## Dallas Love Field Impact Analysis Update

In the Absence of the Wright Amendment



Prepared by: DMJM Aviation

May 31, 2006



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#### **Preface**

The subject of this report is the impact of Dallas Love Field, specifically how it may be expected to change in the absence of Wright Amendment control over the limits of scheduled air carrier service. With few exceptions, airports exist as tradeoffs between environmental and economic impacts. The degree to which airports are able to balance these impacts is largely dependent on the policies and plans enacted and approved by leaders of local government and the practices of individuals charged with management of airport operator organizations. For both policy makers and managers, the cooperation of a large third party comprised of airport tenants, users and aircraft operators is usually essential to achieve a balance between environmental and economic impact.

Dallas Love Field, operating in the shadow of Dallas/Fort Worth International Airport for 32 years, had achieved an acceptable balance. While the efforts of airport management deserve much credit, a major reason for this balance has been a federal regulation known as the Wright Amendment. Under Wright Amendment tenets familiar to all by now, there has been little need for policies and plans relating to scheduled air carrier services or compatible off-airport land use and development. Capital facilities development for increased capacity, level of service improvement, or to meet governmental requirements have been minimal in volume and nature with the exception of recent auto parking garage, passenger terminal curbside and security additions and improvements. Adjusted residential property values have risen over the years and continue to rise in support of the municipal tax base and actual tax contributions from the communities and businesses surrounding Love Field.

The balance was upset when in 1999 the startup of a new airline served as the catalyst for sudden changes in the volume and characteristics of scheduled air carrier services. To restore balance, albeit at a new level of off-airport impact, the City of Dallas commissioned the preparation of a Love Field Master Plan / Airport Impact Analysis. After many months of analysis and coordination with all interested parties, including; airlines, other airport tenants and users, residents and home owners, and local, regional and federal government, broad and strong consensus was reached in favor of the Airport Master Plan published in March 2001 and unanimously approved by the City Council.

However, the Master Plan and supporting Airport Impact Analysis were based on a continuation of the Wright Amendment's provisions at the time. Since publication, the Wright Amendment has been modified to again upset the balance that had been achieved between economic and environmental impact. Many of the parties that had participated in forging consensus support for the new plan, and the City that had unanimously approved it, became bystanders to an increasingly acrimonious debate that began with a national campaign to repeal the Wright Amendment in its entirety. Finally, members of the U.S. Congress encouraged a local solution be formed or it would act to repeal the federal statute by the end of 2006.

In response, the Mayor and Council of Dallas have joined in mutual discussions with the City of Fort Worth to explore potential solutions that would, once again, establish an acceptable new balance for Love Field should the Wright Amendment be repealed. This time, however, the Dallas initiative would attempt to gain regional support and would need effective measures to manage the growth of Love Field consistent with the environmental impacts agreed to in the 2001 Master Plan.

This report describes the results of studies performed to determine how the impact of Dallas Love Field would change in the following areas:

- Aircraft noise;
- Ground traffic in the airport vicinity;
- Air quality; and
- Economic activity.

With few exceptions, the individuals (planners, engineers/scientists and economists) who were prominent in the development of the Airport Master Plan have been the principal contributors to this impact update effort. This enabled the work to be completed within the brief period ultimately determined by the federal mandate, and assured an understanding of the master plan as the background for the performance and documentation of this work.

The starting point for the impact analysis update was the completion of the analysis of air service activity in absence of the Wright Amendment, performed by the firm of GRA, Inc. GRA performed the market analysis of scheduled service opportunities and profit potentials in much the same manner as would an airline itself, assuring the study of an accurate and authoritative starting point.

The analyses of aircraft noise, ground traffic and air quality impacts were performed as closely as possible to the methods and techniques used in the original Master Plan / Airport Impact Analysis. Care was exercised to assure the results could be fairly compared directly to the Master Plan results. Differences from master plan techniques were adopted only in cases where better tools had become available and even then the ability to make fair comparisons with the Master Plan was provided for. Without exception, for the same number of aircraft gates as developed in the Master Plan, the results of the environmental and community impact analyses describe consistently greater impacts than had been agreed to by the Master Plan Advisory Committee and approved by Council, as presented in direct comparison with the master plan. However, when the number of aircraft gates is allowed to increase only slightly above the existing number of passenger terminal gates, which is considerably less in total number than the Master Plan, the impacts of aircraft noise, ground traffic and air quality conform much more closely with the Master Plan.

As would be expected with the greater number of passengers and aircraft operations capable of being generated by the Master Plan, economic impact is greater than would be expected under a lesser number of gates which correspond to the levels of environmental and community impact established in the Master Plan. The results of the economic impact update, however, must be used with discretion. Because Love Field operates in the shadow of D/FW International Airport, the extent to which economic impact will accrue in the region and to Dallas due to increased aircraft activity and passengers at Love Field may, in part, materialize as a reduction or a slow down in the rate of economic generation at DFW. Previous studies have shown the business and commerce community and citizens of Dallas receive some 70% of the economic impact of DFW. Caution should also be used in interpreting the economic impact results in that the generated economic activity does not accrue entirely to the City of Dallas. Not all airport employees are citizens of Dallas, not all

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businesses at the airport are Dallas owned, and not all purchases are made from Dallas owned and staffed businesses. Studies far more time consuming and detailed would be needed to isolate the economic impact of Love Field to the City of Dallas exclusively, and such studies, out of necessity, would have to consider the economic impact of the entire Metroplex system of airports and air transportation.

The future of Dallas Love Field, the level of air service it can provide for its business community seeking the convenience of close-in airport access, and the degree to which it will affect and shape the future of the residential communities surrounding it, will be determined by the Mayor and Council on behalf of the citizens of Dallas. It will surely have to pass the scrutiny of federal regulators seeking equal access to airport facilities and competition among airlines. In the aftermath, the City will have the challenge of managing the use and development of Love Field under a new balance between environmental and economic impact, one that will be predictable, not subject to the imposition of national interests above those of its citizens.



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### **Executive Summary**



Prepared by: DMJM Aviation

#### **Executive Summary**

#### Introduction

**Background** - The Dallas Love Field Impact Analysis/Master Plan, published in early 2001, was prepared in close coordination with and received the approval of a Master Plan Advisory Committee consisting of airlines, other airport users and the citizens residing in communities in the immediate vicinity of the airport. That report and this one are available at <a href="https://www.dallas-lovefield.com">www.dallas-lovefield.com</a>. The plan was based on a projection of the characteristics and volume of scheduled air carrier aircraft operations as permitted at the time under the 1979 Wright Amendment. With the support of users and residents, the Master Plan established the levels of aircraft noise, air quality and ground traffic congestion that could be expected under the Wright Amendment air traffic projection.

The validity of the Master Plan is now in question owing to a national campaign organized to repeal the Wright Amendment. The Congress has requested regional resolution of the issue before it acts with new legislation as early as the end of 2006. The City of Dallas has determined it will seek a regional solution acceptable to Congress that is consistent with the goals and achievements of the Master Plan.

DMJM Aviation was engaged to prepare a technical study to update the air service projections and impact analyses contained in the 2001 Airport Master Plan/Impact Analysis to reflect a "No Wright Amendment" demand for scheduled air carrier services at Love Field.

#### Purpose - The purpose of this engagement was:

- to develop future air service scenarios at Dallas Love Field that could realistically result if the Wright Amendment is repealed;
- to assess and compare the noise, air quality, traffic, and economic impacts of each air service scenario to the 2001 Master Plan 32 Gate full build-out scenario that presumed the Wright Amendment would remain in place.

**Methodology** - In this study update there are no market demands or operational restrictions imposed on the characteristics and growth of scheduled air carrier operations other than the number of gates available for use and a limit to domestic destinations.

The methodologies employed to conduct the technical analyses of noise, air quality, traffic, and economic impacts were essentially the same as those which were used in the 2001 Master Plan, updated to the latest versions of the tools, to ensure the most equitable comparison of results.

**Summary of Findings** - The results of the analyses presented in this report indicate that the overall impacts of operating 20 Gates under a No Wright Amendment scenario are the most comparable to the environmental thresholds agreed to and established in the 2001 Master Plan/Impact Analysis 32 Gate scenario with the Wright Amendment in place. Aircraft noise exposure is slightly less for the DNL 65 dB level used by the FAA for noise mitigation actions. Average traffic delays are within a second or two, per vehicle per intersection, of the Master Plan results. Some air pollutants are greater than the Master Plan levels, but the pollutants that contribute to ozone formation, which is the area of non-attainment for the region, are less.

The following provides a summary of the elements that have been assessed in this update under a No Wright Amendment scenario and compared to the 2001 report.

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#### **Air Service Activity in Absence of Wright Amendment**

The first task of this assignment was to develop a realistic, market-driven forecast of airline activity at Dallas Love Field (DAL) if the Wright Amendment was repealed. GRA, Inc. was tasked with developing two long-term operational scenarios, the first with 20 gates and the second with 32 gates. For both scenarios, a flexible accommodation of carriers at gates was assumed for a typical range of aircraft.

This air service analysis and demand forecast was prepared, in part, to update the existing Master Plan forecast developed before the events of 9/11. In that earlier forecast, the Wright Amendment was assumed to remain in place, allowing operations beyond the non-stop service area only with reconfigured standard jet and regional jet aircraft up to 56 seats.

Other events in the airline industry have now eclipsed that forecast and the potential for the repeal of the Wright Amendment would change the dynamics at the airport in the future. In the year 2005, there were approximately 85,000 commercial operations at DAL resulting in the enplanement of approximately three million passengers. Without the repeal of the Wright Amendment, FAA expects relatively slow growth at DAL, with enplanements increasing only two percent per year over the period 2006 through 2020. In that same period, FAA expects commercial operations to grow only one percent per year.

The repeal of the Wright Amendment would change the potential profit opportunities of carriers at DAL. Today, there are 30 markets not served on a non-stop basis from DAL that produce 300 or more passengers per day each way (PDEW) from/to the Dallas/Fort Worth Metroplex. While all of these markets receive non-stop service at DFW, some carriers may find service at DAL to be financially attractive. The repeal of the Wright Amendment would make it possible for carriers to fly to either coast and to any region for the first time with standard jet aircraft. Because standard jets can produce commercial airline seat miles at much lower costs than the aircraft of 56 seats or less that are currently allowed to fly beyond the Wright Amendment defined area, it may be possible for carriers to mount profitable operations in many of these large markets.

To examine these opportunities, a methodology was employed that is designed to replicate as closely as possible the decision-making process of commercial airlines.

These items were performed in this new air service analysis and demand forecast:

- Review of recent forecasts made by other firms.
- Discussions with Southwest Airlines, American Airlines, DFW Airport, Dallas Love Field and other airline network planners.
- Examination of data on the catchment areas for the two major commercial service airports in the Dallas/Fort Worth Metroplex.
- Application of methodologies in GRA's airline practice that examine profit opportunities for carriers at DAL in the event of repeal of the Wright Amendment.

The methodology is discussed in greater detail in the main body of this report. Markets with the following characteristics were the focus of this analysis:

- Significant demand (defined as passengers per day each way) to/from the Metroplex.
- Opportunities to stimulate demand because of the absence of low cost carriers in a non-stop market to the Dallas/Fort Worth Metroplex today.
- Opportunities to have a sustainable cost advantage or to be cost competitive in the market.

<sup>&</sup>lt;sup>1</sup> 2006 FAA Terminal Area Forecast

- Markets where a carrier would have a structural advantage either in Dallas or at the other end of the flight segment.
- Markets where a carrier would be unlikely to face direct non-stop competition.

The increased opportunity to connect traffic at DAL and at other airports due to lifting of the through ticketing provision of the Wright Amendment was also considered.

In developing these forecasts, the gate and other facility capacities at DAL were taken into account. Two scenarios were examined - 20 and 32 gates, which create different profit opportunities for airlines because more gates can physically accommodate more traffic, if it were profitable. It was assumed that point-to-point carriers could produce up to 10 to 11 departures and arrivals (turns) per gate per day at DAL, while hub-and-spoke carriers would produce on average eight turns per day. The difference between the two types of carriers is due primarily to their business models: hub carriers must time flights to match connecting hub banks, whereas point-to-point carriers do not.

**Table ES-1** summarizes the findings for the 15 largest markets in the Dallas/Fort Worth Metroplex. In the 32 gate scenario, the GRA forecast suggests in the long-term there would be non-stop service in 14 of the 15 largest markets consisting of existing and new service. In contrast, the 20 gate scenario shows non-stop service to 12 of the top 15 markets.

Looking at all service changes to all points, in the 32 Gate scenario, there would be new non-stop services to 36 cities not currently served from DAL. In the 20 gate scenario, there would be new non-stop services to 16 cities. Obviously, the scenarios with fewer gates show new services primarily concentrated in the largest markets.

		METROPLEX 2006	2006	NEW SERVICES AT DAL		
	Location	eation PDEW		GRA 32 GATES	GRA 20 GATES	
1	Houston (HOU)	1621	ü			
2	Atlanta	1453		ü		
3	New York - LaGuardia	1216				
4	Las Vegas	1213		ü	ü	
5	Chicago – O'Hare	1147		ü	ü	
6	Los Angeles	1116		ü	ü	
7	San Antonio	1052	ü			
8	Denver	929		ü	ü	
9	Orlando	924		ü	ü	
10	Austin	771	ü			
11	Baltimore	713		ü	ü	
12	Houston (IAH)	709	ü			
13	Newark	709		ü	ü	
14	Boston	709		ü		
15	Phoenix	683		ü	ü	
	ting Non-Stop Service Poi	nts	4			
New	<b>Non-Stop Service Points</b>			10	8	
	I Number of Non-Stop Poi	nts	4	14	12	

Table ES-1: 15 Largest Markets for the Dallas/Fort Worth Metroplex

#### **Summary of Long-Term Forecasts**

**Table ES-2** provides a summary of the long-term forecasts. The summary separately lists annual enplanements and annual operations for each of the GRA forecasts (20 and 32 gates) and compares them to the current FAA forecast for the year 2020. <sup>2</sup> In the 20 gate scenario,

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<sup>&</sup>lt;sup>2</sup> 2006 FAA *Terminal Area Forecast* 

both operations and enplanements are up approximately 42 percent relative to the FAA forecast, and are double the FAA forecast in the 32 gate scenario.

Also shown in **Table ES-2** is a comparison of the GRA forecast with existing operations at DAL as published in the April 2006 edition of the *Official Airline Guide*. In the 20 Gate No Wright Amendment scenario, seats per day increase by 53 percent and weekday operations are 39 percent higher than in the April 2006 OAG. Average seats per operation are about 10 percent higher than today. Average turns per gate are about a third more than today.

In the 32 Gate No Wright Amendment scenario, seats per day increase by approximately 109 percent, while operations increase by 95 percent. Seats per operation are up by seven percent, and the average operation has seven percent more seats than today. If the airport expanded to 32 gates, the GRA forecast suggests that, on average, airlines would turn their aircraft 9.1 times per gate whereas today they turn them 7.9 times per existing gate per day.

Table ES-2: Summary of Long-Term Forecasts: 20 and 32 Gate Scenarios

2020 DAL	GRA 20 Gates	FAA TAF	Percent Higher
Annual Enplanements	6,155,406	4,391,123	40.2%
Annual Operations	135,947	96,102	41.5%
		April 2006 OAG	
Total Seats – Weekday	53,876	35,282	52.7%
Total Operations – Weekday	416	300	38.7%
Average Seat Per Operation	129.5	117.6	10.1%
Turns Per Gate	10.4	7.9	31.7%

2020 DAL	GRA 32 Gates	FAA TAF	Percent Higher
Annual Enplanements	8,757,139	4,391,123	99.4%
Annual Operations	190,848	96,102	98.6%
		April 2006 OAG	
Total Seats – Weekday	73,576	35,282	108.5%
Total Operations – Weekday	584	300	94.7%
Average Seat Per Operation	126.0	117.6	7.1%
Turns Per Gate	9.1	4.7	94.7%

Finally, **Figure ES-1** shows the pattern of arrivals and departures in each scenario for a future weekday. Obviously, an airport with 32 gates could and would accommodate significantly more flying than the 20 gate airport.

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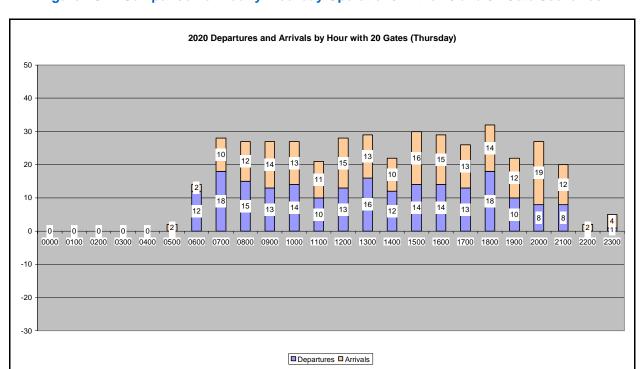
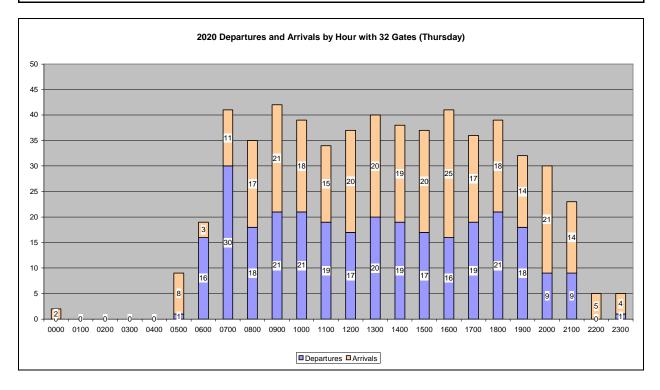


Figure ES-1: Comparison of Hourly Weekday Operations in the 20 and 32 Gate Scenarios



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#### **Noise Impacts**

To examine the aircraft noise impact of each gate scenario, a methodology was employed to objectively evaluate only the impacts related to repeal of the Wright Amendment for comparison against the impacts identified in the 2001 Master Plan 32 Gate scenario.

The methodology is discussed in detail in Section 2 and includes the following items used in modeling each of the gate scenarios:

- O FAA's INM Version 6.1 and 2000 census database;
- Annual and daily air carrier activity;
- Aircraft fleet mix and schedule profiles;
- Master Plan general aviation activity and aircraft mix;
- Master Plan runway and flight track utilization.

#### **Findings of Noise Analysis**

The noise contours were processed using the most updated version of the FAA's Integrated Noise Model (INM), Version 6.1. The original 2001 Master Plan contours were processed using the then current INM Version 6.0 and 1990 U.S. Census database. To maintain consistency, the Master Plan contours were reprocessed in INM 6.1, along with new population data from the 2000 U.S. Census, to update the results using this enhanced version of the model. The results slightly altered the previously reported impacts from the Master Plan Impact Analysis; however, the results are in accordance with today's standards for noise modeling and allow for a more accurate and fair comparison with the two new gate scenarios.

The level of noise exposure for the 20 Gate No Wright Amendment scenarios decreases from that estimated for the Master Plan 32 Gate scenario while the 32 Gate No Wright Amendment scenario increases the level of noise exposure. **Table ES-3** on page ES-9 comparatively summarizes the inputs and results of the modeling of each scenario.

- The DNL 65 dB noise contour for the 20 Gate No Wright Amendment scenario is approximately 4.3 percent smaller than the Master Plan 32 Gate scenario and impacts approximately 3,800 fewer people.
- The DNL 65 dB noise contour for the 32 Gate No Wright Amendment scenario is approximately 4 percent larger in area than the Master Plan 32 Gate scenario and includes approximately 4,350 additional people.

In each of the No Wright Amendment scenarios, the Master Plan 32 Gate regional jet fleet mix has been replaced for the most part by standard air carrier jets. These aircraft are larger and have a louder noise footprint than the CRJ, EMB135 and EMB145 aircraft. Furthermore, under the air service analysis some of the standard jets are departing at heavier take off weights to service more distant non-stop destinations than were possible under the Wright Amendment.

The updated INM calculations use 2000 census data versus the 1990 data adjusted for growth that was used in the Master Plan. As a result, the population impact numbers are more current than those presented in the Master Plan, and by updating the Master Plan contours, a more accurate and fair comparison between the scenarios is made.

In terms of both the area of impact and the population estimated within each DNL noise contour, the findings are clear:

 Removal of the Wright Amendment restrictions, while increasing to 20 gates, will reduce noise impacts from those projected in the Master Plan 32 Gate scenario.

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 Increasing the number of gates to 32, without Wright Amendment restrictions, will increase noise impacts from those projected in the Master Plan 32 Gate scenario.

#### **Traffic Impacts**

This section provides an assessment of the roadway traffic impacts that could result from the 20 and 32 gate air service scenarios. The variations in impacts to the neighboring roadway system have been evaluated, as represented by twelve selected nearby roadway intersections.

Airport related roadway traffic was estimated using the forecast air passenger activities, combined with the non-airport traffic projections from the Master Plan, to generate total traffic levels and to evaluate the Levels of Service (LOS) that would result at the selected intersections. LOS is a standard traffic engineering methodology to evaluate the level of congestion and delays associated with increasingly heavy traffic conditions, with a range from light conditions (LOS 'A') to over-capacity conditions (LOS 'F').

To enable direct comparison to the 2001 Master Plan, the current analysis assumed the same improvements at the selected intersections as defined in the Master Plan. These included the improvements that had been planned by the City prior to the Master Plan and those recommended in the Master Plan to help resolve remaining congestion concerns. Most of the Master Plan recommended improvements were relatively minor, except for the grade separated intersection at Mockingbird Lane and Cedar Springs Road.

A summary comparison of the assumptions and results is presented in **Table ES-3** on page ES-9. These results include both the delays that would be experienced as well as the number of intersections with poorer LOS. While the 32 Gate No Wright Amendment scenario would have much higher air carrier activity, the 20 Gate scenario is about 11 percent heavier than the Master Plan conditions (Wright Amendment 32 Gates). When the higher likely connecting passenger ratio is considered, the number of originating and terminating passengers in the 20 Gate scenario are essentially the same as the Master Plan.

The results indicate that traffic impacts in the 20 Gate No Wright Amendment scenario would be slightly worse than in the Master Plan 32 Gate scenario. The 32 Gate No Wright Amendment scenario would be significantly worse with considerably greater congestion levels. PM delays would be more than twice the AM levels and five major intersections would be at LOS 'F'; even with the recommended Master Plan improvements.

#### **Air Quality Impacts**

An updated air quality evaluation was expressly used to quantify the impacts for Dallas Love Field under the 20 and 32 Gate No Wright Amendment scenarios and compare them to the 2001 Master Plan 32 Gate scenario.

The air quality results produced for the original 2001 Master Plan Impact Analysis were modeled using Emission Dispersion Modeling System (EDMS) Version 3.2. However, in order to maintain consistency between all gate scenarios, the 2001 Master Plan input data was entered into an updated EDMS Version 4.4 and reprocessed to update the results using this enhanced version of the model. The reprocessing of this data slightly altered the results previously reported in the Master Plan Impact Analysis; however, the results are in accordance with today's standards for air quality modeling and allow for a more accurate and fair comparison with the three new gate scenarios.

The methodology used for this air quality evaluation followed very closely the methodology used for the 2001 Master Plan. Annual emissions were calculated in metric tons for several pollutants based upon the annual aircraft operations, operation of ground support equipment

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and aircraft auxiliary power units, and from vehicles driving or parking on the airport property. All of the assumptions used in the 2001 air quality analysis were carried over into this analysis including the previously used year 2010 vehicle fleet to provide a more direct comparison to the analysis conducted for the Master Plan. Ground vehicles emissions were also calculated using the Mobile 5a option to compare to the 2001 Master Plan analysis.

**Table ES-3** on page ES-10 presents the results of the modeling effort for each of the future gate scenarios in comparison to the Master Plan 32 Gate scenario which presumed the Wright Amendment would be in place. In summary,

- The 20 Gate No Wright Amendment scenario has less nitrous oxide and carbon monoxide emissions than the Master Plan 32 Gate scenario.
- The 32 Gate No Wright Amendment scenario will have NOx emissions approximately 12 percent greater than the Master Plan 32 Gate scenario emissions forecast.
- The 32 Gate No Wright Amendment exceeds the Master Plan 32 Gate forecast of emissions for pollutants for which Dallas County is in attainment: Hydrocarbons, CO, SOx, and PM10.
- □ In addition, the Master Plan did not forecast emissions for VOC and PM2.5. In comparison, the Master Plan 32 Gate scenario re-calculated with the new model, the VOC, PM10, and PM2.5 each were greater under the 20 and 32 Gate No Wright scenarios.

Overall, the 20 Gate No Wright Amendment scenario results are similar and have fewer emissions than the 32 Gate Master Plan scenario for each of the pollutants calculated by the EDMS model, whereas the 32 Gate No Wright Amendment scenario has greater emissions than the 32 Gate Master Plan scenario.

#### **Economic Impacts**

The methodology and approach used for assessing the economic impact resulting from the 20 and 32 gate air service scenarios is a general one, with the aim of providing an overview of the airport's economic activity and impact in the region. Several sources of data went into the assessment, including the economic impact analysis developed for the 2001 Master Plan/Impact Analysis, recent data on airport activity and tenants, the GRA forecasts for DAL activity in the absence of the Wright Amendment, and regional economic data from the U.S. Department of Commerce Regional Input-Output Modeling System (RIMS-II).

The assessment finds that DAL is responsible for an economic impact in 2005 of approximately \$4.3 billion in the City of Dallas and the metropolitan statistical area that includes the city. For the future gate scenario years, economic impact levels are estimated (in 2005 dollars) by scaling economic activity to the growth forecasts for the aviation activities that drive the airport's economic activity. **Table ES-3** provides a comparative summary of the results of the assessment for each of the scenarios.

#### **Property Tax Contribution**

An updated evaluation was completed to estimate the total property tax contribution from Dallas residential property owners residing within the 55+ DNL noise contours for all gate scenarios generated for this update. The estimated property tax contribution totals by contour level were derived using GIS information obtained from the City of Dallas Public Works and Transportation, GIS Division and the Dallas Central Appraisal District for Tax Year 2005. The new data allowed for updating the results of the Master Plan 32 Gate scenario to reflect 2005 property tax contribution. Compared to the Master Plan 32 Gate scenario, the 20 Gate No Wright Amendment scenario results in the following: as follows:

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- There are approximately 11,768 residential parcels located within the DNL 55 dB or greater noise contour in the 20 Gate No Wright Amendment scenario (20 Gate NWA), and approximately 16,910 in the 32 Gate No Wright Amendment (32 Gate NWA), while the Master Plan 32 Gate scenario (MP 32 Gate) contains approximately 10,945.
- The estimated market value of the above properties is approximately \$2.79 billion (20 Gate NWA), \$2.97 billion (32 Gate NWA), and \$2.76 billion (MP 32 Gate).
- The taxable value of all residential properties within the DNL 55 dB or greater noise contour is approximately **\$2.17 billion** (20 Gate NWA), **\$2.32 billion** (32 Gate NWA), and **\$2.16 billion** (MP 32 Gate).
- The estimated property tax contribution is approximately:
  - Solution DNL 55 60 dB property tax contribution \$33,577,927 (20 Gate NWA), \$35,375,572 (32 Gate NWA), and \$33,104,323 (MP 32 Gate)
  - S DNL 60 65 dB property tax contribution \$14,274,677 (20 Gate NWA), \$15,175,353 (32 Gate NWA), and \$14,087,637 (MP 32 Gate)
  - § DNL 65 70 dB property tax contribution **\$2,207,810** (20 Gate NWA), **\$2,674,524** (32 Gate NWA), and **\$2,373,978** (MP 32 Gate)
- The total estimated property tax contribution from those residing within the Love Field noise contours **\$50.2 million** (20 Gate NWA), **\$53.4 million** (32 Gate NWA), and **\$49.7 million** (MP 32 Gate).

A summary of the tax contribution for each of the gate scenario's is presented in **Table ES-4**.

#### **Survey of Real Estate Values**

A survey of real estate values for the areas surrounding Love Field was compiled and presented in the 2001 Master Plan/Impact Analysis for the years 1997 – 2000. This survey data has been researched from current sources and updated for the years 2001 – 2005 and is presented in **Table ES-5.** It should be noted that the data available for this update differed from that available at the time of the 2001 Master Plan in that it is for single family homes only. This, it should not be compared to the Master Plan in terms of numeric values, but it is an updated indicator of the continued positive growth in property values over the past 5 years.

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**Table ES-3: Impact Summary Table** 

Table 20 of Impact Carminary Table									
Noise Impact Analysis									
Description		Wright Ar	nendment			No Wright Amendment			
Description		32 0	ates		20 G	iates	32 G	ates	
	INM 6.0/1990	U.S. Census	INM 6.1/2000	U.S. Census	INM 6.1/2000	U.S. Census	_		
Air Carrier Activity (annual ops)	182	,804	182	,804	135	,947	190	,848	
Air Carrier Activity (daily ops)	50	01	50	01	3	73	52	23	
	Q Standard Jets	(7 States)	Q Standard Jets	(7 States)	Q Standard Jets		Q Standard Jets		
Fleet Mix/Schedule Profile	Q Reconfigured	Jets (56 Seats)	Q Reconfigured Jets (56 Seats)		Q Longer Haul Routes		Q Longer Haul Routes		
	Q Regional Jets (	(50 Seats)	Q Regional Jets	○ Regional Jets (50 Seats)					
GA Activity & Fleet Mix*	Master Pla	in Forecast	Master Pla	in Forecast	Master Plan Forecast		Master Plan Forecast		
Runway Use/Flight Tracks*	Master P	Plan 2001	Master F	Plan 2001	Master Plan 2001	Master Plan 2001			
Noise Impact: DNL 65 dB Area	4.8 Sq	ı. Miles	4.6 Sq. Miles		4.4 sq. Miles		4.8 Sq. Miles		
Impact by Contour	Square Miles	Population	Square Miles	Population	Square Miles	Population	Square Miles	Population	
DNL 55 dB +	22.3	95,533	23.2	111,395	23.8	111,759	26.9	117,369	
DNL 60 dB +	10.4	60,802	10.3	71,355	10.4	70,429	11.6	76,451	
DNL 65 dB +	4.8	23,198	4.6	24,872	4.4	21,045	4.8	29,219	
DNL 70 dB +	2.2	860	1.9	2,686	1.8	2,620	2	2,655	
DNL 75 dB +	0.9	0	0.9	0	0.8	0	0.9	0	

NOTE: The impacts for each contour include the entire area for that contour level. For example, the DNL 55 dB and above impacts includes the impacts for the DNL 60, 65, 70 and 75 dB and above contour.

