

February 2002

# AIRPORT INFRASTRUCTURE

## Unresolved Issues Make It Difficult to Determine the Cost to Serve New Large Aircraft



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## Report Documentation Page

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<b>Abstract</b> Airbus Industrie (Airbus), 1 the European manufacturer of large commercial aircraft,plans to introduce New Large Aircraft (NLA)to U.S. airports in 2006. 2 Airports,such as New York s John F.Kennedy International (JFK)and Los Angeles International,which now provide service to the Boeing 747 (B-747),currently the largest commercial aircraft,as well as those that serve as hubs for airlines that might purchase NLA,are likely candidates to serve these new aircraft.The Federal Aviation Administration (FAA)sets the design standards that govern how an airport must be configured to safely serve aircraft with certain wingspans and weight.A B-747 operates under Design Group V standards, while FAA has determined that NLA will operate under Design Group VI standards.Currently,FAA is reviewing the standards for NLA,which were published in 1983,to determine whether they should be revised.		
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## Abbreviations

A380	Airbus 380
B-747	Boeing 747
FAA	Federal Aviation Administration
GAO	General Accounting Office
JFK	John F. Kennedy International Airport
NLA	New Large Aircraft



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United States General Accounting Office  
Washington, DC 20548

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February 4, 2002

The Honorable Ernest F. Hollings  
Chairman, Committee on Commerce,  
Science, and Transportation  
United States Senate

The Honorable John D. Rockefeller IV  
Chairman, Subcommittee on Aviation  
Committee on Commerce, Science,  
and Transportation  
United States Senate

Airbus Industrie (Airbus),<sup>1</sup> the European manufacturer of large commercial aircraft, plans to introduce New Large Aircraft (NLA) to U. S. airports in 2006.<sup>2</sup> Airports, such as New York's John F. Kennedy International (JFK) and Los Angeles International, which now provide service to the Boeing 747 (B-747), currently the largest commercial aircraft, as well as those that serve as hubs for airlines that might purchase NLA, are likely candidates to serve these new aircraft. The Federal Aviation Administration (FAA) sets the design standards that govern how an airport must be configured to safely serve aircraft with certain wingspans and weight. A B-747 operates under Design Group V standards, while FAA has determined that NLA will operate under Design Group VI standards. Currently, FAA is reviewing the standards for NLA, which were published in 1983, to determine whether they should be revised.

Many large airports could serve NLA now by placing restrictions on NLA's ground operations or those of other aircraft. However, because many of these large airports have typically experienced congestion and delay problems, such measures as restricting NLA to designated taxi routes, terminal gates, and runways, and/or restricting the ground movements of other aircraft would likely hinder the efficient movement of traffic. To

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<sup>1</sup>Airbus is one of only two aircraft manufacturers (Boeing being the other) in the market for large commercial airliners. Airbus designs, builds, sells, and supports commercial aircraft with a capacity of 100 seats or more.

<sup>2</sup>The term New Large Aircraft is generally used to describe the new aircraft being developed by Airbus Industrie that have wingspans and lengths substantially greater than today's Boeing 747 aircraft, weigh up to 1.2 million pounds, and have a seating capacity ranging from 555 to 880 passengers. Airbus calls its NLA the A380.

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safely serve significant numbers of NLA while efficiently moving air traffic, U.S. airports might need to upgrade such infrastructure as runways and taxiways. In 1997, 20 airports that were likely candidates to receive NLA reported to FAA that costs to meet Design Group VI standards would total \$6.6 billion (in 1997 dollars).<sup>3</sup> At that time, FAA noted that the costs reported by some airports included estimates associated with planned projects that were not a direct consequence of the NLA. Since then, some airports have decided not to serve NLA and others have revised their estimates. In response to your request, this report provides the airports' estimates of the costs needed for infrastructure changes to accommodate NLA.

While the number of NLA that individual airports would serve is uncertain at this time, Airbus expects the market for its A380 to be robust. Because of the terrorist attacks of September 11, 2001, it is unclear whether any long-term reduced demand for flying might result in fewer than expected NLA sales and lower use at U.S. airports. It is also unclear how the increased emphasis on airport security might affect the cost of infrastructure changes airports plan to make to serve NLA. As agreed with your office, we plan, at a later date, to examine the costs and other issues associated with safety and security as well as the operational, capacity, and environmental challenges that U.S. airports might face in serving NLA.

In July 2001, we mailed a survey to officials at the 23 airports that we identified as likely candidates to serve NLA and asked them if they were planning to accommodate NLA at their airport and to estimate the costs for those infrastructure changes that they would likely make if FAA revises the standards and/or grants modifications to their individual airport.<sup>4</sup> We received responses from 22 airports. We asked airports to derive their cost estimates from those that were used to support planning documents, such as an airport's master plan and capital budget. We did

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<sup>3</sup>See *The Operational and Economic Effects of Large Airplanes on United States Airports*, FAA, Office of Airport Safety and Standards, Mar. 1998. FAA noted in the report that the costs reported by airports include some estimates associated with planned projects that are not a direct consequence of NLA. To solicit estimated costs, FAA, in cooperation with the Airports Council International-North America and the Air Transport Association, jointly prepared a survey that was sent to 22 airports. They received responses from 20 of them.

