



# Federal Aviation Administration

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## Memorandum

Date: March 22, 2010

From: Frank SanMartin, Manager, Financial Assistance Division, APP-500

To: Mark McClardy, Acting Manager, Great Lakes Airports Division, AGL-600

Subject: Analysis and Review of City of Chicago's Application for Letter of Intent, Chicago O'Hare International Airport, Chicago, IL

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### Introduction and Summary

The City of Chicago (City) submitted an application requesting a Letter of Intent (LOI) for \$500 million in Airport Improvement Program (AIP) discretionary funds to be paid over a ten-year period for development at Chicago O'Hare International Airport (O'Hare). The Federal Aviation Administration (FAA) has reviewed the LOI application dated March 1, 2009, along with the supplemental submissions by the City. The review was conducted by FAA staff and FAA contractors retained for this purpose.

The FAA has concluded, as detailed below, that the City's application meets the criteria of the applicable statutory provisions based on its analysis and review of the LOI application and the supporting exhibits and supplementary documents attached hereto. Accordingly, the FAA will issue a LOI, informing the City that it is eligible to receive \$410 million in AIP discretionary funds over a 16-year period. The LOI is an FAA document stating the agency's intent to obligate from future budget authority those amounts for allowable project costs at O'Hare in connection with the Completion Phase Airfield of the O'Hare Modernization Program (OMP).

### Letters of Intent Generally

The statute governing Letters of Intent (LOI) is expressly clear that an LOI is not an obligation of the United States; issuance of an LOI is not deemed to be an administrative commitment for financing. See, 49 USC section 47110(e)(3). In part, this section provides:

“The letter shall establish a schedule under which the Secretary will reimburse the sponsor for the Government's share of allowable project costs, as amounts become available, if the sponsor, after the Secretary issues the letter, carries out the project without receiving amounts under this subchapter.”

Thus, an obligation or administrative commitment may be made only as amounts are provided in authorization and annual appropriation laws. These annual amounts then become available as

reimbursement for funds the sponsor has already spent on allowable project costs. Accordingly, the actual decisions to issue these annual grants as scheduled in this LOI are made when the City submits grant applications to the FAA based on costs it has incurred in implementing Completion Phase of the OMP. At that point, the FAA applies the statutory criteria applicable to the use of discretionary grants as identified in this document, and makes decisions on availability for that year's previously proposed scheduled allotment.

### Background

O'Hare is one of the most important airports in the National Airspace System (NAS). The Airport has been ranked first in worldwide operations in 40 of the last 46 years and first in total passengers in 36 of the last 46 years. It provides vital origin and destination service to the nation's third largest metropolitan area, as well as serving as an important connecting hub for two large airlines – American Airlines and United Airlines. Moreover, it provides substantial and growing international service.

In 2008, O'Hare was the world's second busiest airport as measured by total operations and enplaned passengers. Based on Official Airline Guide Data for December 2008, it was the fourth busiest international gateway in the nation in terms of total international enplaned passengers. O'Hare also operates as a major cargo airport.

As of January 2010, 50 scheduled passenger airlines regularly served O'Hare--nine U.S. flag carriers, 25 foreign-flag carriers, and 16 regional/commuter carriers. In addition, 15 carriers provided scheduled cargo service only at O'Hare. Each week, O'Hare provides nonstop passenger service to approximately 130 domestic and approximately 50 international destinations.

Growing demand at O'Hare has resulted in travel delays, affecting passengers traveling to and from Chicago and those using O'Hare for connections. In 2003, O'Hare was the most delayed airport in the country. These delays reverberated across the NAS, causing delays far beyond O'Hare. Although recently delays have been down with a commensurate reduction in total operations and passengers due to the current national and worldwide economic conditions, and the commissioning of the new Runway 9L/27R and the extension of Runway 10/28 in 2008, current FAA forecasts indicate that growth rates are comparable with the EIS forecast. In the Environmental Impact Statement (EIS) prepared to address the OMP and other Total Master Plan components, the FAA has described in detail the purpose and need of the proposed action.

In response to historical airport delay issues, the City of Chicago undertook a modernization program through its O'Hare Modernization Program (OMP) which reconfigures the airfield into a more modern layout, reducing existing delays and increasing capacity, to meet future aviation needs.

Because the City's overall proposal to modernize O'Hare would take many years to construct, the City elected to divide the overall OMP portion into two phases for construction and funding purposes. In this LOI request, the City has identified various components of airfield development. These include OMP Phase 1 Airfield, OMP Completion Phase Airfield (the LOI Projects), OMP Completion Phase, OMP Total Airfield and Total Master Plan. The individual

components for each of these development scenarios are summarized below for clarity in this analysis:

### ***OMP Phase 1 Airfield (LOI AGL-06-01)***

In 2005, the City sought out federal funding assistance for the purpose of developing OMP Phase 1 Airfield projects. These projects included the following:

- New Runway 9L-27R (commissioned on November 20, 2008),
- Extension of Future Runway 10L-28R (Existing Runway 9R-27L) (commissioned on September 25, 2008),
- Future Runway 10C-28C (Relocation of Existing Runway 18-36), under construction now and
- Taxiway system, navigational aids, and other enabling projects necessary to construct and operate these runway projects.

The City submitted its LOI Application to cover the activities in the OMP Phase 1 Airfield development scenario. The FAA issued an LOI on November 21, 2005 for OMP Phase 1 Airfield for \$337.2 million to be paid over 15 years.

### ***OMP Completion Phase Airfield (The LOI Projects)***

The City is now preparing to begin the next phase of the OMP, OMP Completion Phase. When OMP completion phase is completed, O'Hare will have six parallel east-west runways (and two crosswind runways) with sufficient separations to allow multiple independent arrival streams in both good and bad weather. The OMP completion phase runways are identified in **Exhibit 1** and include the following:

- Extension of Runway 9R-27L (3,293' extension on the west end of Runway 9R; includes the relocation of the Runway 27L threshold, ultimate length of 11,260')
- Future Runway 9C-27C (Relocation of Existing Runway 14L-32R) 11,245' x 200'
- Future Runway 10R-28L (Relocation of Existing Runway 14R-32L) 7,500' x 150'

The ultimate configuration will allow the airport to operate primarily on an east-west flow basis. The parallel runway configuration eliminates most runway intersections so runway dependencies are reduced resulting in reduced delays. This delay reducing benefit increases the capacity of the Airport and in turn, carries over to the national air transportation system. In addition to the new runway development, the LOI projects include Taxiway LL which is a World Gateway Program (WGP) taxiway improvement. The WGP includes a new Terminal 4, new Terminal 6, an extension to the K Concourse, and associated taxiway improvements and enabling projects and was proposed as an airfield improvement before the City proposed the OMP. The project components that make up OMP Completion Phase Airfield are listed in **Table 1**.<sup>1</sup>

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<sup>1</sup> The City's listing of the LOI projects excludes the OMP Completion Phase Noise Program projects. FAA includes these costs for the BCA review as it better represents the total costs of the program. FAA will still consider future funding requests for AIP Noise monies that are separate from the LOI award.

Table 1 - LOI Projects - OMP Completion Phase Airfield

Project Components	BCA Cost Estimate (unescalated 2008 dollars) <sup>1</sup>	LOI Application (Escalated dollars) <sup>2</sup>
Runway 9R-27L Extension (Previous 9L-27R)	\$ 357,188,000	\$ 430,387,241
Future Runway 9C-27C (Relocation of Existing Runway 14L-32R)	\$ 1,469,688,000	\$ 1,739,784,000
Future Runway 10R-28L (Relocation of Existing Runway 14R-32L)	\$ 578,061,000	\$ 681,942,410
WGP Taxiway Improvements	\$ 242,175,000	\$ 288,480,776
OMP Completion Phase Noise Program	\$ 104,697,000	\$ 136,661,060
<b>Total Project Costs</b>	<b>\$ 2,751,809,000</b>	<b>\$ 3,277,255,487</b>
<sup>1</sup> Source: ORD LOI Application, Table IV-1, pg. IV-4, dated 3/1/09		
<sup>2</sup> LOI Template: Estimates are cash flowed and escalated using 5% per year		

### ***OMP Completion Phase***

The OMP Completion Phase encompasses more development than the OMP Completion Phase Airfield (LOI Projects) defined above. OMP completion Phase consists of the OMP completion phase runways described above as well as the western terminal complex, people mover, and program-wide requirements such as wetlands and noise mitigation and land acquisition.

The City's OMP Completion Phase includes the Western Terminal complex and on airport circulation components as it expects to improve terminal service for the future demands of new and existing carriers. The City currently can provide passenger handling facilities at O'Hare sufficient for the growth that will be accommodated by the runways and related facilities to be constructed in OMP completion phase airfield without construction of new gates.

### ***OMP Total***

The OMP Total scenario includes all of the airfield components listed above under OMP Phase 1 and OMP completion phase. It does not include the project costs for Taxiway LL (See **Table 2** for OMP Total and LOI project cost breakdown by development scenario). Note: OMP Total costs are taken from the City's February 24, 2009, Current Working Estimate which is provided in 2007 dollars.

Development Scenario	Project Components	Project Costs (2007 dollars)	LOI Application (2008 dollars)
OMP Phase 1	OMP Phase 1 (including Noise)	\$ 3,210,807,015	
OMP Completion Phase	Runway 9R-27L Extension (Previous 9L-27R)	342,900,057	357,187,559
OMP Completion Phase	Future Runway 9C-27C (Relocation of Existing Runway 14L-32R)	1,410,900,660	1,469,688,187
OMP Completion Phase	Future Runway 10R-28L (Relocation of Existing Runway 14R-32L)	554,938,752	578,061,200
OMP Completion Phase	OMP Completion Phase Noise Program	104,697,000	104,697,000
OMP Completion Phase	OMP Western Terminal	2,184,850,393	
OMP Completion Phase	OMP On-Airport Circulation	546,646,919	
	<b>OMP Total Project Costs</b>	<b>\$ 8,355,740,795</b>	
World Gateway Program	WGP Taxiway Improvements (Taxiway LL)		242,175,000
	<b>LOI Project Costs</b>		<b>\$ 2,751,808,946</b>

### ***Total Master Plan***

The Total Master Plan scenario includes all of the projects identified on the City's September 2005 Future Airport Layout Plan (ALP). These include OMP Total development and the complete World Gateway Program (Extension of the K Concourse, Terminal 4, Terminal 6, and associated taxiway improvements and enabling projects). The components included in this scenario are identical to those analyzed in the Build Out Phase of Alternative C in the FAA's EIS.

It is important to note that the Airport's Capital Improvement Program (detailed in the City's Total Master Plan) is assumed to occur in all scenarios, including the No-Action scenario.

### LOI Analysis

The LOI committee has reviewed the FY 2009 LOI request for the City of Chicago.<sup>2</sup> The decision to issue the LOI is based on the FAA's analysis of the LOI application and supporting benefit cost analysis (BCA) information. The committee has concluded that the Projects have satisfied all the LOI statutory and administrative programming requirements, including the requirements under 49 USC section 47110(e). Under section 47110(e)(2)(C), the project must meet the criteria of section 47115(d) and (if located at a medium or large hub airport) be a project that the FAA decides will enhance system-wide airport capacity significantly.