Roadway Traffic Impact Analysis								
Description	Wright Amendment		No Wright A	Amendment				
Description	32 Gates	20 Gat	es	32 Gates				
Air Carrier Activity (annual enplanements - 2020)	5.54 Million	6.16 Mil	lion	8.76	Million			
Connecting Passenger Ratio	19 percent	25 perc	ent	25 pe	ercent			
2020 Originating Passengers	4.49 Million	4.62 Mil	lion	6.57	Million			
Intersection Improvements	City 1999 Plans     Master Plan recommendations	Same	Э	Sa	me			
12 Intersections Analyzed	Eight along Mockingbird     Five along Lemmon (including the one at Mockingbird)	abird) Same		Same				
Average Delay (sec.) per Vehicle per	AM Peak Hour PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour			
Intersection	23 39	24	41	30	74			
Number of Intersections by LOS	AM Peak Hour PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour			
LOS C or Better	11 6	11	6	9	4			
LOS D or Better	12 11	12	10	11	7			
LOS E	0 0	0	1	1	0			
LOS F	0 1	0	1	0	5			

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Air Quality Analysis						
Description Wright Amendment No Wright Amendment						
Description	32 G	ates	20 Gates	32 Gates		
Pollutant	EDMS 3.22	EDMS 4.4	EDMS 4.4			
Nitrous Oxides (Nox)	614.1	511.5	502.6	687.6		
Aircraft	542.6	462.3	452.9	617.9		
GSE/APU	35.5	13.2	13.9	18		
Traffic	36	36	35.8	51.7		
Carbon Monoxides (CO)	1,226	1,809	1,684	1,982		
Aircraft	695	1,293	1,194	1,285		
GSE/APU	154	211	179	248		
Traffic	376	305	311	449		
Hydrocarbons	123.2	106.2	141.3	162.9		
Aircraft	76.1	69.9	106.4	113		
GSE/APU	6.3	8.3	7.3	10		
Traffic	40.8	28	27.6	39.9		
VOC	N/A	107.7	145.4	167		
Aircraft	N/A	73.8	112.3	119.7		
GSE/APU	N/A	7.9	6.9	9.5		
Traffic	N/A	26	26.2	37.8		
SOx	30.1	45.2	38.1	51.3		
Aircraft	27.3	42.2	35.1	47.6		
GSE/APU	0.8	2.7	2.7	3.3		
Traffic	1.9	0.3	0.3	0.4		
PM10	3.05	8.2	9.43	12.39		
Aircraft	0	5.8	6.91	9.09		
GSE/APU	1.5	1.2	1.25	1.46		
Traffic	1.55	1.2	1.27	1.84		
PM2.5	N/A	7.8	8.92	11.65		
Aircraft	N/A	5.8	6.91	9.09		
GSE/APU	N/A	1.2	1.21	1.41		
Traffic	N/A	0.8	0.8	1.15		

Economic Impact Analysis						
	No Wright Ar	nendment				
		20 Gates	32 Gates			
Type of Economic Impact	2005	2020	2020			
Primary Airport Direct impacts	\$1,533.00	\$1,846.70	\$2,627.30			
Primary Non-Airport Impacts (Visitors)	\$563.90	\$1,145.50	\$1,610.90			
Primary Airport Inducted Impacts	\$1,734.50	\$2,089.40	\$2,972.50			
Primary Non-Airport Induced Impacts	\$502.30	\$1,020.30	\$1,434.80			
TOTAL Regional Economic Impact	\$4,333.70	\$6,101.90	\$8,645.40			
	(Dollar amounts in Millions)					



Table ES-4: Property Tax Contribution from Residential Parcels within the DNL 55 dB Noise Contour

Master Plan 32 Gate (updated for INM 6.1)

DNL	Residential Parcels Under Contour			Total Potential Tax Contribution
55-60	6,150	\$1,839,129,070	1.8%	\$33,104,323
60-65	3,514	\$782,646,490	1.8%	\$14,087,637
65-70	1,181	\$131,887,680	1.8%	\$2,373,978
70-75	100	\$7,416,020	1.8%	\$133,488
Totals	10,945	\$2,761,079,260	1.8%	\$49,699,427

20 Gate No Wright Amendment Scenario

DNL	Residential Parcels Under Contour	Total Market Value	Rate	Total Potential Tax Contribution						
55-60	6,093	\$1,849,051,690	1.8%	\$33,282,930						
60-65	3,513	\$793,037,600	1.8%	\$14,274,677						
65-70	1,111	\$122,656,130	1.8%	\$2,207,810						
70-75	67	\$4,935,530	1.8%	\$88,840						
Totals	10,784	\$2,786,069,630	1.8%	\$50,149,253						

32 Gate No Wright Amendment Scenario

DNL	Residential Parcels Under Contour	Total Market Value		Total Potential Tax Contribution
55-60	6,770	\$1,965,309,540	1.8%	\$35,375,572
60-65	3,753	\$843,075,150	1.8%	\$15,175,353
65-70	1,260	\$148,584,660	1.8%	\$2,674,524
70-75	137	\$9,916,840	1.8%	\$178,503
Totals	11,920	\$2,966,886,190	1.8%	\$53,403,951

**Table ES-5: Survey of Real Estate Data** 

	Location	Total		Average					Days on
ADEA 4		<u>Sales</u>	<u>S</u>	ales Price	<u>Low</u>			<u>High</u>	<u>Market</u>
AREA 1	2001 2002 2003 2004 2005	405 432 410 379 406		237,877 246,412 265,915 277,722 241,153	\$ \$ \$ \$ \$	32,000 26,000 68,500 50,000 30,000	\$ \$ \$ \$ \$	895,000 860,000 1,800,000 535,000 380,000	58 60 60 67 59
	Percent Increase 2001 to 2005	0%		1%		-6%		-58%	2%
AREA 2									
AREA 2	2001	11	\$	679,273	\$	79,900	\$	2,450,000	75
	2002 2003 2004 2005 Percent Increase 2001 to 2005	10 8 23 20 <b>82</b> %	\$ \$ \$	360,175 576,500 570,452 709,438 <b>4%</b>	\$ \$ \$	90,750 55,000 128,000 138,000 <b>73%</b>	\$ \$ \$ \$	950,000 1,845,000 1,750,000 2,800,000 <b>14%</b>	47 113 93 99 <b>32%</b>
AREA 3			Ţ.						
	2001 2002 2003 2004 2005 Percent Increase 2001 to 2005	15 15 10 18 28 <b>87%</b>	\$ \$ \$ \$	69,170 70,323 85,783 95,494 96,125 <b>39%</b>	\$ \$ \$ \$ \$	26,650 27,000 39,900 48,000 43,000 <b>61%</b>	\$ \$ \$ \$ \$	106,000 99,900 138,000 135,000 135,000 <b>27%</b>	70 81 38 71 60 <b>-14%</b>
AREA 4									
	2001 2002 2003 2004 2005 Percent Increase 2001 to 2005	45 36 51 55 56 <b>24</b> %	\$ \$ \$ \$	222,486 202,416 221,075 225,151 268,633 <b>21%</b>	\$ \$ \$ \$ \$ \$ \$	55,000 45,000 63,750 72,500 64,900 <b>18%</b>	\$ \$ \$ \$	519,000 635,617 541,000 685,000 680,000 <b>31%</b>	72 60 83 83 56 <b>-22</b> %
AREA 5									
	2001 2002 2003 2004 2005 Percent Increase 2001 to 2005	776 836 850 947 880 <b>13%</b>	\$ \$ \$	668,857 692,915 732,980 623,298 836,550 <b>25%</b>	\$ \$ \$ \$ \$	49,000 51,000 51,400 53,000 33,500 -32%	\$ \$ \$ \$ \$ \$	7,500,000 4,500,000 9,250,000 7,995,000 3,349,500 -55%	77 78 83 69 58 <b>-25</b> %
AREA 6	2001	519	\$	164,353	\$	40,000	\$	571,428	51
	2002 2003 2004 2005	499 496 509 560	\$ \$ \$	177,442 185,649 196,392 206,456	\$ \$ \$ \$	27,500 50,447 30,000 22,500	\$ \$ \$ \$ \$	529,000 535,000 1,175,000 730,000	53 67 75 62
L	Percent Increase 2001 to 2005 nell Jones, using North Texas Real Estate	8%	~~	26%		-44%		28%	22%

Source: Lynell Jones , using North Texas Real Estate Info. Systems, Inc., 5/25/06 Property type: Single family homes only. Status: Homes Sold

Areas are keyed to the map presented in Figure 5-1

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## DMJM AVIATION AECOM

## **Section 1 Forecast of Activity**



Prepared by: GRA, Inc.

#### SECTION 1—FORECAST OF ACTIVITY

#### 1.1 Engagement

GRA, as a subcontractor to DMJM Aviation, has been asked by the City of Dallas to assess the air service characteristics of additional activity at Dallas Love Field that may result from the repeal of the Wright Amendment.

This assessment was deemed necessary to provide an accurate and authoritative basis for the analysis of noise, ground traffic, air quality and economic impacts that would follow. Federal legislation was enacted in 1979 (and amended twice) that restricts fares, ticketing and non-stop commercial service by standard jets to, from and through Dallas Love Field to cities within the states of Alabama, Mississippi, Louisiana, Arkansas, Oklahoma, New Mexico, Kansas, Missouri and Texas. Single tickets involving Love Field can only include connections at airports within the specified states. Aircraft with fewer than 56 seats may provide service to points outside of the Wright Amendment defined service area. Because there are many markets that cannot be served with standard jet aircraft, there may be opportunities for substantial increases in commercial operations at Love Field if the Wright Amendment were repealed.

GRA's role in the engagement was to provide a forecast of annual enplanements, operations, fleet mix, distribution of flight distances, and a time of day distribution of arrivals and departures assuming that the Wright Amendment was repealed. Two forecasts were created for 2020, one constrained by 20 gates and the other by 32 gates.

#### 1.2 Ground Rules for the Forecast

In developing the forecast, GRA was instructed to assume that DAL's facility capacities would be balanced to handle additional operations assuming gate capacities of 20 and 32 gates. The definitions of the gates, the capacity to handle specific aircraft types, and the assumed use agreements that would pertain to gate usage are summarized in **Table 1-1**.

Gates	Use Agreement	Number	of Gates	Maximum Future
<u> </u>	Ose Agreement	Α	В	Gauge
AA	Preferential	3	3	B787
СО	Preferential	2	2	B787
WN	Preferential	15	14	B737-800
Lemon Avenue	Common		6	B737-800/A320-200
North Concourse	Common		7	B787
Total Gates	20	32		

**Table 1-1: Two Scenarios for Forecasting** 

In Scenario A, the current gate complement (totaling 19) would remain in place with one additional gate built to increase the Southwest complement from 14 to 15 gates. American, Continental and Southwest are assumed to have preferential rights to their gates, but it is assumed that any other remaining gate time would be made available to other carriers.

In Scenario B, the six existing gates on Lemmon Avenue (originally built for defunct Legend Airlines) would be put back into operation and modified to accommodate larger aircraft up to B737-800 or A320-200 aircraft. These gates would be made available to air carriers on a common use basis, with the Department of Aviation assuming control and distributing access among competing carriers. In addition, seven additional gates on the North Concourse would be made available. These seven gates would also be under the control of airport management and made available to carriers on a common use base. These gates would be capable of

accommodating up to B787 aircraft. The additional Southwest gate is excluded from this scenario. (Note: As the demand for gates increases in future years, such that all users cannot be satisfied, the Department of Aviation should consider the development of economic policy and procedures for the equitable allocation of gates to service airline schedules in a manner as to maximize the economic return on gates as assets of the City.) In the GRA forecast, it was also assumed that the American and Continental gates in the Central Terminal building could be modified to accommodate up to B787 aircraft.

#### 1.3 2001 Master Plan Forecast

In 2001, GRA, under subcontract to DMJM Aviation, developed a future forecast for DAL's Master Plan. The need for a specialized forecast was occasioned by two important developments at that time:

- A U.S. DOT order (upheld in the U.S. Court of Appeals, Fifth Circuit on February 1, 2000) that permitted the use of standard jet operations to any point from DAL so long as no more than 56 seats were onboard the aircraft.<sup>1</sup>
- The emergence and rapid adoption of 50-seat regional jets by hub and spoke carriers and their potential application at DAL.

By the time the forecast was undertaken, Legend Airlines (a new entrant) and American Airlines had both commenced service with standard jets featuring 56 seats with a first class configuration from DAL. Delta and Continental Airlines had begun service to their hubs using 50-seat jets. The forecast reflected the potential consequences for DAL if these new services became economically viable. **Table 1-2** summarizes the unconstrained 2001 Master Plan forecast. With the 32 Gate configuration that resulted from the Master Plan, the total air carrier operations were constrained to a 2020 level of 182,804 operations, and the 2020 enplanements were constrained to 5,540,038 passengers.

Table 1-2: Forecasts of Unconstrained Aviation Demand: 2001 Master Plan for DAL

Air Carrier Operations by Market Segment: 1999-2020

Year	Southwest	Other Large	Reconfigured 56 Seat	RJ 50	Total Air Carrier
1999	93,704	10,602	0	2,980	107,286
2002	96,720	3,700	23,544	22,890	146,854
2005	96,720	4,000	32,700	35,970	169,390
2010	100,048	4,400	45,126	55,590	205,164
2015	102,752	4,800	61,476	78,480	247,508
2020	105,456	5,200	75,868	101,370	287,894
Percent 2020/1999	12.5%	-51.0%	NM	3,301.7%	168.3%

Air Carrier Passengers by Market Segment: 1999-2020

Year	Large Aircraft (Unrestricted)	Hub Markets	Non-Network Markets	Total Air Carrier
1999	3,384,587	83,220	0	3,467,807
2002	3,533,471	467,185	333,278	4,333,934
2005	3,682,355	606,618	573,035	4,862,008
2010	3,930,496	821,718	902,912	5,655,127
2015	4,178,787	1,080,604	1,313,559	6,572,950
2020	4,443,304	1,328,863	1,699,125	7,471,291
Percent 2020/1999	31.3%	1,496.8%	NM	115.4%

<sup>&</sup>lt;sup>1</sup> U.S. DOT: "Order in Love Field Service Interpretation Proceeding" (Docket OST-98-4363, December 22, 1998).

The operations for Southwest Airlines reflected the FAA 2001 TAF forecast for the airport. The rationale for the slow growth scenario was that without changes to the Wright Amendment there would be limited additional service by Southwest Airlines. The decline in other large aircraft operations reflected a then recent service change by American Airlines to Austin.

The larger changes in activity and enplanements were due to 56-seat standard jet and 50-seat RJ's. The operations by reconfigured 56-seat aircraft reflected the then recent inauguration of service by Legend and American Airlines using standard jets in a first class configuration. The still larger increase in operations by RJ-50's was due in part to the large order books for these aircraft that hub carriers had at the time and the potential strategic advantage such carriers would have by serving two points in Dallas from their own hubs.

In the original forecast, concern was expressed about the long-term viability of the 56-seat first class service from DAL. As it turned out, there was insufficient demand to support such services, at least at that time, and they were soon discontinued.

Regional jet operations also proved to be unsuccessful at DAL. Services by Delta, American and Continental were subsequently pulled. With respect to these services, it is hard to unbundle the airlines' economic problems from the events of 9/11. There was both an immediate and longer-term consequence of 9/11 that made the regional jet service with 50-seat aircraft at DAL less attractive. Immediately after 9/11, there was a substantial drop off in traffic throughout the U.S. New and unproven services such as the RJ's at DAL were early victims of such cutbacks. The hub and spoke carriers were particularly hard hit and remain financially fragile to this day. In such circumstances, it was difficult for these carriers to justify a large investment to maintain a second and often redundant set of services in the Dallas/Fort Worth Metroplex.

The longer-term impact of 9/11 on RJ's was the change in pilot scope clauses, which rendered the 50-seat regional jet less attractive across the board. Before 9/11, most large carriers had labor contracts with their pilots, which prohibited regional subsidiaries or code-share partners from operating jet aircraft in excess of 50 seats. One could argue that the 50-seat regional jet was designed primarily to provide U.S. hub and spoke carriers with an expansion opportunity using lower cost labor. After 9/11, most scope clause restrictions were substantially eliminated for regional jets, so that today carriers can operate regional aircraft up to 90 or 100 seats with much greater flexibility using separate pilot pools.

As a consequence, hub and spoke carriers have reduced their reliance on 50-seat aircraft, and their subsidiaries and regional partners have been busy acquiring larger regional jets—70 and 90/100 seat airplanes. Because these larger regional jets have substantially lower costs per available seat mile, they are more attractive in the hypercompetitive airline industry of today.

#### 1.4 Changes Due to Repeal of the Wright Amendment

In the present engagement, GRA was instructed to assume that the Wright Amendment has been repealed and that sufficient time has elapsed to modify facilities and otherwise make the airport ready to accept additional traffic.

The important potential changes in air service at DAL are due to the following:

- In the absence of the Wright Amendment, carriers would be free to add service beyond the prescribed service area using standard jet aircraft. Because there are many large markets currently not served by DAL, there is a potential for added service.
- Motivations of individual carriers may vary widely. Southwest Airlines has indicated publicly that it would significantly increase its operations at DAL, which is its home base and focus city. Absent the restrictions in the Wright Amendment, Southwest could be expected to add

- service to major cities and to provide connection opportunities at DAL (although its primary orientation would remain as a point-to-point carrier), as well as from DAL through existing hub and focus cities such as Chicago Midway, Phoenix, Las Vegas, Nashville, etc.
- American Airlines has made public its intentions to substantially increase its operations at DAL if the Wright Amendment were repealed, with the primary focus being to match Southwest and other airlines' increase in service in order to preserve its position in the local Dallas market. One of American's primary concerns is that many of its frequent flyers live or work closer to DAL than they do to DFW, and DAL's closer proximity to major hotels for inbound traffic, might cause AA to lose passengers to new service provided by Southwest or other carriers at DAL.
- Other carriers may be motivated to either add service at DAL to their hubs, or to change their service to the Metroplex from DFW to DAL, or both.

With the exception of Southwest Airlines, all other carriers may consider use of the latest generation of RJ aircraft with up to 100 seats. Seat-mile costs of these aircraft are substantially lower than those of their 50-seat predecessors. All carriers would take account of the increased opportunity to build connections both at DAL and at their own hubs and focus cities if the Wright Amendment were repealed.

To give some dimension to the opportunity, **Table 1-3**, which is based on DOT statistics from the ticket sample, summarizes opportunities by potential market sizes (for the entire Metroplex including DFW and DAL) for cities (and airports) currently not served from DAL on a non-stop basis. There are 62 cities with at least 100 passengers per day each way not currently served from DAL. A majority of the passengers in these markets currently fly on American Airlines to DFW. Southwest is the second ranked carrier despite not providing any non-stop service to the cities shown.

Table 1-3: Largest Markets in the Metroplex without Service to DAL USDOT Db1b YE 3Q 2005 and OAG April 2005

				Doo	0000000	Dor Do	v Eoob	Mov						
Airport	All	AA	СО	DL	sengers F9	FL	y Each HP	way NW	SY	TZ	UA	US	WN	ΥX
ATL	1,453	554		677		191					0,1			
LGA	1,216	873		66						122			0	
LAS	1,213	627				151	345						26	
ORD	1,147	820									280			
LAX	1,116	653		64		142	66				83		14	
DEN	929	441			203						243			
MCO	924	615		103		147							14	
BWI IAH	713 709	526 212	388			110							11 98	
EWR	709	350	242										0	
BOS	709	518	242	56									0	
PHX	683	362		- 00			189						48	
MSP	676	273						276	97					
PHL	618	348										155	4	
DCA	609	451										79	0	
SFO	535	325									94			
SEA	535	324					56						6	
SNA	525	412											11	igsquare
MDW	521	187							<u> </u>	297			12	igwdapprox
TPA	476	374						400	<u> </u>				9	$\vdash \vdash \vdash$
DTW FLL	455 448	242 345						166	<del>                                     </del>				3 8	$\vdash$
SAN	448	297					64	-	-	-	-		13	$\vdash \vdash \vdash$
SJC	360	261					04						4	$\vdash$
RDU	356	281											3	
MIA	354	319												
IAD	331	257												
CLT	331	174										108		
SLC	311	114		118									6	
BNA	304	244											20	
IND	292	213											1	
ONT	283	187											3	
PIT	271	158										72	0	
MKE	256	77												154
LGB SMF	255 255	241 154											4	
PDX	249	128											3	
BUR	241	206											3	
CMH	222	165											2	
OAK	217	144											9	
CRP	214	65											141	
CVG	211	77		124										
JFK	210	178												
JAX	207	136											3	
HRL	203												197	igsquare
CLE	194	94	66										2	igwdapprox
MEM	187	123							<u> </u>				4	<del>                                     </del>
BDL BHM	184 168	131 115											1 25	$\vdash$
HNL	163	109							<del>                                     </del>				0	<del>                                     </del>
RIC	154	121											J	$\vdash$
OMA	152	124											1	
DAY	145	105												
TUS	145	114											6	
RNO	138	93											3	
COS	134	124												
PBI	131	82											0	igsquare
SDF	129	99											2	igwdapprox
ORF	124	89					ļ		<u> </u>				1	
SJU	114	97												
RSW BTR	111 106	79 83							<u> </u>					$\vdash$
MFE	100	91												
Grand Total	33,968	17,976	695	1,210	203	740	719	442	97	419	700	413	6,436	154
Share	100%	53%	2%	4%	1%	2%	2%	1%	0%	1%	2%	1%	19%	0%

#### 1.5 Recent Forecasts

Within the last 11 months, other consultants have developed four forecasts regarding the consequences for air services at DAL in the event the Wright Amendment is repealed. The following is a brief summary of those four studies.

#### 1.5.1 SH&E: "Potential Airport Impacts With Repeal of Wright Amendment"

Sponsored by DFW Airport, the SH&E study projected that with the repeal of the Wright Amendment, Southwest would add long-haul flying at their existing gate complexes and be matched substantially at DAL by American Airlines. Other carriers would transfer flying from DFW to DAL. As a consequence, there would be a substantial pull down in operations at DFW and loss of services to smaller communities. SH&E forecasts that between 276 and 362 operations per day would be added to DAL if the Wright Amendment was repealed. As a consequence, 16 million passengers (8 million enplanements) would be added to the 6.4 million already at DAL. The result, projected by SH&E, was gridlock at DAL, and a substantial reduction in service at DFW.

#### 1.5.2 Eclat Consulting: "Repealing the Wright Amendment—Risks Facing Small Communities and the Dallas/Fort Worth Metroplex"

On behalf of American Airlines, Eclat Consulting examined the consequences of the repeal of the Wright Amendment. Eclat projected that 251 additional daily operations would occur at DAL and that DFW would lose 279 operations. Eclat provided details on service changes and projected 93 additional flights by Southwest, 90 additional flights by American, and 67 additional flights by other airlines at DAL. Virtually all of the service losses at DFW would be pull downs by American Airlines because of a splintering of its DFW hub with DAL.

#### 1.5.3 Campbell-Hill: "The Wright Amendment Consumer Penalty"

Sponsored by Southwest Airlines, the Campbell-Hill study assumed that Southwest would add service to 15 large markets with three daily roundtrips each. It projected that the new service would attract 3.7 million one-way passengers annually to and from the Dallas/Fort Worth Metroplex and that there would be a substantial compression in fares in the Dallas area. Campbell-Hill did not project any reaction by American Airlines at DAL.

#### 1.5.4 The Boyd Group: "The Wright Amendment Debate: Now for Some Facts"

Produced independently, The Boyd Group projected that Southwest would add 66 daily flights to major markets as a result of the repeal of the Wright Amendment. It projected that American would not respond by adding flights at DAL, nor would other carriers.

To gain a better perspective on these alternative forecasts, **Table 1-4** provides a comparison of the service changes projected in each. Unfortunately, the SH&E report that was made available for this study does not provide details on their specific service changes. But, **Table 1-4** shows that there is broad agreement on the new markets that Southwest is likely to serve when one compares the Campbell-Hill and Eclat studies. This is interesting because these two studies were sponsored by opposing groups in the debate over the repeal of the Wright Amendment.

Table 1-4: Current and Forecast Service at DAL with Repeal of the Wright Amendment

	Se	ervice at DA	\L	New WN Service Forecast for				
		Apr-06			DAL			
		OAG			2005 Campbell			
	WN	AA	СО	Boyd	Hill	Eclat		
ABQ	Р							
AMA	Р							
ATL								
AUS	Р	Р						
BHM						Р		
BNA				Р		Р		
BOS				P	Р	P		
BWI CLE				Р	Р	Р		
CLE								
CMH								
COS								
CVG								
DAY								
DCA								
DEN								
DTW								
ELP	Р							
EWR								
FLL						Р		
HOU	Р							
IAD IAH			Р					
IND			Р					
LAS				P	Р	Р		
LBB	Р			'	'	'		
LAX	·			Р	Р	Р		
LGA								
LIT	Р							
MAF	Р							
MCI	Р	Р		Р	Р	Р		
MCO				Р	Р	Р		
MDW				Р	Р	Р		
MEM								
MIA								
MKE MSP								
MSY	Р							
OAK	-			Р	Р	Р		
OKC	Р					·		
ORD								
PHL				Р	Р	Р		
PHX				Р	Р	Р		
PIT								
PVD					Р	Р		
RDU								
RNO					Р	Р		
SAN					Р	Р		
SAT	Р	Р			P	P		
SEA SFO					۲	۲		
SDF	<del> </del>			-				
SJC	1							
SLC								
SNA								
STL	Р	Р		Р	Р	Р		
TPA				P	P	P		
TUL	Р							
TUS								

SH&E also developed a forecast that showed between 136-178 new operations by WN, and between 158 and 288 new operations by AA.

Details on the points served were not provided in the public document.

Sources: Campbell-Hill: "The Wright Amendment Consumer Penalty" (June 7, 2005); Eclat Consulting: "Repealing the Wright Amendment—Risks Facing Small Communities" (October 2005); SH&E: "Potential Airport Impacts—Repeal of the Wright Amendment" (May 2005)

In fact, **Table 1-5** shows there is broad agreement across all four forecasts with respect to Southwest's likely utilization of gates at DAL. When one calculates average number of turns at DAL resulting from the forecasts, we note that Southwest would not have sufficient gate capacity using their present 14 gates. However, it is feasible that the carrier could accommodate all of the forecasts with 15 to 20 gates. Even the SH&E aggressive forecast could be accommodated with 21 gates.<sup>2</sup>

**Table 1-5** also makes clear the very close correspondence in projected operations by Southwest's forecast by four independent entities. With the exception of the SH&E aggressive forecast, the range of projected operations by Southwest is between 300 and 360 operations per day. Assuming an average of ten turns per gate, this difference amounts to three gatesworth of capacity between the lowest forecast—Boyd—and the SH&E moderate forecast.

SH&E SH&E Campbell Moderate Aggressive Boyd Hill **Eclat** SPONSOR None WN AA DFW WN TOTAL NEW 66 90 136 136 178 WN **EXISTING** 234 234 234 224 224 HOU -8 AUS -4 MSY -2 SAT -6 OKC -2 LIT -4 MAF -4 **AMA** -8 LBB -4 **REVISED** 192 WN **TOTAL** 300 324 328 360 402 Gates WN Gate Turns 14 10.7 11.6 11.7 12.9 14.4 27 5.6 6.0 6.1 6.7 7.4

Table 1-5: Alternative Forecasts of Changes in WN Operations at Love Field

Turning now to projected operations by carriers other than Southwest in the event of the repeal of the Wright Amendment, there is a wide variation among the four forecasts. The Boyd and Campbell Hill forecasts show no increase in operations by other carriers, concluding that operations at DAL would merely divert traffic from established operations at DFW. In contrast, both Eclat and SH&E show sharp increases in operations by other airlines (OAL), ranging from 182 to 313 operations per day. The Eclat and SH&E "moderate" forecasts show essentially the same increase with the former providing details on new service points. Eclat shows American adding 58 operations per day, and AirTran and other airlines adding 34 and 33 operations per day.

**Table 1-6** shows that it is differences in the projected increases in operations by airlines other than Southwest that account for a large portion of the variation in projected total operations among the forecasts. The table also provides information on scheduled operations as of April

2

<sup>&</sup>lt;sup>2</sup> These forecasts also assume that all other airport facilities are modified and can adequately handle the added traffic.

2006. Recent service additions at DAL by Southwest and American have accounted for a 10 percent increase in baseline operations relative to when the four forecasts were completed in 2005. These additions are due primarily to the addition of Missouri to the Wright Amendment service area this year.

BOYD CAMPBELL April OAG **ECLAT** SH&E SH&E HILL **MODERATE** AGGRESSIVE Operations 242 234 234 234 224 224 Existing WN Reductions -42 WN Existing Forecast 242 234 192 234 224 224 WN New 66 136 90 136 178 WN Total Forecast 242 300 328 324 360 402 Other Airlines 25 25 25 25 AA 32 90 Airtran 34 OAL as a group 0 33 0 158 TOTAL OAL OPERATIONS 57 25 182 25 183 313 TOTAL OPERATIONS 299 325 510 349 543 715

**Table 1-6: Comparison of Current Operations and Recent Forecasts** 

One way to gain a better perspective on these forecasts is to examine how feasible each would be given alternative gate complexes at DAL. Here, the ground rules of the GRA forecast are applied to determine if there is sufficient capacity to accommodate the traffic forecasts summarized in **Table 1-6**. Recall that two scenarios are being examined:<sup>3</sup>

- Scenario A: Current gate complex (19 gates), plus one additional gate, for a distribution of 20 gates on a preferential basis.
- Scenario B: Current gate complex (19 gates), with the addition of six gates on Lemmon Avenue upgraded to accommodate A320 class aircraft and seven gates on the North Concourse capable of handling B787 aircraft for a total of 32 gates; both increments in gate capacity would be distributed on a common use basis.