<sup>4</sup>FAA defines "modifications to standards" as any change to its standards applicable to an airport's design, construction, or equipment procurement project that results in lower costs, greater efficiency, or is necessary to accommodate an unusual local condition, when adopted on a case-by-case basis.

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not verify the airports' estimates for accuracy. (See app. I for additional information on our scope and methodology.)

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## Results in Brief

At this time, determining the cost to serve NLA is difficult because a number of important issues that affect the infrastructure changes that airports might be making are unresolved. These issues include (1) whether and the extent to which FAA revises the standards or grants modifications, (2) which airlines buy NLA and the frequency of NLA service at U.S. airports, (3) when NLA begin serving these airports, and (4) the extent to which the cost estimates reported by the airports are attributable to NLA instead of changes to accommodate growth in air traffic. The 14 airports that expect to serve NLA by 2010 collectively reported that their cost estimate for infrastructure changes is \$2.1 billion; however, the ultimate cost will depend on how issues that affect cost will be resolved. As these issues are resolved, airports will have a clearer understanding of what infrastructure changes must be made and their costs.

We provided the Department of Transportation, the Airports Council International-North America, and Airbus with a draft of this report for review and comment. Officials from the Department of Transportation and Airports Council International-North America provided oral comments and generally agreed with the information presented in the report. They provided clarifying and technical comments, which we have incorporated as appropriate.

Airbus provided written comments through its Deputy Vice President of Safety and Technical Affairs (see app. V). Airbus officials agreed with the list of 14 airports that reported that they expect to serve NLA by 2010 but said that airport officials overestimated the costs to serve NLA. The company estimated the cost for these 14 airports to accommodate NLA at \$520 million as opposed to the \$2.1 billion the airports estimated. Airbus offered two major reasons why it believed airport officials overstated the cost estimates reported to us. First, Airbus stated that, in the majority of cases, there is no safety need to bring existing airport infrastructure to Group VI standards to accommodate the A380. Although we revised the report to acknowledge that many airports could safely serve NLA by placing restrictions on NLA's operations or the operations of other aircraft, we do not view this as a long-term solution to serving NLA because many of these airports have typically experienced delay and congestion problems that could be made worse by additional restrictions. Second, Airbus said that most of the estimated costs airports reported are attributable to the growth of air traffic and not directly related to serving NLA. We revised the report to acknowledge that cost estimates would

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change if it is determined that some portion of the overall costs airports reported might be attributable to overall growth rather than specifically to serving NLA. Airport officials have told us that it is very difficult to separate these costs, especially when an airport expects to serve NLA as a part of its growth.

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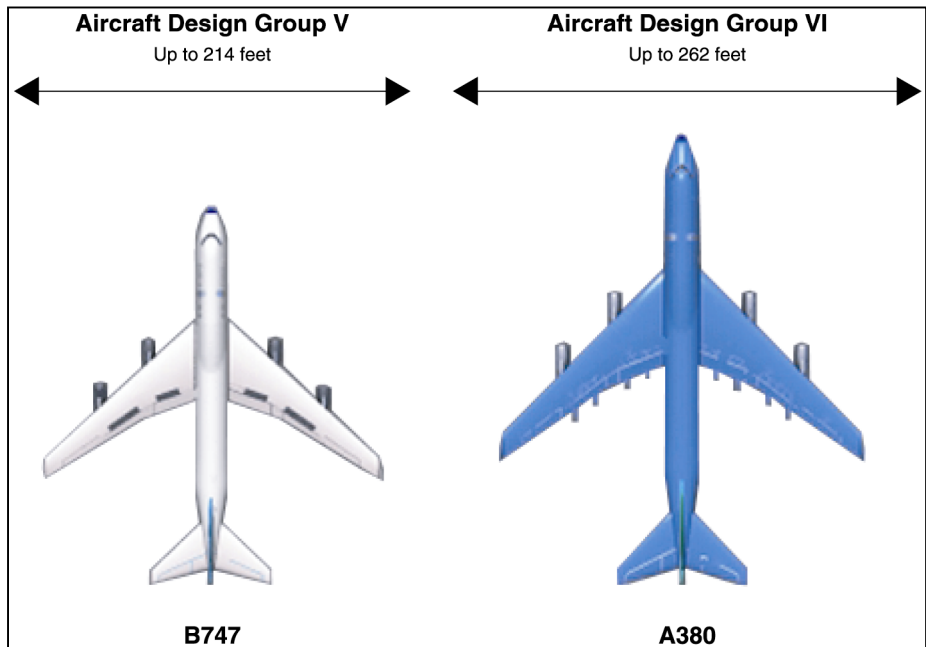
## Background

