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BEFORE THE
FEDERAL AVIATION ADMINISTRATION

In the matter of the	)
	)
CITY OF CHICAGO APPLICATION FOR	)
A LETTER OF INTENT (LOI) FOR	)
PHASE I OF THE "O'HARE	)
MODERNIZATION PROGRAM" (OMP)	)

Affidavit of Robert Haveman,
Professor Emeritus
Department of Economics,
University of Wisconsin-Madison

Robert H. Haveman, being first duly sworn on oath, deposes and says:

1. I currently serve as the John Bascom Emeritus Professor, Department of Economics and La Follette School of Public Affairs at the University of Wisconsin-Madison, Madison, Wisconsin.

2. Prior to taking Emeritus Status I served as Chairman of the Department of Economics and Director of the La Follette School of Public Affairs, University of Wisconsin–Madison.

3. I have a Ph.D. in Economics from Vanderbilt University.

4. In my career I have been deeply involved in the development of the principles of economic analysis for benefit-cost calculation and valuation for federal government projects. I have written and taught extensively on the subject of the requirements for proper benefit-cost analysis.

5. I have read and analyzed the document submitted by the City of Chicago entitled *Request for Letter of Intent to provide a Multi-Year Commitment of Airport Improvement Program Grant-in-Aid Funding* (dated February 2005) which contains the City of Chicago's statement of benefit-cost analysis for both Phase I of the O'Hare Modernization Program (OMP) and for

the full build OMP-Master Plan. (For clarity of analysis I shall refer to this document as the "BCA-I Submission").

6. I have also read and analyzed the report entitled *Chicago's O'Hare Modernization Program Fails To Meet The FAA Tests For Benefit-Cost Justification* (June 6, 2005) authored by Dr. Brian Campbell, Mr. Rex Edwards, and Mr. James Lundy of the Campbell-Hill Aviation Group, Inc. That Campbell-Hill report contains an economic analysis of the BCA-I Submission. (For clarity of analysis I shall refer to this document as the "Campbell-Hill-I Report")

7. I have also read a document apparently co-authored by Chicago and FAA entitled *Supplemental Benefit-Cost Analysis, FAA Review Draft*, dated September 27, 2005 and released by the FAA on October 7, 2005. (I shall refer to this document as the "BCA-II Submission.")

8. Finally, I have also read a second report authored by Dr. Brian Campbell, Mr. Rex Edwards, and Mr. James Lundy of the Campbell-Hill Aviation Group, Inc. entitled *The City Of Chicago's Second Attempt To Justify The O'Hare Modernization Program Fails The FAA Benefit-Cost Requirements,* dated October 28, 2005 which analyses the September 27, 2005 *Supplemental Benefit-Cost Analysis, FAA Review Draft*. (I shall refer to this document as the "Campbell-Hill-II Report")

9. As a preliminary observation to my own analysis and conclusions regarding the BCA-I Submission (February 2005) and the BCA-II Submission (September 27, 2005), I concur in the findings of the Campbell-Hill-I Report as to both of these submissions.

10. In particular, with respect to the BCA-I Submission I agree with the findings that:

A. Using only the forecast and modeling data produced by Chicago and FAA (the so-called "Delay Based Adjustment Model") the economic benefits of Phase I are less than 1 cent for every dollar of cost, and the economic benefits of the Total OMP Master Plan are less than 27 cents for every dollar of cost. I emphasize the conclusions based on the Delay Based Model because its results are predicated solely on Chicago's and FAA's forecast, modeling and cost data and do not include the use of additional variables that Campbell-Hill used in the alternative Campbell-Hill "Full BCA Model," which is described in the Campbell-Hill-I Report.

B. The alternative Campbell-Hill "Full BCA Model" used in the Campbell-Hill-I Report also includes a number of additional variables such as corrections for overstated downstream benefits and the impact of increasing airline costs and fares attributable to the costs of the OMP. These are appropriate adjustments that not only should, but must be made in a proper benefit cost analysis.

C. The Campbell-Hill-I Report correctly notes that the "Base Case" conditions assumed by Chicago improperly assume a "no action" scenario, as opposed to a scenario in which reasonable actions to reduce delay are implemented at the existing airfield. Such actions would allow passenger growth to continue, and include increasing aircraft capacity, adjusting peak period schedules, maintaining the existing scheduling orders limiting arrivals, improvements in operating procedures. The application of an improper "no action" assumption led to Chicago's use of a 15.9 minute asserted AAAW (Average Annual All Weather) modeled

delay for the existing airfield, which was then extrapolated into the future (in particular, from 2009 to 2032). In reality, there are a number of actions at the existing airfield other than the construction of new runways that can be, will be, and indeed have been undertaken to reduce delays while allowing significant increased passenger growth. Neither Chicago nor FAA has modeled the AAAW delay performance of the existing airfield based on such actions. These actions include: a) the FAA's August 2004 scheduling order limiting arrivals to 88 per hour which has now been extended to April 2006 (and which the FAA has proposed to extend to 2008) and/or b) the improved operating procedures and conditions discussed in Chicago's August 1, 2005 submission to the FAA in FAA Docket FAA-2004-16944 In the Matter of Operating Limitations at Chicago O'Hare International Airport. August 1, 2005; and/or increases in aircraft capacity by substituting larger aircraft for smaller aircraft. The City itself has acknowledged in comments filed with FAA that these actions are valid and will occur. By ignoring these actions, the date at which the existing airfield is estimated by Chicago to reach capacity is sooner than it would otherwise be, and the level of operations is much lower than it would otherwise be and hence the benefits of both Phase I and Total OMP Master Plan are significantly overestimated.

D. The Campbell-Hill-I Report correctly notes that the BCA-I Submission failed to adequately consider alternatives. The BCA-I Submission relied simply on the alternatives analysis contained in the FAA's Draft Environmental Statement. However, that

analysis of alternatives is inadequate for a proper benefit-cost analysis. Several alternatives exist for meeting future passenger demands, and it is essential that each of these be assessed using proper benefit cost analysis methods. That alternative revealing the largest net present value of benefits should be identified and pursued. Such an analysis and comparison of alternatives is required by FAA Guidelines, consistent with accepted benefit-cost practice, yet it is completely absent in the DEIS (and now the FEIS) and the BCA-I Submission (and the BCA-II Submission as well).

