

77



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09/21/2005 12:45 PM

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Subject: BCA review comments

History: This message has been forwarded.

Shawn

The final review has raised some final edit requests on the supplemental BCA. These requests are 1) attached as a word file and 2) marked up directly and attached as a pdf file. Both sets of comments can be incorporated into the final supplemental BCA as they do not alter the substance of the review but only clarify some issues or correct text problems.

FYI, two comments related to the travel time issue raised this morning are included.

thanks



9-13-05 BCA edits .pdf FAA Comments on Supplemental 9_13_05.doc

Dennis Walsh
APP-510, Financial Analysis and PFC Branch
202-493-4890

Summary

In February 2005, the City of Chicago (City) submitted a revised request for a Letter of Intent (LOI) for a multiyear commitment of Airport Improvement Program (AIP) funding for Phase I of the O'Hare Modernization Program (OMP). That submittal included a Benefit/Cost Analysis (BCA) based primarily on the delay reduction (measured in terms of changes in total aircraft travel time) benefits anticipated to be produced by the project. The February 2005 BCA relied on an assumption that the Base Case and the OMP Scenarios (Scenario Cases) would realize the Environmental Impact Statement (EIS) constrained forecast's level of operations. The Federal Aviation Administration (FAA) subsequently requested that the City provide a supplemental BCA that relaxed the assumption that aircraft operations in the Scenario Cases were capped consistent with the Base Case. This document outlines the methodology, assumptions, and results of that supplemental analysis.

In this analysis, the capacity benefits of the project, i.e. the airport's ability to process additional traffic and passengers as a result of the proposed project, are estimated using consumer surplus as the appropriate measure of the benefits of the project. Consumer surplus is defined as the difference between what consumers must pay for a given level of service and what they would be willing to pay for that same level of service. The FAA provided a document (included in Appendix C and prepared by GDA Incorporated (GDA)) that describes how the benefits of a capacity expansion project can be calculated based on an economic model that measures changes in consumer surplus. This methodology is derived from the information contained in Appendix C, Section C.2 of the *FAA Airport Benefit-Cost Analysis Guidance, December 15, 1999 (BCA Guidance)*. 

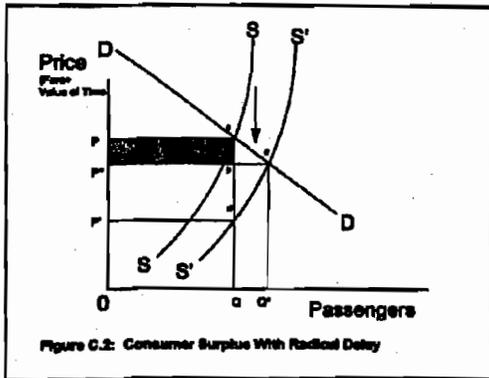
In the original BCA prepared by the City, benefit-cost ratios were estimated for the *OMP Phase I Airfield* (which consists of the OMP projects for which the LOI monies are being requested and includes the airfield components for which the City has received Majority-In-Interest approval from the airlines and the supporting Program-wide requirements such as preliminary engineering, wetlands mitigation, OMP Phase I noise mitigation, land acquisition, and other miscellaneous program-wide requirements) using the base assumptions as well as various sensitivity assumptions. In addition, Appendix D of that document included BCRs for the *Master Plan Phase I* (which included the costs of all projects covered under Phase I as defined in the Master Plan Study and EIS, including but not limited to the costs of the Western Concourse, Concourse K extension, Taxiway LL, etc.), the *OMP Total Airfield* (which included the costs of all airfield components of the OMP but did not include terminal and other facility development), and the *Total Master Plan* (which included the costs of all capital projects described in the Airport's Master Plan). This supplemental analysis uses the same project groupings and focuses on the two Phase I definitions: *OMP Phase I Airfield* and *Master Plan Phase I*. These two scenarios differ in their cost data; however, for the purposes of this analysis, their benefit streams are identical. As in the previous analyses, 2001 is assumed to be the base year for the analysis, and all dollar values are presented in 2001 dollars.

