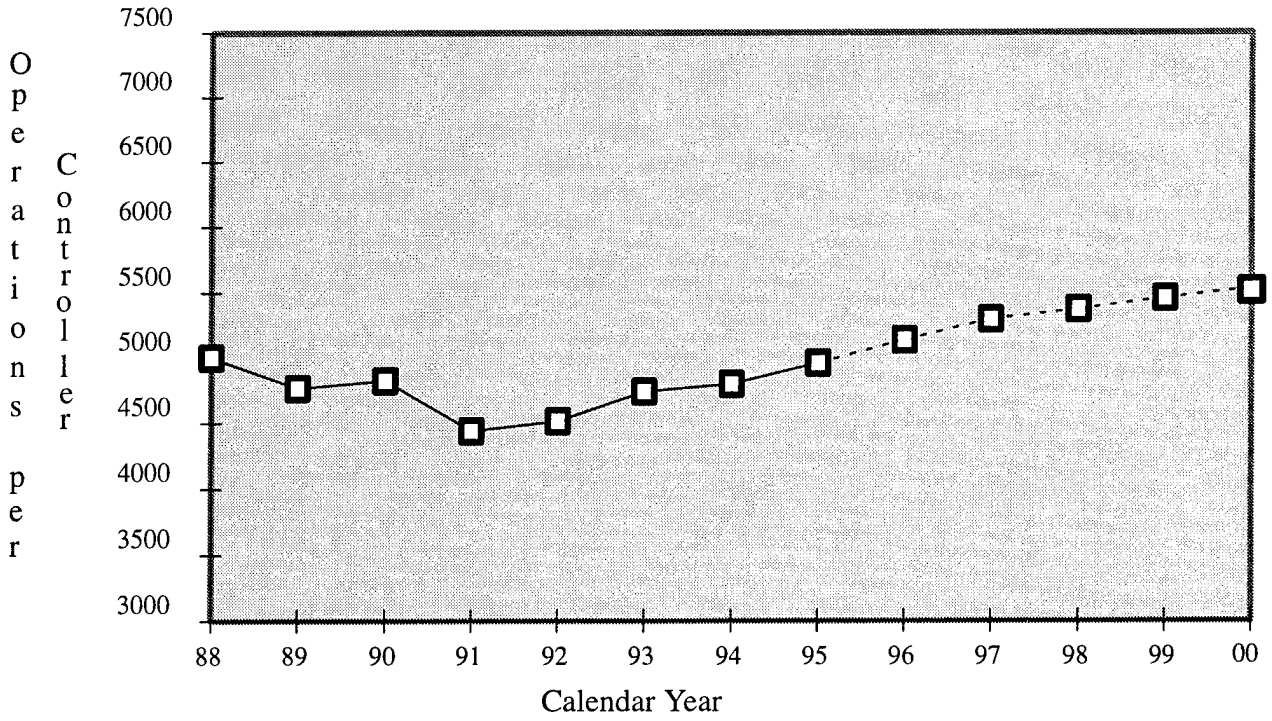


Figure 2–11. En Route: Operations per Controller

Figure 2–12 Capital Stock Analysis–Ground Based Navigation Systems shows the aging of ground–based navigation equipment. Many of these systems are approaching the end of their projected service life (PSL). The global positioning system (GPS) wide area augmentation system (WAAS) could lead to phase–out of these existing NAS ground–based navigation equipment. Figure 2–13 Capital Stock Analysis–Radars addresses the radar equipment which is in overall excellent condition as many new systems have just started operational service. Those systems approaching or pass their PSL will be replaced by systems currently in the development cycle, i.e., the ASR–11 and the air traffic control beacon interrogator (ATCBI) replacement. Figure 2–14 Capital Stock Analysis–Voice Switches shows the NAS voice switching equipment with a 10–year PSL for TRACON switches and 20–year PSL for en route switches. Figure 2–15 Capital Stock Analysis–ARTCC Displays indicates that the plan view displays (PVDs), which are 15 to 20 years past their PSL, will be replaced by the display system replacement (DSR) equipment.

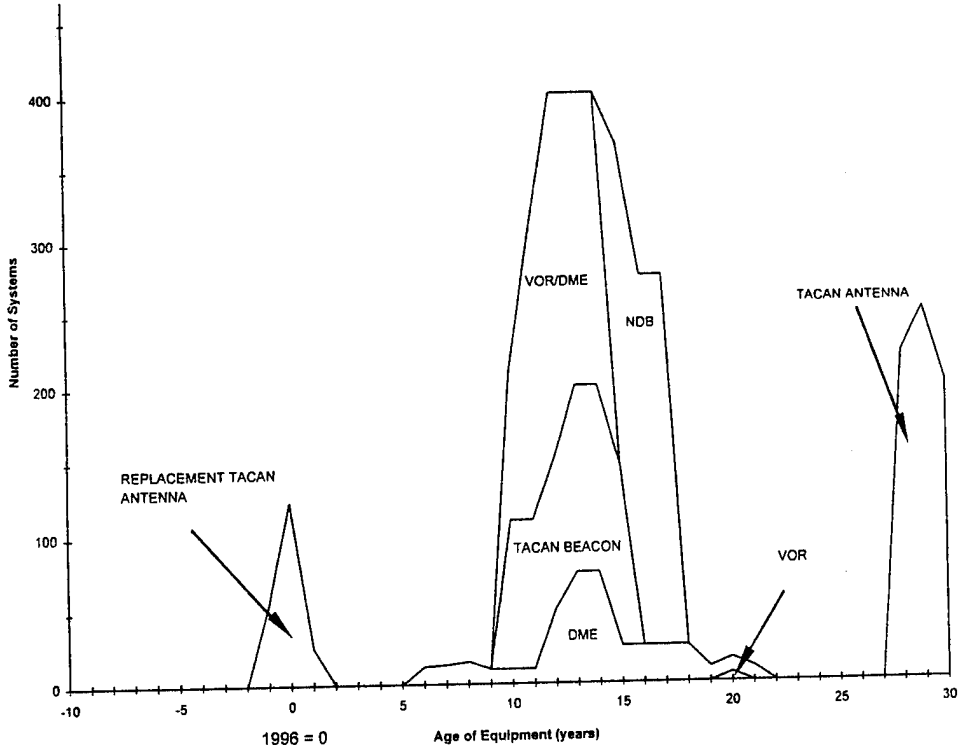


FIGURE 2–12. CAPITAL STOCK ANALYSIS–GROUND BASED NAVIGATION SYSTEMS

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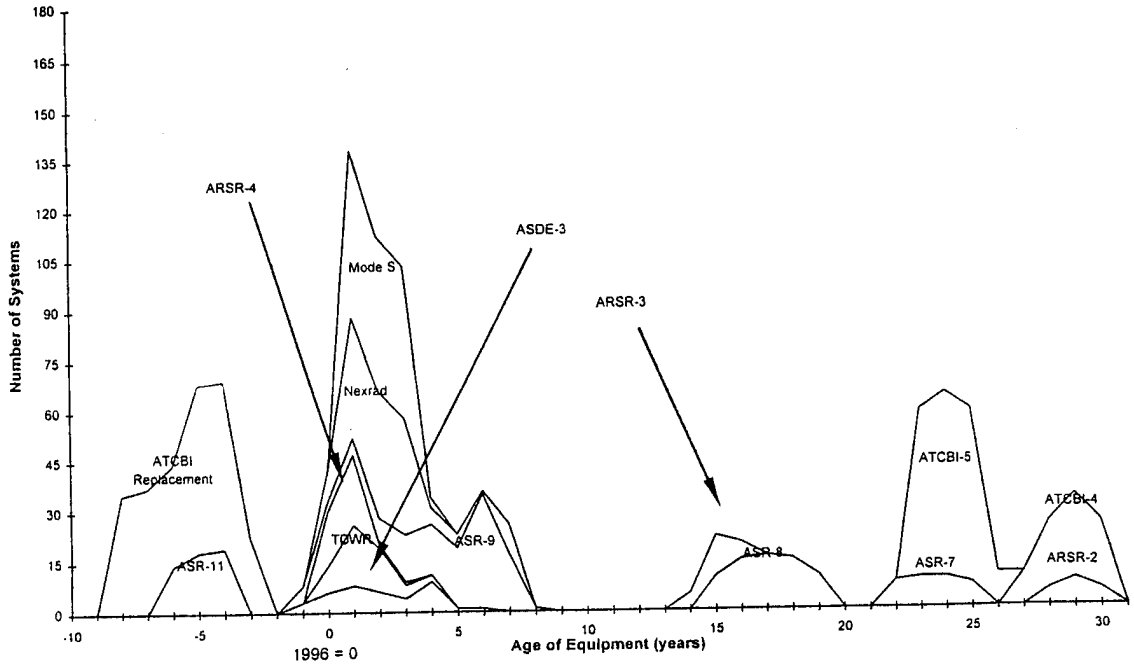


FIGURE 2–13. CAPITAL STOCK ANALYSIS–RADARS

(page 2–1 interprets this figure)

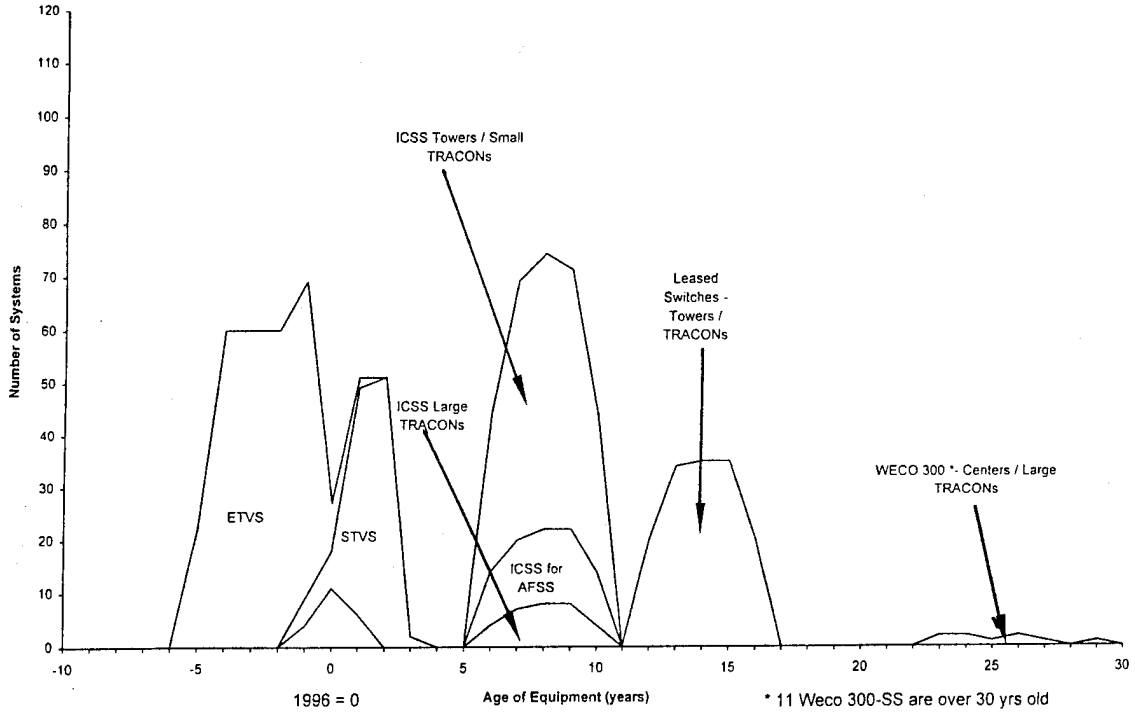


FIGURE 2–14. CAPITAL STOCK ANALYSIS–VOICE SWITCHES

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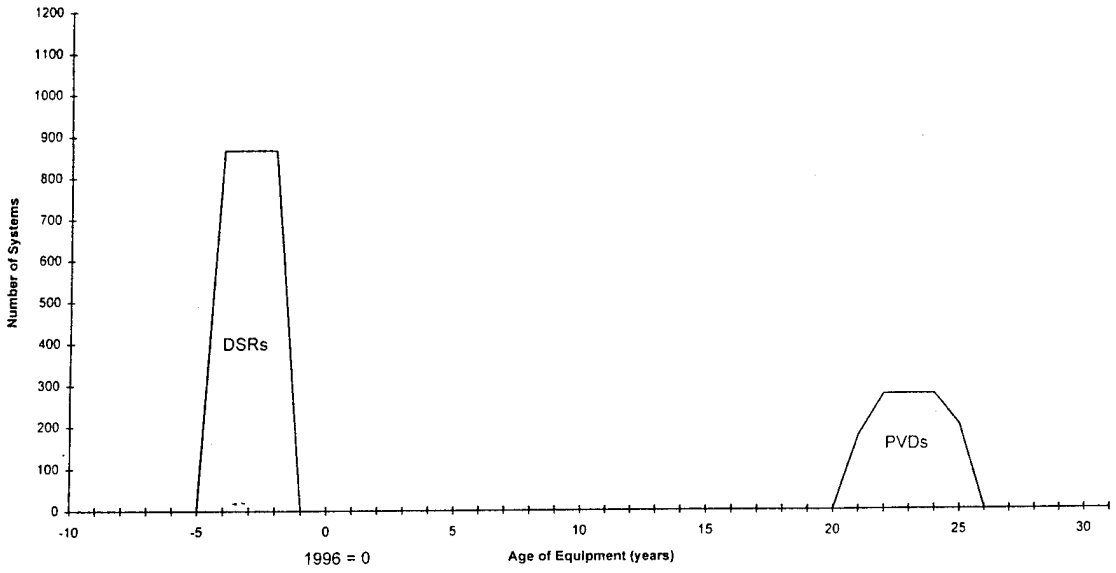


FIGURE 2–15. CAPITAL STOCK ANALYSIS–ARTCC DISPLAYS

(page 2–1 interprets this figure)

FAA Internal Support

The projects in this area provide important functions that allow the FAA to accomplish its mission, but they do not provide a direct service to the flying public. These projects also are not directly related to a specific service area.

Additionally, the FAA Technical Center operates the Atlantic City International Airport, the only airport owned and operated by the FAA. The FAA Technical Center uses the airport and Runway 13–31 for research, engineering and development (R,E&D) in support of NAS projects and is responsible for its maintenance as the Part 139 certificate holder. Runway degradation is affecting both civil flight operations and R,E&D activities in addition to having an impact on airport maintenance. Figure 2–16 is a standard model for predicting runway lifecycle. Runway 13–31 is in its fourteenth year and the model predicts that it has expended 70 percent of its useful life. Independent studies have been conducted on Runway 13–31 that verify the runway's condition mirrors the model's prediction. The runway's condition is currently good, but the model predicts deterioration will accelerate exponentially. As the model shows, delays in repairing the runway will greatly increase costs. In particular, between years 17 and 18 the deteriorating substrata increases the cost to repair 150–200 percent per square foot.

Project Applicability

The projects in Chapter 3 support the previously listed service areas. Many projects apply to more than one service area. These projects have been consolidated into seven functional areas: automation, communications, facilities and associated systems, mission support, navigation and landing, surveillance, and weather. The functional listing of CIP projects and their service area applicability is shown in Table 2–1 Functional Project Applicability to Service Areas.

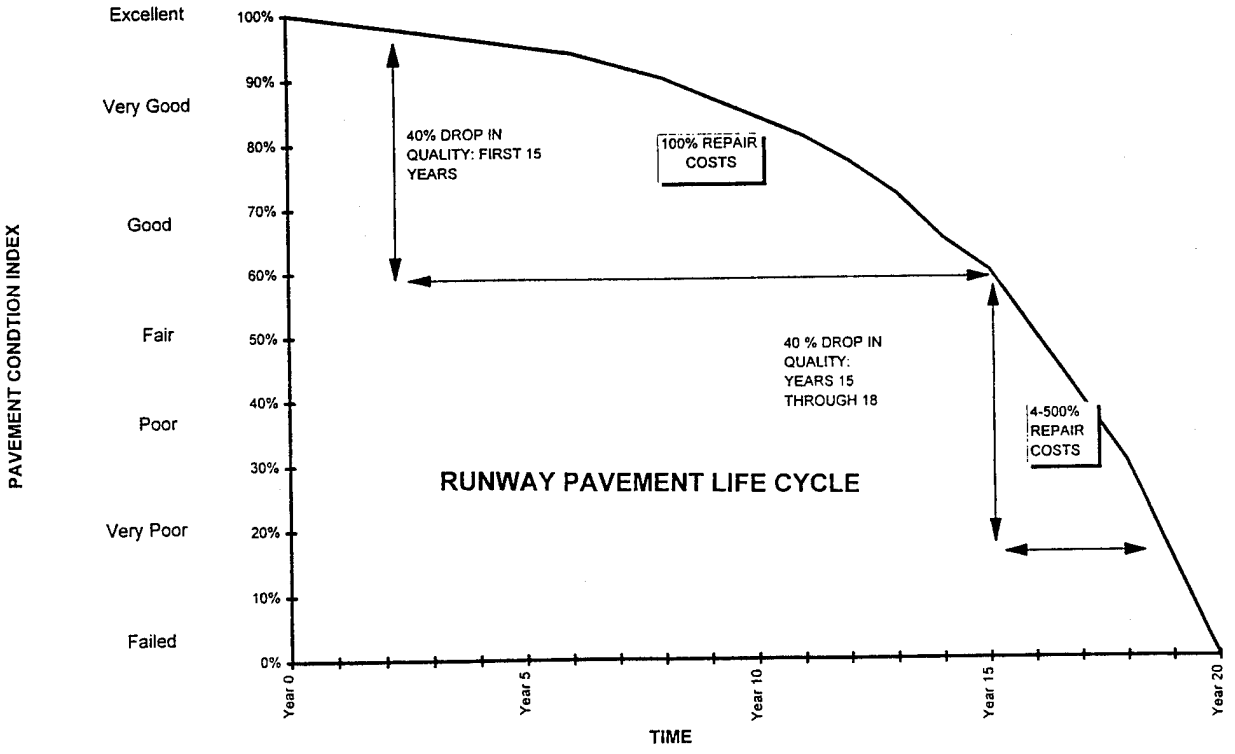


FIGURE 2–16 PAVEMENT LIFE CYCLE FOR RUNWAY 13–31

Table 2-1. Functional Project Applicability to Service Areas

New CIP No.	Project Title	Service Areas					FAA Internal Support
		Aircraft and Aircrew	Flight Service Stations	Airport	Terminal	En Route/ Oceanic	
	Automation						
A–01	En Route Automation Program					X	
A–02	Tower Automation Program			X			
A–03	ARTS Improvements				X		
A–04	Standard Terminal Automation Replacement System				X		
A–05	Traffic Management System (TMS)			X	X	X	
A–06	En Route Software Development					X	
A–07	Flight Service Automation System (FSAS)		X				
A–08	Operational Data Management System (ODMS)		X	X	X	X	
A–10	Oceanic Automation Program (OAP)		X			X	
A–11	Terminal ATC Automation (TATCA)				X		
A–12	Airport Surface Target Identification System (ATIDS)			X			
A–13	Digital Bright Radar Indicator Tower Equipment			X			
A–14	Instrument Approach Procedures Automation	X					
A–15	Civil Aviation Registry Modernization	X					
A–17	Aviation Safety Analysis System (ASAS)	X					
A–18	Safety Performance Analysis System (SPAS)	X					
A–19	Portable Performance Support System (PPSS)	X					
A–20	Integrated Flight Quality Assurance	X					
	Communications						
C–01	Voice Switching and Control System (VSCS)					X	
C–02	Multichannel Voice Recorders		X	X	X	X	
C–03	Weather Message Switching Center (WMSC) Replacement		X	X	X	X	
C–04	Radio Control Equipment (RCE)		X	X	X	X	
C–05	Voice Switches			X	X		
C–06	Communications Facilities Enhancement		X	X	X	X	
C–09	Sustaining Backup Emergency Communications (BUEC)					X	
C–10	Emergency Transceiver Replacement			X	X		
C–11	Data Multiplexing Network (DMN) Continuation		X	X	X	X	X
C–12	Expansion/Reconfiguration of LDRCL		X	X	X	X	
C–14	Critical Telecommunications Support		X	X	X	X	X
C–15	FAA Telecommunications Satellite (FAATSAT)		X		X	X	

New CIP No.	Project Title	Service Areas					FAA Internal Support
		Aircraft and Aircrew	Flight Service Stations	Airport	Terminal	En Route/ Oceanic	
C–17	Establish Alaskan NAS Interfacility Communications System (ANICS) Satellite Network		X	X	X	X	
C–18	National Airspace System (NAS) Recovery Communication (RCOM)						X
C–20	Aeronautical Data–link			X	X	X	
C–21	Next–Generation Air/Ground Communications System		X	X	X	X	
C–22	Gulf of Mexico					X	
C–23	Digital Voice Recorder System (DVRS)		X	X	X	X	
	Facilities and Associated Equipment						
F–01	ATCT/TRACON Establishment/Sustainment/Replacement			X	X		
F–02	Metroplex Control Facility (MCF)				X		
F–03	Austin–Bergstrom International Airport Program			X	X		
F–04	DOD/FAA Air Traffic Control Facility Transfer/ Modernization			X	X		
F–05	Flight Service Facilities		X				
F–06	ARTCC Plant Modernization/Expansion					X	
F–08	Sustain San Juan Facilities		X		X	X	
F–09	Replacement of Controller Chairs						X
F–10	Airport Cable Loop Systems Sustained Support			X			
F–11	Power Systems Sustained Support		X	X	X	X	
F–12	Modernize and Improve FAA Buildings and Equipment Sustained Support						X
F–13	NAS Facilities Occupational Safety and Health (OSH) and Environmental Compliance						X
F–14	System Support Laboratory Sustained Support						X
F–15	General Support Laboratory Sustained Support						X
F–16	FAA Technical Center Building and Plant Support						X
F–17	CAEG Enhancement						X
F–18	Aeronautical Center NAS Support Facilities						X
F–19	Aeronautical Center Leases						X
F–20	Provide FAA Housing						X
F–22	Child Care Centers						X
F–23	Relocate Honolulu Combined Center Radar Approach Control (CERAP)				X	X	
	Mission Support						
M–02	Technical Support Services						X
M–03	CIP System Engineering and Technical Assistance						X
M–04	NAS In–Plant Contract Support Services						X

New CIP No.	Project Title	Service Areas					FAA Internal Support
		Aircraft and Aircrew	Flight Service Stations	Airport	Terminal	En Route/ Oceanic	
M–05	NAS Regional/Center Logistics Support Services						X
M–07	NAS Infrastructure Management System (NIMS)			X	X	X	X
M–08	Continued General Support		X	X	X	X	X
M–10	Distance Learning						X
M–11	Aircraft Fleet Modernization	X					
M–12	Aircraft Related Equipment Program	X					
M–13	Precision Automated Tracking System (PATS)			X			
M–15	NAS Spectrum Engineering Management		X	X	X	X	X
M–17	Test Equipment Modernization and Replacement						X
M–18	Computer Resources Nucleus (CORN)						X
M–20	National Airspace System Training						X
M–21	Logistics Support Systems and Facilities						X
M–22	NAS Implementation Support						X
M–24	National Aviation Safety Data Analysis Center	X					
M–25	Independent Operational Test and Evaluation Oversight						X
M–26	NAS Management Automation Program (NASMAP)						X
M–27	National Airspace Integrated Logistics Support (NAILS)						X
M–28	FAA Corporate Systems Architecture						X
M–29	Air Traffic Operational Management System (ATOMS) Local Area/Wide Area Networks						X
M–30	Integrated Communications Switching System (ICSS) Logistics Support		X				
	Navigation and Landing						
N–02	Direction Finder (DF)		X				
N–03	Instrument Landing System (ILS)			X			
N–04	Visual Navaids			X			
N–05	Low–Power TACAN Antennas					X	
N–06	VORTAC			X	X	X	
N–08	Runway Visual Range (RVR)			X			
N–09	Sustain Distance Measuring Equipment (DME)			X	X	X	
N–10	Sustain Nondirectional Beacon (NDB)			X	X	X	
N–11	Loran-C Monitors and Transmitter Enhancements				X	X	
N–12	Augmentations for the GPS			X	X	X	

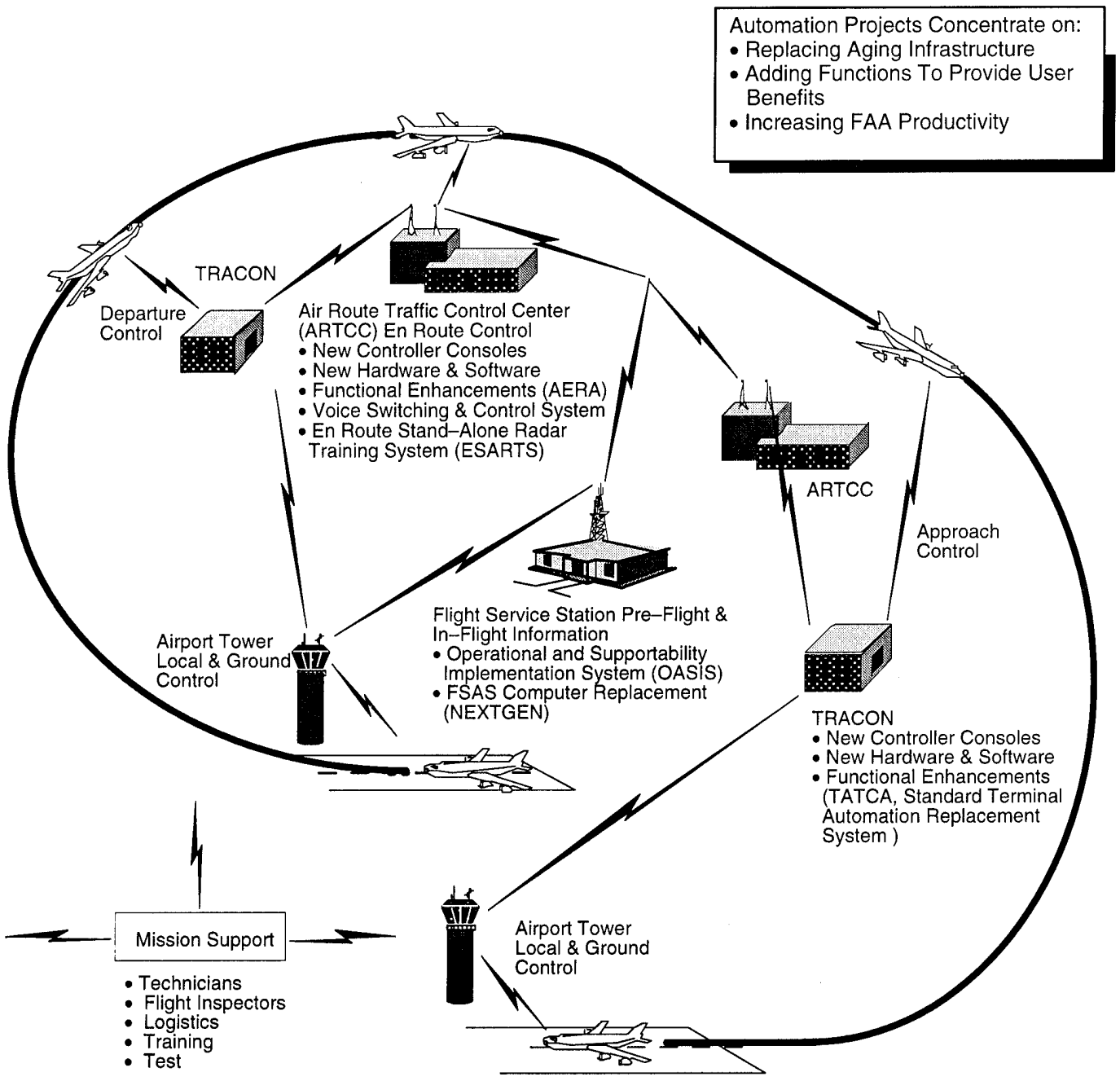
New CIP No.	Project Title	Service Areas					FAA Internal Support
		Aircraft and Aircrew	Flight Service Stations	Airport	Terminal	En Route/ Oceanic	
	Surveillance						
S–01	ASDE Radar			X			
S–02	Mode S			X	X	X	
S–03	Terminal Radar (ASR) Program			X	X		
S–04	Long–Range Radar Program					X	
S–05	Long-Range Radar (LRR) Radome Replacement					X	
S–08	Precision Runway Monitor			X			
	Weather						
W–01	Automated Weather Observing System (AWOS)		X	X		X	
W–02	Weather Radar Program					X	
W–03	Terminal Doppler Weather Radar (TDWR) System			X	X		
W–04	Weather and Radar Processor (WARP)					X	
W–05	Low–Level Windshear Alert System (LLWAS)			X			
W–06	Digital Altimeter Setting Indicator Replacement			X			
W–07	Integrated Terminal Weather System (ITWS)				X		
W–09	ASR Weather Systems Processor				X		

CHAPTER 3

PROJECTS ORGANIZED BY FUNCTIONAL AREAS

Automation Functional Projects

New Project Number	Title	Previous Project Number(s)	Page Number
A – 01	En Route Automation Program	21–12, 21–13 56–29	Auto – 3
A – 02	Tower Automation Program	21–12,	Auto – 6
A – 03	Automated Radar Terminal System (ARTS) Improvements	22–09, 32–04, 32–06, 32–20, 32–29, 42–21, 42–25, 52–21, 56–29	Auto – 8
A – 04	Standard Terminal Automation Replacement System (STARS)	62–25	Auto – 13
A – 05	Traffic Management System (TMS)	21–06, 41–06, 51–22	Auto – 15
A – 06	En Route Software Development	21–09, 41–21	Auto – 17
A – 07	Flight Service Automation System (FSAS)	43–01, 43–04, 43–22	Auto – 18
A – 08	Operational Data Management System (ODMS)	43–21	Auto – 20
A – 10	Oceanic Automation Program (OAP)	21-05, 61–22, 61–23	Auto – 22
A – 11	Terminal Air Traffic Control Automation (TATCA)	62–20	Auto – 25
A – 12	Airport Surface Target Identification System (ATIDS)	62–21	Auto – 27
A – 13	Digital Bright Radar Indicator Tower Equipment (DBRITE)	32–16	Auto – 30
A – 14	Instrument Approach Procedures Automation (IAPA)	56–23	Auto – 31
A – 15	Civil Aviation Registry Modernization	56–24	Auto – 33
A – 17	Aviation Safety Analysis System (ASAS)	56–51	Auto – 34
A – 18	Safety Performance Analysis System (SPAS)	56–68	Auto – 37
A – 19	Portable Performance Support System (PPSS)	56–72	Auto – 39
A – 20	Integrated Flight Quality Assurance	66–21	Auto – 40


Automation Projects Concentrate on:
• Replacing Aging Infrastructure
• Adding Functions To Provide User Benefits
• Increasing FAA Productivity
TRACON
Departure Control
Air Route Traffic Control Center (ARTCC) En Route Control
• New Controller Consoles
• New Hardware & Software
• Functional Enhancements (AERA)
• Voice Switching & Control System
• En Route Stand–Alone Radar Training System (ESARTS)
ARTCC
Approach Control
Flight Service Station Pre–Flight & In–Flight Information
• Operational and Supportability Implementation System (OASIS)
• FSAS Computer Replacement (NEXTGEN)
Airport Tower Local & Ground Control
TRACON
• New Controller Consoles
• New Hardware & Software
• Functional Enhancements (TATCA, Standard Terminal Automation Replacement System)
Mission Support
• Technicians
• Flight Inspectors
• Logistics
• Training
• Test
Airport Tower Local & Ground Control

A–01 En Route Automation Program

Purpose: Expected demand for national airspace system (NAS) utilization is beyond the projected capability of the current air traffic control system. The present air traffic control system is designed to primarily manage aircraft movement within defined corridors. To relieve expected demand overloads and associated higher aircraft operation costs, future systems must allow a progressive evolution to a free flight environment.

Complicating the need for growth is the need to replace aging and unsupportable equipment. Current controller workstation maintenance is difficult due to lack of replacement parts, while the system architecture lacks sufficient flexibility to accommodate software enhancements. Projects within the en route program will replace aging and unsupportable equipment and allow continued system growth providing a safe, effective, and efficient air traffic environment.

Project Information: This project combines projects 21–12 Advanced Automation System (AAS) (en route portion), 21–13 Automated En Route Air Traffic Control (AERA), and 56–29 On–Site Simulation–Based Training System (en route portion) from the 1993 CIP.

Approach: The en route automation program includes a number of discrete projects being developed in a parallel, building–block fashion. Though discrete, interdependencies exist between these projects.

Display System Replacement (DSR): The display system replacement will modernize radar display systems in air route traffic control centers in the conterminous United States and Alaska. Display system replacement implementation is a required precursor for the automated en route air traffic control project. This project will replace aging and unsupportable display equipment with functionally equivalent, expandable hardware and software. The system will address the need for enhanced display management, high reliability, continuous operation, and adaptability. The system design will minimize life–cycle cost, standardize human/computer design, and provide compatible and expandable interfaces. The display system replacement will be functionally equal or superior to the current system. It will also replace equipment used to provide communications with the Host mainframe computer, alphanumeric data displays, and flight strip printers. This project will provide air traffic controllers with a modern digital display system capable of processing and providing information in a fast, reliable manner. Information necessary for the safe management of aircraft movement will be provided more efficiently.

Display Channel Complex Replacement (DCCR): This is a low risk display system replacement. This project relies upon commercially available and nondevelopmental item procurements to provide a new controller display channel and associated firmware that will function with in–place software. The display channel complex replacement project does not provide the enhanced functionalities or display replacements that the display system replacement project will. It is meant only as a stopgap measure, until planned display system replacement implementation.

Automated En Route ATC (AERA): Automated en route air traffic control follows the display system replacement project. Although dependent upon a number of projects, it provides the most obvious benefit to the flying public. It is an air traffic management tool that provides a number of safety and flight plan management improvements. The Host interface device/local area network (HID/LAN) is the earliest control phase and brings data buffering, translation, and preprocessing functions required for future systems. Subsequent implementation phases will provide the capability to look long-term and detect potential aircraft conflicts with airspace boundaries or other aircraft. This project will also monitor aircraft conformance to flight plan routes and notify controllers if the aircraft drift outside of acceptable

tolerances. Automated en route air traffic control will be capable of projecting and analyzing a requested flight route or flight route change, repeatedly look ahead for possible conflicts, and notify controllers when conflicts no longer exist. This project will serve as an automation tool integrator and lay the framework for the future air traffic control system where air traffic management responsibilities are shared between controllers and pilots.

Host Computer System Replacement: Designed to replace the heart of the air traffic system, this program will modernize and enhance the current automation infrastructure. Current functionalities will be maintained while improved wind data modeling and flight trajectory accuracy will be provided for enhanced strategic and tactical planning. This replacement system will accommodate radar and satellite data processing to provide aircraft current and projected positions; strategic planning; data-link; and traffic management functionalities. This program will also provide the hardware, software, networks, and interfaces required to replace the current Host mainframe computer and utilize the display system replacement workstations. The Host replacement will provide a modern foundation designed to not only ensure that controllers have the data necessary for safe airspace management, but also have it in a timely manner. The design will also ensure that the system can grow and expand in capacity and functionality to meet future needs.

En Route Stand–Alone Radar Training System (ESARTS): A segment of the On–Site Simulation–Based Training program, the en route stand alone radar training system will be an advanced training system identical in form, fit, and functionality to the operational en route system. The en route stand alone radar training system will be used to provide initial, certification, and proficiency training to air traffic controllers using actual operational software. Realistic scenarios, archiving, and replay are design features that will contribute to a highly–trained controller workforce.

This program includes construction and site preparation that is required for the implementation of all en route automation projects.

Products:

- 21 display system replacement systems at the centers including Anchorage. (21–12)
- 1 display system replacement system at the FAA Technical Center and 1 at the FAA Aeronautical Center for operational support. (21–13)
- Automated en route air traffic control software for 20 centers, the FAA Technical Center, and the FAA Academy. (21–13)
- 22 Host computer replacement systems for centers, the FAA Technical Center, and the FAA Academy. (21–12)
- 22 en route stand–alone radar training systems. (56–29)
- 5 display channel complex replacement systems at selected centers with options for 3 more sites.

1995 Accomplishments:

Display System Replacement:

- Developed specification, completed system design review, awarded contract modification, and completed critical design review.

Display Channel Complex Replacement:

- Awarded letter contract and completed critical design review.

AERA:

- Completed user request evaluation tool prototype targeted for Indianapolis center.
- Initiated mission oriented independent evaluation at Kansas City center.

1996 Planned Accomplishments:

- Complete User Request Evaluation Tool field assessment at Indianapolis center.
- Complete Prediction Resolution Analysis Tool information assessment at Boston center.
- Award HID/LAN contract.

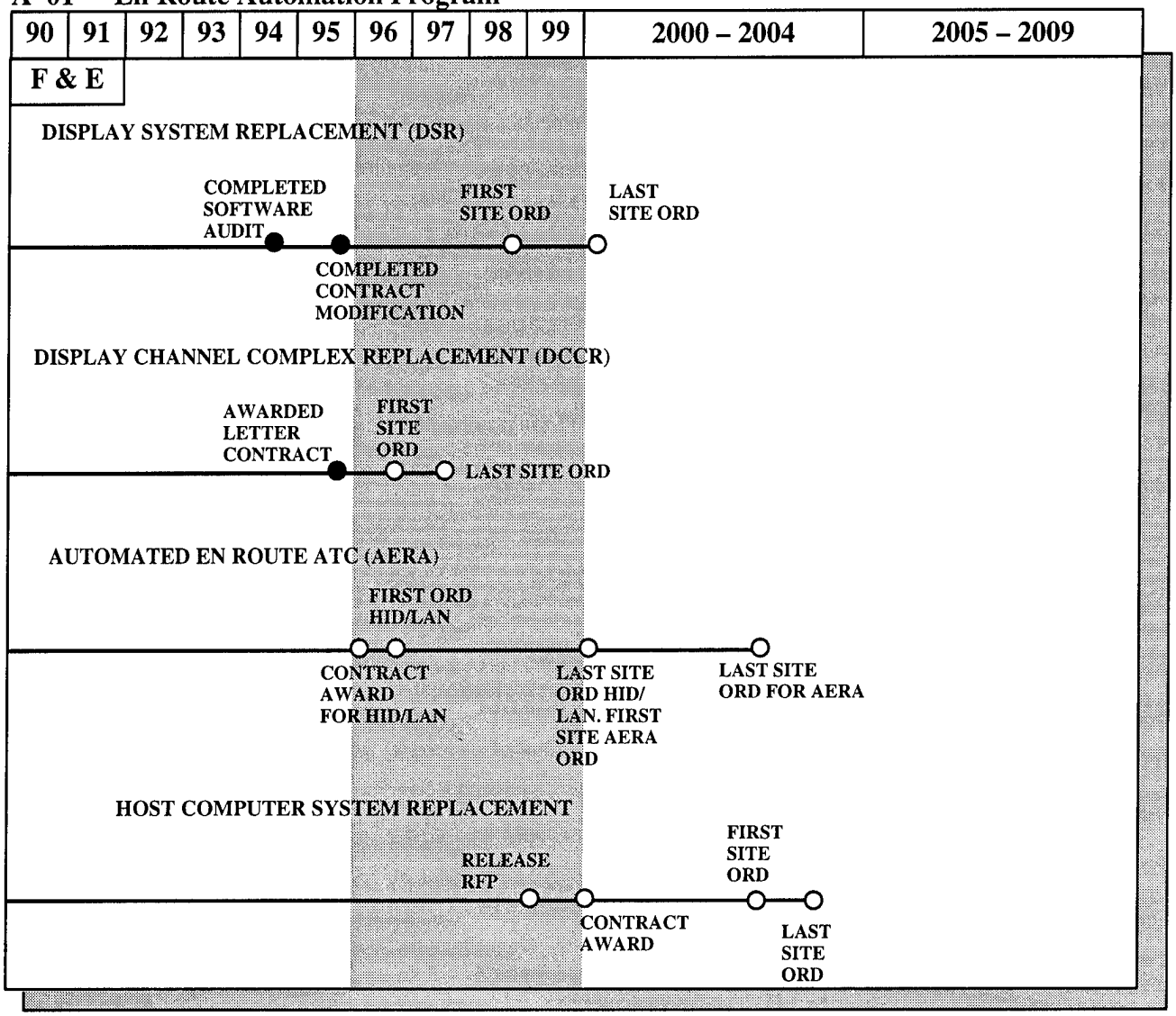
Benefit/Cost Ratio: A benefit–cost ratio study for DSR began in December 1995 and a benefit–cost study for Host/DARC will be conducted in April 1996.

Related Projects/Activities: A–02 Tower Automation Program, A–03 Automated Radar Terminal System (ARTS) Improvements, A–04 Standard Terminal Automation Replacement System (STARS), A–05 Traffic Management System (TMS), A–06 En Route Software Development, A–11 Terminal Air Traffic Control Automation (TATCA), C–01 Voice Switching and Control System (VSCS), C–03 Weather Message Switching Center (WMSC) Replacement, C–20 Aeronautical Data–link, F–06 Air Route Traffic Control Center (ARTCC) Plant Modernization/ Expansion, S–04 Long–Range Radar Program, and W–04 Weather and Radar Processor (WARP). Research, Engineering and Development (R,E&D) Plan projects, 021–110 Advanced Traffic Management System (ATMS), 031–110 Aeronautical Data Link Communications and Applications, and 032–110 Satellite Navigation Program are related projects.

List of Contractors:

- Loral Corporation
  (DCCR systems)
  St. Paul, Minnesota
- Loral Federal Systems Incorporated
  (hardware and software)
  Rockville, Maryland

A–01 En Route Automation Program



A–02 Tower Automation Program

Purpose: This program will integrate new safety systems with existing systems in a consolidated automation platform with a common computer/human interface. There is no basic infrastructure to efficiently build new functionality/capability into towers. Airport traffic control towers have added status and control systems in a piece–meal fashion where space was available. This has led to a proliferation of individual keyboards and displays, creating an inefficient use of space and an overcrowded tower cab. The basic problem is that controllers have minimal flexibility to rearrange operational positions for different tower operating conditions, and the individual control systems are not placed in optimal positions for most efficient controller performance. Also, each system within a tower has a

separate computer/human interface that requires training on each individual piece of equipment.

Project Information: This project includes the tower section of 21–12 Avanced Automation System (AAS) from the 1993 CIP.

Approach: This program was part of the advanced automation system program which has been restructured into separate components. The tower automation program will establish a common platform that will integrate the multiple tower cab status/monitor control systems, keyboards, and displays. The automation platform will provide reconfigurable controller position workstations to meet the full range of operational requirements. For example, the workstation can be configured for clearance delivery, local control, and supervisory positions (or others) as needed.

This program will provide a high availability automation platform that maximizes use of commercial–off–the–shelf hardware and software to minimize life–cycle costs. A key element of the program is that it will be expandable to support the integration of new airport capacity, safety, and efficiency enhancements such as airport surface traffic automation, departure sequence processing, terminal Doppler weather radar, and data link. A solid tower automation infrastructure will enable the FAA and the user community to fully realize the benefits from the proposed safety, capacity, and efficiency projects. These major capital improvement projects will mainly be installed at high activity, major metropolitan airports. Therefore, the automation platform developed by this program will be placed only in major activity airport traffic control towers.

The tower automation program will also encompass system operational supportability training for operators and maintainers. Standardizing to a common entry, display, and message format will maximize operator efficiency and reduce training time. For example, a red light will indicate a problem independent of the subsystem involved or the tower's geographical location.

Products:

- Up to 70 tower automation platforms at high activity airports with an average of 6–11 workstations, with options for up to 80 additional units.
- Up to four automation platforms for the FAA Academy.
- Up to two automation platform systems for the FAA Technical Center.

1995 Accomplishments:

- Redefined the contract modification for the upgrade to high availability basic TCCC requirements.
- Completed critical design review for high availability basic TCCC.
- Completed all software builds.

1996 Planned Accomplishments:

- Complete system integration testing.
- Complete full system test.
- Start the operational test and evaluation.
- Ship and install at the key site (El Paso).
- Start key site acceptance testing.

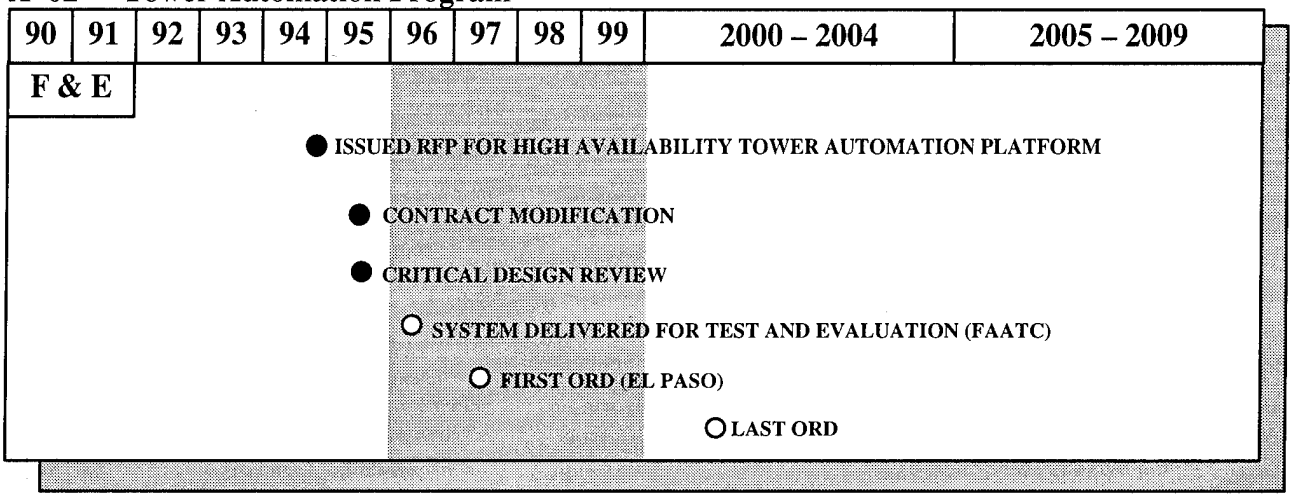
Benefit/Cost Ratio: A study is in progress for Surface Movement Advisor (SMA).

Related Projects/Activities: A–01 En Route Automation Program, A–03 Automated Radar Terminal System (ARTS) Improvements, A–04 Standard Terminal Automation Replacement System (STARS), A–05 Traffic Management System (TMS), A–12 Airport Surface Target Identification System (ATIDS), A–13 Digital Bright Radar Indicator Tower Equipment (DBRITE), C–05 Voice Switches, C–20 Aeronautical Data–link, F–01 Airport Traffic Control Tower/Terminal Radar Approach Control Facility (ATCT/TRACON) Establishment/Sustainment/Replacement, M–03 Capital Investment Plan (CIP) System Engineering and Technical Assistance, M–07 NAS Infrastructure Management System (NIMS), N–03 Instrument Landing

System (ILS), N–04 Visual Navaids, N–08 Runway Visual Range (RVR), S–01 Airport Surface Detection Equipment (ASDE) Radar and Airport Movement Area Safety System (AMASS), S–08 Precision Runway Monitor, W–01 Automated Weather Observing System (AWOS), W–03 Terminal Doppler Weather Radar (TDWR) System, W–05 Low–Level Windshear Alert System (LLWAS), W–06 Digital Altimeter Setting Indicator (DASI) Replacement, and W–07 Integrated Terminal Weather System (ITWS). R,E&D Plan projects, 021–190 Airport Surface Target Identification System (ATIDS), 031–110 Aeronautical Data Link Communications and Applications and 032–110 Satellite Navigation Program are also related projects.

List of Contractors:
Loral Federal Systems Company
(hardware and software)
Rockville, Maryland

A–02 Tower Automation Program



A–03 Automated Radar Terminal System (ARTS) Improvements

Purpose: Automated radar terminal systems gather data from surveillance sensors, process it, and present it to air traffic controllers in terminal radar approach control facilities and control towers. Requirements currently exist and will continue to grow for providing new automation systems that enhance services to users. Established facilities are experiencing increased demand for new system capability, capacity, and sustainability.

This project provides several benefits to the user community. New establishments will provide radar approach services where none currently exist. Enhancements at existing facilities will provide increased processor capacity and number of displays. New capabilities such as Mode–C intruder and final approach spacing tool will maintain or improve safety levels while increasing traffic capacity. The new/modified equipment will be logistically more supportable and will provide more reliable service to users. This project will also develop stand–alone, simulation based training systems for terminal and metroplex control facilities and a supplemental system for en route and terminal training. These systems will permit training of Air Traffic personnel in a realistic

environment without taking operational equipment out of service, risking injury to personnel, or damaging system equipment. Simulators will: permit practicing of emergency or hazardous situations, allow for flexible training schedules, provide for consistent training, and be less costly than operational equipment.

Project Information: This project combines the following projects from the 1993 CIP: 22–09 ARTS IIA Interface with Mode S/ASR–9, 32–04 Provide ARTS IIIE Upgrades for Select Air Traffic Facilities, 32–06 Expand Automated Radar Terminal System (ARTS) IIA Capacity and Provide Mode C Intruder (MCI) Capability, 32–20 Expand Automated Radar Terminal System (ARTS) IIIA Capacity and Provide Mode C Intruder (MCI) Capability, 32–29 Establish Additional Radar Positions, 42–21 Terminal Software Development, 42–25 ARTS IIIA Data Entry and Display Subsystem (DEDS), portions of 46–30 Interim Support Program (ISP), 52–21 ARTS IIIA Peripheral Adapter Module (PAM) Modernization, and sections of 56–29 Onsite Simulation–Based Training Systems.

Approach: The basic approach is to sustain and improve the automated radar terminal units until their time–phased replacement by the standard terminal automation replacement system (STARS). The strategy also includes utilizing displaced automated radar terminal units to support remaining fielded systems, thus making optimal use of limited resources.

The ARTS improvement project is divided into five major elements: IIA, IIE, IIIA, IIIE, and terminal software development and supports a stand alone training system being developed to provide an onsite training capability (See Training section).

ARTS IIA: These units provide terminal automation at smaller airports with a maximum of 11 controller displays and input from 1 surveillance sensor. If more controller positions are required to meet traffic demands, or more sensor inputs are needed, the usual practice is to install an additional IIA system. This project is procuring new IIA systems to fill additional operational needs. Additional hardware and software will be acquired to improve capacity and add required capabilities at existing sites. Capacity improvements will be accomplished by redesigning specific cards to upgrade processors and increase memory. This permits the overall automation system to support more traffic and provides the capability to add safety functions

ARTS IIE: These units provide upgrades to the existing ARTS IIA's at smaller airports. The IIE system provides increased functionality relative to IIA, and it supports double the controller positions along with more surveillance sensor inputs. The approach is to buy the necessary hardware and integrate existing software coded in higher order language, including Mode C Intruder, to provide operational systems. This is an intermediate step in the evolution toward a common hardware and software architecture.

ARTS IIIA: The IIIA units provide terminal automation at large airports with approximately 50 controller displays and input from multiple surveillance sensors. This project is in the final implementation stage to meet near–term additional operational needs. The approach is to sustain the IIIA units currently in the field. This includes a number of activities, such as adding input/output processors, improving peripheral equipment, and improving logistics support, as well as providing software support.

ARTS IIIE: The IIIE units provide terminal automation services at selected large facilities. Currently there is one operational system IIIE at the New York terminal radar approach control facility with additional systems programmed for installation at Chicago and Dallas/Fort Worth. The IIIE system provides increased functionality relative to IIIA, and it supports significantly more controller positions and surveillance sensor inputs. The approach is to buy the necessary hardware and integrate existing software, coded in a higher order language, to provide operational systems for Chicago and Dallas/Fort Worth. This is an intermediate step in the evolution toward a common hardware and software architecture.

Terminal Software Development: This project provides contractor support for the development, integration, and implementation of software changes to correct operational problems and provide system enhancements. This contract augments in–house FAA resources to provide services for all automated radar terminal units on recurring tasks such as software system releases, configuration management, and maintenance of system software libraries. The software being supported is written in a unique language with limited applicability. This project will provide the needed expertise for the remainder of the software's life–cycle.

Training: A terminal stand–alone radar training system (TSARTS) will be developed for terminal and metroplex control facilities. It will include capabilities to freeze and playback of scenarios and other needed training improvements. These systems will emulate the current terminal system functionality and NAS terminal automation system displays used in operational environment.

A supplemental training system (STS) will be developed and deployed to support en route and terminal training. This system will provide basic training scenarios and will be tailored to specific training needs.

Products:

- National software build A 2.09 for automated radar terminal system IIA interface with Mode S/ASR–9. (32–06)
- Upgrade four ARTS facilities (Chicago, Dallas/Fort Worth, Southern California, and FAA Academy) to IIIE with an option to upgrade additional facilities. (32–04)
- Mode C intruder software for IIA and IIIA locations. (32–06 and 32–20)
- Peripheral processors and equipment. (32–06)
- Video time compression modifications to automated radar terminal system IIA displays to support Mode C intruder. (32–06)
- 277 input/output processors to be added to IIIA system sites to accommodate Mode C intruder software. (32–20)
- Video time compression kits to stop the data entry and display system flickering. (32–20)
- Up to 214 additional radar positions established using full digital displays. (32–29)
- Contractor support for recurring and nonrecurring software support service tasks. (42–21)
- Hardware and software for common ARTS facilities. (32–04)
- Terminal stand-alone training systems for the terminal radar approach control facilities. (56–29).
- Supplemental training system simulator workstations for each center and terminal radar approach control facility. (56–29)

1995 Accomplishments:

- Delivered hardware for ARTS IIIE A6.04 to New York TRACON for retrofit; and, to Dallas/Fort Worth and Chicago TRACONs.
- Completed hardware installations for ARTS IIIE A6.04 at New York, Dallas/Fort Worth, and Chicago TRACONs.
- Delivered ARTS IIIE A6.04 software to New York, Dallas/Fort Worth, and Chicago TRACONs.
- Installed second ARTS IIA and achieved operational readiness capability at Anchorage, AK.
- Commissioned the relocated Norfolk, VA and New Orleans, LA TRACON ARTS IIIA systems.
- Completed installation of ARTS IIIA Mode C Intruder/Input Output Processors Model B at Honolulu, HI, Philadelphia, PA, New

Orleans, LA, Jacksonville, FL, and Hartford, CT.

- Commissioned the new Denver International Airport ARTS IIIA and Final Monitor Approach (FMA) systems.
- Completed an architectural study of Initial Terminal Data Link (ITDL) capabilities for use within the ARTS systems.
- Delivered ARTS IIIE A6.05 hardware to Southern California TRACON.
- Completed installation and commissioning of the Ontario and San Diego, CA TRACONs within the Southern California TRACON facility.
- Completed dual installation of ARTS IIIA at Daytona, FL.

1996 Planned Accomplishments:

- Complete New York, Chicago, and Dallas/Fort Worth TRACON ARTS IIIE A6.04 operational readiness capabilities.
- Complete ARTS IIIE A6.05 hardware deliveries to New York, Chicago, and Dallas/Fort Worth TRACON's.
- Complete ARTS IIIE A6.05 software deliveries to New York, Chicago and Dallas/Fort Worth TRACON's.
- Complete ARTS IIE hardware delivery to Fort Smith, AR.
- Achieve ARTS IIE operational readiness capability at Fort Smith, AR.

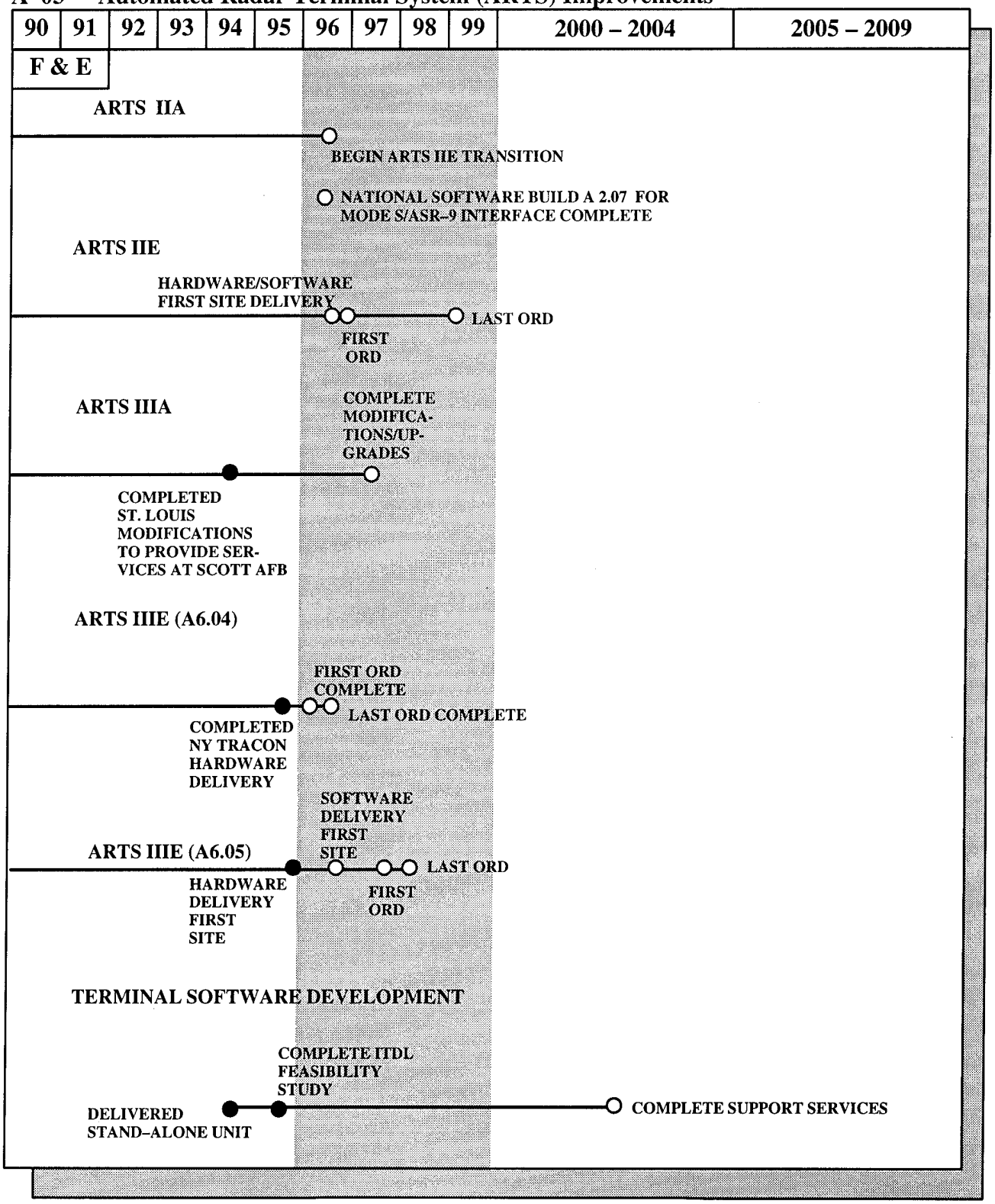
Benefit/Cost Ratio: A benefit–cost ratio has not been developed for this project.

Related Projects/Activities: A–01 En Route Automation Program, A–02 Tower Automation Program, A–04 Standard Terminal Automation Replacement System (STARS), A–11 Terminal Air Traffic Control Automation (TATCA), A–13 Digital Brite Radar Indicator Tower Equipment (DBRITE), F–01 ATCT/TRACON Establishment/Sustainment/Replacement, F–02 Metroplex Control Facility (MCF), F–04 DOD/FAA Air Traffic Control Facility Transfer/Modernization, S–02 Mode S, and S–03 Terminal Radar (ASR) Program.

List of Contractors:

- Loral Corporation Air Traffic Control Systems (hardware and software)
  St Paul, Minnesota
  - Paoli, Pennsylvania
  - Pleasantville, New Jersey
  - Clearwater, Florida
  - Denver, Colorado
- Magnavox
  (metric systems (memories))
  Fort Walton Beach, Florida

A–03 Automated Radar Terminal System (ARTS) Improvements



A–04 Standard Terminal Automation Replacement System (STARS)

Purpose: The standard terminal automation replacement system project represents a long–term view at improving the FAA's automation capabilities in the terminal environment. This project is complementary to the short–term automated radar terminal system improvement program that addresses immediate shortfalls in the current terminal automation system. The current automation systems suffer from escalating maintenance costs because they have exceeded their expected life–cycle. Numerous hardware components are no longer commercially available and the antiquated software is expensive to maintain. The current system capacity cannot be economically expanded to meet projected traffic levels because the hardware architecture has reached its limits. The hardware and software architecture will also delay introducing some new functional enhancements designed to reduce controller workload, improve safety, and increase throughput capacity at major airports. The standard terminal automation replacement system will focus on deploying a new automation system that uses a modern, commercial open architecture that solves the existing capacity problems and can grow to meet future needs.

Project Information: This project was 62–25 Future TRACON Automation System from the 1993 CIP.

Approach: An overall FAA objective is to shorten the time it takes to acquire and field major new systems. Procuring commercially available systems rather than developing a new system is a significant factor in meeting this objective. The standard terminal automation replacement system is structured to buy a commercially available terminal automation system that meets initial requirements with minimal development. This will allow a quick acquisition and deployment without waiting for future enhancements. Any enhancements will be provided as annual pre–planned product improvements. This strategy will improve capabilities, reduce maintenance costs, and provide the foundation to add new functionalities.

STARS will be a scaleable system designed to meet the terminal automation needs at facilities ranging from the smallest stand–alone terminal approach control facility to the largest metroplex control facility. The STARS architecture will allow the FAA to field modular common hardware and software at all facilities. The number of hardware elements installed will vary depending upon the facility capacity requirements. The software will also be built upon a common architecture with modular design that can support varying functional requirements. This program will deploy new controller workstations and back-room computer hardware to replace the currently deployed complement of ARTS IIA, IIE, IIIA, and IIIE systems. The standard terminal automated replacement system will be installed at 9 metroplex control facilities and approximately 152 FAA and 60 Department of Defense terminal radar approach control sites. Additional systems will be installed at the FAA Technical Center, FAA Academy, and eight Department of Defense training facilities. These additional systems will support training requirements, logistics needs, and future testing for preplanned product improvements.

STARS will replace current multiple types of processors and custom built controller displays with modern displays and distributed processing network architectures that are faster, cheaper, and more robust. These attributes are necessary to make the terminal air traffic control system viable well into the 21st century.

Products:

- Approximately 224 systems for terminal radar approach control facilities and metroplex control facilities with options as needed.
- Approximately 1,700 controller workstations with options for additional requirements.

- Software for the above systems and workstations based on modern computer language.
- Support systems for the terminal automation mission.
- Options for contract maintenance support for hardware and software.

1995 Accomplishments:

- Released Operational Requirements Document specifications, statement of work, and Operational Capability Demonstration Plan to industry.
- Completed terminal automation system market survey.
- Approved Human Factors Plan.
- Approved Program Master Plan.
- Approved Integration Logistics Support Plan.
- Approved Test and Evaluation Master Plan.
- Approved Program Implementation Plan.
- Approved KDP–2.

1996 Planned Accomplishments:

- Release RFP.
- Conduct operational capability demonstration and testing.
- Complete evaluation and award contract.

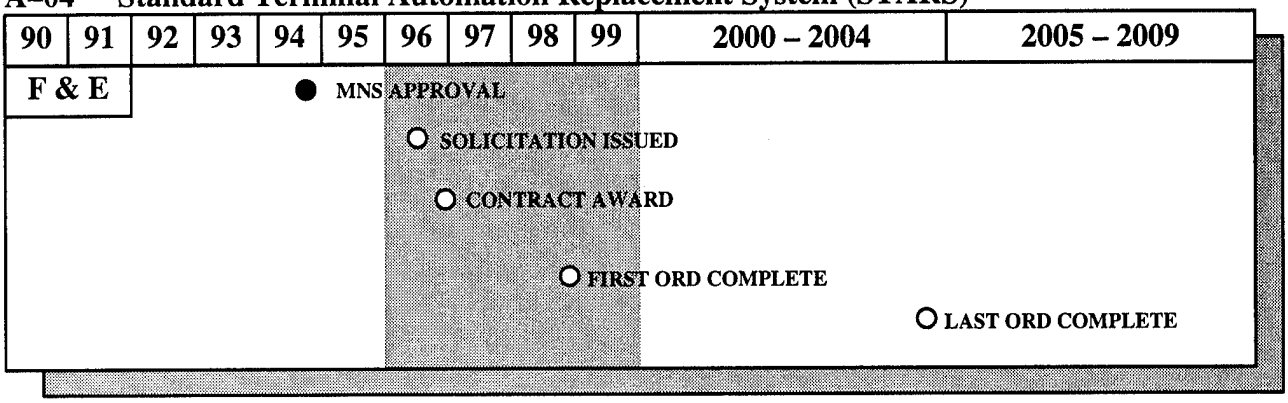
Benefit/Cost Ratio: A May 1995 study indicated a 5.6/1.0 benefit–cost ratio.

Problems Resulting in Delays: Last implementation slipped due to higher priority procurements by DOD.

Delays Minimized by: Schedule revised to reflect increased purchase.

Related Projects/Activities: A–01 En Route Automation Program, A–02 Tower Automation Program, A–03 Automated Radar Terminal System (ARTS) Improvements, A–05 Traffic Management System (TMS), A–11 Terminal Air Traffic Control Automation (TATCA), A–13 Digital Bright Radar Indicator Tower Equipment (DBRITE), C–20 Aeronautical Data–link, F–01 ATCT/TRACON Establishment/Sustainment/ Replacement, F–02 Metroplex Control Facility (MCF), F–04 DOD/FAA Air Traffic Control Facility Transfer/Modernization, S–03 Terminal Radar (ASR) Program, W–03 Terminal Doppler Weather Radar (TDWR) System, W–07 Integrated Terminal Weather System (ITWS), and W–09 Airport Surveillance Radar (ASR) Weather Systems Processor. R,E&D Plan projects 031–110 Aeronautical Data Link Communications and Applications and 032–110 Satellite Navigation Program are related projects.

A–04 Standard Terminal Automation Replacement System (STARS)



A–05 Traffic Management System (TMS)

Purpose: The traffic management system will maximize air traffic throughput, minimize air traffic delays, and establish a reliable serviceable automation platform.

This project will replace outdated equipment at the air route traffic control center, terminal radar approach control facility, air traffic control system command center, Technical Center, Aeronautical Center, and emergency operations facility by upgrading the enhanced traffic management computer complex. It will replace the existing system architecture with an architecture that complies with FAA and National Institute of Standards and Technologies (NIST) documentation. The new architecture will have the capability to support commercial-off-the-shelf equipment and transportability of software to various types of equipment.

This project will also encompass an en route analysis and reporting system (EARS) that will permit air traffic facilities to quickly evaluate impacts to new or proposed changes in air routes, traffic flow/metering, approach/departure procedures, and delay projects.

Project Information: This project combines project 21–06 Traffic Management System (TMS), 41–06 Traffic Management System (TMS) Sustainment, and 51–22 En Route Analysis and Reporting.

Approach:

- Replace the existing system with commercial-off-the-shelf equipment through an 8A contract.
  - Replace and relocate the traffic management computer complex from the Volpe National Transportation Systems Center in Cambridge, Massachusetts, to the air traffic control system command center in Herndon, Virginia.
  - Implement the monitor and alert functions in all en route centers and selected terminal radar approach control facilities.
- Convert to open systems standards.
  - Provide necessary interfaces to existing and planned air traffic systems (e.g., dynamic oceanic track system, oceanic display and planning system, en route automated radar tracking system).
- Issue a competitive procurement request for proposal in 1996 with options to replace all hardware and software.

Products:

- Integrated hardware and software that is highly responsive to existing and projected traffic management situations. (21–06)
- Upgraded hardware at 21 centers, the air traffic control system command center, and 26 terminal radar approach control facilities. (41–06)
- Provide en route analysis and reporting system analytical and performance evaluation capabilities to air traffic control facilities. (51–22)
- Departure sequence programs (DSPs) at 26 terminal radar approach control facilities, 20 centers, and 70 airport traffic control towers. (A–05)

1995 Accomplishments:

TMS:

- Installed TMS workstations at 26 TRACONs, 21 centers and 2 CERAPs.
- Released version 5.0 of enhanced TMS software.

1996 Planned Accomplishments: None.

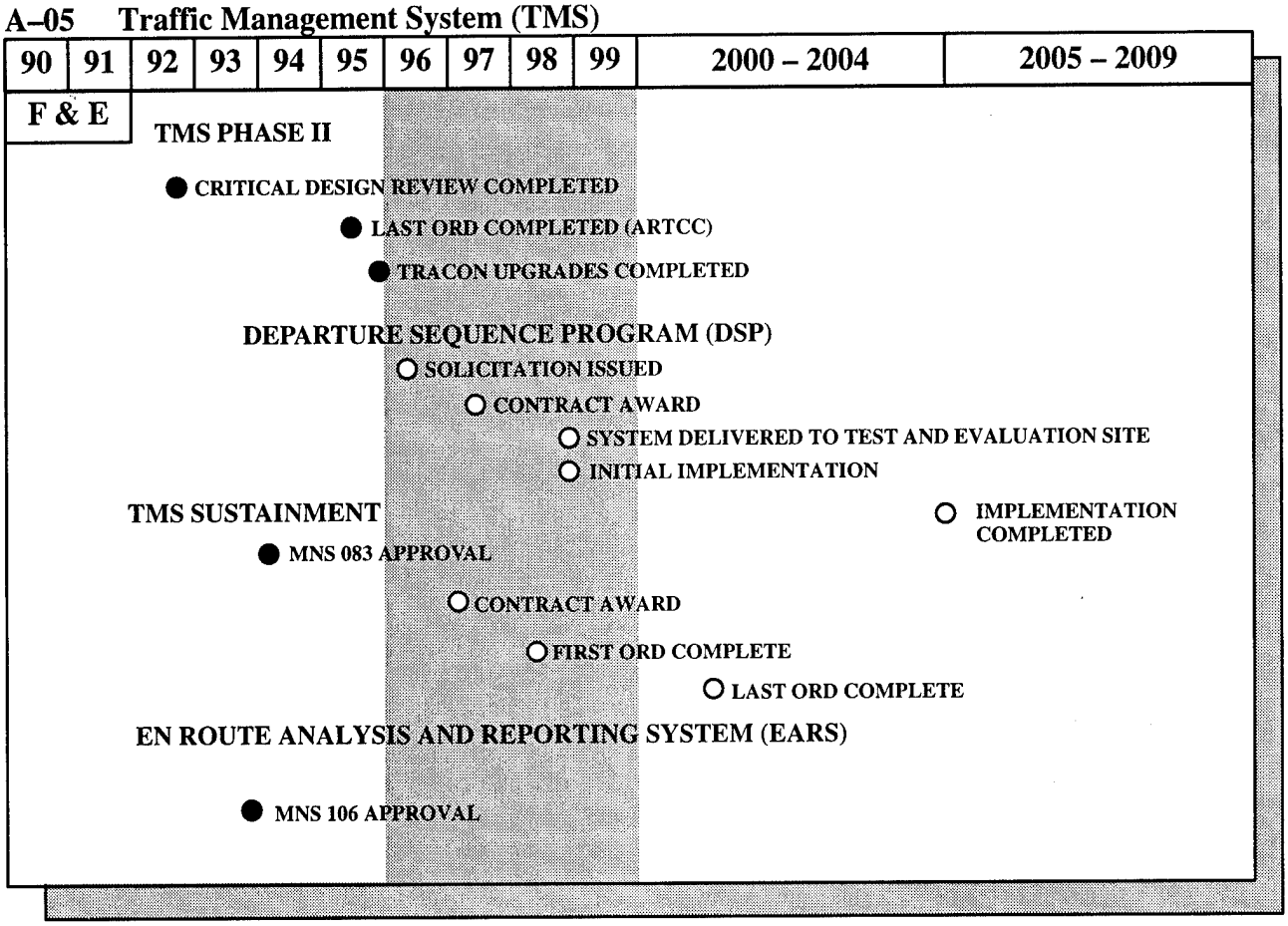
Benefit/Cost Ratio: A benefit–cost ratio has not been developed for this project.

Related Projects/Activities: A–01 En Route Automation Program, A–02 Tower Automation Program, A–04 Standard Terminal Automated Radar System, A–06 En Route Software Development, A–08 Operational Data Management System (ODMS), A–10 Oceanic Automation Program (OAP), A–11 Terminal Air Traffic Control Automation (TATCA), A–12 Airport Surface Target Identification System (ATIDS), C–03 Weather Message Switching Center (WMSC) Replacement, and data link. R,E&D Plan projects 021–110 Advanced Traffic Management System (ATMS), 021–190 Airport Surface Target Identification System (ATIDS), and 032–110 Satellite Navigation Program are related projects.

List of Contractors:

- Computer Science Corporation
  Pomona, New Jersey
- MITRE Corporation
  (requirements and system engineering)
  McLean, Virginia
- Volpe National Transportation Systems Center (software and ETMCC support)
  Cambridge, Massachusetts
- GTE/Contel Federal Systems
  (telecommunications networking)
  Chantilly, Virginia
- Sylvest
  (commercial-off-the-shelf equipment)
  Lanham, Maryland

A–05 Traffic Management System (TMS)



A–06 En Route Software Development

Purpose: This project provides the required support for the continuing development, integration and implementation of NAS en route software changes to correct operational problems and provide systems enhancement.

Project Information: This project includes projects 21–09 Conflict Resolution Advisory (CRA) Function and 41–21 En Route Software Development from the 1993 CIP.

Approach: Requirements for software services exceed in–house capabilities. Continued contractor support will be required in developing software functions and providing support services to implement and maintain en route software per the following current and future needs:

- Implementing time–critical corrections to system problems.
- Increasing system capacity by activities such as resizing due to software updates.
- Reducing system vulnerability by improving system security.
- Continuing development of Host data–link.
- Performing other tasks, as assigned, to develop software functions and provide support

services to implement and maintain en route software.

Products: The contractor will develop software functions and provide support services to implement and maintain en route software as per the following recurring and nonrecurring tasks:

- Recurring projects (41–21)
  - Support for NAS en route system releases.
  - FAA Technical Center support.
  - Project requirements analysis.
- Nonrecurring projects (41–21)
  - Three–level weather.
  - Flight plan communications link.

1995 Accomplishments:

- Completed dual automated radar terminal system (ARTS) circuit design and development.
- Completed test and evaluation of conflict resolution advisory function.
- Awarded follow–on contract.

1996 Planned Accomplishments:

- Complete enhanced en route functionality, departure sequencing program, and aeronautical data–link studies.

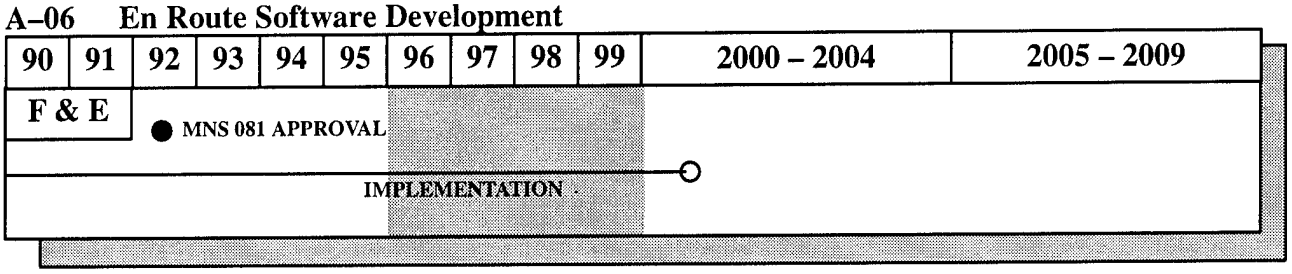
Benefit/Cost Ratio: A October 1991 study indicated a 14.2/1.0 benefit–cost ratio.

Related Projects/Activities: A–01 En Route Automation Program, A–05 Traffic Management System (TMS), A–11 Terminal Air Traffic Control Automation (TATCA), and C–20 Aeronautical Data–link.

List of Contractors:

- Computer Sciences Corporation
  (testing and software support)
  Silver Spring, Maryland

A–06 En Route Software Development



A–07 Flight Service Automation System (FSAS)

Purpose: The flight service automation system provides a flight service specialist with automated enhancements that improves weather and Notice to Airmen (NOTAM) briefings and simplify flight plan filing. This system also replaces 318 manual Flight Service Stations (FSSs) with 61 Automated Flight Service Stations (AFSSs). The purpose of the FSAS replacement is to sustain and enhance the current flight service automation system by replacing the model 1 full capacity (M1FC) components which have reached the end of their supportable life–cycle and incorporating a uniform graphic weather display system (GWDS) capability at the AFSSs.

Project Information: This project combines projects 43–01 National Graphic Weather Display System (GWDS), 43–04 Flight Service Automation System (FSAS) Computer Replacement (NEXTGEN), and project 43–22 Operational and Supportability Implementation System (OASIS) from the 1993 CIP.

Approach: Provide hardware and software to replace model 1 full capacity (M1FC) equipment. The FSAS replacement, OASIS, will be located at the automated flight service stations. OASIS will be an integration of commercial–off–the–shelf (COTS) hardware and software, including workstations with shared servers and mass storage. The OASIS procurement will use a competitive source selection process. Initially, OASIS will import weather graphic products from commercial sources to provide GWDS functionality and replace the existing interim weather graphic-display system (IGWDS). When available, weather graphics products will be imported from the weather and radar processor (WARP).

Products:

- Replacement of M1FC equipment at the 61 AFSSs, 21 flight service data processing systems (FSDPS), and 2 aviation weather processors (AWP) with OASIS at AFSS facilities.
- Eight support systems; one at the maintenance depot, three at the FAA Technical Center, and four at the FAA Academy

1995 Accomplishments:

- Completed market survey.
- Released draft RFP to industry for comment.
- Released formal RFP.

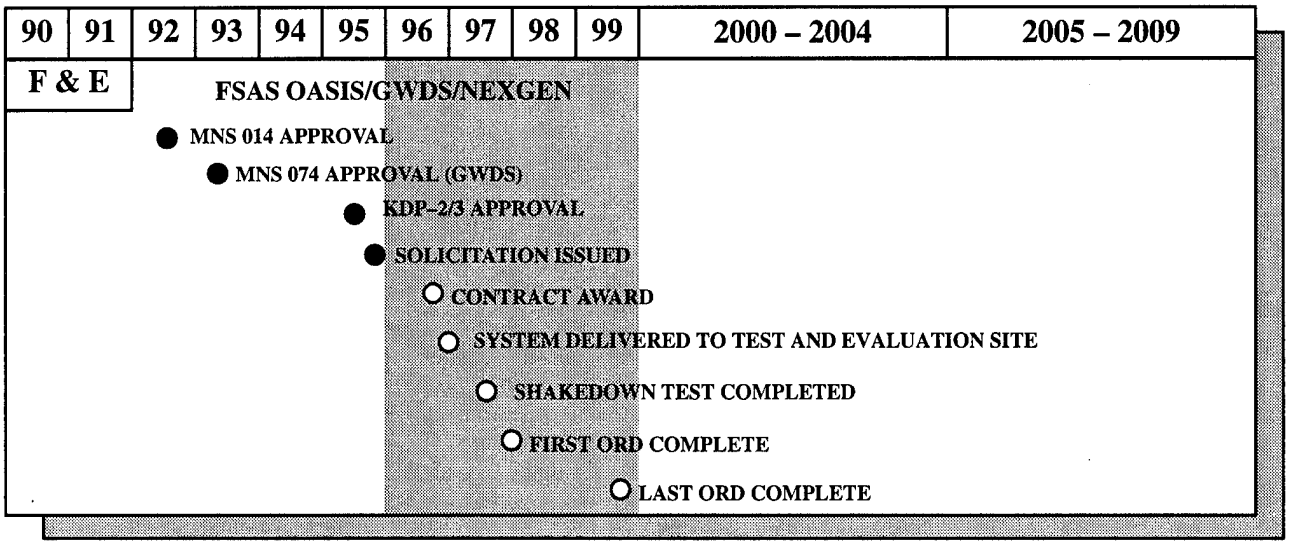
1996 Planned Accomplishments:

- Demonstrate operational capability.
- Conduct operational capability test.
- Award contract.

