C. Terminal Area Facility Requirements

This chapter examines terminal area facility needs to determine the type and magnitude of facilities to be ultimately planned and programmed for the Airport. Specific allocations of the type and magnitude of such facilities will be noted as a basis for the recommendations for improvements. Perhaps the most important component of this Terminal Area Plan is the passenger terminal building itself. With the exception of the holdroom expansion and modifications to the checkpoint, ticket counters, and concessions, the existing terminal is basically unchanged since it was originally constructed in 1982. Although these modifications were improvements over the original facilities, some areas do not function optimally.

Developing a terminal facility program begins with examining the adequacy of each existing component to serve current activity. From that basis, forecast changes in activity are applied to develop recommendations for future planning horizons. These recommendations use actual activity and facilities at Grand Junction Regional Airport as a basis, and are the subject of quantitative as well as qualitative analyses. Although some "industry standard" criteria are used, the recommendations for future facilities are based on local conditions and circumstances.

Planning Activity Levels

Because the forecasts in Chapter B project demand over a specific timeframe (i.e. the 20-year planning period) removing the timeframe from the analysis and focusing on an activity level can increase the shelf-life of a future plan. Using Planning Activity Levels instead of specific time-based forecasts provides an appropriate response to a future level of demand even if the forecast of exactly when future demand will materialize is incorrect, and will focus planning decisions on the size and configuration of a terminal. Planning Activity Levels are typically rounded to representative enplanement forecasts rather than focusing on serving a specific demand level for a given year. Based on the selected forecast scenario and the TAF, included in the previous table, the following annual enplanement levels are recommended for terminal planning purposes. The following table entitled *PLANNING ACIVITY LEVELS* also includes the approximate years that the levels correspond to:

Table C1
PLANNING ACTIVITY LEVELS

Level/ Phase	Enplanements	Scenario 1 Corresponding Year	Scenario 3[1] Corresponding Year	FAA TAF Corresponding Year
I	250,000	2017	2015	2015
II	300,000	2025	2024	2020
III	350,000	>2030	2026	2025
IV	400,000	>2030	>2030	2029
V	450,000	>2030	>2030	>2030

Source: *HIRSH ASSOCIATES.*

[1] *Selected Enplanement Forecast*

Planning Activity Levels I through IV correspond approximately with the four forecast intervals (5, 10, 15 and 20 years) of the Selected Enplanement Forecast Scenario (Scenario Three). Planning Activity Level V is slightly higher than the 20-year forecast of the TAF and represents a long-term growth scenario beyond that included in Scenario Three. It is also important to note that 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 area facilities based upon the specific user patterns of a given airport. Forecast peak hour (design hour) passengers are presented in a later section of this chapter.

Aircraft Gate Demands

The number of gates needed to support forecast activity is a critical element in determining the over-all size and configuration of the terminal complex. A "gate" has been defined as an aircraft parking position near the terminal which is used on a daily basis for actively loading and unloading passengers. A gate may have a passenger loading bridge, or be ground loaded.

The existing terminal has notionally 6 gates. There are two gate areas: the original terminal's gates (now numbered #1 and #6); and the expansion's four gates (#2 - 5). Gates #3 and 4 have loading bridges, which are common use for all airlines on a first come-first serve basis. If the gate with a loading bridge is occupied, other aircraft will park at walk-out positions. However, from a practical standpoint, Gates #2/3 is used by Allegiant, American and US Airways. Gate #4 is used for Delta flights, with United as the secondary user. This is due to the location of each airline's gate equipment in the holdrooms and Ground Service Equipment (GSE) on the ramp. United primarily uses Gate #6 for walk-out flights. Gate #1 is seldom used for scheduled flights. Thus, there effectively four gates in use on a regular basis: #3 and 4 with loading bridges, and #2 and 6 as walk-out gates.

Summer and fall airline schedules were analyzed for calendar year 2010. Due to the variation in schedules by Allegiant, Thursdays and Sundays are the busier days in terms of scheduled seats.

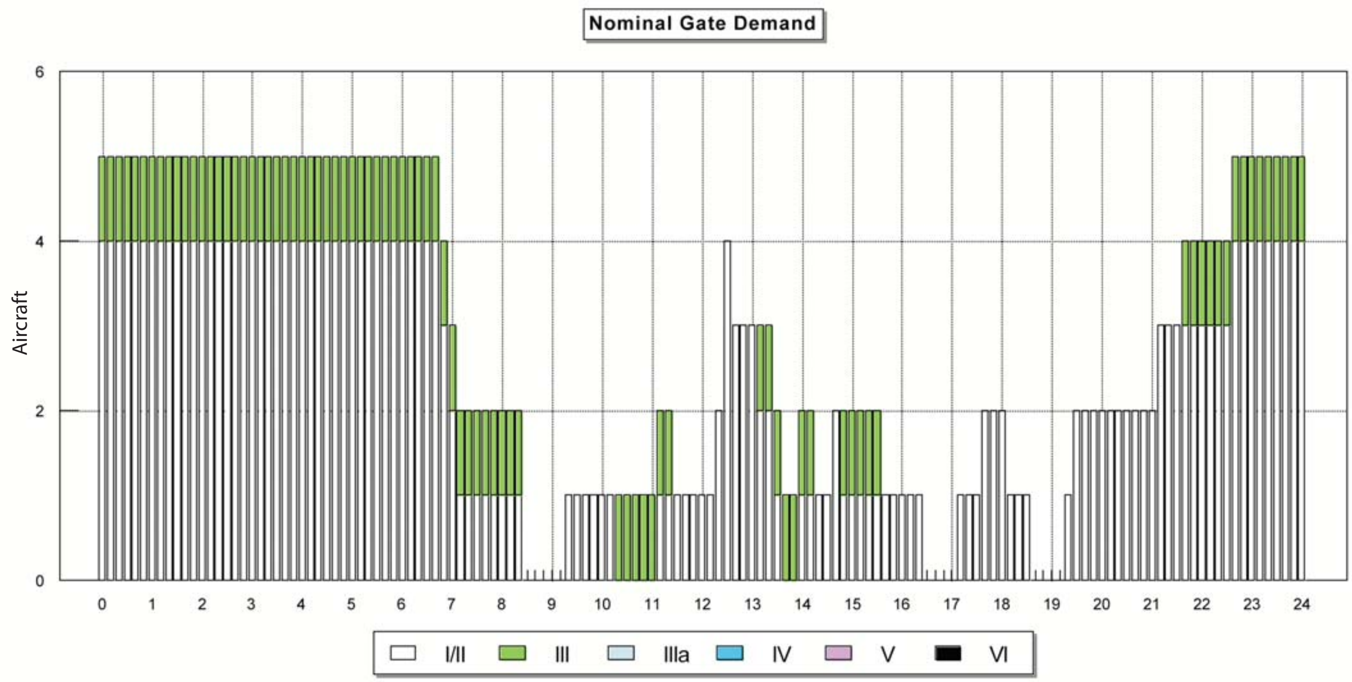
The following figure entitled *TOTAL AIRCRAFT PARKING POSITION DEMAND, INCLUDING RONs* illustrates the number of aircraft parking positions, including Remain-Over-Nights (RONs), required to support the 2010 summer day schedule. A 20 minute buffer time between a scheduled departure and the next arrival is assumed. This shows that the maximum number of aircraft on the ground was five during the overnight period. Of these, four are FAA Airplane Design Group (ADG) II aircraft (wingspans up to 79 feet) which are regional jets (RJs). There was only one ADG III aircraft parked overnight which was a DHC-8 turboprop operated by US Airways.

The following figure entitled *ACTIVE AIRCRAFT GATE DEMAND* illustrates the same schedule, but only for active gates. The assumptions in this analysis are that a RON aircraft requires a gate from 30 minutes before departure time to 30 minutes after arrival. These would be the parameters by which an aircraft may be towed to or from a remote RON parking pad. The peak active gate demand is between 6 and 7 a.m. for three gates, and again at mid-day for four gates. During the fall and summer, Allegiant's flights did not overlap the peaks of the other carriers, but, according to airport staff, that may change and could affect the demand for gates as well as peak hour passengers.

Gate demands have been estimated for each of the forecast planning activity levels. There are a number of methodologies which can be used to project future gate demands. These include ratios of annual passengers per gate, daily flights per gate, and projecting design day schedules. Because design day schedules were not developed for the forecast years, that approach was not used.