Section 47115(d)(1) establishes the factors that the FAA considers in selecting projects that are intended to preserve and improve capacity, the agency must consider six separate factors. They are

- 1) The project's effect on overall national transportation system capacity;
- 2) Project benefits and costs;
- 3) Financial commitment from Non-U.S. government sources to preserve or improve airport capacity;
- 4) Airport improvement priorities of the States to the extent such priorities are not in conflict with 1 and 2 above;
- 5) Projected passenger or aircraft growth that will be using the airport;
- 6) Ability of the project to foster US competitiveness in securing global air cargo activity;

For all projects, including those to preserve or enhance capacity, the FAA must consider two additional factors under section 47115(d)(2). They are:

- 1) Whether funding has been provided for all other qualifying projects that were given higher priority during the fiscal year;
- 2) Whether the sponsor will be able to begin construction within the fiscal year in which the grant is made or within six months thereafter, whichever is later.

### **Considerations, Findings and Conclusions with Supporting Reasons or Bases**

#### Determinations involving Section 47110(e)

Section 47110(e)(2)(C) requires a determination that the project must be one that will enhance system-wide airport capacity significantly.

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<sup>2</sup> The LOI request was submitted in March, 2009. The LOI committee is chaired by APP-500 and includes ARP representatives from APP-510, APP-520. The committee may also include representation an Airports regional division manager (or designee) with no LOI candidate in the current year, the Office of Aviation Policy and Plans (APO), the Air Traffic Organization and/or other FAA offices, as determined by the committee chair.

Program Guidance Letter 07-03, titled, "Revised and Updated Requirements for Letter of Intent (LOI) Requests" dated November 20, 2006, states that "Because a Large or Medium hub airport is by definition an airport that supports at least 0.25% of U.S. enplanements, these airports by definition represent a significant portion of system-wide airport capacity."

In addition, PGL 07-03 identifies several factors that FAA may consider in making the system wide capacity determination.

In its LOI application, O'Hare provided evidence that the OMP Completion Phase Airfield projects will address several of the factors that would enhance system-wide airport capacity significantly. The City references the original FAA Order limiting scheduled operations at O'Hare as well as the follow on Order providing further evidence of the system wide impacts attributable to delays at O'Hare. FAA determinations with regard to significant system wide capacity impacts are noted below:

1. Capacity increase in annual operations, either in Visual Flight Rules (VFR) or Instrument Flight Rules (IFR) conditions or both.

OMP Completion Phase Airfield results in a capacity increase in both VFR and IFR conditions. As was demonstrated in the final BCA, the OMP Phase 1 Airfield was capped at 1,150,000 total annual operations and approximately 16 minutes of average annual delay. With the completion of the proposed project, the Airport, based on FAA extrapolation and professional judgment, would most likely perform at an average delay of between 13 and 16 minutes per operation at 1,400,000 total annual operations. In summary, the Airport could accommodate 250,000 additional operations with roughly the same level of average annual delay (FEIS, R-11) which enhances system-wide airport capacity significantly.

2. Increase in airport service volume by the addition of a new runway, elimination of runway intersections or other airfield operational constraints.

OMP Completion Phase Airfield includes the construction of two new runways and a runway extension. In addition, at the end of the project, two existing crosswind runways will be decommissioned reducing the total number of runway intersections. OMP Phase 1 Airfield has three runway intersections restricting the use of these runways during certain wind and weather conditions. With the OMP Completion Phase Airfield, the number of runway intersections is reduced to two. This reduces the restrictions and complexity of the airfield. This will allow the Airport to accommodate an increase in total airport operations. For the purposes of the BCA, the Phase 1 airfield was capped at 1,150,000 total operations with an annual average delay of 16 minutes per operation. The addition of two new runways and runway extension, and then subsequent decommissionings, will result in both an increase in Airport capability and reduction in delay. The OMP Completion Phase Airfield layout will be able to accommodate approximately 1.4 million total annual operations with an average annual delay of between 13 and 16 minutes. As such, the OMP Completion Phase Airfield will be able to accommodate approximately a quarter of a million additional total annual operations at

about the same delay level as the OMP Phase 1 Airfield enhancing system-wide airport capacity significantly.

3. Increase in hourly “call rates” (i.e. local tower acceptance rates in terms of hourly arrivals and departures).

OMP Completion Phase Airfield will result in increased arrival and departure acceptance rates both during good and poor weather conditions. Under the OMP Phase 1 Airfield condition, on an annual basis, the average hourly balanced arrival rate will increase from 111 to 130 operations per hour. The average hourly departure rate will increase from 127 to 135 per hour.

During the best good weather configuration in the OMP Phase 1 Airfield condition, the hourly arrival rate is 120 operations per hour. With the completion of the project, the worst good weather configuration will be able to accommodate 120 arrival operations per hour. During approximately 54% of the year, the Airport will be able to accommodate 140 arrivals per hour. On the departure side, the completion of the project will allow the Airport to accommodate 140 departures per hour approximately an additional 10% of the year.

The benefits of the OMP Completion Phase Airfield illustrate dramatic hourly throughput increases during poor weather conditions. With the OMP Phase 1 Airfield, the primary poor weather configurations are only able to accommodate 92 and 76 hourly arrivals, respectively. With the proposed action, the hourly arrival rate increases to 116 hourly arrivals for both primary operating configurations enhancing system-wide airport capacity significantly.

4. Delay reduction relative to existing or forecast levels, either at the individual airport or among multiple airports serving the same geographic area.

OMP Completion Phase Airfield is able to accommodate additional operations (as passengers) with a reduction in delay. During the EIS modeling, it was determined that the proposed project can accommodate 1,120,600 total annual operations with an annual average of 5.0 minutes per operation. The OMP Phase 1 Airfield could accommodate the same level of total annual operations with an annual average of 14.2 minutes per operation (EIS D-18).

In addition, the OMP Completion Phase Airfield can accommodate additional operations beyond the EIS planning horizon, albeit with higher annual average delays. In Appendix R – Alternate Considerations of the EIS, the FAA stated that the OMP Completion Phase Airfield would most likely perform at an average annual delay of between 13 and 16 minutes per operation at approximately 1.4 million operations. Based on extrapolation of the current FAA TAF, approximately 1.4 million operations would be reached beyond 2034; a significant enhancement of system-wide airport capacity.

5. Projected delay savings as a percentage of existing delays at the airport, or as a percentage of all national delays.

Delay savings by finishing the OMP Completion Phase Airfield are substantial. As mentioned above, based on the EIS, the average annual delays at 1,120,600 total annual operations are reduced by approximately 65% when compared to the OMP Phase 1 Airfield.

In addition, the O'Hare Modernization EIS outlines how delays at O'Hare contribute to delays throughout the National Airspace System. The EIS notes "The physical and operational characteristics of O'Hare contribute to high levels of congestion and delay that are expected to become more severe over the forecast period. Continued growth in air traffic, congestion and delay at O'Hare in turn affects the efficiency of the entire NAS". The projected delay savings enhance system-wide airport capacity significantly.

6. Delay reduction that can be shown to enhance airline schedule reliability, even if the project does not lead to substantial increases in operations.

A problem with the runway geometry at O'Hare has always been that it allowed for 3 independent arrival runways during good weather that was reduced to 2 independent arrival runways during poor weather. The airlines, not knowing when or for how long poor weather will last, schedule their operations based on the good weather condition which exists approximately 90% of the year. Poor weather conditions, when they exist, would result in delays and cancellations. The OMP Completion Phase Airfield will result in enhanced airline schedule reliability as it will better balance the good weather and poor weather capability of the Airport. OMP Phase 1 Airfield provided benefits in reliability over the pre-OMP airfield. The OMP Completion Phase Airfield furthers the balance between good weather and poor weather capability. The OMP Completion Phase Airfield results in a minimum of 3 independent arrival runways in both good and poor weather conditions. As such, when poor weather sets in, there is less of an impact on the Airlines as the reliability of the schedule has been increased. This improvement enhances system-wide airport capacity significantly.

7. Creation of an additional arrival stream or reduced dependency between arrival streams.

The OMP Completion Phase Airfield further reduces the dependency between arrivals and departures at the Airport. At the end of construction, the Airport will have six parallel runways oriented in the east west direction and a pair of parallel crosswinds. This allows the Airport to accommodate quad VFR arrivals during good weather while the OMP Phase 1 Airfield only can accommodate three parallel arrivals. Based on the FAA's analysis, this benefit based on wind and weather conditions may be available 54.0% of the year. This additional independent arrival stream will allow the airport to accommodate an estimated additional 20 arrivals per hour during a balanced airport operation enhancing system-wide airport capacity significantly.

With respect to the impact of the project on the national air transportation system FAA finds that the project will enhance overall airport system capacity significantly as the City has demonstrated that the capacity benefits are real, measurable and significant. These projects, once commissioned, will help FAA meet their Flight Plan Target of increasing the annual service volume of the 35 Operational Evolution Partnership airports by at least 1 percent annually. This target is, measured as a five-year moving average and is expected to be updated to include the OMP completion phase runway projects. As one of the country's busiest airports, the project's impact on the national air transportation system is most predominantly felt in the segment of the national air transportation system comprising the *airport system* segment. Accordingly, based on the significant airport system benefits, the FAA has considered and determined that the project will enhance system wide airport capacity significantly at O'Hare and throughout the NAS.

Section 47110(e)(4) limits the total estimated amount of future Government obligations covered by all outstanding letters of intent to not more than the amount authorized to carry out section 48103 of this title, less an amount reasonably estimated to be needed for grants under section 48103 that are not covered by a LOI.

The FAA has structured its LOI offer to the City in a manner that assures compliance with the terms of section 47110(e)(4). As a matter of policy stated in Section 1071 of FAA's Program Guidance Letter 07-03 titled, Revised and Updated Requirements for Letter of Intent Requests (PGL 07-03), the FAA limits the aggregate amount available for all LOIs to 50 percent of the available discretionary funding categories. This limitation ensures that the FAA has sufficient funding to preserve a reasonable amount for grants not covered by LOIs.

In addition, the FAA has reviewed its LOI budget to account for prior LOI awards, current proposed LOI requests, and those LOIs that are reasonably foreseeable in the future, given ongoing planning initiatives. The LOI funding schedule adopted by the FAA for this LOI ensures compliance with the requirements of section 47110(e)(4) within the limitations of Section 1071 of FAA's PGL 07-03. Also, the FAA is extending the payment schedule from the 10 years requested by the City to 16 years. This longer schedule reduces the annual commitment to the LOI by approximately 46% of the City's request during the City's proposed pay period. This assures that discretionary funds will remain available for other projects. The extension of the funding schedule for OMP Completion Phase Airfield is similar to many other funding schedules adopted for other qualifying projects, where the agency has also extended the timeframe for payment. This aspect of the decision reflects the FAA's support of this project while acknowledging its obligation to protect the health of the overall discretionary funding program. Accordingly, the FAA has determined that this requirement is met.

