ratio of truck/auto area to building area of approximately 2.0 was considered high, due to the small size of the overall facility. With a 14,000-square foot building, this ratio is projected to decrease to 1.4. **This ratio results in a requirement for 10,000 square feet of truck/auto area (a deficit of 1,500 square feet) to serve demand through 2020.** As with the belly cargo facility, employees must park in one of T. F. Green's long-term parking lots, and not at the actual facility itself. Therefore, employee parking has not been considered in this particular analysis.

III.5 General Aviation Facilities

This section reviews the spatial requirements for general aviation building areas, aircraft parking, and auto parking facilities at T. F. Green. The FAA defines general aviation as encompassing "all aviation activity except that of air carriers certified in accordance with FAR Parts 121, 123, 127 and 135," excluding military aircraft. Within this broad definition of general aviation, there are a number of sub-categories that further define general aviation aircraft and operations. Some of these categories include: corporate/executive users; business users; personal users; aerial application users; instructional users; charter users; industrial/special users; and rental users.

The process for determining general aviation facility requirements is based upon the forecast demand for general aviation and the ability of the existing facilities to accommodate this demand. As noted in Chapter II, *Forecasts of Aviation Demand*, Section II.3.5, *Forecasts of Aircraft Operations Demand*, it was assumed that local general aviation operations at T. F. Green would remain constant throughout the forecasting period, but that the airport would experience a continued moderate growth of itinerant corporate and business aircraft. Therefore, the forecast of general aviation operations for T. F. Green assumed a combined (local and itinerant) annual growth rate for general aviation operations of 0.8 percent.

III.5.1 Existing General Aviation Facilities

As noted in Chapter I, *Inventory*, Section I.5.4, *Support Facilities*, and shown on **Exhibit III.5-1**, the existing general aviation facilities at T. F. Green are spread out along the Northeast and Northwest Ramps and are intermixed with airport operations and air cargo facilities. The general aviation facilities include two Fixed Base Operator (FBO) hangars, four corporate hangars, and three RIAC-owned general hangars, all of which are accessible only from Airport Road.

Basic flying services such as fueling, aircraft storage, and general support services for both local and itinerant general aviation are provided by Northstar Aviation, one of the two FBOs with a hangar. The other FBO hangar is operated by Quality Aviation, which provides aircraft (primarily helicopter) maintenance, and general avionics repair. Two additional FBOs, P T Aero Service Inc. and ADS Aviation Maintenance, Inc., operate out of Hangars #1 and #2 respectively. They also provide general aircraft maintenance services. Aircraft rental, charter, and flight instruction are provided by T. F. Green's

remaining two FBOs, Horizon Aviation Inc. and Corporate Air Charter Inc., both of which operate out of Hangar #1. Two corporate hangars are operated by Fleet and CVS. The remaining two corporate hangars are operated by Textron.

The RIAC-owned Hangars #1 and #2 provide general aeronautical office, service, and hangar storage rental spaces. They are utilized by a variety of operators, including the smaller FBOs, as noted above, and Federal Express, who leases half of the storage area of Hangar #2. Hangar #3 contains the RIAC aeronautics inspection offices, as well as the state of Rhode Island's helicopter and single-engine aircraft.

Of special note is Hangar #1, which is the western-most hangar and is located near the threshold of Runway 16. This hangar has been determined to be a penetration of T. F. Green's FAR Part 77 imaginary surfaces, and, as such, has been slated to be eventually demolished. In addition, while the offices and smaller, ancillary hangar spaces in Hangar #1 are currently occupied by FBOs, the main hangar area (approximately 30,000 square feet) is presently vacant.

In total, the general aviation facilities currently provide 139,500 square feet of building space at T. F. Green. However, it is assumed that this number will be reduced to approximately 86,300 square feet with the likely demolition of Hangar #1 by 2010.

The aircraft parking area currently available for general aviation activity consists of approximately 21,100 square yards. It is important to note that this total area is divided into six, separate areas scattered across the Northeast and Northwest Ramps and tends to be small or odd-shaped. As such, the overall layout of this total area is very inefficient in that much more area is required for taxilanes and parking spots than would otherwise be required in an efficient, consolidated layout of similar overall size.

III.5.2 Building Area Requirements

The calculation of the general aviation building area requirements is shown in **Table III.5-1**. The existing hangar demand was determined through interviews with RIAC, the corporate operators, and the fixed-base operators. The general aviation hangar requirements were evaluated by determining the total number of based aircraft that will be stored in the hangar and assigning a corresponding square footage for each type of aircraft.

The assumptions used in this analysis are shown below:

- As noted in Chapter II, *Forecasts of Aviation Demand*, Section II.3.5, *Forecasts of Aircraft Operations Demand*, the forecast of general aviation operations for T. F. Green assumed an overall annual growth rate for general aviation operations of a moderate 0.8 percent. Growth in hangar demand is assumed to parallel the growth in general aviation operations.

Table III.5-1
T. F. Green Airport

General Aviation Building Area Requirements

Aircraft Category	Hangared Aircraft [1/]	Year	Avg. Parking Area Per Hangared Aircraft [2/]	Hangar Requirements	Surplus / (Deficit)
			(square feet)	(square feet)	(square feet)
Corporate Jet	10	2000	2,450	24,500	
Multi-Engine Turbo Prop/Piston	7		1,550	10,850	
Single-Engine Piston	10		850	8,500	
Total Hangar Requirement:	27			43,850	
Total Building Requirement: [3/]				54,800	
Existing Hangar Space: [4/]				139,500	84,700
Corporate Jet	11	2005	2,450	26,950	
Multi-Engine Turbo Prop/Piston	8		1,550	12,400	
Single-Engine Piston	11		850	9,350	
Total Hangar Requirement:	30			48,700	
Total Building Requirement: [3/]				60,900	
Existing Hangar Space: [4/]				139,500	78,600
Corporate Jet	12	2010	2,450	29,400	
Multi-Engine Turbo Prop/Piston	9		1,550	13,950	
Single-Engine Piston	12		850	10,200	
Total Hangar Requirement:	33			53,550	
Total Building Requirement: [3/]				67,000	
Existing Hangar Space: [5/]				86,300	19,300
Corporate Jet	13	2015	2,450	31,850	
Multi-Engine Turbo Prop/Piston	10		1,550	15,500	
Single-Engine Piston	13		850	11,050	
Total Hangar Requirement:	36			58,400	
Total Building Requirement: [3/]				73,000	
Existing Hangar Space: [5/]				86,300	13,300
Corporate Jet	14	2020	2,450	34,300	
Multi-Engine Turbo Prop/Piston	11		1,550	17,050	
Single-Engine Piston	14		850	11,900	
Total Hangar Requirement:	39			63,250	
Total Building Requirement: [3/]				79,100	
Existing Hangar Space: [5/]				86,300	7,200

Note: Requirements were calculated based on the draft forecasts and were not updated to reflect the final forecasts.

