



**Worcester
Municipal
Research
Bureau**

AN INDEPENDENT VOICE FOR RESPONSIBLE GOVERNMENT

THE FEASIBILITY OF AIR CARGO AT WORCESTER AIRPORT

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EXECUTIVE SUMMARY

Based on an examination of air cargo operations at nine airports, the Research Bureau makes the following observations:

- The experiences of these airports suggest that significant road access and airfield improvements would be required in order to attract private all-air cargo carriers like FedEx, UPS, and Airborne Express. These improvements would also enhance the ability of Worcester Regional Airport to attract passenger carriers to the facility.
- While the development of a modest air cargo operation would generate a significant source of revenue to the Airport, it would not by itself offset the costs of these improvements. However, the experiences of the other airports examined suggests a significant amount of off-airport economic development might result from the initiation of air cargo service at Worcester Regional Airport.
- The community impacts of air cargo would likely be manageable. New Federal Aviation Administration (FAA) regulations would greatly limit the noise impact of the estimated 3 to 4 cargo aircraft that would arrive and depart Worcester Airport each day. The estimated 6 to 8 trucks that would be needed to serve these flights would also have a very limited local impact, especially considering that over 150 trucks are currently operating daily in the vicinity of Worcester Airport.
- The feasibility of air cargo operations at Worcester Airport will ultimately depend on the City's ability to obtain state and federal funds to pay for the improvements to the airfield and local roadways that will be required to attract both air cargo carriers and commercial airlines. If such funds can be obtained, air cargo service could play an important role in the Airport's future operational plans.

I. INTRODUCTION

In its 1998 Airport Capacity Enhancement Plan FAA reports that nationwide passenger enplanements (the number of passengers boarding airplanes) grew 24% from 1992 to 1997, and predicts that they will grow by an additional 57% by 2009. The FAA attributes much of the recent growth in enplanements to a strong national economy, which has spurred demand for commercial airline services. Even more substantial growth is predicted for the air cargo industry. The Boeing Corporation predicts that in the next twenty years the amount of air cargo shipped worldwide will triple.

Air cargo is shipped in two major ways: in the baggage compartments of passenger airplanes, and in planes dedicated exclusively to the transport of air freight. In an increasingly global economy which demands the timely delivery of critical documents and heavy equipment, the air cargo business has developed into a major international industry and has become an essential service for many business operations worldwide. While more total cargo weight is shipped in the baggage compartment or "belly" of passenger airplanes, the amount of cargo shipped by all-cargo carriers is growing rapidly and generates more total revenue.

Despite the recent national and regional growth in both passenger enplanements and air cargo service,¹ Worcester Regional Airport has experienced a dramatic decline in the number of passenger enplanements in the 1990s, and has no cargo service. In contrast, other New England airports have experienced steady, and in several instances meteoric, increases in enplanements along with comparable growth in their air cargo service since 1990. The impact of this substantial growth is most visible at Logan Airport, the region's largest and busiest facility, where a growing demand for passenger service, coupled with increasing flight delays, has led to a recent and highly controversial plan to build an additional uni-directional runway.

Logan also is no longer able to accommodate the growing number of cargo carriers who wish to develop and/or expand their operations there in order to serve the vibrant New England economy. The Massachusetts Port Authority (Massport), which owns and operates Logan and Hanscom airports has thus far preferred to concentrate its efforts

¹See Appendix A for a summary of passenger and cargo activity at the 9 airports examined.

on expanding Logan's passenger capacity, and expanding the capacity of other regional airports in New England.

Toward this end, Governor Cellucci recently filed a bill with the State Legislature which, if passed, would allow Massport to take over the management and eventually assume ownership of Worcester Regional Airport. The Cellucci administration and Massport officials have stated publicly that Worcester Airport will play a key role in the state's future transportation plans, although to date the specifics remain unclear. Given the continued lack of space to accommodate growing cargo operations at Logan, and the predicted increases in demand for this service, the development of air cargo service at Worcester Airport is a very real possibility.

This report explores the feasibility of developing air cargo service at Worcester Airport by examining the facilities and experiences of several regional airports: Hanscom(Bedford,MA), T.F. Green (Providence, RI), Manchester(NH), Portland(ME), Pease(NH), and Bradley(CT). Airports in Des Moines(IA) and Columbia(SC) were also examined.

