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CHICAGO O'HARE INTERNATIONAL AIRPORT
O'HARE MODERNIZATION PROGRAM

Request for Letter of Intent to provide a

Multi-Year Commitment of Airport Improvement Program Grant-in-Aid Funding

March 1, 2004

Updated February 2005

CHICAGO O'HARE INTERNATIONAL AIRPORT

City of Chicago
Richard M. Daley, Mayor

O'Hare Modernization Program

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February 15, 2005

Mr. Phillip Smithmeyer
Airports District Office Manager
Federal Aviation Administration
2300 East Devon Avenue
Des Plaines, Illinois 60018

Subject: Letter of Intent for AIP Funding
Chicago O'Hare International Airport

Dear Mr. Smithmeyer:

On March 1, 2003, the City of Chicago (City) submitted a request for a Letter of Intent (LOI) for a multi-year commitment of Airport Improvement Program (AIP) funding for Phase 1 of the O'Hare Modernization Program (OMP-Phase 1) at O'Hare International Airport. The LOI was requested while awaiting completion of the simulation modeling for the Environmental Impact Statement, which is the same modeling used for the Benefit-Cost Analysis (BCA) conducted to support this LOI request. The purpose of the amended LOI request is to include the BCA required from the City to complete the application process.

Consistent with the original LOI application, this amended request is for $300 million in AIP discretionary grants over a 10-year period with the City committing $55.8 million of its entitlement grants to the implementation of OMP- Phase 1. While we have provided a preferred reimbursement schedule, we would be amenable to working with the FAA to define an alternative schedule. The City intends to submit an LOI request for OMP-Phase 2 at a later date.

Thank you for your consideration of this request. We believe that the OMP is an effective use of the LOI funding mechanism and provides significant capacity enhancing benefits to the Airport and the National Airspace System. If you need any additional information, please do not hesitate to contact Rosemarie S. Andolino at 773-557-4742.

Sincerely,

[ORIGINAL SIGNED BY]

Rosemarie S. Andolino
Executive Director
O'Hare Modernization Program

[ORIGINAL SIGNED BY]

John A. Roberson
Commissioner
Department of Aviation

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Executive Summary

Request for Letter of Intent to provide a

Multi-Year Commitment of Airport Improvement Program Grant-in-Aid Funding

RICHARD M. DALEY
MAYOR

CHICAGO O'HARE INTERNATIONAL AIRPORT
O'HARE MODERNIZATION PROGRAM

Executive Summary

The City of Chicago (the City or Sponsor) is requesting federal assistance in the form of a Letter of Intent (LOI) to provide a multi-year commitment of Airport Improvement Program (AIP) grant-in-aid funding for airfield projects at O'Hare International Airport (the Airport or O'Hare) as part of Phase 1 of the O'Hare Modernization Program (OMP-Phase 1). The City intends to submit an LOI request for OMP-Phase 2 projects at a later date.

Purpose of the OMP

The purpose of the full OMP is to reduce current and projected delays at O'Hare and enhance capacity of the National Airspace System (NAS). Under the OMP, the airfield is to be reconfigured into a modern parallel runway system, allowing more efficient operations.

Delays at O'Hare adversely affect regional and national air transportation. The need to reduce delays at O'Hare has been historically recognized by the FAA and others, as the following list demonstrates:

- *Air Traffic Congestion and Capacity in the Chicago, Illinois Region and Its Effects on the National Air Transportation System, U.S. Senate Committee on Commerce, Science, and Transportation* field hearing, June 15, 2001*;*
- *Airport Capacity Benchmark Report 2001,* FAA*;*
- *Order Limiting Scheduled Operations, Docket FAA-2004-16944-1,* FAA and U.S. Department of Transportation, January 2004 (the *January 2004 FAA Order*);
- *Order Limiting Scheduled Operations at Chicago O'Hare International Airport, Docket FAA-2004-16944-55*, FAA and U.S. Department of Transportation, August 2004 (the *August 2004 FAA Order)*; and
- *Airport Capacity Benchmark Report 2004,* FAA.

O'Hare delays are a consequence of the Airport's converging runway configuration, which does not provide balanced capacity in instrument flight rules (IFR) and visual flight rules (VFR) conditions or between arrivals and departures. Currently, these limitations significantly impact the NAS even in good weather during peak periods of the day, as recognized by the *January 2004 FAA Order* and the *August 2004 FAA Order* limiting scheduled operations during peak operating hours.

Consistent with statutory requirements for the use of LOI grants, the OMP will enhance system-wide airport capacity. The O'Hare Modernization Draft Environmental Impact Statement dated January 2005 (DEIS) defines the purpose and need of the proposed action (OMP development) as follows:

- Address the projected needs of the Chicago region by reducing delays at O'Hare, and thereby enhancing capacity of the NAS.
- Ensure that existing and future terminal facilities and supporting infrastructure (access, landside, and related ancillary facilities) can efficiently accommodate airport users.

Additional benefits of the OMP include:

- Providing flexible opportunities for increasing terminal and landside capacity;
- Creating opportunities for enhanced competition among air carriers;
- Enhancing the ability of the Airport to accommodate new large aircraft (NLA); and
- Mitigating noise impacts.

Description of the OMP

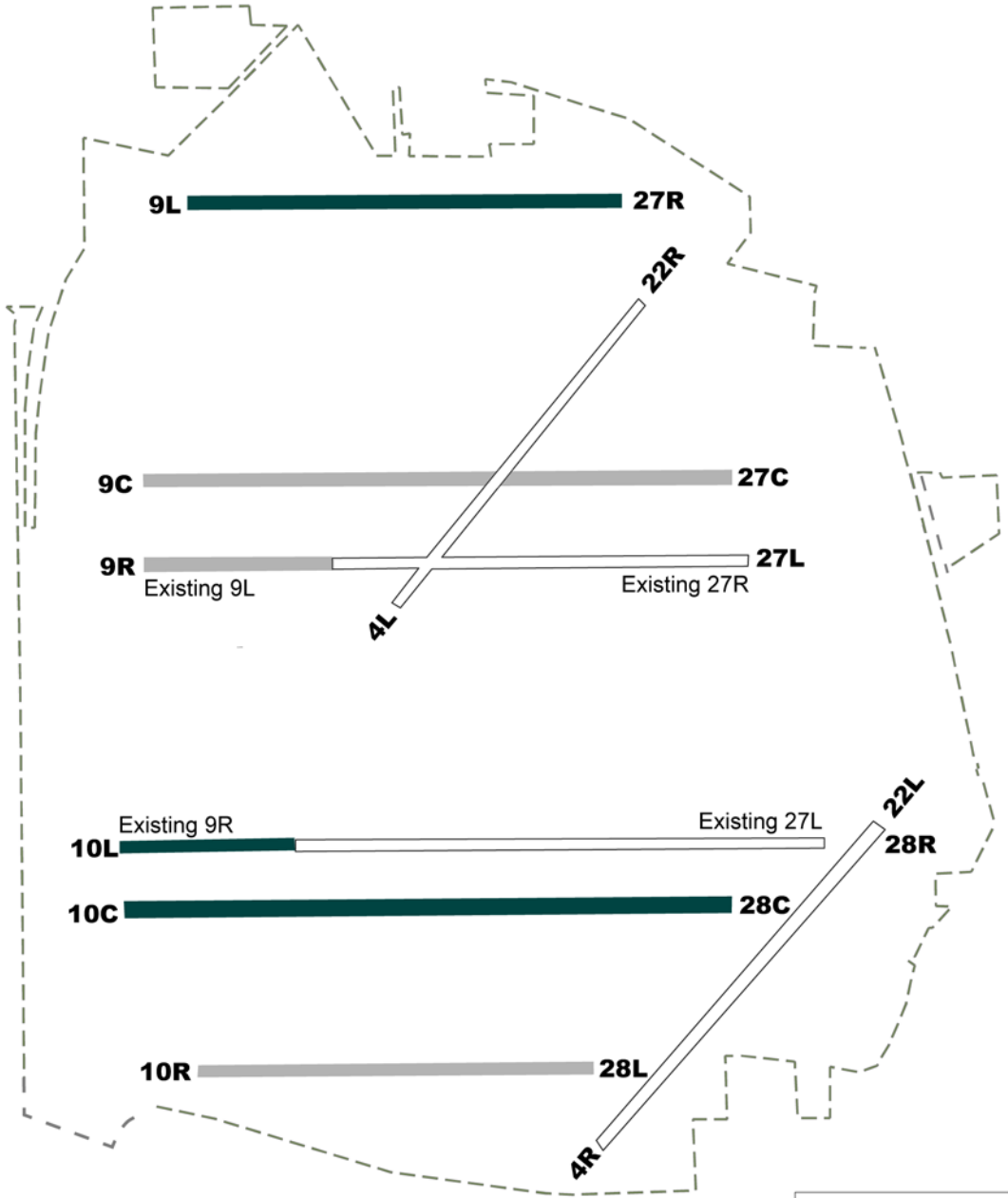
Implementation of the OMP will reduce delays and enhance capacity by modernizing the airfield configuration. O'Hare's existing layout of converging runways will be reconfigured into a predominantly parallel runway configuration (as shown in **Exhibit ES-1**) typical of modern, large-hub airports. These parallel runways will allow operation of a combination of arrival and departure runways, providing balanced and flexible capacity in all weather conditions.

The OMP will be implemented in phases and is expected to be a multi-year process entailing the reconfiguration of the runway layout; relocation of other existing facilities; construction of a new western terminal complex, including supporting roadway and parking facilities; noise mitigation; and land acquisition. Various improvements will also be implemented to relocate and expand existing utilities and infrastructure, including stormwater collection and detention facilities, water supply lines, electrical systems, sanitary sewer systems, vehicle service roads, and perimeter fencing.

LOI Projects

The projects in this LOI request include the following (the LOI Projects):

- New Future Runway 9L-27R;
- Extension of Future Runway 10L-28R (Existing Runway 9R-27L);
- Future Runway 10C-28C (Relocation of Existing Runway 18-36); and
- Associated runway enabling projects, generally including associated taxiway systems, navigation aids installation and upgrade, site utilities construction, and existing facilities relocation



[1]Depicts only the proposed runways associated with the LOI Projects. Other supporting airfield development, including taxiways, is also included as part of the LOI Projects.

Source: Ricondo & Associates, Inc.
Prepared by: Ricondo & Associates, Inc.

Exhibit ES-1

north

Not to Scale

OMP Airfield Projects (Runways Only)

Z://ORD Financial/LOI/Exhibits/LOI Exhibit Pack.pdf

Benefit-Cost Analysis

As required for this LOI request, a Benefit-Cost Analysis (BCA) has been performed for the OMP-Phase 1 Airfield Projects, which consist of the LOI Projects and the supporting Program-Wide Requirements projects. Program-Wide Requirements include the following projects: preliminary engineering, wetlands mitigation, OMP-Phase 1 noise mitigation, land acquisition, and other miscellaneous program-wide requirements. The results are shown in **Table ES-1**. In addition, several sensitivity analyses were conducted. Summarized in **Table ES-2**, the sensitivity analyses include (1) increasing capital investment costs by 25 percent, (2) delaying the construction schedule by 5 years, (3) decreasing benefits by 25 percent, and (4) combination of all three of the items. Additionally, a sensitivity analysis stating the costs and benefits in 2004 dollars (instead of stated in 2001 dollars consistent with the DEIS and Master Plan) is also provided. For all of the analyses, the results exceed the FAA thresholds of a benefit-cost ratio of 1.0 and a positive net present value (NPV). The full BCA is included in Section IV. In addition, various sensitivity analyses are also presented to demonstrate the economic justification for the OMP-Phase 1 Airfield Projects if project benefits, costs, or timing differ from those envisioned. This analysis and the sensitivity analyses *do not* attempt to quantify or consider all benefits associated with the project, but rather illustrate that the aircraft travel time savings alone are sufficient to produce benefits that in all cases exceed project costs. Thus, the benefit-cost ratios and NPVs presented here are based on underestimated benefits and would be expected to be higher if a full accounting of project benefits were performed.

Table ES-1

Benefit-Cost Ratio and Net Present Value (2001 dollars) – OMP-Phase 1 Airfield Projects
Aircraft Travel Time Benefits Only

Project	Present Value Benefits (billions)	Present Value Costs (billions)	Net Present Value (billions)	Benefit-Cost Ratio
OMP-Phase 1 Airfield Projects	$4.1	$1.9	$2.2	2.13

Sources (Costs): Ricondo & Associates, Inc. and O'Hare Partners, based on cost estimate analyses from TOK LLC, and AOR.
Source (Benefits, NPV, Benefit-Cost Ratio): Ricondo & Associates, Inc.
Prepared by: Ricondo & Associates, Inc.

Table ES-2

Benefit-Cost Ratio and Net Present Value (2001 dollars) – Sensitivity Analyses
Aircraft Travel Time Benefits Only

Projects	Evaluation Period End Year	Present Value Benefits (billions)	Present Value Costs (billions)	Net Present Value[1] (billions)	Benefit-Cost Ratio
Increase capital costs by 25 percent	2028	$4.1	$2.4	$1.7	1.69
Delay construction schedule by 5 years	2033	$2.9	$1.4	$1.5	2.13
Decrease benefits by 25 percent	2028	$3.1	$1.9	$1.2	1.61
All of the above	2033	$2.2	$1.7	$0.4	1.27
Project using 2004 base year and 2004 dollars	2028	$5.1	$2.5	$2.6	2.06

[1] Totals may not add due to rounding.

Sources (Costs): Ricondo & Associates, Inc. and O'Hare Partners, based on cost estimate analyses from TOK LLC, and AOR.
Source (Benefits, NPV, Benefit-Cost Ratio): Ricondo & Associates, Inc.
Prepared by: Ricondo & Associates, Inc.

The City is requesting $300 million in an LOI discretionary grant over a 10-year period for OMP-Phase 1 and intends to submit an LOI request for OMP-Phase 2 at a later date. The City's initial request is formulated on the basis of the airfield components of OMP-Phase 1, two new/relocated runways at $125 million each plus one runway extension at $50 million, for a total of $300 million in discretionary AIP grants. This formulation is consistent with the amount of LOI grants received by other U.S. airports for similar projects. The $300 million request reflects the distribution of runway improvements between the development phases and is consistent with the conditions of airline funding commitment described later in Section I. Federal grants (entitlement and discretionary) would provide approximately 12 percent of the funding sources for the OMP-Phase 1 Airfield Projects, and local funds would provide approximately 88 percent. The requested LOI discretionary grant represents a relatively small share funding sources for the LOI Projects and an even smaller share in the context of total funding sources for the OMP-Phase 1 Airfield Projects.

Table ES-3 presents the LOI Projects expenditures in 2001 dollars and **Table ES-4** presents the proposed LOI reimbursement schedule.

Table ES-3

LOI Projects Expenditures Schedule (2001 dollars)

Calendar Year	LOI Projects Expenditures ($ millions) [1]
2003	$64.1
2004	355.5
2005	495.5
2006	455.3
2007	294.7
2008	286.4
2009	0.0
2010	0.0
2011	0.0
2012	0.0
2013	0.0
2014	0.0
Total [2]	$1,951.5

[1] Expenditures are shown in calendar years as originally planned by the City in 2001 dollars. The timing of expenditures is subject to change, and amounts shown for 2003 and 2004 do not represent actual amounts spent.

[2] Totals may not add due to rounding.

Source: O'Hare Partners.
Prepared by: Ricondo & Associates, Inc.

Table ES-4

Proposed LOI Reimbursement Schedule

Federal Fiscal Year	Proposed LOI Reimbursement ($ millions)
2003	$0.0
2004	0.0
2005	30.0
2006	30.0
2007	30.0
2008	30.0
2009	30.0
2010	30.0
2011	30.0
2012	30.0
2013	30.0
2014	30.0
Total	$300.0

Source: City of Chicago, Department of Aviation.
Prepared by: Ricondo & Associates, Inc.

RICHARD M. DALEY
MAYOR

CHICAGO O'HARE INTERNATIONAL AIRPORT
O'HARE MODERNIZATION PROGRAM

I. Introduction

Request for Letter of Intent to provide a

Multi-Year Commitment of Airport Improvement Program Grant-in-Aid Funding

I. Introduction

The City of Chicago (the City) requests federal assistance in the form of a Letter of Intent (LOI) to provide a multi-year commitment of Airport Improvement Program (AIP) grant-in-aid funding for airfield development as part of Phase 1 of the O'Hare Modernization Program (OMP-Phase 1). The LOI request is for $300 million in AIP discretionary grants over a 10-year period, with the City proposing to commit approximately $55.8 million of AIP entitlement grants. The City intends to submit an LOI request for OMP-Phase 2 at a later date.

The OMP is a $6.6 billion (in 2001 dollars), multi-year plan to reduce aircraft delay and enhance the capacity of the Airport. The following proposed runway projects are included as part of the full OMP airfield development, along with the associated proposed supporting airfield infrastructure (the OMP Airfield Projects):

- New Future Runway 9L-27R
- Extension of Future Runway 10L-28R (Existing Runway 9R-27L)
- Future Runway 10C-28C (Relocation of Existing Runway 18-36)
- Extension of Future Runway 9R-27L (Existing Runway 9L-27R)
- Future Runway 9C-27C (Relocation of Existing Runway 14L-32R)
- Future Runway 10R-28L (Relocation of Existing Runway 14R-32L)

Consistent with statutory requirements for the use of LOI grants, the OMP will enhance system-wide airport capacity. The DEIS defines the purpose and need of the proposed action (OMP development) as follows:

- Address the projected needs of the Chicago region by reducing delays at O'Hare, and thereby enhancing capacity of the NAS.
- Ensure that existing and future terminal facilities and supporting infrastructure (access, landside, and related ancillary facilities) can efficiently accommodate airport users.

Additional benefits of the OMP include:

- Providing flexible opportunities for increasing terminal and landside capacity;
- Creating opportunities for enhanced competition among air carriers;
- Enhancing the ability of the Airport to accommodate new large aircraft (NLA); and
- Mitigating noise impacts.

1.1 Background

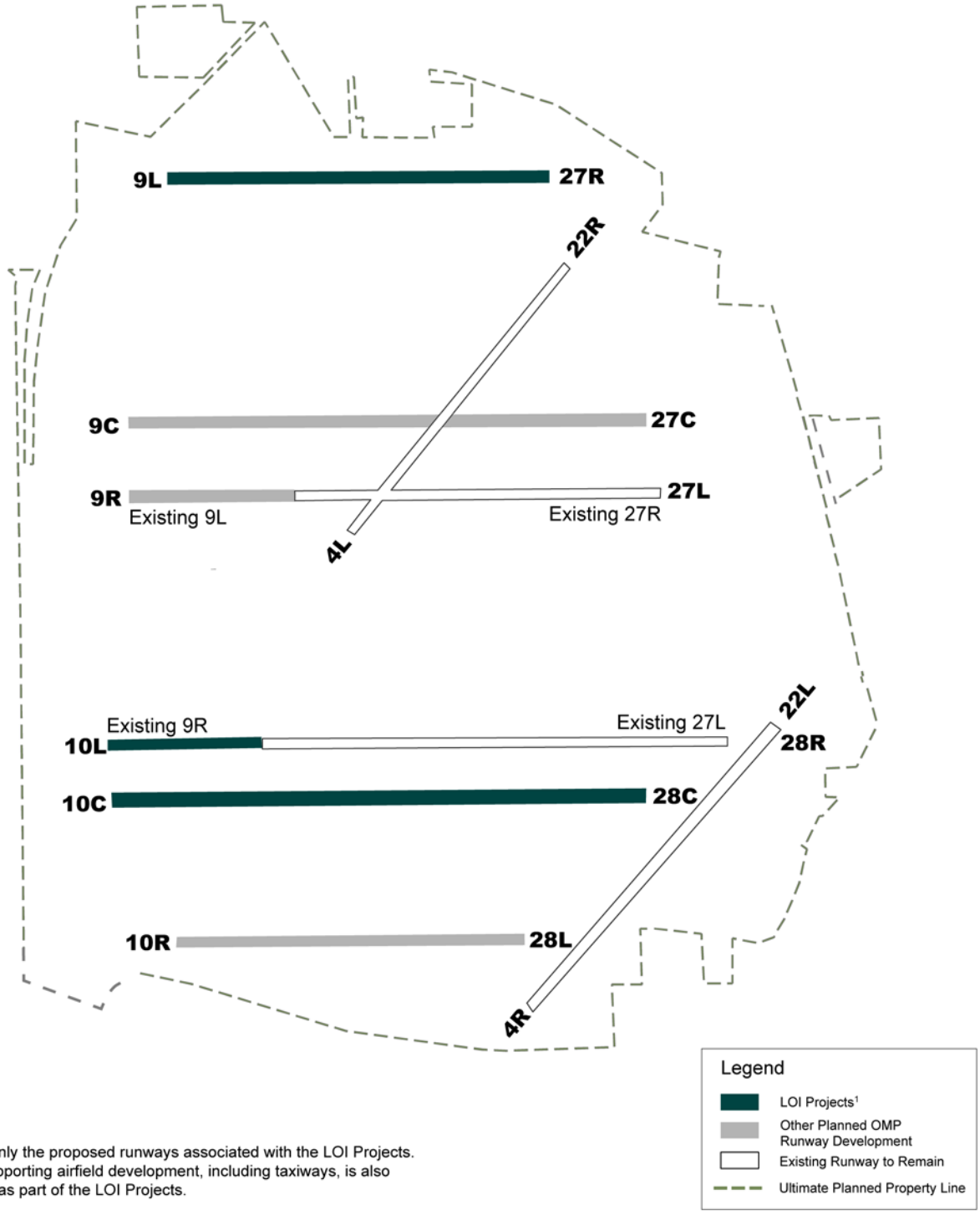
Aircraft delay historically has been a major issue at the Airport. The City and others have undertaken numerous studies over the past two decades aimed at identifying solutions to the increasing delay problem. These studies, which include the *1991* and *2002 Delay Task Force Studies*, have been conducted to investigate opportunities for runway development to mitigate escalating delays. While these studies concluded that several options were available to mitigate existing delays, few options studied prior to the OMP provided long-term capacity growth consistent with potential demand.