Benefit/Cost Ratio: An October 1995 study indicated a 3.0/1.0 benefit–cost ratio for the OASIS project.

Related Projects/Activities: F–05 Flight Service Facilities and W–04 Weather and Radar Program (WARP).

A–07 Flight Service Automation System (FSAS)



A–08 Operational Data Management System (ODMS)

Purpose: This project will modernize the Aeronautical Information System (AIS) and the United States Notices to Airmen (NOTAM) System (USNS) in support of FAA's mission. The current Aeronautical Information System and Notices To Airmen System are labor intensive, prone to data input error, consist of obsolete technology, and do not meet the operational needs of the NAS elements or of the aviation user community. The data being processed by these systems are critical to aviation safety and require quick and reliable dissemination to any/all users of the NAS. An operational data management system will be a key component of the traffic flow management (TFM) program and will provide air traffic static and operational data for the traffic flow management functions.

This project will also provide automation to the obstruction evaluation/airport airspace analysis (OE/AAA) operations. Currently the regions have different levels of automation. Automation and continuity are needed to screen the 17,000 obstruction evaluation notices received each year.

Project Information: This project contains project 43–21 Operational Database Management System from the 1993 CIP.

Approach: To ensure integrity and consistency among all NAS air traffic control and user based systems, a common national, relational, aeronautical information data base will be established. Included will be the development of policy and procedures and new hardware and software resources to facilitate data entry, collection and validation, information quality control, timely dissemination, and system flexibility and expandability. Detailed requirements analyses, development of system specifications, and the concept exploration/alternatives analysis for the aeronautical information subsystem has been completed.

In addition, a national operational data archive (NODA), i.e., national data base, will be established with the possibility of adding new front–end application development tools to allow users the ability to create, select, and retrieve data for analyses and evaluation of the operational system. This will entail significant work in the area of data management, i.e., policies, procedures, and large data base design alternatives and research. Initially, national operational data archive will constitute the archiving of operational data by manual means, graduating to archiving the operational data electronically and cataloging these data in FAA's corporate repository, followed by data access and retrieval for analysis purposes from selected workstations and eventually reaching the operational data management system end–state. The project will also provide a single data source of obstruction evaluation/airport airspace analysis data. Automation will also allow screening, tracking, and administration of obstruction relevant information. Support to the FAA will be provided by the following functions: preliminary screening of obstruction proposals, tracking of obstruction construction progress, interoffice access to case data and responses, and form letter generation.

Products: An operational data management system will provide hardware and software that will permit timely distribution of critical safety information throughout the FAA, aviation industry, and the flying public. In addition, an operational data management system will provide efficient and effective management of data collection, manipulation, and dissemination of critical aviation operational data. Each processor in the NAS will have an up–to–date flight information data base which is essential to the operation of the air traffic control system.

1995 Accomplishments:

- NODA concept exploration/alternatives analysis, with supporting studies, in progress.
- Conducted NOTAM critical design review.

1996 Planned Accomplishments:

- Install Aeronautical Information System (AIS) test platform.
- Install AIS operational platform.
- Complete Obstruction Evaluation/Airport Airspace Analysis business process improvement study.
- Begin AIS parallel testing.
- Begin AIS initial operating capability (IOC).
- Test NODA prototype.

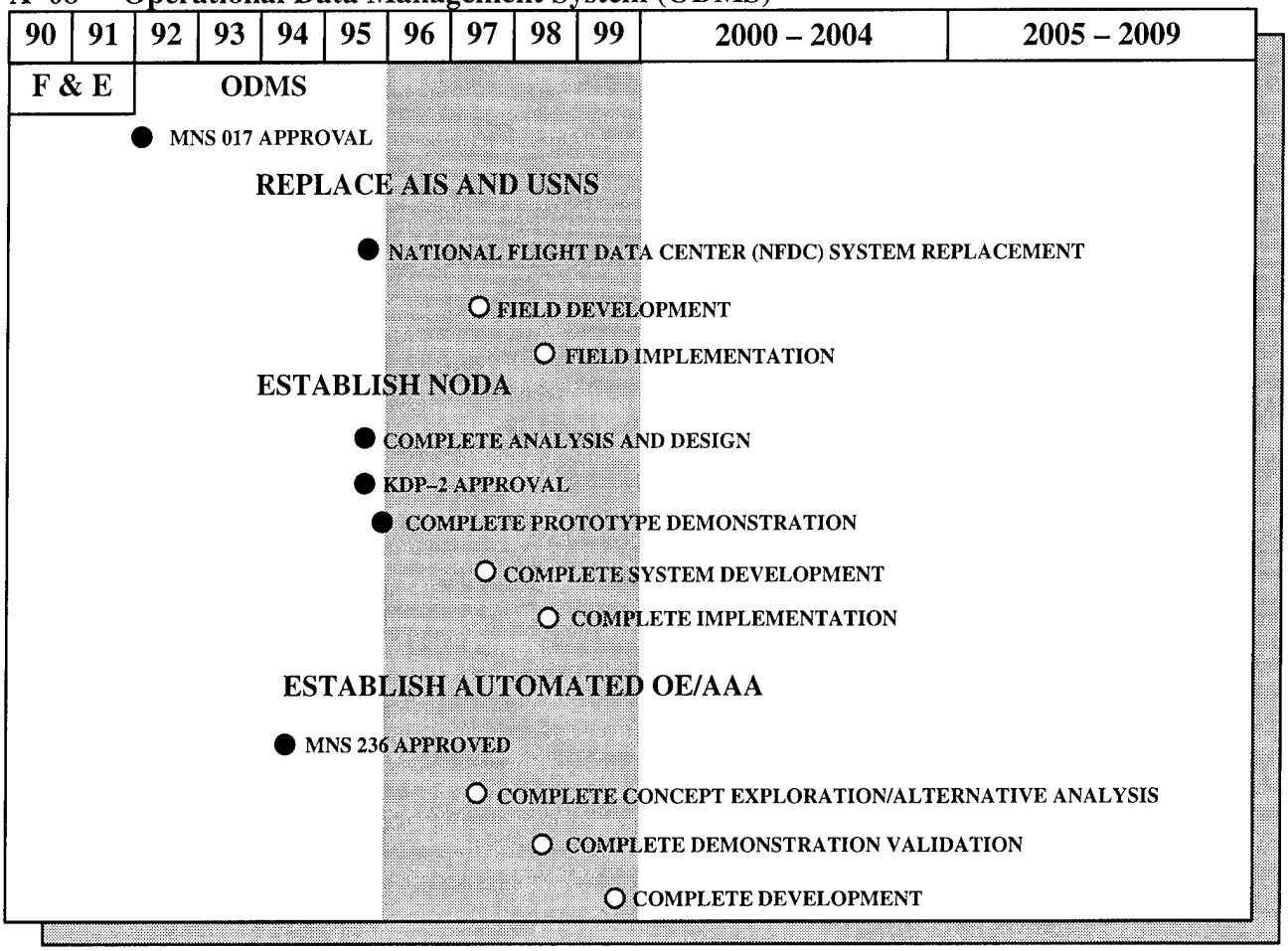
Benefit/Cost Ratio: A June 1995 study indicated a 1.9/1.0 benefit–cost ratio.

Related Projects/Activities: A–05 Traffic Management System (TMS) and M–29 Air Traffic Operational Management System (ATOMS) Local area/Wide Area Networks.

List of Contractors:

- Dimensions International
  (air traffic operational data analysis)
  Alexandria, Virginia
- Systems Research and Applications Corporation (data administration and management)
  Arlington, Virginia
- Unisys Corporation
  (system acquisition support)
  Arlington, Virginia
- Volpe Transportation System Center
  (program management support)
  Cambridge, Massachusetts
- Digicon Corporation
  (business systems design)
  Bethesda, Maryland
- Science Applications International Corp.
  (AIS prototype development)
  Laurel, Maryland

A–08 Operational Data Management System (ODMS)



A–10 Oceanic Automation Program (OAP)

Purpose: The FAA is responsible for providing air traffic services to all aircraft flying over large areas of the Atlantic, Pacific, and Arctic Oceans. A large increase in air traffic is expected in these areas over the next ten to fifteen years. The existing system is not capable of handling the projected growth. Technological breakthroughs in satellite, communications, navigation, and automation provide the FAA with an opportunity to increase system performance and capacity to meet future growth.

With radar coverage unavailable and aircraft navigation limited to onboard systems, the current oceanic air traffic control system is significantly different from the domestic NAS. In addition to being largely manual, the system depends on air/ground communications through a third party via HF radio, subject to atmospheric anomalies and human error, to obtain position reports and maintain aircraft separation. This lack of reliable and timely position information in turn requires large aircraft separation standards, severly limiting the useable system capacity. As a result, oceanic users are rarely able to obtain maximum fuel efficiency, minimum travel times, and access to preferred takeoff times and flight paths.

This project will develop new abilities to increase oceanic air traffic capacity and efficiency, without degrading safety, leading to the introduction of free flight in oceanic air space.

Project Information: This project combines projects 21–05 Oceanic Display and Planning System (ODAPS), 61–22 ATC Applications of Automatic Dependant Surveillance (ADS), and 61–23 Oceanic Automation Program (OAP) from the 1993 CIP. This project also includes offshore and oceanic air traffic management systems.

Approach: The key element of the Oceanic Automation Program is implementation of the Advanced Oceanic Automation System (AOAS) being developed and implemented through the Oceanic System Development and Support (OSDS) contract and other related activities. Maintenance of OSDS products will also be provided under the same contract. The OSDS effort will proceed through five separate phases to develop and implement new technologies gradually. This approach will reduce technical risk, increase operator involvement in the development process, and deliver capabilities to the user community as soon as possible. In addition to the OSDS contract, studies and analyses in related areas will provide insight into areas such as system safety, measurement of benefits to users and changes needed in international standards and procedures to fully utilize new technology. R,E&D activities supporting OSDS systems is conducted under R,E&D program 021–140 Oceanic Air Traffic Automation.

The OSDS contract is an eight year effort to replace aging flight data processing hardware and software with open system architecture components and revamped computer/human interface features. Also, systems will be delivered to take advantage of newly developed technologies using space–based communications and navigation systems. Baseline flight data processor hardware and software will be delivered and incrementally upgraded in a series of five phases. Implementation will be in the Oakland, New York and Anchorage centers, with an option for Honolulu.

Phase I of OSDS will provide a national Oceanic Data Link (ODL) based on prototype activities conducted under R,E&D program 021–140.

Phase II will provide the equipment infrastructure necessary to support system enhancements in subsequent phases.

Phase III will provide enhancements and new capabilities to automate flight separation planning and verification.

Phase IV will develop and deploy oceanic traffic flow management and air traffic control applications that support optimization of oceanic operations.

Phase V will include residual tasks necessary for completion of development of the "endstate" AOAS.

In addition to implementation of the AOAS, the Oceanic Automation Program will continue to support the Oceanic Traffic Planning System (OTPS) prototype traffic management and planning tool at Oakland, New York and Anchorage centers. The program will also continue to support implementation of the Micro En Route Automated Radar Tracking System (MicroEARTS).

Products:

Pre–OSDS activities: (61–23)

- Replace Flight Data Input/Output (FDIO) system with a Telecommunications Processor (TP).
- Replace the Plan View Displays with Interim Situation Display (ISD) workstations.

OSDS: (61–23)

- Phase I: National Oceanic Data Link (ODL) with foreign Flight Information Region (FIR) interface.
- Phase II: Enhanced flight data processing capability and open systems architecture.
- Phase III: Aeronautical Telecommunications Network (ATN) data–link and

automated flight separation planning and verification.

- Phase IV: Advanced display features, weather products and controller productivity tools.
- Phase V: System completion and transfer.

1995 Accomplishments:

- Installed telecommunications processor at Oakland center.
- Completed interim situation display preliminary design review.
- Awarded OSDS contract.
- Completed Micro EARTS Phase I at Anchorage, Honolulu, San Juan, Guam, Nellis AFB and White Sands Missile Range; Phase II contract awarded.

1996 Planned Accomplishments:

- Install the Interim Situation Display (ISD) at New York and Oakland centers.
- Complete Critical Design Review for Phases I and II of OSDS.
- Initiate work on Phase III of OSDS.
- Complete MicroEARTS Phase II at Anchorage, Honolulu, San Juan, Guam, FAATC, Nellis AFB and White Sands Missile Range.

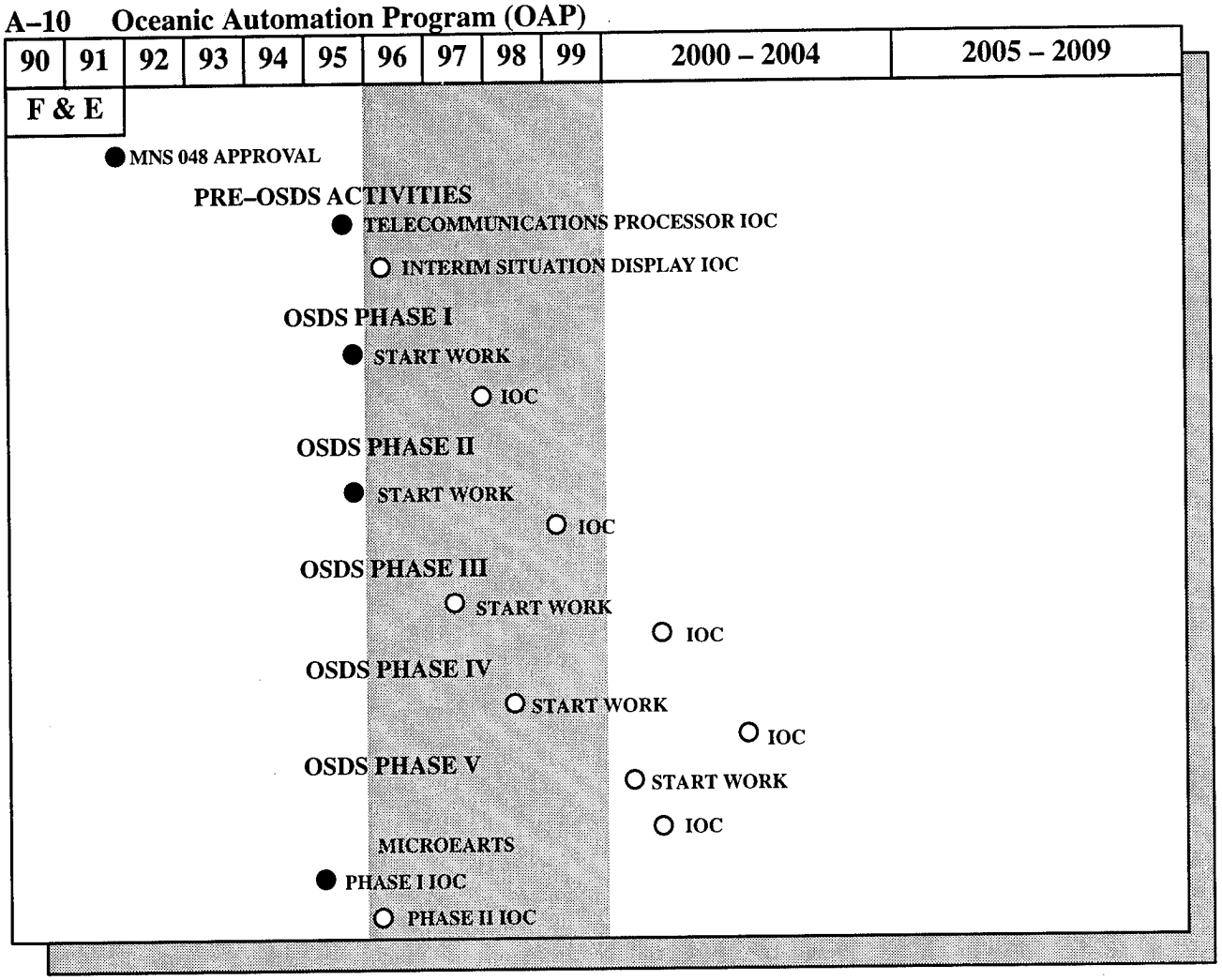
Benefit/Cost Ratio: An October 1993 study indicated a 4.7/1.0 benefit–cost ratio for the oceanic automation system.

Related Projects/Activities: A–05 Traffic Management System (TMS), C–07 National Airspace Data Interchange Network (NADIN) II provides specific communication services, C–20 Aeronautical Data-link, N–12 Augmentations for the Global Positioning System (GPS), and W–04 Weather and Radar Processor (WARP).

List of Contractors:

- OSDS Contractor
  TBD
- Aviation Technology Systems Corporation
  Manassas, Virginia
- ARINC
  Annapolis, Maryland

A–10 Oceanic Automation Program (OAP)



A–11 Terminal Air Traffic Control Automation (TATCA)

Purpose: This project will provide automation aids to assist terminal radar approach control facility and air route traffic control center controllers by increasing traffic flow and fully utilizing airspace capacity.

Terminal air traffic control automation goals include: (1) decreases in fuel burn and overall flight duration along user preferred flight paths; and (2) increases in arrival traffic flow during instrument meteorological conditions.

This project consists of the center terminal radar approach control automation system (CTAS) and the previously completed converging runway display aid (CRDA).

Project Information: This project contains project 62–20 Terminal ATC Automation (TATCA) from the 1993 CIP.

Approach: The center terminal radar approach control automation system project is proceeding

currently through the research and development phase.

A prototype of each tool will be developed in the laboratory. After demonstration and test, each tool will be installed in one of two development sites. After installation, field evaluations will be conducted and the operational assessment will be completed.

The software from the research and development phase is refined to production level software and documented to meet tailored MIL–STD–2167A requirements. System level tests will be conducted on the software.

A competitive contract will be awarded for commercial-off-the-shelf hardware. The software produced will be provided to the full scale development contractor.

Products:

The center terminal radar approach control automation system will provide the following products :

- Planning advisors provide initial traffic management advisor functionality including time lines, planning tools, and workload reducers to assist center and terminal radar approach control facility controllers.
- Passive advisors provide complete traffic management advisor functionality including metering lists to assist center and terminal radar approach control controllers and initial, passive final approach spacing tool functionality including runway assignment and sequencing number to assist terminal radar approach control facility controllers.
- Direct advisors provide active final approach spacing tool functionality including heading and speed advisories to assist terminal radar approach controllers and descent advisor functionality including top–of–descent points, speed, altitude, and heading advisories to assist center controllers to meet the traffic management generated traffic plan.
- Future enhancements will provide expedited departure path functionality to assist terminal radar approach controllers in merging airport departures into arrival and en route flows. Future enhancements will also provide integration of the center terminal radar approach control automation system and other systems such as the flight management system, data link, and the automated en route air traffic control.

The controller automated spacing aid (CASA) will upgrade conflict resolution display automation software and explore a ghosting technique to merge traffic streams to a fix, as well as other applications.

1995 Accomplishments:

- Demonstrated prototype CTAS planning advisors in field.
- Performed lab simulations with controllers of CTAS FAST prototype.
- Demonstrated CTAS TMA arrival meter fix schedules on controller displays at Denver center.
- Demonstrated CTAS descent advisor in field.
- Performed functional verification testing of 50 percent of software.
- Installed operational prototype at Denver.
- Developed prototype of CTAS dynamic planner.
- Evaluated FAST at NASA Ames.

1996 Planned Accomplishments:

- Complete planning advisor system testing.
- Install planning advisor upgraded prototype system at Denver.
- Complete initial prototyping of direct advisor passive final approach spacing tool and deliver to Dallas/Fort Worth.

- Develop final prototype of direct final approach spacing tool.

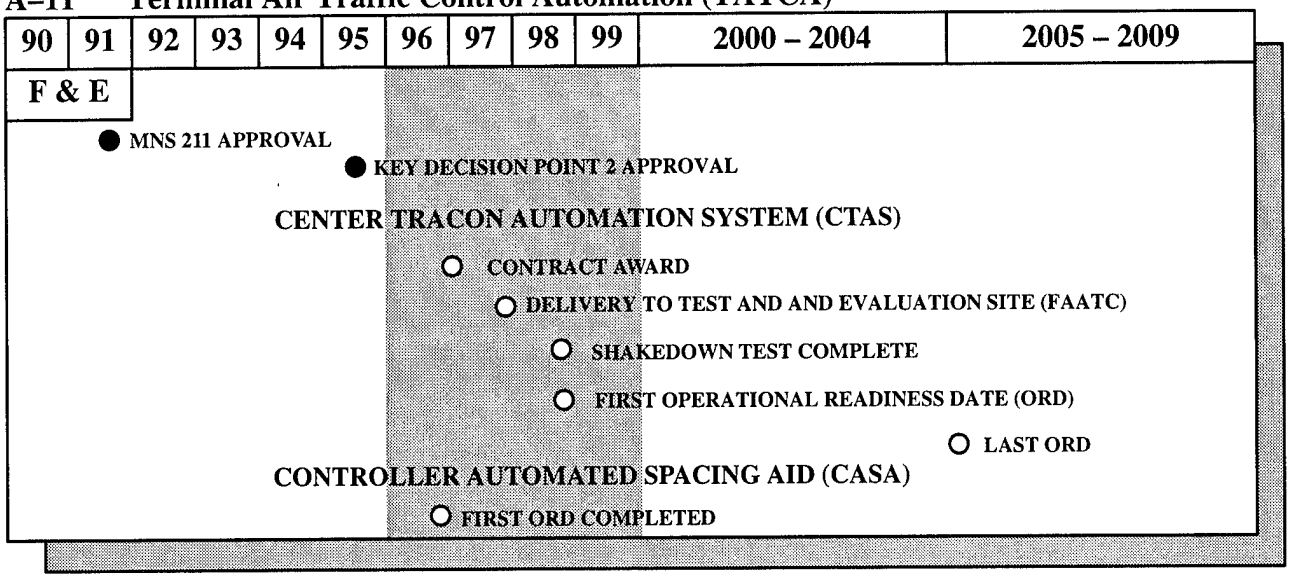
Benefit/Cost Ratio: A November 1994 study indicated a 4.0/1.0 benefit–cost ratio.

Related Projects/Activities: A–01 En Route Automation Program, A–03 Automated Radar Terminal System (ARTS) Improvements, A–04 Standard Terminal Automated Radar System, A–05 Traffic Management System (TMS), A–06 En Route Software Development, A–12 Airport Surface Target Identification System (ATIDS), C–14 Critical Telecommunications Support, C–15 FAA Telecommunications Satellite (FAATSAT), C–20 Aeronautical Data-link, S–02 Mode S, and W–07 Integrated Terminal Weather System (ITWS). R,E&D Plan projects 021–110 Advanced Traffic Management System (ATMS), 021–190 Airport Surface Target Identification System (ATIDS), 021–220 Multiple Runway Procedures Development, 021–230 Wake–Vortex Separation Standards, and 031–110 Aeronautical Data Link Communications and Applications are related projects.

List of Contractors:

- Lincoln Laboratory
  (developing operational software)
  Lexington, Massachusetts
- Center for Advanced Aviation System Development of the MITRE Corporation
  (technical support)
  McLean, Virginia
- NASA Ames Research Center
  (developing prototype software)
  Moffett Field, California
- Various support contractors for project/technical support

A–11 Terminal Air Traffic Control Automation (TATCA)



A–12 Airport Surface Target Identification System (ATIDS)

Purpose: This project will develop aids to help prevent runway incursions. This will include airport surface surveillance, communication, and automation techniques to provide an

effective all-weather runway incursion alert and prevention capability. This capability will increase safety and reduce taxi delays by approximately 5 to 15 percent, thereby enhancing airport capacity.

Project Information: This project contains project 62–21 Airport Surface Target Identification System (ATIDS) from the 1993 CIP.

Approach: This project will develop an enhanced surface safety system, utilizing ground sensor primary radar, airport surface detection equipment (ASDE–3), automated radar terminal system (ARTS), differential global positioning system (DGPS), and the airport movement area safety system (AMASS) to reduce taxi delays and increase surface capacity. This project will share information with the departure sequencing program (DSP) and the terminal air traffic control automation (TATCA) program to create an interrelated arrival/departure sequencing system. The system will be installed at 37 airports where airport surface detection equipment and airport movement area safety systems exist.

The system consists of two subsystems. The first is the target identification equipment which will display target locations with alpha–numeric data tags and provide positive target identification for special vehicles (fire, rescue, snow plows, etc.). The second subsystem is the surface movement advisor which combines surveillance information with the appropriate safety logic to provide controllers with prioritized aural and visual warnings, as well as elevation information to prohibit the automatic safety alert generation process from being degraded at airports with significant helicopter/vertical flight operations.

Additionally, this project will provide surveillance data and interfaces for the runway status light (RSL) system, providing safety alerts for pilots when a runway is in use. Upgrades to the existing runway status light software, and demonstration of commercial–off–the–shelf (COTS) runway incursion systems will also be performed.

This project will begin with technical and operational specification development, and evolve into the production of one preproduction prototype unit. The developed system will be used as the basis for an Advisory Circular. Airports which decide to implement this aid will be furnished with the software and must procure the necessary hardware and installation support.

Products:

- The runway status light system will result in publication of an Advisory Circular describing the system. The FAA will provide system software and standards, operational concepts and procedures, system descriptions, communications architecture, preproduction prototype test bed, data collection and analysis, system evaluations, and system specifications.
- 37 airport surface traffic automation target identification systems.
- 37 surface movement advisor systems.

1995 Accomplishments:

- Completed installation of the Airport Surface Target Identification System (ATIDS) at Atlanta Hartsfield Airport.
- Completed ATIDS/ASDE–3/AMASS integration.
- Conducted ATIDS meetings with industry.
- Approved ATIDS operations requirements document and integrated logistics plan.

1996 Planned Accomplishments:

- Complete ATIDS demonstration/validation at Atlanta.
- Complete ATIDS specification for full–scale development.
- Issue draft RFP for full–scale development of ATIDS.

- Complete installation of low cost ASDE's at two sites.

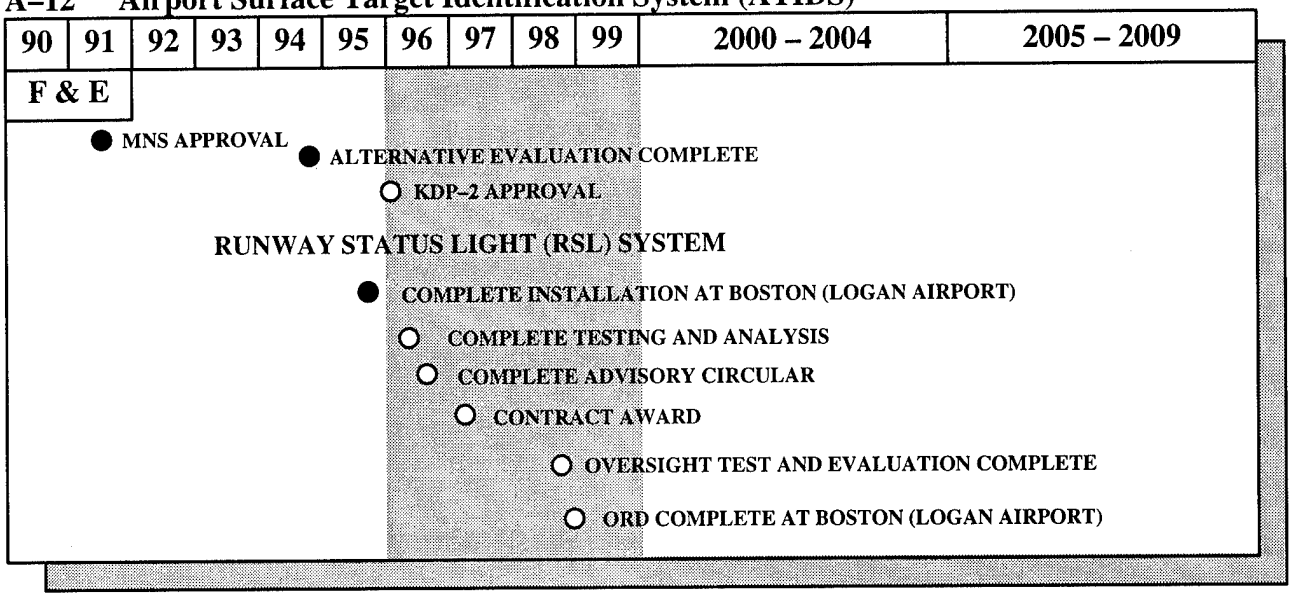
Benefit/Cost Ratio: A March 1994 study indicates a benefit–cost ratio of 15.2/1.0 for this project.

Related Projects/Activities: A–02 Tower Automation Program, A–05 Traffic Management System (TMS), M–03 Capital Investment Plan (CIP) System Engineering and Technical Assistance, M–07 NAS Infrastructure Management System (NIMS), M–21 Logistics Support Systems and Facilities, M–27 National Aviation Integrated Logistics Support (NAILS), S–01 Airport Surface Detection Equipment (ASDE) Radar and Airport Movement Area Safety System (AMASS), S–02 Mode S, and Research, Engineering and Development Plan projects 021–220 Multiple Runway Procedures Development, 031–110 Aeronautical Data Link Communications and Applications, and 051–130 Airport Safety Technology.

List of Contractors:

- Lincoln Laboratory
  (design and documentation)
  Lexington, Massachusetts
- MITRE Corporation
  (technical acquisition support)
  McLean, Virginia
- Norden Systems
  (AMASS development organization)
  Melville, New York

A–12 Airport Surface Target Identification System (ATIDS)



A–13 Digital Bright Radar Indicator Tower Equipment (DBRITE)

Purpose: The digital bright radar indicator tower equipment provides the air traffic controller with a visual display of aircraft position information in the high ambient light conditions found in the airport traffic control tower. This presentation provides the air traffic controller with display and control information similar to that available in the terminal radar approach control facility. It also provides a signal for minimum safe altitude warning and collision alert for Mode C equipped aircraft under positive terminal approach control. An alarm is activated when low altitude or potential collision conditions occur.

Project Information: This was project 32–16 Establish/Expand Digital Bright Radar Indicator Tower Equipment (DBRITE) in the 1993 CIP.

Approach: Digital bright radar indicator tower equipment will be purchased through a fixed price contract that will include production and installation of hardware configurations, including associated spares and national airspace integrated logistics support (NAILS).

This acquisition will produce and install additional systems that are essentially identical to those currently in use by the FAA. This will enable the FAA to establish radar displays at satellite airport traffic control towers that do not currently have radar displays, and expand services at operational sites.

Future remoting requirements will be met by using either fiber optics or video compression. There will be no use of television microwave links to support new equipment installations.

Products:

- Establish digital bright radar indicator tower equipment for satellite airport traffic control towers to support new requirements.
- Remoting to support satellite installations of new DBRITE equipment.
- Expand current systems to support new requirements.

1995 Accomplishments:

- Completed DBRITE technical evaluation.
- Completed DBRITE contract award.
- Received video compression deployment readiness review approval.
- Deployed video compression/DBRITE systems at Nantucket and Yakima.
- Installed DBRITE at the new Chicago ATCT and TRACON at Elgin (11 systems).
- Planned DBRITE installation at the following sites: Yakima, Myrtle Beach, Salt Lake City, Charlotte, Scottsdale, Falcon (Mesa), Lihue, and Medford.

1996 Planned Accomplishments:

- Award Video compression contract.
- Complete DBRITE first article testing.
- Complete DBRITE operational test and evaluation.

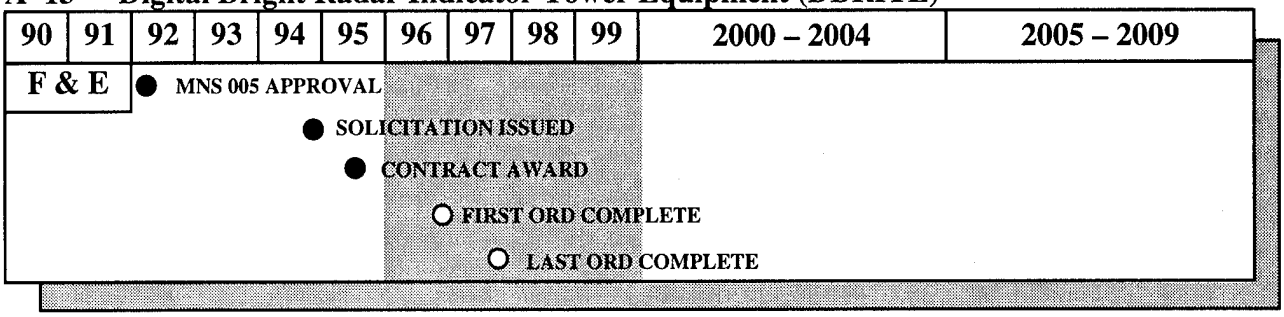
Benefit/Cost Ratio: An October 1993 study indicates a benefit–cost ratio of 1.2/1.0 for this project.

Related Projects/Activities: A–02 Tower Automation Program, A–03 Automated Radar Terminal System (ARTS) Improvements, A–04 Standard Terminal Automation Replacement System (STARS), C–05 Voice Switches, F–02 Metroplex Control Facility (MCF), and F–23 Relocate Honolulu Combined Center Radar Approach Control (CERAP).

List of Contractors:

- Loral Corporation

A–13 Digital Bright Radar Indicator Tower Equipment (DBRITE)



A–14 Instrument Approach Procedures Automation (IAPA)

Purpose: Instrument approach procedures are used by pilots to land at airfields during instrument flight rules (IFR) conditions. The FAA has a responsibility to provide current instrument approach procedures for every airfield and runway with instrument approach capability (including those operated by the DOD). These procedures are developed at the National Flight Procedures Office by procedures specialists.

This project provides an automated tool which allows the procedures specialist to provide more accurate and timely development of standard instrument approach procedures (SIAPs). It also provides the capability to electronically store and transmit SIAPs. This project results in faster development (25 to 50 percent time reduction to develop a SIAP) with fewer errors, greater accuracy, and increased standardization.

Project Information: This project consists of project 56–23 Instrument Approach Procedures Automation (IAPA) from the 1993 CIP.

Approach: To transition the existing IAPA process from a Data General MV 8000 platform through Unix–based software using a prototype Sun 386i workstation to an Indigo^2 silicon graphics workstation which will become the final system platform. The new system meets the requirements for procedures development using standardized data bases which incorporate terminal instrument procedures (TERPS), geodetic calculations, math functions, and graphic display generators. This technology ensures standardized procedures development and decreased response time during a period of increasing requirements. The automated workstations developed for this project consist of graphic workstations, map modeling software, terrain modeling software, specialized printers, and local and wide area networks.

Products:

- One hundred sixty–one Indigo^2 silicon graphics workstations.
- Eleven file servers.
- Associated peripheral equipment including specialized black and white printers, color printers, and graph tablets.
- Software for standardized development of instrument flight procedures including take-off minimum/instrument departure procedure, en route (airways) procedures, fixes and holding development, and instrument approach procedures.
- Software to electronically transmit instrument procedures data from the procedures specialist through the National Flight Data

Center (NFDC) to the National Ocean Service (NOS) for publication.

- Database software for storing completed instrument procedures with a capability for automatic data retrieval and display.

1995 Accomplishments:

- Completed the conversion and recertification of the IAPA software from the prototype Sun 386i to the Indigo^2 silicon graphics workstations.
- Began and completed distribution of IAPA workstations to the Regional Flight Procedures Office (FPOs), National FPO, and Flight Inspection Area Offices (FIAOs).
- Began programming criteria in Order 8260.38 (Civil Utilization of Global Positioning System (GPS)).
- Began conversion of IAPA system from a menu–based system to a graphic user interface (GUI) system to include display of digital maps and terrain.
- Updated the Indigo^2 operating system to version 5.3 and provided several enhancements to the IAPA program.

1996 Planned Accomplishments:

- Complete programming of GPS criteria with turns less than 15 degrees.
- Continue the conversion of the IAPA system from a menu–based system to a graphic user interface (GUI) system. The first step will be to provide a graphics window with digital maps, underlying terrain, and IAPA graphics.
- Explore the capability of using additional graphics engines in the Indigo^2 silicon graphics workstations to make use of three dimensional capabilities.
- Evaluate the IAPA program digital terrain to relieve the need for manual interface in determining the highest terrain feature.

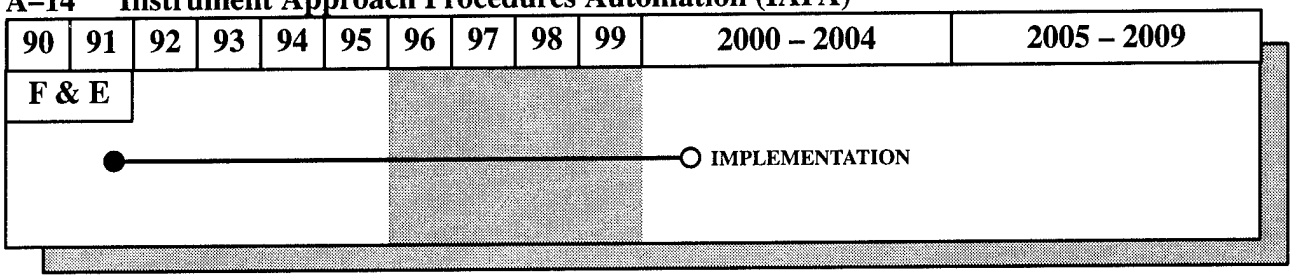
Benefit/Cost Ratio: A July 1994 study indicated a 3.4/1.0 benefit–cost ratio.

Related Projects/Activities: This program supports all projects that provide navigation landing aids (e.g., instrument landing system, global position system, Loran–C, etc.).

List of Contractors:

- Concept Automation Incorporated
  Sterling, Virginia

A–14 Instrument Approach Procedures Automation (IAPA)



A–15 Civil Aviation Registry Modernization

Purpose: To modernize the airmen certification and aircraft registration systems to support changes mandated by the Anti–Drug Abuse Act of 1988, support the operational needs of the Civil Aviation Registry Division (the Registry), and provide better service to law enforcement agencies and the aviation community.

Project Information: This project consists of project 56–24 Airmen and Aircraft Registry Modernization from the 1993 CIP.

Approach: The 1988 FAA Drug Enforcement Assistance Act mandated a number of basic record keeping, procedural, and communications changes in the Registry. Upgrades of basic document recording, storing, and retrieval are to be accomplished along with faster and better interagency communication of data on airmen and aircraft. The modernization of the Registry will provide the capability to address the following:

- Registration of aircraft to fictitious people.
- The use of a post office box or mail drop as a return address by people registering an aircraft or applying for an airmen certificate for the purpose of evading identification.
- The registration of aircraft to corporations and other entities to facilitate unlawful activities.
- The illegal use of "reserved" registration marking on aircraft.
- The lack of a system to assure timely and adequate notice of the transfer of aircraft ownership.
- The practice of allowing temporary operation and navigation of aircraft without issuance of a registration certificate.
- Use of false or nonexistent addresses by people registering aircraft.
- Submission of names which are not identifiable on applications for aircraft registration.
- The use of fictitious names and addresses or fraudulent or stolen identification by applicants for airmen certificates.
- The use of counterfeit and stolen airmen certificates by pilots.
- The absence of information concerning physical characteristics of holders of airmen certificates.
- Ability to make frequent legal changes in the registration markings which are assigned to aircraft.
- Use of false registration markings on aircraft.
- The large number of aircraft which are classified as being in "sale–reported" status.

The implementation of these precepts will require the purchase and installation of new equipment. The Registry is using a mix of old and new technologies. Although information can be accessed by computer, the accuracy of the information, its completeness, and the ability to retrieve historical supporting data will require new automation equipment and document storage facilities.

To accomplish this task, the FAA will procure optical disk systems and document production equipment which will support the following functions:

- Periodic renewal of aircraft registrations and airmen certificates.
- A photograph will be included on a new airmen certificate with features making it less prone to forgery. Photographic documentation will be used to validate applicants for aircraft registration.
- Aircraft registration and airmen certificates will be machine readable by the United States Customs Service.

- Verification of original registration applications by an FAA office authorized to perform this function when immediate flight authority is required.

Products: The enhanced registry system will function in accordance with the congressional mandates included in the 1988 FAA Drug Enforcement Assistance Act. The improved systems for registering aircraft, certificating pilots, processing major aircraft repair and alteration forms, and the increased enforcement of requirements will benefit all users (including law enforcement officials) and the general public.

1995 Accomplishments:

- Completed major enhancements to mainframe systems, including the comprehensive airmen information system and the aircraft registration system.
- Implemented Phase I of the enhanced aircraft registration system.
- Achieved production–level conversion of aircraft microfiche to electronic medium utilizing conversion contract awarded during 1994.
- Released RFP for acquisition of an electronic document management system (EDMS).
- Awarded contract to convert airmen and aircraft microfilm, microfiche, and paper records to electronic images.

1996 Planned Accomplishments:

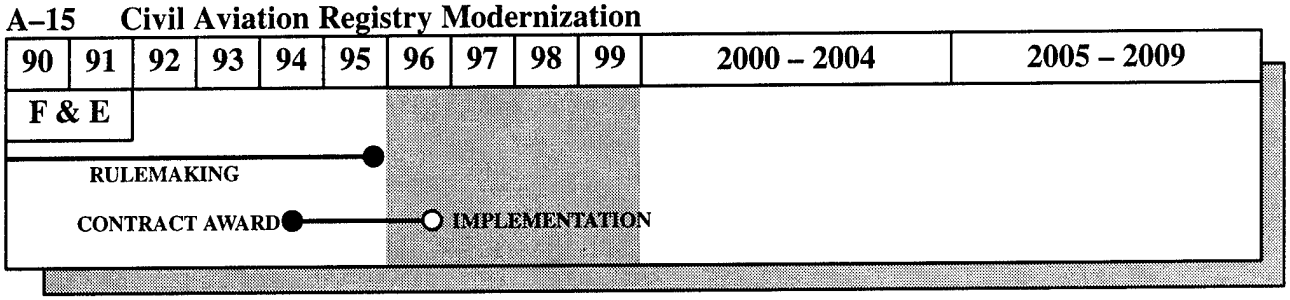
- Award EDMS contract. Contractor will have 180 days to deliver the system for acceptance testing.

Benefit/Cost Ratio: An August 1988 study indicated a 13.8/1.0 benefit–cost ratio.

Related Projects/Activities: A–17 Aviation Safety Analysis System (SPAS).

List of Contractors:

A–15 Civil Aviation Registry Modernization



A–17 Aviation Safety Analysis System (ASAS)

Purpose: This project provides FAA's safety workforce with essential automation tools (i.e., microcomputers and application software) necessary for effective management of FAA's safety resources.

The primary functions supported include the certification of air personnel, aircraft products, operators, and air agencies, as well as automated support to accident investigation, enforcement activities, security, inspections, surveillance, accident prevention, safety analyses, aviation medicine, staffing use, research and development projects, and rulemaking activities.

The FAA's safety workforce accomplishes these functions with essential automation tools that:

- Plan, schedule, capture, and track work programs, inspections, and investigations.
- Capture and analyze results of inspections, investigations, and safety information.
- Provide access to safety information and regulatory guidance.

Project Information: This project consists of project 56–51 Aviation Safety Analysis System (ASAS) from the 1993 CIP.

Approach: The basic design philosophy is to integrate safety–related information into a single data structure, provide source–level information capture and dissemination through user– friendly computer terminal interfaces, and provide management with the tools and information necessary to improve both aviation safety and management functions. Extensive help functions and local data editing will be provided to improve the accuracy and completeness of the entered information. The Agency data telecommunications network links field offices with regional and national FAA information processing facilities. The procurement approach is to use commercial–off–the–shelf hardware and software through existing contracts where possible. The major vehicle for hardware procurement is the FAA office automation technology and services (OATS) contract. This approach is intended to provide field personnel and other Agency organizational elements with improved access to more reliable and timely certification and safety information data, and provide the capability to retrieve and conduct more effective analysis of potential safety issues.

Products: The aviation safety analysis system development process is evolutionary in nature. It has numerous data bases, or subsystems, in various stages of development. Many of these subsystems are operational, providing benefits to users at all organization levels. Commercial hardware and software products are available from the OATS contract. Specific products include:

- Subsystem equipment includes desktop micro computers, local area network hardware and software tools, portable equipment for mobile field inspectors and investigators, and telecommunication links to provide access to safety information systems and regulatory guidance systems.
- Essential automation information tools are replacing antiquated, obsolete, and mostly manual processes. ASAS automated subsystem elements directly support critical areas such as FAA certification processes, enforcement functions, manufacturing oversight, engineering structural analysis, regulatory and rulemaking functions, accident investigations, medical certifications, civil aviation security functions, air carrier operations specifications, FAA policy information, aviation inspections, and aircraft/airman registration information.
- Integrated data structures are established to facilitate electronic exchanges between various information specialties. Business activity flow is naturally integrated into automated information systems where corporate data banks can be shared across functional work areas. Focus on integration is expressed in subsystems such as the integrated safety information system where standardization and enhanced data quality results from automation.

1995 Accomplishments:

Civil Aviation Security:

- Completed Phase 1 deployment of microcomputer workstations to 60 percent of the regional level employees.
- Developed and implemented Phase 1 of the airport and air carrier information reporting system.

Aircraft Certification:

- Started development of a national suspected unapproved parts system (SUPS). The SUPS will track and report information on unapproved parts used in the manufacturing, modification, and maintenance of aircraft and aircraft components. The national system will serve as the single point of information for all reports of suspected unapproved parts and subsequent investigations submitted to the FAA.
- Completed the functional requirements document for the national aircraft certification systems evaluation program.

Flight Standards:

- Prepared integrated safety information system for integration of feeder information systems.

Accident Investigation:

- Completed Version 2 of the improved accident/incident data system which deploys the subsystem to a limited number of remote sites for testing and evaluation.

Rulemaking:

- Developed and implemented a document management system.

1996 Planned Accomplishments:

Civil Aviation Security:

- Complete Phase 1 microcomputer workstation coverage in field offices.
- Develop and implement additional components of the airport and air carrier inspection reporting system.

Aircraft Certification:

- Complete the national suspected unapproved parts system which permits field offices to perform data entry from field sites directly to the central database.
- Complete the design and implement the first phase of the aircraft certification systems evaluation program.

Flight Standards:

- Implement integrated safety information system with new feeder information systems.

Accident Investigation:

- Deploy improved accident/incident data system Version 3 to provide automated field input of incident data and interface with the National Transportation Safety Board.

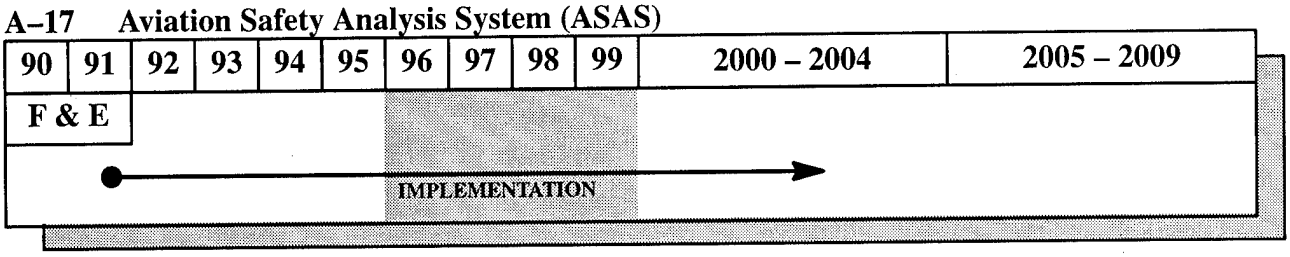
Benefit/Cost Ratio: A March 1994 study indicated a life cycle benefits–cost ratio of 1.93/1.0 for Medical Databases. A November 1990 study indicated a benefit–cost ratio of 2.5/1.0 for OATS.

Related Projects/Activities: A–15 Civil Aviation Registry Modernization, A–18 Safety Performance Analysis System (SPAS), A–19 Portable Performance Support System (PPSS), and M–24 National Aviation Safety Data Analysis Center (NASDAC).

List of Contractors:

- DOT's Transportation Computer Center
  Washington, District of Columbia
- Electronic Data Systems (EDS)
  Plano, Texas
- Digital Solutions, Inc.
  Washington, District of Columbia
- Battelle
  Washington State
- Volpe National Transportation Systems Center (VNTSC)
  Cambridge, Massachusetts
- CACI
  Arlington, Virginia
- AT&T
  Washington, District of Columbia

A–17 Aviation Safety Analysis System (ASAS)



A–18 Safety Performance Analysis System (SPAS)

Purpose: The FAA has the statutory responsibility to conduct surveillance of air operators, air agencies, aircraft, and air personnel to assure conformance with FAA aviation regulations. The SPAS is considering 25 candidate databases with different data structures and protocols containing information on thousands of operators, air agencies, aircraft and air personnel. The databases are not integrated and the information cannot be analyzed in any automated fashion. As such, the FAA does not have the capability to use the data to target the areas of highest risk or priority or to validate the national work program.

One of the major functions of the safety inspector is to prevent safety problems. In order to do that he/she must have access to synthesized information that reflects potential problem areas in a timely fashion. SPAS provides an automated capability to analyze safety critical performance indicators and to retrieve underlying data.

The SPAS will provide safety inspectors the capability to identify certificate holders that pose a greater safety risk and assist in establishing and updating the surveillance program work elements. SPAS will also allow the FAA to monitor the status of aging aircraft, to track the growing number of aircraft operations, and to increase industry accountability for aviation safety.

SPAS will assist Flight Standards in targeting inspector work force by:

- Identifying areas where increased surveillance may be warranted.
- Identifying specific problems pertaining to a region/district office.
- Identifying certificate holder's specific problems.
- Determining staffing needs.
- Planning for appropriate training.
- Improving guidance to inspectors.
- Improving data quality.

Project Information: This project consists of project 56–68 Safety Performance Analysis System (SPAS) from the 1993 CIP.

Approach: Minimize development cost by utilizing existing databases coupled with commercial–off–the–shelf/non–developmental item hardware and software. Using architectural studies and Cost Benefit Analyses, database structures and communications networks are being developed. User requirements will be further refined during the operational test beginning in 1995. Following successful operational testing, field implementation will occur incrementally.

The operational test will be performed using SPAS I available to a limited community. The fully enhanced SPAS II, and its supporting infra-

structure, will be available beginning in 1997 for all inspectors with ad hoc query capabilities and be able to obtain full range of data in a user friendly format which may be tailored to unique requirements necessary to perform their job. SPAS I equipment will be enhanced to perform SPAS II functionality.

Future plans address the requirement for all FAA inspectors to access, review, analyze, and integrate industry proprietary and agency data. Inspectors must be able to rapidly respond to changing technology and international aviation and safety efforts. Inspectors must also be aware of all types of information that is international in influence, extensive in size and scope, and comprehensive in complexity. There are a large number of international operators and an extensive amount of industry technical data outside the FAA's system of records which must be referenced to provide the most comprehensive data possible to support the activities of the FAA inspectors.

Products: Facilities and equipment costs include:

- Hardware (desktop workstation enhancements and network servers).
- Software (database management and graphical user interface).
- Communications network.

1995 Accomplishments:

- Initiated operational test (SPAS I).
- Began operational training.
- Continued development of air operator and air agency indicators.
- Began development of aircraft indicators.
- Completed architectural study.

1996 Planned Accomplishments:

- Continue operational testing of indicators.
- Begin development of air personnel indicators.
- Obtain KDP–4 approval.
- SPAS II implementation plan.

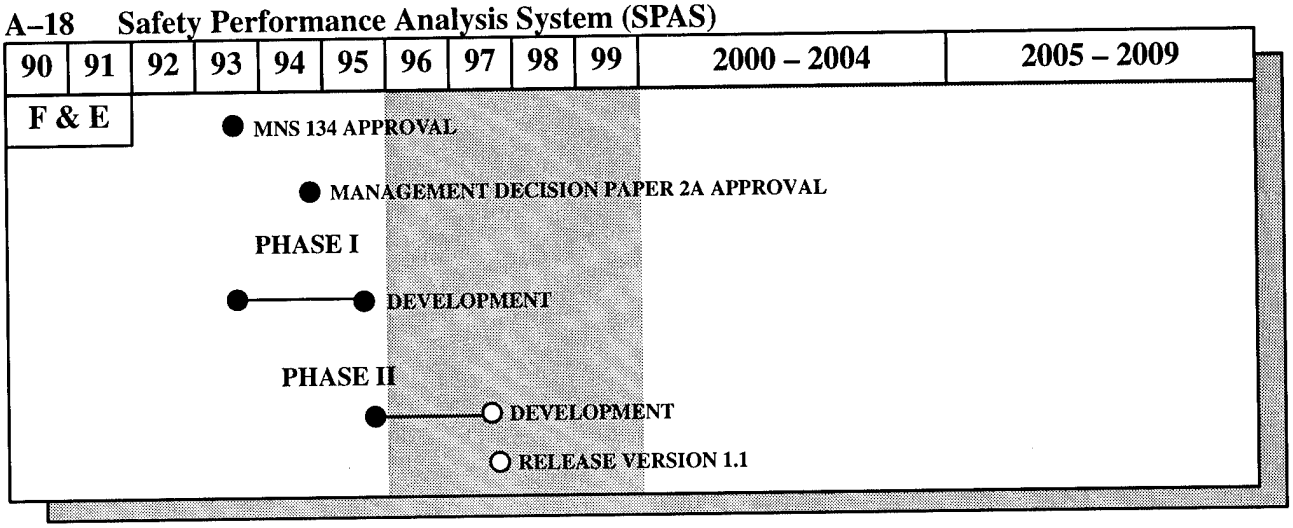
Benefit/Cost Ratio: A benefit–cost ratio has not been developed for this project.

Related Projects/Activities: A–17 Aviation Safety Analysis System (ASAS) and A–19 Portable Performance Support System (PPSS).

List of Contractors:

- Volpe Center
  Cambridge, Massachusetts
- UNISYS
  Cambridge, Massachusetts
- Brattle Corporation
  Cambridge, Massachusetts
- Rutgers University
  New Jersey
- Georgia Institute of Technology
  Atlanta, Georgia

A–18 Safety Performance Analysis System (SPAS)



A–19 Portable Performance Support System (PPSS)

Purpose: Provide aviation safety inspectors in field environments with computer software and hardware to directly access air operator technical and safety data. The inspectors will also be able to collect and store data from the field, "top" analyze, and combine data with cross references to regulations and internal guidance. Using this real–time information, the inspectors will have the capability to make on–site decisions based on this combined information.

Project Information: This project consists of project 56–72 Portable Performance Support System (PPSS) from the 1993 CIP.

Approach: The inspectors will be provided with a field system that will allow them to access central data bases, collect and store field data, synthesize and analyze the collective data, cross reference regulations and internal guidance, and subsequently make more accurate decisions from the field in real–time.

Specifically, the field system supports:

- Access to central FAA industry data bases on a real–time basis.
- Entry of collected data to FAA data bases on a real–time basis.
- Analysis of the combined data, including cross–referenced regulations and guidance, on a real–time basis.
- More accurate and timely decisionmaking, based on the availability of more complete and timely data and supporting analysis.

Products: Portable microcomputer–based system that uses pen–based technology for the operator interface, and includes a modem for data upload/download to FAA mainframes. This system will be equipped with commercial and custom developed software to support the requirements of the aviation safety inspectors.

1995 Accomplishments:

- Awarded contract.

- Initiated project planning through pre–contract cost agreement.

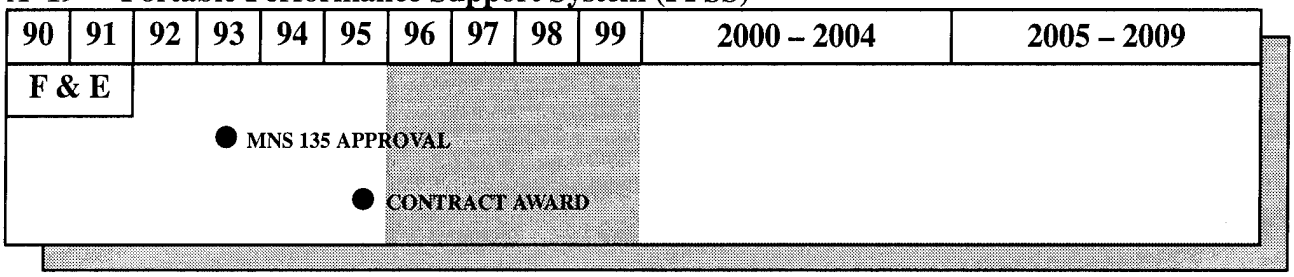
1996 Planned Accomplishments:

- Deploy a large–scale prototype of portable devices in continuance of the human factors study now underway using leading–edge technologies.
- Evaluate Aviation Safety Inspector use of new PPSS software, version 2, using on–line Federal Aviation Regulations, handbooks, Project Tracking and Reporting System, Airment Certification and Rating Application, surveillance work program, new notebook, and subnotebook computer hardware.

Benefit/Cost Ratio: A strict benefit–cost comparison (using net present value and benefit–cost ratio) has not been done.

Related Projects/Activities: A–17 Aviation Safety Analysis System (ASAS), M–24 National Aviation Safety Data Analysis Center (NASDAC), and M–26 NAS Management Automation Program (NASMAP).

A–19 Portable Performance Support System (PPSS)



A–20 Integrated Flight Quality Assurance

Purpose: Modern digital aircraft can continuously record detailed data, which could provide an audit trail for all phases of flight, from pushback to departure to docking on arrival. Because this information would be an accurate measure of aircraft performance within the NAS, it could provide a potentially invaluable tool for quality management by both the airline and the FAA whether the focus is on flight operations surveillance, aircrew performance, or air worthiness. The purpose of this project is to facilitate industry implementation of this capability and provide the FAA with the means of using digital flight data to better accomplish its safety surveillance responsibilities.

Project Information: This project consists of project 66–21 Integrated Flight Quality Assurance from the 1993 CIP.

Approach: In cooperation with the airline industry and aircraft manufacturers, technological alternatives for airborne digital data recording equipment, including hardware which would be required to support immediate on–board analysis, will be installed and evaluated in a representative sample of modern technology aircraft. Evaluation of onboard equipment will address both functional issues and the benefit–costs associated with alternative hardware configurations, an analysis of appropriate param-

eters and sampling frequencies to meet the above data.

Products: Distributed computer resources, including custom developed software.

1995 Accomplishments:

- Identified technological achievements.
- Achieved airline agreements.
- Awarded contract to conduct a demonstration study in partnership with the airline industry.

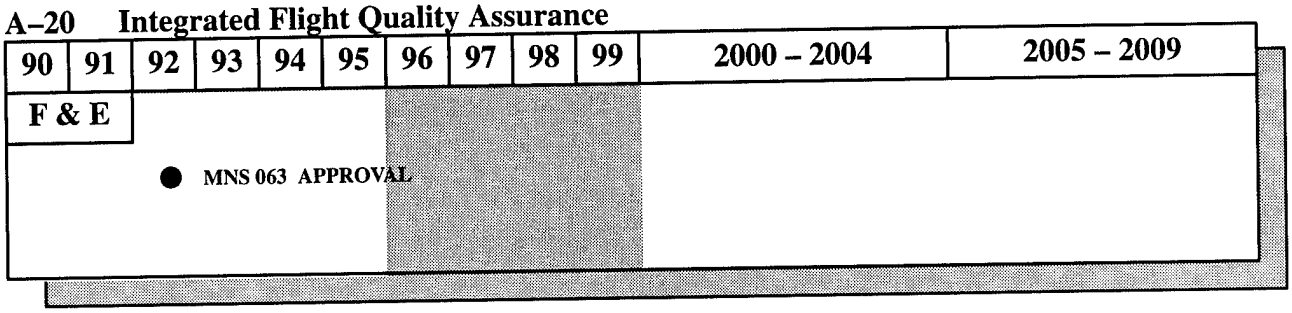
1996 Planned Accomplishments:

- Install digital flight data recording equipment in a selected cross–section of modern technology aircraft for a representative sample of United States major airlines.
- Demonstrate proactive corrective action for negative safety trends based upon routine acquisition and analysis of digital flight data.
- Document benefit–costs associated with alternative technological alternatives.

Benefit/Cost Ratio: A strict benefit–cost comparison (using net present value and benefit–cost ratio) has not been completed.

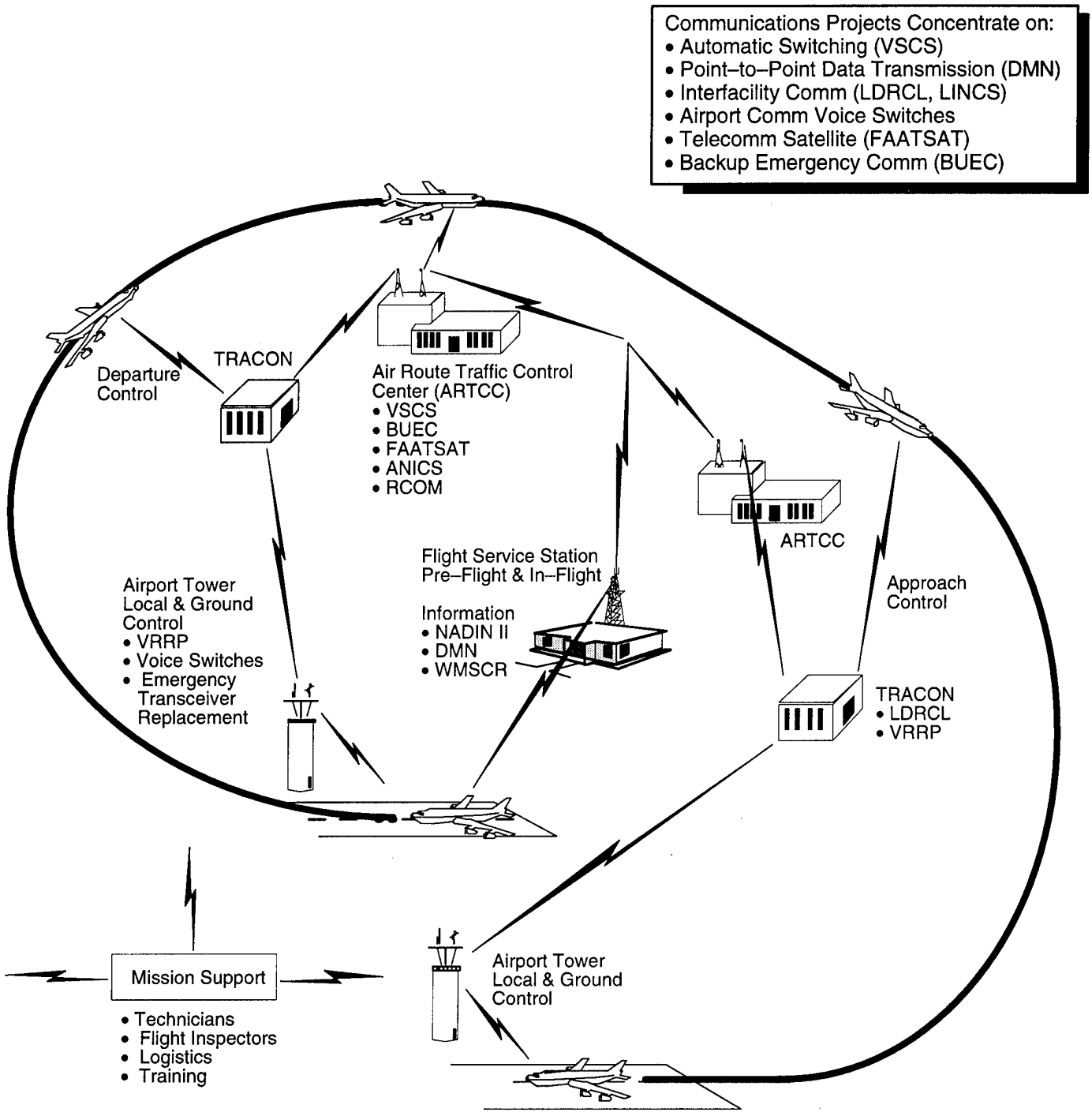
Related Projects/Activities: Flight Operational Quality Assurance Study (FAA Flight Safety Foundation Contract DTFA01–91–C–00016), Safety Performance Analysis System, and the Advanced Qualification Program (AQP).

A–20 Integrated Flight Quality Assurance



Communications Functional Projects

New Project Number	Title	Previous Project Numbers	Page Number
C – 01	Voice Switching and Control System (VSCS)	21–11	Comm – 3
C – 03	Weather Message Switching Center Replacement (WMSC)	23–04	Comm – 4
C – 04	Radio Control Equipment (RCE)	25–08	Comm – 6
C – 05	Voice Switches	22–12, 32–12	Comm – 7
C – 06	Communications Facilities Enhancement	34–23, 44–03	Comm – 9
C – 09	Sustaining Backup Emergency Communications (BUEC)	44–05	Comm – 12
C – 10	Emergency Transceiver Replacement	44–07	Comm – 13
C – 11	Data Multiplexing Network (DMN) Continuation	45–02	Comm – 14
C – 12	Expansion/Reconfiguration of Low Density Radio Communications Link (LDRCL)	45–05	Comm – 15
C – 14	Critical Telecommunications Support	45–20	Comm – 17
C – 15	FAA Telecommunications Satellite (FAATSAT)	45–21	Comm – 18
C – 17	Establish Alaskan NAS Interfacility Communications System (ANICS) Satellite Network	45–24	Comm – 19
C – 18	National Airspace System (NAS) Recovery Communication (RCOM)	46–28	Comm – 21
C – 20	Aeronautical Data-link	23–05, 63–05	Comm – 23
C – 21	Next–Generation Air/Ground Communications System		Comm – 27
C – 22	Gulf of Mexico	64–17	Comm – 29
C – 23	Voice Recorder Replacement Program (VRRP)		Comm – 30



Communications in the NAS

C–01 Voice Switching and Control System (VSCS)

Purpose: This project will provide a voice communications system which performs the intercom, interphone, and air/ground voice connectivity and control functions needed for air traffic control operations in an air route traffic control center. This system must satisfy the voice communications reconfiguration, service, quality, and availability needs of the air route traffic control center or area control facility users. It will reduce leased costs, increase modularity and growth capability, and increase controller productivity over current communications.

Project Information: This project consists of project 21–11 Voice Switching and Control System (VSCS) from the 1993 CIP.

Approach: This project will use computer controlled technology adapted to meet FAA requirements. Two competing prototype systems were produced and evaluated prior to awarding a contract for the production systems. The winning system was upgraded to production specifications and will remain at the FAA Technical Center. The contractor has designed controller position equipment compatible with the computer/human interface used today in an air route traffic control center and terminal radar approach control facilities. The controller position equipment will also be compatible with the computer/human interface of the display system replacement and other en route automation programs. The display system replacement contractor will position the voice communications equipment and display devices in common consoles to best fit the total computer/human interface and console design. An interface is required with the en route automation system for reconfiguration and status reporting purposes. A set of predetermined reconfiguration maps will be embedded in the system. Capability to modify or create new reconfiguration maps from designated system supervisory positions will be provided.

Products:

- One system for the FAA Technical Center and one for the FAA Academy.
- One system for each of the 20 contiguous air traffic control centers and one for Anchorage center.

1995 Accomplishments:

- Completed Operational Test and Evaluation (OT&E).
- Commissioned seven operational en route air traffic control centers (Seattle, Salt Lake City, Denver, Atlanta, Anchorage, Chicago, and Fort Worth).
- Installed voice switching and control system equipment at eleven operational sites (Anchorage, Chicago, Fort Worth, Washington, Houston, Boston, Cleveland, New York, Kansas City, Memphis, and Albuequerque).
- Continued formal controller and airway facilities training.

1996 Planned Accomplishments:

- Commission 12 operational en route air traffic control centers (Washington, Houston, Boston, Cleveland, New York, Kansas City, Memphis, Albuequerque, Oakland, Minneapolis, Miami, and Los Angeles).
- Deliver voice switching and control system equipment to six operational sites (Oakland, Minneapolis, Miami, Los Angeles, Indianapolis, and Jacksonville).
- Continue formal controller and airway facilities training.

Benefit/Cost Ratio: A January 1994 study indicated a 2.9/1.0 benefit–cost ratio.

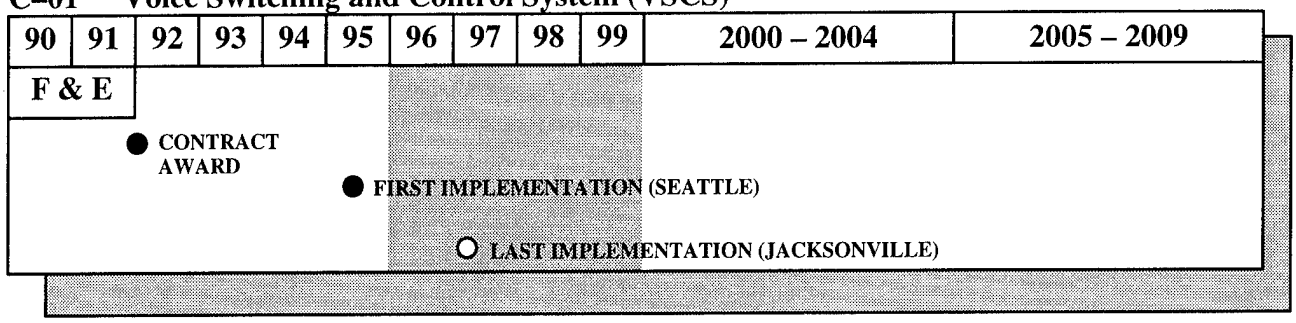
Related Projects/Activities: A–01 En Route Automation Program, C–04 Radio Control Equipment (RCE), C–09 Sustaining Backup Emergency Communications (BUEC), C–14

Critical Telecommunications Support, C–23 Voice Recorder Replacement Program (VRRP), M–03 Capital Investment Plan (CIP) System Engineering and Technical Assistance and M–22 National Airspace System Implementation Support.

List of Contractors:

- Harris Corporation
  (23 production units)
  Melbourne, Florida
- Magnavox
  Fort Wayne, Indiana
- Tandem Computers, Incorporated
  Cupertino, California

C–01 Voice Switching and Control System (VSCS)



C–03 Weather Message Switching Center (WMSC) Replacement

Purpose: This project will replace the weather message switching center with modern equipment and technology to perform all current data handling functions of the center. It will also provide storage and distribution of notice to airmen and rely on the national airspace data interchange network (NADIN) packet switched network for a majority of communications support. Further, the system functions as the primary FAA gateway to the National Weather Service telecommunications gateway, which will be the source of National Weather Service's products for the NAS.

Project Information: This project consists of project 23–04 Weather Message Switching Center (WMSC) Replacement from the 1993 CIP.

Approach: The system will be procured for turnkey installation. To provide geographic redundancy, the weather message switching center replacement will have identical nodes located in the national aviation weather processor facilities in Atlanta, GA, and Salt Lake City, UT. Each node will support approximately one–half of the network and continuously exchange data and coordination messages with the other node to maintain identical data bases. In the event of a nodal failure, the surviving node will assume responsibility for the entire network. Implementation of the weather message switching center replacement and consolidated notice to airmen system will allow the closing of the National Communications Center.

Products: Weather message switching center replacement nodal processors and related peripherals to be located at each of the two national aviation weather processing facilities. A third weather message switching center replacement

node is installed at the FAA Technical Center for second level hardware/software support.

1995 Accomplishments:

- Completed OT&E integration and shakedown testing.

1996 Planned Accomplishments:

- Commission center.

Benefit/Cost Ratio: A benefit–cost ratio has not been developed for this project.

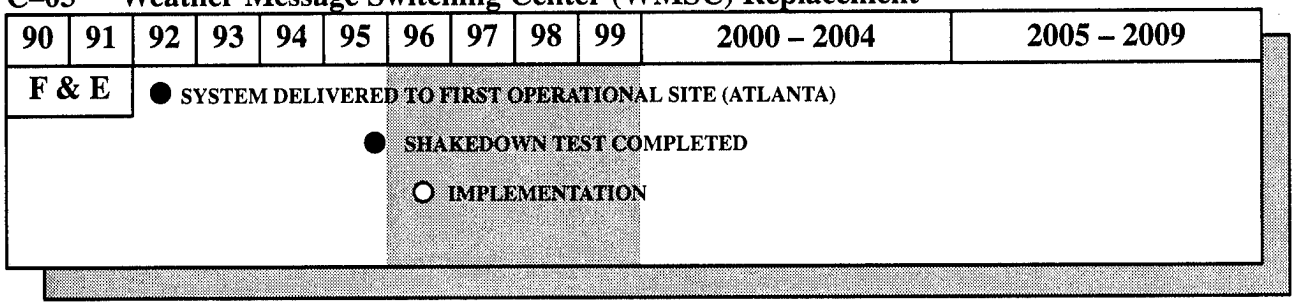
Related Projects/Activities: The weather message switching center replacement will:

- Interface with A–01 En Route Automation Program.
- Exchange weather products with A–05 Traffic Management System (TMS) traffic management processor.
- Interface with C–07 National Airspace Data Interchange Network (NADIN) II Continuation packet switch network which will provide the communications between the weather message switching center replacement and its users.
- Exchange alphanumeric weather data and notices to airmen with the aviation weather processor.
- Interface with M–07 NAS Infrastructure Management System (NIMS) for status reporting.
- Route weather products from W–01 Automated Weather Observing System (AWOS) data acquisition system (ADAS) to the National Weather Service telecommunications gateway (NWSTG) and other NAS users.
- Exchange weather products with W–04 Weather and Radar Processor (WARP).
- The consolidated notice to airmen system and the automated weather observation station data collection units (GS 200s) are also related activities.

List of Contractors:

- Harris Corporation
  Government Information Systems Division
  (two weather message switching center replacement units and one off-line maintenance unit)
  Melbourne, Florida

C–03 Weather Message Switching Center (WMSC) Replacement



C–04 Radio Control Equipment (RCE)

Purpose: This project provides equipment used to control air/ground radios from a remote location. Radio control equipment is part of the air/ground communications link used to provide voice communications between an air traffic control facility and aircraft. It will replace vacuum–tube equipment that is maintenance–intensive and logistically unsupportable, and will provide equipment for new air/ground communications facilities.

Project Information: This project consists of project 25–08 Radio Control Equipment (RCE) from the 1993 CIP.

Approach: Through full and open competition and the use of an operational capabilities test as part of source selection, nondevelopmental radio control equipment was procured from Communications Systems Technology, Inc. This contract is being administered at a national level with initial deliveries to selected air route air traffic control centers and terminal radar approach control (TRACON) facilities with the balance going to the FAA Logistics Center. Equipment will be further distributed from the FAA Logistics Center to the regions based on priorities developed during the annual call for estimates. The use of an operational capability test, as part of the source selection process, added time to the solicitation/evaluation period. However, this approach reduced risk and improved the system delivery schedule.

Products: The radio control equipment will replace approximately up to 530 channels of existing equipment and provide up to 970 channels of new equipment.

1995 Accomplishments:

- Completed operational test and evaluation.
- Completed shakedown testing.
- Completed RCE deliveries to Southern California and Chicago TRACONs and selected ARTCCs.

1996 Planned Accomplishments:

- Continue RCE deliveries to selected ARTCCs.
- Complete RCE deliveries to FAA Logistics Center.

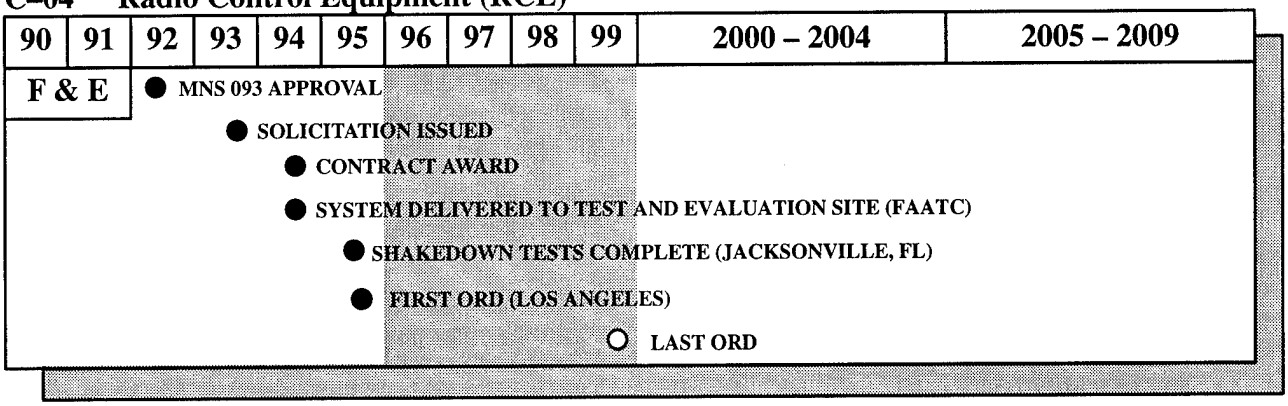
Benefit/Cost Ratio: A benefit–cost ratio has not been developed for this project.

Related Projects/Activities: C–01 Voice Switching and Control System (VSCS), C–05 Voice Switches, C–06 Communications Facilities Enhancement, C–09 Sustaining Backup Emergency Communications (BUEC), C–15 FAA Telecommunications Satellite (FAATSAT), C–17 Establish Alaskan NAS Interfacility Communications System (ANICS) Satellite Network, C–21 Next–Generation Air/Ground Radio Communications System, F–01 Airport Traffic Control Tower/Terminal Radar Approach Control Facility (ACTC/TRACON) Establishment/Sustainment/Replacement, F–02 Metroplex Control Facility (MCF), F–03 Austin–Bergstrom International Airport Program, F–04 DOD/FAA Air Traffic Control Facility Transfer/Modernization F–08 Sustain San Juan Facilities, F–23 Relocate Honolulu Combined Center Radar Approach Control, M–03 Capital Investment Plan (CIP) System Engineering and Technical Assistance, M–21 Logistics Support Systems and Facilities, and M–27 National Airspace Integrated Logistics Support (NAILS).

List of Contractors:

- Communications Systems Technology, Inc. Columbia, Maryland

C–04 Radio Control Equipment (RCE)



C–05 Voice Switches

Purpose: This project will provide modern voice switching equipment to replace outdated and unsupportable voice switches in terminal radar approach control facilities (previously provided with leased communication equipment), metroplex control facilities, and airport traffic control towers as the present equipment reaches the end of its useful economic life. The new equipment will meet air traffic control voice switching requirements in the terminal area including access to air/ground and ground/ground facilities, an interface to the automation system, access to available backbone network features, and an interface to network monitoring and control.

Project Information: This project combines projects 22–12 Terminal Voice Switch Replacement (TVSR) and 32–12 Enhanced Terminal Voice Switch (ETVS) from the 1993 CIP.

Approach: Remaining leased electromechanical switches in the FAA inventory (unsupportable and aging) are being replaced in four active procurements:

1) Enhanced terminal voice switch will replace electromechanical switches (aging and expensive to maintain) in terminal radar approach control facilities/metroplex control facilities/airport traffic control tower facilities which require more than four operational positions.

2) Small tower voice switches will replace these switches in visual flight rule airport traffic control towers. These two procurements will replace all leased electromechanical and aging electronic switches.

3) An operational support telephone system will replace the administrative telephone system when that capability is displaced by small tower voice switches or enhanced terminal voice switch installations.

4) A rapid deployment voice switch (RDVS) I of II is being installed in new airport traffic control towers and terminal radar approach control facilities/metroplex control facilities that were awaiting voice switches. An acquisition program was initiated to use existing commercial switches.

Products:

- Approximately 247 voice switches will be procured and installed in airport traffic control towers, metroplex control facilities and terminal radar approach control facilities to replace leased electromechanical switches. (22–12)

- Approximately 200 switches will be procured to replace aging integrated communications switching system Phase I switches. Additionally, 224 switches will be procured to support the DOD needs. (32–12)

1995 Accomplishments:

- Awarded the Enhanced Terminal Voice Switch (ETVS) project to Denro.
- Awarded the Integrated Communication Switching System (ICSS) to DME.
- Awarded the RDVS II to Denro and Litton.
- Delivered 16 RDVS I and II.
- Delivered 25 Operational Support Telephone Switches (OSTS).
- Delivered 52 Small Tower Voice Switches (STVS).