E. The FAA Guidelines, consistent with accepted benefit-cost practice, require at least a 20-year period of analysis starting with the opening day of the proposed project (2009-2028 for Phase I and 2013-2032 for Total OMP Master Plan). The Campbell-Hill-I Report correctly points out that the BCA-I Submission's failure to produce and analyze forecasts, and impacts, and alternatives over the appropriate and required evaluation period of 20 years from the project start until the projected end of project life (2028 for Phase I and 2032 for Total OMP Master Plan) violated proper benefit-cost analysis procedures and leads to seriously erroneous conclusions as to benefits, costs, and alternatives.

F. In Chapter 5 of the Campbell-Hill-I Report, Campbell-Hill correctly identifies a large number of other serious analytical and structural problems in the BCA-I Submission that violated proper benefit-cost analysis procedures and lead to seriously erroneous conclusions as to benefits, costs, and required alternatives.

11. Many of the problems identified in the Campbell-Hill-I Report as to BCA-I Submission have been carried over by Chicago and FAA in the BCA-II Submission. I discuss several of the significant flaws below.

12. I also concur in the findings of the Campbell-Hill-II Report as to the errors and lack of empirical evidence and justification for the benefit-cost claims made in the BCA-II Submission.

13. The following are my own professional analyses and conclusions as to both the BCA-I Submission and BCA-II Submission.

The BCA-I Submission

14. The BCA-I Submission was based on the assertion that the expansion of O'Hare capacity according to the City's plans would generate large savings in travel times for passengers using O'Hare, and that these time savings, when given a value reflecting the time costs that individuals bear, would exceed the social costs of the expansion. The Campbell-Hill and other critiques of this study revealed that these reductions in delay and travel times were grossly exaggerated, and that within a very short time after the expansion was put into place, delay times would be at least as great as those prior to the expansion.

15. Although the City asserted that the travel time reductions realized immediately after the new capacity was opened would persist throughout the life of the project, further analysis demonstrated that this was not the case. Indeed, within a few years after the expansion is put into place, travel times at O'Hare are likely to be greater than before the expansion. (Indeed, if more recent traffic forecasts were employed, travel times at O'Hare are likely to be as great or greater virtually on opening day.) This result is due to both the rise

in delays under either Phase I or the Total OMP Master Plan[1] and the substantially longer taxi times necessary for operations taking off from and landing at O'Hare.

16. As a result of the City's errors in the BCA-I Submission, Chicago had radically overstated the delay savings benefits of both Phase I and the Total OMP Master Plan. When even the most simple corrections are made in the City's arithmetic computation, the delay savings benefits for Phase I and for Total OMP Master Plan are far less than the costs, *i.e.,* less than a penny of benefits per dollar of cost for Phase I and less than 27 cents per dollar of cost for Total OMP Master Plan.

The BCA-II Submission

17. After assessing Campbell-Hill's criticisms of the City's first benefit-cost analysis (BCA-I Submission), the FAA has apparently accepted the conclusion of Campbell-Hill that the delay savings benefits from Phase I and from the Total OMP Master Plan would be far less than the costs[2]. The FAA then directed the City to prepare another benefit-cost analysis using a totally new and different approach for assessing the benefits to passengers using O'Hare from the proposed expansion. This new analysis, the September 27, 2005 BCA-II Submission, purports to be based on the economic theory of "Consumer Surplus".

18. Consumer Surplus is a widely recognized economic concept that is useful for evaluating the benefits to demanders (in this case, passengers) from

[1] The rate at which delays will rise under Phase I or Total OMP Master Plan is greatly influenced by the forecast used by Chicago. By using the understated 2002 TAF, Chicago was able to claim that increases in delays would be more gradual (still rising quickly for Phase I) for the Total OMP Master Plan. If more recent forecasts are used the delays for the Total OMP Master Plan reach unacceptable levels much sooner.

[2] See, FAA Comments in document LOI-BCA 17157 in which FAA states: "The benefits estimated under the previous approach are artificial and would never have been realized."

changes in the supply or price of some good or service that they value. It is based on accepted economic theoretical principles.

19. However, to properly use the Consumer Surplus concept to estimate the benefits from a capacity changing project, certain well-recognized procedures must be followed and equally well-recognized requirements must be met. It is clear from an examination of Chicago's BCA-II Submission that Chicago (and the FAA who assisted in writing the document) did not follow these clear procedures and meet these requirements. As a result, as discussed below, the claims made in the BCA-II Submission are grossly overstated, deeply flawed, and unreliable.

20. While the Consumer Surplus approach and its application to the proposed Phase I and the Total OMP Master Plan can be discussed in both numerical and conceptual terms, Chicago and FAA use a conceptual graph (Exhibit 1-1 in the BCA-II Submission, p. 4) to visually illustrate the Consumer Surplus benefits which Chicago claims for Phase I (and later for Total OMP Master Plan). Because this graph can be used to visually illustrate the errors in the Chicago BCA-II Submission, I have included Chicago's graph as Exhibit A to this affidavit.

Summary of Fundamental Flaws in Chicago's Use of the Consumer Surplus Theory in the BCA-II Submission

21. The fundamental flaws in the use of the "Consumer Surplus" approach to benefit cost analysis in the BCA-II Submission include the following (as discussed more fully below):

A. Central to the theoretical Consumer Surplus economic model envisioned in the BCA-II Submission (an in the Exhibit A graph taken from this submission) is the assumption that all of a very

large number of suppliers in the market are powerless to control prices, irrespective of their costs. Only with this assumption will the prices shown in the graph, FPT_1 and FPT_2, be determined where the available capacity is equal to the demand curve, reflecting the willingness of buyers to pay for the last unit of the available supply. Only with this theoretical assumption, would an increase in the capped supply (from Q_1 to Q_2) result in a drop in the Full Price of Travel (FTP), as in the graph (Exhibit A. attached), irrespective of whether there is an increase or reduction in supply costs related to the price decrease. While this theoretical model may be arguably applicable in the short run, it is certainly not so in the longer run (i.e. during the required period of the BCA analysis). In the longer run, price changes in competitive markets directly reflect underlying changes in costs. Since the theoretical reduction in the Full Price of Travel [from FPT_1 and FPT_2] claimed in the BCA-II Submission is far in excess of any empirical evidence of actual cost reduction, there is no theoretical or empirical basis for these claimed benefits. This is especially true (as discussed below) when a substantial portion of the cost of the projects (Phase I or Total OMP Master Plan) is borne by the airlines, and when the expanded project increases taxi times (and hence airline costs) driving up their full costs and exerting pressure for an increase in fares.