1/ Assumes number of hangared aircraft matches overall percentage growth in General Aviation operations.

2/ Based on a typical mix of General Aviation aircraft.

3/ Total building requirement adjusted to reflect 20 percent of total building space for office and maintenance.

4/ Sum total of RIAC Hangars #1, 2 & 3; Fleet; Quality Aviation; Textron #1 & 2; CVS; and Northstar Aviation hangars.
Note: Only 11,000 square feet of RIAC Hangar #2 is used for General Aviation.

5/ Includes all those hangars noted above except for RIAC Hangar #1, which has been targeted for demolition by 2010.

Source: RIAC and Northstar Aviation

Draft

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- Average parking areas per aircraft were determined based on a typical mix of general aviation aircraft. It is assumed that corporate jets require 2,450 square feet per aircraft, multi-engine aircraft require 1,550 square feet per aircraft, and single-engine pistons require 850 square feet per aircraft.
- Portions of the conventional hangars are also used for aircraft maintenance and servicing, as well as for office space. It is assumed that 20 percent of the total building space is occupied by these areas. Therefore, the hangar area requirements were adjusted to include this space in order to determine the total building requirement.

General aviation building area requirements were calculated based on the above assumptions and the final forecasts. These calculations demonstrate that there is currently a demand for approximately 54,800 square feet of hangar space, resulting in a surplus of 84,700 square feet. This surplus will drop to 19,300 square feet with the demolition of Hangar #1 by 2010. There will continue to be a surplus of general aviation building area through 2020. **An increase in the number of aircraft using the hangars beyond the 39 projected for 2020 could trigger a need for additional general aviation facilities.**

It is important to recognize that the building area requirements are gross square footages and cannot account for the inherent inefficiencies of separate hangar facilities. For example, a private hangar may be only half utilized by choice of its owner. While this space may be reflected as an overall "surplus" of space, it may not, in fact, be available for use by others. It is important to plan appropriate land use area for general aviation hangars should additional facilities be needed.

III.5.3 Apron Area Requirements

General aviation apron areas include areas required for access to, and parking of, both based and itinerant aircraft not stored in hangars. The general aviation apron area requirements for T. F. Green are shown in **Table III.5-2**. Similar to the hangar requirements, the general aviation apron area requirements were determined by establishing the total number of aircraft that will require apron space and assigning a corresponding square footage for each type of aircraft. The assumptions used in this analysis are shown below:

- The demand for general aviation apron area is based on PMAD general aviation operations as derived from Chapter II, *Forecasts of Aviation Demand*, Section II.3.5, *Forecasts of Aircraft Operations Demand.* Based on interviews with Northstar Aviation, and through calculations of existing PMAD parking demands, it was determined that 32 percent of the PMAD arrivals required apron area at any one time.

Table III.5-2

T. F. Green Airport

General Aviation Apron Requirements

Aircraft Category	PMAD Arrivals [2/]	PMAD Apron Demand [3/]	Year	Avg. Parking Area Per Aircraft [4/]	Parking Area Requirements	Apron Area Requirements [5/]	Surplus / (Deficit)
				(square yards)	(square yards)	(square yards)	(square yards)
Corporate Jet	21	7	2000	272	1,900	5,700	
Multi-Engine Turbo Prop/Piston	42	13		172	2,240	6,720	
Single-Engine Piston	30	10		95	950	2,850	
Total Apron Requirement	93	30			5,090	15,270	
Existing Apron Space:						21,100	5,830
Corporate Jet	22	7	2005	272	1,900	5,700	
Multi-Engine Turbo Prop/Piston	44	14		172	2,410	7,230	
Single-Engine Piston	31	10		95	950	2,850	
Total Apron Requirement	97	31			5,260	15,780	
Existing Apron Space:						21,100	5,320
Corporate Jet	23	8	2010	272	2,180	6,540	
Multi-Engine Turbo Prop/Piston	45	14		172	2,410	7,230	
Single-Engine Piston	32	10		95	950	2,850	
Total Apron Requirement	100	32			5,540	16,620	
Existing Apron Space:						21,100	4,480
Corporate Jet	25	8	2015	272	2,180	6,540	
Multi-Engine Turbo Prop/Piston	47	15		172	2,580	7,740	
Single-Engine Piston	32	10		95	950	2,850	
Total Apron Requirement	104	33			5,710	17,130	
Existing Apron Space:						21,100	3,970
Corporate Jet	27	9	2020	272	2,450	7,350	
Multi-Engine Turbo Prop/Piston	49	16		172	2,750	8,250	
Single-Engine Piston	32	10		95	950	2,850	
Total Apron Requirement	108	35			6,150	18,450	
Existing Apron Space:						21,100	2,650

Note: Requirements were calculated based on the draft forecasts and were not updated to reflect the final forecasts.

1/ Assuming operations per based aircraft remain constant, and there is no forecasted growth in based aircraft on apron.

2/ PMAD refers to peak month average day.

3/ Equal to 32 percent of PMAD arrivals. Based on interviews and observations at T. F. Green.

4/ Based on a typical mix of General Aviation aircraft.

5/ Assuming that three times the required parking area would be necessary for aircraft circulation and wing tip clearances.

Source: RIAC and Northstar Aviation

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P:\pvd00\Master Plan\Dem-Cap-FacilityReq\From Subs\EK\[Section III.5 Tables_102501.xls]Table III.5-2

- The average parking areas per aircraft presented in the previous section were also used in this analysis. However, for planning purposes, these figures were multiplied by three to account for the area necessary for aircraft circulation and wing tip clearances.
- The aircraft parking areas are assumed to be consolidated and to be reasonably efficient in the future.

The general aviation apron area requirements calculated based on the above assumptions showed that there is currently a demand for approximately 15,300 square yards at T. F. Green. This results in a current apron area surplus of 5,800 square yards. **Based on the final forecasts, there will continue to be a surplus of apron space through 2020. An increase in daily general aviation activity beyond the levels forecast for 2020 (approximately 110 arrivals per day) could trigger a need for additional apron space for general aviation aircraft.**

As noted previously, the surpluses reflected in these calculations are based on the existing square footages of an extremely inefficient apron layout. As such, while the projected square footage requirements accurately reflect the overall future general aviation apron area demands, the projected surpluses may be misleading in that much of this surplus area is actually lost in the inherent inefficiency of the current layout. This fact is validated by Northstar Aviation who reports the existing aprons to be full during peak periods.

III.5.4 Auto Parking Requirements

Just as there are a variety of general aviation building and apron facilities at T. F. Green, there are also a variety of vehicular parking areas associated with these facilities. These parking areas currently total approximately 68,800 square feet in nine separate, distinct lots of varying size, design, and efficiency.