1996 Planned Accomplishments:

- Deliver 14 RDVS I and II.
- Deliver 26 operation support telephone switches.
- Deliver 78 small tower voice switches.
- Deliver three ETVS.

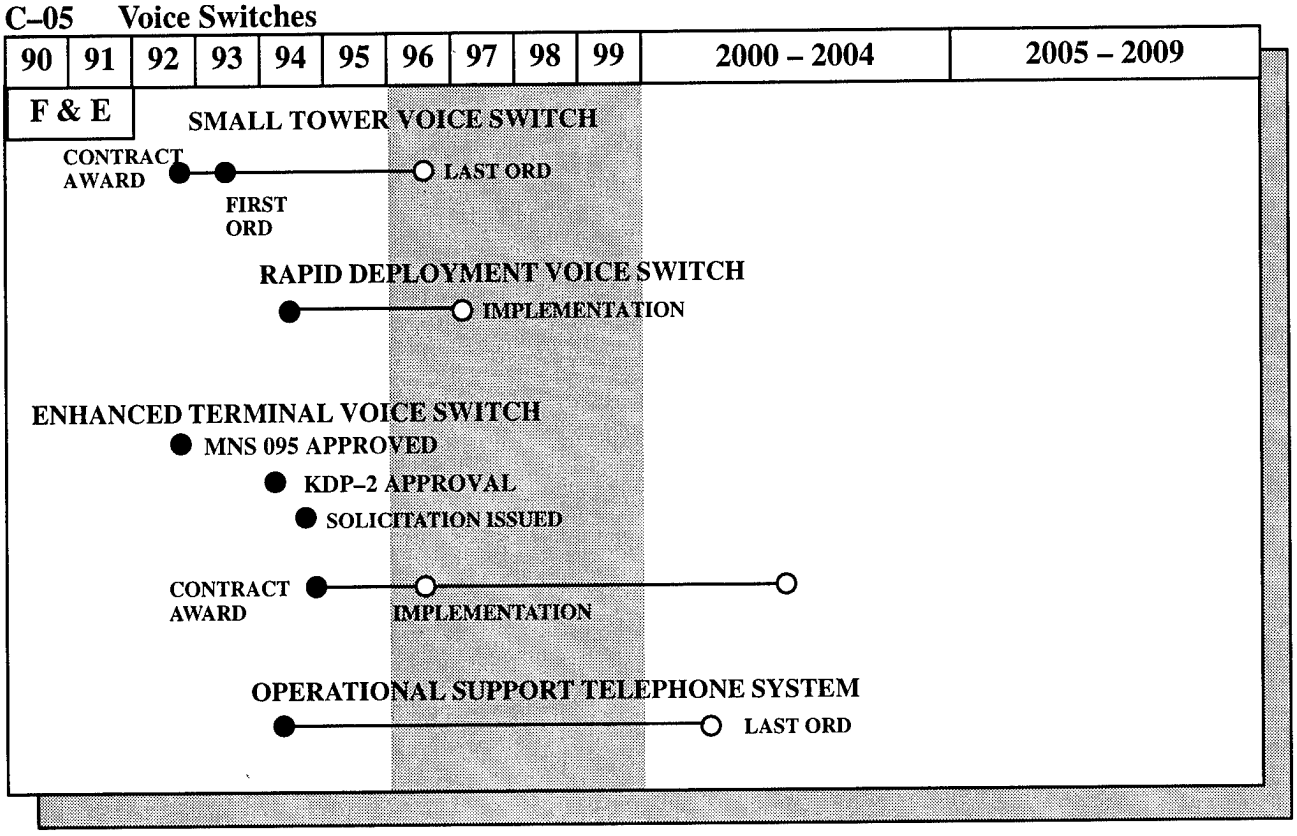
Benefit/Cost Ratio: A December 1990 study indicates a 2.0/1.0 benefit–cost ratio for the terminal voice switch replacement project. A March 1994 study indicates a 1.7/1.0 benefit–cost ratio for the enhanced terminal voice switch.

Related Projects/Activities: A–02 Tower Automation Program, C–04 Radio Control Equipment (RCE), C–23 Voice Recorder Replacement Program (VRRP), F–01 ATCT/TRACON Establishment/Sustainment/Replacement, F–02 Metroplex Control Facility (MCF), F–03 Austin–Bergstrom International Airport Program, F–14 System Support Laboratory Sustained Support, F–18 Aeronautical Center NAS Support Facilities, F–23 Relocate Honolulu Combined Center Radar Approach Control (CERAP), M–03 Capital Investment Plan (CIP) System Engineering and Technical Assistance, and M–22 National Airspace System Implementation Support.

List of Contractors:

- Denro
  (RDVS and ETVS)
  Rockville, Maryland
- Litton
  (RDVS I and II)
  College Park, Maryland
- Executone
  (operational support telephone system)
  Fairfax, Virginia

C–05 Voice Switches



C–06 Communications Facilities Enhancement

Purpose: Radio frequency interference and crowded radio frequency spectrum problems are impacting reliable air/ground communications. This project provides modern communications and ancillary equipment to improve operational performance at selected remote communications facilities.

Additionally, changes in airspace use are causing an increased demand for services in the en route, terminal and flight service station environments. Therefore, this project will provide new remote communications capabilities and improve air/ground radio communications service for those selected sites that have a persistent radio communications problem.

Project Information: This project combines project 34–23 Communications Facilities Expansion and project 44–03 Air/Ground Communications Radio Frequency Interference (RFI) Elimination from the 1993 CIP.

Approach: Based on approved regional priorities, this project will procure and install commercially available communications commodities to correct radio frequency interference problems and satisfy expanding air traffic services/requirements. Procurement of these commodities is being performed under multiple existing contracts.

Products:

- VHF/UHF transmitters and receivers

- Receiver multicouplers
- Transmitter combiners
- Filters
- Racks and cables
- Solid–state linear power amplifiers

1995 Accomplishments:

- Procured equipment and began installation for 19 remote communications facilities.
- Awarded receiver multicoupler contract.
- Delivered transmitter combiner equipment to FAA Southern Region.
- Began delivery of linear power amplifers to the FAA Logistics Center.

1996 Planned Accomplishments:

- Procure equipment and begin installation for 2 additional remote communications facilities.
- Begin delivery of receiver multicouplers to FAA Logistics Center.
- Continue deliveries of transmitter combiners, linear power amplifiers, transmitters, and receivers.

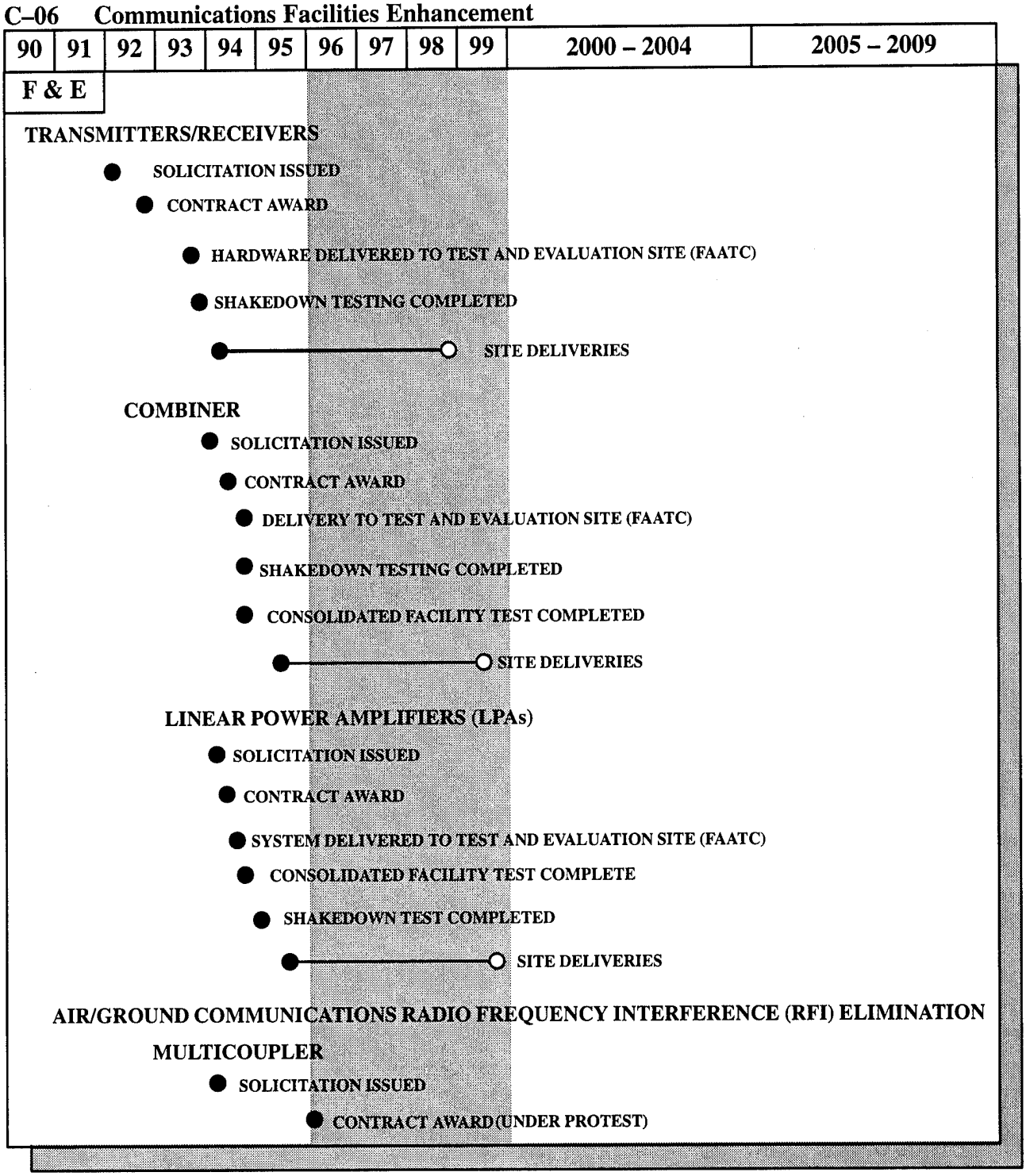
Benefit/Cost Ratio: A benefit–cost ratio study is underway with an expected completion date of December 1995.

Related Projects/Activities: C–04 Radio Control Equipment (RCE), C–09 Sustaining Backup Emergency Communications (BUEC), C–21 Next–Generation Air/Ground Radio Communications System, F–02 Metroplex Control Facility (MCF), F–03 Austin–Bergstrom International Airport Program, F–04 DOD/FAA Air Traffic Control Facility Transfer/Modernization, M–03 Capital Investment Plan (CIP) System Engineering and Technical Assistance and M–08 Continued General Support.

List of Contractors:

- Motorola Government Electronics Group
  (VHF/UHF transmitters, receivers, and linear power amplifiers)
  Scottsdale, Arizona
- Sinclair Radio Laboratories
  (VHF and UHF transmitter combiners)
  Tonawanda, New York

C–06 Communications Facilities Enhancement



C–09 Sustaining Backup Emergency Communications (BUEC)

Purpose: The existing backup emergency communications system was completed in the late 1970's using 1950's technology. This project will replace this system at air route traffic control centers (ARTCC) which have parts supply problems and rising maintenance costs.

The loss of air/ground communications has the most severe air traffic control impact. Lack of reliable radio communications precludes the application of any type of aircraft separation or guidance. While fallback to manual procedures is possible during radar failures, the inability to speak with pilots cancels all options for control. This project will provide modern equipment to improve backup communications coverage of the airspace to better meet air traffic control requirements.

Project Information: This project consists of project 44–05 Backup Emergency Communications (BUEC) Replacement from the 1993 CIP. "The BUEC project has evolved. To more accurately express the mission and intent of the project, it has been retitiled 'Sustaining Backup Emergency Communications'."

Approach: Procure, integrate, and install non-developmental items such as transmitters, receivers, and ancillary items. This will totally replace the existing obsolete, unsupportable, backup emergency communications system with solid–state equipment.

Products: Integrated systems (up to 1000) comprised of:

- UHF/VHF transmitters and receivers.
- Radio control equipment.
- Stand–alone environmental enclosures.
- Power systems.
- Antennas.
- Equipment racks.

1995 Accomplishments:

- Prepared specification for selected/approved alternative.

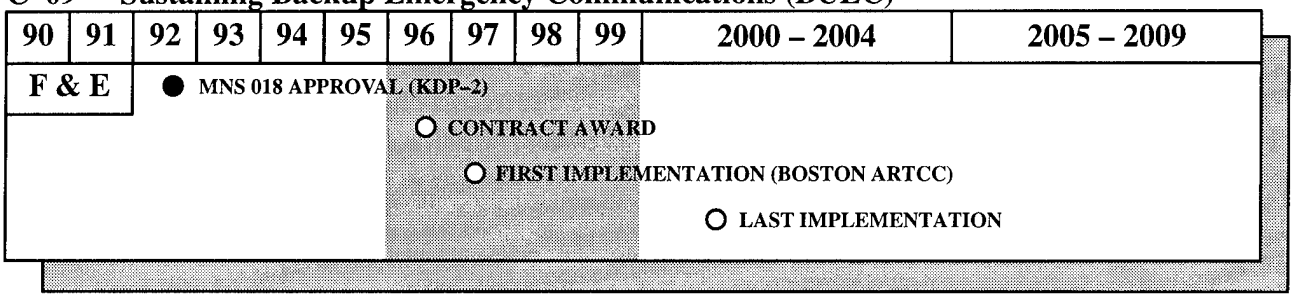
1996 Planned Accomplishments:

- Award system integration contract.

Related Projects/Activities: C–01 Voice Switching and Control System (VSCS), C–04 Radio Control Equipment (RCE), C–06 Communications Facilities Enhancement, C–12 Expansion/Reconfiguration of Low Density Radio Communications Link (LDRCL), F–02 Metroplex Control Facility (MCF), F–11 Power Systems Sustained Support, M–03 Capital Investment Plan (CIP) System Engineering and Technical Assistance, M–15 NAS Spectrum Engineering Management, M–21 Logistics Support Systems and Facilities and M–27 National Aviation Integrated Logistics Support (NAILS).

Benefit/cost Ratio: A December 1992 study indicates a benefit–cost ratio of 1.04/1.0 for this project.

C–09 Sustaining Backup Emergency Communications (BUEC)



C–10 Emergency Transceiver Replacement

Purpose: This project will provide for the replacement of obsolete emergency transceiver equipment in airport traffic control towers and terminal radar approach control facilities. This equipment is required to provide a backup emergency transceiver communications capability for critical air traffic operations at these facilities. The majority of emergency equipment now in use in the towers and approach control facilities is maintenance–intensive, technologically obsolete, and meets neither minimum performance standards for operation in a congested radio frequency spectrum environment nor the criteria for radio frequency interference elimination.

The FAA is currently experiencing severe logistics support and radio frequency interference problems with the existing equipment. Much of the equipment is 30 years old and was purchased prior to the implementation of the 25 kilohertz channel spacing requirement. The obsolete hardware, lack of logistics support, and growing number of radio frequency interference problems all contribute to the urgent need to replace this equipment.

Project Information: This project consists of project 44–07 Emergency Transceiver Replacement from the 1993 CIP.

Approach: Through a full and open competition, nondevelopment ultra high frequency/very high frequency transceivers are being procured from Motorola. The technical proposal evaluation included an operational capabilities test to ensure no developmental work is required to manufacture and implement these transceivers. The contract will be administered at a national level with deliveries to the FAA Logistic Center. Transceivers will be distributed to the regions based on priorities estimated during the annual call for estimates.

Products: A total of 2,160 modern transceivers may be procured for installation at 350 towers and 150 approach control facilities.

1995 Accomplishments:

- Enhanced system performance through an engineering change.
- Started transceiver production.

1996 Planned Accomplishments:

- Complete testing and deploy transceiver systems.

Benefit/Cost Ratio: A benefit–cost ratio has not been developed for this project.

Related Projects/Activities: C–21 Next–Generation Air/Ground Radio Communications System, F–01 Airport Traffic Control Tower/Terminal Radar Approach Control Facility (ATCT/TRACON) Establishment/Sustainment/Replacement, F–02 Metroplex Control Facility (MCF), F–03 Austin–Bergstrom International Airport Program, F–04 DOD/FAA Air Traffic Control Facility Transfer/Modernization, F–08 Sustain San Juan Facilities, F–23 Relocate Honolulu Combined Center Radar Approach Control (CERAP), M–03 Capital Investment Plan (CIP) System Engineering and Technical Assistance, M–21 Logistics Support Systems and Facilities, and M–27 National Airspace Integrated Logistics Support (NAILS).

Problems Resulting in Delays:

- System modified to enhance performance through an engineering change.

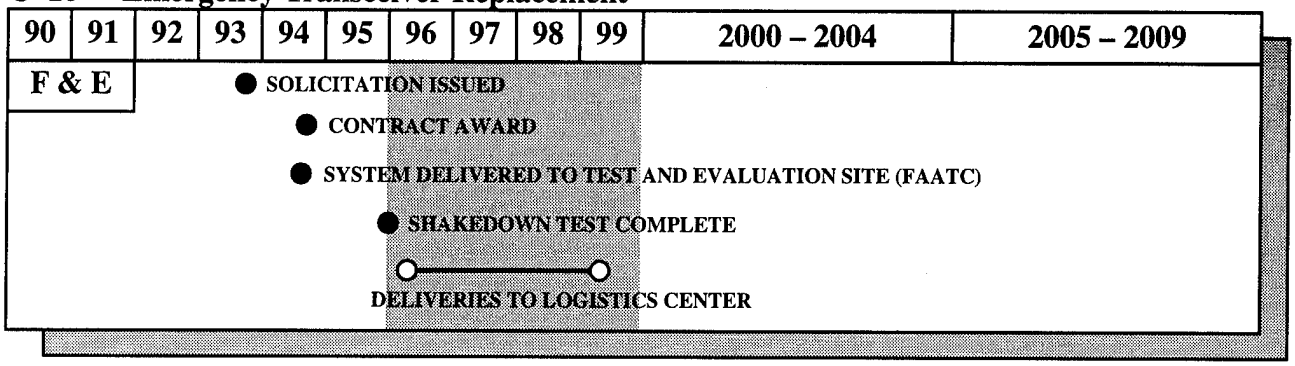
Delays Minimized by:

- Project schedule rebaselined to reflect engineering change.

List of Contractors:

- Motorola Government Electronics Group (transceivers)
  Scottsdale, Arizona

C–10 Emergency Transceiver Replacement



C–11 Data Multiplexing Network (DMN) Continuation

Purpose: This project provides the NAS with modern data communications technologies for cost–effective, point–to–point data transmission. These technologies include: (1) data multiplexing, which enables a number of independent transmission requirements to be consolidated onto a single circuit; and (2) automated network monitoring and control, which enables the identification of failed network elements from central locations and circuit restoral in real-time. The use of data multiplexing is an integral part of the FAA's strategy for cost–effective interfacility communications transmission.

Continuing effort is required to complete installation of statistical time division multiplexing (STDM) and deterministic time division multiplexing (DTDM) network equipment.

Project Information: This project consists of project 45–02 Data Multiplexing Network (DMN) Continuation from the 1993 CIP.

Approach: This project will provide for the continuing acquisition of commercial–off–the–shelf hardware and completion of Phase III of the data multiplexing network effort to provide circuit–end equipment for data transmission requirements.

Products:

- Modems
- Multiplexing modems
- Channel service units/data service units
- High–speed time division multiplexer
- Automated network management systems

1995 Accomplishments:

- Completed statistical time division multiplexer installations at: Minneapolis, Denver, Albuquerque, Anchorage, New York, Boston, Miami, Washington, Kansas City, Cleveland, Chicago, and Indianapolis air route traffic control centers; at Honolulu and San Juan center radar approach control (CERAP) facilities; and southern California, New York, and Chicago terminal radar approach control (TRACON) facilities.
- Completed deterministic time division multiplexing installations at 18 centers, 2 CERAPs, 3 major TRACONs, and the Atlanta national airspace data interchange network (NADIN) facility.

1996 Planned Accomplishments:

- Complete statistical time division multiplexer installation at the nine remaining centers.
- Complete installation of network design revision 5 at Los Angeles, Oakland, and Seattle centers and begin upgrade of all previous installations.
- Complete installation of revision 5 to deterministic time division multiplexing at all centers.

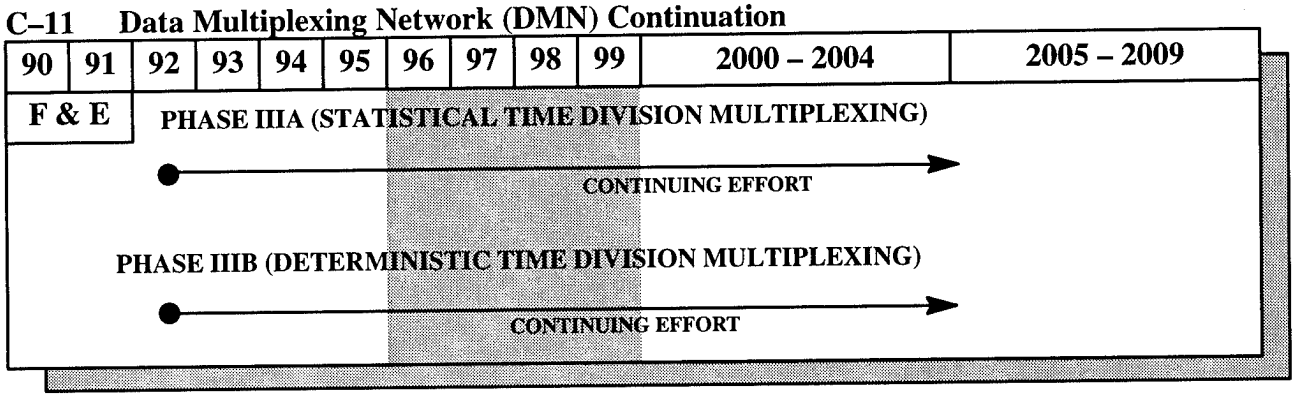
Benefit/Cost Ratio: A January 1995 study indicated a 3.0/1.0 benefit–cost ratio.

Related Projects/Activities: C–14 Critical Telecommunications Support, F–02 Metroplex Control Facility (MCF), F–04 DOD/FAA Air Traffic Control Transfer/Modernization, W–01 Automated Weather Observing System (AWOS), W–02 Weather Radar Program, and W–03 Terminal Doppler Weather Radar (TDWR) System. However, DMN provides network transmission services to a majority of CIP projects that require point–to–point data connectivity.

List of Contractors:

- Cray Communications
  (STDM)
  Bethesda, Maryland
- Codex/Motorola
  (DMN)
  Mansfield, Massachusetts

C–11 Data Multiplexing Network (DMN) Continuation



C–12 Expansion/Reconfiguration of Low Density Radio Communications Link (LDRCL)

Purpose: Low density radio communications link provides the interfacility communications system with the capability to establish low density microwave spurs to its backbone, the radio communications link system. It provides diversity for critical and essential voice and data services in the NAS, and it provides connectivity where leased services are not available. Low density radio communications link also provides point-to-point microwave radio systems in support of NAS requirements to replace existing radar microwave link systems, and it establishes new systems not previously covered under the radar microwave link replacement program.

Project Information: This project consists of project 45–05 Expansion/Reconfiguration of Low Density Radio Communications Link (LDRCL) from the 1993 CIP.

Approach: Phase I provides for the replacement of selected low–capacity, obsolete radar microwave link systems. Phase II (funded under OPS) will provide interfacility communications where it is economically advantageous when compared to leased service, or where leased service does not exist. Low density radio communications link equipment will provide connectivity between centralized facilities (e.g., airport traffic control tower, automated flight service station, etc.) as well as centralized facilities not provided for by the radio communications link backbone system and their remote facilities. Commercial–off–the–shelf equipment will be used.

Actions taken as a result of Title VI of the Omnibus Budget Reconciliation Act of 1993 require that 235 megahertz (MHz) of Federal Government radio frequency spectrum be transferred to the private sector to promote use of new telecommunication technologies. The full reallocation of the 1710–1755 MHz frequency band to the private sector will occur by 2004. However, there will be an early reallocation of this spectrum near the 25 largest United States cities in January 1999. This will directly impact FAA operations because some FAA systems currently operate within this frequency band. Transferring this frequency band to the civil sector in 1999 may result in expenditure of FAA funds estimated at $96 million. This estimate is based on an initial program office study indicating over 200 systems will be affected at an estimated cost of $400,000 per system.

Products:

- Low density radio communications link segments.

1995 Accomplishments:

- Completed project implementation plan.
- Completed operational tests and evaluations (8 gegahertz digital).
- Completed Dallas/Fort Worth metroplex (10 systems).
- Continued Academy training.
- Completed project requirements for new Denver airport.
- 1.8 gegahertz:.
  - Completed shakedown testing.
  - Received deployment decision at Excom.
  - Completed first implementation.
- 23 gegahertz:
  - Continued system installations.
- 900 megahertz:
  - Completed shakedown testing.

1996 Planned Accomplishments:

- Complete Phase I.

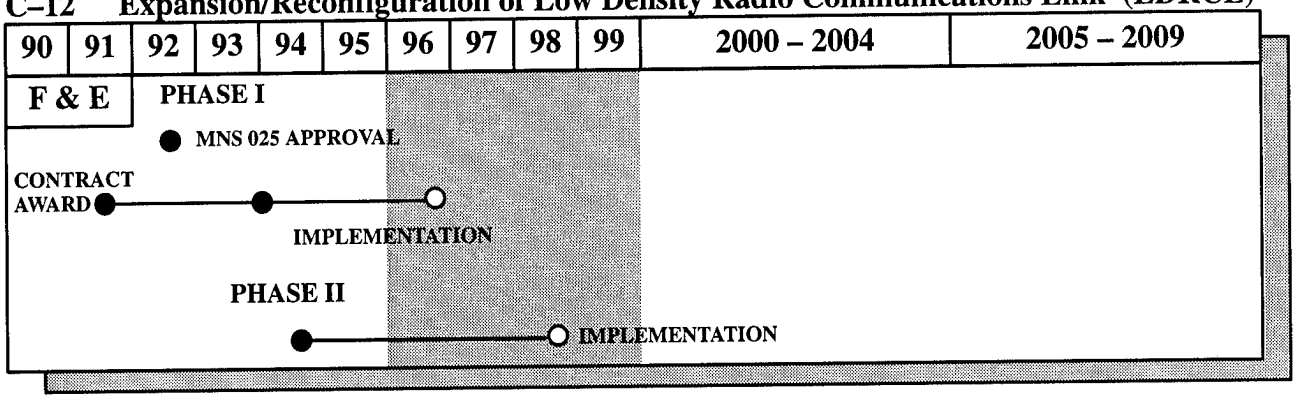
Benefit/Cost Ratio: A May 1991 study indicated a 2.0/1.0 benefit–cost ratio.

Related Projects/Activities: F–02 Metroplex Control Facility (MCF), C–18 NAS Recovery Communication (RCOM), and M–15 NAS Spectrum Engineering Management.

List of Contractors:

- Alcatel Network Systems
  (160 low density radio communications link systems)
  Richardson, Texas

C–12 Expansion/Reconfiguration of Low Density Radio Communications Link (LDRCL)



C–14 Critical Telecommunications Support

Purpose: This project supports upgrades to existing telecommunication systems. It provides local planning, engineering, installation, and hardware for intrafacility connectivity of facilities and equipment and operations-funded telecommunications projects in over 5,000 FAA facilities nationwide. Frequently, during the budget formulation stage of national telecommunications programs, local termination and intrafacility connectivity requirements cannot be anticipated due to the site specific nature and dynamics of telecommunication requirements. When not provided by national telecommunications efforts, this project supports such activities as telecommunication planning, engineering, site preparation, acquisition and installation of termination equipment, testing, verification, and cutover activities. This project also supports low-cost initiatives to increase telecommunication service reliability and minor telecommunications modifications, relocations, consolidations, and upgrades.

Project Information: This project consists of project 45–20 Critical Telecommunications Support from the 1993 CIP.

Approach: Regional offices will identify their requirement for critical telecommunications support during annual planning activities to support future installations and other planned events. These requirements are evaluated and prioritized. Funds to support the highest priority projects are transferred to the regions for local procurement of telecommunications hardware, software, and services.

Products:

- 3,000 mini–demarcation systems.
- Automated line test equipment.
- Low density radio communications link test bed at FAA Technical Center.
- National airspace data interchange network IA memory enhancements.
- Circuit diversity to radio communications link.
- Transition to leased interfacility NAS communications system.
- Radio communications link drop and insertion equipment.

1995 Accomplishments:

- Supported regional projects.

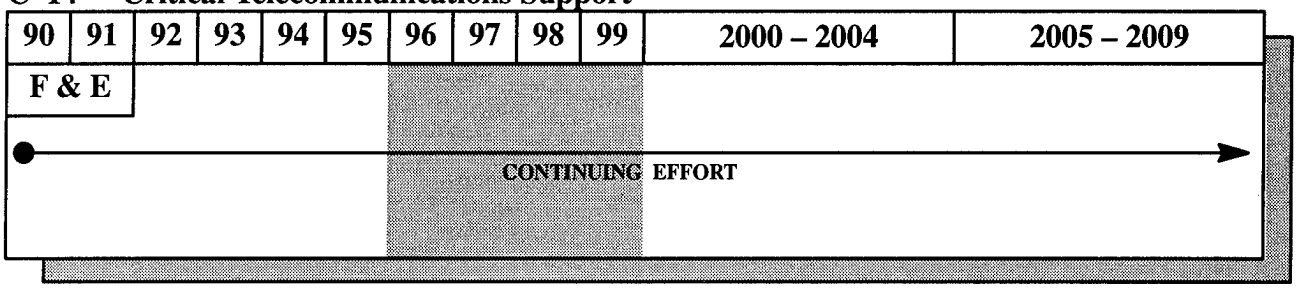
1996 Planned Accomplishments:

- Distribute and obligate two million dollars of 96 funding to nine regions and two centers.

Benefit/Cost Ratio: Due to the nature of this project, a strict benefit–cost comparison (using net present value and benefit–cost ratio) is not appropriate.

Related Projects/Activities: A–11 Terminal Air Traffic Control Automation (TATCA), C–01 Voice Switching and Control System (VSCS), C–05 Voice Switches, C–11 Data Multiplexing Network (DMN) Continuation, C–15 FAA Telecommunications Satellite (FAATSAT), C–17 Establish Alaskan NAS Interfacility Communications System (ANICS) Satellite Network, and C–20 Aeronautical Data-link, and W–03 Terminal Doppler Weather Radar (TDWR) System.

C–14 Critical Telecommunications Support



C–15 FAA Telecommunications Satellite (FAATSAT)

Purpose: This project provides the FAA with a leased satellite interfacility communications network. The network supports the FAA strategy for cost–effective interfacility communications transmission by providing redundant alternatives to avoid single-points-of-failure through circuit diversity. The network will also meet NAS service availability and message quality requirements.

This project economically supports the increased requirement for communications and data circuits needed to support the metroplex control facility and flight service station consolidation programs, particularly in remote areas. It also supports the weather and radar processor program as well as broadcast requirements.

Project Information: This project consists of project 45–21 Satellite Communication Circuits System from the 1993 CIP.

Approach: Communications requirements through 2005 were examined and compared with the FAA's capability to provide such services. Transmission alternatives, including continued use of leased circuits, microwave, satellites, and fiber optics were analyzed. A plan has been developed to include a comprehensive cost–effective, satellite–based network.

Satellite services will be implemented as required, in stages, to assure orderly growth and compatible telecommunication services. A competitive, national requirements–type contract will be awarded to include design, production, site preparation, installation, implementation, operation, and maintenance at locations to be specified. The earth stations will be acquired on a leased basis. The space segment and maintenance service will also be leased. The vendor will

provide network management and control and keep the FAA informed of system status.

This project will benefit from experience gained in the development, design, production, installation, and implementation of the Alaskan NAS interfacility communications system and the leased interfacility NAS communications system.

Products:

- Approximately 205 earth station terminals.
- Network management and control subsystem.
- Limited number of portables and transportable earth stations for temporary service requirements and disaster recovery.
- A communications system connecting air route traffic control centers and metroplex control facilities to the air traffic control system command center.

1995 Accomplishments:

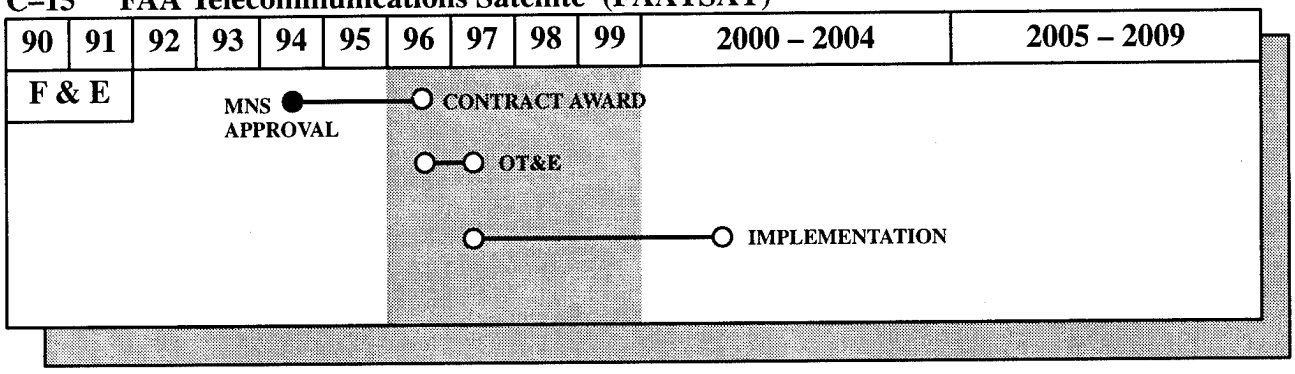
1996 Planned Accomplishments:

- Award contract.
- Conduct operational test and evaluation.

Benefit/Cost Ratio: A January 1994 study indicated a 2.2/1.0 benefit–cost ratio.

Related Projects/Activities: A–11 Terminal Air Traffic Control Automation (TATCA), C–14 Critical Telecommunications Support, C–17 Establish Alaskan NAS Interfacility Communications System (ANICS) Satellite Network, C–20 Aeronautical Data-link, F–02 Metroplex Control Facility (MCF), F–05 Flight Service Facilities, and W–01 Automated Weather Observing System (AWOS).

C–15 FAA Telecommunications Satellite (FAATSAT)



C–17 Establish Alaskan NAS Interfacility Communications System (ANICS) Satellite Network

Purpose: This project provides for the establishment of an FAA backbone interfacility communications system within the Alaskan region using satellite earth station technology. It supports the FAA strategy for cost–effective interfacility communication transmission and fulfills the requirements of FAA Order 6000.36, Communications Diversity. It provides redundant alternative routes, and avoids single points of failure through circuit diversity to meet NAS service availability and message quality requirements in the expanding air traffic control environment. This system parallels the radio communications link system and the leased NAS

interfacility communications system functions which were not implemented in Alaska due to geographical considerations.

Project Information: This project consists of project 45–24 establish Alaskan NAS Interfacility Communications System Satellite Network from the 1993 CIP.

Approach: Initially, off–the–shelf satellite earth stations and associated equipment will be used to establish a voice and data network in Alaska to meet NAS telecommunications requirements. A network monitoring and control system will be provided to allow for rerouting circuits, monitoring the quality of the circuits, and for initial circuit establishment and termination. The network control center will be located in the Anchorage air route traffic control center (ARTCC).

The Alaskan network will be established in three phases: Phase I establishes satellite earth stations at 53 critical locations needed to support the instrument flight rules portion of the Alaska air traffic control system. Phase I also sets up the network control center in the Anchorage center to support NAS facility monitor and control functions. Phase II introduces additional earth stations into the network, and Phase III implements non–FAA circuit station requirements from other eligible Government agencies (Department of Defense and National Weather Service NAS support requirements).

Specific applications are: radar data from sites to area control facility/air route traffic control center; radio air–to–ground voice communications between remote communications facilities and air route traffic control center/area control facility/automated flight service stations; flight data between airport traffic control tower/air route traffic control center/area control facility/automated flight service stations ; navaids to area control facility/sector flight service data processing system/automated flight service station data; next generation weather radar to area control facility data; flight service data processing system data between the air route traffic control centers and automated flight service stations; and associate operational support voice and data communications.

The entire procurement is planned for a 10–year period. The maintenance and operations portions of the contract will cover a 5–year period that will then be followed with five 1–year options, if fully exercised.

Products: Provide reliable and cost–effective telecommunications for Alaskan Region facilities to meet all present and future NAS requirements.

1995 Accomplishments:

- Completed operational test and evaluation.
- Completed regional deployment readiness review.
- Completed construction and installation of 4 hub and 27 remote earth stations.
- Completed testing and live circuit cutover at 20 locations.

1996 Planned Accomplishments:

- Complete construction and installation at an additional 15 locations.
- Complete cutover of circuits at remaining 26 locations.
- Complete study of contractor versus FAA operations and maintenance.
- Deploy Seattle ANICS installation to provide Alaskan connectivity with continental United States.

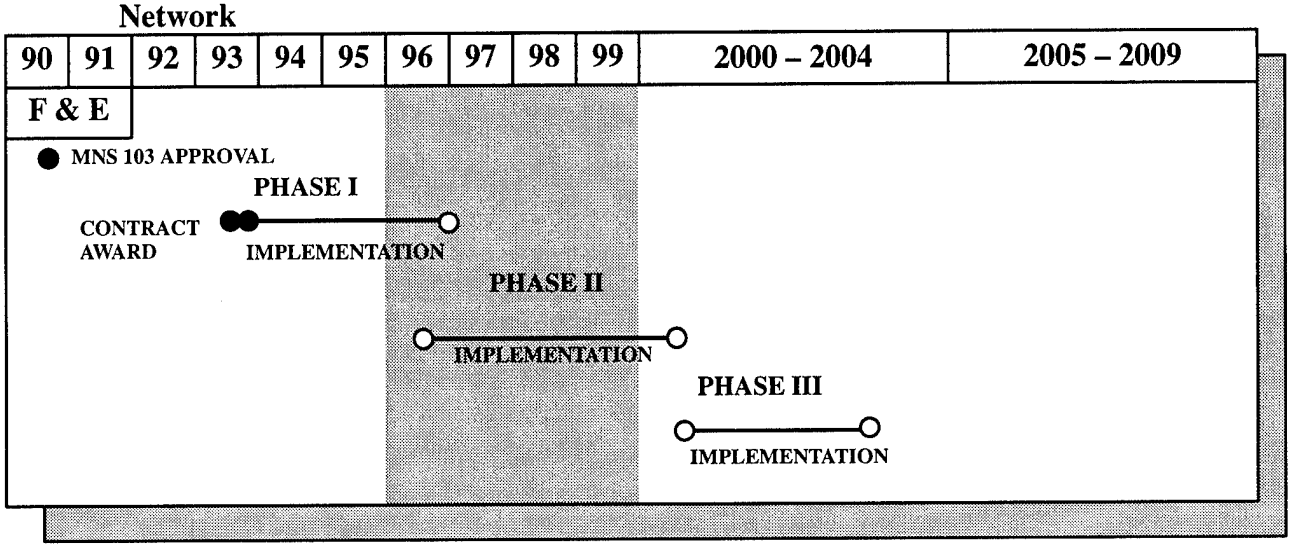
Benefit/Cost Ratio: A May 1991 study indicated a 2.0/1.0 benefit–cost ratio.

Related Projects/Activities: Interfacility communications for all CIP projects within the Alaskan Region. C–14 Critical Telecommunications Support, C–15 FAA Telecommunication Satellite (FAATSAT), F–05 Flight Service Facilities, and W–01 Automated Weather Observing System (AWOS).

List of Contractors:

- Harris Corporation
  Melbourne, Florida
- New Horizons Telecom, Inc
  Anchorage, Alaska
- Alascom
  Anchorage, Alaska

C–17 Establish Alaskan NAS Interfacility Communications System (ANICS) Satellite Network



C–18 National Airspace System (NAS) Recovery Communication (RCOM)

Purpose: This project supports Executive Orders 12472 and 12656, and National Security Decision Directives 47, 97, 145, 180, 286, and 314. This project ensures the existing national radio communication system remains fully capable of establishing minimum essential command and control communications. These communications are necessary to direct the management, operation, and reconstitution of the NAS during national, regional, and/or local emergencies (e.g., during and after earthquakes, hurricanes (typhoons), and tornadoes. This improved emergency communications network will continue to save flying hours for FAA flight inspection aircraft. This network plan for recovery communications supports FAA flight inspection aircraft, accident investigations, Airway Facilities maintenance technicians, and routine activities for aviation security.

Project Information: This project consists of project 46–28 National Airspace System (NAS) Recovery Communication (RCOM) from the 1993 CIP.

Approach: The recovery communications project is separated into two phases:

- Phase I began in 1992 and will continue through 1999. This phase involved completing residual national radio communications system manufacturing, installation, documentation, training, maintenance packages, and HF/SSB upgrades.

- Phase II upgrades, expands, and enhances the existing emergency communications network to improve system reliability and availability. Further, federal government changes to the radio frequency channelization plan for various frequency bands used by NAS recovery communications equipment (from 25 kilohertz channels to 12.5 kilohertz channels) will require replacement of existing multi–channel transceivers. Candidate systems include, but are not limited to, nondevelopmental multi–channel transceivers/microwave radio connectivity in conjunction with low density radio communications link/radio communications link programs.

Products:

- Phase I
  - Complete the manufacturing and installation of high frequency/single sideband (HF/SSB) radio systems that are now partially manufactured. In addition, complete the installation of high frequency systems at the Kansas City air route traffic control center; the remote high frequency transceiver site; the Kansas City Regional Office; the Leesburg air route traffic control center; New York Regional Office; Honolulu consolidated en route radar approach control (CERAP); and the San Juan CERAP.
  - Completion of system level instruction books.
  - Completion of training and maintenance packages.
  - Antenna replacements and improvements where required.
  - Multichannel microwave radio connectivity where operationally required.
  - Engineer, rehabilitate, or replace planned communications and electronics systems for FAA emergency operations.
  - Implementation of Federal Standard 1045 which specifies an automatic link establishment system capability.
  - Uninterruptible power systems where operationally required.
  - Expand the secure telephone network.
  - Complete offshore national radio communication system site requirements.
- Phase II
  - Expand, upgrade, and replace existing national radio communications system hardware deemed obsolete or unsupportable. This may include very high frequency/frequency modulation repeaters, base stations at selected locations, and/or mobile and hand held transceiver units. These items will tie into the recovery communications/low density radio communications link network to complete the required national radio communications system connectivity.
  - Continued expansion of the secure telephone network.

1995 Accomplishments:

- Installed HF/SSB system at New York Regional Office.
- Installed HF/SSB system at San Juan CERAP.
- Installed HF/SSB system at Honolulu CERAP.
- Conducted site survey for system in American Samoa.

1996 Planned Accomplishments: None.

Benefit/Cost Ratio: A benefit–cost ratio has not been developed for this project.

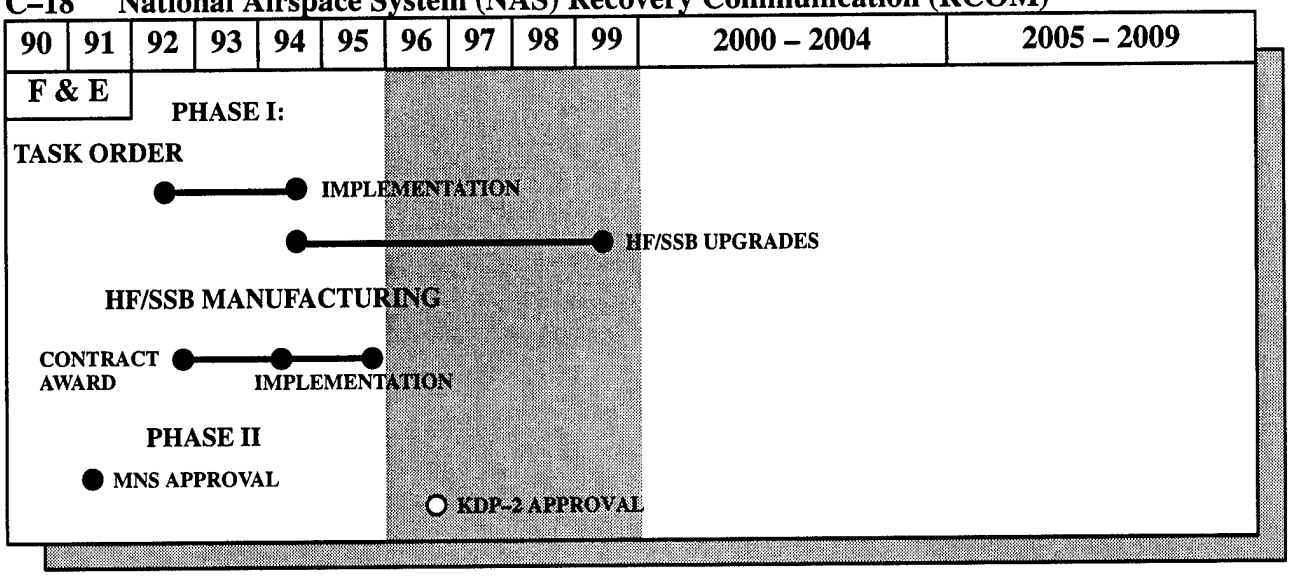
Related Projects/Activities: F–08 Sustain San Juan Facilities, M–03 Capital Investment Plan

(CIP) System Engineering and Technical Assistance, M–15 National Airspace System Spectrum Engineering Management, M–21 Logistics Support Systems and Facilities, and M–27 National Airspace Integrated Logistics Support (NAILS).

List of Contractors:

- Eastern Computers, Incorporated
  Virginia Beach, Virginia
- United States Tower Service Limited
  Frederick, Maryland

C–18 National Airspace System (NAS) Recovery Communication (RCOM)



C–20 Aeronautical Data–link

Purpose: The availability of data–link communications will improve air/ground communications and contribute to system safety and capacity by enhancing pilot accessibility to information, relieving congested voice frequencies, and reducing the workload of pilots, specialists, and controllers.

Project Information: This project combines projects 23–05 Aeronautical Data–link and 63–05 Aeronautical Data–link Communications and Applications from the 1993 CIP.

Approach:

- Construction of an initial communications architecture (air and ground).
- Development and implementation of an aeronautical telecommunication network capability within the NAS and an evolutionary set of air traffic control and flight information service applications that will employ an aeronautical telecommunication network.
- Implement applications in en route and terminal NAS automation.
- Selection, development, and evaluation of candidate services.
- Identification of any additional frequency spectrum which may be required to implement this project.

Elements involved in the above are development and implementation of the initial data–link processor and definition of the tower data–link system. The initial data-link processor (Build–1) will provide subnetwork, independent message routing between application processors and associated end–to–end communication functions.

The aeronautical telecommunication network communications routing capabilities to be implemented within data-link processor (Build–2) will route messages between aircraft and ground computers. The air/ground communications subnetworks will include the FAA operated mode select beacon system sensors, as well as industry operated satellite and very high frequency data–links.

The data–link processor will support aeronautical telecommunications network communications services within United States domestic and oceanic airspace. Host data–link and terminal data–link will be implemented at each air route traffic control center and terminal radar approach control facility, with air traffic control automation computers using the aeronautical telecommunication network router to exchange air traffic control data–link messages with aircraft. The data-link processors will be interconnected to provide for seamless NAS communications coverage.

Operational requirements for data–link applications have been established with the user community, and studies will be conducted to establish the economic and safety benefits of candidate data–link applications.

Each data–link application will be evaluated and classified based on type of service, criticality, and spectrum capacity requirements so that future decisions can be made regarding choice of suitable spectrum for the application.

Products:

- 24 data-link processors Build–1 (22 for air route traffic control centers; 1 each to FAA Academy and FAA Technical Center). (23–05)
- Tower data-link services for predeparture clearance code service at 57 major airports. These will support a digital automated terminal information system with automatic voice generation. (both 23–05 and 63–05)
- Data-link processor Build–2 will provide initial implementation of aeronautical telecommunication network, support for digital automated terminal information system, and other near–term flight information services applications. (63–05).
- Data–link weather applications (routine weather reports, route–oriented weather forecasts, and hazardous weather graphical services). (63–05)
- Requirements for Host data-link and the migration to a global aeronautical telecommunication network environment for air/ground as well as ground/ground aeronautical data communications. (63–05)
- Controller/pilot data–link communications applications for host data–link and terminal data–link.
- Technical concepts for aviation minimum operational performance standards, such as an FAA Advisory Circular for data–link certification requirements and International Civil Aviation Organization standards and recommended practices for data–link. (63–05)

1995 Accomplishments:

R&D

- Demonstrated automatic dependent surveillance (ADS)–B in the Gulf of Mexico.
- Demonstrated flight information services in conjunction with Aircraft Owners and Pilots Association at Dulles.
- Demonstrated terminal weather information for pilots (character graphic and text) at five airports.
- Obtained aeronautical mobile communications panel approval of aeronautical mobile

satellite system (AMSS) standards and recommended practices (SARPS).

F&E

- Began implementation of tower data–link services (TDLS) pre–departure clearance and flight data input output emulation.
- Accepted delivery of data–link processor Build 2 software code from Computer Sciences Corporation.
- Completed en route data link benefits study, showing $340 million per year in benefits.
- Developed specification for host interface device (HID) national airspace system (NAS) local area network (LAN) for use by data–link and AUA programs including traffic flow management and user benefits infrastructure.
- Completed acquisition package for initial terminal data link, which is being developed in coordination with (STARS).

1996 Planned Accomplishments:

R&D

- Conduct flight information services evaluations with general aviation users groups.
- Demonstrate terminal weather information for pilots (TWIP) full color graphics at Boston Logan.
- Demonstrate TWIP character graphics and text at eight airports.
- Demonstration of two–way data–link and ADS–B in the Gulf of Mexico.
- Publish AMSS standards and recommended practices.
- Publish AMSS Mininum Operational Performance Standards.
- Validate Communication/Navigation/Surveillance Air Traffic Management SARPs.
- Obtain ICAO aeronautical telecommunication network (ATN) panel approval of ATN SARPs.

F&E

- Complete TDLS implementation at 57 airports.
- Begin implementation of digital automatic terminal information service at 57 airports.
- Implement regional evaluation of flight information services on the east coast.
- Complete terminal data link user benefits study.
- Perform critical design review for initial terminal data–link by the contractor.
- Conduct developmental testing of HID NAS LAN by the FAA Technical Center.
- Begin ordering equipment for all air route traffic control centers.

Benefit/Cost Ratio: An March 1995 study indicated a 3.6/1.0 benefit–cost ratio for the aeronautical data–link communications and applications project.

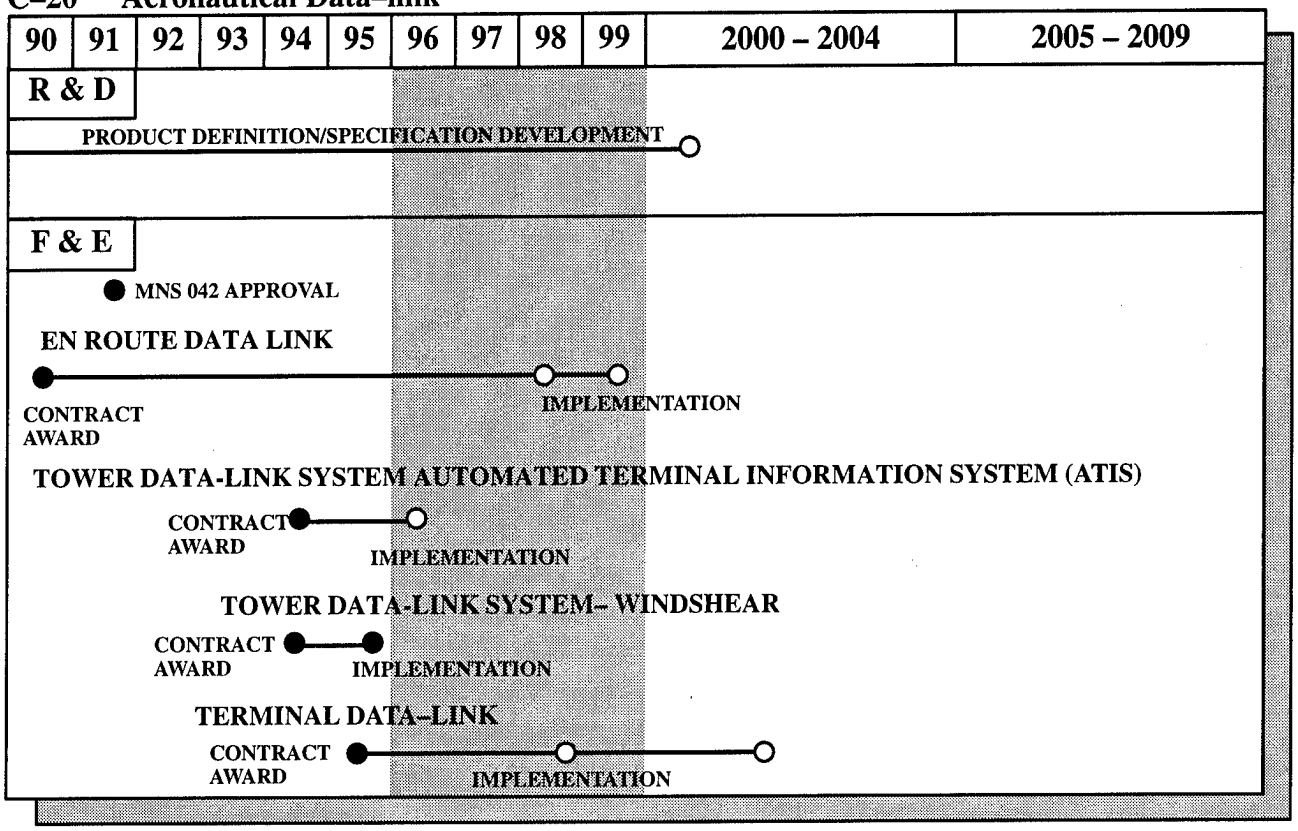
Related Projects/Activities: A–01 En Route Automation Program, A–02 Tower Automation Program, A–04 Standard Terminal Automation Replacement System (STARS), A–06 En Route Software Development, A–10 Oceanic Automation Program (OAP), A–11 Terminal Air Traffic Control Automation (TATCA), A–12 Airport Surface Target Identification System (ATIDS), C–14 Critical Telecommunications Support, C–15 FAA Telecommunications Satellite (FAATSAT), C–21 Next–Generation Air/Ground Radio Communications System, M–15 NAS Spectrum Engineering Management, N–12 Augmentations for the Global Positioning System (GPS), S–02 Mode S, W–04 Weather and Radar Processor (WARP), and Research, Engineering and Development Plan projects 021–190 Airport Surface

Target Identification System (ATIDS), 022–110 Traffic Alert and Collision Avoidance System (TCAS), 022–150 Flight Operations and Air Traffic Management Integration, 031–110 Aeronautical Data Link Communications and Applications (for related United States and international standards activities to assure compliance with the evolving air traffic related standards), 031–120 Satellite Communications Program, 031–130 NAS Telecommunications for the 21st Century, 032–110 Satellite Navigation Program, 041–110 Aviation Weather Analysis and Forecasting, and 042–110 Aeronautical Hazards Research.

List of Contractors:

- GTE/Federal Systems
  (data link processor hardware)
  Chantilly, Virginia
- Computer Sciences Corporation
  (data-link processor Build–2 and Host data–link software)
  Calverton, Maryland
- ARINC
  (tower data-link system)
  Annapolis, Maryland
- Loral Federal Systems
  (terminal data–link)
  Atlantic City, New Jersey

C–20 Aeronautical Data–link



C–21 Next–Generation Air/Ground Radio Communications System

Purpose: The FAA needs air/ground communications to provide air traffic control services. Very high frequency (VHF) and ultra high frequency (UHF) radio air/ground communication links are needed to support all phases of flight: from coordination of ground movements on the airport surface (including gate areas), to the coordination of departures and arrivals in the terminal area, and to the coordination needed to support the en route phase of flight. In addition, air/ground communications link is also needed to provide services from the automated flight service stations. Functionally, the need for air/ground communications includes requirements to ensure aircraft separation, to transmit instructions and clearances, for hand–offs, and to provide weather services and pilot reports.

The current mode of communications is primarily voice. This project addresses the need for new air/ground radios to replace aging, expensive to maintain equipment in a system which does not have the capacity to meet the near–term air traffic control communication demands. Specific needs include the following:

- Provide air traffic controllers the capability to accommodate the growing number of sectors and services using the available, limited radio frequency spectrum.
- Reduce logistical costs by replacing expensive to maintain VHF and UHF radios that use 1940s technology and have exceeded their life expectancy by 10 years.
- Provide new data–link communications capability to all classes of users.
- Reduce air/ground radio frequency interference and provide security mechanisms to identify unauthorized users.

This project will design, implement, and install a new air/ground radio communications system. This new system will increase spectrum capacity in the VHF aeronautical band, replace unmaintainable VHF/UHF analog radios, and resolve radio frequency interference problems in the existing analog radio system. The new digital radios will incorporate additional functionality such as automatic channel management and discrete addressing capability. More importantly, these radios will support voice and data communications within a single avionics transceiver system. This new A/G radio system will meet the demand for voice channels as air traffic increases and provide data capability to all users including general aviation. The current system is projected to approach its capacity limit by 2002; sooner in certain high traffic density areas like metropolitan New York, Chicago, and Los Angeles.

The new radio system will satisfy future air traffic system requirements. It will be based on the VHF digital link radio physical layer standards defined by the International Civil Aviation Organization's (ICAO) Aeronautical Mobile Communications Panel (AMCP). The new radio system will be backward compatible with the current radio system. It will also include capabilities to minimize circuit blockage, increase security and radio frequency interference protection, improve voice quality, reduce circuit contention, and provide automatic circuit management. The new digital radio will permit rapid failure detection and recovery to meet A/G service availability requirements. The new system will provide compatible interfaces with voice switches and aeronautical telecommunications network elements at control facilities.

Data capabilities of the new VHF radio system will be an important addition to the A/G data links due to the extensive additional data communications geographic coverage which the new system will offer. Currently FAA operates VHF outlets at over 2,500 sites nationwide.

Use of VHF data link will alleviate spectrum congestion in the current VHF voice functions. Significant lead time is required for spectrum and

implementation planning in an orderly and extensive transition period.

Project Information: This is a new project to the 1995 CIP that is transitioning from the R,E&D Plan.

Approach: Pursue next–generation radio system alternative based on the VHF digital link/ time division multiple access concept to improve spectrum efficiency. Define ground architecture based on air traffic system requirements as identified by AMCP; support approval of international standards for the A/G communications VHF radio; and develop system specifications.

Determine performance of selected A/G string elements through investigations, simulations, and laboratory and field tests. This development effort includes formulation of a spectrum transition plan and flight demonstrations of the new system. Commercially available technology will be used to show that projected improvements are feasible.

Procure radio equipment that supports the current system as well as the VDL/TDMA system. A single digital radio type will therefore be a flexible communications system offering the users voice and data capability to match their needs both during a transition period and beyond. Introduction of a fundamentally new system using these techniques may require additional spectrum during a transition period. During the transition both the analog system and the digital system may have to cooperate side–by–side. Spectrum relief will not be realized until analog channels begin to be decommissioned and reassigned to the new radio system. Therefore, planning for the incremental introduction of the new system must begin well before spectrum capacity is exhausted under the current analog radio standard and sufficient spectrum capacity remains to operate both systems during transition.

Products:

This procurement program will provide radio system equipment to satisfy both the FAA's need to replace existing unmaintainable radios and increase VHF spectrum efficiency. The next–generation radio system will consist of digital radios and ground elements at both control facilities and remote radio sites to satisfy air traffic system requirements.

1995 Accomplishments:

- Established program at key decision point 1 (KDP–1).

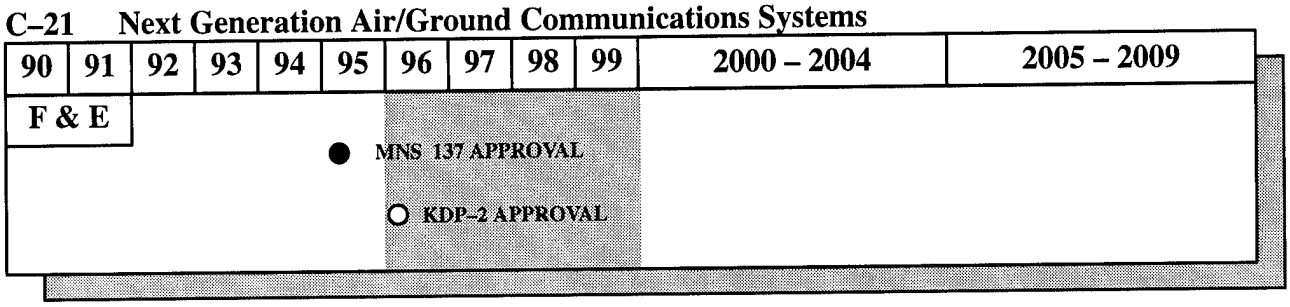
1996 Planned Accomplishments:

- Obtain KDP–2 approval.

Benefit/Cost Ratio: A benefit–cost analysis is underway with an expected completion date of January 1996.

Related Projects/Activities: C–01 Voice Switching and Control System (VSCS), C–04 Radio Control Equipment (RCE), C–06 Communications Facilities Enhancement, C–09 Sustaining Backup Emergency Communications (BUEC), C–10 Emergency Transceiver Replacement, C–20 Aeronautical Data–link, M–15 NAS Spectrum Engineering Management, and other voice switches such as the aeronautical telecommunications network (ATN) and the leased interfacility NAS communications system (LINCS). Related Research, Engineering and Development (R,E&D) Plan projects include 031–110 Aeronautical Data–link Communications and Applications and 031–130 NAS Telecommunications for the 21st Century.

C–21 Next Generation Air/Ground Communications Systems



C–22 Gulf of Mexico

Purpose: This project will provide enhancement of air traffic operations and services in the Gulf of Mexico airspace. Currently aircraft transversing the Gulf of Mexico airspace operate under ICAO rules. System shortfalls will be rectified by providing the necessary improvements to the communications infrastructure, which will, in turn, support expansion of navigation, automation, and surveillance services. This improvement plan allows for the conversion of the Gulf of Mexico airspace into an offshore environment.

Project Information: This project consists of project 64–17 Gulf of Mexico from the 1993 CIP.

Approach: Since the shortfall in VHF communications coverage is severe and forces procedural constraints on air traffic operations in the Gulf, the first priority of the program will be to provide direct pilot/controller communication. Operational requirements will be developed for operating in the Gulf as an offshore control area rather than an oceanic sector. Using the system engineering process, the operational requirements will be translated into a set of alternative solutions, one of which will be selected for implementation based on life–cycle cost, reliability, maintainability, availability, and identification of suitable radio frequency spectrum.

Products:

- An acquisition plan for acquiring and implementing communications enhancements.
- Communications, navigation, and surveillance hardware and software.

1995 Accomplishments:

- Identified the navigational requirements.
- Developed an RFP for Buoy Communications System.
- Contracted for buoy platforms.

1996 Planned Accomplishments:

- Upgrade navigational aids and reduce separation standards.
- Award a contract for system integration.
- Deploy one buoy system.
- Identify automation requirements.
- Identify ground–to–ground communication requirements.
- Identify surveillance requirements/systems.

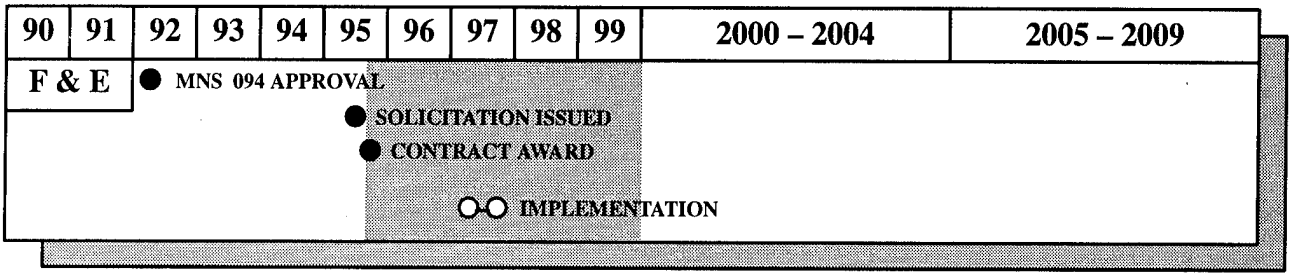
Benefit/Cost Ratio: A December 1993 study indicated a 3.0/1.0 benefit–cost ratio.

Related Projects/Activities: C–15 FAA Telecommunications Satellite (FAATSAT), M–15 NAS Spectrum Engineering Management, N–11 Loran-C Monitors and Transmitter Enhancement, and S–02 Mode S.

List of Contractors:

- National Data Buoy Center
  Stennis, Mississippi

C–22 Gulf of Mexico



C–23 Voice Recorder Replacement Project (VRRP)

Purpose: This project will provide replacement of all remaining analog reel–to–reel voice recorders in all NAS Air Traffic Control Facilities. The FAA inventory has approximately 6 different analog recording systems which are becoming difficult to maintain. Supply support is a problem as more vendors are switching to digital systems and parts for the older analog systems become more difficult to acquire. This project will procure commercial–off–the–shelf digital voice recorders to replace current systems for legal voice recordings between pilots and controllers.

Project Information: This is a new project to the 1996 CIP.

Approach: This project uses an existing acquisition for commercial–off–the–shelf digital voice recorder system (DVRS) equipment. This acquisition has three phases: Phase I was funded by project C–02 (now completed) and provided DVRS equipment to approximately 100 radar facilities not consolidated under the area control facility concept. Project C–23 funds for Phase II and Phase III to acquire digital voice recorders for all of the remaining terminal radar approach control (TRACON) facilities, air traffic control towers (ATCT), automated flight service stations (AFSS), flight service stations (FSS), and the air route traffic control centers (ARTCC).

Phase II will provide DVRS equipment to approximately 455 TRACON's, ATCT's, AFSS's, FSS's. Phase III will provide DVRS equipment to approximately 23 ARTCC's including Honolulu, and San Juan facilities. The 23 voice recorders at the air route traffic control centers will reach their intended 7–year life–cycle starting in 2001.

Throughout Phase II and Phase III, the existing acquisition will be used to satisfy requirements for legal voice recording capability at new or refurbished facilities. Funding for these new requirements will be provided by the project needing the capability.

Products:

- Approximately 478 digital voice recorder systems.

- Ancillary equipment to the recorders including a GPS antenna/receiver and an uninterruptible power supply.

1995 Accomplishments:

- Approved mission needs statement 295.
- Conducted concept exploration and benefit–cost studies.
- Awarded contract for Phase I.
- Completed shakedown testing at Bay TRACON.

1996 Planned Accomplishments:

- Receive Deployment Readiness Review approval.
- Verify and validate requirements for Phase II.
- Initiate orders and begin equipment deployment for Phase II.

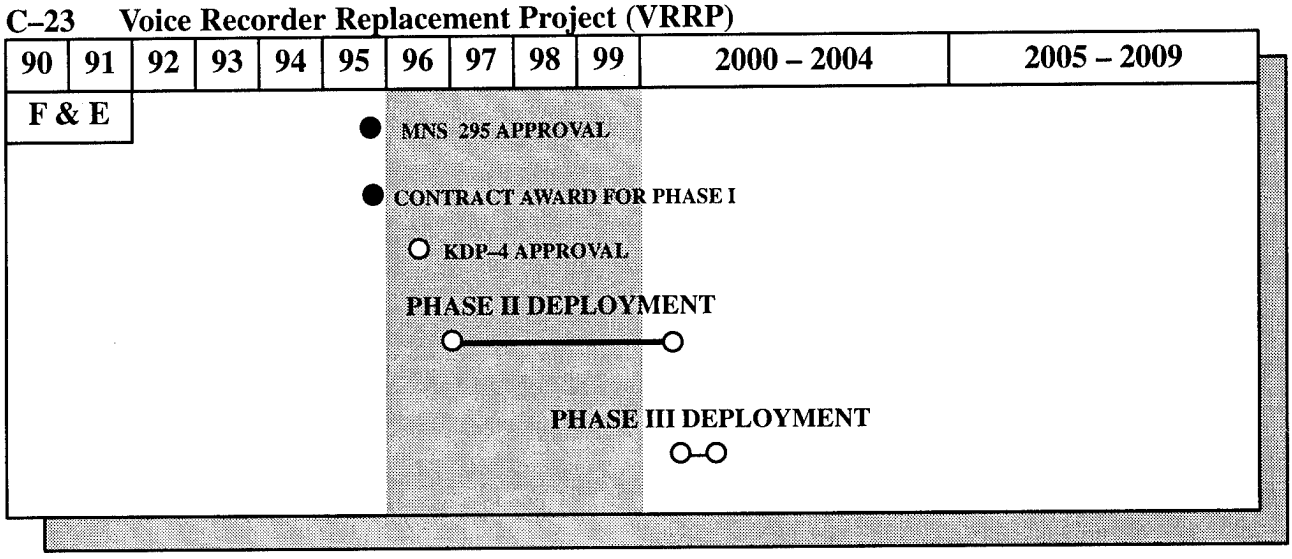
Benefit/Cost Ratio: A 1995 study indicated a 2.7/1.0 benefit–cost ratio.

Related Projects/Activities: C–01 Voice Switching and Control System (VSCS), C–05 Voice Switches, F–01 Airport Traffic Control Tower/Terminal Radar Approach Control (ATCT/TRACON), F–02 Metroplex Control Facility (MCF); F–03 Austin–Bergstrom International Airport Program, F–04 DOD/FAA Air Traffic Control Facility Transfer/Modernization, M–03 Capital Investment Plan (CIP) System Engineering and Technical Assistance, M–21 Logistics Support Systems and Facilities, and M–27 National Airspace Integrated Logistics Support (NAILS).

List of Contractors:

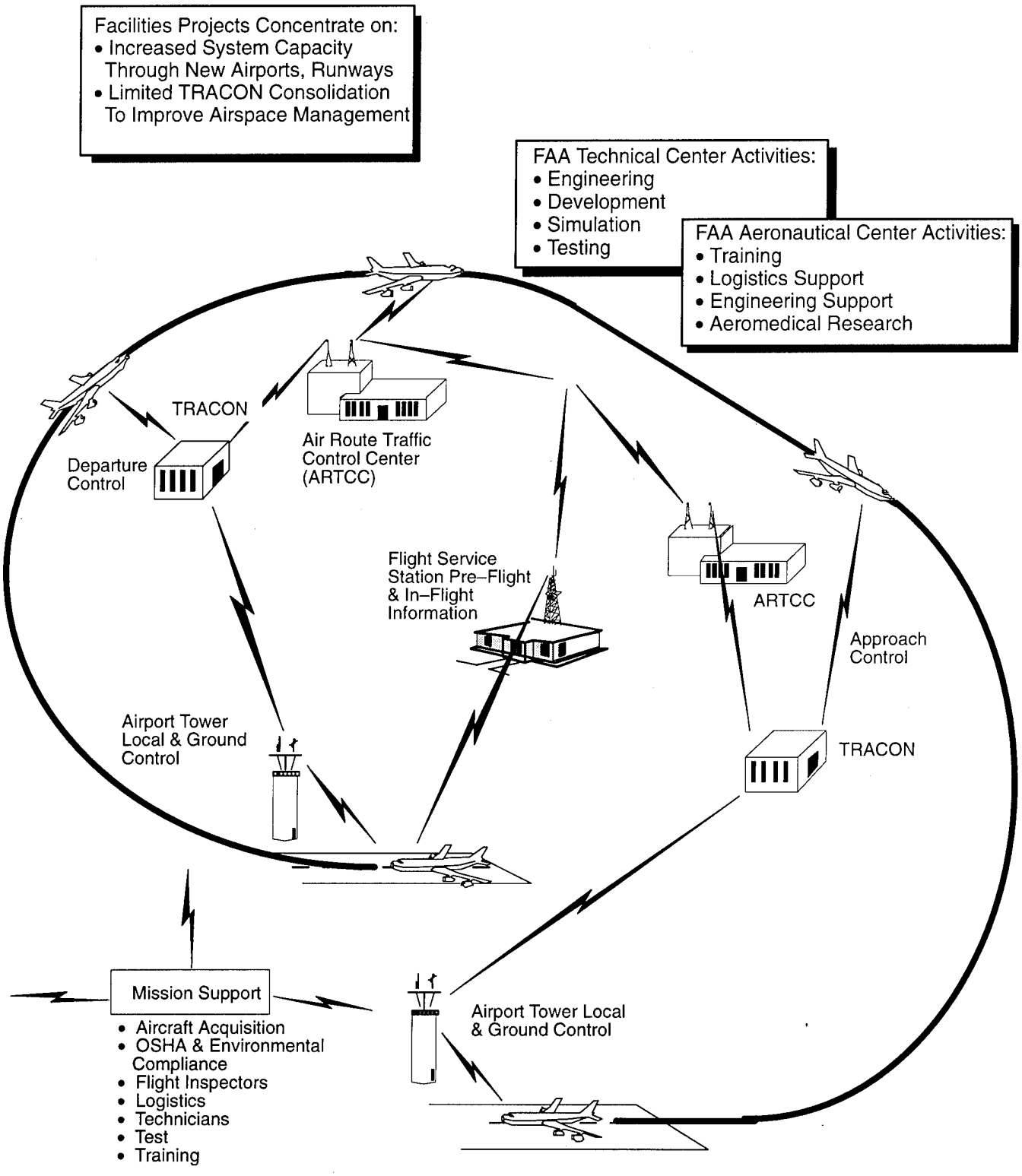
- Denro
  Gaithersburg, Maryland

C–23 Voice Recorder Replacement Project (VRRP)



Facilities and Associated Systems Functional Projects

New Project Number	Title	Previous Project Number	Page Number
F – 01	Airport Traffic Control Tower/Terminal Radar Approach Control Facility (ATCT/TRACON) Establishment/Sustainment Replacement	32–13, 42–13 42–14	Facl – 3
F – 02	Metroplex Control Facility (MCF)	32–21, 32–22, 32–24, 32–26, 32–34, 32–36, 32–38, 32–40, 32–42, 32–44	Facl – 5
F – 03	Austin–Bergstrom International Airport Program	32–25	Facl – 12
F – 04	DOD/FAA Air Traffic Control Facility Transfer/ Modernization	32–27, 32–28	Facl – 13
F – 05	Flight Service Facilities	33–20, 43–03	Facl – 15
F – 06	Air Route Traffic Control Centers (ARTCC) Plant Modernization/Expansion	26–09, 36–20, 46–09, 56–60	Facl – 16
F – 08	Sustain San Juan Facilities	42–22	Facl – 19
F – 09	Replacement of Controller Chairs	42–24	Facl – 20
F – 10	Airport Cable Loop Systems Sustained Support	46–05	Facl – 20
F – 11	Power Systems Sustained Support	46–07	Facl – 21
F – 12	Modernize and Improve FAA Buildings and Equipment Sustained Support	46–08	Facl – 23
F – 13	NAS Facilities Occupational Safety and Health (OSH) and Environmental Compliance	46–22, 46–23, 46–26	Facl – 24
F – 14	System Support Laboratory Sustained Support	56–17	Facl – 27
F – 15	General Support Laboratory Sustained Support	56–18	Facl – 29
F – 16	FAA Technical Center Building and Plant Support	56–19	Facl – 30
F – 17	Computer Aided Engineering Graphics (CAEG) Enhancement	56–25, 56–70	Facl – 32
F – 18	Aeronautical Center NAS Support Facilities	56–30	Facl – 34
F – 19	Aeronautical Center Leases	56–33	Facl – 37
F – 20	Provide FAA Housing	56–54	Facl – 38
F – 22	Child Care Centers	56–62	Facl – 39
F – 23	Relocate Honolulu Combined Center Radar Approach Control (CERAP)	New	Facl – 40



Facilities in the NAS

F–01 Airport Traffic Control Tower/Terminal Radar Approach Control Facility (ATCT/TRACON) Establishment/Sustainment/Replacement

Purpose: This project provides for the establishment of airport traffic control towers and the sustainment and replacement of towers and terminal air traffic control facilities. This includes the assumption by the FAA of operation and maintenance of sponsor–owned towers where they meet airway planning standards cost effectiveness criteria.

In addition to the establishment and relocation of terminal facilities where appropriate, the FAA is also required to support growth items identified elsewhere in the CIP (e.g., major new airports and assumption of bases being closed by DOD).

This project sustains terminal facilities by replacing obsolete equipment and rehabilitating space for growth and expansion. This includes modernizing existing towers and terminal radar approach control facilities, additional operating positions, training space, operational support space, and replacement of obsolete or unreliable items. (e.g., engine generators, uninterruptible power supplies, batteries, and heating, ventilating, and air conditioning (HVAC) systems).

This project also provides replacement airport traffic control tower/terminal radar approach control (ATCT/TRACON) facilities. The economic life cycle of many existing facilities has been exceeded. Within the next 10 years, nearly 100 towers and 17 terminal radar approach control facilities will need to be replaced to provide an acceptable level of safe air traffic control services to meet current and future operational requirements.

Project Information: This project combines projects 32–13 ATCT/TRACON Establishment, 42–13 ATCT/TRACON Modernization, and project 42–14 ATCT/TRACON Replacement from the 1993 CIP.

Approach: The regions annually recommend which towers and terminal radar approach control facilities should be established, modernized or relocated. FAA headquarters validates and prioritizes the recommendations. The number depends on funding availability. Renovation and refurbishment will be accomplished at the regional level. During the progress of these refurbishments, a facility shutdown may be required to abate asbestos materials. Mobile towers will be used to continue service where possible.

The FAA develops national standards for constructing towers and terminal radar approach control facilities in accordance with their nominal categories, i.e., low, intermediate, and major levels of activity. Construction will be by regional contracts. National architectural engineering support is available for site–adapted designs. Major considerations used in establishing the project scope are the effective management of increasing volumes of traffic, changing airport configurations, enhanced equipment/software developments, additional operating positions, increased staffing levels, and expanded operational support space requirements.

Replacement of airport traffic control towers may be treated as separate projects from replacement of the terminal radar approach control facility. In many cases, tower replacement is needed only because of visual obstructions to the tower controllers, which does not affect the terminal radar approach control facility. In these cases, only the tower will be replaced, and the existing terminal radar approach control facility will remain in its location until its economic life expires. In other cases, it may be desirable to replace both facilities simultaneously, especially when the terminal radar approach control facility can no longer handle the traffic requirements without large scale expansion.

Products:

- Historically, one or two locations per year have qualified for establishment of a new tower or FAA assumption of operation of existing facility. (32–13)
- Approximately 10 or more facilities per year will receive some level of major modification. (42–13)
- Approximately 100 facilities per year will receive some level of minor modernization, (e.g., tower console, wind instruments, clocks). (42–13)
- Eight mobile airport traffic control towers (MATCTs) were acquired for basing within the eight contiguous regions of the United States. These units will be used for spontaneous response to disasters, shutdowns, asbestos removal, and events such as airshows and fly–ins at non–towered airports. (42–13)
- Typically, 10 towers will be replaced annually. Approximately one or two terminal radar approach control facilities per year will be replaced, collocated, or consolidated. (42–14)

1995 Accomplishments:

- Accepted delivery of eight mobile airport traffic control towers (ATCT) which are currently being equipped.
- Completed project 32–13 ATCT/TRACON Establishment.
- Awarded construction contract for eight replacement airport traffic control towers.
- Commissioned seven establishment/replacement airport traffic control facilities.

1996 Planned Accomplishments:

- Award construction contracts for eight replacement airport traffic control facilities.
- Commission eight establishment or replacement airport traffic control facilities.

