

# **Study Resource Committee (SRC) Meeting/Technical Subcommittee Meeting**

**T. F. Green Airport Master Plan Update**

**Facility Needs**

**April 25, 2002**



Rhode Island Airport Corporation



*Landrum & Brown Team*

# Where Are We In The Master Plan?

- **Completed inventory and forecasts**
- **RIAC Board adopted most likely forecast scenario (Existing Role Medium Case)**
- **FAA has approved forecast**
- **Tonight's meeting:**
  - **Identification of facilities needed to accommodate 20-year demand at acceptable levels of delay and congestion**
  - **Preliminary concepts for the future of the airport**
- **Next Master Plan Steps:**
  - **Two more meetings on alternatives**
  - **Select preferred alternative**
  - **Airport Layout Plan (ALP)**



# Current Utilization of Facilities

- **Utilization percentages from Chapter II, *Forecasts of Aviation Demand, Section II.5, Capacity Constrained Scenarios:***

<b>Airport Element</b>	<b>Current Capacity (Passengers)</b>	<b>Current Demand (Passengers)</b>	<b>Approximate Utilization</b>
Airfield	9,307,900	5,430,900	58% <sup>1/</sup>
Terminal	6,701,400	5,430,900	81%
Landside	7,997,600 <sup>2/</sup>	5,430,900	68%

1/ Based on passengers.  
2/ Based on key airport intersections along Post Road.



# Why is Demand/Capacity Used?

- **Demand** - Level of activity expected to occur at the airport
- **Capacity** - The processing capability of a facility at an acceptable level of delay and congestion
- **Demand/Capacity**
  - Comparison between the level of activity (demand) and the processing capability (capacity) of a facility.
  - As demand approaches capacity, delays and congestion increase.
  - Serves to determine future facility needs



# Why are Facility Requirements Calculated?

- **Purpose**

- Determine which facilities will become inadequate to meet demand at what demand level (trigger point).
- Identify facilities needed to reasonably accommodate 20-year demand (i.e. shortfall).

- **Objective**

- Define the level of airport facilities needed so facilities are not underutilized or overcrowded too often
- Based on acceptable level of service

- **Basis and framework for the development of alternatives**



# When to Implement Improvements?

- **Chapter identifies needed facilities by demand triggers and in five year increments**
- **RIAC will target implementation based on how demand actually materializes**
  - **Implementation too soon may not receive environmental approval and is not financially prudent.**
  - **Implementation too late causes delays and congestion and ties up funds.**



# Why use Trigger Points?

- **Identifying improvements based on “trigger points” (levels of activity) is more realistic than specific years.**
- **Makes plan more flexible**
- **Planned improvements should not be initiated unless:**
  - **Actual demand justifies it (trigger point will be met)**
  - **Financially feasible**
  - **Environmentally justified and approved**



# Applicable Triggers

Facility	Trigger
Runway/Taxiway System	Peak hour operations, annual operations
Runway Length - Main Runway	Aircraft type and stage length
Runway Length - Crosswind Runway	Design standard is 80% of the main runway length
Technology & Taxiway Improvements	Airport role
Runway Safety Areas (RSAs)	FAA standards
Overnight Aircraft Parking	Airport role
Pavement Conditions	Useful life of pavement
Gates	Daily flights
Terminal Building	Annual passengers
Fuel Farm	Daily operations
GSE Maintenance	New entrant airlines, number of gates, daily operations
Airfield Maintenance	Pavement area (facility size) and proximity to terminal area (location)
ARFF	Annual passengers

Facility	Trigger
<b>Landside</b>	
Access Roadways	Airport and non-airport roadway traffic volumes
Terminal Area Roadways	Annual passengers
Curbfront	Peak hour passengers
Short-term public parking	Peak hour passengers
Long-term public parking	Annual passengers
Employee parking	Annual passengers
Rental Car parking	Annual passengers
<b>Cargo Facilities</b>	
Integrated Cargo Facilities	Freight demand
Belly Cargo Facilities	Belly cargo volume
USPS	Mail volumes
<b>General Aviation Facilities</b>	
General Aviation Facilities	General aviation activity



# Capacity Enhancement Needs - Runway

- **FAA's Airport Capacity Model used**
- **Inputs to model include:**
  - Existing and forecast demand
  - Weather conditions
  - Runway/taxiway configuration
- **Findings rely on more than one analysis method:**
  - Hourly Runway Capacity
  - Annual Service Volume
  - Aircraft Delays