Table 1-7 shows that if reasonable assumptions are made about average turns per gate, only the Boyd and Campbell-Hill forecasts are likely to be feasible at DAL as it is currently configured and with the current distribution of gates. This assumes that Southwest's maximum average turns per gate is 10 while more traditional hub and spoke carriers could manage at most eight turns on average. The top portion calculates the average turns per gate implied in each forecast. Notice that American would need 15 turns per gate to sustain either the Eclat or SH&E forecasts. American's three gates are capable of 24 turns or 48 operations per day (with standard jets) while Eclat has projected 90 operations per day. American might be able to double its capacity on some of its gates by operating RJ's, however; a large scale RJ operation with inherent higher unit costs would be less cost competitive with Southwest's costs, however.. Southwest would be short of gates if it chose to operate the number of flights projected by Campbell-Hill and Boyd (again assuming the current distribution of gates), but, under the rules of this engagement, their excess flights could be accommodated at other gates.

<sup>&</sup>lt;sup>3</sup> See Table 1.

The bottom part of the table below calculates the maximum number of operations for each carrier grouping assuming the current distribution of gates. The final row shows the shortfall in operations relative to each forecast. Using this method, the airport would be capable of producing 380 commercial operations per day, even if gate capacity were redistributed among the carriers.

The results for cases with 20 and 32 gates are shown in **Table 1-7**. The top of the table reports the results for the 20 gate scenario, Scenario A. Overall, the airport could accommodate 380 operations per day, and as a result in the 20 gate case there is a shortfall in operations relative to the Eclat and SH&E forecasts. The top portion calculates the average turns per gate implied in each forecast. With its current complement of gates, American would need 15 turns per gate to sustain either the Eclat or SH&E forecasts. American's three gates are capable of 24 turns or 48 operations per day (with standard jets) while Eclat has projected 90 operations per day. American might be able to double its capacity on some of its gates by operating RJ's, however; a large scale RJ operation with inherent higher unit costs would be less competitive with Southwest's costs, however. Southwest would also be short of gates, except in the Boyd forecast.

In Scenario B, shown at the bottom of **Table 1-7**, thirteen additional common use gates are added to the existing complex with the airport reaching its full 32-gate capacity. With the addition of 13 common gates, carriers have relatively easy access to the capacity they need to expand. In this scenario, there would remain shortfalls only in the SH&E aggressive forecast, again assuming feasible accommodation across all gates.

Table 1-7: Scenario A & B- Feasibility of Alternative Forecasts with 20 & 32 Gates

Sconario	A: 20 gat	000		April OAG	BOYD	CAMPBELL	ECLAT	SH&E	SH&E	
Scenario	7 A. 20 gai	.62				HILL		MODERATE	AGGRESSIVE	
WN Opera	tions			244	300	324	328	360	402	
TOTAL OF	ERATIONS			299	325	349	510	543	715	
Max Turns	Max Turns Gate Distribution 20 gates Max Ops					AVERAC	GE TURNS			
10	WN	15	300	8.1	10.0	10.8	10.9	12.0	13.4	
8	AA	3	48	5.3	0	0	15	15	15	
8	CO	2	32	6.3	6.3	6.3	6.3	6.3	6.3	
8	Common	0	0	0	0	0	0	0	0	
			380							
				CAPACITY CAPPED OPERATIONS						
	WN	15		242	300	300	300	300	300	
	AA	3		32	20	44	48	48	48	
	СО	2		25	25	25	32	32	32	
	OAL	0		0	0	0	0	0	0	
TOTAL CA	TOTAL CAPACITY CAPPED OPERATIONS			299	345	369	380	380	380	
SHORT FA	LL IN FOR	ECAST OPERATION	SNC	0	0	0	-130	-163	-335	

<sup>\*</sup>Assume 10 turns per WN gate and 8 for all others: [(14gates\*10) + (5gates\*8)] \*2 = 360

Scenario I	3: 32 Gates	S		April OAG	BOYD	CAMPBELL HILL	ECLAT	SH&E MODERATE	SH&E AGGRESSIVE
<b>FORECAS</b>	T OPERAT	IONS		299	325	349	510	543	715
Max Turns Gate Distribution 32 gates Max Ops						TOTAL G	ATES REQU	IRED	
10	WN	14	280	12.1	15.0	16.2	16.4	18.0	20.1
8	AA	3	48	2.0	0.0	0.0	5.6	0.0	0.0
8	CO	2	32	1.6	2.0	2.0	2.0	2.0	2.0
8	Common	13	208	0.0	0.0	0.0	4.2	9.9	18.0
	TOTAL		568	15.7	17.0	18.2	28.2	29.9	40.1
	Revised To	otal Operations							
	Assume Mi	in 6, Max 10 Turn	S	CAPACITY CAPPED OPERATIONS					
	WN			242	280	280	280	280	280
	AA			32	0	0	48	48	48
	CO			25	25	25	25	25	25
	OAL			0	20	44	157	190	208
TOTAL CA	TOTAL CAPACITY CAPPED OPERATIONS			299	325	349	510	543	561
SHORT FA	ALL IN FOR	ECAST OPERAT	IONS	0	0	0	0	0	-154

#### 1.6 GRA Near-Term Unconstrained Forecast

The purpose of the near-term forecast was to identify the set of possible profitable service additions that would result from the repeal of the Wright Amendment. This forecast was not constrained based on gates available. In addition to reviewing the forecast made by other firms (described immediately above), GRA also:

- Conducted in-person interviews with American Airlines, Southwest Airlines, DFW Airport, Love Field, and other airline network planners.
- Assembled information on market sizes and existing schedules.
- Identified existing stations operated by carriers.
- Reviewed existing and planned future fleets.
- Assessed the consistency of Love Field service with carrier business cases.

Likely service introductions were identified to occur in large markets where a carrier already had a station and where the carrier had:

- A sustainable cost advantage.
- A structural advantage defined as a connecting hub or focus city on at least one side of a segment.
- The potential to offer a unique service unlikely to be duplicated by others.

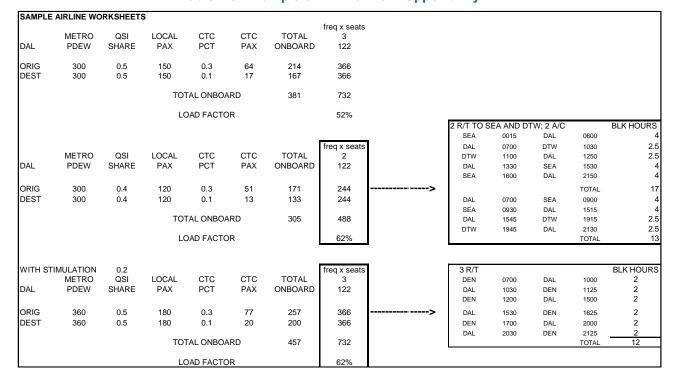
Where there was substantial potential for profitable service, specific aircraft rotations and service frequencies were developed. This helped confirm that the posited services would result in high aircraft and labor utilization, two important determinants of airline profitability, and would meet basic scheduling constraints.

Finally, it should be noted that in developing the near-term forecast, the number of gates at Love was not a constraint. Instead the focus was on the near-term profit opportunities for carriers based on the criteria described immediately above.

**Table 1-8** illustrates the process developed for screening for potential service additions at Dallas Love Field. The estimates of passengers on-board are illustrative only and do not represent the specific markets described in the table.

In the example in **Table 1-8**, it is assumed that there are approximately 300 passengers per day each way (PDEW) traveling to and from the Dallas/Fort Worth Metroplex and currently there is no non-stop service available at Love Field, at least in part because the Wright Amendment prohibits such flights. With the repeal of the amendment, the carriers with a station in the subject market might consider adding service to Love Field, if they had a sustainable cost advantage or a structural advantage on either end of the flight, or otherwise could offer service that would be unlikely to be matched by other airlines. It is also assumed that if the carrier were to fly three times per day, it would capture approximately 50 percent of the market. The top left portion of **Table 1-8** shows the calculation of on-board load factor made up of local passengers and connecting passengers. This results in an estimated load factor of 52 percent for the proposed service, which is too low to sustain profitable operations.

In the example, it is assumed that if the same carrier flew twice a day, it would capture approximately 40 percent of the market, resulting in a 62 percent load factor. A carrier might decide to enter the market with this expected load factor realizing that over time the market would grow, as would its on-board loads.



**Table 1-8: Example of Airline Profit Opportunity** 

In **Table 1-8**, we have assumed, for illustration purposes only, that two of these markets are Seattle and Detroit. We then developed a set of aircraft rotations that results in very high utilization rates for two aircraft, approximately 17 hours on one (benefiting from eastbound redeye flying) and 13 hours per day on the other. With this level of utilization, it is apparent that the carriers would have a good opportunity to earn a profit, especially given the other criteria for selection.

The bottom part of the chart repeats the same exercise but assumes that the carriers' entry stimulates the market by 20 percent. Stimulation would be more likely in markets where there are no low cost carriers serving the Dallas/Fort Worth Metroplex. In this case, a carrier examining a market currently with 300 passengers per day each way might be able to offer three frequencies per day and capture a larger market share because of the stimulation its entry

would cause. The aircraft rotations for this service are illustrated in the box to the right of the illustration. We created actual rotations for every market assumed to have entry at Love.

The change in non-stop service for the unconstrained near-term forecast is summarized in **Table 1-9**. The individual LOCIDs of other airports together with the market sizes to the Dallas/Fort Worth Metroplex are shown in the first two columns of the table. The third column shows existing services at DAL, including the recently added services to Kansas City (MCI) and St. Louis (STL).

The remaining columns in the table illustrate forecast entry at Love Field as a result of the repealed Wright Amendment. The table compares GRA's forecast entry with those of other firms.

Table 1-9: Near-Term Existing and Forecast Market Entry at Dallas Love Field

	Metroplex	DAL				
	YE 3Q 05	April 2006	New S	Service Due	Repeal	
LOCID	PDEW	Service	GRA	Boyd	Hill	Eclat
ABQ	482	ü				
AMA	359	ü				
ATL	1453		ü			ü
AUS	771	ü				
BHM	168					ü
BNA	304		ü	ü		ü
BOS	709		ü			
BWI	713		ü	ü	ü	ü
CLE	194		ü			
CLT	331					
CMH	222					
COS	134					
CVG	211					
DAY	145					
DCA	609					
DEN	929		ü			
DTW	455		ü			
ELP	505	ü				
EWR	709		ü			
FLL	448		ü			ü
HOU	1621	ü				
IAD	331		ü			
IAH	709	ü				
IND	292					
JFK	210		ü			ü
LAS	1213		ü	ü	ü	ü
LBB	446	ü				
LAX	1116		ü	ü	ü	ü
LGA	1216					
LIT	393	ü				
MAF	319	ü				

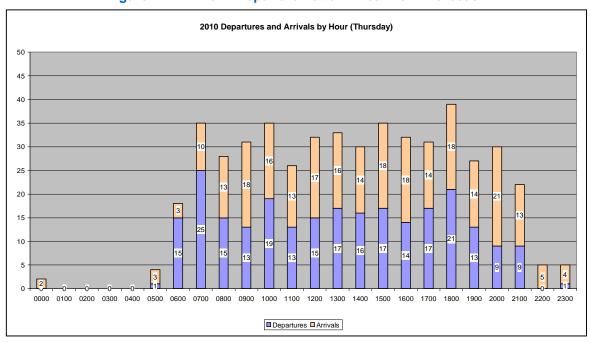
	Metroplex	DAL				
	YE 3Q 05	April 2006	New Service Due to Wi			Repeal
					Campbell	
LOCID	PDEW	Service	GRA	Boyd	Hill	Eclat
MAF	319	ü				
MCI	429	ü		ü	ü	ü
MCO	924		ü	ü	ü	ü
MDW	521		ü	ü	ü	ü
MEM	187					
MIA	354					
MKE	256					
MSP	676		ü			
MSY	651	ü				
OAK	217		ü	ü	ü	ü
OKC	208	ü				
ORD	1147		ü			
PHL	618		ü	ü	ü	ü
PHX	683		ü	ü	ü	ü
PIT	271					
PVD	98		ü		ü	ü
RDU	356					
RNO	138		ü		ü	ü
SAN	439		ü		ü	ü
SAT	1052	ü				
SEA	535		ü		ü	ü
SFO	535					
SDF	129					
SJC	360					
SLC	311					
SNA	525					
STL	463	ü		ü	ü	ü
TPA	476		ü	ü	ü	ü
TUL	403	ü				
TUS	145					

**Table 1-10** shows the time of day activity projections for the unconstrained forecast in the event of the repeal of the Wright Amendment. The activity levels in this table are for a weekday. The two left-hand columns show current operations (as of April 2006). The middle column shows the added operations posited in the GRA forecast. The final three columns show totals. **Figure 1-1** provides an illustration of the weekday pattern of service.

Table 1-10: GRA Near-Term Time of Day Forecast for DAL (Weekday)

2010	2006 OP	ERATIONS	NEW OP	ERATIONS		TOTAL	
	Departures	Arrivals	Departures	Arrivals	Departures	Arrivals	Operations
Hour			·		·		
0000	0	0	0	2	0	2	2
0100	0	0	0	0	0	0	0
0200	0	0	0	0	0	0	0
0300	0	0	0	0	0	0	0
0400	0	0	0	0	0	0	0
0500	0	0	1	3	1	3	4
0600	7	0	8	3	15	3	18
0700	11	10	14	0	25	10	35
0800	14	12	1	1	15	13	28
0900	10	8	3	10	13	18	31
1000	9	10	10	6	19	16	35
1100	7	7	6	6	13	13	26
1200	9	10	6	7	15	17	32
1300	11	10	6	6	17	16	33
1400	8	8	8	6	16	14	30
1500	9	11	8	7	17	18	35
1600	12	13	2	5	14	18	32
1700	11	8	6	6	17	14	31
1800	11	11	10	7	21	18	39
1900	9	9	4	5	13	14	27
2000	6	13	3	8	9	21	30
2100	6	7	3	6	9	13	22
2200	0	2	0	3	0	5	5
2300	0	1	1	3	1	4	5
	150	150	100	100	250	250	500

Figure 1-1: Arrival – Departure Pattern: Near-Term Forecast



**Table 1-11** provides additional information on the near-term forecast, including statistics on average seat size per commercial operation. Also shown in **Table 1-11** is the distribution of operations by aircraft type and mileage block. In the near-term forecast, carriers are assumed to continue to use their existing aircraft fleets; there is no substitution of more modern technology airplanes within the time period.

Table 1-11: Characteristics of the Near-Term Forecast

#### FLIGHT CHARACTERISTICS

 Current 2006 Operations

 Total Seats
 35,282

 Total Ops
 300

 Avg Seats per Op
 117.6

 2010 Forecast New Flying

 Total Seats
 24,130

 Total Ops
 200

 Avg Seats per Op
 120.7

 2010 Total Forecast

 Total Seats
 59,412

 Total Ops
 500

 Avg Seats per Or
 118.8

#### DISTRIBUTION OF OPERATIONS BY AIRCRAFT TYPE AND MILEAGE BLOCK

Miles	717	733	735	738	73G	CR7	ER3	ER4	E70	E90	MD80	TOTAL
0000-0500	0	68	124	0	18	0	2	42	0	0	6	260
0501-1000	12	20	6	2	66	12	0	0	22	0	8	148
1001-1500	0	0	0	8	58	0	0	0	8	6	0	80
1501-2000	0	0	0	0	8	0	0	0	0	4	0	12
												500

Only 40 of 300 current operations exceed 500 miles.

For airport planning purposes, it is important to convert daily services to annual estimates of enplanements and operations. To make these estimates, airline services at other airports were examined and compared to DAL. Because of the Wright Amendment, there are few opportunities to make connections at DAL because of the prohibition against through ticketing and because there are fewer services to distant cities than would otherwise be the case. In examining similar airports including Houston Hobby and Chicago Midway, it was concluded that the load factor at DAL would increase if the Wright Amendment were appealed. The T-100 data were also used for these airports to annualize the daily operations and enplanements, taking account of both cancellations and seasonal variations in services. The results are illustrated below in **Figure 1-2**.

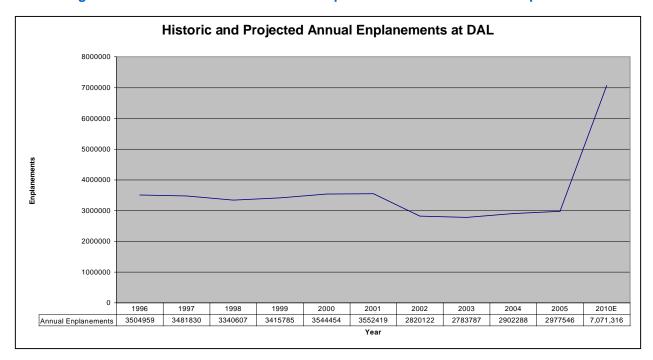
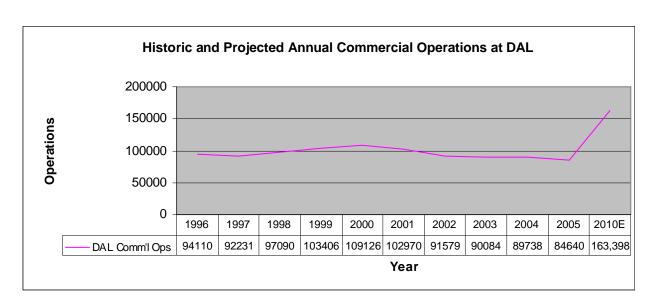


Figure 1-2: Near-Term Forecast Annual Enplanements and Commercial Operations



Finally, as noted previously, the GRA near-term forecast was not constrained specifically by gate limitations at Love Field. Nevertheless, it is interesting to examine whether gate limitations would in fact impinge on the future operations forecast. In **Table 1-12**, the same criteria were applied for the number of turns per gate to the GRA forecast discussed earlier in this report. As a result, the GRA forecast could not be fully implemented in the 20-gate scenario, but would be feasible in the 32-gate scenario. The results for other forecasts made by other firms are also shown in **Table 1-12**.

**Table 1-12: Applying Gate Constraints to Near-Term Forecasts** 

#### Comparison of the GRA 2010 Forecast with other Forecasts

	April OAG	GRA	Boyd	Campbell Hill	ECLAT	SH&E Moderate	SH&E Aggressive
Existing Operations	300	300	259	259	259	249	249
New Operations	0	200	66	90	251	294	466
TOTAL FORECAST	300	500	325	349	510	543	715
Scenario A: 20 Gates	300	380	325	349	380	380	380
Scenario B: 32 Gates	300	500	325	349	497	529	571

#### 1.7 GRA Long-Term Forecasts

The near-term forecast provided a useful platform for identifying profitable opportunities for airlines in the event that the Wright Amendment is repealed. But, because the near-term forecast was unconstrained by gate capacity, it may not represent a realistic future scenario for Love Field, at least under certain gate scenarios.

In order to develop the longer-term forecast, GRA focused on the same profit opportunities for airlines but took into account difference in service patterns under two gate capacity scenarios:

- 20 Gate Scenario: 19 gates distributed as they are today and one additional gate used on a preferential basis by Southwest.
- 32 Gate Scenario: Assumed the same distribution of current gates, and then common gate utilization for the incremental 13 gates.

In each scenario, it was assumed that the gate capacity would be limited, in part, by airline business models. It was also assumed that origin-destination carriers such as Southwest Airlines might be able to realize up to 10 or 11 turns per day on their gates, while hub and spoke carriers would be more constrained and would be able to average approximately eight turns per day. The difference in number of turns occurs because hub and spoke carriers generally need to time their arrivals and departures in order to hit hub banks and therefore may need additional turn time at out stations like DAL.

Again, profit opportunities for carriers made possible by the repeal of the Wright Amendment were the main focus. Another main focus again was on large markets where carriers would have:

- A sustainable cost advantage;
- A structural advantage on at least one side of a flight, and/or;
- The opportunity to provide a unique service not likely to be matched by others.

**Table 1-13** shows that there would be more non-stop service in the 32-gate scenario. Thirty-six non-stop points will be added in the long-term under this scenario. In contrast, 16 new service points would be feasible in a 20 gate scenario. It should be noted that the non-stop points in the 20 gate scenario are among the largest markets to the Dallas/Fort Worth Metroplex. Since larger markets tend to offer greater profit opportunities this result should not be surprising.

Table 1-13: Long-Term Forecast Non-Stop Service at DAL with 20 and 32 Gates

	Metrople	X	2020			
	DAL 200		New Servi	ce at DAL		
LOCID	PDEW	PDEW Service		GRA 20 Gates		
HOU	1621	Р				
ATL	1453		Р			
LGA	1216					
LAS	1213		Р	Р		
ORD	1147		Р	Р		
LAX	1116		Р	Р		
SAT	1052	Р				
DEN	929		Р	Р		
MCO	924		Р	Р		
AUS	771	Р				
BWI	713		Р	Р		
IAH	709	Р				
EWR	709		Р	Р		
BOS	709		Р			
PHX	683		Р	Р		
MSP	676		Р			
MSY	651	Р				
PHL	618		Р	Р		
DCA	609					
SFO	535		Р			
SEA	535		Р	Р		
SNA	525					
MDW	521		Р	Р		
ELP	505	Р				
ABQ	482	Р				
TPA	476		Р			
STL	463	Р				
DTW	455		Р	Р		
FLL	448		Р	Р		
LBB	446	Р				
SAN	439		Р			

	Metrople	20	20	
	DAL 200	6	New Servi	ice at DAL
LOCID	PDEW	Service	GRA 32 Gates	GRA 20 Gates
MCI	429	Р		
TUL	403	Р		
LIT	393	Р		
SJC	360		Р	
AMA	359	Р		
RDU	356		Р	
MIA	354			
IAD	331		Р	
CLT	331		Р	
MAF	319	Р		
SLC	311		Р	
BNA	304		Р	
IND	292		Р	
ONT	283		Р	
PIT	271		Р	
MKE	256			
SMF	255		Р	
PDX	249		Р	
CMH	222		Р	
OAK	217		Р	Р
CVG	211			
JFK	210		Р	Р
OKC	208	Р		
CLE	194		Р	
MEM	187			
BHM	168			
DAY	145			
TUS	145			
RNO	138		Р	
COS	134			
SDF	129			
PVD	98		Р	Р

**Table 1-14 and Figure 1-3** show the weekday flight pattern for the 20 and 32 gate long-term forecasts. It should be noted that in the 20 gate scenario, there are more average turns per gate. Experience suggests that at constrained facilities like DAL, carriers find means to turn gates more intensively than at airports with more generous gate endowments. Of course the most salient feature of the forecast illustrated in both **Table 1-14 and Figure 1-3** is the substantial difference in weekday operations in the 32 gate scenario.

Table 1-14: Long-Term Forecasts - Weekday Flight Patterns

	2020 - 20 Gat	te Scenario	
DAL Hour	Departures	Arrivals	Total Operations
0000	0	0	0
0100	0	0	0
0200	0	0	0
0300	0	0	0
0400	0	0	0
0500	0	2	2
0600	12	2	14
0700	18	10	28
0800	15	12	27
0900	13	14	27
1000	14	13	27
1100	10	11	21
1200	13	15	28
1300	16	13	29
1400	11	10	21
1500	14	16	30
1600	14	15	29
1700	13	13	26
1800	18	14	32
1900	10	11	21
2000	8	19	27
2100	8	12	20
2200	0	2	2
2300	1	4	5
Grand Total	208	208	416

2020 - 32 Gate Scenario									
DAL Hour	Departures	Arrivals	Total Operations						
0000	0	2	2						
0100	0	0	0						
0200	0	0	0						
0300	0	0	0						
0400	0	0	0						
0500	1	8	9						
0600	16	3	19						
0700	30	11	41						
0800	18	17	35						
0900	21	21	42						
1000	21	18	39						
1100	19	15	34						
1200	17	20	37						
1300	20	20	40						
1400	19	19	38						
1500	17	20	37						
1600	16	25	41						
1700	19	17	36						
1800	21	18	39						
1900	18	14	32						
2000	9	21	30						
2100	9	14	23						
2200	0	5	5						
2300	1	4	5						
Grand Total	292	292	584						

Average Gate Turn Per Day 10.4

Average Gate Turn Per Day 9.1

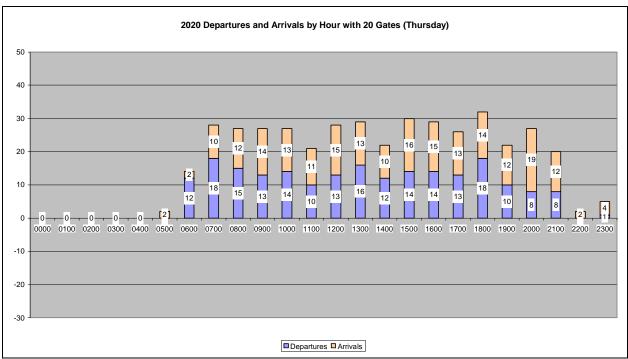
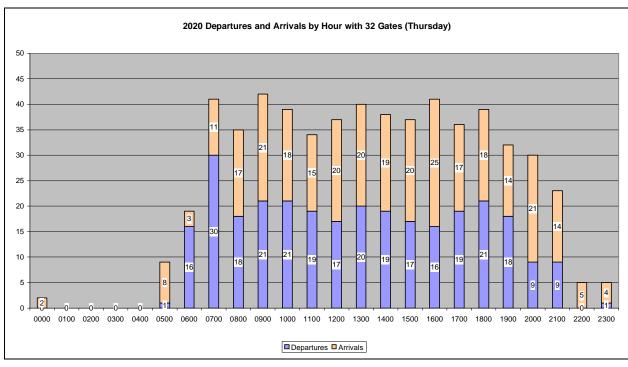


Figure 1-3: Long Term Forecasts: Weekday Flight Patterns



**Table 1-15** provides some additional information on the characteristics of each scenario. The top part of the table shows weekday average seat size and operations counts for the 20 gate scenario. Included in this chart is a distribution of aircraft by length of flight. The same characteristics are repeated for the 32 gate scenario at the bottom of the table. Differences in the scenarios include:

- Average seat size remains approximately constant in the 20 gate scenario as carriers use larger equipment to process more passengers through a more limited gate facility than in the 32 gate scenario.
- There is more long-haul flying in the 32 gate scenario as carriers are able to serve 20 additional non-stop points.

The distribution of flying also shows another important feature of the long-term forecasts. In all three scenarios, virtually all of the flying is done by very modern equipment. We have assumed very limited operations by old technology Category III aircraft such as the MD-80. In the long-term, virtually all of these aircraft will have been retired from service.

Table 1-15: Characteristics of the 20 and 32 Gate Long-Term Forecast

#### 20 Gate Scenario

Current 2006 Operations; 2020 Eqp Total Seats 38,906 Total Ops 300 Avg Seats per Op 129.7

Added Flying: 2	020 20 Gates
Total Seats	14,970
Total Ops	116
Avg Seats per	129.1
•	

2020 Total Forecast: 2	20 Gates
Total Seats	53,876
Total Ops	416
Avg Seats per Op	129.5
•	

NEWFLT	distcat	738	73G	CR7	E70	E90	M80	Grand Total
1	0000-0500	18	192	0	44	0	6	260
	0501-1000	6	68	12	0	0	8	94
	1001-1500	8	40	0	0	6	0	54
	1501-2000	0	8	0	0	0	0	8
Grand Total		32	308	12	44	6	14	416

#### 32-Gate Scenario

Current 2006 Operations; 2020 Eqp Total Seats 38,906 Total Ops 300 Avg Seats per Op 129.7

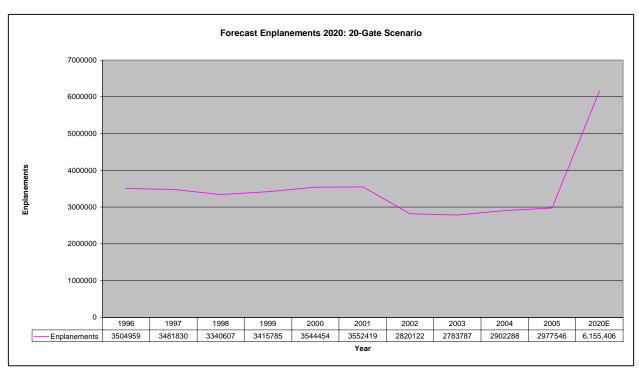
2020 Added Flying 32 C	<i>s</i> ates
Total Seats	34,670
Total Ops	284
Avg Seats per Op	122.1

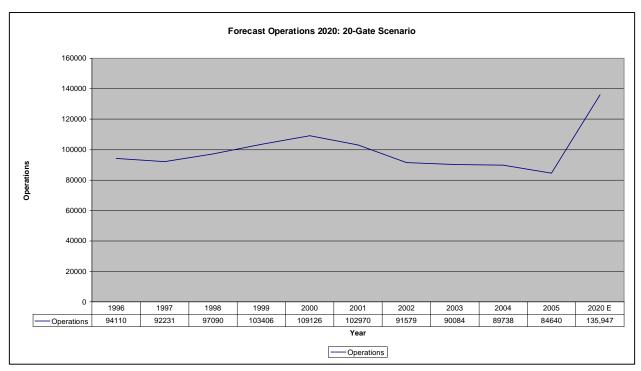
2020 Total Forecast: 3	2 Gates
Total Seats	73,576
Total Ops	584
Avg Seats per Op	126

NEWFLT	distcat	717	733	735	738	73G	CR7	E70	E90	MD80	Grand Total
1	0000-0500	0	2	8	18	194	0	44	0	6	272
	0501-1000	12	0	2	8	105	12	22	0	8	169
	1001-1500	0	0	0	8	91	0	18	8	0	125
	1501-2000	0	0	0	0	12	0	0	6	0	18
Grand Total		12	2	10	34	402	12	84	14	14	584

Finally, **Figures 1-4 and 1-5** provide estimates of annual enplanements and annual commercial operations at DAL in the 20 and 32 gate scenarios respectively. Each of the figures show that enplanements and operations through 2005 have not returned to pre-9/11 levels. The repeal of the Wright Amendment would result in relatively sharp increases in operations and enplanements in both scenarios. Obviously, the 32 gate scenario would create substantially more opportunities for airlines to operate at DAL resulting in more dramatic increases in both enplanements and operations.