To develop and maintain a national system of safe airports, FAA promulgates federal standards and recommendations for the design of airport infrastructure. FAA's airport design standards regulate how an airport must be configured to safely serve aircraft with certain characteristics, such as wingspan and weight. Design Group V standards serve the B-747, while Design Group VI standards will serve NLA (see fig. 1).<sup>5</sup> FAA has established a process to grant modifications to airport design standards according to an airport's unique local conditions. Under a recently established policy, FAA headquarters officials have the sole authority to approve modifications to the standards for accommodating NLA. Generally, an airport's request must show that an acceptable level of safety, economy, durability, and workmanship will continue despite any modification. (See app. II for more detailed information on airport design standards and the process for requesting and granting modifications.)

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<sup>5</sup>To help introduce NLA at U.S. airports, FAA has an NLA Facilitation Group made up of FAA, Boeing, Airbus, and other aviation officials, including representatives of airports, airlines, and pilots.

**Figure 1: Comparison of Aircraft Design Group V and VI Standards**



Source: FAA's *Airport Design Advisory Circular 150/5300-13*.

## The Cost for Airports' Infrastructure Upgrades to Serve NLA Will Be Affected by a Number of Unresolved Issues

With the arrival of NLA closer and the availability of more up-to-date information to airport officials about whether airlines plan to offer NLA service at their airports, 14 airports reported that they expect to serve NLA by 2010.<sup>6</sup> Determining the cost to serve NLA is difficult because a number of issues are unresolved including

- whether and the extent to which FAA revises NLA's design standards or grants modifications;
- which airlines actually buy NLA and the frequency of NLA service at U.S. airports;
- whether NLA will begin service in the United States as early as 2006, as planned; and

<sup>6</sup>Of the eight other airports responding to our survey, six reported that they probably or definitely would not serve NLA by 2010. These airports are Bradley International, Honolulu International, Minneapolis-St. Paul International, Phoenix Sky Harbor International, Seattle-Tacoma International, and Detroit Metropolitan. Two others, Philadelphia International and Logan International (Boston), told us that they are as likely as not to serve NLA.

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- the extent to which the cost estimates reported by the airports are attributable to NLA instead of changes to accommodate growth in air traffic.

The 14 airports that expect to serve NLA by 2010 collectively reported that their cost estimate for infrastructure changes is \$2.1 billion. However, even with these changes, officials from most of these airports told us that they do not expect their airports to fully meet current Design Group VI standards. (See app. III for a list of these cost estimates by airport. See app. IV for the cost estimates from these 14 airports to upgrade their four major types of infrastructure.)

Regarding the unresolved issues, most airport officials told us that they plan to apply to FAA for modifications to the standards or to serve NLA by restricting its operations.<sup>7</sup> FAA has three studies underway to evaluate certain Design Group VI standards to determine which ones should be revised. One study uses actual data from taxiing B-747 aircraft to determine how much pilots deviate from a taxiway's centerline. The amount of deviation is important to help determine a taxiway's required width to operate NLA safely. According to FAA, it has continuously kept airport and industry officials informed of preliminary results of its on-going studies. However, FAA will not know until 2003, when the final results are expected, whether to revise the current Design Group VI standards and/or grant modifications or what the nature of any changes might be. There are certain Design Group VI standards for which modifications cannot be granted. For example, runway and taxiway bridges designed to safely support a B-747 with a maximum taxiing weight of 875,000 pounds cannot support an A380 with a maximum taxiing weight of 1.4 million pounds.

Which airlines actually buy NLA, how they use these aircraft in their route structure, and the total number of NLA that are put into service will influence which airports eventually receive NLA and the cost for infrastructure changes. For example, Honolulu International Airport is a likely destination for NLA if Japan Airlines or All Nippon Airways, two of

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<sup>7</sup>Only three airports, Dallas/Fort Worth International, Orlando International, and Washington-Dulles International, expect to fully meet current Design Group VI standards. Although Denver International is very close to meeting Design Group VI standards, it reported that it would need at least one modification to the standard or for FAA to revise this standard to accommodate NLA, even after this airport's currently planned upgrades are completed.

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the key airlines that serve this airport, buy them. If not, Honolulu International Airport would not likely receive NLA on a regular basis and could possibly accommodate them through modifications to standards, thereby avoiding more costly infrastructure changes.<sup>8</sup> The total number of NLA in service and which airlines purchase them will be influenced by market demand, which is even more uncertain than when the estimates were made because of the September 11th terrorist attacks. Before and after these attacks, Airbus has estimated that 1,500 NLA would be flying worldwide by 2019. In contrast, in July 2001, Airbus' competitor, Boeing, said that it estimated that 500 NLA would be flying by then—a threefold difference.<sup>9</sup> Each company's future vision of air travel accounts for the large difference between their estimates.<sup>10</sup> Officials at many of the airports we surveyed believe that if they serve only a few NLA, they might be able to accommodate these aircraft with operational restrictions, thus making full compliance with Design Group VI standards unnecessary. For example, to help ensure safety, an airport could restrict NLA's ground movement to designated taxi routes, terminal gates, and runways, and/or could restrict the ground movement of other aircraft.

