Greater Pittsburgh International Airport

Airport Capacity Enhancement Plan
October 1991

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Prepared jointly by the U.S. Department of Transportation, Federal Aviation Administration, County of Allegheny, Department of Aviation, and the airlines and general aviation serving Greater Pittsburgh International Airport

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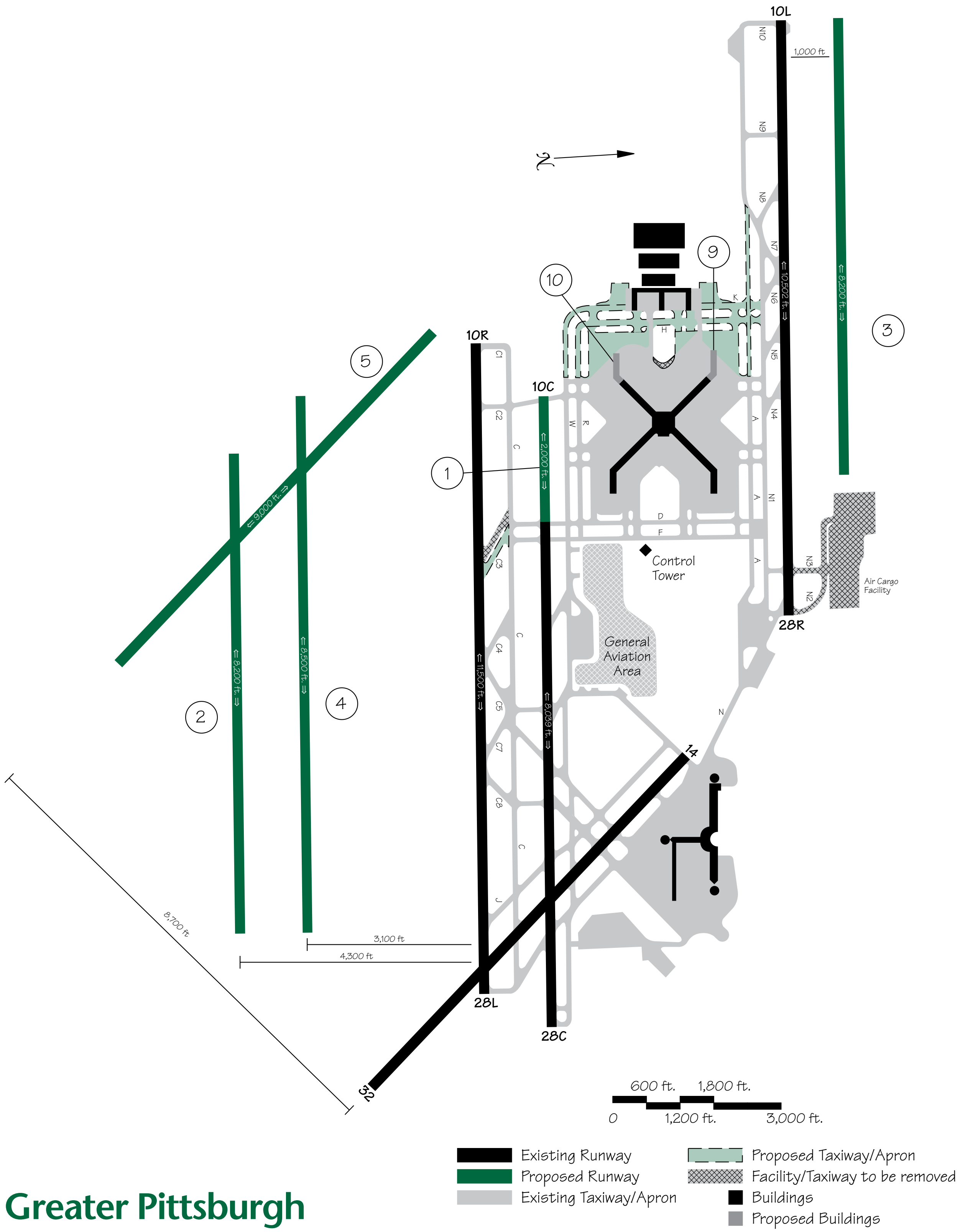
Figure 1 Greater Pittsburgh International Airport



Greater Pittsburgh International Airport

Figure 2 Capacity Enhancement Alternatives and Annual Savings

Airfield Improvements		Estimated Annual Net Savings‡ (in 000s of hours and millions of 1990 dollars) Baseline	Future 1	Future 2
	Runway Extension			
1.	Extend Runway 10C/28C 2,000 feet west		†	
	One New Runway			
2.	Build 8,500 foot independent South Parallel runway 4,300 feet south of Runway 10R/28L	15/$18	40/$45	98-100/$98-100*
3.	Build 8,200 foot North Parallel runway 1,000 feet north of Runway 10L/28R	14-18/$16-20*	30-42/$30-45*	57-90/$50-87*
4.	Build 8,500 foot dependent South Parallel runway 3,100 feet south of Runway 10R/28L	13/$16	38/$43	91/$90
5.	Build 9,000 foot Crosswind runway (14R/32L) 8,700 feet west of Runway 14/32	12/$14	—	—
	Two New Runways			
6.	Build North and South Parallel runways	—	59-60/$67-68*	124-126/$127-129*
7.	Build two South Parallel runways, 3,100 and 4,300 feet south of Runway 10R/28L	—	53/$60	118/$120-121*
8.	Build South Parallel and Crosswind runways	—	59/$68	116/$122
	Terminal Area Improvements			
9.	Add new gates to NW finger of new Midfield Terminal and improve Taxiway H to Taxiway R		†	
10.	Add new gates to SW finger of new Midfield Terminal and improve Taxiway K from Taxiway W to A		†	
Facilities and Equipment Improvements				
11.	Upgrade Runway 10R to CAT II/III ILS	2/$3	—	—
12.	Install Precision Runway Monitor (PRM)		†	
Operational Improvements				
13.	Conduct an airspace capacity design project and re-structure terminal airspace		†	