In response to the national interest in airport capacity and delay in Chicago, the U.S. Senate Committee on Commerce, Science and Transportation held a field hearing in Chicago on June 15, 2001, on *Air Traffic Congestion and Capacity in the Chicago, Illinois Region and Its Effects on the National Air Traffic System*. Testimony was provided by proponents of O'Hare expansion, proponents of a third airport in the Peotone area, and opponents of O'Hare expansion. While the Senate Committee did not take specific actions, it made clear its desire that local and State officials act soon on the issue of aviation capacity in Chicago, or face the possibility of federal intervention.

In response to the Committee's challenge, the City presented its OMP proposal for the future of O'Hare on June 29, 2001. The OMP proposal provided for the addition of one new runway, relocation of three runways, and extension of two existing runways, resulting in an airfield configuration with six runways in the east-west direction. **Exhibit I-1** depicts the proposed OMP runway projects. As presented, designations of two of the existing runways would change and the Airport's north and south airfields would be distinguished through the parallel runway naming convention. Specifically, the proposed parallel runways in the north airfield will be designated 9-27, and the proposed parallel runways in the south airfield would be designated 10-28. For the purposes of this document, the proposed runways will be identified by their proposed ultimate designations as presented on Exhibit I-1. Additional development is also proposed as part of the OMP, including construction of new taxiways, relocation of certain buildings, new Airport Traffic Control Towers, development of new terminal facilities on the west side of the Airport, and associated ground transportation access.

Subsequent to the City's proposal of the OMP, the State of Illinois held hearings on the proposed plan in the communities surrounding O'Hare. In December 2001, the City and the State agreed on the future OMP proposed development concept. On May 31, 2003, the Illinois General Assembly approved the O'Hare Modernization Act (Illinois Public Act 93-0450) and the Governor signed it into law on August 6, 2003. The O'Hare Modernization Act is intended to expedite and facilitate the OMP.

The OMP has business, community, and airline support (see **Appendix A** and **Appendix B**). Airline support for the OMP generally, and the LOI Projects specifically, has been reflected through a series of Majority-in-Interest (MII) funding approvals. These funding approvals are subject to certain conditions including the receipt of a $300 million LOI commitment for the LOI Projects.



[1]Depicts only the proposed runways associated with the LOI Projects. Other supporting airfield development, including taxiways, is also included as part of the LOI Projects.

Source: Ricondo & Associates, Inc.
Prepared by: Ricondo & Associates, Inc.

Exhibit I-1

north

Not to Scale

OMP Airfield Projects (Runways Only)

Z://ORD Financial/LOI/Exhibits/LOI Exhibit Pack.pdf

1.2 Outline of Application

In its 1994 LOI Policy, the FAA outlined three major criteria that it would use to evaluate LOI applications, including a proposed project's (1) effect on overall system capacity, (2) benefits and costs, and (3) financing and timing. The subsequent sections of this LOI request discuss these criteria in depth.

- *Section II: System Role and Existing Conditions.* The purpose of this section is to illustrate the importance of the Airport's role in the NAS. Historical and forecast aviation activity and current airfield limitations at the Airport are identified.
- *Section III: The O'Hare Modernization Program.* This section summarizes the OMP purpose and need and expected system capacity benefits. Descriptions of the OMP and LOI Projects, cost estimates, and implementation schedule are provided.
- *Section IV: Benefit-Cost Analysis.* The FAA requires a qualitative and quantitative analysis of any capacity-enhancing project for which an LOI or AIP discretionary funding of $5 million or more is sought. This section summarizes the BCA methodology and results. The BCA was performed in accordance with the procedures outlined in the FAA's Benefit-Cost Analysis Guidance dated December 15, 1999 (the *BCA Guidance*).
- *Section V: Financial Plan.* The LOI request must demonstrate a sound financial representation of the relevant capital development program. The financial plan will place the request for LOI funds in the context of the total cost of OMP-Phase 1 Airfield Projects and highlight the local financial commitment.

Supporting documentation is provided in the following appendices:

- *Appendix A*: Community Support. Summary of OMP supporters.
- *Appendix B*: Airline Support. Transmittal letters from airline MII approvals.
- *Appendix C*: FAA and USDOT Documents. The appendix includes (1) *Airport Capacity Benchmark Report 2001*, FAA; (2) *Order Limiting Scheduled Operations, Docket FAA-2004-16944-1*, FAA and U.S. Department of Transportation, January 2004 (the *January 2004 FAA Order*) (3) Remarks by Secretary Mineta, Chicago O'Hare News Conference, January 21, 2004 (the *Secretary's Remarks*), (4) *Order Limiting Scheduled Operations at Chicago O'Hare International Airport*, Docket FAA-2004-16944-55, FAA and U.S. Department of Transportation, August 2004 (the *August 2004 FAA Order*), and (5) *Airport Capacity Benchmark Report 2004*, FAA.
- *Appendix D*: Supplemental Information
- *Appendix E*: BCA Tables
- *Appendix F*: Airport Master Plan – Capital Development Program

II. System Role and Existing Conditions

Request for Letter of Intent to provide a

Multi-Year Commitment of Airport Improvement Program Grant-in-Aid Funding

RICHARD M. DALEY
MAYOR

CHICAGO O'HARE INTERNATIONAL AIRPORT
O'HARE MODERNIZATION PROGRAM

1.2 Outline of Application

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- *Appendix D*: Supplemental Information
- *Appendix E*: BCA Tables
- *Appendix F*: Airport Master Plan – Capital Development Program

II. System Role and Existing Conditions

To further describe the Airport's role in the NAS, the following are discussed in this section: (1) the specific nature of airline operations at the Airport; (2) historical, current, and forecast aviation activity; (3) current capacity constraints at the Airport; and (4) the resulting effect of these limitations on the NAS.

2.1 Role of the Airport

The Airport, located approximately 18 miles northwest of downtown Chicago, has been the primary commercial airport serving the Chicago Region[1] since 1962. The current airfield configuration consists of six main runways used primarily by commercial service air carriers and one runway used for general aviation. The six main runways are configured in three sets of parallel runways: two east-west runways, two northwest-southeast runways, and two northeast-southwest runways.

Based on statistics from Airports Council International, the Airport ranked first worldwide in total operations in 2003[2] and second worldwide in total passengers (see **Exhibit II-1**). The Airport has been ranked first worldwide in total operations in 39 of the last 42 years and first worldwide in total passengers in 36 of the last 42 years.

The Airport is an integral component of the NAS as evidenced by its high level of aviation activity. Based on preliminary City statistics subject to change for calendar year 2004, O'Hare had 990,957 total aircraft operations, which is an increase of 6.7 percent from 2003.

2.1.1 Transportation Hub

The Chicago Region's large population and economic base provide a strong demand for local origin-destination (O&D) traffic at the Airport. This O&D traffic base, coupled with Chicago's location near the center of the United States along heavily traveled east/west air routes, make it a natural location for airline hubbing operations.

As noted in the *January 2004 FAA Order*, "O'Hare enjoys a unique status within the NAS. O'Hare serves as a network hub for two of the largest domestic airlines [American Airlines and United Airlines], an origin and destination for many international flights by both U.S. and foreign carriers, and given its location a logical connecting point for significant passenger flows across the United States."

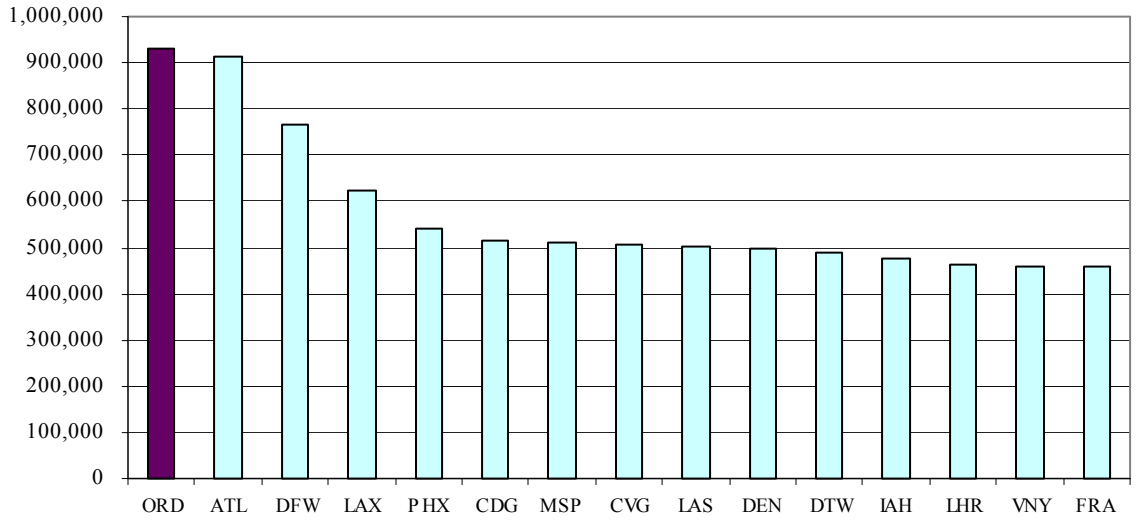
[1] Defined as the 13-county Chicago-Gary-Kenosha Consolidated Metropolitan Statistical Area (CMSA), which consists of the Chicago, Gary, Kankakee, and Kenosha MSAs, which are adjoining.

[2] 2004 annual statistics unavailable at the time of publishing.

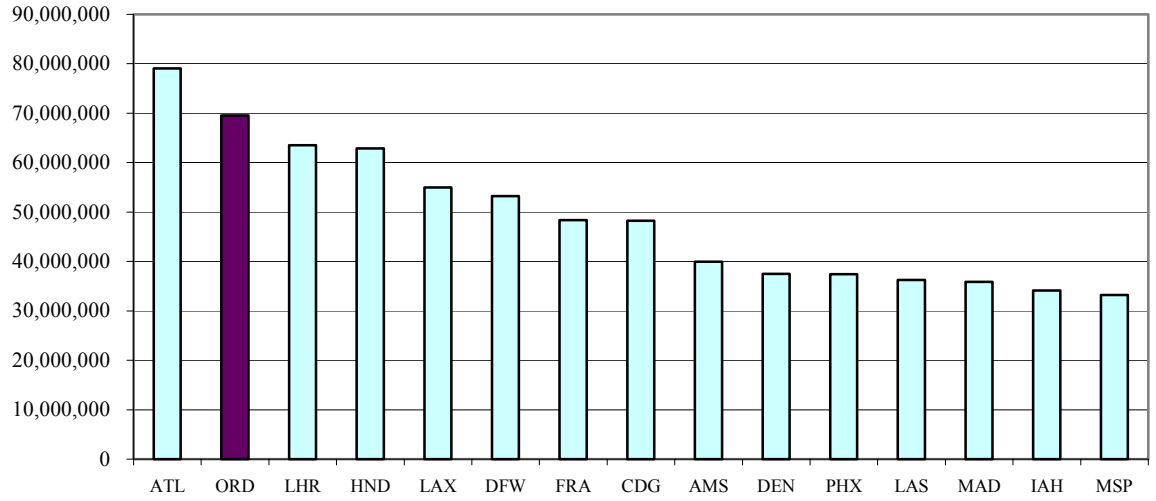
Exhibit II-1

Top 15 Worldwide Ranking of Activity - 2003

Total 2003 Aircraft Operations



Total 2003 Passengers



Source: Airports Council International; City of Chicago, Department of Aviation Management Records.
Prepared by: Ricondo & Associates, Inc.

2.1.2 Economic Benefit

The Airport is an important part of the NAS, and it significantly contributes to both regional and national economic growth. Based on a July 2001 study by Booz•Allen & Hamilton, *Economic Impact of Chicago's Airports*, O'Hare's economic benefit to the region in 2000 was substantial and included the following:

- Contributed 400,000 to 480,000 jobs to the Greater Chicago Region.[3] The Airport generated between 15 and 20 percent of the employment in its immediate vicinity.
- Included 30,000 airline personnel based at O'Hare; 130,000 persons employed by the Airport and its tenants; 170,000 persons employed in tourism and visitor services; and 100,000 to 180,000 persons employed in access-sensitive businesses (i.e., corporate headquarters, research and development facilities, manufacturing, etc.) whose locations require proximity to an airport. The proximity itself promotes further business.
- Contributed $34 billion to $41 billion in annual economic activity to the Greater Chicago Region.

2.1.3 Air Service

The Chicago Region's strong economic base provides a significant O&D market of business and leisure travelers. The number of large corporations in the Chicago Region creates a significant demand for air transportation. Over the 10-year period from 1994 through 2003, O&D passengers have accounted for 43.2 percent of enplaned passengers.

The Airport has had a strong and stable base of air carriers. In 2004, the Airport had scheduled passenger service provided by 20 U.S. flag air carriers, scheduled and nonscheduled service by 27 foreign flag carriers, and non-scheduled service by 8 airlines, as shown in **Table II-1**. In addition, 26 all-cargo carriers provided cargo service at the Airport. Of the nation's 13 major air carriers, 12 serve the Airport.

In December 2004, nonstop service was provided to 129 domestic cities with a total of 8,144 weekly departing flights.[4] Each of the Airport's top 25 domestic O&D markets was served with nonstop service. As shown on **Table II-2**, the New York market was provided with the most service with 375 weekly nonstop departing flights during this period. **Exhibit II-2** illustrates the Airport's nonstop domestic markets as of December 2004. During the same period in December 2004, nonstop service was provided to 50 international cities with a total of 786 weekly departing flights, as shown on **Table II-3. Exhibit II-3** illustrates the Airport's nonstop international markets as of December 2003. Outside of North America, the London market was provided with the most service with 73 weekly nonstop departing flights during this period. This time period is reflective of current market service and traffic levels at the Airport.

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[3] In the Booz•Allen report, the Greater Chicago Region includes five economic regions around O'Hare: Chicago Downtown; O'Hare Vicinity Area, including the Northern and Western Suburbs and first set of townships in Lake and Kane Counties; Midway Vicinity, including the suburbs centered around Midway Airport; Northern Outer Suburbs, including the first set of townships along the lake shore north of Chicago, McHenry, Lake, Kane, and DuPage Counties; Southern Suburbs, including Will County, and a portion of Cook County not already included in the Chicago Downtown or Midway Vicinity.

[4] Source: *Official Airline Guide* - December 11, 2004 through December 17, 2004.

Table II-1

Airlines Serving O'Hare – 2004

Scheduled U.S. Carriers (20)	Foreign Flag Carriers (27)	Other/Nonscheduled Carriers (8)	All-Cargo Carriers (26)
Air Wisconsin (United Express)	Aer Lingus	Air 2000	Air China
Alaska	AeroMexico	American Trans Air	Airborne Express
America West	Air Canada	Casino Express	Air Trans International
American	Air France	Champion Air	(BAX Global)
American Eagle	Air India	Miami Air	Asiana
Atlantic Coast (United Express)	Air Jamaica	Ryan International	Atlas Air
Atlantic Southeast	Alitalia	Transmeridian	CAL Cargo
(Delta Connection)	Aviacsa	U.S.A. 3000	Cathay Pacific
Chautauqua	British Airways		China Airlines
Comair (Delta Connection)	British Midland		China Cargo
Continental	Cayman Airways		China Eastern
Continental Express	Condor		China Southern
Delta	Cross/Swiss		DHL Worldwide
Independence Air	El Al Israel		Emery/ACF
Mesa	Iberia		EVA Airways
Northwest	Japan		Evergreen
Sky West	KLM Royal Dutch		FedEx
Spirit	Korean		Gemini Air
Trans States	Kuwait		Kalitta
United	Lacsa		Lufthansa Cargo
US Airways	LOT Polish		Martin Air Holland, N.V.
	Lufthansa		Nippon
	Mexicana		Polar
	Pakistan		Singapore Cargo
	Royal Jordanian		Southern Air
	Scandinavian		United Parcel Service
	Turkish		World

Source: City of Chicago, Department of Aviation.
Prepared by: Ricondo & Associates, Inc.

Table II-2

Top 25 Domestic Nonstop Passenger Markets

Rank	Market	Scheduled Weekly Nonstop Departing Flights [1]
1	New York/Newark	375
2	Washington	325
3	Minneapolis/St. Paul	174
4	Philadelphia	175
5	Los Angeles	193
6	Dallas/Ft. Worth	167
7	Atlanta	166
8	Cincinnati	153
9	Boston	145
10	Cleveland	141
11	Detroit	135
12	St. Louis	127
13	Denver	123
14	Madison	121
15	Houston	119
15	Pittsburgh	119
17	Las Vegas	117
18	Phoenix	113
19	Charlotte	112
20	Milwaukee	104
21	Indianapolis	103
22	Columbus	102
22	San Francisco	102
24	Cedar Rapids/Iowa City	97
24	Nashville	97
	Other Markets	4,439
	Total	8,144

[1] For the week of December 11, 2004 through December 17, 2004.

Source: Official Airline Guides, Inc. *Official Airline Guide.*
Prepared by: Ricondo & Associates, Inc.

Source: *Official Airline Guide, Inc.,* (December 11, 2004 - December 17, 2004).
Prepared by: Ricondo & Associates, Inc.

Exhibit II-2

north

S://Graphics Library/Misc Maps/non-stop domestic flights.ai

Chicago-O'Hare's Nonstop Domestic Markets

Table II-3

Top International Nonstop Passenger Markets

Rank	City	Country	Scheduled Weekly Nonstop Flights [1]
1	Toronto	Canada	121
2	Montreal	Canada	74
3	London	U.K.	73
4	Ottawa	Canada	61
5	Frankfurt	Germany	38
6	Mexico City	Mexico	37
7	Tokyo	Japan	28
7	Winnipeg	Canada	28
9	Birmingham	U.K.	21
9	Calgary	Canada	21
11	Paris	France	20
12	Manchester	U.K.	15
13	Amsterdam	Netherlands	14
13	Edmonton	Canada	14
13	Guadalajara	Mexico	14
13	Vancouver	Canada	14
17	Monterrey	Mexico	13
18	Cancun	Mexico	12
19	Beijing	China	7
19	Brussels	Belgium	7
19	Buenos Aires	Argentina	7
19	Copenhagen	Denmark	7
19	Dublin	Ireland	7
19	Hong Kong	China	7
19	Los Cabos	Mexico	7
19	Madrid	Spain	7
19	Milan	Italy	7
19	Morelia	Mexico	7
19	Munich	Germany	7
19	Osaka	Japan	7
19	Sao Paulo	Brazil	7
19	Seoul	Korea	7
19	Shanghai	China	7
19	Stockholm	Sweden	7
19	Warsaw	Poland	7
19	Zurich	Switzerland	7
	Other Markets		42
	Total		786

[1] For the week of December 11, 2004 through December 17, 2004.