Minimum Buffer Time: 20 minutes

RON Parking Positions Included



	I/II	III	IIIa	IV	V	VI	Combined
Maximum Number of Gates:	4	1	0	0	0	0	5
begins at:	0	0					0
Avg. Scheduled Time on Gate:	144	142	NA	NA	NA	NA	134 minutes

Figure C1 **Total Aircraft Parking Position Demand Including RON's**

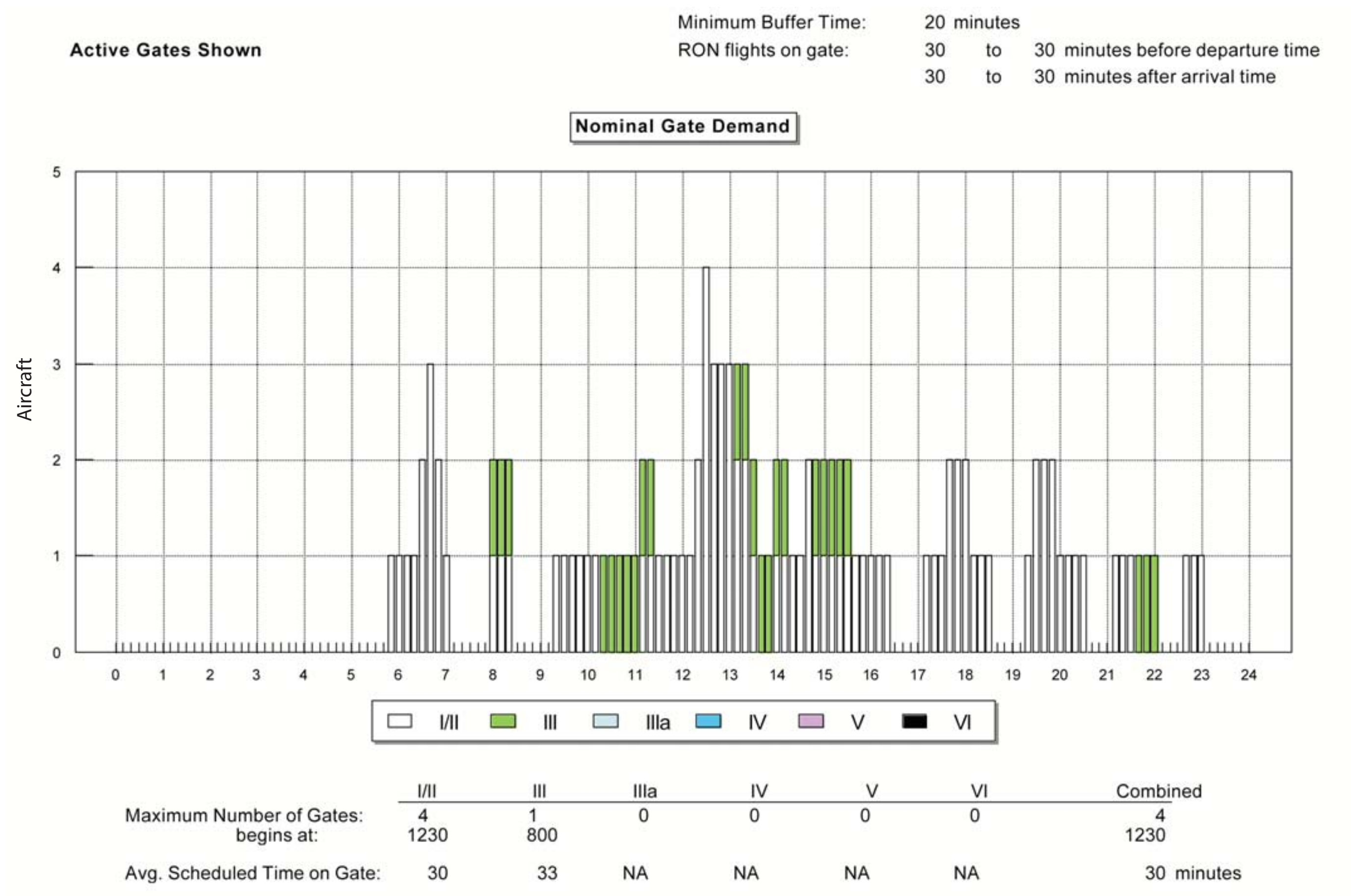


Figure C2 **Active Aircraft Gate Demand**

Annual Passengers per Gate Approach

The first approach shown in the following table entitled *PROJECTED GATE DEMAND – ANNUAL PASSENGERS PER GATE APPROACH*, uses the current ratio of annual passengers per gate, adjusted for forecast changes in fleet mix and annual load factors at each forecast level. This methodology assumes that the pattern of gate utilization will remain relatively stable. The increase in passengers per gate would be due to increases in enplanements per departure (due to fleet seating capacity and/or passenger load factors), as opposed to increasing numbers of departures per gate. Forecasts for annual departures were based on the average enplanements per departure from Forecast Scenario 3 which most closely matched the Planning Activity Levels I through IV. For PAL V, the ratio was increased slightly from PAL IV.

Table C2

PROJECTED GATE DEMAND –ANNUAL PASSENGERS PER GATE APPROACH

	Enplaned Passengers	Departures	Enplaned Passengers per Departure	Enplaned Passengers per Gate	Recommended Gates
2010 (est.)	218,519	5,550	39.4	54,600	4
PAL I	250,000	5,750	43.5	60,300	5
PAL II	300,000	6,800	44.1	61,100	5
PAL III	350,000	7,880	44.4	61,500	6
PAL IV	400,000	8,930	44.8	62,100	7
PAL V	450,000	10,000	45.0	62,400	8

Note: Using Planning Activity Levels (PALs).

The basis for the existing factor is the number of gates in use. As noted previously, the peak demand for active gates in 2010 was four at mid-day. Although the RON demand was five gates, this is not considered to be the determinant for gate demand at most airports.

The ratio of passengers/gate for each forecast year is calculated by multiplying the current (2010) factor by the percentage increase in passengers/operation. For example, the factor would increase from 54,600 enplanements/gate (2010 data) to 60,300 for PAL I, based on enplanements per departure increasing from 39.4 to 43.5 in the near term. This would increase further to 62,400 enplanements/gate by PAL V without any further increase in the number of daily departures per gate.

Future gate requirements were then estimated by dividing annual forecast passengers by the estimated passengers per gate factor for that forecast period. For example, at PAL I, 250,000 enplanements divided by 60,300 enplanements/gate results in a demand for 5 gates. This approach results in a forecast demand for 8 gates by PAL V.

Departures per Gate Approach

The first methodology has as an underlying basis that the pattern of service at GJT is basically stable. While this may be true at many airports and for some airlines at GJT, it is likely that gate utilization will change to some extent for other airlines. This has already been demonstrated at GJT as additional service has been added by existing airlines.

However, if GJT attracts service by airlines not currently serving the Airport, it is likely that these carriers would initially follow scheduling patterns similar to existing carriers. This could result in a demand for more gates during the morning departure peak and/or afternoon (and more RONs), with most likely a reduction in average turns per gate until service to these markets matures.

For this approach it has been assumed that annual gate utilization would increase from current 2010 levels (4.0 departures/gate) through PAL IV. This increase is reasonable given the low existing frequencies to many current markets. It is also reasonable when comparing the average gate utilization to that of a busy day in late 2010 when there were 21 departures for an average of 5.3 departures per gate.

For the Departures per Gate approach, as shown in the following table entitled *PROJECTED GATE DEMAND – DEPARTURES PER GATE APPROACH*, the ratio of annual departures/gate for each forecast year is calculated by multiplying the current (2010) factor by the percentage change in assumed daily departures/gate. For example, the factor would increase from 1,390 departures/gate (2010) to 1,510 for PAL I as average daily departures per gate increase from 4.0 to 4.3.

Table C3
PROJECTED GATE DEMAND –DEPARTURES PER GATE APPROACH

	Enplaned Passengers	Departures	Daily Departures per Gate	Annual Departures per Gate	Recommended Gates
2010 (est.)	218,519	5,550	4.0	1,390	4
PAL I	250,000	5,750	4.3	1,510	4
PAL II	300,000	6,800	4.5	1,580	5
PAL III	350,000	7,880	5.0	1,760	5
PAL IV	400,000	8,930	5.5	1,940	5
PAL V	450,000	10,000	5.5	1,940	6

Note: Using Planning Activity Levels (PALs).