# Capacity Enhancement Needs - Runway (Cont'd)

- **What can be done to defer the need for additional capacity?**
  - **Taxiway optimization**
  - **Technology additions or enhancements**
- **Results:**
  - **Taxiway optimization would provide some capacity benefit.**
  - **Technology enhancements would increase safety and efficiency, but would not defer the need for additional capacity.**
- **T. F. Green will still need additional capacity during the planning period in spite of taxiway improvements.**



# Capacity Enhancement Needs - Runway (Cont'd)

- Results:**

Forecast Demand			Capacity		Delay		Demand/ Capacity Ratio
Annual Operations	Peak Demand Operations	Demand Year	Annual Service Volume	Design Hour VFR Operations	Average per Operation (minutes)		
					Low	High	
156,000	52	2000	221,000	79	0.9	1.3	71%
177,000	58	2005	221,000	79	1.0	1.5	80%
195,000	64	2010	221,000	79	1.4	2.2	88%
212,000	69	2015	221,000	79	2.2	3.3	96%
230,000	75	2020	221,000	79	3.6	5.7	104%



# Capacity Enhancement Needs - Runway (Cont'd)

- **Method 1 - Hourly Capacity**

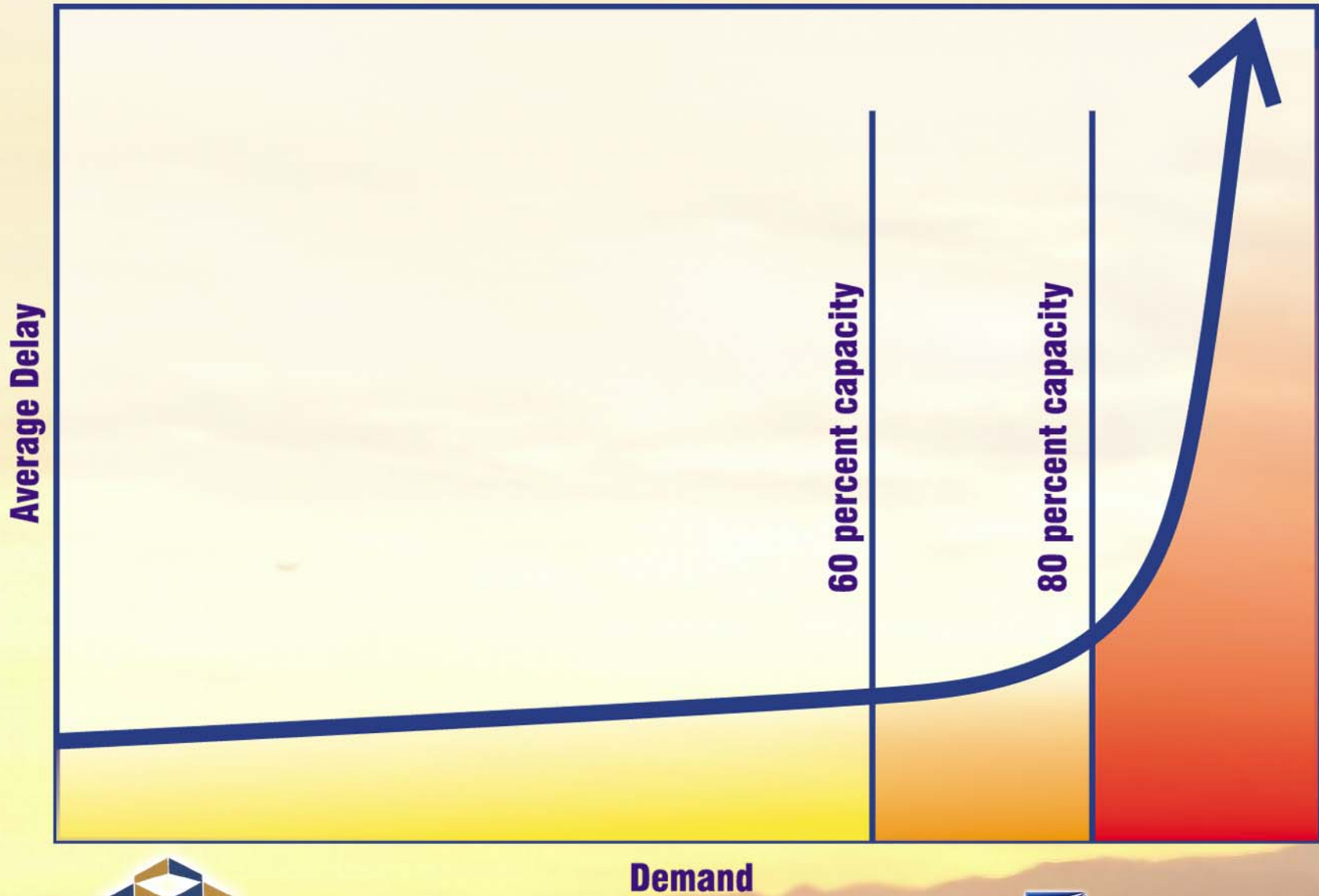
- Compare hourly demand to capacity in good and poor weather
- Additional capacity needed when peak hour demand reaches 60 operations (shortly after 2007)

