FAA Regional Air Service Demand Study

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(Phase I)

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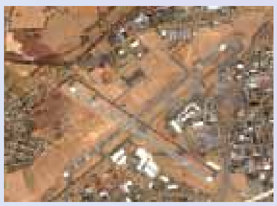
(Phase II)

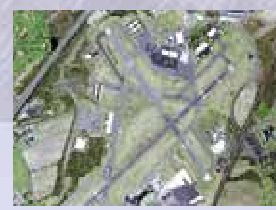
Task E — Assessment of Suburban Airports' Capacity To Meet Current and Forecasted Demand

May 2007

Delaware Valley Regional Planning Commission


ABE –
Lehigh Valley
International Airport


ACY –
Atlantic City
International Airport


TTN –
Trenton Mercer
Airport

Port Authority of New York & New Jersey


JFK –
John F. Kennedy
International Airport

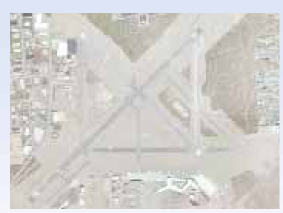

LGA –
LaGuardia Airport


EWR –
Newark Liberty
International Airport

New York State Department of Transportation


SWF –
Stewart International
Airport


HPN –
Westchester County
Airport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DVRPC: 3-42-0125-003-03 (Phase I); 3-42-0125-005-05 (Phase II)

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EXECUTIVE SUMMARY

Introduction and Purpose

It is widely accepted that at some point in the future, John F. Kennedy International (JFK), Newark Liberty International (EWR), and LaGuardia Airport (LGA), will ultimately exceed their capacity to accommodate the demand for commercial air service in the NY/NY metropolitan area. Recognizing both the limitations of the three metropolitan area airports and the possibility that other commercial service airports in the region could potentially augment regional airport capacity, the Federal Aviation Administration (FAA) initiated a study to evaluate future air service demand in the region and to assess the ability of nine regional airports to accommodate that demand. Under contract with the Delaware Valley Regional Planning Commission, and funded by an FAA grant, a team of aviation consultants comprised of staff from Parsons Brinckerhoff Aviation, Landrum & Brown, and Airport Interviewing and Research, initiated the FAA Regional Air Service Demand Study (The Study) in late November, 2004.

Included in the Study is an examination and assessment of the region's three large-hub airports including John F. Kennedy International (JFK), LaGuardia Airport (LGA) and Newark Liberty International Airport (EWR), as well as, six of its small hub airports, including Stewart International (SWF), Westchester County (HPN), and Long Island/Mac Arthur (ISP) Airports in New York State; Trenton Mercer (TTN) and Atlantic City International (ACY) Airports in New Jersey; and Lehigh Valley International Airport (ABE) in Pennsylvania. To some degree, the service areas of the small-hub airports overlap that of the region's large-hub airports. It is therefore important to determine to what extent these outlying airports can provide incremental capacity in the regional airport system.

Primary among the study tasks was the requirement to assess capacity at the three NY/NJ metropolitan large-hub commercial service airports, as well as the six small-hub regional airports noted above. The goal of the capacity assessment exercise was to:

- Assess existing (2004) landside, terminal and airfield capacity at ABE, ACY and TTN
- Compare existing (2004) capacity levels to unconstrained forecasts of demand for 2015 and 2025
- Identify the level of capacity required to meet the unconstrained forecasts for 2015 and 2025

This report presents the results and key findings associated with Task E: "The Assessment of Airport Capacity" and covers the analysis associated with ABE, ACY and TTN.

Summary of Findings - Airside Capacity Analysis

ABE - Existing Airfield Capacity

As stated in section I.1.1, the base peak hour capacity was 60 operations per hour. When adjusted to account for the number of local/touch-and-go operations the hourly capacity is 68 operations. **Table I** shows the peak hour capacity with and without touch and go operations and the resulting annual capacity based on the demand profile presented in Section II.1.1.

Table 1
ABE Peak Hour and Annual Operations Capacity

Peak Hour Capacity	
Without touch and go activity	60
With touch and go activity	68
Annual Capacity	
Without touch and go activity	216,000
With touch and go activity	244,000

Based on the analysis presented above, the existing airfield has sufficient capacity to serve the forecast demand through the planning period.

ACY - Existing Airfield Capacity

As stated in section I.1.1, the base peak hour capacity was 60 operations per hour. When adjusted to account for the number of local/touch-and-go operations the hourly capacity is 74 operations. **Table II** shows the peak hour capacity with and without touch and go operations and the resulting annual capacity based on the demand profile presented in Section III.1.1.

Table 2
ACY Peak Hour and Annual Operations Capacity

Peak Hour Capacity	
Without touch and go activity	60
With touch and go activity	74
Annual Capacity	
Without touch and go activity	224,000
With touch and go activity	273,000

Based on the analysis presented above the existing airfield has sufficient capacity to serve the forecast demand through the planning period.

TTN - Existing Airfield Capacity

As stated in section I.1.1, the base peak hour capacity was 60 operations per hour. When adjusted to account for the number of local/touch-and-go operations the hourly capacity is 70 operations. **Table IV-2** shows the peak hour capacity with and without touch and go operations and the resulting annual capacity based on the demand profile presented in Section IV.1.1.

Table 3
TTN Peak Hour and Annual Operations Capacity

Peak Hour Capacity	
Without touch and go activity	60
With touch and go activity	70
Annual Capacity	
Without touch and go activity	228,000
With touch and go activity	269,000

Based on the analysis presented above the existing airfield has sufficient capacity to serve the forecast demand through the planning period.

Summary of Findings - Terminal Capacity Analysis

Exhibit 1
ABE Annual Capacity Estimates

A. Domestic Equivalent Check-in Positions

Existing Facilities (positions)	Design Hour Capacity (O&D enplanements)	Annual Capacity
46	600	845,000

C. Security Screening (SSCP) Lanes

Existing Facilities (lanes)	Design Hour Capacity (O&D enplanements)	Annual Capacity
6	760	1,070,000

D. Contact Gates

Existing Facilities (NBEG)	Design Hour Capacity (NBEG)	Annual Capacity
17.7	17.7	1,552,000

E. Holdrooms

Existing Facilities (square feet)	Design Hour Capacity (EQA)	
21315	11.3	1,163,000

F. Domestic Baggage Claim

Existing Facilities (linear feet)	Design Hour Capacity (O&D deplanements)	Annual Capacity
260	660	929,000

Summary of Findings - Terminal Capacity Analysis

Exhibit 2
ACY - Annual Capacity Estimates

A. Domestic Equivalent Check-in Positions

Existing Facilities (positions)	Design Hour Capacity (O&D enplanements)	Annual Capacity
40	510	809,000

C. Security Screening (SSCP) Lanes

Existing Facilities (lanes)	Design Hour Capacity (O&D enplanements)	Annual Capacity
3	540	857,000

D. Contact Gates

Existing Facilities (NBEG)	Design Hour Capacity (NBEG)	Annual Capacity
8.0	8.0	1,142,000

E. Holdrooms

Existing Facilities (square feet)	Design Hour Capacity (EQA)	
13991	7.6	1,085,000

F. Domestic Baggage Claim

Existing Facilities (linear feet)	Design Hour Capacity (O&D deplanements)	Annual Capacity
280	340	539,000

Summary of Findings - Terminal Capacity Analysis

Exhibit 3
TTN – Annual Capacity Estimates

A. Domestic Equivalent Check-in Positions

Existing Facilities (positions)	Design Hour Capacity (O&D enplanements)	Annual Capacity
3	60	49,000

C. Security Screening (SSCP) Lanes

Existing Facilities (lanes)	Design Hour Capacity (O&D enplanements)	Annual Capacity
1	40	33,000

D. Contact Gates

Existing Facilities (NBEG)	Design Hour Capacity (NBEG)	Annual Capacity
2.0	2.0	94,000

E. Holdrooms

Existing Facilities (square feet)	Design Hour Capacity (EQA)	
855	0.4	33,000

F. Domestic Baggage Claim

Existing Facilities (linear feet)	Design Hour Capacity (O&D deplanements)	Annual Capacity
38	30	25,000

Summary of Findings - Landside Capacity Analysis

ABE – Terminal Frontage Roadways

As shown in Table 4, there is sufficient frontage curb capacity for the inner arrivals and outer departures roadways under 2004, 2015 and 2025 passenger demand conditions. A redistribution of excess curb space surplus for passenger cars on arrivals roadway is necessary to mitigate curb deficit for taxis/limos and buses. The existing bus stop length of 349 feet should be reduced to 150 feet for the redistribution of available curb surplus for taxis/limos, buses and shuttles under 2004, 2015 and 2025 conditions.

Table 4
ABE – Terminal Frontage Roadway Summary

Frontage Road	Available Frontage (feet)			Required Frontage (80%) (feet)			Surplus (Deficit) (feet)		
	2004	2015	2025	2004	2015	2025	2004	2015	2025
Cars	294	294	294	100	125	125	194	169	169
Taxis/Limos	25	25	25	50	50	50	(25)	(25)	(25)
Buses	55	55	55	110	110	110	(55)	(55)	(55)
Shuttles	40	40	40	40	40	40	0	0	0
Arrivals Road	**414**	**414**	**414**	**300**	**325**	**325**	**114**	**89**	**89**
All Vehicles	458	458	458	100	101	126	358	357	332
Departures Roadway	**458**	**458**	**458**	**100**	**101**	**126**	**358**	**357**	**332**

ABE – Vehicle Parking

According to the analysis, Lehigh-Valley Airport is expected to have a surplus of on-airport parking spaces through 2025. A detailed parking demand analysis is presented in Table 5.

Table 5
ABE – Vehicle Parking Analysis

Public Lot	Supply			Required			Surplus (Deficit)		
	2004	2015	2025	2004	2015	2025	2004	2015	2025
Short Term	75	75	75	-	-	-	-	-	-
Long Term	1,472	1,472	1,472	-	-	-	-	-	-
Economy	1,164	1,164	1,164	-	-	-	-	-	-
TOTAL	**2,711**	**2,711**	**2,711**	**2,196**	**2,239**	**2,453**	**515**	**472**	**258**

ABE – Off-Airport Roadways and landside Access

The primary issue affecting landside access to Lehigh Valley International Airport today and in the future is the recurring congestion on US 22. Improvements to US 22 scheduled to be implemented by PennDOT by the year 2010 should improve operations on US 22 in the vicinity of the airport. However, the continued high growth in traffic volumes in the Lehigh Valley is expected to increase overall congestion levels on the US 22 corridor. Localized congestion could occur along Airport Road at the airport entrances, as identified in the analysis described in chapter II.6.

Summary of Findings - Landside Capacity Analysis

ACY – Terminal Frontage Roadways

As shown in Table 6, there is frontage curb capacity deficit on the inner roadway for cars, taxis and limos under 2004, 2015 and 2025 passenger demand conditions, assuming a one-lane loading/unloading operation. Since there are a total of four frontage lanes at the inner roadway, the operation can allow a two-lane frontage loading/unloading operation. This would increase the 'equivalent' frontage length by 60%, from 320 ft. to 512 ft. The result would be no deficiencies through 2025.

Table 6
ACY– Terminal Frontage Roadway Summary

Frontage Road	Available Frontage (feet)			Required Frontage (80%) (feet)			Surplus (Deficit) (feet)		
	2004	2015	2025	2004	2015	2025	2004	2015	2025
Autos/Taxis	320	320	320	350	375	475	(30)	(55)	(155)
Buses/Shuttles	600	600	600	0	0	0	600	600	600
Arr/Dep's	**920**	**920**	**920**	**350**	**375**	**475**	**570**	**545**	**445**

ACY – Vehicle Parking

Table 7 shows that there exists significant parking surplus under 2004, 2015 and 2025 passenger demand conditions. A detailed parking demand analysis is presented in Table 7.

Table 7
ACY – Vehicle Parking Analysis

Public Lot	Supply			Required			Surplus (Deficit)		
	2004	2015	2025	2004	2015	2025	2004	2015	2025
Short Term	200	-	-	100	150	173	-	-	-
Long Term	1,612	1,612	1,612	1,612	2,419	2,788	-	-	-
Overflow Long Term	980	980	980	323	485	559	-	-	-
Parking Garage	-	1,400	1,400	-	-	-	-	-	-
TOTAL	**2,792**	**3,992**	**3,992**	**2,035**	**3,055**	**3,520**	**757**	**937**	**472**

ACY – Off-Airport Roadways and Landside Access

With the Atlantic City Expressway, Garden State Parkway and NJTransit's Atlantic City Rail Line nearby, Atlantic City International Airport has significant assets for off-airport access. Unless its capacity is increased, Delilah Road will present a bottleneck to growth in airport landside access demand above the level forecast for 2025 in this study. The four-lane Amelia Earhart Road has sufficient capacity for the both the FAA Tech Center and Airport related traffic, but it may be necessary to add a second left-turn lane at the Tech Center entrance traffic signal for airport related traffic and widen the access road leading to the terminal area about 1,400 feet to add a second lane.

Summary of Findings - Landside Capacity Analysis

TTN – Terminal Frontage Roadways

As shown in Table 8, there is sufficient frontage curb capacity for all vehicles at the combined arrivals/departures roadway of Trenton-Mercer County Airport under 2004, 2015 and 2025 passenger demand conditions.

Table 8
TTN – Terminal Frontage Roadway Summary

Frontage Road	Available Frontage (feet)			Required Frontage (80%) (feet)			Surplus (Deficit) (feet)		
	2004	2015	2025	2004	2015	2025	2004	2015	2025
All Vehicles	200	200	200	25	50	50	175	150	150
Arr/Dep's	**200**	**200**	**200**	**25**	**50**	**50**	**175**	**150**	**150**

TTN – Vehicle Parking

As shown in Table 9, there exists significant parking surplus under 2004, 2015 and 2025 passenger demand conditions. A detailed parking demand analysis is presented in Table 9.

Table 9
TTN – Vehicle Parking Analysis

Public Lot	Supply			Required			Surplus (Deficit)		
	2004	2015	2025	2004	2015	2025	2004	2015	2025
All Lots	643	643	643	164	171	209	479	472	434
TOTAL	**643**	**643**	**643**	**164**	**171**	**209**	**479**	**472**	**434**

TTN – Off-Airport Roadways and landside Access

Low vehicle trips are projected to be generated by TTN through the planning horizon. Capacity limitations on two-lane Bear Tavern Road would preclude a significant increase in airport passenger activity above these levels without capacity improvements.

I. APPROACH & METHODOLOGY

I. Approach and Methodology

I.1 Airfield Capacity

The analysis of runway capacity for Lehigh Valley International Airport, Atlantic City International Airport, and Trenton Mercer Airport must be conducted at a level of detail that identifies the approximate timing for needs for additional capacity, based on the forecasts of aviation demand. However, the approach does not need to address tactical operational issues associated within one of the more complex airspace settings in the nation. The analysis framework defined in the Airport Capacity and Delay Advisory Circular, AC 150/5060-5, was used as a basis for determining the annual capacity of each airfield.

The following section describes the methodology and major assumptions. Airport specific assumptions and findings are presented in Sections II, III and IV respectively.

I.1.1 Methodology and Assumptions

This demand/capacity analysis utilizes the framework defined in Advisory Circular 1150/5600-5 to determine annual capacity for the three DVRPC airfields. The three components needed to develop the airfield capacity are:

- Peak Month Average Day (PMAD) Operations
- Peak Hour to PMAD ratio
- Hourly airfield capacity

The PMAD operations are compared to the annual operations to develop the PMAD to design day ratio. The PMAD to design day ratio is multiplied by the peak hour ratio and the hourly airfield capacity to arrive at the annual service capacity.

OPSNET data were analyzed to identify peak month average day demand for each of the airports. OPSNET operation counts are provided for both itinerant and local/touch-and-go operations. Itinerant operations include GA, military, air taxi, and air carrier. Local operations include only GA and military. PMAD distributions by operation type (GA, air taxi, etc.) for each airport were developed using daily activity counts from August 2004. The PMAD daily operation counts were then compared to the annual operations for 2004 to determine the PMAD to annual ratio.

The peak hour to PMAD ratio of 11.0 was used for each airport. 11.0 is an industry standard ratio for “busy” airports.

None of the airports are included in the ASPM database so an analysis of similar airfields was conducted to identify the peak hour capacity. Similar airfields typically report and acceptance rate of 30 arrivals per hour. Although airfields with higher concentrations of GA traffic are able to conduct a higher number of operations per hour, 60 operations was utilized in this analysis as conservative baseline peak hour capacity.

I.1.2 Determination of Future Runway Capacity Needs

Unlike the analysis of terminals and roadways, no universally accepted standard for levels of service exist for the flow of air traffic through the airfield and airspace systems. Thus, needs for runway capacity were defined by the ratio of annual demand to annual capacity throughout the planning period.

I.2 Gate Capacity

Aircraft gates presented in the tables of Sections II, III and IV include all contact gates i.e. those with loading bridges or direct walk-out from the terminal.

I.2.1 Gate Demands

Future gate mixes were developed based on the 2015 Design Day schedules (see Task D Report) and typical airline operating parameters. Schedules were processed through models which assigned the following parameters.

15 minute buffer times between a scheduled departure and the next arrival.

For aircraft towed to or from a remote parking position:
Arrivals - 30 minutes on gate prior to tow-off
Departures - 30 minutes on gate prior to departure

Within a terminal, all gates are considered common use for capacity analysis.

Additional remote positions for remain overnight (RON) or layover aircraft parking are not included in the terminal capacity analysis tables. For over-all apron planning purposes, the additional RON positions (if any) for each airport in 2015 are noted in Sections II, III and IV.

An example of gate mixes is shown in Exhibit I.2-1 and I.2-2 for ABE. Exhibit I.2-1 illustrates the total number of aircraft on the ground including RONs which peak at midnight with nine aircraft. In Exhibit I.2-2, only active gates are shown with RON flights removed 30 minutes after arrival and towed to a gate 30 minutes prior to departure, resulting in a peak demand of seven gates at 16:40.

For the other planning years in the forecast (2010, 2020 and 2025) the total number of gates was estimated by interpolating and extrapolating the 2004 and 2015 gate totals as compared to the forecasts of annual operations for each airport. Once the number of gates was estimated, gate mixes were developed based on the trends in fleet mix changes shown in the Forecast Report.

It is recognized that for operational reasons and to handle off-schedule operations, additional gates would likely be planned for certain terminals. These policies vary by airline and airport. In order to provide a consistent capacity analysis for all the airports, such additional gates have not been included in the demand calculations.

Exhibit I.2-1
ABE – Nominal Gate Demand (Design Day 2015)

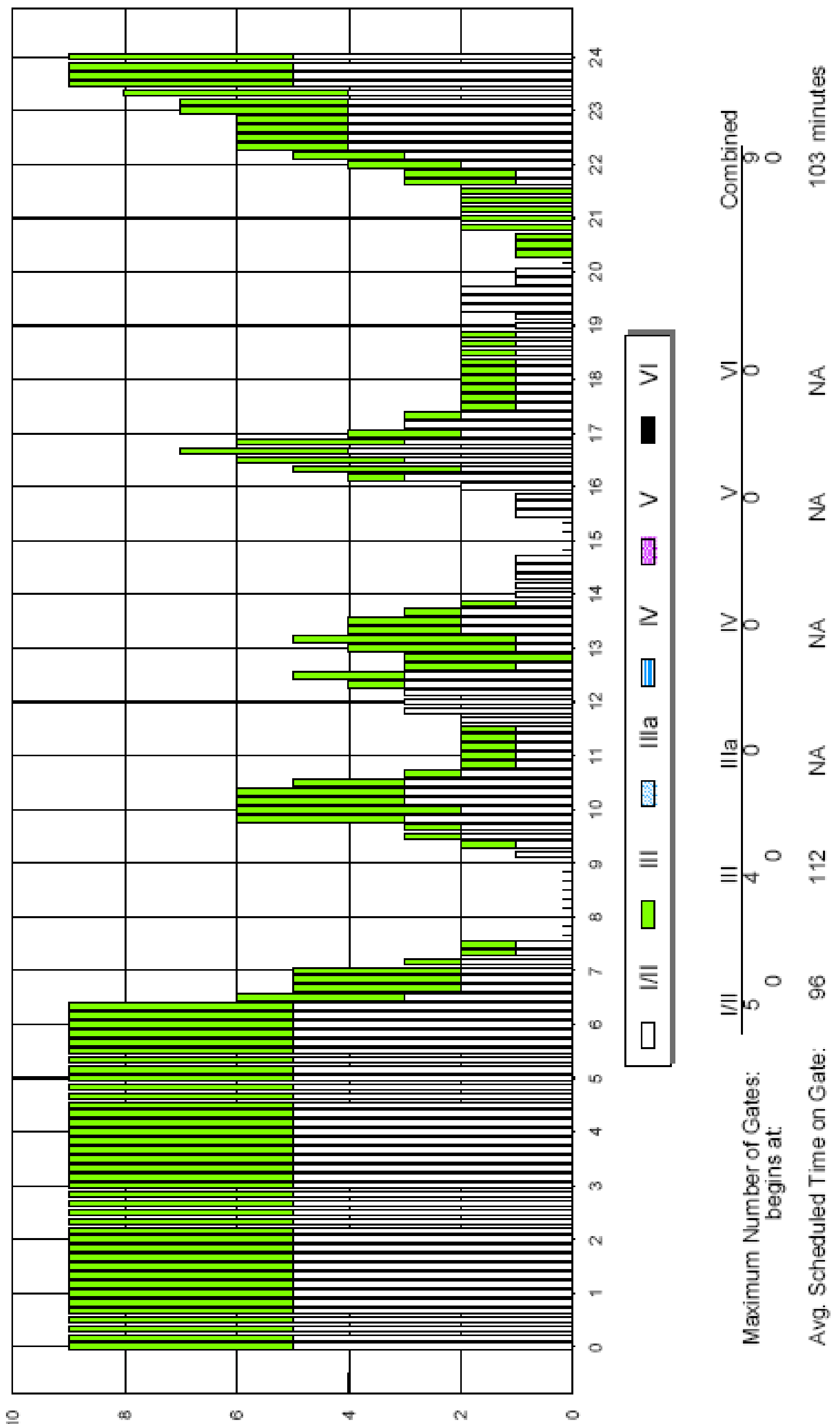
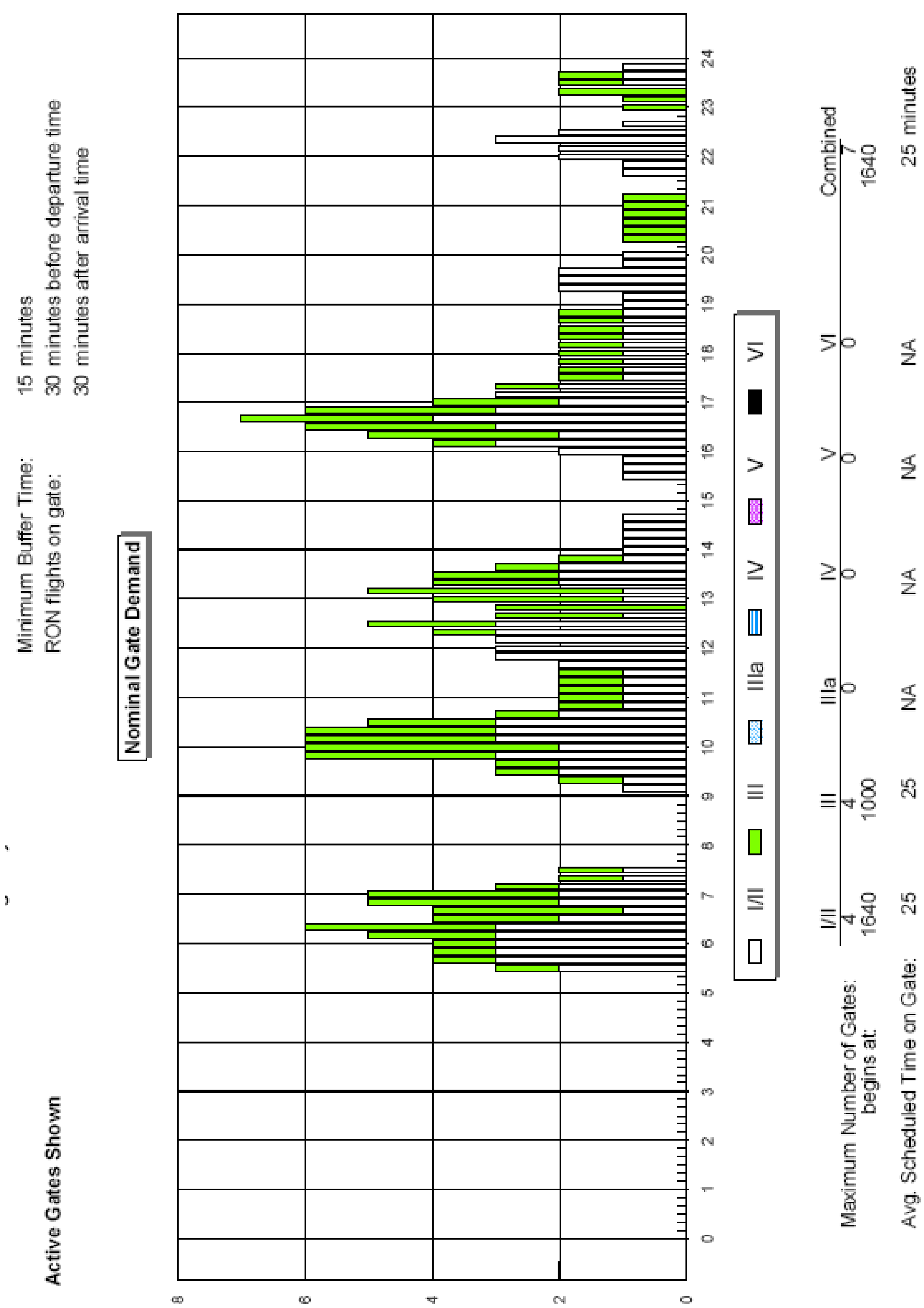


Exhibit I.2-1
ABE – Nominal Gate Demand (Design Day 2015)



I.2.2 Gate Metrics

Airport comparisons are frequently made on the basis of passengers per gate, or terminal area per gate, but these lack a consistent definition of the term "gate". To standardize the definition of "gate" when evaluating aircraft utilization and requirements, the consultant has developed a statistic referred to as a NarrowBody Equivalent Gate (NBEG). This statistic is used to normalize the apron frontage demand and capacity to a that of a typical narrowbody aircraft gate. The amount of space each aircraft requires is based on the *maximum* wingspan of aircraft in its respective aircraft group. FAA Airplane Design Groups have been used to classify the aircraft as follows:

NarrowBody Equivalent Gate (NBEG) Index

FAA Airplane Design Group		Maximum Typical Wingspan	NBEG Aircraft	Index
I.	Small Regional	49'	Metro	0.4
II.	Medium Regional	79'	SF340/CRJ	0.7
III.	Narrowbody/Lrg. Regional	113'	A320/B737/MD-80/ATR	1.0
IIIa.	B757	125'	B757	1.1
IV.	Widebody	171'	DC-10/MD-11/B767	1.5
V.	Jumbo	214'	B747/A330,340/B777	1.9
VI.	A380	262'	A380	2.3

The basis for Group III has been reduced to 113' (from 118' maximum wingspan) to reflect the majority of Group III aircraft in production: the B737-600/700/800 and the A319/320/321. Group IIIa has also been added to more accurately reflect the B757 which has a wider wingspan than Group III but is substantially less than a typical Group IV aircraft.

In developing terminal facilities requirements, the apron frontage of the terminal, as expressed in NBEG is a good determinant for some facilities and allows different gate configurations to be compared.

The concept of Equivalent Aircraft (EQA) is similar to that of NBEG, i.e. a way to look at the capacity of a gate. EQA, however, normalizes each gate based on the seating capacity of the aircraft which can be accommodated. The EQA concept was originally developed in the early- to mid-1970's as a technique for sizing terminal facilities[1]. At that time, the majority of jet aircraft had 80 to 110 seats, with some larger narrowbodies of up to 150 seats. The only widebody aircraft in service were the DC-10-10, L1011-100 and B747-100. Consequently, the EQA measure centered on the 80-110 seat range with an EQA of 1.0.