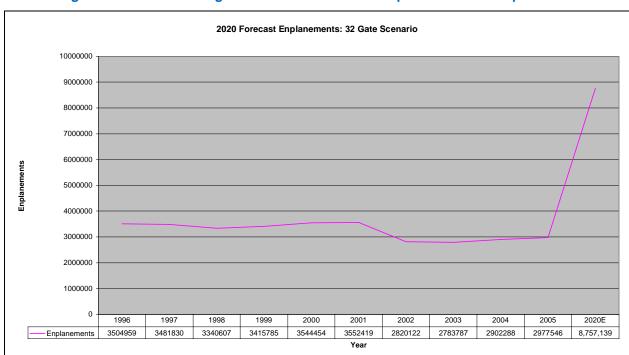
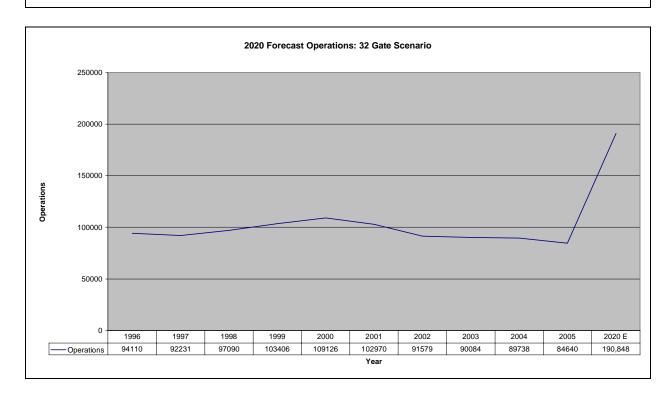


Figure 1-5: 32 Gates Long-Term Forecast - Annual Enplanements and Operations



#### 1.8 Summary

**Table 1-16** summarizes the 20 and 32 gate long-term forecasts developed in this report and contrasts them with the FAA's latest terminal area forecast for DAL. In summary, if the Wright Amendment were repealed, the 20 gate forecast suggests that there would be a 40 percent increase in both operations and enplanements at DAL in the long-term relative to levels now expected by the FAA under the Wright Amendment. If instead, 32 gates were available and the Wright Amendment was repealed, both enplanements and commercial operations would be twice as high as the FAA now projects.

Table 1-16: Comparison of Long-Term Forecasts with FAA's Terminal Area Forecast

	Terminal Area Forecast 2020	20 Gate Long Term Forecast	32 Gate Long Term Forecast
Enplanements	4,333,556	6,155,406	8,757,139
Percent vs. TAF		42%	102%
Commercial Operations	96,102	135,947	190,848
Percent vs. TAF		41%	99%

## DMJM AVIATION AECOM

# **Section 2 Noise Impact Analysis**



Prepared by: DMJM Aviation

#### **SECTION 2—NOISE IMPACT ANALYSIS**

#### 2.1 Introduction

#### 2.1.1 Background

The basis for this noise analysis update is Section 1 of this report titled "Forecast of Activity at Dallas Love Field in the Absence of the Wright Amendment", in which realistic air carrier schedules were developed for the long term use of the 20 and 32 gate scenarios.

#### 2.1.2 Purpose

The purpose of this noise analysis update is to assess the impacts that would occur under the expected future air service in the absence of the Wright Amendment, and compare those impacts to the Love Field Master Plan Impact Analysis published in March 2001. The following sections provide an overview of the methodology, assumptions and findings of the analysis.

#### 2.1.3 Methodology

The noise contours developed within this study were developed using the most updated version, at the time this study began, of the FAA's Integrated Noise Model (INM), Version 6.1. The INM is designed to estimate the effects of aircraft noise surrounding an airport for an average annual day. This is accomplished by taking a full year of data and averaging it into a 24-hour period. The INM then uses this data to compute the day-night average sound level, or DNL, and identify areas of varying levels of airport noise exposure.

It was important to objectively evaluate and isolate only the impacts related to the repeal of the Wright Amendment and compare them to the Master Plan noise contours and impacts. Thus, several noise modeling input factors from the Master Plan remained constant and were carried through in this analysis, including the number and aircraft mix of general aviation operations, as well as the time of day distribution of air carrier operations. The number of air carrier operations, and the type and length of flight of air carrier aircraft, for each of the two gate scenarios, are the main elements that differ in this impact analysis update.

The noise contours produced for the original 2001 Master Plan Impact Analysis were modeled using INM 6.0, and used 1990 U.S. Census data for population estimates. This updated analysis used INM 6.1, the FAA's most current version available when the study commenced, to model each of the scenarios. The updates within INM 6.1 incorporate several new algorithms, based on United States and international research that alter some of the equations used to calculate noise in propeller aircraft and jet aircraft with wing-mounted engines. These changes more precisely model the lateral attenuation of noise resulting in noise exposure calculations that better reflect aircraft noise propagation.

In order to maintain consistency between all scenarios, the 2001 Master Plan input data was entered into INM 6.1 and reprocessed, along with updated population data from the 2000 U.S. Census, to update the results using this enhanced version of the model. The reprocessing of this data slightly altered the results previously reported in the Master Plan Impact Analysis; however, the results are in accordance with today's standards for noise modeling and allow for a more accurate and fair comparison with the two new gate scenarios.

#### 2.2 Technical Discussion

#### 2.2.1 Integrated Noise Model Overview

Since 1978, the Integrated Noise Model (INM) has been the FAA's standard tool used in determining aircraft noise levels generated by the specific characteristics of aircraft operations at an airport. Its origins were for the purpose of compatible land use planning around airports and it has been continuously updated through years of research to better refine the propagation of aircraft noise.

The INM requires the following data to be compiled as input to the program:

- A description of the airport layout; specifically the location, length and width of the active runways at the airport;
- Runway utilization assignments of aircraft arrivals and departures;
- The various arrival and departure flight tracks to and from each runway and the frequency that each track is used;
- The number and time of day of operations, as well as the type of aircraft operating at the airport and the stage lengths of departing aircraft. Stage length information is necessary to identify aircraft takeoff weights.

The INM generates a grid surrounding the airport, the size and complexity of which is based on user input, and calculates the noise level at each point within the grid based on the input data described above. The INM then connects the grid points of those having the same noise level value through a curve drawing algorithm to create a noise contour. The more points included within the grid and the less separation between each of the points, the more precise and sharper the contour line.

In addition to modeling noise at specific grid points to create a noise contour line, INM can also calculate noise levels at other points identified by the user or from other sources. This is a valuable feature of INM. It allows U.S. Census population data to be modeled to estimate the number of people impacted by a specific noise level. The U.S. Census data contains population levels for census blocks; each block is identified by a data point based on latitude and longitude. INM calculates the noise level for each data point within a defined area, and then computes the total population for each point. For example, typically it is desired to know how many people are estimated to be located within the DNL 65 dB noise contour. The INM will compute the total population for each data point where the INM calculated the noise level to be at or above DNL 65 dB. While this is a beneficial tool, the results of the census analysis are not exactly the actual number of people residing within the contour. This is because a contour line may cross the middle of a census block. The entire population contained within the block is counted even though some people may not actually reside within the noise contour.

#### 2.2.2 Runway Utilization

Runway utilization at an airport is a primary factor in defining the noise exposure pattern. The more frequently aircraft utilize a particular runway, especially for departures and nighttime operations; the greater the amount of noise energy that will be attributed to that runway. The Love Field runway utilization for this analysis was obtained from the 2001 Airport Master Plan. The percentages were originally derived using data from the Love Field Noise and Operations Monitoring System (NOMS) for the months of January through October 2000. Runway utilization, presented on the following page in **Table 2-1**, was divided by arrivals and departures, day and night, and was then sorted by aircraft operator groups established in the GRA air service forecast from Section 1.

**Table 2-1: Runway Utilization (2001 Master Plan)** 

31L   22%   31%   20%   26%   22%   31%   20%   26%   22%   31%   20%   266   32%   31%   20%   266   32%   31%   20%   36%   17%   33%   66%   17%   31R   2%   17%   33%   11%   2%   17%   33%   11%   2%   17%   33%   11%   2%   17%   33%   11%   2%   17%   33%   11%   100%   1	Aircraft	Ma	aster Pla	n 32 Gat	es	2	0 Gates I	No Wrigh	nt	3	2 Gates	No Wrig	ht
Runway	Operator	Arri	Arrivals Departures Arrivals Departures Arrivals Departu					Arrivals Departures			rtures		
Airline Group A           13R         65%         65%         70%         71%         65%         65%         70%         71%         20%         22%         31%         20%         26%         22%         31%         20%         26%         13L         10%         3%         6%         1%         10%         3%         6%         1%         20%         26%         22%         31%         20%         26%         13L         10%         3%         6%         1%         20%         26%         22%         31%         20%         26%         1%         30%         6%         1%         31K         10%         3%         1%         20%         1%         3%         1%         3%         1%         3%         1%         3%         1%         3%         1%         10%         3%         1%         10%         100% <th></th> <th>Day</th> <th>Night</th> <th>Day</th> <th>Night</th> <th>Day</th> <th>Night</th> <th>Day</th> <th>Night</th> <th>Day</th> <th>Night</th> <th>Day</th> <th>Night</th>		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
13R			Nigili	Day	Nigitt	Day	Migrit	Day	Mignit	Day	Nigit	Day	Migrit
31L   22%   31%   20%   26%   22%   31%   20%   26%   22%   31%   20%   266   32%   31%   20%   266   32%   31%   20%   36%   17%   33%   66%   17%   31R   2%   17%   33%   11%   2%   17%   33%   11%   2%   17%   33%   11%   2%   17%   33%   11%   2%   17%   33%   11%   100%   1						I							
13L													71%
31R													
TOTAL   100%													
Airline Group B													
13R			100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
31L			E70/	100/	1.40/	00/	F70/	100/	1.40/	00/	F70/	100/	4.40/
13L													
31R													
TOTAL   100%													
Airline Group C   13R													
13R			100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
31L			72%	10%	73%	l				10%	72%	10%	73%
13L						Not appl	icable cino	a thaca ar	arations				
31R													
TOTAL         100% <th></th> <th></th> <th></th> <th></th> <th></th> <th>uo</th> <th>TIOT OXIOT III</th> <th>1110 00011</th> <th>ano</th> <th></th> <th></th> <th></th> <th></th>						uo	TIOT OXIOT III	1110 00011	ano				
Airline Group D   13R													100%
13R         15%         28%         15%         47%         15%         28%         15%         47%         31L         5%         9%         5%         10%         5%         9%         5%         10%         5%         9%         5%         10%         5%         9%         5%         10%         5%         9%         5%         10%         5%         9%         5%         10%         5%         9%         5%         10%         5%         9%         5%         10%         5%         9%         5%         10%         10%         10%         10%         5%         9%         5%         10%			10070	10070	10070	<u> </u>				10070	10070	10070	10070
31L         5%         9%         5%         10%         5%         9%         5%         10%         5%         9%         5%         10%           13L         59%         46%         57%         28%         59%         46%         57%         28%         59%         46%         57%         28%           31R         20%         18%         23%         15%         20%         18%         23%         15%         20%         18%         23%         15%         20%         18%         23%         15%         20%         18%         23%         15%         20%         18%         23%         15%         20%         18%         23%         15%         20%         18%         23%         15%         20%         18%         23%         15%         20%         18%         23%         15%         20%         18%         23%         15%         20%         18%         23%         15%         20%         100%         100%         100%         100%         100%         100%         100%         100%         100%         100%         100%         100%         100%         100%         100%         100%         100%         100%         10			28%	15%	47%	15%	28%	15%	47%	15%	28%	15%	47%
13L         59%         46%         57%         28%         59%         46%         57%         28%         59%         46%         57%         28%           31R         20%         18%         23%         15%         20%         18%         23%         15%         20%         18%         23%         15%         20%         18%         23%         15%         20%         18%         23%         15%         20%         18%         23%         15%         20%         18%         23%         15%         20%         18%         23%         15%         20%         18%         23%         15%         20%         18%         23%         15%         20%         100%													10%
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Air Cargo           13R         8%         24%         4%         24%         4%         24%         4%         24%         4%         24%         4%         24%         4%         24%         4%         24%         4%         24%         4%         24%         4%         24%         4%         24%         4%         24%         4%         24%         4%         24%         1%         8%         2%         8%         1%         8%         24%         8%         1%         8%         2%         8%         1%         8%         2%         8%         1%         8%         2%         8%         1%         8%         2%         8%         1%         8%         2%         8%         1%         8%         2%         8%         1%         8%         1%         1%         8%         2%         8%         1%         1%         8%         24%         18%         24%         18%         24%         18%         24%         18%         24%         18%         24%         18%         24%         18%         24%         18%         24%         18%         24%         18%         24%         18%         24%         18% </th <th></th> <th>100%</th>													100%
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13L       64%       48%       71%       48%       64%       48%       71%       48%       64%       48%       71%       48%       64%       48%       71%       48%       64%       48%       71%       48%       31R       27%       19%       24%       19%       27%       19%       24%       19%       27%       19%       24%       19%       27%       19%       24%       19%       27%       19%       24%       19%       27%       19%       24%       19%       27%       19%       24%       19%       27%       19%       24%       19%       27%       19%       24%       19%       27%       19%       24%       19%       27%       19%       24%       19%       26%       100%       10	13R								24%		24%	4%	24%
31R         27%         19%         24%         19%         27%         19%         24%         19%         27%         19%         24%         19%         27%         19%         24%         19%         27%         19%         24%         19%         27%         19%         24%         19%         100%         10	31L	2%									8%	1%	8%
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13L         59%         46%         57%         28%         59%         46%         57%         28%         59%         46%         57%         28%           31R         20%         18%         23%         15%         20%         18%         23%         15%         20%         18%         23%         15%													47%
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TOTAL 14000/ 4000/ 4000/ 4000/ 4000/ 4000/ 4000/ 4000/ 4000/ 4000/ 4000/													
TOTAL   100% 100% 100% 100%   100% 100% 100%						100%	100%	100%	100%	100%	100%	100%	100%
						15%	15%	12%	3%	15%	15%	12%	3%
													2%
													72%
													23%
													100%
General Aviation and Air Taxi Piston						10070	10070	10070	10070	10070	10070	100/0	10070
						12%	8%	10%	5%	12%	8%	10%	5%
													2%
													68%
													25%
													100%

SOURCE: Master Plan 2001, GRA Inc., DMJM Aviation, May 2006

#### 2.2.3 Flight Tracks

A flight track is the path over the ground flown by an aircraft while heading to or from a particular runway at the airport. **Figures 2-1 and 2-2** depict the arrival and departure flight tracks that were modeled for the runways at DAL. The tracks displayed in **Figure 2-1** are the primary arrival (red) and departure (blue) tracks, while **Figure 2-2** displays the dispersed flight tracks. The purpose of dispersing flight tracks is to account for the "scatter" that normally occurs along the primary flight track due to a variety of factors including wind drift and other factors of flight. This procedure allows for a more realistic modeling of actual flight track patterns.

The flight tracks were originally derived for the 32 Gate Master Plan scenario from actual radar data collected by the Airport NOMS. The same tracks, along with the same utilization of each flight track by aircraft operator group, were used in the 20 and 32 Gate No Wright Amendment scenarios.

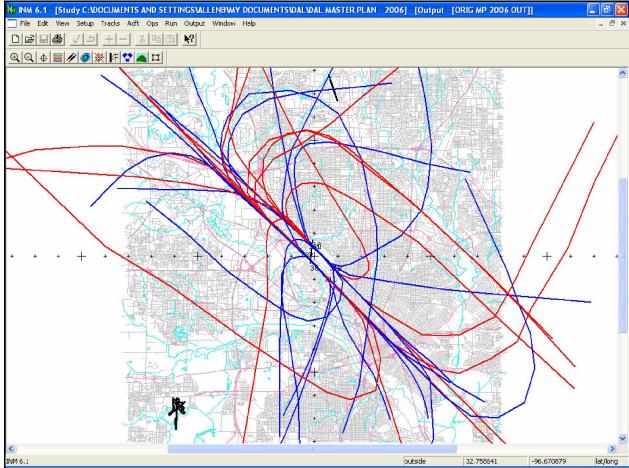


Figure 2-1: Primary Flight Tracks (2001 Master Plan)

SOURCE: Actual INM Screen Capture

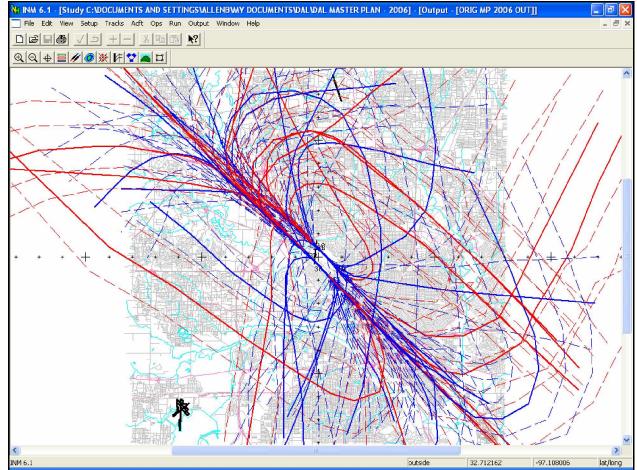


Figure 2-2: Primary and Dispersed Flight Tracks (2001 Master Plan)

SOURCE: Actual INM Screen Capture

#### 2.2.4 Aircraft Operations

Aircraft operations are the most important input data required to model noise at an airport. The type of aircraft, frequency of arrivals and departures, and the time of day those operations occur will have a major influence on the overall noise exposure.

There are many different aircraft types in operation including piston driven propeller, turbopropeller, business jets and air carrier jets. Each aircraft has its own unique characteristics that determine the level of noise energy associated with it. These characteristics include the size and weight of the aircraft, type of engine (jet vs. prop), number of engines, and distance (or stage length) the aircraft will fly.

Obviously a jet aircraft will produce more noise than a piston driven propeller aircraft, but this is not always the case when different types of jet aircraft are compared. The type of jet engine is one particular key difference in defining the noise signature of a jet aircraft. As of January 1, 2000, all air carrier jet aircraft operating within the United States are Stage 3, meaning they meet a quieter mandated noise threshold that is approximately 50% quieter than the previously phased out Stage 2 aircraft. The required phase out of Stage 2 aircraft was limited to aircraft weighing more than 75,000 lbs, meaning there are still many Stage 2 private and corporate general aviation jets currently in operation. A number of these are much louder than some air carrier jets.

The time of day an aircraft operates is an extremely important factor in modeling aircraft noise. Aircraft that operate between the nighttime hours of 10:00 pm and 7:00 am are given a 10 decibel penalty in calculating DNL noise exposure. This penalty is intended to account for the lower ambient (or background) noise levels that occur during the nighttime hours. Thus, the noise energy associated with a single nighttime operation equates to the noise energy associated with ten daytime operations. In many cases the noise generated by nighttime operations can prevail over the noise generated during the daytime, even though there may be fewer aircraft operations at night.

To objectively evaluate the noise impacts of repealing the Wright Amendment in the 20 and 32 gate scenarios, the only changes made to these No Wright Amendment scenarios, from that included in the Master Plan runs, were the type and frequency of air carrier operations. These were taken directly from Section 1.7. The time of day distribution of air carrier operations and the general aviation fleet mix and activity levels used in the Master Plan 32 Gate scenario were used in the 20 and 32 Gate No Wright Amendment scenarios. This approach would result in isolating any change in the noise characteristics that are predominately due to the repeal of the Wright Amendment.

**Table 2-2** displays modeled aircraft operations for each scenario broken down by aircraft operating group, aircraft type (INM code), and number of operations by arrival and departure for both daytime and nighttime operations.

**Table 2-2: Modeled Average Annual Day Aircraft Operations** 

Aircraft		ster Pla				0 Gates		aht Ope		Gates I	Vo Wrig	aht
Operating Group/	_	rtures		vals	_	rtures		ivals	_	rtures		ivals
Aircraft Type	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Airline Group A	Day	Nigit	Day	Nigiit	Day	Nigiit	Day	Nigiit	Day	Nigiit	Day	Nigiit
B737-300	0	0	0	0	0	0	0	0	1	0	1	0
B737-500	61	4	61	4	0	0	0	0	3	0	3	0
B737-700	61	1	61	1	98	9	99	8	115	11	116	10
Subtotal	122	5	122	5	98	9	99	8	119	11	120	10
Airline Group B												
Fokker 100	23	3	24	2	0	0	0	0	0	0	0	0
MD80	0	0	0	0	6	1	6	0	5	0	6	0
Subtotal	23	3	24	2	6	1	6	0	5	0	6	0
Airline Group C DC9-30	22	2	19	5	0	0	0	0	0	0	0	0
B717-200	0	0	0	0	0	0	0	0	0 5	0	0 5	0
Subtotal	22	2	19	5	0	o	o	0	5	0	5	0
Airline Group D		_	10		Ū			Ü			Ü	
CRJ	31	8	36	3	5	0	5	0	6	1	6	0
EMB135	24	3	25	2	0	0	0	0	0	0	0	0
EMB145	4	0	2	2	0	0	0	0	0	0	0	0
EMB170/190	0	0	0	0	20	2	21	2	40	4	41	3
B737-500	0	0	0	0	0	0	0	0	1	0	1	0
B737-700	0	0	0	0	28	3	28	2	50	4	50	4
B737-800	0	0	0	0	13	1	13	1_	14	1	14	1
Subtotal	59	11	63	7	66	6	67	5	111	10	112	8
Air Cargo B767-300	1	0	0	1	1	0	0	1	1	0	0	1
CNA208	0.5	0	0.5	0	0	0	0	0	0	0	0	0
CNA208 CNA402	0.5	0	0.5	0	0	0	0	0	0	0	0	0
MD81	0.5	1	0.5	1	1	1	0	1	1	1	ő	1
SD360	0.5	0	0	1	0	0	0	0	0	0	ő	0
Subtotal	3	1	1	3	2	1	o	2	2	1	o	2
GA / AT Jet												
Citation 3	2	0	2	0	2	0	2	0	2	0	2	0
CL600	2	0	2	0	2	0	2	0	2	0	2	0
CL601	1	0	1	0	1	0	1	0	1	0	1	0
EMB145	3	0	3	0	3	0	3	0	3	0	3	0
Citation 2	3	0	3	0	3	0	3	0	3	0	3	0
Falcon 900	1 2	0	1	0 0	1 2	0 0	1	0 0	1 2	0	1	0
Falcon 20 GIIB	4	0	1 4	0	4	0	4	0	4	0	4	0
GIV	1	0	1	0	1	0	1	0	1	0	1	0
Astra 1125	Ιί	0	1	0	1	0	1	0	1	0	li	0
Lear 25	3	1	3	1	3	1	3	1	3	1	3	1
Lear 35	11	1	11	1	11	1	11	1	11	1	11	1
MU300-10	2	0	2	0	2	0	2	0	2	0	2	0
Subtotal	36	2	35	2	36	2	35	2	36	2	35	2
GA / AT Turboprop												
CNA441	3	3	3	3	3	3	3	3	3	3	3	3
Dash 6 Dash 8	37 0	2	37 0	3 0	37 0	2	37 0	3 0	37 0	2	37 0	3 0
HS748A	0	0	0	0	0	0	0	0	0	0	0	0
L188	0	0	0	0	0	0	0	0	0	0	0	0
SD330	2	0	1	1	2	0	1	1	2	0	1	1
SF340	1	Ö	1	0	1	Ö	1	0	1	Ö	1	0
Subtotal	43	5	42	7	43	5	42	7	43	5	42	7
GA / AT Prop												
1-Eng. Fixed	11	2	11	2	11	2	11	2	11	2	11	2
1-Eng. Variable	26	6	26	6	26	6	26	6	26	6	26	6
DC3	0	0	0	0	0	0	0	0	0	0	0	0
BEC58P	59 <b>66</b>	14	59 <b>66</b>	14	59 <b>66</b>	14	59 <b>66</b>	14	59 <b>06</b>	14	59 <b>66</b>	14
Subtotal Military	96	22	96	22	96	22	96	22	96	22	96	22
A7D	0	0	0	0	0	0	0	0	0	0	0	0
C130	1	0	1	0	1	0	1	0	1	0	1	0
Subtotal	1	Ö	1	Ö	1	Ö	1	Ö	1	Õ	1	Ö
Total	406	52	406	52	346	46	346	46	416	52	415	53
SOURCE: 2001 Master		-						- 10		<u> </u>		

SOURCE: 2001 Master Plan Impact Analysis and GRA Inc. Technical Report #1

NOTE: Totals may vary due to rounding

#### 2.2.5 Noise Modeling Results

The runway utilization, flight tracks, and aircraft operations described above for each scenario were used as input to the INM to calculate the noise exposure levels surrounding the airport. The noise contours do not represent the noise levels on any one day, but rather represent the average daily noise pattern that would be experienced over a one year time period. The DNL 65 dB is being highlighted for comparison because it is the threshold used by the FAA for classifying a particular land use, such as residential, as compatible (below DNL 65 dB) or noncompatible (greater than DNL 65 dB) with aircraft noise.

As previously discussed in Section 2.1.3 - Methodology, the noise contours developed for this analysis were processed using INM 6.1. The noise contours produced for the Master Plan Impact Analysis were processed using INM 6.0. To maintain consistency, the original 2001 Master Plan input data was entered into INM 6.1 and reprocessed to update the results using this enhanced version of the model. As a result, the Master Plan 32 Gate scenario differs slightly from what was published in the 2001 Master Plan Impact Analysis, but offers a more accurate assessment of the noise impacts and an updated accounting of population impacts.

**Figure 2-3** presents the original Master Plan 32 Gate scenario modeled in INM 6.0. **Figure 2-4** presents the revised Master Plan 32 Gate scenario modeled in INM 6.1. The size of the DNL 65 dB noise contour modeled in INM 6.1 slightly decreased in area by 0.2 square miles from that modeled INM 6.0. The population estimates increased by approximately 2,500 people due to population growth reflected in the updated U.S. census data, and how INM 6.1 calculates noise differently from INM 6.0. **Table 2-3** summarizes the difference in impacts between the cases modeled in INM 6.0 and INM 6.1.

Table 2-3: Noise Impacts for Master Plan 32 Gates - INM 6.0 vs. INM 6.1

Master Plan 32 Gate									
Impact by Contour	INM 6.0/1990	U.S. Census	INM 6.1/2000 U.S. Census						
impact by Contour	Square Miles	Population	Square Miles	Population					
DNL 55 dB and above	22.3	95,533	23.2	111,395					
DNL 60 dB and above	10.4	60,802	10.3	71,355					
DNL 65 dB and above	4.8	23,198	4.6	24,872					
DNL 70 dB and above	2.2	860	1.9	2,686					
DNL 75 dB and above	0.9	0	0.9	0					

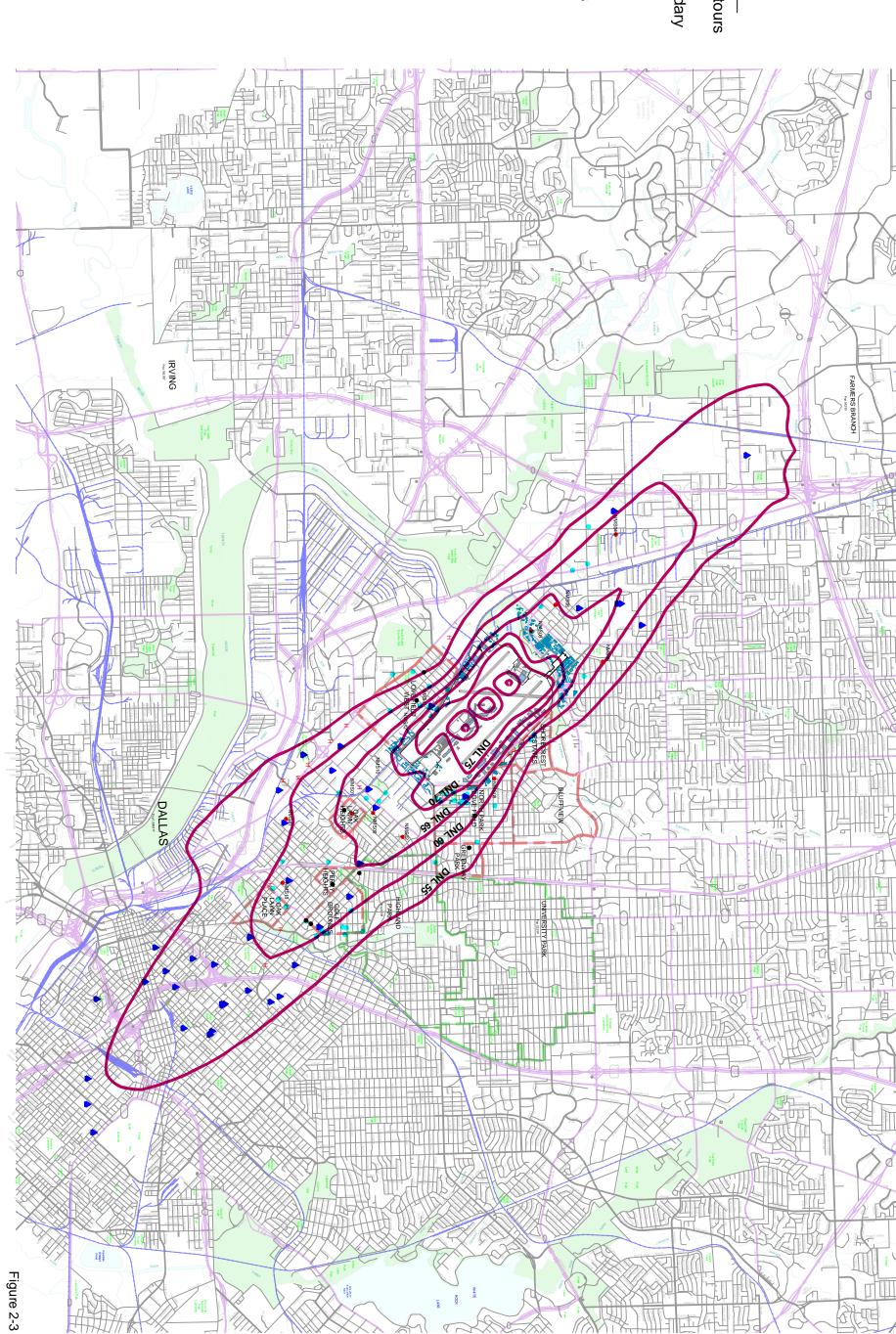
SOURCE: 2001 Love Field Master Plan Impact Analysis and DMJM Aviation, May 2006

To maintain consistency for the purposes of this analysis, the revised Master Plan 32 Gate scenario modeled in INM 6.1 has been used for comparison with the 20 and 32 Gate No Wright Amendment scenarios. **Figure 2-5** presents the 20 Gate No Wright Amendment scenario, and **Figure 2-6** presents the 32 Gate No Wright Amendment scenario. These figures graphically display the average noise exposure predicted to occur at the airport for 20 and 32 gates without the restrictions of the Wright Amendment. The corresponding impact results of both scenarios are summarized in **Table 2-4**.