‡ Net savings in aircraft delays and travel times.
† These improvements were not simulated. Therefore, no dollar figures are available. There is a description of each of these items in Section 2 — Capacity Enhancement Alternatives.
* Lower value represents Runway 10L use without jet departures; higher value, with jet departures.

Summary

The Federal Aviation Administration (FAA), airport operators, and aviation industry groups have initiated Airport Capacity Design Teams at various major air carrier airports throughout the United States to identify and evaluate means to enhance existing airport and airspace capacity to handle future demand. A Capacity Team for Greater Pittsburgh International Airport (PIT) was formed in 1990.

Steady growth at PIT has made it one of the busiest airports in the country. Activity at the Airport has increased from 5,919,322 passenger enplanements in 1983 to 8,534,457 in 1990, a 44 percent increase. In 1990, the Airport handled 385,837 aircraft operations (take-offs or landings). These traffic volumes placed the Airport 19th in operations and 20th in passenger enplanements among U.S. airports.

The primary objective of the Capacity Team at PIT was to identify and assess various actions which, if implemented, would increase PIT's capacity, improve operational efficiency, and reduce aircraft delays. The purpose of the process was to determine the technical merits of each action and its impact on capacity. Additional studies will be needed to assess environmental, socioeconomic, or political issues associated with these actions.

Selected alternatives identified by the Capacity Team were tested using FAA-approved computer models to quantify the benefits provided. Different levels of activity were chosen to represent growth in aircraft operations in order to compare the merits of each action. These annual activity levels are referred to throughout this report as:

Baseline – 471,000 operations;
Future 1 – 540,000 operations; and
Future 2 – 618,000 operations.

If no improvements are made at PIT (the Do Nothing scenario), annual delay costs will increase from 44,000 hours or $49 million at the Baseline level of operations to 142,000 hours or $155 million by Future 2.

The major findings resulting from the Greater Pittsburgh study include:

	Future 2 Annual Net Savings*	
New Runway Option	**Hours**	**Millions on 1990 $**
• Build independent south parallel runway	98,000-100,000	$98-100
• Biuld north parallel runway	57,000-90,000	$50-87
• Build dependent south parallel runway	91,000	$90
• Build north and south parallel runways	124,000-126,000	$127-129

* Net savings in aircraft delays and travel times.