1 The Apron & Terminal Building Planning Manual; for US DOT, FAA by The Ralph M.Parsons Company; July 1975

In considering the modern fleet mix of regional and jet aircraft, and in order to have some relationship with the physical parameters associated with the NBEG, the basis for EQA has been revised. The modern Equivalent Aircraft is also a Group III narrowbody jet, however the larger aircraft in this class typically have 140-150 seats. This establishes a basis of 1.0 EQA = 145 seats. As with the concept of NBEG, smaller aircraft may use a gate, but the EQA capacity should be based on the largest aircraft/seating configuration typically in use:

Equivalent Aircraft (EQA) Index

FAA Airplane Design Group	Typical	Typical Seats	EQA Aircraft	Index
I.	Small Regional	25	Metro	0.2
II.	Medium Regional	50	SF340/CRJ	0.4
III.	Large Regional	70	ATR/EMB-170	0.5
III.	Narrowbody	145	A320/B737/MD-80	1.0
IIIa.	B757	185	B757	1.3
IV.	Widebody	280	DC-10/MD-11/B767	1.9
V.	Jumbo	400	B747/A330,340/B777	2.8
VI.	A380	550	A380	3.8

While most terminal facility requirements are a function of design hour passenger volumes, some airline facilities are more closely related to the size of the aircraft. For example, while the total number of baggage carts or containers required for a flight are a function of design hour passengers (and their bags), the number of carts/containers staged at any one time are generally based on the size of the aircraft. Thus, the EQA of the terminal can represent a better indicator of demand for these facilities.

I.3 Terminal Capacity

I.3.1 Design Level Activity

Airport terminal facilities are sized to accommodate the peak hour passenger volumes of a design day. Annual enplanements are an indicator of over-all airport size, however peak hour volumes more accurately determine the demand for terminal facilities based upon the specific user patterns of a given airport or terminal. Peak hour passengers are typically defined as Peak Hour-Average Day-Peak Month (PHADPM) passengers, and are also often referred to as Design Hour passengers. The Design Hour measures the number of enplaned and deplaned passengers departing, or arriving, on aircraft in an elapsed hour of a typically busy (design) day. The Design Hour typically does not correspond exactly to a "clock hour" such as 7:00-7:59 but usually overlaps two "clock hours", e.g. 7:20-8:19 reflecting airline scheduling patterns.

The Design Hour is not the absolute peak level of activity, nor is it equal to the number of persons occupying the terminal at a given time. It is, however, a level of activity which the industry has traditionally used to size many terminal facilities. The number of persons in the terminal during peak periods, including visitors and employees, is also typically related to Design Hour passengers.

Each airport or terminal also has its own distinct peaking characteristics due to differences in airline schedules; business or leisure travel; long or short haul flights; the mix of mainline jets and regional aircraft; originating/terminating passenger activity or transfer passenger activity; and international passenger or domestic passenger use. These peaking characteristics determine the size and type of terminal facilities. Thus, two airports or terminals with similar numbers of annual passengers may have different terminal requirements, even if the Design Hour passenger volumes are similar.

Since the deregulation of the airlines, most major airlines have developed "hub" and "spoke" route systems such as American's hubs in Chicago and Dallas/Ft. Worth; Delta's hubs in Atlanta and Cincinnati; United's in Chicago and Denver; etc. At these hubs there are a number of banks of flights when most passengers change planes to reach their final destination. These banks of connecting flights form a series of peaks during the day - typically seven to 10. Recent changes in airline operations in many cases have flattened the peaks, however the basic idea of connecting banks still remains.

In contrast, the other cities served by the airlines are referred to as "spokes". Individual airline schedules at the spoke cities are generally tied to the connecting banks at their hubs. Most airlines have similar scheduling patterns and these tend to reinforce each other at the spoke airports resulting in, for example, a large number of departures between 7 and 7:30 a.m. More recently, airlines have been re-establishing point to point service in some larger markets such as New York, often with regional jets, thus bypassing hubs. This can help spread activity during the day and increase gate utilization.

Scheduling Patterns

Each of the Region's airports has a different pattern of activity. An analysis of these characteristics is presented in the report on design day schedules (Task D).

The following summary represents activity for the 2004 Base Design Day. Any assumed changes for the 2015 Design Day are also noted.

ABE:

ABE has a typical spoke airport pattern with a large number of early departures and late evening arrivals. Because most of the service is by regional aircraft there is a relatively steady, if not high, level of activity throughout the day. Almost all of the domestic service is to hub cities. In the Base year, there was also service to Toronto by small turboprop aircraft which is forecast to continue. The 2015 Design Day schedule also reflects a spoke pattern. However, there are a number of larger peaks during the day similar to the morning departure peak. The number of NB aircraft is less than in 2004, but the average size of the regional aircraft is larger.

ACY:

In the past, ACY primarily served passengers coming to the casinos. However, with the direct service provided by Spirit Airlines to a number of leisure destinations, most of the passengers are now originating. The scheduled activity pattern consists of four mainline and one RJ early departures; a mid-day peak of mainline and RJ operations, and evening arrivals. The 2015 Design Day schedule has a similar pattern, but with additional mid-day departures by NB aircraft. There are also a variable number of charter operations which are scheduled when gates are available. Some charters are international. Charters are not included in the Design Day schedule.

TTN:

TTN has had a highly variable scheduling pattern depending on the airline serving the Airport. At present, 19 seat aircraft serve a single destination (Bedford, MA, a Boston suburb) with mostly weekday service. In the past, TTN had B737 service to leisure destinations. In 2004 there were two closely spaced morning departures by 19 seat aircraft. In 2006 the two morning departures were more spread out, with a single departure in a given hour. The base forecast assumes that the 19 seat aircraft would be replaced by 50 seat aircraft flying a schedule similar to 2006.

Estimates of Design Hour Passengers have been developed based on scheduled seats and Peak Day passengers. This has been done using historic passengers and schedules for the 2004 Base Year, and forecasts and Design Day Schedules developed for 2015. Design Hour passengers for other years have been interpolated from 2015.

For each airport, the 2004 and 2015 Design Day schedules were analyzed to determine:

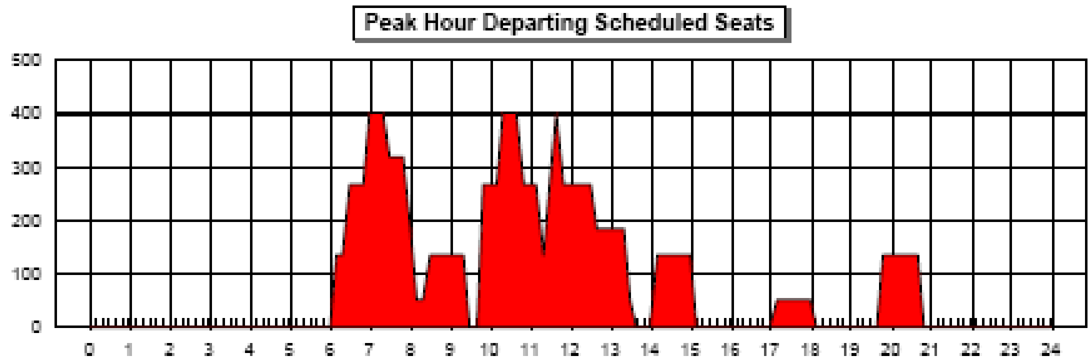
- Daily and rolling peak hours for departing, arriving and total seats;
- The percentage of daily seats represented by the peak hour; and
- The times the peak hours begin.

Exhibit I.3-1 illustrates this activity for ACY in 2015. Sections II, III and IV contain output for each of the airports.

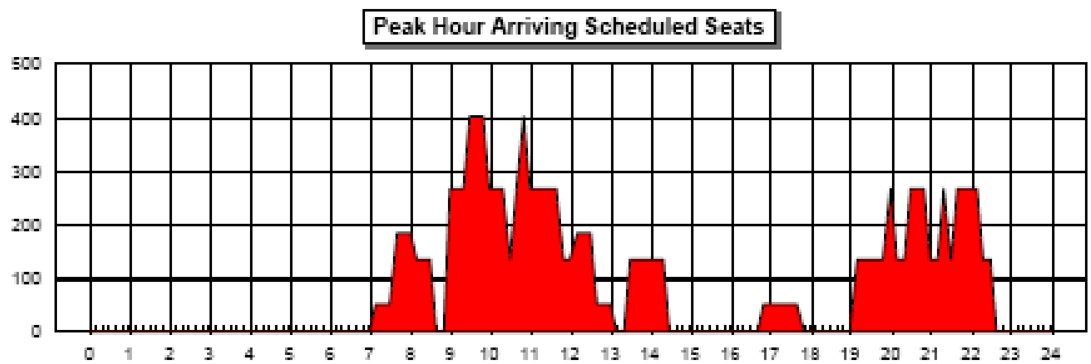
Scheduled seats were combined with assumptions of peak hour load factors and percentages of connecting passengers where appropriate. For the DVRPC airports, all passengers are assumed to be O&D. Design hour load factors of 85%, 90% and 70% were assumed for ABE, ACY and TTN respectively. These were based on an analysis of average daily passengers for August 2004, and typical relationships between average daily and peak hour load factors.

For the intermediate forecast year (2010), design hour passengers were interpolated between the 2004 and 2015 design hour passengers. For the longer term forecasts out to 2025, design hour passengers were extrapolated from 2015 based on increases in average day-peak month enplanements. The 2015 patterns of activity were assumed to remain stable through 2025.

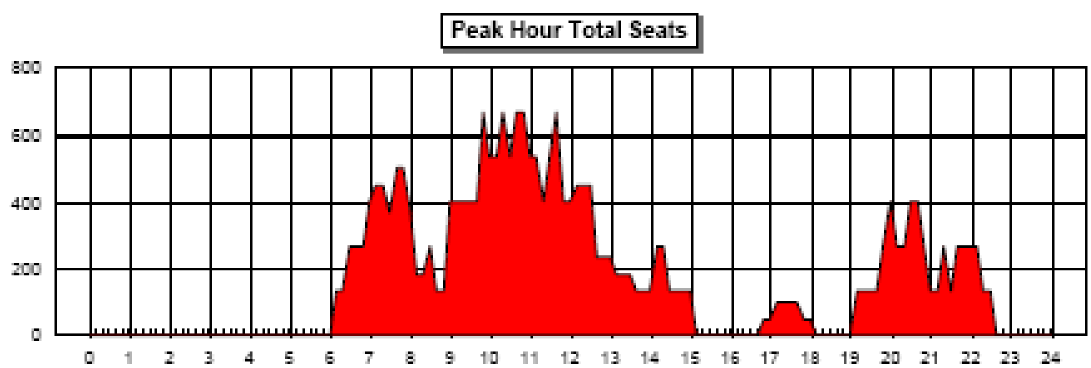
Exhibit I.3-1
ACY - Peak Hour Seats (Design Year 2015)



Peak Hour Seats: 402 begins at 700 Daily Seats: 2,026
Peak Hour = 19.8% of daily seats



Peak Hour Seats: 402 begins at 930 Daily Seats: 2,026
Peak Hour = 19.8% of daily seats



Peak Hour Seats: 670 begins at 1140 Daily Seats: 4,052
Peak Hour = 16.5% of daily seats

Source: Hirsh Associates Analysis ACY2015.WK4

I.3.2 Projected Terminal Facilities Demands

Recommended facilities for a terminal are a function of the specific unique characteristics of that terminal. These include the design levels of passenger and aircraft activity; the number and type of airlines utilizing the terminal; the operating requirements of the airlines; and local factors such as the proportions of connecting passengers, leisure vs. business travellers, locally originating passengers, etc.

Unlike airfield facilities, the capacity of each element of a terminal facility can vary depending on the level of crowding and/or processing time which is considered acceptable. A passenger travelling on business may be less tolerant of congestion or delay than a passenger travelling for pleasure. In many cases the degree of acceptability itself may also vary depending on the configuration of the terminal space and the level of amenity provided. Thus, the 'capacity' of a terminal can vary significantly.

The approach taken in developing the capacity analyses has been to review the available plans and areas of the terminals, visit each terminal to confirm existing utilizations, and observe the activity in the terminals. These observations - coupled with calculations of area per passenger, per gate, or other determinant of demand - were compared to generally accepted industry planning factors. Where appropriate, standards or factors developed for the Port Authority airports were used for consistency in the analyses. Passenger characteristics were also obtained from the 2005 passenger surveys conducted as part of this Study.

From these comparisons, a planning factor for each terminal component was determined and used to project facility requirements for each forecast period. These were then compared to existing facilities to estimate future excess capacities or deficiencies.

For each airport a table was prepared containing the following:

1) Existing and Approved Buildings Through 2008: Areas were taken from terminal CAD drawings, where available, or from other plans. Gross areas are used. These were field checked during February and March 2006 to confirm current utilization and add details (such as self-service check-in kiosks) which may not appear on the plans. Both ACY and ABE have major projects which are committed to be completed by 2008. Although TTN has environmental approvals for a replacement terminal, financial commitments have not been made at this time.

2) Recommended Facilities: These areas represent the facilities which would be needed to support current and forecast levels of passenger activity. These were developed for the base year 2004, and the four planning forecast years 2010, 2015, 2020 and 2025. The

recommended areas are typically not concept-specific. However, the configurations of the existing terminals have been taken into account where appropriate.

6) Projected Surplus or Deficiency: These entries point out those functions of the existing terminals which are either undersized or oversized compared to what would be recommended to accommodate future activity. Excesses suggest potential areas which may be convertible to other functions or to provide additional capacity for growth beyond forecast levels.

In the following capacity analyses, functions are listed for passenger processing (check-in, security screening, holdrooms, baggage claim and international arrivals) in the order a passenger would use them; airline operations and support; concessions; and other public spaces.

Within the time frame of this Study, scheduled international service requiring Federal Inspection facilities (FIS) are not anticipated. Service to Canada, Bermuda and some Caribbean islands can be pre-cleared and do not require inspection at the U.S. airport and are handled the same as domestic flights. This is not to preclude the development of FIS facilities to serve charter activity, but these have not been assumed for the suburban airports.

Table I.3-1 illustrates the analysis for ABE. Sections II, III and IV contain the analyses for all of the airports, as well as the major surpluses and deficiencies.

Table I.3-1
ABE – Terminal Capacity Analysis

	Existing and Approved Buildings Through 2008 [1]	Recommended Facilities - Demand: Base Year Activity 2004	Forecast Year Activity 2010	2015	2020	2025	Projected Surplus / (Deficiency): Base Year Activity 2004	Forecast Year Activity 2010	2015	2020	2025
Annual Enplanements											
Domestic		504,336	473,000	535,000	605,000	685,000					
Design Hour Factors:											
Domestic Load Factor		85%	85%	85%	85%	85%					
Domestic Connect %		0%	0%	0%	0%	0%					
Design Hour Passengers											
Enplaned Domestic O&D		360	340	380	430	490					
Enplaned Domestic total		360	340	380	430	490					
Deplaned Domestic O&D		280	340	380	430	490					
Deplaned Domestic total		280	340	380	430	490					
Visitors/Passenger		0.3	0.3	0.3	0.3	0.3					
GATES											
Total Gates:											
Regional Aircraft (Group II)	8 gates	5	4	3	3	3	3	4	5	5	5 gates
Narrowbody (Group III)	11 gates	2	3	4	5	5	9	8	7	6	6 gates
B757 (Group IIIa)	1 gates						1	1	1	1	1 gates
Widebody (Group IV)	0 gates						0	0	0	0	0 gates
Total Gates	20 gates	7	7	7	8	8	13	13	13	12	12 gates
Narrowbody Equivalent Gates (NBEG)	17.7 NBEG	5.5	5.8	6.1	7.1	7.1	12.2	11.9	11.6	10.6	10.6 NBEG
Equivalent Aircraft (EQA)	15.5 EQA	4.0	4.6	5.2	6.2	6.2	11.5	10.9	10.3	9.3	9.3 EQA
TICKETING & CHECK-IN											
Conventional Staffed Positions	33 pos	20	17	19	22	25	13	16	14	11	8 pos
Self-Service Kiosks	13 units	9	9	10	11	13	4	4	3	2	0 units
Equivalent Positions	46 pos	29	26	29	33	38	17	20	17	13	8 pos
Linear Positions	46 pos	29	26	29	33	38	17	20	17	13	8 pos
Counter length	253 LF	150	130	150	170	190	103	123	103	83	63 LF
Ticket Counter - area	2,580 SF	1,700	1,500	1,700	2,000	2,200	880	1,080	880	580	380 SF
Ticket Lobby - depth	31-45 LF	40	40	40	40	40	(9)-5	(9)-5	(9)-5	(9)-5	(9)-5 LF
Ticket Lobby - area	9,670 SF	6,800	5,900	6,800	7,700	8,600	2,870	3,770	2,870	1,970	1,070 SF
Subtotal	12,250 SF	8,500	7,400	8,500	9,700	10,800					SF

Table I.3-1
ABE – Terminal Capacity Analysis (Con't)

	Existing and Approved Buildings Through 2008 [1]		Recommended Facilities - Demand: Base Year Activity 2004	Forecast Year Activity 2010	2015	2020	2025	Projected Surplus / (Deficiency): Base Year Activity 2004	Forecast Year Activity 2010	2015	2020	2025	
HOLDROOMS & SECURE CIRCULATION													
Security Screening (SSCP) Lanes	6	lanes	3	2	3	3	3	3	4	3	3	3	lanes
Checkpoint/Search Area	7,330	SF	3,900	2,600	3,900	3,900	3,900	3,430	4,730	3,430	3,430	3,430	SF
Secure Circulation	22,760	SF	18,200	19,200	20,200	23,500	23,500	4,560	3,560	2,560	(740)	(740)	SF
Concourse Width	25-45	LF	30	30	30	30	30	(5)-15	(5)-15	(5)-15	(5)-15	(5)-15	LF
Holdrooms:													
Regional Aircraft (Groups II & III)		SF	4,000	3,200	2,400	2,400	2,400						SF
Narrowbody (Group III)		SF	3,700	5,600	7,400	9,300	9,300						SF
B757 (Group IIIa)		SF	0	0	0	0	0						SF
Widebody (Group IV)		SF	0	0	0	0	0						SF
Total Holdroom Area	21,315	SF	7,700	8,800	9,800	11,700	11,700	13,615	12,515	11,515	9,615	9,615	SF
Subtotal	51,405	SF	29,800	30,600	33,900	39,100	39,100						SF
DOMESTIC BAGGAGE CLAIM													
Claim Frontage Required	-	LF	110	130	150	170	190						LF
Claim Units	2	units	1	1	1	1	2	1	1	1	1	0	units
Claim Frontage Programmed	260	LF	150	150	150	150	300	110	110	110	110	(40)	LF
Baggage Claim Area	7,540	SF	5,300	5,300	5,300	5,300	10,500	2,240	2,240	2,240	2,240	(2,960)	SF
AIRLINE SPACE													
ATO Offices	8,630	SF	4,500	3,900	4,500	5,100	5,700	4,130	4,730	4,130	3,530	2,930	SF
Airline Operations & Offices (excluding ATO)	10,980	SF	5,200	5,900	6,700	8,000	8,000	5,780	5,080	4,280	2,980	2,980	SF
Baggage Handling													
Estimated make-up capacity	36	carts/LD3s	8	9	10	12	12	28	27	26	24	24	carts/LD3s
Baggage Make-up area	14,725	SF	4,800	5,500	6,200	7,400	7,400	9,925	9,225	8,525	7,325	7,325	SF
Checked Baggage Screening	440	SF	1,430	1,430	1,430	1,430	2,145	(990)	(990)	(990)	(990)	(1,705)	SF
Baggage Claim Off-load	3,730	SF	1,500	1,500	1,500	1,500	3,000	2,230	2,230	2,230	2,230	730	SF
Baggage Service Offices	1,200	SF	500	600	600	700	800	700	600	600	500	400	SF
Subtotal	39,705	SF	17,930	18,830	20,930	24,130	27,045						SF

Table I.3-1
ABE – Terminal Capacity Analysis (Con't)

	Existing and Approved Buildings Through 2008 [1]	Recommended Facilities - Demand					Projected Surplus / (Deficiency)					
		Base Year Activity	Forecast Year Activity				Base Year Activity	Forecast Year Activity				
		2004	2010	2015	2020	2025	2004	2010	2015	2020	2025	
CONCESSIONS												
Ground Services/Information Counter	0 SF	100	100	100	100	100	(100)	(100)	(100)	(100)	(100)	SF
Rental Car Counter Length	116 LF	50	50	50	50	50	66	66	66	66	66	LF
Rental Car Lease Area	1,235 SF	1,000	1,000	1,000	1,000	1,000	235	235	235	235	235	SF
Food/Beverage; Secure	3,100 SF	2,100	2,000	2,200	2,500	2,800	1,000	1,100	900	600	300	SF
News/Gift/Retail; Secure	800 SF	1,400	1,300	1,500	1,700	1,900	(600)	(500)	(700)	(900)	(1,100)	SF
Subtotal; Secure Concessions	3,900 SF	3,500	3,300	3,700	4,200	4,700	400	600	200	(300)	(800)	SF
Food/Beverage; Non-Secure	2,050 SF	3,200	3,200	3,200	3,200	3,200	(1,150)	(1,150)	(1,150)	(1,150)	(1,150)	SF
News/Gift/Retail; Non-Secure	990 SF	100	100	100	100	100	890	890	890	890	890	SF
Subtotal; Non-Secure Concessions	3,040 SF	3,300	3,300	3,300	3,300	3,300	(260)	(260)	(260)	(260)	(260)	SF
Other Services	0 SF	400	300	400	400	500	(400)	(300)	(400)	(400)	(500)	SF
Concession Support Area	5,460 SF	4,900	4,700	5,000	5,400	5,800	560	760	460	60	(340)	SF
Subtotal	13,635 SF	13,200	12,700	13,500	14,400	15,400						SF
OTHER PUBLIC AREAS												
Public Seating and Meeter/Greeter Lobbies	1,550 SF	700	1,300	1,400	1,600	1,800	850	250	150	(50)	(250)	SF
Restrooms - Terminal Locations	1,980 SF	900	1,700	1,900	2,200	2,500	1,080	280	80	(220)	(520)	SF
Restrooms - Concourse Locations	2,770 SF	900	1,100	1,200	1,400	1,400	1,870	1,670	1,570	1,370	1,370	SF
Subtotal	6,300 SF	2,500	4,100	4,500	5,200	5,700						SF
Vacant spaces suitable for: non-secure airline offices	12,150 SF											SF

[1] - Sources:
Breslin, Ridyard, Fadero Architects - Additions & Alterations Plan, June 2005
Hirsh Associates site visit, March 2006
Hirsh Associates analysis

Ticketing and Check-in -

Passengers may check in for flights at various locations depending on the type of travel (domestic or international), and airline. These include conventional staffed counters, self-service units (kiosks), curbside, and internet check-in. Of these options, conventional positions and kiosks occupy space within the terminal and are considered determinants of capacity. Although characteristics may vary between domestic and international passengers, check-in requirements have been combined for the suburban airports due to the limited amount of international activity.

Check-in Positions

The methodology includes the following factors:

- The percentage of passengers using conventional counters and kiosks (from the passenger survey). See Task A report. It has been assumed that the percentage of domestic passengers using kiosks and electronic check-in will increase as people become more familiar with the technology, and airlines add kiosks at smaller airports. The existing and projected utilizations of conventional counters and kiosks are as follows. Note that these do not include passengers using curbside and/or internet check-in.

Airport	Existing		Future	
	ATO	kiosk	ATO	kiosk
Lehigh Valley	71%	22%	65%	30%
Atlantic City	72%	2%	55%	20%
Trenton-Mercer	96%	0%	50%	40%

- Processing times per passenger based on observations during August 2005 at Port Authority airports. A total of 169 domestic transactions and 97 international transactions involving 236 and 167 passengers respectively were observed at LGA and JFK. Processing times were similar to those obtained by the consultant at other airports with similar types of activity.

- Processing times used reflect the 80th percentile; that is 80% of the passengers were checked-in in x minutes or less. This is considered a realistic level of service parameter for peak conditions. The 80th percentile times per passenger are:

	min./pax.
Domestic staffed counter	2.8
Domestic kiosk	2.6

- It has been assumed that as passengers become more familiar with kiosk operations the times per passenger will decline to 2.0 minutes/passenger by 2010. Staffed counter processing times are assumed not to change.

- The percentage of passengers arriving within a 30 minute peak (derived from the passenger survey). This varies from 35-53%. These arrival time distributions are illustrated in Exhibit I.3-2. The arrival time curves may shift over time, but the percentage within a peak 30 minutes is assumed to remain constant.

- Airlines are assumed to have exclusive counters. The number of staffed counters required to accommodate the 30 minute peak passenger loads has been increased to reflect the number of airlines in a terminal.

- The number of kiosks has been increased by 50% over those required to accommodate the 30 minute peak passenger loads, as well as for the number of airlines. This reflects airline efforts to improve passenger service with more kiosks so as to reduce or eliminate queues for kiosk users. The introduction of common use self-service (CUSS) kiosks has not been assumed at this time.

The combined total of staffed positions and kiosks is the number of equivalent check-in positions. Because airlines have different preferences for kiosk location and configurations (in-line with the counter; islands; clusters; or remote from the check-in counter), converting equivalent positions to linear counter frontage varies by terminal. It has been assumed that the existing ratio of equivalent positions to linear positions will be maintained in the future.

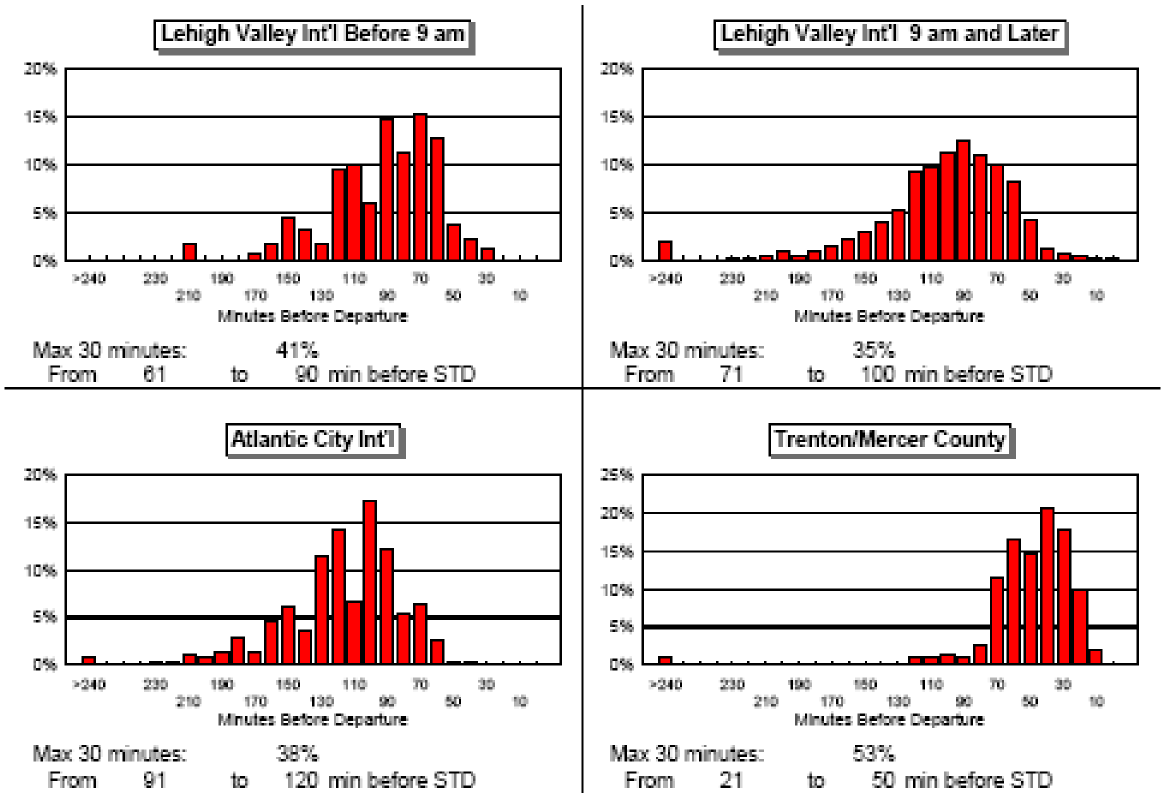
Check-in Counter Length and Area

The length of the check-in counter has been calculated based on 5 LF per position for typical domestic counters. Ticket counters are assumed to be 10' deep for conventional counters, and 14' deep for those with powered take-back belts. For recently renovated terminals, existing counter widths and depths have been assumed.

Ticket Lobby

The ticket lobby includes check-in counter queuing area and cross circulation. Seating and entry vestibules should be outside this zone. The dimension from the face of the ticket counter to any obstruction to cross circulation should be between 30' (TTN) and 40' (ACY & ABE). This would provide adequate queuing for typical peak passenger loads and the types of aircraft expected. The ticket lobby area in the tables includes an allowance for additional circulation at the ends of the counters.

Exhibit I.3-2
Passenger Arrival Time Distributions (DVRPC Study Airports)



The location of self-service kiosks can affect ticket lobby depths. Although increased use of kiosks should reduce queue lengths (and airline staffing), placement of these units may not result in reducing ticket lobby depths. Due to continuing evolution of self-service concepts, changes in recommended ticket lobby depths cannot be made at this time.