- **Method 2 - Annual Service Volume**

- At 60 percent of capacity, new airfield facilities should be planned.
- New facilities should open at 80 percent of capacity
- Additional capacity should come on line at 177,000 annual operations (shortly after 2007)



# Typical Demand/Delay Relationship



Demand



# Capacity Enhancement Needs - Runway (Cont'd)

- **Method 3 - Aircraft Delay**
  - **No universal standard of acceptable delay**
    - **FAA: five minutes of average delay per aircraft**
    - **AAAE: four to six minutes of average delay per aircraft**
  - **Four to six minutes of average delay per aircraft used for T. F. Green**
  - **Results in need for additional capacity when annual operations reach 212,000 to 230,000 (2016-2020)**
- **Findings (combined three approaches) - Operation levels in the range of 64-69 in the peak hour or 194,000-212,000 annually will trigger the need for additional capacity in the 2011-2017 timeframe.**



# Runway Length Needs

- **Runway length will be driven by the use of aircraft such as the B-737-700, B-737-800, and the B-767-300.**
- **Based on individual aircraft performance characteristics**
- **Arrivals requirement - 7,200'**
- **Departures:**
  - **General aviation aircraft require 5,000'**
  - **Commuter aircraft require 6,400'**
  - **Air carrier aircraft ultimately require 9,500'-10,500'**
    - **10,500' accommodates all aircraft under all conditions**
    - **9,500' (requirement based on most prudent planning standards). Some aircraft would experience acceptable payload reductions under certain conditions.**
- **Crosswind runway requirement - 7,600' (80% of main runway length)**



# Other Major Airfield Needs

- **Need taxiway and technology enhancements as soon as possible to improve safety, meet FAA standards, and help offset the need for additional runway capacity**
- **Reconstruct Runway 16-34 as soon as possible**
- **Provide standard length RSAs as soon as possible to enhance safety**
- **Maximize overnight aircraft parking**
- **Close Runway 5L-23R**



# Aircraft Gates Needs

- **T. F. Green has 22 gates currently.**
- **Four different methods used to project future requirements**
- **Shortfalls identified based on ratio of daily flights per gate**
- **Findings – Expansion needed immediately due to current activity levels.**
- **40 gates needed by end of the planning period.**



# Passenger Terminal Building Size

- **Domestic airport passenger terminals should measure 20,000 square feet per gate.**
- **Resulting terminal building requirement:**

<b>Needed Gates</b>	<b>Annual Passengers</b>	<b>Terminal Building Area (square feet)</b>
22	5,400,000	352,000(Existing)
26	6,700,000	520,000
31	8,000,000	620,000
36	9,300,000	720,000
40	10,800,000	800,000

- **Over 6 million annual passengers (and 24 gates) will trigger the need for expansion of the terminal.**



# Surface Transportation Facility Needs

- Evaluation criteria based on Level of Service (LOS) A through F

LOS	Average Stopped Delay (seconds per vehicle)	
	Signalized Intersection	Unsignalized Intersection
A	<10	<10
B	>10 - <20	>10 - <15
C	>20 - <35.0	>15 - <25
D	>35 - <55.0	>25 - <35.0
E	>55 - <80	>35 - <50.0
F	>80	>50



# Access Roadway Needs

- **Roadway needs are determined by airport and non-airport roadway traffic volumes.**
- **Access roadways that are approaching LOS E/F:**
  - **Post Road at Airport Road**
  - **Post Road at Coronado Road**
  - **Post Road at Airport Connector**
  - **Jefferson Boulevard at Coronado Road**
  - **Jefferson Boulevard at Airport Connector Off Ramp - eastbound left**
  - **Airport Road at Hade Court**
  - **Airport Road at Commerce Drive**
  - **Internal intersection at short-term parking**