Figure 3 Demand Versus Average Delay With Existing Runways Under IFR Conditions

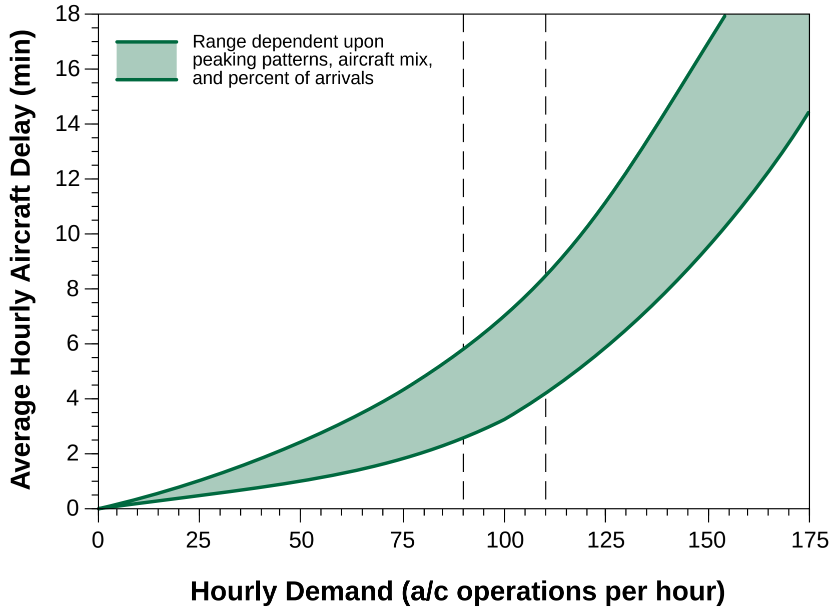


Figure 4 Profile of Daily Demand — Hourly Distribution

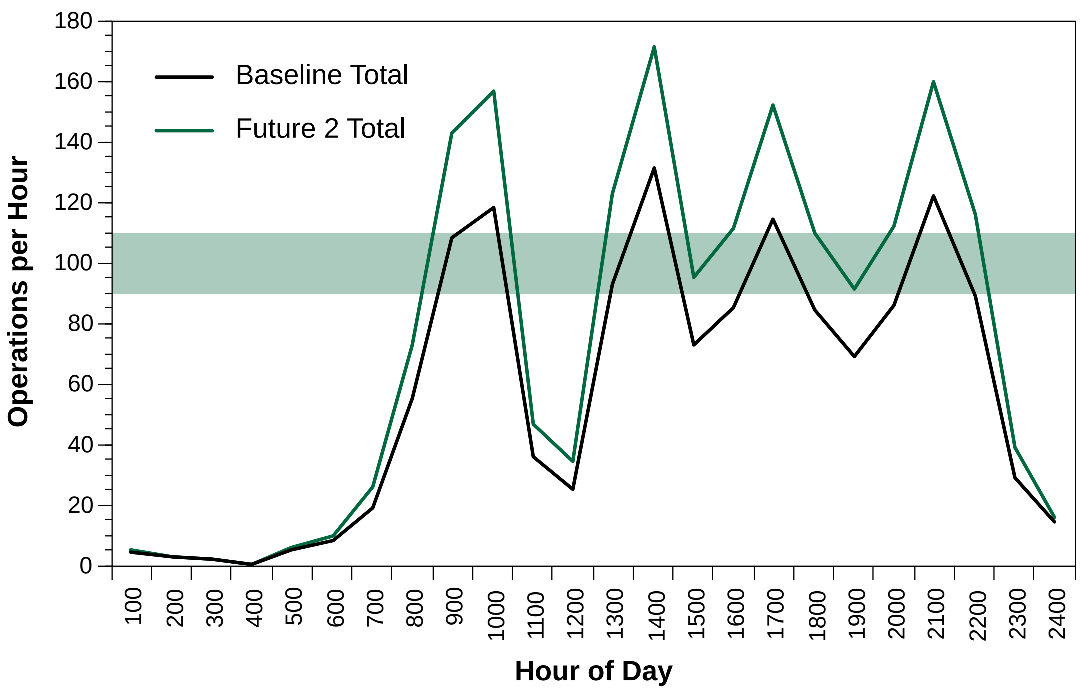


Figure 3 illustrates the relationship between hourly demand and average hourly delay per operation (take-off or landing) for the current airfield configuration at PIT under Instrument Flight Rules (IFR) conditions. It shows that aircraft delays begin to escalate rapidly as hourly demand exceeds 90 to 110 operations per hour. Figure 4 shows that hourly demand would exceed 90 to 110 operations frequently at forecasted Future 2 demand levels if no new runways were built.

Figure 5 Annual Delay Costs — Capacity Enhancement Alternatives

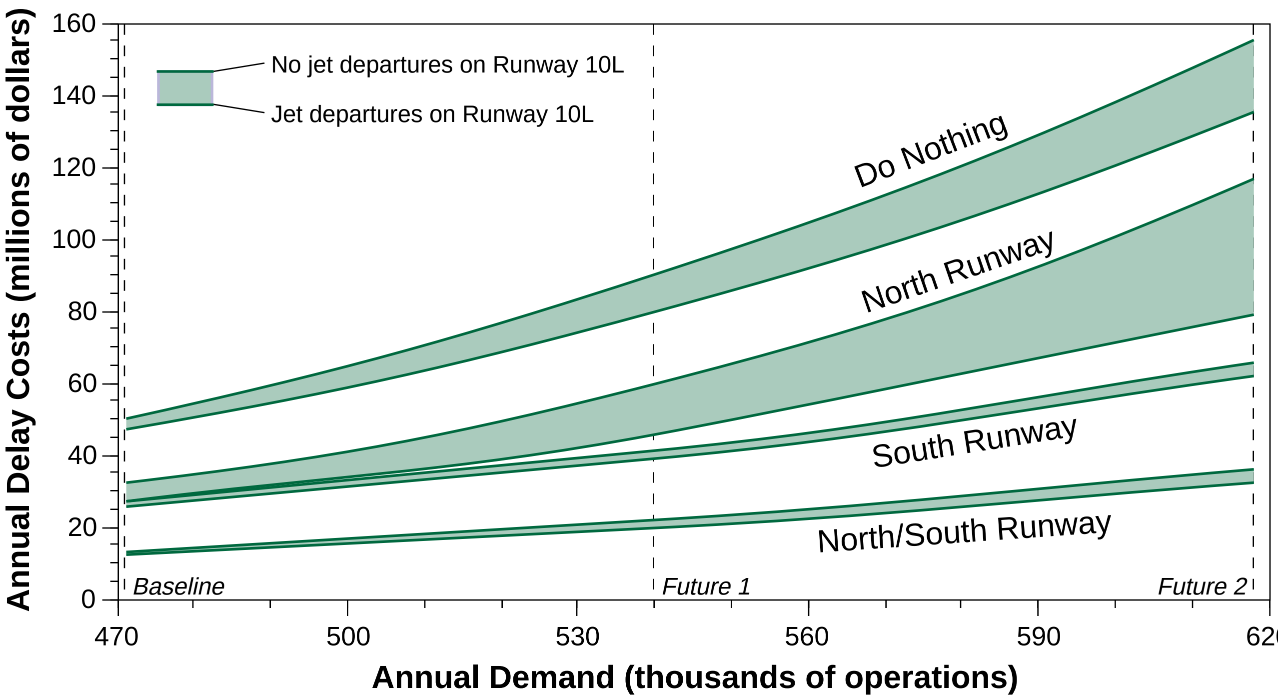


Figure 5 shows how delay will continue to grow at a substantial rate as demand increases if there are no improvements in airfield capacity, i.e., the "Do Nothing" scenario. The total annual delay costs will increase from $49 million at the Baseline level of operations to an estimated $155 million by Future 2. The chart also illustrates that significant savings in delay costs would be provided by any of the following alternatives:

- Building independent South Parallel runway
- Building North Parallel runway
- Building North and South Parallel runways

Greater Pittsburgh International Airpoort, circa 1950's

Landside Terminal of midfield complex under construction

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Landside and commuter terminal of new midfield complex

Section 1
Introduction

Background

Greater Pittsburgh International Airport (PIT) has seen remarkable growth in passenger enplanements since it first opened its doors in 1952. In that year, less than 600,000 passengers were enplaned. In 1990, passenger enplanements totaled over 8.5 million. Although the Airport has seen an overall steady growth in the last four decades, much of this growth can be attributed to causes and events in the aviation industry. This is especially true in more recent times with the advent of deregulation and the development of the "hub and spoke" system that has proven its efficiency to the airline industry.

The increased use of PIT as a hub by USAir has resulted in not only a larger percentage of connecting passengers (about 60 percent of enplaned passengers), but also a greater demand on both landside and airside facilities. Activity at the Airport has increased from 5,919,322 passenger enplanements in 1983 to 8,534,457 in 1990, a 44 percent increase. In 1990, the Airport handled 385,837 aircraft operations (take-offs or landings).

These traffic volumes placed PIT 20th in passenger enplanements and 19th in aircraft operations when compared to the top 50 U.S. airports. By 1998, FAA forecasts indicate that PIT will rank 13th in enplanements and 8th in operations.

Since the growth experienced by PIT is not uncommon to airports across the U.S., there has been a considerable concern over the demand this growth has placed on the available landside and airside capacity at our Nation's airports and its effect on the overall efficiency of the air transportation system. In response to this timely concern, the Federal Aviation Administration (FAA), airport operators, and aviation industry groups have initiated airport capacity design teams at various major air carrier airports throughout the U.S. to identify and evaluate alternative means to enhance existing airport and airspace capacity to handle future demand.

Although PIT is currently constructing a new terminal facility, which will substantially increase its landside capacity in terms of a new apron and gates, the Pittsburgh Capacity Team was initiated with the objective of further increasing PIT's capacity, improving operational efficiency, and reducing aircraft delays. A number of capacity enhancement alternatives were considered with the specific purpose of determining the technical merits of each alternative action identified and its impact on capacity.

Selected alternatives identified by the Capacity Team were tested using FAA-approved computer models to quantify the benefits provided. Different levels of activity or traffic demand were chosen to represent growth in aircraft operations in order to compare the merits of each action. These annual activity levels are referred to throughout this report as Baseline — 471,000 operations; Future 1 — 540,000 operations; and Future 2 — 618,000 operations.

The PIT Capacity Team identified a number of improvement alternatives for evaluation. However, if no improvements are made at PIT (the Do Nothing scenario), annual delays and associated aircraft operating costs will increase from an estimated 44,000 hours or $49 million at the Baseline level of operations to 142,000 hours or $155 million by Future 2.

The improvements evaluated as a part of the Capacity Team's efforts are delineated in Figure 2 and described in some detail in Section 2 — Capacity Enhancement Alternatives.

Objectives

The major goal of the Capacity Team at PIT was to identify and evaluate proposals to increase airport capacity, improve airport efficiency, and reduce aircraft delays. In achieving this objective, the Capacity Team:

- Assessed the current airport capacity and the causes of delay associated with the airfield, the immediate airspace, and the apron and gate-area operations.
- Evaluated capacity and delay benefits of alternative air traffic control (ATC) procedures, navigational improvements, airfield development, and operational improvements.
- Examined the relationship between air traffic demand and delay, so that it could be used as an aid in establishing the schedule for airfield improvements (based on traffic growth).

Scope

The Greater Pittsburgh International Airport Capacity Team limited its analyses to aircraft activity within the terminal area airspace and on the airfield. They considered the technical and operational feasibility of the proposed improvements, but did not address environmental, socioeconomic, or political issues regarding airport development. These issues need to be addressed in future airport master planning studies.

Methodology

The Capacity Team proceeded along a logical sequence of events, with periodic meetings for review and coordination. The Airport's Master Plan consultant performed the simulations. Other Capacity Team members contributed suggested improvement options, data, text, and capital cost estimates.

Proposed improvements were analyzed in relation to current and future demands with the Airfield Delay Simulation Model (ADSIM). Appendix B briefly explains the model.

The simulation model considered air traffic control procedures, airfield improvements, and traffic demands. Alternative airfield configurations were prepared for the analysis from present and proposed airport plans. Various configurations were evaluated to assess the benefit of proposed improvements. Air traffic control procedures and system improvements determined the aircraft separations to be used for the simulations under both visual flight rules (VFR)and instrument flight rules (IFR) conditions.