Source: Official Airline Guides Inc., *Official Airline Guide.*
Prepared by: Ricondo & Associates, Inc.

Source: *Official Airline Guide, Inc.,* (December 11, 2004 - December 17, 2004).
Prepared by: Ricondo & Associates, Inc.

Exhibit II-3

north

S://Graphics Library/Misc Maps/non-stop international flights2.ai

Chicago-O'Hare's Nonstop International Markets

2.2 Aviation Activity

2.2.1 Historical Growth

Table II-4 presents aircraft operations at the Airport between 1995 and 2004. As shown, total operations at the Airport increased from 900,279 in 1995 to 990,957 in 2004 as preliminarily reported by the City. This increase represents a compounded annual growth rate of 1.1 percent during this period, compared to an FAA forecast of nationwide growth rate of 0.4 percent. Total aircraft operations at the Airport increased 0.3 percent in 2001, 1.2 percent in 2002, 0.6 percent in 2003, and 6.7 percent in 2004 as preliminarily reported by the City.

Table II-4

Historical Aircraft Operations (1995-2004)

Year	Total Aircraft Operations [1]
1995	900,279
1996	909,593
1997	883,761
1998	896,110
1999	896,228
2000	908,989
2001	911,917
2002	922,817
2003	928,691
2004[2]	990,957

[1] Includes general aviation, helicopter, and other miscellaneous operations.

[2] 2004 aircraft operations are preliminary data and subject to change.

Source: City of Chicago, Department of Aviation.
Prepared by: Ricondo & Associates, Inc

Table II-5 presents historical enplanements (domestic and international) for the Airport from 1995 through 2004. As shown, enplanements at the Airport increased from approximately 32.9 million enplanements in 1995 to approximately 35.9 million in 1999. This increase represents a compounded annual growth rate of 1.0 percent during this period. Due in large part to labor troubles at United, enplanements decreased 0.7 percent in 2000 from 1999 levels. Enplanements at the Airport decreased 6.7 percent in 2001 from 2000 levels, and an additional 1.2 percent in 2002 due primarily to the events of September 11, 2001 and the national economic slowdown. These three years of decreasing activity caused enplanements to decline from approximately 35.9 million in 1999 to approximately 32.9 million in 2002. However, by 2004, enplanements exceeded pre-September 11, 2001 levels reaching 37.4 million, an 8.8 percent increase over 2003 enplanements.

Table II-5

Historical Enplanements (1995-2004)

Year	Enplanements
1995	32,861,460
1996	34,067,885
1997	34,774,114
1998	35,758,810
1999	35,946,964
2000	35,700,525
2001	33,310,203
2002	32,918,936
2003	34,406,667
2004[1]	37,431,122

[1] 2004 enplanements are preliminary data and subject to change.

Source: City of Chicago, Department of Aviation.
Prepared by: Ricondo & Associates, Inc.

2.2.2 Forecast Growth

Future aviation demand at the Airport is based on forecasts previously developed by FAA. As shown in **Table II-6**, according to the 2002 TAF as converted to calendar years (CY) in the DEIS, aircraft operations at the Airport are forecast to increase from 976,544 in CY 2004 to 1,194,000 in CY 2018, at a compound average annual growth rate of 1.4 percent over the 14-year period. The number of enplanements at the Airport is forecast by the FAA to increase from approximately 33.6 million in 2004 to 50.4 million in 2018, a 2.9 percent compound average annual growth rate over the same 14-year period.

Air transportation demand is strongly influenced by the demographic and economic characteristics of an airport's O&D passenger market, which includes passengers that either begin or end their trip at the airport. As a result, the strength of the City's underlying economic base remains an important element of passenger demand. The Chicago Region, which includes the nation's third-largest city, has an economic base that will generate increased demand for air travel at the Airport during the forecast period.

Table II-6

2002 FAA Terminal Area Forecasts for O'Hare International Airport – Total Operations and Enplanements
Unconstrained Schedule

Calendar Year	2002 TAF Operations	2002 TAF Enplanements
2002	922,787	31,710,512
2003	960,500	32,609,000
2004	976,544	33,633,730
2005	992,855	34,696,477
2010	1,072,706	40,280,622
2015	1,149,402	46,367,491
2018	1,194,000	50,372,000

Source: FAA, *O'Hare Modernization Draft Environmental Impact Statement*, January 2005.
Prepared by: Ricondo & Associates, Inc.

2.3 Aircraft Delay and Airfield Limitations

Given the changing conditions in the aviation industry and the high levels of current and forecast airline traffic at the Airport, several issues currently impact O'Hare's ability to fulfill its critical role in the NAS. These include the following:

- Aircraft Delay
- Lack of Arrival and Departure Balance
- Peak Period Demand
- Lack of Visual Flight Rules (VFR) and Instrument Flight Rules (IFR) Capacity Balance
- VFR Delay
- Land and Hold Short Operations
- Runway Length
- Regional Jet Operations
- New Large Aircraft

A description of each of these issues follows.

2.3.1 Aircraft Delay

Aircraft delay has historically been a major issue at the Airport. The City and others have undertaken numerous studies over the past two decades aimed at identifying solutions to the increasing delay problem. These studies, which include the *1991* and *2002 Delay Task Force Studies*, investigated opportunities for runway development to mitigate escalating delays. While it was concluded that several options were available to mitigate existing delays, few options studied prior to the OMP provided long-term capacity growth consistent with potential needs.

In the late 1990s delays rose substantially, primarily as the result of changes in the use of land and hold short operations (LAHSO) procedures and the increased use of regional jet (RJ) aircraft, which have aircraft performance limitations. Due to weather and airline labor issues, the summer of 2000 was a particularly delay-prone period at O'Hare and throughout the NAS, resulting in national attention being focused on airport delay issues.

In response to the system-wide increases in delay experienced in the summers of 1999 and 2000, and notwithstanding FAA initiatives to mitigate those delays, the U.S. Congress requested that the FAA develop capacity benchmarks for the busiest airports in the nation. The current capacity benchmark is defined as an achievable level of performance for a particular airport. The following are excerpts from the FAA's *Airport Capacity Benchmark Report 2001*[5] relevant to O'Hare:

- The optimum acceptance rate for aircraft operations at Chicago O'Hare is 200-202 flights per hour in good weather with unlimited ceiling and visibility.
- Current capacity decreases to the reduced rate of 157 to 160 flights (or fewer) per hour in adverse weather conditions, which may include poor visibility, unfavorable winds, or heavy precipitation.
- In 2000, O'Hare was ranked the third most delayed airport in the country in terms of number of flights delayed per 1,000 operations. Overall, slightly more than 6 percent of all flights were delayed more than 15 minutes.

[5] Since the publication of the *Airport Capacity Benchmark Report 2001*, the FAA has also published an *Airport Capacity Benchmark Report 2004* dated Setpember 2004, which is included in Appendix C.

- On good weather days, scheduled traffic is at or above the capacity benchmark for three and one-half hours of the day and about two percent of the flights are delayed more than 15 minutes.
- In adverse weather, O'Hare's airfield capacity drops and scheduled traffic exceeds capacity for eight hours of the day. The number of flights delayed over 15 minutes jumps to 12 percent.
- Technology and procedural improvements are expected to increase O'Hare's airfield capacity benchmark in good weather by 6 percent over the next 10 years.
- The adverse weather airfield capacity benchmark will increase by a total of 12 percent compared to today, given expected technology and procedural improvements.
- Demand at O'Hare is forecast to increase 18 percent over the next decade. This imbalance between capacity and demand growth is expected to significantly increase delays at O'Hare.

As a reaction to record aircraft delays since November 2003, the FAA, with the consent of American Airlines and United Airlines, issued its *January 2004 FAA Order,* which required American and United to reduce their number of aircraft operations and those of their regional affiliates by 5 percent during peak hours at the Airport for 6 months. Based on FAA Aviation System Performance Metrics (ASPM) data for November and December 2003, 39 percent of O'Hare's arrivals were delayed. During this period, there were an average of 492 aircraft delays per day and an average of 57 minutes of delay per flight. Upon announcement of this order, it was stated in the *Secretary's Remarks*, "As many of you are aware, delays at Chicago O'Hare International Airport have increased sharply in recent months, reaching what I believe to be an unacceptable level." Secretary Mineta recognized that this action is not the ultimate solution towards addressing the delay situation at the Airport, as he stated, "While this Department continues working toward a comprehensive, long-term solution to this challenge, this order provides American travelers with necessary and immediate action to alleviate potential travel delays."

Subsequent to expiration of the *January 2004 FAA Order*, the FAA issued its *August 2004 FAA Order*. Effective November 1, 2004, the FAA and the domestic airlines serving O'Hare, agreed to voluntarily limit scheduled arrivals to 88 per hour between 7:00 a.m. and 8:00 p.m. United and American, which represented a total of approximately 80 percent of enplanements (including affiliates) at O'Hare in the past 5 years agreed to the largest reductions. United agreed to reduce 20 arrivals per hour and American agreed to reduce 17 arrivals per hour, both between 7:00 a.m. and 8:00 p.m. United (including United Express) will still have 588 daily arrivals between 7:00 a.m. and 8:00 p.m., and American (including American Eagle) will have 492 daily arrivals during the same period. The voluntary agreement is expected to reduce delays at O'Hare by 20 percent. The measures contained in the voluntary agreement are scheduled to expire on April 30, 2005.

The FAA considers two main measures of delay for airports, the number of flights delayed and average annual delay per aircraft operation. The first measure is intended to quantify how many aircraft operations experience a delay at a given airport. The second measure is used to describe the average severity of aircraft delays at a given airport.

2.3.1.1 Number of Flights Delayed

Since completion of the FAA's *Airport Capacity Benchmark Report 2001*, delays at O'Hare have continued at high levels. **Table II-7** presents the number of aircraft delayed 15 minutes or more at 20 large hub airports in 1997 though 2003, the latest available final data. As shown, O'Hare ranked first in number of delays per 1,000 flights in 2002 and 2003. Since 1997, the number of flights at

O'Hare delayed 15 minutes or more has increased 216 percent, from 23.5 flights per 1,000 in 1997 to 74.3 flights per 1,000 in 2003.

Table II-7

Number of Operations Delayed 15 Minutes or More Per 1,000 Operations at Scheduled Airports

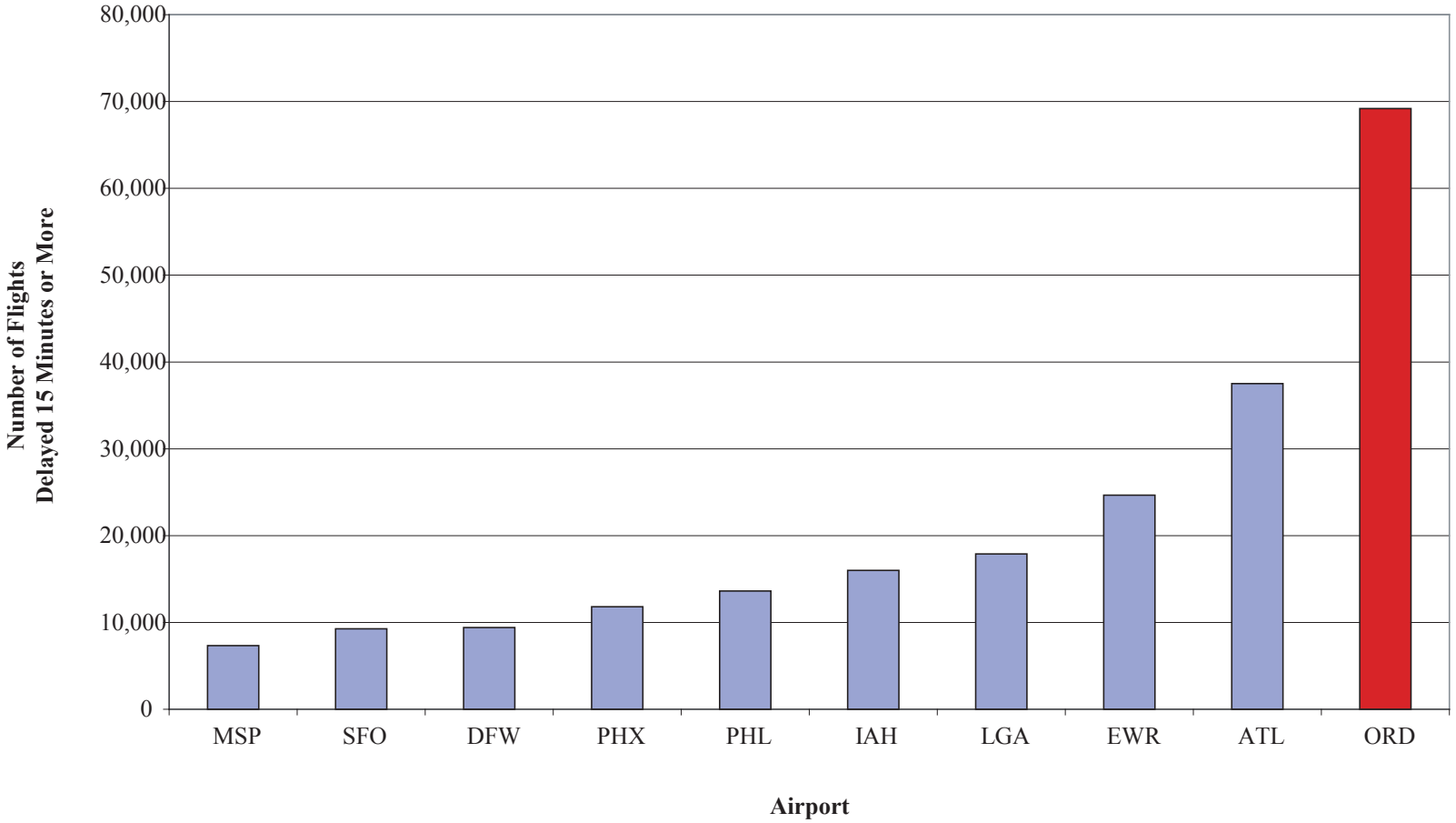
2003 Rank	City and Airport	1997	1998	1999	2000	2001	2002	2003
1	**Chicago - O'Hare (ORD)**	**23.5**	**32.0**	**54.8**	**63.3**	**59.5**	**57.6**	**74.3**
2	Newark (EWR)	57.9	69.2	78.9	81.2	60.3	33.6	60.0
3	New York - LaGuardia (LGA)	49.0	68.4	77.3	155.9	77.0	34.4	47.2
4	Atlanta (ATL)	31.8	32.8	36.0	30.9	24.3	33.5	41.2
5	Houston (IAH)	12.9	22.2	20.5	28.1	33.0	41.4	33.4
6	Philadelphia (PHL)	16.2	24.6	30.2	44.5	40.4	35.1	30.6
7	San Francisco (SFO)	43.0	68.1	48.0	56.9	38.3	35.3	27.8
8	New York-Kennedy (JFK)	18.3	36.3	38.1	38.8	24.6	25.2	20.9
9	Phoenix (PHX)	9.2	22.2	20.9	22.0	15.3	14.7	20.0
10	Washington D.C. - Dulles (IAD)	5.9	12.1	19.2	19.5	8.1	10.0	16.0
11	Chicago - Midway (MDW)	3.5	5.1	9.7	11.9	8.1	9.8	15.2
12	Minneapolis-St. Paul (MSP)	6.7	7.2	17.2	12.7	14.5	17.2	14.4
13	Cincinnati (CVG)	11.9	15.2	18.5	15.4	10.2	13.7	13.8
14	Fort Lauderdale (FLL)	1.9	2.2	2.8	3.7	5.3	7.0	13.5
15	Las Vegas (LAS)	4.1	6.4	7.1	8.0	5.4	7.3	13.1
16	Dallas-Fort Worth (DFW)	14.6	11.3	19.3	23.8	22.0	24.1	12.1
17	St. Louis (STL)	30.5	31.6	19.2	18.2	18.1	15.4	12.1
18	Miami (MIA)	6.8	6.3	8.2	11.3	11.3	8.6	11.8
19	Boston (BOS)	25.2	31.8	29.8	47.5	34.4	10.7	10.2
20	Detroit (DTW)	8.3	9.4	20.6	17.6	15.4	12.9	9.8

Source: FAA, OPSNET.
Prepared by: Ricondo & Associates, Inc.

When compared according to total number of flights delayed (delays equal to or greater than 15 minutes), O'Hare experiences significantly greater delays than the other delayed airports in the system. **Exhibit II-4** depicts the total flights delayed at top 10 most-delayed airports in 2003. The number of flights delayed at O'Hare was almost double the number at the second most-delayed airport. In November 2003, delays of 15 minutes or more at O'Hare reached 152.6 flights per 1,000. Based on United States Department of Transportation (USDOT) standards, on-time performance for November 2003 was only 57.3 percent at the Airport compared to 80.3 percent nationwide.

2.3.1.2 Average Annual Delay

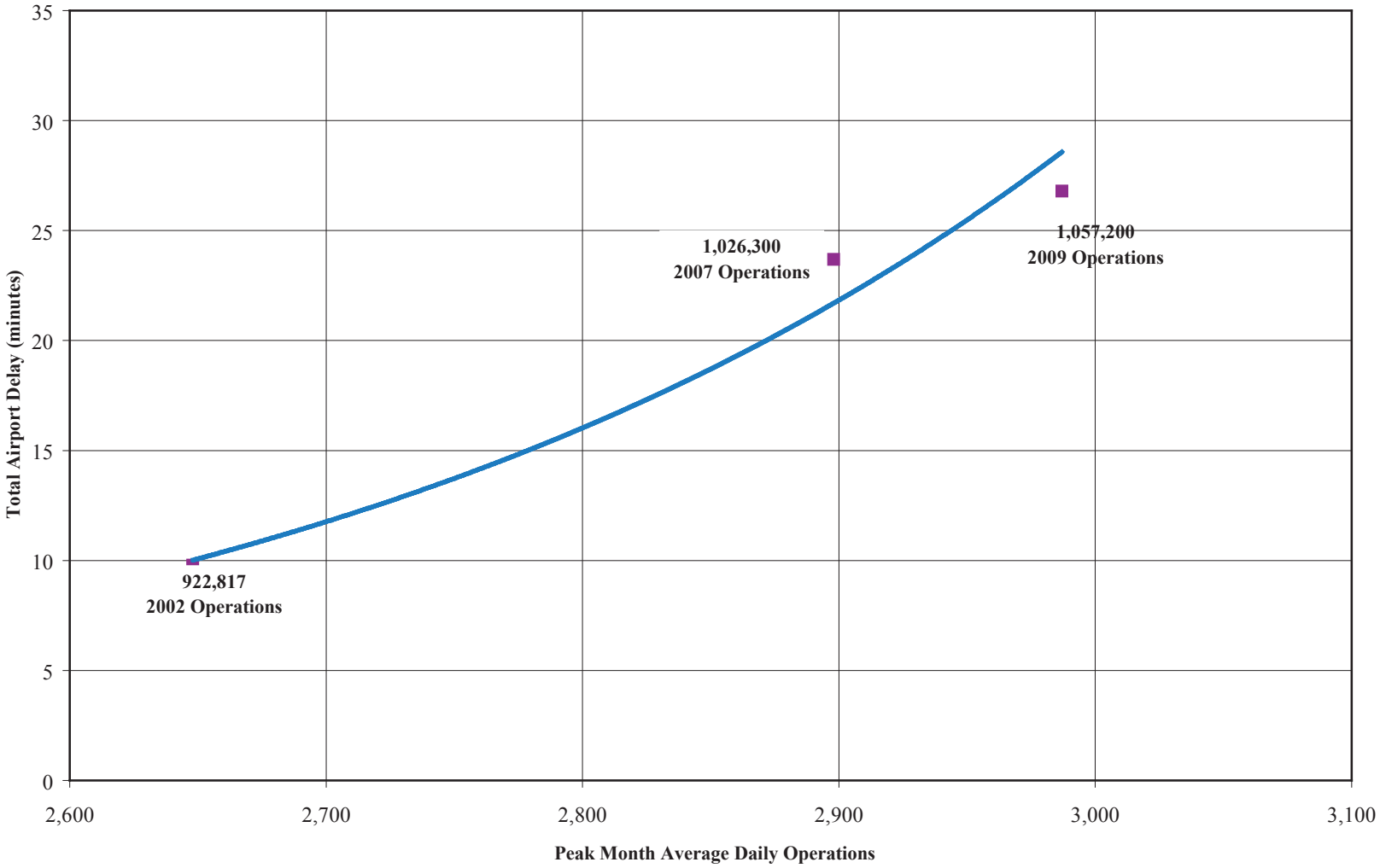
According to the *BCA Guidance*, average annual delays of 10 minutes or more per operation are considered "severe", and operations would generally stop increasing when average annual delays reach 20 minutes per operation. As presented on **Exhibit II-5**, average annual delay at the Airport under the unconstrained forecast will exceed these levels in the near-term future.



