

Addendum to FAA AIRPORT BENEFIT-COST ANALYSIS GUIDANCE

FAA has long emphasized the need for airport benefit-cost analyses to consider system-wide delay reductions associated with airport investment projects. Failure to incorporate such delay reductions frequently understates the true benefit of a proposed project. To aid airport sponsors in developing more reliable measures of system-wide delay reduction for incorporation in their airport benefit-cost analyses, FAA in collaboration with the MITRE Corporation has recently developed an approach, using Airline Service Quality Performance (ASQP) data, for deriving delay propagation multipliers for use in airport benefit-cost analyses. This multiplier is a measure of the change in system-wide delay as a result of a change in delay at a particular airport. The multipliers have been developed for all major U.S. commercial airports and are provided below for use in airport benefit-cost analyses. These data will be updated yearly by FAA's Office of Policy and Plans. An airport specific delay propagation multiplier is defined as:

$$DM(i) = \frac{D(i) + Dp(i)}{D(i)}$$

Where:

DM(i) is the Delay Multiplier for airport (i);

D(i) is the original delay at airport (i); and

Dp(i) is the propagated delay that results from original delay at airport (i).

A detailed description of the methodology used to calculate the multipliers can be found in a report titled *Calculating Delay Propagation Multiplier for Cost-Benefit Analysis*, MITRE Corporation, February 2010. This report is available on the following FAA website:

http://www.faa.gov/regulations_policies/policy_guidance/benefit_cost/

The multipliers identified in Table A1 are designed to be used on an airport-specific basis show the propagated delay associated with a minute of original delay at the airport. For example, a multiplier of 1.65 means that, on average, a one-minute reduction in original delay at an airport results in 0.65 minute reduction of propagated arrival delay at downstream airports.

The national composite multiplier, based on the 295 airports, is estimated to be 1.57 for CY 2008. The use of this multiplier could be used in cost benefit analyses in which the analyst needed a generalized measure of the system-wide impact of Federal action designed to reduce airport delay. It is also possible to construct other composite multipliers for a combination of airports. This approach would be useful when assessing the system-wide economic impact of an airport investment which would affect more than one airport within a region or metropolitan area. In theory, the calculation of composite multipliers should not be based on a simple average of the individual airport multipliers, but instead should be adjusted to avoid the double counting of delay minutes. However,

research indicates that there is little, if any, bias introduced by using a simple average when constructing these composite multipliers. Other custom multipliers, such as time of day, can also be derived from the data base used to construct these individual airport multipliers. To facilitate more robust airport benefit-cost analyses as well as more generalized aviation investment studies, specialized multipliers based on this methodology, can be obtained from FAA's Office of Policy and Plans. To obtain these multipliers, please contact Dr. Tony Diana at Tony.Diana@faa.gov. For more information on the use of these multipliers with investment and benefit-cost analysis, please contact Dr. Jeffrey C. Wharff, at Jeffrey.Wharff@faa.gov.

**Table A1
Delay Propagation Multipliers Based on 2008 ASQP**

Airport	Total Original Delay (minutes)	Total Propagated Arrival Delay (minutes)	Multiplier
ATL	5,613,616	3,442,862	1.61
ORD	5,586,598	3,598,543	1.64
DFW	3,786,119	2,070,936	1.55
DEN	2,740,415	1,606,444	1.59
EWR	2,572,557	1,312,448	1.51
IAH	2,498,514	1,148,145	1.46
DTW	2,274,800	1,054,822	1.46
JFK	2,192,166	991,642	1.45
LAX	2,176,426	1,078,444	1.50
PHX	1,960,974	995,845	1.51
CLT	1,705,401	766,663	1.45
LGA	1,701,255	878,371	1.52
MSP	1,695,082	631,018	1.37
LAS	1,619,386	900,406	1.56
SFO	1,610,645	891,245	1.55
BOS	1,599,508	827,916	1.52
MCO	1,454,046	928,185	1.64
PHL	1,401,238	737,822	1.53
SEA	1,218,684	584,729	1.48
SLC	1,201,550	655,436	1.55
MIA	1,187,457	523,287	1.44
IAD	1,117,908	654,849	1.59
CVG	1,053,305	488,158	1.46
BWI	990,602	794,769	1.80
MEM	943,040	440,892	1.47
DCA	935,812	431,589	1.46
MDW	880,967	862,570	1.98
FLL	872,508	577,613	1.66
SAN	783,965	502,495	1.64
TPA	781,740	489,494	1.63
CLE	768,740	441,489	1.57
RDU	680,068	420,191	1.62
STL	603,218	449,609	1.75
MKE	542,101	383,578	1.71
MCI	531,014	378,183	1.71
BNA	524,224	375,857	1.72
PDX	486,131	264,937	1.54
PIT	481,133	307,917	1.64
IND	475,850	288,725	1.61
HOU	463,941	507,838	2.09
AUS	419,127	284,364	1.68
DAL	400,496	464,066	2.16
SAT	392,311	261,032	1.67
OAK	382,223	274,746	1.72

MSY	374,284	256,254	1.68
CMH	372,406	250,125	1.67
HNL	365,787	191,918	1.52
SNA	358,921	199,237	1.56
PBI	352,853	216,632	1.61
SMF	344,592	220,712	1.64
SJC	337,361	199,871	1.59
JAX	320,459	210,789	1.66
BDL	320,082	190,595	1.60
BUF	318,466	213,017	1.67
RSW	304,346	189,226	1.62
SJU	300,217	88,195	1.29
OMA	282,656	166,234	1.59
ABQ	274,793	199,914	1.73
SDF	250,672	176,523	1.70
RIC	248,695	137,608	1.55
PVD	246,351	202,485	1.82
ONT	223,017	163,330	1.73
OKC	219,917	152,867	1.70
BHM	216,861	155,694	1.72
MHT	204,523	175,272	1.86
TUL	203,255	142,661	1.70
ROC	197,246	118,210	1.60
XNA	193,397	105,662	1.55
TUS	191,907	112,605	1.59
ANC	190,366	100,391	1.53
GRR	187,727	106,283	1.57
DSM	183,230	109,242	1.60
BUR	177,130	126,640	1.71
SYR	170,343	110,001	1.65
CHS	166,733	101,122	1.61
DAY	166,517	97,861	1.59
SAV	164,561	104,431	1.63
ICT	162,976	95,556	1.59
TYS	162,284	92,964	1.57
GSO	158,709	91,626	1.58
ORF	158,231	97,574	1.62
MSN	157,490	100,617	1.64
LIT	153,111	108,687	1.71
COS	152,740	95,444	1.62
LGB	152,537	83,916	1.55
SGF	149,537	72,919	1.49
RNO	148,797	126,000	1.85
ALB	147,912	98,065	1.66
HPN	146,479	102,562	1.70
CAE	140,915	89,537	1.64
ELP	124,777	87,314	1.70
GEG	121,437	76,686	1.63
BOI	119,763	87,632	1.73
GSP	118,780	68,091	1.57

BTR	118,154	62,086	1.53
FAT	113,903	102,682	1.90
LEX	113,239	63,482	1.56
CID	110,382	71,936	1.65
JAN	108,755	71,923	1.66
BTV	108,712	73,439	1.68