

AM 220 Airport Operations Class Notes

1. Introduction

1.1. Airport components

1.1.1. Airside

- Runways
 - Configurations
 - Single
 - Parallel
 - Cross-wind
 - Intersecting
 - Open-V
 - Designators
 - Single runway
 - Parallel runways
 - Three parallel runways
 - Double parallels
 - Classifications
 - Utility (up to 12,500 lbs MTOW)
 - Other-than-utility
 - Instrument approach
 - Visual (i.e., no instrument approach)
 - Non-precision
 - Precision
 - Surface type
 - Paved
 - Unpaved
 - Turf (i.e., grass)
 - Gravel
- Taxiways
 - Parallel
 - Exit
 - Stub (90°)
 - High speed
 - Holding areas/bays and run-up areas
- Aircraft parking
 - Tie-downs
 - Based aircraft
 - Transient aircraft
 - Stands/positions
 - Contact (with jetway/passenger boarding bridge)
 - Remote
- Hangars
- Taxilanes
- Markings
- Lights
- Signs

- Visual aids
 - Approach slope indicators
 - Wind indicator
 - Segmented circle
 - Rotating beacon
- Instrument approaches
- Weather observation systems
 - Automated Surface Observing System (ASOS)
 - Automated Weather Observing System (AWOS)

1.1.2. Landside

- Terminals
- Cargo handling facilities
- Maintenance facilities
- Access roads
- People movers
- Parking
 - Lots
 - Garages
- Intermodal connections
- Hotels
- Agricultural land
- Training facilities
- Airport maintenances/snow removal equipment storage facilities
- Aircraft rescue and fire fighting (ARFF) station
- Air traffic control facilities (typically TRACON and/or control tower)

1.2. History

December 17, 1903	<i>Wright Flyer at Kitty Hawk</i>
1920s	Air mail/military drives airfield development. <i>20 airports.</i>
1926-1938	<i>Air Commerce Act: funded air mail, but prohibited airport funding</i>
1933-1938	<i>Great Depression: 600 airports constructed through works projects</i>
1939-1945	Military expansion: more than 1,000 airports
1946-69	<i>Federal Airport Act (Federal Aid to Airports Program, \$100 million). Shared airport construction costs. Airports must be open to the public.</i>
1958	<i>Federal Aviation Agency established</i>
1966	U.S. Department of Transportation established. Federal Aviation Agency becomes Federal Aviation Administration
1970	<i>Airports and Airway Development Act (Airport Development Aid and Planning Grant Program, \$280 million). Creates Airport and Airway Trust Fund. Self-funding through:</i> <ul style="list-style-type: none"> Passenger fare tax International flight surcharge Fuel tax Air freight tax Registration fees
1978	Airline Deregulation Act
1982	<i>Airport and Airway Improvement Act (Airport Improvement Program, \$1.6 billion). Revised schedule of user taxes. Up to 3,500 airports.</i>
1990	Passenger Facility Charges (PFC). <i>Military Airport Program.</i>
2000	Wendell H. Ford Aviation Investment and Reform Act for the 21st Century (AIR 21). Substantial increase in aviation and airport funding (AIP up to \$3.4 billion).

1.3. Summary

Airport development was originally driven by air mail and military aviation
Government involvement initially prohibited direct airport investments

Federal funding programs:

- Use matching funds
- Require non-exclusive assurances
- Are funded through the Airport and Airway Trust Fund
- Airport and Airway Trust Fund is funded through ticket, fuel, and cargo taxes
- Passenger Facility Charges (PFC) supplement Airport Improvement Program (AIP) funds

2. Airport operations

2.1. Markings

Runway markings (white)

- Designation
- Centerline
- Threshold
 - Displaced (white)
 - Unusable pavement (yellow – a.k.a. "relocated threshold")
- Fixed distance/aiming point
- Touchdown zone
- Side stripes

Taxiway markings (yellow)

- Centerline
- Edge
- Hold line

2.2. Signs

Mandatory instruction signs (white on red background)