The City has reviewed the methodology provided by FAA, ~~as prepared by GDA~~ and determined that it is consistent with the FAA's BCA guidance. While the City's February 2005 BCA provided a worst-case scenario of the estimation of project benefits by focusing only on aircraft travel time savings resulting from implementation of the OMP, the methodology provided by FAA for this supplemental analysis provides a mechanism to quantify the benefits associated with the increased traffic and passengers that can be processed by the airport as a result of the capacity increase attributed to the project. This methodology utilizes sound, common economic principles in analyzing the benefits of the program. It relies on the principle that consumers make travel decisions based on

are undertaken, P denotes the full price of travel, which includes the money fare plus an increment representing the value of travel time, and Q denotes the passenger demand. However, after infrastructure improvements occurs, the supply at the airport increases, thus the supply curve shifts and is now denoted by S' . The demand curve D is assumed to be linear, and a new equilibrium point occurs at c where S' intersects with D . Thus, the new price of travel is P^* and the new demand is Q^* . The benefits from consumer surplus are denoted by the polygon contained by P , P^* , c , and a . Benefits to existing passengers are contained in the shaded region C .

Exhibit I-3

Graphical Description of Consumer Surplus from the BCA Guidance



Source: FAA, *Airport Benefit-Cost Analysis Guidance, December 13, 1999 BCA Guidance, Appendix C, Page C-4*
 Prepared by: Ricordo & Associates, Inc.

In the case of an airport improvement program that reduces delay and provides additional capacity, such as the OMP, additional air service could be provided at the same total price per passenger; or, these improvements could result in a reduction in the price of travel for the level of passengers. In other words, the increase in supply provided by the program benefits the consumer either through additional service opportunities, a reduction in price, or some combination of both.

A fully populated spreadsheet, with comments regarding mathematical steps, as used to develop the benefit stream for the Net Present Value (NPV) calculation is contained in Appendix C. This appendix also includes the ~~GRF prepared~~ document provided to the City by the FAA.

1.2 Benefit-Cost Comparison

The FAA's BCA Guidance requires an airport sponsor to perform the following activities in the preparation of a BCA:

- **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 BCRs. Section V presents the comparison of benefits and costs. Detailed tables for these calculations can be found in Appendix A.

Table V-5

Annual Passenger Prices (Yield) for Scheduled Service on Domestic Airlines

Year	Real Yield (in 1978 cents)		
	Domestic	International	System
1978	8.49	7.49	8.29
1979	8.05	6.88	7.81
1980	9.09	6.98	8.70
1981	9.14	6.79	8.85
1982	8.12	6.47	7.95
1983	7.89	6.39	7.61
1984	8.03	5.89	7.60
1985	7.40	5.62	7.07
1986	6.59	5.73	6.50
1987	6.57	5.59	6.38
1988	6.78	5.73	6.55
1989	6.88	5.45	6.54
1990	6.70	5.40	6.37
1991	6.34	5.42	6.10
1992	5.97	5.37	5.81
1993	6.20	5.09	5.89
1994	5.77	4.92	5.54
1995	5.78	4.76	5.51
1996	5.72	4.54	5.41
1997	5.68	4.45	5.35
1998	5.63	4.15	5.24
1999	5.46	3.94	5.06
2000	5.52	4.01	5.12
2001	4.88	3.72	4.57
2002	4.35	3.57	4.15
2003	4.36	3.59	4.17
2004	4.16	3.66	4.04
Average Rate of Yearly Decrease	-2.6%	-2.6%	-2.6%

Source: The Air Transport Association of America, Inc. 1995-2005, <http://www.airlines.org/econ/print.aspx?nid=1035>
 Prepared by: [redacted] Ricondo & Associates, Inc.

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Appendix C

This appendix includes information related to the calculation of benefits obtained from consumer surplus. Appendix C: Adjustments of Benefits and Costs for Induced Demand, of the BCA Guidance, recommends that a BCA address the dynamic interaction of project benefits and costs and level of airport usage. The net benefits generated by an airport improvement investment will allow the airport to serve a greater portion of the unconstrained demand. The new users will benefit from the improvement; however, the increased demand at the airport generated by the new users may reduce the net benefits of the project to current users.