Holdrooms and Secure Circulation -

Security Screening Checkpoints (SSCP)

All passengers must be inspected for weapons and other prohibited items before entering the secure gate areas of the terminals. Since 2001, only ticketed passengers with boarding passes are allowed through security. Although this could change in the future, current policies have been assumed to continue.

The number of SSCP lanes has been projected based on an average processing rate of 140 passengers/hour/lane. This rate is less than that used for the PANYNJ airports based on activity data at LGA for July 2005 provided by the TSA. This lower processing rate is more typical of that measured by the consultant at other leisure dominated airports. As at most airports, processing rates can vary greatly by time of day, the experience of passengers with screening procedures, and the ability of the personnel on duty. Checkpoint lanes have been based on a peak 30 minute demand to be consistent with check-in counter demands.

The current TSA module of one walk-thru metal detector and one carry-on bag X-ray unit occupies an area of approximately 750 SF per lane. This includes equipment, passenger inspection, and space for passengers to repack any carry-on items which may have been opened at the checkpoint. A queue length of 20' has been assumed. An allowance of 25% has been added for exiting lanes, search rooms and TSA offices at the checkpoint for a total of 1,310 SF per lane.

The TSA is testing new equipment such as body scanners and other types of explosive detection equipment in an effort to improve screening and reduce delays. Some of this equipment may require additional area, but if processing rates can be increased, fewer lanes may be required. For purposes of this capacity analysis, no changes have been assumed in either processing rates or area per lane.

Secure Circulation

Secure circulation typically consists of the main corridor of the concourse and adjacent egress stairs on the holdroom level. The corridor width is typically defined by holdroom seating as well as structural elements. Ancillary uses would be located outside of these corridors.

Generally accepted terminal planning guidelines recommend 30' wide double-loaded, and 20' single-loaded corridors for terminals not requiring moving walkways. Where moving walks are recommended due to longer walking distances, corridors are recommended to increase to 45' and 25' for double and single loaded concourses respectively. None of the suburban airports are expected to require moving walkways within the concourses. The recommended area is based on an area per equivalent concourse length determined by gates expressed as NBEG. Corridor width assumptions are listed on the Terminal Capacity Analysis table for each terminal. Connectors, such as exist and planned for ABE, are not included in the functional space analysis.

Holdrooms

Holdrooms (Departure Lounges) are based on the mix of gates and the average seating capacity of each class of aircraft. The holdroom area consists of the passenger seating/lounge area; the airline's ticket lift podium; and circulation.

The amount of seating/lounge area is typically based on providing lounge area for 80% of the aircraft seating capacity. Of these, the percentage of passengers seated varies from 50% to 80%, with the remaining 20% to 50% standing. The area per passenger for a 50% seated ratio corresponds to an IATA Level of Service (LOS) C, whereas an 80% seated ratio is LOS B. While achieving LOS B is a goal of the PANYNJ and some other airports, LOS C for a single holdroom has been used for determining capacity.

Grouping could make it is possible to reduce the amount of holdroom seating area by 10%. For capacity estimates a reduction in the seating area has not been assumed due to the varying configurations of the terminals. It should be noted, however, that a single holdroom sized for LOS B when reduced by 10% is equivalent in seating area to a holdroom sized for LOS C. Therefore, where holdrooms are grouped, the Study's single gate LOS C capacity methodology is equivalent to LOS B for grouped holdrooms, and thus in many cases meets LOS B.

A 180 SF (6' wide) deplaning corridor has been added to the lounge area which assumes an average 30' deep holdroom. The corridor effectively acts as an extension of the 4-5' wide loading bridge door.

Each ticket lift podium position is allocated 5' for width, although many airlines use 3-4' wide positions. The depth of the podium and back wall is typically 8', and a 15' deep queuing area is provided, for a total of 115 SF per position. Podium positions are assumed to be as follows: one for regional/commuter aircraft (with a 10' deep queue for a total of 90 SF); two for Group III narrowbody aircraft; and three for B757 and Group IV widebody aircraft.

The average aircraft seating capacities and recommended holdroom sizes are:

	Seats	Area (SF)
Regional Jet (II)	50	800
Narrowbody (III)	145	1,850
B757 (IIIa)	185	2,400
Widebody (IV)	230	2,850

Domestic Baggage Claim -

Baggage claim requirements are based primarily on design hour deplaned O&D passengers, the concentration of these arriving passengers within a 20 minute time period, percentage of passengers checking bags, average travelling party size, and - to a lesser extent - on checked baggage per passenger ratios. Observations at U.S. airports indicate that the majority of domestic passengers arrive at the baggage claim area before their bags are unloaded onto the claim units. The result is that the claim units should be sized for the estimated number of passengers waiting for baggage, because most bags are claimed on the first revolution of the claim unit.

The methodology includes the following factors:

- The analyses of flight schedules (Section I.3.1) provided statistics of peak 20 minute arriving seats. These vary considerably by airport. ABE has 50% of the peak hour arriving seats within 20 minutes which is typical of most domestic spoke airports. ACY has 80% of the seats in the peak 20 minutes. This is due to the concentrated arrivals by the limited number of peak hour flights. TTN is unusual in that 100% of the peak hour arriving seats occurred within 20 minutes in 2004 since there is only a single arrival during the peak hour.

- The percentages of passengers who check bags and average travelling party sizes were determined from the 2005 departing passenger surveys. It has been assumed that arriving passengers have similar characteristics.

- In projecting the required frontage of a claim unit, it has been observed by the consultant that not all members of a travelling party are actively claiming bags. Thus, claim frontage has been reduced compared to the total number of passengers with checked bags. Total claim frontage is calculated based on 1.5 LF per person actively claiming bags (LOS C).

- Average recommended claim unit size has been estimated based on typical aircraft sizes and load factors during peak periods, and the number of flights. For most spoke airports being served by regional and narrowbody aircraft 150 LF claim units are recommended. These can accommodate single arrivals by NB and multiple flights by regional aircraft. In the case of TTN with only regional service, a smaller claim unit is appropriate.

- Baggage claim area is 30 SF/LF of frontage for flat plate claim units; and 35 SF/LF of frontage for sloped bed claim units for most terminals. If bag trolleys are staged between claim units, additional area is required to maintain adequate circulation space.

Airline Space -

Airline space includes both exclusive leased areas (for example offices, operations and clubs), and joint use space (such as baggage handling).

Airline Offices

Airline Offices include the ATO offices and other airline administrative spaces. The ATO offices are usually located immediately behind, or adjacent to the ATO counter to provide support functions for the ticket agents. Typically these are 30' deep along the length of the counter. In some terminals where terminal depth does not permit adjacent ATO offices, these functions may be located elsewhere. For capacity comparison purposes, a typical behind the counter location has been assumed, and areas were projected based on ATO counter length.

Other offices may include functions such as the airline station manager or a sales office. The amount of these offices and location (ATO, operations area, office location on a terminal upper level, etc.) is dependent on individual airline requirements and preferences, and space availability.

Airline Operations

Operations typically include all of the apron level support spaces for aircraft servicing, and aircraft crew related support spaces. The demand for operations areas is a function of the size and types of aircraft being operated and individual airline operating policies. A program area for operations is typically based on the number of gates (as expressed in EQA) and airlines in a terminal. At airline hub terminals, there may be additional operations related functions on other levels of the terminal.

In some terminals it was not possible to separate and identify ATO, other offices and operations functions. For capacity comparison purposes, these three areas should be considered in the aggregate. A combined planning factor for operations and offices was developed for each airport based on existing areas, the consultant's understanding of the adequacy of existing spaces, and comparisons to factors from other airports.

Baggage Handling

Baggage handling includes manual or automated make-up units, the cart/container staging areas, baggage tug/cart (baggage train) maneuvering lanes, checked baggage screening systems, and off-load areas for baggage claim units.

Although checked baggage ratios are a consideration, these generally affect the total number of baggage carts/containers in use rather than the size of the make-up area. The number of carts/containers staged at any one time, however, are generally based on the size of the aircraft. Using EQA provides a consistent basis for baggage system planning and capacity analysis, since larger widebody aircraft require more bag cart/container staging area than smaller aircraft. The number of staged carts/containers is also a function of individual airline policies for pre-sorting baggage at a spoke airport for more efficient transfer at their hub. For capacity analysis two carts per EQA typical of domestic spoke airlines has been assumed.

The recommended area has been based on the types of baggage make-up systems currently in each terminal using three basic types: pier sortation, common use recirculating make-up units, or exclusive use make-up units. Based on typical bag make-up systems, the following areas per staged cart have been used: 300 SF for high efficiency pier sortation systems; 400 SF for common use manual systems; and 600 SF for individual airline manual systems. In terminals with new make-up systems, the existing area per staged cart has been used.

It has been assumed that checked baggage screening in the lobby will be replaced by explosives detection systems (EDS) in some form of "behind the wall" system in the long term. Existing systems (L3 or GE/Invision) presently can handle approximately 200 bags/hour (manual) to 400 bags/hour (in-line configuration). Lower capacity systems (Reveal CT-80) can handle 100 bags/hour in either a manual or in-line installation. It is recognized that technologies will likely change. However, for the purpose of estimating terminal capacity, current systems and protocols have been assumed. Higher capacity systems with manual feeds (200 bags/hr.) have been assumed for ABE, with a lower capacity (100 bags/hr.) systems assumed for ACY and TTN. It is understood that ACY will be installing three CT-80 units in late 2006.

The number of EDS units has been based on the 30 minute peak check-in volumes used for ticket counters and security screening. The 2005 passenger survey did not provide data on the number of checked bags per passenger. Based on the Consultant's experience at other airports, it has been assumed that originating domestic passengers check an average of 1.1 bags, except for ACY where 1.5 bags has been assumed due to the high percentage of leisure passengers.

The area for in-line systems is also quite variable depending on the degree of existing baggage sortation automation, conveyor configurations, and building structure limitations. Based on the planned manual semi-in-line installation for ACY, an average of 715 SF per in-line module has been assumed for the EDS unit, Level 3 ETD inspection areas, and feed/return conveyors. Lower capacity configurations assumed for TTN typically require 600 SF per module. Existing ticket lobby EDS equipment was not included as existing conditions under the assumption that these will eventually be relocated to an operations area and the lobbies returned to their intended use.

Baggage claim off-load includes: the portion of a flat plate, direct feed claim unit upon which the bags are placed, or the feed conveyor for a remote-fed claim unit; the adjacent baggage train lane and work area; and a by-pass lane for baggage trains. The planning area of 2,500 SF per claim unit is based on providing adequate space for the off-loading and bypass lanes for a baggage train of 4 carts or single container dollies. For TTN a shorter 2 cart off-load area is assumed.

Baggage Service Offices

Baggage service offices are typically required only by airlines with sufficient activity to warrant staffing. In some terminals, the major airline in an alliance may provide baggage service for other carriers, thus reducing the total area required. Lower activity airlines will typically use baggage lock-up areas to store late or unclaimed baggage rather than staffed offices. The planning factor is based on design hour deplaned O&D passengers and includes area for both staffed offices and lock-up storage areas. For the suburban airports, this ranges from 0.7 to 2.0 SF per terminating passenger depending on the number and types of airlines.

Concessions

Terminal Concessions include all of the commercial, revenue-producing functions which serve the travelling public. In developing the concessions capacity analyses, planning factors have been developed to reflect passenger characteristics obtained from the 2005 passenger surveys.

The approach used is based on a methodology originally developed by a principal of SI Partners, and now used by a number of other consultants. It should be noted that this methodology is usually customized to consider the unique qualities of a specific airport and its passengers. It is also usually modified to consider the specific concession goals established by airport management.

The methodology considers various passenger and facilities characteristics to develop preliminary area per passenger planning factors for food/beverage, retail and duty free. Tables in Sections II, III and IV derive the planning factors for the individual terminals. This approach is suitable for a first cut estimate such as required for the Regional Study. However it is not a substitute for a detailed concessions study which would more fully analyze revenue production, concession mixes, passenger characteristics and other terminal specific factors. Therefore, for this Study the UF factors are only initial estimates and may be subject to significant change.

At the present time, the splits of concessions between secure and non-secure areas varies significantly by airport. Those with a high percentage outside security were not considered a problem prior to 9/11 when security screening was faster. Passengers could stay in the non-secure area longer, or easily return to the non-secure area if a flight was delayed. With slower, more intensive screening and the prohibition of visitors past security, passengers are reluctant to stay in the non-secure area as long. Unless a delay is of a known, long duration, passengers are also reluctant to leave the holdroom to use concessions in the non-secure area.

For larger domestic terminals it is generally recommended that 90% of the concessions be located in the secure area. Smaller airports where there is likely to be a higher percentage of well-wishers generally have a lower percentage of secure concessions In the case of the suburban airports, the existing percentage of secure concessions are 69% at ACY; 56% at ABE and 0% at TTN. It is recommended that 80% of concessions be in secure areas for the longer term at ACY and ABE.

Trenton-Mercer is a special case. The Airport has a large restaurant/lounge which serves primarily a non-passenger market. Based solely on passenger activity, the terminal would likely support little more than vending machines. The capacity analysis has assumed that TTN's concessions would be unchanged over the Study period.

There are three on-airport rental car companies at ACY; two at TTN and six at ABE. Each company is assumed to have 15 LF of counter with a small office for a total depth of 20 feet. Other transportation services generally do not have staffed counters in the terminals at present. Either a staffed counter or area for information boards has been assumed for the future.

Other services can cover a wide range of businesses including currency exchanges, ATM machines, insurance sales, rental office cubicals, etc.

Concession support consists of storage/receiving areas, preparation kitchens, employee lockers, loading docks and administrative offices. Service elevators and service corridors, where provided, are considered separately as non-public circulation. For capacity planning, 25-35% is typically used depending on the number of individual concessionaires, the availability of out-of-terminal support space, and the types of concessions. In computing existing support areas, it was often difficult to identify support from passenger service areas, thus the low end of the range has been used for most terminals.

Other Public Areas -

Public Seating & Meeter-greeter Lobbies

Public seating areas include general waiting areas near the ticket lobby and baggage claim areas. These are typically in non-secure areas of the terminal. Most airports have traditionally provided seating for approximately 15% of the design hour enplaned passengers and their visitors, plus visitors for the deplaning passengers.

Since 9/11, passenger activity patterns have changed. Because enplaning passenger well-wishers have been reduced to very small numbers in larger domestic terminals, and passengers typically want to go through security as soon as possible, relatively little seating for enplaning passengers is now needed. Since security regulations now prohibit visitors from going beyond security, there is a need for domestic meeter-greeter areas located at concourse exits and the baggage claim area in addition to the traditional international meeter-greeter lobbies. As noted in the concessions section, smaller airports have tended to maintain higher well-wisher ratios.

Specific visitor ratios for the suburban airports are not available. However, Passenger Satisfaction Surveys conducted by the PANYNJ in 2005 indicated that the average number of well-wishers for domestic terminals was 0.1 per passenger, and meeter-greeters ranged from 0.2 to 0.7. For the suburban airports an average of 0.3 visitors per passenger has been assumed.

For the capacity analysis, seating and meeter-greeter areas have been combined. Area demands have been based on design hour total passengers and their visitors. Area for 10-20% of these passengers and visitors has been used depending on the type of activity.

Restrooms

Restrooms should have at least as many toilets for women as toilets and/or urinals for men. Many recent building codes are now requiring 25% more fixtures for women than for men. Most of the restrooms in the various terminals meet the equal number goal and some locations in ACY and ABE provide the additional fixtures for women.

To provide a consistent analysis for all airports in the Study, the methodology used for the PANYNJ airports has been used. The base number of fixtures is taken from the New York City Building code which is based on terminal occupancy, and requires equal numbers for each sex. The PANYNJ then adds the 25% female factor.

Restroom capacity has been divided between the main terminal locations (ticketing, bag claim and non-secure concession areas) and the concourses:

- The terminal demand is based on design hour deplaning O&D passengers and their visitors @ 2.0 SF per person.

- The concourse restroom demand is based on the PANYNJ/NYC Code methodology of occupancy equal to 150% of aircraft capacity (expressed as EQA) plus the additional factor for female fixtures. Restroom area per fixture is based on an average derived from plans of new or recently renovated terminals. The combined planning factor is equivalent to 230 SF per EQA.

- In addition to handicapped access toilets, sinks and urinals, it is recommended that companion care restrooms be provided. These unisex restrooms allow an elderly or disabled person to be accompanied into a restroom by another person who assists the disabled person. Although not very large (typically 70-100 SF), retrofitting these companion care facilities can be difficult. The above planning factors include allowances for companion care restrooms and related janitor closets.

A minimum sized restroom module of 500 SF has been used for TTN in each area of the terminal.

I.3.3 Annual Capacity Estimates

As discussed in previous sections, airport terminal facilities are sized to accommodate the peak (Design) hour passenger volumes of a design day. Design Hours for a specific planning horizon are calculated from annual forecasts based on assumptions as to:

- The percentage of annual passengers occurring in the peak month;
- The number of days in the peak month; and
- The percentage of daily passengers which arrive or depart in the peak hour. This percentage is either:

  1) estimated based on assumed changes from the existing base year activity, or

  2) estimated from a future design day schedule to which peak hour load factors have been applied.

This approach is very much "top down". Annual passengers have been forecast for each planning horizon; design hours projected; and facilities needs calculated based on assumed levels of service. Comparing these to existing conditions results in a deficiency or surplus for each functional area.

However, most policy makers and the public focus on a simpler annual capacity estimate. It is easier to understand that a airport has been planned for "10 million annual passengers" than for "1,500 peak hour enplanements".

This annual passenger capacity is relatively straight forward when describing the level of activity used to program a new or expanded terminal. However, it is not necessarily the absolute "capacity" of the airport. A terminal planned for 10 million passengers doesn't grind to a halt if 11 million passengers use it, just as a properly designed terminal shouldn't shut down on the busiest days of the year which exceed the Design Hour levels of activity. During these "super peak" days, waiting times would exceed design objectives and areas become more crowded, but the terminal should still function at a lower level of service.

One of the goals of this Study is to estimate the capacities of each airport. This can be more complicated and variable than starting with the Design Day planning assumptions and working toward facilities requirements.

Taking a simple example beginning with the planning assumptions:

- 1 million annual enplanements.
- 10% of annual enplanements in the peak month = 100,000 monthly enplanements.
- Peak month has 31 days = 3,225 design day enplanements.
- Based on schedules and actual activity, 15% of daily enplanements occur in the peak hour = 480 design hour enplaned passengers.

From this, facilities would built to provide the desired level of service for 480 design hour enplanements, and it can be said that the terminal was designed with a "capacity" of 1 million annual enplanements. However, if the airlines change their patterns of activity so as to either add flights outside of the peak, or conversely, concentrate activity by reducing flights or aircraft size outside the peaks, that same 480 design hour facility could accommodate more, or less, than 1 million enplanements.

For example, without changing the seasonal patterns (peak month as percentage of annual passengers), the "annual capacity" of this theoretical terminal could change as follows:

- If flights were added outside the peak so that the 480 peak hour enplanements represented only 12% of daily passengers this would equal 4,000 daily enplanements; 124,000 peak month enplanements; and 1.24 million annual enplanements. High gate utilization conditions (such as hubbing or some low cost carriers) can increase this annual capacity even further.

- Conversely, if airline activity was reduced during the non-peak hours, so that the 480 peak hour enplanements represented 18% of daily passengers this would equal 2,670 daily enplanements; 82,670 peak month enplanements; and 826,700 annual enplanements.

Thus, unanticipated changes in airline scheduling can change the "capacity" of this terminal to a range of approximately 0.83 - 1.24 million enplanements.

Annual Capacity Approach

Due to the variability in the factors which can be used to translate design hour capacities to annual passengers, it is necessary to set these assumptions in a consistent manner for each passenger processing facility. In Section I.3.1, the 2015 design day schedules were analyzed and design hour load factor assumptions developed. For purposes of estimating a airport's annual capacity, these 2015 assumptions are assumed to be fixed.

By fixing the assumptions underlying the design hour/annual passenger relationship, the annual capacity of individual facilities can be calculated by ratio. The basic approach is as follows:

- Using the recommended facilities demands for 2015, a ratio is established between design hour passengers and the facility. For example: 20 enplaned peak hour O&D passengers per equivalent check-in position with the processing time and utilization assumptions for 2015.

- This ratio is applied to the existing facilities to estimate the design hour capacity of each. For example, if the airport has 30 equivalent check-in positions, this would be a capacity of 600 peak hour O&D passengers.

- This peak hour facility capacity is then compared to the design hour/annual passenger relationship. Using the previous example of 480 design hour enplanements for 1.0 million enplanements, the ratio is 2,083 annual enplanements per peak hour enplanement. Applying this to a check-in capacity of 600 peak hour enplanements yields an annual capacity estimate of 1.25 million O&D enplanements based on check-in facilities.

The consultant believes there are five facilities which fundamentally determine a domestic terminal's processing capacity:

- Check-in positions
- Security screening (SSCP) lanes
- Contact gate mix
- Holdroom area
- Domestic bag claim frontage

Discussions with PANYNJ staff have focused on the first four facilities - check-in, SSCP, gates and holdrooms - as the key capacity determinants. Baggage claim is considered a secondary determinant primarily relating to level of service issues.

Other facilities, such as circulation and queuing areas, concessions or airline lounges can affect the level of passenger comfort/amenity or revenue generating potential, but are not critical to passenger processing. Airline operating areas, baggage handling and offices similarly affect the efficiency of airline operations but only indirectly the ability to handle passengers.

In Sections II, III and IV, these annual capacity estimates have been computed for each airport. In most cases there is a range of annual capacities for each airport based on the various facilities. The decision then is to take one of three approaches:

1. Use the full range of indicated capacities recognizing that few terminals have balanced facilities.

2. Take a worst case "point of failure" approach and base the annual capacity on the weakest link. This may involve all elements or be limited to those seen to be most critical and most difficult to improve.

3. Develop a weight for each element and compute a weighted average capacity.

Based on the approach used for the PANYNJ airports, the full range of capacities has been retained for each airport.

I.4 On-Airport Roadway & Terminal Frontage Capacity

I.4.1 Introduction

On airport roadway and terminal frontage capacity and needs analysis was conducted for 2004 baseline and forecast 2015 and 2025 conditions. This process encompassed two components. First, vehicular demand was derived for terminal frontages at Lehigh Valley International, Atlantic City International and Trenton-Mercer Airports as well as demand entering and leaving each airport. For frontage analyses, demand was translated into required frontage length and compared with existing available frontage. For on-airport roadway analysis, vehicle demand was evaluated relative to findings of recent prior studies and roadway capacities at various service levels. These processes are described below.

I.4.2 Demand Estimation

Baseline demand on on-airport roadways and terminal frontages in terms of total vehicles, and vehicles by class when required, was derived based upon 2004 design day airline schedules for each airport. Forecast demand for 2015 was derived based upon projected 2015 design day schedules. Forecast demand for 2025 was derived by projecting 2015 demand based upon forecast annual 2025 passenger enplanements developed by airport as part of this study.

As a first step, baseline 2004 vehicle trip estimates were derived from air passenger volumes by applying various factors to the 2004 design hour-by-hour distribution of arriving and departing airline seats by airport. This began with the application of values for load factor and the proportion of arrivals and departures that are connecting rather than origin or destination passengers. Since passengers usually arrive at the airport well before their scheduled flight departure time, a distribution of passenger arrival time at the airport prior to departure was derived from the 2005 Departing Air Passenger Survey and applied, with the airport arrival spread compressed prior to 9AM for departures as determined from the survey. It was assumed that arriving passengers leave the airport in the same hour as their flight arrival and that meeter/greeters arrive in the same hour as the arrival of their scheduled pickup. Various values for airport specific mode split, vehicle occupancy, and whether air passengers were dropped off, picked up or parked were also applied. Most were derived from the air passenger survey conducted as part of this study while load factors were consistent with those used in the terminal analysis and findings from other studies were used to reconcile frontage use by vehicles with parking activity. Key values used are provided in Table I.4-1.

Table I.4-1
Variables Involved in Trip Generation Projections

LOAD FACTORS AND CONNECTING PASSENGERS

Variable	Trenton-Mercer Airport	Atlantic City Int Airport	Lehigh Valley Int Airport
	Domestic	Domestic	Domestic
Load Factor	70%	90%	85%
Connecting Passengers[2]	0%	0%	0%

Source:
1. Terminal Capacity Analyses, Hirsh Associates
2. 2005 Departing Air Passenger Surveys.

MODAL SPLITS

Airport	Private Car			Taxi	Limo/Car Service (For Hire)	Shared Limo/ Courtesy Vehicles	Courtesy Vans	Scheduled Bus	Charter Bus	Local City Bus	Rental Car
	Dropped Off	*Parked On-Airport*	*Parked Off-Airport*								
TTN	17.4%	71.4%	1.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	9.2%
ACY	53.8%	33.4%	0.8%	2.8%	1.5%	0.2%	0.1%	0.2%	0.2%	0.0%	7.1%
ABE	50.3%	35.5%	1.0%	1.7%	0.7%	0.0%	0.7%	0.1%	0.2%	0.2%	9.7%

Source:
2005 Departing Air Passenger Surveys.

VEHICLE OCCUPANCIES

Airport	Private Car[1]			Taxi[1]	Limo/Car Service (For Hire)[1]	Shared Limo/ Courtesy Vehicles[2]	Courtesy Vans	Scheduled Bus	Charter Bus	Local City Bus	Rental Car
	Dropped Off	*Parked On-Airport*	*Parked Off-Airport*								
TTN	1.94	2.30	2.00	2.00	1.90	5	5	-	25	-	2.44
ACY	2.47	2.98	3.22	2.13	2.41	2	2	-	25	-	2.85
ABE	2.40	2.32	2.75	2.43	2.25	5	3	-	25	-	2.24

Notes:
1. Derived from 2005 Departing Air Passenger Surveys using travel party size.

I.4.3 On-Airport Roadways

The on-airport roadway systems at Lehigh Valley International, Atlantic City International and Trenton-Mercer Airports are generally similar in the terminal areas, consisting of a loop recirculation roadway around a surface parking facility. Atlantic City and Trenton-Mercer Airports also have long access roadways that connect with the external roadway network. Rather than strictly defining on-airport roadways as those under the jurisdiction of the airport owner/operator, on-airport roadways were defined in this study as roadways that service exclusively airport related traffic. The on-airport roadway analysis performed for this study focuses on primary roadway elements whose functions are to provide access to, egress from and circulation within the passenger terminal areas of each airport. Although vehicle trips not directly associated with air passenger departures and arrivals are present on these roadways, such as employee, police and service vehicle trips, the bulk of the traffic on most of the roadways analyzed is related to air passenger transportation.

Recent previous master plan and/or environmental impacts studies have been conducted at each of the three airports and each reviewed at some level on-airport roadways or the intersections of airport access roads with the external roadway network. The analysis presented herein references and updates these previous studies.

Traffic operations and quality of flow are usually measured in terms of level of service (LOS) as defined in the Highway Capacity Manual, with LOS A representing the best condition with the lowest demand relative to capacity and LOS E operations at capacity (for uninterrupted flow conditions, i.e. those not controlled by traffic signals or STOP signs). Oversaturated conditions (LOS F) occur when demand exceeds capacity. Generally, LOS D is an acceptable design standard in urban areas, but due to the time-critical nature of airport related travel, LOS C is often considered as the service level threshold that indicates the need for planning of roadway improvements, given the time required to design and implement an improvement project.

I.4.4 Terminal Frontages

The amount of frontage curb required to accommodate the peak-hour arriving and departing flights on the terminal frontage roadways was estimated based upon a multi-server queuing model used by the Port Authority Engineering Department. This methodology was adopted from the FAA's *Apron and Terminal Building Manual* and a similar methodology used in the *1989 Frontage Operating Plan* prepared for the JFK Redevelopment Program. The curb space requirement at a specified limiting value of probability level is determined by the queuing model using input data in terms of peak-hour arrival related vehicles and departure related vehicles, derived using various variables, average dwell times and a range of probability confidence levels (i.e., 80% and 85%). An 80% probability confidence level was used in this analysis, which would assure that at least 80% of the arriving vehicles will immediately find a legal space at the curb.

Results of the frontage analysis algorithm are summarized for the terminal arrivals and departures roadways in terms of “common” and “segmented” frontage space in the discussions of findings for the terminal frontages of each airport. The common frontage allows a mix of different types of vehicles to access the entire curbside of a terminal facility. The segmented frontage assigns specific vehicle parking to a designated curbside location. Most of the arrivals frontage roadways provide segmented curb spaces whereas the departures frontage roadways provide common curb spaces. Results of the required terminal frontage analysis were compared to the available frontage supply for each airport to determine the extent of either surplus or deficit under 2004, 2015 and 2025 conditions. Information on the available frontage curb supply was determined based upon review of aerial photographs, previous project reports and field reconnaissance trips.