- Runway holding position sign
- Runway approach area holding position sign
- ILS critical area holding position sign
- No entry sign

Location signs (yellow on black background unless otherwise noted)

- Taxiway location sign
- Runway location sign
- Runway boundary sign (black on yellow background)
- ILS critical area boundary sign (black on yellow background)

Direction signs (black on yellow background)

Destination signs (black on yellow background)

Information signs (black on yellow background)

Runway distance remaining signs (white on black background)

2.3. Lights and visual aids

Runway lights

- Edge lights (white/amber)
- Threshold lights (red/green)
- Subtypes
 - Low intensity runway lights (LIRL)
 - Medium intensity runway lights (MIRL)
 - High intensity runway lights (HIRL)

- Pilot or tower controls intermediate brightness settings
- Taxiway lights
 - Edge lights (blue)
- Obstruction lights (red)
- Approach lights
 - Approach lighting system with sequenced flashing lights (ALSF-1 or 2)
 - Medium intensity approach lighting system with runway alignment indicator lights (MALSR)
- Visual approach aids
 - Visual approach slope indicator (VASI)
 - Precision approach path indicator (PAPI)
- Rotating beacon (alternating white/green)
- Runway end identifier lights (white strobes)

2.4. Instrument approach procedures

- Instrument landing system (ILS)
 - Glide slope
 - Localizer
 - Outer/middle marker
 - Approach lights

2.5. Pavement maintenance

First pavement: Ford Terminal, Dearborn, MI 1928

Types

- Rigid: Portland cement concrete
 - Requires expansion joints
 - Higher initial expense
 - Lower maintenance costs
 - Less cracking
 - Resistant to fuel/oil spills
 - Does not require seal coat
 - May not be able to cope with thermal expansion in cold climates
- Flexible: Bituminous asphalt
 - Aggregate
 - Binder
 - No expansion joints required
 - Lower initial expense
 - Higher maintenance costs
 - Cracks are common
 - Longitudinal and lateral
 - Block
 - Alligator
 - Reflective
 - Overlays
 - Damaged by oil/fuel spills (unless covered by seal coating)
 - May soften on hot days and be damaged by equipment parked on apron
 - Flexibility allows for thermal expansion

Construction

- Sub grade
- Sub base
- Base
- Pavement
- Expansion joints
- Grooving

- Testing
- Maintenance
 - Crack sealing
 - Seal coat
 - Pavement rejuvenating compound
 - Overlay
 - Reconstruction
 - Sweeping (FOD)
 - Rubber deposit/contaminant removal

2.6. Snow removal

- Timing/forecasting
- Equipment/procedures:
 - Mechanical
 - Rotary plow (blower)
 - Displacement plow
 - Snow brush (sweeper)
 - Chemical
 - Anti-icing
 - Deicing
 - Sanding
- Aircraft deicing

2.7. Safety

- FAR Part 139, *Certification and Operations: Land Airports Serving Certain Air Carriers*
 - Weather hazards
 - Obstructions
 - Protection of public
 - Erosion/broken facilities
 - Construction activity
 - Bird/wildlife hazards
 - Personnel/equipment/training
 - Inspections/drills
 - Self inspections
 - FAA inspections
- Bird Hazards
 - Food sources (landfills)
 - Habitats
 - Noise makers
 - Chemical treatment
 - Killings
- Aircraft rescue and fire fighting (ARFF)
 - ARFF index
 - A through E
 - Number and types of vehicles
 - Quantity and type of extinguishing agents
 - Water
 - Foam
 - Three minute response time
 - Training

2.8. Security [this section is outdated and needs to be updated]

~~FAR Part 107, Airport Security~~

~~Addresses airport security~~

~~Security plan~~

~~Identification~~

~~Gates/doors/keys~~

~~Screening/training of employees~~

~~Law enforcement officers~~

~~Security systems~~

~~Applicable to:~~

~~Air carrier airports served by aircraft with more than 60 seats~~

~~Portions apply to air carrier airports served by aircraft with 30-60 seats~~

~~FAA's interest in aviation security under Part 107 is limited by statute to security as it affects safety in flight~~