Neighborhoods

# Schools Airport Noise Municipal Boundary Hospitals Monitoring Sites Churches **DNL Noise Contours** LEGEND:







May 31, 2006

Original 32 Gates with Wright Amendment 2001 Master Plan Modeled in INM 6.0

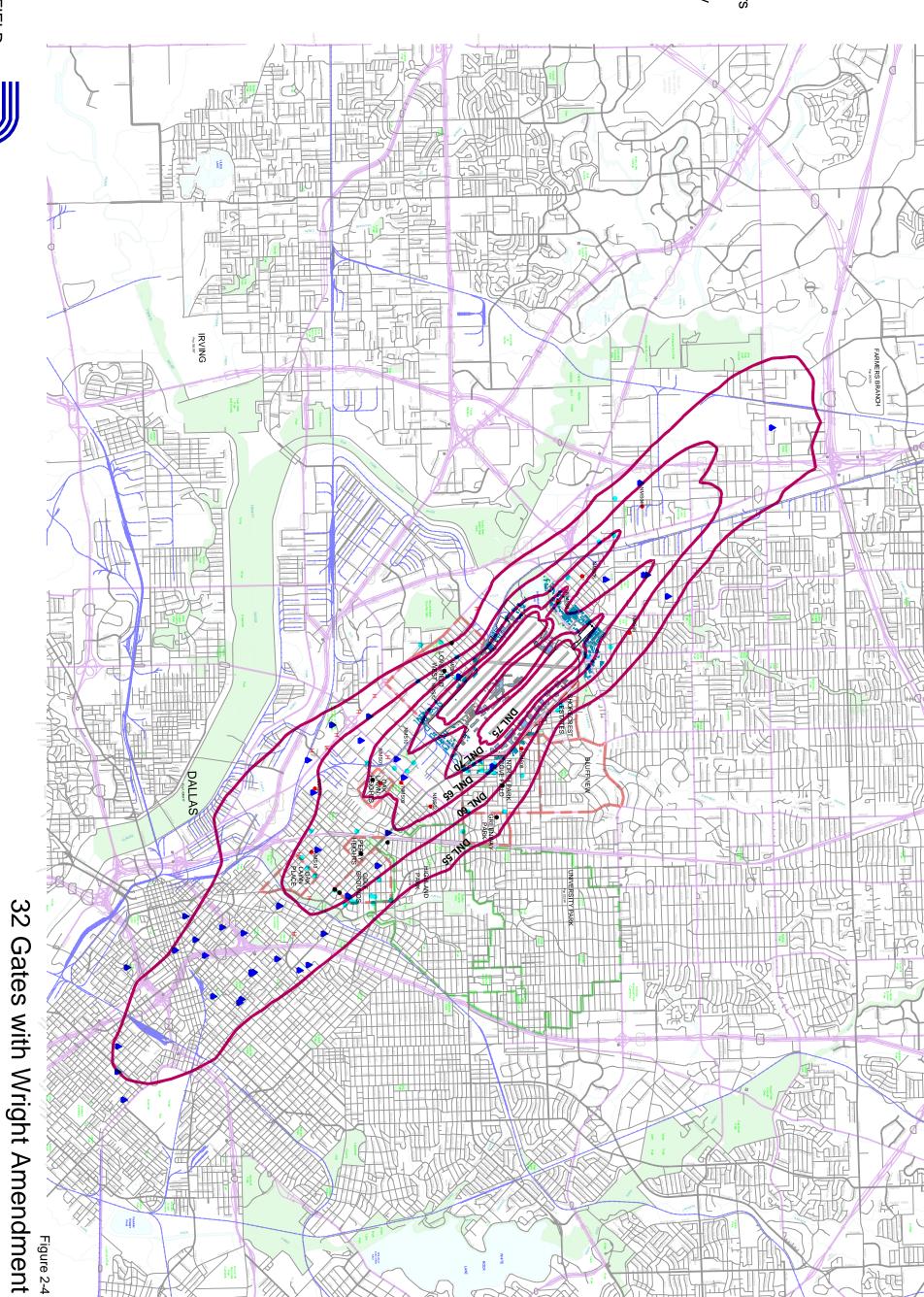
DMJM AVIATION | AECOM



Municipal Boundary Hospitals Churches Neighborhoods **DNL Noise Contours** LEGEND:

Schools Airport Noise

Monitoring Sites



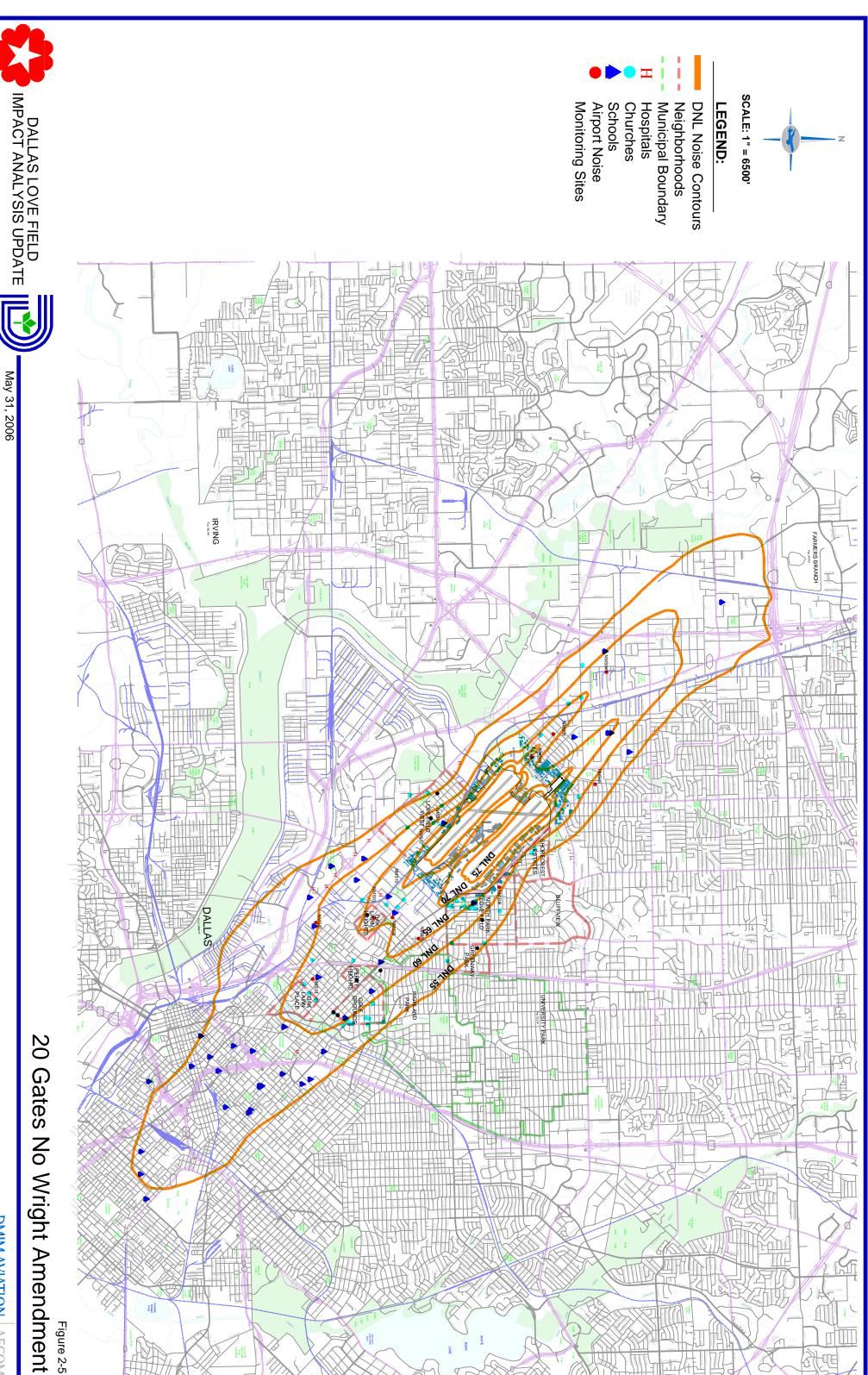




May 31, 2006

DMJM AVIATION | AECOM

2001 Master Plan modeled in INM 6.1



May 31, 2006

DMJM AVIATION | AECOM

Figure 2-5

Purkdate Stonge Pond

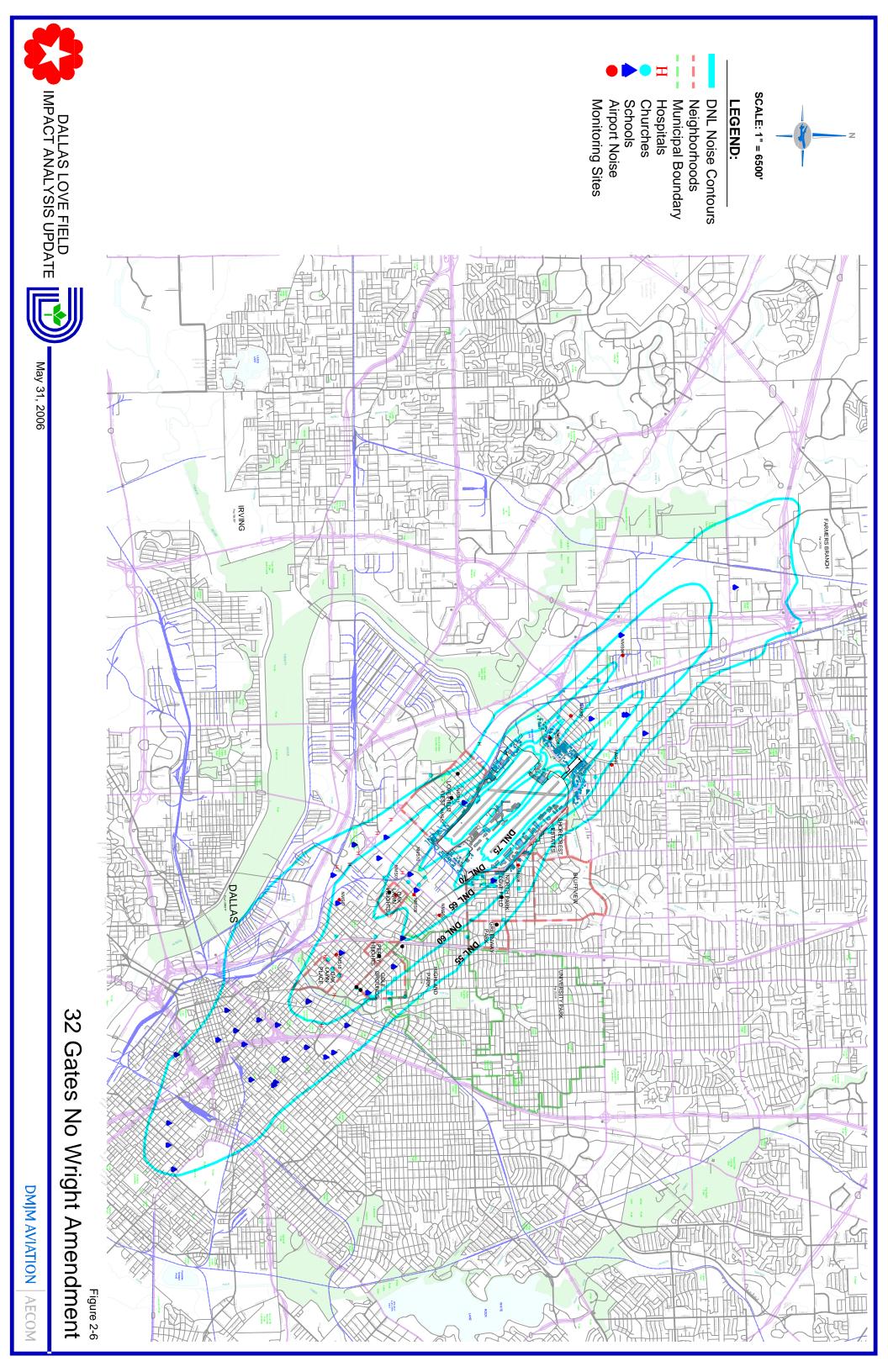


Table 2-4 – Noise Impacts for each scenario

DNL Contour	Master Plan 32 Gates		20 Gates Amen	No Wright dment	32 Gates No Wright Amendment		
Level	Sq. Miles	Population	Sq. Miles	Population	Sq. Miles	Population	
DNL 55 dB +	23.2	111,395	23.8	111,759	26.9	117,369	
DNL 60 dB +	10.3	71,355	10.4	70,429	11.6	76,451	
DNL 65 dB +	4.6	24,872	4.4	21,045	4.8	29,219	
DNL 70 dB +	1.9	2,686	1.8	2,620	2.0	2,655	
DNL 75 dB +	0.9	0	0.8	0	0.9	0	

SOURCE: 2001 Love Field Master Plan Impact Analysis and DMJM Aviation, May 2006

The results document that in the 20 Gate No Wright Amendment scenario the noise impacts surrounding the airport will decrease from those identified within the Master Plan scenario. In the 32 Gate No Wright Amendment scenario the noise impacts increase from those identified within the Master Plan. The number of people affected by DNL 65+ dB noise levels is 15 percent less in the 20 gate No Wright Amendment scenario than in the Master Plan. The affected population in the 32 Gate No Wright Amendment scenario is 18 percent greater than the Master Plan scenario.

The ensuing sections provide further explanation of the differences between the two No Wright Amendment scenarios and the Master Plan. Individual comparisons of the DNL 65, 60, and 55 dB noise contours of each scenario are presented in **Figures 2-7 and 2-8**.

#### 2.2.5.1 Comparison: Master Plan 32 Gates versus 20 Gates No Wright Amendment

With the exception of air service characteristics, the INM input factors from the Master Plan were used without change in the 20 Gate No Wright Amendment scenario, including percent of nighttime air carrier operations and the number and aircraft mix of general aviation operations. The level of air carrier operations decreased from 182,804 annual (501 daily) air carrier operations in the Master Plan to 135,947 annual (373 daily) air carrier operations in the 20 Gate No Wright Amendment scenario. The aircraft types changed to include more standard jets in place of both reconfigured 56-seat jets and 50-seat regional jets. The standard jet takeoff weights included a distribution of heavier aircraft accounting for longer nonstop stage lengths.

The DNL 65 dB noise contour for the 20 Gate No Wright Amendment scenario is approximately 4.3 percent smaller than the Master Plan 32 Gate scenario and impacts approximately 3,800 fewer people.

#### 2.2.5.2 Comparison: Master Plan 32 Gates versus 32 Gates No Wright Amendment

The INM input factors from the Master Plan were again used without change in the 32 Gate No Wright Amendment scenario. In this scenario, the level of air carrier operations increased from 182,804 annual (501 daily) air carrier operations in the Master Plan to 190,848 annual (523 daily) air carrier operations without the Wright Amendment and with 32 gates. The types changed to include more standard jets in place of both reconfigured 56-seat jets and 50-seat regional jets. The standard jet takeoff weights included a distribution of heavier aircraft accounting for longer nonstop stage lengths.

The DNL 65 dB noise contour for the 32 Gate No Wright Amendment scenario is approximately 4 percent larger in area than the Master Plan 32 Gate scenario. The population within the DNL 65 dB contour increases by 4,350 people.



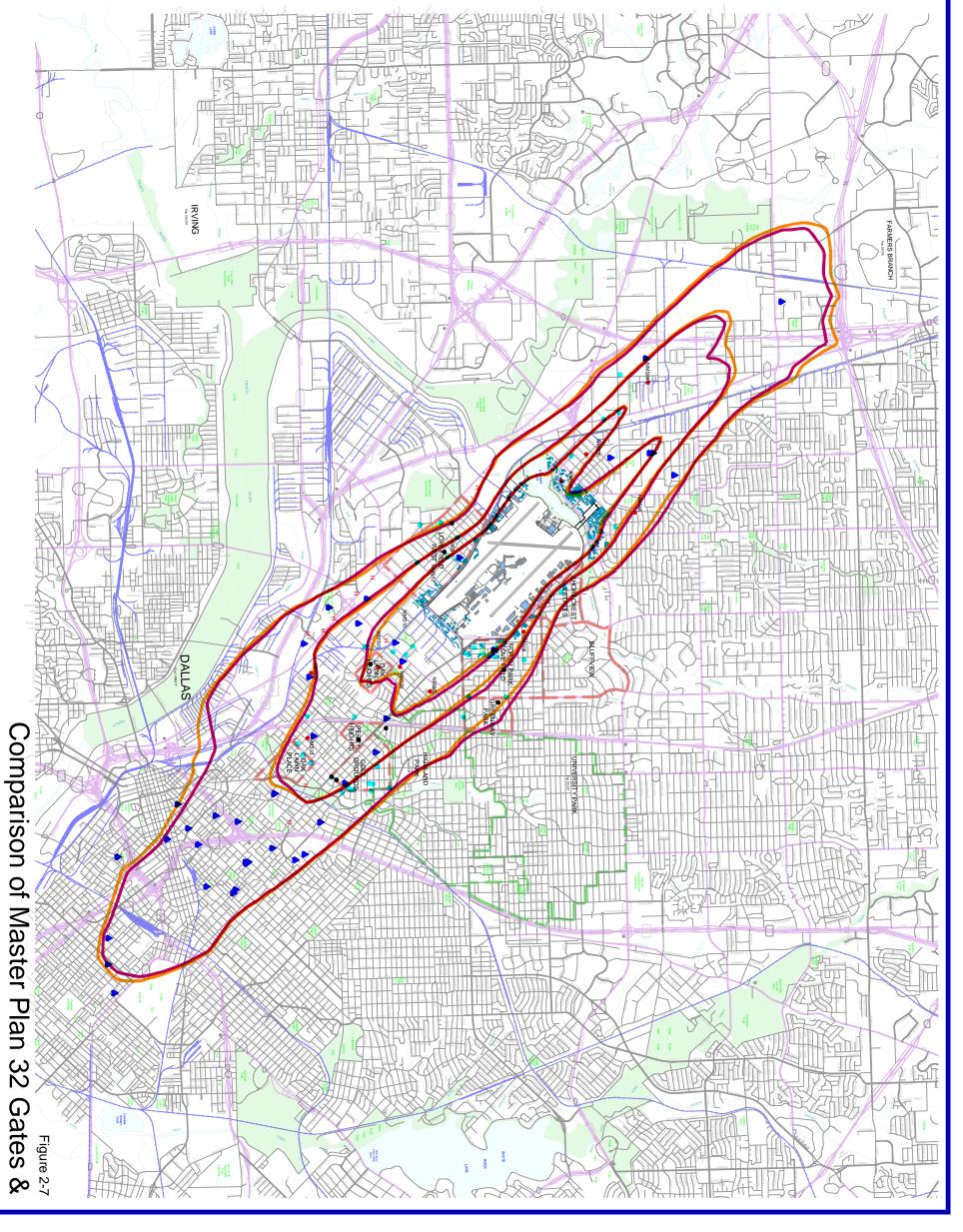
LEGEND:

20 Gates No Wright Amendment with Wright Amendment Master Plan 32 Gates

Neighborhoods Municipal Boundary

Hospitals
Churches
Schools
Airport Noise Monitoring Sites

DNL	9	55+	60+	1
Mast	Sq. Miles	23.2	10.3	
Master Plan 32 Gates	Sq. Miles Population Sq. Miles Population	111,395	71,355	25010
20 No 1 Ame	Sq. Miles	23.8	10.4	
20 Gates No Wright Amendment	Population	111,759	70,429	24.04.7







20 Gates No Wright Amendment DMJM AVIATION AECOM



SCALE: 1" = 6500'

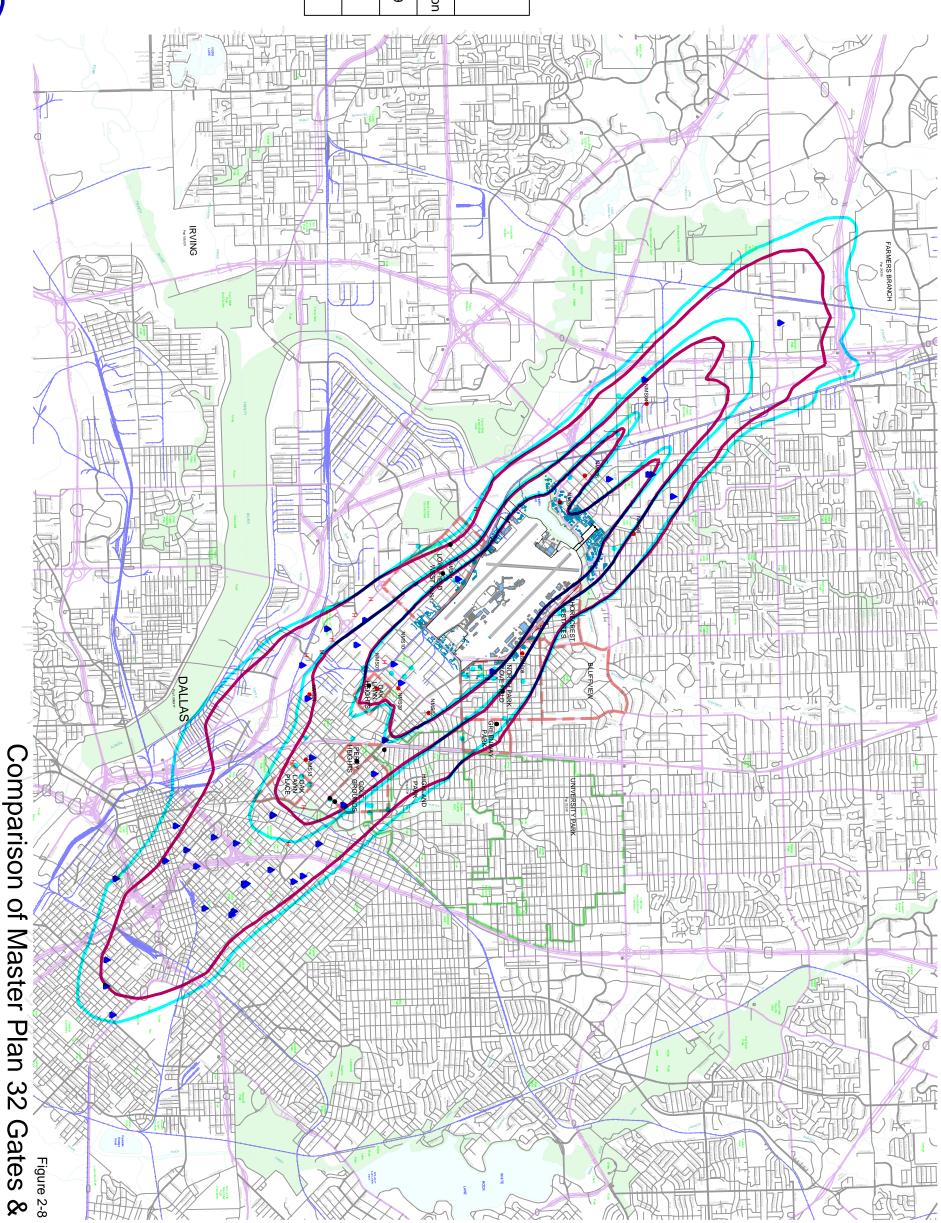
LEGEND:

32 Gates No Wright Amendment Master Plan 32 Gates with Wright Amendment

Neighborhoods Municipal Boundary

Hospitals
Churches
Schools
Airport Noise Monitoring Sites

DNL Contour Level	[ ]	55+	60+	65+
Mast	Sq. Miles	23.2	10.3	4.6
Master Plan 32 Gates	Population	111,395	71,355	24,872
32 ( No ) Ame	Sq. Miles Population Sq. Miles Population	26.9	11.6	4.8
32 Gates No Wright Amendment	Population	117,369	76,451	29,219







May 31, 2006

32 Gates No Wright Amendment

#### 2.3 Findings and Conclusions

The results of this noise impact analysis update indicate that the expected changes in future air service, with the absence of the Wright Amendment, and 20 gates in operation at Love Field, would result in a slight decrease in noise exposure, but essentially would be the same as what was previously predicted in the 2001 Love Field Master Plan Impact Analysis. Increasing the number of gates to 32 would result in an increase in noise impacts from the Master Plan 32 Gate scenario.

**Table 2-5** provides an overall summary of this analysis. It contains a description of the input data used, as well as the comparative impacts for each scenario. **Figure 2-9** provides a graphical comparison of the DNL 65 dB noise contours for each No Wright Amendment scenario. The areas where the contours differ are shown "close-up" and can be viewed in relation to specific streets, etc.

In terms of both the area of impact and the population estimated within each DNL noise contour, the findings are clear.

- The analysis indicates removal of the Wright Amendment restrictions, while increasing to 20 gates, will result in fewer noise impacts than those projected in the Master Plan.
- O If the number of gates were to increase to 32 without Wright Amendment restrictions, additional noise impacts over those projected in the Master Plan with 32 Gates will result.
- The 32 Gate No Wright Amendment scenario would result in a 9 percent greater impact in area and nearly 8,200 more people¹ than that associated with the 20 Gate No Wright Amendment scenario.
- The 32 Gate No Wright Amendment scenario has 41 schools located within the DNL 55 dB and greater noise contour, while the 20 Gate No Wright Amendment scenario has 39, as displayed in Table 2-6.

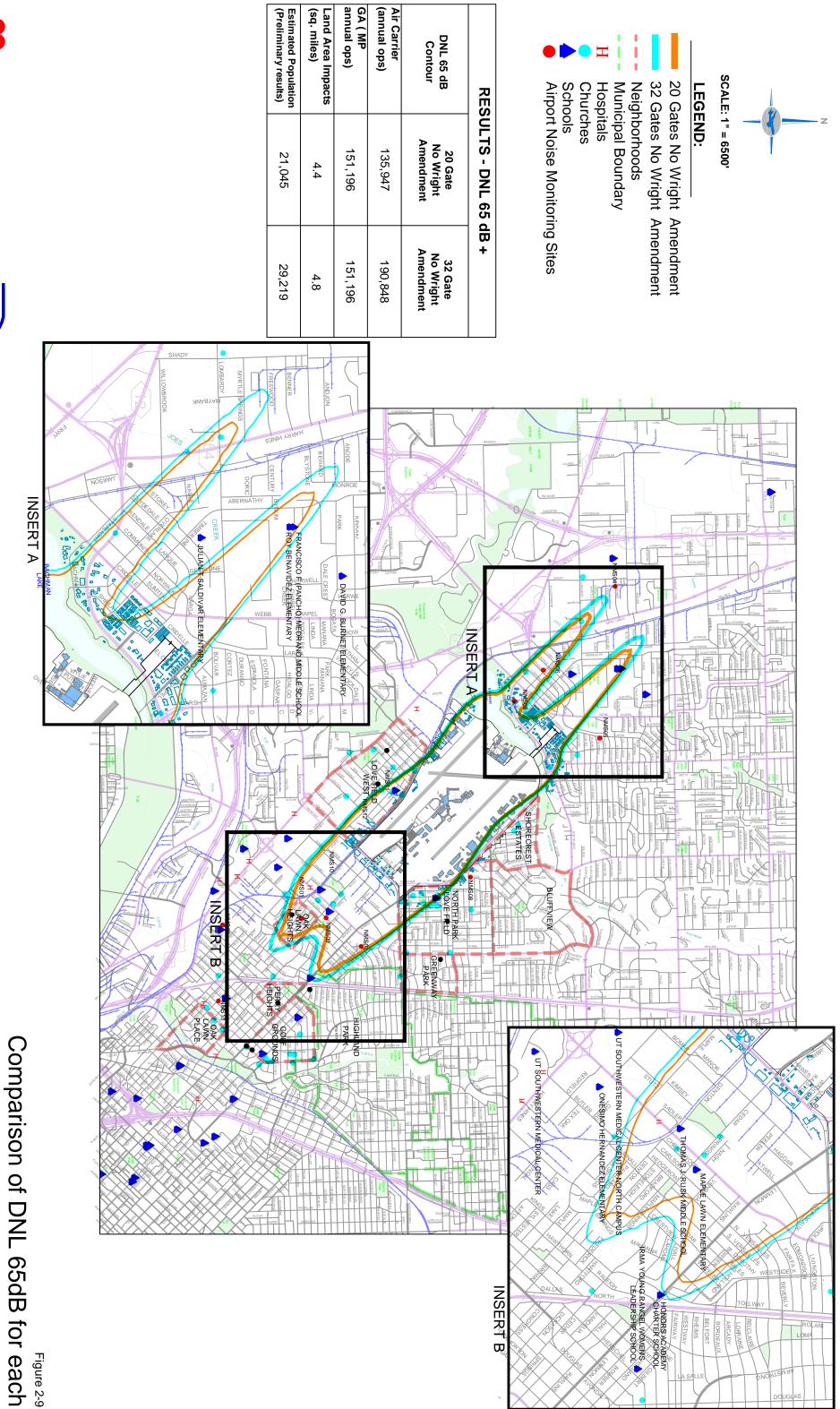
These findings document the changes in noise exposure expected without the air service restrictions of the Wright Amendment. In effect, 20 gates without the Wright Amendment will be essentially the same as those projected in the Master Plan 32 Gate scenario, and 32 gates without the Wright Amendment will slightly increase those impacts.

<sup>&</sup>lt;sup>1</sup> Based on a comparison of the DNL 65 dB noise contour.

**Table 2-5: Summary of Analysis** 

		Wright An	nendment			No Wright	Amendment	
Description		32 G	ates		20 G	ates	32 G	ates
		/1990 U.S. ensus	INM 6.1/2000 U.S. Census		INM 6.1/2000 U.S. Census			
Air Carrier Activity (annual ops)	182,804		182,	804	135,947		190	,848
Air Carrier Activity (daily ops)	501		50	)1	373		5.	23
Fleet Mix/Schedule Profile	<ul> <li>Standard Jets (7 States)</li> <li>Reconfigured Jets (56 Seats)</li> <li>Regional Jets (50 Seats)</li> </ul>		<ul> <li>Standard Jets (7 States)</li> <li>Reconfigured Jets (56 Seats)</li> <li>Regional Jets (50 Seats)</li> </ul>		<ul><li>Standard Jets</li><li>Longer Haul Routes</li></ul>		<ul><li>Standard Jets</li><li>Longer Haul Routes</li></ul>	
GA Activity & Fleet Mix*	Master P	lan Forecast	Master Plan Forecast		Master Plan Forecast		Master Pla	n Forecast
Runway Use/Flight Tracks*	Master	Plan 2001	Master Plan 2001		Master Plan 2001		Master Plan 2001	
<b>Noise Impact:</b> DNL 65 dB Area	4.8 S	q. Miles	4.6 Sq	4.6 Sq. Miles		ı. Miles	4.8 Sq. Miles	
Impact by Contour	Square Miles	Population	Square Miles	Population	Square Miles	Population	Square Miles	Population
DNL 55 dB +	22.3	95,533	23.2	111,395	23.8	111,759	26.9	117,369
DNL 60 dB +	10.4	60,802	10.3	71,355	10.4	70,429	11.6	76,451
DNL 65 dB +	4.8	23,198	4.6	24,872	4.4	21,045	4.8	29,219
DNL 70 dB +	2.2	860	1.9	2,686	1.8	2,620	2.0	2,655
DNL 75 dB +	0.9	0	0.9	0	0.8	0	0.9	0

NOTE: The impacts for each contour include the entire area for that contour level. For example, the DNL 55 dB and above impacts includes the impacts for the DNL 60, 65, 70 and 75 dB and above contour.