Future gate requirements were then estimated by dividing annual forecast departures by the estimated departures per gate factor for that forecast period. For example, at PAL II, 6,800 departures divided by 1,580 departures/gate results in a demand for 5 gates. This approach results in a forecast demand for 6 gates by PAL V.

Recommended Gates

The results of the gate methodologies are summarized in the following table entitled *PROJECTED GATE DEMAND - SUMMARY*. Airlines would require fewer gates under the Departures/Gate approach.

Typically, from an airport planning perspective, the higher number of gates from the Passengers/Gate approach should be used to preserve a land envelope for terminal development. For financial feasibility, a lower gate demand is typically seen as more reasonable. However, since the differences are small, it is recommended that the higher gate projections be used to provide the Airport and airlines with more flexibility to continue to develop new service.

Table C4
PROJECTED GATE DEMAND – SUMMARY

	Passengers Per Gate Methodology	Departures Per Gate Methodology	Recommended Number of Gates
Existing Gates	---	---	4
PAL I	5	4	5
PAL II	5	5	5
PAL III	6	5	6
PAL IV	7	5	7
PAL V	8	6	8

Note: Using Planning Activity Levels (PALs).

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 airport facilities based upon the specific user patterns of a given airport. 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", (i.e. 7:20-8:19) reflecting airline scheduling patterns.

The Design Hour is typically 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 also has its own distinct peaking characteristics due to differences in airline schedules; business or leisure travel; long or short haul flights; and the mix of mainline jets and regional aircraft. These peaking characteristics determine the size and type of terminal facilities. Thus, two airports with similar numbers of annual passengers may have different terminal requirements, even if the Design Hour passenger volumes are approximately the same.

Existing Activity

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 in Atlanta and Salt Lake City; 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.

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 the hub. 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. As passenger volumes on specific routes increase, the number of flights also tends to increase which can fill in the 'valleys' during the day. Additional flights to cities which can support direct service may also develop, some of which may be in peak periods.

The daily pattern of flight activity and passenger peaking at GJT is typical of spoke activity. Morning departures have flights to all of the major hub destinations served from GJT. In the evening there are corresponding arrivals which serve to position equipment for the next day's departure peak. There is also a mid-day peak for both arrivals and departures. Allegiant's pattern of service does not tend to follow these typical spoke airline patterns. During the busy days of 2010, Allegiant operated in the late morning and early afternoon. These flight times may change in 2011 and begin to overlap more flights to hubs.

Also included in the schedule are flights by Denver Air Connection with two flights most days. This is an unusual operation which uses a check-in counter and offices in the terminal, but parks its aircraft west of the deice pad. Passengers do not require security screening. However, their activity does utilize parking and other terminal facilities so their operation has been included.

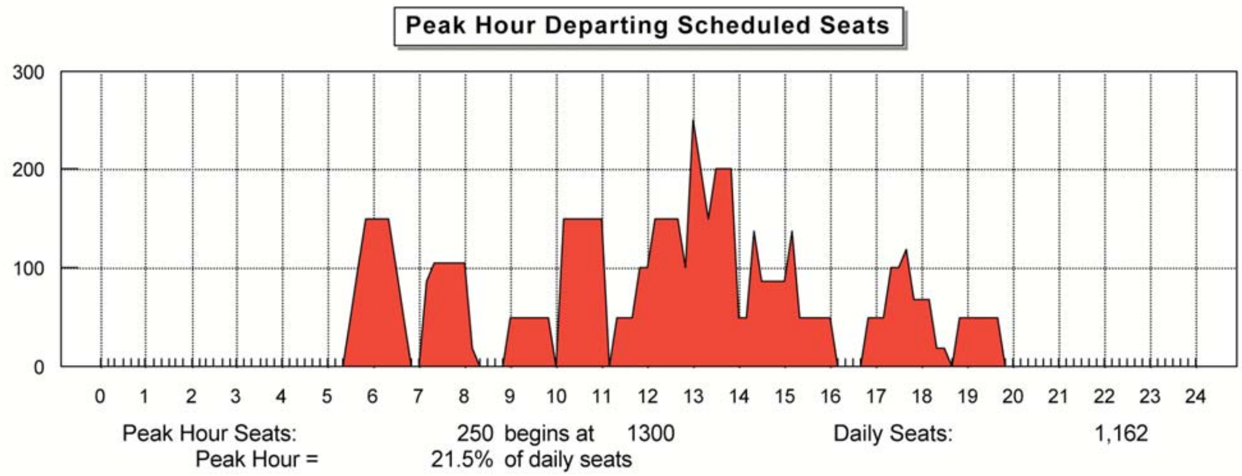
Scheduled seats and flights were analyzed for the busy days in summer and fall of 2010. This reflects days when Allegiant operated. The following scheduling and peaking characteristics were noted:

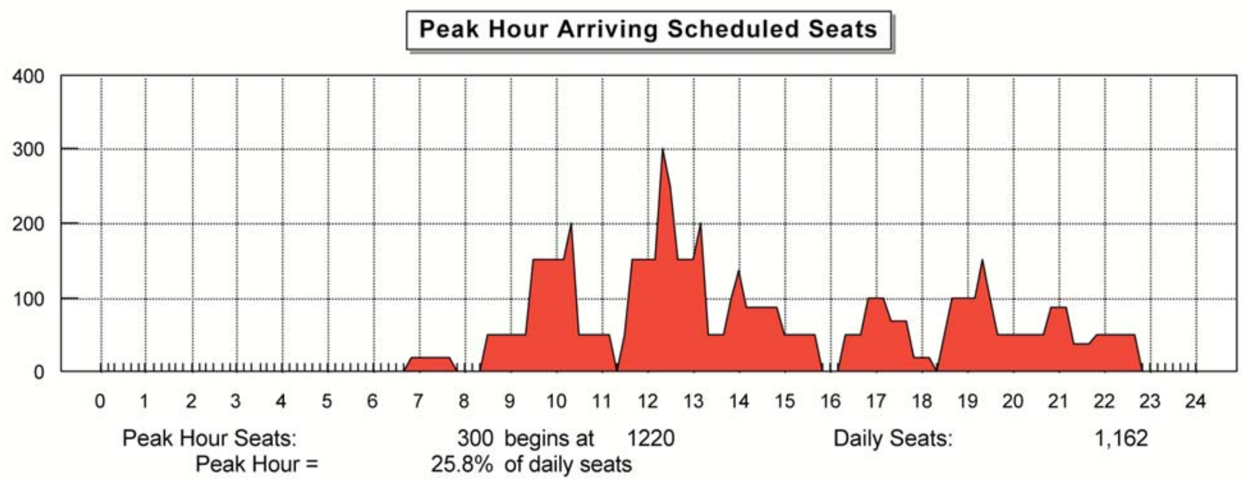
- **Peak Days.** On busy days there were 21 departures with 1,162 seats. Of these, 300 seats are due to two Allegiant flights. Therefore, the busy day has 35% more seating capacity than most other days.
- **Peak Hour Departures.** Peak hour departures consist of three flights. There are peaks for departures at multiple times during the day including two peaks in the morning; mid-

day/early afternoon, late afternoon, and early evening. The early afternoon peaks have the most capacity due to Allegiant's schedule overlapping other carrier's departures.

- **Arrivals.** Arriving flights are more spread out. There was a mid-day arrival peak of four flights, but generally busy hours consist of two to three arrivals. As with departures, the mid-day arrivals peak has the most seat capacity and includes one of the Allegiant flights.

The following figures entitled *ROLLING PEAK HOUR SEATS* and *FLIGHTS BY 30-MINUTE PERIODS* illustrate the characteristics from the busy day schedule. The exhibits show rolling peak hour seats; and flights per half hour.