For the purposes of this analysis, these various parking areas were broken down into two groups based on their current level of demand versus capacity. Through discussions with representatives of the various parking area users, parking area deficiencies were identified at both Hangar #2 and the Northstar Aviation hangar. Specifically, Hangar #2 is occupied by five separate users, four of which are commercial operations that generate parking demands that consistently exceed the lot capacity. Consequently, these parking demands invariably spill over to the neighboring Northstar Aviation facility, whose existing parking area is undersized for its own demand levels. These two facilities comprise the first group.

Through discussions with Northstar Aviation, a planning ratio of 0.7 square feet of parking and access area for every one square foot of building area was derived to account for the existing shortages in the Hangar #2 and Northstar Hangar areas**. Table III.5-3** shows the resulting auto parking requirements for the forecast years. By applying the planning ratio, there is an existing deficit in auto parking area of

approximately 12,800 square feet. **This deficit will increase to 29,800 square feet by 2020, when there will be a demand for 55,400 square feet of total parking and access area for Hangar #2 and Northstar Aviation.**

Table III.5-3
HANGAR #2/NORTHSTAR AVIATION AUTO PARKING REQUIREMENTS
T. F. Green

Projected Building Area Requirement (square feet)	Existing Parking Area to Building Area Ratio	Area Required (square feet)	Surplus/ (Deficit) (square feet)	Year[1]
54,800	0.7	38,400	(12,800)	2000
60,900	0.7	42,600	(17,000)	2005
67,000	0.7	46,900	(21,300)	2010
73,000	0.7	51,100	(25,500)	2015
79,100	0.7	55,400	(29,800)	2020

2000 Area Available: 27,000 square feet

[1] Requirements were calculated based on the draft forecasts and were not updated to reflect the final forecasts

Source: RIAC and Federal Express.

The second group defined for this parking analysis is comprised of the remaining general aviation facilities, who have all indicated that their existing parking facilities are adequate. However, of special note is Hangar #1, whose existing parking area is currently near capacity, but whose main hangar, as noted previously, is also currently empty. It is very likely that additional parking capacity would need to be considered for Hangar #1 if its existing vacant areas were to be either utilized as rental hangar space for aircraft, or occupied by a commercial operation similar to those in Hangar #2.

Through discussions with representatives of these various facilities, a planning ratio of 0.45 square feet of parking and access area for every one square foot of building area was derived from existing parking usage percentage estimates**. Table III.5-4** shows the resulting auto parking requirements for the forecast years. Through applying the planning ratio, it can be determined that there is an existing surplus in auto parking area of approximately 18,500 square feet that will decrease to 7,600 square feet by 2020, when there will be a demand for 35,600 square feet of total parking and access area for these general aviation facilities. **No additional parking areas are needed for these hangars through 2020.**

Table III.5-4
GENERAL AVIATION AUTO PARKING REQUIREMENTS
T. F. Green

Projected Building Area Requirement (square feet)	Existing Parking Area to Building Area Ratio	Area Required (square feet)	Surplus/ (Deficit) (square feet)	Year[1]
54,800	0.45	24,700	18,500	2000
60,900	0.45	27,400	15,800	2005
67,000	0.45	30,200	13,000	2010
73,000	0.45	32,900	10,300	2015
79,100	0.45	35,600	7,600	2020

2000 Area Available: 43,200 square feet

[1] Requirements were calculated based on the draft forecasts and were not updated to reflect the final forecasts

Source: RIAC, Fleet, CVS, Textron, Horizon Aviation, and P T Aero Service, Inc.

III.6 Support Facilities

Support or ancillary facilities play a vital role in the operations and maintenance of T. F. Green Airport. The sizing, location, and phasing of any proposed improvements to these facilities must provide flexibility to accommodate the dynamic aviation industry. Short-term actions and recommendations should not preclude long-range planning options. The requirements contained herein provide general planning parameters and are based on the forecasts of aviation demand and the existing or anticipated conditions at T. F. Green.

Support facilities, most of which are shown on **Exhibit III.6-1**, include the following:

- Air Traffic Control Tower (ATCT)
- Fuel Farm
- Ground Support Equipment (GSE) Maintenance
- Airfield Maintenance/Snow Removal Equipment (SRE) Facilities
- Northeast and Northwest Ramp Facilities
- Aircraft Rescue and Firefighting (ARFF)
- Flight Kitchens

III.6.1 Air Traffic Control Tower (ATCT)

The T. F. Green Airport ATCT is located south of Runway 16-34 and east of Runway 5R-23L. The ATCT contains a tower cab, a Terminal Radar Approach Control Facility (TRACON), and various administration offices. Chapter I, *Inventory*, Section I.3.2, *Air Traffic Control*, describes the functions of the TRACON and the ATCT.

The tower was built in 1990. It has a 20-year expected life span and will therefore likely need to be replaced around 2010. In addition, the ATCT is not in the most optimal location for air traffic controllers. ATCT personnel have indicated the following issues regarding the tower's current location:

- Restricted line of sight. Trees must be maintained at both the Runway 5R end and Taxiway "T."
- Controllers face the sun at sunset making it difficult to see ground movements.
- The ATCT is nearly a mile away from the terminal core making it difficult to see the difference between aircraft lights and terminal lights during sunset and nighttime operations.
- Commuter aircraft parking positions behind the concourse (Gates 1 and 1A) cannot be seen from current location.

A new ATCT will be needed around 2010 as the existing tower reaches the end of its useful life. The FAA is responsible for determining whether/when a replacement tower is needed. The FAA also funds any new ATCT facilities. However, it is important for the Master Plan to consider this issue in order to reserve land for this function.

III.6.2 Fuel Farm

Commercial aviation (air carrier, commuter, cargo, and charter) demand for Jet A and AVGAS 1000LL fuel is currently met by a central fuel farm, located north of the terminal building. The fuel farm is owned by the airport and operated exclusively by Northstar Aviation.

Jet A Fuel Storage Requirements

The fuel farm has a total Jet A storage capacity of 250,000 gallons in five above-ground, 50,000-gallon tanks that are located on a concrete pad surrounded by a dike for spill containment purposes. There is currently no space within this existing diked area for additional tanks to be placed.

The primary users of Jet A fuel are the commercial passenger and cargo carriers. Northstar Aviation indicated that general aviation demand for Jet A fuel is minimal in relation to the overall scope of commercial demand. As a result, general aviation demand for Jet A was not considered as part of this analysis. Cape Air's projected operations were also not included for the purposes of establishing Jet A demand, since they expect to continue to operate with Cessna aircraft, which use AVGAS 100LL fuel.