The total estimated cost to accommodate NLA could also change because the timing of its arrival is uncertain. The A380 has not been completely built and the first flight (certification trial) is not expected until 2004.<sup>11</sup> The A380 is not expected to arrive in the United States until 2006.<sup>12</sup> Meanwhile, many factors, including commercial decisions and unforeseen technical problems in certifying the aircraft for service, could delay this schedule. This uncertainty has led some airports to decide that they will not upgrade

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<sup>8</sup>Since the A380 has not yet been built and neither of these airlines has committed to purchasing NLA, Honolulu International Airport officials reported that they are not expecting the arrival of NLA.

<sup>9</sup>At the time we completed our audit work in December 2001, Airbus maintained that its estimate was still valid while Boeing did not respond to our inquiry about whether it had revised its estimate.

<sup>10</sup>At the time of its estimate, Boeing anticipated more point-to-point travel ("fragmentation" of the market), making large aircraft like the A380 less necessary. Therefore, the company has decided to pursue developing a faster aircraft instead of a larger one. Airbus, while believing that fragmentation will certainly occur, expects more hub travel ("consolidation" of the market), making the A380, which carries many passengers to one place, more useful.

<sup>11</sup>FAA conducts certification flight trials to demonstrate that new aircraft comply with its standards and requirements.

<sup>12</sup>The first version expected to arrive is the passenger aircraft, with the cargo aircraft expected to begin service in the United States in 2008.

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their infrastructure unless they are reasonably certain that some of the airlines they serve will be using NLA there.

Lastly, distinguishing, where possible, between the costs for growth and those specific to serving NLA would affect the estimated costs of infrastructure changes. Costs that airports would incur for growth, regardless of whether they serve NLA, should be separated from those that an airport is incurring only because it is serving NLA. Airbus officials stated that most of the estimated costs airports reported for infrastructure upgrades are attributable to growth rather than accommodating NLA. However, airport officials have told us that, in some cases, costs attributable to growth and serving NLA are so interrelated that it is very difficult to separate them.

Within the next 2 years, we expect some of these issues will be resolved. For example, FAA expects to have final results from its tests on certain airport design standards in 2003 and will then be able to decide whether to revise the standards. With these issues resolved, airports will have a clearer understanding of the infrastructure changes that must be made and their costs.

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## Agency Comments

We sent a draft of this report to the Department of Transportation, the Airports Council International-North America, and Airbus for their review and comment. We met with Transportation officials, including the Director, Office of Airport Safety and Standards, FAA. These officials suggested that we explain why some airports indicated large differences between the costs for meeting Design Group VI standards reported to FAA in 1997 and those we received in 2001. We believe that the costs for making infrastructure changes to fully meet Design Group VI do not provide a realistic estimate of the changes that airports expect to make to serve NLA. Therefore, we revised the report to focus on the airports that expect to serve NLA and the costs of those infrastructure changes they expect to make. FAA officials also provided a number of clarifying comments, which we have incorporated.

The Senior Vice-President, Technical and Environmental Affairs, Airport Council International-North America, provided oral comments. He suggested that we clarify the relationship between Design Group VI standards for new construction at airports and NLA's operational requirements. He said that the draft report made reference to airports' inability to meet Design Group VI standards without noting that airports

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can accommodate NLA with operating restrictions. We revised the report to clarify this point.

The Deputy Vice President of Safety and Technical Affairs for Airbus provided written comments (see app. V for the full text of Airbus' comments). Airbus agreed with the list of 14 airports that reported that they expect to serve NLA by 2010. However, the company said that the estimates from these airports overstated the costs to accommodate NLA. The company's collective estimate for the 14 airports that expect to serve NLA is \$520 million, as opposed to the \$2.1 billion collectively estimated by the airports. The company provided two major reasons for this difference. First, Airbus said that, in the majority of cases, there is no safety need to bring existing airport infrastructure to Group VI standards to accommodate the A380. Second, Airbus said that the cost estimates reported by the airports are "rough" and do not reflect detailed analysis. Airbus said that most of the cost estimates airports reported could be attributed to the growth of air traffic and are not directly related to accommodating NLA.