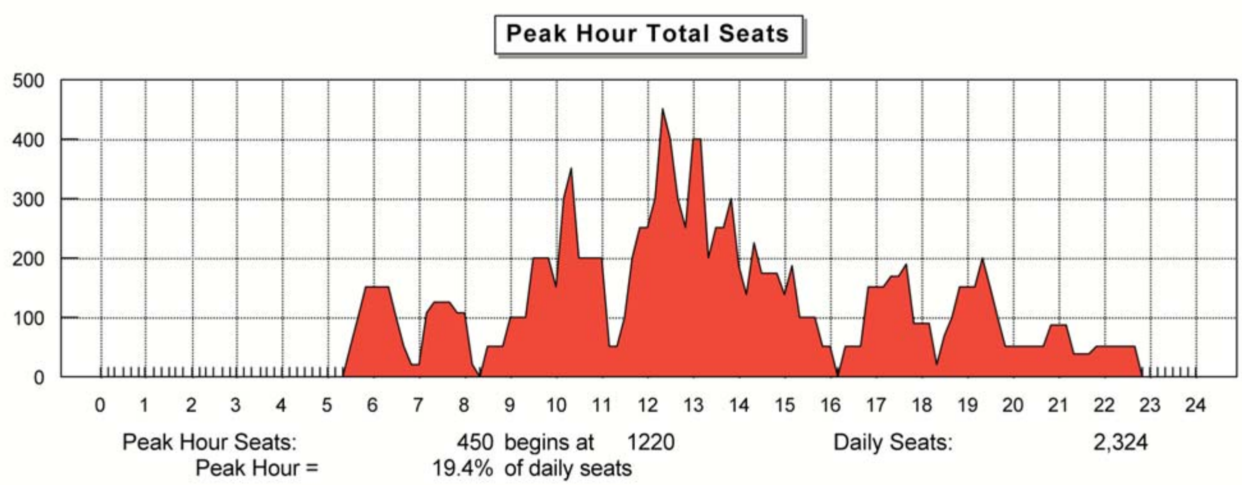


Figure C3 **Rolling Peak Hour Seats**

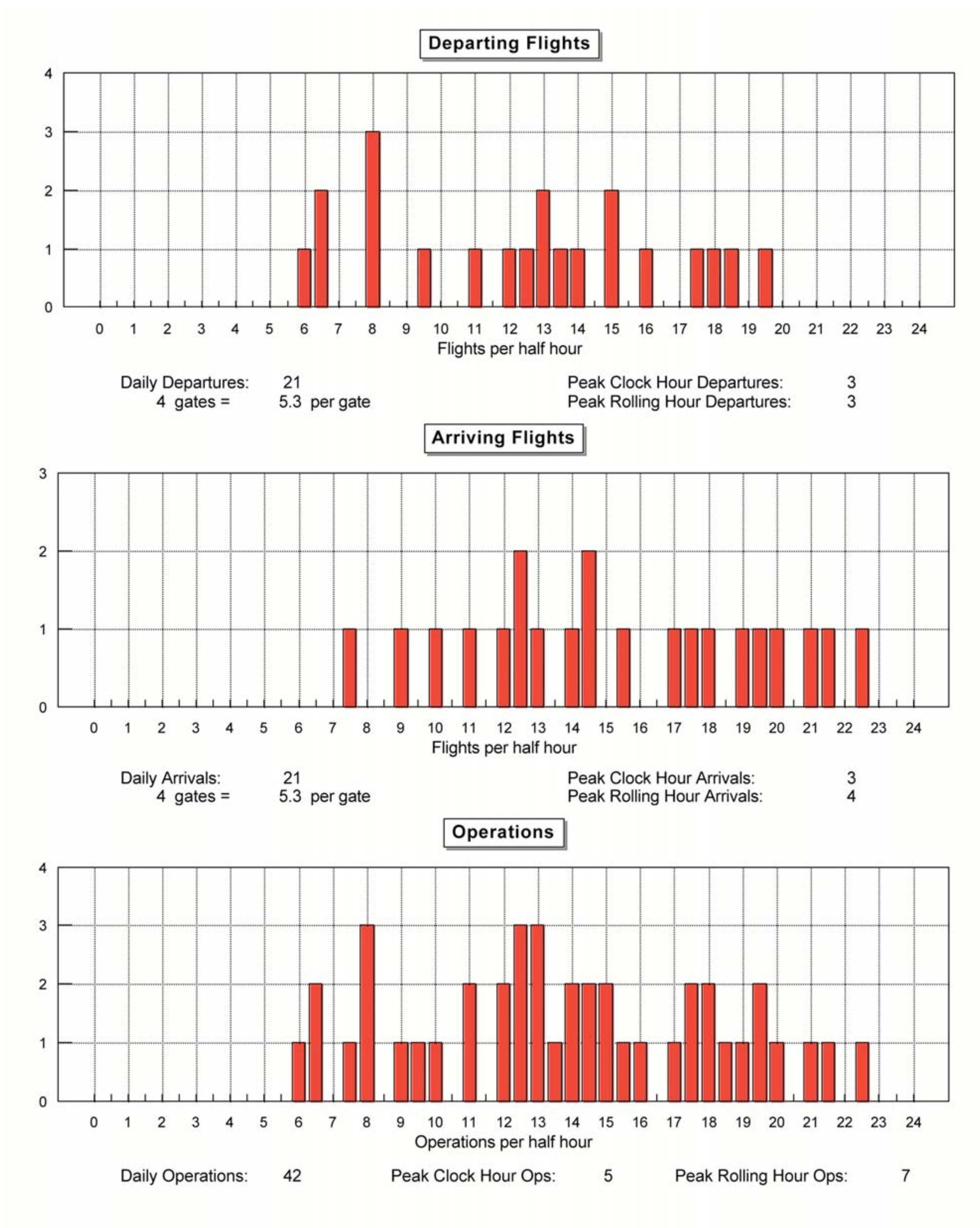


Figure C4 **Flights by 30-Minute Periods**

Projected Design Hour Activity

As noted in the introduction to this section, many terminal facilities are based on Design Hour passengers. At Grand Junction Regional Airport, activity is highest on days when Allegiant operates. Although an average day of the peak month would typically be used for terminal planning, the unusual concentration of activity on these days places unusual stress on terminal facilities. Thus, it is recommended that a Thursday/Sunday be used as the Design Day.

Peak Month Passengers

The peak month has represented between 9.1 percent and 10.4 percent of annual enplanements since 2007. The peak month has varied, occurring in May for 2007 and 2008; July in 2009; and October in 2010, but August and September were almost as busy. Because there is no obvious trend in peak month percentages, an average of the last four years (9.7 percent) has been used for planning.

The forecasts developed for the Terminal Area Plan include different scenarios. As discussed in the beginning of this chapter, Planning Activity Levels will be used to represent reasonable increments of activity growth.

An Average Day would normally be estimated by dividing Peak Month Activity by 31 days. However, since there are additional flights on certain days as well as higher load factors for those flights, the average day enplanements were increased to account for the higher activity.

The Busy Day schedule has 35 percent more departing seats than most other days and 43 percent more seats than Saturdays. Based on this significant change in scheduling and different average load factors for each airline, Design Day enplanements are estimated to be 45 percent greater than average day enplanements. This differential would be expected to be reduced over time, as Allegiant or other carriers add service to approach daily frequencies, but some days are expected to retain a disproportionate share of activity. See the following table entitled *FORECAST DESIGN HOUR PASSENGERS*.

Table C5
FORECAST DESIGN HOUR PASSENGERS

		Planning Activity Level				
	2010	**I**	**II**	**III**	**IV**	**V**
Annual Enplanements	221,826	250,000	300,000	350,000	400,000	450,000
Peak Month Enplanements						
% of Annual Enplanements	9.4%	9.7%	9.7%	9.7%	9.7%	9.7%
Peak Month Enplanements	20,756	24,300	29,100	34,000	38,800	43,700
Avg. Day/Peak Month (31 days)						
Enplaned Passengers	670	780	940	1,100	1,250	1,410
Design Day (Allegiant Operations)						
% Busier than Average Day	45%	40%	25%	15%	15%	15%
Enplaned Passengers	970	1,090	1,180	1,270	1,440	1,620
Design Hour Passengers (percentage of daily activity in the peak hour)[1]						
Enplaned	22.0%	20.9%	20.9%	19.9%	19.9%	19.9%
Deplaned[2]	26.0%	24.7%	24.7%	23.5%	23.5%	23.5%
Total[3]	20.0%	19.0%	19.0%	18.1%	18.1%	18.1%
Peak Hour Passengers						
Enplaned	220	230	250	250	290	320
Deplaned	250	270	290	300	340	380
Total	390	410	450	460	520	580

[1] Some peak percentage reduction anticipated in short term: 5% decrease in peak activity by Level I; hold constant Level II; with a 5% reduction for Level III and later.
[2] Based on daily enplaned passengers.
[3] Total daily passengers assumed to be twice daily enplanements.

Design Hour Passengers

An estimate of the existing peak hour passenger volume as a percentage of daily activity was made based on analyses of scheduled seats and assumptions as to flight load factors on busy days. Allegiant's operations currently set the peaks due to their use of 150 seat aircraft with average 90 percent load factors. This compares to all other airlines operating mostly 50 seat aircraft with a few 37 and 19 seat aircraft.