I.5 Analysis of On-Airport Vehicle Parking

I.5.1 Introduction

On airport vehicle parking capacity and needs analysis was conducted for 2004 baseline and forecast 2015 and 2025 conditions at Lehigh Valley International Airport, Atlantic City International Airport and Trenton-Mercer Airport. The future parking demand was estimated by applying the projected 2015 and 2025 growth rates to the 2004 baseline demand. Appropriate growth rates were developed based upon comparison of future daily origin and destination (O&D) passengers and existing 2004 O&D passengers.

I.5.2 Parking Demand Estimation

Both the inventory and peak parking demand data for each on-airport parking facility under 2004 baseline condition were derived from various data sources, including aerial photographs, project reports, field reconnaissance trips and conversations with specific airport operations personnel. Actual 2004 peak parking occupancy data was not available at any of the three study airports.

In the absence of actual peak-hour parking occupancy data at Lehigh Valley Airport, the regression equation developed in the previous 2003 "Airport Master Plan Update" was used to estimate the required parking supply under 2004, 2015 and 2025 passenger demand conditions.

For the projection of future parking demand at the Atlantic City and Trenton-Mercer Airports, the daily O&D passenger parameter was adopted from the methodology used in the "Parking Generation Manual" published by the Institute of Transportation Engineers (ITE). Thus, the daily O&D passenger estimate was derived from the projected 2015 design day airline schedules. Future parking growth rate from 2004 to 2015 was estimated as a ratio of future design day O&D passengers over existing design day O&D passengers for the 2015 forecast year. The projected 2025 parking demand was developed as a ratio of the 2025 annual enplanements over the 2015 annual enplanements.

I.6 Analysis of Airport Access/Off-Airport Roadway Capacity

I.6.1 Introduction

Lehigh Valley International Airport, Atlantic City International Airport and Trenton-Mercer Airport are all adjacent to interstate, toll or other limited access highways, but direct access to each is via local roadways. All three airports are located in areas that have experienced significant growth over the last 20 years and are expected to continue to grow. Only at Lehigh Valley International Airport was significant recurring congestion identified on a primary access corridor. In addition, development not presently defined that could occur on undeveloped land in the vicinity of each airport may present issues related to airport access in the future.

The methodology used for off-airport access studies addresses both roadway and transit access. Included is an inventory of existing highway and transit systems, a general assessment of existing and future operations as well as an identification of transportation system expansions planned over the study time horizon.

I.6.2 Transit Access

Existing transit service at each airport was inventoried. Although transit service is provided to Lehigh Valley International Airport and is available by shuttle connection at Atlantic City International Airport, transit use by airline passengers is very low at these airports, as determined by the 2005 Departing Air Passenger Survey.

I.6.3 Off-Airport Roadway Capacity

Off-airport roadway conditions were evaluated on a qualitative basis with conditions, problems and issues defined based upon observation, discussion with airport personnel, and review of information available from departments of transportation and planning agencies. Also, all proposed improvements that would enhance airport access were identified and reviewed.

II. CAPACITY ASSESSMENT

Lehigh Valley International Airport

II.1 Airfield Capacity

The analysis of runway capacity for ABE was conducted as described in Section I, using the framework found in Advisory Circular 150/5060/5. The Peak Month Average Day was derived from the forecast to determine the PMAD to annual ratio and the user group distribution. These values were combined with the capacity rates determined from analysis of similar airports in the FAA ASPM database to develop annual runway capacity rates. The annual capacity values developed were compared to the forecast operations to determine the level of future runway capacity need.

II.1.1 Future Demand Profiles

Exhibit II.1-1 shows the actual and forecast annual operations by user group for the period from 1996 to 2025. Commercial passenger operations, including scheduled commuter service, are forecast to grow from 27,500 annual operations in 2006 to 31,000 operations in 2025. Air taxi operations are forecast to increase from 20,000 to 27,600 operations over the same period. The majority of the growth in annual operations is driven by the General Aviation (GA) activity. GA operations are forecast to increase from 90,000 annual operations in 2006 to 124,000 annual operations in 2025. Military operations are forecast to remain constant at 3,600 operations per year throughout the planning period. Total annual operations are forecast to grow from 141,100 in 2006 to 186,200 in 2025.

Analysis of the FAA OPSNET data for August 2004 was conducted to determine the distribution of activity by user group for the PMAD. The result of this analysis is presented in **Table II.1-1**. The daily activity is 74 percent itinerant and 26 percent local/touch-and-go. The majority of the itinerant operations are GA, with air carrier and air taxi operation comprising approximately 27 percent of daily traffic. Table II-1 also presents the percentage of instrument flight rule (IFR) operations. An IFR percentage of 74 percent indicates a sophisticated GA fleet that would predominately use Runway 6/24 instrumentation for approaches.

Exhibit II.1-1
ABE Forecast Annual Demand

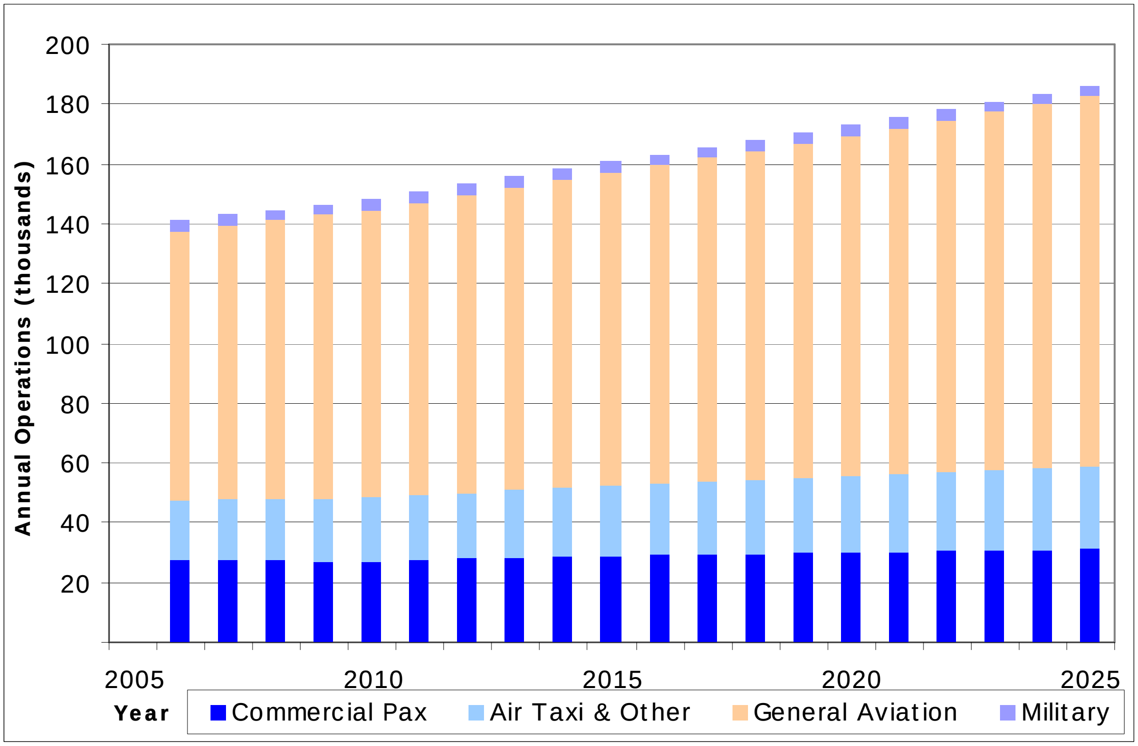


Table II.1-1
ABE Peak Month Average Day by User Group

Peak Month Average Day	Operations	Percent
Itinerant		
Air Carrier	60	15%
Air Taxi	48	12%
General Aviation	185	45%
Military	7	2%
Total Itinerant	**299**	**74%**
Local		
General Aviation	105	26%
Military	3	1%
Total Local	**108**	**26%**
Total Itinerant and Local	**407**	**100%**
2004 Annual Activity	132,976	
Annual/PMAD Ratio	327.0	
PMAD/Peak Hour Ratio	11.0	(assumed)
2004 Instrument Operations	98,937	74%

II.1.2 Existing Airfield Capacity

As stated in section I.1.1, the base peak hour capacity was 60 operations per hour. When adjusted to account for the number of local/touch-and-go operations the hourly capacity is 68 operations. **Table II-2** shows the peak hour capacity with and without touch and go operations and the resulting annual capacity based on the demand profile presented in Section II.1.1.

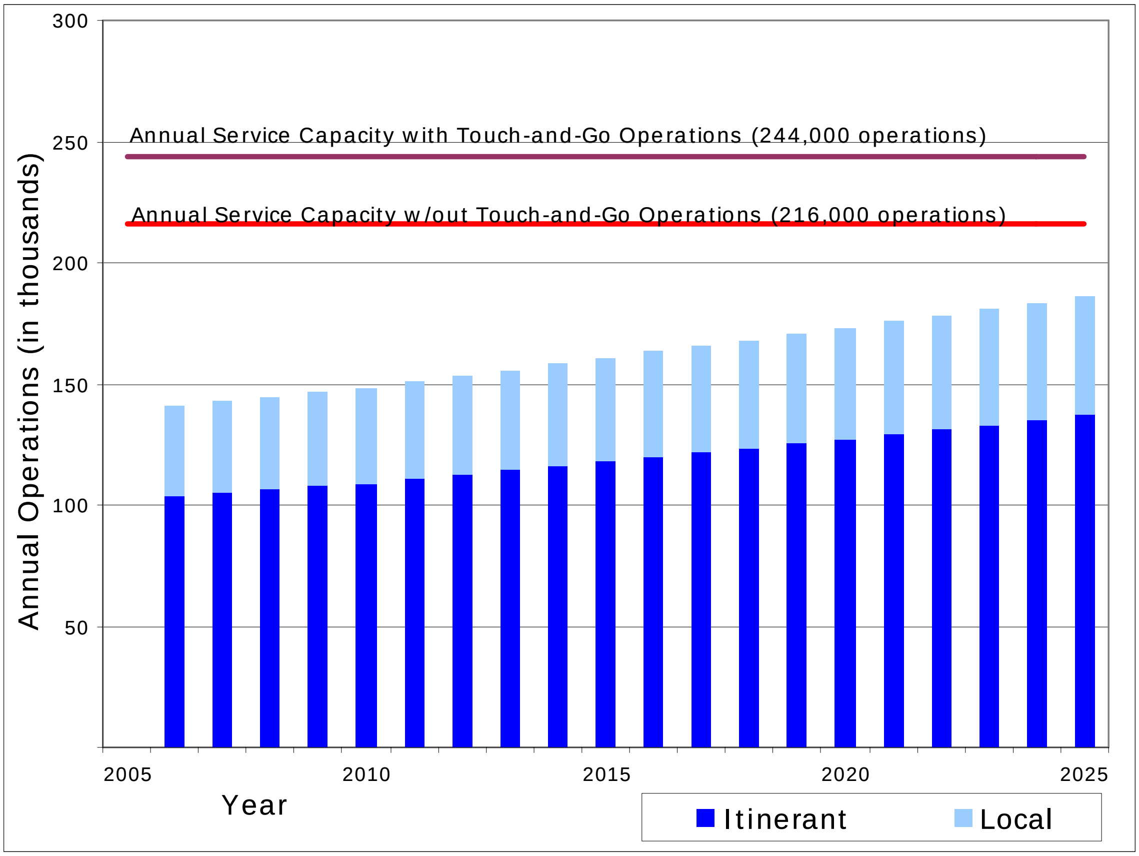
Table II.1-2
ABE Peak Hour and Annual Operations Capacity

Peak Hour Capacity	
Without touch and go activity	60
With touch and go activity	68
Annual Capacity	
Without touch and go activity	216,000
With touch and go activity	244,000

II.1.3 Existing and Future Capacity Analysis

Exhibit II.1-2 shows the annual demand and annual service capacity for ABE. The stacked bars represent the annual demand, the light blue is the local/touch-and-go traffic and the dark blue is the itinerant operations. The bright red line represents the annual service capacity without touch and go operations (216,000 annual operation) and the dark red line represents the annual service capacity with touch and go operations (244,000 annual operations). Based upon the forecast demand by user group the existing airfield has sufficient capacity to serve the demand through 2025.

Exhibit II.1-2
ABE Annual Demand and Capacity



II.1.4 Future Capacity Needs

Based on the analysis presented above the existing airfield has sufficient capacity to serve the forecast demand through the planning period.

II.2 Gate Utilization

Please refer to Appendix A for gate charts depicting utilization for planning years 2004 & 2015

II.3 Terminal Capacity

This section contains a summary of the major findings of the terminal facilities assessment for Lehigh Valley International Airport.

The section contains -

> Exhibit II.3-1: 2015 Design Day scheduled seats.
>
> Table II.3-1: Concessions Utilization Factors.
>
> Table II.3-2: Terminal Capacity Analysis table. As discussed in Section I.3, the table shows existing and approved facilities; recommended facilities to support current and forecast levels of activity; and any surpluses or deficiencies.
>
> Table II.3-3: Annual Passenger Capacity Estimates based on the key facilities identified in Section I.3.3.

Gates

The 2015 schedule requires seven active gates, of which only once gate is for a NB aircraft. The other Group III gates are for wider-wingspan regional aircraft.

As noted in Section I.2 (Analysis of Gate Capacity), remote parking positions were estimated only for the 2015 Design Day schedule to provide a guide to over-all airport apron requirements. The 2015 Design Day schedule has a total of nine RON aircraft as compared to a demand for seven active gates. Due to a surplus of gates the additional RON aircraft would likely be parked on gates rather than remotely.

Ticketing and Check-in

There will be excess check-in counter positions through the forecast period. There are multiple check-in areas with differing lobby depths. The main lobby has the shallowest depth (31'). A smaller check-in area used by two carriers has a 45' deep lobby. Terminal renovations will add a third area to be used primarily for charter flights which will also have a 45' deep lobby.

Security Screening, Holdrooms and Circulation

After the planned renovations are completed, there will be excess SSCP lane capacity through the forecast period.

Secure circulation within the concourses varies in width from 25' in the ground level gate area to 45' in the second level gate area. This compares to a recommended width of 30'.

There is significant excess holdroom capacity through the forecast period.

Domestic Baggage Claim

There is adequate baggage claim frontage through the forecast period. Separations between the two claim units, and between the claim units and adjacent walls and baggage service offices is less than recommended.

Airline Space

The Airport has excess airline offices and operations space through the forecast period.

Expansion and reconfiguration of the baggage make-up areas should provide excess capacity through the forecast period.

Checked baggage screening is currently conducted in the ticket lobbies. There appears to be sufficient space within the expanded baggage make-up areas for EDS equipment. However, there are no firm plans at this time for installing in-line systems.

There is excess baggage service office space through the forecast period.

Concessions

The total amount of food/beverage concessions is adequate through 2015. Most of the food/beverage space is located in the secure portion of the terminal, and this is adequate through the forecast period. The shortfall is in non-secure areas.

The reverse is true of news/gift/retail space. There is adequate total space through the forecast period, but most of the space is located in the non-secure sections of the terminal.

There is adequate counter space for the six rental car companies.

Other Public Areas

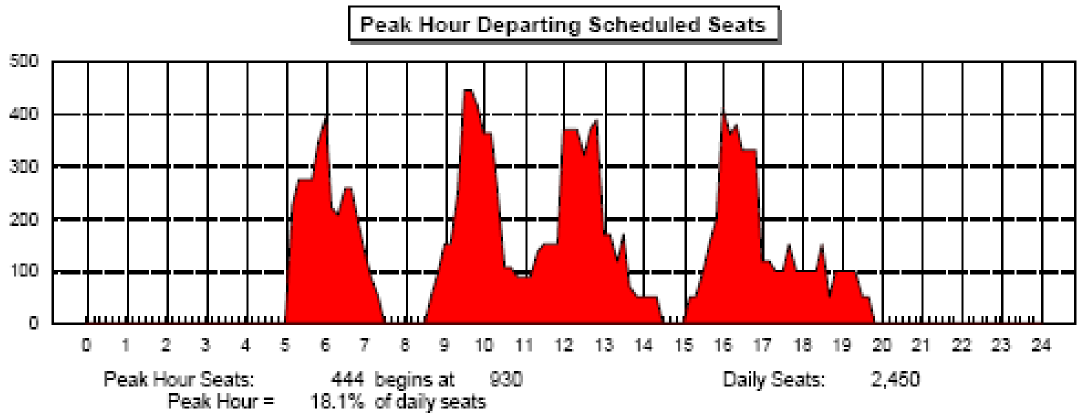
Terminal restrooms are adequate through 2015, and concourse restrooms through the forecast period.

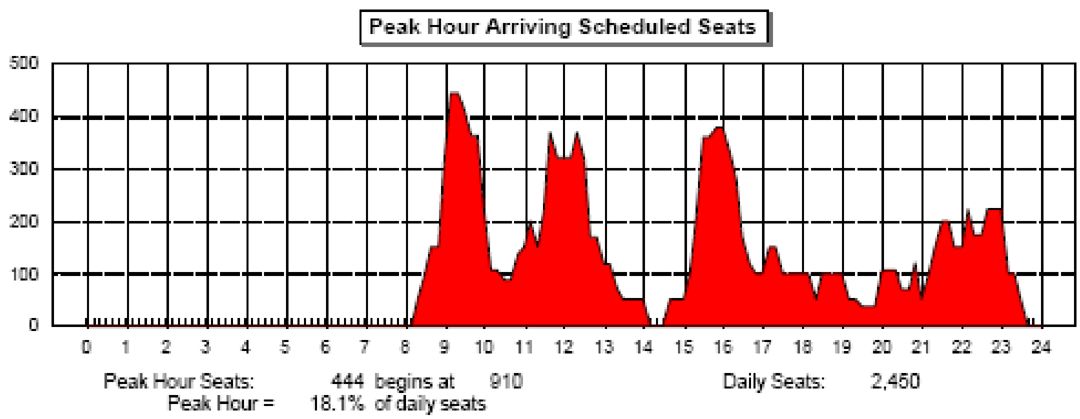
Public seating and waiting areas should be adequate through 2015. When the terminal renovations are completed, the meeter/greeter area on the lower level should be improved after the SSCP is removed. The existing EDS equipment in the ticket lobby also occupies a seating area which is assumed to be usable in the future.

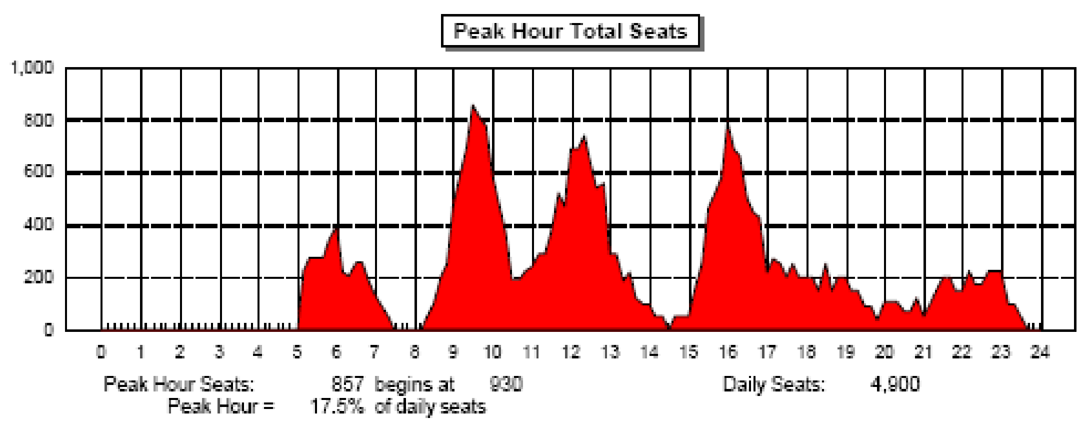
Annual Capacity

ABE shows a range of annual capacities from 845,000 to over 1.5 million enplanements. Contact gates have the greatest capacity, with check-in counters and baggage claim being more limiting. In all cases, the annual capacities are well in excess of the Study's forecasts.

Exhibit II.3-1
ABE – Peak Hour Seats (Design Day 2015)







Source: Hirsh Associates Analysis

ABE2015.WK4

Table II.3-1
ABE – Estimate of Concession Utilization Factors

Applied to annual enplanements in thousands

	Range 0.1 - 0.6	
	Food/Bev	Retail
Passenger Characteristics		
Business/Pleasure	0.4	0.4
Domestic/Int'l	0.1	0.1
Originating airport, XXX/other	0.2	0.2
Daily peaking, low/high	0.5	0.5
Dwell times, short/long	0.4	0.4
Facility Characteristics		
Scattered/clustered	0.4	0.4
Difficult/easy access	0.5	0.5
Location, away from gates/view of gates	0.4	0.4
Landside/airside	0.5	0.5
Term config, short walks/long walks	0.3	0.3
Retail Characteristics (food/bev)		
Fast food/sit down	0.2	
Variety, not important/important	0.4	
Street pricing Policy, no/strict yes	0.4	
Non-branded/Nat'l,regional brands	0.5	
Retail Characteristics (news/gift/specialty)		
Traditional products/specialtys		0.2
Non-branded/Nat'l,regional brands		0.2
Street pricing Policy, no/strict yes		0.4
Prominence as tourist attraction, low/high		0.1
UF Factor (Retail factor discounted 25%)	**5.2**	**3.5**

Table II.3-2
ABE – Terminal Capacity Analysis

	Existing and Approved Buildings Through 2008 [1]	Recommended Facilities - Demand: Base Year Activity 2004	Forecast Year Activity 2010	2015	2020	2025	Projected Surplus / (Deficiency): Base Year Activity 2004	Forecast Year Activity 2010	2015	2020	2025
Annual Enplanements											
Domestic		504,336	473,000	535,000	605,000	685,000					
Design Hour Factors:											
Domestic Load Factor		85%	85%	85%	85%	85%					
Domestic Connect %		0%	0%	0%	0%	0%					
Design Hour Passengers											
Enplaned Domestic O&D		360	340	380	430	490					
Enplaned Domestic total		360	340	380	430	490					
Deplaned Domestic O&D		280	340	380	430	490					
Deplaned Domestic total		280	340	380	430	490					
Visitors/Passenger		0.3	0.3	0.3	0.3	0.3					
GATES											
Total Gates:											
Regional Aircraft (Group II)	8 gates	5	4	3	3	3	3	4	5	5	5 gates
Narrowbody (Group III)	11 gates	2	3	4	5	5	9	8	7	6	6 gates
B757 (Group IIIa)	1 gates						1	1	1	1	1 gates
Widebody (Group IV)	0 gates						0	0	0	0	0 gates
Total Gates	20 gates	7	7	7	8	8	13	13	13	12	12 gates
Narrowbody Equivalent Gates (NBEG)	17.7 NBEG	5.5	5.8	6.1	7.1	7.1	12.2	11.9	11.6	10.6	10.6 NBEG
Equivalent Aircraft (EQA)	15.5 EQA	4.0	4.6	5.2	6.2	6.2	11.5	10.9	10.3	9.3	9.3 EQA
TICKETING & CHECK-IN											
Conventional Staffed Positions	33 pos	20	17	19	22	25	13	16	14	11	8 pos
Self-Service Kiosks	13 units	9	9	10	11	13	4	4	3	2	0 units
Equivalent Positions	46 pos	29	26	29	33	38	17	20	17	13	8 pos
Linear Positions	46 pos	29	26	29	33	38	17	20	17	13	8 pos
Counter length	253 LF	150	130	150	170	190	103	123	103	83	63 LF
Ticket Counter - area	2,580 SF	1,700	1,500	1,700	2,000	2,200	880	1,080	880	580	380 SF
Ticket Lobby - depth	31-45 LF	40	40	40	40	40	(9)-5	(9)-5	(9)-5	(9)-5	(9)-5LF
Ticket Lobby - area	9,670 SF	6,800	5,900	6,800	7,700	8,600	2,870	3,770	2,870	1,970	1,070 SF
Subtotal	12,250 SF	8,500	7,400	8,500	9,700	10,800					SF

Table II.3-2
ABE – Terminal Capacity Analysis (Con't)

	Existing and Approved Buildings Through 2008 [1]	Recommended Facilities - Demand: Base Year Activity 2004	Forecast Year Activity 2010	2015	2020	2025	Projected Surplus / (Deficiency): Base Year Activity 2004	Forecast Year Activity 2010	2015	2020	2025
HOLDROOMS & SECURE CIRCULATION											
Security Screening (SSCP) Lanes	6 lanes	3	2	3	3	3	3	4	3	3	3 lanes
Checkpoint/Search Area	7,330 SF	3,900	2,600	3,900	3,900	3,900	3,430	4,730	3,430	3,430	3,430 SF
Secure Circulation	22,760 SF	18,200	19,200	20,200	23,500	23,500	4,560	3,560	2,560	(740)	(740) SF
Concourse Width	25-45 LF	30	30	30	30	30	(5)-15	(5)-15	(5)-15	(5)-15	(5)-15 LF
Holdrooms:											
Regional Aircraft (Groups II & III)	SF	4,000	3,200	2,400	2,400	2,400					SF
Narrowbody (Group III)	SF	3,700	5,600	7,400	9,300	9,300					SF
B757 (Group IIIa)	SF	0	0	0	0	0					SF
Widebody (Group IV)	SF	0	0	0	0	0					SF
Total Holdroom Area	21,315 SF	7,700	8,800	9,800	11,700	11,700	13,615	12,515	11,515	9,615	9,615 SF
Subtotal	51,405 SF	29,800	30,600	33,900	39,100	39,100					SF
DOMESTIC BAGGAGE CLAIM											
Claim Frontage Required	- LF	110	130	150	170	190					LF
Claim Units	2 units	1	1	1	1	2	1	1	1	1	0 units
Claim Frontage Programmed	260 LF	150	150	150	150	300	110	110	110	110	(40) LF
Baggage Claim Area	7,540 SF	5,300	5,300	5,300	5,300	10,500	2,240	2,240	2,240	2,240	(2,960) SF
AIRLINE SPACE											
ATO Offices	8,630 SF	4,500	3,900	4,500	5,100	5,700	4,130	4,730	4,130	3,530	2,930 SF
Airline Operations & Offices (excluding ATO)	10,980 SF	5,200	5,900	6,700	8,000	8,000	5,780	5,080	4,280	2,980	2,980 SF
Baggage Handling											
Estimated make-up capacity	36 carts/LD3s	8	9	10	12	12	28	27	26	24	24 carts/LD3s
Baggage Make-up area	14,725 SF	4,800	5,500	6,200	7,400	7,400	9,925	9,225	8,525	7,325	7,325 SF
Checked Baggage Screening	440 SF	1,430	1,430	1,430	1,430	2,145	(990)	(990)	(990)	(990)	(1,705) SF
Baggage Claim Off-load	3,730 SF	1,500	1,500	1,500	1,500	3,000	2,230	2,230	2,230	2,230	730 SF
Baggage Service Offices	1,200 SF	500	600	600	700	800	700	600	600	500	400 SF
Subtotal	39,705 SF	17,930	18,830	20,930	24,130	27,045					SF

Table II.3-2
ABE – Terminal Capacity Analysis (Con't)

	Existing and Approved Buildings Through 2008 [1]	Recommended Facilities - Demand					Projected Surplus / (Deficiency)				
		Base Year Activity	Forecast Year Activity				Base Year Activity	Forecast Year Activity			
		2004	2010	2015	2020	2025	2004	2010	2015	2020	2025
CONCESSIONS											
Ground Services/Information Counter	0 SF	100	100	100	100	100	(100)	(100)	(100)	(100)	(100) SF
Rental Car Counter Length	116 LF	50	50	50	50	50	66	66	66	66	66 LF
Rental Car Lease Area	1,235 SF	1,000	1,000	1,000	1,000	1,000	235	235	235	235	235 SF
Food/Beverage; Secure	3,100 SF	2,100	2,000	2,200	2,500	2,800	1,000	1,100	900	600	300 SF
News/Gift/Retail; Secure	800 SF	1,400	1,300	1,500	1,700	1,900	(600)	(500)	(700)	(900)	(1,100) SF
Subtotal; Secure Concessions	3,900 SF	3,500	3,300	3,700	4,200	4,700	400	600	200	(300)	(800) SF
Food/Beverage; Non-Secure	2,050 SF	3,200	3,200	3,200	3,200	3,200	(1,150)	(1,150)	(1,150)	(1,150)	(1,150) SF
News/Gift/Retail; Non-Secure	990 SF	100	100	100	100	100	890	890	890	890	890 SF
Subtotal; Non-Secure Concessions	3,040 SF	3,300	3,300	3,300	3,300	3,300	(260)	(260)	(260)	(260)	(260) SF
Other Services	0 SF	400	300	400	400	500	(400)	(300)	(400)	(400)	(500) SF
Concession Support Area	5,460 SF	4,900	4,700	5,000	5,400	5,800	560	760	460	60	(340) SF
Subtotal	13,635 SF	13,200	12,700	13,500	14,400	15,400					SF
OTHER PUBLIC AREAS											
Public Seating and Meeter/Greeter Lobbies	1,550 SF	700	1,300	1,400	1,600	1,800	850	250	150	(50)	(250) SF
Restrooms - Terminal Locations	1,980 SF	900	1,700	1,900	2,200	2,500	1,080	280	80	(220)	(520) SF
Restrooms - Concourse Locations	2,770 SF	900	1,100	1,200	1,400	1,400	1,870	1,670	1,570	1,370	1,370 SF
Subtotal	6,300 SF	2,500	4,100	4,500	5,200	5,700					SF
Vacant spaces suitable for: non-secure airline offices	12,150 SF										SF

[1] - Sources:
Breslin, Ridyard, Fadero Architects -
Additions & Alterations Plan, June 2005
Hirsh Associates site visit, March 2006

Table II.3-3
ABE – Annual Capacity Estimates

A. Domestic Equivalent Check-in Positions

Existing Facilities (positions)	Design Hour Capacity (O&D enplanements)	Annual Capacity
46	600	845,000

C. Security Screening (SSCP) Lanes

Existing Facilities (lanes)	Design Hour Capacity (O&D enplanements)	Annual Capacity
6	760	1,070,000

D. Contact Gates

Existing Facilities (NBEG)	Design Hour Capacity (NBEG)	Annual Capacity
17.7	17.7	1,552,000

E. Holdrooms

Existing Facilities (square feet)	Design Hour Capacity (EQA)	
21315	11.3	1,163,000

F. Domestic Baggage Claim

Existing Facilities (linear feet)	Design Hour Capacity (O&D deplanements)	Annual Capacity
260	660	929,000

II.4 On-Airport Roadway & Terminal Frontage Capacity

II.4.1 On-Airport Roadways

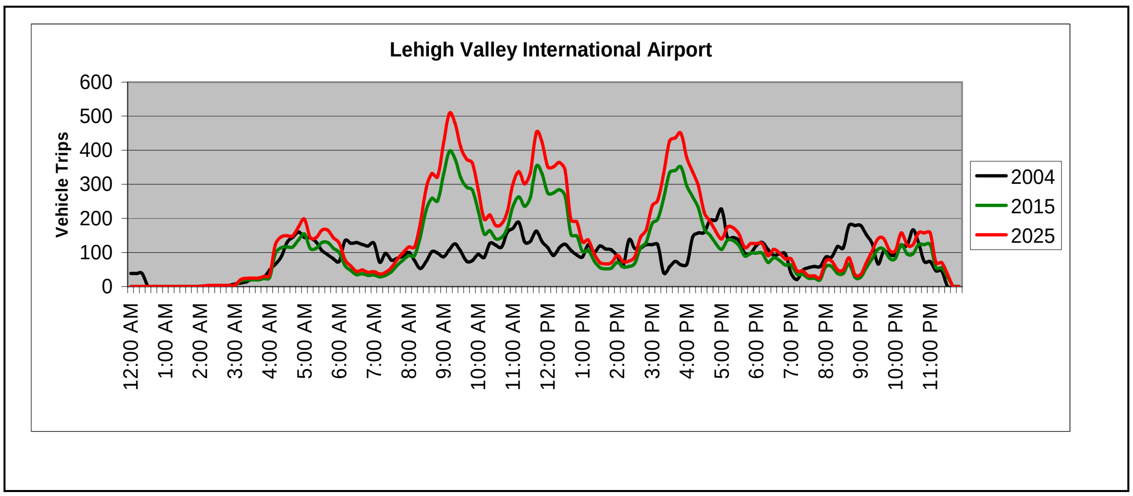
The primary on-airport roadway serving the Lehigh Valley International Airport (ABE) passenger terminal consists of a counter-clockwise two lane loop roadway with ingress and egress at the signalized intersection with Airport Road and City Line Road, as shown on Exhibit II.4-1. Vehicles entering the airport either proceed right to the car rental return or economy parking lot, veer left to the short- and long-term lots or proceed straight to the terminal frontage. A second entrance to the long term lot is available after the terminal frontage. From the east side of the recirculation road, vehicles can either recirculate back to the frontage or turn right to exit the airport. Access to the general aviation area is via Postal Road, a separate circulation roadway intersecting with Airport Road and also with a slip ramp connection from the terminal circulation roadway.