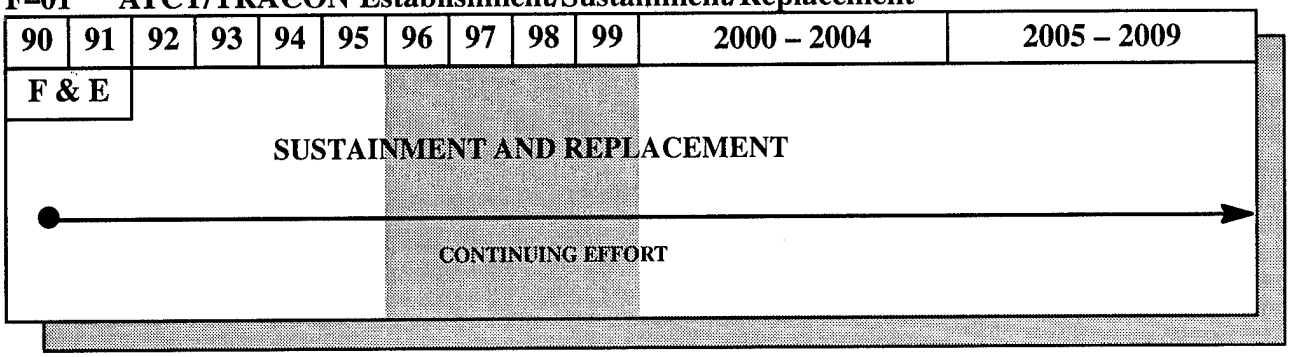
Benefit/Cost Ratio: A March 1992 study indicates a 1.9/1.0 benefit–cost for the ATCT/TRACON modernization project. A November 1994 study indicates 3.2/1.0 for the replacement project.

Related Projects/Activities: None.A–02 Tower Automation Program, A–03 Automated Radar Terminal System (ARTS) Improvements, A–04 Standard Terminal Automation Replacement System (STARS), C–04 Radio Control Equipment (RCE), C–05 Voice Switches, C–10 Emergency Transceiver Replacement, C–11 Data Multiplexing Network (DMN) Continuation, C–20 Aeronautical Data Link, C–23 Voice Recorder Replacement Program (VRRP), F–02 Metroplex Control Facility (MCF), F–04 DOD/FAA Air Traffic Control Facility Transfer/Modernization, F–11 Power Systems Sustained Support, F–13 NAS Facilities Occupational Safety and Health (OSH) and Environmental Compliance, M–08 Continued General Support, M–22 National Airspace System Implementation Support, S–01 Airport Surface Detection Equipment (ASDE) Radar and Airport Movement Area Safety System (AMASS), S–03 Terminal Radar (ASR) Program, and W–07 Integrated Terminal Weather System (ITWS).

List of Contractors:

- Multiple construction and design contracts to be determined by the regions.
- Sverdrup
  (architectural and engineering services)
  Arlington, Virginia
- Volpe National Transportation Center
  (subcontract administration)
  Cambridge, Massachusetts
- NAS Implementation Support Contractor
  Lockheed Martin
  (transition and integration services)
  Washington, District of Columbia

F–01 ATCT/TRACON Establishment/Sustainment/Replacement



F–02 Metroplex Control Facility (MCF)

Purpose: Metropolitan areas have experienced increased air traffic demand that makes the existing terminal airspace structure inefficient. This inefficiency contributes to delays, inefficient routings, complex air traffic control procedures, and airspace saturation. Consolidating two or more smaller facilities into a single facility makes it possible to redesign the airspace and make it more efficient. These nine MCF projects provide a platform for the consolidation to more efficiently use existing airspace thereby increasing capacity and reducing operator costs.

Metroplex Control Facilities will provide an air traffic control architecture that maximizes technological advances in data processing, telecommunications, voice switching, and security to meet increased capacity and safety demands.

Project Information: This project combines 32–21 New Airport Facilities, Denver, Colorado, and Denver Metroplex, 32–22 Dallas/Fort Worth Metroplex, 32–24 Chicago Metroplex, 32–26 Southern California Metroplex, 32–34 Potomac Metroplex, 32–36 Northern California Metroplex, 32–38 Atlanta Metroplex, 32–40 Central Florida Metroplex, 32–42 New York Metroplex, and 32–44 Advanced Facility Planning from the 1993 CIP.

Approach: The approach is to take two or more adjacent terminal radar approach control facilities and physically relocate the controllers and equipment into a single facility. This makes it possible to redesign/streamline the airspace and procedures. Redesigning airspace sectors and eliminating unneccessary procedures translates directly into reduced delays for users. The first five consolidations will be done in a multi–phased approach. Initial phases will consolidate the facilities and existing ARTS III automation systems. Later phases will provide a common automation platform, such as the Standard Terminal Automation Replacement System (STARS), and consolidate the airspace.

Metroplex control facilities will be established only when an operational need is identified and validated, as cost effective and beneficial. These projects will take advantage of existing acquisition programs to procure the necessary equipment. Funding is included for facility design, construction, equipment, equipment installation, airspace redesign, etc.

The level of airspace and facility consolidation under the metroplex control facility architecture will be based on extensive studies and analyses, taking into consideration operational criteria,

system capacity, safety, radio frequency spectrum impacts, security, technical and operational risks, environmental concerns, benefits, cost, and personnel impacts. Metroplex control facilities will be constructed or current buildings will be expanded. These facilities will accommodate the new systems and the consolidation of operations within their area of responsibility.

Southern California Metroplex: Southern California Metroplex has a two–phase approach. Phase I collocated the Los Angeles, Coast, Burbank, Ontario, and San Diego terminal radar approach controls into a common facility at Miramar Naval Air Station. This phase relocated ARTS IIIA equipment sets into a new facility using the existing airspace structure.

Phase II is the MCF phase. During this phase, the airspace will be restructured, an ARTS IIIE using A6.05 software will replace the five ARTS IIIA's, and the Enhanced Terminal Voice Switch will replace three voice switches. The FAA decided to use the new ARTS equipment and terminal voice switch to realize benefits as early as possible and to satisfy pressing operational needs. Ultimately, the Southern California MCF will transition to the STARS automation platform. (32–26)

Denver Metroplex: Consolidates Colorado area terminal radar approach control facilities into Denver metroplex control facility. A recently completed program provided FAA equipment and facilities for the new Denver International Airport. (32–21)

Dallas/Fort Worth Metroplex: The Dallas/Fort Worth Metroplex Air Traffic Systems Plan was developed to meet current and forecasted air traffic activity. The increased volume of traffic, coupled with the operational complexity of the airspace within the Dallas/Fort Worth area, has placed constraints on efficient air traffic control operations. This program significantly enlarges the terminal airspace to increase capacity and reduce delays. (32–22)

Major air traffic procedural changes are planned as part of the Dallas/Fort Worth Metroplex Program. These include incorporating selected sector airspace from the Fort Worth ARTCC and restructuring sectors within the terminal airspace to make operations more efficient, thereby reducing delays and increasing capacity.

The Dallas/Fort Worth Metroplex Program includes: constructing two new airport traffic control towers (for a total of three); expanding the TRACON; relocating four VORTAC's and providing two new VORTAC's; establishing four ASR–9 radar facilities; upgrading to ARTS IIIE; and providing additional terminal and en route air/ground communications. In addition, to support the two new runways planned for the Dallas/Fort Worth International Airport, this program provides the necessary approach and landing aids, which will allow quadruple simultaneous instrument approaches. (32–22)

Chicago Metroplex: This is one of the facilities designated to have a multiphase approach to become a MCF. Phase I consists of acquiring land, installing equipment, and constructing a new facility for the Chicago terminal radar approach control facility away from the Chicago O'Hare Airport. Phase I will upgrade from the ARTS IIIA currently in the existing TRACONs to an ARTS IIIE. The facility is planned to accommodate the future consolidations.

Phase II will incorporate selected sector airspace from the Chicago ARTCC, using the ARTS IIIE equipment. The immediate payoff will be an ability to manage greater numbers of aircraft within the airspace. (32–24)

Concurrent with Phase II, airspace studies will be conducted to determine what further airspace can be consolidated within the Chicago MCF. Incorporating that airspace into the new facility will be Phase III. During Phase III a transition plan will be developed to determine the proper sequence for consolidating additional airspace and transitioning from ARTS IIIE to STARS.

Atlanta Metroplex: The Atlanta terminal area will be consolidated based on increasing demand for air traffic services and future demand

generated by the planned construction of a fifth runway at Atlanta Hartsfield Airport. The Atlanta Metroplex will be accomplished in two phases.

Phase I will acquire land, redesign the airspace, and build the end state facility for the Atlanta MCF. This construction will include all equipment acquisitions required to commission a facility using STARS as the planned automation platform. The Atlanta TRACON will transition to the new facility during this phase and a partial airspace redesign will be implemented.

Phase II is the MCF phase. The Macon and Columbus TRACON's will be consolidated into the new facility and the restructured airspace design will be completed. (32–38)

Potomac Metroplex: The Washington/Baltimore terminal area, has been identified to consolidate the Dulles, National, Baltimore/Washington, and Andrews AFB approach control facilities. This consolidation will streamline the seventh busiest airspace in the world. Airspace redesign studies are being conducted to determine the most efficient airspace design for the four terminal areas and selected low altitude ARTCC airspace. This project will achieve early benefits through phased consolidation of airspace, meeting operational needs and solving facility constraints. The new facility will provide the physical space to allow consolidation using the STARS automation platform and an enhanced terminal voice switch.(32–34).

Northern California Metroplex: The Northern California Metroplex will consolidate the Oakland, Sacramento, Stockton, Monterey, Travis AFB TRACONs, along with selected sectors from Oakland ARTCC. Airspace redesign will take place prior to consolidation allowing a 12 month transition strategy. During the transition the physical facilities will be established using the STARS automation platform then consolidating the staff and cutting over operations. Operations in the Northern California area are expected to increase by more than 25 percent over the next 15 years. By consolidating these facilities and their associated airspaces, the FAA and users will gain greater efficiency and economy of operations than by simply updating the existing TRACON structure. (32–36)

New York Metroplex: The current facility is too small to accommodate the STARS automation platform and advanced communication systems needed to meet anticipated demands. The initial planning study will determine whether to expand the existing facility or relocate to a new structure. Additional studies will look at redesigning airspace and consolidating other northeast corridor TRACONs. This project is in the very early planning stages; therefore, a detailed implementation strategy is not yet available. (32–42)

Central Florida Metroplex: The central Florida terminal area has been identified for consolidation based on current and projected traffic volume and overall terminal airspace boundary constraints. The Jacksonville, Orlando, Daytona, Tampa, and Patrick AFB terminal approach control facilities are being considered for consolidation. This project is in the very early planning stages; therefore, a detailed implementation strategy is not yet available. (32–40)

Advanced Facility Planning: This project will conduct concept studies for metroplex control facilities to identify opportunities and operational needs for consolidation. (32–44)

Products:

- Validated operational requirements.
- Plans, benefit–cost, vulnerability, and risk analyses.
- Site selection, environmental, security studies and reports.
- Conceptual and site specific architectural designs.
- Redesigned airspace.
- Controllers and technicians trained on the new airspace design and equipment.
- New or refurbished buildings.
- Integrated DOD radar approach controls.

1995 Accomplishments:

- Southern California – Completed collocation phase; decommissioned Ontario and San Diego TRACONs; and began MCF phase.
- Dallas/Fort Worth – Commissioned two ASR–9 radars; installed new critical power system, ARTS IIIE, and enhanced voice switch.
- Chicago – Completed ARTS IIIE testing.
- Atlanta – Received management approval to proceed with detailed design; established teams to begin airspace analysis; and completed generic facility design.
- Potomac – Established teams to initiate site selection, facility design, airspace redesign, and equipment architecture.

1996 Planned Accomplishments:

- Dallas/Fort Worth – Commission expanded TRACON, one ASR–9 radar, and five VORTACs; institute new procedures for expanded airspace.
- Chicago – Commission Phase I facility.
- Atlanta –Complete land acquisition, airspace analysis, and site specific facility design; prepare request for proposal for facility construction; and procurement documents for long lead time equipment procurements.
- Potomac – Complete site selection and preliminary airspace redesign concept.
- New York – Complete initial MCF studies.
- Northern California – Complete site selection.

Benefit/Cost Ratio: Studies indicated the following benefit–to cost ratios. Study dates are in parentheses.

- Southern California Metroplex = 36.0/1.0 (September 1995)
- Dallas/Fort Worth Metroplex = 9.8/1.0 (May 1991)
- Chicago Metroplex Phase II = 22/1.0 (July 1995)
- Atlanta Metroplex = 2.1/1.0 (September 1994)
- Potomac Metroplex = 3.8/1.0 (November 1995)
- Northern California Metroplex = 4.6/1.0 (September 1995)
- Central Florida Metroplex = A benefit–cost ratio has not been developed for this project.

Related Projects/Activities: None.A–04 Standard Terminal Automation Replacement Systems (STARS), C–04 Radio Control Equipment (RCE), C–05 Voice Switches, C–06 Communications Facilities Enhancement, C–10 Emergency Transceiver Replacement, C–11 Data Multiplexing Network (DMN) Continuation, C–12 Expansion/Reconfiguration of Low Density Radio Communications Link (LDRCL), C–15 FAA Telecommunications Satellite (FAATSAT), C–23 Voice Recorder Replacement Program (VRRP), F–01 ATCT/TRACON Establishment/ Sustainment/Replacement, F–04 DOD/FAA Air Traffic Control Facility Transfer/Modernization, M–03 Capital Investment Plan (CIP) System Engineering and Technical Assistance, M–10 Distance Learning, M–22 National Airspace System Implementation Support, N–03 Instrument Landing System (ILS), N–08 Runway Visual Range (RVR), S–03 Terminal Radar (ASR) Program, W–03 Terminal Doppler Weather Radar (TDWR) System, and W–07 Integrated Terminal Weather System (ITWS).

List of Contractors: This effort is planned to be accomplished in–house. National or regional architect/engineering contractors will be used for facility design work.

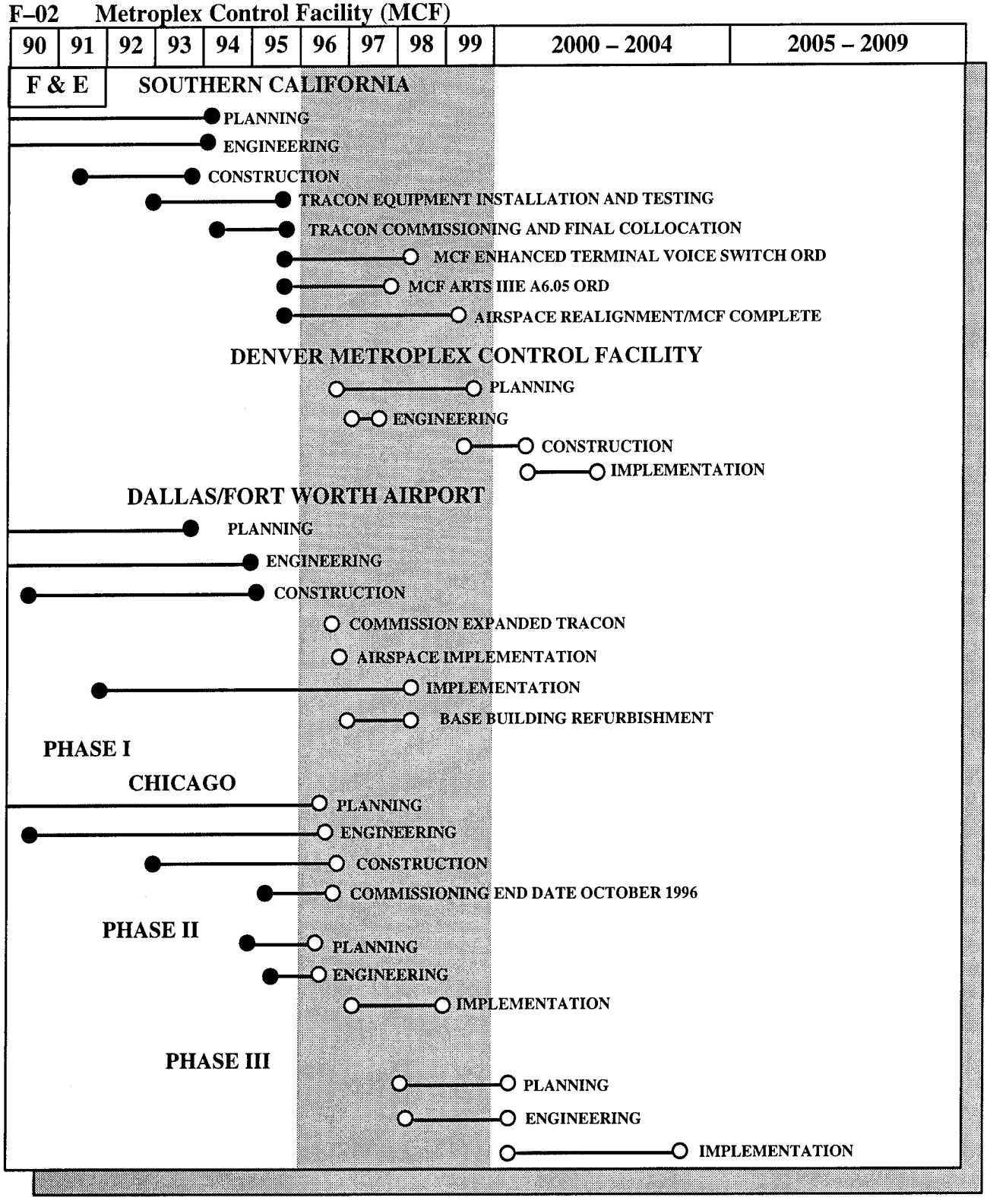
National Contracts:

- Volpe National Transportation Systems Center
  (planning and risk analysis
  Cambridge, Massachusetts

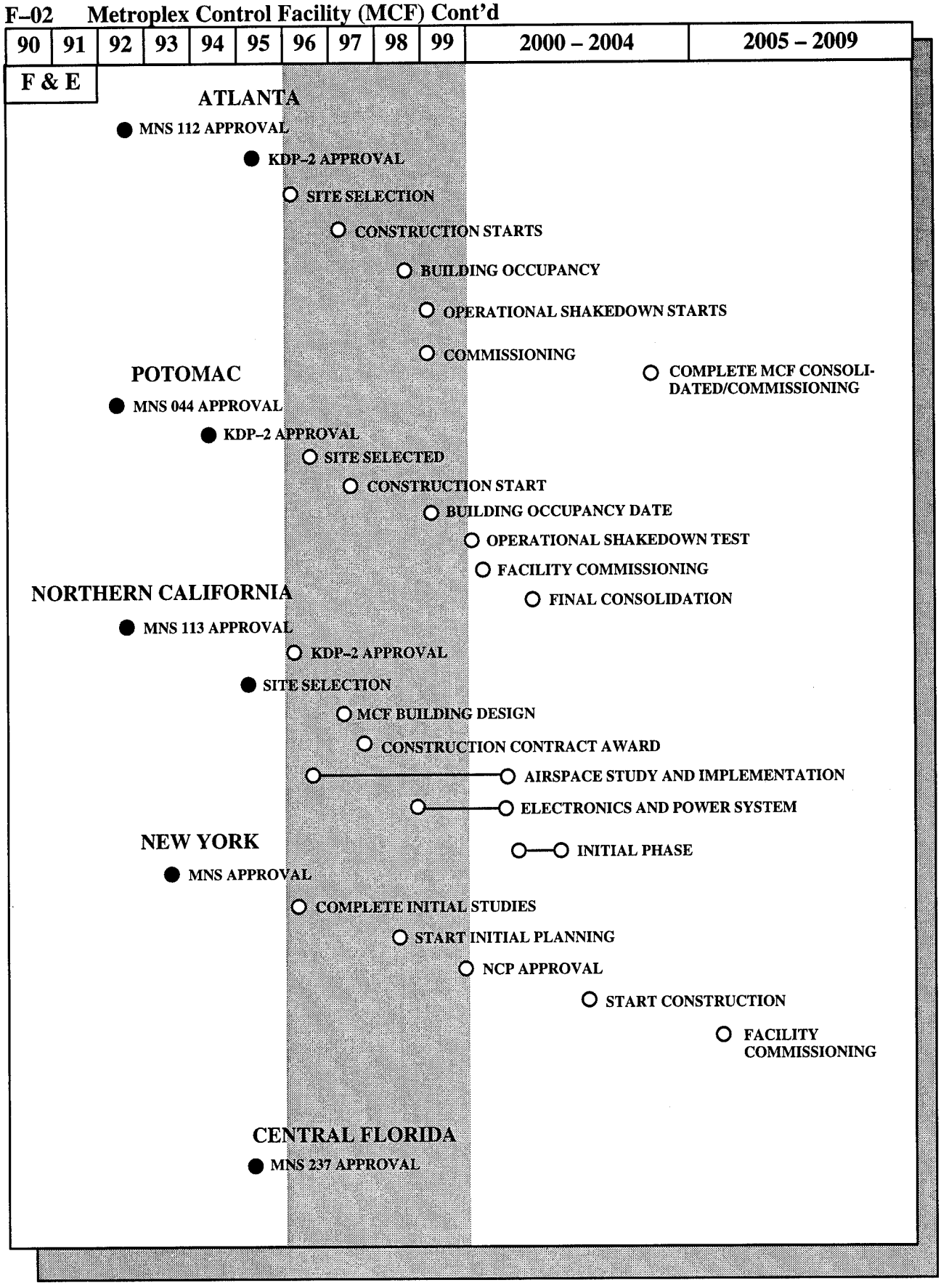
- NAS Implementation Support Contractor
  Lockheed Martin Corporation
  (transition, integration, support and program management)
  Washington, District of Columbia

- Conwal Incorporated
  Washington, District of Columbia

F–02 Metroplex Control Facility (MCF)



F–02 Metroplex Control Facility (MCF) Cont'd



F–03 Austin–Bergstrom International Airport Program

Purpose: The requirement for a new airport to replace the existing Robert Mueller Airport at Austin, Texas, has been in the planning process for many years. In 1990, the Department of Defense announced the planned closure of Bergstrom Air Force Base. Based on a referendum approved on May 1, 1993, the city of Austin committed to establish the new airport at Bergstrom. This project provides the means to accomplish this transition.

Project Information: This is a new project (not in the 1993 CIP); however, it was included in the 1991 CIP as project 32–25 New Austin Airport.

Approach: This program will provide the time–constrained activities necessary to establish the air traffic control infrastructure required for opening the new airport in October 1998. Cargo operations will begin in late 1996. The FAA facilities and equipment required will be planned, engineered, procured, integrated, and installed to support the use of this new airport. The City of Austin has completed the airport master plan. Concurrent with the opening of the new airport, Mueller Airport will be closed and the present structures will be removed. This land will then be converted to other purposes.

Products:

- New airport traffic control tower/TRACON
- Terminal surveillance radar
- Terminal automation system
- Terminal and en route communications
- Navigational aids
- Approach and landing aids for two runways

1995 Accomplishments:

- Began construction of tower/TRACON and approach and landing aids on the existing runway.

1996 Planned Accomplishments:

- Complete construction of approach and landing aids on existing runway.

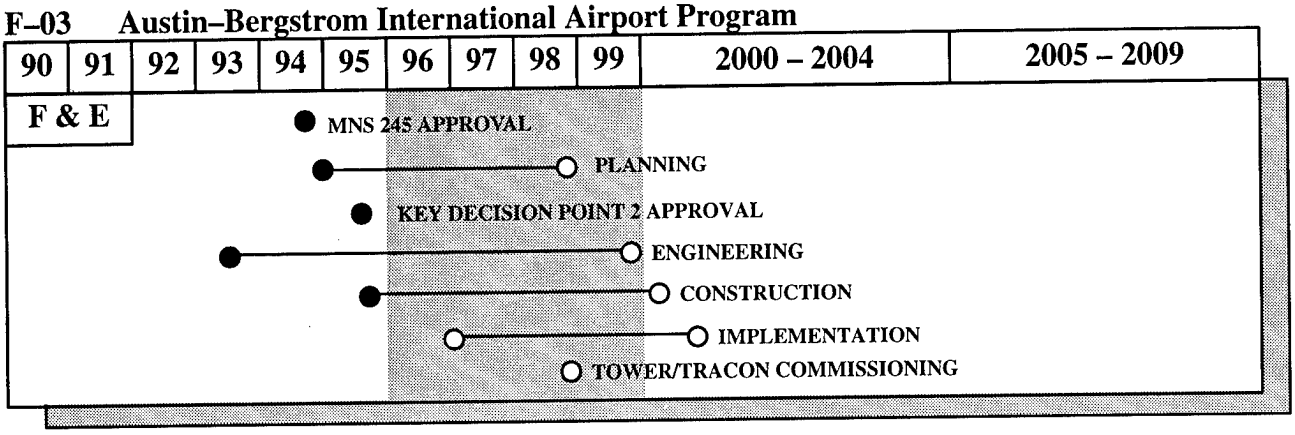
Benefit/Cost Ratio: A September 1995 cost effectiveness study was done in lieu of a benefit–cost analysis.

Related Projects/Activities: None.A–02 Tower Automation Program, A–03 Automated Radar Terminal System Improvements (ARTS), A–04 Standard Terminal Automation Replacement System (STARS), A–13 Digital Bright Radar Indicator Tower Equipment (DBRITE), C–04 Radio Control Equipment (RCE), C–05 Voice Switches, C–06 Communications Facilities Enhancements, C–10 Emergency Transceiver Replacement, C–14 Critical Telecommunications Support, C–23 Voice Recorder Replacement Program (VRRP), F–01 ATCT/TRACON Establishment/Sustainment/Replacement, F–10 Airport Cable Loop Systems Sustained Support, F–11 Power Systems Sustained Support, N–03 Instrument Landing System (ILS), N–04 Visual Navaids, N–05 Low–Power TACAN Antennas, N–06 VORTAC, N–12 Augmentations for the Global Positioning System (GPS), S–02 Mode S, S–03 Terminal Radar (ASR) Program, W–01 Automated Weather Observing System (AWOS), W–06 Digital Altimeter Setting Indicator (DASI) Replacement, W–09 Airport Surveillance Radar (ASR) Weather Systems Processor.

List of Contractors:

- Volpe National Transportation Systems Center
  (planning and risk analysis)
  Cambridge, Massachusetts
- NAS Implementation Support Contractor
  Lockheed Martin Corporation
  (transition, integration, support and program management)
  Washington, District of Columbia

F–03 Austin–Bergstrom International Airport Program



F–04 DOD/FAA Air Traffic Control Facility Transfer/Modernization

Purpose: In 1988 the FAA and Department of Defense signed a memorandum of agreement concerning radar approach controls in the NAS. This document was updated and reaffirmed in 1993. It established national policy for realignment of some FAA and DOD approach control jurisdictions in the far–term. The transfer provides an optimal mix of air traffic control assets for the benefit of the entire system.

This project will also provide necessary facilities and equipment to support known base closure impacts. It will also mitigate impacts from future DOD base closures that contain needed aviation facilities/services.

In accordance with Public Law 101-510, Title XXIX, the Secretary of Defense released a list in 1991 of 70 military establishments to be closed. In 1993, a second list was released consisting of an additional 140 military establishments to be closed. Congress has approved these closures. The Defense Base Closure and Realignment Commission proposed an additional list in 1995.

A number of these military establishments provide air traffic control service for civilian and military air traffic. Closure of some bases will have little or no impact on aviation, yet several will require the FAA to assume air traffic control services for airspace currently controlled by military personnel. This will require the FAA to equip and upgrade the air traffic control services for those facilities that will be converted to civilian use.

Project Information: This project combines project 32–27 DOD/FAA Air Traffic Control Facility Transfer/Modernization and 32–28 DOD Base Closures from the 1993 CIP.

Approach: The FAA will provide approach control service formerly provided by DOD at agreed–upon transfer locations. FAA controllers will provide service to these military airfields from an FAA facility (e.g., a metroplex control facility, adjacent stand–alone facility, or assumption of the military facility). While a complete plan for FAA assumption of the specific DOD facilities is being evaluated, some portions have started. For example, Manchester terminal radar approach control facility absorbed Pease Air Force Base, New Hamphire in 1991 and St. Louis terminal radar approach control facility absorbed Scott Air Force Base, Illinois, terminal radar approach control facility in 1994. Additionally, three others are included in separate metroplex control facility projects. The absorption of the DOD facilities constitutes growth in the FAA's

NAS architecture and will be part of an integrated schedule. Approaches and schedules for the modernization of the Guam CERAP and the Edwards AFB RAPCON are still under discussion.

DOD will provide supply support for these facilities and equipment until they can be replaced by the FAA. This will require engineering resources to plan, design, and implement procurement strategies for a number of equipment types, assemblies, and sub–assemblies that cannot be logistically supported by FAA's training and supply support center.

Summarized below are the capabilities which the FAA plans to provide with this project:

- Computer Software Programs: Develop testing, implementation, and maintenance support strategies for rehosting DOD computer software operations. Also, provide fully tested operational software and associated maintenance diagnostic software in the event of automation hardware replacement.
- Hardware Replacement: Provide hardware systems to replace the existing DOD equipment as part of integrated logistics and standardized equipment programs.
- Implementation Support: Provide engineering and installation support services required to replace, modify, or otherwise upgrade DOD facilities absorbed by the FAA.
- Maintenance Support: Provide an interim operational/maintenance program to support the development of maintenance/certification criteria on existing DOD equipment that will be maintained until replacement with FAA systems. This program will also provide modifications to DOD equipment to meet minimum FAA standards. It will also include provisions for telecommunications, underground cabling, utilities, and real estate acquisitions.

Products:

- Transfer of several DOD approach control facilities and absorption of their services in the FAA NAS. (32–27)
- Facilities and equipment which will support the transition of military airfields to civil airports, or airspace realignments to incorporate airspace previously controlled by the DOD. (32–28)

1995 Accomplishments:

- Assumed responsibility of the Agana, Guam Naval Air Station airport traffic control tower.
- Assumed responsibility for Bermuda Naval Air Station approach control and en route services.
- Assumed responsibility for Castle AFB approach control.
- Assumed responsibility for K.I. Sawyer AFB approach control.
- Assumed responsibility for Adak Naval Air Station and Eareckson Air Force Station non–directional beacons.

1996 Planned Accomplishments:

- Assume responsibility for Williams AFB ASR.

Benefit/Cost Ratio: A February 1992 study indicated a 1.6/1.0 benefit–cost ratio for the DOD/FAA air traffic control facility transfer/modernization project.

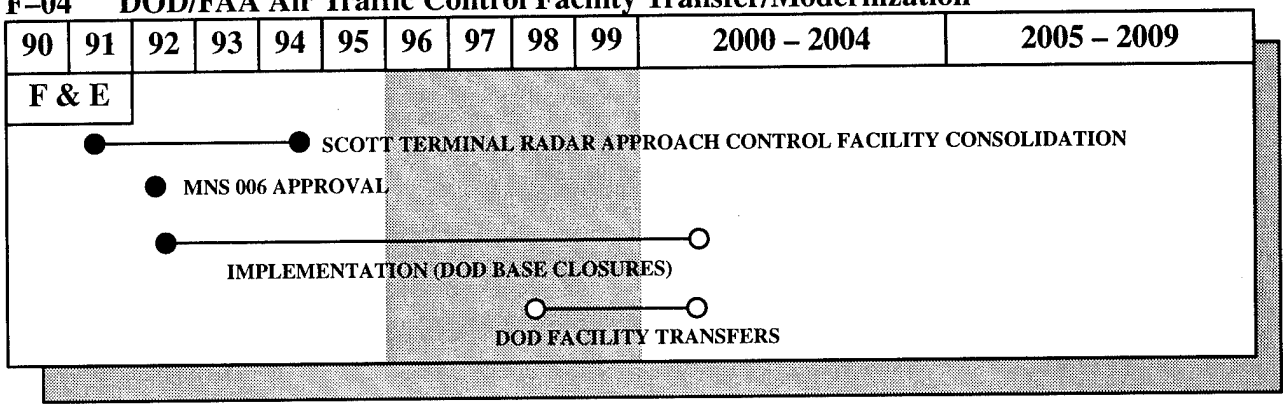
Related Projects/Activities: None.A–03 Automated Radar Terminal System (ARTS) Improvements, A–04 Standard Terminal Automation Replacement System (STARS), C–01 Voice Switching and Control System (VSCS), C–04 Radio Control Equipment (RCE), C–06 Communications Facilities Enhancement, C–11 Data

Multiplexing Network (DMN) Continuation, C–18 NAS Recovery Communication (RCOM), F–01 ATCT/TRACON Establishment/Sustainment/Replacement, F–02 Metroplex Control Facility (MCF), M–07 NAS Infrastructure Management System (NIMS), S–02 Mode S, S–03 Terminal Radar (ASR) Program, and W–04 Weather and Radar Processor (WARP).

List of Contractors:

- Contractors will be those associated with the list of related projects/activities.
- Planning assistance is being provided by MITRE and Lockheed Martin Corporations McLean, Virginia

F–04 DOD/FAA Air Traffic Control Facility Transfer/Modernization



F–05 Flight Service Facilities

Purpose: This project provides additional automated flight service station operational support space and addresses deficiencies in power, heating, ventilating, and air conditioning (HVAC) systems.

Project Information: This project combines projects 33–20 Automated Flight Service Station Support Space and 43–03 Provide Flight Service Automation System (FSAS) Power Conditioning Systems from the 1993 CIP.

Approach: The automated flight service station space study, "Operational Support Space Requirements Validation Team (OSSRVT) Report", completed in 1991, documented space, power, and environmental deficiencies at 10 facilities. It remains necessary to validate requirements at the remaining facilities, in order to develop recommended solutions, and implement necessary corrective actions.

Provide additional operational space, heating, ventilating, air conditioning, environmental, and power systems at 59 automated flight service stations. Requirements at each station are unique and will require individual assessment and corrective action. These actions could include relocating some equipment/functions out of the service stations, modifying the facility mission to reduce space requirements, reallocating space within the facility for more compact utilization, or providing additional space, either by construction or lease. Heating, ventilating, air conditioning, environmental, and power concerns would be addressed at every facility regardless of space requirements.

This project will also provide power conditioning and battery backup systems in the service stations which are subject to frequent power fluctuations due to weather or commercial power outages.

Products:

- Space (33–20)
- HVAC (43–03)
- Lighting (43–03)

1995 Accomplishments:

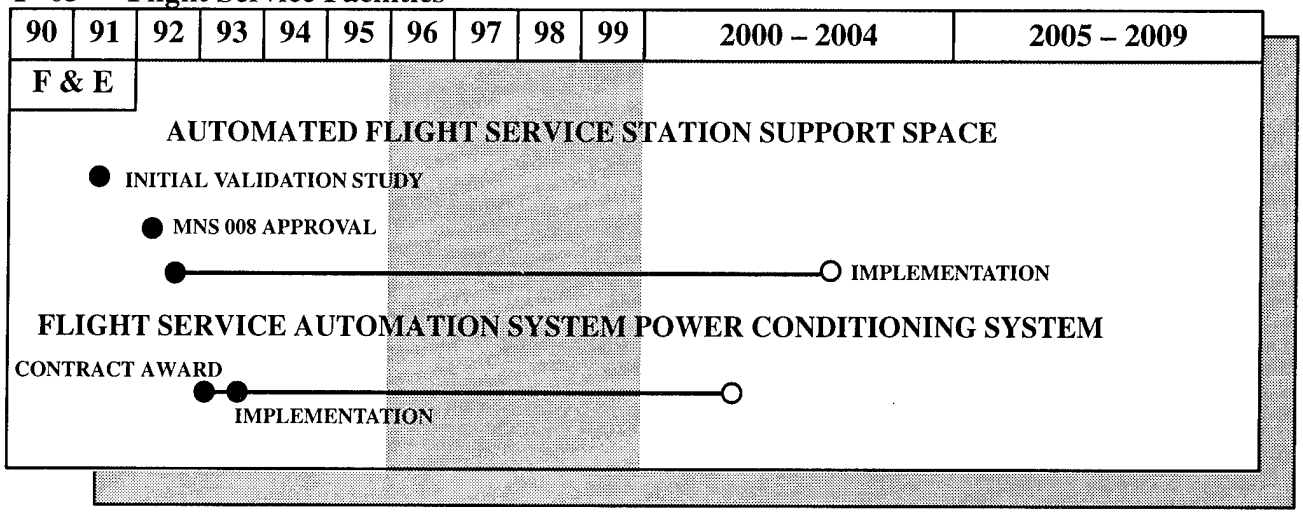
- Commissioned last two automated flight service station AFSS sites (Honolulu and San Juan).
- Continued support of the reconstruction of the St. Louis AFSS. Miami expansion in progress (30 percent complete).
- Conducted contractor review of the Miami AFSS replacement lighting system design submittal. Installation of the lighting will take priority over the facility expansion.
- Implemented expansion/modernization projects at Cedar City, Leesburg, St. Petersburg, Fort Worth, Conroe, Seattle, and Fairbanks AFSSs.
- Completed interagency agreement with the Air Force to acquire power conditioning and emergency backup systems.

1996 Planned Accomplishments: None.

Benefit/Cost Ratio: An October 1991 study indicated a 14.2/1.0 benefit–cost ratio for the AFSS support space project and a 1.5/1.0 ratio for the FSAS power conditioning system.

Related Projects/Activities: None.A–07 Flight Service Automation System (FSAS), C–05 Voice Switches, C–15 FAA Telecommunications Satellite (FAATSAT).

F–05 Flight Service Facilities



F–06 Air Route Traffic Control Centers (ARTCC) Plant Modernization/ Expansion

Purpose: The original structures for the Air Route Traffic Control Centers were completed in 1962. These buildings were built to the specifications and requirements of the time. To continue meeting air traffic control requirements additions and modifications were constructed in

1970 and 1985. Certain portions of the center buildings have been operating in their present configuration since the early 1960's. Within the next five years (1995 – 2000) much of the existing plant and structures will have exceeded its life cycle requiring additional replacement, refurbishment or upgrades. In addition new requirements have been identified due to changing energy, safety, environmental, security, and new equipment needs which will require building additions or upgrades.

This project ensures that adequate facilities are provided for air traffic control centers and that they comply with Federal and local environmental laws and regulations.

Project Information: This project combines projects 26–09 ARTCC Plant Modernization, 36–20 ARTCC/ACF Support Space, 46–09 Sustain ARTCC/ACF Facilities, and 56–60 ISMS from the 1993 CIP.

Approach: This program will sustain the existing facility infrastructure as well as expand to meet emerging system and operational requirements. The facility infrastructure having outlived its expected life is being replaced in an incremental basis. Items to be replaced include chillers, engine generators and associated radiators, power conditioning systems, battery backup, exterior siding, roofing water/sewer lines, and kitchen equipment. Parking lot expansions, loading dock enclosures, and implementing security management systems are required to support the personnel and operations at each ARTCC. Removal of asbestos–containing materials and installation of fire protection equipment will allow the Agency to comply with Federal, State and Local laws, regulations and building codes. Building re–engineering provides additional space for operational and system requirements. These improvements will allow the facilities to accommodate and support the new NAS equipment, provide a safe and healthy work environment, and provide adequate physical security.

Modernization designs and site adaptation will be provided by a national architectural and engineering contractor. Site–unique designs and construction will be by regional contracts. Construction contracts are regionally awarded and managed.

Preliminary studies have shown that some facilities are falling below Agency standards for personnel space allocations. A complete reevaluation of facility space requirements is currently in progress to determine specific shortfalls.

Products:

- The 21 centers will be upgraded as appropriate to provide an additional 20 to 30 years of service. (26–09)
- One offshore center (Honolulu) will continue in service as a combined center radar approach control (CERAP) facility and receive required maintenance and upgrades until the CERAP is relocated out of the Diamond Head Crater (refer to project F–23). (26–09)
- The New York terminal radar approach control facility will receive appropriate upgrades until conversion to a metroplex control facility. (26–09)
- 18 updated standard control center environments providing space for personnel and support activities. (36–20)
- 4 updated unique environments. (36–20)
- Upgraded facilities for continued support of operations. (46–09)

1995 Accomplishments:

- Awarded power system building expansion contract for one site.
- Awarded power system installation delivery orders for eight sites.
- Completed power system installations for five sites.
- Awarded automation wing second floor and attic renovation contracts for two sites.
- Awarded cooling tower/chiller replacement contract for one site.

- Awarded technical and operations wing expansion for one site.

1996 Planned Accomplishments:

- Award chiller and cooling tower replacement contracts for four sites.
- Award automation wing first floor renovation contracts for five sites.
- Award automation wing second floor and attic renovation contracts for five sites.
- Award fire protection water supply upgrade contracts for five sites.

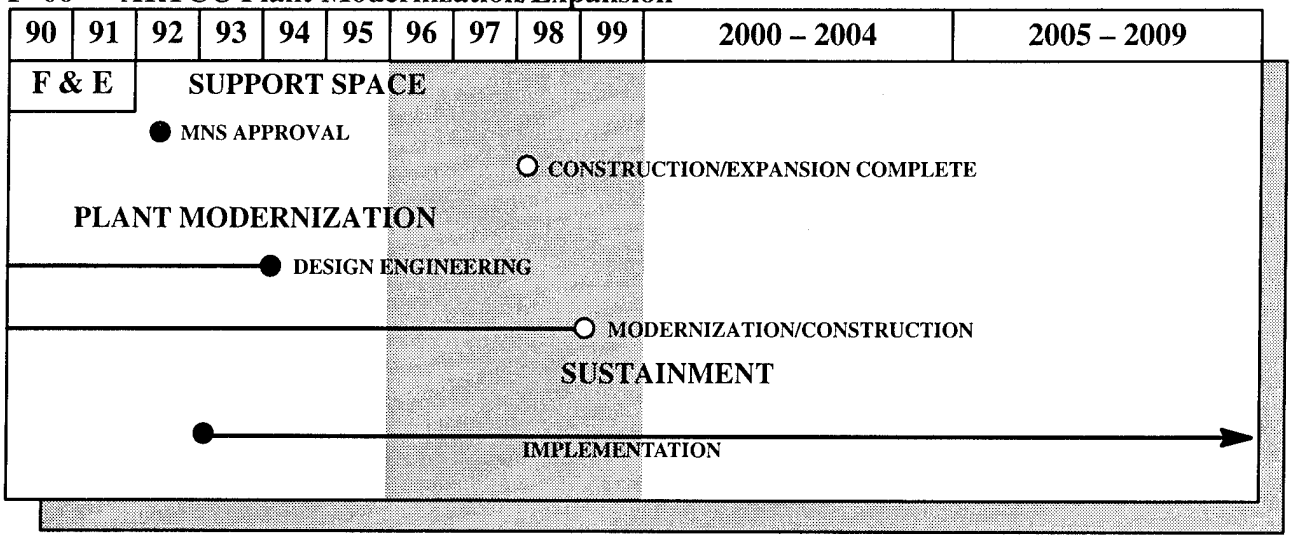
Benefit/Cost Ratio: A benefit–cost ratio has not been developed for this project.

Related Projects/Activities: None.A–01 En Route Automation Program, A–05 Traffic Management System (TMS), A–10 Oceanic Automation Program (OAP), C–11 Data Multiplexing Network (DMN) Continuation, C–12 Expansion/ Reconfiguration of Low Density Radio Communications Link (LDRCL), C–15 FAA Telecommunications Satellite (FAATSAT), C–17 Establish Alaskan NAS Interfacility Communications System (ANICS) Satellite Network, and F–18 Aeronautical Center NAS Support Facilities, F–19 Aeronautical Center Leases, F–23 Relocate Honolulu Combined Center Radar Approach Control (CERAP), M–10 Distance Learning, M–22 National Airspace System Implementation Support, W–07 Integrated Terminal Weather System (ITWS).

List of Contractors:

- NAS Implementation Support Contract
  Lockheed Martin Corporation
  Washington, District of Columbia
- Sverdrup Corporation
  (architectural and engineering support)
  Arlington, Virginia
- Conwal Incorporated
  (technical assistance)
  Washington, District of Columbia
- Various regional contractors

F–06 ARTCC Plant Modernization/Expansion



F–08 Sustain San Juan Facilities

Purpose: This project replaces or upgrades various systems to sustain the combined center radar approach control (CERAP) operation until refurbishment is completed under project F–01. Also, the international flight service station (IFSS) will be upgraded to an automated international flight service station (AIFSS).

Project Information: This project consists of project 42–22 Sustain San Juan Facilities from the 1993 CIP.

Approach: Replace/upgrade the San Juan CERAP systems and convert/upgrade the San Juan IFSS to an AIFSS, as provided in the Southern Region's San Juan CERAP/IFSS facility transition plan. Examples of upgrades are listed below.

Products: (42–22)

- Modernize and sustain the San Juan center.
  - Replace Western Electric Company 301A communications system with an integrated communications switching system.
  - Replace the radar microwave link system from the San Juan center to Pico with a low density radar microwave link system.
  - Realign 18 existing operating positions and equipment and remove unnecessary consoles.
  - Establish a workstation for an Airway Facilities system engineer.
- Replace/upgrade environmental systems and facilities.
  - Replace engine generators.
  - Replace/upgrade the chiller and cooling tower system.
  - Upgrade electrical service; provide redundancy to power conditioning system.
- Replace/upgrade the international flight service station (IFSS) to an automated international flight service station (AIFSS).
  - Provide a model 1 full capacity automation system and operational consoles (including operational equipment).
  - Provide a Type III integrated communications switching system telecommunication system.
  - Provide weather graphics system.
  - Improve the reliability of telecommunications between San Juan, the mainland, and other Caribbean countries.

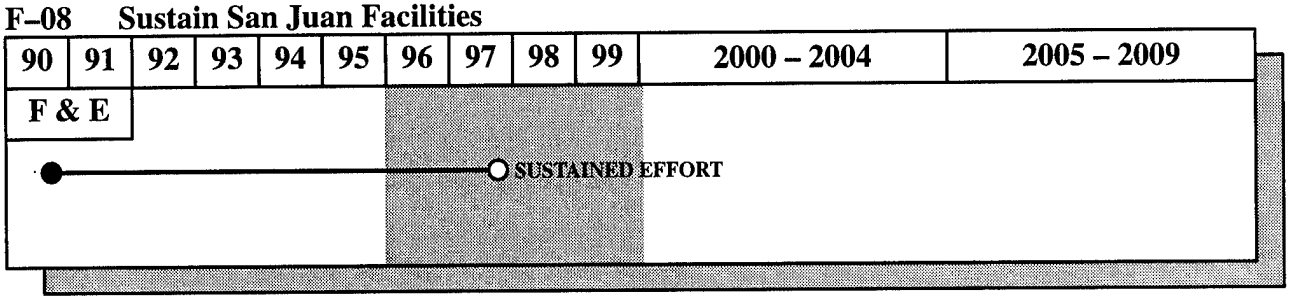
1995 Accomplishments: None.

1996 Planned Accomplishments: None.

Benefit/Cost Ratio: A July 1991 study indicated a 2.7/1.0 benefit–cost ratio.

Related Projects/Activities: None.

F–08 Sustain San Juan Facilities



F–09 Replacement of Controller Chairs

Purpose: This project replaces controller chairs in air traffic control facilities, i.e., air route traffic control centers (ARTCCs), airport traffic control towers (ATCTs), and flight service stations (FSSs).

Project Information: This project consists of project 42–24 Replacement of Controller Chairs from the 1993 CIP.

Approach: Completely replace the chairs used by air traffic controllers in all Air Traffic facilities. A five–year contract for maintenance and parts will provide ongoing controller chair maintenance.

Products: This project includes the replacement of controller chairs at all centers, towers, and flight service stations. Chairs are selected from the General Services Administration (GSA) catalog.

1995 Accomplishments:

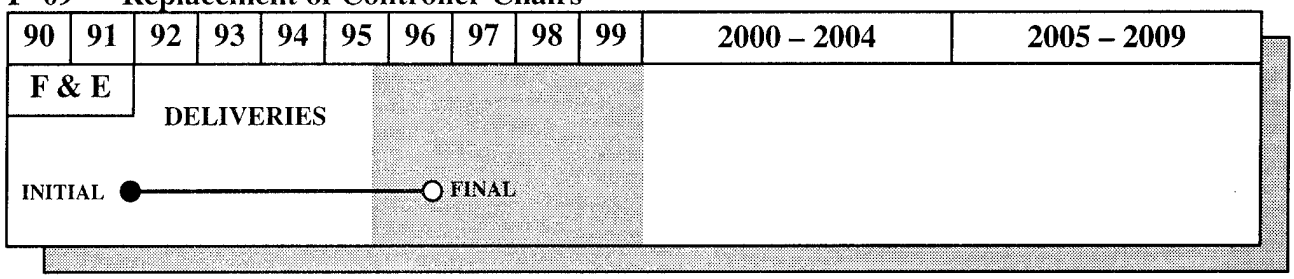
- Purchased additional chairs and extended maintenance contract.

1996 Planned Accomplishments:

- Complete deliveries of replacement chairs.

Benefit/Cost Ratio: Due to the nature of this project, a strict benefit/cost comparison (using net present value and benefit/cost ratio) is not appropriate.

F–09 Replacement of Controller Chairs



F–10 Airport Cable Loop Systems Sustained Support

Purpose: Many existing airport cable configurations do not allow for redundant communication paths between airport facilities and towers. Order 6950.23A directs airway facilities to reconfigure cable configurations whenever possible into cable loop systems. This project provides for the implementation of airport cable loop systems and updates existing cable systems when required.

Newly planned construction efforts for power and signal distribution continue at all types of airports beyond the year 2000. Cable loop systems employ counter rotating rings (multiple pathways) that are reliable and allow increased capacity of signal transmission. This project supports cable loop analysis and engineering, and it supplements other establishment programs to allow installation of fiber optic cable where cost effective. Benefits of fiber optic cable are significant when installed with power cable since it may be placed in the same trench without any adverse

effects. Fiber optic cable also offers immunity to lightning strikes.

Project Information: This project consists of project 46–05 Airport Cable Loop Systems Sustained Support from the 1993 CIP.

Approach: This ongoing project will provide for both installation of replacement cable and expansion or update of existing airport cable loop projects. The regions will continue to define requirements for new, expanded, and updated facilities. Signal and power cable will be reconfigured from radial to loop systems where feasible and as funding allows. Spare cable, repair tools, cable repair kits, and training for fiber optics systems will be provided to meet the needs of the NAS.

Products:

- Reliable and flexible power and/or signal distribution systems.

1995 Accomplishments:

- Incorporated fiber optic cable loop system in new Denver airport.
- Installed a new fiber optic system at Los Angeles.
- Began planning and implementation stages for fiber optic cable loop system at St Louis.
- Obtained supply support funding for ongoing support functions in the Aeronautical Center and the Academy.

1996 Planned Accomplishments:

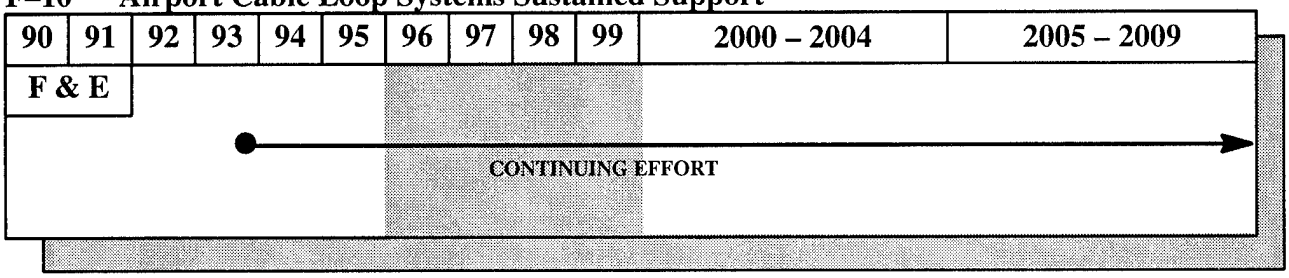
- Establish cable loop training module at the FAA Academy.
- Establish supply support for cable loop system components (e.g., programmable logic controllers and channel bank equipment).

Benefit/Cost Ratio: A strict benefit/cost comparison (using net present value and benefit/cost ratio) has not been done.

Related Projects/Activities: None.The airport cable loop project is related to all other airport projects such as M–07 NAS Infrastructure Management System (NIMS) and N–03 Instrument Landing System (ILS), all of which require buried cable for power, signal, control, and communications between sites.

List of Contractors: Determined regionally.

F–10 Airport Cable Loop Systems Sustained Support



F–11 Power Systems Sustained Support

Purpose: This project provides main and standby electrical power and grounding for FAA facilities. This assures high facility reliability and availability, while reducing electrical interference, operating cost, and energy consumption at NAS facilities.

To achieve these objectives, it is necessary to improve, refurbish, upgrade, overhaul, and replace aging equipment on a continuing basis. Existing engine generators and power conditioning systems have become difficult to support and may become overloaded because of increased electrical requirements or facility consolidations, replacements, or modification. Some existing engine generators, as well as power and line conditioning systems remaining in the NAS are not suitable for the newer generations of electronic equipment using switching power supplies. This equipment must be updated or replaced with power systems that are compatible with modern electronics. Once updated or replaced new equipment requires sustained support be established at the FAA Logistics Center.

Existing battery systems must be updated because of age and changing requirements. Direct Current systems will be deployed at facilities where engine generators can be removed.

The grounding and lightning protection systems in some facilities are not adequate for modern electronics, have deteriorated with age, or have damaged components. These systems must be surveyed, repaired and modified or upgraded to assure proper operation of new NAS equipment.

Some facilities have old electrical wiring distribution systems which must be replaced to meet the requirements of the National Electrical Code.

Project Information: This project consists of project 46–07 Power Systems Sustained Support from the 1993 CIP.

Approach: This project will provide reliable power sources and power and line conditioning devices on a continuing basis. Engine generators will be supplied under a national contract to be awarded first quarter of FY 1996. Facility lightning protection, grounding, and electrical distribution projects will be accomplished regionally.

Products:

- Engine generator replacement contract.
- Facility lightning protection, grounding, bonding, and shielding.
- Facility electrical improvements.
- Battery distribution systems.

1995 Accomplishments:

- Awarded engine generator contract.
- Completed interagency agreement with the Navy to supply uninterruptable power systems (UPS).
- Revised the power system implementation order.

1996 Planned Accomplishments:

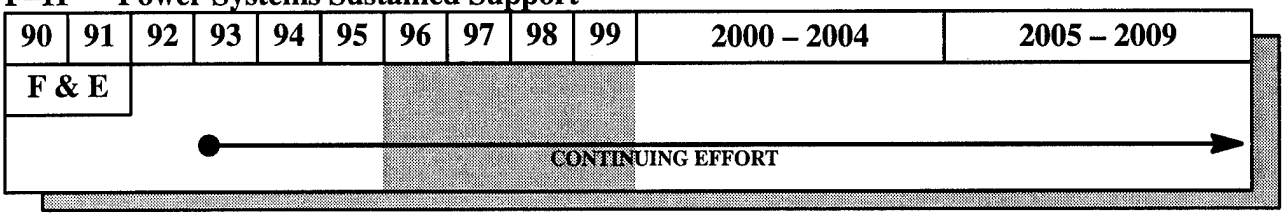
- Continue regional activity.
- Continue engine generator replacements.
- Revise approximately 20 outdated FAA orders related to power systems.

Benefit/Cost Ratio: A strict benefit–cost comparison (using net present value and benefit/cost ratio) has not been done.

Related Projects/Activities: None.This project is related to those projects affecting Airway Facilities buildings, such as F–05 Flight Service Facilities, F–12 Modernize and Improve FAA Buildings and Equipment Sustained Support and F–13 NAS Facilities Occupational Safety and Health (OSH) and Environmental Compliance. Also related are those projects affecting Agency electronic and communication conditioning devices, lighting and grounding systems, and facility availability and personnel safety throughout the NAS.

List of Contractors: Determined regionally.

F–11 Power Systems Sustained Support



F–12 Modernize and Improve FAA Buildings and Equipment Sustained Support

Purpose: This project provides support to sustain and upgrade existing buildings and plant equipment which house and support NAS navigation, communications, surveillance, and navigational aids. This project provides funds for building upgrades and modifications necessary to bring facilities into compliance with published standards (e.g., replace roofs, refurbishment of facility interiors/exteriors, etc).

Project Information: This project consists of project 46–08 Modernize and Improve FAA Buildings and Equipment Sustained Support from the 1993 CIP.

Approach: Continue the comprehensive modernization and improvement of buildings and plant equipment which house and support NAS facilities. Timely modifications and repairs will be made to keep the buildings in usable condition. Modifications will also be made to maintain building integrity, enhance energy conservation through the installation of insulation, and meet new equipment environmental support requirements and structural seismic compliance.

Buildings and structures which cannot be economically upgraded or modified will be replaced with modular structures based on standard national designs. Seismic studies are also conducted under this project at facilities in high risk areas.

Most funding under this program is distributed directly to and controlled by the regions.

Products:

- Define requirements for sustaining building and plant support.
- Multi–year building and plant improvement/ modernization program involving approximately 2,400 separate improvements at 1,000 facilities each year.

1995 Accomplishments:

- Updated sustaining requirements document.

1996 Planned Accomplishments:

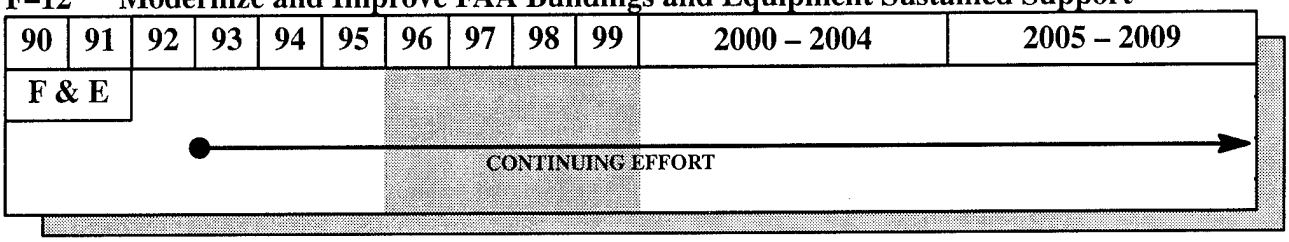
- Publish sustaining project guidance.

Benefit/Cost Ratio: A strict benefit/cost comparison (using net present value and benefit/cost ratio) has not been done.

Related Projects/Activities: None. F–11 Power Systems Sustained Support and all facility establishment projects scheduled for deployment at existing structures.

List of Contractors: Determined regionally.

F–12 Modernize and Improve FAA Buildings and Equipment Sustained Support



F–13 NAS Facilities Occupational Safety and Health (OSH) and Environmental Compliance

Purpose: This national program has been established to ensure that all FAA facilities comply with existing and future federal, state, and local regulations and statutes regarding environmental protection, occupational safety and health, and energy conservation. These mandates emanate from various Executive Orders, the Environmental Protection Agency, the Occupational Safety and Health Administration (OSHA), FAA labor agreements, and state and local authorities.

Project Information: This project combines projects 46–22 Fuel Storage Tanks, 46–23 Environmental Cleanup, and 46–26 NAS Facilities OSHA and Environmental Standards Compliance from the 1993 CIP.

Approach: This program addresses existing and future environmental, employee safety, and energy conservation concerns by establishing comprehensive Agency–wide projects that fully incorporate mandated requirements into FAA operations.

Environmental, Occupational Safety & Health, and Energy Conservation Compliance:

Executive Order 12088, Federal Compliance and Pollution Standards; the Federal Facility Compliance Act; the Occupational Safety Act; and 33 other Public Laws require Federal agencies to comply with all Federal, State, and local environmental regulations. These mandates compel the FAA to develop and implement a comprehensive, Agency–wide environmental compliance/occupational safety and health program. Adequate protection of FAA employees and the public from environmental and safety hazards is essential because failure to do so could expose people to hazardous conditions. Environmental compliance funding provides pollution prevention; waste minimization; environmental management/training; and developing new permits and required response planning.

Heightened environmental concerns and the threat of energy shortages has increased the attention on natural resource management. A strengthened national energy and water conservation policy has been enacted by the President and Congress via the 1992 Energy Policy Act and Executive Order 12902, "Energy Efficiency and Water Conservation in Federal Facilities." There are significant requirements from 12902 that directs all agencies to make profitable investments in energy efficiency projects to save federal dollars and benefit the environment. The most significant requirements include: perform a prioritization survey of all FAA facilities/buildings to identify the highest priority energy savings projects based on cost effectiveness and pay back periods; implement a 10–year comprehensive facility audit program; implement audit recommendations within 6 months of audit completion; and designate at least one building to be a

showcase highlighting advanced technologies and practices for energy efficiency, water conservation, or using renewable energy sources.

Environmental Cleanup

This project has been established to ensure that all FAA facilities meet existing and future Federal, State, and local environmental regulations for cleanup of hazardous substances resulting from past FAA practices. Environmental cleanup activities can result from several regulatory activities such as the Comprehensive Environmental Response, Compensation, and Liability Act; corrective actions under the Resource Conservation and Recovery Act; site characterization investigations in preparation for interim clean–up or corrective actions; and emergency response actions associated with any release or threatened release of a hazardous substance exceeding a reportable quantity. The project comprises discovery of hazardous waste contamination, sampling and analysis to determine the type and extent of contamination, developing remediation options, removing of hazardous waste, and long and short–term facility monitoring.

Site restoration is the identifying, investigating, and cleaning up or controlling contamination from past hazardous waste disposal operations and hazardous material spills. Restoration activities include sites within FAA owned and operated facilities, sites contaminated by the migration of hazardous waste from FAA facilities, and non-government owned sites which have been contaminated by FAA generated hazardous waste. This process involves coordinating with regulatory agencies and the public. The Environmental Protection Agency, appropriate state and local officials, and the general public are given the opportunity to review and comment on proposed actions which can affect the final solution and associated costs.

Fuel Storage Tanks

This project provides compliance with the Hazardous and Waste Amendments of 1984 to the Clean Water and Solid Waste Disposal Act. This act requires owners (including the Federal Government) of underground petroleum fuel storage tanks to: notify local governments that they have tanks; clean sites that are leaking and replace the tanks; and install leak detection equipment to prevent further environmental pollution.

Approximately 1,100 tanks remain to be removed or replaced by the mandated December 1998 deadline. Approximately 15 to 25 percent of the sites in the lower 49 states are considered "leakers", while the average rate for leaking tanks in Alaska is running 3 and 4 times higher. The average removal/replacement cost for a leaking storage tank rises precipitously depending on the size, duration of the spill, and whether or not the contamination has reached groundwater. Double–walled fiberglass tanks with internal leak detectors will be installed at sites where underground storage tanks are still needed. Leak detectors are required to preclude the possibility of future leaks causing either soil and/or water contamination.

If these sites do not qualify for conversion to battery standby power, they will be replaced with conforming aboveground and underground tanks or propane conversions. Leak detection equipment will not be installed at sites that are candidates for battery standby power or alternative energy sources unless it is required by Federal, State, or local law.

Products:

Environmental, Occupational Safety & Health, and Energy Conservation Compliance

- Agency–wide facility environmental and employee safety compliance assessments.
- Agency–wide facility energy efficiency and water conservation surveys and audits.
- Implement mandatory programs such as:
  - Hazard Communication
  - Respiratory Protection
  - Personal Protective Equipment
  - Fall Protection and Working Surfaces

- Electrical Safety
- Asbestos Exposure Control
- Confined Space Entry
- Pollution Prevention
- PCB Management

- Education/training of employees.

Environmental Cleanup:

- Environmental Compliance Assessment Program, Remedial Actions, and Emergency Response Actions.

Fuel Storage Tanks:

- Locate, remove, or replace leaking fuel tanks.

1995 Accomplishments:

Environmental, Occupational Safety & Health, and Energy Conservation Compliance:

- Implemented agency–wide inspections for environmental and occupational safety & health hazards.
- Realigned agency's Occupational Safety & Health program.
- Implemented Occupational Safety & Health and Environmental Lifecycle Management effort.
- Published AF Asbestos Order.
- Completed energy analysis/survey of selected AF facilities in Southwest Region.
- Completed Energy Management Reporting System evaluation study.
- Completed fire safety upgrades for 297 Airport traffic control towers.

Environmental Cleanup:

- Completed Phase I of Environmental Compliance Assessment Program.
- Completed Memphis emergency response.
- Completed Tamiami, Jacksonville, Nashville, and Leesburg spill cleanup.
- Completed Huntsville and Bimini spill response.
- Completed Montgomery and Bucks Harbor hazardous waste Cleanup Activities.
- Completed site cleanup activities at Technical Center.

Fuel Storage Tanks:

- Continued to test, remove, or replace storage tanks and cleanup contaminated sites.

1996 Planned Accomplishments:

Environmental, Occupational Safety & Health, and Energy Conservation Compliance:

- Develop prioritized energy efficiency and water conservation action plan.
- Upgrade Energy Management Reporting System.
- Complete Phase I and begin Phase II of the Occupational Safety & Health Compliance Assessment Program.

Environmental Cleanup:

- Complete Phase II Environmental Compliance Assessment Program.

Fuel Storage Tanks:

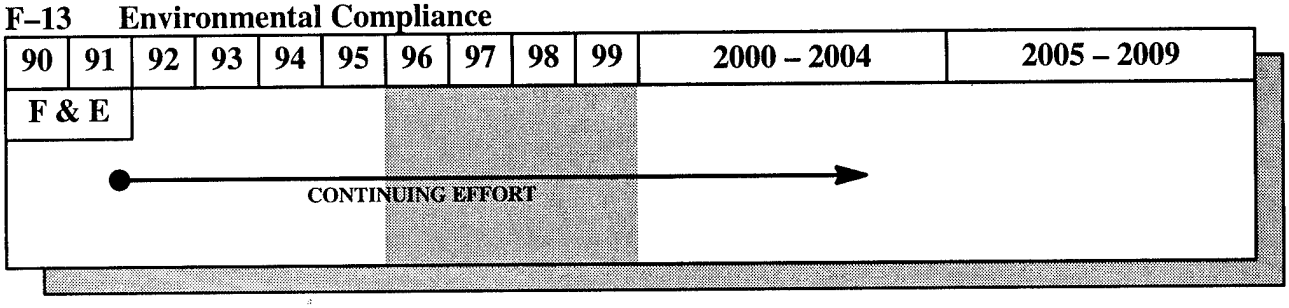
- Continue to test, remove, and replace storage tanks and cleanup contaminated sites.

Benefit/Cost Ratio: A March 1994 study indicated a 1.9/1.0 benefit–cost ratio for the NAS facilities OSHA and Environmental Standards Compliance project.

Related Projects/Activities: None. F–11Power Systems Sustained Support.

List of Contractors: United States Army Corps of Engineers, TSSC, TSC–Volpe, RMCI, NISC, NAVCOM, and multiple contracts to be determined by the regions and centers.

F–13 Environmental Compliance



F–14 System Support Laboratory Sustained Support

Purpose: The system support laboratory provides facilities and equipment at the FAA Technical Center for testing, evaluating, and integrating new systems. To support the FAA test and evaluation policy, the system support laboratory will duplicate future systems, equipment, and interfaces necessary to establish realistic environments for all types of developmental, operational, and production acceptance testing. The testing will ensure that total system requirements are met prior to installation at field facilities. Upon completion of testing, systems will be integrated into the laboratory for direct field support, development and testing of hardware, software, and firmware modifications, and development of system enhancements.

Project Information: This project consists of project 56–17 System Support Laboratory Sustained Support from the 1993 CIP.

Approach: Maintain and provide necessary upgrades for the system support laboratory which is partitioned into six complexes:

- En route systems.
- Terminal systems.
- Flight service and weather systems.
- Ground–to–air systems.
- Interfacility communications systems.
- Maintenance and operations support systems.

A Technical Center transition plan is updated periodically for consistency with the master program baseline schedule. The plan identifies space requirements, installation plans, and evolutionary changes that ensure the integrity of the configurations in the system support laboratory. System interdependency and the switching capabilities of system configurations are also defined in the transition plan. The cost for operating and maintaining the laboratory are prorated across the R,E&D, Operations, and F&E appropriations.

Products: System support laboratory improvements such as:

- Test environment for display system replacement (DSR) project.
- Test environment for standard terminal automation replacement system (STARS).
- Test environment for operational and supportability implementation system (OASIS).
- Test environment for oceanic system development and support.

1995 Accomplishments:

- Supported test environment for voice switching and control system (VSCS).

- Planned and began installation of the test environment for DSR project.
- Planned the test environment for STARS and OASIS.
- Planned and began modification of the test environment for oceanic system development and support.

1996 Planned Accomplishments:

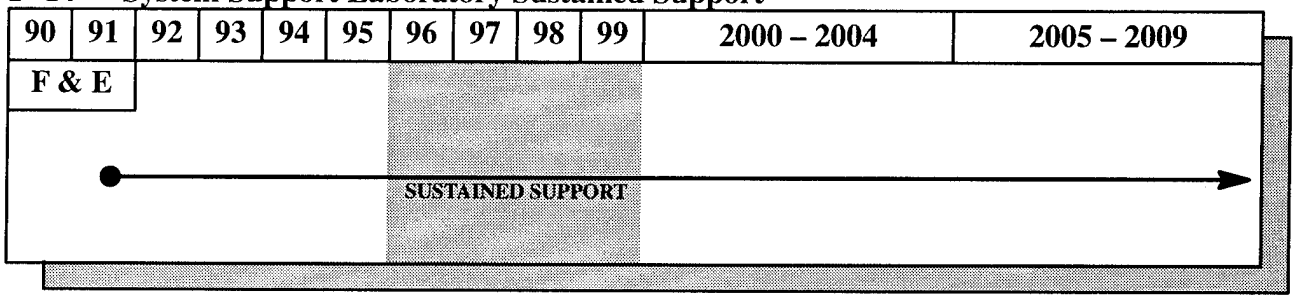
- Implement the test environment for DSR, STARS, OASIS, and the oceanic system development and support projects.

Cost/Benefit Ratio: A March 1991 benefit–cost analysis indicates a 1.2/1.0 ratio for this project.

Related Projects/Activities: None.A–01 En Route Automation Program, A–02 Tower Automation Program, A–03 Automated Radar Terminal System (ARTS) Improvements, A–04 Standard Terminal Automation Replacement System (STARS), A–05 Traffic Management System (TMS), A–06 En Route Software Development, A–07 Flight Service Automation System (FSAS), A–10 Oceantic Automation Program (OAP), A–11 Terminal Air Traffic Control Automation (TATCA), A–13 Digital Bright Radar Indicator Tower Equipment (DBRITE), C–01 Voice Switching and Control System (VSCS), C–03 Weather Message Switching Center (WMSC) Replacement, C–04 Radio Control Equipment (RCE), C–05 Voice Switches, C–11 Data Multiplexing Network (DMN) Continuation, C–12 Expansion/Reconfiguration of Low Density Radio Communications Link (LDRCL), C–20 Aeronautical Data–link, C–23 Voice Recorder Replacement Program (VRRP), F–16 FAA Technical Center Building and Plant Support, S–01 Airport Surface Detection Equipment (ASDE) Radar, S–02 Mode S, S–03 Terminal Radar (ASR) Program, S–04 Long–Range Radar Program, S–08 Precision Runway Monitor, W–01 Automated Weather Observing System (AWOS), W–02, Weather Radar Program, W–04 Weather and Radar Processor (WARP), W–05 Low–Level Windshear Alert System (LLWAS), W–07 Integrated Terminal Weather System (ITWS), W–09 Airport Surveillance Radar (ASR) Weather Systems Processor. Related Research, Engineering and Development (R,E &D) Plan projects include 021–110 Advanced Traffic Management System (ATMS), 021–140 Oceanic Air Traffic Automation, 021–220 Multiple Runway Procedures Development, and 031–110 Aeronautical Data Link Communications and Applications.

List of Contractors: Multiple regional contractors.

F–14 System Support Laboratory Sustained Support



F–15 General Support Laboratory Sustained Support

Purpose: The general support laboratory is partitioned into distinct complexes where resources are shared by systems and projects. The support systems and projects for the complexes are involved with the design, research, development, testing, and evaluation of advanced concepts, procedures, and systems that are being considered for introduction into the NAS.

The complexes provide airborne support, which includes fixed–wing aircraft and helicopters instrumented to provide flight data for projects. air traffic control simulation support is provided for system tests that require both real–time and fast–time simulation of present and future air space environments. The technical computer data center supports computational models as well as reduction and analysis of data obtained in tests and research. The human factors laboratory performs simulations, measures human performances, and evaluates human factor issues.

Project Information: This project consists of project 56–18 General Support Laboratory Sustained Support from the 1993 CIP.

Approach: Capital and infrastructure improvements are provided predominantly for R,E&D projects requiring facilities of the general support laboratory. Plans are being developed to upgrade specific complexes within the general support laboratory.

An example is the current ten year old Technical Center network infrastructure, which is no longer expandable or supportable. The Technical Center fiber data distribution interface (FDDI) is designed to meet current and emerging industry standards. The FDDI will be used for various Technical Center project activities, such as simulations, modeling, desktop video, computer aided drawing (CAD), computer aided engineering graphics (CAEG), and host software development. The FDDI technology is required because of exponential network traffic growth caused by the rapidly increasing reliance on network based applications. Exercising existing contracts, an industry developed architecture will be implemented by purchasing and installing commercial–off–the–shelf systems and components to achieve an operational FDDI network.

Products: Items in progress include:

- Test equipment.
- Technical Center fiber data distribution.
- Technical Center data computer upgrade.
- Provision for antenna farm.
- Target generator facility enhancement.
- Refrigerated pavement test section.
- Structures research facility.

1995 Accomplishments:

- Upgraded terminal air traffic control automation (TATCA) facility.
- Issued statements of work for the FDDI.
- Began FDDI cabling.

1996 Planned Accomplishments:

- Enhance technical computer data center.
- Begin upgrade of target generator facility.
- Provide airborne global positioning system (GPS) platform.
- Complete FDDI cabling and procure FDDI electronics.
- Upgrade workstations for FDDI.

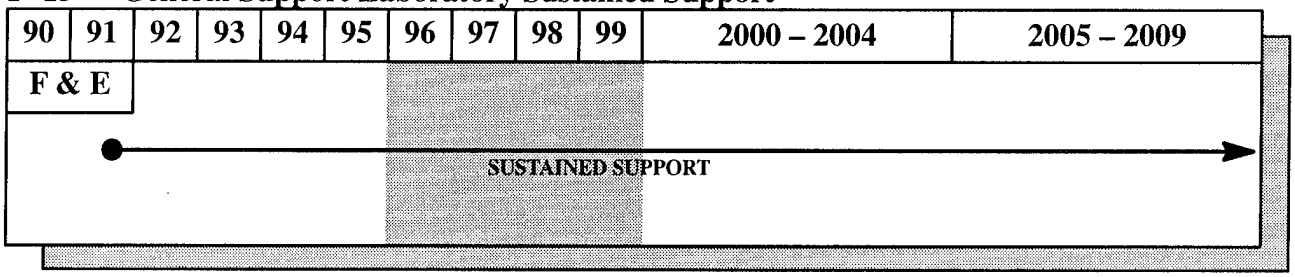
Benefit/Cost Ratio: A May 1991 study indicated a 3.1/1.0 benefit–cost ratio.

Related Projects/Activities: None.A–10 Oceanic Automation Program (OAP), C–20 Aeronautical Data–link, and N–12 Augmentations for the Global Positioning System (GPS). Related Research, Engineering and Development Plan projects includes: 021–220 Multiple Runway Procedures Development, 021–230 Wake–

Vortex Separation Standards, 023–120 Separation Standards, 024–110 Aviation System Capacity Planning, 025–110 National Simulation Capability (NSC), 027–110 Automation System Assessment, 027–120 Advanced Air Traffic Management Concepts, 031–110 Aeronautical Data Link Communications and Applications, 032–110 Satellite Navigation Program, 051–120 Airport Pavement Technology, 051–130 Airport Safety Technology, 073–110 Airport Security Technology Integration, 076–110 Aviation Security Human Factors, 082–110 Air Traffic Control Human Factors, 083–110 Airway Facilities Human Factors, and 084–110 Flight Deck/ATC System Integration.

List of Contractors: Multiple regional contractors.

F–15 General Support Laboratory Sustained Support



F–16 FAA Technical Center Building and Plant Support

Purpose: This project sustains the operation and maintenance of the FAA Technical Center, supporting infrastructure, and the Atlantic City International Airport (ACIAP) physical plant. Supported activities include: FAA Technical Center building lease; improvement, rehabilitation, or replacement of plant equipment; and airport facility support required for certification, including runway maintenance and airport safety systems.

The FAA Technical Center physical plant is designed to support both F&E and R, E&D projects. While the Technical Center structure is over 15 years old, some of the utility systems supporting the Technical Center date to the 1940s. Individual components of the utility systems (e.g., automatic temperature controls, air cooling systems, etc.) are inefficient and unsupportable.

The Atlantic City International Airport is the only airport owned and operated by the FAA. Airport operations include: FAA flight inspection aircraft, FAA aircraft for test and evaluation of ongoing FAA programs, commercial and general aviation aircraft, and the New Jersey Air National Guard. ACIAP also acts as a reliever airport for the central atlantic coast region.

Project Information: This project consists of project 56–19 FAA Technical Center Building and Plant Support from the 1993 CIP.

Approach: Plan and execute incremental replacement and/or refurbishment of the aging physical plant at the FAA Technical Center and the FAA owned and operated ACIAP. Individual replacement and refurbishment projects are prioritized by equipment age and expected cost savings inherent in more efficient utility systems.

The utility improvement activity consists of numerous items including replacement of chiller and boiler units. These units are 20 years old and fail frequently, most often during maximum need, such as extremely hot and humid

conditions. The downtime is costly as important testing must frequently be delayed. Replacement will allow for the latest design incorporation of energy efficiency improvements.

Airport improvements include refurbishing runways, taxiways and shoulders. Primary on this list are Runways 13–31 and Taxiway B. Taxiway F, Runway 17–35, and Runway 8–26 are permanently closed and must be removed. Timely refurbishment will eliminate the need to completely replace the deteriorating asphalt and concrete. Aged lighting systems are also planned for refurbishment and/or replacement.

There is an ongoing engineering study of the Technical Center waste water collection system to determine and correct any deficiencies in the system.

Products:

- Chiller unit replacements.
- Boiler unit replacements.
- Condenser water modifications.
- Control systems replacement/expansion.
- Fire protection system improvements.
- Rehabilitate Taxiway H.
- Overlay Runway 13–31 and Taxiway B.
- Remove deteriorated pavement.
- Rehabilitate building 228 (air field electrical vault).
- Airfield drainage improvements.
- Airport lighting system evaluation, design, and replacement.
- Runway/taxiway pavement and strength evaluation.
- Evaluation of drainage system.

1995 Accomplishments:

- Completed installation of the last central utility plant chiller unit.
- Completed the boiler plant modifications.
- Completed handhole modifications.
- Completed blast pad on Runway 31.
- Began chilled water piping system study.
- Completed design of condenser water modifications.
- Completed ACIAP perimeter fencing installation.
- Completed electrical modification in Building 301 (flight operations building).
- Upgraded fire alarm systems in FAA Technical Center main building and Building 301.
- Upgraded main electrical substation.
- Began additional electrical substation upgrades.
- Completed central utility plant electrical upgrade.
- Cleared tree obstructions from approach surface of Runway 31.
- Installed ACIAP emergency access gate.

1996 Planned Accomplishments:

- Install ACIAP emergency access gate roadway.
- Install runway end indicator lights (REIL) on Runway 4.
- Construct condenser water system modifications.
- Continue center energy management system design.
- Design the environmental upgrade to the Technical Center main building.
- Design chilled water modifications.