The following methodology was used to determine future facility requirements:

- Monthly fuel demand for Jet A was provided by Northstar Aviation for 2000. From this data, the peak month demand for 2000 (October: 4,109,000 gallons) was developed and then divided by 31 (the number of days in the month) to estimate the PMAD demand.
- An existing (year 2000) gallons per PMAD operation ratio was calculated for Jet A fuel. This ratio is 491 gallons per PMAD operation.
- The future ratio was inflated to take into account the following factors:
  - Continued replacement of turboprop commuter aircraft with regional jets, having greater fuel requirements and capacities
  - The use of larger aircraft, with larger fuel capacities, by the air carriers and cargo operators
  - Increases in flight stage lengths
- A three-day Jet A fuel reserve was established as a standard requirement by the air carriers to protect for any potential fuel supply disruptions.

The ratios discussed above were applied to the PMAD commercial operations to establish the PMAD demand for Jet A fuel. The resulting PMAD demands for Jet A fuel were then multiplied by three to reflect the air carriers' three-day fuel reserve requirement.

The results of this analysis are shown in **Table III.6-1**. Based on PMAD fuel demand requirements, the existing fuel farm has an existing deficit of approximately 141,500 gallons based on a three-day reserve; RIAC currently has slightly less than a two-day reserve. Future fuel storage requirements are expected to grow to 734,100 gallons by 2020 when PMAD operations are projected to reach 437. This results in a 484,100-gallon deficit in 2020.

Table III.6-1
JET A COMMERCIAL FUEL STORAGE REQUIREMENTS
T. F. Green Airport

PMAD Operations[1]	Gallons Per PMAD Operations (gallons)	PMAD Demand[2] (gallons)	Storage Requirements (3 Day Supply) (gallons)	Surplus/ (Deficit) (gallons)	Year[3]
266	491	130,500	391,500	(141,500)	2000
312	500	156,000	468,000	(218,000)	2005
354	520	184,100	552,300	(302,300)	2010
396	540	213,800	641,400	(391,400)	2015
437	560	244,700	734,100	(484,100)	2020

2000 Jet A Storage Available: 250,000 gallons

1 Excludes Cape Air, military and general aviation operations.
2 October 2000 fuel demand was provided by Northstar Aviation.
3 Requirements were calculated based on the draft forecasts and were not updated to reflect the final forecasts.
Source: Northstar Aviation

The fuel storage land area requirements were derived by developing a ratio characterizing existing gallons of storage to square feet of land occupied. The analysis includes all facilities associated with the fuel farm area. **Table III.6-2** displays the land area requirements associated with the previously derived storage requirements. The gallons per square feet ratio in 2000 is approximately 6.2. This ratio was applied to the storage requirements in the forecast years to develop a land requirement for the fuel farm. **Based on this analysis, there is currently a deficit in land area because T. F. Green does not meet the three-day storage requirement. As PMAD operations increase to 560, 118,400 square feet of land will be needed. This results in a deficit of 55,000 square feet in 2020.**

These requirements were calculated based on the draft forecasts. Based on the final forecasts, the 2005 identified requirements will more likely occur two to three years later. The 2010 projections will shift one to two years and the 2015 requirements will shift one year. The 2020 final forecasts were virtually unchanged from the original projections, so the 2020 support facility requirements are valid. Daily operations levels should be monitored closely to ascertain if expansion is required sooner or later than projected.

Table III.6-2
FUEL STORAGE LAND REQUIREMENTS
T. F. Green Airport

Storage Requirement (3 Day Supply) (gallons)	Existing Gallons of Storage Per Square Feet of area (gallons)	Area Required Square Feet	Area Required Acres	Surplus/(Deficit) Square Feet	Surplus/(Deficit) Acres	Year[1]
391,500	6.2	63,145	1.5	229	0.0	2000
468,000	6.2	75,500	1.7	(12,126)	(0.3)	2005
552,300	6.2	89,000	2.1	(25,626)	(0.6)	2010
641,400	6.2	103,500	2.4	(40,126)	(0.9)	2015
734,100	6.2	118,400	2.7	(55,026)	(1.3)	2020

2000 Area Available: 63,374 square feet
1.5 acres

[1] Requirements were calculated based on the draft forecasts and were not updated to reflect the final forecasts.

Source: RIAC and Northstar Aviation

AVGAS 100LL Fuel Storage Requirements

While the previous analysis summarized the fuel storage requirements as they relate to commercial operators at T. F. Green, it did not consider Cape Air, who utilizes 100LL aviation fuel exclusively. In addition to the Jet A fuel storage capacity noted above, there is currently a single 10,000-gallon 100LL storage tank in the existing fuel farm to meet the AVGAS 100LL fuel demands of both commercial and general aviation operations at T. F. Green.

Similar to Jet A, the methodology used to determine future facility requirements for 100LL fuel are as follows:

- Monthly commercial fuel demand for 100LL fuel was provided by Northstar Aviation for 2000. From this data, the peak month demand for 2000 (July: 16,000 gallons) was identified and then divided by 31 (the number of days in the month) to estimate the PMAD demand.
- An existing (2000) gallons per PMAD operation ratio was calculated for 100LL fuel. The current demand is 9.2 gallons per PMAD operation, and is expected to remain constant throughout the planning period.
- A three-day 100LL fuel reserve was established as a standard requirement by the air carrier to protect for any potential fuel supply disruptions.

- Northstar Aviation indicated that general aviation and military demand for 100LL fuel is typically equal to that of the overall commercial demand. These operations do not require the three-day fuel reserve.

Table III.6-3 depicts the AVGAS 100LL fuel storage requirements. As shown, there will a surplus in AVGAS 100LL storage capacity throughout the planning horizon. Therefore, no additional AVGAS 100LL fuel storage will be required through 2020.

However, Northstar Aviation also noted that beyond the issues of overall demand, a larger 100LL storage tank would be very useful from an operational standpoint. Since refueling tanker trucks typically deliver a standard load of 9,400 gallons, Northstar is forced to wait until the existing 10,000-gallon tank is nearly empty to have it refilled. This typically reduces the on-airport 100LL inventory below the three-day reserve requirement for commercial operators and raises the possibility that a disruption in the regional AVGAS 100LL distribution network could leave the airport without adequate reserves. Northstar has suggested that a 12,000- to 15,000-gallon tank would alleviate these operational issues.

Fuel Truck Access

Fuel and space requirements are expected to nearly double over the planning period. **As requirements increase, fuel truck traffic on Delivery Drive will increase, possibly resulting in a need to widen this road.** Delivery Drive is located adjacent to the fuel farm and is used for the delivery of fuel to the facility as well as by airport staff to re-fuel trucks and service vehicles.