#### Considerations involving Section 47115(d).

In contrast with other statutory provisions regarding funding (such as Section 47106(c)(1)(B)) where the Agency is required to make specific findings or determinations, this provision of law imposes a duty upon the Secretary, in selecting a project for an individual grant to preserve and improve capacity, to "consider" the following:

Section 47115(d)(1)(A) requires the Secretary to consider the project's effect on the overall capacity of the national air transportation system.

Earlier, in addressing the requirements of section 47110(e), the FAA considered whether the project enhanced system-wide airport capacity significantly. As noted above, the FAA determined that the OMP Completion Phase Airfield will enhance system-wide airport capacity significantly and determined that the OMP Completion Phase projects would have significant national airport system benefits. Accordingly, the FAA finds that its determination above satisfies the consideration criteria of 47115(d)(1)(A).

Section 47115(d)(1)(B) requires the Secretary to consider the benefits and costs of the project.

FAA Systems and Policy Analysis Division (APO-200) conducted a review of the BCA for the OMP Completion Phase Airfield. Given the fact that the major economic benefit associated with the OMP Completion Phase Airfield was a reduction in delay for the incumbent airport users (both passengers and air carriers), the City selected an approach that simply measured the benefits associated with reduced passenger travel time and reduced aircraft operating costs<sup>3</sup>. For the purpose of producing a conservative benefit cost ratio, the City imposed a constraint on operations by capping operations in the out-years so that average annual delays would not exceed that level of delay which caused the FAA to negotiate voluntary operational caps at the Airport shortly after AIR-21 phased out slots at O'Hare.

During the review, it was established that the sponsor's sensitivity analysis 2a was the closest representation to baseline conditions at the airport. Additionally, various new sensitivity analyses were conducted to assess potential changes to activity forecasts, construction schedule, changes in capital costs, change to the discount rate, and changes to the distribution of the occurrences of block hour times. APO concluded that it appears the project (as detailed under sensitivity 2a) is cost beneficial and that the results of the additional sensitivity analyses indicate the project remains cost beneficial over a range of different assumptions. The FAA's internal review memo dated January 12, 2010, is attached to this analysis as **Attachment A**.

Given the sizable Federal investment requested, the FAA undertook additional steps to determine if an investment in the OMP Completion Phase Airfield projects was sound. The FAA executed a consulting contract with GRA Incorporated (GRA) to review the City's benefit cost analysis. Previously, the FAA had engaged this company to perform a similar analysis for OMP Phase 1 BCA. GRA concluded that the project (as detailed under Sensitivity 2a) had a reported benefit cost ratio of 1.25 and that the project was justified. This corroborated FAA's findings that the project was cost beneficial.

In addition, GRA observed that the OMP Phase 1 Airfield resulted in a more reliable airfield because it produces a third arrival stream in IMC conditions. If this was considered in the analysis, FAA could establish a revised base case that would increase the Phase 1 cap at operations levels that would produce up to 20 minutes of average delay and still produce the

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<sup>3</sup> In the 2005 BCA, the City selected a social surplus approach to monetize the economic benefits associated with the proposed expansion. A social surplus approach is recommended when demand exceeded the available capacity, and incremental expansions resulted in increases in the number of passengers, but only modest reductions in delays. In these circumstances, a social surplus approach may be used to calculate the benefits of the project.

same reliability that the airfield produced in the No-Action (pre OMP) case. A higher cap in the base case would then result in more net benefits for the OMP Completion Phase Airfield. FAA opted to consider this as a non quantified benefit in the analysis. GRA provided the FAA with a summary report of their findings and is attached as **Attachment B**.

Finally, FAA contracted with MITRE to conduct research and develop a methodology for measuring how delays at a particular airport can propagate throughout the National Airspace System.<sup>4</sup> Specifically, the research will develop delay propagation multipliers designed for use in cost-benefit analyses for airports. The system application multiplier reflects the relationship between arrival and departure delays at an airport and arrival delays at all other airports. These multipliers can then be applied to estimates of passenger and airline delay costs. FAA has received a report titled, “Calculating Delay Propagation Multipliers for Cost- Benefit Analysis,” dated February 2010, which indicate that downstream delays at O’Hare can reach 64% of the local delays. The additional downstream delay benefits would result in the increase in the baseline b/c ratio from 1.15 to 1.59. All other sensitivity analyses would increase proportionally. Since APO-200 has not yet formally adopted the findings of this report for inclusion into benefit cost analysis, FAA opted to consider the downstream benefits as a non-quantified benefit in the analysis.

The FAA has considered the benefit and cost of the project and concludes that the project will be cost beneficial over a reasonable range of probable outcomes.

Section 47115(d)(1)(C) requires the Sponsor to demonstrate financial commitment from Non-U.S. government sources to preserve or improve airport capacity.

The FAA reviewed the City’s financing plan that was submitted as part of the March 1, 2009, LOI application. FAA’s review considered the sponsors request with respect to the non-federal contributions.

The total cost estimate for the OMP Completion Phase is \$2.75 billion in 2008 dollars (\$3.28 billion in escalated dollars). With respect to the non-federal contributions, FAA has historically considered the sponsor’s financial commitment to be that which minimizes the reliance of AIP assistance necessary to fund the project. In seeking an LOI, FAA encourages a sponsor to seek and use its own resources to the maximum extent reasonable and to keep Federal financial support to the minimum amount necessary to allow the project to proceed. Ultimately, this allows FAA to make scarce funds available to as many sponsors as possible seeking new capacity initiatives.

In its financing plan, the City requested approximately 15% (\$500 million) of the escalated project costs to come from AIP in the form of Discretionary funds under a new LOI. The sponsor’s shares (\$1,001 million) would be contributions from passenger facility charges and funded out of PFCs (PAYgo and Bond Funds) and \$1,776 million coming from general airport revenue bonds (See **Table 3**).

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<sup>4</sup> MITRE is a research and development firm that works with FAA in support of FAA’s mission.

Financing Sources	Amount	% of Total Costs
Entitlement	\$ -	0%
Discretionary	\$ 500,000,000	15%
PFC (Design-approved)	\$ 177,600,000	5%
PFC (Construction-intend to file)	\$ 823,228,760	25%
GARBs	\$ 1,776,426,727	54%
	\$ 3,277,255,487	100%

Source: ORD LOI Template dated March 2009

On the surface, O'Hare's discretionary request of \$500 million is considerably higher than other LOI awards for other runway projects at large hub locations. However, if one viewed the discretionary request on a per runway basis (e.g. \$200 million for each new runway and \$100 million for the runway extension), the request would be higher but more in line with LOI awards for similarly priced runway programs at other airports (See **Table 4**)<sup>5</sup>.

Location	Discretionary (Total)	AIP Total <sup>1</sup>	Total Project Costs (LOI) <sup>2</sup>	Discretionary Rate	Fed Rate
Seattle (Amended)	206,555,686	\$ 301,293,560	\$ 1,129,000,000	18%	27%
St Louis	180,000,000	\$ 226,434,000	\$ 1,100,000,000	16%	21%
Chicago Ph1 (10C-28C)	180,000,000	\$ 213,000,000	\$ 1,702,579,000	11%	13%
Atlanta	179,000,000	\$ 240,000,000	\$ 1,350,000,000	13%	18%
Washington-Dulles	150,000,000	\$ 200,220,000	\$ 390,000,000	38%	51%
Houston	100,000,000	\$ 193,024,000	\$ 331,714,000	30%	58%
Cincinnati	100,000,000	\$ 131,699,860	\$ 233,000,000	43%	57%
Minneapolis	95,000,000	\$ 109,000,000	\$ 563,000,000	17%	19%
Denver	90,313,000	\$ 123,345,000	\$ 179,284,000	50%	69%
Charlotte	85,298,836	\$ 183,903,879	\$ 300,110,000	28%	61%
Chicago Ph1 (9L-27R)	85,000,000	\$ 100,000,000	\$ 801,200,000	11%	12%
Miami	69,040,000	\$ 110,976,481	\$ 208,000,000	33%	53%
Boston	58,000,000	\$ 91,000,000	\$ 137,909,000	42%	66%
Orlando	52,086,186	\$ 107,760,961	\$ 203,000,000	26%	53%
Chicago Ph1 (10L ext)	40,000,000	\$ 47,000,000	\$ 376,563,000	11%	12%
<b>Average / Location</b>	<b>\$ 111,352,914</b>	<b>\$ 158,577,183</b>	<b>\$ 600,357,267</b>	<b>19%</b>	<b>26%</b>

<sup>1</sup> Total AIP funds include pre-LOI and LOI funds including funds awarded through amendments

<sup>2</sup> Project Costs are based on updated or escalated costs (if applicable)

As seen in **Table 5**, for new runway programs with total project costs close to \$1 billion, the average discretionary award has been \$166 million.<sup>6</sup> On a percentage basis, ORD's discretionary request (15% of the overall costs) is slightly higher than the average discretionary

<sup>5</sup> For evaluation purposes, Chicago OMP Phase 1 LOI was viewed on a per runway basis. Therefore, LOI amounts and Project Costs were distributed between the three runway projects.

<sup>6</sup> The calculation assumed Chicago (OMP Phase 1) with three new runways, with only two reaching the comparable total project cost level.

award (14% of the overall costs) but lower than the average overall federal participation rate (18% of overall costs).

Location	Discretionary (Total)	AIP Total	Total Project Costs (LOI)	Discretionary Rate	Fed Rate
<b>Seattle (Amended)</b>	206,555,686	\$ 301,293,560	\$ 1,129,000,000	18%	27%
<b>St Louis</b>	180,000,000	\$ 226,434,000	\$ 1,100,000,000	16%	21%
<b>Atlanta</b>	179,000,000	\$ 240,000,000	\$ 1,350,000,000	13%	18%
<b>Chicago Ph1 (10C-28C)</b>	180,000,000	\$ 213,000,000	\$ 1,702,579,000	11%	13%
<b>Chicago Ph1 (9L-27R)</b>	85,000,000	\$ 100,000,000	\$ 801,200,000	11%	12%
<b>Average / Location</b>	<b>\$ 166,111,137</b>	<b>\$ 216,145,512</b>	<b>\$ 1,216,555,800</b>	<b>14%</b>	<b>18%</b>

The City's request (when viewed in total) could also be compared against two earlier LOIs that included multiple runway development programs. In the early 1990s, FAA provided LOI funding for the new Denver airport which included five new runways and the Detroit Metropolitan Wayne County airport for its new two-runway expansion. These earlier investments would be comparable to the O'Hare request if they were converted to current-year dollars:

- a. The FAA provided more than \$672 million in AIP funds for the new Denver airport, if those funds were adjusted to 2009 dollars.<sup>7</sup>
  - b. To build two new runways at Detroit Metro, the FAA provided more than \$444 million, if those funds were adjusted to 2009 dollars.<sup>8</sup>
- **Pledged Entitlements:** The City of Chicago committed all of their entitlements through FY2010 for the LOI for Phase 1. The City's plan of finance for OMP Completion Phase does not include entitlement grants as a source of funding because it is assumed that with an increase in the PFC collection level, entitlements will not be available. This is consistent with the recent Reauthorization bill.
  - **Other Sponsor Sources: PFC:** The City indicated that they will use Passenger Facility Charges to cover approximately 30% of the project costs. In the PFC approval dated February 26, 2009, the City received approval to impose and use \$177.6 million of PFC's for the design for OMP Completion Phase Airfield projects. The City intends to file future PFC applications for the construction of OMP Completion Phase Airfield projects. It is currently estimated that the City would need to commit an additional \$823 million, plus interest, of PFCs for OMP Completion Phase Airfield projects. FAA expects the City to file applications sequentially as needed for projects in the OMP.