B. Apart from this inconsistency of market operation with the asserted price decrease, the calculated decrease in price is totally unjustified. The FAA Guidelines (as well as sound economic

analysis) emphasize the need to test any asserted changes in price associated with an expansion of capacity for plausibility and to compare the asserted price changes with 'experience', presumably by identifying cost changes that can serve as the basis for the asserted price changes. There is no effort to present such a justification or rationalization of the asserted fare decreases in the BCA-II Submission. I note that the GRA Report that is a part of the BCA-II Submission emphasizes that "The analyst should assess whether the expected reduction in the money fare is plausible given market circumstances and experience." (pages 74-75, BCA-II Submission).

C. As explained below, central to a proper calculation of benefits under a Consumer Surplus theory is a forecast of traffic differentials in any given year between the Base Case (called Q_1 in the BCA-II Submission) and the added traffic that would use the facility (called Q_2 in the BCA-II Submission) as a result of lower fares. The traffic forecasts used for Q_1 and Q_2 in the BCA-II Submission are based on extensions of 2002 FAA Terminal Area Forecast (TAF) and do not incorporate an analysis and computation based on such assumed reduced fares. As a result, these forecasts cannot be used to justify a claim of benefits based on the Consumer Surplus theory.

D. Given its simplistic market model, the City describes the calculation of Consumer Surplus Benefits for the existing passengers in the Base Case— which Chicago says is the largest part of its new claim of Consumer Surplus Benefits. Within the the market framework that is assumed, these consumer surplus

benefits must necessarily be fully offset by the loss of equivalent "producer surplus" benefits. The loss of such "producer surplus" benefits stems from the imposition (through a competitive market adjustment) of the claimed fare decrease on airline revenues from the existing passengers. From the standpoint of economic benefits to the nation, a correct use of the theoretical model used by Chicago would result in net consumer surplus benefits to the nation that are zero—the theoretical Fare Reduction for the existing Base Case passengers leading to consumer surplus benefits is fully and equivalently cancelled out by the loss of producer surplus benefits that would otherwise have been experienced by the airlines. Chicago's superficial attempt to address this very significant error in its analysis by a single footnote (see discussion below) is clearly wrong from a theoretical standpoint and is without empirical foundation.

E. The only passenger group that will have any theoretical Consumer Surplus Benefit from Fare Reduction is the increased passenger increment from Q_1 to Q_2. There are several problems with the benefits claimed for this group:

(1) As detailed in A. (above), the theoretical basis for benefits to this group (the passengers represented by the distance Q_1 to Q2 on the graph in Exhibit A) under the Chicago theoretical Consumer Surplus approach rests on the assumed structure of the market for airline services at O'Hare airport and the fare reduction is asserted without any empirical evidence. There is no empirical evidence to support a claim that airlines serving O'Hare will reduce

fares to the levels claimed by Chicago in the absence of a reduction in costs (e.g., reduction in operating and travel time costs) to serve as the basis for the fare reductions. Since the only cost reduction claimed by Chicago is the relatively small and short lived reduction in travel times resulting from Phase I, there is no empirical basis to support the assumed and claimed fare reductions that serve as the basis of Chicago's Consumer Surplus claim for the additional or incremental passenger growth (from Q_1 to Q_2, in the Exhibit A graph) in the BCA-II Submission.

(2) As discussed above the size of this group — and necessarily the size of the Consumer Surplus — benefit attributable to this group is critically dependent on the difference between Q_1 and Q_2 and that difference must be based on a forecast keyed to fare differentials. Since the Q_1-Q_2 forecasts used by Chicago in the BCA-II Submission were not based on those fare differentials, the Q_1-Q_2 values used in the BCA-II Submission are invalid for purposes of Consumer Surplus analysis

22. Chicago asserts that it can paper over these fundamental deficiencies by simply running a claimed series of "sensitivity" analyses. However, the flaws in Chicago's improper use and application of the Consumer Surplus theory are so basic and fundamental that it is virtually certain that the so-called "sensitivity" simply miss major elements of the errors in Chicago's BCA-II Submission.

The Claimed Benefits in Chicago's BCA-II Submission

23. This new Consumer Surplus analysis of the City and the FAA claims two kinds of national benefits attributable to the proposed expansion:

A. The first form of benefit is the same 'savings in travel times' gain that served as the heart of their first benefit cost analysis. In the city's BCA-II Submission, these 'savings in travel times' benefits included in the estimates of 'consumer surplus' benefits. However, in this second analysis, these benefits are much smaller than in the first analysis, in part due to the correction of the egregious errors made in implementing this approach in the first study. Nevertheless, the City concedes that 'savings in travel times' constitute only a small portion[3] of the total national benefits attributed to the expansion project.

B. Moreover, the analysis needs to consider the extent to which there would be savings in delay times. I note that after 2015, there are no savings in delay times that are calculated for the Phase I expansion in the city's BCA-II Submission.

C. The second form of benefit is predicated on a claim (analyzed below) that the increase in capacity caused by Phase I will automatically result in significantly lower fares for both existing passengers and additional passengers that may use O'Hare airport given the expanded capacity and imposed cap on operations. As discussed below, the BCA-II Submission contains virtually no analysis for the claimed benefits of the Total OMP Master Plan.

[3] "Most of this reduction in the full price of travel would be due to the reduction in money fare…" BCA-II Submission, page 5.

24. As discussed below, there is no theoretical or empirical justification for the benefits claimed by Chicago.

The New Traffic Forecasts in the BCA-II Submission

25. As in their first study, the principal first step of the analysis in Chicago's BCA-II Submission is the development of a pair of traffic projections, one projecting operation and passenger growth without the O'Hare expansion in place, and the other projecting operation and passenger growth with the expansion.

26. The forecasts used by the City in this current analysis are not the same forecasts as those used in Chicago's BCA-I Submission or in the Draft and Final Environmental Impact Statements for the Phase I and Total OMP Master Plan, even though both sets of forecasts are described as being based on the 2002 TAF. While the BCA-II Submission again uses the "constrained" forecast for No Action/Base Case, a brand new "Constrained" forecast for OMP-Phase I is created for the benefit cost analysis under the same theory of delay-based constraints (namely, "unconstrained" operations/passenger growth will hit approximately 17 minutes of delay in 2015/16 and then operations will freeze and passenger growth will taper off). Prior to 2015, the Phase I forecast is the same as the Unconstrained 2002 TAF, the basis for this new and alternative forecast for OMP-Phase I.