~~FAR Part 108, Aircraft Operator Security~~

~~Addresses airline security~~

~~Applies to U.S. air carriers, including scheduled and public charter air carriers~~

~~Screening passengers and luggage is responsibility of air carriers under FAR Part 108~~

2.9. Other ground equipment

2.9.1. Ground support equipment for aircraft handling

Unloading/loading

Passengers

Cargo

Food

Water

Towing

Cleaning

Refueling

Maintenance

Power

Air conditioning

Pressurized air

Turn-around time: 20-30 minutes

2.9.2. Airport equipment

Maintenance vehicles

Friction measuring device

3. The Airport System

3.1. National Plan of Integrated Airport Systems

3.1.1. Background

Required by 1982 Airport and Airway Improvement Act

An airport must be included in NPIAS to be eligible for AIP funding

Published periodically

3.1.2. Airport Ownership vs. Use

Ownership

- Private (increasing)
- Public (decreasing)
 - Municipal
 - County
 - State
 - Airport/port authorities

Use

- Private
- Public

3.1.3. Numbers of Airports

In January 2001 there were:

- 19,306 airports*
 - 13,992 private use*
 - 5,314 open to the public*
- 3,489 NPIAS airports*
 - 3,364 Existing airports*
 - 3,226 Publicly owned*
 - 138 Privately owned*
 - 422 Primary*
 - 124 Commercial*
 - 260 Reliever*
 - 2,558 General aviation*
- 125 Proposed airports*
 - 0 Primary*
 - 5 Commercial*
 - 9 Reliever*
 - 111 General aviation*

3.1.4. Activity Measures

Passengers (Enplanements)

- Origin-Destination (O-D) vs. connecting
- Domestic vs. international
- Business vs. discretionary (recreational)

Operations

- Local vs. itinerant (transient)
- Annual
- Hourly

Based aircraft

- Single engine
- Multi-engine
- Turbojet
- Rotorcraft

3.1.5. Eligibility

- At least 10 based aircraft
- At least 30 minutes from nearest NPIAS airport
- Included in State Airport System Plan

3.1.6. NPIAS Classifications

- Commercial service (2,500 annual enplanements)
 - Non-primary (2,500-10,000 annual enplanements)
 - Primary (10,000 annual enplanements)
 - Small hub (0.05% of total US annual enplanements)
 - Medium hub (0.25% of total US annual enplanements)
 - Large hub (1% of total US annual enplanements – *27 large hubs in U.S., which account for 64% of all enplanements*)
- General Aviation
 - Reliever
- Cargo (*100 million lbs landed weight*)

3.1.7. Planning Issues

- NPIAS is not a plan because it does not prioritize projects
- Many of the airports in NPIAS are not of national significance
- NPIAS is not coordinated with other transportation modes

4. Airport Planning

4.1. System Planning

Need to maximize use of limited funds over multiple airports in a system

4.1.1. National

NPIAS

4.1.2. State

- State Airport System Plans (SASP)
- Improvements/funding resources coordinated on State level
- Limitations
 - Inflexible
 - Often ignores market realities
- Better approach may be a continuous SASP

4.1.3. Regional

- Metropolitan airport systems
- Diversion of demand/optimize assets
- Limitations
 - Competing airport systems
 - Demand is not easily diverted

4.2. Local Planning

- Airport Master Plan
 - Required for AIP funding
 - 5-20 year period
 - Outcomes
 - Goals/community values
 - Inventory: current facilities
 - Historical review of airport and facilities
 - Airspace structure and navaids
 - Airport related land use