<sup>7</sup> Nominally, Denver received \$444 million. This amount was adjusted to 2009 dollars using a compound annual growth rate of 2.1%.

<sup>8</sup> Nominally, Detroit received \$300 million. This amount was adjusted to 2009 dollars using a compound annual growth rate of 2.1%.

Even though the City has PFCs committed through April 1, 2028, applicable PFC laws place no limit on the duration of collecting PFCs for eligible projects. FAA has already approved PFC collection authority at 24 other airports beyond 2024. Also, even though the City has based its collections on a PFC rate of \$4.50, FAA reauthorization is contemplating PFC rate increases above that level. Any rate increases enacted by law above \$4.50 would likely accelerate the City's ability to collect PFC revenues. After review of the City's PFC status and funding potential, the FAA determined that the City's PFC funding estimates were supportable and realistic. Therefore, FAA believes it is reasonable for the City to include an additional \$823 million of PFCs in the financial plan.

- **Other Sponsor Sources: General Airport Revenue Bonds:** The City indicated that they will use GARBs to cover approximately 54% of the project costs. The FAA has reviewed the information provided by the City on other sources of financing and agrees that the City has the authority and means to issue bonds to cover these costs. The City has stated that it is prepared to move forward with a funding plan for construction without airline support. It prefers a mutually agreeable plan, and the City hopes that ongoing negotiations are productive in reaching an agreement that would cover these bond costs. The City, however, has also indicated that the benefits of the OMP are of such great importance to the City that the City will use funding options that will allow the program to move forward if there is no agreement.

## LOI Award

FAA will offer an LOI in the amount of \$410,000,000 of which all of it is in new discretionary funds (see LOI annual payout in **Table 6**).

Year	Project Costs <sup>1</sup>	Entitlement	Discretionary	Annual LOI Funding
2008	\$ 3,199,111	\$ -	\$ -	\$ -
2009	71,864,793	-	-	\$ -
2010	479,621,679	-	-	\$ -
2011	1,075,624,550	-	40,000,000	\$ 40,000,000
2012	985,384,272	-	30,000,000	\$ 30,000,000
2013	474,703,661	-	30,000,000	\$ 30,000,000
2014	186,857,422	-	30,000,000	\$ 30,000,000
2015		-	25,000,000	\$ 25,000,000
2016			25,000,000	\$ 25,000,000
2017			25,000,000	\$ 25,000,000
2018			25,000,000	\$ 25,000,000
2019			25,000,000	\$ 25,000,000
2020			25,000,000	\$ 25,000,000
2021			25,000,000	\$ 25,000,000
2022			25,000,000	\$ 25,000,000
2023			20,000,000	\$ 20,000,000
2024			20,000,000	\$ 20,000,000
2025			20,000,000	\$ 20,000,000
2026	-	-	20,000,000	\$ 20,000,000
<b>Total</b>	<b>\$ 3,277,255,488</b>	<b>\$ -</b>	<b>\$ 410,000,000</b>	<b>\$ 410,000,000</b>

FAA's AGL office recommended a longer schedule of payments that took into account other LOI commitments already approved such as MSP, CLE, IND and O'Hare Phase 1 and AGL's ability to undertake other projects during the payback period. Also, a longer payback schedule reduces the annual commitment to the LOI budget, assuring that discretionary funds will remain available for other projects. Therefore, a 16 year payout steam was established. A 16 year pay period is in line with 3 other locations receiving significant LOI awards (Detroit -19 years, Cleveland-17 years, and Seattle-18 years) as well as O'Hare OMP Phase Airfield 1 (15 years).

The overall discretionary participation rate of 13% is lower than most of the discretionary rates seen for other new runway projects at large hub airports (see **Table 7**). Also, if OMP Completion Phase Airfield is viewed on a per runway basis, the discretionary rates are still on the lower half of rates for comparable runway programs.

Location	Discretionary (Total)	AIP Total <sup>1</sup>	Total Project Costs (LOI) <sup>2</sup>	Discretionary Rate	Fed Rate
Denver	90,313,000	\$ 123,345,000	\$ 179,284,000	50%	69%
Cincinnati	100,000,000	\$ 131,699,860	\$ 233,000,000	43%	57%
Boston	58,000,000	\$ 91,000,000	\$ 137,909,000	42%	66%
Washington-Dulles	150,000,000	\$ 200,220,000	\$ 390,000,000	38%	51%
Miami	69,040,000	\$ 110,976,481	\$ 208,000,000	33%	53%
Houston	100,000,000	\$ 193,024,000	\$ 331,714,000	30%	58%
Charlotte	85,298,836	\$ 183,903,879	\$ 300,110,000	28%	61%
Orlando	52,086,186	\$ 107,760,961	\$ 203,000,000	26%	53%
Seattle (Amended)	206,555,686	\$ 301,293,560	\$ 1,129,000,000	18%	27%
Minneapolis	95,000,000	\$ 109,000,000	\$ 563,000,000	17%	19%
St Louis	180,000,000	\$ 226,434,000	\$ 1,100,000,000	16%	21%
Atlanta	179,000,000	\$ 240,000,000	\$ 1,350,000,000	13%	18%
Chicago Ph 2 (9R-27L ext)	62,000,000	\$ 62,000,000	\$ 494,541,635	13%	13%
<b>Chicago Ph2 (All)</b>	<b>410,000,000</b>	<b>\$ 410,000,000</b>	<b>\$ 3,277,255,000</b>	<b>13%</b>	<b>13%</b>
Chicago Ph 2 (10R-28L)	98,000,000	\$ 98,000,000	\$ 783,594,126	13%	13%
Chicago Ph2 (9C-27C)	250,000,000	\$ 250,000,000	\$ 1,999,119,727	13%	13%
Chicago Ph1 (10L ext)	40,000,000	\$ 47,000,000	\$ 376,563,000	11%	12%
Chicago Ph1 (9L-27R)	85,000,000	\$ 100,000,000	\$ 801,200,000	11%	12%
Chicago Ph1 (all)	305,000,000	\$ 360,000,000	\$ 2,880,342,000	11%	12%
Chicago Ph1 (10C-28C)	180,000,000	\$ 213,000,000	\$ 1,702,579,000	11%	13%
<sup>1</sup> Total AIP funds include pre-LOI and LOI funds including funds awarded through amendments					
<sup>2</sup> Project Costs are based on updated or escalated costs (if applicable)					

The \$410 million award is commensurate with the level of funding offered to the City under the OMP Phase 1 Airfield. In OMP Phase 1 Airfield, the City received approximately \$360 million (combined entitlement and discretionary funds). This represented approximately 12% of the total funding plan. For the completion phase program, an offer of \$410 million equates to approximately 13% of the total funding plan. The 13% discretionary participation rate is also on par with the discretionary levels recommended when utilizing FAA's new model that calculates federal discretionary rates of participation. The model utilizes a statistical relationship between project size and the Federal discretionary rate for past LOIs, then adjusts the rate for criteria such as airport size, type of project, project's benefit and cost, capacity benefits (including impacts on the national air transportation system), sponsor's financial commitment to project, and historic discretionary funding levels. **Exhibit 2 (a and b)** includes the model's input criteria and calculations for determining the amount of discretionary funding.

As seen in **Table 8**, FAA's proposed LOI would require a sponsor contribution of an additional \$90 million (or just 3% of the overall costs), up from \$2,777 million that was identified in the sponsor's financial plan.

Financing Sources	ORD Financial Plan				FAA Review			
	ORD Sources	FAA Contribution	Total Sources	% of Total Costs	ORD Sources	FAA Contribution	Total Sources	% of Total Costs
Entitlement			\$ -	0%	\$ -			0%
Discretionary		\$ 500,000,000	\$ 500,000,000	15%		\$ 410,000,000	\$ 410,000,000	0%
PFC (Design-approved)	\$ 177,600,000		\$ 177,600,000	5%	\$ 177,600,000		\$ 177,600,000	6%
PFC (Construction-intend to file)	\$ 823,228,760		\$ 823,228,760	25%	\$ 823,228,760		\$ 823,228,760	29%
GARBs	\$ 1,776,426,727		\$ 1,776,426,727	54%			1,776,426,727	62%
Other Sponsor Contribution			\$ -		\$ 90,000,000		\$ 90,000,000	3%
	\$ 2,777,255,487	\$ -	\$ 2,777,255,487	100%	\$ 2,867,255,487	\$ 410,000,000	\$ 3,277,255,487	100%

Based on the airport's size and the nature and magnitude of the project, the City may use general airport revenue bonds or other local funds to fund some portion of the funds not committed by AIP or PFC. With this in mind, FAA reviewed the City's financing plan to determine if the City has sufficient non-U.S. government financial resources available for this project.

In 2005, the FAA hired John F. Brown (Brown) to conduct a comprehensive review of the City's proposed financing plan for OMP Phase 1 Airfield projects.<sup>9</sup> In addition, FAA asked Brown to assess the OMP Total Airfield scenario as well as the overall O'Hare Total Master Plan. The OMP Total Airfield Scenario included OMP Phase 1 Airfield and OMP Completion Phase Airfield projects as well as the western terminal complex and people mover projects. To that extent, the OMP Completion Phase Airfield projects are addressed below.

As part of the OMP Phase 1 Airfield review, FAA also concluded that the City would be able to finance the non-Federal share of the OMP Total Airfield and Total Master Plan. That review contemplated sensitivity analyses, including cost escalation, project delay, and alternative LOI funding, to assess the affordability of the project.

Since 2005, the City has tracked the actual costs of OMP Phase 1 (either work performed or under contract) as well as look at updated cost estimates for the OMP Completion Phase Airfield projects. The City's current working estimate is \$8.36 billion in 2007 dollars. This is comparable to the costs that were estimated in the Brown analysis in 2005 (See **Table 9**).

Cost Estimate Source	Year of estimate	OMP Total (escalated costs)	OMP Total (2007 dollars)
FAA ( Brown Analysis)	2005	\$ 7,959,168	\$ 7,626,000
15% increase		\$ 9,153,043	\$ 8,770,000
City Current Estimate	2009		\$ 8,356,000

<sup>9</sup> The FAA contracted with John F. Brown Company, Airport Management Consultants (now Jacobs Consultants), to develop a financial model and compile financial projections.

In 2005, FAA contemplated a 15% increase in costs (or \$8.77 billion in 2007 dollars) which is significantly larger than the current working estimate. Therefore, FAA is satisfied that the sensitivity analyses conducted in 2005 fully captured the cost increases that have occurred since 2005.

One area not captured in FAA's model from 2005 is the reduction in airline traffic and the significant reduction forecasted in FAA's latest Terminal Area Forecasts. In 2005, FAA relied on the 2002 TAF which was the basis for the EIS, BCA, and LOI analyses. Due to the economic recession, enplanements were down 9% in 2008 and 17% in 2009 from those forecasted in 2002. In addition, enplanements are forecasted to be down 17%, on average, between 2010 and 2015 (See **Table 10**).