27. For purposes of analyzing Chicago's calculation of Consumer Surplus benefits that it attributes to the proposed expansion, it is important to emphasize a basic principal of analysis: When components of an analysis are interdependent, this interrelationship must be specified and quantified in the analysis. For example, when a project is alleged to alter some value (in this case the fare which is asserted to decrease because of the expansion) which is an integral determinant of a separate component of the analysis (in this case,

the traffic forecasts for the base and the scenario cases), the altered value (the fare) must be reflected in this separate component (the forecast of traffic), which depends on the fare). This interrelated effect must be recorded using empirical evidence and not supposition.

28. Consider the application of this principal to this case. In order to make a proper Consumer Surplus calculation, separate traffic forecasts for the existing Base Case (which Chicago relies upon when it limits the number of operations, and thereby passenger traffic, to Q_1) and for Phase I (which Chicago relies upon when it limits the number of operations, and thereby passenger traffic, to Q_2) are required. (See Chicago graph Exhibit A). These forecasts should quantitatively reflect the effect of the claimed fares that are expected to be in effect in the base case and the scenario case on the forecast number of passengers desiring to use O'Hare, including the fare reduction that Chicago attributes to the expanded capacity (the Phase I project). The assumption of the Consumer Surplus method is that the reduction in the full cost of travel due to a corresponding fare reduction resulting from Phase I project will cause more passengers to want to use O'Hare, thus resulting in the increase in passenger volume from Q_1 to Q_2 ,as shown in the graph Exhibit A.

29. However, this asserted reduction in fares (used by Chicago in calculating the consumer surplus benefits) is not reflected in the forecasts used as the basis of the Chicago analysis. Indeed, the traffic forecasts used by Chicago in the BCA-II Submission to calculate the differential between Base Case traffic in a given year and Phase I traffic in the same year (used as the basis for securing the passenger limits of Q_1 and Q_2 in the base and Phase I expansion cases) were made completely apart from and unrelated to any consideration of fares or possible fare changes or related changes in delay costs. There is nothing in the forecasts used in Benefit-Cost Study [purported

to be extensions of the FAA 2002 TAF (Terminal Area Forecast) to generate Q_1 and Q_2 that reflect this interdependence. Analyzing the interrelationships among components of the analysis is a critical element in any reliable Consumer Surplus analysis. The analysis of this interdependence is completely missing in the City's analysis. Indeed, the City simply "assumed" that fares would decrease to a level necessary to generate the additional passengers reflected in the traffic forecasts, an assumption that turns the proper analysis on its head.

30. As a result, the quantitative value (Q_2 minus Q_1) which is used by Chicago to calculate that portion of Consumer Surplus attributable to the increased passenger growth that is asserted to be caused by Phase I is invalid and any quantitative benefits based on the value (Q_2 minus Q_1) are erroneous.

The Chicago Travel Time Savings Claims in the BCA-II Submission

31. Using these forecasts, the City calculates the levels of expected delays (as reflected in travel times) for 20 future years (the life of the project) that would be experienced at the airport both with and without the expansion. When no expansion is assumed, these expected delays (as reflected in travel times) are judged to be 'unacceptable' to the airlines at virtually the first year of the analysis period, and hence the City assumes that a limit on operations would be imposed. With such restrictions, operations are not allowed to grow beyond the level that would generate an average of about 16-17 minutes of delay per airplane. With the expansion, more of the projected traffic is able to move through O'Hare during the first few years, and during this time period some reduction in delays (reflected in savings in travel times) are recorded. However, soon after the expansion, delays are again calculated by the City to be 'unacceptable,' and again caps are imposed on operations so that delays would not exceed the 16-17 minutes per operation limit.

32. Now, one would think that after the Phase I project reaches the same level of delay as the Base Case, and limits on operations (and thereby passenger traffic) are imposed, there would be no savings in the value of travel times—during these years operations are limited to volumes reflecting the same level of delay both without the expansion and with the expansion. Indeed, the central assumption of Chicago's and FAA's Consumer Surplus theory reflected in Exhibit I-1 of the BCA-II Submission (and enclosed as Exhibit A to this affidavit) is that both Base Case and Phase I would have the same delays. Nevertheless, astonishingly, the City purports to find savings in the value of travel time.

33. The City finds these savings through its reliance on a complex model called the Total Airspace and Airport Modeler (TAAM). (Page 14ff of the BCA-II Submission). The description of this model suggests that the airlines will simply add numerous short haul flights and change the timing of the flight schedules so that reductions in travel times will result when compared to longer-haul flights. These additional operations are then credited to the proposed airport expansion, and the expansion project is then credited with some savings in the value of travel time.

34. There are a number of serious errors in this approach.

A. First, the traffic forecasts and the TAAM based savings (described above) are justified by asserting that they reflect the continuation of existing trends, and hence **unrelated** to the expansion of O'Hare. For a benefit to be credited to the expansion, the basis for the benefit must be caused directly by the improved services provided by the airport expansion. This is not the case, and hence

these additional savings in travel times beyond the point that traffic is limited are inappropriate.

B. Second, as discussed under the Forecast Section above, the TAF traffic forecast that is used by the City assumes that the passengers represented in the forecast will be paying the same full price of travel (airline fares plus delay times) with both the existing airport and the proposed expansion. However, as I detail below, in calculating the consumer surplus benefits (based on the asserted reduction in money fare, see FPT_1 minus FPT_2 in the Chicago graph shown in Exhibit A), the City postulates a very large decrease in the fares airlines will charge their passengers in response to the expansion.[4] These postulated fare decreases will surely have some effect on the traffic that would be forecasted to use O'Hare. Indeed, with lower fares asserted to be generated by the expansion, it follows that forecasted traffic would most likely be larger with the expansion than the City's 2002 TAF-based forecast. In this necessary case, traffic with the expansion would grow faster than is indicated in the with-expansion forecast, and hence the limitations on operations would have to be imposed sooner after the expansion. In this case, the asserted with-expansion savings in travel times would decrease or vanish; the national benefits attributed to this source by the City would be dramatically smaller, or possibly zero.

[4] For example, in the year 2007, a fare decrease of approximately $4 per passenger is calculated, and this value increases over time. See Tables IV-1, V-7, and C-1 of the BCA-II Submission.

The Fare Reduction Savings Claims for Consumer Surplus in Chicago's BCA-II Submission

35. However, the deficiencies and the errors in the overstated delay savings benefits is the smaller of the defects of the City's second benefit cost analysis. The principle defect stems from that portion of consumer surplus benefit that the City now attributes to the expansion which is the claimed reduction in the money fare. This money fare reduction benefit which Chicago attributes to the Phase I project is shown on Chicago's Consumer Surplus graph (my Exhibit A) in the area bounded by FPT_1, FPT_2 and points a and b and is shown in the area marked in the color green on Exhibit B to this affidavit.