- Aeronautical activity
- Socioeconomic factors
- Forecasting
 - 5, 10, 20 years
 - Methods
 - Time series
 - Causal method
 - Subjective/judgment
 - Weaknesses
 - Rigid planning
 - Uncertainties are simply too large
 - Alternative: Scenario driven forecasts
 - Thresholds of activity
 - Strategies to deal with growth
 - Elements
 - Operations
 - Annual (by type of flight)
 - Peak hour
 - Enplanements
 - Annual (by type of flight)
 - O-D, connecting, international
 - Peak hour
 - Based aircraft (by type)
- Demand/capacity analysis
 - Airfield
 - Terminal area
 - Airspace
 - Ground access
- Airspace/approaches/obstructions
- Facility requirements
- Non-standard conditions
- Alternatives analysis
- Airport layout plan (ALP)
 - Ultimate layout
 - Shows all eligible projects
 - Approved by airport sponsor, State, and FAA
- Environmental impacts
 - Usually as separate study
 - Three possible outcomes:
 - Categorical exclusion
 - Environmental assessment (EA)
 - Environmental impact statement (EIS)
 - Aircraft noise
 - Air pollution
 - Conservation
 - Water quality
- Capital improvement plan
 - Project costs
 - Priorities
 - Funding sources
- Public participation
- Limitations
 - Overly optimistic
 - Not coordinated with funding availability

Often not implemented

5. Site Selection

- Demand
- Land
- Accessibility
- Utilities
- Weather
- Construction costs
- Environmental impact
- Methodology
 - Universe of sites
 - Rank each site
 - Evaluate top sites in greater detail

6. Airport Layout and Land Use Plans

6.1. *Airport Layout Plan*

- Airport Layout Plan (ALP)
 - Facilities
 - Existing
 - Ultimate (i.e., future)
 - Topography (ground contours)
 - Natural features (tree lines, water bodies, etc.)
 - Runway Protection Zone (RPZ)
 - Runway safety area
 - Airport property boundaries (including easements)
 - Dimensional data
 - Location/vicinity maps
 - Basic data table
 - Wind information (wind rose)

6.2. *Obstructions*

Shown on Runway Plan and Profile and FAR Part 77 Imaginary Surfaces/Obstructions drawing
Defined in FAR Part 77, *Objects Affecting Navigable Airspace*

- Imaginary surfaces
 - Primary
 - Approach
 - Transitional
 - Horizontal
 - Conical

6.3. *Land Use*

- Shown on Land Use Plan
 - On airport land use
 - Off airport land use
- May also show noise impact contours or FAR Part 77 imaginary surfaces
- Runway protection zones
- Zoning

7. Terminal Area and Airport Access

Airside and landside are not independent

Terminal serves as the interface between landside and airside for:

Passenger

Cargo

7.1. Terminal Design Concerns at Large Airports

Curb space

Walking distance

Passenger transportation

Connections

Baggage handling

Parking

Rental cars

Terminal passenger flow

Conveniences

Security

Aircraft movement/parking

Safety

Access for disabled

7.2. Terminal Design Concerns at Small Airports

Parking

Rental cars

Conveniences

Aircraft movement/parking

Safety

7.3. Design Concepts

7.3.1. Centralized: single terminal

Advantages:

Centralized: cost efficient

Control of passengers: connections/security

Simplified information systems

Disadvantages:

Vehicle congestion

Pedestrian congestion

Long walking distances

Limited expansion

7.3.2. Decentralized: multi-terminal

Advantages

Targeted services

Short walking distances

Dispersed vehicle circulation

Growth potential through modular construction

Disadvantages:

Decentralized: Costly

Increased capital costs

7.3.3. Terminal types

- Simple
- Linear
- Curvilinear
- Pier/fingers
- Satellite
 - Pier
 - Remote
- Transporter

7.4. Facilities

- Passenger handling
 - Access/egress
 - Processing
 - Security
 - Passengers
 - Luggage
 - Gate area
 - Baggage handling
- Support facilities
 - Airport operations/management
 - Airline offices
 - Federal inspection services (FIS)
 - Customs
 - Immigration
 - Agriculture
- On-airport transportation
 - Shuttle buses
 - People movers (automated trains)
 - Moving sidewalks
- Conveniences
 - Concessions
 - Restaurants
 - Restrooms
 - Entertainment