DALLAS LOVE FIELD

IMPACT ANALYSIS UPDATE



No Wright Amendment Scenario DMJM AVIATION | AECOM

**Table 2-6: Schools within the Noise Contours** 

	Schools within Noise Contours –	32 Gate No Wright Amendmen	t	
Contour	School Name	Address	CITY	ZIP Code
Interval DNL 70	Obadiah Knight Elementary	2615 Anson Rd.	Dallas	75235
DILL 10	Roy Benavidez Elementary	Wheelock St	Dallas	75220
	Maple Lawn Elementary	3120 Inwood Rd.	Dallas	75235
DNL 65	Francisco F Medrano Middle School	Wheelock St	Dallas	75220
	Thomas J. Rusk Middle School	2929 Inwood Rd	Dallas	75235
	Dallas County Schools	2455 Rentzel St	Dallas	75220
	Onesimo Hernandez Elementary	5555 Maple Ave.	Dallas	75235
	Holy Trinity Catholic School	3815 Oak Lawn Ave	Dallas	75219
	Honors Academy Charter School	4300 Macarthur Ave	Highland Park	
	Sam Houston Elementary	2827 Throckmorton St.	Dallas	75219
DNL 60	Medrano Elementary	2221 Lucas Dr	Dallas	75219
	K. B. Polk Elementary	6911 Victoria Ave.	Dallas	75209
	Julian T Saldivar Elementary	9510 Brockbank Dr.	Dallas	75220
	William B. Travis Elementary	3001 Mckinney Ave	Dallas	75204
	William B. Travis Middle	3001 Mckinney Ave	Dallas	75204
	UT Southwestern Medical Center North	6000 Harry Hines Blvd	Dallas	75235
	David G. Burnet Elementary	3200 Kinkaid Dr.	Dallas	75220
	Callier Center For Deaf	3700 Ross Ave	Dallas	75204
	City Park Elementary	1738 Gano St.	Dallas	75215
	Community Education Partners	4711 Harry Hines Blvd	Dallas	75235
	Criswell College	4010 Gaston	Dallas	75204
	Billy Dade Elementary	2801 Park Row Ave	Dallas	75215
	Dallas Can! Academy Charter (Moved)	2601 Live Oak	Dallas	75204
	Dallas Day School	4242 Office Pkwy	Dallas	75204
	Dallas High School	2215 Bryan St	Dallas	75201
	Dallas Theological Seminary	3909 Swiss Ave	Dallas	75204
	District D District Office	3700 Ross Ave	Dallas	75204
	Tom W. Field Elementary	2151 Royal Ln.	Dallas	75229
DNL 55	First Baptist Academy	1704 Patterson	Dallas	75201
	Daniel "Chappie" James Learning Center	1718 Robert B Cullum Blvd	Dallas	75210
	James Madison High School	3000 Martin Luther King Blvd.	Dallas	75215
	Middle College	3700 Ross Ave	Dallas	75204
	North Dallas High School	3120 N. Haskell Ave.	Dallas	75204
	Notre Dame School	2018 Allen	Dallas	75204
	Pegasus Charter H S	2121 Main Street Suite 200	Dallas	75201
	Irma Young Rangel Women's Leadership	3801 Herschel Ave	Dallas	75219
	J. W. Ray Elementary	2211 Caddo St.	Dallas	75204
	Alex W. Spence Middle School	4001 Capitol Ave	Dallas	75204
	Texas A&M HSC/Baylor College Dent	3302 Gaston Ave	Dallas	75246
	UT Southwestern Medical Center	5323 Harry Hines Blvd	Dallas	75235
	Booker T Washington High School	2501 Flora St	Dallas	75201

Schools within Noise Contours – 20 Gate No Wright Amendment				
DNL Contour Interval	School Name	Address	CITY	ZIP Code
70	Obadiah Knight Elementary	2615 Anson Rd.	Dallas	75235
65	Roy Benavidez Elementary	Wheelock St	Dallas	75220
	Maple Lawn Elementary	3120 Inwood Rd.	Dallas	75235
	Francisco F Medrano Middle School	Wheelock St	Dallas	75220
	Thomas J. Rusk Middle School	2929 Inwood Rd	Dallas	75235
60	Onesimo Hernandez Elementary	5555 Maple Ave.	Dallas	75235
	Honors Academy Charter School	4300 Macarthur Ave	Highland Park	75209
	Sam Houston Elementary	2827 Throckmorton St.	Dallas	75219
	K. B. Polk Elementary	6911 Victoria Ave.	Dallas	75209
	Irma Young Rangel Women's Leadership	3801 Herschel Ave	Dallas	75219
	Julian T. Saldivar Elementary	9510 Brockbank Dr.	Dallas	75220
55	David G. Burnet Elementary	3200 Kinkaid Dr.	Dallas	75220
	Callier Center For Deaf	3700 Ross Ave	Dallas	75204
	Community Education Partners	4711 Harry Hines Blvd	Dallas	75235
	Criswell College	4010 Gaston	Dallas	75204
	Billy Dade Elementary	2801 Park Row Ave	Dallas	75215
	Dallas Can! Academy Charter (Moved)	2601 Live Oak	Dallas	75204
	Dallas County Schools	2455 Rentzel St	Dallas	75220
	Dallas Day School	4242 Office Pkwy	Dallas	75204
	Dallas High School	2215 Bryan St	Dallas	75201
	Dallas Theological Seminary	3909 Swiss Ave	Dallas	75204
	District D District Office	3700 Ross Ave	Dallas	75204
	Tom W. Field Elementary	2151 Royal Ln.	Dallas	75229
	First Baptist Academy	1704 Patterson	Dallas	75201
	Holy Trinity Catholic School	3815 Oak Lawn Ave	Dallas	75219
	James Madison High School	3000 Martin Luther King Blvd.	Dallas	75215
	Medrano Elementary	2221 Lucas Dr	Dallas	75219
	Middle College	3700 Ross Ave	Dallas	75204
	North Dallas High School	3120 N. Haskell Ave.	Dallas	75204
	Notre Dame School	2018 Allen	Dallas	75204
	Pegasus Charter H S	2121 Main Street Suite 200	Dallas	75201
	J. W. Ray Elementary	2211 Caddo St.	Dallas	75204
	Alex W. Spence Middle School	4001 Capitol Ave	Dallas	75204
	Texas A&M Hsc/Baylor Collg Dent	3302 Gaston Ave	Dallas	75246
	William B. Travis Elementary	3001 Mckinney Ave	Dallas	75204
	William B. Travis Middle	3001 Mckinney Ave	Dallas	75204
	UT Southwestern Medical Center	5323 Harry Hines Blvd	Dallas	75235
	UT Southwestern Medical Center North	6000 Harry Hines Blvd	Dallas	75235
	Booker T Washington High School	2501 Flora St	Dallas	75201

## DMJM AVIATION AECOM

## **Section 3 Roadway Traffic Impacts**



Prepared by: DMJM Aviation

#### **SECTION 3—TRAFFIC IMPACT ANALYSIS**

#### 3.1 Introduction

#### 3.1.1 Background

The basis for a roadway traffic analysis update is the activity forecasts presented in Section 1, "Forecast of Activity at Dallas Love Field in Absence of the Wright Amendment." This section presents an updated traffic evaluation based on projected annual enplanements and other data for the 20 and 32 gate terminal development scenarios.

#### 3.1.2 Purpose

As part of the effort to evaluate impacts associated with the No Wright Amendment scenarios, the variations in impacts to selected near-by roadway intersections have been evaluated and compared with the results from the Master Plan. The selected intersections evaluated, as coordinated with the City during the Master Plan, are as follows:

- 1. Mockingbird Lane at the I-35 Southbound Frontage Road
- 2. Mockingbird Lane at the I-35 Northbound Frontage Road
- 3. Mockingbird Lane at Cedar Springs Road
- 4. Mockingbird Lane at Airdrome
- 5. Mockingbird Lane at Lemmon Avenue
- 6. Mockingbird Lane at Inwood Road
- 7. Mockingbird Lane at Southbound Dallas North Tollway
- 8. Mockingbird Lane at Northbound Dallas North Tollway
- 9. Lemmon Avenue at Inwood Road
- 10. Lemmon Avenue at Airdrome
- 11. Lemmon Avenue at University Boulevard
- 12. Lemmon Avenue at Lovers Lane

#### 3.1.3 Methodology

The methods defined in the Highway Capacity Manual for signalized intersections have been used, based on projected am and pm peak hour traffic turning movement volumes that combine airport and non-airport related traffic.

#### 3.2 Technical Discussion

The variations in traffic impacts are projected, based on the difference in vehicular activity associated with the anticipated change in the nature of air service at Love Field without the Wright Amendment restrictions. The air service analysis estimates the change in enplaning passengers from the Master Plan for the year 2020 as given in **Table 3-1**. The other anticipated shift due to removal of the Wright Amendment restrictions is an increase in the percentage of passengers that would connect between flights at Love Field, instead of starting or ending their air trip in the Dallas area. The connecting ratio is assumed to grow from the 19 percent assumed in the Master Plan to 25 percent. Alternatively, the "origin/destination" (O/D) passengers, who would be using the ground access facilities, would decrease from 81 percent to 75 percent. This effect is also shown in **Table 3-1**, with the result that the number of O/D passengers would increase slightly between the Master Plan scenario and the 20 Gate scenario, and increase significantly for the 32 Gate scenario. However, since all the O/D activity

for the 20 Gate scenario would be at the main terminal, the projected traffic flows using the main airport entrance on Cedar Springs Road would be slightly higher than those for the Master Plan scenario, while the traffic along Lemmon Avenue, where 6 of the 32 Gates are located, would decrease.

Table 3-1: Development of Projected Traffic Ratios Relative to the Master Plan

	Master Plan	20 Gates No Wright Amendment	32 Gates No Wright Amendment
Enplanements (million) in 2020	5.54	6.16	8.76
O/D Ratio	81%	75%	75%
Originating Pax (million) in 2020	4.49	4.62	6.57
Traffic Ratio	-	1.03	1.46

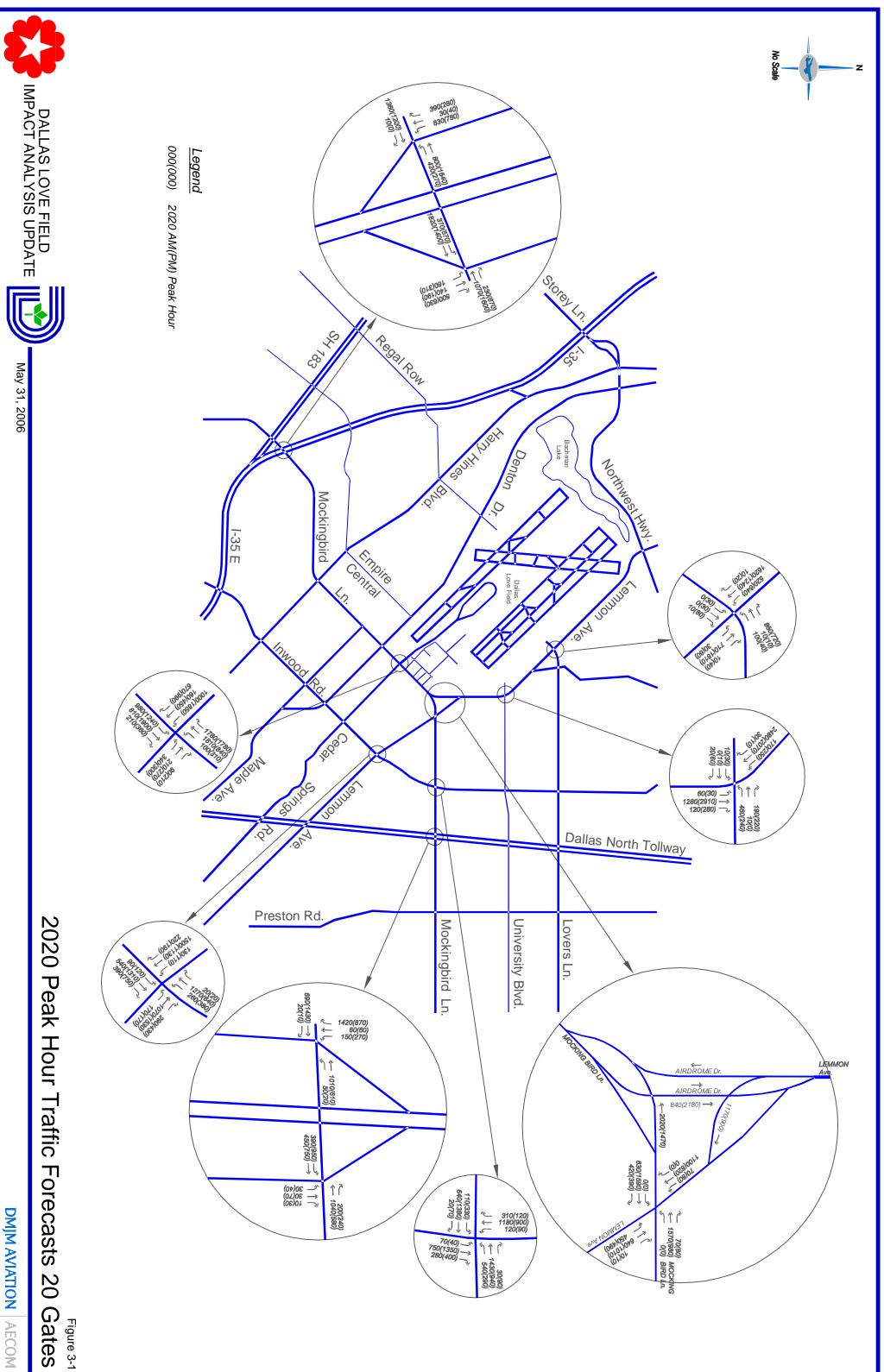
These traffic ratios have been used to factor the projected airport related vehicular traffic used in the Master Plan to generate airport traffic for the No Wright Amendment scenarios. This airport traffic, including the proportionate turning movements at each intersection, was combined with the same non-airport traffic movements as used in the Master Plan analyses, which had been developed from analyses of the NCTCOG¹ regional forecasts for 2020 and historical turning movement counts. The resulting traffic flow projections during the am and pm peak hours for the Average Weekday of the Peak Month are depicted in **Figures 3-1 and 3-2**, for the 20 and 32 Gate No Wright Amendment scenarios, respectively.

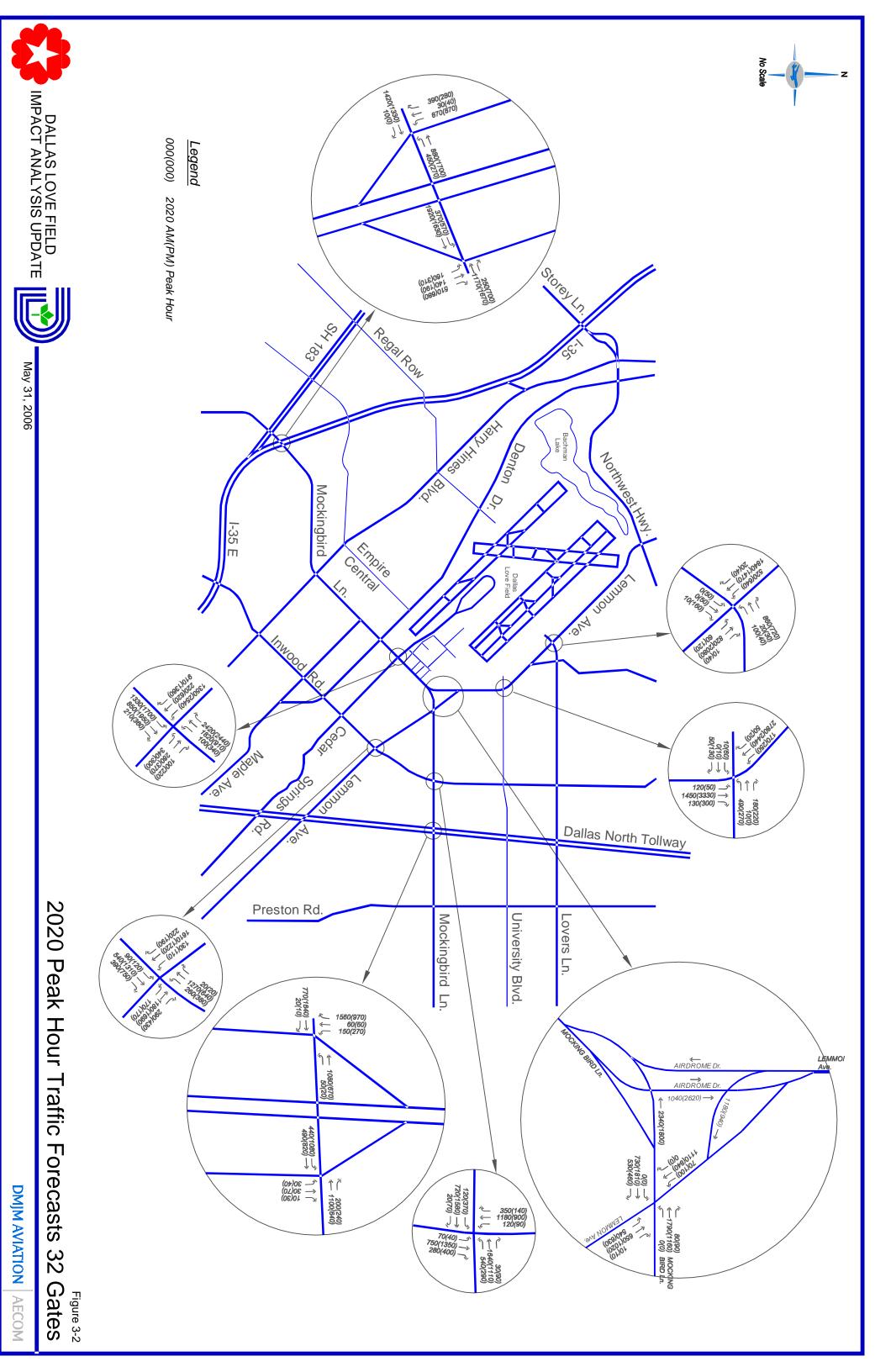
The resulting Levels of Service (LOS) at the selected intersections are shown in **Figure 3-3**, comparing the prior Master Plan 32 Gate results with the results for the 20 and 32 Gate No Wright Amendment scenarios. These assume that the intersection improvements identified in the Master Plan are implemented.

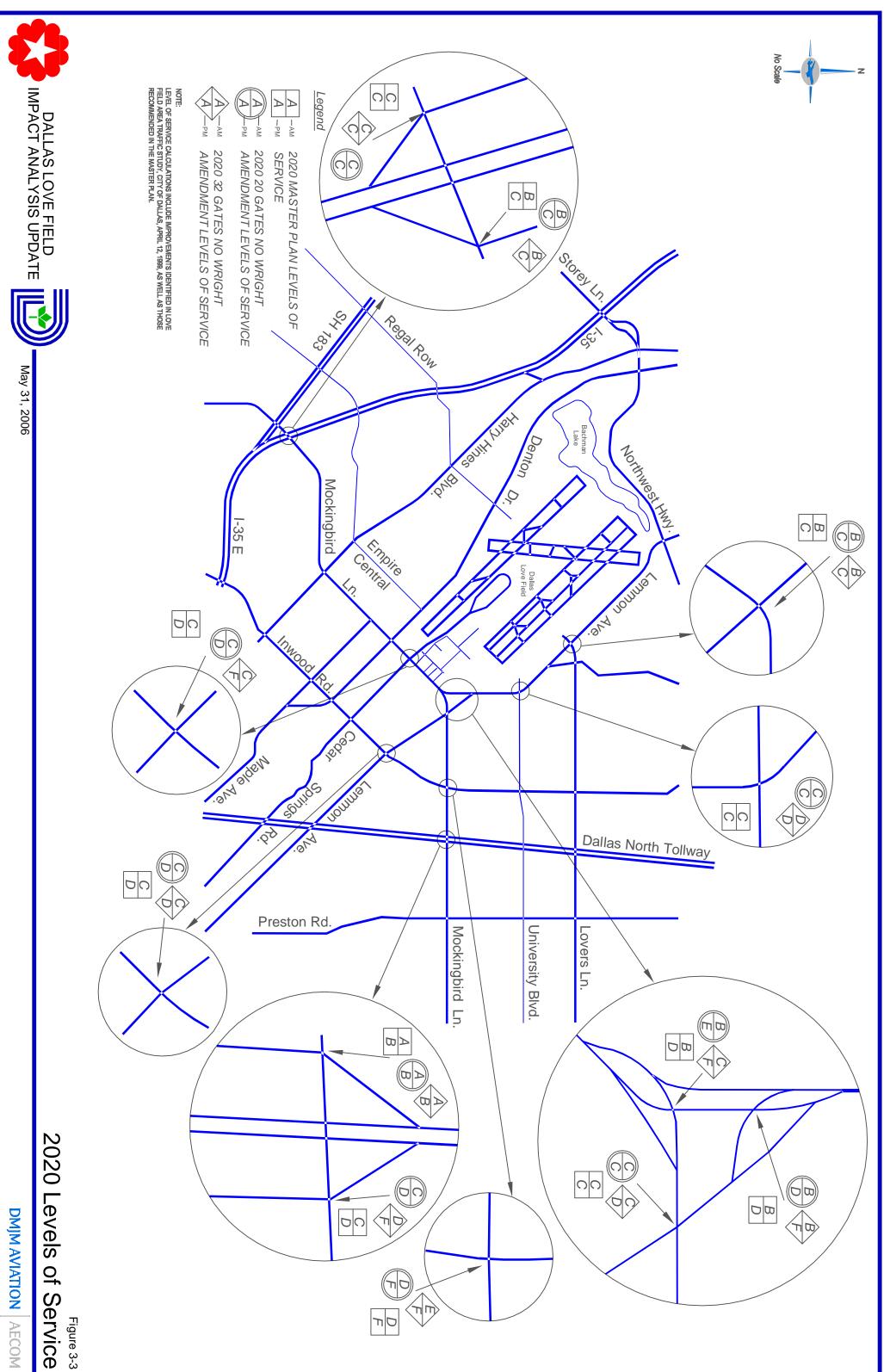
City defined improvements that had been planned prior to the Master Plan (1999) were:

- Mockingbird at Cedar Springs increase southeast and southwest curb radii
- Mockingbird, Airdrome to Denton add westbound lane from Airdrome to Cedar Springs and Cedar Springs to Denton – median improvements
- Mockingbird at Airdrome geometric improvements
- Mockingbird at Lemmon add northbound (Lemmon) dual left-turn, increase northwest corner radius
- Lemmon at Inwood dual left turns for all approaches, right-turn lanes for eastbound, westbound, and northbound, improve all corner radii
- Mockingbird at Inwood westbound dual left turn, southbound right turn lane, increase southbound and northbound left turn storage, improve all corner radii
- ☐ Lemmon, Airdrome to Bluffview add southbound lane, add two northbound lanes from Airdrome to University, add one northbound lane from University to Bluffview, geometric improvements, signal upgrades

<sup>&</sup>lt;sup>1</sup> North Central Texas Council of Governments







Additional improvements defined as part of the 2001 Master Plan were:

- Mockingbird and Cedar Springs grade separation and signalization of the southbound to eastbound and eastbound to northbound left turns
- Mockingbird at I-35 northbound add northbound and westbound right turn lanes with acceleration lanes
- Lemmon at Inwood add acceleration lane for eastbound right-turn
- Lemmon at Lovers Lane add southbound dual left turn and acceleration lane for westbound right-turn

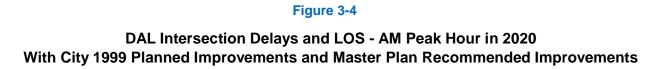
Levels of service (LOS) represent varying levels of traffic congestion and are defined in accordance with the Highway Capacity Manual based on the amount of average delay per vehicle at an intersection, as follows:

- LOS A Delay per vehicle less than 10 seconds.
- LOS B Delay per vehicle between 10 and 20 seconds.
- LOS C Delay per vehicle between 20 and 35 seconds.
- LOS D Delay per vehicle between 35 and 55 seconds.
- LOS E Delay per vehicle between 55 and 80 seconds.
- LOS F Delay per vehicle greater than 80 seconds.

A more detailed assessment of the performance of the intersections is given in **Figures 3-4 and 3-5**, in which the calculated delays are shown for am and pm peak hour conditions, by intersection, for the scenarios, relative to the LOS thresholds.

This shows slightly worse results for the 20 Gate No Wright Amendment scenario, compared with the Master Plan 32 Gate, but significantly worse performance for the 32 Gate No Wright Amendment scenario. For the 20 Gate scenario, one intersection, Mockingbird at Airdrome, is worse than the Master Plan, going from LOS D in the pm peak hour to LOS E. The uniformly poor performance at Mockingbird and Inwood during the pm peak hour is due to the constraints that prevent needed improvements at this intersection.

**Figures 3-6 and 3-7** present similar information, but the results assume that only the City defined improvements are made, except for the City defined improvements at Lemmon and Inwood, since community opposition for the improvements at this intersection has cancelled plans for implementation. A comparison of **Figures 3-4 through 3-7** highlights the importance of making the improvements recommended in the Master Plan, and that poor conditions will result from abandoning the Lemmon at Inwood plans.



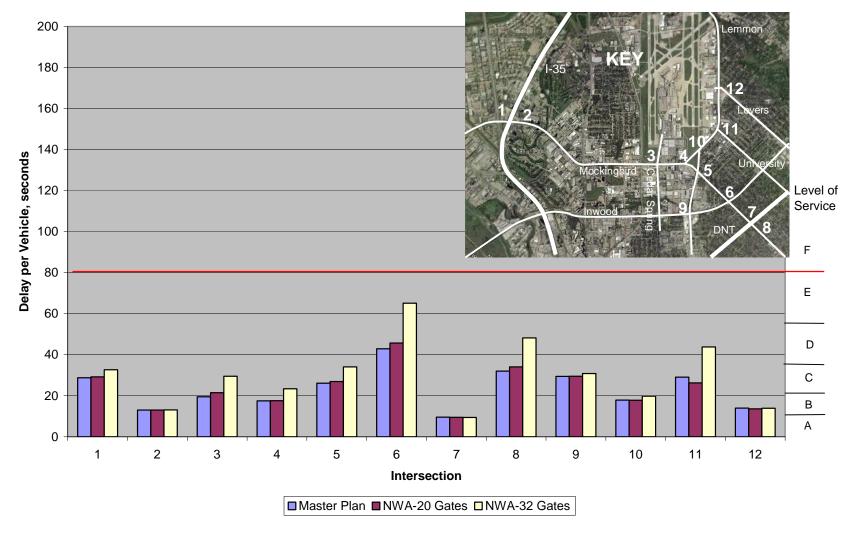
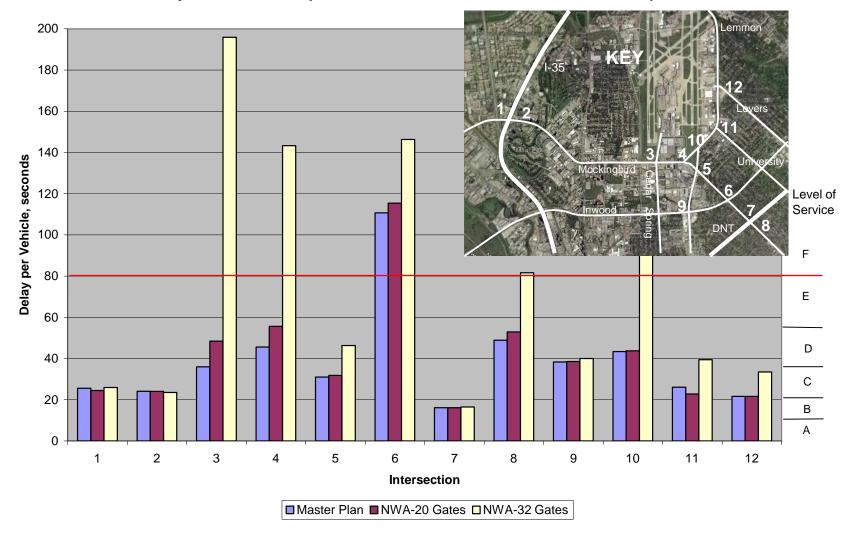
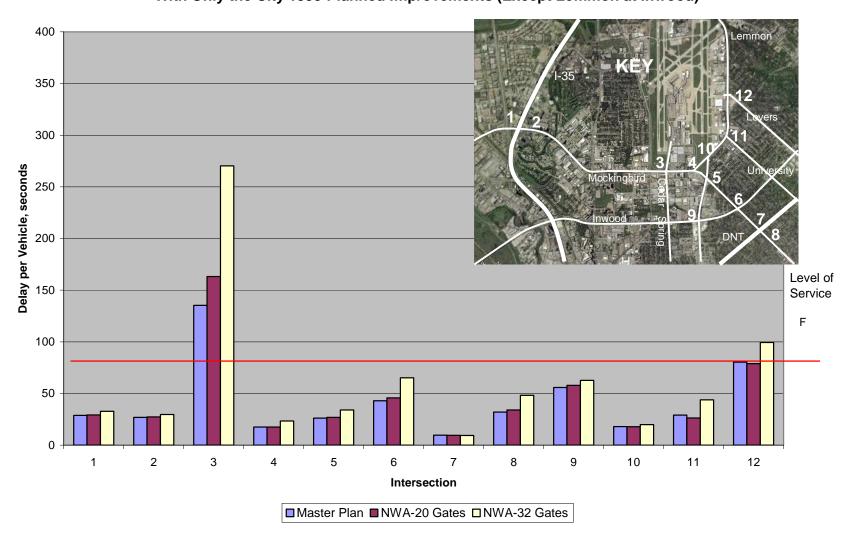


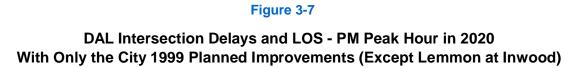
Figure 3-5

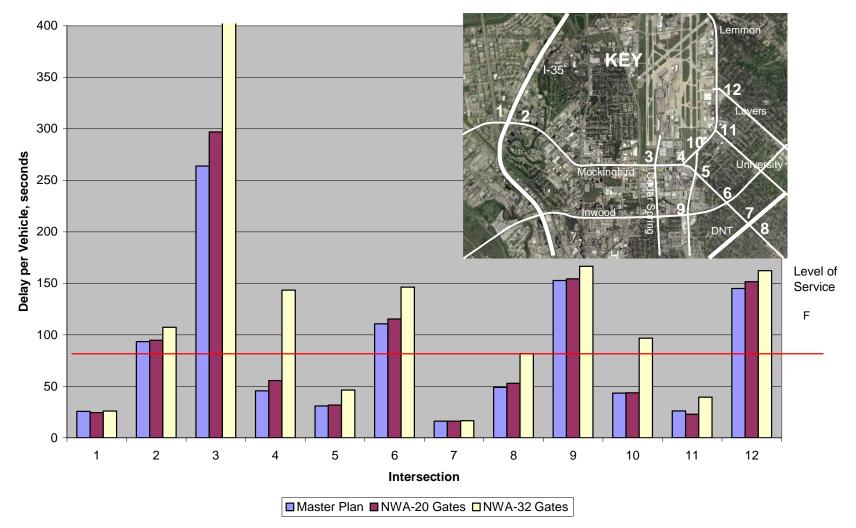




DAL Intersection Delays and LOS - AM Peak Hour in 2020
With Only the City 1999 Planned Improvements (Except Lemmon at Inwood)







# 3.3 Findings and Conclusions

If the number of terminal gates at the airport is increased to 20, the potential traffic impacts are essentially the same as those defined in the Master Plan 32 Gate scenario. This requires improvements at a number of intersections, as defined in the Master Plan and repeated above in Section 3.2, in order to provide acceptable traffic levels of service. If any of the proposed improvements are not made, poor performance at the affected intersections will occur. In particular, the improvements at Mockingbird Lane and Cedar Springs Road (at the entrance to the airport) will be needed, probably soon after the removal of the Wright Amendment restrictions.