Air traffic demand levels were derived from *Official Airline Guide* data, historical data, Capacity Team forecasts, and forecasts developed as a part of the Airport's Master Plan Update. Aircraft volume, mix, and peaking characteristics were considered for each of the three different demand forecast levels (Baseline, Future 1, and Future 2). From this, annual total delay and travel time estimates were determined based on implementing various improvements. These estimates took into account historic variations in weather and demand. The annual total delay and travel time estimates for each configuration were then compared to identify net savings resulting from the improvements.

Following the evaluation, the Capacity Team developed a set of alternatives for consideration.


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Section 2
Capacity Enhancement Alternatives

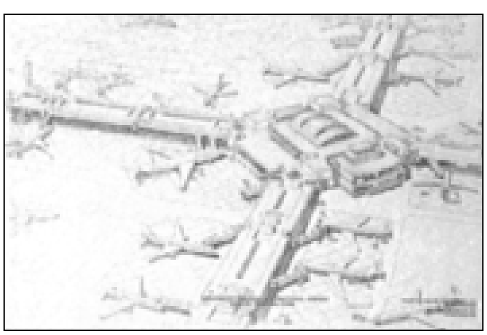
Figure 1 shows the current layout of the Airport, plus the recommended airfield improvements. The PIT Capacity Team selected the capacity enhancement alternatives listed in Figure 2 for evaluation.

These alternatives are categorized and discussed under the following headings:

- Airfield Improvements.
- Facilities and Equipment Improvements.
- Operational Improvements.

The savings described in this section are expressed in terms of "net" savings in aircraft delays and travel times and associated aircraft direct operating costs. Such net savings take into account the additional taxiing distances that may be associated with use of the new runways under consideration.

For purposes of estimating aircraft direct operating costs, a "unit" operating cost of $18.55 per minute was used, which 1) reflects the mix of aircraft types at PIT and 2) includes only the costs of fuel, crew, and direct maintenance.



Airside terminal of new midfield complex

Airfield Improvements

1. Extend Runway 10C/28C 2,000 feet to the west.

Runway Extension

Runway 10C/28C crosses, or intersects, Runway 14/32. Air traffic control procedures for operations conducted on intersecting runways are more restrictive than for operations conducted on non-intersecting runways.

Currently, Runway 10C/28C is used primarily for departures. Extending the runway and using Taxiway J to support intersection departures would eliminate the need to cross Runway 14/32, reduce the dependence of Runway 28C departures and Runway 32 arrivals, and increase the departure capacity of Runway 28C. This procedure would reduce the taxiing distances for aircraft departing on Runway 28C. In addition, departures on Runway 10C would have just over 10,000 feet available for take-off, which is nearly the same as that available on Runway 10R. This should reduce requests from long-haul aircraft to use the outboard runway (10R). Air traffic controllers would also benefit from the elimination of the requirement to deal with the intersection of the two runways.

One New Runway

2. Build 8,500 foot independent south parallel Runway 9/27, 4,300 feet south of Runway 10R/28L.

This air carrier runway option, 4,300 feet to the south of Runway 10R/28L, could allow for four independent VFR arrival streams. It could also support three independent IFR arrival streams after new standards currently being developed are finalized.

Annual net savings in aircraft delays and travel times at the Baseline activity level would be 15,000 hours or $18 million, and, at Future 2 activity levels, 98,000 to 100,000 hours or $98 to $100 million.

3. Build 8,200 foot north parallel Runway 9/27, 1,000 feet north of Runway 10L/28R.

An air carrier runway located to the north of Runway 10L/28R would be limited to about 8,200 feet in length and a 1,000 foot separation from Runway 10L/28R because of the location of the airport boundaries and the distance between the proposed Southern and Beaver Valley Expressways. It would serve primarily as an arrival runway in both east and west flows. Because of a noise sensitive area east of the runway, it would not be used extensively for air carrier departures, except possibly in the future by the quieter Stage III aircraft.

Under IFR conditions, the limited 1,000 foot separation between the proposed north parallel runway (9/27) and the existing Runway 10L/28R would mean that the two runways would only accomodate a single arrival stream during IFR.

Annual savings at the Baseline activity level would be 14,000 to 18,000 hours or $16 to $20 million, and, at Future 2 activity levels, 57,000 to 90,000 hours or $50 to $87 million.

4. Build 8,500 foot dependent south parallel Runway 9/27, 3,100 feet to the south of Runway 10R/28L.

The parallel runways proposed to the south of Runway 10R/28L would be located between the Airport Parkway and the proposed Southern Expressway.

If the new runway were constructed 3,100 feet to the south of Runway 10R/28L, it could allow additional VFR arrival streams and three IFR arrival streams, two of which would be dependent (staggered). If the Precision Runway Monitor (PRM) currently under development (see alternative 13) allows new IFR approach procedures at reduced runway separations, this new runway may be able to support three independent IFR arrival streams. If built in conjunction with alternative 2, this new runway could provide for three all-weather arrival runways and a dedicated departure runway on the south side.

Annual savings at the Baseline activity level would be 13,000 hours or $16 million, and, at Future 2 activity levels, 91,000 hours or $90 million.

5. Build 9,000 foot crosswind Runway 14R/32L, 8,700 feet to the west of Runway 14/32.

This crosswind parallel runway, a 9,000 foot air carrier runway, would allow for two IFR arrival streams during cross-wind operations.

Annual savings at the Baseline activity level would be 12,000 hours or $14 million.