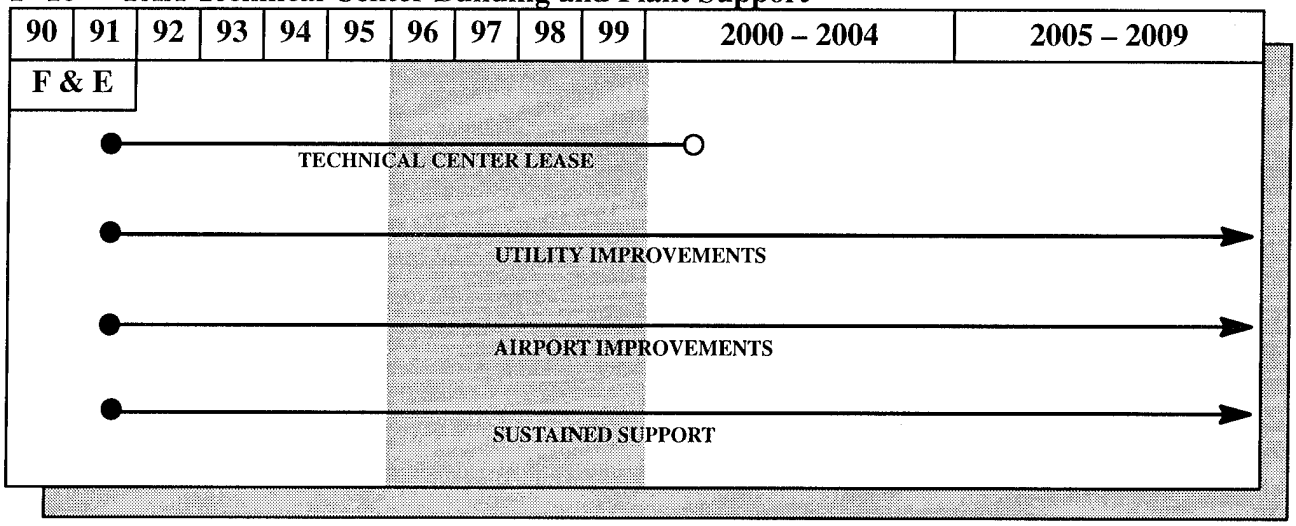
Benefit/Cost Ratio: A strict benefit–cost comparison (using net present value and benefit–cost ratio) has not been done.

Related Projects/Activities: None.Supports the technical infrastructure for program test and evaluation and R, E&D activities.

List of Contractors:

- Stone & Webster Company
  Cherry Hill, New Jersey
- Atlantic County Improvement Authority
  Atlantic City, New Jersey

F–16 FAA Technical Center Building and Plant Support



F–17 Computer Aided Engineering Graphics (CAEG) Enhancement

Purpose: To replace computer aided engineering graphics workstations at existing sites with a modern graphics service and expand the scope of the service to additional sites and users. The end state will provide graphics service workstations at the regions, air route traffic control centers, FAA Technical Center, FAA Aeronautical Center, system maintenance offices, and the airport district offices. These workstations will facilitate installation, transition, airport, and site planning; air traffic sector design; obstruction evaluation; noise abatement studies; radio coverage analysis; and a host of analytical capabilities in the various engineering disciplines. This effort is currently being performed with the existing system, or where a system is not available, manually or through outside sources at higher cost and extended schedule. These efforts include:

- Developing equipment installation plans.
- Developing and revising Air Traffic sector boundary charts.
- Developing a transition plan for tower equipment and metroplex control facilities.
- Analyzing facility space in 3-dimensions for future growth capabilities.
- Developing information models for future growth capabilities.
- Developing noise contour charts.

- Developing electromagnetic coverage analysis charts.

The goal is to provide easy access and ease of operation to the workforce. The existing system will be replaced with a new version to take advantage of the technological breakthroughs such as enhanced processing/throughput, iconographic access, and other characteristics. This will support the users of graphics automation with various levels of computer literacy.

Project Information: This project combines projects 56–25 CAEG Enhancement and 56–70 CAEG Replacement from the 1993 CIP.

Approach: Several facilities are being combined or transitioned into new facilities as a result of the Agency's downsizing and streamlining efforts. At the same time, CIP projects are being implemented to enhance air traffic capacity and safety. The FAA requires the necessary tools to provide for facility modeling and analysis, site analysis, and the ability to generate graphical information to support the development of transition, installation, and site plans. Analytical capabilities are necessary to support heating, ventilation, air conditioning, power sizing, space planning, and management as facilities are updated with new equipment. Site plans require the ability to display spatial and geographic information to assess radar coverage, electromagnetic interference, penetrations to protected airspace surfaces, etc. Other requirements exist to identify environmental impacts of changes in flight procedures in terms of noise generated and how to mitigate the effects.

These capabilities are necessary at the regional offices, air route traffic control centers, general maintenance offices, FAA Technical Center, FAA Aeronautical Center, headquarters offices, and airport district offices. The projected workload exceeds the current workforce capability, and modern automated graphical analysis capabilities are necessary to prevent a workload backlog.

Providing computer aided engineering graphics capabilities to the above sites will enhance the FAA rapid prototyping capabilities. Linking these facilities through the administrative data telephone network (or equivalent) will shorten the time needed for approval of plan modifications and aid in accelerating CIP implementation. More importantly, linking these facilities to the existing database will provide engineers and technicians timely access to current information to facilitate implementation activity and/or evaluate aeronautical cases.

The enhancement service will offer improved productivity. It will also offer modularity and expandability to ensure the future system can meet user demands.

Products: Each of the regions and centers will receive one or more workstations with software and training. (56–25 and 56–70)

1995 Accomplishments:

- Implemented software and hardware modifications at CAEG major sites which permits PC access to the CAEG facility.
- Installed improved wide area network services and transitioned to ADTN–2000.
- Defined an improved business process for drawing management.
- Prototyped a drawing management system tool at the Southern Region and developed a functional specification for the national implementation.
- Tested the integration of different vendor products.
- Developed network file system implementation plan.

1996 Planned Accomplishments:

- Expand current system at existing sites by 24 workstations supporting 96 additional users.
- Fully implement the drawing management system.
- Beta test the airports system for Federal Aviation Regulation Part 77 analysis.

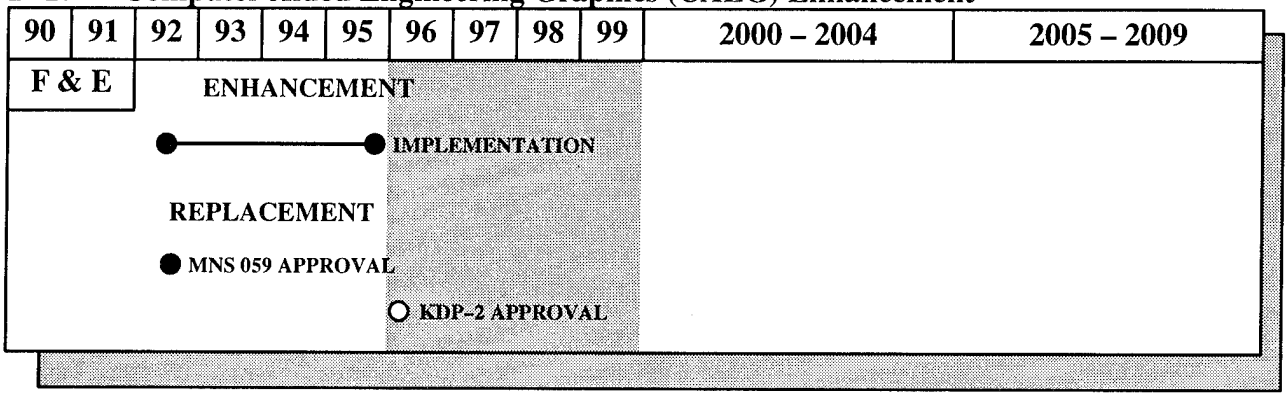
- Improve user interface to the radio coverage analysis system.
- Complete key decision point 2 (KDP–2).

Benefit/Cost Ratio: A benefit–cost analysis is underway, with an expected completion date of December 1995.

Related Projects/Activities: None.A–02 Tower Automation Program, A–07 Flight Service Automation System (FSAS), A–08 Operational Data Management System (ODMS), A–10 Oceanic Automation Program (OAP), A–11 Terminal Air Traffic Control Automation (TATCA), A–14 Instrument Approach Procedures Automation (IAPA), C–01 Voice Switching and Control System (VSCS), C–09 Sustaining Backup Emergency Communications (BUEC), F–01 ATCT/TRACON Establishment/Sustainment Replacement, F–02 Metroplex Control Facility (MCF), F–03 Austin–Bergstrom International Airport Program, F–04 DOD/FAA Air Traffic Control Facility Transfer/Modernization, F–05 Flight Service Facilities, F–06 Air Route Traffic Control Center (ARTCC) Plant Modernization/Expansion, F–08 Sustain San Juan Facilities, F–13 NAS Facilities Occupational Safety and Health (OSH) and Environmental Compliance, F–15 General Support Laboratory Sustained Support, F–18 Aeronautical Center NAS Support Facilities, M02 Technical Support Services, M–03 Capital Investment Plan (CIP) System Engineering and Technical Assistance, M–15 National Airspace System Spectrum Engineering Management, M–18 computer Resources Nucleus (CORN), M–21 Logistics Support Systems and Facilities, M–22 National Airspace System Implementation Support, M–26 NAS Management Automation Program (NASMAP), M–27 National Airspace Integrated Logistics Support (NAILS), N–03 Instrument Landing System (ILS), S–02 Mode S, S–03 Terminal Radar (ASR) Program, S–04 Long–Range Radar Program, and S–05 Long Range Radar (LRR) Radome Replacement.

List of Contractors: Regional contractors.

F–17 Computer Aided Engineering Graphics (CAEG) Enhancement



F–18 Aeronautical Center NAS Support Facilities

Purpose: This project provides complexes, support buildings, and the necessary infrastructure to house functions and equipment required for training, logistics, engineering support, and aeromedical research systems.

Project Information: This project consists of project 56–30 Aeronautical Center Training and Support Facilities from the 1993 CIP.

Approach: The facilities are being constructed consistent with FAA Aeronautical Center comprehensive land use and space plans. Office of Management and Budget Circular A–94 requires that all leases of capital assets must be justified as preferable to direct Government purchase and ownership. It is anticipated that direct federal construction will clearly be the least costly alternative based on this criteria. Therefore, the funding allocated is for direct federal construction of the proposed facilities on leased Aeronautical Center land. Buildings, enclosures, and related structures will be located and configured to provide for efficient use of training, logistics, engineering, and aeromedical research support functions.

The training complexes, when completed, will meet specific requirements with features such as classrooms, training laboratories, instructor/administrative support offices and work areas, and training/support material space. They will be configured for maximum flexibility to meet future requirements. The different training complexes will consolidate present training systems and accommodate new systems.

The second level engineering support facility will accommodate engineering support personnel, systems, equipment, and functions for definition and resolution of NAS problems, sustaining engineering functions, and related activities.

The logistics support facilities will provide space for repair, test, quality control, engineering, and supply support functions. These facilities are necessary to provide repair support of NAS programs via contract and in–house organic repair and to provide supply support for hundreds of programs needed to promote air traffic safety. These requirements will be met by (1) performing studies to determine the optimum long–term configuration, costs, and benefits, (2) identifying interim solutions and accomplishing associated projects, and (3) modifying and constructing space and facilities to meet long–term Logistics Center needs.

Facilities will be provided to meet specific requirements such as flight line support, Civil Aeromedical Institute human factors and regulatory processes, general Aeronautical Center operations (storage, staging, shipping, maintenance, flight line support, and operations) and other tenant needs (subject to approved memorandum(s) of agreement). These facilities will be predicated on approved studies and plans.

Products:

- Modern facilities to accommodate general NAS training, administrative offices, development and production areas for classroom delivered training materials, and new equipment installations.
- Facilities for aircraft maintenance and shops.
- Facilities to consolidate very high frequency omnidirectional range (VOR)/tactical air navigation (TACAN)/distance measuring equipment (DME) training systems and accommodate the installation of new systems.
- Facilities to consolidate landing systems equipment.
- Facilities to consolidate present radar systems and accommodate the installation of new systems.
- Facilities to accommodate second level engineering support personnel, systems, equipment, and functions for definition and resolution of NAS problems, sustaining engineering functions, and related activities.
- Modernization of the Civil Aeromedical Institute infrastructure to include the hypobaric chamber, aircraft cabin evacuation facility, highbay crashworthiness track, and supporting structures and systems.
- Facilities to accommodate both interim and long–term storage, equipment, repair, test, engineering, quality control, administrative

support, and related activities necessary for continued Logistics Center support of NAS programs.

- The necessary infrastructure (streets; parking; pedestrian ways; electrical, gas, and water distribution systems; telecommunications; storm and sanitary sewers; general storage and support structures; and other supporting facilities) to serve training, engineering, logistics, aeromedical research, and other existing and planned support complexes.

1995 Accomplishments:

- Completed construction of the VOR/TACAN/DME training complex.
- Completed first phase of construction of roads and utility systems for new NAS support facilities.
- Continued engineering studies for general NAS (GNAS), landing systems, radar, logistics, and engineering facilities.
- Continued planning and development of infrastructure to support existing and planned facilities.

1996 Planned Accomplishments:

- Complete construction of a general NAS training facility.
- Complete construction of a landing systems training facility.
- Complete design of the first construction phase to relocate outdated and unsuitably located radar training facilities.
- Begin construction of infrastructure to improve access and to support second level engineering and training facilities.
- Complete design of long term Logistics Center facility improvements and begin implementing interim modifications to existing warehouse/shops structures.

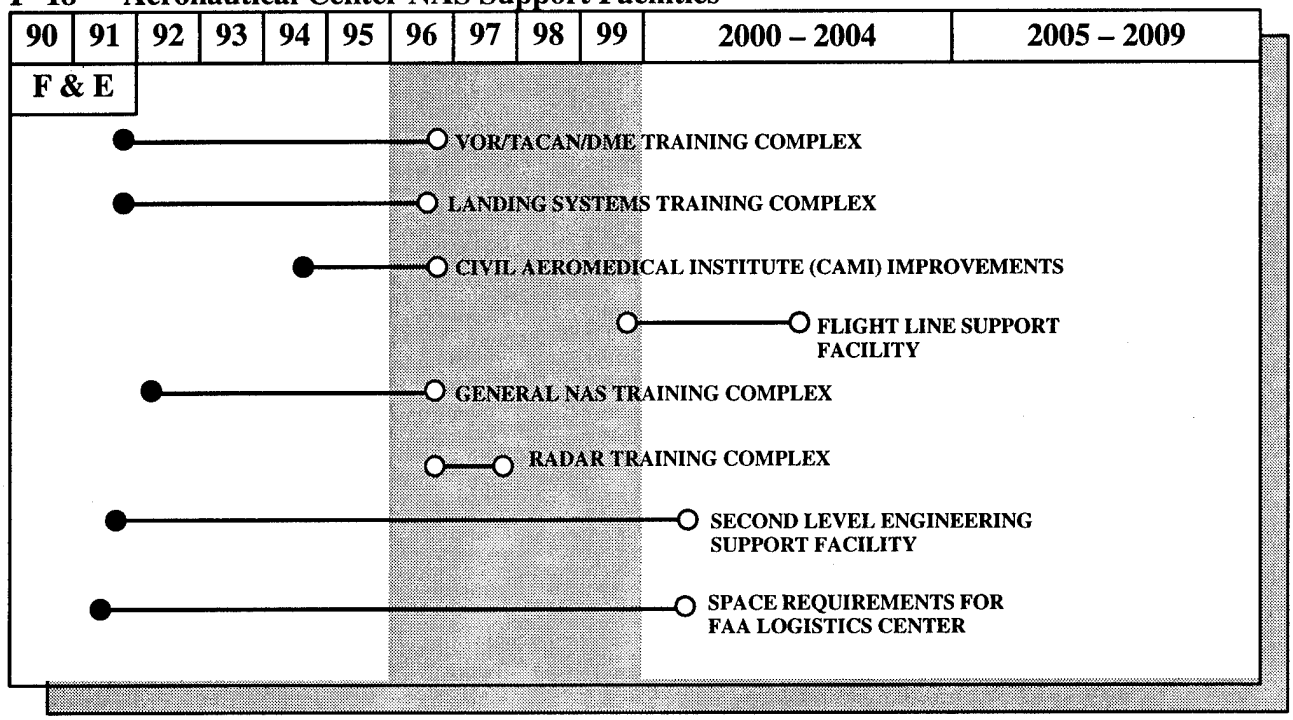
Benefit/Cost Ratio: A benefit–cost ratio has not been developed for this project.

Related Projects/Activities: None.All CIP projects requiring Agency training, logistics, and engineering services support. F–19 Aeronautical Center Leases, and M–21 Logistics Support Systems and Facilities.

List of Contractors:

- C.H. Guernsey and Company
  Oklahoma City, Oklahoma
- Elliot and Associates Architects
  Oklahoma City, Oklahoma
- Allen Consulting, Inc.
  Norman, Oklahoma
- J. Morris Construction, Inc.
  Oklahoma City, Oklahoma
- Chambers Construction Company, Inc
  Oklahoma City, Oklahoma

F–18 Aeronautical Center NAS Support Facilities



F–19 Aeronautical Center Leases

Purpose: This project provides lease payments for the land and buildings which house the Mike Monroney Aeronautical Center and tenant Department of Transportation organizational elements.

Project Information: This project consists of project 56–33 Aeronautical Center Lease from the 1993 CIP.

Approach: The Mike Monroney Aeronautical Center is a major organizational complex in Oklahoma City, Oklahoma. It conducts centralized training, aircraft fleet maintenance and modification, central warehousing and supply, and aeromedical research. It also maintains and administers aircraft and airman (including medical) records. The Mike Monroney Aeronautical Center manages centralized administrative automatic data processing for national programs. It also provides engineering support, technical modification, and maintenance field guidance for the operation and maintenance of assigned NAS facilities. The leased land and buildings which house the Mike Monroney Aeronautical Center, as well as tenant organizational elements, provide a cost–effective, midcontinent location for the functions described above.

Products: Mike Monroney Aeronautical Center lease.

1995 Accomplishments:

- Finished renovation of classroom Building 6.
- Completed renovation of Air Traffic classroom Building 3.

1996 Planned Accomplishments:

- Begin renovation of Building 5.

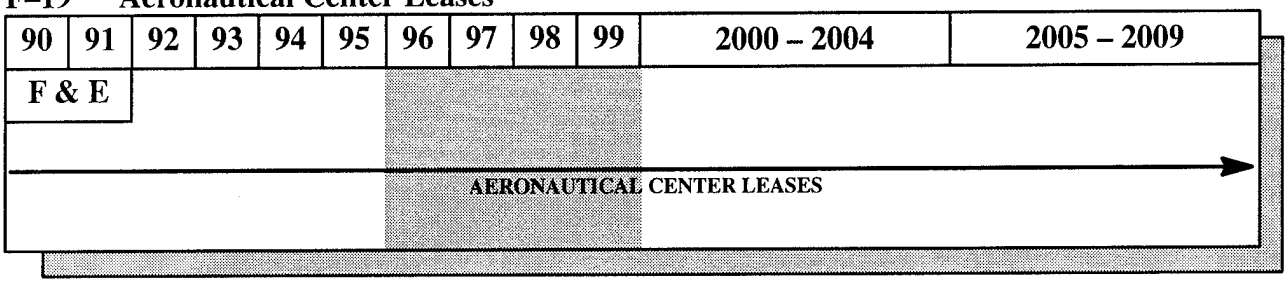
Benefit/Cost Ratio: A November 1991 study indicates a 1.4/1.0 benefit–cost ratio.

Related Projects/Activities: None.This program supports numerous ongoing facility and engineering efforts and operations. F–18 Aeronautical Center NAS Support Facilities, M–07 NAS Infrastructure Management System (NIMS) and M–21 Logistics Support Systems and Facilities.

List of Contractors:

- Oklahoma City Airport Trust
  Oklahoma City, Oklahoma
- State of California Public Employees Retirement System c/o Alex Brown Kleinwort Benson Realty Advisors Corp.
  Dallas, Texas
- Thomas Road Partners
  c/o N.W. Property Management, Inc.
  Oklahoma City, Oklahoma

F–19 Aeronautical Center Leases



F–20 Provide FAA Housing

Purpose: This project provides for the establishment and replacement of FAA employee housing units at remote locations for permanent and temporary personnel. The FAA operates a number of facilities in remote areas where commercial housing is not available or adequate. The FAA must provide suitable housing for operations and maintenance personnel and their families at these locations.

Project Information: This project consists of project 56–54 Provide FAA Housing from the 1993 CIP.

Approach: Architectural and engineering firms will develop standard housing designs for remote areas of Alaska and the Caribbean. Construction contractors will be selected by a competitive acquisition process for the establishment of new housing units, replacement of obsolete units, or modernization and refurbishment of existing units. Also, as an alternative, the FAA intends to use local real estate agents and local advertising to purchase existing homes where they are available.

Products:

- Permanent housing and transient quarters for FAA employees and their families.
- Repairs and renovations to existing housing and support systems in various remote locations in Alaska, Caribbean, Grand Canyon, Nantucket, and the Pacific Territories.
- Emergency quarters at remote facilities.

1995 Accomplishments:

- Designed, modernized, purchased, or completed construction activities at Cold Bay, King Salmon, Yakutat, Cordova, Kotzebue, St. Paul, and Bethel, AK.

1996 Planned Accomplishments:

- Design, modernize, purchase, or construct housing at Bethel, Nome, and Dillingham, AK. Purchase housing units at St. Thomas, VI.

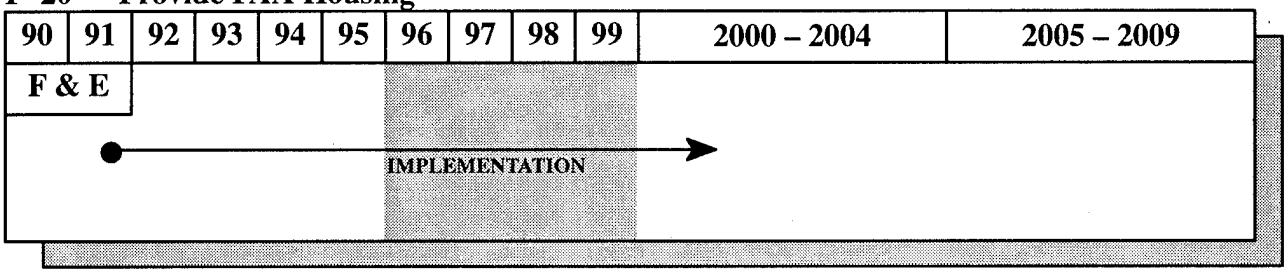
Benefit/Cost Ratio: A July 1994 study indicates a 3.4/1.0 benefit–cost ratio.

Related Projects/Activities: None.None.

List of Contractors:

- Koonce–Pheffer
  (architectural and engineering support)
  Anchorage, Alaska
- U.S. Army Corps of Engineers

F–20 Provide FAA Housing



F–22 Child Care Centers

Purpose: This project will provide for the establishment of child care centers at air route traffic control centers (ARTCCs) to meet employee needs for on–site child care. Available on-site child care greatly enhances the FAA's ability to recruit and retain a highly qualified, diverse work force in the increasingly technical specializations which are required.

Project Information: This project consists of project 56–62 Child Care Centers from the 1993 CIP.

Approach: Federal agencies are authorized to support provisioning and furnishing of child care centers under Public Law 90–591. These sites are proposed by the regions and approved and prioritized by the Office Of Labor and Employee Relations in headquarters. Sites are determined upon completion of formal needs assessments of employees, surveys of surrounding private child care availability, and employee and management support. Construction is accomplished by regional contracts after radiation hazard surveys, if required, have been performed and analyzed. National standard design is available for use where appropriate and may be site modified. The General Services Administration provides guidance on using federal space for child care centers.

Child care centers are constructed, furnished, and maintained as necessary to provide for the ongoing, growing needs of employees. Upon completion, the child care centers are managed as nonprofit corporations by boards of directors consisting of Agency employees/parents. Tuition and fund raising efforts by the nonprofit corporation pay for the child care center's staff and operational costs (exclusive of maintenance).

Products:

- On–site child care centers at ARTCCs.
- Facilities were previously opened at Oakland, Jacksonville, Kansas City, and Minneapolis ARTCCs

1995 Accomplishments:

- Opened child care centers at Denver, Memphis and Houston ARTCCs.

1996 Planned Accomplishments:

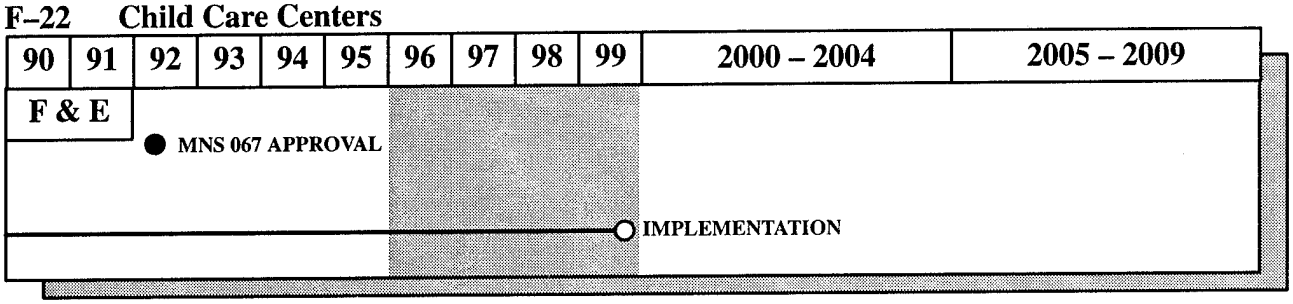
- Open child care centers at Atlanta, Miami, and Los Angeles ARTCCs.

Benefit/Cost Ratio: Due to the nature of this project, a strict benefit/cost comparison (using net present value and benefit/cost ratio) is not appropriate.

Related Projects/Activities: None.

List of Contractors: Regional contractors are selected for each facility.

F–22 Child Care Centers



F–23 Relocate Honolulu Combined Center Radar Approach Control (CERAP)

Purpose: The FAA has agreed to relocate the Honolulu combined center radar approach control (CERAP) facility from its location at Diamond Head Crater, an area that Hawaii wishes returned to its natural condition to serve as a state park. The FAA needs to evaluate site, facility, and equipment alternatives for relocation of the Honolulu facility and select the best overall combination of alternatives. In the alternative selection process, the FAA must ensure that the unique mission of this facility is maintained to control both en route and terminal air traffic for the airspace in and around the Hawaiian Islands. Then the FAA needs to execute a program to accomplish the relocation of the Honolulu facility and to ensure the disposal of the current facility and cleanup of the crater site.

Project Information: This is a new project.

Approach: Analyze the relative merits and costs of each site, facility, and automation equipment alternative, including life–cycle costs, benefits, performance, risk, and schedule. Identify the most promising combination of alternatives for implementation. Develop an acquisition strategy and program documentation for the most promising approach. Upon key decision point–2 approval, execute the approved alternative according to the approved acquisition plan.

Products: Relocated Honolulu CERAP facility to at a new site in a new facility, with the necessary equipment to accomplish its mission.

1996 Planned Accomplishments:

- Replace engine generators and chiller.

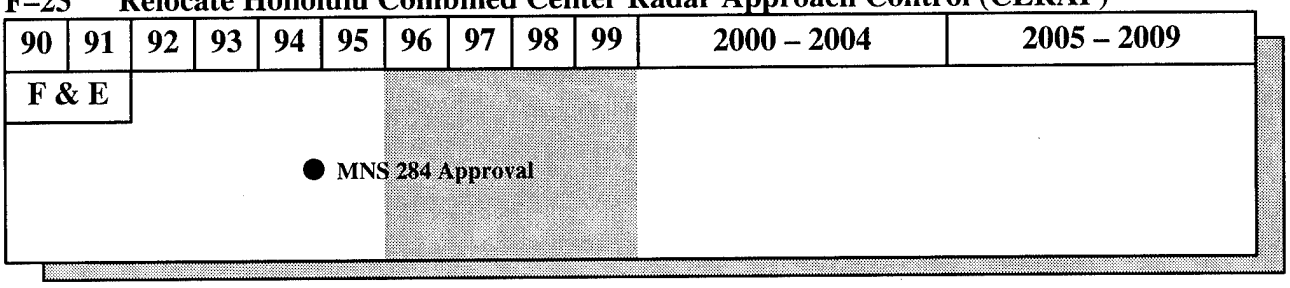
Benefit/Cost Ratio: A benefit–cost ratio has not been developed for this project.

Related Projects/Activities: None.A–10 Oceanic Automation Program (OAP), C–05 Voice Switches, C–10 Emergency Transceiver Replacement, M–10 Distance Learning, and M–22 National Airspace System Implementation Support.

List of Contractors:

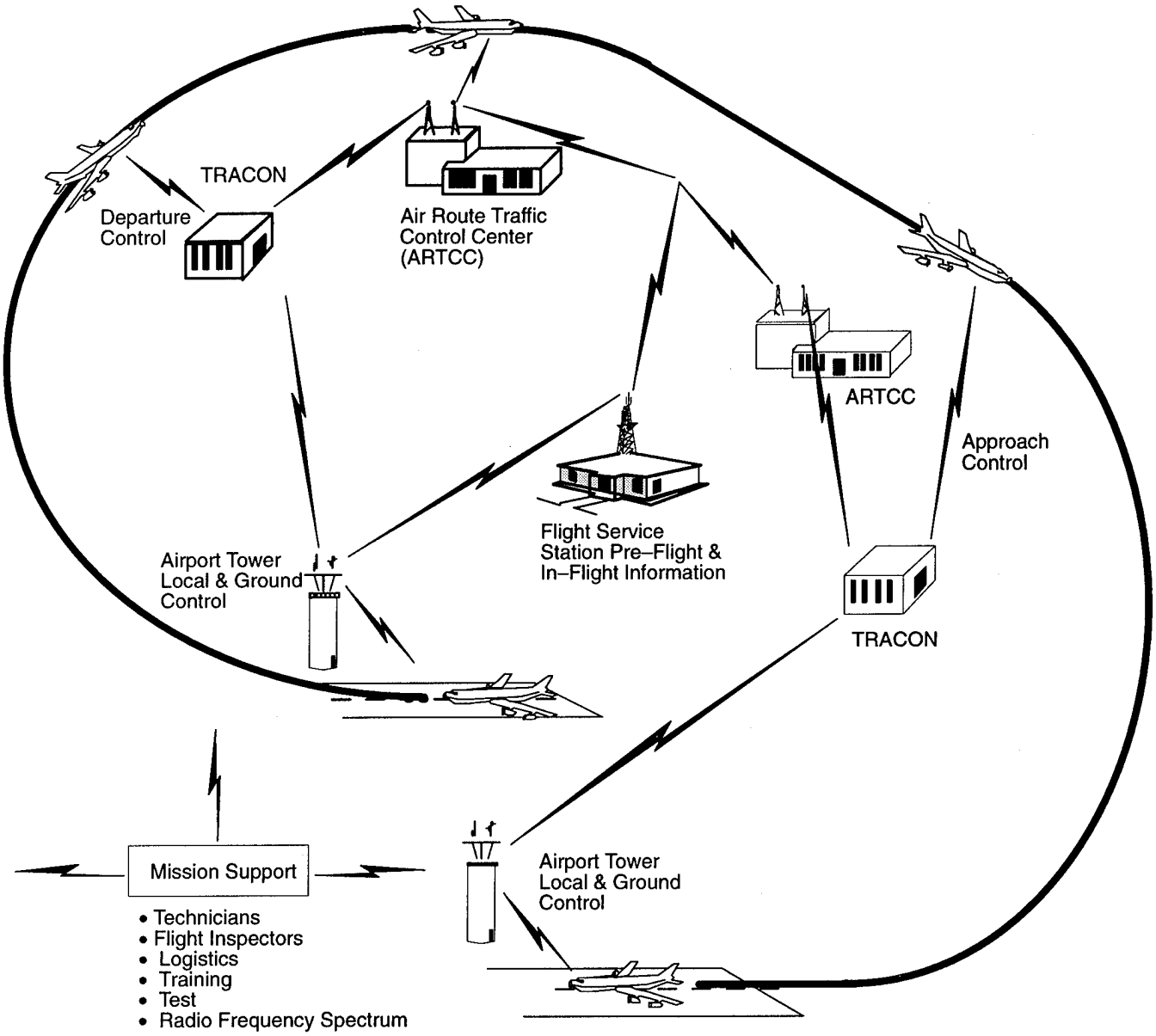
- NAS Implementation Support Contract
  Lockheed Martin Corporation
  (transition and integration support)
  Washington, District of Columbia

F–23 Relocate Honolulu Combined Center Radar Approach Control (CERAP)



Mission Support Functional Projects

New Project Number	Title	Previous Project Number	Page Number
M – 02	Technical Support Services	26–19	MS–3
M – 03	Capital Investment Plan (CIP) System Engineering and Development Support	36–13	MS–4
M – 04	National Airspace System In–Plant Contract Support Services (NAS/IPCSS)	36–23	MS–5
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M – 07	NAS Infrastructure Management System (NIMS)	26–01, 26–04 46–01, 46–04	MS–8
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M – 13	Precision Automated Tracking System (PATS)	56–16	MS–16
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M – 17	Test Equipment Modernization and Replacement	56–27	MS–19
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M – 27	National Airspace Integrated Logistics Support (NAILS)	56–58	MS–32
M – 28	FAA Corporate Systems Architecture	56–61	MS–34
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M – 30	Integrated Communications Switching System (ICSS) Logistics Support	43–14	MS–38



Mission Support in the NAS

M–02 Technical Support Services

Purpose: This project provides technical services to supplement region, FAA Aeronautical Center, and FAA Technical Center facilities and equipment staff efforts necessary to implement NAS improvements. These improvements were anticipated to create peak implementation work requirements on FAA region and center organizations which could not be accommodated within current and projected staffing levels. Analysis of Agency requirements in the 1980's indicated it would not be prudent management to increase the Federal work force to meet anticipated short–term peak work requirements. Since then, NAS modernization schedules have expanded into the future, and the workload requirements have been extended with them. This project has evolved and now provides level-of-effort resources to meet ongoing NAS modernization requirements which exceed Agency staff availabilities.

Project Information: This project consists of project 26–19 Technical Support Services from the 1993 CIP.

Approach: A national technical support services contract (TSSC) has been awarded to provide a means whereby regions and centers can obtain the support required to accomplish their facilities and equipment mission. This support involves site selection analysis; site preparation and construction; equipment installation and testing; equipment tuneup, modification, renovation, and/or remodeling; and site/facility environmental remediation. Another technical support services contract acquisition is under development. It will allow the FAA to obtain facilities and equipment resources to meet its future NAS modernization requirements.

Work under the technical support services contract is issued to the contractor via a work release which may cover any portion of the "hands on" effort necessary to complete a particular project. Work releases are issued and managed by headquarters for work which is national in scope (cuts across regional boundaries and involves most regions) or in the more common form, issued and managed by individual regions. The contract structure provides the capability for the contractor to begin work within 30 to 60 days following issuance of a work release. Most facilities and equipment funded projects may be considered for implementation support under this contract.

Funds are obligated via contract modifications which identify planned projects. Work releases are written periodically against routine contract modifications. Emergency modifications to accommodate "pop–up" requirements are initiated as needed.

Funding to support the projects is provided from two sources. Funding for project materials and site preparation costs is provided within other CIP project costs. Funding for contractor labor and travel (including overall management) is provided on a national basis via this project.

Products: Support regions and centers in completing NAS improvement and implementation.

1995 Accomplishments:

- Prepared sites and installed several NAS modernization projects.

1996 Planned Accomplishments:

- Continue support of NAS modernization requirements.

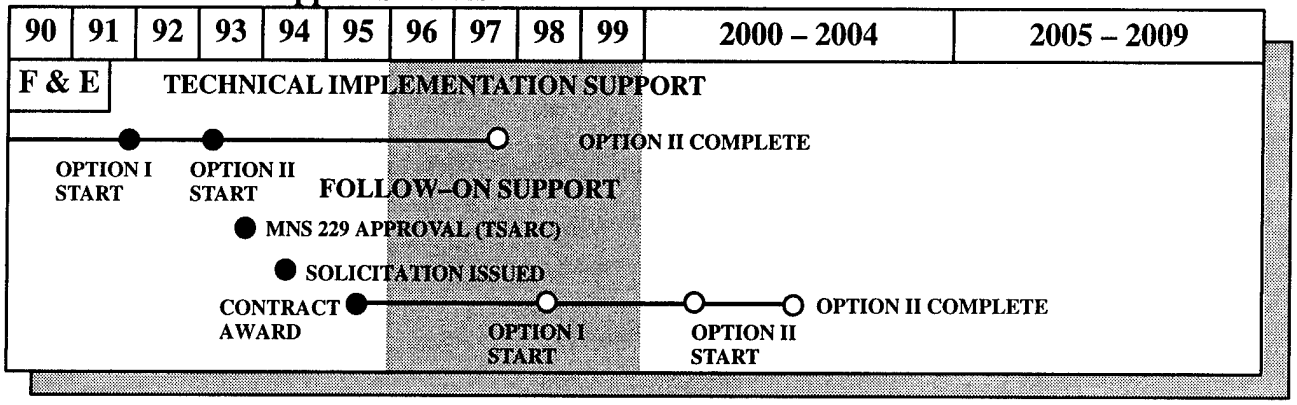
Benefit/Cost Ratio: Due to the nature of this project, benefit–cost data is included within the benefit–cost analyses for the individual projects being supported.

Related Projects/Activities: Support to most of the CIP facilities and equipment projects.

List of Contractors:

- Raytheon Service Company
  (technical services)
  Washington, District of Columbia

M–02 Technical Support Services



M–03 Capital Investment Plan (CIP) System Engineering and Development Support

Purpose: This project provides expertise in system architecture and system engineering (including software engineering) and program management (including configuration management, operational test and evaluation, and interface management) of CIP project implementation. The requirements for system architecture and system engineering and program management expertise cannot be met with the available FAA staff.

Project Information: This project consists of project 36–13 CIP System Engineering and Technical Assistance from the 1993 CIP.

Approach: One or more contracts will be awarded to provide the technical and scientific expertise and decision support tools necessary for implementation of CIP projects.

Products:

- CIP annual updates.
- System architecture and system engineering support to translate general performance requirements established by users into final, workable systems. This includes system designs, prototypes, integration, and implementation strategies.
- Program management support for CIP projects to ensure efforts are accomplished within acceptable parameters of cost, schedule, and technical performance.
- Software engineering support for CIP projects containing software development. This includes supporting the improvement of the software acquisition process, and providing projects with consultation support, software engineering training, software architecture and system engineering tools expertise, liaison to external groups, and software engineering policies, standards, processes, procedures and guidelines.

1995 Accomplishments:

- Published 1995 CIP.

1996 Planned Accomplishments:

- Publish 1996 CIP in January 1996.

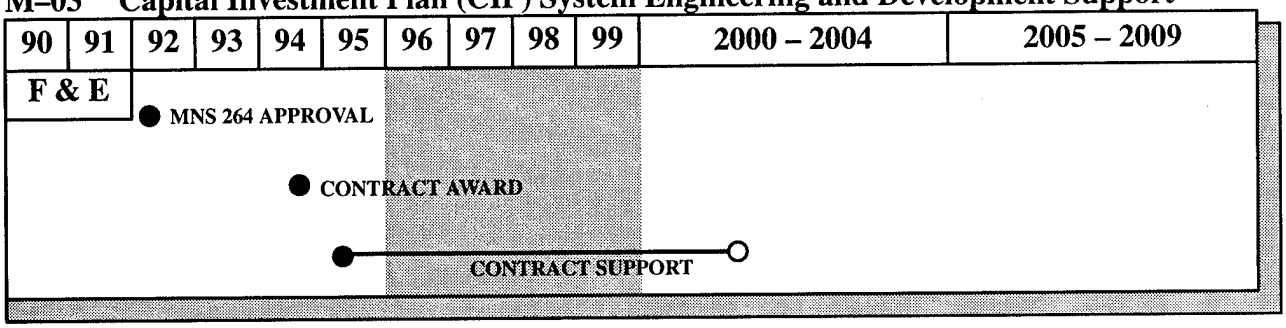
Benefit/Cost Ratio: Due to the nature of this project, benefit–cost data is included within the benefit–cost analyses for the individual projects being supported.

Related Projects/Activities: All CIP projects and R,E&D project 021–110 Advanced Traffic Management System (ATMS), and 024–110 Aviation System Capacity Planning.

List of Contractors:

- TRW, Inc.
  Fairfax, Virginia
- META Engineers
  Washington, District of Columbia
- CEXEC
  McLean, Virginia
- Mitre
  McLean, Virginia
- Adsystech
  Washington, District of Columbia
- SRM
  Washington, District of Columbia
- Fu Associates
  Arlington, Virginia

M–03 Capital Investment Plan (CIP) System Engineering and Development Support



M–04 National Airspace System In–Plant Contract Support Services (NAS/IPCSS)

Purpose: This project provides experienced procurement and production resources to represent FAA interests during the award and performance of critical CIP contracts.

Project Information: This project consists of project 36–23 NAS In-Plant Contract Support Services (NAS/IPCSS) from the 1993 CIP.

Approach: The Agency awarded a contract that provides services in the procurement areas, including cost analysis and production surveillance. Most of these services will be performed onsite at selected contractor plants, and will include the following functions:

- Assist the contracting officer in the review and evaluation of contractor proposals, and furnish recommendations as appropriate.
- Perform production support, surveillance, and status reporting of potential and actual

slippages in contract delivery schedules, and report as appropriate to FAA representatives.

- Report inadequacies in compliance with contract specifications, terms, and other conditions to the contracting officer.

The contractor will provide improved contract administration and effective oversight of the contractor's production activities and potential problem areas. In addition, an on–site presence provides the FAA with better data to assess contract and production activities, and to evaluate planned versus actual contract progress.

Products: Monthly status reports to the contracting officers of selected programs; administrative assistance for selected cost analyses, contract administration functions, and production surveillance; and monthly briefings to senior management on the status of selected contracts.

1995 Accomplishments:

- Supported 28 major acquisition programs.
- Provided resources that enabled the Agency to realize an estimated $361M in cost savings/avoidance.

1996 Planned Accomplishments:

- Support major acquisition programs.
- Provide resources to aid FAA contracting officers and program managers acquire systems or services in the most economic manner.

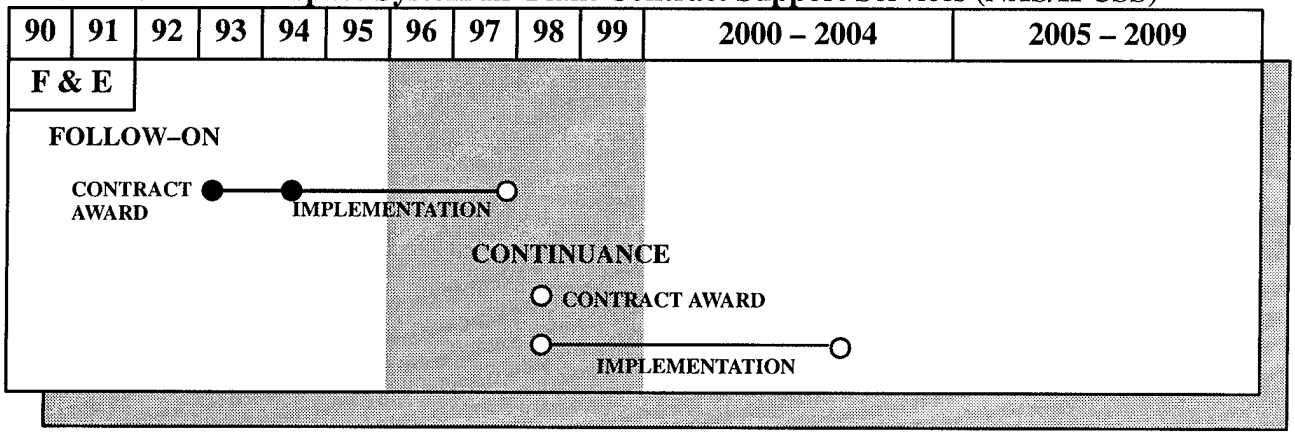
Benefit/Cost Ratio: A December 1994 study documented a directly related 5.8/1.0 benefit–cost ratio and an indirect ratio of 42.3/1.0.

Related Projects/Activities: Any FAA project/program requiring acquisition/production surveillance support.

List of Contractors:

- CEXEC
  (contract support and surveillance)
  McLean, Virginia

M–04 National Airspace System In–Plant Contract Support Services (NAS/IPCSS)



M–05 National Airspace System Regional/Center Logistics Support Services

Purpose: This project will continue to provide procurement, real estate, material management, and automated data processing support resources to support FAA regional/center logistics personnel in the implementation of CIP contracts.

Project Information: This project consists of project 36–24 NAS Regional/Center Logistics Support Services from the 1993 CIP.

Approach: A contract will be awarded for providing services in the above areas. Most of these services will be performed onsite at FAA region/center logistics offices, and will include the following functions.

- Assist the contracting officer in various functions related to the solicitation, award, and administration of facility and equipment funded contracts.
- Prepare documentation for real property and surplus property reports, processing capitalizations, and reviewing project materiel reports.
- Prepare leases and appraisals, site surveys, and lease versus purchase studies for new FAA facilities. These will assure that planned preparation activities for receipt of new systems are accomplished in a timely manner. In addition, they will provide for timely and comprehensive preparation of reports, studies, and procurement related documents.

Products:

- Status reports to the contracting officers of various CIP procurements.
- Administrative assistance in the performance of various logistics functions.
- Pre–award and post–award contract assistance.
- Automated data processing support relative to the use of logistics data bases and software.

1995 Accomplishments:

- Released solicitation for new Central Region office.
- Performed energy efficiency audits for the FAA Technical Center.
- Released contracts decommissioning Stapleton International Airport, Denver, CO.
- Acquired sites for CIP projects, involving: terminal Doppler weather radar (TDWR), next–generation weather radar (NEXRAD), and airport surveillance radar (ASR–9).

1996 Planned Accomplishments:

- Relocate to new Central Region office.
- Continue site acquisitions for CIP projects.
- Develop Aviation Security Laboratory expansion project.

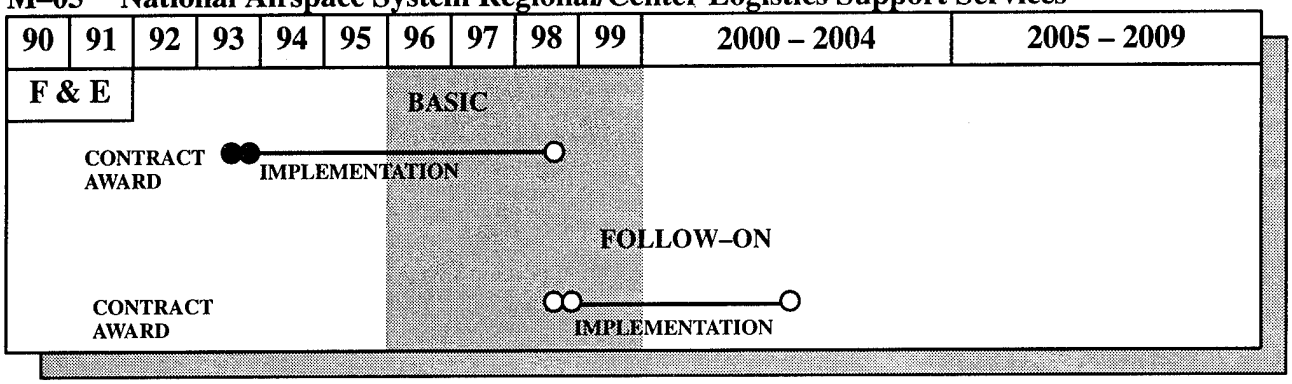
Cost/Benefit Ratio: A November 1994 study indicates a 4.0/1.0 benefit–cost ratio.

Related Projects/Activities: Any regional activity requiring logistics support services.

List of Contractors:

- CEXEC
  (support services)
  McLean, Virginia
- Automated Information Management, Inc.
  (support services)
  Lanham, Maryland

M–05 National Airspace System Regional/Center Logistics Support Services



M–07 NAS Infrastructure Management System (NIMS)

Purpose: NAS infrastructure management system (NIMS) acquisition will provide a distributed management infrastructure, a shared data architecture and data repository, and remote management capabilities networks and subsystems to implement Airway Facilities concepts of operations for the future. The NIMS will provide the necessary capabilities needed to manage the NAS infrastructure to meet customer (flying public, pilots, Air Traffic managers, and others) service requirements in a cost effective manner.

Project Information: This project combines projects 26–01 Remote Maintenance Monitoring System (RMMS), 26–04 Maintenance Control Center (MCC), 46–01 Sustain Remote Maintenance Monitoring System (RMMS), and 46–04 Maintenance Control Center (MCC) Enhancement from the 1993 CIP.

Approach: This program will provide a three–tier architecture consisting of one National Operational Control Center (NOCC), four to ten Operational Control Centers (OCC), and over 300 Work Centers (WC)/System Support Centers (SSC). Existing RMMS and MCC components that have reached the end of their cost–effective life cycle or cannot meet future performance requirements will be replaced, enhanced, or upgraded with standards based, commercial off–the–shelf equipment and software. The future NIMS will address the following major functional areas of Airway Facilities operations:

- Service and system operations.
- Service and system maintenance.
- Information management.
- Operations systems planning and requirements.
- Operations administration.

Products:

- One National Operations Control Center.
- Up to 10 Operational Control Centers.
- Monitoring and control processing subsystems (MCPS); (46–01)
- New COTS/NDI processors and software will be procured to replace/upgrade: (26–01)
  - Up to 29 maintenance processor subsystems.
  - Up to 6,000 maintenance data terminals.

– Up to 12,500 subsystems to provide monitoring and control of systems not previously included in the RMMS.

1995 Accomplishments:

- OCC prototype contract signed.

1996 Planned Accomplishments:

- ARC scheduled for second quarter 1996.
- TSARC planned for third quarter 1996.

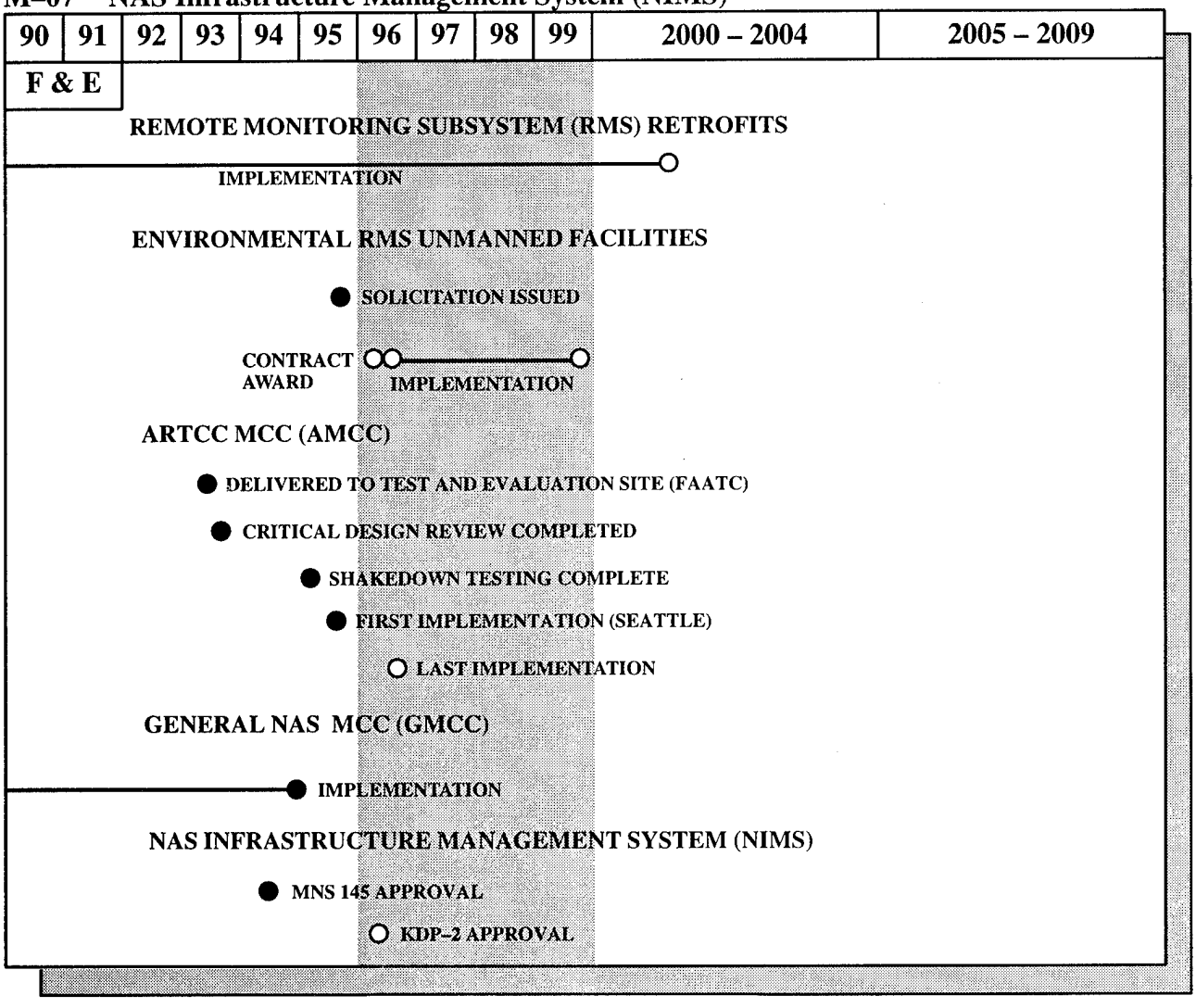
Benefit/Cost Ratio: Benefit–cost ratio will be completed by November 24, 1996.

Related Projects/Activities: M–26 NAS Management Automation Program (NASMAP) and all project offices with remote monitoring and control subsystem requirements.

List of Contractors:

- Electronic Data Systems
  (OCC prototype development)
  Herndon, Virginia

M–07 NAS Infrastructure Management System (NIMS)



M–08 Continued General Support

Purpose: This project provides continued general support for NAS initiatives and activities that arise annually. Included are: (a) regional projects that respond to changing air routes or hubbing; (b) small infrastructure replacement projects necessitated by local emergencies or natural disasters; (c) thermal neutron analysis (TNA); (d) common digitizer CD–2 sustainment; (e) CD–2 three level weather; (f) Airway Science Grant Program; (g) en route automated radar tracking system enhancements; (h) system safety and efficiency reviews support; (i) air route traffic control center resectorization, (j) purchasing or leasing land and/or easements for technical facilities; (k) leasing space for air traffic control operational facilities; and (l) small nonrecurring national programs not covered in any other CIP projects.

Project Information: This project consists of project 46–16 Continued General Support from the 1993 CIP.

Approach: Regions are allocated funding after they have listed all their local projects in a priority order. Each region submits small improvement/modification projects that are generally site specific, and unforeseen emergencies such as recovery from local disasters, etc., that require immediate attention. National project managers are allocated requested amounts to complete short–term projects or exercise options on existing contracts to meet administration or Congressional mandates.

Products: Engineering feasibility studies, additional air traffic control operating positions due to increased demand, purchasing or leasing land and/or easements for technical facilities, upgrading of off–road equipment, other national and regional requirements, natural disaster recovery, and leasing space for air traffic control operational facilities.

1995 Accomplishments:

- Completed delivery to last CD–2 site.
- Completed delivery to last ARSR–3 site.

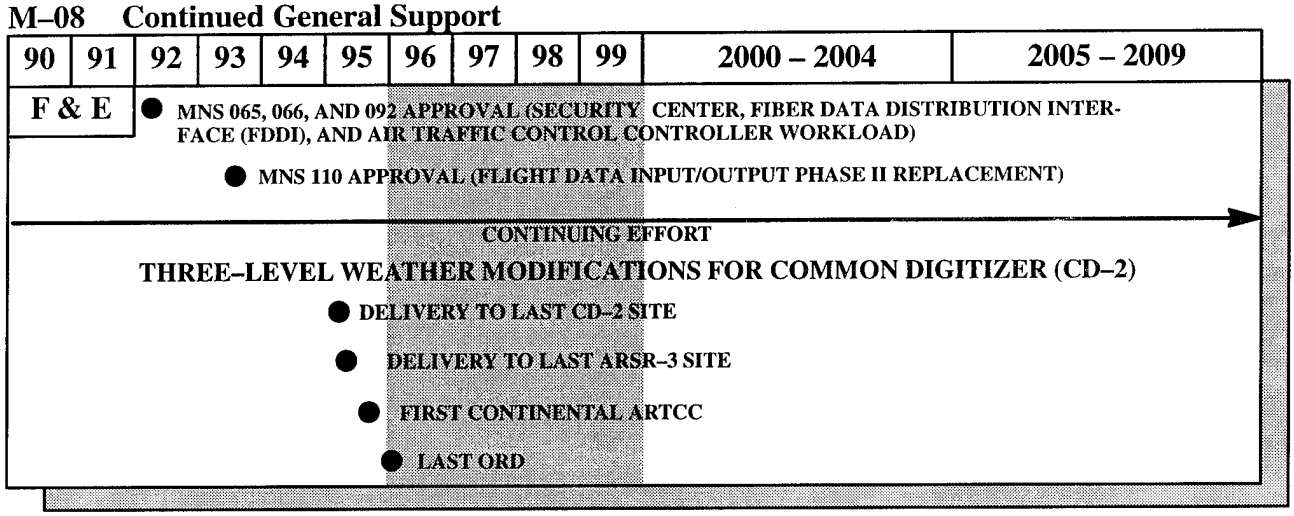
1996 Planned Accomplishments: None.

Benefit/Cost Ratio: An October 1994 study indicates a 1.4/1.0 benefit–cost ratio for the DCCR.

Related Projects/Activities: C–06 Communications Facilities Enhancement.

List of Contractors:

M–08 Continued General Support



M–10 Distance Learning

Purpose: The FAA has an increasing requirement, but with a greatly constrained budget, for technical and management training based on the NAS implementation, buyouts, attrition, diversity, and other operational requirements. The distance learning mission is to provide cost–effective and efficient training to geographically dispersed students with a reduced dependency on travel to centralized facilities.

There are four distance learning technologies: (a) computer–based instruction (CBI); (b) interactive video teletraining (IVT); (c) correspondence study; and (d) emerging technologies. This project currently addresses only CBI and IVT. The FAA has experience that proves distance learning is an effective and efficient training technology.

Project Information: This project consists of project 56–02 Computer Based Instruction (CBI) Expansion from the 1993 CIP.

Approach: The CBI and IVT technologies will be merged to facilitate a cohesive FAA training system. However, their implementation to support the overall goal will progress under separate strategies. Course development/conversion efforts will be supported by the overall goal of converting 40 percent of the current resident–based training to a distance learning delivery method by FY 2000, using FY 1993 as the baseline.

The IVT program will provide an appropriate infrastructure for the delivery of interactive technical and managerial training courses via satellite to remote locations. Compressed digital video (CDV) transmission will be used to support one–way video requirements. This transmission will be complemented by terrestrial two–way audio and viewer response systems for student–instructor interactivity. IVT system technology will consist of three basic sub–components: (a) broadcast studio capability, (b) uplink–downlink capability, and (c) receive site capability.

The CBI hardware requirements were included in the office automation and technical services (OATS) contract. The CBI Phase I program has installed 1,450 delivery platforms in approximately 900 FAA facilities (headquarters, regions, centers, and field sites) for the delivery of technical and management/general training. Approximately 1,100 additional platforms are required to complete the expansion needs. These platforms will be installed at sites which did not receive a platform during the Phase I deployment or for augmenting sites requiring additional platforms to satisfy their training requirements. A standardized platform is a key element in the CBI program to ensure that CBI courseware can be delivered at all sites.

Products:

- CBI Equipment: The CBI platform includes a personal computer (PC), video disc, digital audio, compact disk read only memory (CD–ROM), color monitors, high resolution graphics, and new interface capabilities which are used in a standalone environment. The CBI courseware development platforms also include authoring software and other development software that enhances courseware development and reduces programming time. The CBI central system for collection of student data, report generation, and data distribution is being implemented.
- CBI Courseware: In FY 1994 and FY 1995, 30 new courses were developed and delivered on CD–ROMs. Existing courses continue to be delivered on the new platforms. Additional courses are under development or awaiting funding. The courseware spans the FAA training needs from the most complex subjects to general management and administrative subjects. All FAA employees (engineers, air traffic controllers, pilots, technicians, inspectors, managers, and others) have specific and general training subjects available on the CBI platform.

- IVT Uplink–Downlink: The Aeronautical Center satellite uplink consists of a transmission dish along with encoding hardware. It transmits four channels of live or recorded instruction to a satellite in geosynchronous orbit. Each downlink will consist of a receive–only satellite dish and an integrated receiver/decoder (IRD).

  Studios: The IVT program will require multiple studios for instructor presentation. Two studios will be installed at the FAA Academy by the completion of FY 1996. These studios will be equipped with the FAA's IVT automated instructor presentation system.

  Receive Sites: Each receive site will include, but not be limited to, television monitor(s), a viewer response system, video cassette recorder(s), and associated components.

1995 Accomplishments:

CBI

- Completed installation of 1,450 delivery platforms in approximately 900 FAA facilities.
- Completed acquisition of the central system hardware.
- Delivered 12 new courses on CD–ROM.
- Completed acquisition of additional platforms.

IVT

- Installed IVT uplink and first automated instructor presentation system (AIPS) studio.
- Delivered two successful pilot courses with four additional pilots scheduled.
- Continued upgrading the digital upgrade of the Office of Public Affairs receive site network.

1996 Planned Accomplishments:

CBI

- Complete deployment and installation of additional platforms acquired in 1995.
- Complete central record keeping/collection system.
- Deliver 20 additional courses on CD–ROMs and initiate 20 course development tasks.

IVT

- Complete demonstration and validation phase activities. Achieve KDP–3.
- Complete Office of Public Affairs receive site upgrade and conduct Phase 3 testing. Achieve KDP–4.
- Install second AIPS studio at the FAA Academy and deploy 67 additional FAA receive sites.
- Continue to convert resident courses to the IVT delivery format (approximately 300 course hours).

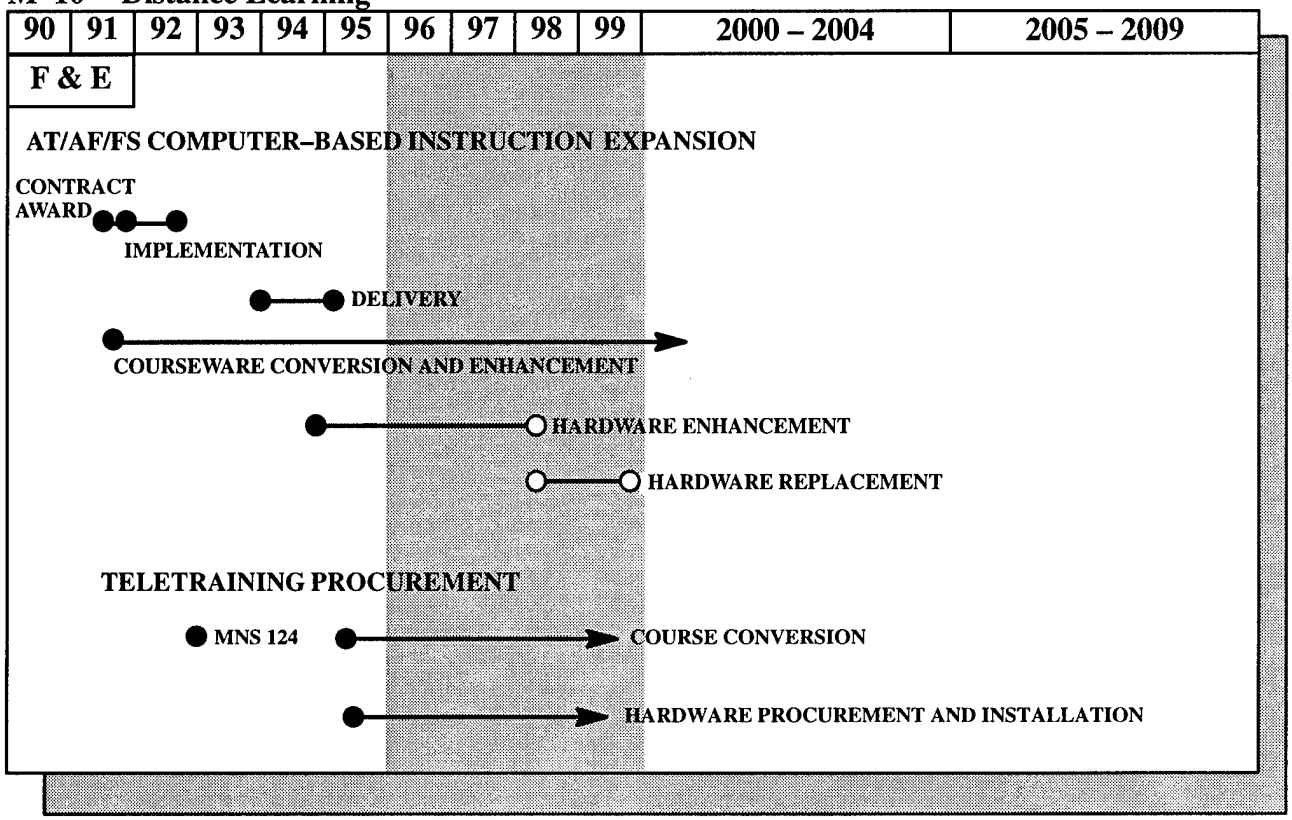
Benefit/Cost Ratio: The benefit–cost ratio for Distance Learning is 2.19/1.0. The ratio for IVT is currently being updated.

Related Projects/Activities: All projects requiring Agency training.

List of Contractors:

- AT&T Tridom
  Atlanta, Georgia
- SIGCOM
  Greensboro, North Carolina

M–10 Distance Learning



M–11 Aircraft Fleet Modernization

Purpose: This project will acquire current technology aircraft to overcome shortcomings associated with the increasing age and obsolescence of the FAA fleet (i.e, the limitations of the current fleet to meet mission requirements), the maintenance problems and excessive downtime associated with supporting aging aircraft, and the maintenance and operational inefficiencies of operating a fleet of multiple aircraft types.

Project Information: This project consists of project 56–11 Aircraft Fleet Modernization from the 1993 CIP.

Approach: Initiatives have begun to acquire current aircraft technology capable of accomplishing the flight program requirements. These new aircraft will:

- Replace aging, obsolescent aircraft where upgrade costs exceed derived benefits.
- Replace aircraft having insufficient range and capability with aircraft capable of performing international flight inspection mission requirements.

- Provide domestic flight inspection aircraft designed for human and safety factors as well as mission efficiency.

Products:

Flight Inspection Program

- Medium size/range domestic flight inspection aircraft systems.
- Large size/long range international flight inspection aircraft systems.
- Exercised contract options for five medium size/range and two large size/long range aircraft.

1995 Accomplishments:

- Exercised options for two aircraft.
- Began OT&E for medium size aircraft.

1996 Planned Accomplishments:

- Complete OT&E for medium size aircraft.
- Conduct OT&E for large size aircraft.
- Exercise lease options for one medium size aircraft and one large size aircraft.
- Deliver four medium size aircraft.
- Deliver one large size aircraft.

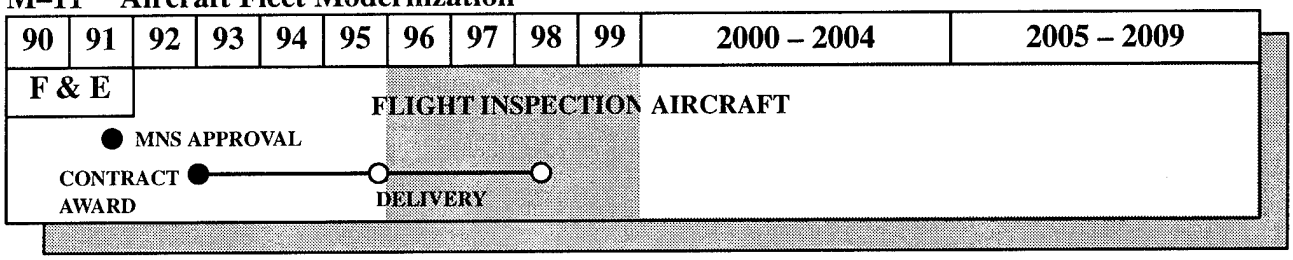
Benefit/Cost Ratio: An April 1991 study indicates a 1.8/1.0 benefit–cost ratio.

Related Projects/Activities: M–12 Aircraft Related Equipment Program.

List of Contractors:

- E-Systems, Incorporated
  Greenville, Texas

M–11 Aircraft Fleet Modernization



M–12 Aircraft Related Equipment Program

Purpose: This project provides technological upgrades, enhancements, and replacement of obsolete equipment needed to support the FAA aircraft fleet. These aircraft support the requirements of R,E&D and CIP initiatives in the area of en route and terminal navigation aids. The FAA's flight inspection aircraft also support DOD worldwide navigational aids requirements.

This project will replace the FAA's obsolete automated aircraft management information system (AMIS) with the aviation standards information system (ASIS). The ASIS will be capable of efficiently supporting both current aircraft program requirements and new requirements such as interagency (e.g., Office of Management and Budget (OMB)) cost reporting.

Project Information: This project consists of project 56–12 Aircraft Related Equipment Program from the 1993 CIP.

Approach: Plans which consider all current and projected aircraft program requirements have been developed and are being continually updated. Aircraft fleet technological upgrade implementations are scheduled to coincide with new workloads generated by CIP initiatives which support federal radio navigation plans. In addition to replacing obsolete systems, changes to aircraft configurations are planned to meet changing federal aviation regulations (FARs) which ensure safe and efficient fleet operation.

An ASIS requirements study has been conducted. The system will be developed by integrating commercial–off–the–shelf hardware and software. Maximum use will be made of existing contract vehicles (e.g., office automation technology and services (OATS)).

Products:

- Global positioning system (GPS) navigation systems.
- Ground proximity warning systems.
- Cockpit voice and flight data recorders.
- Engine condition trend monitoring systems.
- Engine performance upgrades.
- Flight inspection systems upgrades.
- ASIS.

1995 Accomplishments:

- Began installation of global positioning system navigation systems.
- Began installation of ground proximity warning systems.
- Awarded contract and installation began for flight data recorders for Agency aircraft.
- Awarded contract and began installation for flight inspection aircraft digital marker beacon systems.
- Awarded contract and began installation for digital radio altimeter systems for Beech 300 flight inspection aircraft.
- Completed installation of Mode S in the British Aerospace (Bae 800) flight inspection aircraft and began installation of terminal collision avoidance system.
- Continued installation of Beech 300 engine trend and fatigue monitoring system.
- Continued installation of noise cancelling headsets in Beech 300s.
- Continued installation of vertical profile modification for aircraft weather radar.
- Began delivery of tactical air navigation simulator equipment.
- Began installation of flight inspection runway update system.
- Completed ASIS requirements study and established ASIS objectives and critical success factors.

1996 Planned Accomplishments:

- Continue installation of global positioning system navigation systems.
- Continue installation of ground proximity warning systems.
- Continue installation of flight data recorders for Agency aircraft.
- Continue installation of flight inspection aircraft digital marker beacon systems.
- Continue installation of digital radio altimeter systems for Beech 300 flight inspection aircraft.
- Continue installation of terminal collision avoidance systems in British Aerospace (Bae 800) flight inspection aircraft.
- Continue installation of Beech 300 engine trend and fatigue monitoring system.
- Continue installation of noise cancelling headsets in Beech 300s.
- Continue installation of vertical profile modification for aircraft weather radar.

- Complete delivery of tactical air navigation simulator equipment.
- Continue installation of flight inspection runway update system.
- Begin development of ASIS.

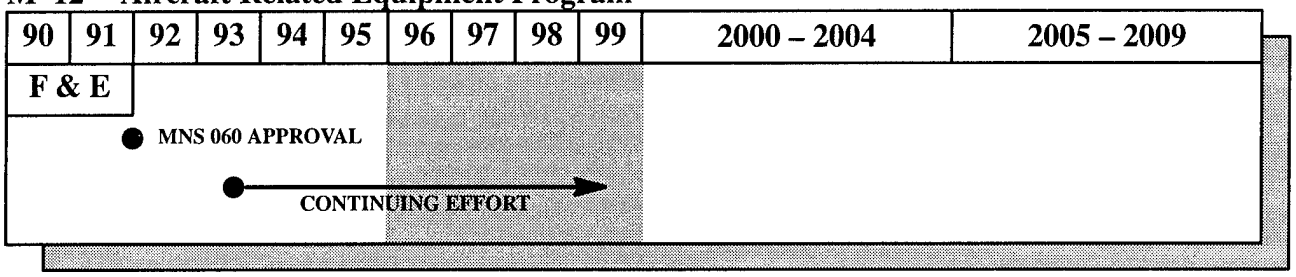
Benefit/Cost Ratio: A strict benefit–cost comparison (using net present value and benefit–cost ratio) has not been done.

Related Projects/Activities: This supports all CIP surveillance, navigation, and landing system programs. An additional related project is M–11 Aircraft Fleet Modernization.

List of Contractors:

- Trimble Navigation Systems
  Austin, Texas
- Allied Signal
  Olathe, Kansas
- Raytheon Aircraft Corporation
  Wichita, Kansas
- Gull Electronic Systems Division
  Smithtown, New York
- Sierra Technologies, Incorporated
  Buffalo, New York

M–12 Aircraft Related Equipment Program



M–13 Precision Automated Tracking System (PATS)

Purpose: To replace the laser–based precision automated tracking system at the FAA Technical Center with a new and significantly more supportable system. The new system must have increased accuracy and a mobile configuration for planned testing at the Technical Center and field locations.

Project Information: This project consists of project 56–16 Precision Automated Tracking System (PATS) from the 1993 CIP.

Approach: This project will replace the precision automated tracking system which was produced in 1975. The new system must have the capability to track a single target aircraft out to a range of 15 nautical miles and provide time correlated position data with a level of accuracy of better than 20 arc–seconds in azimuth and elevation and 5 feet in range.

Products: A modern laser-based target tracking system. The planned system will provide higher accuracy and significantly improved supportability.

1995 Accomplishments: None.

1996 Planned Accomplishments:

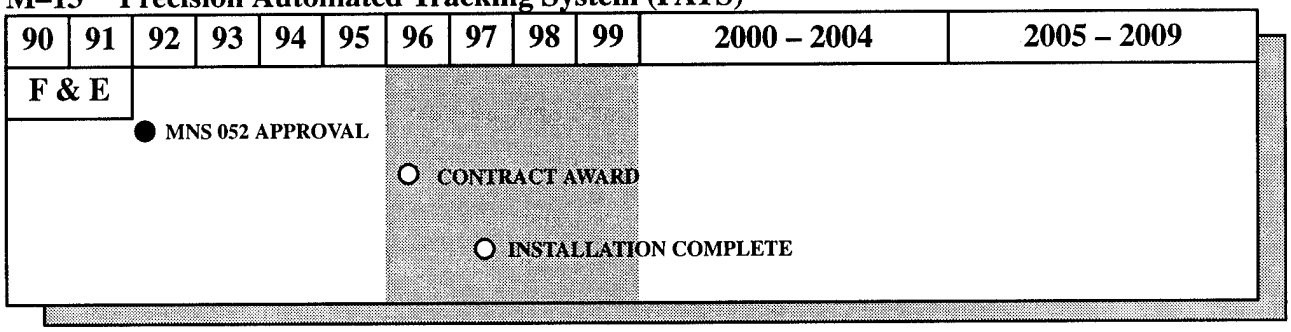
- Award contract.

Benefit/Cost Ratio: A December 1992 study indicated a 2.7/1.0 benefit–cost ratio.

Related Projects/Activities: None.

List of Contractors: List of contractors not available yet.

M–13 Precision Automated Tracking System (PATS)



M–15 National Airspace System Spectrum Engineering Management

Purpose: This project will provide spectrum engineering and frequency management support for projects and facilities that are being implemented under the CIP. Furthermore, this project will provide the sectors with the training, resources, and equipment (spectrum analyzers and direction finders) required to independently identify the source of interference problems in a timely manner.

High power radio and television stations are serious interference sources for both ground and airborne equipment. Resolution and prevention of this type of interference involves close coordination with the broadcasting industry, the FCC, and the ICAO. This project will provide:

- Facility coverage charts necessary for proper engineering of frequencies for relocated or replaced communications, navigation, and surveillance facilities.
- A source of facilities and equipment funding for frequency retrofit of existing equipment replaced or relocated under the CIP.
- United States telecommunications support to international civil aviation as required in the CIP. This involves extensive international coordination on aeronautical mobile services, aeronautical fixed services, aeronautical mobile satellite services, etc.
- Timely identification of the source of interference by the development of sector–level expertise.

Project Information: This project consists of projects 56–15 NAS Spectrum Engineering Sustained Support and 56–26 Frequency Interference Support/Resolution from the 1993 CIP.

Approach: Most of the radio frequency interference (RFI) work will be done at the regional level, but problems that the regions cannot handle will be addressed by FAA headquarters. Frequencies are assigned to ensure interference–free operation of the NAS. This effort involves electromagnetic compatibility analysis, formal spectrum certification by the National Telecommunications and Information Administration, national and international frequency coordinations, and radio propagation studies.

This support will obtain and protect necessary frequencies for new, relocated, or replaced NAS facilities through automated computer tech-

niques. Radio frequency interference problems will be investigated and resolved.

Two new sector–level resources will significantly enhance the sector's ability to independently resolve interference problems. First, the equipment necessary to identify and eliminate frequency interference problems will be provided to every sector office. Second, the sector's technical support staff personnel will be provided training in this area.

Products:

- Frequency plans in support of the CIP include the high–altitude en route flight advisory service, future 25 kHz air–ground communications system, radio communications link, national radio communications system, and next generation weather radar. (56–15)
- Electromagnetic compatibility guidelines for facility consolidation. (56–15)
- Frequency authorization and formal spectrum approval from the National Telecommunications and Information Administration. (56–15)
- Facility coverage charts. (56–15)
- Spectrum engineering studies in support of the CIP. These studies include frequency engineering models, radio frequency interference suppression devices, investigation of modern technology and procedures for radio frequency interference elimination, radio and television interference evaluation, etc. (56–15)
- 11 radio frequency interference vans. (56–26)
- Modern equipment will be procured and deployed to all sector offices. Equipment will be purchased through project M–27 National Airspace Integrated Logistics Support (NAILS). Sector office personnel will receive required training. (56–26)

1995 Accomplishments:

- Awarded a contract for the purchase of 11 radio frequency monitoring systems vans.
- Continued training of regional and sector personnel on RFI investigation and resolution techniques by the program office.
- Provided sectors with hand held directional finder (DF) units.
- Continued development of automation tools for frequency engineering and RFI investigation and resolution.

1996 Planned Accomplishments:

- Establish a prototype fixed DF system in Chicago metropolitan area for real–time response to RFI problems.
- Continue training of regional and sector personnel on RFI investigation and resolution techniques.
- Provide additional sectors with additional DF units.
- Provide regional frequency management offices with portable automated spectrum monitoring system.
- Continue development of automation tools for frequency engineering and RFI investigation and resolution.

Benefit/Cost Ratio: A March 1994 study indicates a 2.8/1.0 benefit–cost ratio for the frequency interference support/resolution project.