The enplaning peak hour currently accounts for approximately 22 percent of the daily enplaned passengers. This occurs in early afternoon. As shown in the previous table, the current enplaning design hour is estimated to be 220 passengers. This is equivalent to the Allegiant flight at a 90 percent load factor, plus two 50 seat departures at an 85 percent load factor. New service expected in 2011 will probably increase the early morning peak, but will not likely exceed the Allegiant dominated early afternoon peak. It would, however reduce the Allegiant peak as a percentage of daily activity. It has been assumed that the enplaning peak hour as a percentage of daily activity will decrease by 5 percent in the short range (PAL I & II). As additional service (either frequency or destinations) is added, it would be expected to occur off peak, or in secondary peaks, which would reduce the peak hour factor further. For the medium to long term, the peak hour factor was reduced by an additional 5 percent.

The mid-day deplaning peak hour is also dominated by an Allegiant arrival and accounts for approximately 26 percent of daily arrivals. As with the enplaning peak, new service will likely increase the early evening (7-8 p.m.) secondary arrivals peak, but not exceed any of the hours when Allegiant operates. Similar reductions in the deplaning peak hour factor have been assumed as for the enplaned peak hour factor.

Total peak hour passengers (enplaned plus deplaned) coincide with mid-day activity, and account for approximately 20 percent of daily passengers. This percentage is assumed to decrease over time in the same proportions as enplaned and deplaned peak hours.

Passenger Terminal Facilities Planning Criteria

Terminal facility requirements for an airport (the terminal program) are a function of the specific and unique characteristics of that airport. These include the design levels of passenger and aircraft activity; the number and type of airlines serving the airport; the operating requirements of the airlines; and local factors such as the proportions of leisure vs. business travelers, 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. 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 terminal facilities requirements for GJT has been to review the plans and areas of the terminal, make limited observations of passenger activity, and discuss with airport and airline staff how well the present facilities are functioning. These observations - coupled with calculations of area per passenger, per gate, or other determinant of demand - were compared to generally accepted industry planning factors. From these comparisons, a planning factor for each terminal component was determined and used to project facility requirements.

The program areas developed were based on the utilization of existing facilities, and on projected trends as discussed in the previous chapters. The following table entitled *AIRPORT TERMINAL FACILITIES PLANNING CRITERIA* presents the program data in seven columns:

- **Column 1. Existing Facilities.** These are the areas measured from architectural plans of the terminal, and the current functions as observed.
- **Column 2. Base Year 2010 Activity.** These areas represent the facilities which would be needed to support levels of passenger activity for the base planning year. These values may differ from existing conditions and either point out deficiencies in existing facilities or facilities with excess capacity. These differences help to establish whether existing ratios of space per unit of demand are appropriate to use for planning.
- **Columns 3 through 7. Recommended Facilities - Planning Activity Levels.** These are the areas recommended to support each level of Peak Hour passengers and the associated annual enplanements associated with each Planning Activity Level. The timing of the needed improvements would be based on the actual passenger growth rates.

Table C6

AIRPORT TERMINAL FACILITIES PLANNING CRITERIA

	Existing Facilities	2010 Activity	I	II	III	IV	V	Units
Annual Enplanements		221,826	250,000	300,000	350,000	400,000	450,000	
Design Hour Passengers								
Design Hour Enplaned Passengers		220	230	250	250	290	320	
Design Hour Deplaned Passengers		250	270	290	300	340	380	
Design Hour Total Passengers		390	410	450	460	520	580	
Well-Wishers per Enplaning Passenger		.2	.2	.2	.2	.2	.2	
Meeters/Greeters per Deplaning Passenger		.4	.4	.4	.4	.4	.4	
GATES								
Aircraft Gates:								
Regional (Group II)[1]	3	3	4	3	3	4	4	Gates
Regional (Group III)	-	-	-	1	2	2	3	Gates
Narrowbody (Group III)	1	1	1	1	1	1	1	Gates
Total Gates	4	4	5	5	6	7	8	Gates
Total NBEG	3.1	3.1	3.8	4.1	5.1	5.8	6.8	NBEG
Total EQA	2.2	2.2	2.6	2.7	3.2	3.6	4.1	EQA
Additional RON Parking	3	1	2	2	3	3	3	Gates
Departure Lounges:								
Regional (Group II)	0	3,500	4,600	3,500	3,500	4,600	4,600	SF
Regional (Group III)	0	0	0	1,400	2,800	2,800	4,200	SF
Narrowbody (Group III)	0	2,500	2,500	2,500	2,500	2,500	2,500	SF
Total Departure Lounge Area	6,675	6,000	7,100	7,400	8,800	9,900	11,300	SF
AIRLINE SPACE								
Ticketing/Check-in - Positions								
Total Equivalent Position	28	19	20	22	22	25	28	Pos.
Percentage Using Staffed Positions		75%	75%	50%	50%	40%	40%	
Conventional Staffed Positions	23	14	15	11	11	10	11	Pos.
Percentage Using Kiosks		25%	25%	50%	50%	60%	60%	SF
Self Service Kiosks	5	5	5	11	11	15	17	Kiosks
Linear Positions	24	15	16	18	18	20	22	Pos.

[1] Only 1 existing active loading position has a loading bridge

	Existing Facilities	2010 Activity	I	II	III	IV	V	Units
Ticket/Check-in Counter length	159	90	100	110	110	120	130	LF
Ticket/Check-in Counter Area	1,590	900	1,000	1,100	1,100	1,200	1,300	SF
ATO Offices	5,140	2,300	2,500	2,800	2,800	3,000	3,300	SF
Airline Operations	Inc. in ATO Offices	3,300	3,900	4,100	4,800	5,400	6,200	SF
Baggage Make-up								
Estimated Make-up capacity	14	10	12	12	14	16	18	Carts
Baggage Make-up area	3,040	5,000	6,000	6,000	7,000	8,000	9,000	SF
Checked Baggage EDS – units	4	3	3	3	3	3	4	Units
Checked Baggage EDS - area	1,590	1,500	1,500	1,500	1,500	1,500	2,000	SF
Baggage Claim:								
Claim Frontage Required	-	130	140	150	160	180	200	LF
Claim Units	2	1	2	2	2	2	2	Units
Claim Frontage Programmed	160	120	240	240	240	240	240	LF
Claim Area	3,760	6,600	7,200	7,200	7,200	7,200	7,200	SF
Oversized Baggage	45	200	200	200	200	200	200	SF
Baggage Service Offices/Storage	0	300	300	300	300	300	400	SF
Baggage Claim Off-Load Area	0	1,500	3,000	3,000	3,000	3,000	3,000	SF
Baggage Train Circulation	0	700	900	900	1,000	1,100	1,200	SF
Subtotal	*15,165*	*19,300*	*26,500*	*27,100*	*28,900*	*30,900*	33,800	SF
CONCESSIONS								
Secure Concessions								
Food/Beverage	1,050	1,500	1,700	2,000	2,400	2,700	3,000	SF
News/Gift/Retail	483	600	700	800	900	1,100	1,200	SF
Subtotal – Secure Concessions	1,533	2,100	2,400	2,800	3,300	3,800	4,200	SF
Non-Secure Concessions								
Food/Beverage	445	200	200	200	300	300	300	SF
News/Gift/Retail	0	100	100	100	100	100	100	SF
Subtotal – Non-Secure Concessions	445	300	300	300	400	400	400	SF
Other Services	270	300	300	400	400	500	500	SF
Concession Support Area	532	700	800	900	1,100	1,300	1,400	SF
Rental Car Counter – length	80	80	100	100	100	100	100	SF
Rental Car Lease Area	2,512	1,600	2,000	2,000	2,000	2,000	2,000	SF
Ground Transportation Services	0	100	100	100	100	100	100	SF
Subtotal	*5,292*	*5,100*	*5,900*	*6,500*	*7,300*	*8,100*	8,600	SF
PUBLIC SPACE								