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Enplanements (2002 TAF ) Used in 2005 Model	34,896	36,799	36,943	38,027	39,149	40,281	41,451	42,661	43,912	45,119	46,367
Enplanements (2009 TAF )	36,594	36,969	36,743	34,624	32,352	32,210	34,626	35,484	36,497	37,626	38,777
difference # enplanements	1,898	1,170	(200)	(3,403)	(6,797)	(8,071)	(6,825)	(7,176)	(7,415)	(7,494)	(7,591)
difference (%)	5%	3%	-1%	-9%	-17%	-20%	-16%	-17%	-17%	-17%	-16%

The two primary impacts of a reduction in passenger traffic are (1) a lower traffic base over which to spread airline costs, which would result in higher airline cost per enplanement (CPE), and (2) a reduction in PFC funds, which are tied to passenger levels.<sup>10</sup> Based on these reduced enplanement levels, the estimated delay in PFC collections would be about \$240 million over the construction period. Issuing additional debt, combined with the lower passenger levels, would result in additional incremental airline costs compared to the base case financing plan.

On the other hand, there have been factors which have mitigated the financial impacts due to the delays in PFC collections. First, an LOI offer of \$410 million is \$110 million greater than the assumed amount when evaluating OMP Total Phase in 2005. Secondly, in Brown's analysis, interest rates for the City's GARBs were estimated to be approximately 6% whereas actual bond issuances have come in well under 6% saving the City significant debt service. FAA also notes that the City's most recent bond issuance for OMP Phase 1 2008 GARBs received positive ratings by Moody's, S&P, and Fitch credit agencies.<sup>11</sup> These recent ratings indicate that the City would continue to see very competitive interest rates in the future. Finally, offsetting the reduction in passenger traffic is the potential for a higher PFC level than planned. In the Total Master Plan assessment, the City (in the Brown report) used \$4.50 PFC level in its calculations. Most reauthorization proposals allow for a higher PFC level which would accelerate the City's ability to collect PFC revenues.

The FAA's review indicates that there may be a nominal increase in the airline CPE from what was expected in Brown's review of the OMP Total scenario in the 2005 study. But, the CPE is expected to be significantly less than that calculated under the Total Master Plan scenario and its respective sensitivity analyses. In assessing CPE results for the Total Master Plan in 2005, FAA

<sup>10</sup> Cost per enplaned passenger (CPE) is a common industry metric used to quantify and measure the affordability of the financing costs associated with the projects

<sup>11</sup> Bond rating agencies evaluate the potential of airports to generate sufficient revenues to repay bond debt service, and on this basis assign ratings to bond issuers.

noted that the Chicago region and O'Hare have many unique characteristics that would enable it to finance the Total Master Plan. These characteristics include O'Hare's strong O&D traffic and international traffic bases and Chicago's role as a regional population and economic center. In its summation in 2005, FAA stated that "should the City elect to go forward with the Total OMP or Total Master Plan, we believe that it will be able to finance the non-Federal share of the project." We believe that the same holds true today.

Based on its review of the City's financial plan and the FAA's understanding of airport finance, the FAA believes O'Hare has a reasonable range of financial options available to complete the LOI projects. Accordingly, the FAA has considered the financial commitment from non-U.S. government sources to preserve or improve capacity and determined that the City has sufficient non-U.S. government financial resources available for this project. This finding is made with the understanding that the City and the airlines have not yet reached an agreement for the airlines to fund the completion phase. The City has identified alternative sources of funding that are reasonable.

Section 47115(d)(1)(D) requires FAA consideration of airport improvement priorities of the States, (to the extent such priorities are not in conflict with sections 47115(d)(1)(A) and 47115(d)(1)(B)).

The AIP priorities of the City of Chicago as outlined in its Total Master Plan for O'Hare are not in conflict with the priorities of the State of Illinois. Indeed, Illinois Public Law 93-0450 (O'Hare Modernization Act), enacted on August 6, 2003, recognizes that O'Hare serves an essential role in air transportation for the State of Illinois as well as the NAS. This State law enhances the City's ability to implement the O'Hare Modernization Program. Specifically, the law includes a section that includes the findings and purposes expressly resolving any concerns under this subsection. Relevant portions of that Act are set forth at page 5 of the FAA's ROD for this project.

Thus, issuance of an LOI for OMP Completion Phase is consistent with the airport improvement priorities of the state in which the airport is located.

Section 47115(d)(1)(E) requires the Secretary to consider the project passenger and aircraft growth that will be using the airport.

The project (OMP Completion Phase Airfield) will enable O'Hare to efficiently accommodate over 163,000 additional annual operations and approximately 7.6 additional million total annual passengers in 2030. The additional operations and enplanements represent an increase of 14% and 15%, respectively, over the levels forecasted without OMP Completion Phase Airfield. The expected growth in operations and passengers is consistent with the 2009 FAA's Terminal Area Forecast for O'Hare. Thus, the FAA has considered the projected passenger and aircraft growth at O'Hare in this analysis.

Section 47115(d)(1)(F) requires the Secretary to consider the ability of the project to foster US competitiveness in securing global air cargo activity.

As described in the O'Hare Master Plan, there are currently 17 facilities at O'Hare used to process cargo. Most of the cargo facilities are located in two primary areas, the Southwest Cargo

Area and Southeast Services Area. Cargo forecasts included in the Airport's Master Plan indicate cargo enplaned tonnage growth of 58 percent between 2000 and 2018. The City of Chicago interviewed large carriers to determine if and how their facilities would accommodate this growth. The results of these interviews were incorporated into allocation of facility requirements.

The City of Chicago has identified that approximately 316 acres of cargo development is needed to accommodate 2018 requirements. Existing cargo facilities total approximately 261 acres. The increase up to 316 cargo acres has been identified and set aside on the City's revised airport layout plan as a result of the OMP. Further, the OMP Phase 1 Airfield and the OMP Total (and Total Master Plan components) will permit an increase in aircraft operations while reducing or maintaining current levels of delay at the airport. Thus the project will provide opportunities for increased all-cargo flights at the airport. Therefore, having considered the matter, we conclude that the project will likely foster competitiveness in securing air cargo activity at O'Hare and because of O'Hare's importance to the national airport system it will likely have a global effect as well.

Section 47115(d)(2)(A) requires the Secretary to consider whether funding has been provided for all other higher scoring projects qualifying for funding during the fiscal year.

Because safety in aviation is and always must be the FAA's foremost priority, this statutory provision and FAA implementing program guidance assures that funding for airport improvement projects will not be approved at the expense of needed safety activities. In this case, the FAA has reviewed its inventory of projects proposed for funding and found that issuance of this LOI will not preclude FAA from funding any otherwise ready-to-go projects that, because of their nature, have a higher priority. Protection is also afforded because the FAA limits the amounts available for LOIs to 50 percent of the available discretionary funding categories to ensure that FAA has sufficient funding to preserve a reasonable amount for grants not covered by LOIs.

During the review process for individual grants under this LOI, the Great Lakes Region Airports Division and Headquarters Office of Airports will also consider whether funding has been provided for all other higher priority projects qualifying for funding during the fiscal year on a regional and national level, respectively.

Section 47115(d)(2)(B) requires the Secretary to consider whether the Sponsor will be able to commence the project in the grant fiscal year or within six months, whichever comes later.

The City has commenced the OMP Completion Phase and plans to continuously proceed on construction until it is completed, currently estimated to be completed in 2014. The OMP Completion Phase will not only be implemented but also completed before the last 12 grants contemplated in the LOI are issued.

Section 47106 requires consideration of a number of individual project grant application criteria. FAA made these findings in 2005 during the review of the LOI for OMP Phase-1. These findings have been reviewed and confirmed as still valid for this LOI and such findings are incorporated herein. Specifically, section 47106(a)(3) of Title 49 United States Code provides that the Secretary of Transportation may approve an application for a project grant if, among

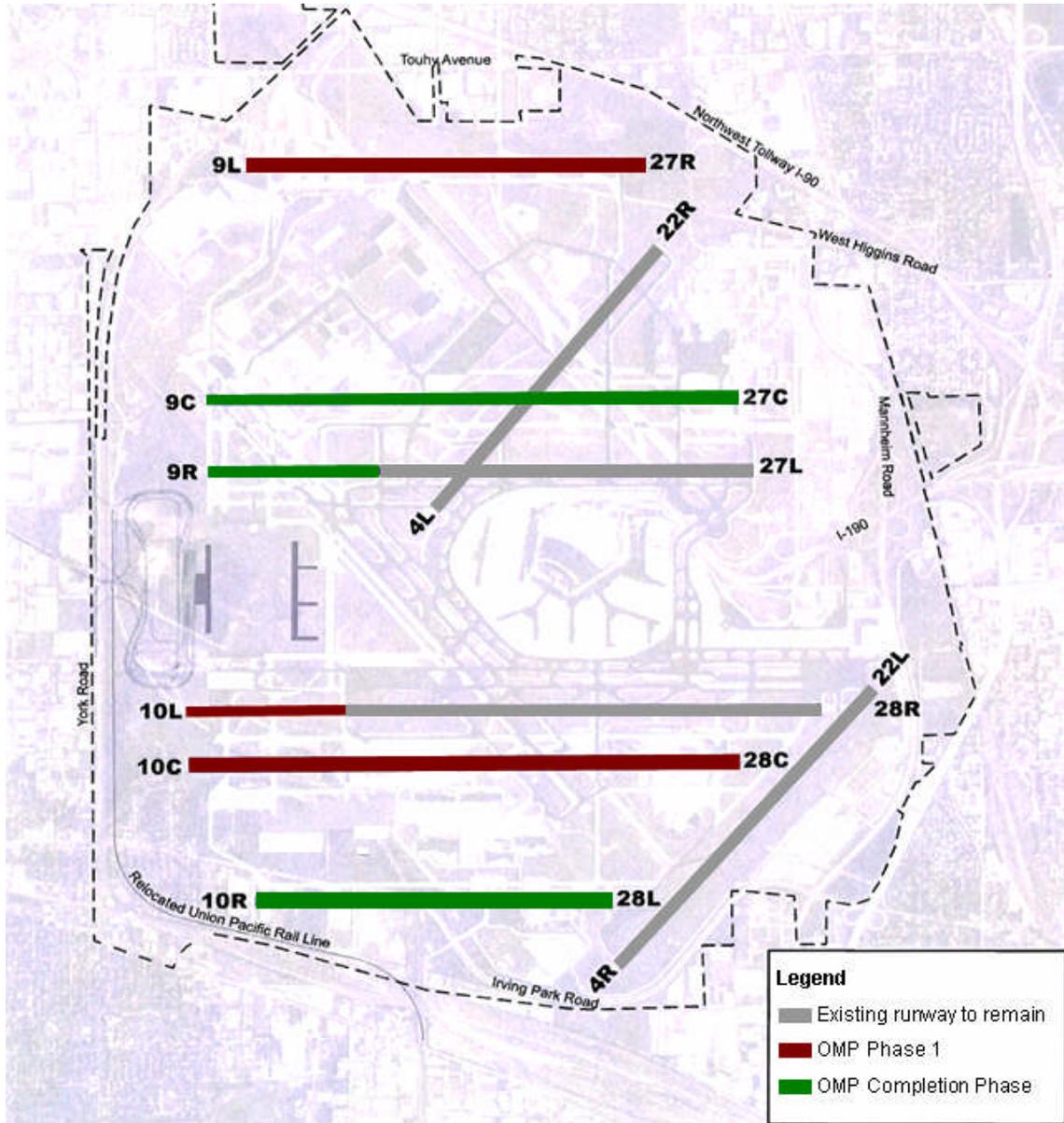
other things, the Secretary is satisfied that “enough money is available to pay the project costs that will not be paid by the United States Government under this subchapter.” At this time Chicago and the airlines continue to negotiate an agreement to fund the Completion Phase. Chicago has also provided alternative sources of fund that could be utilized if there is no agreement with airlines. The FAA considers these sources of funds reasonable and that enough money is available to pay the project costs not paid by the United States Government.