Exhibit II.4-1
ABE - Overall Airport Layout

II.4.2 On-Airport Roadway Capacity and Operations

The on-airport roadway elements consist of the terminal recirculation loop roadway, the roadway leading to the economy parking lot and rental car facility and the intersection of the two roadways. Exhibit II.4-2 shows design day vehicle trips by hour estimated to be generated by Lehigh Valley International Airport by passenger related activity for base year 2004 and projected for 2015 and 2025 forecast years (see Section I.4.2). In comparing 2004, 2015 and 2025 projected patterns, the peak hour trip generation is projected to increase from approximately 225 vehicle trips in 2004 to approximately 400 and 500 vehicle trips in 2015 and 2025, respectively, an increase of 75 per cent and 125 per cent over 2004. This increase in vehicle trips contrasts with an overall forecast increase in annual enplanements of 6 per cent in 2015 and 35 per cent in 2025 over 2004. This difference between the relatively moderate increase in annual enplanements versus the more than doubling of peak hour vehicle trips results from a greater concentration of arriving and departing passengers expected to occur in these out years.

Exhibit II.4-2
ABE - Vehicle Trips



These vehicle trips include both inbound and outbound trips, trips to and from the terminal frontage and the various on-airport parking areas. The overall on-airport roadway capacity of Lehigh Valley International Airport appears adequate to accommodate this projected level of vehicle trips. The two lane recirculation road should be sufficient to accommodate a minimum of 1000 vehicles per hour at a satisfactory level of service. However, it is likely that micro-peaks within each hour could occur, for example after closely spaced arrivals, and delays will occur at some points in the airport, such as on the intersection approach exiting the economy parking area as well as the on recirculating roadway approach. This intersection is the weak point of the on-airport roadway system and it may be necessary to install a traffic signal to adequately manage traffic flows in the future.

II.4.3 On-Airport Roadways – Conclusions and Recommendations

Based upon the passenger enplanement forecast, it is not anticipated that significant on-airport roadway deficiencies will occur within the study planning horizon.

II.4.4 Terminal Frontage Roadways

The existing Lehigh Valley International Airport terminal frontage consists of separate inner lower-level arrivals and outer upper-level departures roadways. The arrivals frontage on the inner roadway provides “segmented” curb spaces with particular designations for cars, taxis, shuttles and buses. The departures frontage on the outer roadway generally provides “common” curb spaces where no use restrictions are applied to any vehicles, except for a short 25-foot shuttle service stop. Each frontage roadway provides one curb loading/unloading lane and two through travel lanes. The arrivals frontage roadway provides a total of 414-foot length of segmented curb spaces as follows:

- Passenger Cars 294 feet
- Taxis 25 feet
- Buses 55 feet
- Shuttles 40 feet

The departures frontage roadway provides a total of 458-foot length of common curb space with 433 feet for all drop-off vehicles and a 25-foot shuttle space.

II.4.5 Terminal Frontage Capacity and Operations

It was assumed that the existing curb frontage configuration would be retained and was used in the analysis of 2015 and 2025 frontage conditions. The critical peak-hour frontage use at the terminal was established from the 2004 and 2015 design day airline schedules. The 2025 peak-hour frontage use was estimated from the ratio of projected annual 2025 enplanements over annual 2015 enplanements. The start of peak hours for the arrivals and departures passengers was estimated as follows:

- Arrivals Peak Hour 8:50 PM (2004) 9:10 AM (2015/2025)
- Departures Peak Hour 4:50 AM (2004) 8:40 AM (2015/2025)

Comparison of the available frontage capacity and the peak hour usage was used to estimate the extent of loading/unloading curb space deficiency or surplus under the 2004, 2015 and 2025 passenger demand conditions, as shown in Table II.4-1.

Although the total frontage capacity on the arrivals roadway is sufficient to accommodate passenger demand forecast between 2004 and 2025, individual curb space deficits for taxis/limos and buses are expected on the arrivals roadway. Therefore, the possible redistribution of available frontage curb supply on the arrivals roadway is recommended to mitigate this deficiency. The departures roadway has considerable excess surplus of curb space for the 2004, 2015 and 2025 passenger demand conditions.

Table II.4-1
ABE - Airport Frontage Analysis Summary

Frontage Road	Available Frontage (feet)			Required Frontage (80%) (feet)			Surplus (Deficit) (feet)		
	2004	2015	2025	2004	2015	2025	2004	2015	2025
Cars	294	294	294	100	125	125	194	169	169
Taxis/Limos	25	25	25	50	50	50	(25)	(25)	(25)
Buses	55	55	55	110	110	110	(55)	(55)	(55)
Shuttles	40	40	40	40	40	40	0	0	0
Arrivals Road	**414**	**414**	**414**	**300**	**325**	**325**	**114**	**89**	**89**
All Vehicles	458	458	458	100	101	126	358	357	332
Departures Roadway	**458**	**458**	**458**	**100**	**101**	**126**	**358**	**357**	**332**

II.4.6 Terminal Frontage Roadways – Conclusions and Recommendations

As shown in Table II.4-1, there is sufficient frontage curb capacity for the inner arrivals and outer departures roadways under 2004, 2015 and 2025 passenger demand conditions. A redistribution of excess curb space surplus for passenger cars on arrivals roadway is necessary to mitigate curb deficit for taxis/limos and buses. The existing bus stop length of 349 feet should be reduced to 150 feet for the redistribution of available curb surplus for taxis/limos, buses and shuttles under 2004, 2015 and 2025 conditions.

II.5 On-Airport Vehicle Parking Capacity

II.5.1 On-Airport Vehicle Parking Facilities

An inventory of existing short-term, long-term and economy on-site parking facilities at the Lehigh Valley Airport (ABE) was extracted from “Airport Master Plan Update” prepared for Lehigh Northampton Airport Authority in April 2003. The on-airport parking assessment is directed towards the parking needs of airline passengers and their meeters-greeters and is classified as short-term (24 hours or less) and long-term (longer than 24 hours) spaces. The assessment of employee and tenant parking needs is not addressed in this study. Locations of the existing on-airport parking facilities are shown on Exhibit II.5-1. A total supply of 2,765 public parking spaces was identified at four on-site public parking facilities as follows:

- Short Term 75 spaces
- Long Term 1,472 spaces
- Economy 1,164 spaces
- Meter (54 spaces) to be eliminated in future

TOTAL 2,711 spaces

Those passengers parking at the airport have four options. They can either park near the terminal in the main lot, choosing either short-term or long-term parking spaces, choose the economy lot located further from the terminal, or use metered parking spaces.

Primary access to both the short- and long-term parking is facilitated via the terminal approach roadway, which splits into a two-lane parking ramp on the left and the arrivals/departures roadway on the right. The left lane on the parking ramp is designated for long-term spaces and the right lane for short-term spaces. There is also a separate entrance to long-term parking only via the airport recirculation road. Both short- and long-term parkers exit through a common toll plaza facility.

The economy lot is located at the east end of the airport. Because of the distance to the terminal, a shuttle bus service provides access between the economy lot and the lower arrivals level roadway of the terminal. The shuttle bus operates from 5:00 AM until the last flight of the day.

A metered parking lot with 48 spaces is located on the west side of the terminal adjacent to the arrivals roadway. In addition, six metered spaces are located along the departures roadway, west of the terminal. It is anticipated that these metered parking spaces will be eliminated at some point in the future.

In addition, there are numerous employee parking areas with a total supply of 185 spaces, which are separated from long-term parking lots. The use of these employee lots require a permit “hang tag” on the driver’s rear view mirror. Five rental car companies (i.e., Avis, Budget, Hertz, National and Thrifty) also provide a total of 595 spaces on designated rental car lots.

Exhibit II.5-1
ABE – Parking Facilities

II.5.2 On-Airport Parking Capacity and Operations

In the absence of detailed on-site parking occupancy data at Lehigh-Valley Airport, the parking demand methodology developed in the 2003 Airport Master Plan Update was used to estimate the required future parking demand based on annual originating passengers. An analysis of parking data (i.e., airport automobile parking systems and rate survey conducted in 1991 by ACI-NA, Washington, D.C.) was used to develop a relationship between parking supply and annual passenger volumes. As a result, the following regression equation with the regression coefficient of 0.75 was developed to estimate the future parking supply requirement:

- Parking Supply = 1,476 + 0.001427 x Annual Originating Passengers

This regression equation was applied to ABE passenger forecasts of annual enplanements for 2015 and 2025. The resulting forecasted parking supply needs were compared to the available supply of 2,711 spaces to determine the extent of a parking deficiency or a parking deficit. The results are indicated on Table II.5-1. According to this analysis Lehigh-Valley Airport is expected to have a surplus of on-airport parking spaces through 2025. A detailed parking demand analysis is presented in Table II.5-2.

Table II.5-1
ABE - Parking Summary

	Supply			Required			Surplus (Deficit)		
Public Lot	2004	2015	2025	2004	2015	2025	2004	2015	2025
Short Term	75	75	75	-	-	-	-	-	-
Long Term	1,472	1,472	1,472	-	-	-	-	-	-
Economy	1,164	1,164	1,164	-	-	-	-	-	-
TOTAL	**2,711**	**2,711**	**2,711**	**2,196**	**2,239**	**2,453**	**515**	**472**	**258**

Table II.5-2
ABE - Airport Parking Demand Analysis

	Existing Facilities	Required Facilities Base 2004	2015	2025	Projected Surplus (Deficiency) Base 2004	2015	2025
Annual Enplanements		504,336	535,000	685,000			
Capacity (Number of Public Parking Spaces)							
Short Term	75						
Long Term	1,472						
Economy	1,164						
SUBTOTAL	2,711						
Metered (Anticipated to be eliminated in the future)	54						
Peak Daily Passengers							
Total Daily Seats		3,946	4,900	6,274			
Load Factor		0.85	0.85	0.85			
Non Connecting		1.00	1.00	1.00			
Daily O&D Passengers		3,354	4,165	5,333			
Growth Rate *		1.00	1.24	1.28			
Formula to Determine Required Parking Spaces							
Source: Airport Master Plan Update -							
Draft 4/2003 - Page 4		2196	2239	2453	515	472	258
Parking Spaces = 1476 + .001427 X Annual Enplanements							

* 2015 Growth Rate = Future Daily O&D Pax / Base 2004 Daily O&D Pax
2025 Growth Rate = 2025 Annual Enplanements / 2015 Annual Enplanements

II.6 Analysis of Airport Access/Off-Airport Roadway Capacity

II.6.1 Introduction

Lehigh Valley International Airport (ABE) is located northeast of the center of Allentown, near the eastern border of Lehigh County in eastern Pennsylvania, approximately 15 miles west of its border with New Jersey. Regionally, the airport is accessible by I-78 and US Route 22 from the east and west and I-476 from the north and south as well as several state and county roads, as described below.

II.6.2 Roadway Access

Direct access to ABE is provided from Airport Road, a north-south four-lane arterial roadway that interchanges with US 22 just south of the airport. US 22, a four lane limited access highway, provides connections with I-78 and I-476.

Significant improvements have been made along Airport Road in recent years. However, traffic congestion along US 22 is one of the major transportation issues in the area. It has been identified by the Lehigh Valley Planning Commission (LVPC) as an existing and worsening congested corridor. Existing Average Annual Daily Traffic (AADT) on US 22 at Airport Road is estimated at approximately 93,000 vehicles per day by the LVPC. Vehicle miles traveled (VMT) grew by 18 per cent in the Lehigh Valley between 1993 and 2000 and significant growth in traffic demand is expected in the future.

Direct access to the airport terminal area is provided through the signalized intersection of Airport Road with City Line Road and the Airport Entrance. A separate access to the general aviation area at Hangar 7 and Hangar 8 is provided at the intersection of Airport Road with Postal Road and Avenue A to the south. A traffic analysis of both intersections was completed in 2003 by DMJM Aviation[1]. Analysis was performed under 2015 passenger enplanement forecasts prepared in 2002 (2015 Base - 804,806 enplanements, 2015 High – 1,179,841 enplanements) and identified future capacity deficiencies. Recommended under both scenarios was the addition of a lane northbound and southbound between City Line Road and US 22 plus additional turning lanes from City Line Road and Postal Road. Under 2015 High forecast demand, a second left turn lane into the Airport from northbound Airport Road was also recommended. It should be noted that in comparison, the base forecast developed for this study is 535,000 enplanements in 2015, approximately 33 per cent less. However, as indicated in Section II.4, a shift in design day passenger activity is projected which would increase the ratio of peak hour to daily vehicle trips in the out years. Thus, these improvements may be required even though the forecast of annual enplanements is less.

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[1] Airport Master Plan Update, Landside Analysis and Concept Development (Draft), DMJM Aviation, April, 28, 2003

II.6.3 Transit Access

The Lehigh and Northampton Transportation Authority (LANTA) provides scheduled bus service to and from ABE on Route 1 with limited service on Routes F and H. Generally, service frequency is at an hour or more on each route.

II.6.4 Off-Airport Transportation Improvements

Off-airport transportation improvements programmed in the area of the Lehigh Valley International Airport are focused on US 22. A significant US 22 improvement project from the 15th Street interchange to Airport Road, including additional lanes and interchange improvements, is scheduled between 2008 and 2010. Furthermore, *22 Tomorrow – A Corridor Planning Study* by the Lehigh Valley Planning Commission is a continuation of the long term commitment and collaboration by the LVPC and PennDOT to identify long range transportation solutions for US 22 in the Lehigh Valley.

II.6.5 Conclusions

The primary issue affecting landside access to Lehigh Valley International Airport today and in the future is the recurring congestion on US 22. Improvements to US 22 scheduled to be implemented by PennDOT by the year 2010 should improve operations on US 22 in the vicinity of the airport. However, the continued high growth in traffic volumes in the Lehigh Valley is expected to increase overall congestion levels on the US 22 corridor. Localized congestion could occur along Airport Road at the airport entrances, as identified in the analysis described above.

II. CAPACITY ASSESSMENT

Atlantic City International Airport

III.1 Airfield Capacity

The analysis of runway capacity for ACY was conducted as described in Section I, using the framework found in Advisory Circular 150/5060/5. The Peak Month Average Day was derived from the forecast to determine the PMAD to annual ratio and the user group distribution. These values were combined with the capacity rates determined from analysis of similar airports in the FAA ASPM database to develop annual runway capacity rates. The annual capacity values developed were compared to the forecast operations to determine the level of future runway capacity need.

III.1.1 Future Demand Profiles

Exhibit III.1-1 shows the actual and forecast annual operations by user group for the period from 1996 to 2025. Commercial passenger operations, including scheduled commuter service, are forecast to grow from 7,500 annual operations in 2006 to 13,900 operations in 2025. Air taxi operations are forecast to increase from 9,300 to 13,100 operations over the same period. GA operations are forecast to increase from 51,000 annual operations in 2006 to 70,300 annual operations in 2025. Military operations are forecast to remain constant at 44,100 operations from 2006 to 2025. In total, annual operations are forecast to grow from 111,908 in 2006 to 141,400 in 2025.

Analysis of the FAA OPSNET data for August 2004 was conducted to determine the distribution of activity by user group for the PMAD. The result of this analysis is presented in **Table III.1-1**. The daily activity is 61 percent itinerant and 39 percent local/touch-and-go. The majority of the itinerant operations are GA with air carrier and air taxi operation comprising approximately 19 percent of daily traffic. Table III-1 also presents the percentage of IFR operations. An IFR percentage of 59 percent indicates a sophisticated GA fleet that would use Runway 13/31 instrumentation for approaches.

Exhibit III.1-1
ACY Forecast Annual Demand by User Group

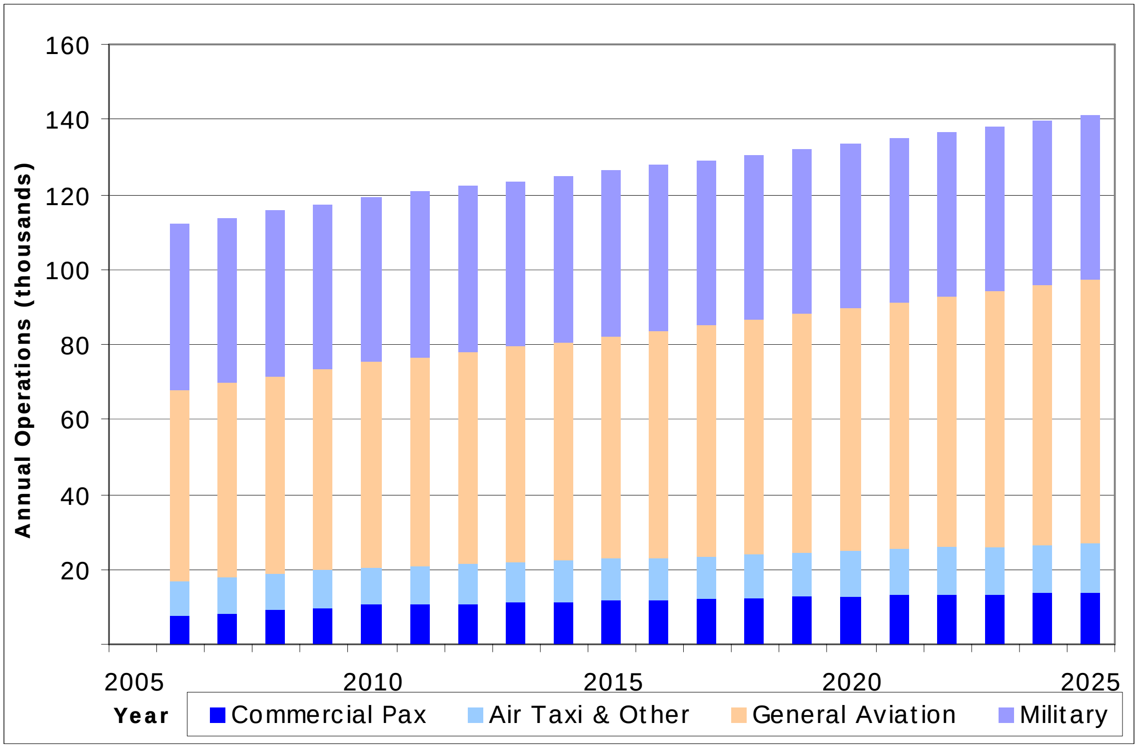


Table III.1-1
ACY Peak Month Average Day by User Group

Peak Month Average Day	Operations	Percent
Itinerant		
Air Carrier	39	11%
Air Taxi	30	8%
General Aviation	104	29%
Military	52	14%
Total Itinerant	**225**	**61%**
Local		
General Aviation	72	20%
Military	69	19%
Total Local	**141**	**39%**
Total Itinerant and Local	**366**	**100%**
2004 Annual Activity	119,955	
Annual/PMAD Ratio	328.0	
PMAD/Peak Hour Ratio	11.0	(assumed)
2004 Instrument Operations	72,946	61%

III.1.2 Existing Airfield Capacity

As stated in section I.1.1, the base peak hour capacity was 60 operations per hour. When adjusted to account for the number of local/touch-and-go operations the hourly capacity is 74 operations. **Table III-2** shows the peak hour capacity with and without touch and go operations and the resulting annual capacity based on the demand profile presented in Section III.1.1.

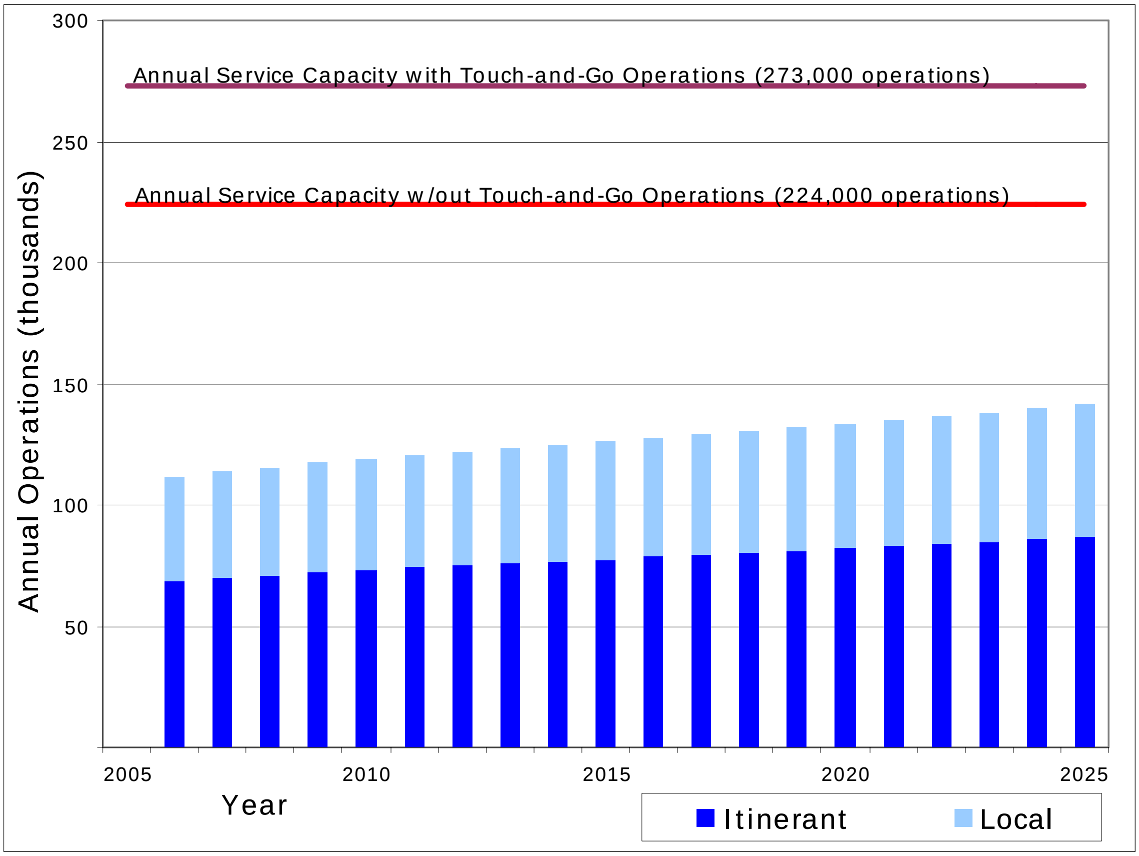
Table III.1-2
ACY Peak Hour and Annual Operations Capacity

Peak Hour Capacity	
Without touch and go activity	60
With touch and go activity	74
Annual Capacity	
Without touch and go activity	224,000
With touch and go activity	273,000

III.1.3 Existing and Future Capacity Analysis

Exhibit III.1-2 shows the annual demand and annual service capacity for ACY. The stacked bars represent the annual demand, the light blue is the local/touch-and-go traffic and the dark blue is the itinerant operations. The bright red line represents the annual service capacity without touch and go operations, 224,000 annual, and the dark red line represents the annual service capacity with touch and go operations, 273,000 annual operations. Based upon the forecast demand by user group the existing airfield has sufficient capacity to serve the demand through 2025.

Exhibit III.1-2
ACY Annual Demand and Capacity



III.1.4 Future Capacity Needs

Based on the analysis presented above the existing airfield has sufficient capacity to serve the forecast demand through the planning period.

III.2 Gate Utilization

Please refer to Appendix A for gate charts depicting utilization for planning years 2004 & 2015

III.3 ACY Terminal Capacity

This section contains a summary of the major findings of the terminal facilities assessment for Atlantic City International Airport.

The section contains -

Exhibit III.3-1: 2015 Design Day scheduled seats.

Table III.3-1: Concessions Utilization Factors.

Table III.3-2: Terminal Capacity Analysis table. As discussed in Section I.3, the table shows existing and approved facilities; recommended facilities to support current and forecast levels of activity; and any surpluses or deficiencies.

Table III.3-3: Annual Passenger Capacity Estimates based on the key facilities identified in Section I.3.3.

Gates

The 2015 schedule requires four active NB gates. The demand for an RJ gate does not overlap with the peaks for NBs, and there are no limitations in using a NB gate for RJ operations. Charter flights can occupy additional gates but typically operate outside of the scheduled flight peaks. If these limitations on charters continues, the Airport is considered to have adequate gate capacity through the forecast period.

As noted in Section I.2 (Analysis of Gate Capacity), remote parking positions were estimated only for the 2015 Design Day schedule to provide a guide to over-all airport apron requirements. The 2015 Design Day schedule has a total of four RON aircraft. Therefore, no additional RON positions would be required.

Ticketing and Check-in

The Airport has two charter operators which have a combined 12 ATO positions. Charters typically operate outside of scheduled peaks and are not included in the Design Day enplaning peak. These 12 positions have been held constant in determining future check-in counter demands.