On the other hand, under the 32 Gate No Wright Amendment scenario, much more extensive intersection modifications and road widening than had been defined in the Master Plan would be needed to accommodate the growth with acceptable levels of service.

# DMJM AVIATION AECOM

# **Section 4 Air Quality Analysis**



Prepared by: DMJM Aviation

#### SECTION 4—AIR QUALITY IMPACT ANALYSIS

#### 4.1 Introduction

#### 4.1.1 Background

The basis for this air quality analysis update is Section 1 "Forecast of Activity at Dallas Love Field in the Absence of the Wright Amendment", in which realistic air carrier schedules were developed for the long term use of two gate scenarios: 20 and 32 gates.

#### 4.1.2 Purpose

The purpose of this air quality analysis update is to assess the impacts that would occur under the expected future air service scenarios in the absence of the Wright Amendment, and compare those impacts to the Love Field Master Plan Impact Analysis published in March 2001. The following sections provide an overview of the methodology, assumptions and findings of the analysis.

#### 4.1.3 Methodology

The air quality results for this study were developed using the most updated version of the Emissions and Dispersion Modeling System (EDMS), Version 4.4. The EDMS is used to estimate the total annual amount of emissions from aircraft, support vehicles and on-airport vehicles based upon the calculation of total fuel burned. The FAA requires that EDMS be used for airport air quality analyses.

The air quality results produced for the original 2001 Master Plan Impact Analysis were modeled using EDMS Version 3.2. This updated analysis used EDMS 4.4, the EPA and FAA's most current version, to model each of the scenarios. The EDMS Version 4.4 incorporates several new enhancements including new data that changed the emission coefficients of several aircraft, as well as the addition of several new engines and aircraft types. The new model also calculates emission factors for the following pollutants: Total Hydrocarbons (THC), Non-Methane Hydrocarbons (NMHC), Volatile Organic Compounds (VOC) and Particulate Matter (PM2.5).

In order to maintain consistency between all gate scenarios, the 2001 Master Plan input data was entered into EDMS Version 4.4 and reprocessed to update the results using this enhanced version of the model. The reprocessing of this data slightly altered the results previously reported in the Master Plan Impact Analysis; however, the results are in accordance with today's standards for air quality modeling and allow for a more accurate and fair comparison with the two new gate scenarios.

The methodology used for this air quality evaluation followed very closely the methodology used for the 2001 Master Plan. Annual emissions were calculated in metric tons for several pollutants based upon the annual aircraft operations, operation of ground support equipment and aircraft auxiliary power units, and from vehicles driving or parking on the airport property. Unlike the 2001 Master Plan, no calculation of emissions was made for traffic at off airport intersections. All of the assumptions used in the 2001 air quality analysis were carried over into this analysis including the previously used year 2010 vehicle fleet to provide a more direct comparison to the analysis conducted for the Master Plan. Ground vehicles emissions were also calculated using the Mobile 5a option to compare to the 2001 Master Plan analysis.

#### 4.1.4 Dallas County Air Quality Status

Dallas County is listed by the EPA on their web site as being in the 8-hour Ozone Non-attainment area, Subpart 2 Moderate, as shown in **Figure 4-1**. Ozone is the only pollutant that Dallas County is in non-attainment for national air quality standards.

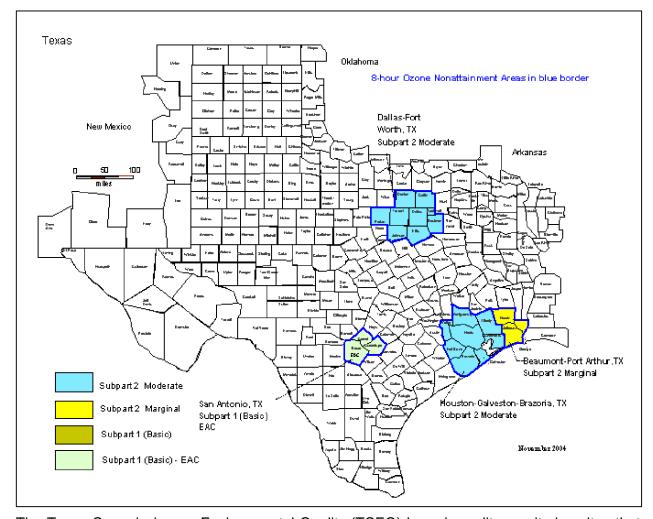


Figure 4-1: EPA Designation of Ozone Non-attainment Areas in Texas

The Texas Commission on Environmental Quality (TCEQ) has air quality monitoring sites that record the quantities of several air pollutants in Dallas County. The TCEQ data is available on their web site and they calculate the Air Quality Index for Dallas County. The Air Quality Index (AQI) is defined by federal regulations relative to National Ambient Air Quality Standards (NAAQS).

Table 4-1 Dallas County Air Quality Index for July 2005

DATE	Ozone 8-hr AQI	Ozone 8-hr ppb	Carbon Monoxide AQI	Carbon Monoxide ppm	Sulfur Dioxide AQI	Sulfur Dioxide ppb	PM-2.5 AQI	PM-2.5 ug/m3
1-Jul-2005	42	54	6	0.5	1	1	32	9.8
2-Jul-2005	116	91	6	0.5	2	2	72	26.0
3-Jul-2005	42	54	6	0.5	13	9	52	16.2
4-Jul-2005	39	50	5	0.4	20	13	45	13.9
5-Jul-2005	69	72	6	0.5	3	2	27	8.4
6-Jul-2005	124	94	7	0.6	1	0	35	10.7
7-Jul-2005	34	44	10	0.9	1	1	45	13.9
8-Jul-2005	85	78	10	0.9	3	2	56	18.2
9-Jul-2005	85	78	8	0.7	1	1	61	20.3
10-Jul-2005	64	70	7	0.6	2	1	58	19.1
11-Jul-2005	109	88	6	0.5	2	1	63	21.6
12-Jul-2005	92	81	6	0.5	2	1	59	19.5
13-Jul-2005	61	69	7	0.6	2	2	48	14.7
14-Jul-2005	116	91	6	0.5	1	1	39	11.9
15-Jul-2005	100	84	0	0.0	3	2	30	9.2
16-Jul-2005	69	72			1	1	37	11.4
17-Jul-2005	27	35			4	3	23	7.1
18-Jul-2005	34	43	0	0.0	2	1	32	9.9
19-Jul-2005	39	50	3	0.3	6	4	42	12.8
20-Jul-2005	36	46	5	0.4	5	4	39	12.0
21-Jul-2005	43	55	5	0.4	3	2	35	10.9
22-Jul-2005	59	68	5	0.4	4	3	41	12.5
23-Jul-2005	66	71	5	0.4	2	1	32	10.0
24-Jul-2005	41	52	3	0.3	2	1	26	8.0
25-Jul-2005	32	41	5	0.4	6	4	47	14.6
26-Jul-2005	36	46	3	0.3	7	5	57	18.3
27-Jul-2005	31	40	5	0.4	3	2	28	8.6
28-Jul-2005	39	50	7	0.6	4	3	36	11.1
29-Jul-2005	111	89	8	0.7	3	2	47	14.5
30-Jul-2005	100	84	5	0.4	3	2	60	20.3
31-Jul-2005	69	72	0	0.0	4	3	62	20.8



As shown in **Table 4-1**, Dallas County exceeded the NAAQS standard for average 8-hour ozone concentrations of 84 ppb for 5 days in July 2005 achieving an AQI of Unhealthy for Sensitive Groups. The data also shows that the maximum AQI for Carbon Monoxide (CO) was only a 10 and the maximum AQI for Sulfur Dioxide (SOx) was only a 20. The TCEQ web site did not report PM10 concentration but does report PM2.5 concentrations. The July 2005 data, as shown in Table 4-1, indicated that on 11 days the PM2.5 concentrations did reach the AQI of Moderate. The highest 24 hour average concentration on July 2, 2005 was 26 micrograms per

cubic meter of air, which is far below the NAAQS of 65 micrograms per cubic meter. Fine particulate matter is of concern as a matter of air quality pollution but it is not likely that Dallas County will reach non attainment at the current NAAQS.

Ozone attainment is a goal of Dallas County and emissions from the operations of Dallas Love Field are contributing factors. However aircraft and vehicles do not emit ozone directly as a pollutant. Ozone is naturally formed each day from sunlight acting upon the nitrous oxides and volatile organic compounds in the air. Aircraft and vehicles burning fuels such as gasoline, diesel, and kerosene jet fuel do emit nitrous oxides (NOx) and VOCs. Ozone formation rate is sensitive to the NOx/VOC ratio, but the largest contributor of aircraft and vehicles to the formation of ozone is the NOx emissions. In most situations, the reduction of NOx emissions is the primary goal in reducing concentrations of ozone pollution.

Based upon the actual general aviation and business aircraft flights for March 2006 and the actual OAG April 2006 schedule of airline flights, a 2006 baseline estimate of annual emissions from the airport was generated using the Master Plan assumptions of GSE. The analysis produced the data using EDMS 4.4 which is presented in **Table 4-2** below:

	Nitrous Oxides	Carbon Monoxides	Hydrocarbons	Volatile Organic Compounds	Sulfur Dioxide	Particulate Matter 10	Particulate Matter 2.5
Aircraft	315.1	551	85.7	91.3	27.8	2.19	2.19
GSE/AP	9.9	151	6.2	5.9	1.9	0.90	0.87
Traffic	32.0	278	24.6	23.3	0.2	1.14	0.17
Total	357.0	979	116.5	120.5	29.9	4.23	3.77

**Table 4-2 2006 Baseline Airport Emissions (tons/year)** 

The emissions calculated for 2006 using the new EDMS 4.4 are lower in emissions for each pollutant except sulfur dioxide than what was reported for 2000 in the Master Plan document. Most of the improvements are credited to newer less polluting vehicles, the Master Plan forecast of reduced GSE usage, and the new emission factors used in the new EDMS model. There were no reductions in the number of aircraft or vehicles.

Overall, emissions generated from the Dallas Love Field airport on an annual basis are a very small contributor to the overall emissions affecting air quality in Dallas County. Nitrous Oxides and VOCs are the only emissions that the airport contributes that are precursors to ozone formation. Ozone is the only pollutant for which Dallas County is in non-attainment. Because ozone occurs from the interaction of sunlight with NOx and VOC, Dallas County is most likely to exceed standards for ozone in the summer months when the sunlight exposure is the greatest.

#### 4.2 Technical Discussion

#### 4.2.1 EDMS Overview

The Environmental Protection Agency and the Federal Aviation Administration have jointly developed a procedure and software to evaluate the emissions that affect air quality on airports. The software was written for EPA and FAA and is the only software that is certified for evaluating the contributions of aircraft to air quality emissions. The use of EDMS is required by FAA for air quality analyses.

The current version 4.4 has many enhancements and more new data than the previous version used in the 2001 Master Plan. The emission coefficients of several aircraft have been changed as a result of new test data. Many new engines and new aircraft have been added to the

database. The previous version of EDMS did not calculate particulate matter for 10 microns (PM10) for aircraft, but did estimate contributions for GSE and traffic. The new model also calculates new emission factors for the following pollutants:

- Total Hydrocarbons (THC)
- Non-Methane Hydrocarbons (NMHC)
- Volatile Organic Compounds (VOC)
- Particulate Matter (PM2.5)

#### 4.2.2 EDMS Settings and Assumptions

The essence of the EPA and FAA guidelines are to calculate the total annual amount of emissions from aircraft, support vehicles and on-airport vehicles based upon the calculation of total fuel burned. The model estimates the time of operation of fuel burning vehicles and the power settings used because the type and percentage of the emissions are different if the engine of the vehicle/aircraft is idling or is operating near full power. The model input requires an average of time in mode for aircraft and vehicles as well as an average of time in mode for the support equipment operations for each aircraft type.

For aircraft operations the largest single assumption on emission contribution is the average amount of time the aircraft are taxiing in and out. Because the actual takeoff and landing time is relatively constant, this assumption of average annual taxiing time is one of the most important assumptions of aircraft contributions. The EDMS model (both version 3 and 4) has a standard default annual average taxiing time of 26 minutes per aircraft. However, during the 2001 Master Plan the average annual taxiing time was studied using data supplied by airlines to the Bureau of Transportation Statistics and visual observations at Dallas Love Field which resulted in selecting an annual taxiing time of 10.46 minutes per aircraft.

No new analysis of average taxi times was performed for this air quality analysis. The previously used value of 10.46 minutes seems reasonable and makes for a better comparison to the 2001 Master Plan data if this value remains the same. If future delays occur because of airport capacity issues that result in an increase in the annual average taxi time, the result will increase aircraft contributions to pollutant emissions.

#### 4.2.3 Aircraft Operations

The increased number of aircraft flights and the type of aircraft has an influence on the air quality analyses. The EDMS air quality model estimates the fuel burned by an aircraft until it reaches the mixing height (3,000 feet above ground). Aircraft operations were input into the EDMS model using a summary of the INM input files described in Section 2. Certain aircraft were substituted for other aircraft because the INM and EDMS aircraft available in each database differs slightly. In all cases the best database match to aircraft currently operating at Dallas Love Field was selected for the aircraft engine combination to be used in the analysis.

The INM input file reduces all flights into an average day of takeoffs and landings and the EDMS input file calculates the yearly number of landing /takeoff cycles (LTOs). **Tables 4-3 and 4-4** show the actual aircraft operations used in the 20 and 32 Gate No Wright Amendment analyses.

Table 4-3: Annual LTO for 20 Gate Air Quality Analysis

Aircraft	INM	EDMS	Daytime	Nighttime	Operations	Annual	Annual
Category	Aircraft	Aircraft	Operations	Operations	per Day	Operations	LTO
Cargo	767300	767300F	1.0	1.0	2.0	730	365
Cargo	SD330	BE20	3.0	1.0	4.0	1,460	730
Cargo	GASEPF	C208	22.0	4.0	26.0	9,490	4,745
Cargo	MD81	MD81F	1.0	2.0	3.0	1,095	548
Cargo	SF340	SF340	2.0	0.0	2.0	730	365
Com	737700	B737	0.0	0.0	0.0	0.0	0.0
Com	7377SW	B737	253.5	22.3	275.8	100,665	50,332
Com	737800	B738	26.3	2.3	28.65	10,459	5,229
Com	CL601	CRJ700	9.9	.87	10.75	3,922	1,961
Com	EMB145	EMB145	6.0	0.0	6.0	2,190	1,095
Com	717EMB	EMB170	41.2	3.6	44.8	16,342	8,171
Com	MD83	MD83	11.5	1.0	12.5	4,576	2,288
GAJ	MU3001	BE40	10.0	0.0	10.0	3,650	1,825
GAJ	CIT3	C560	4.0	0.0	4.0	1,460	730
GAJ	CL600	CL60	6.0	0.0	6.0	2,190	1,095
GAJ	FAL20	FA20	2.0	0.0	2.0	730	365
GAJ	IA1125	G200	2.0	0.0	2.0	730	365
GAJ	GIIB	G3	8.0	0.0	8.0	2,920	1,460
GAJ	GIV	G4	2.0	0.0	2.0	730	365
GAJ	LEAR25	LJ25	6.0	2.0	8.0	2,920	1,460
GAJ	LEAR35	LJ35	22.0	2.0	24.0	8,760	4,380
GAP	GASEPV	C172	52.0	12.0	64.0	23,360	11,680
GAP	BEC58P	PA31	118.0	28.0	146.0	53,290	26,645
GAT	DHC6	BE20	74.0	5.0	79.0	28,835	14,418
GAT	CNA441	C441	6.0	6.0	12.0	4,380	2,190
MIL	C130HP	C130	2.0	0.0	2.0	730	365
				TOTAL	784.5	286,342	143,171

Table 4-4: Annual LTO for 32 Gate Air Quality Analysis

Aircraft	INM	EDMS	Daytime	Nighttime	Operations	Annual	Annual
Category	Aircraft	Aircraft	Operations	Operations	per Day	Operations	LTO
Cargo	767300	767300F	1.0	1.0	2.0	730	365
Cargo	GASEPF	C208	22.0	4.0	26.0	9,490	4,745
Cargo	MD81	MD81F	1.0	2.0	3.0	1,095	548
Com	717200	B717200	9.0	11.4	20.4	7,442	3,721
Com	737300	B733	0.5	0.1	0.5	195	98
Com	7373SW	B733	1.1	0.2	1.3	458	228
Com	737500	B735	2.3	0.4	2.7	981	490
Com	7375SW	B735	5.3	1.0	6.3	2,288	1,144
Com	737700	B737	90.7	17.3	108.0	39,412	19,706
Com	7377SW	B737	211.6	40.3	251.9	91,960	45,980
Com	737800	B738	25.6	4.9	33.4	11,111	5,555
Com	SD330	BE20	3.0	1.0	4.0	1,460	730
Com	CL601	CRJ700	10.0	1.7	11.7	4,287	2,143
Com	EMB145	EMB145	6.0	0.0	6.0	2,190	1,095
Com	717EMB	EMB170	73.7	14.0	87.7	32,026	16,013
Com	MD83	MD83	10.5	2.0	12.5	4,576	2,288
Com	SF340	SF340	2.0	0.0	2.0	730	365
GAJ	MU3001	BE40	10.0	0.0	10.0	3,650	1,825
GAJ	CIT3	C560	4.0	0.0	4.0	1,460	730
GAJ	CL600	CL60	6.0	0.0	6.0	2,190	1,095
GAJ	FAL20	FA20	2.0	0.0	2.0	730	365
GAJ	IA1125	G200	2.0	0.0	2.0	730	365
GAJ	GIIB	G3	8.0	0.0	8.0	2,920	1,460
GAJ	GIV	G4	2.0	0.0	2.0	730	365
GAJ	LEAR25	LJ25	6.0	2.0	8.0	2,920	1,460
GAJ	LEAR35	LJ35	22.0	2.0	24.0	8,760	4,380
GAP	GASEPV	C172	52.0	12.0	64.0	23,360	11,680
GAP	BEC58P	PA31	118.0	28.0	146.0	53,290	26,645
GAT	DHC6	BE20	74.0	5.0	79.0	28,835	14,418
GAT	CNA441	C441	6.0	6.0	12.0	4,380	2,190
MIL	C130HP	C130	2.0	0.0	2.0	730	365
				TOTAL	945.5	345,116	172,558

#### 4.2.4 Ground Support Equipment (GSE)

During the 2001 Master Plan a study was conducted of the ground support equipment in use by Southwest Airlines and other air carriers. The Master Plan air quality analysis calculated the year 2000 air quality emission based upon existing ground support equipment being utilized by Southwest Airlines and the daily hours of operations. The analysis then forecast the operations at 32 Gates based upon a predominant Southwest Airlines flight schedule and a commitment by Southwest Airlines to convert to a more environmental friendly GSE fleet.

Southwest has since added electric baggage tractors and has hydrant fueling reducing the need for fuel trucks. However, in the 2001 Master Plan the 3.2 version of EDMS did not have electric baggage tractors in the database. Therefore, in order to reduce emissions from GSE and auxiliary power units (APU) operations, assumptions were made to reduce operating times of the GSE equipment. For example the electric baggage tractor was modeled as a gasoline baggage tractor operating at 7.5 minutes versus a default of 75 minutes per takeoff and landing. A B737-700 APU operating time was modeled at 3.75 minutes per takeoff and landing.

In order to have a good comparison to the Master Plan air quality analysis, the modeling assumptions used in this update were the same as those modeled in 2001 with EDMS Version 3.2. However, with updates to the GSE database in EDMS Version 4.4 a reduction in GSE/APU emissions were calculated even with increased operations.

#### 4.2.5 On Airport Ground Traffic

The modeling of on airport vehicle traffic and parking was performed exactly as it was done in the 2001 Master Plan. The only difference in the modeling was that the total annual number of vehicles was adjusted to reflect the ratio of O/D passengers for the 20 and 32 Gate No Wright Amendment scenarios to the O/D passengers used in the Master Plan 32 Gate Wright Amendment scenario. EDMS 4.4 was used but Mobile 5a was selected as the default vehicle profile and emission coefficients. The same vehicle speeds and travel distances were used. The year 2010 default vehicle fleet mix was used. The results are shown below in **Table 4-5.** 

	2001 Master Plan	20 Gates	32 Gates
Vehicles / Year	1.0 Ratio	1.0134	1.464 Ratio
Roadways	34.635	34.270	49.508
Parking Facilities	2.457	1.533	2.215
Total	37.092	35.803	51.723

Table 4-5: Results of NOx for 20 and 32 Gates for Roadway and Parking

#### 4.2.6 EDMS Results

#### 4.2.6.1 Master Plan versus 20 Gates No Wright Amendment

Dallas is in non attainment for ozone pollution. The principal emissions that form ozone are the exposure of NOx and VOC to sunlight. The 2001 version of the master plan did not report VOC because the model did not calculate it. The substitute for VOC in the 2001 air quality analysis was Hydrocarbons. Therefore comparing NOx and Hydrocarbons as a substitute for VOC are the only pollutants for which Dallas is in non attainment.

A comparison can be made between the Master Plan 32 Gate scenario and the 20 Gate No Wright Amendment scenario. As shown in **Table 4-6**, the nitrous oxides would be slightly less

in the 20 gate scenario than the Master Plan 32 Gate scenario however the Hydrocarbons would be slightly greater.

	NOx (t	ons/yr)	HC (tons/yr)		
	Master Plan 32 Gates	20 Gates No Wright Amendment	Master Plan 32 Gates	20 Gates No Wright Amendment	
Aircraft	542.6	452.9	76.1	106.4	
GSE/APU	35.5	13.9	6.3		
Traffic	36	35.8 40.8		27.6	
Total	614.1	502.6	123.2	141.3	

Table 4-6: NOx and Hydrocarbon Emissions for 20 Gates

Although Dallas County is in attainment for Carbon Monoxide, Sulfur, PM10 and PM2.5, it is useful to make comparisons to the 2001 Master Plan air quality analysis. The Carbon Monoxide shown in **Table 4-7** shows a large increase in CO levels. However, in reviewing the EDMS model output, over 50% of the aircraft output is traced to a light piston twin engine aircraft, PA31 used in the analysis. If an updated general aviation fleet mix forecast were developed that showed an increase in turboprop and business jet activity, the CO levels would likely be reduced using the updated EDMS and found to be comparable to the master plan analysis.

The sulfur oxides show a small increase in the 20 Gate No Wright Amendment scenario from the Master Plan 32 Gate analysis. This is likely due to the increase in narrow body jet aircraft operations projected to be in operation under the 20 Gate No Wright Amendment scenario.

The particulate matter calculated in the Master Plan analysis used EDMS 3.2 which at the time had no data within the program to calculate the PM emissions for aircraft. In comparing the two analyses shown in **Table 4-7**, the traffic and GSE/APU data for 20 gates shows a small decrease in PM10 emissions, but the aircraft PM10 emissions is 73% of the total PM10 emissions.

	CO (tons/yr)		SOx (to	ons/yr)	PM10 (tons/yr)	
		20 Gates		20 Gates		20 Gates
	MP 32 Gates	No Wright	MP 32 Gates	No Wright	MP 32 Gates	No Wright
		Amendment		Amendment		Amendment
Aircraft	695	1194	27.3	35.1	0	6.91
GSE/APU	154.4	179	0.83	2.7	1.5	1.25
Traffic	376.1	311	1.94	0.3	1.55	1.27
Total	1225.5	1684	30.07	38.1	3.05	9.43

Table 4-7: CO, SOx, and PM10 Emissions for 20 Gates

#### 4.2.6.2 Master Plan versus 32 Gate No Wright Amendment

The comparison between the Master Plan 32 Gate scenario and the 32 Gate No Wright Amendment scenario shows that the 32 Gate No Wright Amendment scenario is higher in all categories of air quality emissions. This is to be expected because the number of large jet aircraft is higher than the Master Plan 32 gate scenario.

As shown in **Table 4-8** the 32 Gate No Wright Amendment scenario is higher in NOx and Hydrocarbons and will be higher in VOC as well. For the two emissions that contribute to ozone formation, NOx and VOC, the 32 Gate No Wright Amendment scenario produces more emissions than the Master Plan 32 gate.

Table 4-8: NOx and Hydrocarbon Emissions for 32 Gates

	NOx (to	ons/yr)	HC (tons/yr)		
	MP 32 Gates	32 Gates No Wright Amendment	MP 32 Gates	32 Gates No Wright Amendment	
Aircraft	542.6	617.9	76.1	113	
GSE/APU	35.5	18	6.3	10	
Traffic	36	51.7	40.8	39.9	
Total	614.1	687.6	123.2	162.9	

As shown in **Table 4-9**, the 32 Gate No Wright Amendment scenario produces higher emission of the CO, SOx, and particulate matter than the Master Plan 32 Gate.

Table 4-9: CO, SOx, and PM10 Emissions for 32 Gates

	CO (tons/yr)		SOx (to	ons/yr)	PM10 (tons/yr)	
		32 Gates		32 Gates		32 Gates
	MP 32 Gates	No Wright	MP 32 Gates	No Wright	MP 32 Gates	No Wright
_		Amendment		Amendment		Amendment
Aircraft	695	1284.8	27.3	47.6	0	9.09
GSE/APU	154.4	248.4	0.83	3.3	1.5	1.46
Traffic	376.1	448.9	1.94	0.39	1.55	1.84
Total	1225.5	1982.1	30.07	51.29	3.05	12.39

#### 4.2.6.3 20 Gates No Wright Amendment versus 32 Gates No Wright Amendment

In comparing the 20 and 32 Gate No Wright Amendment scenarios, the 32 Gate scenario is always significantly higher. In the case of emissions that are necessary for the formation of ozone, the 32 Gate scenario produces 43 percent more tons/year of nitrous oxides and 17 percent more tons per year of VOCs.

**Figure 4-4** shows the comparison of NOx emissions in tons/year for the two cases and a comparison to the Master Plan 32 Gates scenario calculated using EDMS version 3.2 and the current EDMS 4.4. There is a reduction in total NOx calculated by the EDMS version 4.4 from that which was calculated using EDMS 3.2 in the 2001 Master Plan. The reduction is because the new model has updated emission coefficients for many of the aircraft to more realistically approximate the actual emissions. Any future calculations or other comparisons should be made with the new model. The results also show that the 20 Gate No Wright Amendment scenario would have less NOx emissions than the Master Plan 32 Gate scenario would have more NOx emissions than the Master Plan 32 Gate scenario.

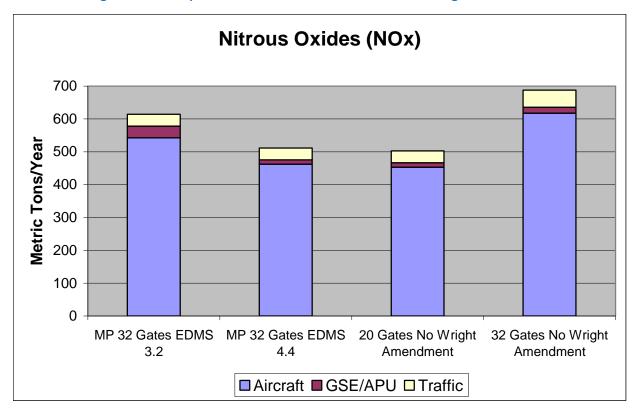


Figure 4-2: Comparison of NOx for 20 and 32 Gate No Wright Amendment

### 4.3 Findings and Conclusions

The following represent the most relevant findings of the updated air quality analyses for the Master Plan 32 gate scenario and the two gate scenarios studied under the No Wright Amendment conditions presented in Section 1.

- Ozone is formed from the sunlight acting on the pollutants of nitrous oxides (NOx) and volatile organic compounds (VOC). Dallas County is in non-attainment for 8-hour average level of ozone pollution and is in attainment for all other pollutants.
- The 20 Gate No Wright Amendment scenarios have less nitrous oxide and carbon monoxide emissions than the Master Plan 32 gate scenario.
- The 32 Gate No Wright Amendment scenario will have NOx emissions approximately 12 percent greater than the Master Plan 32 gate scenario emissions forecast.
- The 32 Gate No Wright Amendment exceeds the Master Plan 32 gate forecast of emissions for pollutants for which Dallas County is in attainment: Hydrocarbons, CO, SOx, and PM10.
- In a comparison between the Master Plan at 32 gates re-calculated with the new model, the VOC, PM10, and PM2.5 each were greater under the 20 and 32 gate scenarios than the 2001 Master Plan 32 gates with the Wright Amendment in place.