Additionally, this analysis has taken into consideration an update to the good title finding under 49 USC section 47106(b)(1). Since the issuance of the first LOI in 2005, the City has acquired almost all of the properties necessary for the construction and operation of the OMP, including its Completion Phase. The City has acquired all of the land needed for construction in the northwest sector of the approved ALP and has acquired 598 parcels in Bensenville. The City is currently in the process of acquiring or in litigation to acquire the remaining properties. The City remains in litigation over acquisition of the cemetery. A lower court awarded ownership and possession of the cemetery to the City. That order has been appealed, and the appellate court stayed enforcement of the lower court order. Final resolution of the City’s ownership awaits the outcome of the case. Construction of new Runway 10C/28C requires the acquisition and relocation of Saint Johannes cemetery. New Runway 10C/28C was identified as an OMP Phase I Airfield project and approved for funding in the first LOI.

### Summary

Based on the foregoing, the FAA finds that the City of Chicago’s Application for LOI for development at Chicago O’Hare International Airport includes all relevant support material necessary for LOI selection approval, and meets the applicable statutory requirements for issuance of an LOI. In consideration of the foregoing, the FAA has concluded that a Letter of Intent in the amount of \$410 million in AIP discretionary funds paid over a 16 year period as noted in the LOI offer may be issued to the City as partial funding for the OMP Completion Phase Airfield project.

# Exhibit 1: O'Hare Modernization Program Runway Configuration



## Exhibit 2a: Input Criteria for FAA Model

Factors considered when determining LOI amounts	Level-->	6	5	4	3	2	1	0
		Additive Grade	3%	2%	1%	0%	-1%	-2%
	Weighting = Final pct	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%
	<b>WEIGHTED GRADE</b>	<b>0.36%</b>	<b>0.24%</b>	<b>0.12%</b>	<b>0.00%</b>	<b>-0.12%</b>	<b>-0.24%</b>	<b>-0.36%</b>
1 Hub size (enplanement level)	Smaller airports (ability to pay) are given more credit . Range could be tied to enplanement levels - not necessarily hub size specific	10,000-300,000	300,000 - 1,000,000	1,000,001 - 2,000,000	2,000,001 - 6,000,000	6,000,001- 10,000,000	10,000,001- 20,000,001	over 20,000,000
2 Type of Projects	Use NPR to establish range (higher for runways)	runway 75+% of project	majority runway	minority runway	75+% taxiway	majority taxiway	minority taxiway	75+% apron
3 Benefit Cost Ratio	The higher the number of benefits the better - unless most go to reducing airline operating costs	high NPV	positive NPV	high NPV (but most to airlines)	marginal NPV	positive NPV (but most to airlines)	low BCA BUT >.9 (need non-quantified benefits)	low BCA AND <.9 (need non-quantified benefits)
4 System capacity	Adjustment if benefiting 7 metro regions	significant increase in capacity	meaningful increase in capacity	small increase in capacity	no impact	NA	NA	NA
5 Local Funding	Entitlements pledged, PFC pay-go or financing costs, airport debt to cover sponsor's share, other local contributions	+90% of total available	75%+ of what is available	50%+ of what is available	40%+ of what is available	25%+ of what is available	10%+ of what is available	nothing available pledged
6 Historic LOI awards for similar airports and projects	Discretionary rate (cumulative discretionary funds vs. cumulative enplanements):	below 90% of like size	below 75% of like size	below avg	average + - 5	above average	above 75% of like size	above 90% of like size

## Exhibit 2b: FAA Model Discretionary Rate Calculation

				<b>Statutory Max</b>	<b>75%</b>
	Enter Airport ID		ORD		
	Enter Hub Size		L	<b>POLICY Max</b>	<b>65%</b>
	Enter Year Costs Were Estimated		2008		
	Enter Project Size in Millions		3096	<b>Project in 2002 Dollars</b>	<b>1860.383</b>
	Enter BCA		1.25		
		Other Criteria Weighting Factor (Standard Value =1)		Preliminary	Final
<b>INPUT Level for Other Criteria</b>	Percent for Project Size			9.94%	<b>12.00%</b>
1	Hub size (enplanement level)	1		-0.24%	<b>-0.24%</b>
6	Type of Projects	1		0.36%	<b>0.36%</b>
6	Benefit Cost Ratio	1		0.36%	<b>0.36%</b>
6	System capacity	1		0.36%	<b>0.36%</b>
5	Local Funding	1		0.24%	<b>0.24%</b>
3	Historic LOI awards for similar airports and projects	1		0.00%	<b>0.00%</b>
				11.02%	<b>TOTAL % 13.08%</b>
				Disc Amount	<b>\$404.96</b>



## Federal Aviation Administration

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### Memorandum

Date: January 12, 2010

To: Joe Hebert, Manager, Financial Analysis and PFC Branch

From: Bob Robeson, Manager, APO-200 *Bob Robeson*

Prepared By: Jeffrey C. Wharff, Senior Economic Advisor, APO-5

Subject: Chicago O'Hare Modernization Program (The Completion Phase) Benefit Cost Analysis Review

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Thank you for the opportunity to review the *Request for Letter of Intent to Provide a Multi-Year Commitment of Airport Improvement Program Grant-in-Aid Funding* dated March 1, 2009 along with the supplemental material dated November 24, 2009.

On April 2, 2009, we provided your office with an initial assessment of the benefit-cost analysis that was submitted as part of Chicago O'Hare's Letter of Intent. In that assessment, we noted a number of shortcomings associated with the analysis. These identified shortcomings were later documented in a consolidated letter, dated June 24, 2009, that was sent to the City of Chicago by the FAA's Chicago Airports District Office. The concerns outlined in our assessment were primarily with regard to the inclusion of costs and the methodology used to calculate travel time savings.

These concerns were addressed by the City of Chicago in a subsequent submission, dated November 24, 2009. As part of their additional analysis, the City of Chicago developed a benefit-cost scenario described as sensitivity analysis 2a. Based on our review of their November 24th submission, we have determined that sensitivity analysis 2a should be used as the basis of our review. This analysis effectively addressed the major points we noted in our earlier assessment. In particular, sensitivity analysis 2a includes the following assumptions:

- In the base case, operations are capped in 2024 at 1,150,000 per year, a level that produces 16 minutes of average delay and 140.8 minutes of unimpeded travel time. This average level of delay is consistent with level of delay where FAA capped ORD operations before the build out of Phase 1.
- In the Full Build case, Operations grow unconstrained according to the 2008 TAF.
- Delay saving calculations are based on the constrained operations as identified in the base case.
- Unimpeded travel times used in the Full Build and Base Case calculations were constrained to be comparable so that travel time savings could be compared on an equal footing.

After a careful review of sensitivity analysis 2a, it appears that, based on the information provided, the reported benefits exceed the costs. To ensure that the results produced under sensitivity analysis 2a are robust, we asked your office to provide us with some additional sensitivity tests which were not included the city's subsequent submission. In particular, at our request your office considered the following scenarios: (1) replace the 2008 TAF with the current 2009 TAF, (2) change in the construction schedule, (3) change in capital costs (both increases and decreases), (4) change in the discount rate, and (5) and changes in percent distribution of whether avoided delays occur en-route or on the ground.

The results of these additional sensitivity tests, summarized in Table 1, indicate that the proposed project remains cost beneficial over a range of different assumptions. It is interesting to note that the sensitivity test associated with delaying construction of the proposed project by five years produces a larger benefit cost ratio than is reported in the baseline. A review of this finding suggests that the increase in the benefit-cost ratio is a function of the relative timing of the benefit and cost streams. In particular, by delaying construction, the construction costs are discounted to a greater extent than they are discounted in the base case. Without the airport sponsor conducting further analysis into this finding, it is difficult to draw any particular conclusions associated with this result. However, it should be noted, as suggested by sensitivity test 3 (reported below) if the real cost of construction increases over time, the benefits of

delaying construction will be mitigated or possibly eliminated. While interesting, this observation has no material effect on the overall results of our review. If you have any questions regarding our conclusions, we would be happy to answer any questions.

Table 1  
Sensitivity Tests using FAA's 2009 Terminal Area Forecast

<b>Sensitivity Tests</b>	<b>Benefit Cost Ratio</b>
1) Baseline BCR	1.15
2) Change in Construction Schedule (5 year delay)	1.36
3) Change in Construction Costs	
➤ Reduction in Construction Costs by 25%	1.49
➤ Increase in Construction Costs by 25%	0.93
4) Change in percentage distribution of avoided delays	
➤ 100 % of delays are ground delays	1.08
➤ 100 % of delays are airborne delays	1.54
5) Change in Discount Rate to 3 percent	1.84

# ORD Full Build Benefit Cost Summary Report

**Frank Berardino, GRA**

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This report documents the selection of scenario 2a undertaken by the City of Chicago in its benefit cost study (BCA) for the Full Build Case at ORD.