36. This theoretical basis for the money benefit can be thought of as follows: When limits are placed on the amount of a service that can be supplied (such as operations into and out of O'Hare), the full price will be determined by the willingness to pay for the service by the marginal passenger. If the limits are increased, more passengers will be able to be served, and the marginal passenger will have a lower willingness to pay. This theory assumes that the sellers are compelled to lower the price to attract this marginal passenger who has a lower willingness to pay, that fares will drop and thus the money fare for all passengers, both existing and additional, will decline.

37. The City assumes that the fare will automatically lower when the number of operations are allowed to increase. However, there is no empirical evidence presented to support a claim that the carriers at O'Hare will reduce fares to the levels claimed by Chicago without having reduction in costs (*e.g.,* reduction in travel time costs and reduction in operating costs) to serve as the basis for the fare reductions. Since the only cost reduction claimed by Chicago

is the relatively small and short lived delay cost reduction resulting from Phase I, there is no theoretical or empirical basis to support the assumed and claimed fare reductions that make up the bulk of Chicago's Consumer Surplus claim in the BCA-II Submission.

38. Indeed, over the long run, it is the costs of the producers that ultimately determine market price (fares). Hence, any expansion of O'Hare could only influence the price of travel through O'Hare if it affected the costs of the producers (the airlines) which service O'Hare. It follows directly that any fare decrease attributed to the expansion of O'Hare airport must be directly tied to documented reductions in the costs of the carriers serving O'Hare. A proper economic analysis requires empirical evidence of the anticipated cost reductions experienced by the airlines, which savings could be the basis of a fare reduction. Further, as indicated above, any calculated cost reductions to the extent reflected in fare decreases would need to be used in constructing the traffic forecasts used in calculating the economic gains attributed to the expansion. The City has offered no evidence suggesting airline cost savings attributable to the proposed expansion that might serve as the basis for any claimed price reduction, and the associated consumer surplus.

39. Indeed, the benefit cost analysis put forth by the City implies just the opposite. The City's reports indicate that the expanded and reconfigured airfield will result in substantial increases in taxi times between terminals and runways. These are cost increases that will result in increases in the full travel price, and not reductions as the City claims. Moreover, as part of the City's plan, a share of the financing costs of the airport will be directly borne by the airlines, and these too are cost increases that will result in increases (and not reductions) in the full price of travel. Rather than the expansion of O'Hare leading to decreases in the full travel price of using airport (as the

City's inappropriate consumer surplus model posits), the expansion would appear to lead to increases in airline costs, and upward pressure on the full price of travel at O'Hare.

40. Nevertheless, accepting for the sake of argument that the additional capacity due to the proposed expansion will cause the number of passengers to increase from Q_1 to Q_2 (again emphasizing that Chicago failed to use fare differentials or cost differentials in generating the 2002 TAF extensions that represent Q_1 and Q_2), Chicago's theoretical (and unsupported) asserted fall in the full price of travel will have theoretical effects on three components of the national economic benefits that are claimed: 1) the consumer surplus benefits for existing buyers, 2) an offsetting loss of producer surplus benefits associated with these same existing buyers, and 3) a consumer surplus benefit for additional buyers who are able to enter the market because of the increase in capacity at O'Hare and the associated lower price.

41. I examine each of these effects in turn:

A. First, existing buyers (passengers) will experience the lower price, and will gain 'consumer surplus' benefits because of this fall in price. This is the box in the graph in Exhibit A which is delineated FPT_1, FPT_2 and points a and c, and is marked in yellow on Exhibit C to this affidavit.

B. Second, this lower price will have a fully offsetting effect on the sellers of the service (the airlines), and they will lose 'producers surplus'; their loss will be precisely and exactly equal to the gain in consumer surplus by the passengers. On balance, there is no national economic benefit that can be claimed from the reduced price affecting existing passengers, as the consumer surplus claimed for these passengers is precisely offset by the loss of

producer surplus benefits (*i.e.,* net benefits = the increase in consumer surplus benefits minus the reduction in producer surplus benefits) are zero. So turning to Exhibit C — in which the area claimed by Chicago as a consumer surplus benefit attributable to the reduction in the money fare for the Base Case passenger is marked in cross-hatched green — it is this area that is bounded by FPT_1, FPT_2 and points a and c which is directly offset by a 'producers surplus' loss that will be precisely and exactly equal to the gain in consumer surplus by the existing passengers.[5] Since this source of benefits has no theoretical basis, and alone accounts for over 90 percent of total benefits attributed to the expansion in the BCA-II Submission, it is clear that assigning an appropriate value of zero to them destroys the economic viability of the proposal. Without this source of benefit, the total remaining benefit falls to a very small value—one well below the present value of the costs of the expansion.

C. Third, the theoretical lower full price will lead to some additional passengers using the airport. For these additional passengers—those represented by moving down the demand curve from the prior higher price—the full price that they would be willing to pay will be greater than the reduced full price of travel calculated by the City in the BCA-II Submission. These additional passengers will experience some consumer surplus benefits.

42. The core problem with the City's theoretical estimate is that Chicago counts both sources of consumer surplus benefit, but ignores the offsetting loss

[5] In the first few years after the proposed Phase I expansion, some cost savings would occur, and these would have to be taken into account in the analysis.

of producer surplus benefits that will be experienced by the airlines. When one accounts for this error, the level of total consumer surplus benefits is limited to those benefits accruing only to the additional buyers (the additional passengers in this case) who are willing to pay more than the lower price but less than the higher price. As a result the consumer surplus benefits claimed by the City falls dramatically, as it is the asserted gains in consumer surplus to existing passengers that form over 90 percent of the claimed total benefits. Indeed, the only possible source of net consumer surplus benefits are those that accrue to the additional buyers who will procure the good or service at the lower price.