Overall, the 20 gate No Wright Amendment scenario results have fewer emissions than the 32 gate No Wright Amendment scenario for each of the pollutants calculated by the EDMS model.

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# DMJM AVIATION AECOM

# Section 5 Economic Impact Assessment



Prepared by: DMJM Aviation and GRA, Inc.

#### SECTION 5—ECONOMIC IMPACT ANALYSIS

### **5.1 Economic Impact Assessment**

Dallas Love Field (DAL) is a significant infrastructure asset for the City of Dallas and its residents. DAL provides scheduled airline service and general aviation services to the people and firms in the Dallas metropolitan area and those who visit. In 2005, DAL served nearly six million arriving and departing passengers as well as a large corporate general aviation community, who base more than 500 general aviation aircraft at the airport. It is also home to a variety of service providers who serve those who use the airport, including federal service providers for air traffic control and aviation security. In addition, DAL is the location for a substantial aircraft maintenance and overhaul business, and a major U.S. airline is headquartered there. All of these activities are the source of significant benefit to the region's economy.

The methodology and approach used for this economic impact assessment is a general one, with the aim of providing an overview of the airport's economic activity and impact in the region. Several sources of data went into the assessment, including the economic impact analysis developed for DAL's 2001 Master Plan, recent data on airport activity and tenants, the GRA forecasts for DAL activity in the absence of the Wright Amendment (Section 1), and regional economic data from the U.S. Department of Commerce Regional Input-Output Modeling System (RIMS-II). The airport activity forecast data are used to ramp up current economic impact estimates to future years, and the RIMS-II regional multipliers make it possible to use direct and indirect output and spending data from the airport to estimate the effects on the region-wide economy on the airport's economic activity.

The assessment finds that DAL is responsible for an economic impact in 2005 of approximately \$4.3 billion in the City of Dallas and the metropolitan statistical area that includes the city. For future years, economic impact levels are estimated (in 2005 dollars) by scaling economic activity to the growth forecasts for the aviation activities that drive the airport's economic activity.

The economic impacts are calculated in terms of economic output, which includes:

- Primary airport impacts, sometimes called "direct impacts," are those that result from expenditures by the airport and the airport's tenants. For future years, these impacts are built up from forecast growth in the airport's aviation activity, including both commercial and general aviation services.
- Primary non-airport impacts, sometimes called "indirect impacts," are those that occur as a result of spending by visitors to the region who arrive at the airport, and then spend money elsewhere within the region's economy. This spending generally occurs away from the airport. For future years, these are built up from the GRA forecasts for future enplanements in the absence of the Wright Amendment, and on recent trends in general aviation activity.
- "Induced impacts" are those that result from the rounds of spending subsequent to the direct and indirect impacts described above. These are the economic transactions within the Dallas region that occur when the incomes derived from the primary rounds of spending and earning are themselves in turn spent. The source for the multiplier relationships used for these estimates is the RIMS-II data and model as developed by the U.S. Department of Commerce Bureau of Economic Analysis.

There are many companies and organization that are tenants at the airport, and in addition to commercial passenger air transportation services, these tenants offer a broad range of services to the passengers and other users of the airport. There are three passenger airlines operating

at DAL, and general aviation users of the airport have based more than 500 corporate jets and other aircraft at DAL.

Some airport tenants are federal agencies that provide air traffic control or security services to the general public and to aviation system users. Examples include the Federal Aviation Administration (FAA) and the Transportation Security Administration (TSA). Airport tenants are involved in such lines of business as:

- Air taxi and charter
- Aircraft repair and modification
- Aircraft sales and rental
- Avionics sales, rental and installation
- Automobile rental
- Flight instruction
- Q Fuel sales
- FBO services to general aviation users
- Hanger and tie-down rental
- Restaurants, retail, financial and vending services

The direct or primary economic impacts from the operations of these varied firms and airport users have been developed using the primary impacts estimated for the airport during the preparation of the 2001 Master Plan. A more recent tenant list provided current employment counts. Airport payrolls in 2005 were estimated using this new employment count and also an adjustment for productivity changes in the general economy since 2000. The dollar figures were also converted to 2005 dollars using the Consumer Price Index. Finally, primary airport economic output for 2005, presented in **Table 5-1**, was estimated by maintaining the 2001 Master Plan study's ratio between airport tenant payrolls and primary economic output.

Table 5-1: DAL Primary Airport Impacts – 2005

<b>Direct Impact Category</b>	<u>Amount</u>
Employment	8,201
Payroll	\$634.1 *million
Output	\$1,533.0 *million
*2005 dollars	

Primary non-airport economic impacts were also based on the estimates and methodology from the 2001 Master Plan. These impacts involve the spending by visitors to the Dallas region who arrive on flights into DAL. These are primarily passengers from commercial flights, but GA visitor arrivals are also included. The data and parameters for calculating these impacts are based on past passenger surveys conducted at the airport.

Table 5-2: DAL Primary Non-Airport Impacts – 2005 (Visitor Expenditures in Region)

Area Visitor Parameter	<u>Amount</u>
Annual Commercial Passengers	2,977,546
Annual General Aviation Passengers	175,232
Total Passengers	3,152,778
Visitors (55% of total)	1,734,028
Visitor Days (times 2.43)	4,213,688
Visitor Expenditures (times \$133.8/day)	\$563.9 *million
*2005 dollars	

Primary economic impacts of future DAL activity were estimated for the 20 and 32 Gate No Wright Amendment scenarios. For each scenario, growth in airport employment (which leads to growth in primary airport impacts) is assumed to be linked directly to growth in commercial passenger enplanements, but employment growth is adjusted for anticipated productivity improvements. These productivity values are based on annual average productivity improvements in the overall national economy (which equal 3.7% improvement in labor productivity per year), as reported in the 2006 Economic Report of the President for the years 2000 through 2005. Dollar values are stated in 2005 dollars, and average employee compensation is held constant from the 2005 estimate. Total economic output for airport-based activities is estimated by using the payroll/output ratio that was reported for the year 2000 in the Master Plan Update and extended to the 2005 economic output estimate.

For future primary non-airport economic impacts, it was necessary to develop estimates for annual commercial passenger enplanements and annual GA operations at the airport in future years. Enplanement forecasts were developed for each future scenario as part of this assignment. These enplanement forecasts are reported in Figures 1-4 and 1-5 of this report. Future GA operations were estimated by extending recent trends in annual GA operations at DAL to the year 2020. The annual growth rate for GA activity was estimated to be 2.2% based on these recent trends. Once these activity measures were established, visitor spending for each scenario was estimated using the methodology applied for the 2001 Master Plan Update (expressed in 2005 dollars).

Forecast primary economic impact estimates are reported for each scenario in **Table 5-3**. It should be kept in mind that just as economic activity at DAL will grow in future years, so will overall economic activity within the City of Dallas and the surrounding region. Therefore, while primary economic impacts for the airport will grow over time, this does not imply that the airport's share of overall economic activity within the city or the region will necessarily increase.

Table 5-3: Future Scenarios for DAL Primary Airport and Non-Airport Impacts

	2005 Impacts	No Wright Amendment			
	2003 IIIIpacts	20 Gates	32 Gates		
Direct impact Category	<u>2005</u>	<u>2020</u>	<u>2020</u>		
Employment	8,201	9,879	14,055		
Payroll	\$634	\$764	\$1,087		
Output	\$1,533	\$1,847	\$2,627		
Area Visitor Parameter					
Annual Commercial Passengers	2,977,546	6,155,406	8,757,139		
Annual General Aviation Passengers	175,232	249,058	249,058		
Total Passengers	3,152,778	6,404,464	9,006,197		
Visitors (55% of total)	1,734,028	3,522,455	4,953,404		
Visitor Days (times 2.43)	4,213,688	8,559,566	12,036,783		
Visitor Expenditures (times \$133.80/day)	\$563.9	\$1,145.5	\$1,610.9		
(Dollar t	erms in millions of	\$2005)			

The incomes earned, output and passenger spending identified for future year activity will, in turn, be received as income by other Dallas area residents and businesses, and spent again. The magnitude of this spending cycle—referred to as "induced economic impacts"—is estimated in regional economic multipliers that are developed by the Department of Commerce's Bureau of Economic Analysis. These multipliers have been applied to the 2005 estimate and to estimates of future primary airport and non-airport economic activity, and the resulting total economic impact of DAL within the Dallas region in these time periods and scenarios are reported in **Table 5-4**.

Table 5-4: Summary of Total Economic Impacts of DAL – 2005 and All Scenarios

	2005 Impacts	No Wright Amendment			
	2003 inipacts	20 Gates	32 Gates		
Type of Economic Impact Estimate	<u>2005</u>	<u>2020</u>	<u>2020</u>		
Primary Airport Direct Impacts	\$1,533.0	\$1,846.7	\$2,627.3		
Primary Non-Airport Impacts (visitors)	\$563.9	\$1,145.5	\$1,610.9		
Primary Airport Inducted Impacts	\$1,734.5	\$2,089.4	\$2,972.5		
Primary Non-Airport Induced Impacts	\$502.3	\$1,020.3	\$1,434.8		
Total Regional Economic Impact	\$4,333.7	\$6,101.9	\$8,645.4		
(Dollar te	rms in millions of \$200	5)			

## **5.2** Property Tax Contribution

An updated evaluation was completed to estimate the total property tax contribution from Dallas residential property owners residing within the 55+ DNL noise contours for all gate scenarios generated for this update. The estimated property tax contribution totals by contour level were derived using GIS information obtained from the City of Dallas Public Works and Transportation, GIS Division and the Dallas Central Appraisal District for Tax Year 2005. The new data allowed for updating the results of the Master Plan 32 Gate scenario to reflect 2005 property tax contribution. Compared to the Master Plan 32 Gate scenario, the 20 Gate No Wright Amendment scenario results indicate:

- There are approximately 11,768 residential parcels located within the DNL 55 dB or greater noise contour in the 20 Gate No Wright Amendment scenario (20 Gate NWA), and approximately 16,910 in the 32 Gate No Wright Amendment (32 Gate NWA), while the Master Plan 32 Gate scenario (MP 32 Gate) contains approximately 10,945.
- The estimated market value of the above properties is approximately \$2.79 billion (20 Gate NWA), \$2.97 billion (32 Gate NWA), and \$2.76 billion (MP 32 Gate).
- The taxable value of all residential properties within the DNL 55 dB or greater noise contour is approximately \$2.17 billion (20 Gate NWA), \$2.32 billion (32 Gate NWA), and \$2.16 billion (MP 32 Gate).
- The estimated property tax contribution is approximately:
  - § DNL 55 60 dB property tax contribution \$33,577,927 (20 Gate NWA), \$35,375,572 (32 Gate NWA), and \$33,104,323 (MP 32 Gate)
  - § DNL 60 65 dB property tax contribution **\$14,274,677** (20 Gate NWA), **\$15,175,353** (32 Gate NWA), and **\$14,087,637** (MP 32 Gate)
  - § DNL 65 70 dB property tax contribution **\$2,207,810** (20 Gate NWA), **\$2,674,524** (32 Gate NWA), and **\$2,373,978** (MP 32 Gate)
- The total estimated property tax contribution from those residing within the Love Field noise contours \$50.2 million (20 Gate NWA), \$53.4 million (32 Gate NWA), and \$49.7 million (MP 32 Gate).

A summary of the tax contribution for each of the gate scenarios is presented in **Table 5-5**.

Table 5-5: Property Tax Contribution from Residential Parcels within the DNL 55 dB Noise Contour

Master Plan 32 Gate (updated for INM 6.1)

DNL	Residential Parcels Under Contour	Total Market Value	Rate	Total Potential Tax Contribution
55-60	6,150	\$1,839,129,070	1.8%	\$33,104,323
60-65	3,514	\$782,646,490	1.8%	\$14,087,637
65-70	1,181	\$131,887,680	1.8%	\$2,373,978
70-75	100	\$7,416,020	1.8%	\$133,488
Totals	10,945	\$2,761,079,260	1.8%	\$49,699,427

20 Gate No Wright Amendment Scenario

DNL	Residential Parcels Under Contour	Total Market Value	Rate	Total Potential Tax Contribution
55-60	6,093	\$1,849,051,690	1.8%	\$33,282,930
60-65	3,513	\$793,037,600	1.8%	\$14,274,677
65-70	1,111	\$122,656,130	1.8%	\$2,207,810
70-75	67	\$4,935,530	1.8%	\$88,840
Totals	10,784	\$2,786,069,630	1.8%	\$50,149,253

32 Gate No Wright Amendment Scenario

DNL	Residential Parcels Under Contour	Total Market Value	Rate	Total Potential Tax Contribution
55-60	6,770	\$1,965,309,540	1.8%	\$35,375,572
60-65	3,753	\$843,075,150	1.8%	\$15,175,353
65-70	1,260	\$148,584,660	1.8%	\$2,674,524
70-75	137	\$9,916,840	1.8%	\$178,503
Totals	11,920	\$2,966,886,190	1.8%	\$53,403,951

## 5.3 Survey of Real Estate Values

A survey of real estate values for the areas surrounding Love Field was compiled and presented in the 2001 Master Plan/Impact Analysis for the years 1997 – 2000. This survey data has been researched from current sources and updated for the years 2001 – 2005 and is presented in **Table 5-6** for the areas shown in **Figure 5-1**. It should be noted that the data available for this update differed from that available at the time of the 2001 Master Plan in that it is for single family homes only. Thus, it should not be compared to the Master Plan in terms of numeric values, but it is an updated indicator of the continued positive growth in property values over the past 5 years.

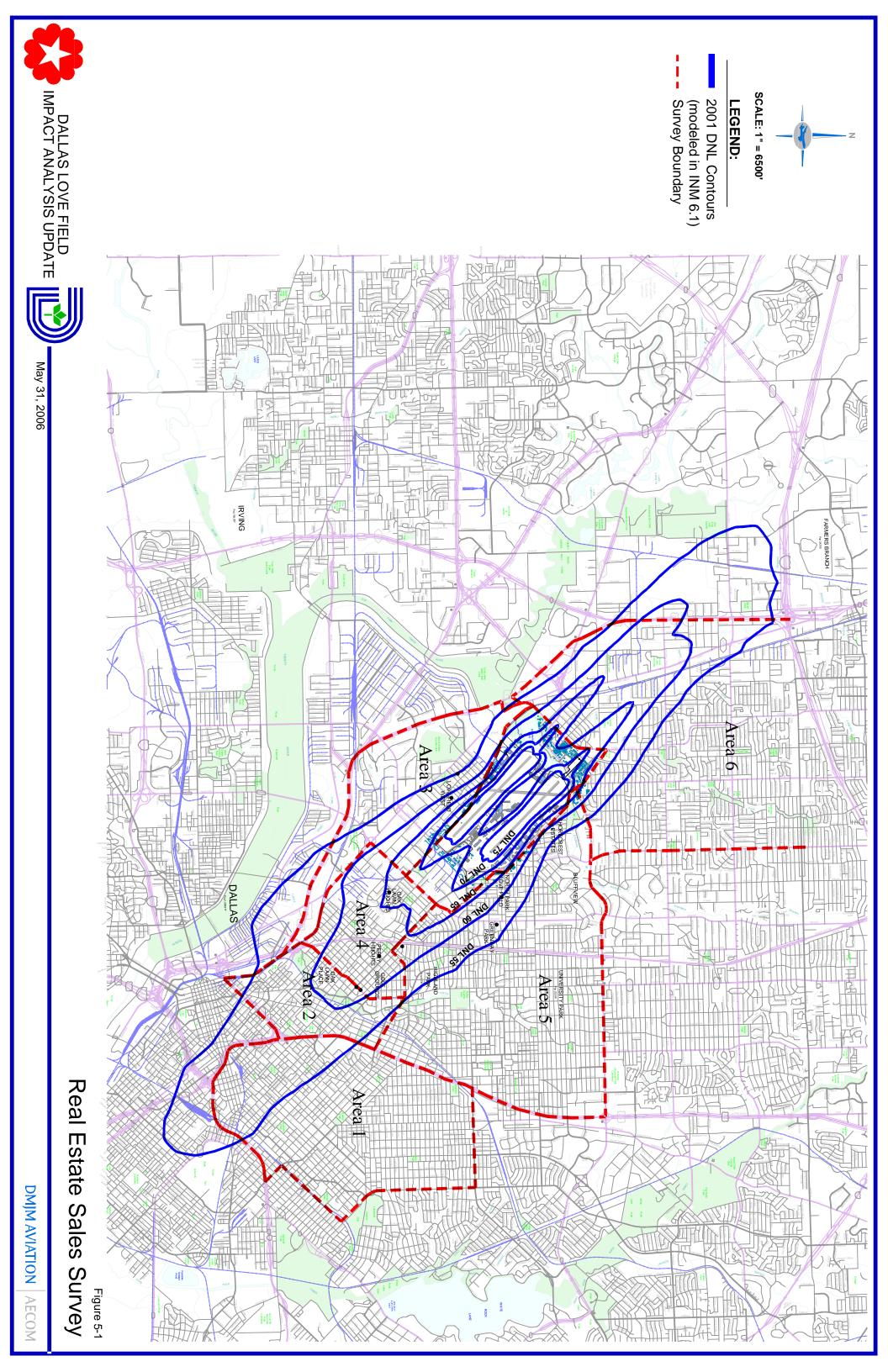
Table 5-6: Survey of Real Estate Data

	The second second	T-1-1	_						
	Location	Total		erage					Days on
		<u>Sales</u>	Sale	s Price		<u>Low</u>		<u>High</u>	<u>Market</u>
AREA 1	0004	405			_	00.000	_	225 222	
	2001	405		237,877	\$	32,000	\$	895,000	58
	2002	432		246,412	\$	26,000	\$	860,000	60
	2003	410	*	265,915	\$	68,500	\$	1,800,000	60
	2004	379		277,722	\$	50,000	\$	535,000	67
	2005	406	\$	241,153	\$	30,000	\$	380,000	59
	Percent Increase 2001 to 2005	0%		1%		-6%		-58%	2%
AREA 2									
	2001	11	\$	679,273	\$	79,900	\$	2,450,000	75
	2002	10	\$	360,175	\$	90,750	\$	950,000	47
	2003	8	\$	576,500	\$	55,000	\$	1,845,000	113
	2004	23	\$	570,452	\$	128,000	\$	1,750,000	93
	2005	20	\$	709,438	\$	138,000	\$	2,800,000	99
	Percent Increase 2001 to 2005	82%	•	4%		73%		14%	32%
AREA 3									
	2001	15	\$	69,170	\$	26,650	\$	106,000	70
	2002	15	\$	70,323	\$	27,000	\$	99,900	81
	2003	10	\$	85.783	\$	39,900	\$	138,000	38
	2004	18	\$	95.494	\$	48,000	\$	135,000	71
	2005	28	\$	96,125	\$	43,000	\$	135,000	60
	Percent Increase 2001 to 2005	87%	Ψ	39%	Ψ	61%	Ψ	27%	-14%
	i ercent increase 2001 to 2005								
AREA 4									
AREA 4	2001		\$		\$		\$	519.000	72
AREA 4	2001 2002	45		222,486	\$	55,000	\$	519,000 635,617	72 60
AREA 4	2002	45 36	\$	222,486 202,416	\$	55,000 45,000	\$	635,617	60
AREA 4	2002 2003	45 36 51	\$ \$	222,486 202,416 221,075	\$	55,000 45,000 63,750	\$	635,617 541,000	60 83
AREA 4	2002 2003 2004	45 36 51 55	\$ \$ \$	222,486 202,416 221,075 225,151	\$ \$ \$	55,000 45,000 63,750 72,500	\$ \$ \$	635,617 541,000 685,000	60 83 83
AREA 4	2002 2003 2004 2005	45 36 51 55 56	\$ \$ \$	222,486 202,416 221,075 225,151 268,633	\$	55,000 45,000 63,750 72,500 64,900	\$	635,617 541,000 685,000 680,000	60 83 83 56
AREA 4	2002 2003 2004	45 36 51 55	\$ \$ \$	222,486 202,416 221,075 225,151	\$ \$ \$	55,000 45,000 63,750 72,500	\$ \$ \$	635,617 541,000 685,000	60 83 83
	2002 2003 2004 2005	45 36 51 55 56	\$ \$ \$	222,486 202,416 221,075 225,151 268,633	\$ \$ \$	55,000 45,000 63,750 72,500 64,900	\$ \$ \$	635,617 541,000 685,000 680,000	60 83 83 56
AREA 4	2002 2003 2004 2005 Percent Increase 2001 to 2005	45 36 51 55 56 <b>24%</b>	\$ \$ \$ \$	222,486 202,416 221,075 225,151 268,633 <b>21%</b>	\$ \$ \$ \$	55,000 45,000 63,750 72,500 64,900 18%	\$ \$ \$ \$	635,617 541,000 685,000 680,000 <b>31%</b>	60 83 83 56 <b>-22%</b>
	2002 2003 2004 2005 Percent Increase 2001 to 2005	45 36 51 55 56 <b>24%</b>	\$ \$ \$ \$	222,486 202,416 221,075 225,151 268,633 <b>21%</b> 668,857	\$ \$ \$ \$	55,000 45,000 63,750 72,500 64,900 <b>18%</b>	\$ \$ \$ \$	635,617 541,000 685,000 680,000 <b>31%</b> 7,500,000	60 83 83 56 <b>-22%</b>
	2002 2003 2004 2005 Percent Increase 2001 to 2005 2001 2002	45 36 51 55 56 <b>24%</b> 776 836	\$\$\$\$\$	222,486 202,416 221,075 225,151 268,633 <b>21%</b> 668,857 692,915	\$ \$ \$ \$	55,000 45,000 63,750 72,500 64,900 <b>18%</b> 49,000 51,000	\$ \$ \$ \$	635,617 541,000 685,000 680,000 <b>31%</b> 7,500,000 4,500,000	60 83 83 56 <b>-22%</b> 77 78
	2002 2003 2004 2005 Percent Increase 2001 to 2005 2001 2002 2003	45 36 51 55 56 <b>24%</b> 776 836 850	\$\$\$\$	222,486 202,416 221,075 225,151 268,633 <b>21%</b> 668,857 692,915 732,980	\$ \$ \$ \$ \$	55,000 45,000 63,750 72,500 64,900 <b>18%</b> 49,000 51,000 51,400	\$ \$ \$ \$ \$	635,617 541,000 685,000 680,000 <b>31%</b> 7,500,000 4,500,000 9,250,000	60 83 83 56 <b>-22%</b> 77 78 83
	2002 2003 2004 2005 Percent Increase 2001 to 2005 2001 2002 2003 2004	45 36 51 55 56 <b>24%</b> 776 836 850 947	· \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	222,486 202,416 221,075 225,151 268,633 <b>21%</b> 668,857 692,915 732,980 623,298	\$ \$ \$ \$ \$ \$ \$	55,000 45,000 63,750 72,500 64,900 <b>18%</b> 49,000 51,000 51,400 53,000	\$ \$ \$ \$ \$	635,617 541,000 685,000 680,000 <b>31%</b> 7,500,000 4,500,000 9,250,000 7,995,000	60 83 83 56 <b>-22%</b> 77 78 83 69
	2002 2003 2004 2005 Percent Increase 2001 to 2005 2001 2002 2003 2004 2005	45 36 51 55 56 <b>24%</b> 776 836 850 947 880	****	222,486 202,416 221,075 225,151 268,633 <b>21%</b> 668,857 692,915 732,980 623,298 836,550	\$ \$ \$ \$ \$	55,000 45,000 63,750 72,500 64,900 <b>18%</b> 49,000 51,000 51,400 53,000 33,500	\$ \$ \$ \$ \$	635,617 541,000 685,000 680,000 <b>31%</b> 7,500,000 4,500,000 9,250,000 7,995,000 3,349,500	60 83 83 56 <b>-22%</b> 77 78 83 69 58
	2002 2003 2004 2005 Percent Increase 2001 to 2005 2001 2002 2003 2004	45 36 51 55 56 <b>24%</b> 776 836 850 947	****	222,486 202,416 221,075 225,151 268,633 <b>21%</b> 668,857 692,915 732,980 623,298	\$ \$ \$ \$ \$ \$ \$	55,000 45,000 63,750 72,500 64,900 <b>18%</b> 49,000 51,000 51,400 53,000	\$ \$ \$ \$ \$	635,617 541,000 685,000 680,000 <b>31%</b> 7,500,000 4,500,000 9,250,000 7,995,000	60 83 83 56 <b>-22%</b> 77 78 83 69
AREA 5	2002 2003 2004 2005 Percent Increase 2001 to 2005 2001 2002 2003 2004 2005	45 36 51 55 56 <b>24%</b> 776 836 850 947 880	****	222,486 202,416 221,075 225,151 268,633 <b>21%</b> 668,857 692,915 732,980 623,298 836,550	\$ \$ \$ \$ \$ \$ \$	55,000 45,000 63,750 72,500 64,900 <b>18%</b> 49,000 51,000 51,400 53,000 33,500	\$ \$ \$ \$ \$	635,617 541,000 685,000 680,000 <b>31%</b> 7,500,000 4,500,000 9,250,000 7,995,000 3,349,500	60 83 83 56 <b>-22%</b> 77 78 83 69 58
	2002 2003 2004 2005 Percent Increase 2001 to 2005 2001 2002 2003 2004 2005 Percent Increase 2001 to 2005	45 36 51 55 56 <b>24%</b> 776 836 850 947 880 <b>13%</b>	****	222,486 202,416 221,075 225,151 268,633 <b>21%</b> 668,857 692,915 732,980 623,298 836,550 <b>25%</b>	\$\$\$\$	55,000 45,000 63,750 72,500 64,900 18% 49,000 51,000 51,400 53,000 33,500 -32%	\$\$\$\$\$	635,617 541,000 685,000 680,000 <b>31%</b> 7,500,000 4,500,000 9,250,000 7,995,000 3,349,500 - <b>55%</b>	60 83 83 56 <b>-22%</b> 77 78 83 69 58 <b>-25%</b>
AREA 5	2002 2003 2004 2005 Percent Increase 2001 to 2005 2001 2002 2003 2004 2005 Percent Increase 2001 to 2005	45 36 51 55 56 <b>24%</b> 776 836 850 947 880 <b>13%</b>	*****	222,486 202,416 221,075 225,151 268,633 <b>21%</b> 668,857 692,915 732,980 623,298 836,550 <b>25%</b>	\$\$\$\$\$	55,000 45,000 63,750 72,500 64,900 18% 49,000 51,400 53,000 33,500 -32%	\$\$\$\$\$	635,617 541,000 685,000 680,000 <b>31%</b> 7,500,000 4,500,000 9,250,000 7,995,000 3,349,500 -55%	60 83 83 56 -22% 77 78 83 69 58 -25%
AREA 5	2002 2003 2004 2005 Percent Increase 2001 to 2005 2001 2002 2003 2004 2005 Percent Increase 2001 to 2005	45 36 51 55 56 <b>24%</b> 776 836 850 947 880 <b>13%</b>	****	222,486 202,416 221,075 225,151 268,633 <b>21%</b> 668,857 692,915 732,980 623,298 836,550 <b>25%</b>	\$\$\$\$\$	55,000 45,000 63,750 72,500 64,900 18% 49,000 51,400 53,000 33,500 -32% 40,000 27,500	\$\$\$\$\$	635,617 541,000 685,000 680,000 <b>31%</b> 7,500,000 4,500,000 9,250,000 7,995,000 3,349,500 -55% 571,428 529,000	60 83 83 56 -22% 77 78 83 69 58 -25%
AREA 5	2002 2003 2004 2005 Percent Increase 2001 to 2005 2001 2002 2003 2004 2005 Percent Increase 2001 to 2005	45 36 51 55 56 <b>24%</b> 776 836 850 947 880 <b>13%</b>	***	222,486 202,416 221,075 225,151 268,633 <b>21%</b> 668,857 692,915 732,980 623,298 836,258 <b>25%</b> 164,353 177,442 185,649	\$\$\$\$\$	55,000 45,000 63,750 72,500 64,900 18% 49,000 51,000 53,000 33,500 -32% 40,000 27,500 50,447	****	635,617 541,000 685,000 680,000 <b>31%</b> 7,500,000 4,500,000 9,250,000 7,995,000 3,349,500 -55% 571,428 529,000 535,000	60 83 83 56 -22% 77 78 83 69 58 -25%
AREA 5	2002 2003 2004 2005 Percent Increase 2001 to 2005 2001 2002 2003 2004 2005 Percent Increase 2001 to 2005 2001 2002 2003 2004 2005	45 36 51 55 56 <b>24%</b> 776 836 850 947 880 <b>13%</b> 519 499 496 509	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	222,486 202,416 221,075 225,151 268,633 <b>21%</b> 668,857 692,915 732,980 623,298 836,550 <b>25%</b> 164,353 177,442 185,649 196,392	\$\$\$\$\$	55,000 45,000 63,750 72,500 64,900 18% 49,000 51,000 53,000 33,500 -32% 40,000 27,500 50,447 30,000	****	635,617 541,000 685,000 680,000 31% 7,500,000 4,500,000 7,995,000 3,349,500 -55% 571,428 529,000 535,000 1,175,000	60 83 83 56 -22% 77 78 83 69 58 -25% 51 53 67
AREA 5	2002 2003 2004 2005 Percent Increase 2001 to 2005 2001 2002 2003 2004 2005 Percent Increase 2001 to 2005	45 36 51 55 56 <b>24%</b> 776 836 850 947 880 <b>13%</b>	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	222,486 202,416 221,075 225,151 268,633 <b>21%</b> 668,857 692,915 732,980 623,298 836,258 <b>25%</b> 164,353 177,442 185,649	\$\$\$\$\$	55,000 45,000 63,750 72,500 64,900 18% 49,000 51,000 53,000 33,500 -32% 40,000 27,500 50,447	****	635,617 541,000 685,000 680,000 <b>31%</b> 7,500,000 4,500,000 9,250,000 7,995,000 3,349,500 -55% 571,428 529,000 535,000	60 83 83 56 -22% 77 78 83 69 58 -25%

Source: Lynell Jones, using North Texas Real Estate Info. Systems, Inc., 5/25/06

Property type: Single Family

Status: Homes Sold





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