7.5. Design

- Terminal circulation
 - Terminal design has to account for:
 - Travel time
 - Waiting time
 - Buffer
 - Factors that affect circulation:
 - Terminal configuration
 - Passenger types
 - Domestic vs. international
 - Business vs. leisure
 - Connecting vs. O-D
 - Passenger characteristics
 - Baggage
 - Mobility
 - Assistance

- Arrival time
 - Flight schedule
 - Load factors
 - Aircraft size
- Actual walking times are 1.3-2.1 times theoretical
- Space requirements
 - Passenger volume
 - Current
 - Forecast
 - Peaking factors for design
 - Peak month
 - Peak hour
 - Inefficient to use the highest peak hour of the year
 - Use peak hour of the average day of the peak month or similar measures
- Facilities
- Baggage handling
- Curb length
 - Parking/access
- Passenger waiting area
 - 15-20 minutes before departure 70-90% of all passengers have arrived*
 - Weather disruptions can place much higher demands on waiting areas*
 - Rule-of-thumb: 10-15 ft²/passenger*
 - Comparison, for urban transit: 3-4 ft²/passenger*
- Transfer passengers
 - Terminal configuration*
 - Ground transportation*
 - Large hub connections: 45 minutes for domestic, 75 minutes for international*
 - Small hub connections: 25 minutes*
- Ticketing
 - Number and type of positions
 - Airline procedures and staffing
 - Passenger characteristics
 - Pre-ticketed
 - E-tickets
 - Baggage
 - Space/circulation

7.6. Federal Inspection Services

- Customs
- Immigration
 - Red channel/green channel
 - Uneven peaks
- Agriculture
- Holding cells

7.7. Landside access

- Issues:
 - Passengers
 - Meeters/greeters
 - Airport employees
 - Cargo
- Cars: 90-100% of all passengers
- Curb front design

- Dwell time
- Frontage
 - Dimensions
 - Geometry
- Management policy
- Airport ground access
 - Modes
 - Increased demand for rapid transit
 - Alternative fuel vehicles
 - Vehicle operator behavior
- Parking areas
 - Lots
 - Garages
 - Short term
 - Long term
 - Shuttle service
 - Demand is sensitive to pricing

8. Financial Planning

8.1. Expenses

- Operating
- Capital
 - Non-depreciable
 - Permanent value
 - Examples: Property
 - Depreciable
 - Has a specified useful life
 - Examples: Buildings, equipment, pavement surfaces

8.2. Revenue

8.2.1. Airside

- Landing fees
- Aircraft parking
 - Tie-downs
 - Overnight parking
 - Hangar leases
- Fuel flowage fee

8.2.2. Landside

- Leases
 - Terminal
 - Cargo
 - Non-aviation uses of airport property
- Percentage of gross revenue
- Public parking
- Rental cars
- Bus/limo/taxi operations

8.3. Financing

8.3.1. Public funds

Federal funding (AIP)

State funding

AIP match

State specific programs

Passenger facility charges (PFC)

Federal anti-head tax provisions prohibit airports from collecting any per-passenger tax, other than the PFC

Collected by the airlines for the airports

Using PFC funds

Generally fall under same provisions as AIP funds

Can be used as 5% local share for AIP-funded projects

PFC funds can be used for some non-AIP eligible projects

8.3.2. Bonds

General obligation

Issued by government agency

Lower interest rate

Legal limits

Political reservations

Revenue bonds

Backed by revenues from facilities

Most popular

No burden on taxpayer

Bonds are used primarily at large airports (GA airports cover only 1% of all bonds)