We focus on three main issues:

- 1) An examination of the facilities and infrastructure in place in the nine airports studied, and an assessment of the key areas in which Worcester Regional Airport would require improvements so as to compete effectively for air cargo service.
- 2) An evaluation of the potential economic impact of air cargo service on both the Airport and the region.
- 3) An assessment of the impact that air cargo development could have on the City as a whole and its neighborhoods.

II. FACILITIES AND INFRASTRUCTURE ANALYSIS

The dominant firms in the all-air-cargo industry are integrated carriers. These organizations provide their customers with door-to-door pick up and delivery service and full logistical support. Major integrated air cargo carriers include Federal Express, United Parcel Service, DHL, Emery Worldwide, and Airborne Express. The main operational goal of these carriers is the timely and efficient delivery of their shipments, which are predominately small packages and critical documents. Integrated carriers compete fiercely for customers on both quality (reliability and timeliness) and price.

Small packages and documents can be delivered by air, truck or van. Typically, after being unloaded at the airport, air shipments are either loaded into tractor-trailer trucks and shipped to an off-airport sorting and distribution facility, or else are unloaded and sorted at the airport itself and then delivered to local destinations via van or small truck.

According to the airport managers interviewed, the major air cargo carriers (FedEx, UPS, Airborne etc.) have three major concerns when they are deciding where to locate their facilities and where to land their planes. The first concern is the overall demand for their services in the region served by the airport. Unlike their counterparts in the commercial airline industry, air cargo carriers tend not to demand publicly funded tax incentives and service guarantees (agreements from private firms to purchase their services) in exchange for locating their operations at a particular airport. Rather, air cargo carriers rely on their own local market studies to determine whether regional demand for their services is sufficient to justify the added expense of routing their limited number of airplanes to a particular regional airport. None of the New England airports examined has needed to provide tax or other financial incentives to attract air cargo service.

A second major consideration is the location and accessibility of the airport site. As noted above, providing reliable and timely service is critical to remaining competitive in the air cargo industry. Easy access to state and interstate highway systems is essential to ensuring that the trucking and delivery phase of the shipping process is as efficient and predictable as possible. In contrast to Worcester, each of the airports examined is located immediately adjacent to a major interstate highway.

A third major concern of air cargo carriers is the condition and facilities of the airfield itself. Its runways must be long enough to accommodate the aircraft that would be using the airport. It must be equipped with the parallel taxiways required to maneuver large aircraft to parking positions where they can be efficiently unloaded, refueled and serviced. The navigational equipment and Instrument Landing System (ILS) in place at the airport also must be sufficiently precise to ensure that landings will be possible and delivery deadlines will be met even in severe weather conditions.

Figure 1
AIRFIELD FACILITIES COMPARISON

Airport	Governance	Length/Width-Main Runway	Road Access	ILS System
Bradley	State D.O.T.	9,502X200	<10 minutes from I -91	Category 3
Columbia	Commission	8,602x150	<5 minutes from I-26**	Category 2
Des Moines	Municipal	9,001x150*	<10 minutes from I-80**	Category 1
Hanscom	Authority	7,001x150	< 5 minutes from I-95	Category 1
Manchester	Municipal	7,001X150* new 9,000' runway	< 10 minutes from highway**	Category 1 ***
Pease	State D.O.T.	11,318x150	<10 minutes from I-95**	Category 1
Portland	Municipal	6,800x150* will be 7,200	<10 minutes from highway **	Category 1
Providence	Authority	7,166x150	<5 minutes from I-95	Category 2***
Worcester	Municipal	7,000x150	15+ minutes from Route 290	Category 1

* Runway extension project planned ** Road Improvement Planned *** ILS upgrade planned

Prepared by: Worcester Municipal Research Bureau

III. WHERE WORCESTER STANDS

An assessment of the potential market for air cargo in the Central Massachusetts region has been recently undertaken by Leigh Fisher Associates, a private airport management consulting firm based in San Francisco. The preliminary results of their efforts suggest that local market demand for air cargo service is substantial enough to justify bringing air cargo service to Worcester Airport. This local demand is driven by the numerous corporations and manufacturing concerns located in the Central Massachusetts region that regularly ship and receive a considerable amount of freight and time- sensitive documents.