Two New Runways

6. Build North and South Parallel runways.

Annual savings at the Future 1 activity level would be 59,000 to 60,000 hours or $67 to $68 million, and, at Future 2 activity levels, 124,000 to 126,000 hours or $127 to$129 million.

7. Build both south parallel runways, south of Runway 10R/28L.

Annual savings at the Future 1 activity level would be 53,000 hours or $60 million, and, at Future 2 activity levels, 118,000 hours or $120 to$121 million.

8. Build south parallel and crosswind runways.

Annual savings at the Future 1 activity level would be 59,000 hours or $68 million, and, at Future 2 activity levels, 116,000 hours or $122 million.

Terminal Area Improvements

9. Add 10 gates to northwest finger of new Midfield Terminal and improve Taxiway H to Taxiway R.

At the level of aircraft operations forecast for Future 1 and Future 2, there will be a requirement for additional passenger terminal gates.

10. Add 15 gates to southwest finger of new Midfield Terminal and improve Taxiway K from Taxiway W to Taxiway A.

At the level of aircraft operations forecast for Future 1 and Future 2, there will be a requirement for additional passenger terminal gates.

Facilities and Equipment Improvements

11. Upgrade Runway 10R to CAT II/III instrument landing system (ILS).

At least 20 days each year, PIT experiences heavy ground fog that often does not lift until 10 or 11 a.m. During this low visibility condition (less that 1,800 feet Runway Visual Range (RVR)), CAT II ILS approaches are required. Currently at PIT, only Runway 10L is equipped for CAT II approaches. The Airport, then, is limited to single runway operations during these Instrument Meteorological Conditions (IMC), and this results in significant aircraft delays and diversion of flights to other airports.

Upgrading the ILS on Runway 10R to CAT II/III would provide for two simultaneous arrival streams during these low visibility conditions and significantly increase capacity.

An ALSF-II, a 2,400 foot high intensity approach lighting system (ALS) with sequenced flashing lights, is required for CAT II and CAT III ILS precision approaches.

Annual savings at the Baseline activity level would be 2,000 hours or $3 million.

12. Install Precision Runway Monitor (PRM).

The greatest capacity enhancement benefit at PIT would be the addition of a third parallel runway that permits three independent parallel approaches in all weather conditions.

A developmental program known as the Precision Runway Monitor (PRM) has demonstrated the potential for reducing parallel runway spacing. This program relies upon improved radar surveillance with higher update rates and a new air traffic controller display system.

Installation of the PRM at PIT would significantly reduce the cost associated with the construction of an independent third parallel runway. The ability to construct more closely spaced parallel runways would reduce siting, construction, and taxiing costs, and would mitigate the potential noise impact on the communities near the airport.

Operational Improvements

13. Conduct an airspace capacity design project and restructure terminal airspace.

The Capacity Team highly recommends a complete analysis of all of the en route airspace that interconnects with PIT. This analysis should include concepts of airspace restructuring that offer the potential for improving arrival and departure air route capacity in conjunction with airport improvements. New technology and operating concepts need to be reviewed in an effort to improve flow-control procedures and reduce 10-mile-in-trail restrictions imposed above optimal aircraft spacing.

Section 3
Summary of Technical Studies

Overview

The Greater Pittsburgh International Airport Capacity Team evaluated the efficiency of the existing airfield and the proposed future configuration. Figure 6 illustrates airfield weather conditions. The potential benefits of various improvements were determined by examining airfield capacity and demand and average aircraft delays.

The Capacity Team used the Airfield Delay Simulation Model (ADSIM) to determine aircraft delays and travel times. Delays and travel times were calculated for current and future conditions.

Daily operations corresponding to an average day in the peak month were used for each of the forecast periods. Daily delays and travel times were annualized to measure the potential economic benefits of the proposed improvements. The annualized delays and travel times provide a basis for comparing the benefits of the proposed changes. The benefits associated with various runway use strategies were also identified.

The fleet mix at Greater Pittsburgh International Airport (PIT) has an average direct operating cost of $18.55 per minute. This figure represents the costs for operating the aircraft and includes such items as fuel, crew, and direct maintenance costs; it does not consider lost passenger time, disruption to airline schedules, or any other intangible factors.

The cost of a particular improvement is measured against its annual net delay and travel time savings. This comparison indicates which improvement will be the most effective.

For expected increases in demand, a combination of improvements can be implemented to allow airfield capacity to increase while aircraft delays are minimized.

Figure 6 Airfield Weather

Ceiling/Visibility		Occurrence (%)
VFR 1	2,000 feet/5 SM or above	75.68
VFR 2	Between 1,999 and 1,000 feet/5 to 3 SM	11.96
IFR 1	Between 999 and 800 feet/3 to 2 SM	4.60
IFR 2	Between 799 and 200 feet/2 to 0.5 SM	6.87
IFR 3	Between 199 and 100 feet/0.5 to 0.25 SM	0.50
IFR 4	Less than 100 feet/0.25 SM	0.39
	Total	100.00

VFR — Visual Flight Rules
IFR — Instrument Flight Rules
SM — Statute Miles

Airfield Capacity

The PIT Capacity Team defined airfield capacity to be the maximum number of sustained aircraft operations (landings or takeoffs) that can take place in a given time. The following conditions were considered.