Ticket Lobby	4,373	4,500	5,000	5,500	5,500	6,000	6,500	SF
	Existing Facilities	**2010 Activity**	**I**	**II**	**III**	**IV**	**V**	**Units**
Public Seating/Waiting Area	2,998	2,100	2,200	2,400	2,500	2,800	3,100	SF
RAC Queue Area	800	800	1,000	1,000	1,000	1,000	1,000	SF
Restrooms- Terminal Locations	1,084	1,100	1,100	1,300	1,300	1,500	1,600	SF
Other Public Circulation	13,868	10,000	12,200	12,900	14,000	15,700	17,000	SF
Subtotal – Non-Secure Circulation	23,123	18,500	21,500	23,100	24,300	27,000	29,200	SF
Restrooms – Secure Locations	1,199	1,800	1,800	1,800	1,800	1,800	1,800	Units
Secure Circulation	5,550	5,100	6,300	6,800	8,400	9,600	11,300	SF
Security Screening lanes	2	2	2	2	2	3	3	SF
Checkpoint/search/queue area	2,250	3,400	3,400	3,400	3,400	5,100	5,100	SF
Subtotal – Secure Circulation	*9,000*	*10,300*	*11,500*	*12,000*	*13,600*	*16,500*	18,200	SF
Subtotal	*32,123*	*28,800*	*33,000*	*35,100*	*37,900*	*43,500*	47,400	SF
OTHER AREAS								
Information Counter	50	50	50	50	50	50	50	SF
Airport Administration/Operations	4,472	9,000	0	0	0	0	0	SF
TSA Offices	3,871	1,800	1,800	1,800	1,800	2,100	2,500	SF
Loading Docks and Receiving	213	500	500	500	500	500	500	SF
Non-Public Circulation	2,824	2,700	2,100	2,200	2,400	2,700	3,000	SF
Subtotal	*11,430*	*14,100*	*4,500*	*4,600*	*4,800*	*5,400*	6,100	SF
Total Functional Area	**70,685**	**73,300**	**77,000**	**80,700**	**87,700**	**97,800**	**107,200**	**SF**
Mechanical/Electrical/Utility	3,243	7,300	7,700	8,100	8,800	9,800	10,700	SF
Janitorial/Storage/Shops	913	2,200	2,300	2,400	2,600	2,900	3,200	SF
Structure/Non-Net Areas	2,629	2,500	2,600	2,700	3,000	3,300	3,600	SF
Total Terminal Gross Area	**77,470**	**85,300**	**89,600**	**93,900**	**102,100**	**113,800**	**124,700**	**SF**
Gross Terminal Area per Gate	19,400	21,300	19,900	18,800	17,000	16,300	15,600	SF/gate
Revenue Area: (Airlines, Concessions & Other Tenants)	38.0%	36.0%	44.4%	44.0%	44.4%	43.5%	43.5%	
Non-Revenue Area	62.0%	64.0%	55.6%	56.0%	55.6%	56.5%	56.5%	

Source: *HIRSH ASSOCIATES.*

Notes: *SF – Square Foot. LF – Linear Foot. NBEG – Narrow Body Equivalent Gate. RON – Remain Overnight Parking. EQA – Equivalent Aircraft.*

It should be noted that the terminal space program represents a starting point for terminal planning. It is generally considered a minimum program which is needed to support the design hour levels of passenger activity. As such, it does not refer to any specific terminal concept or gate configuration. When a final terminal concept is chosen, the gross terminal area may differ from the square foot total presented in the tables. For example, the amount of secure and non-secure circulation may vary from the program due to the terminal configuration and location of the security checkpoint, whereas the amount of airline space is relatively independent of the concept selected.

Comparisons between airports, or between alternative concepts, 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, Hirsh Associates 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 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 (ADG) used to define runway/taxiway dimensional criteria have been used to classify the aircraft. Group IIIa has been added to more accurately reflect the B757 which has a wider wingspan than ADG III but is substantially less than a typical ADG IV aircraft.

Table C7

NARROW BODY EQUIVALENT GATE (NBEG) INDEX

FAA Airplane Design Group	Maximum Wingspan	Typical Aircraft	NBEG Index
I. Small Commuter	49 feet	Metro	0.4
II. Medium Commuter	79 feet	SF340/CRJ	0.7
III. Narrow Body/Large Commuter	113 feet	A320/B737/MD-80/ATR	1.0
IIIa. Boeing 757	125 feet	B757	1.1
IV. Wide Body	171 feet	DC-10/MD-11/B767	1.5
V. Jumbo	214 feet	B747/A330/A340/B777	1.9

Source: *HIRSH ASSOCIATES.*

In developing terminal facilities requirements, the apron frontage of the terminal, as expressed in NBEG is a good determinant for some facilities, such as secure circulation. Different terminal concepts can also be more easily to be compared by normalizing different gate mixes.

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. In order to have a relationship with the physical parameters associated with the NBEG, the basis of EQA is also a ADG III narrowbody jet. Most 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 is based on the largest aircraft and seating configuration typically in use:

Table C8

EQUIVALENT AIRCRAFT (EQA) INDEX

FAA Airplane Design Group	Typical Seats	Typical Aircraft	EQA Index
I. Small Commuter	25	Metro	0.2
II. Medium Commuter	50	SF340/CRJ	0.4
III. Large Commuter	50	ATR/DASH 8	0.4
III. Narrow Body	145	A320/B737/MD-80/ATR	1.0
IIIa. Boeing 757	185	B757	1.3
IV. Wide Body	280	DC-10/MD-11/B767	1.9
V. Jumbo	400	B747/A330/A340/B777	2.8

Source: *HIRSH ASSOCIATES.*

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

In the following program analysis, peak hour passengers, NBEG and EQA have been used as appropriate to estimate the demand for terminal facilities.

Aircraft Gates and Departure Lounges

The previous discussion of the methodology used to project the demands for aircraft gate positions were for nominal gates. The total number of gates must be converted to a gate mix to develop a terminal Program.

Gate Mix. Only two of the existing gates have loading bridges. One of these gates can accommodate a narrowbody (MD80), and both can service regional jets. The other active parking positions are walk-out gates. Thus, although the current demand for four active gates can be met, the level of service provided by the two walkout gates is substantially less than the others which have loading bridges. It is the intention of the Airport to provide loading bridges for all gates, including turboprops which would have push-back operations.

Grand Junction is considered to be primarily a regional aircraft airport. One full sized narrowbody gate has been assumed through the planning period, primarily to accommodate Allegiant or similar flights. Most of the remaining gates would be for ADG II regional jets ranging from 50 to 70 seats. Over time, it is likely that some larger 90 seat ADG III regional jets could replace smaller aircraft on busier routes or for longer range routes.

Remain Overnight (RON) Aircraft Parking. In addition to active gates, parking needs to be provided for additional RON aircraft. During the Summer of 2010 period there were five aircraft on the ground overnight, as compared to the four active gates. This is a typical pattern at spoke airports. New service anticipated in 2011 would likely require an additional RON position. In the longer term, it is expected that the number of RON positions increase slowly based on individual airline scheduling practices and fleet allocation.

Grand Junction also serves as a diversion airport for some airports in western Colorado and occasionally for Denver International Airport. This requires additional aircraft parking positions which should be reflected in the terminal area planning but are not included in the terminal Program. These aircraft are currently parked on the terminal apron, cargo apron, and along the apron edge taxilane as required.

Departure Lounges. Departure Lounges, or Holdrooms, 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 dependent on the Level of Service (LOS) which the Airport wishes to provide. The LOS is based on the aircraft load factor, the percentage of passengers seated vs. standing, and the average area per seated or standing passenger.

It was noted in the *Background Information and Inventories* chapter that the holdrooms in the main part of the terminal have irregular configurations, and are shallow in the gate expansion area. The existing area per seat would imply a high LOS, but this assumes that the holdroom areas are fully usable for seating and other functions, which they are not. In addition, the seating units - while large and comfortable - do not provide a large number of usable seats for passengers. Finally, the distribution of holdroom seating is not good relative to the gates. For example, the large holdroom area at Gate #1 is seldom used for departures, while the largest capacity aircraft (Allegiant's MD-80) uses Gate #3 which has a much smaller holdroom.

Typically holdrooms are planned for 80 percent aircraft loads with 50 percent of passengers seated and 50 percent standing. This is considered LOS C. For GJT a higher load factor is recommended (90 percent) and a ratio of 80 percent seated and 20 percent standing (LOS B). The difference in gross area is relatively small for gates primarily serving regional aircraft and would provide a LOS more in keeping with the Airport's image.

A 180 SF (6-foot wide) deplaning corridor has been added to the lounge area which assumes an average 30-foot deep holdroom. The corridor effectively acts as an extension of the loading bridge or apron door. Each ticket lift podium position is allocated 5 feet for width, although many airlines use 3-4-foot wide positions. The depth of the podium and back wall is typically 8 feet and a 15 feet deep queuing area is provided.