In addition to offering air cargo carriers a strong local market for their services, Worcester has a distinct competitive advantage in its proximity to the Greater Boston area. With less and less space to work with at Logan, and the planned removal of a portion of the central artery (Route 93) related to the "Big Dig," air cargo carriers will

increasingly be forced to consider alternatives to Logan. Worcester Airport is geographically well-positioned to take advantage of this opportunity.

The state of road access to Worcester Airport is the most obvious obstacle preventing Worcester from fully capitalizing on this natural advantage. While improvements in signage in recent years have made finding the Airport much easier, the circuitous routes that must be traveled through residential neighborhoods, and the very steep hill that leads to the Airport and its existing warehouse facility make accessibility by truck less than ideal. According to industry experts, cargo carriers are most concerned with the amount of time it takes to get from the Airport to the nearest interstate highway, in this case Route 290 or the Massachusetts Turnpike.

Currently, both Federal Express and UPS have distribution and sorting centers in the area (in Auburn and Shrewsbury respectively). Packages processed at these facilities are trucked in from Logan Airport, despite their proximity to Worcester Airport. One major reason for this seemingly inefficient arrangement is Worcester Airport's poor highway access.² Roadway improvements that significantly reduce the time it would take a tractor-trailer truck to reach the highway from the Airport would greatly improve the chances that Worcester Airport officials could persuade Federal Express, UPS, and other integrated cargo carriers to land their planes in Worcester.

The existing airfield facilities at the Airport also are an impediment to the development of air cargo service. Currently, the Airport's Instrument Landing System (ILS) is the least sophisticated system available, Category 1. Typically, ILS upgrades are paid for with FAA funds that are granted to airports that can demonstrate at least 2,500 air carrier instrument landing approaches for three consecutive years. According to Airport officials, in 1997 and 1998 there were 1,004 and 1,085 instrument-landing approaches, respectively, at Worcester Airport. Only 100 of the ILS approaches involved commercial airlines, the remainder coming from private and corporate airplanes.

Since the Airport will not be eligible for an FAA-funded ILS upgrade in the foreseeable future, the only available alternative is to request a non-federal installation. This would

² The location of other facilities is another major factor. Both FedEx and UPS have facilities in the Framingham area. These facilities process twice as many packages as their Auburn and Shrewsbury counterparts. Trucking the final third of those packages west to the Worcester area is currently more efficient than flying into Worcester and trucking east to the Framingham area.

involve the Airport purchasing an upgraded ILS using its own funds. An airport-purchased ILS would be technically identical to an FAA funded system. While it is possible that the FAA could elect not to provide the support and maintenance functions that typically come with an FAA-funded ILS, knowledgeable airport officials suggest that this is highly unlikely. (If the FAA did decline, the Airport would have to maintain the ILS with its own revenues.)

Figure 2
Flight Cancellations due to Worcester Weather

Month	1992	1997
January	24	27
February	12	12
March	26	20
April	5	15
May	5	4
June	2	2
July	4	7
August	4	7
September	12	2
October	15	0
November	56	20
December	83	13
Total (% of total scheduled)	248 (5.4%)	129(1.6%)

Source: Worcester Airport

Prepared by: Worcester Municipal Research Bureau

Flight cancellations due to Worcester weather have declined from 5.4% of all flights in 1992, to 1.6% of all flights in 1997. Despite this dramatic reduction in weather-related flight cancellations, Worcester Airport is still perceived by cargo carriers, commercial airlines, and travel agents as an unreliable place to schedule air service. An ILS upgrade would significantly improve Worcester's chances of attracting both cargo and passenger carriers to the Airport because it would further reduce weather-related cancellations and help to dispel popular misconceptions about the reliability of Worcester Airport.

Currently, aircraft landing at the Airport must back-taxi on the runway in order to get to the gate to deplane passengers. One potential solution to this problem would involve constructing a "jug handle," a semicircular turning area at the end of Runway 11-29. According to industry experts, the "jug handle" would be needed to allow the larger "wide-body" cargo aircraft occasionally used by cargo carriers to access gates and cargo facilities without backing up on the runway. It should be noted that the "jug handle" solution would need to be viewed as the first phase of a longer term effort to construct a full parallel taxiway adjacent to Runway 11-29. The full parallel taxiway project could be delayed until increases in air traffic warranted its development.

The Airport's existing 45,000 square foot Euro-American Cargo facility can accommodate cargo unloading at three 22-foot high bays, each of which can service a 727 aircraft. There are also ten truck bays which allow the efficient transfer of cargo and freight from the warehouse to the tractor-trailer trucks which carry the cargo to another sorting and distribution facility or to its final destination.