The BCA Guidance suggests the use of Consumer Surplus as a method to quantify benefits to passengers, while capturing the effects of increased demand. GRA prepared a document describing a methodology for ~~the consumer surplus calculation~~. This document can be found (provided to the City) attached at the end of this appendix. Exhibit 3 of this document contains the basis for the mathematical calculation of consumer surplus. An example of how this exhibit was used by R&A to calculate consumer surplus is shown in Table C-1 on the following page.

Calculating Benefits
Based on the concept
of consumer surplus.

for the
FAA

Table C-1
Example Calculation to Develop Benefits Stream

Col #	1	2	3	4	5	6	7	8	9	10	11	
GRA Inputs	Average Travel Time per Operation (minutes)	Value of Time per Minute	Base Case Value of Travel Time	Average Segment Money Fare	Base Case Full Price of Travel	Base Case Total Passengers (millions)	Scenario Total Passengers (millions) TAF unconstrained	Scenario Full Price of Travel	Arc Elasticity Calculation of "X" for col 8	Benefits to Existing Passengers (\$ mil)	Benefits to Incremental Passenger (\$ mil)	Total Benefits (\$ Mil)
Source	Simulation Studies	FAA-APO-03-1 March '03	(1) * (2)	DB1a Database	(3)+(4)	Constrained No Project	Constrained Phase 1	col 5 * (1-x) (1-x)	Elasticity Values - BCA Guidance	(5)-(6)*(6)	0.5*(5)-(8)*(7)*(6)	(9)+(10)
2001												
2002												
2003	137.65	0.54	73.65	220.05	293.70	65.22	65.22	293.25	-119.41	3,583,722.63	362.40	0.00
2004	139.76	0.54	74.77	220.05	294.82	67.27	67.27	292.29	-82.74	7,650,339.71	536.27	0.00
2005	141.87	0.54	75.90	220.05	295.95	69.39	69.39	291.35	-63.40	19,365,318.3	717.72	0.00
2006	143.98	0.54	77.03	220.05	297.08	71.50	71.50	290.33	-51.68	48,152,006.1721	902.13	0.00
2007	146.09	0.54	78.15	220.05	298.20	72.44	73.99	289.31	-43.66	1,065,262,981.9431	1,094.87	0.00
2008	146.40	0.54	79.39	220.05	299.44	73.91	76.05	288.31	-37.80	1,453,441,852.86	1,506.79	0.00
2009	150.72	0.54	80.63	220.05	300.68	75.44	78.30	287.31	-33.35	1,852,861,819.657	1,944.70	0.00
2010	152.77	0.54	81.73	220.05	301.78	76.96	80.56	286.57	-29.81	2,255,814,049.0897	2,320.37	0.00
2011	154	0.54	82.83	220.05	302.88	78.54	82.90	285.7	-26.93	2,659,441,859.0726	2,682.09	0.00
2012	154	0.54	83.93	220.05	303.98	80.15	85.32	284.92	-27.15	3,067,945,965.13	3,049.04	0.00
2013	154	0.54	85.02	220.05	305.07	81.82	87.82	284.21	-26.26	3,484,242,242.24	3,422.93	0.00
2014	154	0.54	85.35	220.05	305.40	83.36	90.24	283.51	-25.43	3,911,911,369.0	3,862.09	0.00
2015	164	0.54	85.68	220.05	305.71	84.95	92.73	282.80	-25.17	4,350,594.9	4,259.81	0.00
2016	160.76	0.54	86.01	220.05	306.02	86.24	95.22	282.09	-25.17	4,800,000.0	4,688.09	0.00
2017	161.36	0.54	86.34	220.05	306.31	87.54	97.71	281.39	-23.22	5,250,000.0	5,066.09	0.00
2018	161.99	0.54	86.66	220.05	306.61	88.86	100.19	280.68	-22.78	5,700,000.0	5,453.55	0.00
2019	161.99	0.54	86.66	220.05	306.71	91.38	101.89	280.45	-22.36	6,150,000.0	5,842.85	0.00
2020	161.99	0.54	86.66	220.05	306.71	92.56	103.62	280.45	-22.36	6,600,000.0	6,232.37	0.00
2021	161.99	0.54	86.66	220.05	306.71	93.74	105.38	280.45	-22.36	7,050,000.0	6,622.85	0.00
2022	161.99	0.54	86.66	220.05	306.71	94.91	107.17	280.45	-22.36	7,500,000.0	7,013.33	0.00
2023	161.99	0.54	86.66	220.05	306.71	96.00	108.92	280.45	-22.36	7,950,000.0	7,403.81	0.00
2024	161.99	0.54	86.66	220.05	306.71	97.09	110.63	280.45	-22.36	8,400,000.0	7,794.29	0.00
2025	161.99	0.54	86.66	220.05	306.71	98.18	112.34	280.45	-22.36	8,850,000.0	8,184.77	0.00
2026	161.99	0.54	86.66	220.05	306.71	99.27	114.05	280.45	-22.36	9,300,000.0	8,575.25	0.00
2027	161.99	0.54	86.66	220.05	306.71	100.36	115.76	280.45	-22.36	9,750,000.0	8,965.73	0.00