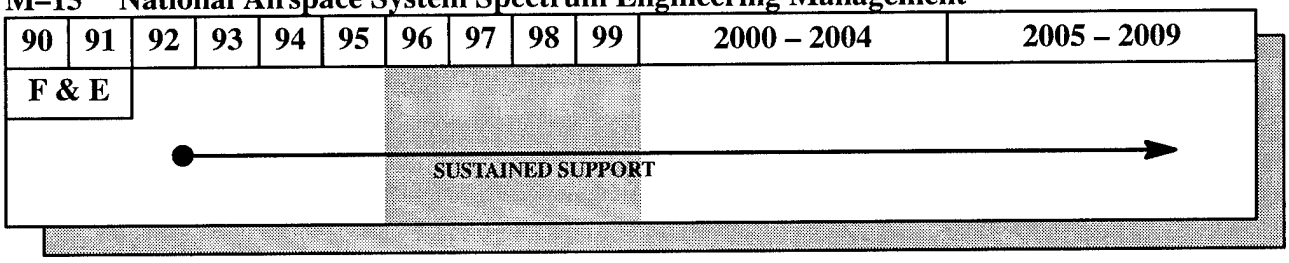
Related Projects/Activities: Spectrum engineering facilities and activities at the FAA Technical Center provide the test bed and electromagnetic compatibility analysis necessary to accomplish the spectrum management function. A–12 Airport Surface Target Identification System (ATIDS), C–09 Sustaining Backup Emergency Communications (BUEC), C–12 Expansion/Reconfiguration of Low Density Radio Communicaitons Link (LDRCL), C–20 Aero-

nautical Data–link, C–21 Next–Generation Air/Ground Communicaitons System, C–22 Gulf of Mexico, N–03 Instrument Landing System (ILS), N–06 VORTAC, N–09 Sustain Distance Measuring Equipment (DME), N–10 Sustain Nondirectional Beacon (NDB), N–12 Augmentations for the Global Positioning System (GPS), S–01 Airport Surface Detection Equipment Radar (ASDE), S–02 Mode S, S–03 Terminal Radar Program (ASR), S–04 Long–Range Radar Program, W–01 Automated Weather Observing System (AWOS), W–02 Weather Radar Program, W–03 Terminal Doppler Weather Radar (TDWR) System, and W–05 Low–Level Windshear Alert System (LLWAS). R,E&D Plan project 031–130 NAS Telecommunications for the 21st Century is a related project.

List of Contractors:

- Volpe National Transportation Systems Center
  (hardware maintenance and engineering support)
  Cambridge, Massachusetts
- MITRE
  (engineering studies)
  McLean, Virginia
- MiTech
  (training program development)
  Washington, District of Columbia

M–15 National Airspace System Spectrum Engineering Management



M–17 Test Equipment Modernization and Replacement

Purpose: A large percentage of the sector test equipment currently used in equipment maintenance and system certification is compatible with tube–type technologies. As the tube–type equipment is replaced with solid–state equipment, the ability of the older tube–type test equipment will be exceeded. The new equipment requires more precision and accuracy in verifying proper operation and must also be compatible with equipment in a remote maintenance environment. This project provides for the acquisition of new test equipment to replace sector test equipment that is obsolete, has high failure rates, is no longer repairable, and is no longer supportable by the manufacturer or the FAA Logistics Center.

Project Information: This project consists of project 56–27 Test Equipment Modernization and Replacement from the 1993 CIP.

Approach: Modern test equipment will be procured and deployed to replace obsolete test equipment which is ineffective from a technical utilization standpoint or as it becomes inefficient to maintain from a cost standpoint. Regional test equipment coordinators review the current inventory and request upgrades for replacing equipment which is difficult to maintain or no longer functional in today's environment.

The acquisition approach for purchasing test equipment is to make maximum use of existing large–scale government procurement programs which provide cost and schedule benefits to the FAA (e.g., DOD consolidated equipment list and GSA schedules).

Products:

- Provides upgraded test equipment.
- Provides for test equipment repair and calibration prior to system acceptance.
- Provides multi–functional test equipment.
- Establishes test equipment complements which support the maintenance control center (MCC) concept.

1995 Accomplishments:

- Replaced 30–year old radar beacon test sets.
- Replaced 26–year old spectrum analyzer.
- Replaced 30–year old volt meter.
- Began replacement of 2,000, 32–year old communications service monitors.

1996 Planned Accomplishments:

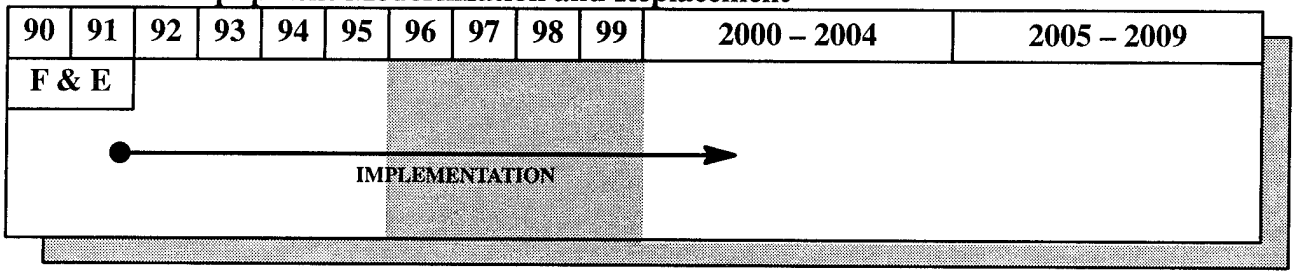
- Continue replacing 1,620, 32–year old communications service monitors.

Benefit/Cost Ratio: A December 1993 study indicates a 7.0/1.0 benefit–cost ratio.

Related Projects/Activities: M–07 NAS Infrastructure Management System (NIMS) and any new CIP system potentially increases the requirement for more general service test equipment.

List of Contractors: Requirement will be met with commercial off–the–shelf equipment.

M–17 Test Equipment Modernization and Replacement



M–18 Computer Resources Nucleus (CORN)

Purpose: This project supports the automated data processing needs of the FAA by creating a uniform, agencywide computing resource for operational and administrative projects. Through such a resource, the inconsistencies and capacity shortfalls of the current automated data processing system are being alleviated. To accomplish this, the project is securing automated data processing services to provide for total facilities management and turnkey operations through contractor–provided facilities, software, and staff. The objectives of this effort are to:

- Provide timely, responsive, and economical general purpose automated data processing resources to satisfy programmatic needs.
- Increase productivity of FAA projects and personnel.
- Provide uniformity of FAA data processing, facilitating systems integration and automated data processing standardization.
- Provide backup processing capabilities.
- Reduce frequency of procurement for automated data processing upgrades, reducing related expenditures.
- Foster utility–like budgeting and usage of computer resources (uniform chargeback mechanisms).
- Devote the FAA's limited automated data processing staff resources to better satisfying its programmatic requirements.

Project Information: This project consists of project 56–28 Computer Resources Nucleus (CORN) from the 1993 CIP.

Approach: The approach is to view the general purpose automated data processing configurations in FAA headquarters, regions, FAA Aeronautical Center, and FAA Technical Center as a common resource for all FAA elements, and to quantify the current and future demand for such automated data processing support. Once defined and quantified, the next step transfers the operational and technical functions of this automated data processing support to the commercial arena.

Products:

- Furnishing the FAA with contractor–provided computer resources and subsequent upgrades.
- Providing for the conversion of existing automated data processing workload to the contractor–provided automated data processing environment.
- Providing all staffing, hardware, systems software, and off–the–shelf package software to meet the requirements for general purpose data processing for all elements (regions, centers, and headquarters) in a timely and economical manner.

1995 Accomplishments:

- Completed application system conversions to CORN.
- Completed NAS Program Management Tools, National Flight Data Center, and Air Traffic Control System Command Center data processing activities under CORN.
- Completed CORN Backup Site Operational Readiness Test.

1996 Planned Accomplishments:

- Fully deploy CORN Chargeback and Cost Recovery System.
- Complete CORN Backup Site – Disaster Recovery Application Test.
- Begin NAS Management System Prototype.

- Project terminates in 1996.

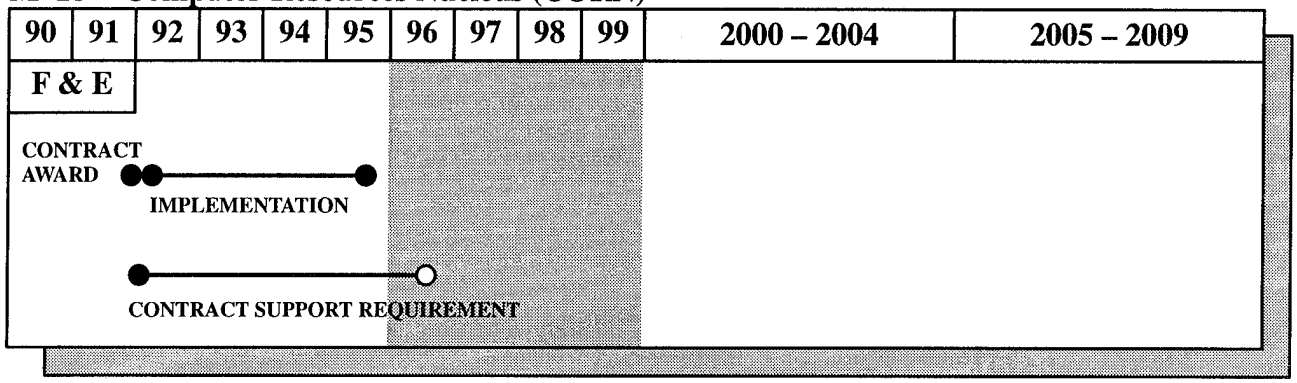
Benefit/Cost Ratio: A strict benefit–cost comparison (using net present value and benefit–cost ratio) has not been done.

Related Projects/Activities: This project supports the interface and data interchange requirements of the office automation technology and services (OATS) contract, and interfaces with the administrative data transmission network (ADTN). F–05 Flight Service Facilities is a related project.

List of Contractors:

- Electronic Data Systems (EDS)
  (principal contractor)
  Plano, Texas
- Erekson Associates
  (technical support)
  Arlington, Virginia
- Columbia Services Group
  (technical support)
  Arlington, Virginia

M–18 Computer Resources Nucleus (CORN)



M–20 National Airspace System Training

Purpose: This project supports courses that require resident training at the FAA Academy. It provides for procurement and installation of modern training media, automated training development systems, and communications equipment supporting resident and field–based materials. The buildings occupied by the FAA Academy are the responsibility of the landlord (Oklahoma City Airport Trust) for maintenance and renovation; internal training infrastructure is the responsibility of the FAA Academy. Classrooms, laboratories, and instructional staff work areas need to be modernized to fulfill the Academy training mission.

Project Information: This project consists of project 56–35 National Airspace System Training from the 1993 CIP.

Approach: Maximum use is made of existing contract vehicles (e.g., office automation technology and services (OATS) and commercial–off–the–shelf (COTS) software and hardware). This project includes procurement of modern training media, simulators, automated training development systems, and training interactivity equipment. Also included are activities to retrofit or improve FAA Academy classrooms, laboratories, and instructional staff work areas to meet the needs of the NAS, as well as make the FAA's training environment more cost–effective.

Products:

- Automation and technology procurement for training.
- Training facility upgrade projects.

1995 Accomplishments:

- Began implementing post–renovation advanced technology classrooms at the Academy.
- Completed several equipment/facility upgrades, including environmental improvements, video device installation, and computer hardware/software acquisition and configuration.
- Installed necessary consoles and hardware to support training simulations.

1996 Planned Accomplishments:

- Complete advanced technology classrooms in Building 3 (Air Traffic Building).
- Upgrade interactive instructional delivery system, tower operator training system, tower external display system, terminal area display station, enhanced debriefing station, instrument flight rules, and visual flight rules tower mockup classroom/laboratory simulations to provide more realistic training capabilities.
- Complete NAS operations manager simulation system.
- Complete simulation system to train personnel to operate maintenance control center equipment.
- Complete instructional resource information system to promote improved monitoring of the FAA Academy activities/cost–effectiveness by its customers and management.

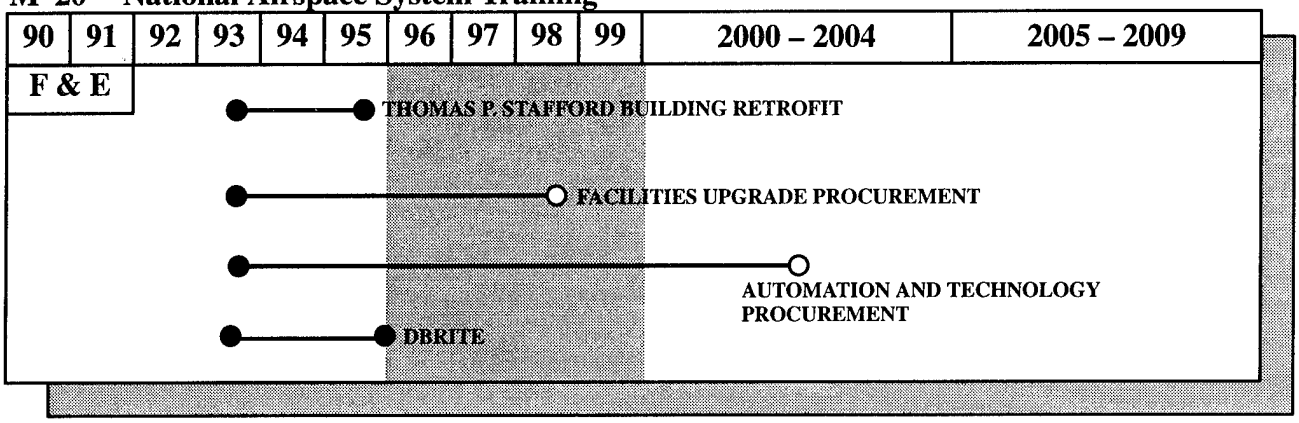
Benefit/Cost Ratio: A strict benefit–cost comparison (using net present value and benefit–cost ratio) has not been done.

Related Projects/Activities: All CIP projects that require training support.

List of Contractors:

- UNICOR
  Texarkana, Arkansas and
  Three Rivers, Texas
- University of Arizona
  Tucson, Arizona
- General Projections System
  Alamonte Springs, Florida
- General Parametrics
  Los Angeles, California
- Hewlett Packard
  Dallas, Texas
- Graphics Resource Center
  Oklahoma City, Oklahoma
- 800 Software
  Richmond, California
- University of Oklahoma
  Norman, Oklahoma

M–20 National Airspace System Training



M–21 Logistics Support Systems and Facilities

Purpose: The FAA Logistics Center supports equipment, facilities, and systems that have become obsolete or have significant deterioration leading to sparing/support problems. In addition, the number of spare parts has increased as a direct result of the CIP project deployment and the technology for testing and quality checking has changed.

The implementation of the CIP projects impacts the FAA logistics support functions, particularly in the area of supply support and repair. This project identifies support equipment, facilities, and systems required for CIP project life cycle support. It also highlights the importance of continued development of the logistics and inventory system/computerized dispatch system (LIS/CDS) to enhance the supply system.

The FAA Logistics Center must provide management and control of operational assets in item identification, requirements determination, acquisition, inventory management, and physical storage or distribution of existing and new NAS facilities and equipment.

Project Information: This project consists of project 56–37 Logistics Support Systems and Facilities from the 1993 CIP.

Approach: To provide responsive life cycle support, the FAA Logistics Center will identify obsolescent/deteriorated parts/equipment to replenish quantities, provide additional materiel handling and testing capability, continue development of the logistics and inventory system/computerized dispatch system, and replace the mobile facilities fleet.

Specific items to be addressed are as follows:

- Determine needs and procure handling equipment (e.g., forklifts).
- Determine needs and provide equipment for automated test equipment and repair of high technology electronic components requiring a clean room environment.
- Determine requirements for demand and forecast of assets supported by the FAA Logistics Center. Determine the modernization requirements for management, control, and handling of these assets.
- Determination and replenishment of stocks of deteriorated or obsolescent parts/equipment and facilities.

Products:

- Modern systems for the management, control, and handling of FAA assets.
- Material handling equipment and upgrade.
- Unique test equipment for depot–level repair.
- Replacement of the existing mobile facilities fleet.
- Adequate spare parts and upgraded unique equipment. In addition, a continuing review will take place for future program actions.

1995 Accomplishments:

- Continued logistics and inventory system development phase.
- Purchased additional test equipment.
- Began receiving materiel handling equipment.

1996 Planned Accomplishments:

- Continue logistics inventory system development.

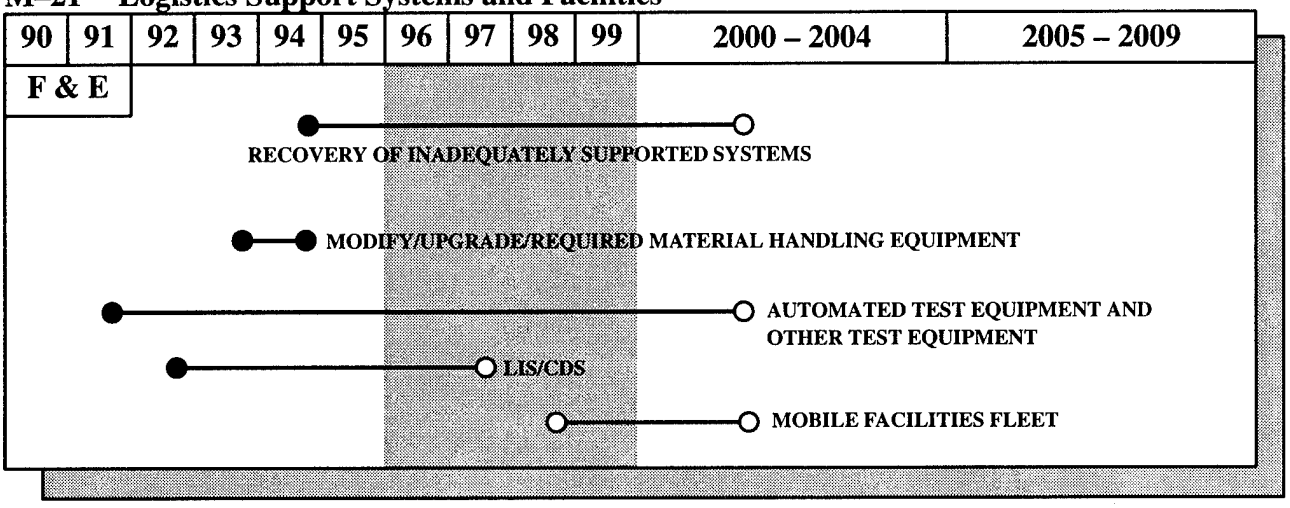
Benefit/Cost Ratio: A May 1991 study indicates a 2.0/1.0 benefit–cost ratio.

Related Projects/Activities: F–18 Aeronautical Center NAS Support Facilities, M–07 NAS Infrastructure Management System (NIMS), and M–27 National Airspace Integrated Logistics Support (NAILS).

List of Contractors:

- Modern Technology Systems
  Oklahoma City, Oklahoma

M–21 Logistics Support Systems and Facilities



M–22 National Airspace System Implementation Support

Purpose: This project will provide support to the regional offices, major FAA facilities, Aeronautical Center, and FAA headquarters for facility level transition planning, project implementation coordination at the facility, development of facility level operational procedures, and verification tests that integrate the new NAS subsystems with the existing facility environment. Additionally, support will be provided to the regions and facilities in the coordination of the activities of the various CIP contractors with the day–to–day air traffic control operations of the facilities.

Project Information: This project consists of project 56–47 NAS Implementation Support from the 1993 CIP.

Approach: The FAA will procure the required support via a long–term implementation support contract. This support will be furnished directly to the Airway Facilities and Air Traffic organizations at regional offices, facilities, and headquarters.

Products: The contractual support will provide the FAA with:

- Major facility transition plans – Transition plans will be produced and updated for air route traffic control centers, airport traffic control towers, and other major air traffic control facilities. Plans will not only address the physical and system changes of the facilities but also the changes the FAA workforce at the facilities must undergo.
- Configuration control of major facilities – The contractor will provide the necessary information exchange and status control to ensure the FAA's major facilities install new systems in a similar manner – thereby reducing the individual facility engineering costs for any further changes.
- Supplemental regional project management – The contractor will provide temporary project management support at the regional level for those transition projects for which the FAA has insufficient staffing.
- Facility level CIP project implementation coordination – Contractor provided on–site coordinators will develop installation schedules which minimize the impact to air traffic control operations at the facility and maximize the time available for installation contractors. Efforts by "turn key" contractors will be monitored and reported to FAA facility and regional staffs.
- Assessments of and recommendations for transition strategies for various systems and equipments.
- Facility level test plans and operating procedures for new NAS subsystems installed at the facilities.
- Documenting site implementation problems and recommending solutions to these problems.
- Review and assessment at the national level of individual facility transition plans and regional transition management plans.
- Assessments of deployment readiness of CIP projects.
- Studies and analyses of radio frequency spectrum requirements and allocations.
- Maintenance requirements documentation for new automation, communications, and navigation/landing systems.
- Integrated Logistics Support Plans (ILSP) for new systems.

1995 Accomplishments:

- Supported commissioning of New Denver Airport and Ontario portion of Southern California TRACON (F–02).
- Supported site preparations and operational commissioning of 15 Alaskan NAS

Interfacility Communication System (ANICS) sites (C–17).

- Supported Voice Switching and Control System (VSCS) (C–17) implementation at 23 centers and support sites.
- Prepared supporting documentation for major acquisition reviews of:
  - Potomac and Northern California Metroplex Control Facilities (F–02)
  - New Austin Airport at Bergstrom (F–03)
- Provided deployment readiness review support for over 110 CIP projects.

1996 Planned Accomplishments:

- Support installation and commissioning of San Diego portion of Southern California TRACON.
- Support installation/commissioning of 20 ANICS earth stations.
- Support three–bay expansion for Anchorage Center.
- Support transition planning, engineering, and construction of Los Angeles center.
- Support transition planning, engineering, and construction of new Austin airport and installation of navigation aids.
- Support installation and commissioning of Dallas/Ft Worth TRACON.
- Continue deployment readiness review support for new system deployments.
- Continue support for VSCS implementation.

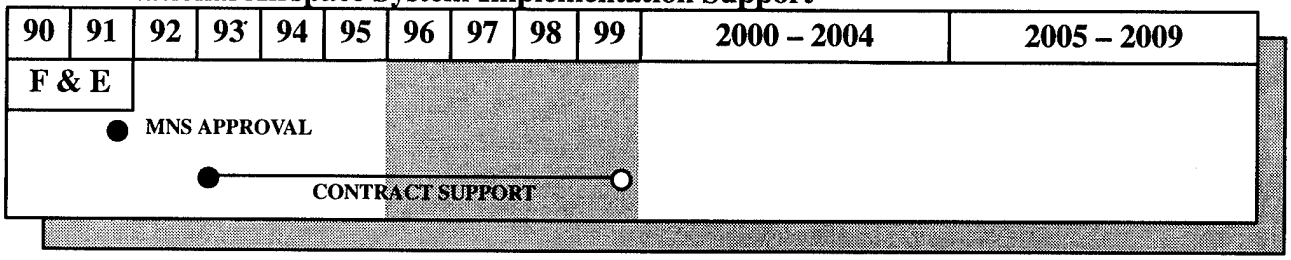
Benefit/Cost Ratio: Due to the nature of this project, benefit–cost data is included within the benefit–cost analyses for the individual projects being supported.

Related Projects/Activities: All projects which are to be installed at FAA air traffic control facilities.

List of Contractors:

- Lockheed Martin Corporation (implementation support)
  Bethesda, Maryland
  - Arthur D. Little
    Cambridge, Massachusetts
  - Fluor Daniel
    Irvine, California
  - Information Spectrum, Inc.
    Falls Church, Virginia
  - Information Systems and Networks Corporation
    Bethesda, Maryland
  - LB&M Associates
    Lawton, Oklahoma
  - Science Applications International Corporation
    San Diego, California
  - Systems Requirements and Services Associates, Inc.
    Arlington, Virginia
  - Washington Consulting Group
    Washington, District of Columbia

M–22 National Airspace System Implementation Support



M–24 National Aviation Safety Data Analysis Center (NASDAC)

Purpose: A centralized National Aviation Safety Data Analysis Center capability will map selected, existing, safety data bases into a standard format. This will facilitate detailed analysis of previously fragmented data bases in a single, verified, quality controlled manner. The National Aviation Safety Data Analysis Center (NASDAC) will function as a partner with existing aviation safety source data systems. Access to resulting analysis and decision support reports will be made available to users.

Project Information: This project consists of project 56–52 National Aviation Safety Data Center (NASDC) from the 1993 CIP.

Approach: The power, reliability, and speed of modern information technology will be employed to significantly enhance the FAA's capability to conduct safety analyses and identify emerging safety issues. Selected safety data currently maintained in differing hardware/software environments and formats will be transferred into a single integrated data base using standardized definitions and an event based structure. Strict data quality control will be maintained by performing data integrity verifications and reporting problem areas to data source managers. An integrated set of powerful automated analysis tools will be applied to the integrated data base to enable the user to identify previously hidden indicators of potential safety problems.

Products: An integrated safety data base that has been enhanced by format standardization, data verification, and the application of automated analysis tools.

Related Projects/Activities: A–19 Portable Performance Support System (PPSS), M–26 NAS Management Automation Program (NASMAP), and M–28 FAA Corporate Systems Architecture.

1995 Accomplishments:

- Expanded integrated safety data base to include data from 14 source information systems.
- Expanded on–line NASDAC access to 25 workstations.
- Prepared detailed facility requirements and procured/configured the computer hardware/software to open a NASDAC facility in the FAA headquarters.
- Prototyped a World–Wide Web server to promote safety data dissemination.
- Formulated a strategic plan for expanding NASDAC services to additional FAA and external users.
- Convened a workshop for senior FAA management to explore future opportunities for accessing new sources of safety data through the NASDAC facility.

1996 Planned Accomplishments:

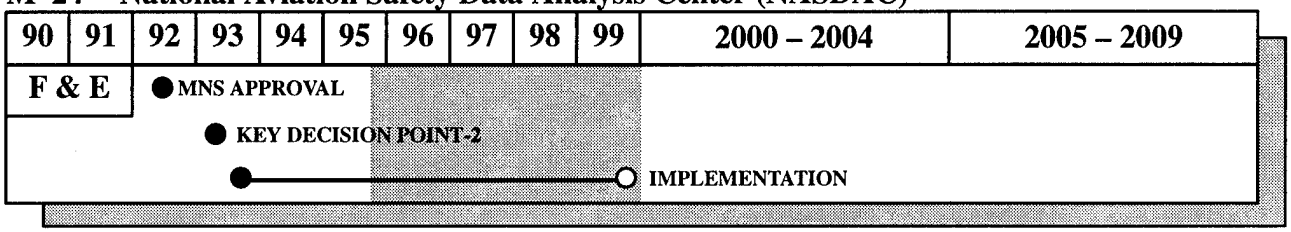
- Develop an international data base that combines the recommendations of national aviation safety oversight authorities.
- Provide public access to selected NASDAC data and publications.
- Import three to five additional safety data bases.

Benefit/Cost Ratio: An April 1992 study indicates a 1.5/1.0 benefit–cost ratio.

List of Contractors:

- Macfadden & Associates, Inc.
  Silver Spring, Maryland
- Advanced Systems Technology, Inc.
  Atlanta, Georgia

M–24 National Aviation Safety Data Analysis Center (NASDAC)



M–25 Independent Operational Test and Evaluation

Purpose: This project provides for independent operational test and evaluation of designated major system acquisitions to ensure their operational effectiveness and suitability, and to reduce deployment risk to the FAA.

Project Information: This project consists of project 56–55 Independent Operational Test And Evaluation Oversight from the 1993 CIP.

Approach: The independent operational test and evaluation function ensures that operational requirements are met, and that systems are ready for production and/or deployment. The independent operational test and evaluation office assesses operational performance of major systems in realistic test environments prior to the full production and/or deployment decision. Independent operational test and evaluation for projects which use an abbreviated acquisition process may also be required. The independent operational test and evaluation office has responsibility for designated FAA programs of significant operational impact.

Products: The extent to which a system increases aviation safety, capacity, and productivity depends on how well the software, hardware, operational procedures, and human factors are integrated in that system. For major acquisitions and selected programs, the independent operational test and evaluation office develops operational readiness criteria and assesses compliance by conducting independent operational tests. Results of the independent operational test and evaluation are reported to the Administrator through the Associate Administrator for Air Traffic Services.

1995 Accomplishments:

- Completed VSCS IOT&E report.
- Completed ARSR–4 IOT&E report.

1996 Planned Accomplishments:

- Complete VSCS report.
- Complete AMASS IOT&E report.
- Complete TATCA/AERA IOT&E report.
- Complete WARP IOT&E report.

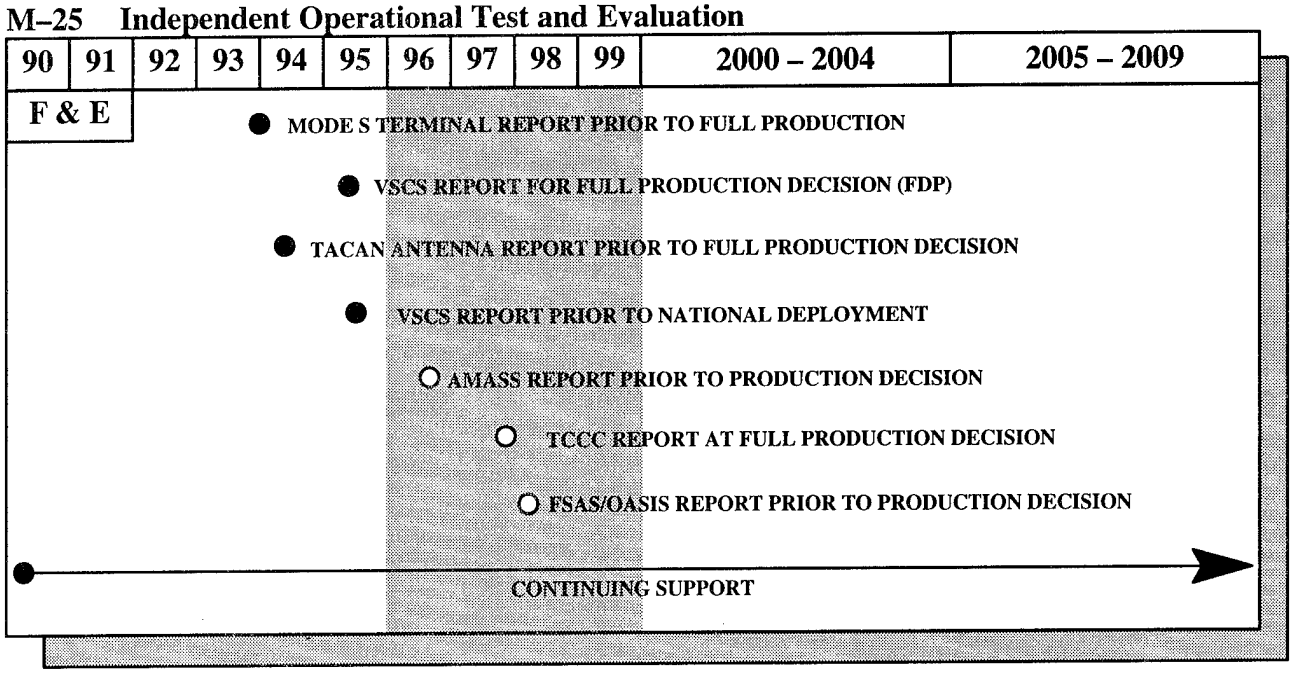
Benefit/Cost Ratio: A November 1994 study indicates a 12.9/1.0 benefit–cost ratio.

Related Projects/Activities: Current/future major acquisitions and other selected systems.

List of Contractors:

- Technautics Inc.
  Alexandria, Virginia
- Galaxy Scientific Corporation
  Pleasantville, New Jersey

M–25 Independent Operational Test and Evaluation



M–26 NAS Management Automation Program (NASMAP)

Purpose: Present NAS data systems are inadequate to provide seamless electronic access to local or distributed NAS data systems. Many of the NAS data systems were designed upon proprietary architectures that meet specific objectives and were not designed to interconnect or provide a common data interface. The ability to access data or share data between systems is non–existent or extremely restrictive. In addition, accessing the various systems requires specific communication connections, a variety of software applications and different hardware configurations. The result is that the current systems cannot meet the growing demand to share or integrate data across different hardware or software platforms. NAS program offices located throughout the United States have a requirement to access relevant data in a timely manner without regard to location or system architecture. Due to the costs associated with maintaining links to the proprietary system, many program offices do not have access to relevant NAS data. The inability to access data in a timely or effective manner forces NAS project managers to rely on incomplete or older data and thus impacts the ability to make well informed decisions. The NAS Management Automation Program will address these problems and help the FAA increase productivity by managing resources and personnel effectively.

Automated Documentation Development and Maintenance: Managing NAS maintenance technical documentation is becoming increasingly more difficult and complex. The Airway Facilities organization is undergoing changes in the way future maintenance activities will be performed to accommodate decreasing resources and rapidly changing infrastructure technologies. As a result, maintenance technical instruction manuals, technical drawings, and training course documentation take on increasing significance to the technicians in the field as they are called upon to fix a wider range of

equipment. The current paper documentation system is extremely time consuming, resource intensive, and requires large storage space. Therefore, most field facilities cannot maintain a complete technical library and the time to receive requested information from a master library is becoming too long. Also, the assets needed to update the master libraries with technical changes is becoming cost prohibitive. For example, the volume of technical documentation is expected to grow from an estimated 4 million pages to more than 12 million pages by the end of the century. This growth is forecast to make management, storage, distribution, and documentation updates unmanageable. The automated documentation development and maintenance element will provide an on–line multi–user access, control, and maintenance capability for NAS technical documentation to address these issues.

Project Information: This program consists of project 56–56 NAS Management Automation Program (NASMAP) from the 1993 CIP.

Approach:

Information is a critical resource within the FAA and this project offers opportunities to harness the growing amount of data within the Agency. This effort is being driven by the Airway Facilities Five Year Information Technology Strategic Plan and the FAA Strategic Plan. This project will provide three key components: an integrated hardware and software architecture plan, the required hardware and software to support the architecture, and an executive information system. Implementing these components will result in establishing a national interconnected network, providing timely access to all NAS data. The architecture plan establishes a baseline for the overall system requirements. This architecture lays out a basic structure to build an integrated hardware/software platform, and data repository. Current equipment has been catalogued to determine what systems meet the baseline architecture. A software data interface will be developed to provide users with easy access to numerous data systems. Commercial–off-the-shelf components will be used as needed for new hardware/software requirements or for upgrades. The executive information system will extract data from multiple databases and repositories and manipulate it into information usable for executive decision making processes. NAS management automation is necessary to achieve sound management decisions, as well as the ability to conduct timely and meaningful analysis for the effective NAS implementation and operation.

Products:

- Baseline architecture plan.
- Hardware procurements.
- Software data interface development.
- Executive information system.

1995 Accomplishments:

- Deployed executive information system as proof of concept for the integrated architecture.
- Developed and distributed draft standards on applications, data, technology, and video–conferencing.
- Developed and distributed a catalog of application systems used throughout Airway Facilities.
- Supported a business process redesign effort in one region undergoing realignment.

1996 Planned Accomplishments:

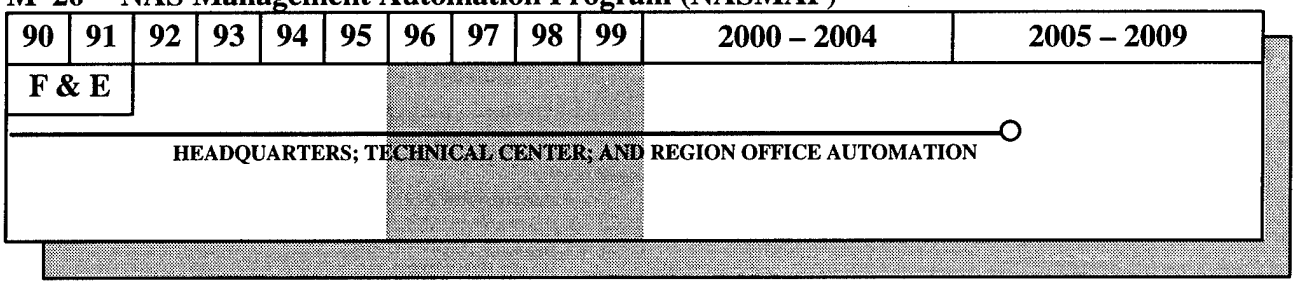
- Deliver architecture design document.
- Release official standards for applications, data, technology, and video–conferencing.
- Deliver data dictionary for the corporate information architecture.
- Develop regional information system (REGIS) as prototype of corporate–wide data repository.

Benefit/Cost Ratio: A December 1992 study indicates a 4.4/1.0 benefit–cost ratio.

Related Projects/Activities: A–19 Safety Performance Analysis System (SPAS), F–17 Computer Aided Engineering Graphics (CAEG) Enhancement, M–07 NAS Infrastructure Management System (NIMS), M–10 Distance Learning, M–24 National Aviation Safety Data Analysis Center (NASDAC), and M–27 National Airspace Integrated Logistics Support (NAILS).

List of Contractors:
Titan Corporation
McLean, Virginia

M–26 NAS Management Automation Program (NASMAP)



M–27 National Airspace Integrated Logistics Support (NAILS)

Purpose: This program supports multiple projects that will ensure supportability planning is incorporated into all phases of acquisition projects and provide cost effective life-cycle management support for NAS subsystems, equipment, facilities, and applicable research, engineering and development projects under the national airspace integrated logistics support (NAILS) project.

Project Information: This project consists of project 56–58 National Airspace Integrated Logistics Support (NAILS) from the 1993 CIP.

Approach: The NAILS project will establish, maintain, and enhance the Agency's ability to effectively manage NAS supportability and minimize life-cycle costs associated with NAS acquisition and maintenance. The logistics models and automation tools developed under this project will be used to perform repair level analyses and spares qualification; identify equipment failure trends; influence equipment design; and ensure equipment supportability over the operational life of a system. In addition, development of a NAILS management information system will enable the Agency to organize and manage integrated logistics support and maintenance data into a central data base to provide for cost effective management support decisions. Incremental development and implementation of these models and tools will provide the earliest opportunity for a return on investment by providing a fully functioning capability upon completion of each program phase. Follow-on phases will provide enhanced capabilities and respond to NAS evolutionary changes.

Initial production and subsequent updating of national airspace integrated logistics support planning documents and data throughout the subsystem acquisition is being provided by automation of the production and updating process.

Products:

- NAILS cost estimating model.
- NAILS acquisition document automation.
- Level of repair analyses model enhancement.
- Spares planning model enhancement.

- Logistics data storage and retrieval system.
- Life cycle management cost model.
- Logistics management information and project tracking.
- Cost and performance measurement system.
- Life cycle management budget tool.

1995 Accomplishments:

- Completed NAILS management information system Phase I development, training and implementation.
- Completed Spares Planning Model Phase I development, testing and implementation.
- Completed level of repair analysis model Phase I development, testing, and implementation.
- Completed Airway Facilities cost estimating model development, testing, and implementation.
- Completed logistics planning and requirements simplification (LOGPARS) Phase I development and prototype testing.
- Completed automated logistics support analysis record data base management system implementation at the FAA Logistics Center.
- Completed logistics funding requirement document (life cycle management budget tool) Phase I development, training, and implementation.

1996 Planned Accomplishments:

- Complete cost and performance measurement system prototype development and testing.
- Complete Phase II of the NAILS management information system.
- Implement LOGPARS Phase I.
- Complete training and implementation of life cycle management cost model.

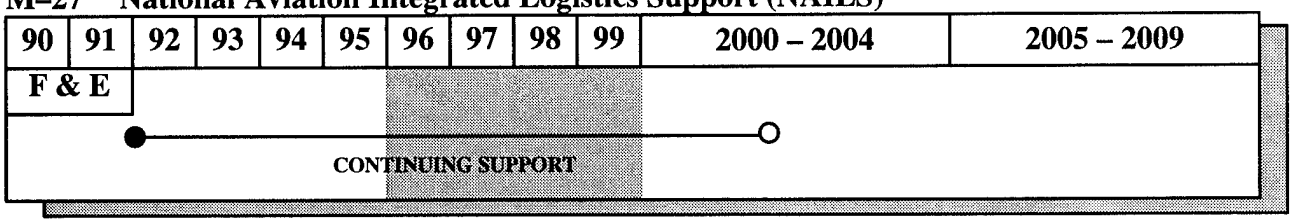
Benefit/Cost Ratio: A March 1994 study indicates a 2.4/1.0 benefit–cost ratio.

Related Projects/Activities: This program supports all current and future major acquisitions that require NAILS support.

List of Contractors:

- Volpe National Transportation Systems Center
  (planning and risk assessment)
  Cambridge, Massachusetts
- Lockheed Martin Corporation
  (transition and integration support)
  Washington, District of Columbia
- Titan Corporation
  McLean, Virginia
- Mathtech
  Falls Church, Virginia

M–27 National Aviation Integrated Logistics Support (NAILS)



M–28 FAA Corporate Systems Architecture

Purpose: This project will establish, maintain, and continue to enhance an Agency-wide systems architecture. A systems architecture is defined as a framework for planning, developing, and maintaining Agency–wide data processing, information, and communications systems. It will guide, coordinate, and integrate the acquisition, development, and implementation of automated data processing equipment, telecommunications, automated information systems and data bases, and associated support services. The architecture will support missions for project areas such as aviation safety, air traffic management, security, logistics, and maintenance. The architecture supports FAA's ability to implement the recommendations, policies, directives, and guidelines promulgated by Office of Management and Budget Circular A–130, the Paper Reduction Act of 1980, the President's National Performance Review Committee, and the recent Electronic Commerce executive order. This project will reduce the paperwork burden within the FAA and the aviation industry. It will promote consistent, accessible, and sharable data within the Agency and provide a blue print for achieving an open systems architecture.

Project Information: This project consists of project 56–61 FAA Information Systems Architecture from the 1993 CIP.

Approach: The architecture will offer a framework of government, industry, and FAA standards that will guide the development of Agency applications and procurements of hardware and software while acting as the focal point in the development of common linkages among mission applications and data bases. The architecture will permit applications to run on a variety of hardware platforms as well as minimize the cost of incorporating new standards in software and hardware.

Products:

- An FAA corporate systems architecture that defines the relationships of all elements involved in information technology management and use.
- A corporate information repository for defining, storing, and managing information.
- A standard set of computer–aided software engineering tools for use in development and maintenance of FAA information systems.
- An Agency–wide plan for reengineering and integration of corporate information and data base systems.
- An Agency–wide strategy and plan for implementing current and evolving standards for electronic data exchange.

1995 Accomplishments:

Software Engineering

- Completed a multi–year strategy for improving FAA–wide software acquisition, development and maintenance and improving software quality.

Information Technology Architecture

- Evaluated Network Management and Configuration Management Tools and Services.
- Developed recabling plan for Building FOB10A.
- Developed p/o infrastructure.

Electronic Commerce
Information Technology Security

- Continued Partnership for Digital Signature Proof–of–Concept with Flight Standards and U.S. Postal Service for the Airman Application and Rating Application.
- Initiated FAA–based X.500 Directory, Public Key Registration/Certificate Authority and Digital Signature Proof–of–Concept.
- Initiated partnership with Director, Budget and Accounting (ABA) to prototype

processing payment authorization using digital signatures.

Electronic Data Interchange

- Partnered with AT&T to conduct Proof–of–Concept for applying Electronic Data Interchange (EDI) to OATS ordering.
- Initiated partnership with Director, Buget and Accounting (ABA) to prototype receipt of electrical utility bills via EDI.

1996 Planned Accomplishments:

- Refocus the program to concentrate on high priority areas including software engineering.

Information Technology Architecture

- FAA Enterprise Network (ENET). Complete topology database, including network, interface, location, and device information. Develop plans to link topology database with X.500 directory information.
- Implement recabling initiative in Building FOB10A.
- Develop plans for other FAA facilities.
- Implement network configuration management.

Software Engineering

- Establish an FAA Software Engineering Process Group to coordinate FAA–wide software improvement activities.
- Establish and implement a software metrics program.
- Provide training to FAA organizations on software engineering "best practices."
- Develop guidelines for the application of commercial–off–the–shelf and open systems standards within National Airspace Systems (NAS).

Electronic Commerce
Information Technology Security

- Continue partnerships and NII workgroup activities.
- Complete FAA–based X.500 Directory, public key registration, certificate authority, and digital signature proof–of–concept.
- Develop and implement X.500 Directory Service with public key registration, certificate authority, directory exchange with DOT and aviation industry.
- Continue partnership with ABA to complete prototype and develop/implement capability to process payment authorizations using digital signatures.

Electronic Data Interchange

- Establish initial EDI capability for processing purchase orders for goods and services, including Federal Acquisition Commerce Network interoperability and Federal Acquisition Streamlining Act compliance.
- Initiate mission–based EDI coalition with the aviation industry and develop standards to streamline the exchange of safety data and operational information.
- In partnership with ABA, develop and implement capability to receive Electrical Utility bills via EDI.

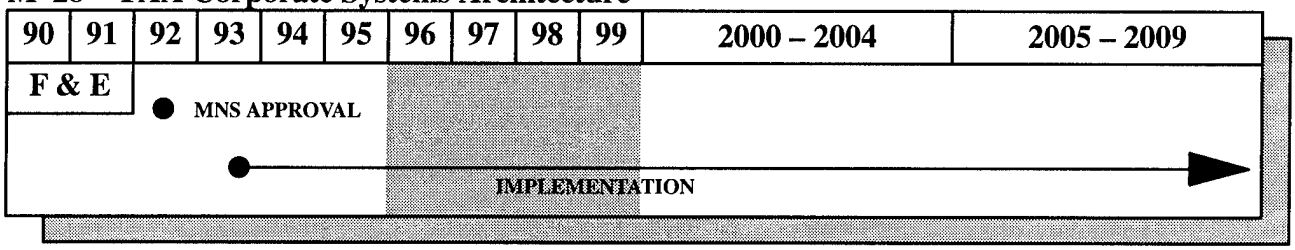
Benefit/Cost Ratio: A June 1994 study indicates a 2.3/1.0 benefit–cost ratio.

Related Projects/Activities: Most CIP projects which involve information technology, including those which involve database development and automated application systems. This project also supports the DOT national performance review initiative for establishing a DOT information architecture. M–10 Distance Learning and M–24 National Aviation Safety Data Analysis Center (NASDAC) are also related projects.

List of Contractors:

- TRW (SETA)
  Washington, District of Columbia
- MITRE Corporation
  McLean, Virginia
- Volpe Transportation Systems Center
  Cambridge, Massachusetts
- Software Engineering Institute
  Pittsburgh, Pennsylvania

M–28 FAA Corporate Systems Architecture



M–29 Air Traffic Operational Management System (ATOMS) Local Area/Wide Area Networks

Purpose: Data collected by the Air Traffic operational management system is required for congressionally mandated reports and for FAA, DOT, and other government agencies preparing statistics on air traffic activity and delays. An Air Traffic operational management system is used in headquarters and at all Air Traffic field facilities to collect, analyze, and distribute real–time operational data throughout the FAA.

Project Information: This project contains project 45–25 Air Traffic Operational Management System (ATOMS) Local Area/Wide Area Networks from the 1993 CIP.

Approach: To create, install, and operate a large–scale national telecommunications network to support use of applications software systems which are critical to the operation of field sites including all air traffic control facilities and the national airspace system. These systems include:

- Various Air Traffic specific management information systems which collect data used for scheduling air traffic controller shifts, overtime, and air traffic controller training and other personnel related functions.
- Software applications for determining the relationship between air traffic control facility staffing and air traffic. These applications are to be used to develop correlations between traffic density, air traffic delays, and staffing of the air route traffic control centers.
- The operations network applications which track the number of operations and delays taking place within the air traffic system nationwide. This statistical data base is used for planning and daily tracking of the operation of the air traffic system.

The Air Traffic operational management system includes 28 local area networks (LANs) in headquarters. It also includes 20 mini LANs, one at each center, and there are plans for a wide area network (WAN) to connect and support approximately 630 field sites doing operational data collection and traffic analysis. Small prototype

LANs are planned for installation at all Level V towers and the nine regional offices.

Some of the computer hardware which will serve as the "end points" in the air traffic operational management system wide area network has been purchased and installed. Air Traffic has assumed a five–to six–year "life cycle" for personal computer hardware in the field. A schedule for orderly replacement of the hardware has been developed. Software and hardware upgrades will be required.

Products:

- Hardware, software, and services for installation and implementation of the air traffic operational management system wide area network. Upgrades for existing network hardware, software, and telecommunications equipment to replace obsolete components of the wide area network.

1995 Accomplishments:

- Installed mini LANs in 20 air route traffic control centers (ARTCCs).
- Conducted network administrator training in ARTCCs.

1996 Planned Accomplishments:

- Purchase and install mini LANs in 35 Level V terminals.
- Purchase hardware for the regional offices, to be linked into the ATOMS network. Network applications will be fine–tuned in conjunction with the requirement for centralized management information systems for use by all field facilities linked through the network.
- Complete training for network administration and security of field facilities.
- Fine tune network applications to link centralized MIS with all field facilities.

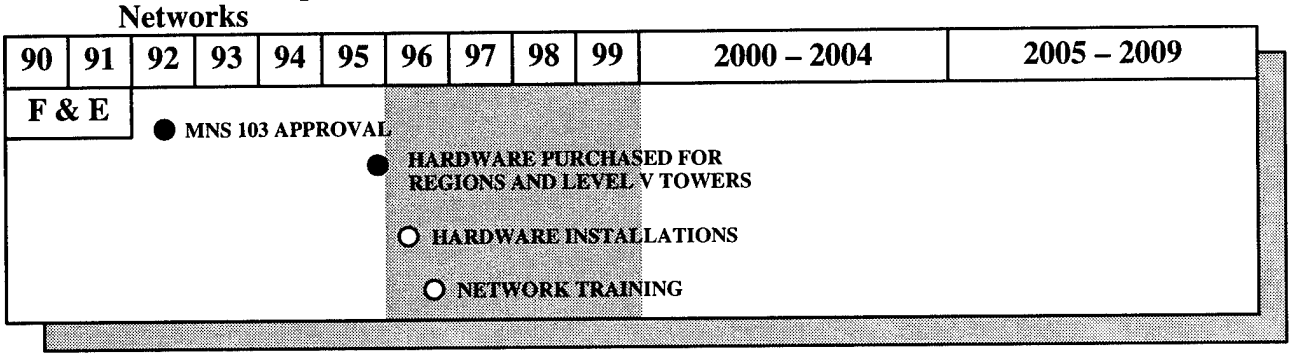
Benefit/Cost Ratio: A strict benefit–cost comparison (using net present value and benefit–cost ratio) has not been done.

Related Projects/Activities: A–08 Operational Data Management System (ODMS).

List of Contractors:

- SYNETICS
  (facility management)
  Vienna, Virginia

M–29 Air Traffic Operational Management System (ATOMS) Local Area/Wide Area Networks



M–30 Integrated Communications Switching System (ICSS) Logistics Support

Purpose: This project transfers site and depot level logistics support responsibility for Denro Type III integrated communications switching systems used in automated flight service stations from the manufacturer to the FAA. The FAA does not own any site or depot spares, documentation, or test equipment for the Phase I Denro Type III integrated communications switching systems. Spare parts for the Phase I systems are provided by the manufacturer. Site spares, documentation, and test equipment were procured for the Phase IA Denro Type III integrated communications switching systems. Depot–level test equipment was not procured for these Phase IA systems. Failed parts for both the Phase I and Phase IA Denro Type III integrated communications switching systems are returned to the manufacturer for repair or replacement. It would be more cost effective for the FAA to assume site and depot level logistics support responsibility for the Denro Type III integrated communications switching systems now being supported by contracts with the manufacturer. The FAA does not plan to replace those switches.

Project Information: This project consists of project 43–14 Integrated Communications Switching System Logistics Support from the 1993 CIP.

Approach: The current integrated communications switching system Phase I contract with the manufacturer (Denro) expired in May 1992. Support is currently being provided through an interim contract. A follow–on contract will be awarded to provide continuing contractor site, depot maintenance services, and depot support for the Type III equipment. The assumption of site and depot-level logistics support responsibility by the FAA involves the purchase of required site spares, depot spares, configuration control and training documentation (task analyses, manuals, etc.), and automatic test equipment (including test beds) from the manufacturers. Additionally, all Denro Phase I Type III integrated communications switching system units must be upgraded to the latest hardware baseline, and appropriate baseline documentation and training provided to the Regions and FAA Logistics Center. A contract was awarded to Denro to accomplish the equipment upgrade activities.

While the normal lead time for implementation of FAA Logistics Center support responsibility is four years, action is underway to reduce that lead time significantly. Interim repair of the integrated communications switching system equipment must be funded until the Regions and FAA Logistics Center assume site and depot-level logistics support responsibilities.

Products:

- Upgraded Phase I Type III integrated communications switching systems.
- Depot test equipment.
- Test bed hardware.
- Configuration and training documentation.
- Site and depot level spares.

1995 Accomplishments:

- Completed eight of 15 upgrades.

1996 Planned Accomplishments:

- Complete remaining upgrades by June 1996.

Cost/Benefit Ratio: A strict benefit–cost comparison (using net present value and benefit–cost ratio) has not been done.

Related Projects/Activities: None.

Problems Resulting in Delays: Delivery schedule effected by contractor/technical problems such as:

- The definition of the physical baseline of the upgraded equipment and provision of

documents to support any discrepancies or deviation from the baseline.

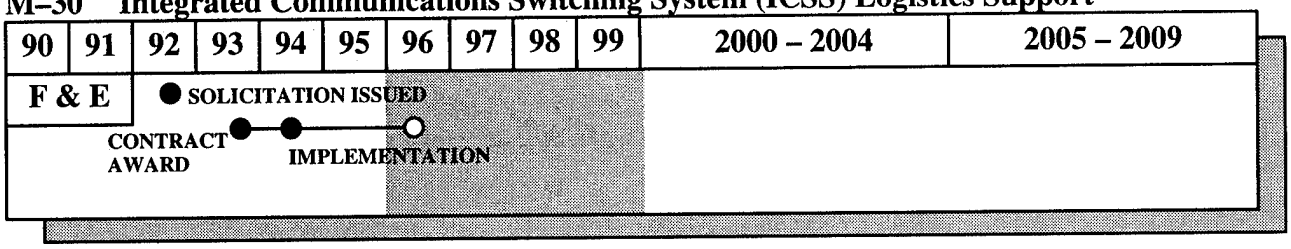
- The streamlining of the factory acceptance test (FAT) procedures.
- Contractor started shipment of first upgraded system late.
- FAA stopped shipment of the Dayton, Ohio, system because the hardware did not reflect released prints for the circuit card assemblies (physical baseline issue again). There was no physical configuration control on the hardware being delivered at FAA sites. These and many other smaller problems were factors that had an impact on the delivery of the systems.

Delays Minimized by: A new factory acceptance test procedure has reduced the schedule slip.

List of Contractors:

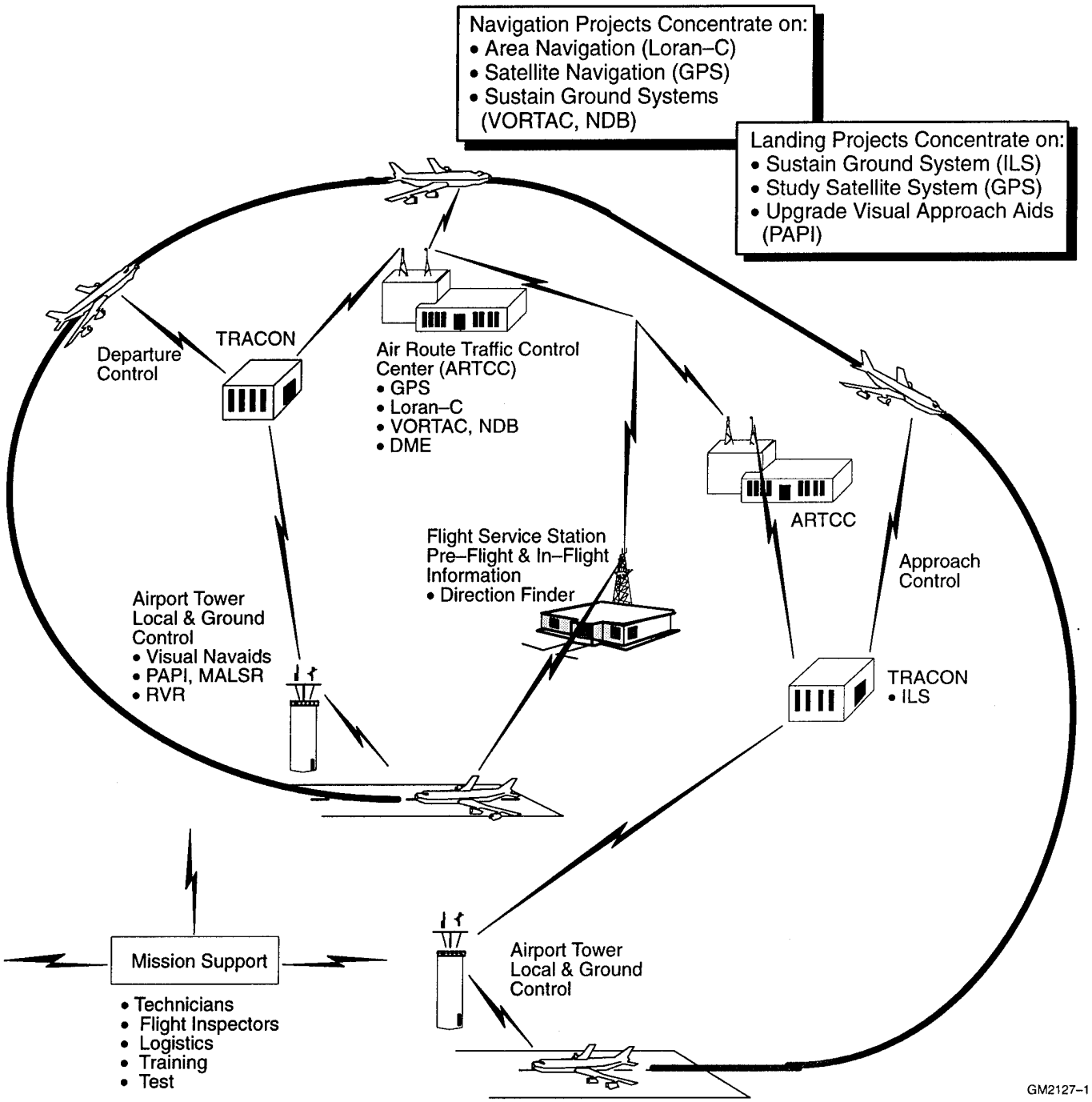
- Denro, Incorporated
  (maintenance support)
  Gaithersburg, Maryland

M–30 Integrated Communications Switching System (ICSS) Logistics Support



Navigation and Landing Functional Projects

New Project Number	Title	Previous Project Number (s)	Page Number
N – 02	Direction Finder (DF)	24–11	N&L – 3
N – 03	Instrument Landing System (ILS)	34–06, 44–20 44–21, 44–22 44–23	N&L – 4
N – 04	Visual Navaids	34–09, 44–09 44–33	N&L – 8
N – 05	Low-Power TACAN Antennas	44–12	N&L – 10
N – 06	VORTAC	24–03, 44–14	N&L – 11
N – 08	Runway Visual Range (RVR)	24–08, 34–08 44–29	N&L – 13
N – 09	Sustain Distance Measuring Equipment (DME)	44–30	N&L – 15
N – 10	Sustain Nondirectional Beacon (NDB)	44–32	N&L – 16
N – 11	Loran–C Monitors and Transmitter Enhancements	24–17, 44–35	N&L – 17
N – 12	Augmentations for the Global Positioning System (GPS)	64–05	N&L – 18



Navigation and Landing in the NAS

N–02 Direction Finder (DF)

Purpose: Direction finders are used to guide lost aircraft and to provide pilots with position information during inflight emergencies. The aircraft's bearing is determined on the ground by using radio transmissions from the aircraft. Distance of aircraft from given locations (direction finder antenna) can be determined after establishing two lines of bearing. The guidance information is then transmitted to the aircraft on a voice channel.

The replacement of the existing tube–type system with solid–state equipment provides cost savings and cost avoidance by reducing power consumption and maintenance requirements.

Project Information: This project consists of project 24–11 Direction Finder (DF) from the 1993 CIP.

Approach: This project upgrades existing direction finder systems with solid–state equipment and provides capabilities for remote maintenance monitoring, control, and certification. This includes replacement of all FA–5530 tube–type antenna systems with solid–state equipment. Additionally, new indicators and simulators will be established within automated flight service station control facilities to increase operational efficiency.

Procure new automated flight service station indicator equipment which will also interface with existing solid–state FA–9964 antenna system. It will also provide the flight service specialist with a graphical display modeled after an aviation sectional chart.

Products:

- 61 new indicator establishments at automated flight service stations.
- 11 antenna sites.
- 3 sets of support systems for the Aeronautical Center.
- 70 simulation trainers.

1995 Accomplishments:

- Initiated first ORD deployment.

1996 Planned Accomplishments:

- Continue deployment.

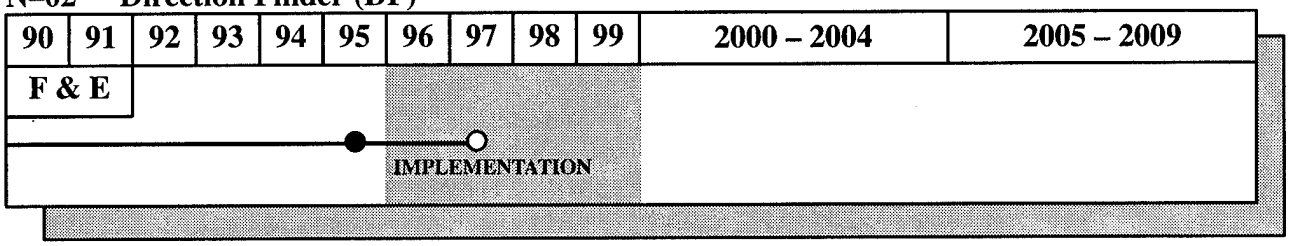
Benefit/Cost Ratio: A benefit–cost ratio has not been developed for this project.

Related Projects/Activities: C–05 Voice Switches, M–03 Capital Investment Plan (CIP) System Engineering and Technical Assistance, M–15 NAS Spectrum Engineering Management, M–21 Logistics Support Systems and Facilities, and M–27 NAS Integrated Logistics Support (NAILS).

List of Contractors:

- ST Systems Corporation (STX)
  Vienna, Virginia
  - CELTECH Corporation
    Carlsbad, New Mexico
  - CATC Corporation
    San Diego, California

N–02 Direction Finder (DF)



N–03 Instrument Landing System (ILS)

Purpose: This project establishes new, partial, and full Category I/II/III instrument landing systems, upgrades existing facilities, replaces older Category II/III and Mark 1A systems, and places Mark 1B and 1C systems in a service life extension program. It also continues assumption responsibility for Airport Improvement Program and Airport Development Aid Program (AIP/ADAP) systems per Public Law 103–331, Section 317 which mandates ILS takeover. ILSs are needed to keep the NAS operating efficiently until global positioning landing systems can be fully implemented and ILS can be withdrawn. This project will ensure that ILS remains a viable system during any transition to the new precision approach system. This project may include the procurement and installation of other equipment as necessary to ensure full operational capability. This range of equipment includes distance measuring equipment (DME), medium–intensity approach lighting system with runway alignment indicator lights (MALSR), high–intensity approach lighting system with sequence flashers (ALSF–2), locator outer markers (LOM), and runway visual range (RVR) units.

Project Information: This project consists of projects 34–06 Instrument Landing System (ILS), 44–20 AN/GRN–27 ILS Replacement, 44–21 Wilcox Category II/III ILS Replacement, 44–22 Mark 1A, 1B, and 1C ILSs, and 44–23 Takeover of AIP/ADAP Funded Non–Federal ILS and Associated Equipment from the 1993 CIP.

Approach: Category II/III precision landing requirements may be met with the differential global positioning system. However, ILS will continue operation at existing locations for a suitable transition period to allow users sufficient time to acquire new avionics. All procurements and locations will be in accordance with Agency policy and plans. New ILS requirements will need to be carefully analyzed due to the severe localizer frequency congestion at certain locations in the United States. Requirements for ILSs will continue during the transition. Systems for FY 1993 locations and beyond will have embedded remote maintenance monitoring capability. The following describes each approach for this project.

Category I: An "interim contract" included all existing requirements through FY 1992. The existing Wilcox Category II/III contract will be used to fulfill ILS Category I requirements from FY 1993 and beyond.

Category II/III: These requirements will be fulfilled through the existing Wilcox contract. These will be for all new qualifier runways.

Other equipment: Other necessary equipment is factored into planned contract awards, including options.

Maintenance: Equipment and logistics support will be procured under options in the existing Wilcox contract to avoid severe logistics support problems, and to maintain the integrity and reliability of these facilities. In addition, the new/replaced ILSs with embedded remote maintenance monitoring will reduce the requirement for site visits to approximately one each quarter.

Mark I: Twenty–seven Category I Mark 1As will be replaced under the existing contract for Category II/IIIs. The 1Bs and 1Cs will be incorporated into a service life extension program which will be implemented under separate contracts. This program will provide supportable and maintainable equipment until the next generation precision approach systems are available.

AIP/ADAP: There were 34 Airport Improvement Program funded systems identified for takeover in 1992, of which eight were not built to FAA specifications and were being modified to permit inclusion into the FAA inventory; however, the modifications were not completed. Eighteen takeovers have been completed; however, there are at least 12 additional non–Federal ILSs that have been approved for AIP grants. Under Public Law 103–331 Section 317, the FAA must

take over maintenance responsibility for these additional ILSs. Therefore, this project will continue as long as non–Federal ILSs continue to be approved for AIP grants and Congress mandates that the FAA assume responsibility for them. However, funding has not been identified to accomplish additional takeovers.

- Each system has associated lighting and visual range equipment (MALSR and RVR). These facilities usually need extensive refurbishment due to improper burial of cables, construction of light supports, and sizing of engine generators.
- Funding is required for replacement of a portion of the Airport Improvement Program facilities and associated equipment. Funding will also be required for refurbishment of a majority of existing systems and associated facilities. This includes replacing shelters, repairing roads, rebuilding pads for localizer antennas, resurveying ground check points, and acquiring additional spares for the Logistics Center and technical training. Regions shall be responsible for each system takeover and requesting waivers as necessary. Prior to takeover, all grant requirements must be met, to include installation and commissioning.

Products:

- New Establishments (34–06)
  - Provide Category I/II/III systems and associated equipment at approved sites.
- Upgrades (34–06)
  - Those facilities with an existing localizer–only facility and which are approved will be upgraded to full operational capability through the acquisition of glide slopes, middle and/or outer markers, approach lighting systems, etc.
- Replacements
  - 64 Category I/II/III systems to replace AN/GRN–27 systems. (44–20)
  - Up to-25 Category II/III systems to replace older Wilcox units. (44–21)
  - 27 Category I Mark 1A replacement systems and service life extension program modifications to the remaining 120 Mark 1B and 1C systems. (44–22)
- 34 ILSs, 24 MALSRs, 6 ALSF–2s, 6 RVRs, 7 DMEs, and 7 LOMs (AIP/ADAP units). (44–23)

1995 Accomplishments:

- Delivered 60 Wilcox MK 20 ILS systems to operational sites.
- Awarded two contracts to upgrade 1B and 1C antenna components.

1996 Planned Accomplishments:

- Continue Wilcox MK 20 ILS installations.
- Deliver 55 additional Wilcox MK 20 ILSs.
- Complete procurement of SLEP remote monitoring subsystem prototypes for testing and evaluation (Step IV).
- Continue implementation of previously procured SLEP upgrades

Benefit/Cost Ratio: Studies indicates the following benefit–cost ratios. Study dates are in parentheses.

- Instrument Landing System = 3.2/1.0 (November 1994)
- AN/GRN–27 ILS Replacement = 2.7/1.0 (November 1994)
- Wilcox CAT II/III ILS Replacement = 3.8/1.0 (November 1994)
- Mark 1A/B/C ILS = 1.5/1.0 (November 1994)

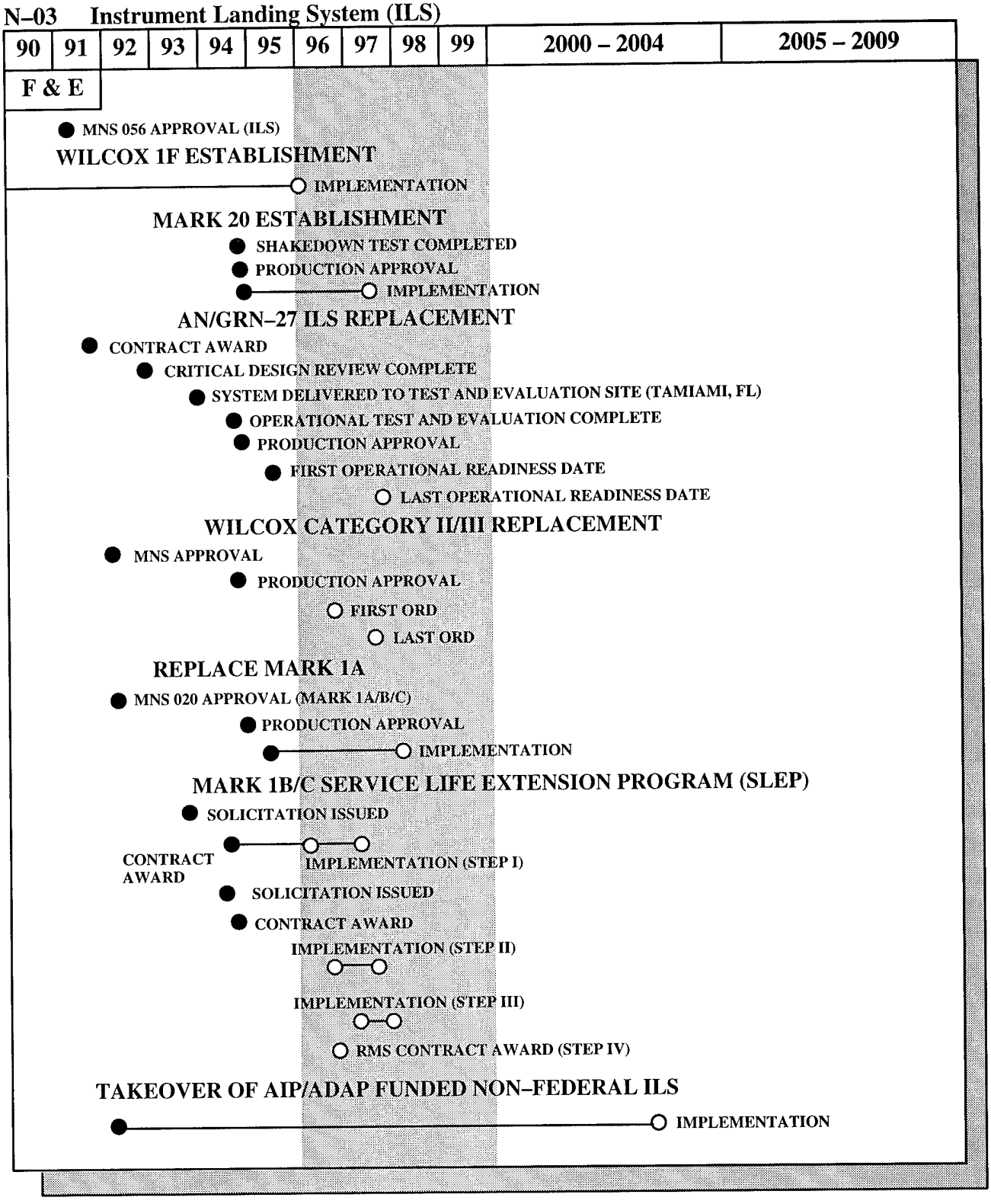
Related Projects/Activities: F–03 Austin–Bergstrom International Airport Program, F–10 Airport Cable Loop Systems Sustained Support, F–11 Power Systems Sustained Support, M–03 Capital Investment Plan (CIP) System Engineering and Technical Assistance, M–07 NAS Infra-

structure Management System (NIMS), M–15 NAS Spectrum Engineering Management, M–21 Logistics Support Systems and Facilities, M–27 National Aviation Integrated Logistics Support (NAILS), N–04 Visual Navaids, N–08 Runway Visual Range (RVR), N–09 Sustain Distance Measuring Equipment (DME), N–10 Sustain Nondirectional Beacon (NDB), N–12 Augmentation For The Global Positioning System. Related Research, Engineering and Development (R,E&D) Plan projects includes: 032–110 Satellite Navigation Program, and 032–120 Navigations System Architecture.

List of Contractors:

- Wilcox Electric Incorporated
  (existing/interim contracts)
  Kansas City, Missouri
- New Bedford Panoramics
  (antennas, power supplies, transmitters)
  Upland, California
- Roselm Industries, Incorporated
  (control units, monitors, integral detectors)
  South El Monte, California
- SRC
  Washington, District of Columbia

N–03 Instrument Landing System (ILS)



N–04 Visual Navaids

Purpose: This project will provide safety–related facilities and enhancements at airports to match air traffic growth requirements and ICAO regulations. Equipment for the establishment of remote radio control for the visual navaids identified in this project are included as required.

This project also modernizes airport lighting systems with low–impact resistant support that will result in improved safety and increased energy efficiency for both the approach light and guidance lighting systems.

Replacement of the existing rigid tower structures with light–weight and low–impact resistant structures that collapse or break apart on impact will reduce damage to an aircraft should it strike an approach light tower structure during takeoff or landing.

Project Information: This project consists of projects 34–09 Establish Visual Navaids for New Qualifiers, 44–09 Replace VASIs with PAPIs, and 44–33 ALSIP Continuation from the 1993 CIP.

Approach: Federal aviation regulations authorize a pilot to descend below the published minimum descent altitude or decision height, provided that approach lights and threshold lights for the intended runway are distinguishable. The installation of threshold light bars as part of the existing medium–intensity approach lighting system with runway alignment indicator lights (MALSR) will provide a visual reference to the runway threshold and make the present system more effective in low–visibility conditions. The modification will enhance safety and comply with ICAO minimum requirements. Annex 14, Aerodromes, paragraph 5.3.6.2 of the International Civil Aviation Organization requires installation of precision approach path indicators at all international airport runways by January 1995. The United States is a contracting state to ICAO and has agreed to comply with this international standard. At present there are approximately 214 federally controlled international runways: 33 are equipped with precision approach path indicator equipment, 170 are equipped with visual approach slope indicators (VASIs), and 11 are not equipped with visual landing guidance equipment. Nonfrangible, high–intensity approach lighting systems on Category I runways will be retrofitted with frangible MALSRs. When fully implemented, energy consumption will be reduced 60 percent. Visual navaids will be installed in conjunction with other related projects where possible. Medium–intensity approach lighting system with runway alignment indicator lights (MALSR) and high–intensity approach lighting system with sequenced flashers (ALSF–2) will be installed with instrument landing systems in accordance with Agency standards. Runway–end identification lights (REIL), precision approach path indicators (PAPI), and omnidirectional approach lighting systems (ODALS) will be qualified in accordance with Airway Planning Standards.

MALSR will be required at runways with global positioning system approach procedures to achieve full Category I minimum requirements (200 feet vertical, 1/2 mile horizontal).

The precision approach path indicator replacement will be a two-phase program.

- Phase I will satisfy the ICAO standard by replacing the 170 VASI systems on U.S. international runways with PAPI.
- A second phase is being considered to replace remaining VASIs (approximately 1,150 systems) with PAPIs. Total implementation of both phases will provide maintenance and logistical benefits associated with the deployment of standardized visual glide slope indicators.
- In phase II, the older, more maintenance intensive systems would be replaced first. These initial replacement systems/sites will be identified via a cost/benefit analysis. In

both phases, the replaced systems will be "cannibalized" for usable components. These components will be shipped to the FAA Logistics Center for supply support of remaining VASIs.

Products: 135 existing rigid MALSRs, simplified short approach lighting systems with sequenced flashing lights (SSALF) and runway indicator lights (SSALR), and ALSF–1 systems will be converted to MALSRs on low–impact structures (44–33). The following equipment will also be ordered:

- ALSF–2 20 systems. (34–09)
- MALSR 200 systems. (34–09)
- REIL 300 systems. (34–09)
- PAPI 400 systems. (34–09)
  170 systems. Phase 1 (ICAO) (44–09)
  1,150 systems. Phase 2 (44–09)
- ODALS 200 systems. (34–09)

1995 Accomplishments:

- ALSF–2: Completed software coding and testing. Completed design qualification testing.
- MALSR: Initiated development.
- PAPI: Initiated deployment.
- REIL: Continued deployment.

1996 Planned Accomplishments:

- ALSF–2: Deliver first article to operational test and evaluation (OT&E) site. Conduct OT&E.
- MALSR: Complete development. Initiate OT&E and full scale development.
- PAPI: Continue deployment.
- REIL: Continue deployment.

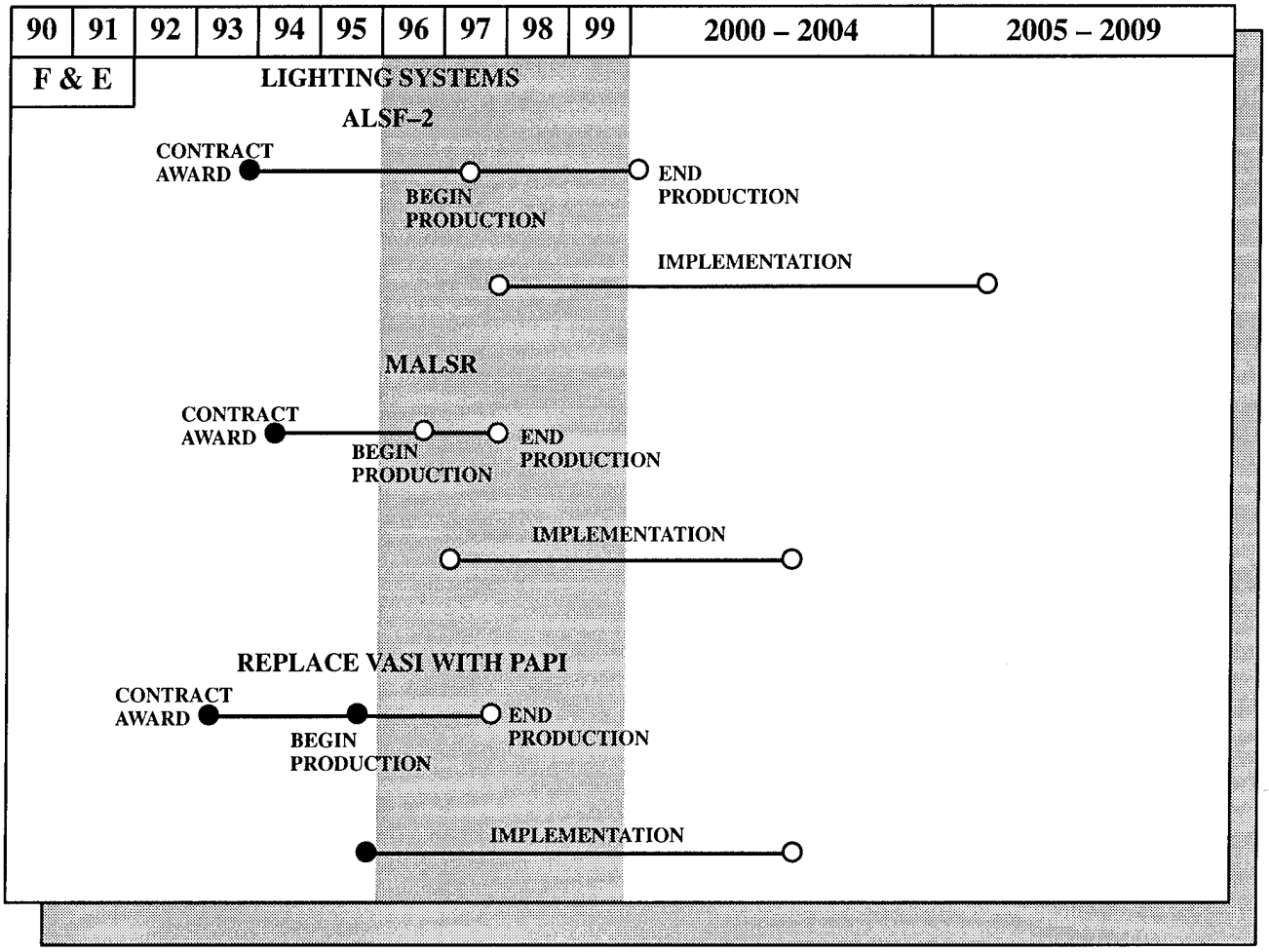
Benefit/Cost Ratio: A May 1994 study indicates a 7.9/1.0 benefit–cost ratio for the new qualifiers project. Another study, completed in April 1994 indicates a ratio of 3.5/1.0 for the project to replace VASIs with PAPIs.