Worcester Airport has two runways: Runway 11-29, which is 7,000 feet long, and Runway 15-33, which is 5,500 feet long. The current length of these two runways limits the size of the aircraft that can land safely at Worcester Airport and the destinations that can be safely reached with a profitable number of passengers or payload on board. Unlike the commercial airline industry, cargo carriers tend to fly into a limited number of central hubs, most of which can be reached with profitable loads using Worcester Airport's main runway.

IV. POTENTIAL ECONOMIC IMPACT

The primary way in which the airports examined generate revenue from air cargo activities is through landing fees. Landing fees are assessed to each incoming flight based on the total landed weight of the airplane. Landing fees in the airports examined ranged from \$1.16 to \$1.56 per 1,000 pounds of landed weight.

In Portland, ME (which charges landing fees of \$1.16/1,000 lbs.), the airport director estimated that the 3 cargo jets that land on an average day generate approximately \$135,000 per year in landing fee revenue and \$54,000 in rental revenue for airplane parking positions. The volume of activity and revenue generated at Portland International Jetport, which has two major cargo carriers (Federal Express and

Airborne), is likely to be similar to the potential air traffic and revenue stream that would be created at Worcester Airport if air cargo carriers were to begin to land their planes here.

There is also a small amount of airport revenue produced by fuel flowage fees, a premium added to the price of airplane fuel. While there is the potential for additional revenue to the airport for hangar and warehouse space rental and other on-site amenities, it is the norm in the airports examined for those operations to be handled by private operators. Occasionally these private operators pay small fees to the airport.

An air cargo operation that was similar in scope and service to that in place in Portland and T.F. Green would probably not produce enough direct revenue to the airport itself to cover the costs of the improvements that would be required in order to attract air cargo carriers. However, if air cargo produced \$189,000 in revenue, as is the case in Portland, it would constitute 8% of Worcester Airport's total FY99 budget of \$2.3 million. Cargo activity would become the single largest source of privately generated revenue to the airport.

Improved road access and investments in updated airfield facilities would also enhance the ability of the Airport to attract and retain commercial airline service, facilitating another significant source of direct revenue to the Airport and providing improved passenger service to the region. There is also good reason to believe that significant off-airport economic impacts would follow the development of cargo service. These impacts, while difficult to measure precisely, suggest that the air cargo business is best viewed as an economic engine for the region, rather than a source of significant revenue to the Airport itself.

Some of the airports examined have undertaken studies of the economic impact of their operations on the local economy. While these studies do not separate out the impact of cargo service specifically, they indicate that the regional economic benefits of an active airport can be substantial.

In 1995, Des Moines, IA commissioned a study of the impact of its airport on the local economy. At that time the total economic impact of the airport was estimated to be \$250 million, with an estimated 3,800 jobs that were either directly or indirectly connected to the airport operation.

A comprehensive study of the impact of T.F. Green Airport in Providence is currently underway and is due to be released later this year. According to T.F. Green's deputy executive director, the economic impact of the airport on the local economy is expected to be over \$1 billion per year. He believes that a small but significant portion of this total can be attributed to their cargo business.

In Portland, ME, the airport director estimates that Federal Express and Airborne, the two cargo carriers providing service at his airport, directly employ fifty local residents. He also stressed that the availability of air cargo service at the airport, which allows for 8am pickup and delivery service to downtown Portland, is highly valued by the local business community.

In several of the airports visited, there were clear signs of new business locations and other airport-related development taking place. In an off-airport land parcel immediately adjacent to Bradley Airport in Windsor Locks, CT, a number of new warehouse and distribution facilities have been built in recent years. According to Andre Libert, Bradley's marketing director, the location of these new facilities is a direct result of the airport's successful cargo operation. Similar signs of airport-related development were witnessed in the general areas surrounding the Manchester, Portland, and Pease airport facilities.

The widely-held view of public officials that airports are important for industrial and commercial growth and tourism has led communities to make substantial investments in their airports. According to Alfred Testa, who until recently managed Manchester Airport, the city of Manchester has demonstrated its belief in the economic value of an active airport by spending \$320 million on airport improvement projects since 1991. A new \$75 million road that directly connects the airport to the state highway system is currently being built and two new runways and several new air cargo facilities (more airplane parking space, cargo ramps and warehouses) are planned. The city has funded these improvements using both federal and state funding sources as well as issuing its own airport revenue bond for almost \$124.3 million. This revenue bond will be repaid using Passenger Facilities Charges (PFCs), a charge assessed to every passenger ticket, and monies obtained from the FAA's Airport Improvement Program (AIP).