Table III.6-3
100LL FUEL STORAGE REQUIREMENTS
T. F. Green Airport

Commercial PMAD Operations[1]	Gallons Per PMAD Operations (gallons)	Commercial PMAD Demand [2] (gallons)	Commercial Storage Requirements (3 Day Supply) (gallons)	Total Storage Requirements[3] (gallons)	Surplus/ (Deficit) (gallons)	Year[4]
56	9.2	515	1,545	2,060	7,940	2000
60	9.2	550	1,655	2,205	7,795	2005
64	9.2	590	1,765	2,355	7,645	2010
68	9.2	625	1,880	2,505	7,495	2015
73	9.2	670	2,015	2,685	7,315	2020

2000 Storage Available: 10,000 gallons

1 Cape Air operations (Excludes military and general aviation)
2 July 2000 fuel demand was provided by Northstar Aviation.
3 Commercial 3-day storage requirement added to general aviation and military storage demand which is equal to commercial PMAD demand, per Northstar Aviation.
4 Requirements were calculated based on the draft forecasts and were not updated to reflect the final forecasts.
Source: Northstar Aviation

III.6.3 Ground Support Equipment (GSE) Maintenance

As discussed in Section III.4.2, *Belly Cargo Facilities*, a portion of the Belly Cargo/GSE Maintenance facility located south of the terminal building is used for GSE maintenance. Approximately 12,000 square feet of this building is used by the commercial service airlines for GSE maintenance. In addition, ADS Aviation Maintenance, Inc., located in Hangar #2, provides maintenance services for air carrier GSE. Requirements for ADS are discussed in Section III.6.5, *Northeast and Northwest Ramp Facilities*. This analysis also excludes GSE from Northstar Aviation and from the integrated cargo carriers, who either conduct their own GSE maintenance at their own facilities, or utilize ADS for those services.

GSE maintenance requirements were determined based on the number of vehicles required. GSE maintenance growth is driven by three factors in varying degrees of impact. First, any new entrant air carrier to the airport will create instant demand for GSE maintenance by bringing in a new, complete GSE fleet in proportion to the number of gates and flights. Second, construction of additional gates usually requires additional GSE. Third, increased daily departures cause the GSE fleet to grow, in that additional tug and bag cart trains are needed as well as other GSE such as deicing trucks.

Additionally, commuter departures are now contributing more to GSE fleet growth because of increased use of regional jet aircraft, which require GSE support similar to that of air carrier aircraft.

These three factors were given consideration when developing the GSE maintenance facility requirements. Specifically, facility requirements incorporate growth factors for the existing GSE tenants as well as allowing space for new tenants in the facility. An 82 percent growth in gates from 22 to 40 during the planning period will create a significant need for additional GSE at T. F. Green. GSE requirements at airports with modest GSE fleets (like T. F. Green) generally mirror gate growth.

Additional GSE fleet growth will come from the projected increase in daily departures for the air carriers and commuters. Daily departures for the air carriers are projected to grow by 96 percent from 2000 to 2020, and commuter carriers are expected to grow by an additional 30 percent.[17] Daily departure growth for medium-size airports such as T. F. Green typically creates GSE growth at a rate of about one half of the daily departure growth rate for air carriers and about one third of the growth rate for commuter departures.

A single maintenance bay can typically service a fleet of 8 to12 motorized GSE units on a single-shift basis. A service bay is approximately 20 feet wide by 32 feet deep (640 square feet) allowing for building columns, etc. Support spaces for GSE maintenance typically require the area equal to the service bay area in a facility. Parts storage space should be added to the facility area separately at about 15 square feet per motorized GSE unit. Additionally, a 25 percent factor is added to the total square footage to account for natural inefficiencies that result from dividing the overall space among tenants.

The resulting GSE Maintenance Building requirements are described in **Table III.6-4**. Based on this analysis, the existing facilities are currently at capacity, and will be undersized by 4,300 square feet by 2005. Approximately 28,100 square feet of building area will be needed in 2020, resulting in a deficit for the existing facilities of 13,200 square feet.

Area for GSE staging, off-season storage, and temporary storage must also be provided. Sheltered storage is preferred, especially in areas with harsh winter conditions like Rhode Island. Area for storage, if judiciously managed, should be sized for all off-season equipment storage and approximately 20 percent of the remaining fleet. The area should be planned as a parking lot or unheated shelter with very small clearances for long-term storage and more generous clearances for more transient uses such as GSE staging. Off-season GSE storage in airports such as T. F. Green usually includes space for deicing trucks and heaters only.

[17] Based on the 2001 draft forecasts.

Table III.6-4
GSE MAINTENANCE BUILDING REQUIREMENTS
T. F. Green Airport

Cumulative GSE Growth Rate[1]	Total Motorized GSE Units	Maintenance Building Requirements		Surplus/(Deficit)		Year[4]
		Bays [2]	Square Feet [3]	Bays	Square Feet	
-	70	9	15,700	0	(800)	2000
20.8%	85	11	19,200	(2)	(4,300)	2005
44.2%	101	12	21,100	(3)	(6,200)	2010
68.3%	118	14	24,600	(5)	(9,700)	2015
87.8%	132	16	28,100	(7)	(13,200)	2020

2000 Available: 9 bays
14,900 square feet

1 Growth rate based on gate growth percentage, plus combined air carrier and commuter daily departure growth, multiplied by a diversity factor of .65.
2 A single maintenance bay can typically service a fleet of 8-12 motorized GSE units on a single shift basis.
3 Square footage requirements based on 1,280 square feet per bay for bay and support space, added to 15 square feet per GSE unit for storage, plus a 25 percent gross-up factor, which includes some inefficiency in dividing space among tenants.
4 Requirements were calculated based on the draft forecasts and were not updated to reflect the final forecasts.

Source: RIAC, Northstar Aviation, US Airways, and ADS Aviation Maintenance

Currently, T. F. Green has no sheltered areas dedicated to the storage of GSE equipment. All GSE, including off-season GSE, is parked outside in available spaces at the belly cargo building, at the fuel farm, or around the terminal gate areas. The existing and forecast GSE sheltered storage requirements are shown in **Table III.6-5**. There is currently a need for 9,800 square feet of sheltered GSE storage space, which is projected to increase to approximately 18,900 square feet by 2020.

Based upon the above analyses and the final forecasts, there is a combined total need for 45,000 to 50,000 square feet of GSE Maintenance/Garage Storage by 2020.

Table III.6-5
GSE SHELTERED STORAGE REQUIREMENTS
T. F. Green Airport

Cumulative GSE Growth Rate [1]	Off-Season Motorized GSE Units	General Storage GSE Units [2]	Sheltered Storage Requirements [3] (square feet)	Surplus/ (Deficit) (square feet)	Year[4]
-	16	11	9,800	(9,800)	2000
20.8%	20	14	12,300	(12,300)	2005
44.2%	24	16	14,500	(14,500)	2010
68.3%	28	19	17,000	(17,000)	2015
87.8%	31	21	18,900	(18,900)	2020

2000 Sheltered Storage Area: 0 square feet

[1] Growth rate based on gate growth percentage, plus combined air carrier and commuter daily departure growth, multiplied by a diversity factor of .65.
[2] 20 percent of total motorized GSE, less off-season motorized GSE
[3] Square footage requirements based on 350 square feet per off-season GSE unit, added to 300 square feet per general GSE unit, plus a 10 percent gross-up factor for columns, etc. (Note: these calculations do not include areas for roads and landside parking, walks, landscaping, etc.)
[4] Requirements were calculated based on the draft forecasts and were not updated to reflect the final forecasts.