The ATO counters are being re-configured as part of the current terminal modifications. As part of the project, a number of counters will be converted to in-line kiosks, although the exact number is not known at this time. The modifications will also allow Spirit to use their existing counters more efficiently. There will be excess capacity in terms of total check-in positions through the forecast period.

The ticket lobby depth is less than recommended for the concentrated departures by a single carrier with expected high load factors.

Security Screening, Holdrooms and Circulation

The three SSCP lanes will provide adequate capacity through the forecast period.

The 15' wide secure corridor is narrower than recommended.

The terminal has excess total holdroom capacity through the forecast period. However, the holdroom area is not well balanced. The west side gates have significantly more holdroom area than the east side gates.

Domestic Baggage Claim

The total amount of baggage claim frontage should be adequate through the forecast period. However, the balance between the two existing claim units (180 LF and 100 LF) does not match the typical peak load of two arriving similar sized NB aircraft.

The baggage claim area is undersized with insufficient separations between the claim units, and between the units and adjacent walls.

Airline Space

There is excess airline offices and operations space through the forecast period.

A new baggage make-up and checked baggage screening facility is being built which will allow the ETD units to be removed from the lobby. It is understood that ACY will be installing CT-80 EDS units in a semi-line configuration. When completed, there will be excess baggage make-up and screening capacity through the forecast period.

Baggage service offices are considered to have adequate capacity through 2010.

Concessions

The total amount of food/beverage concessions is considered undersized. Most of the food/beverage space is located in the secure portion of the terminal, and this is adequate through the forecast period. The shortfall is in non-secure areas.

The reverse is true of news/gift/retail space. There is adequate total space through the forecast period, but most of the space is located in the non-secure sections of the terminal.

There is adequate counter space for the three rental car companies.

Other Public Areas

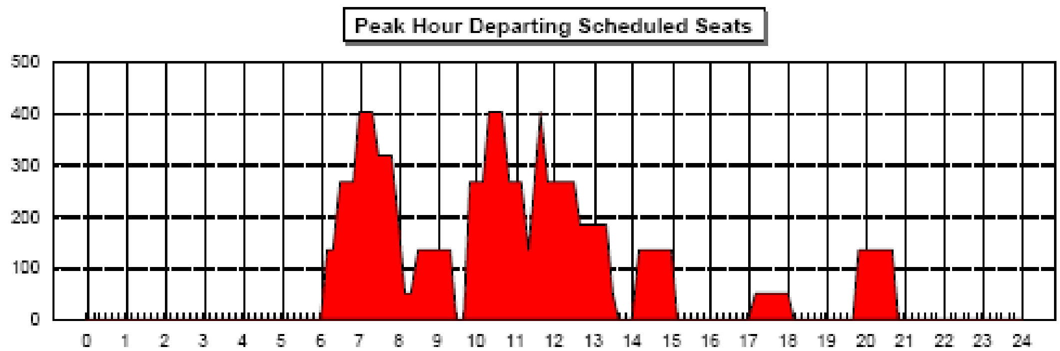
Terminal restrooms are adequate through 2010, and concourse restrooms through the forecast period.

There is adequate public seating area though the forecast period. However, it is all located in the ticket lobby. After the terminal renovations are completed, deplaning passengers will enter the bag claim area directly from the concourse. There will be no meeter/greeter area other than the corridor/queuing area in front of the rental car counters. This may result in congestion.

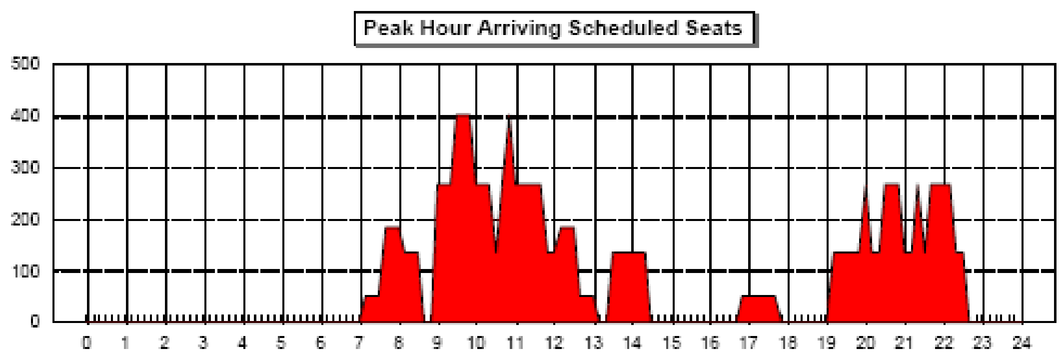
Annual Capacity

The four key determinants have annual capacities of between 800,000 and 1.1 million enplanements. Gates and holdrooms have the greatest capacities, with check-in positions and SSCP lanes at the lower end. Baggage claim has the least capacity, being roughly half of the holdroom capacity. With the exception of baggage claim, the terminal's capacities are greater than the Study's forecasts.

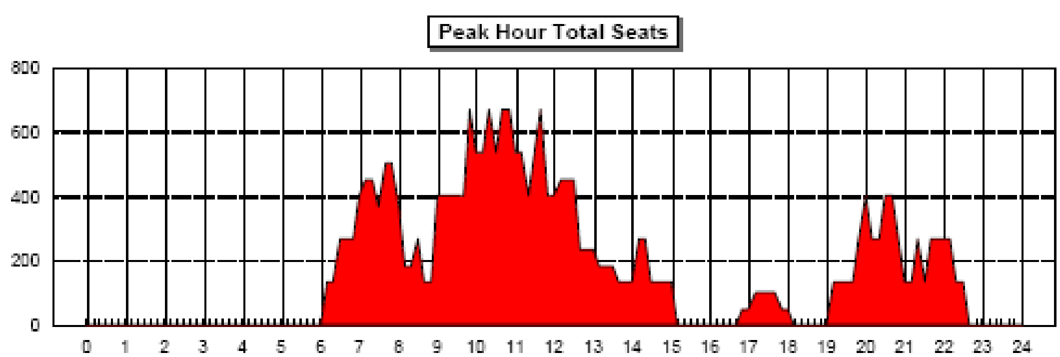
Exhibit III.3–1
ACY – Peak Hour Seats (Design Day 2015)



Peak Hour Seats: 402 begins at 700 Daily Seats: 2,026
Peak Hour = 19.8% of daily seats



Peak Hour Seats: 402 begins at 930 Daily Seats: 2,026
Peak Hour = 19.8% of daily seats



Peak Hour Seats: 670 begins at 1140 Daily Seats: 4,052
Peak Hour = 16.5% of daily seats

Source: Hirsh Associates Analysis

ACY2015.WK4

Table III.3–1
ACY – Estimate of Concession Utilization Factors

Applied to annual enplanements in thousands

	Range 0.1 - 0.6	
	Food/Bev	**Retail**
Passenger Characteristics		
Business/Pleasure	0.6	0.6
Domestic/Int'l	0.1	0.1
Originating airport, XXX/other	0.3	0.3
Daily peaking, low/high	0.5	0.5
Dwell times, short/long	0.4	0.4
Facility Characteristics		
Scattered/clustered	0.3	0.3
Difficult/easy access	0.5	0.5
Location, away from gates/view of gates	0.3	0.3
Landside/airside	0.3	0.3
Term config, short walks/long walks	0.3	0.3
Retail Characteristics (food/bev)		
Fast food/sit down	0.2	
Variety, not important/important	0.4	
Street pricing Policy, no/strict yes	0.4	
Non-branded/Nat'l,regional brands	0.3	
Retail Characteristics (news/gift/specialty)		
Traditional products/specialtys		0.2
Non-branded/Nat'l,regional brands		0.2
Street pricing Policy, no/strict yes		0.4
Prominence as tourist attraction, low/high		0.5
UF Factor (Retail factor discounted 25%)	**4.9**	**3.7**

Table III.3–2
ACY – Terminal Capacity Analysis

	Existing and Approved Buildings Through 2008 [1]	Recommended Facilities - Demand: Base Year Activity 2004	Forecast Year Activity 2010	2015	2020	2025	Projected Surplus / (Deficiency): Base Year Activity 2004	Forecast Year Activity 2010	2015	2020	2025
Annual Enplanements											
Domestic		523,344	532,000	571,000	613,000	658,000					
Design Hour Factors:											
Domestic Load Factor		90%	90%	90%	90%	90%					
Domestic Connect %		0%	0%	0%	0%	0%					
Design Hour Passengers											
Enplaned Domestic O&D		320	340	360	390	410					
Enplaned Domestic total		320	340	360	390	410					
Deplaned Domestic O&D		320	340	360	390	410					
Deplaned Domestic total		320	340	360	390	410					
Visitors/ Passenger		0.3	0.3	0.3	0.3	0.3					
GATES											
Total Gates:											
Regional Aircraft (Group II)	0 gates						0	0	0	0	0 gates
Narrowbody (Group III)	8 gates	4	4	4	4	5	4	4	4	4	3 gates
B757 (Group IIIa)	0 gates						0	0	0	0	0 gates
Widebody (Group IV)	0 gates						0	0	0	0	0 gates
Total Gates	8 gates	4	4	4	4	5	4	4	4	4	3 gates
Narrowbody Equivalent Gates (NBEG)	8.0 NBEG	4.0	4.0	4.0	4.0	5.0	4.0	4.0	4.0	4.0	3.0 NBEG
Equivalent Aircraft (EQA)	8.0 EQA	4.0	4.0	4.0	4.0	5.0	4.0	4.0	4.0	4.0	3.0 EQA
TICKETING & CHECK-IN											
Conventional Staffed Positions	38 pos	26	22	23	24	24	12	16	15	14	14 pos
Self-Service Kiosks	2 units	1	4	5	5	5	1	(2)	(3)	(3)	(3) units
Equivalent Positions	40 pos	27	26	28	29	29	13	14	12	11	11 pos
Linear Positions	40 pos	27	26	28	29	29	13	14	12	11	11 pos
Counter length	145 LF	140	130	140	150	150	5	15	5	(5)	(5) LF
Ticket Counter - area	1,830 SF	1,600	1,500	1,600	1,700	1,700	230	330	230	130	130 SF
Ticket Lobby - depth	30 LF	40	40	40	40	40	(10)	(10)	(10)	(10)	(10) LF
Ticket Lobby - area	4,860 SF	6,300	5,900	6,300	6,800	6,800	(1,440)	(1,040)	(1,440)	(1,940)	(1,940) SF
Subtotal	6,690 SF	7,900	7,400	7,900	8,500	8,500					SF

Table III.3 – 2
ACY – Terminal Capacity Analysis

	Existing and Approved Buildings Through 2008 [1]		Recommended Facilities - Demand: Base Year Activity 2004	Forecast Year Activity 2010	2015	2020	2025	Projected Surplus / (Deficiency): Base Year Activity 2004	Forecast Year Activity 2010	2015	2020	2025	
HOLDROOMS & SECURE CIRCULATION													
Security Screening (SSCP) Lanes	3	lanes	2	2	2	3	3	1	1	1	0	0	lanes
Checkpoint/Search Area	4,240	SF	2,600	2,600	2,600	3,900	3,900	1,640	1,640	1,640	340	340	SF
Secure Circulation	9,545	SF	8,800	8,800	8,800	8,800	11,000	745	745	745	745	(1,455)	SF
Concourse Width	15	LF	20	20	20	20	20	(5)	(5)	(5)	(5)	(5)	LF
Holdrooms:													
Regional Aircraft (Groups II & III)		SF	0	0	0	0	0						SF
Narrowbody (Group III)		SF	7,400	7,400	7,400	7,400	9,300						SF
B757 (Group IIIa)		SF	0	0	0	0	0						SF
Widebody (Group IV)		SF	0	0	0	0	0						SF
Total Holdroom Area	13,991	SF	7,400	7,400	7,400	7,400	9,300	6,591	6,591	6,591	6,591	4,691	SF
Subtotal	27,776	SF	18,800	18,800	18,800	20,100	24,200						SF
DOMESTIC BAGGAGE CLAIM													
Claim Frontage Required	-	LF	270	230	240	260	280						LF
Claim Units	2	units	2	2	2	2	2	0	0	0	0	0	units
Claim Frontage Programmed	280	LF	300	300	300	300	300	(20)	(20)	(20)	(20)	(20)	LF
Baggage Claim Area	5,585	SF	9,000	9,000	9,000	9,000	9,000	(3,415)	(3,415)	(3,415)	(3,415)	(3,415)	SF
AIRLINE SPACE													
ATO Offices	3,183	SF	4,200	3,900	4,200	4,500	4,500	(1,017)	(717)	(1,017)	(1,317)	(1,317)	SF
Airline Operations & Offices (excluding ATO)	12,533	SF	6,000	6,000	6,000	6,000	7,500	6,533	6,533	6,533	6,533	5,033	SF
Baggage Handling													
Estimated make-up capacity	13	carts/LD3s	8	8	8	8	10	5	5	5	5	3	carts/LD3s
Baggage Make-up area	6,760	SF	4,400	4,400	4,400	4,400	5,500	2,360	2,360	2,360	2,360	1,260	SF
Checked Baggage Screening	5,000	SF	2,860	2,860	3,575	3,575	3,575	2,140	2,140	1,425	1,425	1,425	SF
Baggage Claim Off-load	2,670	SF	3,000	3,000	3,000	3,000	3,000	(330)	(330)	(330)	(330)	(330)	SF
Baggage Service Offices	218	SF	200	200	300	300	300	18	18	(82)	(82)	(82)	SF
Subtotal	30,364	SF	20,660	20,360	21,475	21,775	24,375						SF

Table III.3 – 2
ACY – Terminal Capacity Analysis

	Existing and Approved Buildings Through 2008 [1]	Recommended Facilities - Demand: Base Year Activity 2004	Forecast Year Activity 2010	2015	2020	2025	Projected Surplus / (Deficiency): Base Year Activity 2004	Forecast Year Activity 2010	2015	2020	2025
CONCESSIONS											
Ground Services/Information Counter	0 SF	100	100	100	100	100	(100)	(100)	(100)	(100)	(100) SF
Rental Car Counter Length	53 LF	50	50	50	50	50	3	3	3	3	3 LF
Rental Car Lease Area	1,002 SF	1,000	1,000	1,000	1,000	1,000	2	2	2	2	2 SF
Food/Beverage; Secure	3,154 SF	2,100	2,100	2,200	2,400	2,600	1,054	1,054	954	754	554 SF
News/Gift/Retail; Secure	1,220 SF	1,500	1,600	1,700	1,800	1,900	(280)	(380)	(480)	(580)	(680) SF
Subtotal; Secure Concessions	4,374 SF	3,600	3,700	3,900	4,200	4,500	774	674	474	174	(126) SF
Food/Beverage; Non-Secure	1,245 SF	3,200	3,200	3,200	3,200	3,200	(1,955)	(1,955)	(1,955)	(1,955)	(1,955) SF
News/Gift/Retail; Non-Secure	1,060 SF	100	100	100	100	100	960	960	960	960	960 SF
Subtotal; Non-Secure Concessions	2,305 SF	3,300	3,300	3,300	3,300	3,300	(995)	(995)	(995)	(995)	(995) SF
Other Services	317 SF	400	400	400	400	500	(83)	(83)	(83)	(83)	(183) SF
Concession Support Area	2,011 SF	3,300	3,300	3,400	3,500	3,700	(1,289)	(1,289)	(1,389)	(1,489)	(1,689) SF
Subtotal	10,009 SF	11,700	11,800	12,100	12,500	13,100					SF
OTHER PUBLIC AREAS											
Public Seating and Meeter/Greeter Lobbies	2,354 SF	1,300	1,700	1,800	1,900	2,000	1,054	654	554	454	354 SF
Restrooms - Terminal Locations	1,397 SF	1,200	1,500	1,600	1,700	1,800	197	(103)	(203)	(303)	(403) SF
Restrooms - Concourse Locations	1,451 SF	900	900	900	900	1,200	551	551	551	551	251 SF
Subtotal	5,202 SF	3,400	4,100	4,300	4,500	5,000					SF
Vacant spaces suitable for: non-secure airline offices	834 SF										SF

[1] - Sources:
Urban Engineers - existing base plans & expansion plans, January 2005
Hirsh Associates site visit, February 2006
Hirsh Associates analysis

Table III.3–3
ACY – Annual Capacity Estimates

A. Domestic Equivalent Check-in Positions

Existing Facilities (positions)	Design Hour Capacity (O&D enplanements)	Annual Capacity
40	510	809,000

C. Security Screening (SSCP) Lanes

Existing Facilities (lanes)	Design Hour Capacity (O&D enplanements)	Annual Capacity
3	540	857,000

D. Contact Gates

Existing Facilities (NBEG)	Design Hour Capacity (NBEG)	Annual Capacity
8.0	8.0	1,142,000

E. Holdrooms

Existing Facilities (square feet)	Design Hour Capacity (EQA)	
13991	7.6	1,085,000

F. Domestic Baggage Claim

Existing Facilities (linear feet)	Design Hour Capacity (O&D deplanements)	Annual Capacity
280	340	539,000

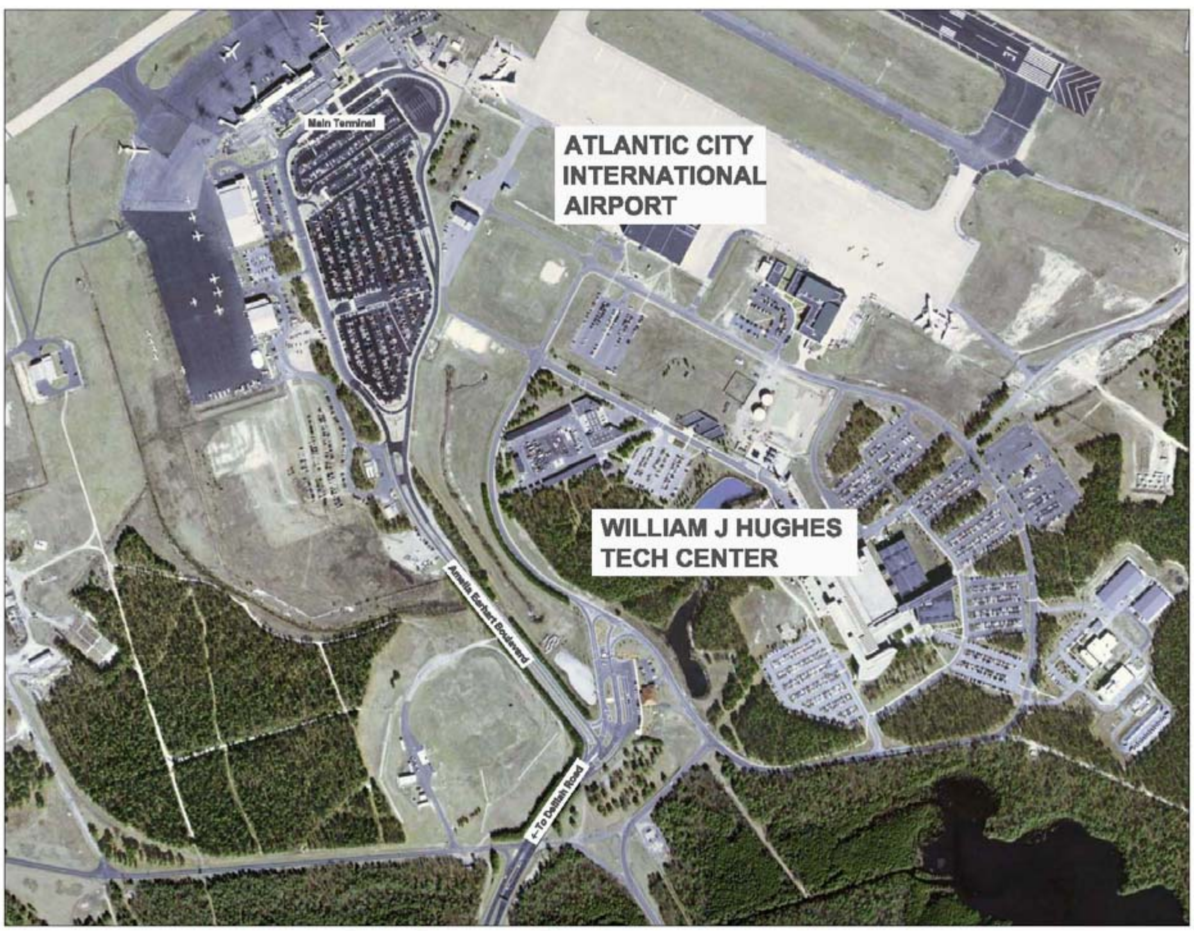
III.4 On-Airport Roadway & Terminal Frontage Capacity

III.4.1 On-Airport Roadways

The on-airport roadway system at Atlantic City International Airport (ACY), as considered in this study, consists of a two-lane airport entrance road from the FAA William J. Hughes Technical Center gate, which leads to a circulation roadway that provides ingress and egress to the short- and long-term parking lots that it surrounds, the bus/limo staging area on the east side of the short-term parking lot, access to the terminal frontage, the general aviation area and overflow parking area on the west side, and then recirculation or exit from the airport. This roadway is two lanes northbound to the terminal and three lanes southbound from the terminal area. As noted in Section III.5, a parking garage will be constructed on the site of the short term surface lot, so the configuration of this area may change.

The overall layout of the on-airport roadways is provided on Exhibit III.4-1.

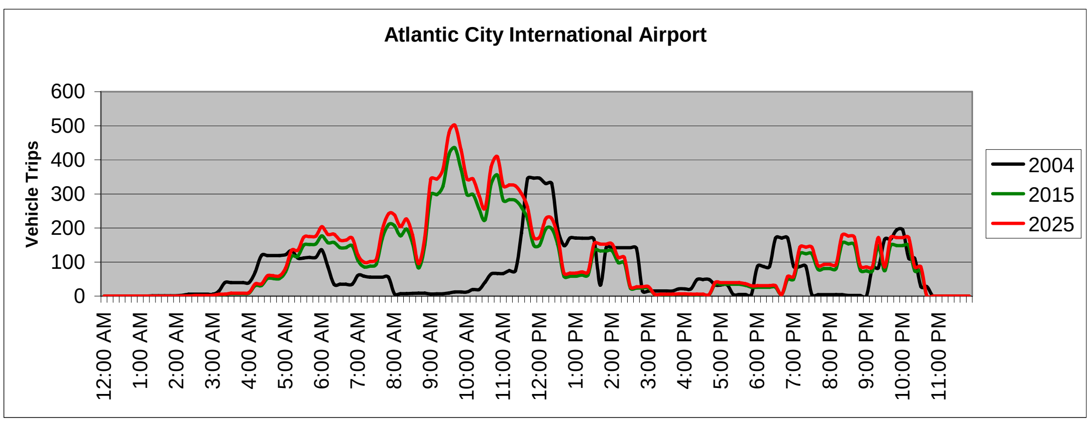
Exhibit III.4-1
ACY - Overall Airport Layout



III.4.2 On-Airport Roadway Capacity and Operations

Exhibit II.4-2 shows design day vehicle trips by hour estimated to be generated by Atlantic City International Airport by passenger related activity for base year 2004 and projected for 2015 and 2025 forecast years (see Section I.4.2). In comparing 2004, 2015 and 2025 projected patterns, the peak hour trip generation is projected to increase from approximately 350 vehicle trips in 2004 to approximately 440 and 500 vehicle trips in 2015 and 2025, respectively, an increase of 26 per cent and 30 per cent over 2004. These vehicle trips include both inbound and outbound trips, trips to and from the terminal frontage and the various on-airport parking areas. The capacity of the multi-lane recirculation roadway is adequate to accommodate this projected level of vehicle trips. However, as noted in Section III.6, the on-airport two-lane entrance roadway will likely need to be widened to provide two lanes inbound in conjunction with an addition of a second left turn lane at the Tech Center entrance traffic signal.

Exhibit III.4-2
ACY - Vehicle Trips



III.4.3 On-Airport Roadways – Conclusions and Recommendations

Based upon the passenger enplanement forecast, it is not anticipated that roadway deficiencies will occur on the circulation loop roadway within the study planning horizon, but an increase in capacity on the entrance roadway will likely be required.

III.4.4 Terminal Frontage Roadways

The existing frontage roadway at Atlantic City International Airport consists of separate inner and outer roadways for combined arrivals and departures. The inner roadway accommodates a total of four lanes including one "common" curb loading/unloading lane, one loading/unloading maneuver lane and two through travel lanes for arriving and departing autos, taxis and limos. The outer roadway also provides a total of four lanes including one "common" right-side loading/unloading lane, two through travel lanes and one "common" left-side loading/unloading lane for buses and shuttles. Combined arrivals/departures roadways are designated as follows:

- Inner Roadway (cars and taxis) 320 feet
- Outer Roadway (buses and shuttles) 330 feet (right) 270 feet (left)

III.4.5 Terminal Frontage Capacity and Operations

A summary of the existing terminal frontages at the airport is shown in Table III.4-1. It was assumed that the existing curb frontage configuration would be retained and was used in the analysis of 2015 and 2025 frontage conditions. Based on the 2004 passenger flight schedule database, the start of composite peak hour for the combined arrivals/departures frontage roadways would be as follows:

- Composite Peak Hour 11:50 AM (2004) 9:40 AM (2015/2025)

Comparison of the available frontage capacity and the peak hour usage was used to estimate the extent of loading/unloading curb space deficiency or surplus under the 2004, 2015 and 2025 passenger demand conditions, as shown in Table III.4-1.

Table III.4-1
ACY - Airport Frontage Analysis Summary

Frontage Road	Available Frontage (feet)			Required Frontage (80%) (feet)			Surplus (Deficit) (feet)		
	2004	2015	2025	2004	2015	2025	2004	2015	2025
Autos/Taxis	320	320	320	350	375	475	(30)	(55)	(155)
Buses/Shuttles	600	600	600	0	0	0	600	600	600
Arr/Dep's	**920**	**920**	**920**	**350**	**375**	**475**	**570**	**545**	**445**

III.4.6 Terminal Frontage Roadways – Conclusions and Recommendations

As shown in Table III.4-1, there is frontage curb capacity deficit on the inner roadway for cars, taxis and limos under 2004, 2015 and 2025 passenger demand conditions, assuming a one-lane loading/unloading operation. Since there are a total of four frontage lanes at the inner roadway, the operation can allow a two-lane frontage loading/unloading operation. This would increase the 'equivalent' frontage length by 60%, from 320 ft. to 512 ft. The result would be no deficiencies through 2025.

III.5 On-Airport Vehicle Parking Capacity

III.5.1 On-Airport Vehicle Parking Facilities

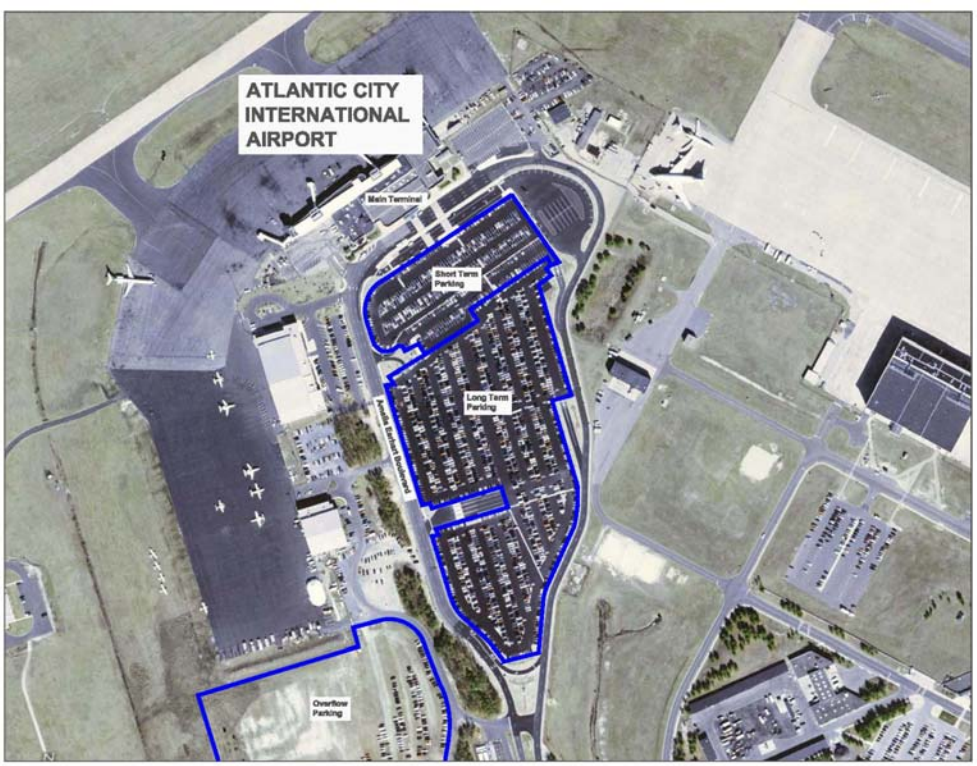
The existing public parking at the Atlantic City International Airport (ACY) currently consists of a short-term parking lot located close to the terminal, a long-term parking lot located immediately south of the short-term lot and an overflow long-term lot located on the west side of the airport exit road, just across the road from the southern tip of the long-term lot. There are shuttle service stops in every lot. A total of 2,792 public parking spaces was identified at these on-airport parking facilities:

- Short Term 200 spaces
- Long Term 1,612 spaces
- Overflow Long Term 980 spaces

TOTAL 2,792 spaces

A design and construction contract was awarded at the ACY Airport in July 2006 to build an approximately 1,400-space parking garage in the short-term parking lot area. Construction of the parking garage will begin in early 2007.