The Rhode Island Airport Corporation is investing \$6 million to expand its airplane parking area and \$15 million to rehabilitate its main runway. Included in the plans for runway improvement is an upgrade from a Category 2 to a Category 3 Instrument Landing System (ILS). Since 1995 they have invested over \$200 million in terminal, parking and other improvements and have plans to spend an additional \$125 million.

The City of Portland is undertaking \$20 million in airport improvements. These include resurfacing and lengthening runways, upgrading to a Category 3 ILS, widening taxiways, and dramatically improving highway accessibility by building a new road that directly connects the airport to the state highway system.

These improvement projects were undertaken to improve each airport's capacity to handle a growing demand for both cargo and passenger service. It is clear that improved road access and airfield facilities benefit both the commercial airline and air cargo segments of their business operations.

If Worcester is serious about attracting air cargo carriers and commercial airline service to Worcester Airport, a significant investment will be needed to pay for the substantial road access and airfield improvements required to bring the Airport closer to the level of those examined. According to engineering estimates provided to the City, upgrading the ILS system will cost an estimated \$4.5 million, while constructing a "jug handle" to help compensate for the Airport's lack of a parallel taxiway could cost an estimated \$5 million. Road access improvements will likely cost considerably more. A number of alternative access routes to the Airport have been discussed in recent months. (See Appendix B for a description of the three routes recommended by The Rust/MassHighway report.) MassHighway officials estimate that the cost of road access improvements would be approximately \$25 million.

Since Worcester Airport is currently operating with an annual deficit and has no immediate prospects for generating revenue, the City will be unable to issue an airport revenue bond to underwrite the improvements required to attract potential air cargo carriers and commercial airlines. Because the City is not in a financial position to fund the necessary improvements itself, the Airport will likely be dependent on non-municipal sources of funding. The FAA, the State of Massachusetts, and the Massachusetts Port Authority are the obvious sources of potential support. While the City has sustained more than \$7.7 million in all-inclusive airport losses and has issued bonds for \$11.5

million since 1990³ to fund the Airport's terminal and other facilities, this investment may well pale in comparison to the amount that will be required to make the Airport a viable and competitive facility.

Figure 3

Estimated Costs and Sources of Funding for Airport Improvements

Improvement	Estimated Cost	Potential Funding Source
ILS Upgrade	\$4.5 million	FAA Grant and/or state or local funds
"Jug Handle"	\$5 million	FAA Grant and/or municipal funds
Cargo Ramp/Taxiway	\$8 million	FAA Grant or State funds
Road Access	Approx. \$25 million	State and federal highway funds

Prepared by: Worcester Municipal Research Bureau

V. POTENTIAL COMMUNITY IMPACT

There are two main ways in which air-cargo could adversely affect the quality of life of the residents of the neighborhoods surrounding Worcester Airport: increased noise from incoming and outgoing aircraft, and increased traffic from the tractor-trailer trucks that would be required to support air cargo service.

A. NOISE

In an effort to limit the noise impact of airport operations on local communities, the FAA has instituted regulations(FAR36) requiring all commercial and cargo aircraft to be equipped with much quieter Stage 3 engines, or to undergo modifications which reduce the noise they generate to meet Stage 3 standards. These regulations become operative at the end of this year. The effect of these new regulations will be to substantially decrease the noise produced by arriving aircraft. In fact, the sound produced by Stage 3 aircraft engines will be less than the sound produced by the air passing over the airplane's wings.

A new cargo operation at Worcester Airport would require a formal noise study prior to the initiation of cargo service as part of a federally required environmental impact

³ City of Worcester, Comprehensive Annual Financial Reports, 1990-1998

assessment. In this noise study both the volume, arrival, and departure times of cargo flights would be considered.

In 1991 the City of Worcester conducted a Noise Compatibility Study which assessed the potential noise impact of what at that time was expected to be an increasing number of aircraft making use of Worcester Airport. This study, which was overseen by an Advisory Committee composed of public officials, representatives of local businesses, and citizens, concluded that if their recommended Noise Compatibility Program was adopted, the noise impact of increased service at Worcester Airport would be acceptable to the community.