With respect to whether airports can safely accommodate NLA now, the report was revised to acknowledge that many airports could accommodate NLA by placing ground restrictions on its movement or the movement of other aircraft and that these measures might obviate the need for immediate infrastructure changes. However, if Airbus' expectation of a robust demand for its NLA becomes reality, these measures are not likely to provide an efficient long-term solution, especially at those large airports that have experienced delay and congestion problems in the past. As for the rigor of the estimates, we asked the airports to derive their cost estimates from those used to support such planning documents as their master plan and capital budget. We revised the report to clarify the basis for their estimates. While the draft report acknowledged that the estimates were based on assumptions about several factors, we revised it to state that distinguishing between the costs attributable to growth versus the costs specific to serving NLA would affect an airport's cost estimate. Airport officials have told us that it is very difficult to separate these costs, especially when an airport expects to serve NLA as a part of its growth.

Airbus also disagreed with including any costs for the five airports that are not likely to receive NLA by 2010. However, if these costs are included, the company estimated the costs for 19 airports to fully meet Design Group VI standards at \$1.7 billion, as opposed to the \$4.6 billion reported to us. We agree with Airbus that including the costs for five airports to fully meet standards when they do not expect to accommodate NLA does not provide

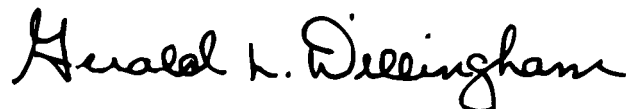
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a useful estimate. Moreover, some airports told us that they do not expect to make some of the changes that they reported would be necessary to meet these standards because of space limitations or other factors. Therefore, we revised the report to focus on the airports that expect to accommodate NLA and their cost estimates for the infrastructure changes they plan to make.

We performed our work from June to December 2001 in accordance with generally accepted government auditing standards.

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As agreed with your offices, unless you publicly release its contents earlier, we plan no further distribution of this report until 30 days after the date of this report. At that time, we will send copies of this report to the Ranking Minority Members, Senate Committee on Commerce, Science, and Transportation and its Aviation Subcommittee; interested Members of Congress; the Secretary of Transportation; and the Administrator, FAA. This report is also available on GAO's home page at <http://www.gao.gov>. If you have any questions on matters discussed in this report, please call me at (202) 512-3650 or call Belva Martin, Assistant Director, at (202) 512-4285. We can also be reached by e-mail at [dillinghamg@gao.gov](mailto:dillinghamg@gao.gov) and [martinb@gao.gov](mailto:martinb@gao.gov), respectively. See appendix VI for a list of key contributors to this report.



Gerald Dillingham, Ph.D.  
Director, Physical Infrastructure Issues

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# Appendix I: Scope and Methodology

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We mailed a survey to officials at 23 airports and asked them to update the cost estimates to upgrade their airport infrastructure that they had reported to the Federal Aviation Administration (FAA) in 1997. We sent surveys to the same 22 airports that FAA had surveyed because those airports provided nearly all of the B-747 service or serve as hubs for airlines that might purchase New Large Aircraft (NLA) and therefore are likely to also serve NLA. We also included Indianapolis because it is a cargo hub for Federal Express, which has already placed an order with Airbus for 10 NLA.

Because 4 years have elapsed, we expected that airport officials would have more recent information to estimate the following:

- the cost to accommodate NLA, if FAA revises the Design Group VI standards or grants modifications to them and
- the cost to fully meet Design Group VI standards.

The officials were asked to specify their airport's total estimated costs to upgrade the following four major types of infrastructure for NLA: runways; taxiways; bridges, culverts, and tunnels; and terminals, concourses, and aprons. (See app. IV for estimates of these costs by category.) We also asked additional questions about their plans for serving NLA, such as the number of aircraft they expect to serve and the time frame for service. When answers were unclear or incomplete, we conducted follow-up telephone calls for clarification. We asked airports to derive their cost estimates from those that were used to support planning documents, such as an airport's master plan and capital budget. We did not verify the airports' estimates for accuracy.

We received responses from 22 of the 23 airports, including 19 of the 20 that responded in 1997 and 3 additional airports. Only Lambert-St. Louis International Airport did not respond. In 1997, FAA received responses from 20 of the 22 airports it surveyed; Honolulu International and Orlando International did not respond.

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# Appendix II: Airport Design Standards

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The FAA establishes airport design standards to configure an airport's infrastructure to safely serve aircraft with certain characteristics, such as wingspan and weight. Design Group V standards serve the Boeing 747, while Design Group VI standards will serve NLA. FAA defines Design Group V aircraft as those having a wingspan of at least 171 feet but less than 214 feet. Design Group VI aircraft are those having a wingspan of at least 214 feet but less than 262 feet. The standards for Design Group VI were published in 1983 and are currently under review by FAA. The agency has established an NLA Facilitation Group to help introduce NLA at airports. This group is made up of FAA, Boeing, Airbus, and other aviation officials, including representatives of airports, airlines, and pilots.