Source: FAA OPSNET 2003 data.
Prepared by: Ricondo & Associates, Inc.

Exhibit II-4

Total Number of Delayed Flights for Top 10 Most Delayed U.S. Airports in 2003



Source: Total Airport and Airspace Modeler, FAA 2002 Terminal Area Forecast, Ricondo & Associates, Inc.
Prepared by: Ricondo & Associates, Inc.

Exhibit II-5

Annualized Average Delay with Existing Airfield

Furthermore, because the Airport has been operating near or at capacity, relatively large increases in average annual delay per aircraft operation are expected to occur as a result of relatively minor increases in demand.

O'Hare reached 990,957 operations in 2004 according to preliminary City statistics, which resulted in airline and FAA actions to limit operations at the Airport to reduce delay. As O'Hare continues to be one of the most delayed airports in the United States and the intensity of these delays also continues to increase, the reliability of the overall NAS will continue to be compromised given the Airport's critical role. Further analysis of expected delay impacts is presented in the BCA.

2.3.2 Lack of Arrival and Departure Balance

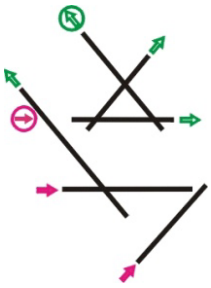
The existing runway geometry of the Airport accommodates the use of a variety of converging runway operating configurations under VFR conditions. The most commonly used configurations are described as follows and are illustrated on **Exhibit II-6.**

- Plan X: Under this operating configuration, aircraft arrive on Runways 4R and 9R and depart on Runway 32L from the intersection of Taxiway T10, Runway 9L, and Runway 4L. During periods of high arrival demand, Runway 9L is used as a third arrival runway.
- Plan W: Under this operating configuration, aircraft arrive on Runways 27L and 22R. During periods of high arrival demand, Runway 27R is used as a third arrival runway, which requires aircraft landing on Runway 22R to land and hold short of Runway 27R. Aircraft depart on Runways 22L and 32L from the intersection of Taxiway T10. During the later afternoon periods, Runway 32R is also used for international departures.
- Plan B: Under this operating configuration, aircraft arrive on Runways 14R and 22R and depart on Runways 14L, 22L, and 27L. During periods of high arrival demand, Runway 22L is used as a third arrival runway.

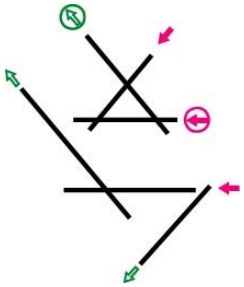
During IFR and certain VFR conditions, converging approaches are not permitted. As a result, only two arrival streams are available and arrival capacity is significantly diminished. The two predominant IFR operating configurations are described below and also illustrated on the attached Exhibit II-6.

- IFR Parallel 27s: Under this configuration, Runways 27R and 27L are used as the arrival runways, while Runways 32R, 22L, and 32L from the intersection of Taxiway T10 are used for departing aircraft.
- IFR Parallel 14s: Under this configuration, Runways 14R and 14L are used as the arrival runways and Runways 27L, 22L, and 9L are used as the departure runways.

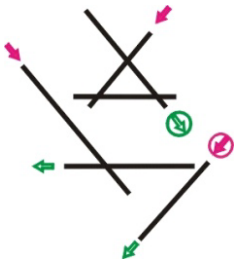
Plan X



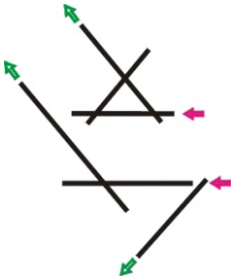
Plan W



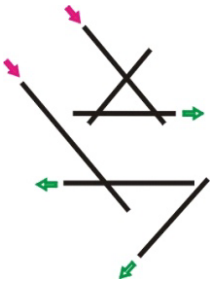
Plan B



IFR Parallel 27s



IFR Parallel 14s



Legend

- Existing Runways
- Primary Arrivals
- Overflow Arrivals
- Primary Departures
- Overflow Departures

Sources: Ricondo & Associates, Inc., ORD ATCT
Prepared by: Ricondo & Associates, Inc.

Exhibit II-6

North

Operating Configurations Existing Airfield

Z://ORD Financial/LOI/Exhibits/LOI Exhibit Pack.pdf

Under most VFR conditions, operating configurations are available which provide either a third arrival runway or a third departure runway, which are used effectively to meet the peaking pattern of the hubbing operations. However, the ability to accommodate a balanced arrival/departure operation at current peak hour volumes is not available.

2.3.3 Peak Period Demand

Both capacity and demand are dynamic with demand changing through the day based on aircraft activity, and capacity changing as different runway configurations are used to match weather conditions and arrival and departure banks. A bank is generally defined as a group of arriving or departing operations scheduled by a hubbing airline during a specific period of time. In order to facilitate the transfer of passengers from an arriving flight to a departing flight in a timely fashion, an arrival bank traditionally precedes a departing bank by approximately 60 to 90 minutes. Therefore, banks are a natural occurrence at hubbing airports due to the transfer of passengers. Given that O'Hare is a hub airport for American Airlines and United Airlines, a major portion of its flights have historically been operated in banks, as follows:

- American Airlines and United Airlines schedule banks of flights in alternating hours and directions (e.g., east/west) throughout the day.
- The duration of a bank is approximately 15 to 25 minutes depending on time of day.
- Within these banks, scheduled flights are typically evenly spread because of capacity/flow constraints.
- Banks tend to overlap; however, the beginning and end of banking periods are less intense than the middle of the bank, and the overlap can be accommodated.

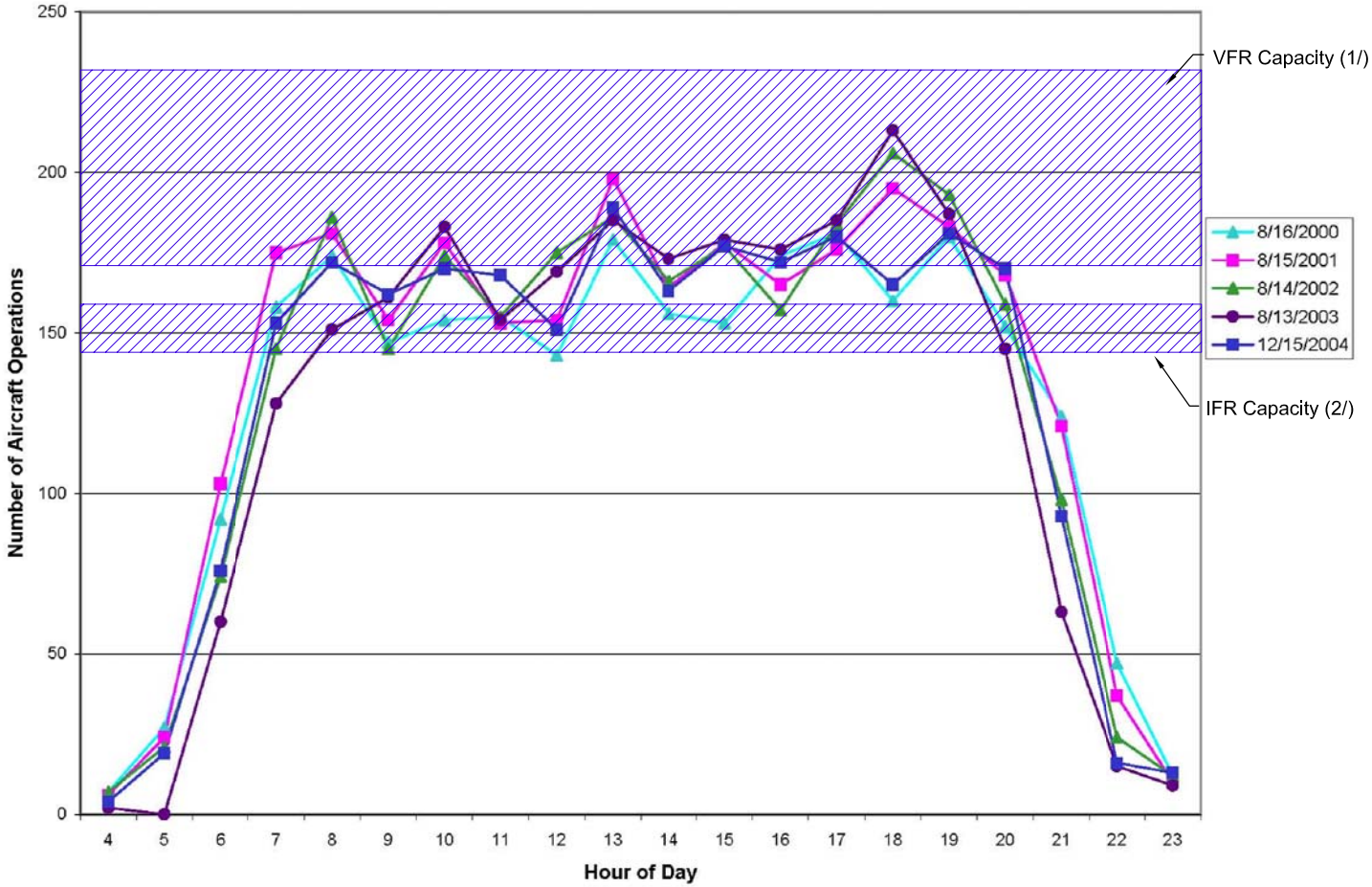
A further review of airline operations at O'Hare reveals that the demand distribution throughout the day has changed over the past few years. As illustrated on **Exhibit II-7,** changes in airline schedules post-September 11, 2001 have resulted in an increase in peak hour demand but an overall decrease in daily demand. Exhibit II-7 illustrates the various daily demand distributions and their relationship to the peak hour throughput of the existing airfield under both VFR and IFR conditions. Demand frequently is at or exceeds capacity throughout the day, especially during IFR conditions, resulting in aircraft delay.

2.3.4 Lack of VFR and IFR Capacity Balance

Current traffic demands require airlines at O'Hare to schedule their operations to the VFR capacity of the airfield. As a result, during conditions of reduced capacity, significant operational delays are incurred. While a third arrival runway is available under most VFR conditions through the use of converging approaches, converging approaches are not utilized during IFR conditions. As a result, airfield capacity during IFR conditions is greatly reduced, causing significant operational delays. This imbalance in VFR and IFR capacity is a significant cause of delay at O'Hare, which propagates throughout the system.

2.3.5 VFR Delay

VFR delays generally occur because of the inability of the airfield to provide a balanced capacity consistent with demand. For example, departure delays occur during VFR conditions with strong easterly winds. In an east runway configuration (Plan X), aircraft are landing on



Notes:
1/ VFR capacity low-range is 171 based on high-arrival demand for Plan X, and high-range of 232 based on high departure demand for Plan X.
2/ IFR capacity low-range of 144 is based on a 50/50 arrival and departure mix for IFR Runways 14L and 14R, and high-range of 159 based on a high departure demand for IFR Runways 14L and 14R or 27L and 27R.

Source: For aircraft operations - Official Airline Guides, Inc. (August 16, 2000; August 15, 2001; August 14, 2002; August 13, 2003 and December 15, 2004),
For IFR & VFR Capacity - FAA Capacity and Delay Model based on LAHSO rules and configurations prior to recent changes.
Prepared by: Ricondo & Associates, Inc.

Exhibit II-7

Typical Daily Air Carrier Operations

Drawing: Z:\Chicago\ORD Financial\LOI\Exhibits\OMP LOI Sched Weekly Air Carrier Ops.dwg_Layout: Layout1_Feb 14, 2005, 2:54pm

Runways 9L, 9R, and 4R. Departures can occur on Runways 4L and 9L, however, only when Runway 9L is not being used for arrivals. Another example of departure delay during VFR conditions occurs during southerly winds and when the Airport is operating in a Plan B configuration. Arrivals occur on Runways 14R, 22R, and as an overflow (during peak arrival periods), Runway 22L. Aircraft depart on Runway 22L and Runway 27L, "shooting the gap" between Runway 14R arrivals. Therefore, aircraft delay occurs when departures are required to hold for runway clearance. In both of these examples, the unbalanced arrival/departure condition results in VFR delay.

In addition, O'Hare's existing airfield relies on several operating configurations during VFR conditions. These various configurations are used primarily based on wind conditions and arrival/departure balance; therefore, a change in operating configuration is required as wind conditions change. A change in configuration typically results in aircraft delay due to the workload requirements on the air traffic system to implement a change in operating configuration.

2.3.6 Land and Hold Short Operations

As explained previously, aircraft delay during VFR conditions is primarily due to the inability of the airfield to provide balanced capacity consistent with demand. This is further exacerbated when relatively minor degradations in VFR weather occur, such as a brief rain shower or a tailwind, which preclude the use of LAHSO procedures.

When the airfield is operating under the Plan W configuration, LAHSO procedures are in effect, and the FAA's established acceptance rate for the airfield is approximately 100 arrivals per hour. However, as the runways become wet, LAHSO is suspended and a third arrival runway is no longer available. As a result, the FAA's acceptance rate drops from 100 arrivals per hour to a maximum of 80 arrivals per hour. This reduction in capacity generally results in a ground delay program and/or ground stops for aircraft at other airports destined for O'Hare.

2.3.7 Runway Length

Some operating configurations reduce the available departure distance of the Airport's longest runway. When pilots require longer runways than available under the operating configuration, the airfield's arrival capacity is impacted as air traffic controllers must delay arrivals on crossing runways to allow a gap for the aircraft to depart. Existing Runway 14R-32L is the longest runway at O'Hare, at 13,000 feet. During a VFR west operation (Plan W), Runway 32L is used as a departure runway from the Taxiway T10 intersection resulting in approximately 8,700 feet of available departure distance. For those aircraft requiring additional departure distance, pilots are offered Runway 32L from the Taxiway M intersection (approximately 9,600 feet of available departure distance). Both of these intersection departure options permit independent arrivals on Runways 27L and 27R with no impact on arrival throughput. For aircraft requiring more than 9,600 feet of departure distance, pilots are offered either Runway 32R or 32L at full length (10,000 and 13,000 feet, respectively). Use of either of these options requires coordination with other runway operations thus reducing capacity.

In a VFR east operation (Plan X), the impact of full-length departures is even greater as aircraft requiring Runway 32L at full length create a requirement for simultaneous arrival gaps on both Runway 9L and 9R.

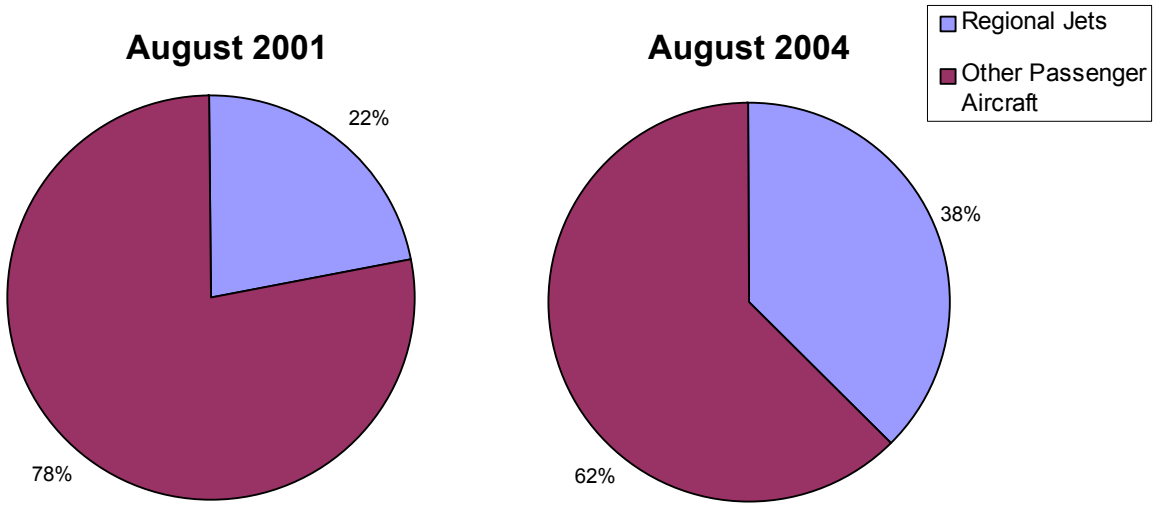
2.3.8 Regional Jet Operations

Since its introduction, the RJ has become the fastest growing aircraft type within the airline industry. The RJ provides service levels similar to mainline jet aircraft with operating characteristics and costs that make it a feasible and attractive replacement to turboprop commuter aircraft on many routes. As shown on **Exhibit II-8**, use of the RJ increased to 38 percent of daily operations at O'Hare in August 2004 from 22 percent in August 2001. The RJ is used both as a replacement for commuter turboprop aircraft and for narrow-body aircraft in traditional mainline markets. RJs are also being used to provide supplemental service to high frequency, short-haul airports near other large markets, such as the airports in Manchester, Hartford, and White Plains in lieu of the more congested airports in Boston and New York.

When airlines use RJs as replacements for mainline aircraft, increased operations are required to provide the same number of seats. Given the aforementioned airfield capacity constraints at the Airport, minor increases in aircraft operations create incremental aircraft delays at the Airport. Therefore, during periods when the number of passengers has decreased, the number of delays has continued to increase. Additionally, the lower operating speeds of RJs compared to mainline aircraft and increased in-trail separation requirements cause further airspace congestion.

Exhibit II-8

Share of Regional Jet Aircraft and Other Passenger Aircraft Operating at O'Hare



Source: City of Chicago, Department of Aviation.
Prepared by: Ricondo & Associates, Inc.

2.3.9 New Large Aircraft

The NLA category, or Airplane Design Group (ADG) VI, most notably includes the Airbus A380, which is projected to enter service in 2007. Several airfield limitations at the Airport restrict access for this aircraft. Only one runway at O'Hare meets the FAA's runway width design criteria for ADG VI aircraft (Runway 14R-32L). However, the parallel taxiway for Runway 14R-32L does not have

adequate separation to allow for unrestricted ADG VI taxiing. Significant operational limitations on specific taxiways would occur when an A380 is operating on the existing airfield.

2.4 National Airspace System Capacity Implications

Among the FAA's major concerns is the impact that increased delays at busy airports have on the efficiency of the NAS. While considerable emphasis has been placed on improving system capacity without adding new pavement (e.g., through refinements in air traffic control procedures and improvements in navigational aids technology), the FAA acknowledges the significant role of building new runways, particularly at major connecting hubs. In its *2001-2005 NPIAS* report, the FAA stated that the largest increases in capacity at the worst delayed airports could be achieved through new runway construction. The report also notes that the ability of connecting hub airports to accommodate future growth and retain hub carriers is predicated on the provision of additional runway capacity. The *2002 Aviation Capacity Enhancement Plan*, which outlines the FAA's initiatives to improve NAS performance, clearly states that the construction of new runways and the extension of existing runways are the most significant and direct ways to improve capacity at existing airports.

The NAS consists of individual airports that form interconnected and interdependent components of a network. A delay at one airport can propagate throughout the system, disrupting traffic well beyond the original location of the delay. Of particular importance are large-hub airports (e.g., O'Hare), which are critical elements of the network and must be able to process significant numbers of operations to maintain system efficiency. Air traffic at one airport must be seen in a system-wide context, in which delays can significantly affect operations at other airports.

One of O'Hare's major benefits to the NAS stems from its role as a connecting hub and the competitive options it provides to travelers in other Midwestern markets and throughout the United States. The Airport's geographical location in the central United States and its large O&D base support its function as a major east-west connecting hub airport, as well as a major Midwest hub providing service to other regions. Given its large share of aviation activity and the overall system's dependency on its connecting capacity, delays at the Airport cause ripple effects throughout the NAS. In the *Secretary's Remarks*, it was noted that in December 2003 alone, delays at O'Hare caused more than a 10 percent increase in the average flight delay at the nation's top 35 airports.