In order to assess the likely quality-of-life impact of cargo service at the Worcester Airport, it is also necessary to consider the total number of daily flights and their arrival and departure times. At Portland International Jetport, the airport director reports that cargo produces six additional jet operations per day. In Providence, the deputy executive director of T.F. Green airport reported eight daily jet operations that are associated with the cargo business. Both officials reported an increase in their cargo activity during the holiday season.

Given its size and facilities, an improved Worcester Airport would likely experience a similar amount of cargo activity as T.F. Green and Portland International Jetport, approximately three to four cargo flights arriving and three to four departing per day, with some increase in volume to be expected during the holiday season. The arrival and departure times for most of these cargo flights were similar across all the airports examined. Cargo flights tend to arrive quite early in the morning, typically between 6 and 8am. Freight and packages are then unloaded and trucked out to centrally located distribution facilities by mid-morning. The departure times of outgoing flights can vary, but usually occur in the early evening, after the last pick-ups have been made and the planes have been loaded⁴. In light of the relatively small number of cargo flights and the

⁴ The Governor and Massport have discussed the role of Worcester Regional Airport within the context of their regional transportation plans. If commercial activity at Worcester Airport increased to 500,000 enplanements per year (the current design capacity of the passenger terminal) or 1370 enplanements per day, what would be the extent of air-traffic? With a 60% load factor (percentage of seats filled to actual capacity), there would be approximately 2250 departing seats each day. If, for example, Worcester Airport were served by regional jets averaging 75 seats and commuter aircraft averaging 35 seats, there would be a need for approximately 18 jet and 26 commuter flights per day for a total of 44 departures.

new FAA regulations (FAR 36) limiting engine noise, the community impact of cargo aircraft would likely be minor.

B. POTENTIAL TRAFFIC

While the number of trucks and vans associated with air-cargo service varies based on the type of freight and packages shipped and received in the local market, a rough rule of thumb emerged from our examination of the air cargo experiences of other airports. According to the airport and facilities managers interviewed, the average cargo flight requires approximately two tractor-trailer trucks. If Worcester were to attract Federal Express and UPS to the airport, and handled three to four cargo flights per day, as is currently the case in Portland and Providence, one could reasonably expect six to eight tractor-trailers a day to be coming in and out of Worcester Airport to service these flights. Currently the Airport Industrial Park and the area immediately adjacent to the Airport is home to a number of businesses that ship and receive products and supplies by truck. Trucks also regularly visit the Airport itself, delivering fuel and other freight.

Figure 4
Current Truck Volume adjacent to the Worcester Regional Airport

Firms	Daily Large Trucks	Daily Vans
Chand Associates	3	3
Folio Exhibits	25	2
Heinrich Ceramic Decal	0	2
IPL	5 to 7	0
Jefferson Rubber Works	5	2
Kennedy Die Casting	4 to 5	3
Kinefac Corp.	5 to 10	Occasionally
LaVigne Press	3 to 5	3 to 4
Leon Supply	2 to 10	0
Madison Wire and Cable	50	0
TJ MAXX	54 to 69	2
Total	156 to 189	17 to 18

Note: Volume estimates derived from telephone interviews with representatives of each firm.

Prepared by: Worcester Municipal Research Bureau

Since there are already 156 to 189 trucks and 17 to 18 vans operating daily in the vicinity of the Airport, six to eight additional trucks per day would have a negligible impact on the local community. It is also possible that if air cargo service were available at Worcester Airport, local firms would find it more financially advantageous to send by air some of the freight they are now trucking, thereby reducing the overall number of trucks making daily visits to the airport industrial park and the surrounding area.

Judging from the experiences of the other airports examined, the six to eight additional trucks that would support a modest air-cargo operation at Worcester Airport would be departing the airport between 8 and 10AM and returning between 6 and 8PM. If FedEx and UPS were to land their planes in Worcester, the destination of a third of these trucks would be their distribution centers in Auburn and Shrewsbury. The remaining two-thirds of the trucks would drive to comparable facilities in Framingham and Ashland.