Unique local conditions might require modifications to airport design standards on a case-by-case basis. FAA's approval is required for modifying airport design standards that are related to new construction, reconstruction, expansion, or an upgrade at an airport that receives federal or federally approved funding. FAA has established a process to approve modifications to standards.<sup>13</sup> An airport's request for a modification must be submitted to the appropriate FAA regional or district office for evaluation to determine whether the modification is appropriate, and, if it is, the proper level of approval. Under a recently established policy, FAA headquarters officials have sole authority to approve modifications to standards related to serving NLA.<sup>14</sup>

Some of the Design Group VI standards that pose the most difficult challenges for airports are runway and taxiway widths, separation distances (e.g., for a runway and parallel taxiway and for parallel taxiways), and infrastructure strength (e.g., for bridges and culverts). Clearances on aprons, ramps, gate areas, and terminals at many airports might also need to be upgraded to meet these standards. For example, John F. Kennedy International Airport (JFK) does not fully meet all of the current Design Group V standards because the airport is severely limited by a lack of airfield space. Airport management is developing plans to get the airport to Design Group V and hopes that with FAA's granting a modification to the airport or revising certain Design Group VI standards, the airport would be able to safely serve NLA. (See table 1 for a

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<sup>13</sup>FAA Order 5300.1F, *Modifications to Agency Airport Design, Construction, and Equipment Standards*, establishes the process to approve modifications to standards.

<sup>14</sup>FAA anticipates publishing guidance to eventually allow consistent nationwide approval of these modifications by regional offices.

comparison of current design group requirements for key infrastructure features of airports and specific features at JFK.)

**Table 1: Design Group Standards, JFK's Current Configuration, and JFK's Plans to Accommodate NLA**

<b>Airport infrastructure</b>	<b>Design Group V</b>	<b>Design Group VI</b>	<b>JFK's Current Configuration</b>	<b>JFK's Plans for NLA</b>
Runway width	150 feet	200 feet	150 feet	200 feet
Taxiway width	75 feet	100 feet	75 feet	75 feet
Taxiway separation	267 feet	324 feet	300 feet	2285 or 2270 feet
Taxiway to fixed or movable object	160 feet	193 feet	130 feet	167 feet

Source: JFK officials and FAA's *Airport Design Advisory Circular 150/5300-13*.

# Appendix III: Cost Estimates Reported by 14 Airports to Serve NLA through Revisions or Modifications to Design Standards

<b>Airport</b>	<b>Cost estimate to service NLA through revisions or modifications</b>
Dollars in thousands	
Los Angeles International	\$1,215,000
O'Hare International (Chicago)	232,750
John F. Kennedy International	109,000
Ted Stevens Anchorage International	106,000
San Francisco International	76,000
Dallas/Fort Worth International	73,055
Indianapolis International	66,030
Washington Dulles International	64,050
Memphis International	36,600
Hartsfield Atlanta International	26,359
George Bush Intercontinental (Houston)	23,600
Orlando International	18,838
Miami International	18,300
Denver International	16,250
<b>Total</b>	<b>\$2,082,000</b>

Source: GAO's 2001 survey.

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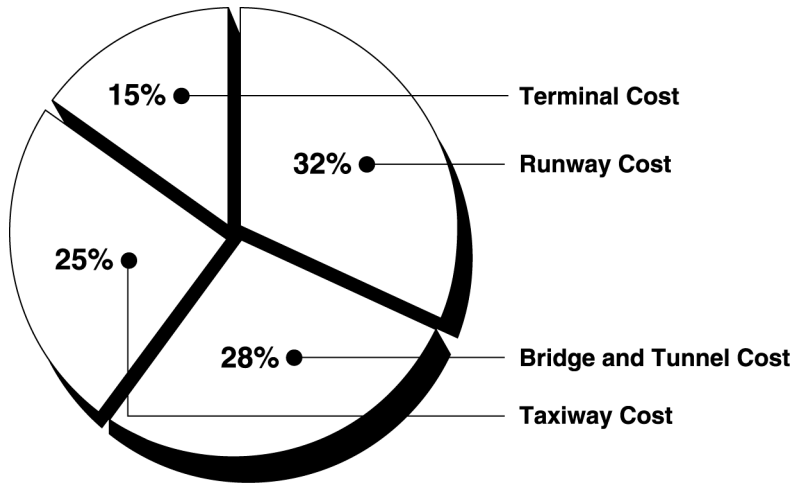
# Appendix IV: Airports' Cost Estimates to Upgrade Four Major Types of Infrastructure

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Our survey asked airports to provide cost estimates for four major types of airport infrastructure: runways; taxiways; bridges, culverts, and tunnels; and terminals, concourses, and aprons. According to a 1997 survey, these areas represent those that are most likely to require upgrades to accommodate NLA.