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

FAA Comments on ORD BCA Dated 9/13/05

General Comments

- The BCA continues to treat salvage value as a benefit rather than an offset to costs. While this does not affect the net present value of the proposed project, it does have a minor impact on the benefit/cost ratio.
- Page 2, Table 1 reports incorrect Net Present Value estimates.
- Pages 7 and 8: delete paragraphs beginning at the bottom of page 7: "As stated by the FAA in their BC Guidance...." and ending with the first paragraph under the chart on page 8; also delete the chart. All of this is replaced by the new language on earlier pages
- Page 16, In Section 5 Benefit-Cost Comparison under the discussion of Base Year, the text indicates that in accordance with FAA's BCA Guidance the benefits and costs should be discounted seven percent per year. What is actually required for the analysis is that the benefits and costs be discounted using a seven percent discount rate.
- Page 18, the text appears to incorrectly note that land acquired through 2003 is treated as a sunk cost. It is our understanding that changes made to the "project construction costs" category in tables A-1 through A-8 for the calendar years 2002 and 2003 were made in response to our earlier critique of this issue in the original BCA. In addition, the project construction cost for 2003 reported in tables A-1 through A-8 is \$50.2 million lower than what is reported for 2003 in Table B-1 on page 42.
- Page 21, Section 5.2.4, replace unimpeded travel time with Phase 1 (or scenario case) travel time. Need to update change in average annual rate of money fare decrease.
- Page 23, Table V-6, Replace Unimpeded travel time values with Scenario travel time values (same as scenario travel times used in Table IV-1). Also, money fare and value of time columns should be switched.
- Page 23 first para: if the annual reduction had exceeded the average since deregulation, the analysis would NOT have been flawed; what we'd need to do is see if there were good reasons for this --e.g. a relaxation of capacity constraints at ORD might lead to rapid reductions in money fare; we'd look to see if there were precedents at other airports. So, I'd instead say: "If the reduction had far exceeded the typical experience since deregulation; an analysis may have been warranted to determine if local conditions (e.g. the relaxation of capacity constraints that have

existed almost continuously for over 30 years) might have results in very large changes in money fares."

- Page 24, The paragraph in section 5.2.5.1 incorrectly makes reference to net present value when referring to a benefit-cost ratio.
- Page 24, The sentence in section 5.2.5.2 "Variations in Elasticity and Passenger Demand" is misleading and inappropriately suggests that previous BCA dated February 2005 provided sufficient evidence to justify the proposed project.
- Page 25, Table VI-1 reports incorrect Net Present Value estimates.
- Page 37, The Table's title refers to "millions of 2001 dollars". This is incorrect – the table's contents are benefit/cost ratios, not dollar values.