Operations forecasts in the BCA are based on the 2008 TAF forecast. In Scenario 2a:

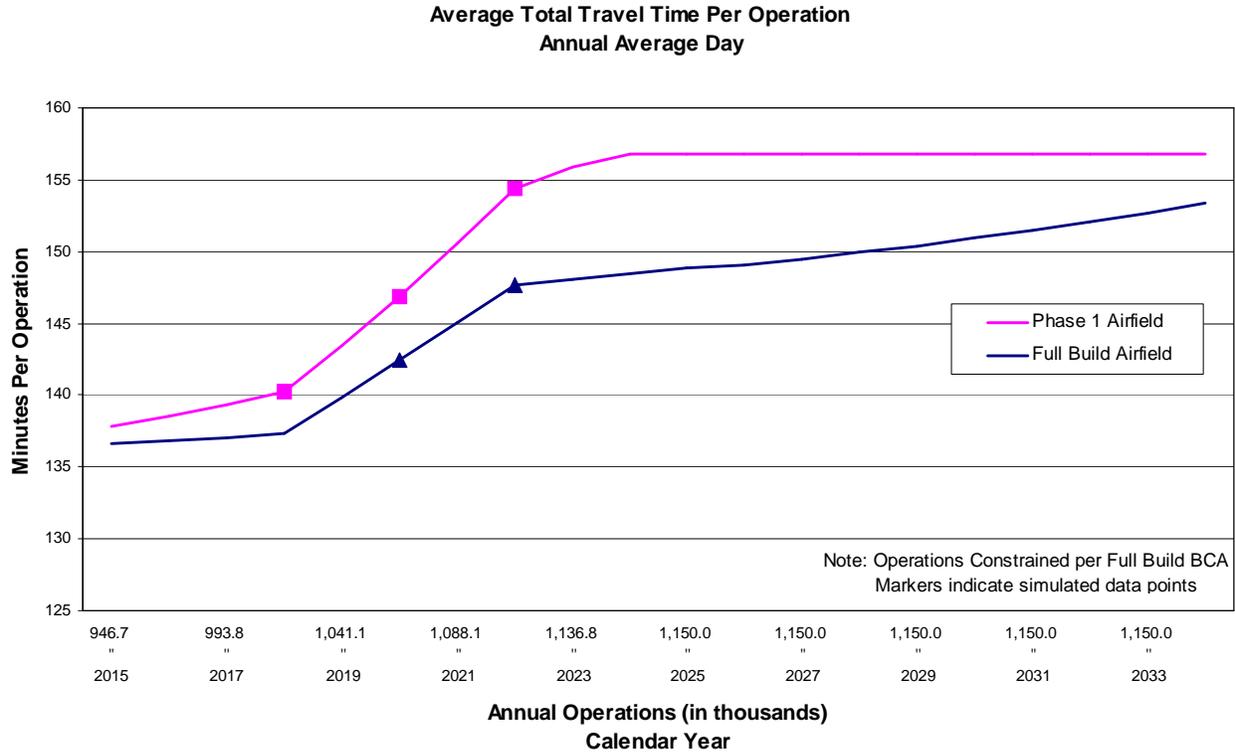
- ➔ Operations in the base case (the Phase 1 case) are capped in 2023 at 1,150,000 per year, a level that produces 16 minutes of average delay and 140.8 minutes of unimpeded travel time. The delay level is identical to the level where FAA capped ORD operations before the build out of Phase 1.
- ➔ Operations in the Full Build Case continue to grow according to the TAF forecast beyond 2024. By way of comparison, in 2024, delays in the Full Build Case are 5.5 minutes per operation while unimpeded travel time is 143 minutes; the additional 2.2 minutes of unimpeded travel time accounts for the added taxi time due to the new runway configuration in the Full Build Case.
- ➔ Because operations continue to grow in the Full Build Case, delays reach 10.4 minutes per operation in 2034
- ➔ In both cases, unimpeded travel times are frozen at the 2024 levels; this was done to eliminate any distortion in comparing the schedules that might arise from different composition of flights beyond 2024. In the unconstrained forecast, there is additional long haul flying at ORD beyond 2024 that occurs in the Full Build Case but not in the Phase 1 case; had unimpeded travel time not been frozen, it would have increased in the Full Build Case but for reasons that had nothing to do with the airfield.

Time related benefits are calculated using standard FAA critical values, taking account of the composition of the fleet.

Time related benefits are calculated for “incumbent” passengers and operations **only**. For each year the following calculation is undertaken:

$$\begin{aligned}
 & (\text{Phase 1 Average Total Travel Time} - \text{Full Build Average Total Travel Time}) \times (\text{Phase 1 Passengers}) \times (\text{the Value of Time}) \\
 & + \\
 & (\text{Phase 1 Average Total Travel Time} - \text{Full Build Average Total Travel Time}) \times (\text{Phase 1 Operations}) \times (\text{the Weighted Average Aircraft Cost per Minute})
 \end{aligned}$$

The following graph shows the differences in total travel time (delay + unimpeded travel).



Note that the difference in delay total travel time between the two cases narrows beyond 2024 because delays in the Full Build Case continue to increase while those in the Phase 1 Case are frozen at 2024 levels due to the cap.

## Rationale for Incumbent Only Calculation

By building the Final Phase, total travel is reduced even though more operations can be accommodated than in the Phase 1 Case. Those airlines and passengers

\* Accounting for differences in en route and ground delay costs in the two cases.

operating at the airport today (the incumbents) are better off by the value of the time saved. So long as the value of time saved exceeds the cost of building and operating the incremental capacity, we can be confident that the project is justified. We can make this conclusion knowing that there are incremental operations in the Full Build Case that we have not valued in any way. Clearly if they are operated in the future, they have some value to society. We have accounted for the delays they cause, but have not calculated the value to consumers and the airlines of flying them – the incremental consumer and producer surplus of the additional flying. Thus, our approach is conservative.

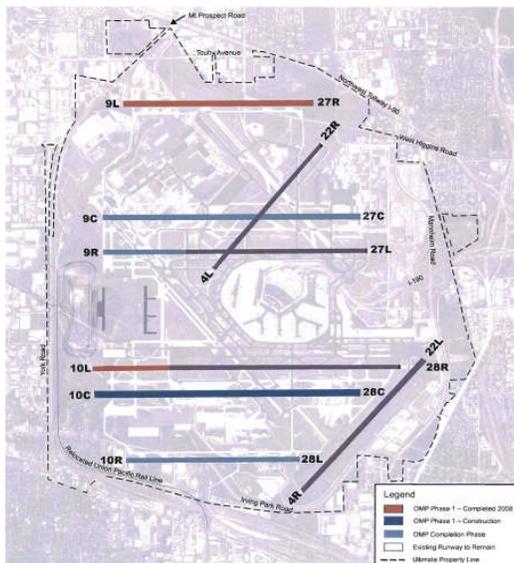
## BCA Conclusion

In Scenario 2a, the City calculates the benefit cost ratio as 1.25. This analysis focused on evaluating the benefits. Costs were provided by the City of Chicago. Based on our comparison of the project benefits against the costs, the project is justified. The BCA calculations are summarized in the tables at the end of this paper.

## Improved Reliability in the Phase 1 Case

Phase 1 of the OMP is the Base Case for the Final Phase BCA. In our review, we noted that the Phase 1 Case had resulted in a more reliable airfield because it produces a third arrival stream in IMC conditions. We suggested that this be considered when making assumptions about where the FAA would implement a cap in the Base Case for the Final Phase BCA. A higher cap in the Base Case would result in more net benefits for the Final Phase.

### *No Action and Phase 1 Airports Are Different*



9L-27R → 3<sup>rd</sup> stream in IMC  
→ More reliable airport

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The results of the available simulation runs corroborated this finding. We compared the ratio of the standard deviation of delays for each run with its mean delay – the so-called coefficient of variation. A more reliable airfield will produce a lower coefficient of variation because it will have fewer extreme delay outcomes. The Phase 1 Case proved to be more reliable and stable in the simulation runs shown below.

## Simulation Results Suggest Phase 1 More Reliable

➔ Fewer extreme delays in Phase 1 than No Action because airfield is more balanced

Sheet	Airfield	EIS Demand Year	Constrained/Unconstrained	PMAD Operations	Annual Operations	Mean Delay	Median	Std Dev. Of Avg. Delay	Std Dev/Mean	Std Dev/Median
1	No Action	2007	Constrained	2,750	974,000	16:50	8:03	19:49	1.18	2.46
2	No Action	2007	Unconstrained	2,898	1,026,300	23:40	9:08	29:49:00	1.26	3.26
3	Phase 1	2007	Unconstrained	2,898	1,026,300	9:52	6:33	10:12	1.03	1.56
4	No Action	2009	Constrained	2,750	974,000	16:27	7:48	19:43	1.20	2.53
5	No Action	2009	Unconstrained	2,987	1,057,200	26:13:00	9:19	33:45:00	1.29	3.62
6	Phase 1	2009	Unconstrained	2,987	1,057,200	10:43	7:01	10:58	1.02	1.56
8	No Action	2013	Constrained	2,750	974,000	17:55	9:01	20:33	1.15	2.28
9	Phase 1	2013	Unconstrained	3,169	1,120,600	14:45	9:24	14:45	1.00	1.57
Average Std Dev/Mean Phase 1									1.02	

Ratio of Standard Deviation to Mean is Lower for Phase 1 than for No Action Case

Phase 1 Ratio of Standard Deviation to Mean is STABLE as operations increase

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We surmised that the consequences and therefore the costs of delay will increase more than proportionally with extreme delays, which cause consumers to miss appointment and on-ward connections (especially at an airport like O’Hare) and cause airlines to cancel more flights, pay for passenger accommodations and find alternate seats at a later time (which has become much more difficult when average load factors are trending beyond 85 percent). Although there is significant evidence in the road literature on the value of reliability<sup>1</sup>, there has been surprisingly little published work done in aviation. However, a great deal of attention has been paid to developing

<sup>1</sup> Chen et al: “Travel-Time Reliability as a Measure of Service” **Journal of the Transportation Research Board** (No. 1855; 2003); Nam et al: “Estimation of the Value of Time Reliability” **Journal of Advanced Transportation** (Vol. 31, No. 1; 2006); Shao et al: “ A Demand Driven Travel Time Reliability-Based Traffic Assignment Problem” presented at the 85<sup>th</sup> Annual Meeting of the Transportation Research Board (2006); Small et al: “Uncovering the Distribution of Motorists’ Preferences for Travel Time and Reliability” **AEI-Brookings Joint Center for Regulatory Studies** (Working Paper 05-02; 2005)

operations research models to help airlines minimize the costs of irregular operations.<sup>2</sup> We also found theoretical support for our supposition.<sup>3</sup> Perhaps because the literature is not fully developed for aviation, *FAA's Airport Benefit Cost Analysis Guidance* does not take account of the value of reliability, nor does it consider altering the value of time or airline costs for extreme delays.

Finally, we noted that FAA could set the Phase 1 cap at operations levels that would produce up to 20 minutes of average delay and still produce the same reliability that the airfield produced in the No Build (pre OMP) case. This might make sense because it would allow more operations in Phase 1 but produce about the same extreme delay experience.

### **Phase 1 Cap of 20 Minutes Produces the Same Reliability as No Action Cap (2013)**

- ➔ Using the stable relationship between standard deviation and the mean for Phase 1
- ➔ Comparing Phase 1 with simulation run for No Action in 2013

	Mean Delay	Std Dev. Of Avg. Delay	Std Dev/Mean
Phase 1	16:00	16:19	1.02
	17:55	18:16	1.02
	18:00	18:21	1.02
	20:00	20:24	1.02
No Action (2013)	17:55	20:33	1.15

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<sup>2</sup> There are many papers in this literature but most of the valuable empirical work uses internal airline data and thus do not report a full range of results. There are numerous commercial software packages that have been developed based on this literature (e.g. Sabre and Navataire). See for example: Bratu S., C. Barnhart. "Real Time Optimization Models to Recover Aircraft Schedules and Minimize Passenger Disruptions." MIT Working Paper, 2003;

<sup>3</sup> Fosgeru & Karlstrom: "The Value of Reliability" **Munich Personal RePEc Archive** (November 2007); This paper shows that in theory the value of reliability depends on the distribution of the duration of delays, meaning that extreme delays would be more costly.