Figure 3 shows the percentage of the \$2.1 billion total estimated cost to upgrade each major type of airport infrastructure at the 14 airports that expect to accommodate NLA through revisions or modifications to FAA's airport design standards. The \$663 million reported for upgrading runways accounts for the largest percentage of cost (32 percent). NLA. Moreover, Los Angeles International Airport's estimate to upgrade its runways accounts for \$398 million of the total reported by 14 airports. Upgrading bridges, tunnels, and culverts accounts for 28 percent of the total cost (\$593 million). The vast majority of the bridge and tunnel costs are attributable to a \$508-million project at Los Angeles where the freeway runs under the airfield. Upgrading the cost for taxiways accounts for 24 percent (\$509 million) of the total cost, and upgrading terminals, concourses, and aprons accounts for 15 percent of the total cost (\$317 million). At some airports, airlines are responsible for these areas, so upgrading them does not show up as a cost to airports. Additionally, since two airports, Indianapolis International and Memphis International, are primarily going to receive the cargo version of the A380, terminal upgrades would not be needed.

Figure 2: Cost Estimates for 14 Airports to Upgrade Four Major Types of Airport Infrastructure



Note: The percentages do not total 100 percent because of rounding.

Source: GAO's 2001 survey.

# Appendix V: Comments From Airbus Industrie



January 10, 2002

Ms. Belva Martin  
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441 G St. N.W., Mail Stop 2T23  
Washington, DC 20548

Dear Ms. Martin:

Airbus appreciates the opportunity to provide our comments on the draft letter report entitled "Cost Estimates for U.S. Airports to Serve New Large Aircraft." We provide these comments as supplemental to those already provided in our facsimile message to you of October 16. We hope that you can incorporate these comments into your final report, and that you will provide recipients of your report with a copy of them.

General Comments:

Airbus is convinced, based upon detailed liaison with airport operators throughout the world, that in the majority of cases there is no safety need to bring existing airport air side facilities to a Group VI standard to accommodate the A380. Should the need arise in specific cases, deviations from airport standards, as already existing in many airports for operations of other large aircraft like the B747 and B777, provide safe and appropriate means to allow economically acceptable means of accessing airports that meet Group V standards.

Of course, if airport growth were to be accommodated by airside modifications, we would expect the airport operator to apply the new Group VI standards to these projects instead of the older Group V standard should there be the necessary land available.

Our review of the draft report provided by your office included a comparison of the data you obtained (Table 3) with that obtained in the 1997 ACI survey reported by FAA. We note that the raw data provided, when compared, show extremely wide fluctuations in magnitude and sign (i.e., increase or decrease in the airport's estimate from one survey to the next). It appears that these costs are not the result of detailed analysis, but rather reflect extremely rough and inconsistent estimating. Fully half of the estimated costs to accommodate the NLA reported to GAO are greater than those reported to ACI in 1997, and the other half are less—by significant amounts. If one takes the lower of the costs reported (GAO Table 3) in 1997 and 2001 by each airport, and sums these costs, and then does the same for the higher costs, the range of cost estimates thus generated is from about \$1,780 million to \$8,420 million. Clearly, these wide fluctuations over such a great range call into question the validity of any conclusions that would be drawn from such data. As discussed with GAO in our earlier briefing, we have taken the available data and tried, on an airport-by-airport basis, to place some discipline into a revised estimate by not including costs of projects needed by airports to accommodate growth or other costs that are not NLA specific. This results in considerably reduced costs for an NLA infrastructure, as detailed below.

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Page 2, footnote 2 (and numerous other places in the report): It is not correct to say that the 1997 survey (reported in March, 1998) was the work of FAA. In fact, the FAA noted in this report that the survey data collection was done by Airports Council International (ACI), an international airport issues advocacy group. FAA did not alter in any way the results of the ACI survey. We note therefore that, contrary to the situation with your report, there was not an independent government or other 3<sup>rd</sup> party evaluation of the validity of the cost estimates provided in the 1997 survey. We recommend that throughout your report you replace references to FAA, with regard to the 1997 survey, with references to ACI, who actually performed that work.

Page 3, top paragraph: This is a good description of Table 2 (Enclosure II), which should be referenced somewhere in this paragraph.

Specific issues:

We are disappointed that we could not obtain access to the data you received in response to your survey questionnaire. This lack of basic data, coupled with the short time available for responding to your request for comments, requires us to limit our comments to the details we were able to obtain by contacting airport operators directly. Where we were able to do so, we provide below specific comments on detailed data that was provided to GAO and shared with us by the airport operator.

Los Angeles (LAX):

The airport cannot meet Group VI separations due to land shortage, even in the case of the North runway relocation, which is necessary to improve the North side taxiway flow situation and to provide independent operations. The only NLA related costs in the \$398+\$508 million figures provided by the airport operator to GAO are the increase of the runway width (from 45m to 60m, 150 to 200 feet) and the difference between a 340 ft. and a 100 ft. runway displacement (Runway/Taxiway separation of 520 ft. versus 400 ft. to go from group V to adapted group VI standard).