# Terminal Area Access/Auto Parking

- **Terminal area roadway improvements will be needed over the next several years as the roadways approach LOS E.**
- **Curbfront – No major improvements are needed. Future improvements will be triggered by changes in the operational characteristics of the curb.**
- **Short-term parking is adequate over the planning period**



# **Terminal Area Access/Auto Parking (Cont'd)**

- **2020 long-term public parking needs - 13,500 spaces (5,100 additional spaces)**
- **Need to provide a dedicated employee lot to free up the public parking for passengers.**
- **2020 employee parking needs - 2,800 spaces**
- **2020 rental car needs - 2,400 spaces (expansion needed today)**



# Air Cargo Facility Needs

- **Air cargo is triggered by the demand of freight and belly cargo volumes**
- **2020 air cargo needs - approximately 15 acres**
- **The airport is pursuing a 15-acre Aeroland development to accommodate a potential FedEx sort operation.**



# General Aviation Facility Needs

- **Building space is adequate to meet demand.**
- **Additional auto parking will be needed for Hanger #2 and Northstar Aviation.**
- **Current layout of the Northeast and Northwest ramps is inefficient.**



# Support Facility Needs

- **Land needed for support facilities is expected to approximately double over the planning period (2020 needs - approximately 15.0 total acres).**
- **2020 fuel farm needs - 2.7 acres (expansion needed now to meet 3-day reserve)**
- **2020 GSE maintenance needs - 1.1 acres (expansion needed today)**
- **2020 airfield maintenance needs - 8-10 acres (needs relocated and expanded today)**



# Summary of Trigger Points

Facility	Trigger	Trigger Point (When Major Expansion Triggered)
<b>Airfield</b>		
Runway/Taxiway System	Peak hour operations, annual operations	Operations levels in the range of 64-69 in the peak hour or 194,000-212,000 on an annual basis (2011-2017).
Runway Length - Main Runway	Aircraft type and stage length	Long haul flights and forecast aircraft require 9,500'
Runway Length - Crosswind Runway	Design standard is 80% of the main runway length	When main runway length exceeds 7,600 feet.
Technology & Taxiway Improvements	Airport role	Needed as soon as possible to improve safety, meet FAA standards, and help offset the need for additional runway capacity.
Runway Safety Areas (RSAs)	FAA standards	Provide standard length RSAs as soon as possible to enhance safety.
Overnight Aircraft Parking	Airport role	Maximize area available for overnight aircraft parking.
Pavement Conditions	Useful life of pavement	Reconstruct Runway 16-34 as soon as possible.
<b>Terminal Area</b>		
Gates	Daily flights	Current activity levels
Terminal Building	Annual passengers	Over 6 million annual passengers - first expansion likely needed in 2005



# Summary of Trigger Points (Cont'd)

Facility	Trigger	Trigger Point (When Major Expansion Triggered)
<b>Landside</b>		
Access Roadways	Airport and non-airport roadway traffic volumes	LOS E at intersections
Terminal Area Roadways	Annual passengers	LOS E
Curbfront	Peak hour passengers	Changes in operational characteristics of curb
Short-term public parking	Peak hour passengers	Not reached
Long-term public parking	Annual passengers	Annual passenger levels of 7 million (first expansion likely needed between 2008-2009)
Employee parking	Annual passengers	Annual passenger activity of over 6 million (first expansion likely needed in 2005)
Rental Car parking	Annual passengers	5 million passengers



# Summary of Trigger Points (Cont'd)

Facility	Trigger	Trigger Point (When Major Expansion Triggered)
<b>Cargo Facilities</b>		
Integrated Cargo Facilities	Freight demand	Establishment of FedEx sort operation
Belly Cargo Facilities	Belly cargo volume	4,030 tons of belly cargo (first expansion likely needed in 2010)
USPS	Mail volumes	Current volumes
<b>General Aviation Facilities</b>		
General Aviation Facilities	General aviation activity	Not reached
<b>Support Facilities</b>		
Fuel Farm	Daily operations	Current activity levels (to meet 3-day reserve requirements)
GSE Maintenance	New entrant airlines, number of gates, daily operations	Current activity levels
Airfield Maintenance	Pavement area (facility size) and proximity to terminal area (location)	Current size and activity
ARFF	Annual passengers	Current activity levels



# Master Plan Alternatives Process