VI. CONCLUSION

The experiences of the airports examined indicate that the regional economic benefits of air cargo may be substantial while the noise and traffic impact of air cargo would likely be modest. The community impact of air cargo is likely to be manageable. New FAA regulations will ensure that the noise impact of new flights will be kept to a minimum and any significant increase in flight activity at Worcester Airport will require a formal environmental impact assessment, including a noise study. Should the results of this study indicate a significant impact, the FAA has funds available for noise abatement programs. The impact of the six to eight additional trucks that would transport air cargo each day would likely be minor, considering that the proposed road improvements (See Appendix B) would dramatically increase the capacity of the roadways immediately adjacent to the airport.

The feasibility of air cargo at Worcester Airport will ultimately depend on the ability of the City to obtain federal and state funds to pay for improvements to the airfield and local roadways that will be required to attract both air cargo carriers and commercial airlines. If these funds can be obtained, air cargo service should play an important role in the Airport's future operational plans.

Appendix A

Passenger Enplanements in Examined Airports, 1990-1997

Airports	1990	1991	1992	1993	1994	1995	1996	1997	% Chg.
Bradley	2,489,965	2,235,121	2,326,590	2,322,392	2,359,592	2,559,642	2,693,490	2,684,701	7.8%
Columbia	555,681	514,096	512,586	501,210	596,487	569,666	586,877	580,899	4.3%
Des Moines	693,842	718,927	715,603	677,216	681,033	795,625	892,848	972,916	28.7%
Manchester	379,145	411,350	419,856	395,117	454,574	432,774	486,128	542,247	43.0%
Portland	570,630	558,784	608,208	592,827	577,803	558,095	565,425	602,886	5.7%
Providence	1,216,548	1,108,383	1,155,961	1,133,430	1,218,681	1,073,939	1,234,271	2,017,782	66.0%
Worcester	150,373	113,729	108,683	99,931	72,910	33,102	41,344	42,849	-71.5%

Note: Pease and Hanscom Airports currently have no passenger service

Source: Federal Aviation Administration

Prepared by: Worcester Municipal Research Bureau

All-Cargo Activity (Pounds of Landed Weight) 1992-1997

Airports	1992	1993	1994	1995	1996	1997	% Chg.
Bradley	811,444,450	803,611,05	873,813,695	879,659,830	927,425,360	996,695,070	22.8%
Columbia	195,935,205	286,621,840	265,760,455	562,980,245	802,837,760	989,075,305	404.8%
Des Moines	488,110,050	556,521,760	697,440,470	801,148,220	719,490,785	703,055,370	44.0%
Manchester*	0	0	307,698,270	316,614,700	368,926,460	398,364,850	29.5%
Pease*	0	0	11,964,500	39,184,000	45,267,000	55,481,000	363.7%
Providence	78,983,000	0	0	100,205,700	123,943,380	121,699,700	54.1%

* percent change calculated from 1994-1997 Note: Worcester and Hanscom airports have no cargo service.

Historical data on landed weight were not available for Portland(ME). According to the Airport Director, 31,169,341 lbs. of cargo landed in Portland last year.

Source: Federal Aviation Administration

Prepared by: Worcester Municipal Research Bureau

Appendix B

The Three Airport Access Routes Recommended by the Rust/ MassHighway Report

Source: Worcester Regional Airport Access Study, October 1998

- 1) I-290 Exit 10/Hope Avenue/Clover Street/Pinehurst Avenue/Grandview Avenue/Goddard Memorial Drive/Airport Drive

Required Improvements Complete the I-290/Hope Avenue interchange (providing an off-ramp from I-290 eastbound and an on-ramp to I-290 westbound). Extend Hope Avenue on new alignment to Clover Street or provide another connection between Hope Avenue and Pinehurst Avenue in the Clover Street area. Upgrade the roads in the Clover and Grandview Avenue areas from local streets to at least two-lane connectors. Rework the Grandview Avenue area connecting road's intersections with Stafford Street and Main Street.

- 2) I-90 Exit 10/Oxford Street/Pinehurst Avenue/Grandview Avenue/ Goddard Memorial Drive/Airport Drive

Required Improvements Upgrade a connection in the Grandview Avenue area from a local street to at least a two-lane connector. Rework the connecting road's intersections with Stafford Street and Main Street.

- 3) I-90 New Exit/Route 56/Stafford Street/ Grandview Avenue/ Goddard Memorial Drive/Airport Drive

Required Improvements Create a new I-90/Route 56 interchange. Upgrade roads in the Grandview Avenue area from local streets to at least a two-lane connector. Rework the connecting road's intersections with Stafford Street and Main Street.