The average aircraft seating capacities and holdroom sizes are:

	Seats	Area (SF)
Regional - ADG II	70	1,150
Regional - ADG III	90	1,400
Narrowbody	165	2,500

The narrowbody holdroom was increased in size to reflect reported planned seating changes for Allegiant's aircraft. The current amount of holdroom area exceeds the gross area that would be programmed, but due to multiple gate podiums at some gates; and the low utilization of Gate 6, holdrooms are actually considered undersized for the four active gates.

Airline Space

Airline space includes both exclusive leased areas (for example offices and operations), and joint use space (such as baggage claims). The airlines serving GJT were contacted to determine how well the terminal was functioning, and requested to provide their individual estimates of future facilities. Limited responses were received.

At GJT, there are four Airport Ticket Office (ATO) areas of equal size. Each "ATO" includes a six position check-in counter, office/operations space, and baggage make-up area. As of the end of 2010 the usage of the ATOs was as follows:

- **ATO #1 - Vacant.** The Airport was in the process of renovating this area (formally occupied by US Airways).
- **ATO #2 - American (AA) and Allegiant (G4).** AA uses most of the offices and operations spaces. G4 uses one office. The two carriers share the bag make-up area.
- **ATO #3 – SkyWest.** SkyWest which operates flights for both Delta (DL) and United (UA).
- **ATO #4 - Denver Express (DX), US Airways (US) and SkyWest.** SkyWest leases one office in this area (for their station manager) and two of the ATO counter positions which are currently not in use. SkyWest also uses it's half of the bag make-up area primarily for ground service equipment maintenance. Due to the unusual operations of DX, they do not use the bag make-up area.

Each airline group has configured their spaces slightly differently, and functions such as airline offices and operations are not easily distinguished in many cases. For the Program, recommended facilities for each function have been developed separately.

Airline Ticketing/Check-In Counter (ATO Counter). The ATO counter traditionally has consisted of staffed agent positions. As airlines provide more self-service kiosks, the definition and configuration of check-in function has, and will continue to change. In order to estimate future ATO requirements, staffed positions and kiosks were combined as Total Equivalent Check-in Positions (ECP).

Ticketing/check-in positions are typically based on the number of peak hour enplaning passengers; the number of peak departing flights; the number of airlines; the time distribution of passengers arriving at the terminal; and the percentage of passengers checking in at the ticket counter vs. curbside check-in or using a self-service kiosk. Most of this information was not directly available and has been estimated for GJT. A planning factor was developed which reflects these characteristics, current ATO counter utilization (not necessarily leased positions), and understood excesses and shortfalls.

The existing airlines are using a combination of 14 conventional staffed ATO counters and five electronic self-service kiosks. One of the kiosks (American) is located in-line with the ticket counter and effectively replaces a staffed position. The other four kiosks (Delta) are in within the check-in queue but close to the ATO counter for power and communications. There are an additional nine check-in positions which are presently vacant. Thus, the current ECP demand is 14 conventional positions plus 5 kiosks, or 19 ECP. The current ratio of Design Hour Enplaned Passengers per ECP was held constant for the forecast years and applied to the forecast passengers.

From the number of kiosks in use and market shares of airlines using kiosks, it is assumed that 75 percent of the passengers currently use conventional check-in counters, and that only 25 percent use kiosks. Based on industry trends, the percentage of kiosk use is expected to increase in the future to between 50 and 60 percent. This assumes that some additional airlines will make the investment in kiosks at GJT.

The number of forecast ECPs was converted to conventional linear positions to establish the length of the ATO counter. Locations for kiosks are a combination of airline preference and the physical constraints of the ticket lobby. At present, kiosk locations at limited to being adjacent to the ATO counter due to lack of power and communications elsewhere in the ticket lobby. Most of the airlines interviewed at GJT expressed an interest in locating some kiosks in other locations. For planning, it has been assumed that 80 percent of the kiosks will be in-line with the ATO counter, and that 20 percent would be located away from the counter.

Most domestic carriers can use a 6-foot double counter plus a shared 30-inch bag well for an average of 4.25 feet per agent. There are also breaks in the ATO counter to allow personnel access to individual ATO office areas, and end counters typically without bag wells. This increases the average ATO counter length for planning to typically 5.5 LF per position. The existing double ATO counters are approximately 9 feet wide, and with breaks in the counter for every airline ATO module, the average is 6.6 LF per position. For planning, a ratio of 6 LF per position has been assumed. The width of an in-line kiosk can be less than that of a staffed counter, but is highly dependent on individual airlines' equipment. For planning, all in-line positions are assumed to require the same width.

The ATO counter depth is typically 10 feet from face of counter to back wall for domestic terminals to provide space for the counter, agent work space, and a baggage conveyor parallel to the counter. At present, the depth is 20 feet to allow for the CT-80 baggage screening equipment located at the check-in counters. For planning, a conventional 10-foot deep counter area has been assumed. Area for checked baggage screening has been estimated separately to allow for different checked baggage screening options in the future (see following section entitled Checked Baggage Screening).

Airline Offices. Airline Offices include the ATO offices and other airline administrative spaces. At most airports the ATO offices are located immediately behind, or adjacent to the ATO counter to provide support functions for the ticket agents. Typically these are 25-30 feet deep along the length of the counter. Other offices may include functions such as the airline station manager. 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.

As noted previously, all offices are located directly behind the ATO counter and include airline operations spaces. For the Program, a 25-foot deep office area has been assumed behind the ATO counter. Operations spaces are estimated separately.

Airline Operations. Operations include all of the 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. Because many airlines do not identify their specific space requirements at this stage of planning and future airlines cannot be identified, a program area for operations is typically based on the number/size of gates and airlines at an airport.

At present, the airlines at GJT are leasing approximately 4,330 SF of combined offices and operations spaces behind the ATO counters. The presence of personnel lockers and other types of storage in the baggage make-up area indicates that operations areas may be undersized for current airline operations. Based on discussions with some of the airlines and Airport staff this amount of space is all that is considered necessary by the present carriers. For planning, however, a slightly higher, more typical small airport ratio of operations space per gate has been assumed.

Baggage Make-Up. Baggage make-up includes the make-up units, the cart loading areas and baggage tug/cart (baggage train) maneuvering lanes. Each of the ATO modules has a single baggage make-up belt which can typically stage two bag carts parallel to the belt. In most cases the configuration of the operations/office spaces allows for a second row of bag carts to be staged if necessary. The make-up areas have dual roll-up doors which allow both rows of carts to be pulled straight out by tugs, but empty carts typically have to be positioned by hand. Most of the airlines also use the make-up area for ground service equipment (GSE) storage at night.

Although checked baggage ratios are a consideration, these generally affect the total number of baggage carts in use rather than the size of the make-up area. The number of carts staged at any one time, however, are generally based on the size of the aircraft and the number of departures within a check-in period - typically 2 hours for domestic flights. Using EQA provides a consistent basis for baggage system planning, since larger aircraft typically require more bag cart staging area than smaller aircraft. The number of staged carts is also a function of individual airline policies for pre-sorting baggage at the spoke airport for more efficient transfer at their hub.

For an airport like GJT which serves primarily smaller regional aircraft, the number of carts is typically one or two for each flight depending on the season. Two cart positions for each flight have been assumed with the morning departure peaks defining the number of flights expected in the make-up process. The program area would be able to continue to accommodate individual make-up units for each airline with increased space for cart maneuvering.

Checked Baggage Screening. As a result of the Aviation and Transportation Security Act, all checked baggage is subject to screening for explosives. Each of the ATO modules has a CT-80 explosive detection system (EDS) located directly behind the check-in counters with a direct feed to the baggage make-up belt. Each CT-80 also requires a separate inspection table and associated explosives trace detection (ETD) unit for bags that alarm in the EDS unit. This arrangement is simple in configuration but requires sharing space with airline check-in personnel which can cause some operational issues.

For planning, it has been assumed that passengers will check 1.0 bag per passenger and that each EDS unit has the capacity to process 100 bags/hour based on current equipment. This implies that the existing EDS units will be adequate through the planning period, but additional area should be provided for each unit to resolve operational conflicts. In a new terminal, the Transportation Security Administration (TSA) may advocate a consolidated checked baggage inspection system (CBIS) using fewer, but higher capacity EDS units to reduce TSA staffing requirements. This type of system would require more floor area and a more complex bag conveyor system. Such as system has not been assumed at this time due to the Airport's and airlines' preferences for simple, individual bag make-up systems.