- Airspace constraints
- Ceiling and visibility conditions
- Runway layout and use
- Aircraft mix
- Percent arrival demand

Hourly airfield capacities are summarized in the following table.

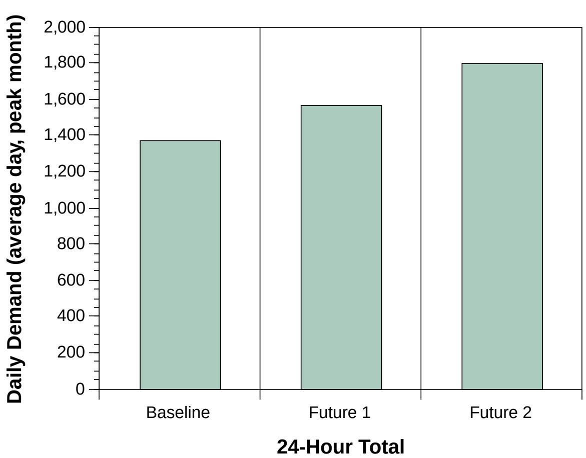
Existing Airfield Capacities in IFR Conditions
(operations per hour)

Arrival Peak (70% arrivals)	**90**
Departure Peak (30% arrivals)	**106 – 110***

* Higher end of range assumes unrestricted runway use.

Figure 7 illustrates the average-day, peak-month arrival and departure demand levels for PIT for each of the annual activity levels used in the study, Baseline, Future 1, and Future 2.

Figure 7 Airfield Demand Levels — Aircraft Operations Average Day of Peak Month



	Annual	24-Hour Day (Average Day, Peak Month)	Peak Hour
Baseline	471,000	1,372	131
Future 1	540,000	1,574	150
Future 2	618,000	1,802	171

Figure 8 presents the relationship between demand and average hourly delay in IFR weather for the existing runways at PIT. The curve represents the most prevalent IFR runway configuration and is based on the existing demand peaking pattern at PIT. Other patterns of demand can alter the demand/delay relationship.

The curve in Figure 8 illustrates the relationship between flow, the number of operations per hour, and the average delay per aircraft for the existing PIT airfield. It shows that, as the number of aircraft operations per hour increases, the average delay per operation increases exponentially.

Figure 9 illustrates the hourly profile of daily demand for the Baseline activity level of 471,000 aircraft operations per year. It also includes a curve that depicts the profile of hourly demand for the Future 2 activity level of 618,000 aircraft operations per year.

Comparing the capacities shown in the above table with the information in Figures 8 and 9 shows that:

- aircraft delays will begin to escalate rapidly as hourly demand exceeds capacity, and,
- while hourly demand exceeds capacity during 0830 - 1100, 1300 - 1400, and 2000 - 2100 hours at Baseline demand levels, capacity would be more frequently exceeded at the demand levels forecast for Future 2 if no new runways were built at the airport.

Figure 8 **Demand Versus Average Delay With Existing Runways Under IFR Conditions**

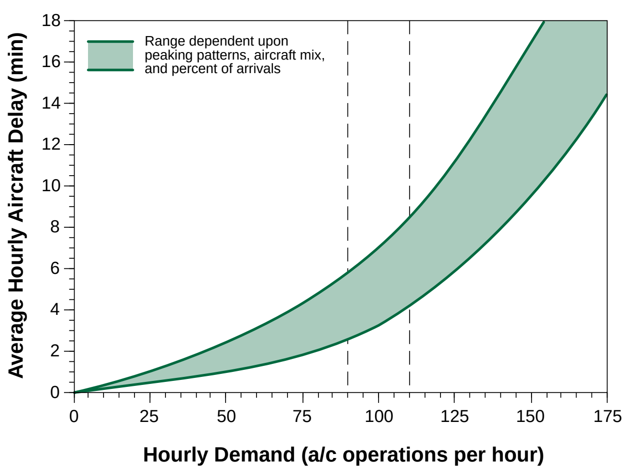
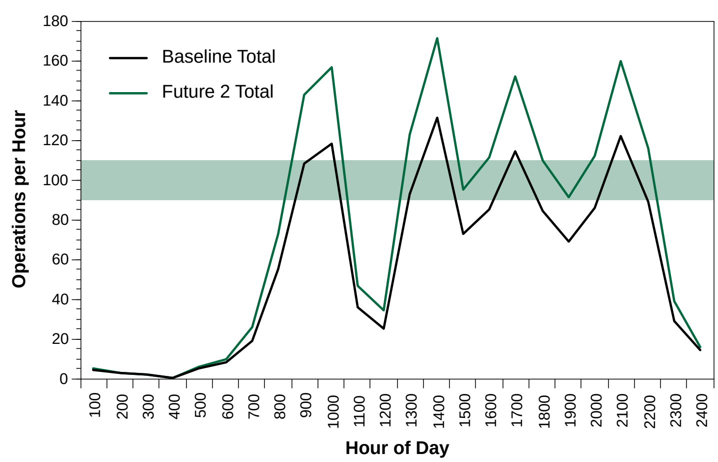


Figure 9 **Profile of Daily Demand — Hourly Distribution**



Aircraft Delays

Aircraft delay is defined as the time above the unimpeded travel time for an aircraft to move from its origin to its destination. Aircraft delay results from interference from other aircraft in the system competing for the use of the same facilities.