III. The O'Hare Modernization Program

Request for Letter of Intent to provide a

Multi-Year Commitment of Airport Improvement Program Grant-in-Aid Funding

RICHARD M. DALEY
MAYOR

CHICAGO O'HARE INTERNATIONAL AIRPORT
O'HARE MODERNIZATION PROGRAM

III. The O'Hare Modernization Program

The purpose of this section is to present (1) an overview of the OMP, including the program's purpose and benefits; (2) a description of proposed improvements; (3) estimated capital costs and implementation schedule; and (4) identification of the OMP-Phase 1 development that constitute the LOI Projects that are the subject of this LOI request.

3.1 Purpose and Benefits of the OMP

The purpose of the OMP is to reduce current and projected delays at O'Hare and throughout the NAS and add incremental capacity for the Airport to accommodate demand. The OMP includes a reconfiguration of the airfield into a modern parallel runway system that will allow the Airport to operate more efficiently. The 2002 FAA TAF forecasts continued growth at the Airport. Delays at O'Hare adversely affect regional air transportation and the NAS.

O'Hare delays are a consequence of the Airport's converging runway configuration, which does not provide balanced capacity in IFR and VFR conditions or between arrivals and departures. Currently, these limitations significantly impact the national system even in good weather during peak periods of the day, as recognized by the *January 2004 FAA Order* and the *August 2004 FAA Order* limiting scheduled operations during peak operating hours.

Consistent with statutory requirements for the use of LOI funds, the OMP will enhance system-wide airport capacity. The DEIS defines the purpose and need of the proposed action (OMP development) as:

- Address the projected needs of the Chicago region by reducing delays at O'Hare, and thereby enhancing capacity of the NAS.
- Ensure that existing and future terminal facilities and supporting infrastructure (access, landside, and related ancillary facilities) can efficiently accommodate airport users.

Additional benefits of the OMP include:

- Providing flexible opportunities for increasing terminal and landside capacity;
- Creating opportunities for enhanced competition among air carriers;
- Enhancing the ability of the Airport to accommodate NLA; and
- Mitigating noise impacts.

3.2 Description of the OMP

Implementation of the OMP will reduce delays and enhance capacity by modernizing the airfield configuration. O'Hare's existing layout of converging runways will be reconfigured into a predominantly parallel runway system typical of modern, large-hub airports. These parallel runways will allow operation of a combination of arrival and departure runways at the Airport, providing balanced and flexible capacity in all weather conditions.

The OMP is to be implemented in phases and is expected to be a multi-year process entailing the reconfiguration of the runway layout; relocation of other existing facilities; construction of a new

western terminal complex including supporting roadway and parking facilities; noise mitigation; and land acquisition. Major components of the OMP are described below, along with associated supporting projects. Various improvements will also be implemented to relocate and expand existing utilities and infrastructure, including stormwater collection and detention, water supply lines, electrical systems, sanitary sewer systems, vehicle service roads, and perimeter fencing.

Runway projects included in OMP-Phase 1 are described in Sections 3.2.1 through 3.2.4. Projects included in OMP-Phase 2 are described in Sections 3.2.5. through 3.2.9.

3.2.1 New Future Runway 9L-27R

New future Runway 9L-27R, including associated taxiways and other supporting development will be the first runway constructed as part of OMP-Phase 1 and is presented on Exhibit I-1. The purpose of this runway is to reduce aircraft delay during IFR conditions, as it will allow for a third stream of independent arriving aircraft during IFR conditions. The construction of this runway is dependent on the relocation and/or reconfiguration of various facilities, roads, and waterways, and the acquisition of land near the northwest quadrant of the Airport. The following enabling projects are associated with this proposed runway development:

- Acquisition of approximately 135 acres of land near the northwest quadrant of Airport property (existing facilities in this area are required to be demolished);
- Relocation of a portion of Willow-Higgins Creek and associated culvert development;
- Relocation of a major water main crossing the alignment of the proposed runway;
- Expansion of the northern stormwater detention facilities;
- Development of a new Airport Traffic Control Tower (ATCT) in the north airfield; and
- Realignment of an Airport service/employee access roadway along Mt. Prospect Road, and relocation of the associated guard post and security facilities.

3.2.2 Extension of Future Runway 10L-28R (Existing Runway 9R-27L)

Construction of a proposed 2,859-foot westward extension to existing Runway 9R-27L (future Runway 10L-28R), associated taxiways, and other support facilities will also be undertaken as part of OMP-Phase 1, as presented on Exhibit I-1. This proposed extension will increase the available runway length to 13,000 feet. The runway will become the longest at the Airport after existing Runway 14R-32L is shortened and ultimately decommissioned as part of the OMP. The relocation of navigational aids and runway approach light systems are the major enabling projects required as part of this proposed runway extension.

3.2.3 Future Runway 10C-28C (Relocation of Existing Runway 18-36)

Future Runway 10C-28C, associated taxiways, and required support facilities are also to be developed as part of OMP-Phase 1, as presented on Exhibit I-1. The following are the associated enabling projects required with this proposed runway:

- Relocation of a segment of the Union Pacific Railroad line in the southwest corner of the Airport;
- Acquisition of approximately 298 acres of land near the southwest quadrant of Airport property;

- Relocation of St. Johannes and Resthaven Cemeteries;
- Reconfiguration of the South Detention Basin. Additional stormwater capacity will also be constructed in the existing detention basin west of Runway 14R-32L;
- Relocation of certain cargo facilities located in the south airfield; and
- Rerouting of the Bensenville Ditch.

3.2.4 Proposed West Satellite Concourse

The proposed West Satellite Concourse is a remote airside facility to be developed in an area west of existing Runway 14R-32L. Associated taxiway and aircraft apron development are also included as part of this project. The concourse facilities will accommodate a mix of RJ and larger aircraft; appropriate aircraft parking and maneuvering areas will also be provided. In part to support future terminal development, dual parallel ADG VI taxilane capacity, capable of supporting NLA, is planned on the west side of the West Satellite Concourse. Dual parallel ADG IV taxilanes are planned on the east side of the West Satellite Concourse. Other facilities associated with the West Satellite Concourse include:

- Construction of two airport surveillance radar facilities, one each at the north and south airfields;
- Construction of a secure automated people mover (APM) to allow the transfer of passengers and employees between the existing Terminal Core Area and the new West Satellite Concourse; and,
- Construction of a service road tunnel under Taxiway T and Runway 14R-32L for the proposed vehicle service road connecting the existing Terminal Core Area to the West Satellite Concourse.

The West Satellite Concourse is included in the Airport Master Plan as part of OMP-Phase 1. Because this LOI request includes only OMP-Phase 1 airfield projects, the West Satellite Concourse is excluded from the BCA.

3.2.5 Extension of Future Runway 9R-27L (Existing Runway 9L-27R)

OMP-Phase 2 includes an approximate 3,594-foot westward extension of existing Runway 9L-27 R (future Runway 9R-27L), including associated taxiways and other supporting airfield development. This extension will provide an ultimate runway length of 11,260 feet. The proposed runway extension is also depicted on Exhibit I-1.

3.2.6 Future Runway 9C-27C (Relocation of Existing Runway 14L-32R)

This OMP-Phase 2 project includes the proposed construction of future Runway 9C-27C with associated taxiways and other supporting airfield development, as depicted on Exhibit I-1. During this phase of construction, several facilities must be relocated before construction can be completed. After the proposed Runway 9C-27C is commissioned, it is planned that Runway 14L-32R will be decommissioned. In addition, the following associated projects are included:

- Relocation of maintenance facilities located in the northwest area of the Airport;
- Relocation of military/general aviation area facilities;
- Construction of a tunnel for the service road located in the northwest area of the Airport;

- Creation of new detention pond capacity; and
- Relocation of the very high frequency omnidirectional range/tactical air navigation facility.

3.2.7 Future Runway 10R-28L (Relocation of Existing Runway 14R-32L)

The final runway project in OMP-Phase 2 entails construction of the southernmost runway, future Runway 10R-28L, associated taxiways, and other supporting airfield development, as presented on Exhibit I-1. Upon commissioning of the runway, it is planned that Runway 14R-32L will be decommissioned and partially converted to a taxiway. In addition to this development, associated projects include:

- Construction of service road tunnels below proposed airfield pavement within the south airfield;
- Relocation of Irving Park Road; and
- Construction of a south ATCT (the ultimate location and characteristics of this facility will be subject to ATCT line-of-sight requirements and will be established in coordination with the FAA).

3.2.8 Proposed West Terminal Building/Concourse

The proposed West Terminal Building/Concourse includes development of passenger terminal facilities and additional aircraft gate capacity to the west of the proposed West Satellite Concourse. Also included as part of this project are the supporting ground access/landside facilities. The West Terminal Building/Concourse is planned to be constructed after Runway 10R-28L is commissioned and Runway 14R-32L is subsequently decommissioned. An APM station serving the West Terminal Building/Concourse is also planned, which will provide access to the proposed West Satellite Concourse and the existing terminal facilities. The West Satellite Concourse and West Terminal Building/Concourse are collectively referred to as the West Terminal Complex.

3.2.9 Noise Mitigation

The City, in accordance with criteria established by the O'Hare Noise Compatibility Commission, plans to continue providing sound insulation of eligible schools and single-family, owner-occupied homes. Sound insulation may include, but is not limited to, the following: installation of heating and air conditioning systems, replacement of windows and exterior doors with sound insulating windows and doors, addition of insulation to exterior walls and ceilings, and addition of baffling devices to exterior vents.

3.3 Capital Costs and Implementation Schedule

The estimated capital cost of the OMP is approximately $6.6 billion in 2001 dollars. **Table III-1** summarizes the estimated costs of the OMP.

As indicated previously, the OMP is to be implemented in two phases. The major airfield projects associated with each phase along with a preliminary implementation schedule for the OMP are presented on **Table III-2**. The original construction and commissioning schedule is presented on **Exhibit III-1**. These schedules are based on the anticipated durations of the various OMP phases and facility development needs. The planned implementation dates necessitate significant coordination of the phases of development defined in the prior sections. These dates will be further refined during the design development and construction planning process. It is also important to note that the

schedules presented here assumed start of construction in mid-2004 concurrent with the originally expected date of the FAA Record of Decision.

3.4 Proposed LOI Project

Certain components or projects of OMP-Phase 1 have been identified that are ideally suited for LOI funding. Because the Airport is a major component of the NAS, excessive delays at O'Hare have a serious impact on national system efficiency. As described in Section II, enhancing O'Hare's facilities to increase airfield capacity will benefit not only the Airport, but also the entire NAS. The City is requesting LOI funding at this time for the LOI Projects, which consist of the following:

- New Future Runway 9L-27R
- Extension of Future Runway 10L-28R (Existing Runway 9R-27L)
- Future Runway 10C-28C (Relocation of Existing Runway 18-36)
- Associated runway enabling projects, generally including associated taxiway systems, navigational aids installation and upgrade, site utilities construction, and existing facilities relocation

Table III-1

OMP Cost Estimates (2001 Dollars)

	Project Cost ($000s)
Program Wide Requirements:	
Program Wide Requirements	$58,277
Preliminary Engineering	43,689
Wetlands Mitigation	24,272
Noise Mitigation	220,000
Land Acquisition	339,296
Land/Environmental Contingency	223,301
Subtotal – Program Wide Requirements Costs	$908,835
Other Program Costs:	
Miscellaneous Operations Budget	$19,418
Program Contingency	301,660
Subtotal – Other Program Costs	$321,078
Airfield (Design and Construction/Decommission):	
Runway 9L-27R	$548,543
Runway 10L-28R Extension	494,175
Runway 10C-28C	908,739
Runway 18-36 Decommission	2,322
Runway 9R-27L Extension	138,032
Runway 9C-27C	642,789
Runway 14L-32R Decommission	1,422
Runway 10R-28L	365,166
Runway 14R-32L Decommission/Taxiway Conversion	110,157
Subtotal – Airfield Costs	$3,211,345
West Terminal Complex (Design and Construction):	
Western Airside Concourse	$579,832
Energy Plant	59,307
Fuel Storage and Distribution Improvements	61,168
Western Terminal	918,297
Parking Facilities	108,115
Subtotal – West Terminal Complex Costs	$1,726,719
On-Airport Circulation (Design and Construction):	
People Mover	$418,903
Maintenance Facility	13,120
Subtotal – On-Airport Circulation Costs	$432,023
Total OMP Costs (2001 dollars)	$6,600,000

Source: Ricondo & Associates, Inc. and O'Hare Partners, based on cost estimate analyses from TOK, LLC, and AOR.
Prepared by: Ricondo & Associates, Inc.

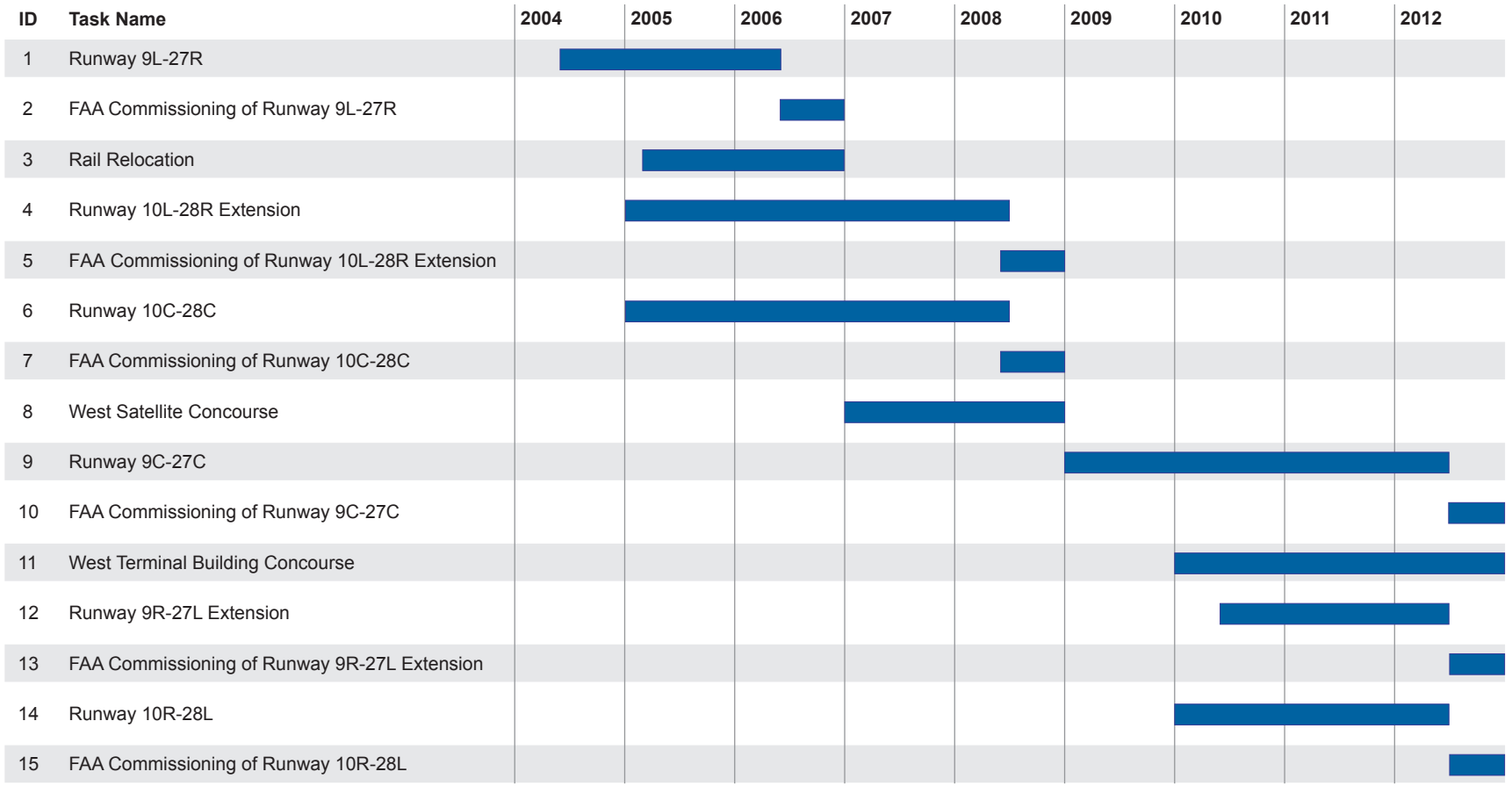
Table III-2

Preliminary Implementation Schedule for OMP Airfield Projects

Major OMP Airfield Projects	First Full Year of Operation
OMP-Phase 1:	
Runway 9L-27R	2007
Runway 10L-28R Extension	2009
Runway 10C-28C	2009
OMP-Phase 2:	
Runway 9R-27L Extension	2013
Runway 9C-27C	2013
Runway 10R-28L	2013

Note: Schedule based on assumed start of construction concurrent with the originally-assumed issuance of the FAA Record of Decision in mid-2004.

Source: Ricondo & Associates, Inc.
Prepared by: Ricondo & Associates, Inc.



Note: Start of construction assumed issuance of ROD in mid-2004.

Source: Ricondo & Associates, Inc.
Prepared by: Ricondo & Associates, Inc.

Exhibit III-1

Schedule of Major Construction and Commissioning Events

IV. Benefit-Cost Analysis Summary

Request for Letter of Intent to provide a

Multi-Year Commitment of Airport Improvement Program Grant-in-Aid Funding

RICHARD M. DALEY
MAYOR

CHICAGO O'HARE INTERNATIONAL AIRPORT
O'HARE MODERNIZATION PROGRAM

IV. Benefit-Cost Analysis Summary

In 1994, the FAA implemented its *Policy Regarding Revision of Selection Criteria for Discretionary Airport Improvement Program Grant Awards* and *Policy for Letter of Intent Approvals under the Airport Improvement Program*. These policies establish the requirement for preparation of a BCA to demonstrate the merits of capacity projects and justify federal grant funding. As of 1997, airport sponsors are required to submit a BCA if they are either:

- Seeking $5 million or more in AIP discretionary grants over the life of an airport capacity project, or
- Requesting grant funding through an LOI.

A BCA demonstrates a project's economic viability if the present value of its benefits exceeds the present value of its costs. The calculation of a positive NPV and a benefit-cost ratio (i.e., ratio of the discounted benefits divided by the discounted costs) equal to or greater than 1.0 indicate economic justification of the project. The FAA does not, however, use the benefit-cost ratio for ranking projects to assess how AIP discretionary grants are to be allocated.

The primary purpose of this BCA is to present the economic justification (i.e., demonstrate that the project has a positive NPV and its benefit-cost ratio equals or exceeds 1.0) for federal funding of the OMP-Phase 1 Airfield Projects, which consist of the LOI Projects and the supporting Program-Wide Requirements projects. Program-Wide Requirements projects include the following: preliminary engineering, wetlands mitigation, OMP-Phase 1 noise mitigation, land acquisition, and other miscellaneous program-wide requirements.

In addition, various sensitivity analyses are also presented to demonstrate the economic justification for the OMP-Phase 1 Airfield Projects if project benefits, costs, or timing differ from those envisioned. This analysis and the sensitivity analyses *do not* attempt to quantify or consider all benefits associated with the project, but rather illustrate that the aircraft travel time savings alone are sufficient to produce benefits that in all cases exceed project costs. Thus, the benefit-cost ratios and NPVs presented here are based on underestimated benefits and would be expected to be higher if a full accounting of project benefits were performed. To facilitate review of this material, this document is divided into the following sections:

- BCA Methodology
- Aviation Activity Forecasts
- Project Costs
- Project Benefits
- Benefit-Cost Comparison
- Recommendation

Exhibit I-1 depicts the proposed OMP runway projects, and highlights the OMP-Phase 1 Airfield Projects.

4.1 BCA Methodology

The following assumptions and methodology used to prepare the BCA are in accordance with the FAA's *Benefit-Cost Analysis Guidance* dated December 15, 1999 (the *BCA Guidance*); the *Economic Values for Evaluation of FAA Investment and Regulatory Decisions, A Guide*, dated June 1998; and FAA-APO-03-1*, Treatment of Values of Passenger Time in Economic Analysis,* dated March 2003 (the *APO Bulletin*). The methodology for the BCA process is outlined in the *BCA Guidance* and generally consists of the following steps:

- *Establish the Objectives:* As stated by the DEIS, the proposed Federal action, which is the subject of the EIS, encompasses the following purposes:
  - Address the projected needs of the Chicago region by reducing delays at O'Hare, and thereby enhancing capacity of the NAS.
  - Ensure that existing and future terminal facilities and supporting infrastructure (access, landside, and related ancillary facilities) can efficiently accommodate airport users.