No defaults to date

Bond ratings affect interest rates

8.3.3. Private financing

Revenue generating facilities

Fuel systems

Hangars

Hotels

Private development on leased land

8.4. Economic Impact

Airports are often receive operational subsidies

Airports must be viewed as economic generators

Direct

Providers of service at the airport

Payroll, capital expenditures, operations costs, taxes, fees

Indirect

Users

Fees, charges, lodging, food, transportation

Approximately half of direct impact

Induced

Multiplier effect

Approximately twice direct and indirect (or 2.5 times direct)

9. Airport capacity and delay

9.1. Demand

Categorized by aircraft mix
Variations

- Peak hour
- Seasonal
- Arrivals/departures
- O-D/connecting

9.2. Capacity

9.2.1. Measures

- Throughput (theoretical)
- Capacity (practical)
 - PANCAP
 - PHOCAP
 - VFR
 - IFR

9.2.2. Airfield

- Runway occupancy time (ROT)
- Runways
- Taxiways
- Navigation aids/instrument approaches
- Radar
- Approach lights

9.2.3. Airspace

- Configuration
- Neighboring airports

9.2.4. Air traffic control

- Procedures
- Spacing
- Multiple runways
- Noise abatement procedures

9.2.5. Meteorological conditions

- VMC/IMC
- Wind direction
- Transient conditions
- Runway braking action

9.3. Delay

Delays are caused when demand exceeds capacity (theory)
Some delay occurs before capacity is reached (practice)

9.3.1. Measuring delay

Air Traffic Operations Management System (ATOMS)

Reports by air traffic controllers

Delays greater than 15 minutes

Identifies cause

Excludes maintenance

Consolidated Operations and Delay Analysis System (CODAS)

Automated

Includes weather data

9.3.2. Solutions

New airports

Expensive

Example: \$5 billion for Denver International Airport

Difficult

Base reuse

Expansion of existing facilities

New runways

Runway extensions

New taxiways

Greater efficiency

Air traffic control procedures

Use of regional airports

Intermodalism

Demand management

Slots

Financial incentives

10. Airside technological improvements

10.1. Airspace development

10.1.1. Free flight

Operators have freedom to select path and speed for IFR flights

ATC restrictions are limited in extent and duration

Represents a shift from air traffic control (ATC) to air traffic management (ATM)

Currently, most IFR operations are restricted to ATC preferred routes, which are narrow corridors with limited capacity

10.1.2. Terminal area/approach procedures

Removal of 250 knot speed limit for departing aircraft in Class B airspace

Simultaneous converging instrument approaches (SCIA)

Simultaneous offset instrument approaches (SOIA)

10.2. Guidance, surveillance, and control

10.2.1. Instrument approaches

Separation requirements depend on:

Accuracy

Update rate

Precision approach and landing systems

Issues

- Curved approaches
- Frequency congestion
- Terrain interference

Systems

- Instrument landing system (ILS)
- Microwave landing system (MLS)
- Differential Global Positioning System (DGPS)
 - Wide Area Augmentation System
 - Local Area Augmentation System

Independent parallel approaches using the Precision Runway Monitoring

- Allows independent operations on parallel runways with close or intermediate spacing
- Currently implemented for 3,000-4,300 ft separation
- Investigating use down to 2,500 ft separation
- Precision Runway Monitoring radar updates position every 0.5 seconds instead of 4.8 seconds
- Dedicated control monitors aircraft on parallel approaches, using Final Monitoring Aid (FMA)

10.2.2. Automated dependent surveillance (ADS)

Does not use radar

ADS transmits position reports based on onboard navigational instruments, using data link technologies and GPS

ADS-A

ADS-Address

Point-to-point information exchanged between a specific aircraft and an ATC facility

ADS-B

ADS-Broadcast

Information broadcast periodically to all aircraft and ATC facilities within area

Aircraft can see position of other ADS-B aircraft on the Cockpit Display of Traffic Information (CDTI)

10.2.3. ATC equipment upgrades

Standard Terminal Automation Replacement System (STARS)

Used in TRACONs

Updated technology

Improved weather displays

New automation tools

Display System Replacement (DSR)