The major factors influencing aircraft delays are:

- Weather
- Airfield and ATC System Demand
- Airfield physical characteristics
- Air traffic control procedures
- Aircraft operational characteristics

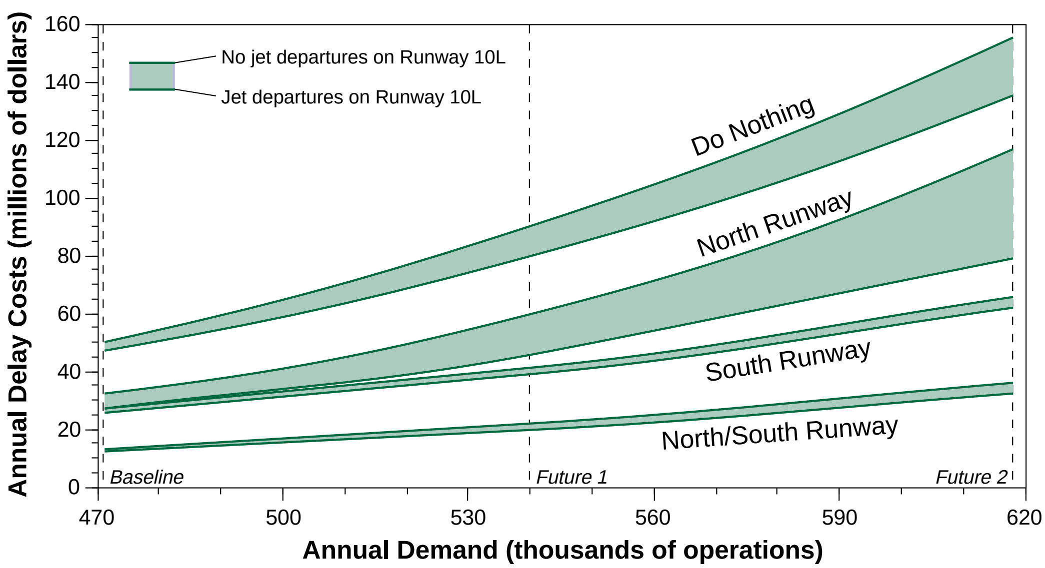
Average delay in minutes per operation was generated by the Airfield Delay Simulation Model (ADSIM). A description of this model is included in Appendix B.

Annual delay costs, expressed in millions of dollars, for various demand levels are shown in Figure 10. This figure presents comparisons between "Do Nothing" and the capacity enhancement alternatives. This figure also identifies the benefit that would result from implementing the individual alternatives.

Under the "Do Nothing" situation, if there are no improvements in airfield capacity, the total annual delay costs could increase as follows:

	Operations	Total Annual Delay Costs Hours	Total Annual Delay Costs Millions of 1990 $
Baseline	471,000	44,000	$49
Future 1	540,000	83,000	$90
Future 2	618,000	142,000	$155

Figure 10 Annual Delay Costs — Capacity Enhancement Alternatives

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Appendix A
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Appendix B
Computer Model and Methodology

The PIT Capacity Team studied the effects of various improvements proposed to reduce delay and enhance capacity. The options were evaluated considering the anticipated increase in demand. The analysis was performed using computer modeling techniques. A brief description of the model and the methodology employed follows.

Computer Model

Airfield Delay Simulation Model (ADSIM)

ADSIM is a fast-time, discrete event model that employs stochastic processes and Monte Carlo sampling techniques. It describes significant movements of aircraft on the airport and the effects of delay in the adjacent airspace. The model was validated in 1978 at Chicago O'Hare International Airport against actual flow rates and delay data. It was calibrated for this study against field data collected at PIT to insure that the model was site specific.

Inputs for the simulation model were derived from empirical field data. The results were averaged to produce output statistics. Total and hourly aircraft delays, travel times, and hourly flows for the airport and for the individual runways were estimated.

Methodology

Model simulations included present and future air traffic control procedures, various airfield improvements, and traffic demands for different times. To assess the benefits of proposed airfield improvements, the Capacity Team used different airfield configurations derived from present and projected airport plans. The projected implementation time for air traffic control procedures and system improvements determined the aircraft separations used for IFR and VFR weather simulations.

For the delay analysis, the analysts developed traffic demands based on the *Official Airline Guide*, historical data, and various forecasts. Aircraft volume, mix, and peaking characteristics were developed for three demand periods (Baseline, Future 1 and Future 2). The estimated annual delays for the proposed improvement options were calculated from the experimental results. These estimates took into account the yearly variations in weather and demand based on historical data.

The potential delay reductions for each improvement were assessed by comparing the annual delay estimates.

The ADSIM model was also used to perform the capacity analysis for PIT.

Appendix C
Glossary

ADSIM	Airfield Delay Simulation Model
AEA	FAA Eastern Region
ALS	Approach lighting system
ALSF-II	Standard approach light system with sequenced flashers and ILS CAT II modification
AOPA	Aircraft Owners and Pilots Association
ATA	Air Transport Association of America
ATC	Air Traffic Control
FAA	Federal Aviation Administration
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
PIT	Greater Pittsburgh International Airport
PRM	Precision Runway Monitor
RVR	Runway Visual Range
SM	Statute miles
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions

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Midfield terminal complex renderings by Edward Dumont.