  OMP-Phase 1 is the initial step in implementation of the OMP and the entire Master Plan.

- *Formulate Assumptions:* Assumptions about future conditions at the airport being analyzed must be clearly explained and documented because they form the framework against which the alternatives are to be evaluated.

  The FAA, as part of the Environmental Impact Statement (EIS) analysis for O'Hare, defined a constrained forecast of activity that would be anticipated to occur without airfield development at the Airport. The 2002 TAF, the most recent demand forecast available when the EIS analysis began, was used for the unconstrained scenarios in the DEIS. For consistency, both of these forecasts, as appropriate, are used in this BCA. Additional discussion of the forecasts is provided in Section 4.2 of this document.

- *Identify the Base Case:* The Base Case is a reference point from which incremental benefits and costs can be quantified. In the absence of major airfield construction (such as the OMP), opportunities to increase airfield capacity at the Airport are limited. As such, the Base Case for this BCA is defined as the no action scenario. The Airport's ongoing Capital Improvement Program (CIP), which would occur regardless of the proposed LOI Projects' implementation, is included in the Base Case.
- *Identify and Screen Alternatives:* As part of the EIS analysis, alternatives to the proposed plan were developed, analyzed, and considered. As stated in the DEIS, "The FAA in this Draft EIS has not made a determination regarding the preferred alternative for this project … The Agency will identify, for purposes of statutory obligations, its determination regarding the feasibility and prudence of alternatives or any other required findings in the Final EIS or in the Record of Decision." The City believes that the OMP is the best development option and, therefore, alternatives are not analyzed as part of this BCA.
- *Define Evaluation Period:* Consistent with the BCA Guidance, the evaluation period assumed for this BCA is 20 years after the completion of construction. For the OMP-Phase 1 Airfield Projects, the evaluation period ends in 2028.
- *Determine Costs:* Costs must be identified, quantified, and evaluated in total dollar amounts and for each year of a project's life. Typical costs include initial investments, such as

planning and construction of the main project as well as any enabling projects, and recurring investments, such as operation and maintenance (O&M) costs. OMP costs are discussed in Section 4.3 of this document.

- *Determine Benefits*: Typical benefits include reduced delays, the ability to accommodate more efficient aircraft and/or larger aircraft, safer and more secure air travel, and reduced environmental impacts.

  For purposes of this BCA, only local delay savings in travel times for aircraft and passengers and system-wide delay savings resulting from O'Hare's role as a major transportation hub are considered. Quantification of these benefits is discussed in Section 4.4 of this document. Other benefits of the OMP-Phase 1 Airfield, including greater schedule predictability, ability to accommodate larger aircraft, and safety improvements are not considered at this time. Monetary quantification of these other benefits is not included in this analysis to avoid speculation. While this approach underestimates the overall benefits of the project, these benefits are not needed to demonstrate the program's justification. The specific project benefits, including those that have not been quantified, are shown in **Table IV-1**.

Table IV-1

Inventory of Benefits Quantified and Not Quantified in the BCA

Project Type	Typical Benefit	Benefits Quantified in BCA	Benefits Not Quantified in BCA
Airside Capacity	• Reduced aircraft, passenger, and cargo delay during normal airport operations	x	
	• Greater schedule predictability including (1) aircraft operator able to make more efficient use of equipment and personnel and (2) passenger able to take later flight and arrive at destination on time		x
	• Improved efficiency of traffic flows (reduced vectoring and taxiing distances)	x	
	• Airport's ability to accommodate faster, larger, and/or more efficient aircraft		x
	• Bringing pre-existing infrastructure into compliance with FAA safety and security standards		x
	• Safety improvements		x

Source (Typical Benefits): FAA, *BCA Guidance*.
Source (Assessed Benefits): Ricondo & Associates, Inc.
Prepared by: Ricondo & Associates, Inc.

- *Compare Benefits and Costs:* Most airport investments require resources at the outset of a project in return for an annual flow of benefits over the long-term future. Because the costs are incurred up front, and the benefits are returned over a longer time period, an analysis recognizing the time value of money must be conducted to appropriately compare the benefits and costs of alternatives to inform ultimate selection of the preferred alternative for development. In the BCA, discounted benefits and costs are used to accurately compare project scenarios by their NPVs and benefit-cost ratios. Section 4.5 presents the comparison of benefits and costs.
- *Conduct Sensitivity Analysis:* Sensitivity analyses are conducted to assess the ability of the project to meet the BCA requirements under alternative assumptions regarding cost and

schedule. In addition to the sensitivity analyses in the BCA, the Sponsor has included additional supplemental analyses presented in Appendix D.

- *Make Recommendation:* Finally, a BCA must state whether a project should be pursued based on the quantified benefits and costs, non-quantified benefits and costs, and sensitivity analysis. Section 4.6 presents the BCA recommendation.

4.2 Aviation Activity Forecasts

As previously discussed, the 2002 TAF is being used as the basis for the OMP EIS analysis. The 2002 TAF, which presents aircraft operations and enplaned passengers by user category at the Airport through the year 2020, was prepared by FAA assuming the absence of any constraints to growth in activity at the Airport. Selected at the initiation of the OMP EIS analysis, the 2002 TAF remains the basis for EIS analysis even though subsequent TAFs were published in 2003 and 2004. To maintain consistency with the DEIS, the 2002 TAF is the primary unconstrained forecast used in this BCA.

Table IV-2 presents the 2002 TAF of operations and enplaned passengers converted from federal fiscal years, which end September 30, to calendar years, and extrapolated through the evaluation period using linear extrapolation. As shown, the 2002 TAF forecasts grow to approximately 1.2 million operations and 50.4 million enplaned passengers in 2018, the last year of the EIS analysis.

Since initiation of the EIS analysis, the FAA has published a 2003 TAF and 2004 TAF, as shown on **Exhibit IV-1** and **Exhibit IV-2** in federal fiscal years. Both the 2003 and 2004 TAFs contain operations and enplaned passenger forecasts greater than those in the 2002 TAF. As previously mentioned, the 2002 TAF is used in this BCA to maintain consistency with the EIS analysis.

In addition to the unconstrained forecast represented by the 2002 TAF, the FAA, as part of the EIS analysis, developed a constrained forecast to represent the potential activity at the Airport if no action is undertaken to improve Airport capacity. This constrained forecast was developed based on simulation modeling efforts to reflect the assumption that growth in aircraft operations will cease once delays exceed the level the airlines and FAA consider "acceptable". **Exhibit IV-3** and **Exhibit IV-4** present the FAA-developed constrained forecasts in comparison to the unconstrained forecasts. Further discussion of the constrained forecast and its use in the BCA is provided in Section 4.4.

Table IV-2

2002 FAA Terminal Area Forecast for O'Hare International Airport –
Total Operations and Enplaned Passengers (Unconstrained Schedule)

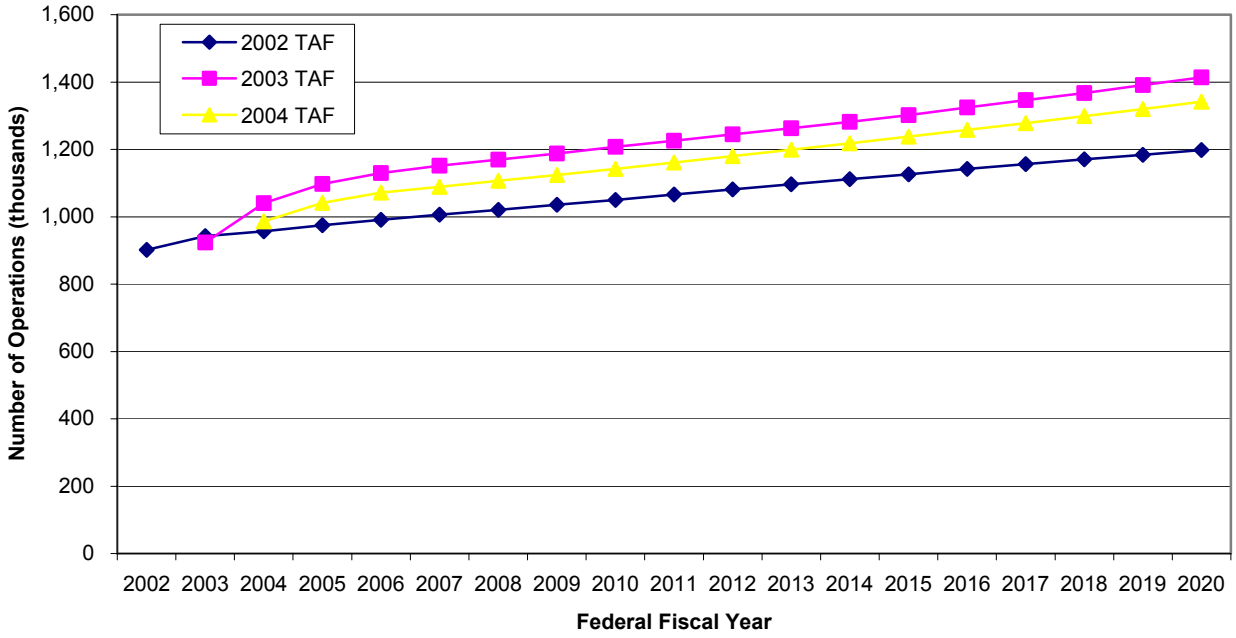
Calendar Year	Total Operations: 2002 Terminal Area Forecast	Enplaned Passengers: 2002 Terminal Area Forecast	Enplaned Passengers: Extrapolation [1]
2002	922,787	31,710,512	
2003	960,500	32,609,000	
2004 [2]	976,544	33,633,730	
2005	992,855	34,696,477	
2010	1,072,706	40,280,622	
2015	1,149,402	46,367,491	
2018	1,194,000	50,372,000	
2020			52,224,100
2025			58,060,253
2030			63,896,405
2032			66,230,866

[1] Linear extrapolation based on calendar year projections.
[2] 2004 data are preliminary and subject to change.

Source (Forecast): FAA, *O'Hare Modernization Draft Environmental Impact Statement,* January 2005.
Source (Extrapolation): Ricondo & Associates, Inc.
Prepared by: Ricondo & Associates, Inc.

Exhibit IV-1

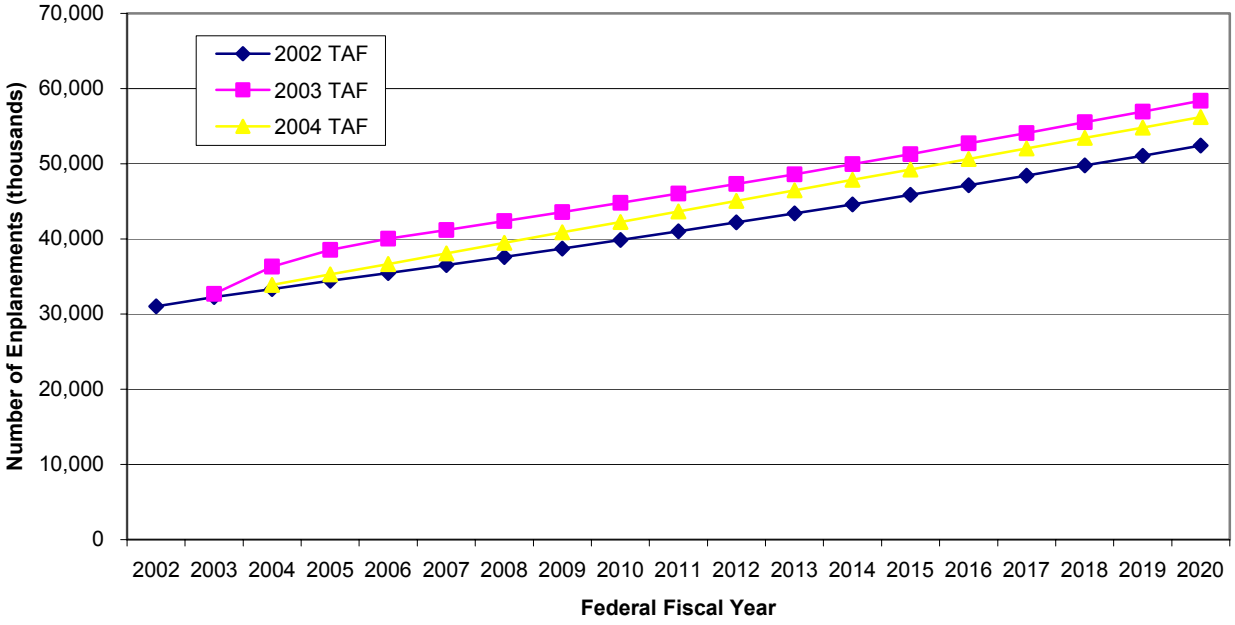
FAA Terminal Area Forecast Comparisons for O'Hare International Airport – Total Operations



Source: FAA.
Prepared by: Ricondo & Associates, Inc.

Exhibit IV-2

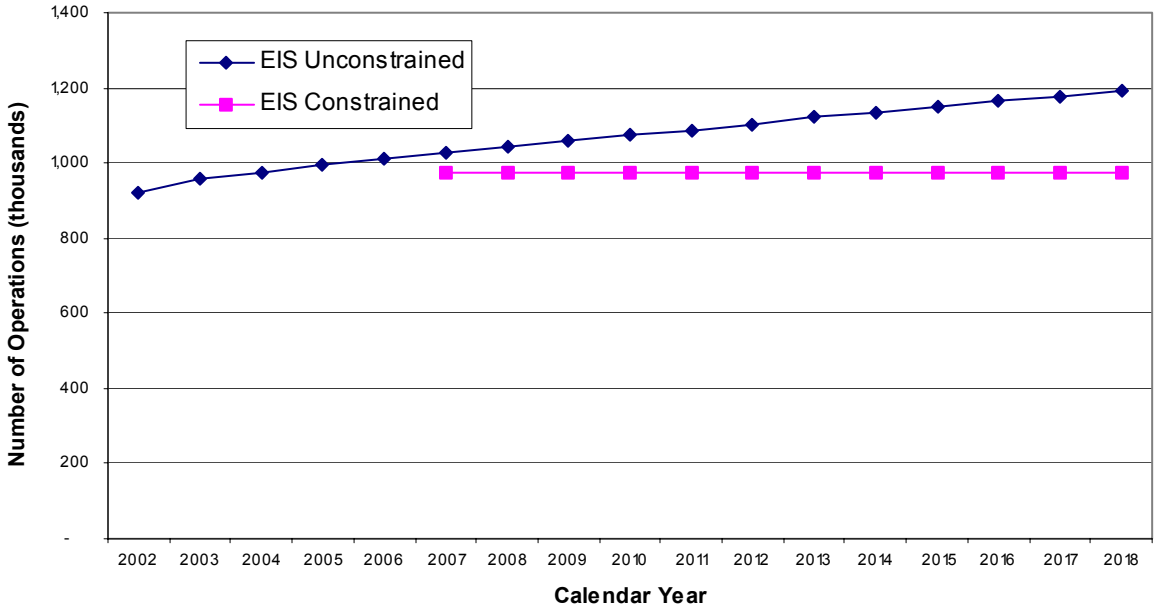
FAA Terminal Area Forecast Comparisons for O'Hare International Airport – Enplaned Passengers



Source: FAA.
Prepared by: Ricondo & Associates, Inc.

Exhibit IV-3

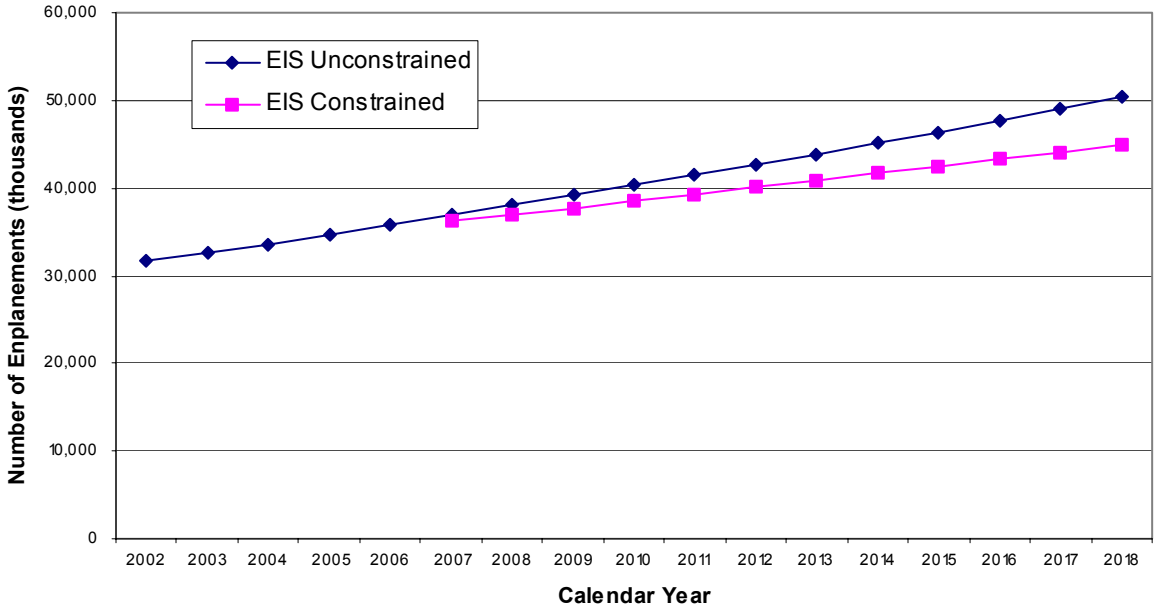
Unconstrained and Constrained Forecast Comparison for O'Hare International Airport – Total Operations



Source: FAA.
Prepared by: Ricondo & Associates, Inc.

Exhibit IV-4

Unconstrained and Constrained Forecast Comparison for O'Hare International Airport – Enplaned Passengers



Source: FAA.
Prepared by: Ricondo & Associates, Inc.

4.3 Project Costs

To provide the basis for the BCA and NPV calculations, costs associated with the project must be quantified to the extent possible. Quantifiable costs to be considered should consist of capital investment and incremental O&M costs. Only those costs that are attributable to a project being undertaken are to be considered. In other words, costs that would be incurred regardless of whether or not a project is undertaken should not be considered.

Table IV-3 lists project elements and their capital investment costs for OMP-Phase 1 Airfield Projects. Included in these costs are necessary land acquisition, supporting facilities (taxiways, lighting, utilities, etc.), planning, design, and construction. Table IV-3 presents these costs in 2001 dollars. The year 2001 was used as the base year in this analysis because OMP cost estimates as originally scheduled are stated in 2001 dollars in the LOI request, DEIS, and Airport Master Plan.[6] The capital investment costs of the OMP-Phase 1 Airfield Projects are estimated to be approximately $2.6 billion in 2001 dollars.

[6] As part of the sensitivity analyses, BCR and NPV calculations are also presented in 2004 dollars.

Table IV-3

Project Capital Costs as Originally Scheduled – OMP-Phase 1 Airfield Projects
(in thousands of 2001 dollars)

Project Element Description	Total	2001[1]	2002 [1]	2003 [1]	2004 [1]	2005	2006	2007	2008	2009
Program-Wide Requirements										
Program-wide Requirements [2]	$58,277	$0	$17,500	$21,607	$19,170					
Preliminary Engineering	43,689			21,845	15,291	6,553				
Wetlands Mitigation	24,272			1,942	22,330					
Noise Mitigation (OMP-Phase 1)	140,000			20,000	20,000	20,000	20,000	20,000	20,000	20,000
Land Acquisition	339,296		31,958	67,532	72,816	82,524	60,194	14,563	9,709	
Subtotal—Program-Wide	**$605,534**	**$0**	**$49,458**	**$132,926**	**$149,607**	**$109,077**	**$80,194**	**$34,563**	**$29,709**	**$20,000**
Airfield										
Runway 9L-27R										
Design	$34,951			$23,301	$11,650					
Construction	513,592				114,132	199,730	199,730			
Runway 10L-28R Extension										
Design	20,388			20,388						
Construction	473,787				88,081	130,333	146,491	82,893	25,989	
Runway 10C-28C										
Design	40,777			20,389	20,388					
Construction	867,962				121,251	165,469	109,034	211,763	260,445	
Subtotal—Airfield	**$1,951,457**	**$0**	**$0**	**$64,078**	**$355,502**	**$495,532**	**$455,255**	**$294,656**	**$286,434**	**$0**
Total—Capital Costs	**$2,556,991**	**$0**	**$49,458**	**$197,004**	**$505,109**	**$604,609**	**$535,449**	**$329,219**	**$316,143**	**$20,000**

[1] Actual expenditures from 2001 through 2004 varied from originally scheduled expenditures.
[2] Includes $17.5 million of program formulation costs.