We assume that 10% of the \$906 million would be NLA specific. We agree with the \$86 million for taxiway improvement.

The \$223 million cost for 8 new NLA gates is related to growth, not the NLA, since it brings a 4500 passenger extra capacity. Without considering the upcoming service by the NLA, the operator would have proposed a 10 747 gate complex with 4200 pax capacity.

To summarize, we believe that a fair evaluation of the costs required to accommodate the NLA is \$177 million to meet adapted Group VI Standards. Costs with equivalent Group V standards (i.e. operational standards based on real landing gear geometry and same wing tip clearances required by Group VI) would be much less.



Chicago (ORD):

From the cost table, the \$24 million fillet cost is not NLA related. In the case of Group V, the widening costs have to be subtracted (\$73.5 million). Some of the terminal costs are related to growth. (We would subtract the \$30 million of Table 4, Question 8 costs.)

Our estimated figures for NLA related costs for ORD are \$105.2 million with Group V standards and \$178.8 million to meet Group VI requirements. A detailed study may reduce this cost even more, should we proceed with operational standards.

New-York John F. Kennedy (JFK):

Based on previous data, we agree with the \$109 million figure using Group V standards. However, the \$2.0 billion cost of a new Jamaica Bay runway is, in our view, only a general non-substantiated estimate and is clearly not specifically NLA related, and should be discounted.

Anchorage (ANC):

From the detailed cost breakdown we obtained, we agree on the \$106 million figure to meet Group VI level standards. Clearly, costs with adapted Group V standards (i.e. using Group V and appropriate operational standards) would be much less.

Atlanta (ATL):

From the detailed costs we obtained, we agree on the figures for both Group V and VI levels, except that we would not include some \$1.7 million fillet costs that are included, which are not NLA related. Our best estimate figures would be \$24.7 and \$89.5 million, respectively.

Our comments for the airports for which we have no detailed data are as follows:

San Francisco (SFO), Dallas-Fort Worth (DFW): Without having details, the costs to meet Group VI requirements seem reasonable to us. Costs with equivalent Group V standards would be much less, which is not reflected in your Table 2.

Dulles (IAD), Memphis (MEM): These appear to be reasonable figures.

Miami (MIA): No comment as we have no details.

Houston (IAH), Denver (DEN): Without having details, the costs to meet Group VI (which we assume to be related to runway/taxiway widening) seem reasonable to us. Costs with equivalent Group V standards would be much less, again not reflected in your Table 2.

Orlando (MCO) and Indianapolis (IND): The costs reflected in Table 2 appear to us to be somewhat higher than reasonable. Orlando indicated no costs were required to accommodate



the NLA in the 1997 ACI survey, yet this one reflects a cost estimate of \$19 million; similarly, we have no basis for affirming the validity of the \$66 million cost estimate given here for IND.

For the rest of the airports discussed in your report and included in Table 3, we see only Minneapolis (MSP) and Detroit (DTW) as potential NLA destinations in the mid term (about 10 years), and believe the costs you indicate are reasonable. On the contrary, the costs to upgrade the 5 other airports (SEA, BOS, PHX, BDL, PHL) seem inappropriate to include in this report, as we do not foresee (and know of no one who does foresee) any NLA operations at these airports in the mid-term future. Even for infrequent operations, the costs would seem too high given the low potential operations of an NLA at these facilities.

Summary Comment:

The Table 2 data provided by GAO in this report reflects an appropriate list of airports that can be expected to receive NLA service in the next 5-10 years. The costs reflected in this table do not reflect the most economical approach to safely accommodating this new aircraft. Airbus believes, as noted above in more detail, that the cost to accommodate the NLA at these 14 airports using adapted Group V standards would be about \$520 million. GAO provides a cost estimate of \$2,082 million.

The Table 3 data provided by GAO adds 5 additional airports to the list for the purposes of estimating NLA infrastructure costs, but as noted above we do not see why these airports are included as NLA service is not expected at these airports in the mid-term future. The costs for these 19 airports, assuming that Group VI standards are to be met, are estimated by GAO to be \$4,302 million. However, Airbus believes, as detailed above, that a more reasonable estimate of NLA related infrastructure costs is closer to \$1,700 million at those Group VI standards.

We appreciate the opportunity to provide our views and, as in the past, are available at any time to assist you in the important work of your office.

Very truly yours,

A handwritten signature in dark ink, appearing to read 'D. Puyplat', is written over the typed name.

Airbus  
Didier Puyplat  
Deputy Vice President, AINA Holdings

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# Appendix VI: GAO Contacts and Staff Acknowledgments

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## GAO Contacts

Gerald Dillingham (202) 512-3650  
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## Staff Acknowledgments

Key contributors to this assignment were Carolyn Boyce, Jean Brady, Stephen Brown, James Fields, David Hooper, Michael Horton, Mitchell Karpman, Kieran McCarthy, Richard Scott, and Kate Wulff.



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