Source: RIAC, Northstar Aviation, US Airways, and ADS Aviation Maintenance

III.6.4 Airfield Maintenance/Snow Removal Equipment (SRE) Facilities

Airfield Maintenance/SRE facilities facilitate the storage and maintenance of airport service vehicles (especially SRE) by providing a warm, sheltered environment for equipment repair and storage. These facilities also protect the airport's investment by shielding equipment and stored materials from moisture and contaminants.

The Airfield Maintenance/SRE facilities at T. F. Green are located off-airport on a 5.5-acre site north of Airport Road and are comprised of four buildings. These buildings and their functions are described in **Table III.6-6**. In addition, RIAC Airfield Maintenance currently occupies the old city of Warwick Fire Station (8,770-square foot facility). They use the facility for storage of SRE equipment as well as for general storage of field materials.

Table III.6-6
EXISTING AIRFIELD MAINTENANCE/SRE FACILITIES
T. F. Green Airport

Facility	Building Area (square feet)	Facility Site (square feet)
Administration Building Offices Administrative Support Facilities Conference Room Personnel Sleeping Quarters Personnel Facilities Field Electrical Maintenance & Storage Records Storage	4,100	-
Sand Storage Shed	1,100	-
Equipment Storage Dome Large SRE & Field Equipment Storage Equipment Accessories Storage Snow Removal Materials Storage	13,900	-
Maintenance Garage Vehicle Maintenance Facilities Maintenance Supplies & Storage Maintenance Offices Personnel Support Facilities Small Field Equipment Storage	4,900	-
Total Maintenance Areas	**24,000**	**245,600**

Source: RIAC Airfield Operations & Facilities

Given the projected increase in operations and the corresponding increase in pavement, additional facilities will be needed over the planning horizon for airfield maintenance and SRE storage. In addition, trade unions sometimes call for separate space for each trade, which can have an impact on the size of future facilities. Senior maintenance staff at T. F. Green were consulted to determine the efficiency and effectiveness of the existing facilities. They indicated that the existing facility is currently undersized in both the overall size of the site and in building area. It lacks appropriate office space, meeting space, personnel support space, sleeping quarters, maintenance space, vehicle storage space, airfield materials storage space, general storage space, etc.

As a result, this facility has been under review by senior airport maintenance staff since 1999, at which time a facility needs assessment was conducted. The results of this facility assessment and subsequent coordination are summarized in **Table III.6-7**.

Senior airfield maintenance staff have determined that a 74,375-square foot building would be sufficient to serve forecast demand at T. F. Green through 2020.

Table III.6-7
AIRFIELD MAINTENANCE/SRE FACILITIES ASSESSMENT
T. F. Green Airport

Building Areas	1999 Assessment (square feet)
Equipment Parking Area	
Large SRE (34 Units)	26,400
Aisle / Maneuvering Space	8,250
Sub-Total	**34,650**
Ancillary Support Areas	
Vehicle Maintenance / Support	8,600
Snow Removal Materials /Maintenance Materials Storage	3,500
Small Equipment Storage	10,000
Field Electrical Maintenance	2,000
Building Support Systems	1,150
Administrative Support	9,625
Center Aisle	3,750
Sub-Total	**38,625**
Sand Storage	1,100
Sub-Total	**1,100**
Total Maintenance/SRE Building Program	**74,375**
Existing Facility	**24,000**
Deficiency	**50,375**

Source: RIAC Airfield Operations & Facilities

As noted above, the facility site is located across a busy, public road from the airport. This requires airfield personnel to wait to access the airfield pending crossing Airport Road at a traffic light. This is both inefficient and dangerous, in that this light has been the scene of numerous accidents and airport vehicles have been struck in the past. It is therefore highly desirable to have this facility located on the airfield itself. As activity levels at the airport increase over the planning period, an on-site location will become essential.

Additionally, the existing 5.5-acre site is undersized for the current level and type of operations being conducted. The size of this particular site will also be a significant constraining factor to the development of a future facility in its sizing, configuration, expandability, efficiency, and ultimate usability. **An eight to ten-acre site having direct access to the airfield would be preferable.**

III.6.5 Northeast and Northwest Ramp Facilities

The Northeast and Northwest Ramps are the locations for five tenants who were not included in the discussion of air cargo and general aviation needs which were discussed in Sections III.4 and III.5, respectively. These tenants and their future facility requirements are as follows:

- P T Aero Service, Inc., located in Hangar # 1, provides aircraft maintenance services primarily for general aviation aircraft. Additionally, they lease some general hangar space for based aircraft. They have approximately 6,500 square feet of administrative, maintenance, and hangar space as well as four tie-down locations immediately adjacent to their facility on the ramp. **P T Aero Service indicated that they currently have adequate space for their maintenance operations.** They project that it would take a 50 percent increase in maintenance operations to require an additional 2,500 square feet of hangar space. Any additional hangar space required for maintenance prior to that time could be acquired by reducing or eliminating their based aircraft hangar rentals.
- RIAC Airfield Maintenance currently occupies the old city of Warwick Fire Station (8,770-square foot facility). They use the facility for storage of SRE equipment as well as for general storage of field materials. **Since the facility needs for this use and equipment have been incorporated into Section III.6.4, *Airfield Maintenance/Snow Removal Equipment Facilities*, the old fire station will not be needed for use by RIAC Airfield Maintenance in the future**.
- The RIAC Airfield Operations Office currently occupies approximately 2,500 square feet on the first floor of the old T. F. Green terminal building on Airport Road. Senior RIAC operations staff have indicated that any future facility demands could be easily accommodated by fully occupying the remainder of the building's first floor and by potentially renovating the second floor for occupancy. **Therefore, no additional space needs to be planned for this function.**
- ADS Aviation Maintenance, Inc., located in Hangar #2, provides general aircraft maintenance services, as well as maintenance services for air carrier GSE. They currently have approximately 11,000 square feet of administrative, maintenance, storage, and hangar space. ADS has indicated that aircraft maintenance has been, and will likely remain, steady. **Therefore, no additional space is needed for aircraft maintenance.**

GSE maintenance has grown significantly over recent years, providing support for eight of T. F. Green's air carriers. Since the GSE inventory for most T. F. Green air carriers is relatively small, it is not cost effective for the carriers to maintain GSE maintenance staff at the station. Many find it to be more efficient to contract ADS for these services. ADS currently has three GSE service "bays" sectioned off in their hangar for this purpose. While projected growth in GSE could indicate an increase in demand for space by ADS, the growth in GSE could also likely lead to a centralized GSE maintenance facility which has been accounted for in Section III.6.3. This would reduce the demand for ADS GSE services. **Therefore, ADS projects no increase in their facility demands above current levels.**

- The RIAC Aeronautics Inspections Office currently occupies all of Hangar #3 on Airport Road. The facility provides an administrative area, general storage, and hangar space for a helicopter and single-engine general aviation aircraft. **RIAC Aeronautics Inspections staff have indicated that the current facility will meet their needs through 2020.**

III.6.6 Aircraft Rescue and Firefighting (ARFF)

The primary responsibility of the ARFF department at T. F. Green is to provide emergency response services to all individuals, aircraft, and facilities on-airport property.