Exhibit III.5-1
ACY – Parking Facilities



III.5.2 On-Airport Parking Capacity and Operations

There is no quantitative information available with respect to existing airport parking lot occupancies. It is acknowledged that the long-term lot is frequently used at 100% capacity. This is further evidenced by the fact that the newly paved overflow lot attracts many parkers. The airport staff qualitatively estimates that the overflow lot is generally 1/3 full during peak days. It is harder to estimate short-term lot usage because of the higher turnover rate. Free parking for the first hour is provided in all the lots, so visitors who expect to park only a very short time would naturally use the short-term lot that is located closest to the terminal. It has been approximately estimated that this lot is ½ full during the busier periods. As a result, the approximate average daily peak parking occupancy data at the Atlantic City Airport under current passenger demand condition was furnished by administration staff as follows:

- Short Term Parking Occupancy 50%
- Long Term Parking Occupancy 100%
- Overflow Long Term Parking Occupancy 33%

Future parking growth rates were estimated as a ratio of future 2015 design day O&D passengers over the existing 2004 design day O&D passengers. The resulting growth rates were then applied to the existing parking lot occupancy estimates to determine the projected 2015 and 2025 parking supply requirements. As shown in Table III.5-1, after completion of construction of the proposed garage, it is estimated that total public parking capacity will be about 3,992 spaces. This assumes that the entire existing short-term lot will be eliminated and all of the existing long-term lot will be retained. Table III.5-1 shows that there exists significant parking surplus under 2004, 2015 and 2025 passenger demand conditions. A detailed parking demand analysis is presented in Table III.5-2.

Table III.5-1
ACY - Parking Summary

Public Lot	Supply			Required			Surplus (Deficit)		
	2004	2015	2025	2004	2015	2025	2004	2015	2025
Short Term	200	-	-	100	150	173	-	-	-
Long Term	1,612	1,612	1,612	1,612	2,419	2,788	-	-	-
Overflow Long Term	980	980	980	323	485	559	-	-	-
Parking Garage	-	1,400	1,400	-	-	-	-	-	-
TOTAL	**2,792**	**3,992**	**3,992**	**2,035**	**3,055**	**3,520**	**757**	**937**	**472**

Table III.5-2
ACY - Airport Parking Demand Analysis

	Existing Facilities	Required Facilities Base 2004	Required Facilities 2015	Required Facilities 2025	Projected Surplus (Deficiency) Base 2004	Projected Surplus (Deficiency) 2015	Projected Surplus (Deficiency) 2025
Annual Enplanements		523,344	571,000	658,000			
Capacity (Number of Public Parking Spaces)							
LongTerm Parking	1,612						
Overflow Long Term Parking	980						
SUBTOTAL	2,592						
Short Term Parking (to be eliminated when garage is built)	200						
TOTAL - EXISTING CAPACITY	2,792						
Parking Garage (construction contract awarded)	1,400						
FUTURE CAPACITY	3,992						
Peak Daily Passengers							
Total Daily Seats		2,700	4,052	4,669			
Load Factor		0.90	0.90	0.90			
Non Connecting		1.00	1.00	1.00			
Daily O&D Passengers		2,430	3,647	4,202			
Growth Rate *		1.00	1.50	1.15			
Parking Demand (Avg. Daily Occ %, Peak Months)							
Source: ACY Administration							
Short Term Parking	50%	100	150	173	Based on	Based on	Based on
LongTerm Parking	100%	1612	2419	2788	Existing	Future	Future
Overflow Long Term Parking	33%	323	485	559	Capacity	Capacity	Capacity
TOTAL		2035	3055	3520	757	937	472

* 2015 Growth Rate = Future Daily O&D Pax / Base 2004 Daily O&D Pax
2025 Growth Rate = 2025 Annual Enplanements / 2015 Annual Enplanements

III.6 Analysis of Airport Access / Off-Airport Roadway Capacity

III.6.1 Introduction

Atlantic City International Airport (ACY) is located in the eastern half of Atlantic County, New Jersey, approximately 10 miles west of Atlantic City. Regionally, the airport is accessible by the Atlantic City Expressway (ACE), an east-west toll road that extends from Atlantic City to Camden County with connection to Philadelphia, and the Garden State Parkway (GSP), which extends north-south along the length of New Jersey, as well as several state and county roads as described below.

III.6.2 Roadway Access

Direct access to ACE is provided by Amelia Earhart Boulevard which intersects with Delilah Road and Tilton Road at Airport Circle. Two-lane Delilah Road interchanges with the Atlantic City Expressway about ½ mile west of Airport Circle and proceeds east to Absecon Boulevard, which extends into Atlantic City. The Garden State Parkway interchanges with the ACE east of its interchange with Delilah Road. The Expressway is three lanes eastbound and two lanes westbound in the vicinity of the airport while the Parkway is a four lane roadway in this area. Traffic levels on both the Expressway and Parkway are seasonal and therefore Average Annual Daily Traffic (AADT) values are somewhat misleading. AADT on the Atlantic City Expressway is approximately 33,000 vehicles per day (vpd) adjacent to the airport, but nearly twice this level east of the Parkway. Congestion occurs in the summer on the Expressway as it approaches Atlantic City.

Atlantic City Airport shares access along Amelia Earhart Boulevard, a four-lane roadway, with the FAA William J. Hughes Technical Center. Airport and Tech Center traffic diverges at a signalized intersection with a single left turn lane leading to the airport (see Exhibit III.4-1). The Technical Center supports over 3,000 employees on a flex time schedule.

The primary issues with respect to roadway access to Atlantic City International Airport is the limited capacity of Delilah Road, operational limitations of Airport Circle, shared access with the FAA Tech Center, and the high growth forecast in this area of Atlantic County. As noted in Section III.4, vehicle trips generated by ACY passenger activity are not only expected to grow to about 500 vehicle trips in the peak hour, but the peak is forecast to shift closer to the commuter peak from the late morning/early afternoon. This may result in more of an overlap with morning traffic into the FAA Tech Center and on the area's highways overall. Countywide vehicle miles traveled (VMT) and total trips are expected to increase 15 per cent and 19 per cent, respectively, between 2005 and 2025[1]. However, while countywide population is projected to increase about 30 per cent

[1] Regional Transportation Plan, 2004 South Jersey Transportation Planning Organization (SJTPO)

over this same period, population is forecast to increase at more than twice this percentage in the two municipalities surrounding the airport.

III.6.3 Transit Access

The South Jersey Transportation Authority operates TransIT Link free shuttle service from Atlantic City Airport to the Pleasantville Bus Terminal every half hour from 6am to 9pm. At the bus terminal, NJTransit bus service can be accessed. In addition, NJTransit's Atlantic City Rail Line, which extends from Philadelphia to Atlantic City and passes the Airport's northern boundary, has nearby stations in Absecon and Egg Harbor City.

III.6.4 Off-Airport Transportation Improvements

Airport Circle is scheduled for modification and installation of a traffic signal. Other proposed projects in the vicinity of the airport, such as a widening of a section of Delilah Road are noted in the 2000 Atlantic County Master Plan, but do not appear to be funded.

III.6.4 Conclusions

With the Atlantic City Expressway, Garden State Parkway and NJTransit's Atlantic City Rail Line nearby, Atlantic City International Airport has significant assets for off-airport access. Unless its capacity is increased, Delilah Road will present a bottleneck to growth in airport landside access demand above the level forecast for 2025 in this study. The four-lane Amelia Earhart Road has sufficient capacity for the both the FAA Tech Center and Airport related traffic, but it may be necessary to add a second left-turn lane at the Tech Center entrance traffic signal for airport related traffic and widen the access road leading to the terminal area about 1,400 feet to add a second lane.

II. CAPACITY ASSESSMENT

Trenton / Mercer County Airport

IV.1 Analysis of Airfield Capacity

The analysis of runway capacity for TTN was conducted as described in Section I, using the framework found in Advisory Circular 150/5060/5. The Peak Month Average Day was derived from the forecast to determine the PMAD to annual ratio and the user group distribution. These values were combined with the capacity rates determined from analysis of similar airports in the FAA ASPM database to develop annual runway capacity rates. The annual capacity values developed were compared to the forecast operations to determine the level of future runway capacity need.

IV.1.1 Future Demand Profiles

Exhibit IV.1-1 shows the actual and forecast annual operations by user group for the period from 1996 to 2025. Commercial passenger operations, including scheduled commuter service, are forecast to remain constant at 1,900 operations from 1996 to 2025. Air taxi operations are forecast to increase from 7,500 to 9,900 operations over the same period. GA operations are forecast to increase from 105,000 annual operations in 2006 to 144,500 operations in 2025. Military operations are forecast to remain constant at 3,500 annual operations throughout the planning period. Total annual operations are forecast to grow from 117,900 in 2006 to 159,800 in 2025.

Analysis of the FAA OPSNET data for August 2004 was conducted to determine the distribution of activity by user group for the PMAD. The result of this analysis is presented in **Table IV.1-1**. The daily activity is 67 percent itinerant and 33 percent local/touch-and-go. The majority of the itinerant operations are GA, with air taxi operation comprising approximately 6 percent of daily traffic. Table IV-1 also presents the percentage of IFR operations. An IFR percentage of 21 percent indicates a GA fleet that is predominately operating under visual conditions and not competing for the same runway capacity as the other operations.

Exhibit IV.1-1
TTN Forecast Annual Demand by User Group

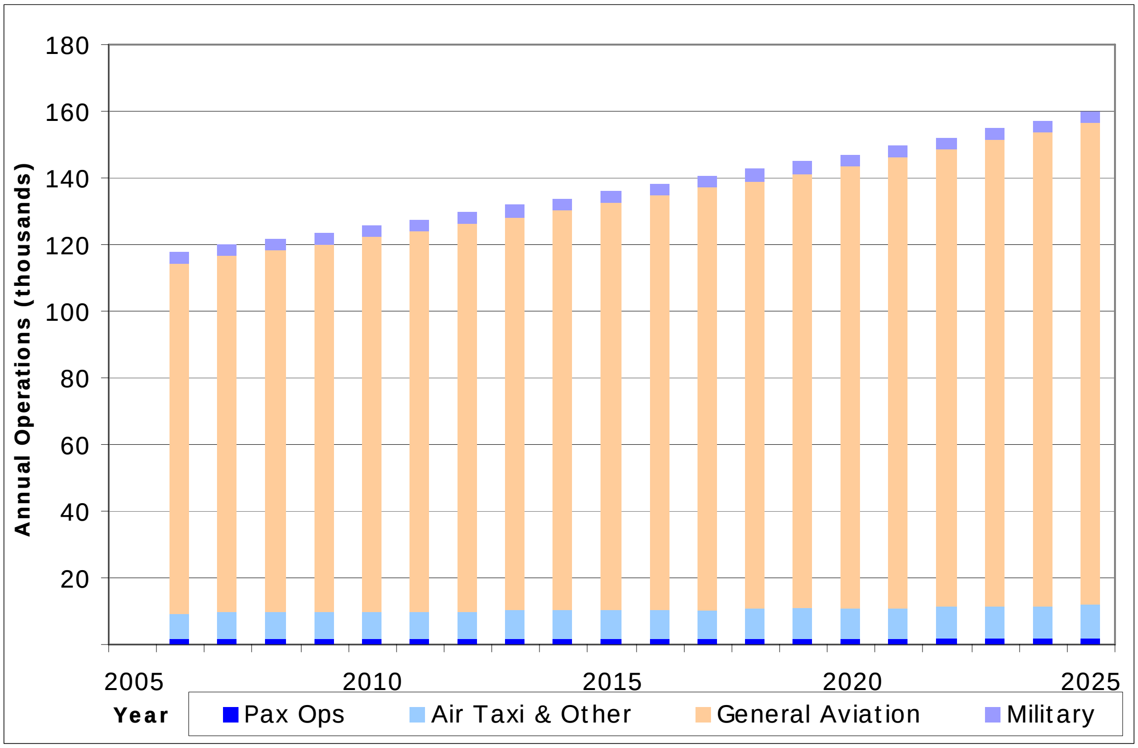


Table IV.1-1
TTN Peak Month Average Day by User Group

Peak Month Average Day	Operations	Percent
Itinerant		
Air Carrier	-	0%
Air Taxi	19	6%
General Aviation	190	58%
Military	10	3%
Total Itinerant	**220**	**67%**
Local		
General Aviation	106	33%
Military	0	0%
Total Local	**106**	**33%**
Total Itinerant and Local	**326**	**100%**
2004 Annual Activity	112,741	
Annual/PMAD Ratio	346.1	
PMAD/Peak Hour Ratio	11.0	(assumed)
2004 Instrument Operations	24,099	21%

IV.1.2 Existing Airfield Capacity

As stated in section I.1.1, the base peak hour capacity was 60 operations per hour. When adjusted to account for the number of local/touch-and-go operations the hourly capacity is 70 operations. **Table IV-2** shows the peak hour capacity with and without touch and go operations and the resulting annual capacity based on the demand profile presented in Section IV.1.1.

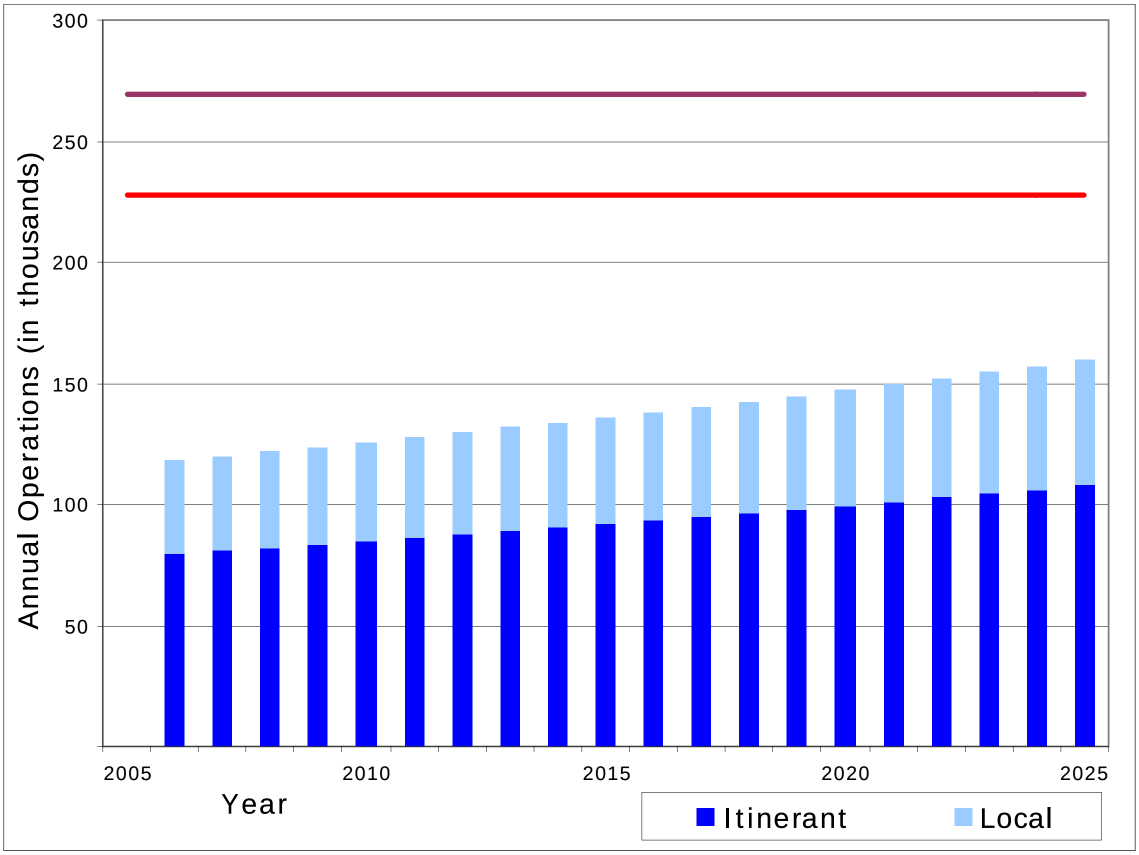
Table IV.1-2
TTN Peak Hour and Annual Operations Capacity

Peak Hour Capacity	
Without touch and go activity	60
With touch and go activity	70
Annual Capacity	
Without touch and go activity	228,000
With touch and go activity	269,000

IV.1.3 Existing and Future Capacity Analysis

Exhibit IV.1-2 shows the annual demand and annual service capacity for TTN. The stacked bars represent the annual demand, the light blue is the local/touch-and-go traffic and the dark blue is the itinerant operations. The bright red line represents the annual service capacity without touch and go operations (224,000 operations) and the dark red line represents the annual service capacity with touch and go operations (273,000 operations). Based on the forecast demand by user group the existing airfield has sufficient capacity to serve the demand through 2025.

Exhibit IV.1-2
TTN Annual Demand and Capacity



IV.1.4 Future Capacity Needs

Based on the analysis presented above the existing airfield has sufficient capacity to serve the forecast demand through the planning period.

IV.2 Gate Utilization

Please refer to Appendix A for gate charts depicting utilization for planning years 2004 & 2015

IV.3 Terminal Capacity

This section contains a summary of the major findings of the terminal facilities assessment for Trenton-Mercer County Airport.

The section contains -

> Exhibit IV.3-1: 2015 Design Day scheduled seats.
>
> Table IV.3-1: Concessions Utilization Factors.
>
> Table IV.3-2: Terminal Capacity Analysis table. As discussed in Section I.3, the table shows existing and approved facilities; recommended facilities to support current and forecast levels of activity; and any surpluses or deficiencies.
>
> Table IV.3-3: Annual Passenger Capacity Estimates based on the key facilities identified in Section I.3.3.

As with all of the airports, the terminal facilities analyses are for the Base forecast. In the case of TTN, this is for continued service by regional aircraft, although of a larger size than at present. In the event that service is re-established by an airline operating 130-150 seat NB equipment (Optimistic forecast), significant increases in the size of holdrooms, baggage claim, airline operations and other facilities would likely be needed beyond those described below.

Gates

The terminal's two existing NB parking positions should be adequate through the forecast period. One of the positions has a loading bridge which may be usable for RJ aircraft depending on the specific aircraft.

Ticketing and Check-in

It has been assumed that kiosks and internet check-in would be introduced at the airport and be heavily used by the predominantly business travellers. Kiosks for smaller airlines are typically an in-line installation requiring an expansion of the existing ticket counter in the longer term. The ticket lobby is only 18' deep, and presently mostly occupied by ETD equipment for checked baggage screening.

Security Screening, Holdrooms and Circulation

Projected passenger volumes would only require a single SSCP lane. However, additional space may be needed for back-up equipment if required by the TSA.

The existing single holdroom terminal does not have a typical concourse, with secure circulation consisting of a corridor from the baggage claim past the SSCP and internal stairs to the loading bridge. For the future, a 15' wide corridor is recommended for the projected passenger volumes.

The existing holdroom is adequate for current and future conditions as long as there is only a single 50 seat RJ departure in a single hour.

Domestic Baggage Claim

The existing baggage claim unit has approximately 38 LF of usable claim frontage which is adequate for existing low percentages of passengers checking bags. In the longer term, a slightly larger claim unit is recommended for RJ operations if the percentages of passengers checking bags increases to more typical levels.

Airline Space

ATO offices are undersized, and operations space limited to a pilot lounge on the upper level of the terminal. The baggage make-up area also functions as operations space. The combined offices, operations and baggage make-up space is 65% of what is recommended through most of the forecast period. In addition, checked baggage screening should be relocated from the ticket lobby to a "behind the wall" location. Dedicated baggage storage space is also recommended as passenger volume increase.

Concessions

The Airport has a large restaurant/lounge which serves primarily a non-passenger market. Based solely on passenger activity, the terminal would likely support little more than vending machines. The capacity analysis has assumed that concessions would be unchanged over the Study period.

The number of rental car companies (two) are not expected to change over the forecast period.

Other Public Areas

There is a large seating/greeter area which has more than adequate capacity through the forecast period.

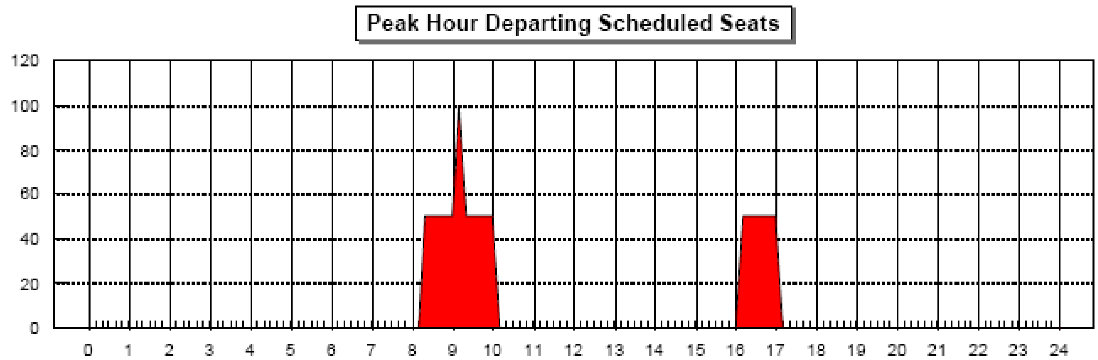
The two non-secure restroom locations (one associated primarily with the restaurant) are adequate. However, there are no restrooms in the secure holdroom.

Annual Capacity

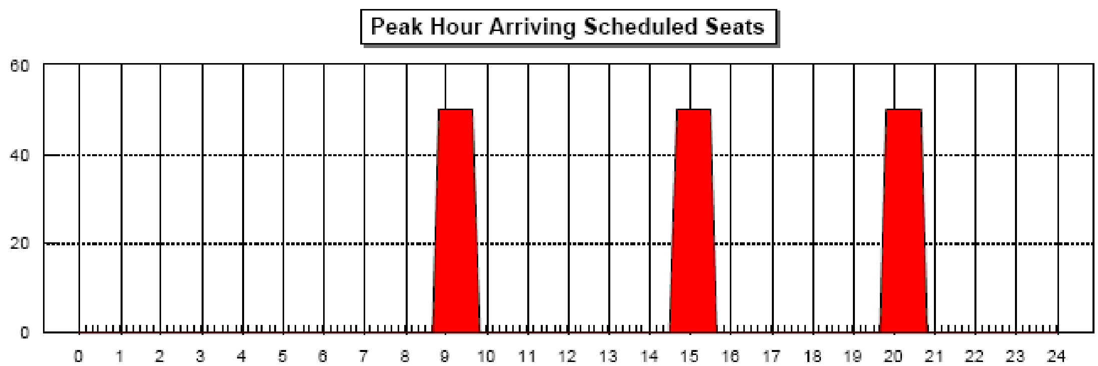
Annual capacities for TTN are highly variable since one additional flight can add 20-30% to annual activity without changing the design hour activity. However, based on the methodology used for all of the other airports in the Study, the terminal is estimated to have an annual capacity range of 25-94,000 enplanements.

Gate represents the greatest capacity. Holdrooms and SSCP are the most critical at 33,000 enplanements which would only meet the 2015 Base forecast. In no case could the terminal adequately handle the Optimistic forecast which would re-introduce NB equipment.

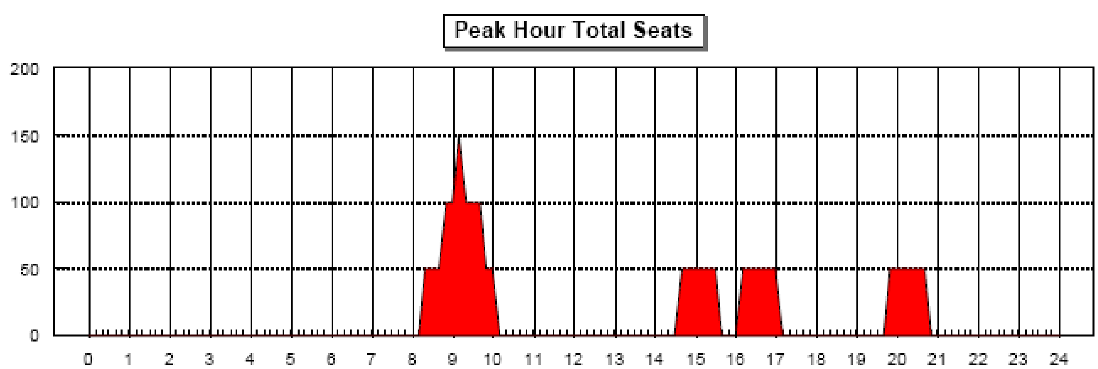
Exhibit IV.3-1
TTN - Peak Hour Seats (Design Day 2015)



Peak Hour Seats:	100	begins at	910	Daily Seats:	150
Peak Hour =	66.7%	of daily seats			



Peak Hour Seats:	50	begins at	850	Daily Seats:	150
Peak Hour =	33.3%	of daily seats			



Peak Hour Seats:	150	begins at	910	Daily Seats:	300
Peak Hour =	50.0%	of daily seats			

Source: Hirsh Associates Analysis

TTN2015.WK4

Table IV.3-1
TTN – Estimate of Concession Utilization Factor (1)

Applied to annual enplanements in thousands

	Range 0.1 - 0.6	
	Food/Bev	**Retail**
Passenger Characteristics		
Business/Pleasure	0.2	0.2
Domestic/Int'l	0.1	0.1
Originating airport, XXX/other	0.2	0.2
Daily peaking, low/high	0.4	0.4
Dwell times, short/long	0.2	0.2
Facility Characteristics		
Scattered/clustered	0.4	0.4
Difficult/easy access	0.5	0.5
Location, away from gates/view of gates	0.3	0.3
Landside/airside	0.3	0.3
Term config, short walks/long walks	0.2	0.2
Retail Characteristics (food/bev)		
Fast food/sit down	0.5	
Variety, not important/important	0.3	
Street pricing Policy, no/strict yes	0.5	
Non-branded/Nat'l,regional brands	0.2	
Retail Characteristics (news/gift/specialty)		
Traditional products/specialtys		0.2
Non-branded/Nat'l,regional brands		0.2
Street pricing Policy, no/strict yes		0.5
Prominence as tourist attraction, low/high		0.1
UF Factor (Retail factor discounted 25%)	**4.3**	**2.9**

[1] - Assumes a new terminal with better air service, but retain existing restaurant landside

Table IV.3-2
TTN – Terminal Capacity Analysis

	Existing and Approved Buildings Through 2008 [1]	Recommended Facilities - Demand					Projected Surplus / (Deficiency)				
		Base Year Activity	Forecast Year Activity				Base Year Activity	Forecast Year Activity			
		2004	2010	2015	2020	2025	2004	2010	2015	2020	2025
Annual Enplanements											
Domestic		15,512	29,900	32,900	36,400	40,200					
Design Hour Factors:											
Domestic Load Factor		70%	70%	70%	70%	70%					
Domestic Connect %		0%	0%	0%	0%	0%					
Design Hour Passengers											
Enplaned Domestic O&D		30	40	40	40	50					
Enplaned Domestic total		30	40	40	40	50					
Deplaned Domestic O&D		30	40	40	40	50					
Deplaned Domestic total		30	40	40	40	50					
Visitors/Passenger		0.3	0.3	0.3	0.3	0.3					
GATES											
Total Gates:											
Regional Aircraft (Group II)	0 gates	2	1	1	1	1	(2)	(1)	(1)	(1)	(1) gates
Narrowbody (Group III)	2 gates						2	2	2	2	2 gates
B757 (Group IIIa)	0 gates						0	0	0	0	0 gates
Widebody (Group IV)	0 gates						0	0	0	0	0 gates
Total Gates	2 gates	2	1	1	1	1	0	1	1	1	1 gates
Narrowbody Equivalent Gates (NBEG)	2.0 NBEG	1.4	0.7	0.7	0.7	0.7	0.6	1.3	1.3	1.3	1.3 NBEG
Equivalent Aircraft (EQA)	2.0 EQA	0.8	0.4	0.4	0.4	0.4	1.2	1.6	1.6	1.6	1.6 EQA
TICKETING & CHECK-IN											
Conventional Staffed Positions	3 pos	2	1	1	1	2	1	2	2	2	1 pos
Self-Service Kiosks	0 units	0	1	1	1	2	0	(1)	(1)	(1)	(2) units
Equivalent Positions	3 pos	2	2	2	2	4	1	1	1	1	(1) pos
Linear Positions	3 pos	2	2	2	2	4	1	1	1	1	(1) pos
Counter length	18 LF	10	10	10	10	20	8	8	8	8	(2) LF
Ticket Counter - area	180 SF	100	100	100	100	200	80	80	80	80	(20) SF
Ticket Lobby - depth	19 LF	30	30	30	30	30	(11)	(11)	(11)	(11)	(11) LF
Ticket Lobby - area	365 SF	400	400	400	400	700	(35)	(35)	(35)	(35)	(335) SF
Subtotal	545 SF	500	500	500	500	900					SF