In the present context, setting a cap at 20 minutes of average delay for Phase 1 would result in more net benefits for the Final Build Case because Phase 1 is the Base Case in that BCA. In some future years, the Base Case would show higher average delay per operation (than is presently assumed). The average delay savings due to the Final Phase would therefore be higher. Furthermore, in those same years, the number of incumbents in the analysis (both passengers and operations) would be higher, which would further increase the benefits due to the Final Phase.

**Table F-4**

Project Benefits

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
<b>ANNUAL OPERATIONS</b>																				
Total Aircraft Operations (thousands)	946.7	969.2	993.8	1,017.5	1,041.1	1,064.6	1,088.1	1,112.5	1,136.8	1,150.0	1,150.0	1,150.0	1,150.0	1,150.0	1,150.0	1,150.0	1,150.0	1,150.0	1,150.0	1,150.0
Estimated Passenger Airline and All-Cargo Operations (thousands)	925.2	947.2	971.2	994.4	1,017.5	1,040.5	1,063.4	1,087.2	1,111.1	1,150.0	1,150.0	1,150.0	1,150.0	1,150.0	1,150.0	1,150.0	1,150.0	1,150.0	1,150.0	1,150.0
<b>AIRCRAFT TRAVEL TIME (MINUTES) PER OPERATION</b>																				
Base Case: EIS Phase 1	137.9	138.6	139.4	140.3	143.5	146.8	150.5	154.4	155.9	156.8	156.8	156.8	156.8	156.8	156.8	156.8	156.8	156.8	156.8	156.8
With Proposed Action	136.6	136.8	137.1	137.3	139.9	142.4	145.0	147.7	148.1	148.5	148.9	149.1	149.5	149.9	150.4	150.9	151.5	152.1	152.7	153.4
Difference in Travel Time per Operation between scenarios (minutes)	1.3	1.7	2.3	2.9	3.6	4.4	5.5	6.7	7.8	8.3	7.9	7.7	7.3	6.9	6.4	5.9	5.3	4.7	4.1	3.4
<b>AIRCRAFT DELAY BENEFITS</b>																				
Total Incremental Aircraft Travel Time Minutes (millions)	1.18	1.65	2.25	2.93	3.71	4.60	5.83	7.28	8.69	9.53	9.11	8.91	8.42	7.90	7.34	6.74	6.10	5.42	4.69	3.90
Percent Airborne Travel Time	14.5%																			
Percent Ground Travel Time	85.5%																			
Weighted Average Enroute Cost	\$52.73	\$52.73	\$52.73	\$ 52.73	\$57.93	\$ 63.13	\$63.05	\$ 62.96	\$62.96	\$62.96	\$62.96	\$62.96	\$62.96	\$62.96	\$62.96	\$62.96	\$62.96	\$62.96	\$62.96	\$62.96
Weighted Average Ground Cost	\$24.96	\$24.96	\$24.96	\$ 24.96	\$27.33	\$ 29.70	\$29.49	\$ 29.29	\$29.29	\$29.29	\$29.29	\$29.29	\$29.29	\$29.29	\$29.29	\$29.29	\$29.29	\$29.29	\$29.29	\$29.29
Airborne Aircraft Savings	\$9.0	\$12.6	\$17.2	\$22.4	\$31.1	\$42.1	\$53.4	\$66.5	\$79.4	\$87.1	\$83.2	\$81.4	\$76.9	\$72.1	\$67.0	\$61.6	\$55.7	\$49.5	\$42.8	\$35.6
Ground Aircraft Savings	\$25.1	\$35.2	\$48.1	\$62.5	\$86.6	\$116.7	\$147.1	\$182.3	\$217.7	\$238.7	\$228.0	\$223.0	\$210.8	\$197.7	\$183.7	\$168.8	\$152.8	\$135.6	\$117.3	\$97.7
Total Aircraft Savings (millions)	\$34.1	\$47.9	\$65.3	\$84.9	\$117.7	\$158.8	\$200.4	\$248.8	\$297.1	\$325.8	\$311.2	\$304.3	\$287.7	\$269.8	\$250.8	\$230.3	\$208.5	\$185.1	\$160.1	\$133.3
<b>PASSENGER DELAY BENEFITS</b>																				
Total Passengers (millions) - Constrained	76.6	78.7	81.0	83.2	85.4	87.7	90.0	92.4	94.7	97.1	98.4	99.7	100.9	102.2	103.5	104.8	106.1	107.5	108.8	110.1
Total Incremental Passenger Travel Time Minutes (millions)	97.4	137.2	187.9	244.9	311.1	387.4	493.7	618.4	741.4	805.3	779.1	771.8	738.9	702.0	660.6	614.4	563.1	506.2	443.2	373.6
Passenger Delay Savings per Minute	\$0.54	\$0.54	\$0.54	\$0.54	\$0.54	\$0.54	\$0.54	\$0.54	\$0.54	\$0.54	\$0.54	\$0.54	\$0.54	\$0.54	\$0.54	\$0.54	\$0.54	\$0.54	\$0.54	\$0.54
Total Passenger Delay Savings (millions)	\$52.1	\$73.4	\$100.5	\$131.0	\$166.4	\$207.3	\$264.1	\$330.9	\$396.6	\$430.9	\$416.8	\$412.9	\$395.3	\$375.5	\$353.4	\$328.7	\$301.3	\$270.8	\$237.1	\$199.9
Total Passenger Delay Downstream Savings (millions)	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
<b>PROJECT BENEFITS</b>																				
Total Incremental Aircraft Delay Savings (millions)	\$34.1	\$47.9	\$65.3	\$84.9	\$117.7	\$158.8	\$200.4	\$248.8	\$297.1	\$325.8	\$311.2	\$304.3	\$287.7	\$269.8	\$250.8	\$230.3	\$208.5	\$185.1	\$160.1	\$133.3
Total Passenger Delay Savings (millions)	52.1	73.4	100.5	131.0	166.4	207.3	264.1	330.9	396.6	430.9	416.8	412.9	395.3	375.5	353.4	328.7	301.3	270.8	237.1	199.9
Total Passenger Delay Downstream Savings (millions)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Savings (millions)	\$86.2	\$121.3	\$165.9	\$215.9	\$284.2	\$366.0	\$464.6	\$579.6	\$693.7	\$756.7	\$728.0	\$717.3	\$683.0	\$645.4	\$604.2	\$559.1	\$509.8	\$455.9	\$397.2	\$333.2

Sources: Area Forecast, FAA 2009, and Ricondo & Associates, Inc. 2009; Travel & Delay Time- EIS Simulations, 2004, Ricondo & Associates, Inc., 2009. Aircraft Operating Cost - U.S. DOT, Form 41, fourth quarter of calendar year 2007 through third quarter of Inc. 2009; Travel & Values of Passenger Time in Economic Analysis, March 2003 and percentages of business and leisure travelers, Landrum & Brown, In-Flight Survey, 1997; Discount Rate - FAA, BCA Guidance, December 15, 1999.

Prepared by: Ricondo & Associates, Inc.

**Table 2**  
**BCA Sensitivity 2A**

Benefit Cost Ratio  
 OMP Completion Phase Airfield (million of 2008 dollars)  
 Sensitivity 1 with Constrained Phase 1 Activity, Unconstrained Completion Phase Activity, and Benefits Applied to Constrained Activity

Year	Benefits				Costs			Present Value			Annual Net Present Value (Benefits-)
	Aircraft Delay Savings	Passenger Delay Savings	Downstream Passenger Delay Savings	Total Project Benefits	Project Construction Costs	Incremental O&M Expenses	Total Project Costs	Discount Rate Factor	Total Project Benefits	Total Project Costs	
2008	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0000	0.0	0.0	0.0
2009	0.0	0.0	0.0	0.0	68.4	0.0	68.4	1.0700	0.0	63.9	(63.9)
2010	0.0	0.0	0.0	0.0	432.6	0.0	432.6	1.1449	0.0	377.9	(377.9)
2011	0.0	0.0	0.0	0.0	925.9	0.0	925.9	1.2250	0.0	755.8	(755.8)
2012	0.0	0.0	0.0	0.0	809.1	0.0	809.1	1.3108	0.0	617.3	(617.3)
2013	0.0	0.0	0.0	0.0	367.5	7.5	375.0	1.4026	0.0	267.4	(267.4)
2014	0.0	0.0	0.0	0.0	145.0	11.4	156.4	1.5007	0.0	104.2	(104.2)
2015	34.1	52.1	0.0	86.2	0.0	24.3	24.3	1.6058	53.7	15.2	38.5
2016	47.9	73.4	0.0	121.3	0.0	24.3	24.3	1.7182	70.6	14.2	56.4
2017	65.3	100.5	0.0	165.9	0.0	24.3	24.3	1.8385	90.2	13.2	77.0
2018	84.9	131.0	0.0	215.9	0.0	24.3	24.3	1.9672	109.8	12.4	97.4
2019	117.7	166.4	0.0	284.2	0.0	24.3	24.3	2.1049	135.0	11.6	123.4
2020	158.8	207.3	0.0	366.0	0.0	24.3	24.3	2.2522	162.5	10.8	151.7
2021	200.4	264.1	0.0	464.6	0.0	24.3	24.3	2.4098	192.8	10.1	182.7
2022	248.8	330.9	0.0	579.6	0.0	24.3	24.3	2.5785	224.8	9.4	215.3
2023	297.1	396.6	0.0	693.7	0.0	24.3	24.3	2.7590	251.4	8.8	242.6
2024	325.8	430.9	0.0	756.7	0.0	24.3	24.3	2.9522	256.3	8.2	248.1
2025	311.2	416.8	0.0	728.0	0.0	24.3	24.3	3.1588	230.5	7.7	222.7
2026	304.3	412.9	0.0	717.3	0.0	24.3	24.3	3.3799	212.2	7.2	205.0
2027	287.7	395.3	0.0	683.0	0.0	24.3	24.3	3.6165	188.9	6.7	182.1
2028	269.8	375.5	0.0	645.4	0.0	24.3	24.3	3.8697	166.8	6.3	160.5
2029	250.8	353.4	0.0	604.2	0.0	24.3	24.3	4.1406	145.9	5.9	140.0
2030	230.3	328.7	0.0	559.1	0.0	24.3	24.3	4.4304	126.2	5.5	120.7
2031	208.5	301.3	0.0	509.8	0.0	24.3	24.3	4.7405	107.5	5.1	102.4
2032	185.1	270.8	0.0	455.9	0.0	24.3	24.3	5.0724	89.9	4.8	85.1
2033	160.1	237.1	0.0	397.2	0.0	24.3	24.3	5.4274	73.2	4.5	68.7
2034	133.3	199.9	0.0	333.2	0.0	24.3	24.3	5.8074	57.4	4.2	53.2
<b>Total</b>	<b>\$3,922.0</b>	<b>\$5,445.1</b>	<b>\$0.0</b>	<b>\$9,367.0</b>	<b>\$2,748.5</b>	<b>\$505.8</b>	<b>\$3,254.3</b>		<b>\$2,945.5</b>	<b>\$2,358.3</b>	<b>\$587.2</b>
<b>Present Value</b>											
									<b>\$2,945.5</b>	<b>\$2,358.3</b>	<b>\$587.2</b>

<b>Benefit-Cost Ratio:</b>	<b>1.25</b>
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2008 project costs are a sunk costs and not included in the BCA analysis.