Related Projects/Activities: A–02 Tower Automation Program, F–18 Aeronautical Center NAS Support Facilities, M–03 Capital Investment Plan (CIP) System Engineering and Technical Assistance, M–07 National Infrastrucute Management System (NIMS), M–20 National Airspace System Training, M–22 National Airspace System Implementation Support, M–27 National Airspace Integrated Logistics Support (NAILS) and N–03 Instrument Landing System (ILS).

List of Contractors:

- DME Corporation
  (REILs and MALSR)
  Fort Lauderdale, Florida
- New Bedford Panoramex Corporation
  (PAPI, ALSF–2, and RRCS)
  Upland, California
- Sonicraft Incorporated
  (RMM retrofit of PAPIs)
  Chicago, Illinois

N–04 Visual Navaids



N–05 Low–Power TACAN Antennas

Purpose: This project provides for the replacement of 30–year old obsolete antennas with low–power consumption tactical air navigation (TACAN) antennas. The new antennas reduce primary input power requirements from 5,000 watts to 400 watts, while maintaining the same radio frequency power output. This reduction removes the requirement for engine–generated power for the antenna.

The DOD requires tactical air navigation equipment throughout the 1990's. The present antenna rotating elements are experiencing logistic support problems which impact availability. In addition, the low–power antenna is easier to maintain.

Project Information: This project consists of project 44–12 Low–Power TACAN Antennas from the 1993 CIP.

Approach: FAA and DOD have jointly funded replacement of the existing mechanical rotating antennas with new, low–power antennas. The FAA is responsible for funding and maintaining TACANs which compose a portion of the

common system (i.e., primarily en route). DOD normally funds and maintains on–base TACANs. DOD provided funds to acquire 119 low–power antennas. The FAA funded 84 additional antennas for a total buy of 203. Future quantities for replacements will be based on DOD requirements.

Products:

- 203 low–power TACAN antennas.

1995 Accomplishments:

- Completed ORD.
- Installed four antennas.

1996 Planned Accomplishments:

- Continue deployment.

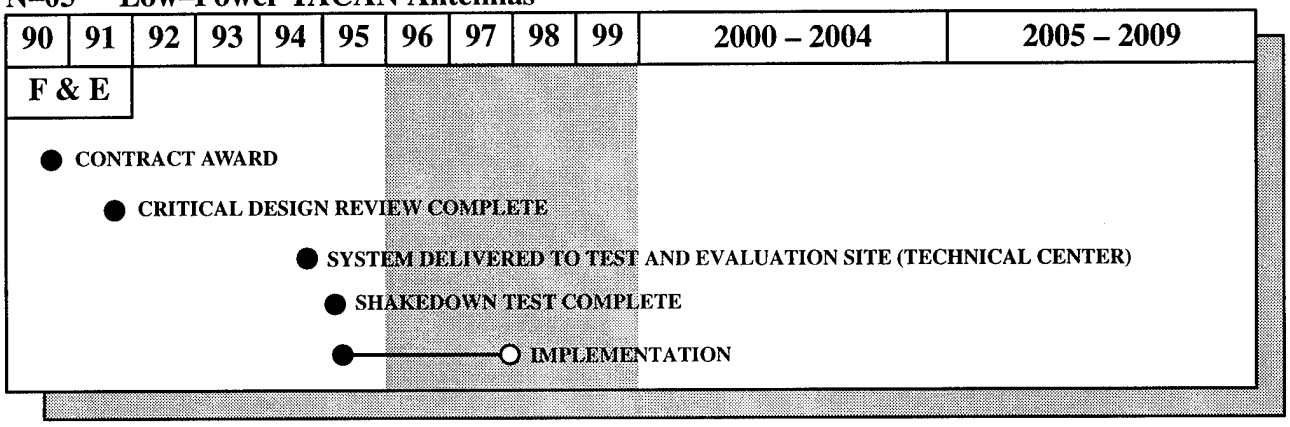
Benefit/Cost Ratio: A May 1991 study indicates a 6.5/1.0 benefit–cost ratio, and an update study is in progress.

Related Projects/Activities: F–13 NAS Facilities Occupational Safety and Health (OSH) and Environmental Compliance, M–03 Capital Investment Plan (CIP) System Engineering and Technical Assistance, M–21 Logistics Support Systems and Facilities and N–06 VORTAC.

List of Contractors:

- COMSAT/RSL
  (203 low–power antenna units)
  Sterling, Virginia

N–05 Low–Power TACAN Antennas



N–06 VORTAC

Purpose: Very high frequency (VHF) omnidirectional range (VOR) units with distance measuring equipment (DME) or collocated with military tactical air navigation (TACAN) units, referred to as a VORTAC site, are en route air navigational and approach aids used by pilots to conduct safe and efficient flights and landings. This project sustains this national navigation network through replacement, relocation, conversion, modification, and establishment of VORTAC, VOR/DME, and VHF omnidirectional range test units. It also provides enhancements to these units to satisfy NAS operational requirements.

Project Information: This project consists of projects 24–03 VORTAC and 44–14 Sustain VOR/VORTAC from the 1993 CIP.

Approach: Distance measuring service will be provided at selected VHF VOR facilities. A network plan has been developed to redistribute these facilities to meet operational requirements. Retrofit kits will be procured and installed to ensure that the national navigation network functions as designed at all geographic locations.

Engineering support will be provided to improve radio navigation system performance and effectiveness for the following:

- Replacements: Distance measuring equipment without remote maintenance monitoring compatibility will be retrofitted at VOR sites.
- Relocations: VOR/DME facilities will be relocated to accommodate route structure changes, real estate considerations, and site suitability.
- Conversions: Conventional VORs are being converted to Doppler VORs (DVORs) to solve siting problems and to obtain required signal coverage. Also, mountaintop counterpoise VORs will be converted to conventional counterpoise.
- Modifications: TACAN equipment will be modified for battery backup power.
- Establishments: Operational requirements that arise in various geographic areas require the establishment of very high frequency navigational aid services. Provisions are being made to establish 70 VOR/DME sites including new VOR/DME at non–Federal takeover locations. VOT equipment has been established at 35 sites. Distance measuring capability will be added at selected VOR only sites.

Products: Procurement of special test equipment and the following:

Item

- TACAN backup battery modification kits (44–14) 203
- DVOR conversion kits (44–14, 24–03) 84
- Establish VOR/DME (24–03) 70
- Replace DME at VOR sites (24–03, 44–14)

1995 Accomplishments:

- Initiated VOR/DME deployment.
- Initiated procurement of battery backup kit components.
- Continued delivery of DVOR kits.
- Initiated regional installation of DVOR conversion kits.

1996 Planned Accomplishments:

- Continue VOR/DME deployment.
- Initiate procurement of 22 commercial–off–the–shelf DMEs with remote maintenance monitoring interface capability.
- Complete DVOR kit delivery.
- Continue regional installation of DVOR conversion kits.

Benefit/Cost Ratio: A June 1990 study indicates a 9.9/1.0 benefit–cost ratio.

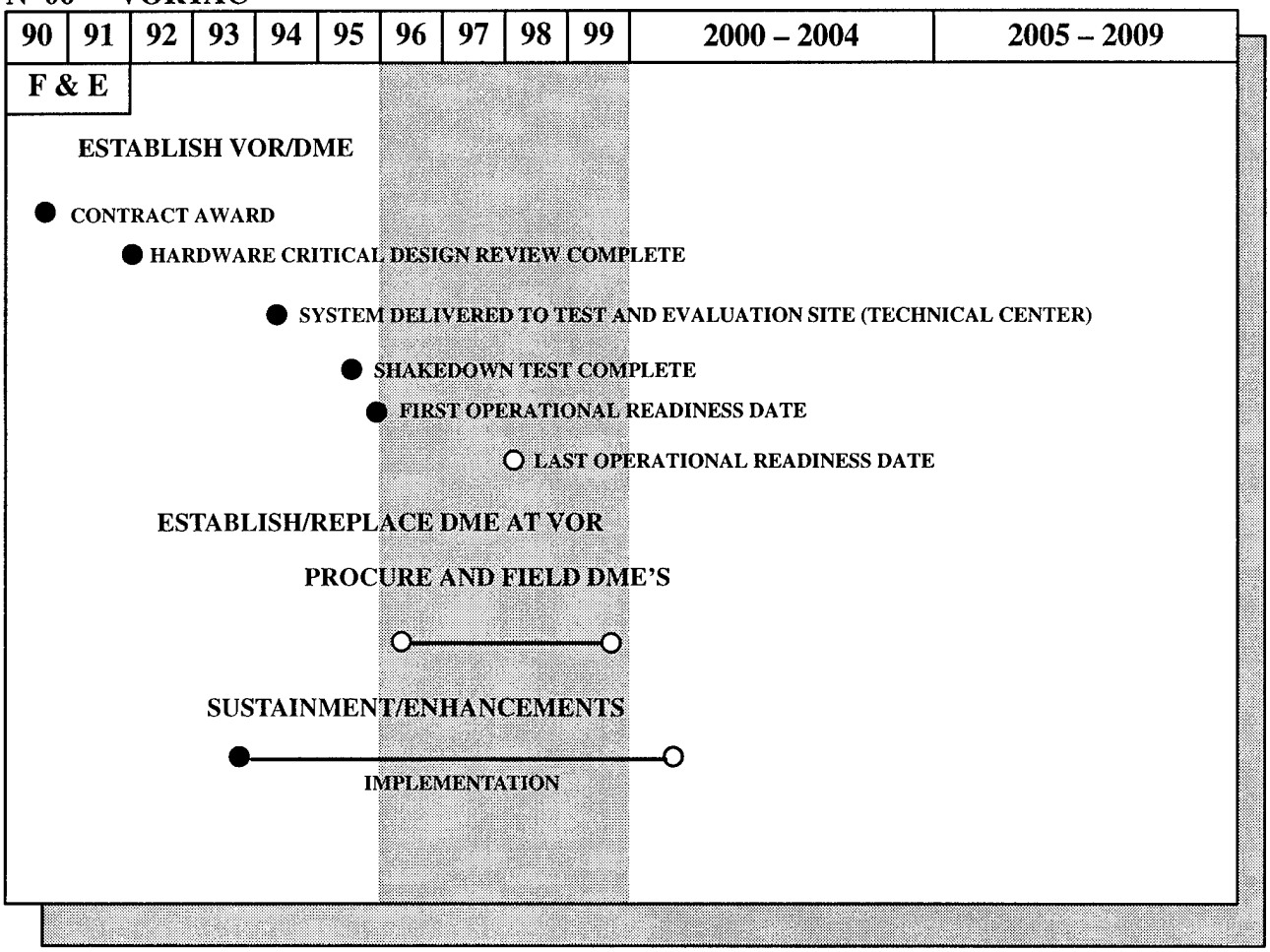
Related Projects/Activities: C–05 Voice Switches, C–06 Communications Facilities Enhancement, C–11 Data Multiplexing Network (DMN) Continuation, C–14 Critical Telecommunications Support, F–03 Austin–Bergstrom International Airport Program, F–04 DOD/FAA Air Traffic Control Facility Transfer/Modernization, M–03 Capital investment Plan (CIP) System Engineering and Technical Assistance, M–07 NAS Infrastructure Management System (NIMS), M–15 NAS Spectrum Engineering Management, M–21 Logistics Support Systems and Facilities, M–27 National Airspace Integrated Logistics Support (NAILS), N–05 Low–Power TACAN Antennas, W–01 Automated Weather Observing System (AWOS) and Research, Engineering and Development (R,E&D)

Plan project 032–120 Navigation Systems Architecture is also a related project.

List of Contractors:

- DME Corporation
  (84 Doppler VOR conversion kits)
  Fort Lauderdale, Florida
- Wilcox Electric, Incorporated
  (70 VOR/DME units)
  Kansas City, Missouri

N–06 VORTAC



N–08 Runway Visual Range (RVR)

Purpose: This project establishes new generation runway visual range systems to support precision landing operations and airport capacity enhancements.

New generation systems will be provided to satisfy new requirements at locations qualified through increased operations, to support airport capacity enhancements through the installation

of systems on nonprecision runways, and to upgrade older generation systems with new generation equipment.

New generation systems will support all Category I, II, and IIIA/B operations utilizing any precision landing system.

Project Information: This project combines projects 24–08 Runway Visual Range (RVR), 34–08 Runway Visual Range (RVR) Establishment, and 44–29 Runway Visual Range (RVR) Replacement from the 1993 CIP.

Approach: This project will provide, under competitive contracts, new generation equipment for establishment at qualifying facilities to satisfy precision landing requirements and to support airport capacity enhancements.

- Install new generation equipment at locations previously budgeted for new requirements.
- Relocate and/or refurbish, as necessary, older equipment to satisfy additional requirements pending the procurement of additional new generation type systems.
- Procure additional new generation type equipment to replace the remaining older systems that are still in service and satisfy anticipated additional requirements.

Products:

- 528 new generation systems to satisfy new requirements and convert existing systems to new generation. (24–08)
- Relocate older generation equipment and refurbish, as necessary, to satisfy requirements pending the procurement of additional new generation equipment. (34–08)
- Procure additional new generation systems to replace 197 Tasker 500 units and to satisfy an additional potential 300–400 requirements. (44–29)

1995 Accomplishments:

- Began full production deliveries of the new generation RVRs.
- Completed installation of new generation RVRs at approximately 50 airports.

1996 Planned Accomplishments:

- Make all retrofitted RVRs available for regional deployment.
- Complete installation of new generation RVRs at 140 airports.

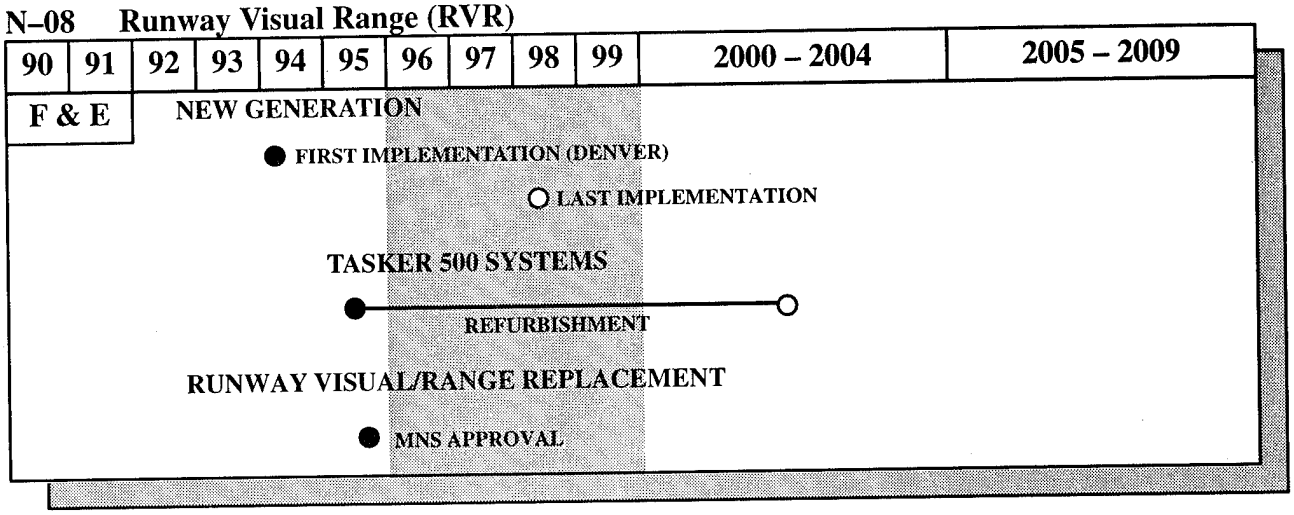
Benefit/Cost Ratio: A March 1994 study indicates a 2.4/1.0 benefit–cost ratio for the runway visual range establishment project.

Related Projects/Activities: A–02 Tower Automation Program, F–02 Metroplex Control Facility (MCF), F–03 Austin–Bergstrom International Airport Program, F–10 Airport Cable Loop Systems Sustained Support, M–03 Capital Investment Plan (CIP) System Engineering and Technical Assistance, M–07 National Infrastructue Management System (NIMS), M–21 Logistics Support Systems and Facilities, M–27 National Aviation Integrated Logistics Support (NAILS), N–03 Instrument Landing System (ILS), N–12 Augmentations for Global Positioning System and Research, Engineering and Development (R,E&D) Plan project 032–110..

List of Contractors:

- Teledyne Controls
  (new generation systems)
  Los Angeles, California

N–08 Runway Visual Range (RVR)



N–09 Sustain Distance Measuring Equipment (DME)

Purpose: This project replaces outdated distance measuring equipment collocated with instrument landing systems (ILSs) and terminal nondirectional beacons (NDBs) with solid–state equipment. The distance measuring systems are a critical component of the NAS since they are used to support ILS/NDB precision and nonprecision instrument approach procedures.

The majority of distance measuring systems collocated with ILS and terminal NDB systems are obsolete tube–type or older solid–state systems, nearing or having reached the end of their normal life expectancy. As such, these systems are difficult and expensive to maintain since replacement parts are either difficult to obtain or unavailable.

Project Information: This project consists of project 44–30 Sustain Distance Measuring Equipment (DME) from the 1993 CIP.

Approach: Procure replacement equipment based on updated functional specifications and maintenance documentation to reflect current technology and provide needed distance measuring capabilities at ILS and terminal NDB facilities.

The procurement of equipment with remote maintenance monitoring capabilities will provide for the replacement of obsolete systems. The new units will interface with the maintenance processor subsystem (MPS) and the tower control computer complex.

Products: 225 systems are candidates for replacement.

1995 Accomplishments: None.

1996 Planned Accomplishments:

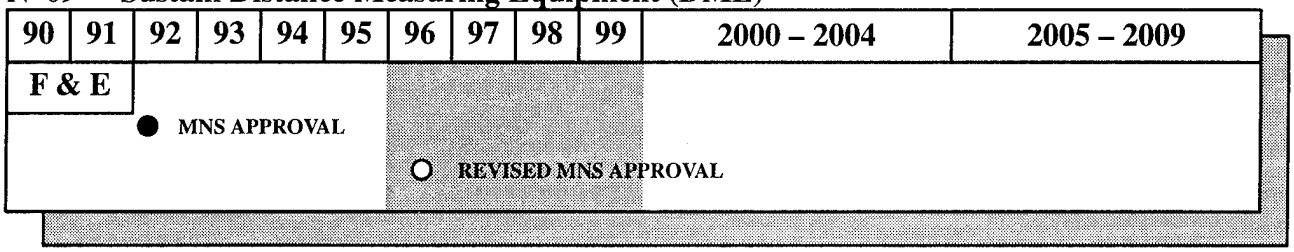
- Obtain MNS approval.

Benefit/Cost Ratio: A benefit–cost ratio has not been developed for this project.

Related Projects/Activities: M–07 National Infrastructure Management System (NIMS), M–21 Logistics Support Systems and Facilities, M–27 National Aviation Integrated Logistics Support (NAILS), N–03 Instrument Landing System (ILS), N–10 Sustain Nondirectional Beacon (NDB) and Research, Engineering and Development (R,E&D) Plan project 032–120.

List of Contractors:

N–09 Sustain Distance Measuring Equipment (DME)



N–10 Sustain Nondirectional Beacon (NDB)

Purpose: This project will sustain the nondirectional beacons presently in the NAS. These units are a critical component of the NAS since they are used to support precision approaches, missed approaches, transition fixes, nonprecision instrument approach procedures, and some en route airways.

The majority of these units are obsolete tube–type or older solid–state systems, nearing or having reached the end of their normal life expectancy. As such, they are difficult and expensive to maintain. Replacement parts are often difficult to obtain or unavailable.

Project Information: This project consists of project 44–32 Sustain Nondirectional Beacon (NDB) from the 1993 CIP.

Approach: The quantity and location of equipment to be sustained/replaced was defined in 1995. If this equipment is to be replaced, it will be with modern commercial-off-the-shelf units with remote maintenance monitoring capability. Equipment replacement requirements will be sufficient to sustain operations until these systems are replaced by other systems.

Products: The following systems and associated peripherals are candidates for replacement or sustainment.

- 268 transmitters (mix of low/medium/high power).
- 268 antenna systems (including antenna tuning units).
- 268 monitor receivers.

1995 Accomplishments: None.

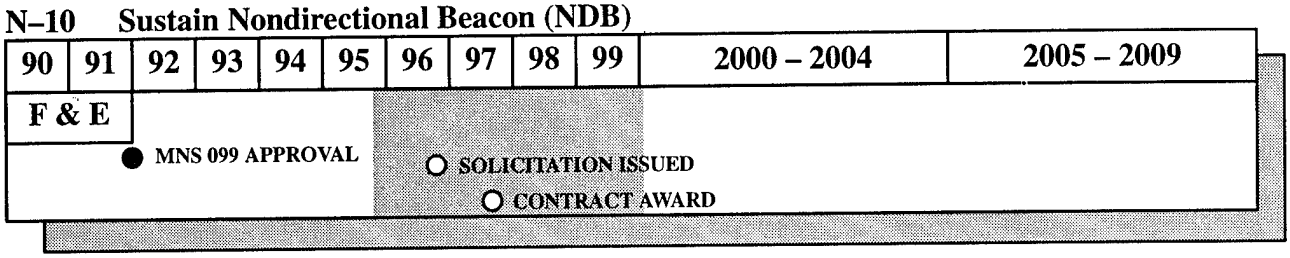
1996 Planned Accomplishments: None.

Benefit/Cost Ratio: A benefit–cost ratio has not been developed for this project

Related Projects/Activities: F–03 Austin–Bergstrom International Airport Program, M–03 Capital Investment Plan (CIP) System Engineering and Technical Assistance, M–15 NAS Spectrum Engineering Management, M–21 Logistics Support Systems and Facilities, M–27 National Airspace Integrated Logistics Support (NAILS), N–03 Instrument Landing System (ILS), N–09 Sustain Distance Measuring Equipment (DME) and Research, Engineering and Development (R,E&D) Plan project 032–120.

List of Contractors:

N–10 Sustain Nondirectional Beacon (NDB)



N–11 Loran-C Monitors and Transmitter Enhancements

Purpose: Long-range navigation (Loran–C) is a supplemental radio navigation system for aviation use, providing at least single–level coverage for en route and terminal instrument flight rule navigation for the contiguous United States. This project provided four stations to complete single–level signal coverage for the 48 contiguous states and 212 monitors to support nonprecision approaches, training, logistics, and field support. This project will also maximize the overall system performance of Loran–C. This will be accomplished by modifying the Loran-C signal monitors and enhancing the Loran-C transmitters.

The modification must be made to all monitors to include data related to establishment of the mid-continent Loran-C chains. Without modification, the monitors cannot recognize the existence of the chains and will not provide the intended service to aviation. The two chains did not exist when the monitor procurement contract was awarded in 1986, and the chain parameters needed for the modification were not available until late 1990. Modifications to the monitors will enhance their operation.

There are two types of enhancements to be made to the Loran-C transmitter stations. The enhancements reduce the number of unscheduled signal outages and assure essential interstation communications. A 1993 study showed that unscheduled signal outages occurred approximately two or three times per day for each trial of Loran–C transmitters (i.e., one master and two secondary stations). There are several correctable causes of the outages, but they remain a problem. The second enhancement is to perform improvements in many of the timing links between stations. The Loran-C system is based on the availability of precise time information at all transmitter stations and the measurement of actual signal timing differences at the signal monitor receivers. Reliable communications between all points are needed to assure the transfer of timing data.

Project Information: This project combines projects 24–17 Loran–C Systems and 44–35 Loran–C Monitors and Transmitter Enhancements from the 1993 CIP.

Approach: Studies defined the number and locations of Loran–C stations and signal monitors. There were four stations installed to improve signal coverage for the Gulf of Mexico and fill the mid–continent coverage gap. Signal monitors at very high frequency omnidirectional range (VOR) facilities will provide correction values for nonprecision approaches. Modify all Loran-C monitor hardware/software to maximize system performance and provide the capability to monitor the new mid–continent Loran-C transmitter chains.

The FAA provided funds to the United States Coast Guard to procure, operate, and maintain the transmitters under an interagency agreement.

Deployment, operation, and maintenance of signal monitors are an FAA responsibility.

Enhance the Loran-C transmitters to reduce the number of unscheduled signal outages, automate the blink function (visual indication of a temporary outage), and improve the reliability of the timing link between transmitter stations.

This project is currently on hold pending resolution of policy issues.

Products:

- Four Loran–C stations and 212 monitors. (24–17)
- Modification of 212 monitors. (44–35)
- Enhancements to Loran-C transmitters. (44–35)

1995 Accomplishments:

- N/A. Pending resolution of policy issues.

1996 Planned Accomplishments:

- N/A. Pending resolution of policy issues.

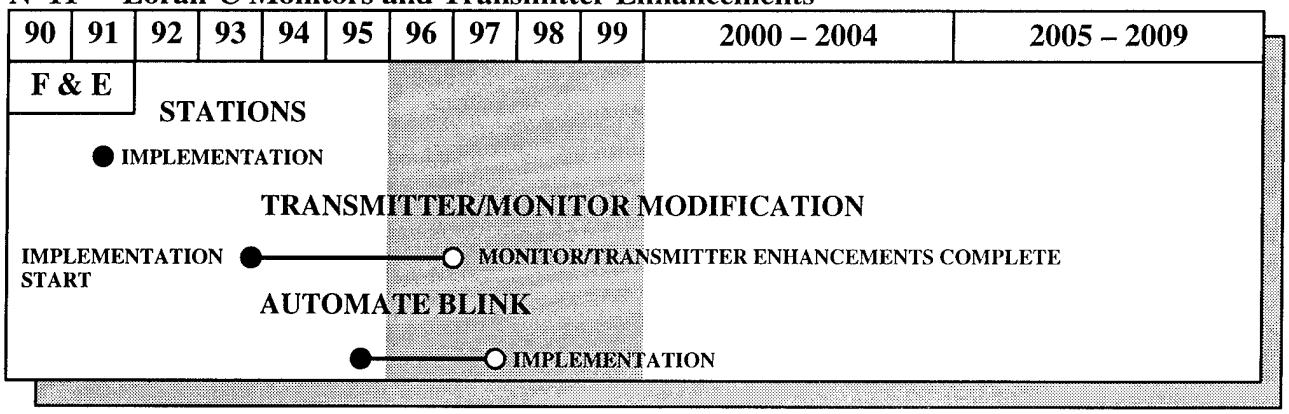
Benefit/Cost Ratio: A benefit–cost ratio has not been developed for this project.

Related Projects/Activities: M–03 Capital Investment Plan (CIP) System Engineering and Technical Assistance and Research, Engineering and Development (R,E&D) Plan project 032–120 Navigation System Architecture.

List of Contractors:

- Frontier Engineering, Incorporated
  (212 Loran–C monitors)
  Stillwater, Oklahoma
- Wilcox Electric, Incorporated
  (249 Loran/VORTAC interface cards)
  Kansas City, Missouri

N–11 Loran-C Monitors and Transmitter Enhancements



N–12 Augmentations for the Global Positioning System (GPS)

Purpose: The global positioning system does not provide the accuracy, integrity, availability, and continuity of service necessary to meet NAS navigation and landing requirements. This project will provide the necessary augmentation equipment which will allow the global positioning system to be used in the NAS as the federal aviation radionavigation system for all oceanic and domestic phases of flight. Satellite navigation presents opportunities for standardized worldwide civil aviation operations using a common navigation receiver, and for

significant improvements in safety, capacity, service flexibility, and aircraft operating cost. A satellite navigation system could lead to the phase–out of existing NAS ground equipment while maintaining or improving existing service levels. In addition, satellite–based navigation systems provide the potential for new navigation and landing services not currently supported by the existing systems.

Project Information: This project consists of project 64–05 Augmentations for GPS from the 1993 CIP.

Approach: Augmentations provided by this project will consist of a network of precisely located monitors, reference stations, and master control stations, as well as leased satellites and earth stations. The augmentation equipment will generate error correction data. Using this information from the reference stations, a message is developed by the master control stations that contains signal integrity and position corrections. This message is broadcast to users and monitor stations over geostationary satellites on the same frequency as the global positioning system and is suitable for ranging like another satellite.

After competitive selection of a contractor, implementation of the wide area augmentation system (WAAS) will proceed in two major contract phases (Phase I and Phase II), with options in the 1998–2001 timeframe, to provide the required availability, accuracy, and operational integrity of the global positioning system and its augmentation. Initial operational capability, utilizing a network of 24 reference stations, will begin in early 1998. Additionally, a functional verification system will be built as a test platform to be used initially by the contractor and ultimately by the government to validate international connectivity.

Phase I will provide a functional verification system consisting of two master stations and five reference stations, an initial WAAS consisting of two master stations and 24 reference stations, and three leased communications satellites to achieve a supplemental Category I precision approach.

Phase II will complete the end–state WAAS by providing additional master stations, reference stations, and communications satellites as required. Phase II will also provide for satellite error software algorithm improvements as well as upgrades to all the initial WAAS capability hardware. The final system will provide triple redundancy for management and control, and a fully operational required navigation performance (RNP) system.

To further improve accuracy and integrity, other augmentations are being investigated such as the local area augmentation system (LAAS), to provide high levels of integrity, accuracy, continuity, and availability required by Category II/III operation. These investigations may lead to additional augmentations that will be identified in the future.

Products:

- An initial WAAS with a network of 24 monitor stations (including 2 configured as master control stations) and a satellite broadcast system. Other products may be developed based on results of feasibility studies and investigations into Category II/III operations.

GPS Wide Area Augmentations

Equipment	Phase I	Phase II	Total
Master station	4	4	8
Leased earth station	7	10	17
Leased communications satellite	4	5	9
Reference station	29	20	49

Monitor station	29	20	49
Air Traffic monitor display	29	20	49
Airway Facilities monitor display	29	20	49
Software (lines of code)	150,000	20,000	170,000
Leased terrestrial communications system	1	Updated	1

1995 Accomplishments:

- Completed technical evaluation to determine competitive range.
- Awarded contract.
- Completed systems requirements review.
- Completed functional verification system installation.
- Completed operational implementation planning.

1996 Planned Accomplishments:

- Conduct preliminary design review.
- Complete software coding and testing.
- Conduct critical design review.
- Begin contractor development, test, and engineering.
- Complete hardware installation of national satellite testbed.
- Complete test readiness review.
- Continue operational implementation.

Benefit/Cost Ratio: An November 1994 study indicates a 2.3/1.0 benefit–cost ratio for the WAAS. The LAAS study is currently in process.

Related Projects/Activities: A–01 En Route Automation Program, A–02 Tower Automation Program, A–04 Standard Terminal Automation Replacement System (STARS), A–05 Traffic Management System (TMS), A–10 Oceanic Automation Program (OAP), C–20 Aeronautical Data-link, and M–15 NAS Spectrum Engineering Management, M–27 National Airspace Integrated Logistics Support (NAILS), N–03 Instrument Landing System (ILS), N–08 Runway Visual Range (RVR), N–09 Sustain Distance Measuring Equipment (DME), and N–10 sustain Nondirectional Beacon (NDB). Related Research, Engineering and Development (R,E&D) Plan projects include: 021–140 Oceanic Air Traffic Automation, 032–110 Satellite Navigation Program, and 032–120 Navigation Systems Development.

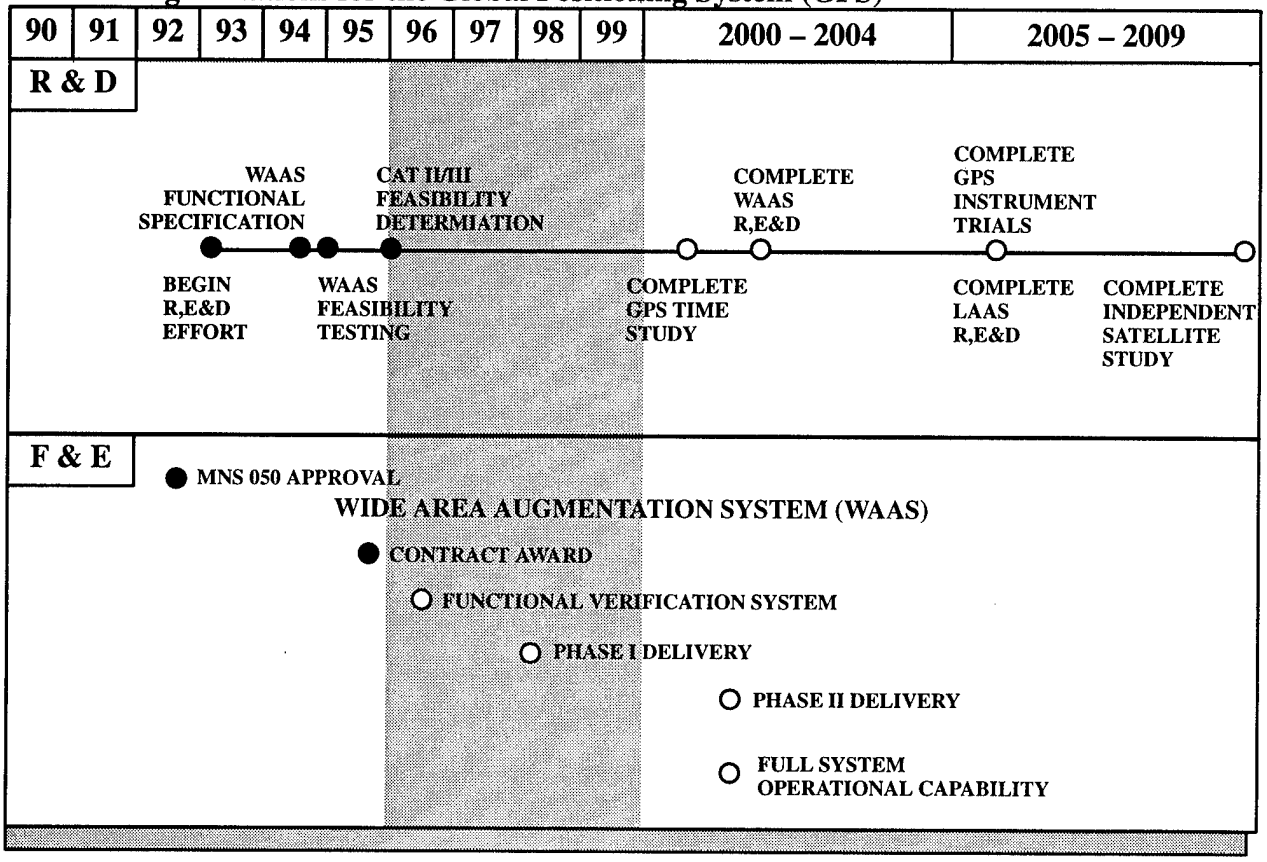
Problems Resulting in Delays: Experienced a four–month delay due to DOD–related issues centered around the resolution of technical accuracy issues. A two–month delay was incurred to resolve a conflict of interest issue related to the contractor.

Delays Minimized by: DOD problem area resolved and schedule adjusted to compensate for delays.

List of Contractors:

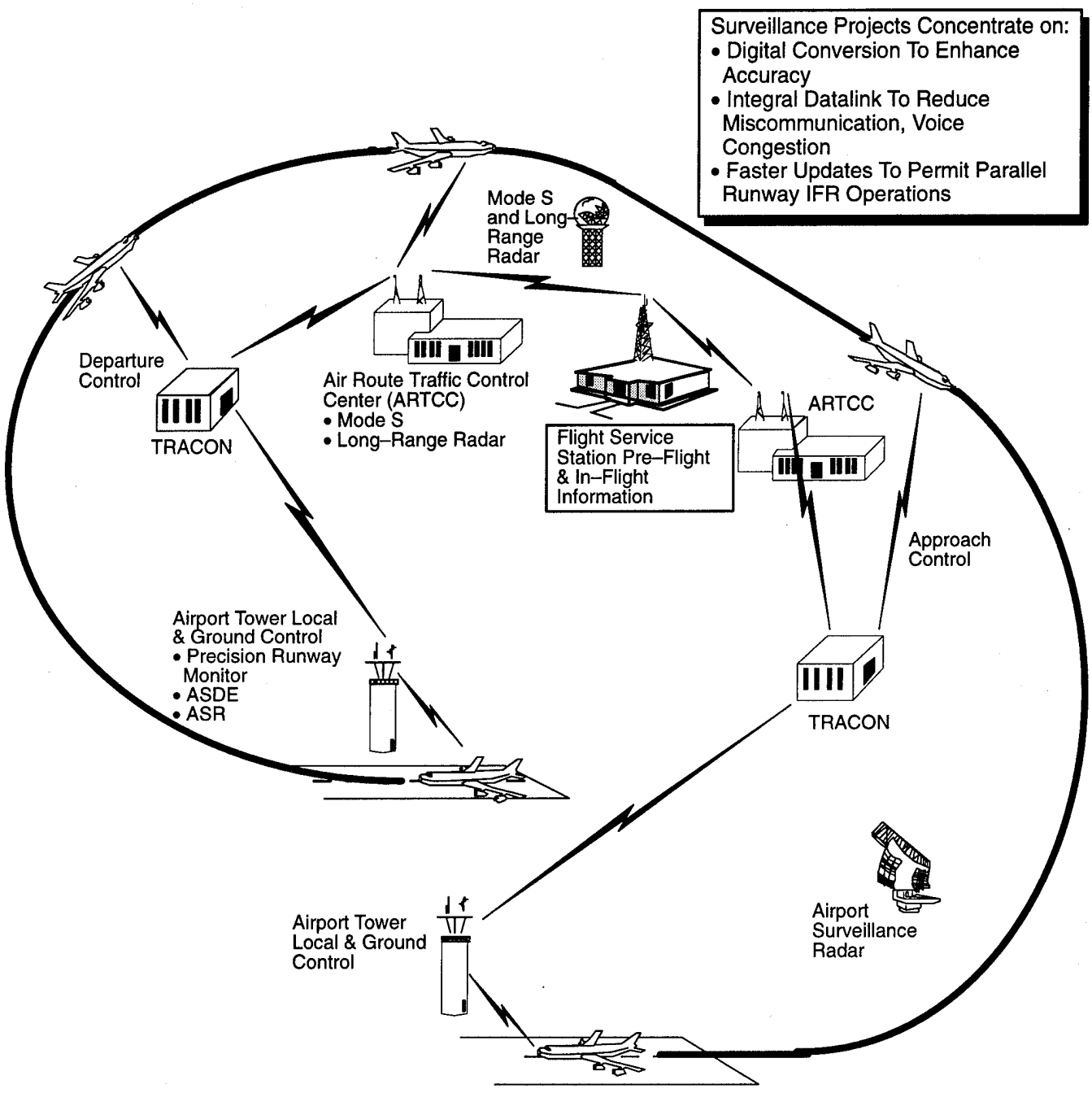
- Wilcox Electric
  Kansas City, Missouri
  - Hughes
  - TRW
    Reston, Virginia

N–12 Augmentations for the Global Positioning System (GPS)



Surveillance Functional Projects

New Project Number	Title	Previous Project Number(s)	Page Number
S – 01	Airport Surface Detection Equipment (ASDE) Radar and Airport Movement Area Safety System (AMASS)	24–14, 62–23	Surv – 3
S – 02	Mode S	24–12, 34–12, 44–45, 44–46	Surv – 5
S – 03	Terminal Radar (ASR) Program	24–13, 34–13, 44–60	Surv – 7
S – 04	Long-Range Radar Program	24–15, 44–40	Surv – 10
S – 05	Long-Range Radar (LRR) Radome Replacement	44–42	Surv – 12
S – 08	Precision Runway Monitor	64–27	Surv – 12



Surveillance in the NAS

S–01 Airport Surface Detection Equipment (ASDE) Radar and Airport Movement Area Safety System (AMASS)

Purpose: This project consists of two distinct projects: the airport surface detection equipment (ASDE–3) radar and the airport movement area safety system (AMASS).

Airport surface detection equipment (ASDE–3) provides radar surveillance of aircraft and airport service vehicles at selected airports. Radar monitoring of airport surface operations (ground movements of aircraft and other supporting vehicles) is required to provide an effective means of directing and moving surface traffic. This is especially important during periods of low visibility such as rain, fog, and night operations.

The airport movement area safety system (AMASS) will implement a near-term solution to provide a runway accident prevention system at airports with airport surface detection equipment (ASDE–3) radars.

Project Information: This project consists of projects 24–14 Airport Surface Detection Equipment (ASDE–3) Radar and 62–23 Airport Movement Area Safety System (AMASS) from the 1993 CIP.

Approach:

ASDE: The contract for a ground surveillance radar that will map the airport complex and determine aircraft or service equipment locations and movement was awarded in 1985. An option to this contract was exercised in 1988 to provide three additional sensors. In 1993 a new contract purchased seven additional systems. Six were for new airports, bringing the total to 37 airports, and the seventh unit was for ATIDS research and development testing at the Technical Center.

The airport surface detection equipment antenna may be located on top of the airport traffic control tower or located remotely on its own tower. Installations on existing airport traffic control towers may require structural modifications to the tower.

AMASS: The airport movement area safety system will add an automation enhancement to the airport surface detection equipment (ASDE–3). This will provide conflict alert algorithms for tower controllers to detect and prevent runway incursions and accidents. This system will be used by local and ground controllers at the 35 operational airport surface detection equipment (ASDE–3) sites. The technical approach includes converting digitally processed target data into target image data as inputs to the runway conflict alert algorithms. The system also includes a track data interface with the automated radar terminal system/standard terminal automation replacement system to include airborne aircraft on final approach in the conflict alert algorithms. The system uses the ASDE–3 as the display/entry device, requiring no additional displays or entry devices in the tower. Controller entries are not required during normal operations. Entries are required to set the logic at the beginning of each change in runway configuration or operating condition. This will require definition of the human/machine interfaces and air traffic procedures.

Products:

- The basic contract bought 30 ASDE–3 systems to replace 13 older ASDE systems and establish 17 new sites (includes FAA Academy). Three additional sensors, provided via contract option, will satisfy the requirement for three dual–sensor systems. The new contract bought seven additional systems (includes Technical Center). (24–14)
- 38 AMASS units at 35 operational sites. Three of the sites have dual mosaics: Houston, Denver, and Los Angeles. (62–23)
- One AMASS unit each at the Technical Center and the FAA Academy. (62–23)

1995 Accomplishments:

- Commissioned 16 ASDE–3 systems: Atlanta, New York (JFK), St. Louis, Los Angeles one and two, Boston, Minneapolis, Dallas/Ft. Worth, Denver one and two, Anchorage, Kansas City, Baltimore, San Francisco, Houston two (remote), and New Orleans.
- Conducted AMASS full scale development.
- Released AMASS solicitation for San Francisco.

1996 Planned Accomplishments:

- Commission 13 ASDE–3 systems: Chicago, Houston, Charlotte, Raleigh, Philadelphia, Miami, Pittsburgh, Memphis, Washington National and Dulles, Cincinnati, San Diego, and Orlando.
- Complete AMASS full scale development.
- Award AMASS contract.

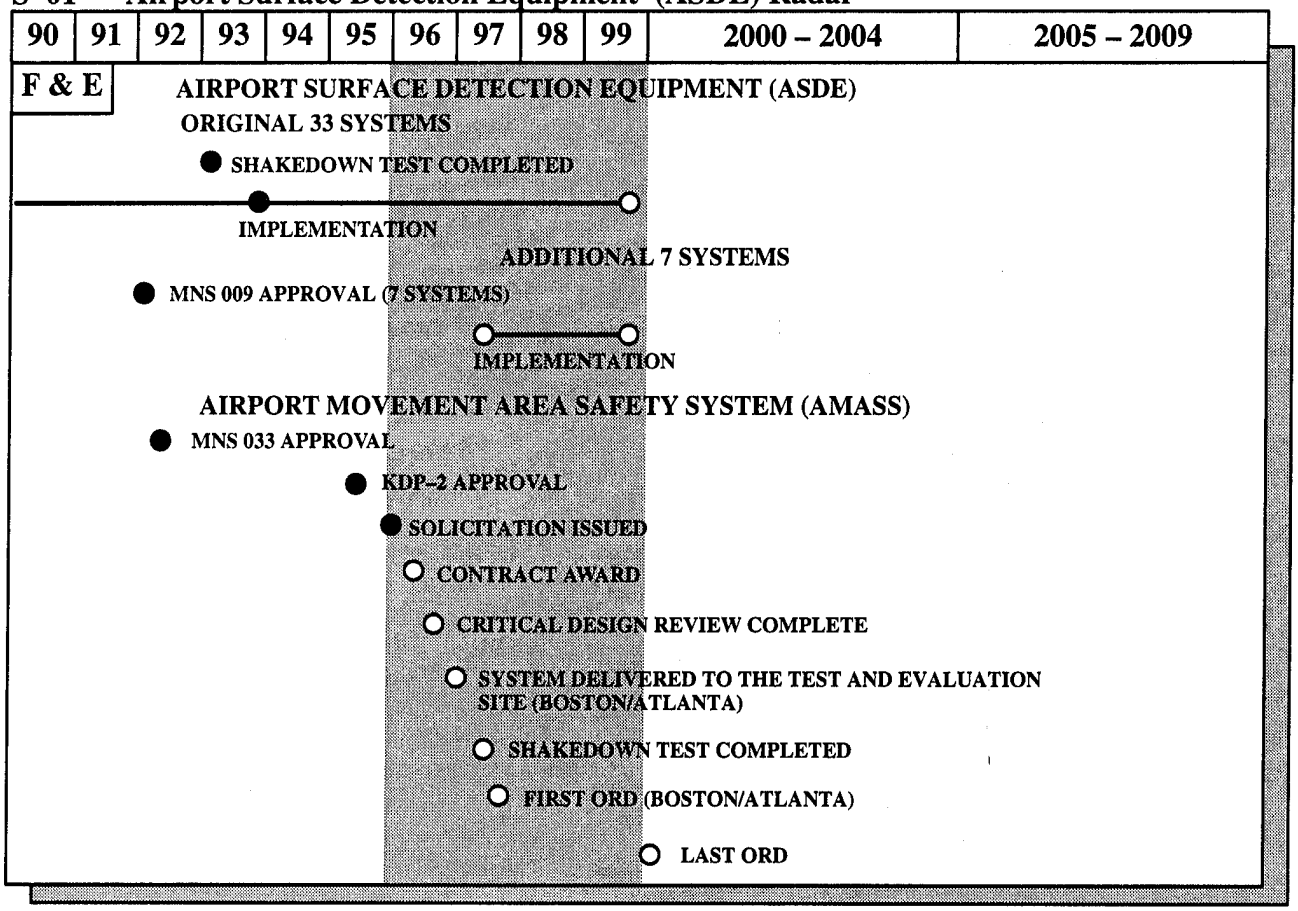
Benefit/Cost Ratio: A September 1994 study indicates a 3.4/1.0 benefit–cost ratio for the ASDE–3 radar with AMASS.

Related Projects/Activities: A–03 Automated Radar Terminal System (ARTS) Improvements, A–04 Standard Terminal Automation Replacement System (STARS), A–12 Airport Surface Target Identification System (ATIDS), F–01 Airport Traffic Control Tower/Terminal Radar Approach Control Facility (ATCT/TRACON) Establishment/Sustainment/Replacement, and M–03 Capital Investment Plan (CIP) System Engineering and Technical Assistance.

List of Contractors:

- Westinghouse–Norden Systems, Inc.
  Norwalk, Connecticut

S–01 Airport Surface Detection Equipment (ASDE) Radar



S–02 Mode S

Purpose: Air traffic control radar surveillance of aircraft by ground-based equipment will be required well into the next century. Mode S will improve the surveillance capability of the air traffic control radar beacon system (ATCRBS). Mode S provides more accurate positional information and minimizes interference. This is accomplished by discrete interrogation of each aircraft and improved processing of aircraft replies. In addition, Mode S provides the medium for a digital data-link which can be used to exchange information between aircraft and various air traffic control functions and weather databases. Mode S systems are being provided to 148 air traffic control beacon interrogator (ATCBI) sites, Multiple technologies (Mode S, monopulse secondary surveillance radars, and global positioning system squitter) are being considered for replacement of the balance of the ATCBI sites.

This project also replaces aging and obsolete air traffic control beacon interrogator (ATCBI-4/5) equipment with Mode S and compatible systems to maintain ground surveillance and increase supportability. The ATCBI–4 systems are 1971 transistor logic technology at the end of their 20–year life cycle. The 5s are 1976 integrated circuit technology systems that are approaching the end of their 20–year life cycle.

Project Information: This project consists of projects 24-12 Mode S, 34–12 Air Traffic Control Beacon Interrogator (ATCBI) Establishment, 44–45 Air Traffic Control Radar Beacon System (ATCRBS) Relocation, and 44-46 Air Traffic Control Beacon Interrogator (ATCBI) Replacement from the 1993 CIP.

Approach:

- 148 Mode S systems will be procured to provide coverage down to the ground at 108 terminals and down to 12,500 feet above mean sea level in other areas. Mode S systems are designed to be remote maintenance monitored and unmanned. Existing radar beacon system antennas not capable of improved azimuth resolution will be replaced and additional antennas procured where increased data rates are required.
- 103 air traffic control beacon interrogator (ATCBI-4/5) systems will be relocated following Mode S commissionings.
- These units will support airport surveillance radar (ASR) sites and one air route surveillance radar (ARSR–4) testing site. Air traffic control beacon interrogator (ATCBI–3) equipment will be removed for disposal.

Products:

- Up to 259 monopulse secondary surveillance radars to replace services provided by existing air traffic control beacon interrogators at low density sites. (44–46)
- 148 Mode S systems at high to mid-density sites at a maximum production capability of 48 per year. (24–12)
- Replacement/establishment program. Final requirements definition depends on requirements for the airport surveillance radar program, future automation, data link, and global positioning system. (34–12)
- 56 Mode S back–to–back monopulse antennas for en route surveillance sites. (24–12)
- 13 equipment shelters. (24–12)

1995 Accomplishments:

- Qualified software to upgrade terminal sites from air traffic control radar beacon system mode operation to Mode S.
- Delivered approximately 90% of the Mode S units in the terminal 400–target configuration, and commissioned one–half of these systems.

1996 Planned Accomplishments:

- Receive acquisition review counsel approval for air traffic beacon interrogator replacement.
- Install Mode S en route software at keysite.

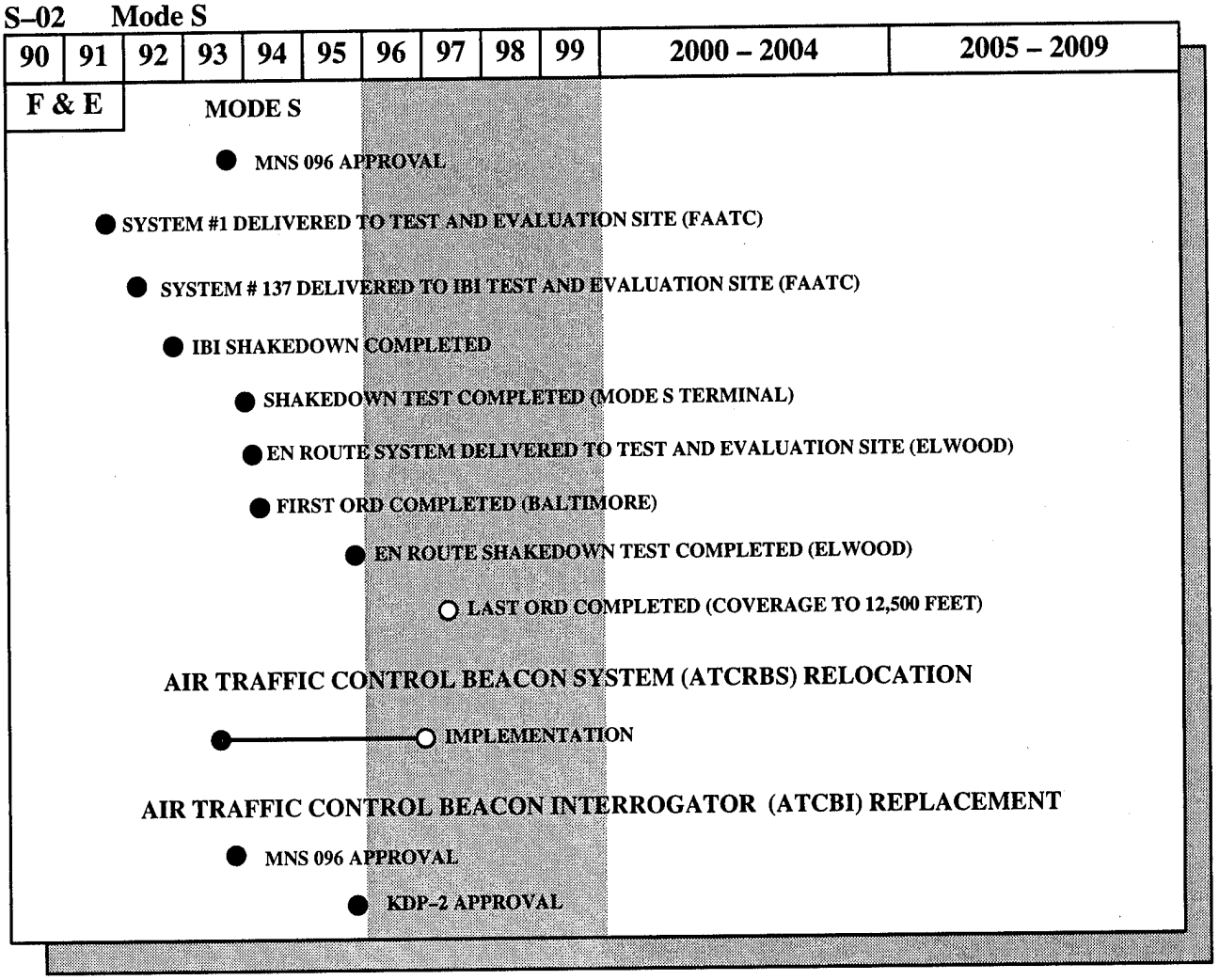
Benefit/Cost Ratio: A benefit–cost analysis is underway.

Related Projects/Activities: Most terminal and en route surveillance radars will be collocated with Mode S and share a digital interface with the air traffic control automation system. Also related are A–03 Automated Radar Terminal System (ARTS) Improvements, A–11 Terminal Air Traffic Control Automation (TATCA), A–12 Airport Surface Target Identification System (ATIDS), C–15 FAA Telecommunications Satellite (FAATSAT), C–17 Establish Alaskan NAS Interfacility Communications System (ANICS) Satellite Network, C–20 Aeronautical Data–link. C–22 Gulf of Mexico, F–02 Metroplex Control Facility (MCF), and F–04 DOD/FAA Air Traffic Control Facility Transfer/Modernization. Mode S will be a remote maintenance monitoring system (M–07 National Infrastructure Management System (NIMS)). M–15 NAS Spectrum Engineering Management, S–03 Terminal Radar (ASR) Program, S–04 Long-Range Radar Program, S–05 Long-Range Radar (LRR) Radome Replacement, S–08 Precision Runway Monitor, W–01 Automated Weather Observing System (AWOS), and Research, Engineering and Development Plan projects 021–190 Airport Surface Target Identification System (ATIDS) 022–110 Traffic Alert and Collision Avoidance System (TCAS), 031–110 Aeronautical Data Link Communications and Applications, and 041–110 Aviation Weather Analysis and Forecasting are related projects.

List of Contractors: A contract has been established as a joint venture composed of Westinghouse and Unisys for production and installation of Mode S units.

- Westinghouse Electric Corporation
  (interrogators for 148 Mode S sensors)
  Linthicum, Maryland
- Loral Defense Systems
  (data processing for 148 Mode S sensors)
  Paoli, Pennsylvania
  - Wilcox Electronics
    Kansas City, Missouri
  - Unr–Rohn
    Birmingham, Alabama
- Radiation Systems Incorporated
  (antennas)
  Sterling, Virginia
  - Kevlin Microwave Corporation
    (rotary joints)
    Wilmington, Massachusetts

S–02 Mode S



S–03 Terminal Radar (ASR) Program

Purpose: This project provides economical radar service at airports with air traffic densities high enough to justify the service. It also upgrades the highest density airports with the latest modern equipment.

Replacement of the airport surveillance radar (ASR–4/5/6) with ASR–7/8/9 is necessary because of the decreasing availability of spare parts and the high–maintenance workload. Repair parts for the ASR–4/5/6 radars are in short supply; parts from decommissioned units are being used to support field requirements.

After the completion of this portion of the program, many terminal areas will have aging analog ASR–7/8 radars and inadequate weather detection capabilities. Another portion of this program will provide digitized radar data suitable for use in air traffic control facilities with standard terminal automated radar system (STARS) equipment where the approach control function

will be performed. Replacement of the ASR–7/8 systems is required to obtain digitized radar data and to contain supportability costs of obsolescence. Digital radar will be provided for those terminals which require radar replacement, for terminals expected to qualify for radar approach control by 2000, and for sites affected by metroplex control facility (MCF) consolidation. This project will also provide for relocations and associated refurbishments of terminal radars.

Project Information: This project combines projects 24–13 Terminal Radar (ASR) Program, 34–13 Terminal Radar Digitizing, Replacement, and Establishment, and 44–60 Sustain/Relocate Airport Surveillance Radar (ASR) from the 1993 CIP.

Approach: The FAA will meet its needs for terminal radar through joint acquisition with DOD of a nondevelopmental item radar system with an integrated monopulse secondary surveillance radar (MSSR) beacon. The system will be capable of providing digitized radar data and weather detection capabilities for replacement of aging ASR–7s/8s, DOD takeover sites, and new establishments. Concurrently with acquisition of a radar system, FAA is reviewing an alternative to upgrade the ASR–8 with a moving target detector and digitized output. If this alternative proves both technically adequate and cost beneficial, only the ASR–7 would be replaced. Several different activities have been combined to form this program.

- Replacement of 96 ASR–4/5/6 vacuum–tube radars with ASR–7/8/9 (leapfrog 16 ASR–7s to ASR–4/5/6 sites, leapfrog 40 ASR–8s to ASR–4/5/6 sites, and install 40 ASR–9s at ASR–4/5/6 sites). Established 28 new ASR–9 sites and procured 10 systems for the DOD.
- Relocation of existing ASRs where necessary due to new construction interfering with required radar coverage or to changes in air traffic volume. Regions provide candidates for relocation. Headquarters validates priorities and funds relocations through the annual budget process.
- Replacement of ASR–7 radars with an ASR–11 solid–state radar at medium to low density airports.
- A concurrent analysis of the cost and technical feasibility of upgrading ASR–8s with a moving target detector and improved weather detection capabilities is ongoing. If the upgrades are successful, only the ASR–7s will be replaced.

Products:

- The FAA procurred 134 replacement and new establishment ASR–9 radars (including 10 for DOD). (24–13)
- Relocate ASRs and raise antennas where required. (44–60)
- Terminal radar to support automation requirements compatibility. (34–13)
- Procurement of terminal radars in support of DOD base closures. (34–13)
- Procurement of terminal radars in support of new qualifying airports. (34–13)

1995 Accomplishments:

- Commissioned 21 ASR–9 systems: Daytona Beach, FL; Norfolk, VA; Rochester, NY; Spokane, WA; Boston #2, MA; Medford, OR; Yakima, WA; Dallas/Ft. Worth #2 and #3, TX; Minneapolis, MN; Columbus, OH; Detroit #2, MI; Knoxville, TN; Grand Rapids, MI; Atlanta #1, GA; Cincinnati, OH; Philadelphia, PA; Portland, ME; Grand Junction, CO; Louisville, KY; and Camp Pendleton, CA.
- Delivered three ASR–9 systems: Dallas/Ft Worth #4, TX; Albany, NY; and Charlottesville, NC.
- Achieved key decision point three for ASR–11.
- Released ASR–11 RFP.

1996 Planned Accomplishments:

- Deliver five ASR–9 systems: Columbia, MO; Atlanta, GA; Roswell, NM; Ft Hood, TX; and Fayetteville, NC.
- Commission 10 ASR–9 systems: Gainesville, FL; Sarasota, FL; Tampa, FL; Charleston, SC; Jacksonville, FL: Albany, NY; Charlottesville, NC; Dallas–Fort Worth, TX; Ft. Hood, TX; and Atlanta #2, GA.
- Award ASR–11 contract.

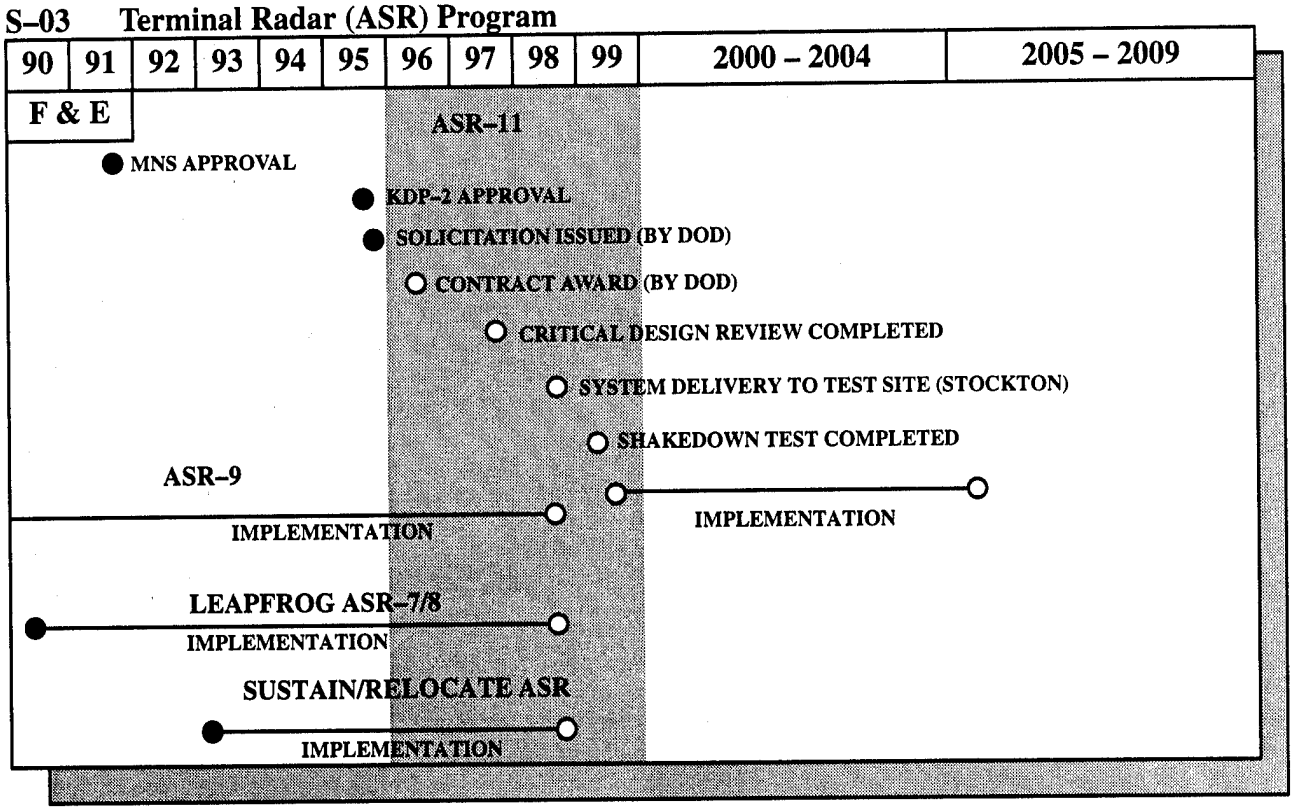
Benefit/Cost Ratio: A benefit–cost ratio has not been developed for this project.

Related Projects/Activities: A–03 Automated Radar Terminal System Improvements, A–04 Standard Terminal Automated Radar System (STARS), F–01 ATCT/TRACON Establishment/Sustainment/Replacement, F–02 Metroplex Control Facility (MCF), F–04 DOD/FAA Air Traffic Control Facility Transfer/Modernization, M–03 Capital Investment Plan (CIP) System Engineering and Technical Assistance, M–15 NAS Spectrum Engineering Management, S–02 Mode S, and W–09 Airport Surveillance Radar (ASR) Weather Systems Processor.

List of Contractors:

- Westinghouse Electric Corporation
  (ASR–9 Systems: 124 for FAA and 10 separately funded for DOD)
  Linthicum, Maryland
  - Varian
    Palo Alto, California
  - Keltec
    Fort Walton Beach, Florida
  - Kevlin
    Woburn, Massachusetts
  - General Defense
    Pinellas Park, Florida
- Raytheon Service Company
  Washington, District of Columbia

S–03 Terminal Radar (ASR) Program



S–04 Long–Range Radar Program

Purpose: This project will provide a national radar surveillance network by installing the air route surveillance radar (ARSR–4) at both existing and new sites, and by replacing or upgrading existing radars that are obsolete or require excessive maintenance. This project will also provide improvements to the current inventory of long–range radars that will extend their useful life and/or provide a smooth transition to a beacon–only en route surveillance system.

Project Information: This project combines projects 24–15 Long–Range Radar Program and 44–40 Long–Range Radar (LRR) Improvements from the 1993 CIP.

Approach: Replace portions of vacuum–tube radars with solid–state devices. Repair and refurbish other portions and improve tolerance to power fluctuations. Provide limited remote control. These steps will extend the usable life of the vacuum–tube radars. Remote maintenance monitoring will be provided for all air route surveillance radar (ARSR–3) facilities on a retrofit basis.

The joint surveillance system coverage around the perimeter of the United States would be unaffected by any phase–out. In the event en route primary radar services are required beyond 2005, the long–range radar improvements program will continue the activity begun with the solid-state receiver/digital moving target indicator to upgrade the current inventory of ARSR–1/2 and military radars. The upgrade will be accomplished by replacing aging and obsolete components and material to make them more supportable and, in so doing, increase the service life another 15 to 20 years. The major part of the improvement will consist of upgrading the transmitter in both ARSR–1/2 and military radars. Other improvements will include rotary joint replacements, wave guide replacement, intercabinet wiring replacement, cooling and dehumidifier upgrades, power conditioning upgrades, and interior and exterior grounding upgrades.

Should the FAA/DOT decide not to continue en route primary radar surveillance beyond 2005, a transition to a beacon–only en route radar surveillance system will be developed and implemented. The transition will address disposal of the primary radars, physical plant changes, and equipment modifications for use with Mode S or other beacon surveillance radars.

Regardless of the en route primary decision, certain improvements such as power grounding, cable tray cleanup, and rotary joint replacements will be accomplished.

Action taken as a result of Title VI of the Omnibus Budget Reconciliation Act of 1993 required that 235 megahertz (MHz) of Federal Government radio frequency spectrum be transferred to the private sector. The reallocation of the 1390–1400 MHz band in January 1999 will impact long–range radar, including the new air route surveillance radar model 4 (ARSR–4). Additional waveguide filters for FAA long–range radars may need to be changed and the ARSR–4 reengineered to operate in the reduced spectrum. FAA has estimated that these actions may cost over $565 million to complete.

Products:

- 43 three–dimensional air route surveillance radar (ARSR–4) systems, including one for field support/training and three fully funded by DOD. (24–15)
- Long–range radar relocations as required. (24–15)
- 76 upgraded en route tube–type radars. (24–15)
- ARSR–1/2 radar set controls. (44–40)
- Cable tray cleanup. (44–40)
- Power and grounding problems resolution. (44–40)

1995 Accomplishments:

- Completed operational test and evaluation on first article.
- Completed final acceptance on six ARSR–4s.
- Completed installation and phase 4 testing on two ARSR–4s.
- Delivered four ARSR–4s to sites.
- Prepared decommissioning plan for notice of proposed rulemaking.

1996 Planned Accomplishments:

- Commission 20 ARSR–4s.
- Install and test 23 ARSR–4s.

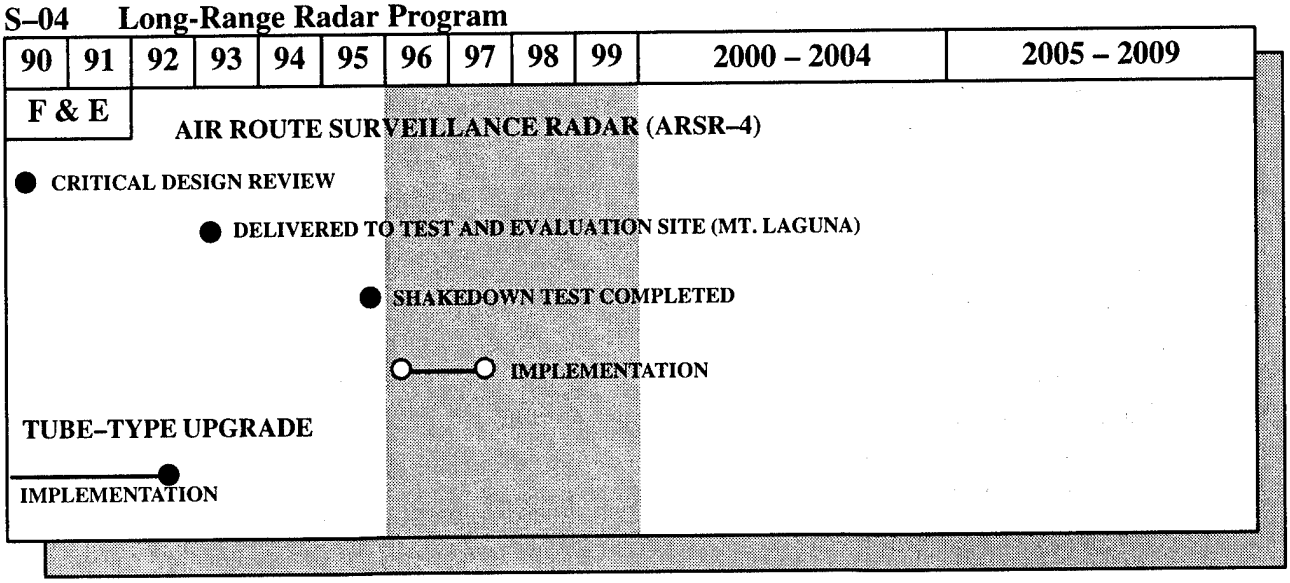
Benefit/Cost Ratio: A November 1991 study indicates a ratio of 1.4/1.0 for the long– range radar improvements project.

Related Projects/Activities: This project will require telecommunications service from the NAS interfacility communications system. A–01 En Route Automation Program will receive target and beacon data from these radars. Long-range radars will be remotely monitored from a maintenance control center M–07 NAS Infrastructure Management System (NIMS). Other related projects include: C–11 Data Multiplexing Network (DMN) Continuation, C–12 Expansion/Reconfiguration of Low Density Radio Communications Link (LDRCL), F–11 Power Systems Sustained Support, F–13 NAS Facilities Occupational Safety and Health (OSH) and Environmental Compliance, M–03 Capital Investment Plan (CIP) System Engineering and Technical Assistance, M–15 NAS Spectrum Engineering Management, M–21 Logistics Support Systems and Facilities, M–27 National Airspace Integrated Logistics Support (NAILS), S–02 Mode S, S–03 Terminal Radar (ASR) Program, and S–05 Long–Range Radar (LRR) Radome Replacement.

List of Contractors:

- Norden Systems, Incorporated
  (64 long–range radar upgrade kits)
  Long Island, New York
- Westinghouse Electric Corporation
  (43 air route surveillance radar–4 systems: 40 jointly funded by FAA and DOD and 3 fully funded by DOD)
  Baltimore, Maryland

S–04 Long-Range Radar Program



S–05 Long-Range Radar (LRR) Radome Replacement

Purpose: This project will replace existing radomes at most long–range radar facilities in the NAS. The majority of the radomes at long–range radar sites have been in service for 25 to 30 years. The radomes have exceeded their normal life expectancy, and their maintenance has become labor intensive.

Current radomes are also not compatible with the new Mode S monopulse antenna system. These radomes are too small to physically accommodate the Mode S antenna system. In addition to being larger, the new radome will minimize radar signal interference, such as antenna beam skewing and excessive attenuation, as compared to existing radome metal frames and dielectric materials.

Project Information: This project consists of project 44–42 Long–Range Radar Radome Replacement from the 1993 CIP.

Approach: Replace all obsolete and Mode S noncompatible long–range radar radomes. Radome procurement was initiated with a request for proposal. The technical specification requires that the new radome be compatible with the Mode S system.

1995 Accomplishments:

- Installed 21 radomes.

1996 Planned Accomplishments:

- Procure remainder of radomes.

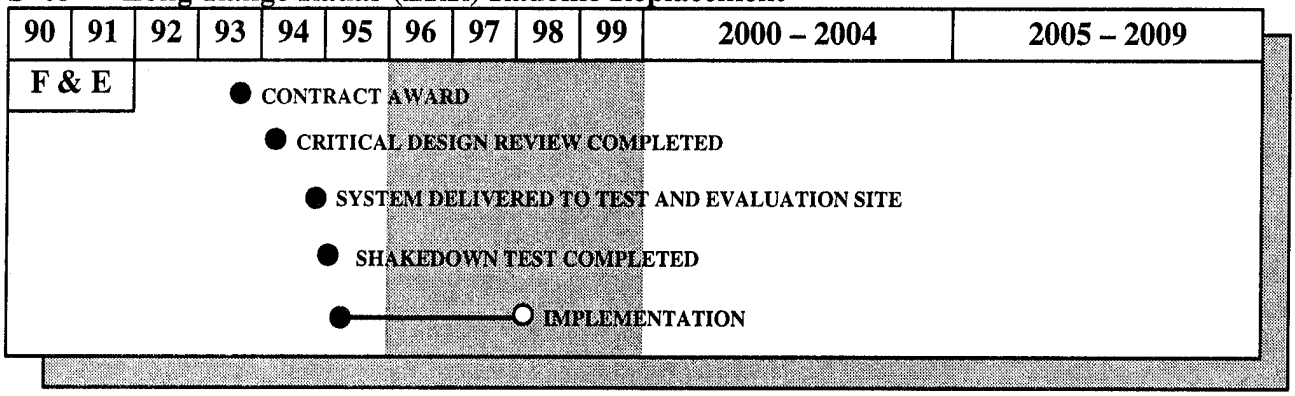
Benefit/Cost Ratio: A benefit–cost ratio has not been developed for this project.

Related Projects/Activities: M–03 Capital Investment Plan (CIP) System Engineering and Technical Assistance, M–21 Logistics Support Systems and Facilities, M–27 National Aviation Integration Logistics Support (NAILS), S–02 Mode S and S–04 Long-Range Radar Program.

List of Contractors:

- Electronic Space Systems Corp. (ESSCO) (up to 109 long–range radar radomes) Concord, Massachusetts

S–05 Long-Range Radar (LRR) Radome Replacement



S–08 Precision Runway Monitor

Purpose: Develop a high–update–rate radar and computer-predictive displays to allow controllers to monitor aircraft on independent instrument flight rule approaches to parallel

runways spaced less than 4,300 feet apart (including triple and quadruple runways). Conducting independent radar approaches will enable airports to increase capacity, reduce delays, and save fuel during reduced visibility.

Project Information: This project consists of project 64–27 Precision Runway Monitor from the 1993 CIP.

Approach: Precision runway monitor demonstrations and simulations were conducted at Memphis and Raleigh–Durham airports using engineering models of a Mode S sensor configured with a back–to–back antenna and an electronically scanned antenna. These demonstrations provided data used to evaluate changes to surveillance factors affecting the minimum runway separation for dual approaches. Engineering tests, flight data (live and simulator), and air traffic controller evaluations have been completed. The electronically scanned antenna system provides a faster update rate than conventional radars because it uses a computer-controlled electronic scanning sensor beam. The update rate requirement for dual parallel runways down to 3,400 feet spacing is 2.4 seconds or less with a capacity of 25 aircraft tracks.

The FAA has awarded a sole–source contract for five limited production electronically scanned units.

As part of this project, simulation and demonstration activities will continue to identify criteria for the conduct of safe, independent approaches to parallel runways spaced less than 4,300 feet apart, including offset localizer, variable radar update rates, display monitors, and control procedures.

Research and development efforts are continuing to develop air traffic control procedures and surveillance/navigation requirements to support independent approaches to dual and triple parallel runways spaced as low as 3,000 feet apart. Preliminary results from real–time simulations indicated that the use of precision runway monitor systems and offset localizer can potentially support independent approaches to dual parallel runways spaced 3,000 feet apart. Additional simulations are planned to investigate the combined use of a precision runway monitor with more accurate navigation/landing systems such as the global positioning system and final monitor aid to permit simultaneous approaches to closely spaced parallel runways. Requirements for surveillance and navigation of closely spaced parallel operations will be developed.

Products:

- Five electronically scanned antenna systems with options for one to three more.
- Procedures for conducting IMC operations at airports with parallel runways that have less than 3,400 feet spacing.

1995 Accomplishments:

- Delivered first article system to Minneapolis–St Paul.

1996 Planned Accomplishments:

- Demonstrate low–cost precision runway monitor alternative at selected airport.
- Commission first article system at Minneapolis–St Paul.
- Develop simulation and procedures at Atlanta, Pittsburgh, JFK, and Philadelphia airports.

Benefit/Cost Ratio: A February 1995 study indicates a 10.0/1.0 benefit–cost ratio.

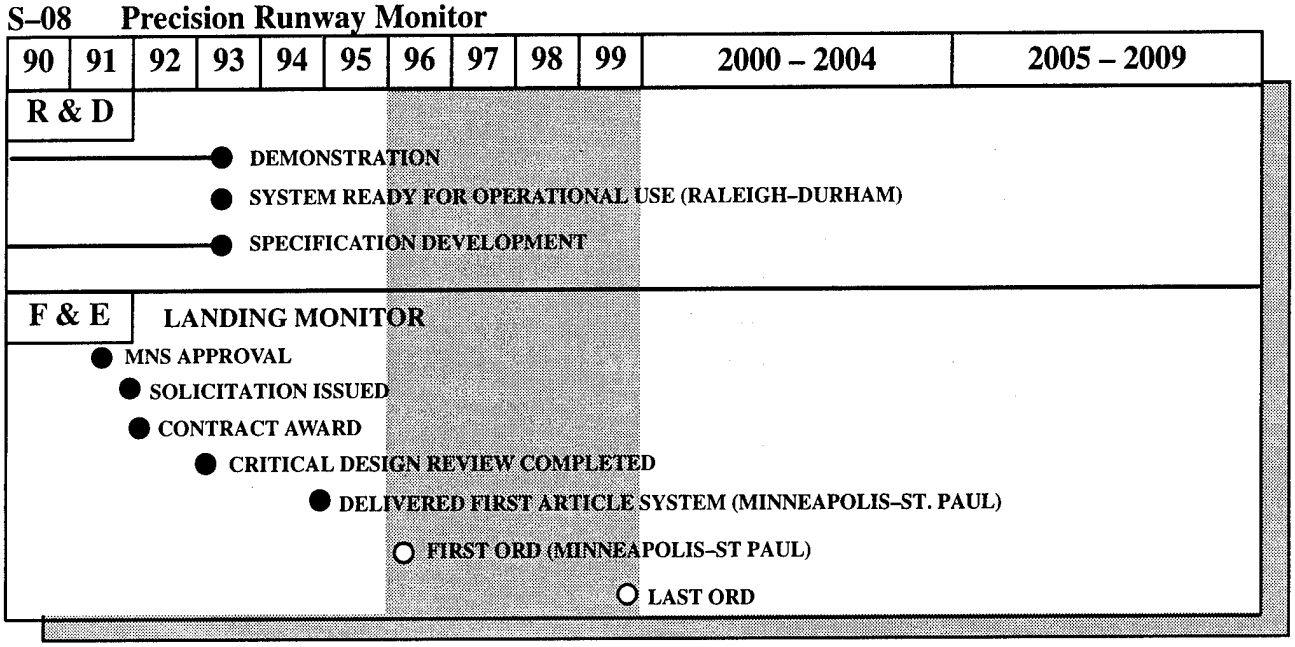
Related Projects/Activities: A–02 Tower Automation Program, S–02 Mode S, and Research, Engineering and Development Plan project 021–220 Multiple Runway Procedures Development.