Table IV.3-2
TTN – Terminal Capacity Analysis

	Existing and Approved Buildings Through 2008 [1]		Recommended Facilities - Demand: Base Year Activity 2004	Forecast Year Activity 2010	2015	2020	2025	Projected Surplus / (Deficiency): Base Year Activity 2004	Forecast Year Activity 2010	2015	2020	2025	
HOLDROOMS & SECURE CIRCULATION													
Security Screening (SSCP) Lanes	1	lanes	1	1	1	1	1	0	0	0	0	0	lanes
Checkpoint/Search Area	930	SF	1,300	1,300	1,300	1,300	1,300	(370)	(370)	(370)	(370)	(370)	SF
Secure Circulation	480	SF	2,300	1,200	1,200	1,200	1,200	(1,820)	(720)	(720)	(720)	(720)	SF
Concourse Width	0	LF	15	15	15	15	15	(15)	(15)	(15)	(15)	(15)	LF
Holdrooms:													
Regional Aircraft (Groups II & III)		SF	800	800	800	800	800						SF
Narrowbody (Group III)		SF	0	0	0	0	0						SF
B757 (Group IIIa)		SF	0	0	0	0	0						SF
Widebody (Group IV)		SF	0	0	0	0	0						SF
Total Holdroom Area	855	SF	800	800	800	800	800	55	55	55	55	55	SF
Subtotal	2,265	SF	4,400	3,300	3,300	3,300	3,300						SF
DOMESTIC BAGGAGE CLAIM													
Claim Frontage Required	-	LF	15	30	30	30	30						LF
Claim Units	0	units	1	1	1	1	1	(1)	(1)	(1)	(1)	(1)	units
Claim Frontage Programmed	38	LF	50	50	50	50	50	(12)	(12)	(12)	(12)	(12)	LF
Baggage Claim Area	1,255	SF	1,500	1,500	1,500	1,500	1,500	(245)	(245)	(245)	(245)	(245)	SF
AIRLINE SPACE													
ATO Offices	240	SF	300	300	300	300	600	(60)	(60)	(60)	(60)	(360)	SF
Airline Operations & Offices (excluding ATO)	465	SF	600	800	800	800	800	(135)	(335)	(335)	(335)	(335)	SF
Baggage Handling													
Estimated make-up capacity	1	carts/LD3s	1	1	1	1	1	0	0	0	0	0	carts/LD3s
Baggage Make-up area	565	SF	600	600	600	600	600	(35)	(35)	(35)	(35)	(35)	SF
Checked Baggage Screening	0	SF	600	600	600	600	600	(600)	(600)	(600)	(600)	(600)	SF
Baggage Claim Off-load	435	SF	1,200	1,200	1,200	1,200	1,200	(765)	(765)	(765)	(765)	(765)	SF
Baggage Service Offices	0	SF	0	100	100	100	100	0	(100)	(100)	(100)	(100)	SF
Subtotal	1,705	SF	3,300	3,600	3,600	3,600	3,900						SF

Table IV.3-2
TTN – Terminal Capacity Analysis

	Existing and Approved Buildings Through 2008 [1]	Recommended Facilities - Demand: Base Year Activity 2004	Recommended Facilities - Demand: Forecast Year Activity 2010	Recommended Facilities - Demand: Forecast Year Activity 2015	Recommended Facilities - Demand: Forecast Year Activity 2020	Recommended Facilities - Demand: Forecast Year Activity 2025	Projected Surplus / (Deficiency): Base Year Activity 2004	Projected Surplus / (Deficiency): Forecast Year Activity 2010	Projected Surplus / (Deficiency): Forecast Year Activity 2015	Projected Surplus / (Deficiency): Forecast Year Activity 2020	Projected Surplus / (Deficiency): Forecast Year Activity 2025
CONCESSIONS											
Ground Services/Information Counter	0 SF	100	100	100	100	100	(100)	(100)	(100)	(100)	(100) SF
Rental Car Counter Length	28 LF	30	30	30	30	30	(2)	(2)	(2)	(2)	(2) LF
Rental Car Lease Area	420 SF	600	600	600	600	600	(180)	(180)	(180)	(180)	(180) SF
Food/Beverage; Secure	0 SF	0	0	0	0	0	0	0	0	0	0 SF
News/Gift/Retail; Secure	0 SF	0	0	0	0	0	0	0	0	0	0 SF
Subtotal; Secure Concessions	0 SF	0	0	0	0	0	0	0	0	0	0 SF
Food/Beverage; Non-Secure	3,210 SF	3,200	3,200	3,200	3,200	3,200	10	10	10	10	10 SF
News/Gift/Retail; Non-Secure	160 SF	100	100	100	100	100	60	60	60	60	60 SF
Subtotal; Secure Concessions	3,370 SF	3,300	3,300	3,300	3,300	3,300	70	70	70	70	70 SF
Other Services	0 SF	0	0	0	0	0	0	0	0	0	0 SF
Concession Support Area	830 SF	1,300	1,300	1,300	1,300	1,300	(470)	(470)	(470)	(470)	(470) SF
Subtotal	4,620 SF	5,300	5,300	5,300	5,300	5,300					SF
OTHER PUBLIC AREAS											
Public Seating and Meeter/Greeter Lobbies	1,090 SF	200	400	400	400	500	890	690	690	690	590 SF
Restrooms - Terminal Locations	965 SF	500	500	500	500	500	465	465	465	465	465 SF
Restrooms - Concourse Locations	0 SF	500	500	500	500	500	(500)	(500)	(500)	(500)	(500) SF
Subtotal	2,055 SF	1,200	1,400	1,400	1,400	1,500					SF

[1] - Sources:
Edwards & Kelcey; Security Assessment - base plans, October 2005
Hirsh Associates site visit, February 2006
Hirsh Associates analysis

Table IV.3-3
TTN – Annual Capacity Estimates

A. Domestic Equivalent Check-in Positions

Existing Facilities (positions)	Design Hour Capacity (O&D enplanements)	Annual Capacity
3	60	49,000

C. Security Screening (SSCP) Lanes

Existing Facilities (lanes)	Design Hour Capacity (O&D enplanements)	Annual Capacity
1	40	33,000

D. Contact Gates

Existing Facilities (NBEG)	Design Hour Capacity (NBEG)	Annual Capacity
2.0	2.0	94,000

E. Holdrooms

Existing Facilities (square feet)	Design Hour Capacity (EQA)	
855	0.4	33,000

F. Domestic Baggage Claim

Existing Facilities (linear feet)	Design Hour Capacity (O&D deplanements)	Annual Capacity
38	30	25,000

IV.4 On-Airport Roadway & Terminal Frontage Capacity

IV.4.1 On-Airport Roadways

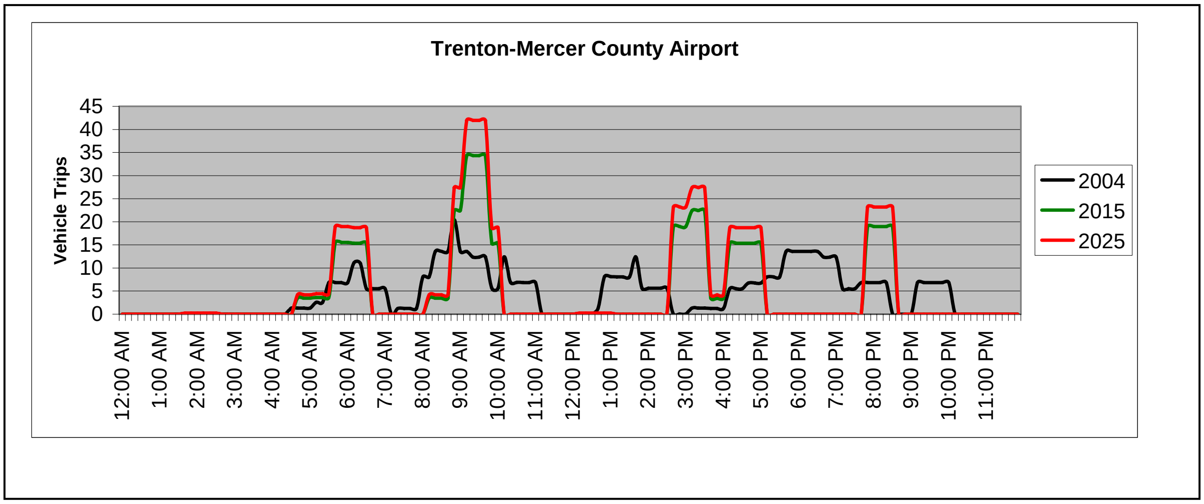
The primary on-airport roadway at Trenton-Mercer Airport consists of two lane Sam Weinroth Road, which intersects with Bear Tavern Road on the west side of the airport and Scotch Road on the east. It also connects internally the commercial aviation facilities on the western portion of the airport with the general aviation facilities on the east. Access to the terminal area roadway is via a right or left turn off Sam Weinroth Road that leads first to the parking entrance, then to the terminal frontage, and proceeds to a counterclockwise roadway for recirculation or exiting the terminal area. The overall layout of the on-airport roadways on the commercial aviation portion of Trenton-Mercer Airport is provided on Exhibit IV.4-1.

Exhibit IV.4-1
TTN - Overall Airport Layout

IV.4.2 On-Airport Roadway Capacity and Operations

The roadways considered for on airport roadway capacity and operations assessment consist of Sam Weinroth Road and those within the terminal area. Exhibit IV.4-2 shows design day vehicle trips by hour estimated to be generated by Trenton-Mercer Airport by passenger related activity for base year 2004 and projected for 2015 and 2025 forecast years (see Section I.4.2).

Exhibit IV.4-2
TTN - Vehicle Trips



Comparing 2004, 2015 and 2025 projected patterns, the peak hour trip generation is projected to increase from approximately 20 vehicle trips in 2004 to approximately 45 vehicle trips in 2025. Although some general aviation related traffic may be on the western portion of Sam Weinroth Road as well a vehicle trips related to the General's Quarters restaurant, which is located in the terminal building and attracts customers from outside the airport, it is evident that the on-airport roadways will operate well below capacity throughout the forecast planning horizon.

IV.4.3 On-Airport Roadways – Conclusions and Recommendations

Based upon the passenger enplanement forecast for Trenton-Mercer Airport, it is not anticipated that on-airport roadway deficiencies will occur within the study planning horizon.

IV.4.4 Terminal Frontage Roadway

A single frontage roadway for combined arrivals/departures passenger operation is available at Trenton-Mercer Airport. The frontage roadway consists of a single curb loading/unloading lane and one bypass travel lane. The combined arrivals/departures frontage roadway provides a common curb length of 200 feet.

IV.4.5 Terminal Frontage Capacity and Operations

Available frontage curb capacity of Trenton-Mercer Airport was estimated from the measurement of curb length from aerial photographs. A summary of existing terminal frontage is shown in Table IV.4-1. Based on the 2004 passenger flight schedule database, the start of composite peak hour for the combined arrivals/departures frontage roadways would be as follows:

- Composite Peak Hour 8:50 AM (2004) 10:20 AM (2015/2025)

Comparison of the available frontage curb capacity and the peak hour usage revealed the extent of loading/unloading curb space deficiency or surplus under the 2004, 2015 and 2025 passenger demand conditions, as shown in Table IV.4-1.

Table IV.4-1
TTN - Frontage Analysis Summary

Frontage Road	Available Frontage (feet)			Required Frontage (80%) (feet)			Surplus (Deficit) (feet)		
	2004	2015	2025	2004	2015	2025	2004	2015	2025
All Vehicles	200	200	200	25	50	50	175	150	150
Arr/Dep's	**200**	**200**	**200**	**25**	**50**	**50**	**175**	**150**	**150**

IV.4.6 Terminal Frontage Roadways – Conclusions and Recommendations

As shown in Table IV.4-1, there is sufficient frontage curb capacity for all vehicles at the combined arrivals/departures roadway of Trenton-Mercer Airport under 2004, 2015 and 2025 passenger demand conditions.

IV.5 On-Airport Vehicle Parking Capacity

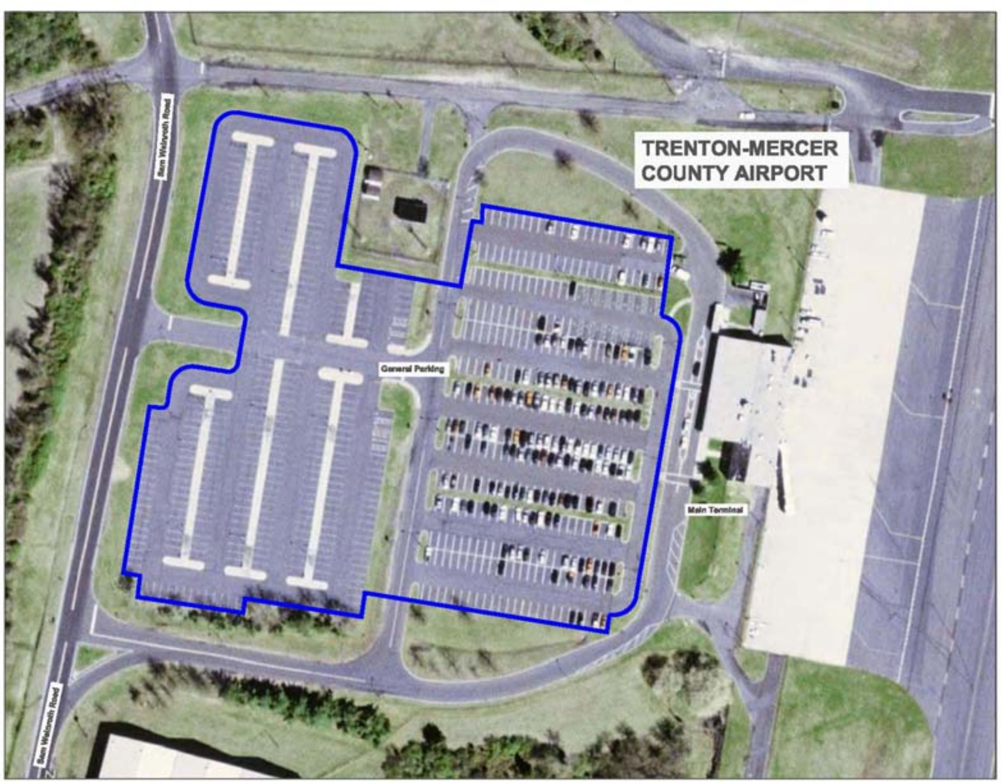
IV.5.1 On-Airport Vehicle Parking Facilities

There are three parking areas at the Trenton-Mercer County Airport (TTN) with separate entrance/exit driveways. The inner parking lot is located closest to the terminal. There is also a small inner parking lot with a separate entrance/exit situated adjacent to the west side of the inner lot. Lastly, an outer lot is located adjacent to the south side of the inner parking lots. A total parking supply of 643 spaces is available at these lots:

• Inner Parking Lot	282 spaces
• Small Inner Parking Lot	48 spaces
• Outer Parking Lot	313 spaces
TOTAL	643 spaces

All parking is free and not controlled or recorded. There is no infrastructure in place to control parking. Some of the inner parking lot spaces are reserved for staff and rental cars.

Exhibit IV.5-1
TTN – Parking Facilities



IV.5.2 On-Airport Parking Capacity and Operations

Field observations have indicated that there is always ample parking space at the present time. One of the airport attractions a restaurant, General's Quarters, overlooking airside. This restaurant attracts patrons from the area who have no flight planned, and thus, it generates its own parking demand.

A 2006 aerial photograph was used to provide an indication of an approximate parking occupancy estimate. The current parking demand is estimated to be approximately 26%, as shown in Table IV.5-1.

Future parking growth rates were estimated as a ratio of future 2015 design day O&D passengers over the existing 2004 design day O&D passengers. The resulting growth rates were then applied to the existing parking lot occupancy estimates to determine the projected 2015 and 2025 parking supply requirements. As shown in Table IV.5-1, there exists significant parking surplus under 2004, 2015 and 2025 passenger demand conditions. A detailed parking demand analysis is presented in Table IV.5-2.

Table IV.5-1
TTN - Airport Parking Summary

	Supply			Required			Surplus (Deficit)		
Public Lot	2004	2015	2025	2004	2015	2025	2004	2015	2025
All Lots	643	643	643	164	171	209	479	472	434
TOTAL	**643**	**643**	**643**	**164**	**171**	**209**	**479**	**472**	**434**

Table IV.5-2
TTN - Airport Parking Demand Analysis

	Existing Facilities	Required Facilities			Projected Surplus (Deficiency)		
		Base 2004	2015	2025	Base 2004	2015	2025
Annual Enplanements		15,512	32,900	40,200			
Capacity (Number of Parking Spaces)							
Inner Parking Lot	282						
Smaller Inner Parking Lot	48						
Subtotal - Inner Parking	330						
Outer Parking Lot	313						
Total Parking Spaces	643						
(also used by employees and rental cars)							
Peak Daily Passengers							
Total Daily Seats		288	300	367			
Load Factor		0.70	0.70	0.70			
Non Connecting		1.00	1.00	1.00			
Daily O&D Passengers		202	210	257			
Growth Rate *		1.00	1.04	1.22			
Parking Demand (2006 aerial photo actual count)	164						
Occupancy	26%	164	171	209	479	472	434

* 2015 Growth Rate = Future Daily O&D Pax / Base 2004 Daily O&D Pax
2025 Growth Rate = 2025 Annual Enplanements / 2015 Annual Enplanements

IV.6 Analysis of Airport Access / Off-Airport Roadway Capacity

IV.6.1 Introduction

Trenton-Mercer Airport (TTN) is located in Mercer County in western New Jersey, approximately two miles east of the New Jersey-Pennsylvania border and approximately six miles north of the City of Trenton. Regionally, the airport is accessible from I-95 just to the north of the airport.

IV.6.2 Roadway Access

Access to Trenton-Mercer Airport is provided by Sam Weinroth Road from its intersection with either Bear Tavern Road or Scotch Road, two-lane roadways both of which interchange with I-95. Generally, commercial aviation customers use the Bear Tavern Road access, while the general aviation related access is via Scotch Road. Access to the airport from the south proceeds through several residential areas and is likely only used by relatively short trips to and from the airport.

I-95, a six lane roadway, intersects with US 1 and I-295 to the west, and forms a ring road with I-295 around the Trenton metropolitan area. The New Jersey Department of Transportation (NJDOT) estimates current Average Annual Daily Traffic (AADT) on I-95 near the airport at approximately 56,000 vehicles per day, which indicates a relatively low utilization for a six-lane interstate in this area.

The vehicle trip generation projected for TTN, as described in Section IV.4, forecasts less than fifty vehicle trips generated per hour through the 2025 planning horizon. Therefore, no landside access problems should be anticipated attributed to vehicle trips generated by commercial aviation at Trenton-Mercer Airport. It is possible, however, that other development in the area could increase traffic levels on Bear Tavern Road to a level that could adversely impact airport access, given the road’s limited capacity. Such problems, should they arise, would likely be mitigated by localized traffic engineering intersection improvements at its intersection with Sam Weinroth Road.

IV.6.3 Transit Access

No bus service is provided at Trenton-Mercer Airport. A rail service connection with the Northeast Corridor is possible by a taxi trip to or from the Trenton train station.

IV.6.4 Off-Airport Transportation Improvements

No off-airport transportation improvements were identified in the vicinity of the airport.

IV.6.5 Conclusions

Low vehicle trips are projected to be generated by TTN through the planning horizon. Capacity limitations on two-lane Bear Tavern Road would preclude a significant increase in airport passenger activity above these levels without capacity improvements.

APPENDIX A
Gate Utilization Analysis (2015)

A. Gate Utilization Analysis

A.1 ABE - Gate and Flight Information

Lehigh Valley International Airport has approximately 20 aircraft parking positions exist and the current airline schedule indicates approximately 46 daily flights.

The terminal has two parts: Gates 1 to 6 are at ground level and Gates 7 to 15 are on a second level. Each gate is physical described below:

Gate 1 has two ground level doors and might accommodate two turboprops or regional jets. United uses the gate.

Gate 2 has two ground level doors and one ground-to-aircraft loading bridge; up to three aircraft can be accommodated because this gate is at the corner of the building. United uses the gate and also services the Air Canada flights from this position.

Gate 3 has a ground level door and a ground-to-aircraft loading bridge. This gate appears vacant but has capacity for two aircraft (one jet and one ground-load aircraft).

Gate 4 has one rather small holdroom and one ground level door. Ramp parking appears adequate for one turbo-prop or regional jet. This area does not appear used.

Gate 6 has a holdroom and two ground level doors. Both Continental and Northwest appear to use this space which has the capacity to park two aircraft up to the size of a regional jet.

Gate 7 (the first of the second level gates) has a loading bridge, but does not appear to be utilized. (One would assume Continental may use this gate because they occupy space on either side of it.)

Gate 8 has a loading bridge and was being used by Continental for regional jet flights.

Gate 9 had two loading bridges labeled 9A and 9B. Delta was using one loading bridge for their regional jets and I suspect also uses the other because they currently have eight flights at the airport.

Gate 10 has a loading bridge and appeared vacant; however, I suspected this gate is used by Alligent for their one or two flights per week. I suspect they are handed by U S Airways.

Gate 11 has a loading bridge and appeared vacant; however, I suspect U S Airways uses this gate occasionally.

Gate 12 has a loading bridge and is used by U S Airways.

Gates 14 and 15 are actually steps leading downstairs to ground load aircraft. These are the only upper level gates without loading bridges. U S Airways was using these gates and ramp space appears adequate for at least two turbo-props or regional jets.

Table A.1 provides an indication by airline of the number and identification of the gates used at Lehigh Valley International Airport.

Table A-1 Gate Property

Airline	**Number Of Gates Used**	**Gate Nos.**	**Parking Positions**	**Number Of Flights**	**Destinations**
US	4	11,12,14,15	4	16	CLT, PHL, PIT
AC / UA	2	1,2	5	10	ORD, IAD, YYZ
CO	1 ½	6,8	4	6	BOS, CLE
NW	½	6	2	4	DET
DL	2	9A,9B	2	8	ATL, CVG
Alligent	1	10	1	1	Sanford (Orlando)

Compared with the existing and forecast flight schedules the more optimistic forecast flights of 49 flights is used to run aircraft gate model for determining gate utilization and aircraft gate requirements. The model demonstrates that no additional gate and parking positions are required. Therefore, Lehigh Valley International Airport has enough gates and parking positions for the existing and future flights. Ramp chart is attached in this report.

A.2 TTN - Gate and Flight Information

Trenton Mercer Airport has not a physical aircraft gate with loading bridge. All flights park at ramp in the terminal area. Based on the length of the terminal the terminal ramp can accommodate five or six regional jet aircraft simultaneously. Only one commuter carrier – Pan Am Clipper Connection operates flights between this airport and Bedfors/Hanscom, MA using Jetstream 31 aircraft. The daily average flights are 7 from morning to the evening.

After analyzing the existing flight schedules one aircraft parking position can handles all flights. Therefore, Trenton Mercer Airport has enough parking positions for existing flights.

In the future year of 2015, the forecast projected three flights per day in the base case and five flights for the optimistic case. The schedules for the flights are spread from early morning to late night. Therefore, there are no parking position issues at this airport.

A.3 ACY - Gate and Flight Information

There are eight gates including six physical aircraft gates with loading bridge and two ramp parking positions at Atlantic City International Airport. Two commuter carriers which are Comair and Spirit airlines operate at this airport. Comair uses a gate and the rest of gates are designed to Spirit airlines.

Through analyzing existing flight schedules Comair has three flights using CRJ aircraft per day and Spirit Airlines flies M80 aircraft and has eight scheduled flights each day. Three Comair flights are scheduled in early morning, early afternoon, and evening, therefore, one gate would be enough. Spirit airlines only has eight flights and has five gates available, no gates are needed for the existing conditions.

The optimistic forecasts are used to analyze gate use for the year of 2015, Comair airlines remain three flights per day using CRJ aircraft and the schedules for the flights are arranged in the morning, early afternoon, and in the evening. One gate can accommodate all flights. It is anticipated that Spirit Airlines will increase operations from eight flights in the existing condition to 20 flights in 2015. The ramp chart is conducted and attached in this report. The ramp chart shows that two additional over nights are needed for the future conditions. Atlantic City Airport already has enough over night parking positions, therefore, no additional gates and over night positions are needed for the future flight schedule.

Exhibit A-1
ABE - Ramp Chart 2015

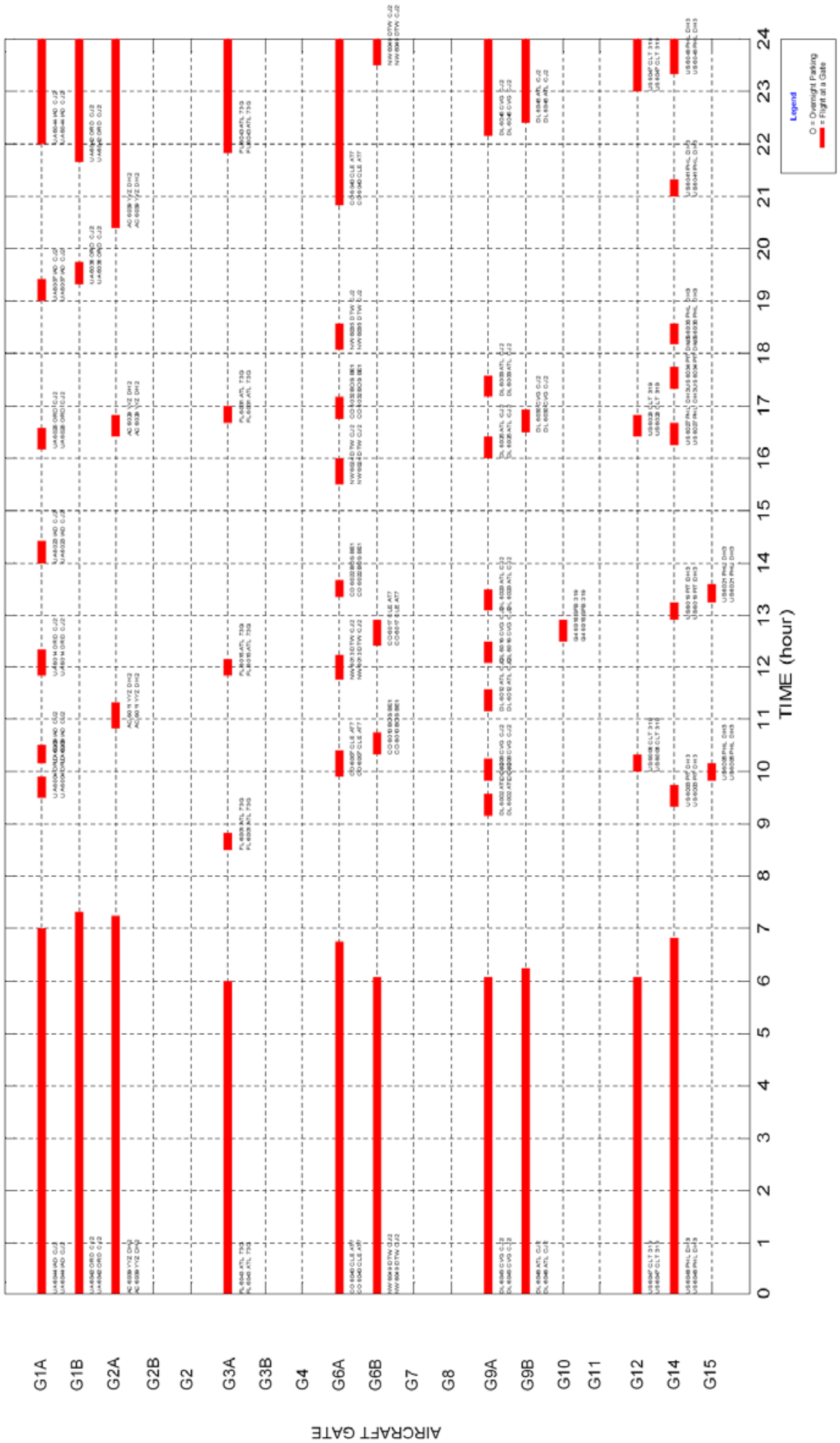


Exhibit A-2
ACY - Ramp Chart 2015