Sources: TOK LLC, AOR, and O'Hare Partners; As presented in the Airport Master Plan, Ricondo & Associates, Inc.
Prepared by: Ricondo & Associates, Inc.

In addition to capital investment costs, estimated incremental O&M costs are included for the evaluation period. Incremental O&M costs for additional runway pavement were estimated at the unit rate for budgeted 2004 Airfield Area O&M expenses for the existing runways adjusted to 2001 dollars using the GDP Implicit Price Deflator. The annual incremental O&M costs for OMP-Phase 1 Airfield Projects are shown in **Table IV-4** in 2001 dollars.

Table IV-4

Incremental Project Recurring Operation and Maintenance Costs – OMP-Phase 1 Airfield Projects
(in thousands of 2001 dollars)

Calendar Year	Incremental O&M Cost [1]
2001	$0
2002	0
2003	0
2004	0
2005	0
2006	0
2007	4,800
2008	4,800
2009	15,600
2010	15,600
2011	15,600
2012	15,600
2013	15,600
2014	15,600

Calendar Year	Incremental O&M Cost [1]
2015	15,600
2016	15,600
2017	15,600
2018	15,600
2019	15,600
2020	15,600
2021	15,600
2022	15,600
2023	15,600
2024	15,600
2025	15,600
2026	15,600
2027	15,600
2028	15,600
Total	$322,100

[1] Rounded to nearest $100,000.

Source: Ricondo & Associates, Inc.
Prepared by: Ricondo & Associates, Inc.

4.4 Project Benefits

Because the OMP, and OMP-Phase 1 in particular, consists largely of airfield capacity improvements in the form of new, relocated, and/or extended runways, aircraft operational delay savings constitute the primary benefits to be considered. Delay savings can be measured as time saved as a result of avoided delay (i.e., the difference in travel time between any scenario and the Base Case), and can be applied to aircraft operations as well as passengers.

4.4.1 Simulation Modeling

In the analyses undertaken as part of OMP planning and the EIS , operational delay and travel times were assessed for the Base Case, OMP-Phase 1, and the OMP Total Airfield. These assessments were undertaken using the *Total Airspace and Airport Modeler* (TAAM), developed by Preston Aviation Solutions, a Boeing Company. TAAM is a fast-time gate-to-gate simulator of airport and airspace operations that facilitates decision-making, planning, and analysis. TAAM has been used in the United States for airfield and airspace assessments by the FAA, the National Airspace Redesign team, American Airlines, Continental Airlines, Delta Air Lines, and Boeing Air Traffic Management, among others. The FAA and its EIS consultant, known as the third party contractor (TPC), have been actively involved in the TAAM simulation analysis of the OMP. As documented in the DEIS:

> "An unprecedented series of TAAM simulation analyses were conducted by the City of Chicago's Consultant Team (CCT) with direction, oversight, review and approval by the FAA and the TPC. The FAA and TPC participated in an intensive, nine-month review process during the simulation effort. The objective of this process was to ensure that TAAM input assumptions, modeling methodologies, and output data conformed to the industry best practices in modeling and accurately reflected air traffic control rules and procedures. In total, FAA invested over 2,000 hours reviewing assumptions, draft results, animations, and final results. The FAA review was conducted by an Air Traffic Work Group, which consisted of FAA Management and National Air Traffic Controller Association (NATCA)

representatives from O'Hare Tower, the Chicago Terminal Radar Approach Control Facility (TRACON), and the Chicago Center (ZAU); FAA Airports Division; and the FAA's TPC." [4]

The results of the TAAM modeling for the unconstrained forecasts are presented for the Base Case and full OMP on **Exhibit IV-5**

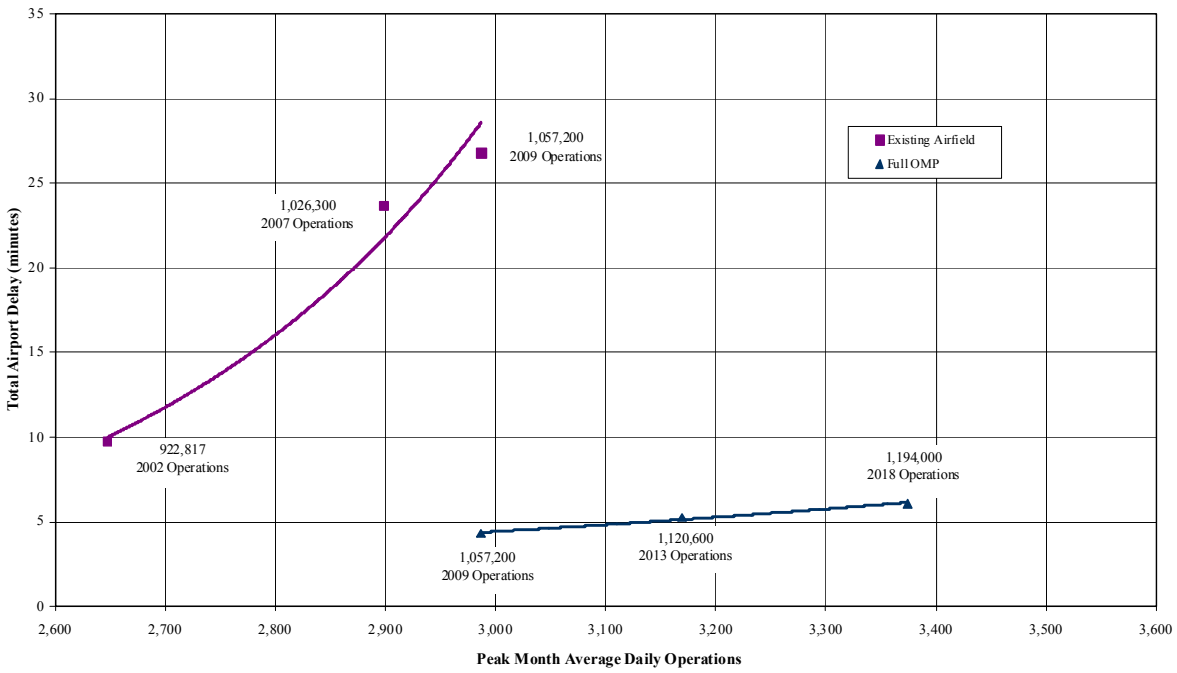
As shown on Exhibit IV-5, the simulation modeling showed that delays increase exponentially under the Base Case as demand approaches capacity. Theoretically, delays can continue to increase to unrealistically high levels as demand exceeds capacity for more and more hours of the day. However, these excessively high levels of delay may not be experienced, as the airlines and passengers may change their behavior to avoid these delays. In response to increasing delays, airlines might increase average aircraft size to accommodate forecast demand, shift connecting passenger traffic through other hub airports.

The FAA in its *BCA Guidance* recognizes the limitations on delay growth, and suggests the need to modify demand growth when delays exceed 15 minutes per operation and that demand should be capped at approximately 20 minutes of delay per operation. Consistent with the *BCA Guidance*, the FAA developed constrained activity forecasts in the DEIS for the Airport to reflect the level of aircraft operations at which FAA believes further growth in aircraft activity would cease due to delays reaching "unacceptable" levels. As indicated in the DEIS, the constrained forecasts developed by FAA result in maximum average aircraft delays at the Airport of approximately 17 minutes per aircraft, which is lower than the 20 minutes per aircraft threshold outlined in the *BCA Guidance*. Therefore, by using the constrained forecast, this BCA underestimates the delay savings benefits of the project. A comparison of the DEIS constrained forecast to the 2002 TAF is presented on Exhibit IV-3 and Exhibit IV-4 for aircraft operations and enplaned passengers, respectively. In assessing delays under the Base Case, the constrained forecast is used to prevent the measurement of excessively high apparent delay savings. To allow for proper comparison, the OMP-Phase 1 Airfield Projects and the sensitivity analyses are also assessed using the constrained forecast. While the proposed plan is capable of accommodating the unconstrained forecast activity, as demonstrated by the FAA's simulations illustrated in Exhibit IV-5, performing the BCA with different forecasts between the Base Case and the proposed plan would necessitate either the monetary quantification of a value for the added operations and passengers under the proposed plan, or of the additional costs incurred by passengers unable to use O'Hare under the constrained Base Case. These analyses would require assumptions regarding the value of additional passengers that can be accommodated with the proposed plan or the cost incurred by passengers who are not accommodated because the proposed plan is not constructed. The effect of these passengers could be difficult to quantify. Using the constrained forecast for the proposed plan produces a BCA that demonstrates the ability of the delay savings alone to justify the project, regardless of the potential for accommodating additional demand.

[4] Source: FAA, *O'Hare Modernization Draft Environmental Impact Statement*, January 2005.

Exhibit IV-5

Total Airport Delay (in minutes)



Source: Ricondo & Associates, Inc.
Prepared by: Ricondo & Associates, Inc.

4.4.2 Simulation Results

As discussed earlier, simulation modeling using TAAM was performed to provide quantitative information on the performance of the OMP-Phase 1 Airfield Projects relative to the Base Case airfield. The Base Case simulations used in this analysis are those originally prepared for the FAA EIS analysis. For the OMP-Phase 1 Airfield Projects and OMP Total Airfield simulations, the EIS models were also used, but constrained schedules of activity developed for the EIS Base Case were applied in both cases. The methodologies and assumptions used in the simulation modeling have been documented in numerous data packages developed and published by the FAA in support of the EIS process.

Delay and travel time statistical results from the simulation analyses are presented in **Table IV-5** for the Base Case, OMP-Phase 1 Airfield Projects, and OMP Total Airfield. Delay, as presented in the table, is the difference between unimpeded travel time and total travel time. Travel time is the time from gate departure at the origin airport to gate arrival at O'Hare, or the time of gate departure at O'Hare to gate arrival at the destination airport. **Exhibit IV-6** and **Exhibit IV-7** graphically present average delay per operation, and average travel time per operation, for the Base Case, OMP-Phase 1 Airfield Projects, and the OMP Total Airfield.

As shown, the differences in average delay between (1) the Base Case and OMP-Phase 1 Airfield Projects and (2) the Base Case and OMP Total Airfield are greater than the differences between the average travel times in any given year. This results because the proposed plan increases unimpeded

travel times due in part to the increase in taxi distance associated with the new runways. Therefore, this BCA uses the differences in travel times to calculate benefits in order to ensure that these benefits are understated.

Table IV-5

Simulation Modeling Results for Constrained Forecast (in minutes)

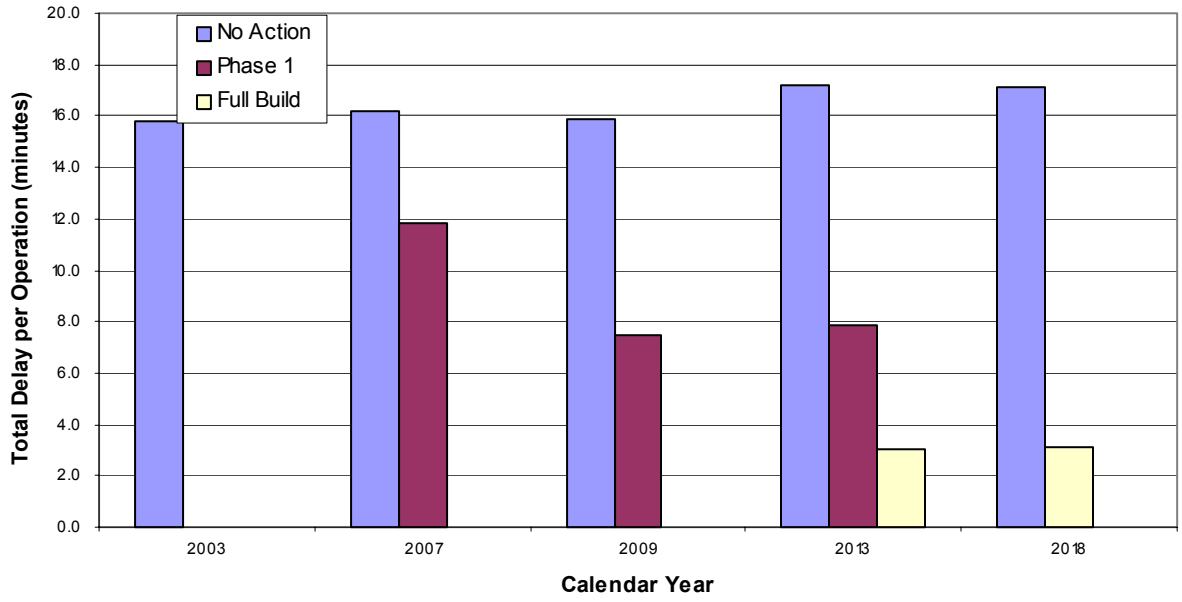
Scenario	Annual Operations	Average Total Travel Time per Operation	Average Unimpeded Travel Time	Average Delay per Operation [1]
Base Case – No Action				
2007	974,000	146.1	129.9	16.2
2009	974,000	150.7	134.8	15.9
2013	974,000	158.9	141.7	17.2
2018	974,000	162.0	144.8	17.1
OMP-Phase 1 Airfield Projects				
2007	974,000	143.6	131.8	11.9
2009	974,000	146.2	138.8	7.5
2013	974,000	153.6	145.7	7.9
OMP Total Airfield				
2013	974,000	151.2	148.2	3.0
2018	974,000	154.4	151.3	3.1

[1] Totals may not add due to rounding.

Source: FAA; Ricondo & Associates, Inc.
Prepared by: Ricondo & Associates, Inc.

Exhibit IV-6

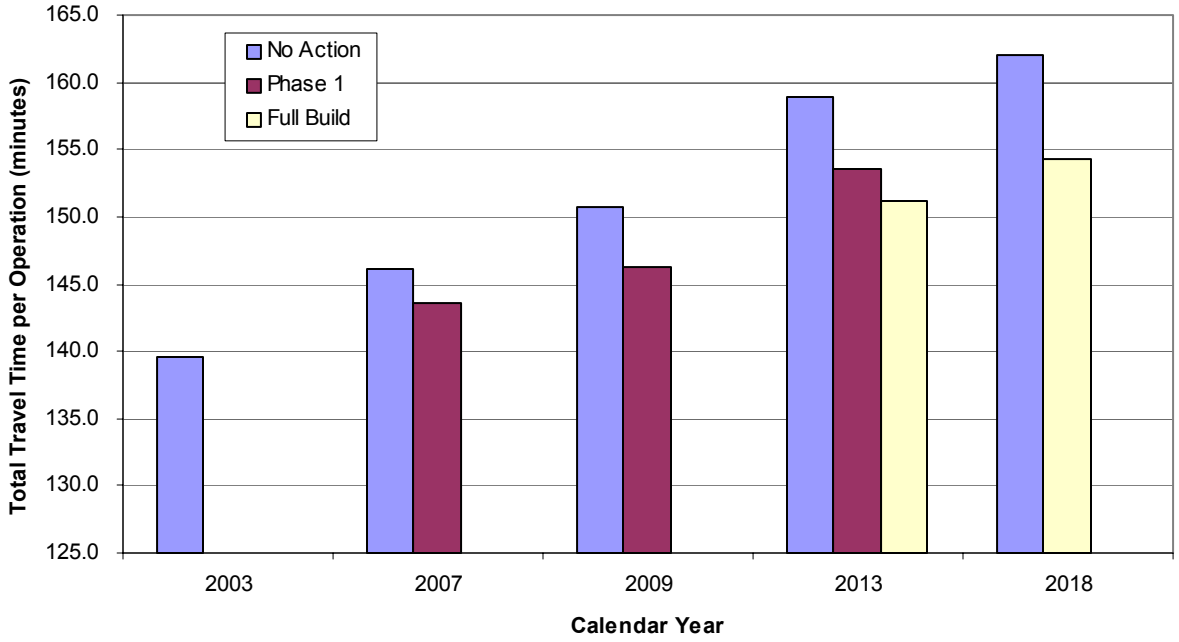
Average Delay per Operation (in minutes) – Constrained Forecast



Source: Ricondo & Associates, Inc.
Prepared by: Ricondo & Associates, Inc.

Exhibit IV-7

Average Travel Time (in minutes) per Operation – Constrained Forecast



Note: Travel time benefits illustrated are based on the constrained forecast and do not consider benefits associated with growth in demand beyond 974,000 annual operations.

Source: Ricondo & Associates, Inc.
Prepared by: Ricondo & Associates, Inc.

4.5 Benefit - Cost Comparison

The comparison of benefits and costs involves the calculation of NPVs and benefit-cost ratios (BCRs) based on recognition of the time value of money in discounting the benefits and costs. Additionally, time savings must be converted into monetary values based on appropriate assumptions regarding the value of passenger time and aircraft operating costs.

As noted previously, this BCA considers only delay savings in travel times for aircraft and passengers, and system-wide delay savings resulting from O'Hare's role as a major transportation hub. Table IV-1 summarizes other benefits not considered in this BCA, which if considered, would further increase the value of the economic benefits attributed to the project(s). The analyses performed in this section provide the benefit-cost comparison for the OMP-Phase 1 Airfield Projects. The following points outline relevant assumptions associated with the quantification of these benefits and **Table IV-6** summarizes the assumptions.

- *Base Year.* Project benefits were evaluated using 2001 as the base year because OMP cost estimates are in 2001 dollars in the LOI request, OMP DEIS, and Airport Master Plan.

Project benefits and costs are stated in 2001 dollars in the year of accrual/expenditure, and benefits and costs are discounted 7 percent per year in accordance with the *BCA Guidance* to calculate present value.

- Aircraft Operating Costs. Variable aircraft operating costs consist of costs for crew, fuel and oil, taxes, and maintenance. Each aircraft model has a unique operating cost. These costs are provided on U.S. Department of Transportation Form 41.[5] To develop an aggregate variable aircraft operating cost for O'Hare, a weighted average of the operating costs for aircraft types in the fleet mix serving O'Hare in each of the simulation years was calculated. Values for years not simulated were linearly interpolated or extrapolated. The block hour cost assumption is approximately $1,800 per hour (or $30 per minute) for the fleet mix of any year in a constrained schedule environment. In an unconstrained schedule environment, the change in fleet mix would produce slightly lower aircraft block hour costs.
- *Passenger Value of Time.* As set forth in the *BCA Guidance*, a blended rate accounting for the value of O'Hare's personal and business travelers' time may be used. The value of passenger time is set forth in the *APO Bulletin*, and the specified value is $40.10 per hour for business travelers and $23.30 for personal travelers.[6] Results of the *In-Flight Air Survey* in 1997 by Landrum & Brown indicated that business travel was the main purpose of the trip 52.4 percent of the time and personal travel 47.6 percent of the time. Based on this passenger distribution, the weighted average passenger cost for O'Hare is $32.10 per hour or $0.54 per minute.
- *Downstream Passenger Multiplier.* Because delays at a particular airport can propagate throughout the NAS, downstream delay savings should also be considered as a benefit as permitted by the *BCA Guidance*.[7] As stated in the BCA Guidance, "an example of a potentially usable methodology is one developed by Lincoln Laboratory." The Massachusetts Institute of Technology's Lincoln Laboratory published a paper titled *Analysis of Downstream Impacts of Air Traffic Delay* in 1997. In the paper, it is suggested that downstream delay savings should consist of savings accrued by passengers only. The formula for calculating the downstream passenger delay savings is the product of aircraft delay savings (in units of time), the average number of downstream enplaned passengers per departure, the dollar value of passenger time, and a downstream multiplier. Lincoln Laboratory derived a general-purpose value of 0.8 for the downstream multiplier, as published in its paper, and this number was used for the entire evaluation period in this BCA.
- *Salvage Value.* As set forth in the *BCA Guidance*, salvage value of the project may be considered. The salvage value of improvements at the end of the 20-year evaluation period is

[5] The time period for data used is the last three months of calendar year 2003 and the first nine months of calendar year 2004, the latest data available. Costs were discounted to 2001 dollars using the Gross Domestic Product Implicit Price Deflator, in accordance with the *BCA Guidance*.