43. Chicago apparently recognizes that the increase in consumer surplus on existing passengers will be offset by a decrease in producer surplus for these same passengers. In both footnote 4 on page 5 and footnote 1 on page 70 (in the GRA paper) of the BCA-II Submission, the existence of this offsetting producers surplus is noted. However, the City assumes (without empirical foundation) that carriers will in fact succeed in avoiding this loss of producer surplus, as they are described as "seek[ing], to preserve it in the OMP Phase I Airfield case." This claim directly recognizes that the carriers at least understand that they are able to take actions to avoid any downward pressure on fares due to the expansion of capacity. This claim is given basis in these passages by the claim that airlines are 'in favor of the project,' suggesting they at least recognize that the fare decrease calculated by the City would not, in fact, occur. Alternatively, the claim that the airlines are in favor of the project in spite of this loss of producers surplus indicates that they fully realize that the fare decrease claimed by the City as the basis for their consumer surplus calculation is fictitious and baseless. Any fare reduction caused by the increase in capacity from Q_1 - Q_2 would necessarily result in a corresponding loss of

Producer Surplus to the airlines with the result that there would be zero net national economic benefit attributable to existing passengers from the proposed expansion.

44. The City's theoretical analysis of consumer surplus benefits also has other serious problems. A second serious problem is that the projected fall in the full price of travel calculated by the City is excessive, and hence generates larger consumer surplus benefits for both existing and additional passengers than is warranted. The City's calculated full price decrease derives directly from an assumed 'elasticity' (or downward sloping shape) for the demand curve of passengers for the use of O'Hare. In particular, the City uses an elasticity that may well be appropriate for use in a national market, but not in a local market where there are a number of very close substitutes to the services provided by the local supplier (in this case, O'Hare airport). For such a local market, the appropriate elasticity value implies a much flatter-shaped demand curve than that suggested by the City.

45. With such a flatter-shaped demand curve, the price associated with the larger number of passengers using O'Hare with the expanded capacity (Q_2) would probably be somewhat lower than the price with the lower limit on traffic, but the decrease in the price due to the expanded limit would be much less than that claimed by the City using its steeply-shaped demand curve. This can easily be seen if one thinks of the extreme case of a perfectly horizontal demand curve; in this case, the larger cap would allow more passengers to use the facility, but the price would not fall at all. Because of the City's use of the unwarranted steeply-sloped demand curve, the decrease in price that they attribute to the expanded limit on traffic (with the expansion) is far too large. With a more appropriate smaller estimated price decrease, the consumer surplus benefits for both the existing and the additional passengers (Q_1 to Q_2)

would be much smaller than that estimated by the City in the second benefit cost analysis.

46. A third basic problem inheres in the interaction of the claimed price decrease with the traffic forecasts that are used by the City. The City created a new forecast for OMP Phase I (Table II-3) . This forecast fails to take account of the effect on traffic into and out of O'Hare due to any possible reduction in travel times or any possible reduction in fares. In effect, the City uses a forecast that was developed for wholly different reasons and on wholly different economic and analytic premises — without regard to any price (airline fare) decreases that are associated with the expansion. The problem here, as indicated above, is that any reliable forecast of future traffic — to be used in any Consumer Surplus benefit claims — must reflect the price that passengers are required to pay for the service and the delay times that they expect to confront.

47. Given the City's very large (and exaggerated) projected decrease in price associated with the expansion, it is inconsistent and wrong to continue using a forecast that fails to account for this asserted price decrease.[6] Stated simply, if the primary benefit of the expansion (consumer surplus) claimed by the City depends on traffic forecasts which themselves depend on the asserted price decrease that generates the forecast, the interdependence of the forecast and the asserted price decrease must be recognized and built into the estimate.

48. In short, any reliable forecast of traffic must reflect the additional traffic generated by the price decrease which the City claims is a result of the

[6] The elasticity measure that the City uses (-1.18) implies a substantial decrease in the full price of travel, and hence additional induced traffic. A more appropriate, more elastic demand curve would generate an even larger increment to traffic. Any 'modeled' lower price would increase the projected future traffic, and hence result in the imposition of the cap sooner after the expansion. This revised cap would alter both the estimate of any savings in delay times and any gains in consumer surplus.

expansion. If the forecasts do not reflect these increases in additional traffic generated by the asserted reduction in the cost of travel, they are invalid for use with the consumer surplus model that is relied upon.

49. What the City has done is simply not defensible from the standpoint of sound economics. Put in layman's terms, the City is apparently mixing economic apples and economic oranges to get economic bananas.

50. It is inconceivable and both theoretically and empirically invalid to claim that, in such a market, any expansion of airport capacity could or would, by itself, bring about a fall in fares of the magnitude suggested by the City analysis, a price reduction that was unconnected to the costs of the producers (the airlines).

51. Indeed, in such a market, it is the costs of the producers that ultimately determine changes in price (fares). Hence, any expansion of O'Hare could only influence the price of travel through O'Hare if it affected the costs of the producers (the airlines) which service O'Hare. It follows directly and necessarily that any fare decrease attributed to the expansion of O'Hare airport must be directly tied to documented reductions in the costs of the carriers serving O'Hare. A proper economic analysis requires empirical evidence of the anticipated cost reductions experienced by the airlines, which savings could be the basis of a fare reduction.

52. Further, as indicated above, any calculated cost reductions to the extent reflected in fare decreases would need to be used in constructing the traffic forecasts used in calculating the economic gains attributed to the expansion. The City has offered no evidence suggesting airline cost savings attributable to the proposed expansion that might serve as the basis for any claimed price reduction, and the associated consumer surplus.

53. Indeed, the benefit cost analysis put forth by the City implies just the opposite. The City's reports indicate that the expanded and reconfigured airfield will result in substantial increases in taxi times between terminals and runways. These are cost increases resulting in increases (and not reductions) in the full travel price.

54. Moreover, as part of the City's plan, a share of the financing costs of the airport will be directly borne by the airlines, and these too are cost increases that will result in increases (and not reductions) in the full price of travel.

55. Rather than the expansion of O'Hare leading to decreases in the full travel price of using airport (as the City's inappropriate consumer surplus model posits), the expansion would appear to lead to increases in airline costs, and upward pressure on the full price of travel at O'Hare.

56. In sum, a proper economic analysis cannot use an artificial, theoretical, short-run model to claim consumer surplus benefits in response to increased airport capacity, when in fact the true market structure bears little resemblance to the theoretical model. In artificial textbook models, increases in capped supply can result in immediate and short-run price decreases that are not reflected in cost decreases. However, even in such artificial markets such price decreases will not persist over time; over the longer-run any price change must and will necessarily reflect changes in supplier costs.

57. In a real world market such as the market for airline passengers at O'Hare airport, any increases in infrastructure expansion will result in price decreases only if the expansion results in verifiable and measurable cost decreases, especially in the long run. Hence, empirical evidence that there would be <u>actual</u> cost savings that would reduce the full price of travel as claimed by the City is essential to assessing their claim. Moreover, any

documented cost and anticipated fare reduction would have to be reflected in the forecast of passenger demand used in the analysis. There has been no demonstration of such cost decreases to support the City's analysis.