Used in ARTCCs

New conflict probe capability

10.3. Traffic management

Collaborative decision making

Improved communication and cooperation between Air Traffic Control System Command Center and airlines

Reduces reliance on ground delay programs

Uses Flight Schedule Monitor (FSM) for what-if analyses

10.4. Airport surface utilization

10.4.1. Airport Surface Detection Equipment

ASDE-3: high resolution ground mapping radar for high activity airports
Airport Movement Area Safety System (AMASS): Provide alerts for potential problems
ADS-B could also be used on the ground

10.4.2. Taxiways

Affect runway occupancy time (ROT)
Location
High-speed exit taxiways
Efficient taxiways can reduce ROT by 20-30%
Low visibility taxiway lighting systems
Taxiway centerline lights
Runway guard lights
Stop bars
Clearance bars

10.4.3. Apron and gate facilities

Optical/electronic guidance for aircraft parking
Fixed systems mounted on loading bridge
Power
Pressurized air
Air conditioning

11. Landside technological improvements

11.1. Terminal facilities

People movers
Examples:
Buses
Mobile lounges
Moving sidewalks
Automated guideway systems
Issues
Efficiency
Cost
Rate of use
Expanding terminals
Labor costs

11.2. Ticketing

Common User Terminal Equipment (CUTE)
Standard ticket counters and equipment for all airlines
Add flexibility and improves cost efficiency

11.3. Landside access

Modes
Increased demand for rapid transit
Alternative fuel vehicles

12. Financial management

12.1. Financial statements

- Operating statement
 - Revenues
 - Operating
 - Airfield
 - Terminal area
 - Non-operating
 - Expenses
 - Operating
 - Airfield
 - Terminal area
 - Buildings and grounds
 - General and administrative
 - Non-operating
 - Depreciation
 - Net income (loss)
- Budget
 - Future allocation of revenues
 - Projected expenses

12.2. Financial management

- Airport use agreements
 - Legal contract between airport operator and airline tenant
 - Lease for facilities
- Approaches to financial management at commercial airports
 - Residual cost approach
 - Airlines pay for all costs non allocated to other users or covered by non-airline revenue
 - Airlines assume risk
 - Compensatory approach
 - Airport operator charges the airlines fees and rental rates to recover actual costs of the facilities and services used
 - Airport assumes risk
 - Net income
 - Residual cost guarantees break-even, but no net income
 - Compensatory approach lacks built in security, but airport can collect net revenue
 - Majority-in-interest
 - Residual cost approach includes majority-in-interest clause giving the airlines the right to approve or veto capital projects
 - Compensatory approach means the airport operator has full control over capital projects

Term of use agreement

Residual cost approach has longer terms to back long term revenue bonds backed by airlines (20-30 years)

Compensatory approach does not require contractual agreements, giving airport operators maximum flexibility

12.3. Pricing of airport facilities

General aviation airports have smaller revenue bases and may not break-even

Rates and charges

Airfield area

Landing fees

Fuel flowage fee

Terminal area concessions

Leased areas

Exclusive

Preferential

Joint use

Common use

12.4. Trends since deregulation

Modification of residual cost rate and majority-in-interest provisions towards compensatory approach

Airports want to retain earnings and exercise control

Shorter term contracts

Maximization of revenues

Passenger facility charge (PFC): Direct incentive to maximize number of travelers

Diversification of revenues

Competitive bidding

New revenue streams

13. Organization and administration

13.1. Airport ownership and operation

Ownership

Municipality

County

Airport authority

Single purpose vs. multipurpose (port authority)

Single municipality vs. intermunicipal

State

Aviation agency

Multimodal agency

Quasi-independent agency

Federal

Private

Ownership

Operating lease

13.2. Airport management

Organization

Airport director

Assistant airport directors

- Operations
- Maintenance
- Planning and engineering
- Finance and administration
- Airport management
 - Roles
 - Landlord
 - Business executive
 - Safety officer
 - Issues
 - Coordination with users, tenants, and service providers
 - Safety
 - Efficiency
 - Public relations
 - Financial planning
 - Day-to-day operations
- Education/training
 - Aviation management
 - Internship
 - Accredited Airport Executive (AAE)
 - Increasing levels of responsibility after entry-level position