[6] The *APO Bulletin* provides passenger value of time in 2000 dollars and states that the values may not be adjusted for inflation.

[7] In the *BCA Guidance*, FAA states "Simulation modeling of delay at the study airport does not capture the effect of 'follow-on' delays e.g., delays that results at other airports as a result of delays originating due to congestion at the subject airport. Whereas FAA attempts to consider systemwide delay impacts in its capacity analyses, it has been unable to develop a robust simulation methodology for measuring these impacts … However, in the case of projects with major average delay reductions (5 minutes or more), the analyst may attempt to quantify follow-on effects. FAA will consider follow-on delay reduction estimates developed from any methodology that is well documented. An example of a potentially usable methodology is one developed by Lincoln Laboratory."

estimated to include only the value of the land acquired for the projects. For purposes of this analysis, it was assumed that the value of the land remains the same as on the purchase date, and the discounted value is included in the project benefits.

- *Sunk Costs*. As set forth in the *BCA Guidance*, sunk costs of the project should be excluded from the BCA. Through 2003, approximately $105.1 million has been spent on Program-Wide Requirements and land acquisition. Therefore, this amount is considered a sunk cost in the BCA.
- *Evaluation Period.* The evaluation period is the time period over which project benefits and costs are calculated. As recommended in the *BCA Guidance*, the evaluation period extends for 20 years after completion of construction.

Table IV-6

Assumptions for Quantified Project Benefits

Fleet Mix in Constrained Schedule	Aircraft Variable Operating Cost (in 2001 dollars) Cost per Hour	Cost per Minute
2002	$1,807	$30.12
2007	1,794	29.90
2009	1,794	29.89
2013	1,762	29.36
2018	1,853	30.88
Value of Passenger Time (in 2000 dollars not escalated)	$32.10	$0.54
Downstream Passenger Delay Multiplier		0.80
Discount Rate		7 percent
Salvage Value NPV Range Depending on Scenario		$44.6 million - $58.4 million
Evaluation Period		20 years after construction completion

	Evaluation Period	
OMP-Phase 1 Airfield Projects	Start Year	End Year
Future Runway 9L-27R	2007	2026
Runway 10L-28R Extension	2009	2028
Future Runway 10C-28C	2009	2028

Source: (Aircraft Operating Cost): U.S. DOT, *Form 41*, fourth quarter of calendar year 2003 through third quarter of 2004, adjusted by Gross Domestic Product Implicit Price Deflator to 2001 dollars.
Source: (Value of Passenger Time): FAA-APO-03-1, *Treatment of Values of Passenger Time in Economic Analysis*, March 2003 and percentages of business and leisure travelers, Landrum & Brown, *In-Flight Survey*, 1997.
Source: (Downstream Passenger Multiplier): Massachusetts Institute of Technology, Lincoln Laboratory, *Analysis of Downstream Impacts of Air Traffic Delay*, 1997. At O'Hare, the average enplanements per aircraft departure is equal to the industry average. As a result, the downstream multiplier can be applied directly to the local passenger delay benefit.
Source: (Discount Rate): FAA, *BCA Guidance*, December 15, 1999.
Prepared by: Ricondo & Associates, Inc.

4.5.1 Project Analysis

Based on the information presented in Table IV-5, and information on costs and travel time benefits presented in prior sections of this document, the benefit-cost ratio and NPV were derived for the OMP-Phase 1 Airfield Projects. These values are presented in **Table IV-7**. As shown, the benefit-cost ratio is greater than 1.0 and the NPV is at $2.0 billion in 2001 dollars. **Appendix D** provides

supplemental information to illustrate the BCRs and NPVs for the Master Plan Phase 1 projects, the OMP total airfield, and the total Master Plan (OMP and World Gateway Program). **Appendix E** presents tabular information detailing the calculation of the BCR and NPV.

Table IV-7

Benefit-Cost Ratio and Net Present Value (2001 dollars) – OMP-Phase 1 Airfield Projects
Aircraft Travel Time Benefits Only

Project	Present Value Benefits (billions)	Present Value Costs (billions)	Net Present Value (billions) [1]	Benefit-Cost Ratio
OMP-Phase 1 Airfield Projects	$4.1	$1.9	$2.2	2.13

[1] Total may not add due to rounding.

Source: Ricondo & Associates, Inc.
Prepared by: Ricondo & Associates, Inc.

The FAA in its *BCA Guidance* recognizes the limitations on delay growth. FAA developed constrained activity forecasts in the DEIS for the Airport to reflect the level of aircraft operations at which FAA believes further growth would cease due to delays reaching "unacceptable" levels. In assessing delays under the Base Case, the constrained forecast is used to prevent the measurement of excessively high apparent delay savings. To allow for proper comparison, the OMP-Phase 1 Airfield Projects and the sensitivity analyses are also assessed using the constrained forecast. As such, the BCR demonstrates that the OMP-Phase 1 Airfield Projects are justified regardless of growth in activity. Building the OMP-Phase 1 Airfield Projects alone would generate benefits greater than costs even without growth in operational activity.

4.5.2 Sensitivity Analyses

Because of the risks involved in infrastructure development and the number of assumptions regarding future conditions that occur in benefit-cost analysis, the analysis should be evaluated for its sensitivity to certain basic parameters to confirm its economic viability. For this BCA, the following sensitivity analyses were conducted for the OMP-Phase 1 Airfield Projects and the results are shown in **Table IV-8**. These are assumptions used only to demonstrate the continued economic justification for the OMP-Phase 1 Airfield Projects under varying cost and schedule conditions and are not anticipated program changes.

- Increase capital investment cost 25 percent
- Delay construction schedule by 5 years
- Decrease benefits savings 25 percent
- Combination of all three of the items

In addition to these sensitivity analyses, a separate analysis was performed to demonstrate the results of the BCA if costs and benefits are stated in 2004 dollars instead of 2001 dollars as originally developed and stated. Under this analysis, capital investment costs and aircraft operating costs are adjusted as necessary to 2004 dollars using the Gross Domestic Product price inflator, while passenger costs remain fixed in accordance with FAA BCA guidelines. Additionally, capital investment costs originally scheduled for 2002 and 2003 are rescheduled to occur in 2004.

Table IV-8

Benefit-Cost Ratios and Net Present Values (2001 dollars) - Sensitivity Analyses for OMP-Phase 1 Airfield Projects - AircraftTravel Time Benefits Only

Sensitivity Analysis	Evaluation End Year	Present Value Benefits (billions)	Present Value Costs (billions)	Net Present Value[1] (billions)	Benefit-Cost Ratio
Increase capital costs by 25 percent	2028	$4.1	$2.4	$1.7	1.69
Delay construction schedule by 5 years	2033	$2.9	$1.4	$1.5	2.13
Decrease benefits by 25 percent	2028	$3.1	$1.9	$1.2	1.61
All of the above	2033	$2.2	$1.7	$0.4	1.27
Project using 2004 base year and 2004 dollars	2028	$5.1	$2.5	$2.6	2.06

[1] Totals may not add due to rounding.

Source : Ricondo & Associates, Inc.
Prepared by: Ricondo & Associates, Inc.

These sensitivity analyses demonstrate that the overall OMP airfield program is economically justified. In all cases, the BCR and NPV of the sensitivity analyses exceed the FAA thresholds.

This analysis does not attempt to quantify or consider all benefits associated with the project but rather it illustrates that the aircraft travel time savings alone are sufficient to produce benefits that in all cases exceed project costs. Thus, the benefit-cost ratios and NPVs presented here are based on underestimated benefits and would be expected to be higher if a full accounting of project benefits were performed.

4.6 Recommendation

Regardless of the scenario modeled–the OMP-Phase 1 Airfield Projects or any of the sensitivity analyses –the BCR and NPV in each scenario exceed the FAA thresholds. Therefore, the OMP-Phase 1 Airfield Projects were determined to have the economic justification necessary for FAA to consider the project for AIP discretionary grants.

V. Financial Plan

Request for Letter of Intent to provide a

Multi-Year Commitment of Airport Improvement Program Grant-in-Aid Funding

RICHARD M. DALEY
MAYOR

CHICAGO O'HARE INTERNATIONAL AIRPORT
O'HARE MODERNIZATION PROGRAM

V. Financial Plan

This section presents a discussion of (1) funding sources for the OMP-Phase 1 Airfield Projects, (2) the historical funding approach for Airport capital projects, (3) the OMP-Phase 1 funding plan, (4) proposed cash flow for OMP-Phase 1 Airfield Projects, (5) LOI benefits, and (6) the Airport capital development program.

5.1 Funding Sources

Funding sources for the LOI Projects include the following:

- Federal grants-in-aid under the AIP,
- Passenger Facility Charges (pay-as-you-go and leveraged), and
- General Airport Revenue Bonds (GARBs).

5.1.1 FAA Airport Improvement Program Grants

The Airport and Airway Improvement Act of 1982 authorizes funding for the AIP from the Airport and Airway Trust Fund for airport development, airport planning, and noise compatibility planning and programs. The Airport and Airway Trust Fund is funded through several aviation user taxes on airfares, air freight, and aviation gasoline.

FAA AIP grants include (1) entitlement grants based on numbers of enplaned passengers and cargo tonnage for use in undertaking eligible projects and (2) discretionary grants awarded based on project merit. Consistent with requirements, the Airport's AIP grants have been used for airfield improvements, Airport roadways, public areas of terminal projects, and safety and security systems and equipment.

On December 12, 2003, President Bush signed into law FAA reauthorization legislation known as Vision 100 – Century of Flight Authorization Act of 2003. Under the reauthorization, the AIP was extended four federal fiscal years to September 30, 2007. The funding levels for AIP investment are $3.4 billion in the first year, increasing by $100 million per year in each subsequent year. It was assumed in this financial analysis that federal programs similar to the AIP will continue throughout the evaluation period.

5.1.2 Passenger Facility Charges

Since 1991, the imposition of a passenger facility charge (PFC) has been authorized by Title 14 of the Code of Federal Regulations, Part 158, and the PFC program administered by the FAA. The Department of Aviation collects a PFC from eligible enplaned passengers to fund eligible projects. PFC revenues may be used on a pay-as-you go basis or leveraged to support the issuance of PFC-backed bonds. PFC Bonds can be issued either as stand-alone or double-barrel bonds, which are backed by both a pledge of PFCs and general airport revenues. As of December 31, 2004, the City had outstanding approximately $879 million of First and Second Lien PFC stand-alone bonds. The City plans to issue either additional stand-alone or double-barrel PFC bonds in the future to finance project costs.

On September 1, 1993, the City imposed a PFC of $3.00 per enplaned passenger, which was increased to $4.50 per enplaned passenger on April 1, 2001. As of December 31, 2004 the City had authority to impose approximately $3.0 billion in PFCs and use approximately $3.0 billion in PFC

revenues at the Airport. Consistent with requirements, PFC funds are used to support projects that (1) preserve or enhance the capacity, safety, or security of the NAS; (2) reduce noise or mitigate noise effects; or (3) furnish opportunities for enhanced competition between or among air carriers.

5.1.3 General Airport Revenue Bonds

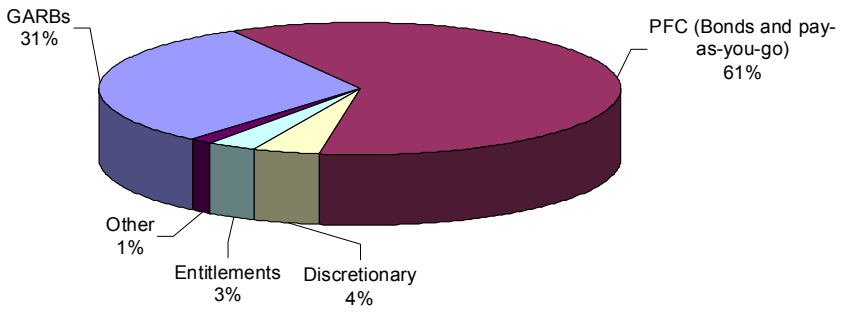
As of December 31, 2004, the City had outstanding approximately $3.2 billion of First Lien, Second Lien, and Third Lien GARBs. The debt service on GARBs is included in airline rates and charges. Generally, issuance of additional GARBs requires airline MII approval under the current Airport Use and Lease Agreement. The City plans to issue additional GARBs to finance project costs and refund existing debt.

5.2 Historical Funding Approach

Historical funding sources for Airport capital development projects have included the following: AIP grants, PFC revenues (pay-as-you-go and backing stand-alone bonds), and GARBs. The Airport has had minimal reliance on federal funding. As shown on **Exhibit V-1**, approximately $1.9 billion in improvements have been constructed at the Airport in the past 10 years (1995 through 2004), funded 93 percent with local funds of $1.8 billion (including PFC revenues and GARBs) and 7 percent with federal funds of $141 million. Of the $141 million in federal funds, approximately 43 percent were entitlement grants and 57 percent were discretionary grants.

Exhibit V-1

10-Year Historical Capital Funding Sources (1995-2004)



Source: City of Chicago.
Prepared by: Ricondo & Associates, Inc.

5.3 OMP-Phase 1 Airfield Projects Funding Plan

Including noise mitigation, the estimated cost of OMP-Phase 1 Airfield Projects is approximately $2.6 billion in 2001 dollars (of which the LOI Projects defined as runway design, construction, and decommissioning projects represent approximately $2.0 billion), or approximately $2.9 billion in

escalated dollars. **Table V-1** presents estimated funding sources for OMP-Phase 1 Airfield Projects.[8] The actual amount of funding available from these sources will depend primarily on future levels of Airport aviation activity, federal reauthorizations, and airline approval.

Table V-1

OMP-Phase 1 Airfield Projects Estimated Sources of Funds [1]

Sources of Funds ($ millions)					
PFCs [2]			FAA AIP Grants		
Pay-As-You-Go	Bond Funds	GARBs [3]	Entitlement [4]	Discretionary [5]	Total [6]
$9.1	$641.6	$1,869.4	$55.8	$304.5	$2,880.3

1 Includes Noise Program and reflects $22.5 million adjustment to May 2003 MII.

2 Includes $40.0 million adjustment from PFC Pay-As-You-Go to PFC Bond Funds.

3 Includes previously issued GARBs and future GARBs for projects with MII approvals.

4 Includes $10.3 million in entitlements already received.

5 Includes a $300 million LOI and a $4.5 million pay-go discretionary award already received.

6 Total may not add due to rounding.

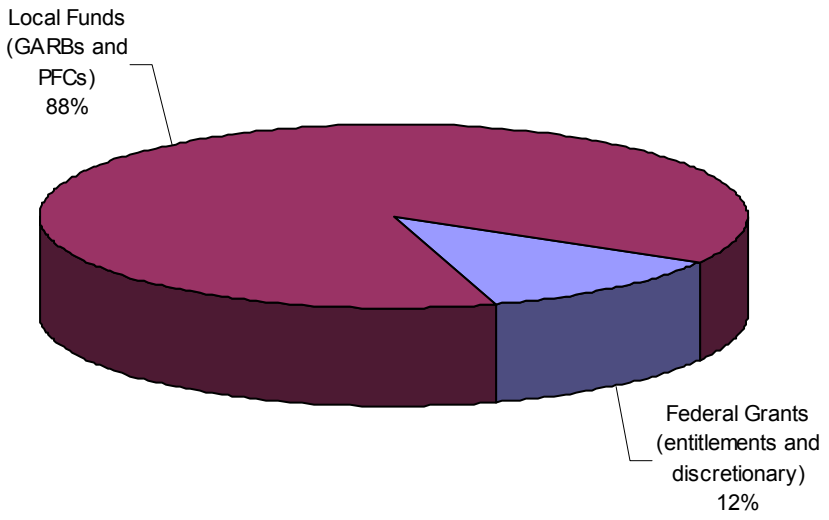
Source: Fullerton & Friar, Inc.
Prepared by: Ricondo & Associates, Inc.

[8] Funding sources as presented in the June 17, 2004 Plan of Finance and subject to change under future MII approvals.

As shown on **Exhibit V-2**, approximately 88 percent of funding sources for the OMP-Phase 1 Airfield Projects (including the Noise Program) are assumed to be local funds including PFC revenues and bonds and GARBs. To date, the airlines serving the Airport have formally granted MII approvals as part of a financing plan to fund more than 88 percent of the OMP-Phase 1 Airfield Projects through a combination of GARBs, pay-as-you-go PFCs, and PFC double-barrel bonds. Funding sources for the remaining 12 percent are assumed in the financing plan to be AIP entitlements and discretionary grants. The financing plan requires a minimum $300 million LOI commitment by the FAA as a condition to the airline funding commitment. In addition, the City intends to commit, as part of this LOI request, approximately $55.8 million in entitlement grants to fund a portion of the construction of the OMP-Phase 1 Airfield Projects.

Exhibit V-2

OMP-Phase 1 Airfield Projects Local Funds and Federal Grants [1]



[1] Includes Noise Program.

Source: Fullerton & Friar, Inc.
Prepared by: Ricondo & Associates, Inc.

5.4 Proposed Cash Flows for LOI Projects

Table V-2 and Table V-3 show the estimated cash flow needs for the LOI Projects (runway projects only) during construction as originally planned by the City in 2001 dollars and the requested flow of funds from the FAA under the LOI for a 10-year timeframe, respectively. The timing of expenditures is subject to change, and amounts shown for 2003 and 2004 do not represent actual amounts spent. The funding needs of the LOI Projects during construction are far greater than the requested funding commitment from the FAA. As permitted, future federal funds will be used to reimburse past expenditures.

Table V-2

Cash Flows for LOI Projects (2001 dollars)

Calendar Year	LOI Projects Expenditures (millions)[1]
2003	$64.1
2004	355.5
2005	495.5
2006	455.3
2007	294.7
2008	286.4
2009	0.0
2010	0.0
2011	0.0
2012	0.0
2013	0.0
2014	0.0
Total [2]	$1,951.5

[1] Expenditures are shown in calendar years as originally planned by the City in 2001 dollars. The timing of expenditures is subject to change, and amounts shown for 2003 and 2004 do not represent actual amounts spent.

[2] Total may not add due to rounding.

Source: O'Hare Partners.
Prepared by: Ricondo & Associates, Inc.

Table V-3

Proposed LOI Reimbursement Schedule

Federal Fiscal Year	Proposed LOI Reimbursement ($ millions)
2003	$0.0
2004	0.0
2005	30.0
2006	30.0
2007	30.0
2008	30.0
2009	30.0
2010	30.0
2011	30.0
2012	30.0
2013	30.0
2014	30.0
Total	$300.0

Source: City of Chicago, Department of Aviation.
Prepared by: Ricondo & Associates, Inc.

5.5 LOI Benefits

Approval of this LOI request will advance FAA's policy goals and assist the City in minimizing the amount of debt necessary to fund the OMP.

5.5.1 Policy Goals

A favorable decision by the FAA on this LOI request will advance two important FAA policy goals. First, the completion of the project will reduce delays and enhance the capacity of the Airport and the NAS. Second, OMP-Phase 1 Airfield Projects will receive significant local commitment with approximately 88 percent local funding.

5.5.2 Financial Implications

If an LOI request is not approved, an alternative method for funding the LOI Projects would be to attempt to secure additional airline MII approvals to issue additional GARBs to finance the construction costs previously identified as being funded with an LOI grant. Estimated debt service payments resulting from an additional $300 million GARB issuance would be approximately $24 million annually. The additional debt service would increase the Airport's cost per enplaned passenger by approximately $0.63 in 2009. The City has an agreement with the airlines to allow it to proceed with construction after the achievement of funding conditions and operational triggers. In 2004, the City met its operational triggers for all subphases of OMP-Phase 1. An LOI commitment will assist the City in moving forward with project construction based on the funding conditions in the agreement.

5.6 Capital Development Program

According to the *AIP Handbook* dated January 8, 2004, the FAA will determine the Sponsor's financial commitment in the analysis of the Airport's financial plan through 2014, the last year of the proposed LOI reimbursement schedule. **Appendix F** contains the Airport's capital development program as developed for the Airport Master Plan dated February 2004.