The Inadequacy of the Elasticity Sensitivity Analysis

58. Chicago in its BCA-II Submission attempts to paper over many of the serious deficiencies described above by claiming that Chicago conducted a sensitivity study using different values for elasticity of demand and projects with elasticity values of as high as -7.65 still produced benefit-cost ratios of 1.0 or more, *i.e.,* that the benefits were equal or greater than the costs.

59. However, simply using alternative elasticity values to the wide range of erroneous premises and data inputs described above has no theoretical or empirical basis. The fundamental theoretical and empirical problems noted above cannot be corrected by the simple application of different elasticities to the faulty foundation of its BCA-II Submission.

60. The City and FAA can not and did not solve the serious problems with the BCA-II Submission by simply showing the sensitivity of their results to other elasticities and values that they have chosen. Such sensitivity analyses cannot and do not address the fundamental error of maintaining the full consumer surplus on existing passengers; they do not show elasticities that suggest the truly large substitution available in that market; they do not reveal the implications of using appropriate forecasts that reflect any realistic changes in airline fares due to the proposed expansion; they do not relate the asserted price decrease to empirical evidence that there will be an associated cost decrease.

Conclusions

61. For the reasons stated above I conclude that Chicago's attempt to use a textbook template Consumer Surplus theoretical model to generate benefits

for Phase I and Total OMP Master Plan is invalid from both a theoretical and an empirical standpoint.

62. The reasons I have set forth above demonstrate that Chicago's use of the textbook template Consumer Surplus theoretical model failed to follow several fundamental requirements for applying the theory.

63. Further, the empirical analysis provided by Campbell-Hill in their Campbell-Hill-II Report as to the empirical deficiencies in the BCA-II Submission demonstrates that there is no empirical basis for the benefits claimed in the BCA-II Submission

64. I also find that the deficiencies noted by Campbell-Hill in Chapter 5 of the Campbell-Hill-I Report as to the BCA-I Submission have been carried over and exist in the BCA-II Submission.

65. There is simply no basis for any competent objective economist to conclude that the BCA-II Submission demonstrates that the benefits of Phase I or Total OMP Master Plan exceed the costs of those projects.

FURTHER AFFIANT SAYETH NOT.

Robert H. Haveman

ROBERT H. HAVEMAN

SUBSCRIBED AND SWORN TO
before me this 8 day
of November, 2005.

Olivia A. Hayfield

Notary Public

Illustration of Equal Delay in Base Case and Scenario Cases

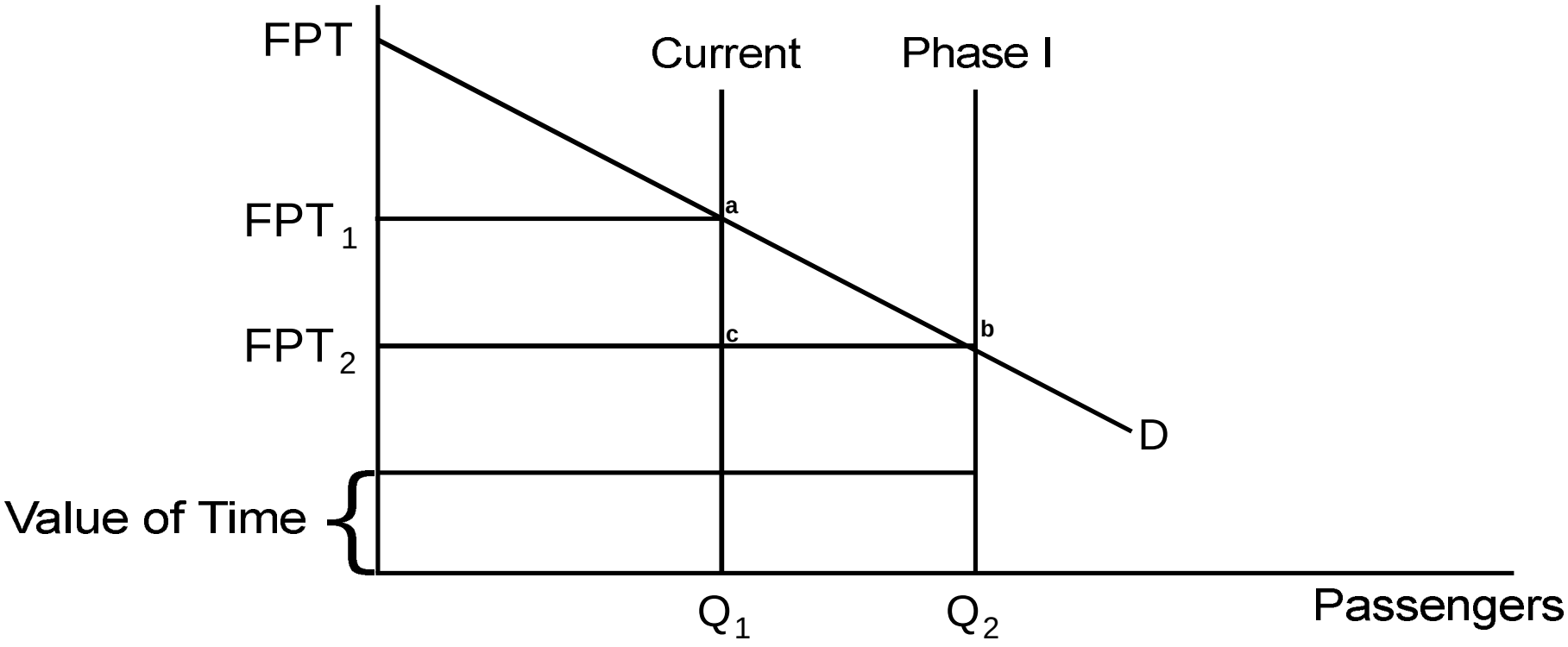
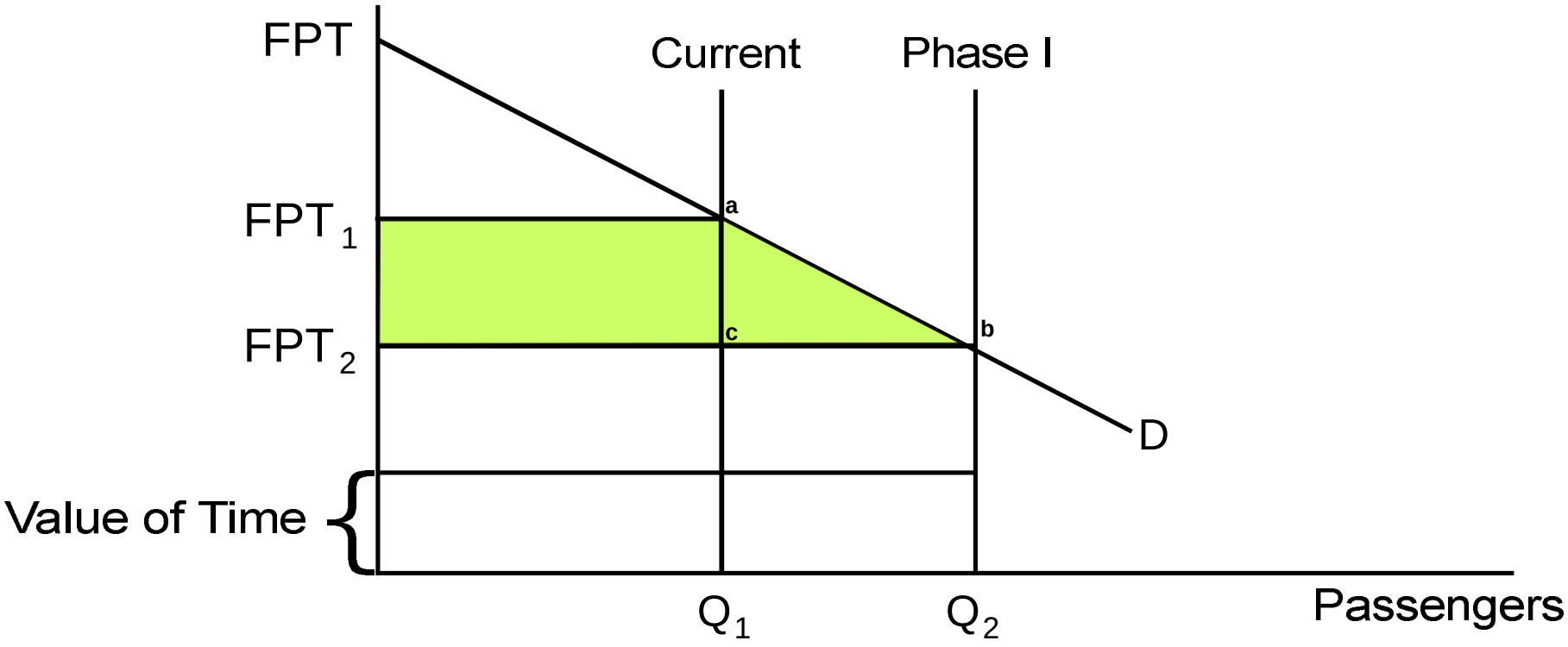