14. Airport relations with tenants and the public

14.1. Airport as landlord

- Airline relations
 - Airlines' demands for airport facilities are dynamic
 - Airports and airlines have common economic goals
 - Deregulation
 - Increased competition
 - Less willing to share information
 - Rapid changes
 - Proliferation
 - Commuter airlines
 - Low cost airlines
- Concessionaires
 - Large revenue source
 - Fixed Base Operator (some times manager)
- General aviation aircraft owners and operators
 - 185,000 GA vs. 7,000 air carrier aircraft
- Needs
 - Parking
 - Storage
 - Fuel
 - Maintenance

14.2. Aircraft noise

14.2.1. Source of problem

- Jets introduced in 1960s
 - Residential encroachment
 - Lack of proper zoning

14.2.2. FAA's role

- Aircraft Noise and Capacity Act of 1990
 - National aviation policy
 - Eliminated Stage 2 aircraft over 75,000 lbs after December 31, 1999
 - Reduced impacted population from 7 million in 1974 to 0.5 million in 1999*
 - Part 150 Airport Land Use Compatibility Planning
 - Part 161 Notice and Approval of Airport Noise and Access Restrictions

14.2.3. Measurements

- A-weighted sound levels in decibels (dBA)
 - Effective perceived noise decibels (EPNdB)*
 - Single event*
 - Used for aircraft certification*
- Day-night average sound level (DNL or L_{dn})
 - Cumulative effect
 - Night-time operations are penalized by factor of 10 dB

14.2.4. Land use

- DNL of 65 dBA is threshold for residential compatibility
- Multiple municipalities are affected by each airport

14.2.5. Noise abatement

- Airport operator is liable
- Restrictions
 - May not place "undue burden"
 - Non-discriminatory
- Techniques
 - Noise abatement procedures
 - Sound barriers
 - Sound proofing
 - Land acquisition
 - Curfews
 - Access restrictions
 - Capacity limitations
 - Differential landing fees
 - Preferential runway assignment
 - Noise budget
- Curfews affect cargo and operations over multiple time zones

14.3. Public relations

- Publics
 - External business
 - External general
 - Internal business
 - Internal employee
- Objectives
 - Public goodwill
 - Communication
 - Information
 - Education
 - Address complaints

Good working relationship with internal business
Promoting employee morale

Principles

Facility serves public interest

Integrity

Public goodwill can determine success of airport

Continuing effort; not just responses to negative situations

Two-way interaction

Security

Old: FAR Part 107, *Airport Security* (implemented by airports)

New: TSR Part 1540 Civil Aviation Security – General Rules, TSR Part 1542 Airport Security (implemented by airports, in coordination with TSA)

Applicable to:

Air carrier airports served by aircraft with more than 60 seats

Portions apply to air carrier airports served by aircraft with 30-60 seats

Addresses airport security

Security plan

Identification

Gates/doors/keys

Screening/training of employees

Law enforcement officers

Security systems

Old: FAR Part 108, *Aircraft Operator Security* (implemented by airlines through contractors)

New: TSR Part 1544 Aircraft Operator Security: Air Carriers and Commercial Operators (implemented by TSA, except in certain pilot project airports)

Addresses airline security

Screening of passengers

Screening of baggage

Applies to U.S. air carriers, including scheduled and public charter air carriers

Other changes:

Air carrier airports have individual TSA security coordinators assigned to them

Explosive detection equipment

Explosive trace detection

Explosive detection systems

Enhanced passenger profiling

Increased emphasis on general aviation airports

Areas of concern

Freight and air mail

Positive baggage matching on connecting flights

Unfunded security mandates

New technology

TSA unproven

Lack of cost-benefit analyses and rational risk assessment