Facilities

The current ARFF station is located northeast of the intersection of Runway 34 and Runway 23L. It houses all airport firefighting equipment, emergency vehicles, as well as all personnel and administrative support facilities. The 12,070-square foot facility was built in 1990 to accommodate a maximum of 18 male firefighters and one supervisor. There are currently 24 firefighters on staff, as well as two supervisors and one administrative assistant. It has been recognized by senior ARFF officials and by RIAC that the existing facility is undersized for most of its current uses and lacks appropriate accommodations for female firefighters, larger ARFF vehicles, ARFF materials storage, and hose drying equipment. As such, in 2001 RIAC endorsed the expansion of the existing ARFF facility and appropriated funding for its design. The proposed sizing requirements for the expansion are described in **Table III.6-8**. **Expanding the existing building to a 60,400-square foot facility would fulfill the spatial requirements for ARFF under existing Part 139 requirements through 2020**.

Table III.6-8
EXISTING ARFF FACILITY REQUIREMENTS
T. F. Green Airport

Facilities	Existing Building Area (square feet)	Existing Building Area Requirements (square feet)
Personnel Facilities Administrative Offices Operations Office Crew Kitchen Crew Dormitory Men's Locker Room/Bathroom Women's Locker Room/Bathroom Crew Training Room Crew Exercise / Weight Training Room Storage Room Building Support Areas	5,300	8,700
Equipment Facilities ARFF Vehicle Storage ARFF Materials Storage (foam/dry chemical) General Storage	6,770 (6 bays)	10,170 (8 bays)
Total Building Area	**12,070**	**18,870**
Facility Site Building Site Ramp / Maneuvering Area Personnel Parking	38,870	60,400
Total Site Area	**38,870**	**60,400**

Source: RIAC ARFF

Vehicles

FAR Part 139, *Certification and Operations: Land Airports Serving Certain Air Carriers, Subpart D – Operations*, outlines the facility requirements for ARFF services at a land airport serving air carriers having a seating capacity of more than 30 seats. Paragraph 139.315 and 139.317 of FAR Part 139 establishes a system of classifying an airport into one of five indexes, which are based on the longest air carrier aircraft with five or more average daily departures at the airport. Each of these indexes has a corresponding ARFF vehicle and equipment requirement to service that category of airport. A summary of the requirements by index is contained in **Table III.6-9**.

Table III.6-9
FAR PART 139.315 & 139.317 ARFF EQUIPMENT REQUIREMENTS
T. F. Green Airport

		Vehicles		Extinguishing Agents [1]	
Airport Index	Length of Aircraft (ft) [2]	Light-Weight	Self-Propelled	Dry Chemicals	Water [3]
A [4]	Under 90	1	0	500 or 450	0
B	90 to 126	1	1	500	1,500
C	126 to 160	1	2	500	3,000
D	160 to 200	1	2	500	4,000
E	Over 200	1	2	500	6,000

[1] The protein-based agents may be substituted for ARFF and the quantities of water shown increased by a factor of 1.5. Dry Chemicals in the ration of 12.7 pounds per gallon of water may be substituted for up to 30 percent of the water specified for ARFF.
[2] Length of largest aircraft providing an average of five scheduled departures per day.
[3] Water for protein foam production
[4] These requirements are part of the total for Indexes B through E pertaining to the lightweight vehicle.
Source: FAR Part 139.317

The longest aircraft group with at least five scheduled departures per day currently is Index C, which includes the B-727-200, the B-757, and the McDonnell Douglas MD-80 series. Based on the forecast fleet mix, T. F. Green will remain Index C throughout the planning period.

A classification of Index C calls for the provision of one lightweight, quick response vehicle and at least two additional self-propelled fire extinguishing vehicles, with the total capacity of 500 pounds of dry chemicals and 3,000 gallons of water. As shown in **Table III.6-10, T. F. Green currently exceeds the ARFF vehicle requirements and will continue to do so through 2020**.

Table III.6-10
ARFF VEHICULAR CAPACITIES FOR EXTINGUISHING AGENTS
T. F. Green Airport

Vehicle	Water (gallons)	Halon (pounds)	AFFF [1] (gallons)	Dry Chemical (pounds)	Discharge (gallons per minute)
Rescue - 301	-	-	-	-	-
Rescue - 302	1,500	-	210	500	300 Bumper 750 / 375 Turret
Rescue - 303	1,500	500	210	-	300 Bumper 1,000 Snozzle
Rescue - 304	-	-	-	-	-
Rescue - 306	3,000	-	400	700	300 Bumper Turret 600 / 1,200 Turret
Rescue - 307	500	-	60	500	250 Bumper
Rescue - 308	-	-	-	-	-
Rescue - 316	3,000	-	410	500	300 Bumper 1,200 Turret
Foam Trailer	-	-	1,000	-	
Medical Trailer	-	-	-	-	-
Total All Stations	**9,500**	**500**	**2,290**	**2,200**	
Index C Requirements	**3,000**			**500**	

[1] Aqueous film forming foam
Source: T. F. Green ARFF staff

Response Time

In addition to the vehicle and equipment requirements stipulated above, FAR Part 139 also identifies operational response time requirements under Paragraph 139.319 (I) which states that:

> *"Within 3 minutes from the time of the alarm, at least one required airport rescue and firefighting vehicle shall reach the midpoint of the farthest runway serving air carrier aircraft from its assigned post, or reach any other specified point of comparable distance on the movement area which is available to air carriers, and begin application of foam, dry chemical or Halon 1212."*

The airport's ARFF facilities are currently in compliance with these FAR Part 139 requirements, based on the following assumptions:

- Use of the shortest travel route, which is to utilize the ARFF access drive to Runway 5R-23L and then travel southwest on the runway until the midpoint is reached
- Twenty-second response time from the sounding of the first alarm to the start of the vehicle
- Thirty seconds for a Class 2 ARFF vehicle to accelerate from a starting point to 50 miles per hour (as specified for Class 2 vehicles in AC 150/5220-10B)
- Average running speed of 50 miles per hour on straight sections
- Average running speed of 30 miles per hour on curved sections
- Fifteen seconds for a Class 2 ARFF vehicle to decelerate from 50 miles per hour to a complete stop (as specified for Class 2 vehicles in AC 150/5220-10B)

Based on the above assumptions, the shortest route is approximately one half mile and takes approximately 70 seconds or 1.17 minutes. **Therefore, the current response time is well within the three-minute response time criterion established under Part 139.** This response time requirement must be revisited once the future layout of the airport is known.