Exhibit A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Phase I
FPT 1
FPT 2
a
b
c
D
Value of Time
Q 1
Q 2
Passengers

Exhibit B

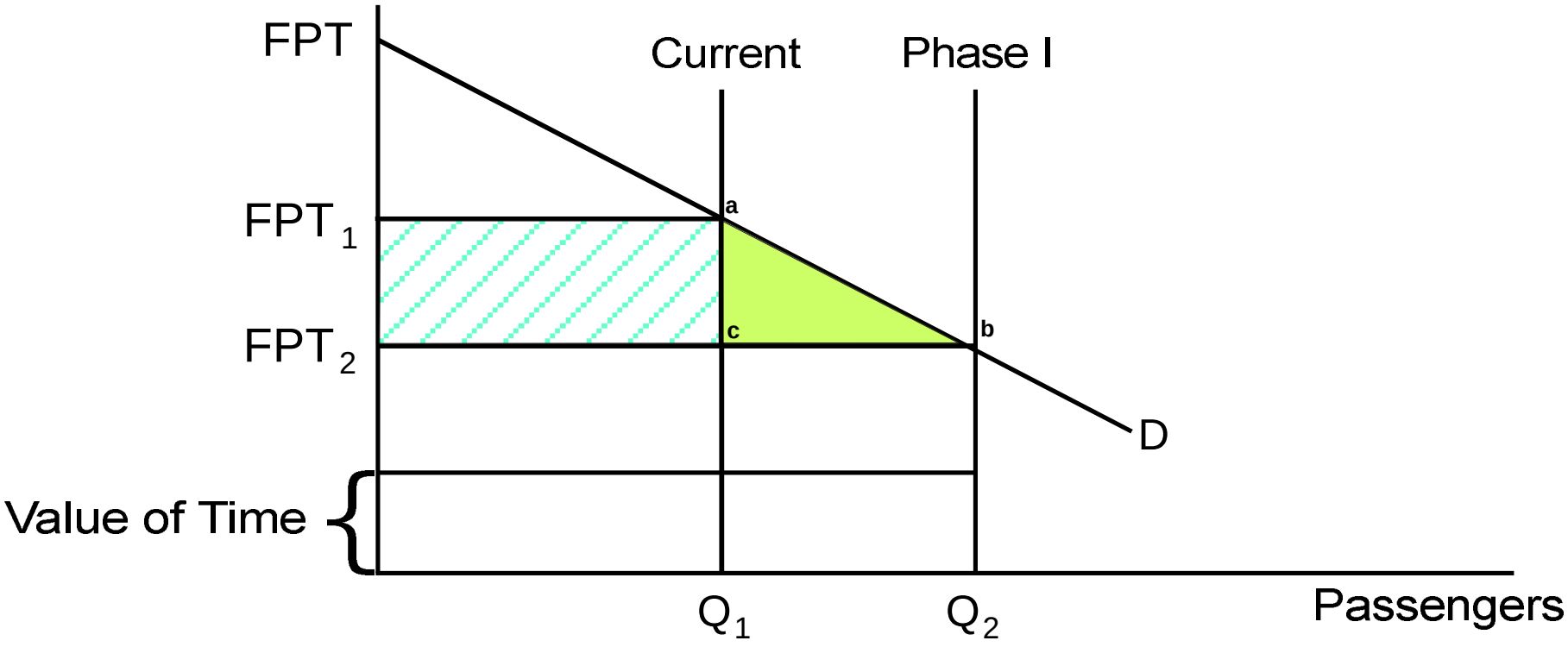
FPT
Current
Phase I
FPT 1
FPT 2
a
c
b
D
Value of Time
Q 1
Q 2
Passengers

Exhibit C