List of Contractors:

- MSI Services, Inc.
  (Raleigh–Durham upgrade)
  Washington, District of Columbia
- Allied–Signal Aerospace Company
  Bendix Communications Division
  (5 electronically scanned antennas)
  Baltimore, Maryland

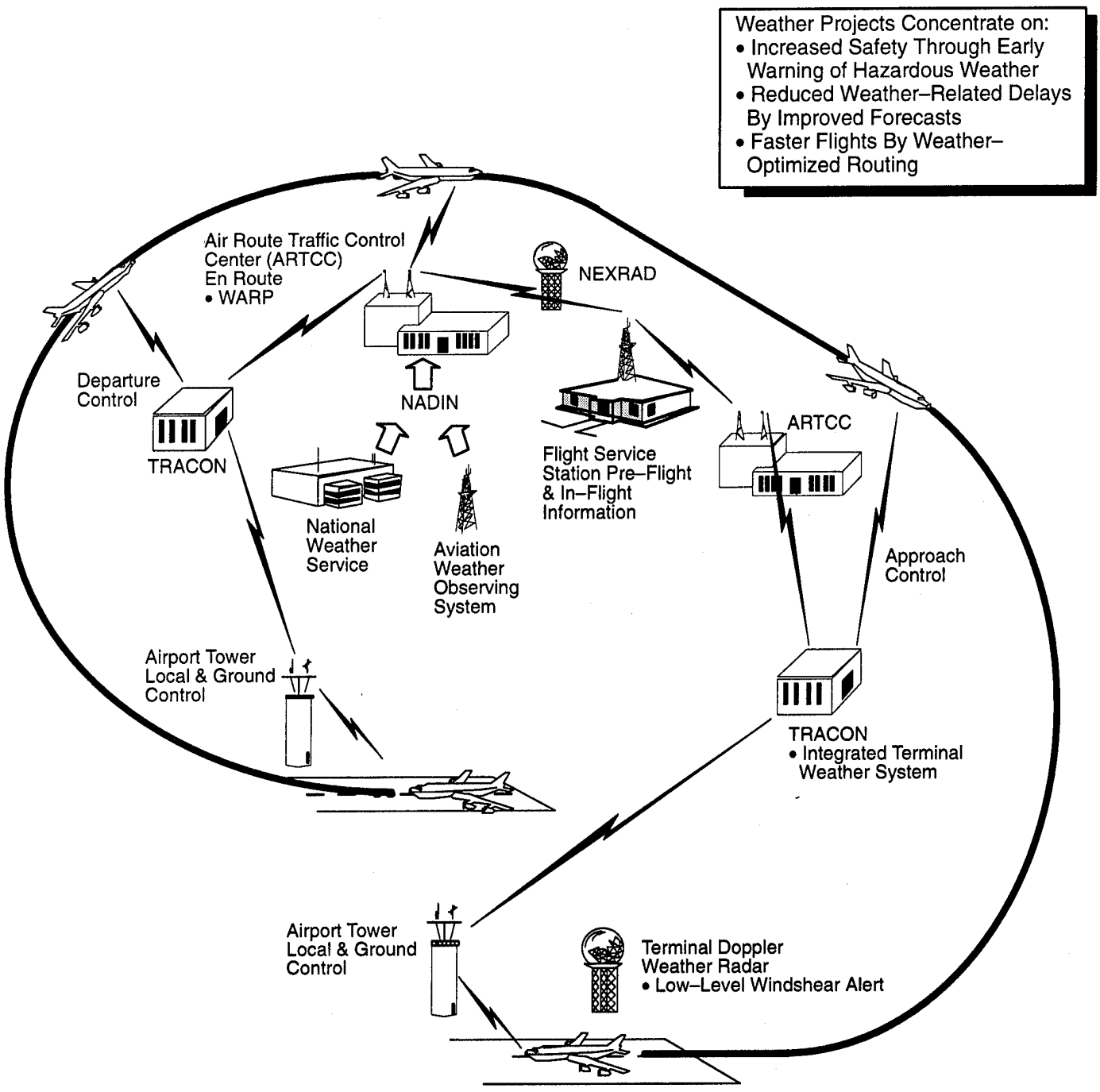
- Lincoln Laboratories
  (engineering support services)
  Bedford, Massachusetts

S–08 Precision Runway Monitor



Weather Functional Projects

New Project Number	Title	Previous Project Number	Page Number
W – 01	Automated Weather Observing System (AWOS)	23–09	Wx – 3
W – 02	Weather Radar Program	24–16	Wx – 5
W – 03	Terminal Doppler Weather Radar (TDWR) System	24–18	Wx – 6
W – 04	Weather and Radar Processor (WARP)	43–02	Wx – 7
W – 05	Low–Level Windshear Alert System (LLWAS)	43–12	Wx – 9
W – 06	Digital Altimeter Setting Indicator (DASI) Replacement	43–13	Wx – 11
W – 07	Integrated Terminal Weather System (ITWS)	63–21	Wx – 11
W – 09	Airport Surveillance Radar (ASR) Weather Systems Processor	64–13	Wx – 13



Weather in the NAS

W–01 Automated Weather Observing System (AWOS)

Purpose: This project obtains aviation–critical weather data (e.g., wind velocity, temperature, dew point, altimeter setting, cloud height, visibility, precipitation type, occurrence, and accumulation) through the use of automated sensors. It will process the data and allow dissemination to pilots via computer synthesized voice. This project includes an automated weather observing system (AWOS) developed by the FAA and the automated surface observing system (ASOS), a joint program with the National Weather Service (NWS), FAA, and DOD.

Automated weather observation systems will be connected to the automated weather observation system data acquisition system (ADAS). This system will collect and concentrate weather messages from the automated weather observing systems and the automated surface observing systems for nearby facilities and national distribution via the weather message switching center replacement to the National Weather Service. This configuration will support the closing of the National Communications Center, and it will make weather observation data available to pilots on a timely basis for safety and efficiency.

Project Information: This project contains project 23–09 Automated Weather Observation System (AWOS) from the 1993 CIP.

Approach: A demonstration program for the automated weather observation system was successfully completed in 1984. Immediately thereafter, a pilot program contract was awarded for a design of a system for nontowered airports. In 1986, FAA Advisory Circular (AC) 150/5220–16 was published for certification and acquisition of automated weather observation system devices for such users as airport operators, fixed–base operators, and heliport operators. This document is also the basis for systems to be funded and installed under the Airport Improvement Program (AIP).

Automated weather observation system equipment is being procured as commercial–off–the–shelf systems (in accordance with the requirements of the advisory circular) to meet immediate needs. The commercial automated weather observing system will be used primarily as stand–alone units for airports without weather observers. There were 193 automated weather observing systems commissioned by 1995, and the remaining five systems are scheduled to be commissioned in 1996. They were maintained by the contractor through March 1994, then maintenance responsibility was transferred to the FAA.

The National Weather Service will procure, install, and maintain automated surface observing system equipment for the FAA at selected airports. Systems will be installed at 233 nontowered airports along with 304 towered airports and locations (e.g., flight service stations) where the FAA takes surface observations or where observations will be met by the National Weather Service procurement.

The AWOS data acquisition system will translate automated weather observing system weather messages into the standard aviation weather observation format. Weather Message Switching Center Replacement will receive automated weather observation system (AWOS) and automated surface observing system (ASOS) hourly and special weather messages through the automated weather observing system data acquisition system (ADAS) via the national airspace data interchange network/local communications network (NADIN/LCN). This project will require interfacility communications service from the NAS interfacility communications system. ASOS data will be furnished for controller use and to update automatic terminal information system (ATIS) weather information. AWOS will support the surface weather observation needs of FAA's rotorcraft programs. The lightning detection data system will provide lightning data to AWOS and ASOS via the automated weather observing system data acquisition system. AWOS and ASOS data will be broadcast through VHF

omnidirectional range located with tactical air navigation or discrete very high frequency/ultra high frequency communications outlets. The automated weather observing system data acquisition system (ADAS) will provide minute–by–minute AWOS and ASOS data to Aeronautical Data–link via NADIN/LCN to respond to pilot requests for weather data via Mode S data–link.

Products:

- 200 commercial AWOSs (facilities and equipment (F&E) funded, FAA contract).
- 233 nontowered airports (F&E funded, National Weather Service contract). Options to include an additional 170 ASOSs.
- 304 towered airports and flight service stations/former flight service stations (F&E funded , National Weather Service contract). Options to include an additional 55 ASOSs.
- 25 automated weather observing system data acquisition systems (ADASs) – 22 to air route traffic control centers; 1 to FAA Academy; 1 to FAA Technical Center; and 1 to New York metroplex control facility.

1995 Accomplishments:

- Completed installation of 193 commercial AWOSs.

1996 Planned Accomplishments:

- Complete installation of all commercial AWOSs.
- Initiate logistics support contract for FAA maintenance of fielded AWOSs.

Benefit/Cost Ratio: A December 1992 study indicated a 2.7/1.0 benefit–cost ratio.

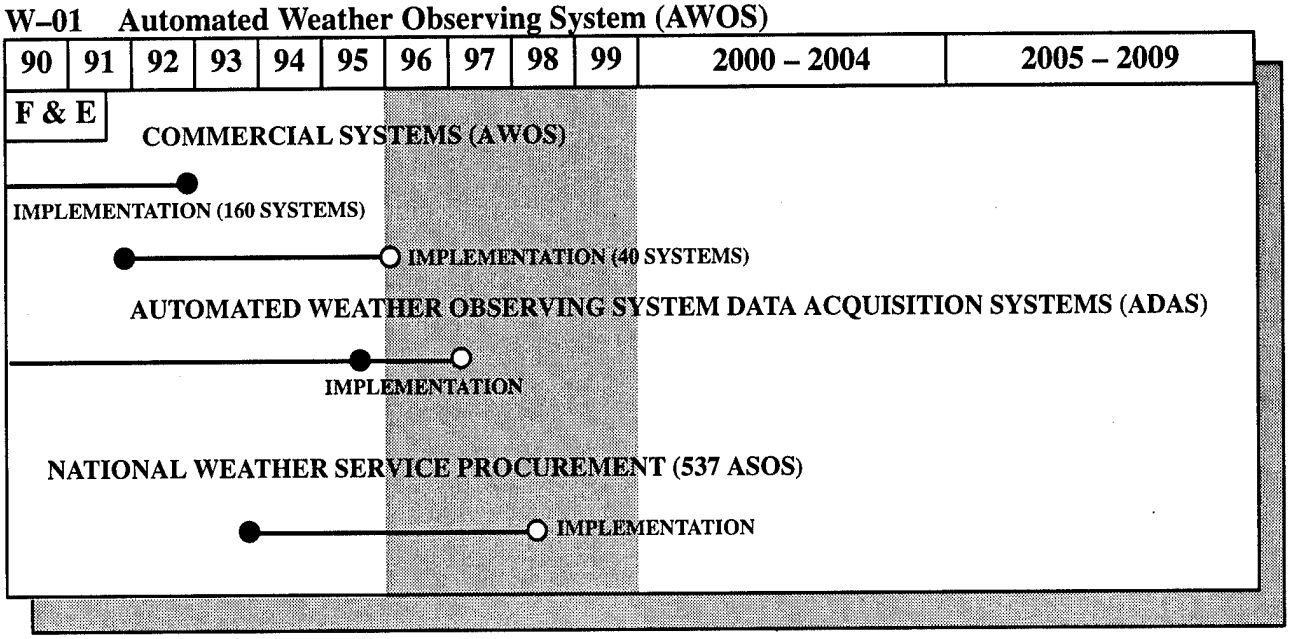
Related Projects/Activities:

- A–02 Tower Automation Program, C–03 Weather Message Switching Center Replacement, C–07 NADIN National Airspace Data Interchange Network (NADIN) II, C–11 Data Multiplexing Network (DMN) Continuation, C–15 FAA Telecommunications Satellite (FAATSAT), C–17 Establish Alaskan NAS Interfacility Communications System ANICS (ANICS) Satellite Network, C–20 Aeronautical Data–link M–15 NAS Spectrum Engineering Management, N–06 VORTAC, N–08 Runway Visual Range (RVR), S–02 Mode S Data–link W–04 Weather and Radar Program (WARP), and W–07 Integrated Terminal Weather System (ITWS).

List of Contractors:

- AAI Corporation (NWS contract)
  (4 ASOS prototype units and 537 production units)
  Hunt Valley, Maryland
- Qualimetrics Corporation
  (200 AWOS units)
  Sacramento, California
- Commpower, Incorporated
  (25 AWOS data acquisition systems)
  Camarillo, California

W–01 Automated Weather Observing System (AWOS)



W–02 Weather Radar Program

Purpose: This project establishes a weather radar network that will provide accurate aviation weather products for en route applications. Radar weather presentations available from today's systems provide limited data for air traffic control. Improved weather data will improve aviation safety and fuel efficiency. In addition to the improvements to be gained in today's system, future automated air traffic control capabilities, such as preferred routing and improved flow management, will depend on reliable and accurate weather data before maximum fuel efficiency and personnel productivity gains projected for these improvements can be realized.

Project Information: This project was project 24–16 Weather Radar Program in the 1993 CIP.

Approach: This program consists of the definition, development, procurement, and installation of a new Doppler weather radar for en route applications. The long–range Doppler radar for en route applications, known as the next generation weather radar (NEXRAD), is being funded jointly by the National Weather Service (NWS), the DOD, and the FAA. The program is managed by the next generation weather radar Joint Systems Program Office under the National Oceanic and Atmospheric Administration. The FAA is responsible for funding 20 percent of the cost of the National Weather Service's 118 site network, all of the cost of 22 principal user processors, and all 12 FAA offshore sites (7 in Alaska, 4 in Hawaii, and 1 in Puerto Rico).

A production contract has been awarded to Loral Corporation for 180 next generation weather radar units. An operational support facility has been established in Norman, Oklahoma, to provide such services as software maintenance, field problem resolution, configuration management, and technical manual maintenance.

Interim display capability will be provided by principal user processors to support operation prior to real–time weather and radar processor availability.

Products:

- NEXRAD
  - Contiguous United States network (joint purchase with FAA, NWS, and DOD) 118
  - FAA 12
  - DOD 44
  - National Weather Service support 1
  - Other 3
- Principal user processors for air route traffic control centers and the air traffic control system command center. 23

1995 Accomplishments:

- Upgraded three FAA offshore NEXRADs to dual channel configuration.
- Installed three FAA offshore NEXRADs.

1996 Planned Accomplishments:

- Complete installation of all NEXRADs.

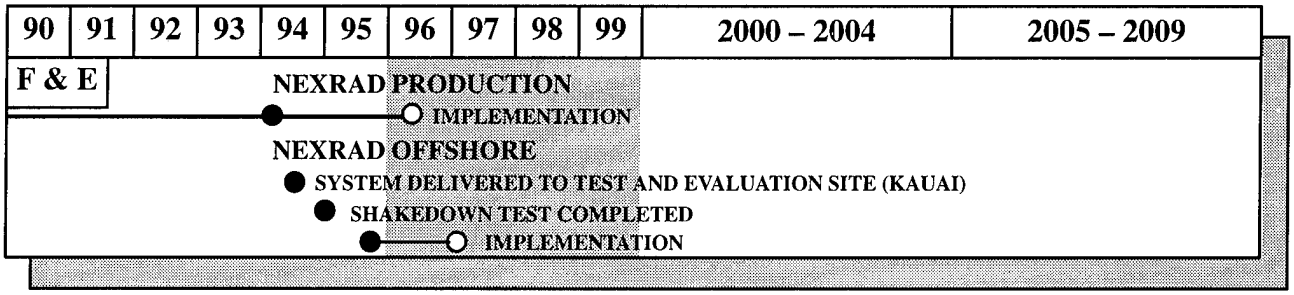
Benefit/Cost Ratio: An August 1988 study indicated a 13.8/1.0 benefit–cost ratio.

Related Projects/Activities: C–11 Data Multiplexing Network (DMN) Continuation, M–07 NAS Infrastructure Management System (NIMS), M–15 NAS Spectrum Engineering Management, S–03 Terminal Radar (ASR) Program, W–03 Terminal Doppler Weather Radar (TDWR) System, and W–04 Weather and Radar Processor (WARP).

List of Contractors:

- Loral
  (175 radars, 135 with FAA participation)
  Great Neck, New York

W–02 Weather Radar Program



W–03 Terminal Doppler Weather Radar (TDWR) System

Purpose: This project consists of the procurement and installation of a new terminal Doppler weather radar which will detect microbursts, gust fronts, wind shifts, and precipitation. This radar will be used to alert aircraft in the terminal area of hazardous weather conditions and to provide advanced notice of changing wind conditions to permit timely change of active runways.

Microbursts are a weather phenomenon that consist of an intense downdraft that may occur in clear air or in precipitation areas. They are particularly dangerous to aircraft landing or departing. The terminal Doppler weather radar scanning mode will be optimized for microburst and windshear detection. The radar will be located near the airport.

Project Information: This project contains project 24–18 Terminal Doppler Weather Radar (TDWR) from the 1993 CIP.

Approach: Terminal Doppler weather radar algorithms were developed by the Government and furnished to the contractor. Data collected using the FAA Doppler weather test bed radar provided the primary basis for algorithm development. The system was used for operational

demonstrations of terminal Doppler weather radar display techniques.

A competitive contract was awarded for a contractor–furnished turnkey system to include terminal Doppler weather radar design, production, site preparation, installation, and implementation at sites specified and acquired by the Government.

Products:

- 47 terminal Doppler weather radar systems (including 2 support systems).

1995 Accomplishments:

- Installed 14 systems (34 total installed).

1996 Planned Accomplishments:

- Install 8 systems (total of 42 installed).

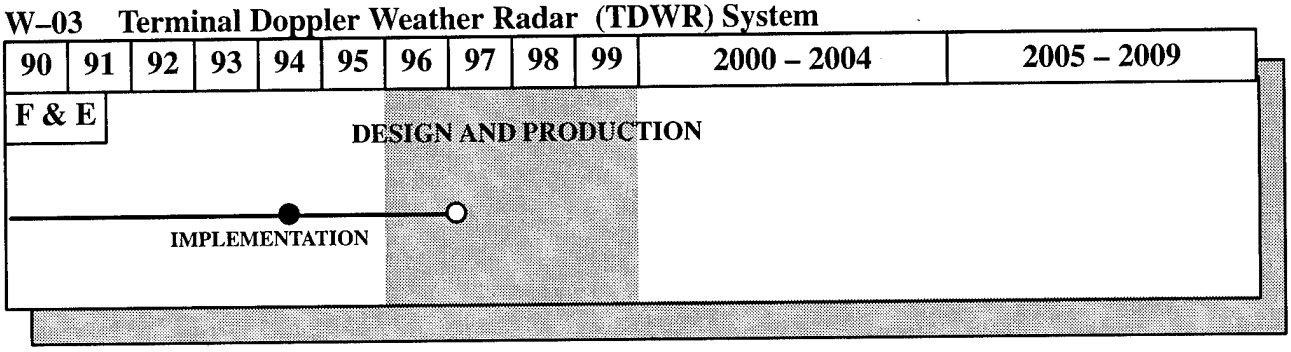
Benefit/Cost Ratio: A March 1994 study indicated a 2.8/1.0 benefit–cost ratio.

Related Projects/Activities: A–04 Standard Terminal Automation Replacement System (STARS), C–11 Data Multiplexing Network (DMN) Continuation, C–14 Critical Telecommunications Support, F–02 Metroplex Control Facility (MCF), M–07 NAS Infrastructure Management System (NIMS), M–15 NAS Spectrum Engineering Management, and W–02 Weather Radar Program. W–05 Low–Level Windshear Alert System (LLWAS) is related when a low–level windshear alert system and terminal Doppler weather radar are both used at a facility. W–09 Airport Surveillance Radar (ASR) Weather Systems Processor, and Research, Engineering and Development Plan project 042–110 Integrated Airborne Windshear Research are related projects.

List of Contractors:

- Raytheon Corporation
  (47 radar units)
  Sudbury, Massachusetts
- Lincoln Laboratory
  (technical support/algorithm development)
  Sudbury, Massachusetts
- National Center for Atmospheric Research
  (technical support/algorithm development)
  Boulder, Colorado
- National Severe Storms Laboratory
  (technical support/algorithm development)
  Norman, Oklahoma

W–03 Terminal Doppler Weather Radar (TDWR) System



W–04 Weather and Radar Processor (WARP)

Purpose: Currently the weather information provided to the air traffic controllers in the en route environment comes from the long range surveillance radars which are not well suited for

this purpose. Next generation weather radars (NEXRAD) will replace the surveillance radars as the source of weather information. The WARP project will collect, process and disseminate NEXRAD and other weather information to controllers, traffic management specialists, pilots, and meteorologists. WARP will provide a mosaic product of multiple NEXRAD information to the Display System Replacement (DSR) for display with aircraft targets. This will improve the quality of weather information available to air traffic controllers thereby reducing accidents and air traffic delays. It also provides the center weather service unit/central flow weather service unit (CWSU/CFWSU) meteorologists with automated workstations which greatly enhance their ability to analyze rapidly changing, potentially hazardous weather conditions, and ensures that the latest and best information is provided to all system users.

Project Information: This project contains project 43–02 Meteorologist Weather Processor (MWP) II from the 1993 CIP.

Approach: This project will be completed in four stages:

Stage 0 provides the commercial off–the–shelf and nondevelopmental item portions of WARP hardware and software as a leased, turn–key system which will replace the existing meteorologist weather processor with updated technology.

Stage 1 develops the NAS interfaces necessary to provide NEXRAD data to controllers consoles via the DSR. This development is conducted in parallel with Stage 0, and takes approximately two years to fully develop, test and implement these interfaces.

Stage 2 provides meteorologists with additional data and analysis tools and it provides the CWSU/CFWSU meteorologist with a single, integrated weather workstation. This replaces the NEXRAD principle user processor workstations.

Stage 3 is a pre–planned product improvements phase which implements advanced weather products currently in research and development and provide weather information to future NAS subsystems (e.g., Aeronautical Data Link (ADL), Operational and Supportability Implementation System (OASIS), Integrated Terminal Weather System (ITWS)).

Products:

- Stage 0: 23 systems
  - 21 to air route traffic control centers (ARTCCs)
  - 2 to air traffic control system command center
- Stage 1: 26 systems
  - 21 to air route traffic control centers (ARTCCs)
  - 1 to air traffic control system command center
  - 1 to FAA Technical Center
  - 1 to FAA Academy
  - 1 to contractor's plant for Stage 2 and 3 DT&E
  - 1 location to be determined

1995 Accomplishments:

- Received key decision point 3 (KDP–3) approval for full scale development.
- Released request for proposal.

1996 Planned Accomplishments:

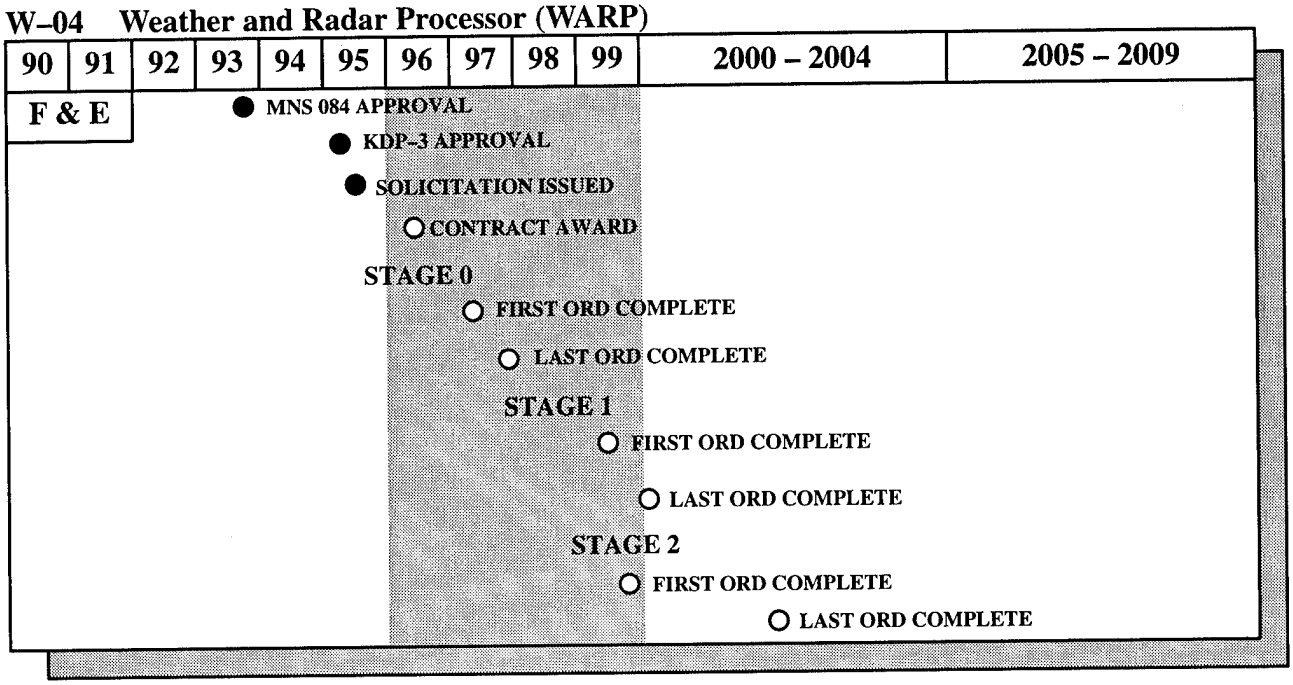
- Conduct operational capability test of potential offerors.
- Award contract.
- Install/test Stage 0.
- Initiate Stage 1 development.

Benefit/Cost Ratio: A March 1995 study indicates a benefit–cost ratio of 9.0/1.0.

Related Projects/Activities: A–01 Display System Replacement (DSR), A–05 Traffic Management System, A–07 Flight Service Automation System (FSAS), A–08 Operational Data Management System (ODMS), A–10 Oceanic Automation Program (OAP), C–03 Weather Message Switching Center (WMSC) Replacement, C–15 FAA Telecommunications Satellite (FAATSAT), C–20 Aeronautical Data Link, F–02 Metroplex Control Facility (MCF), M–03 Capital Investment Plan (CIP) System Engineering Technical Assistance, M–07 NAS Infrastructure Management System (NIMS), M–27 National Aviation Integrated Logistics Support (NAILS), W–01 AWOS Data Acquisition System (ADAS), W–02 Weather Radar Program and W–07 Integrated Terminal Weather System (ITWS).

List of Contractors:

W–04 Weather and Radar Processor (WARP)



W–05 Low–Level Windshear Alert System (LLWAS)

Purpose: The low-level windshear alert system (LLWAS) provides local controllers and pilots with information on microbursts and windshears on or near airports. The LLWAS network expansion, to be installed at nine airports, will enhance the performance of the existing system by providing runway oriented microburst/windshear alerts, increased probability of detection of microbursts, and an interface to the terminal doppler weather radar (TDWR).

Project Information: This project contains projects 43–12 Upgrade Low–Level Windshear Alert System (LLWAS) to Expanded Network Configuration from the 1993 CIP and the network expansion portion of former project 23–12 Low–Level Windshear Alert System (LLWAS).

Approach: The low–level windshear alert system project consists of the following two efforts.

- The LLWAS network expansion will upgrade nine airports to provide increased probably of detection of microburst and windshear on the airport and up along the runway corridors. In addition, the microburst and windshear alert display to the controllers will be runway oriented. The LLWAS network expansion will have an interface to the terminal Doppler weather radar as well as the maintenance processor system.
- The LLWAS life extension and refurbishment program will upgrade 75 LLWAS–2 sites. In addition, the performance of these systems will be improved, and they will be sustainable for at least 15 years. The proposed improvements to these LLWASs include: relocation and replacement of sensor mast, increasing the number of sensor masts, and replacing aging electronics, maintenance monitoring system, and ice free anemometers.

Products:

- Upgrade nine airports to the network expansion configuration. (23–12)
- Upgrade 75 LLWASs. (43–12)
- Integrate the low–level windshear alert system and the TDWR. (43–12)
- Provide an interface to the maintenance processor. (43–12)

1995 Accomplishments:

- Completed integration of TDWR and LLWAS.
- Completed LLWAS network expansion operational test and evaluation.

1996 Planned Accomplishments:

- Complete installation of eight LLWAS network expansion sites.

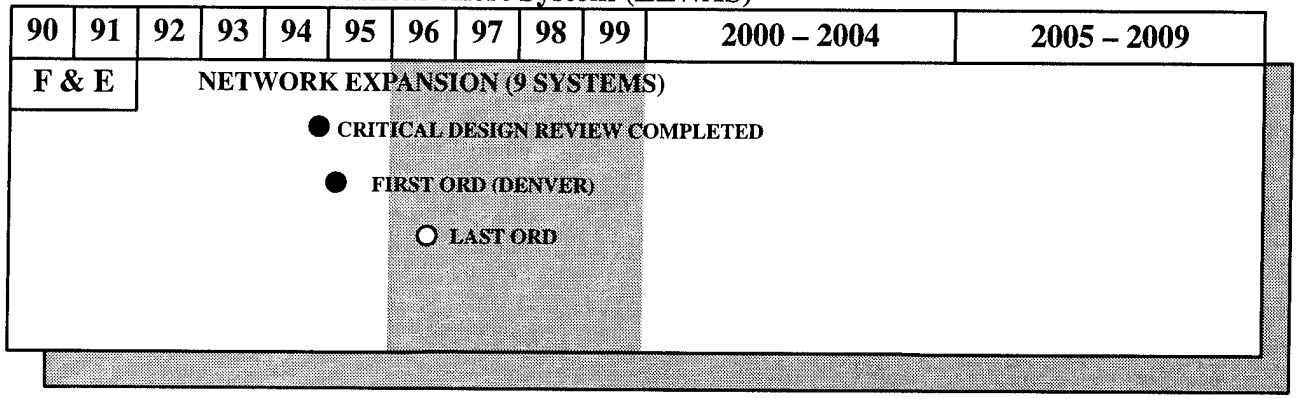
Benefit/Cost Ratio: A March 1994 study indicates a 1.3/1.0 benefit–cost ratio.

Related Projects/Activities: A–02 Tower Automation Program, F–02 Metroplex Control Facility (MCF), M–15 NAS Spectrum Engineering Management, W–03 Terminal Doppler Weather Radar (TDWR) System, W–07 Integrated Terminal Weather System (ITWS), and W–09 Airport Surveillance Radar (ASR) Weather Systems Processor.

List of Contractors:

- Loral Data Systems Incorporated
  (upgrade 9 LLWAS units)
  Sarasota, Florida

W–05 Low–Level Windshear Alert System (LLWAS)



W–06 Digital Altimeter Setting Indicator (DASI) Replacement

Purpose: A digital altimeter setting indicator provides a digital readout of barometric pressure/altimeter setting at airport traffic control tower/terminal radar approach control locations. The barometric pressure/altimeter setting number serves as a reference against which aircraft altimeters can be adjusted for atmospheric pressure variations. Periodic updating of altimeter setting while en route enables pilots to maintain the correct vertical separation between aircraft and ground obstructions.

The purpose of this project is to replace 175 obsolete digital altimeter setting indicators at airport traffic control towers. Some of these indicators have been in service since 1976 and are becoming unmaintainable.

Project Information: The project contains project 43–13 Digital Altimeter Setting Indicator (DASI) Replacement from the 1993 CIP.

Approach: This project will be done via an 8(a) set–aside contract.

Products:

- 175 digital altimeter setting indicator systems.

1995 Accomplishments:

- Delivered 70 systems to FAA Logistics Center.
- Installed 40 systems.

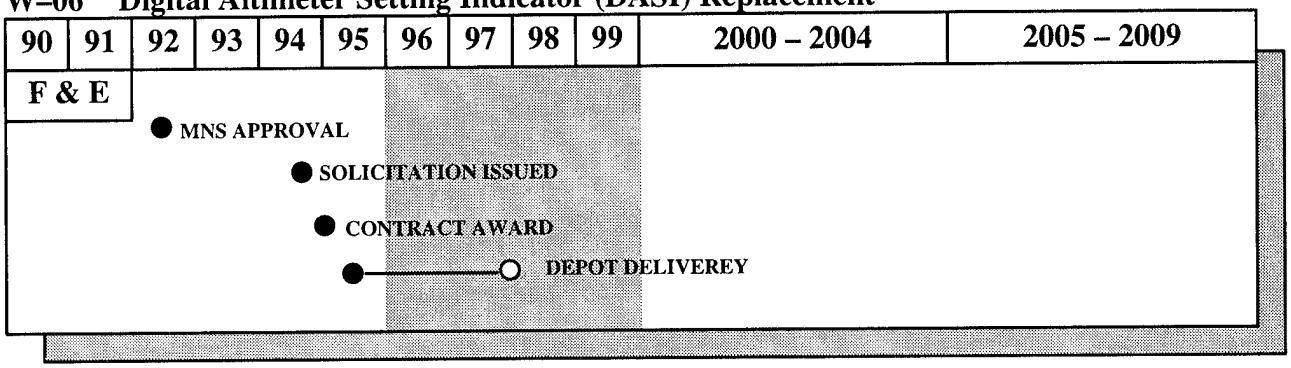
1996 Planned Accomplishments:

- Deliver 85 systems to Logistics Center.

Benefit/Cost Ratio: A November 1991 study indicated a 2.0/1.0 benefit–cost ratio.

Related Projects/Activities: A–02 Tower Automation Program.

W–06 Digital Altimeter Setting Indicator (DASI) Replacement



W–07 Integrated Terminal Weather System (ITWS)

Purpose: This project will integrate all relevant weather data available in the terminal area and from flight aircraft to automatically provide near–term weather information and predictions in easily understood graphical and textual form for air traffic personnel.

Project Information: This project contains project 63–21 Integrated Terminal Weather System (ITWS) from the 1993 CIP.

Approach: The ITWS provides safety and planning products to terminal aviation system users.

These products characterize the current terminal weather situation and forecast approximately 30 minutes into the future. This is achieved by integrating data and products from various FAA and National Weather Service (NWS) sensors (e.g., terminal doppler weather radar, next–generation weather radar, low–level windshear alert system, automated surface observing system, ASR–9), aircraft (via the meteorological data collection and reporting system), and other NWS weather information systems. Products generated by ITWS include windshear and microburst predictions, storm cell and lightning information, terminal area winds aloft, runway winds, and short term ceiling and visibility predictions.

Initial deployment of the ITWS will provide products available as an initial system capability, followed by enhancement packages when both the required input systems and algorithms become available.

The ITWS deployment will be to 34 terminal radar approach control (TRACON) facilities and metroplex control facilities which will cover 45 high traffic airports with significant convective weather. The ITWS situation displays at tower cabs, TRACONs, and their associated air route traffic control centers (traffic management units and central weather service units) will facilitate coordination among air traffic control personnel. Three additional units will be installed at the FAA Technical Center, the ITWS program support facility, and the FAA Academy.

Products:

- 37 ITWS – 34 systems serving 45 airports, plus three support systems.

1995 Accomplishments:

- Received key decision point–3 approval.
- Released request for proposal.

1996 Planned Accomplishments:

- Award ITWS full scale development contract.

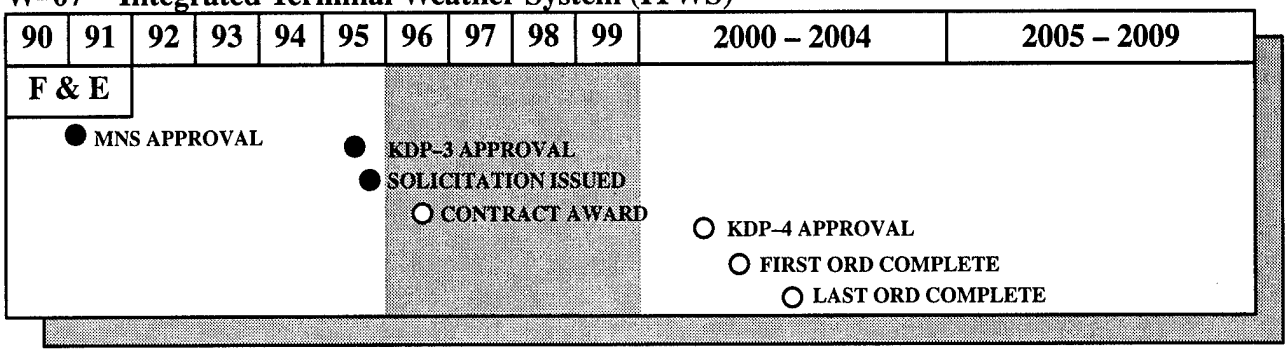
Benefit/Cost Ratio: A March 1995 study indicates a 13.6/1.0 benefit–cost ratio for P3I and a 12.4/1.0 ratio for IOC.

Related Projects/Activities: A–02 Tower Automation Program, A–04 Standard Terminal Automation Replacement System (STARS), A–11 Terminal Air Traffic Control Automation (TATCA), C–11 Data Multiplexing Network (DMN) Continuation, C–15 FAA Telecommunications Satellite (FAATSAT), F–02 Metroplex Control Facility (MCF), M–07 NAS Infrastructure Management System (NIMS), and S–03 Terminal Radar (ASR) Program. It also provides centralized functions which will consolidate and use existing and planned FAA weather capabilities, such as W–01 Automated Weather Observing System (AWOS), W–02 Weather Radar Program, W–03 Terminal Doppler Weather Radar (TDWR) System, W–05 Low–Level Windshear Alert System (LLWAS), W–09 Airport Surveillance Radar (ASR)Weather Systems Processor, and Research, Engineering and Development Plan projects 021–230 Wake–Vortex Separation Standards, 031–110 Aeronautical Data Link Communications and Applications. R,E&D projects 041–110 Aviation Weather Analysis and Forecasting, and 042–110 Aeronautical Hazards Research are also related projects. This project provides an integrated weather data set to meet the weather data requirements.

List of Contractors:

- Lincoln Laboratory
  (integrated terminal weather system prototype)
  Lexington, Massachusetts

W–07 Integrated Terminal Weather System (ITWS)



W–09 Airport Surveillance Radar (ASR) Weather Systems Processor

Purpose: This project enhances the hazardous weather detection capability of an airport surveillance radar (ASR–8 with digital channel and ASR–9). Enhancement is accomplished by developing and testing a modular data processing channel for automatic detection of windshear, thunderstorm microbursts, and gust fronts. This enhancement provides windshear warnings at airports not eligible for terminal doppler weather radar.

Project Information: This project contains project 64–13 ASR Windshear Processor from the 1993 CIP.

Approach: Lincoln Laboratory developed and demonstrated radar modifications, data processing computers, and processing algorithms that enable an airport surveillance radar (ASR–8/9) to detect low–altitude windshear, microbursts, and gust fronts. Techniques have been implemented on a production airport surveillance radar (ASR–9) and demonstrated during tests at the Kansas City, MO; Orlando, FL; and Albuquerque, NM. airports.

Products:

- Signal processing algorithms for estimation of low–altitude radial winds using airport surveillance radar (ASR–8/9).
- Microburst and gust front detection algorithms.
- Demonstration of a weather systems processor on a production airport surveillance radar (ASR–9).
- Specification for radar modifications and weather systems processor.
- Modification of operational ASR systems to add weather systems processor capability.

1995 Accomplishments:

- Conducted operational concept testing at Albuquerque, NM.

1996 Planned Accomplishments:

- Issue request for proposal.

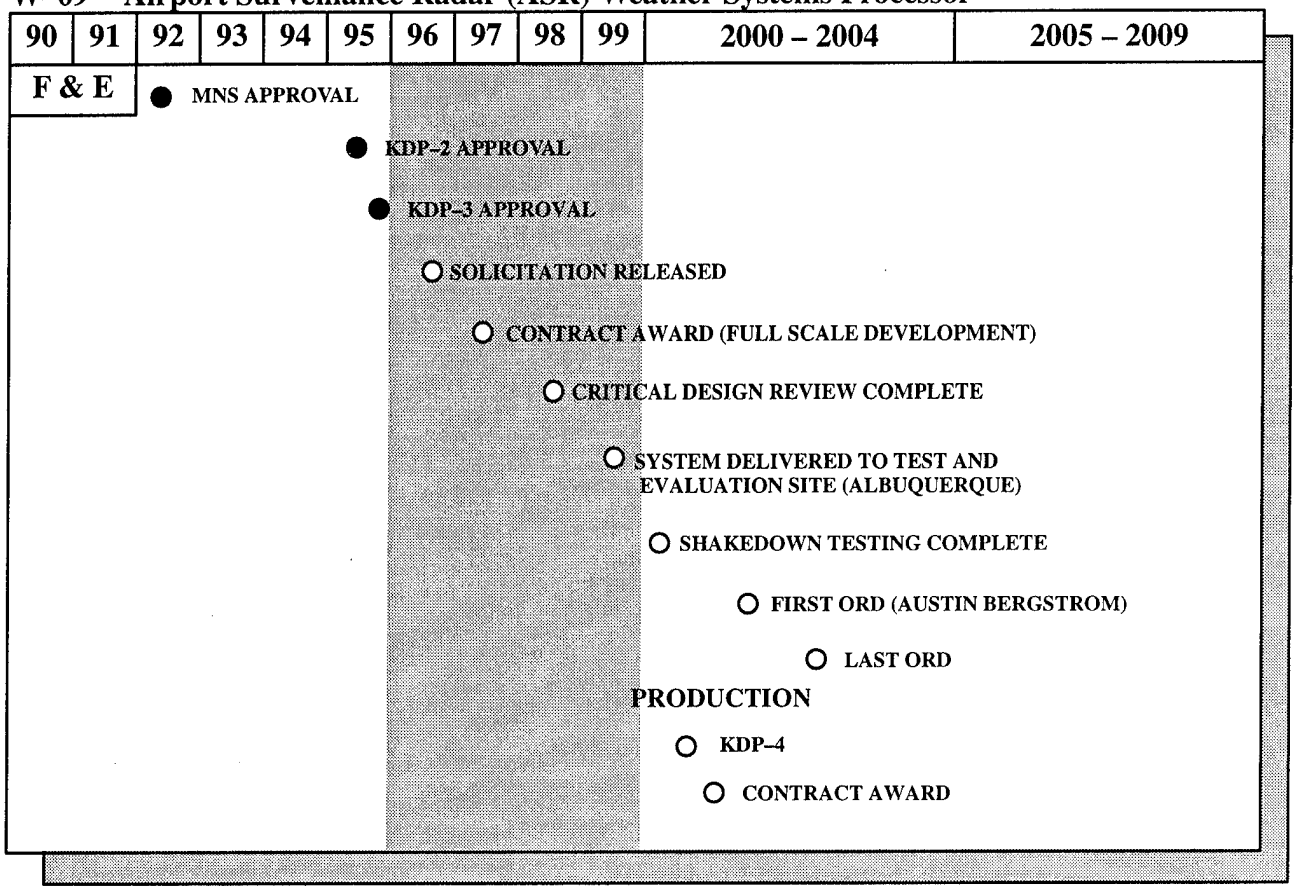
Benefit/Cost Ratio: A March 1994 study indicates a 2.0/1.0 benefit–cost ratio.

Related Projects/Activities: A–04 Standard Terminal Automation Replacement System (STARS), S–03 Terminal Radar (ASR) Program, W–03 Terminal Doppler Weather Radar (TDWR) System, W–05 Low-Level Windshear Alert System (LLWAS), and W–07 Integrated Terminal Weather System (ITWS).

List of Contractors:

- Lincoln Laboratory
  (processor algoritum development)
  Lexington, Massachusetts

W–09 Airport Surveillance Radar (ASR) Weather Systems Processor



Appendix A

GLOSSARY OF ACRONYMS

AC	advisory circular or alternating current
ADAP	airport development aid program
ADAS	AWOS data acquisition system
ADDM	automated documentation development and maintenance
ADL	aeronautical data–link
ADP	automated data processing
ADS	automatic dependent surveillance
ADTN	administrative data transmission network
A&E	architectural and engineering
AERA	automated en route air traffic control
AF	airway facilities
AFB	Air Force Base
AFSS	automated flight service station
A/G	air–to–ground
AIP	airport improvement program
ALSF	approach lighting system with sequenced flashing lights
ALSIP	approach lighting system improvement program
AM	amplitude modulation
AMASS	airport movement area safety system
AMCC	ARTCC maintenance control center
ANICS	Alaskan NICS
APS	Airway Planning Standard
ARINC	Aeronautical Radio, Incorporated
ARSR	air route surveillance radar
ARTCC	air route traffic control center
ARTS	automated radar terminal system
ASAS	aviation safety analysis system
ASDE	airport surface detection equipment
ASOS	automated surface observing system
ASP	arrival sequencing program
ASR	airport surveillance radar
AT	air traffic
ATC	air traffic control
ATCBI	air traffic control beacon interrogator
ATCRBS	air traffic control radar beacon system
ATCSCC	air traffic control system command center
ATCT	airport traffic control tower
ATE	automatic test equipment
ATIDS	airport surface target identification system
ATIS	automatic terminal information service
ATN	aeronautical telecommunications network
AVS	aviation standards
AWOS	automated weather observing system

AWP	aviation weather processor
AWPG	aviation weather products generator
BRITE	bright radar indicator tower equipment
BUEC	backup emergency communications
CA	conflict alert
CA/MSAW	conflict alert/minimum safe altitude warning
CAEG	computer aided engineering graphics
CAT	category
CBI	computer based instruction
CD	common digitizer
CDC	computer display channel
CDR	critical design review
CDS	computer distribution system
CERAP	combined center radar approach control
CFCF	central flow control function/ facility
CFMWP	central flow meteorologist weather processor
CFWSU	central flow weather service unit
CHI	computer/human interface
CIP	capital investment plan
CNS	communications, navigation, and surveillance
CONUS	continental, contiguous, or conterminous United States
CORN	computer resources nucleus
COTS	commercial–off–the–shelf
CRA	conflict resolution advisory
CRDA	converging runway display aid
CTAS	center TRACON automation system
CWP	central weather processor
CWSU	center weather service unit
CY	calendar year
DARC	direct access radar channel
DASI	digital altimeter setting indicator
DBRITE	digital BRITE
dc	direct current
DCC	display channel complex
DCCR	display channel complex replacement
DF	direction finder
DFW	Dallas/Fort Worth
DLP	data–link processor
DME/P	precision distance measuring equipment
DMN	data multiplexing network
DOD	Department of Defense
DOT	Department of Transportation
DOTS	dynamic ocean track system
DSP	departure sequencing program
DSR	display system replacement
DSB	double sideband
DTDM	deterministic time division multiplexing
DVOR	doppler very high frequency omnidirectional range
EARS	en route analysis and reporting system
EARTS	en route automated radar system
EDARC	enhanced direct access radar channel
EMC	electromagnetic compatibility

EPA	Environmental Protection Agency
ERM	en route metering
ESARTS	en route stand-alone radar training system
ESMMC	enhanced SMMC
ESP	en route spacing program
ETMS	enhanced traffic management system
ETVS	enhanced terminal voice switch
FAA	Federal Aviation Administration
FAAAC	FAA Aeronautical Center
FAATC	FAA Technical Center
FAR	Federal Aviation/Acquisition Regulations
FAST	final approach spacing tool
F&E	facilities and equipment
FM	frequency modulation
FPS	military primary radar
FSAS	flight service automation system
FSDPS	flight service data processing system
FSS	flight service station
FY	fiscal year
GMCC	general NAS maintenance control center
GNAS	general NAS
GPS	global positioning system
GSA	General Services Administration
GWDS	graphic weather display system
HF	high frequency
HID/LAN	host interface device/local area network
HVAC	heating, ventilating, and air conditioning
IAPA	instrument approach procedures automation
ICAO	International Civil Aviation Organization
ICSS	integrated communications switching system
IFR	instrument flight rules
IFSS	international flight service station
ILS	instrument landing system
IMC	instrument meteorological conditions
IMCS	interim MCS
IOPB	input/output processor, Model B
IOT&E	integrated operational test and evaluation
IPCSS	in–plant contract support services
ISMS	integrated security management system
ITWS	integrated terminal weather system
JSS	joint surveillance system
kHz	kilohertz
LAN	local area network
LDRCL	low density RCL
LFME	local flow management enhancements
LINCS	leased interfacility NAS communications system
LLWAS	low–level windshear alert system
Loran	long–range navigation

LRR	long–range radar
MAD	MDARC architecture software – Rev D
MAE	MDARC architecture software – Rev E
MALSR	medium–intensity approach lighting system with runway alignment indicator lights
MAR	minimally attended radar
MCC	maintenance control center
MCF	metroplex control facility
MCI	Mode C intruder
MCS	monitor and control software
MDARC	mosaic tracking direct access radar channel
MMS	maintenance management system
MNS	mission need statement
Mode C	altitude reporting mode of secondary radar
Mode S	mode select; discrete addressable secondary radar system with data–link
modem	modulator–demodulator
MPS	maintenance processor subsystem
MSAW	minimum safe altitude warning
MWP	meteorologist weather processor
NADIN	national airspace data interchange network
NAILS	national airspace integrated logistics support
NARACS	national radio communications system
NAS	national airspace system
NASDAC	National Aviation Safety Data Analysis Center
NASMAP	NAS management automation program
NEXRAD	next generation weather radar
NICS	NAS interfacility communications system
NISC	NAS implementation support contractor
NOTAM	notice to airmen
NPIAS	national plan of integrated airport systems
NWS	National Weather Service
OAP	oceanic automation program
OASIS	operational and supportability implementation system
OATS	office automation technology and services
ODALS	omnidirectional approach lighting system
ODAPS	oceanic display and planning system
ODMS	operational data management system
OMB	Office of Management and Budget
ORD	operational readiness date
OSDA	oceanic system development and support
OSHA	Occupational Safety and Health Administration
OT&E	operational test and evaluation
OTPS	oceanic traffic planning system
PAM	peripheral adapter module
PAMRI	peripheral adapter module replacement item
PAPI	precision approach path indicator
PAR	precision approach radar

PATS	precision automated tracking system
PCS	power conditioning system
PDC	pre-departure clearance
PIP	project/program implementation plan
PM	preventive maintenance
RAPCON	radar approach control
RCAG	remote center air/ground
RCE	radio control equipment
RCF	remote communication facility
RCL	radio communications link
RCO	remote communications outlet
RCOM	recovery communication
RCR	routing and circuit restoral
R&D	research and development
R,E&D	research, engineering and development
REIL	runway–end identification lights
RF	radio frequency
RFI	radio frequency interference
RFP	request for proposal
RML	radar microwave link
RMM	remote maintenance monitoring
RMMS	remote maintenance monitoring system
RMS	remote monitoring subsystem
RTR	remote transmitter/receiver
RVR	runway visual range
RWP	real–time weather processor
SAFE	safety activity functional evaluation
SMMC	system maintenance monitor console
SSR	secondary surveillance radar
SSR/DMTI	solid–state receiver/digital moving target indicator
STARS	standard terminal automation replacement system
STDM	statistical time division multiplexing
STEP	service test and evaluation program
TACAN	tactical air navigation
TATCA	terminal air traffic control automation
TCCC	tower control computer complex
TDLS	tower data–link services
TDWR	terminal doppler weather radar
TERPS	terminal instrument procedures
TML	television microwave link
TMS	traffic management system
TMU	traffic management unit
TNA	thermal neutron analysis
TRACON	terminal radar approach control
TSSC	technical support services contract
TVSR	terminal voice switch replacement
UHF	ultra high frequency
UPS	uninterruptible power system
USAF	United States Air Force
VFR	visual flight rules
VHF	very high frequency
VOR	VHF omnidirectional range
VORTAC	VOR collocated with TACAN
VSCS	voice switching and control system
WAN	wide area network
WARP	weather and radar processor

WMSC	weather message switching center

Appendix B

PROJECT CHANGES FROM 1993 TO 1996 CIP

This appendix provides traceability of all CIP projects. Inactive projects, i.e., those that are complete, renumbered, combined, or withdrawn have been removed from the CIP.

OLD PROJECT NUMBER	PROJECT TITLE	LAST ACTIVITY	NEW PROJECT NUMBER
21–01	En Route Automation Hardware Improvements and Enhancements	Complete 1986	
21–02	Flight Data Entry and Printout Devices	Complete 1991	
21–03	Direct Access Radar Channel (DARC)	Complete 1992	
21–04	EARTS Enhancements	Complete 1991	
21–05	Oceanic Display and Planning System (ODAPS)	Combined	A–10
21–06	Traffic Management System (TMS)	Combined	A–05
21–07	Modern ATC Host Computer	Complete 1988	
21–08	En Route Metering (ERM)	Combined With 21–06	A–05
21–09	Conflict Resolution Advisory (CRA) Function	Combined	A–06
21–10	Conflict Alert IFR/VFR Mode C Intruder	Complete 1988	
21–11	Voice Switching and Control System (VSCS)		C–01
21–12	Advanced Automation System (AAS)	Separated	A–01/ A–02
21–13	Automated En Route Air Traffic Control (AERA)	Combined	A–01
21–14	Integration of Nonradar Approach Control Into Radar Facilities	Complete 1987	
21–15	Area Control Facilities (ACF)	Complete 1993	
21–16	Offshore Flight Data Processing System (OFDPS)	Complete 1991	
22–01	Enhanced Terminal Conflict Alert	Complete 1989	
22–02	ARTS IIIA Assembler	Complete 1983	
22–03	Enhanced Target Generator (ETG) Displays (ARTS III)	Complete 1988	
22–04	Additional ARTS IIIA Memory	Complete 1986	
22–05	Addtional ARTS IIIA Support at the FAA Technical Center	Complete 1986	
22–06	ARTS IIA Enhancements	Complete 1993	
22–07	Provide ARTS II Displays	Complete 1984	
22–08	ARTS II Interfacility Interface	Complete 1986	
22–09	ARTS IIA Interface with Mode S/ASR–9	Combined	A–03
22–10	Automatic Terminal Information Service (ATIS) Recorders	Complete 1989	

OLD PROJECT NUMBER	PROJECT TITLE	LAST ACTIVITY	NEW PROJECT NUMBER
22–11	Multichannel Voice Recorders	Complete 1995	C–02
22–12	Terminal Voice Switch Replacement (TVSR)	Combined	C–05
22–13	ATCT/TRACON Establishment, Replacement, and Modernization	Complete 1992	
22–14	VFR ATCT Closures	Complete 1987	
22–15	Combine Radar Approach Control in ARTCC	Withdrawn 1985	
22–16	Bright Radar Indicator Tower Equipment (BRITE)	Complete 1994	
22–17	TPX–42 Replacement	Complete 1990	
22–18	Sustain the New York TRACON	Complete 1991	
23–01	Flight Service Automation System (FSAS)	Complete 1995	
23–02	Central Weather Processor (CWP)	Complete 1994	
23–03	Consolidated NOTAM System (CNS)	Complete 1986	
23–04	Weather Message Switching Center (WMSC) Replacement		C–03
23–05	Aeronautical Data–link	Combined	C–20
23–06	Interim Voice Response System (IVRS)	Complete 1985	
23–07	High–Altitude En Route Flight Advisory Service (EFAS) Frequencies	Complete 1989	
23–08	Hazardous In–Flight Weather Advisory Service (HIWAS)	Complete 1989	
23–09	Automated Weather Observing System (AWOS)		W–01
23–10	Radar Remote Weather Display System (RRWDS)	Complete 1984	
23–11	Geostationary Operational Environmental Satellite (GOES) Recorders	Complete 1985	
23–12	Low–Level Windshear Alert System (LLWAS)	Complete 1994	
23–13	Integrated Communications Switching System (ICSS)	Complete 1995	
24–01	Air/Ground (A/G) Communications Equipment Modernization	Complete 1987	
24–02	Communications Facilities Consolidation/Network	Complete 1992	
24–03	VORTAC	Combined	N–06
24–04	Nondirectional Beacon (NDB)	Complete 1988	
24–05	Global Positioning System (GPS) Monitors	Renumbered to 64–05	N–12
24–06	Instrument Landing System (ILS)	Complete 1989	
24–07	Microwave Landing System (MLS)	Withdrawn 1994	
24–08	Runway Visual Range (RVR)	Combined	N–08
24–09	Visual Navaids	Complete 1993	
24–10	Approach Lighting System Improvement Program (ALSIP)	Complete 1994	
24–11	Direction Finder (DF)		N–02
24–12	Mode S	Combined	S–02

OLD PROJECT NUMBER	PROJECT TITLE	LAST ACTIVITY	NEW PROJECT NUMBER
24–13	Terminal Radar (ASR) Program	Combined	S–03
24–14	Airport Surface Detection Equipment (ASDE–3) Radar		S–01
24–15	Long–Range Radar Program	Combined	S–04
24–16	Weather Radar Program		W–02
24–17	Loran–C Systems	Combined	N–11
24–18	Terminal Doppler Weather Radar (TDWR) System		W–03
25–01	RML Trunking	Complete 1986	
25–02	Data Multiplexing Network	Complete 1993	
25–03	RML Replacement and Expansion	Complete 1993	
25–04	Television Microwave Link (TML)	Combined With 22–16	
25–05	Airport Telecommunications	Complete 1987	
25–06	National Airspace Data Interchange Network (NADIN) IA	Complete 1988	
25–07	National Airspace Data Interchange Network (NADIN) II	Complete 1992	
25–08	Radio Control Equipment (RCE)		C–04
25–09	Teletypewriter Replacement	Complete 1986	
26–01	Remote Maintenance Monitoring System (RMMS)	Combined	M–07
26–02	Computer Based Instruction (CBI)	Complete 1991	
26–03	Central Repair Facility (CRF)	Withdrawn 1985	
26–04	Maintenance Control Center (MCC)	Combined	M–07
26–05	Large Airport Cable Loop Systems	Complete 1993	
26–06	Power Conditioning Systems for Automated Radar Terminal Systems III (ARTS III)	Complete 1989	
26–07	Power Systems	Complete 1992	
26–08	Modernize and Improve FAA Buildings and Equipment	Complete 1992	
26–09	ARTCC Plant Modernization	Combined	F–06
26–10	Acquisition of Flight Service Facilities	Complete 1995	
26–11	Aircraft Fleet Conversion/Flight Inspection Modernization	Complete 1988	
26–12	Aircraft and Related Equipment	Complete 1992	
26–13	System Engineering and Integration Contract (SEIC)	Complete 1995	
26–14	National Radio Communications System (NARACS)	Complete 1991	
26–15	NAS Spectrum Engineering	Complete 1992	
26–16	General Support	Complete 1994	
26–17	System Support Laboratory	Complete 1992	

OLD PROJECT NUMBER	PROJECT TITLE	LAST ACTIVITY	NEW PROJECT NUMBER
26–18	General Support Laboratory	Complete 1992	
26–19	Technical Support Services		M–02
32–04	Provide ARTS IIIE Upgrades for Select Air Traffic Facilities	Combined	A–03
32–06	Expand Automated Radar Terminal System (ARTS) IIA Capacity and Provide Mode C Intruder (MCI) Capability	Combined	A–03
32–12	Enhanced Terminal Voice Switch (ETVS)	Combined 1994 Complete 1995	C–05
32–13	ATCT/TRACON Establishment	Combined	F–01
32–16	Establish/Expand Digital Bright Radar Indicator Tower Equipment (DBRITE)		A–13
32–20	Expand Automated Radar Terminal System (ARTS) IIIA Capacity and Provide Mode C Intruder (MCI) Capability	Combined	A–03
32–21	New Airport Facilities, Denver, Colorado, and Denver Metroplex	Combined	F–02
32–22	Dallas/Fort Worth Metroplex	Combined	F–02
32–23	Chicago Area Improvements	Withdrawn 1990	
32–24	Chicago Metroplex	Combined	F–02
32–25	New Austin Airport at Bergstrom		F–03
32–26	Southern California Metroplex	Combined	F–02
32–27	DOD/FAA Air Traffic Control Facility	Combined	F–04
32–28	DOD Base Closures	Combined	F–04
32–29	Establish Additional Radar Positions	Combined	A–03
32–31	Base Buildings for Airport Traffic Control Towers (ATCT)	Combined with 42–13	F–01
32–32	New Airport and Other Facility Planning	Withdrawn 1993	
32–34	Potomac Metroplex	Combined	F–02
32–36	Northern California Metroplex	Combined	F–02
32–38	Atlanta Metroplex	Combined	F–02
32–40	Central Florida Metroplex	Combined	F–02
32–42	New York Metroplex	Combined	F–02
32–44	Advanced Facility Planning	Combined	F–02
33–01	Direct User Access Terminal (DUAT) Service Geographic Expansion	Withdrawn 1991	
33–07	High–Altitude En Route Flight Advisory Service (EFAS) Expansion	Withdrawn 1990	
33–08	Hazardous In–Flight Weather Advisory Service (HIWAS) Expansion	Withdrawn 1992	
33–20	Automated Flight Service Station (AFSS) Support Space	Combined	F–05

OLD PROJECT NUMBER	PROJECT TITLE	LAST ACTIVITY	NEW PROJECT NUMBER
34–04	Establish Locator Outer Markers (LOM)	Withdrawn 1992	
34–06	Instrument Landing System (ILS)		N–03
34–07	Microwave Landing System (MLS) – Production Phase II	Withdrawn 1993	
34–08	Runway Visual Range (RVR) Establishment	Combined	N–08
34–09	Establish Visual Navaids for New Qualifiers	Combined	N–04
34–12	Air Traffic Control Beacon Interrogator (ATCBI) Establishment	Combined	S–02
34–13	Terminal Radar Digitizing, Replacement, and Establishment	Combined	S–03
34–14	Additional Airport Surface Detection Equipment (ASDE) Establishment	Withdrawn 1993	
34–20	Surveillance System Enhancements	Withdrawn 1994	
34–21	Advanced Format for Radar/Beacon Target Reports	Combined With 34–20	
34–22	Oceanic Satellite Communications	Combined With 61–23	A–10
34–23	Communications Facilities Expansion		C–06
35–07	National Airspace Data Interchange Network (NADIN) II Continuation	Complete 1995	
35–20	Interfacility Data Transfer System for Edwards AFB RAPCON	Complete 1993	
36–13	Capital Investment Plan (CIP) System Engineering and Technical Assistance		M–03
36–20	ARTCC/ACF Support Space	Combined	F–06
36–23	NAS In–Plant Contract Support Services (NAS/IPCSS)		M–04
36–24	NAS Regional/Center Logistics Support Services		M–05
41–06	Traffic Management System (TMS) Sustainment	Combined	A–05
41–21	En Route Software Development	Includes software ORD from 21–09	A–06
41–22	Relocate Air Traffic Control System Command Center	Withdrawn 1991	
42–13	Airport Traffic Control Tower (ATCT)/Terminal Radar Approach Control (TRACON) Modernization	Combined	F–01
42–14	Airport Traffic Control Tower (ATCT)/Terminal Radar Approach Control (TRACON) Replacement	Combined	F–01
42–20	Tower Integration Program	Complete 1994	
42–21	Terminal Software Development	Combined	A–03
42–22	Sustain San Juan Facilities		F–08
42–24	Replacement of Controller Chairs		F–09

OLD PROJECT NUMBER	PROJECT TITLE	LAST ACTIVITY	NEW PROJECT NUMBER
42–25	ARTS IIIA Data Entry and Display Subsystem (DEDS)	Combined	A–03
43–01	National Graphic Weather Display System (GWDS)	Combined	A–07
43–02	Meteorological Weather Processor (MWP) II		W–04
43–03	Provide Flight Service Automation System (FSAS) Power Conditioning Systems	Combined	F–05
43–04	Flight Service Automation System (FSAS) Computer Replacement	Combined	A–07
43–09	Upgrade Commercial Automated Weather Observing System (AWOS)	Withdrawn 1991	
43–12	Upgrade Low–Level Windshear Alert System (LLWAS) to Expanded Network Configuration		W–05
43–13	Digital Altimeter Setting Indicator (DASI) Replacement		W–06
43–14	Integrated Communications Switching System (ICSS) Logistics Support		M–30
43–20	Automated Flight Service Station (AFSS) Support Space	Renumbered To 33–20	F–05
43–21	Operational Database Management System (ODMS)		A–08
43–22	FSAS Operational and Supportability Implementation System (OASIS)	Combined	A–07
44–03	Air/Ground Communications Radio Frequency Interference (RFI) Elimination	Combined	C–06
44–04	A/G Radio Replacement	Withdrawn 1993	
44–05	Backup Emergency Communications (BUEC) Replacement		C–09
44–07	Emergency Transceiver Replacement		C–10
44–08	Radio Control Equipment (RCE) Enhancements	Withdrawn 1991	
44–09	Replace Visual Approach Slope Indicators (VASIs) with Precision Approach Path Indicators (PAPIs)	Combined	N–04
44–12	Low–Power TACAN Antennas		N–05
44–14	Sustain VOR/VORTAC	Combined	N–06
44–20	AN/GRN–27 Instrument Landing System (ILS) Replacement	Combined	N–03
44–21	Wilcox CAT II/III Instrument Landing System (ILS) Replacement	Combined	N–03
44–22	Mark 1A, 1B, and 1C Instrument Landing Systems (ILSs)	Combined	N–03
44–23	Takeover of AIP/ADAP Funded Non–Federal ILS and Associated Equipment	Combined	N–03
44–24	ILS and Visual Navaids Engineering and Sparing	Complete 1995	
44–29	Runway Visual Range (RVR) Replacement	Combined	N–08

OLD PROJECT NUMBER	PROJECT TITLE	LAST ACTIVITY	NEW PROJECT NUMBER
44–30	Sustain Distance Measuring Equipment (DME)		N–09
44–31	Replace Type FA9964 Direction Finder	Withdrawn	
44–32	Sustain Nondirectional Beacon (NDB)		N–10
44–33	Approach Lighting System Improvement Program (ALSIP) Continuation	Combined	N–04
44–35	Loran–C Monitors and Transmitter Enhancements	Combined	N–11
44–38	Long Range Radar (LRR) Replacement and Networking	Withdrawn 1990	
44–39	Sustain/Relocate Air Route Surveillance Radar (ARSR)	Withdrawn 1994	
44–40	Long–Range Radar (LRR) Improvements	Combined	S–04
44–42	Long–Range Radar (LRR) Radome Replacement		S–05
44–43	Radar Pedestal Vibration Analysis	Complete 1994	
44–45	Air Traffic Control Radar Beacon System (ATCRBS) Relocation	Combined	S–02
44–46	Air Traffic Control Beacon Interrogator (ATCBI) Replacement	Combined	S–02
44–48	AN/FPS–117 Beacon Improvement	Withdrawn 1993	
44–60	Sustain/Relocate Airport Surveillance Radar (ASR)	Combined	S–03
45–02	Data Multiplexing Network (DMN) Continuation		C–11
45–05	Expansion/Reconfiguration of Low Density Radio Communications Link (LDRCL)		C–12
45–06	RCL Backbone Routing and Circuit Restoral (RCR)	Withdrawn	
45–20	Critical Telecommunications Support		C–14
45–21	Satellite Communication Circuits System		C–15
45–24	Establish Alaskan NAS Interfacility Communications System (ANICS) Satellite Network		C–17
45–25	Air Traffic Operational Management System (ATOMS) Local Area/Wide Area Networks		M–29
46–01	Sustain Remote Maintenance Monitoring System (RMMS)	Combined	M–07
46–04	Maintenance Control Center (MCC) Enhancement	Combined	M–07
46–05	Airport Cable Loop Systems Sustained Support		F–10
46–07	Power Systems Sustained Support		F–11
46–08	Modernize and Improve FAA Buildings and Equipment Sustained Support		F–12
46–09	Sustain ARTCC/ACF Facilities	Combined	F–06
46–16	Continued General Support		M–08
46–22	Fuel Storage Tanks	Combined	F–13
46–23	Environmental Cleanup		F–13

OLD PROJECT NUMBER	PROJECT TITLE	LAST ACTIVITY	NEW PROJECT NUMBER
46–26	NAS Facilities OSHA and Environmental Standards Compliance	Combined	F–13
46–28	National Airspace System (NAS) Recovery Communication (RCOM)		C–18
46–30	Interim Support Program (ISP)	Complete 1994	
51–16	Oceanic Support	Combined With 61–23	A–10
51–20	Data System Specialist Support	Complete 1987	
51–22	En Route Analysis and Reporting System	Combined	A–05
52–21	ARTS IIIA Periphal Adapter Module (PAM) Modernization	Combined 1994 Complete 1995	A–03
56–02	Computer Based Instruction (CBI) Expansion		M–10
56–11	Aircraft Fleet Modernization		M–11
56–12	Aircraft Related Equipment Program		M–12
56–13	Aircraft Flight Simulators	Withdrawn 1993	
56–15	NAS Spectrum Engineering Sustained Support	Combined	M–15
56–16	Precision Automated Tracking System (PATS)		M–13
56–17	System Support Laboratory Sustained Support		F–14
56–18	General Support Laboratory Sustained Support		F–15
56–19	FAA Technical Center Building and Plant Support		F–16
56–20	Automated Documentation Development and Maintenance (ADDM)	Combined With 56–56	M–26
56–21	Aeronautical Center Centralized Integrated Logistics Support (ACCILS) Plan	Withdrawn 1990	
56–22	Human Resource Management	Complete 1994	
56–23	Instrument Approach Procedures Automation (IAPA)		A–14
56–24	Airmen and Aircraft Registry Modernization		A–15
56–25	Computer Aided Engineering Graphics (CAEG) Enhancement		F–17
56–26	Frequency Interference Support/Resolution	Combined	M–15
56–27	Test Equipment Modernization and Replacement		M–17
56–28	Computer Resources Nucleus (CORN)		M–18
56–29	Onsite Simulation–Based Training Systems	Combined	A–01/ A–03
56–30	Aeronautical Center Training and Support Facility	Combined	F–18
56–33	Aeronautical Center Lease		F–19
56–35	National Airspace System Training		M–20
56–37	Logistics Support Systems and Facilities		M–21
56–41	Development of an Enhanced Radar Analysis Tool	Withdrawn	
56–47	NAS Implementation Support		M–22
56–51	Aviation Safety Analysis System (ASAS)		A–17

OLD PROJECT NUMBER	PROJECT TITLE	LAST ACTIVITY	NEW PROJECT NUMBER
56–52	National Aviation Safety Data Center (NASDC)		M–24
56–53	Refurbish AN/FPS–20 Radars	Withdrawn	
56–54	Provide FAA Housing		F–20
56–55	Independent Operational Test and Evaluation Oversight		M–25
56–56	NAS Management Automation Program (NASMAP)		M–26
56–58	National Airspace Integrated Logistics Support (NAILS)		M–27
56–60	Integrated Security Management System (ISMS)	Combined	F–06
56–61	FAA Information Systems Architecture		M–28
56–62	Child Care Centers		F–22
56–68	Safety Performance Analysis Subsystem (SPAS)		A–18
56–70	Computer Aided Engineering Graphics Replacement	Combined	F–17
56–72	Portable Performance Support System (PPSS)		A–19
61–06	Local Flow Management Enhancements (LFME)	Withdrawn 1993	
61–20	Dynamic Ocean Track System (DOTS)	Combined With 61–23	A–10
61–21	National Control Facility (NCF), formerly called National Airspace Management Facility (NAMFAC)	Withdrawn 1991	
61–22	ATC Applications of Automatic Dependent Surveillance (ADS)	Combined	A–10
61–23	Oceanic Automation Program (OAP)		A–10
62–01	Terminal Intrusion Function	Combined With 42–21	A–03
62–20	Terminal ATC Automation (TATCA)		A–11
62–21	Airport Surface Traffic Automation (ASTA)		A–12
62–22	National Airspace Management Facility (NAMFAC)	Renumbered To 61–21 which was withdrawn in 1991	
62–23	Airport Movement Area Safety System (AMASS)	Combined	S–01
62–24	National Implementation of the "Imaging" Aid for Dependent Converging Runway Approaches	Complete 1994	
62–25	Future TRACON Automation System		A–04
63–02	Central Weather Processor (CWP) Interfaces	Combined With 43–02	W–04
63–05	Aeronautical Data–link Communications and Applications	Combined	C–20
63–12	Low–Level Windshear Alert System (LLWAS) Enhancements	Combined With 43–12	W–05
63–20	Weather Enhancements	Combined With 63–21	W–07
63–21	Integrated Terminal Weather System (ITWS)		W–07

OLD PROJECT NUMBER	PROJECT TITLE	LAST ACTIVITY	NEW PROJECT NUMBER
63–22	Aviation Weather Products Generator (AWPG)	Withdrawn	
64–05	Augmentations for GPS		N–12
64–13	ASR Windshear Processor		W–09
64–16	Weather Enhancements	Renumbered To 63–20	
64–17	Gulf of Mexico		C–22
64–20	National Implementation of the "Imaging" Aid for Dependent Coverging Runway Approaches	Renumbered To 62–24	
64–27	Precision Runway Monitor		S–08
64–28	Improve Capacity of Closely Spaced Parallel Runways	Combined With 64–27	S–08
64–29	ATC Applications of Automatic Dependent Surveillance (ADS)	Renumbered To 61–22	A–10
65–03	Network Management and Control Equipment (NMCE)	Combined With 45–06	
65–07	Conversion of NADIN IA Message Network Users to the NADIN II Packet Switched Network	Combined With 35–07	
65–22	Aeronautical Telecommunications Network (ATN)	Combined With 63–05	C–20
66–20	FAA National Simulation Laboratory	Withdrawn 1991	
66–21	Integrated Flight Quality Assurance		A–20
None	Relocate Honolulu CERAP	New Project 1995	F–23
None	En Route Automation Program	New Project 1995	A–01
None	Tower Automation Program	New Project 1995	A–02

Appendix C

ALPHABETICAL LISTING OF PROJECTS

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F - 18	Aeronautical Center NAS Support Facilities	Facl - 34
C - 20	Aeronautical Data–link	Comm - 23
M - 11	Aircraft Fleet Modernization	MsSp - 13
M - 12	Aircraft Related Equipment Program	MsSp - 14
F - 10	Airport Cable Loop Systems Sustained Support	Facl - 20
S - 01	Airport Surface Detection Equipment (ASDE) Radar and Airport Movement Area Safety System (AMASS)	Surv - 03
A - 12	Airport Surface Target Identification System (ATIDS)	Auto - 27
W - 09	Airport Surveillance Radar (ASR) Weather Systems Processor	Wx - 13
F - 01	Airport Traffic Control Tower/Terminal Radar Approach Control Facility (ATCT/TRACON) Establishment/Sustainment/Replacement	Facl - 03
F - 06	Air Route Traffic Control Center (ARTCC) Plant Modernization/ Expansion	Facl - 16
M - 29	Air Traffic Operational Management System (ATOMS) Local Area/Wide Area Networks	MsSp - 36
N - 12	Augmentations for the Global Positioning System (GPS)	N&L - 14
F - 03	Austin–Bergstrom International Airport Program	Facl – 12
A - 03	Automated Radar Terminal System (ARTS) Improvements	Auto - 08
W - 01	Automated Weather Observing System (AWOS)	Wx - 03
A - 17	Aviation Safety Analysis System (ASAS)	Auto - 34
C - 09	Backup Emergency Communications (BUEC)	Comm - 12
M - 03	Capital Investment Plan (CIP) System Engineering and Technical Assistance	MsSp - 04
F - 22	Child Care Centers	Facl - 39
A - 15	Civil Aviation Registry Modernization	Auto - 33
C - 06	Communications Facilities Enhancement	Comm - 09
F - 17	Computer Aided Engineering Graphics (CAEG) Enhancement	Facl - 32
M - 18	Computer Resources Nucleus (CORN)	MsSp - 21
M - 08	Continued General Support	MsSp - 10
C - 14	Critical Telecommunications Support	Comm - 17
C - 11	Data Multiplexing Network (DMN) Continuation	Comm - 14

Project Number	Title	Page Number
W - 06	Digital Altimeter Setting Indicator (DASI) Replacement	Wx - 11
A - 13	Digital Bright Radar Indicator Tower Equipment (DBRITE)	Auto - 30
C - 23	Digital Voice Recorder System (DVRS)	Comm - 30
N - 02	Direction Finder (DF)	N&L - 03
M - 10	Distance Learning	MsSp - 11
F - 04	DOD/FAA Air Traffic Control Facility Transfer/Modernization	Facl - 13
C - 10	Emergency Transceiver Replacement	Comm - 13
A - 01	En Route Automation Program	Auto - 03
A - 06	En Route Software Development	Auto - 17
F - 13	Environmental Cleanup	Facl - 24
C - 17	Establish Alaskan NAS Interfacility Communications System (ANICS) Satellite Network	Comm - 19
C - 12	Expansion/Reconfiguration of Low Density Radio Communications Link (LDRCL)	Comm - 15
M - 28	FAA Corporate Systems Architecture	MsSp - 34
F - 16	FAA Technical Center Building and Plant Support	Facl - 30
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A - 07	Flight Service Automation System (FSAS)	Auto - 18
F - 05	Flight Service Facilities	Facl - 15
F - 15	General Support Laboratory Sustained Support	Facl - 29
C - 22	Gulf of Mexico	Comm - 29
M - 25	Independent Operational Test and Evaluation	MsSp - 29
A - 14	Instrument Approach Procedures Automation (IAPA)	Auto - 31
N - 03	Instrument Landing System (ILS)	N&L - 04
M - 30	Integrated Communications Switching System (ICSS) Logistics Support	MsSp - 38
A - 20	Integrated Flight Quality Assurance	Auto - 40
W - 07	Integrated Terminal Weather System (ITWS)	Wx - 11
M - 21	Logistics Support Systems and Facilities	MsSp - 24
S - 05	Long–Range Radar (LRR) Radome Replacement	Surv - 12
S - 04	Long–Range Radar Program	Surv - 10
N - 11	Loran-C Monitors and Transmitter Enhancements	N&L - 17
W - 05	Low–Level Windshear Alert System (LLWAS)	Wx - 09

Project Number	Title	Page Number
N - 05	Low–Power TACAN Antennas	N&L - 10
F - 02	Metroplex Control Facility (MCF)	Facl - 05
F - 12	Modernize and Improve FAA Buildings and Equipment Sustained Support	Facl - 23
S - 02	Mode S	Surv - 05
M - 26	NAS Management Automation Program (NASMAP)	MsSp - 30
M - 27	National Airspace Integrated Logistics Support (NAILS)	MsSp - 32
M - 22	National Airspace System Implementation Support	MsSP - 26
M - 04	National Airspace System In–Plant Contract Support Services (NAS/IPCSS)	MsSp - 05
C - 18	National Airspace System (NAS) Recovery Communication (RCOM)	Comm - 21
M - 05	National Airspace System Regional/Center Logistics Support Services	MsSp - 07
M - 15	National Airspace System Spectrum Engineering Management	MsSp - 17
M - 20	National Airspace System Training	MsSp - 22
M - 24	National Aviation Safety Data Analysis Center (NASDAC)	MsSp - 28
M - 07	NAS Infrastructure Management System (NIMS)	MsSp - 08
C - 21	Next Generation VHF Air/Ground Communications System to Digital Networking	Comm - 27
A - 10	Oceanic Automation Program (OAP)	Auto - 22
A - 08	Operational Data Management System (ODMS)	Auto - 20
A - 19	Portable Performance Support System (PPSS)	Auto - 39
F - 11	Power Systems Sustained Support	Facl - 21
M - 13	Precision Automated Tracking System (PATS)	MsSp - 16
S - 08	Precision Runway Monitor	Surv - 12
F - 20	Provide FAA Housing	Facl - 38
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U.S. Department of Transportation, Federal Aviation Administration
800 Independence Avenue, S.W. Washington, D.C. 20591