III.6.7 Flight Kitchens

In-flight catering services are provided to air carriers and charters primarily by Galley Services Providence, Inc., which is located in the rear, ground floor section of the shopping plaza on the corner of Post and Airport Road. The services provided by Galley Services include the preparation of meals and snacks, the storage and handling of all meal and beverage supplies, including alcoholic beverages, and the transportation of these services to and from the aircraft. They have access to the airport through T. F. Green's old security fence onto Delivery Drive, whereupon they typically gain access to the field through the old terminal building gate off of Airport Road. Emery's Catering Service is the only other in-flight caterer operating at the airport. They provide catering services only for Delta Airlines.

There are currently no flight kitchen/galley services located on-airport property. However, flight kitchens are often times located on-airport property. The following discussion presents the requirement for flight kitchen facilities in the event there is a need to provide these facilities on-airport property.

There are two planning factors used in establishing future facility requirements for meal services at an airport. The first factor is the meals per passenger ratio, which is the ratio of the number of meals served, as provided by Galley Services Providence, Inc. and Emery's Catering Service, applied to the total number of passenger enplanements in 2000. That ratio is then applied to the forecast for passenger enplanements to determine the total number of meals required for the forecast years. The current meals per passenger ratio is at a relatively low level of 0.14, due primarily to the combination

of Southwest Airlines' high percentage of enplanements at T. F. Green and their lack of meal services. This ratio is projected to remain consistent throughout the planning period due to both Southwest Airlines' continued influence, and the overall trend of airlines serving fewer meals. This assumption was confirmed by Galley Services personnel.

The second factor is the meals per total square feet ratio, which is determined by dividing the number of annual meals by the total square footage being utilized by the flight kitchens. Personnel at Galley Services estimate that they are nearly at 95 percent capacity, with most of their available space being utilized for bulk receiving and storage of supplies. They also note that they have had to "make do" and design their operation to fit in the limited space that they have available. In having to do so, they have unfortunately created cramped, inefficient working conditions. This fact is reflected in a current ratio of meals per total square foot of 28.5, a relatively high number. In order to help remedy these existing, cramped conditions, Galley Services suggested that this ratio be decreased to 22.0 by 2010 to reflect the increased spatial requirements of a larger food preparation operation and bring them more into line with industry standards. This ratio was applied to the total meals required to determine the total square footage required in the future.

The future flight kitchen requirements are presented in **Table III.6-11**. As noted, the total number of annual meals will roughly double by 2020 to 1.5 million meals, requiring approximately 68,900 square feet of total operational area. There currently exists a surplus of 1,400 square feet of flight kitchen operational space. **An additional 8,600 square feet of flight kitchen building area will be required as annual passenger levels approach 6.7 million. By 2020, there will be a deficit of 41,500 square feet. It is anticipated that this requirement will be accommodated at off-airport locations.** These requirements were calculated using the draft forecasts. Based on the final forecasts, the 2005 identified requirements will more likely occur two to three years later. The 2010 projections could shift one to two years and 2015 requirements could shift one year. The 2020 final forecasts were virtually unchanged from the original projections, so the 2020 support facility requirements are valid.

Table III.6-11
IN-FLIGHT CATERING FACILITY REQUIREMENTS
T. F. Green Airport

Annual Enplaned Passengers	Meals per Passenger[1]	Annual Number of Meals Required	Meals per Total Square Feet [2]	Area Required Square Feet	Surplus/ (Deficit) Square Feet	Year[3]
5,430,938	0.14	740,000	28.5	26,000	1,400	2000
6,701,400	0.14	938,200	26.0	36,000	(8,600)	2005
7,997,500	0.14	1,119,700	22.0	50,900	(23,500)	2010
9,307,800	0.14	1,303,000	22.0	59,200	(31,800)	2015
10,822,700	0.14	1,515,200	22.0	68,900	(41,500)	2020

Approximate Area Currently Available:[4] 27,400 square feet

1 2000 ratio is based on actual daily meals (provided by Galley Services Providence and Emery's Catering Services) divided by PMAD enplanements.
2 2000 meals per square feet based on annual meals divided by current facility utilization. Future ratio based on discussions with Galley Services Providence.
3 Requirements were calculated based on the draft forecasts and were not updated to reflect the final forecasts.
4 Includes both Galley Services Providence and Emery's Catering Services.
Source: Galley Services Providence and Emery's Catering Services

III.7 Summary of Facility Requirements

A summary of the facility requirements described in this chapter is shown in **Exhibit III.7-1**. Most of the airport's facilities will require expansion within the 20-year planning horizon.

Additional runway capacity will be needed towards the middle to end of the planning horizon. A 9,500-foot runway will be needed to accommodate the future fleet mix and potential destinations at reasonable payloads. The passenger terminal will require expansion from the existing 22 gates and 352,000-square foot facility to 40 gates and an 800,000-square foot building. Major roadway improvements will be needed within the planning horizon. Only minor curbfront improvements will be needed provided that operating procedures are adjusted. Auto parking requirements are projected to increase by 50 percent over the planning period. The cargo, general aviation facilities, and other support facilities will all require improvements over the planning horizon. The land area required for these facilities is expected to nearly double over the planning period.

The activity levels that trigger expansion are more important than the actual years that are identified in this chapter. In order to provide maximum flexibility for RIAC, **Table III.7-1** summarizes the trigger points that will lead to the need to expand the airport's facilities. It is important to note that as demand patterns, fleet mix, etc. change

Table III.1
T. F. Green Airport

Summary of Trigger Points

Facility	Trigger	Trigger Point (When Major Expansion Triggered)
Airfield		
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	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.
Terminal Area		
Gates	Daily flights	Current activity levels
Terminal Building	Annual passengers	Over 6 million annual passengers - first expansion likely needed in 2005
Landside		
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
Cargo Facilities		
Integrated Cargo Facilities	Freight demand	Establishment of Federal Express sort operations
Belly Cargo Facilities	Belly cargo volume	4,030 tons of belly cargo (first expansion likely needed in 2010)
USPS	Mail volumes	Current volumes
General Aviation Facilities		
General Aviation Facilities	General aviation activity	Not reached
Support Facilities		
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

over time, the activity triggers may also change. However, this table provides order of magnitude planning criteria for RIAC to monitor actual conditions and activity levels at T. F. Green.

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