Baggage Claim. As baggage claim requirements are based primarily on design hour deplaned passengers, the concentration of these arriving passengers within a 20 minute time period, and - to a lesser extent - checked bag per passenger ratios. Observations at most 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. At an airport such as GJT, virtually 100 percent of the passengers are waiting prior to first bag delivery. The result is that the claim unit 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.

An analysis of the schedules indicates that during the peak hour, the concentration of arriving seats within a peak 20 minute period is 50 percent of peak hour seats. This is a typical percentage given the scheduling patterns at GJT. The percentage of passengers who have checked baggage is estimated at 80 percent during the peak months.

Each of the two baggage claim units has 80 linear feet of claim frontage. This size is adequate for the 50 seat regional jets which are used by the majority of airlines at GJT. Under most circumstances, these would be too small for 150 seat narrowbody equipment such as operated by Allegiant. It was reported, however, that even with Allegiant's high load factors, the claim units are of an acceptable size since the percentage of passengers with checked bags is relatively low.

For the longer term, larger (120 linear foot) claim units are recommended to be able to accommodate multiple flight arrivals by the regional jets, especially as their seating capacity grows. This would also be more suitable for narrowbody aircraft with more typical checked bag ratios. The baggage claim area is recommended to be 30 SF per foot of frontage to provide adequate queuing and circulation space with flat plate claim units. The existing 30-foot separation between adjacent claim units is adequate.

An allowance for oversized baggage delivery has been included. The oversized baggage slide is of adequate size for skis and other large checked items. However, the proximity to the claim units limits the ability of passengers to fully access the claim units. The Program includes a larger area for oversized baggage to provide adequate separation and passenger circulation from the claim units.

Baggage Service Offices. Baggage service offices are typically required only by airlines with sufficient activity to warrant staffing. Other airlines may use baggage lock-up areas to store late or unclaimed baggage. None of the airlines presently have a bag service office, although there are some un-used counters at the claim area. All late bags are presently stored in the ATO offices. Discussions with the airlines indicate that baggage storage lockers or individual rooms would be desirable, but not staffed offices.

Baggage Claim Off-Load. Baggage off-load includes: the portion of a flat plate, direct feed claim unit upon which the bags are placed; the adjacent baggage train lane and work area; and a by-pass lane for baggage trains. The existing off-load area is outside the terminal building. One of the claim units has limited weather protection (only the actual belt is covered), with poor lighting and ramp apron drainage problems. This leads to icing conditions in winter where the airline personnel unload the bag carts. The second claim unit is under cover from the second floor of the terminal, but also has poor lighting. The addition of wind barriers to both claim units has limited the unload frontage to that of a single bag cart at each. When multiple arrivals occur, only one flight can unload at each claim and baggage delivery has been delayed.

The program area assumes that the off-load areas would be enclosed with adequate unloading frontage for each claim unit.

Baggage Train Circulation. A percentage of baggage handling space for baggage train circulation around and between the bag make-up and off-load areas is included for planning. Ten percent has been included but the final configuration of the terminal may require more or less space.

Concessions

Terminal concessions include all of the commercial, revenue-producing functions which serve the traveling public. At the present time, approximately 80 percent of the food/beverage and retail merchandise concessions are located in the secure area of the terminal. The only major non-secure concession is part of the Subway food/beverage concession. For most airports it is recommended that 85-90 percent of concessions be on the secure side of the terminal, so GJT is close to the typical ratio. A 90 percent secure ratio has been assumed for planning.

Food and Beverage Services. Food and beverage concessions presently consist of a Subway restaurant. The main portion is in the secure area, with a smaller section prior to security. Both locations share a common support area. The Subways have liquor licenses, but Colorado law prohibits drinks from being taken outside the railed seating areas. This has led to overcrowding in the secure F/B area, and possibly reduced sales. The planning ratio (in terms of square feet per 1,000 annual enplanements) has been increased approximately 10 percent over the existing ratio.

News/Gift/Specialty. This category includes news, gift, retail, and specialty shops. There is a single news/gift shop in the secure area of the terminal. The planning ratio has been increased to provide a larger retail space in the secure area and accommodate the possibility of a small non-secure news stand operation, possibly in association with the non-secure food/beverage operation, or a vending operation.

Other Services. This category usually includes ATMs, vending, arcades, and other services. The terminal has one small vending/arcade area near the baggage claim. A similar planning ratio has been assumed for these services in the future.

Concession Support. Concession support consists of storage areas, preparation kitchens, employee lockers and administrative offices. The food/beverage support is primarily the adjacent kitchen and prep areas. A small storage room for the food/beverage has been located within the ATO #2 office/operations area. There is no remote storage for the news/gift shop.

Existing concession support space is limited, and all concessionaires have shortages of on-site storage. This is especially acute due to need for screening deliveries prior to being moved into secure areas of the terminal. For Programming, 30 percent of the customer-serving areas have been used for concession support.

Rental Car Counters. There are six rental car (RAC) brands operating on airport. Enterprise and Hertz have individual counters. Avis/Budget and Alamo/National share counters and offices due to common corporate ownership. Based on discussions with the Airport, there is interest from additional RAC companies to locate on-airport. The length of the RAC counters has been increased in the future to accommodate eight companies.

The RAC companies report that their offices may be oversized. This is consistent with comparisons to other small airport RAC offices, therefore a lower ratio of office/counter area per linear foot of counter has been used for planning.

Ground Transportation Services. There are no permanent counters for ground transportation services, other than a hotel/information kiosk. For planning, it is recommended that space be provided for other transportation services in the future.

Public Spaces

Public spaces include most of the non-revenue producing areas of the terminal including queuing areas, seating and waiting areas, restrooms, and circulation. Some of the public space elements are directly related to peak hour passenger volumes, whereas others are functions of other facility requirements.

Ticket Lobby. The ticket lobby includes ticket counter (ATO) queuing area, self-service kiosks, and cross circulation. The passenger circulation and queuing area has been reduced in depth from 38 feet in the original terminal design to 27 feet (as measured from the face of the ATO counter to the escalator). This was done to accommodate placing the checked baggage screening equipment behind the ATO counters. The reduced depth affects half of the ATO counters: Denver Express, US Airways, Delta and United. The passenger queue is approximately 19 feet deep with approximately 8 feet for cross-circulation. Although these depths are less than what would be recommended, the passenger volumes for these carriers and the configuration of the passenger queues appears to be workable most of the time. In front of the other ATO counters

(Allegiant, American, and the currently vacant ATO area #1) the 27-foot depth can be used for passenger queuing without conflicting with a 20-foot deep circulation and seating area.

The minimum dimension from the face of the ticket counter to any obstruction to cross circulation should be 35-40 feet for airports with traffic similar to GJT. Although the trend toward increased self-service check-in has led some in the industry to predict the extinction of ticket lobbies, thus far airlines are using ticket lobbies for different configurations of kiosks and baggage drop counters. Thus, a 40-foot deep lobby is recommended to retain future flexibility.

Public Seating. Public seating areas include general waiting areas near the ticket lobby, baggage claim areas and concessions. These are typically in non-secure areas of the terminal. The main seating areas in the terminal are presently outside of security on the second floor, and in various locations near check-in and bag claim on the first floor.

Airports typically provided seating for a portion of the peak hour enplaned passengers and their visitors, plus the greeters for the deplaning passengers. Due to security restrictions, the number of well-wishers at most airports have declined dramatically and these ratios are estimated to be low at GJT.

For terminal programming, it has been assumed that non-secure seating would be provided for 15 percent of design hour enplaned passengers and their visitors, plus all of the meeter/greeters of deplaning design hour passengers. The bulk of the seating would be located to provide an area for meeter/greeters outside of security or near the baggage claim similar to the current conditions.

Rental Car Queue. Rental car customer queuing is based on a 10 foot deep area in front of the RAC counters. This is considered adequate for the volume of customers at airports of the size of GJT.

Restrooms. Restrooms should have at least as many toilets for women as toilets and/or urinals for men. Most of the existing restrooms have equal or fewer fixtures for women than men. In some jurisdictions, new building codes are mandating 25 percent to 50 percent more fixtures for women than for men.

The program area has been divided between the main terminal locations (ticketing, and bag claim) and the secure holdroom area. The terminal factor is based on peak hour total passengers and their estimated visitors. The holdroom factor is based on providing a restroom appropriate to the size of the aircraft gates. The minimum number of toilets and/or urinals is recommended to be 5 for men and 7 for women in the secure locations. Because the main demand on secure restrooms is for arriving passengers, it is recommended that these be located to be convenient for passengers proceeding from gate to baggage claim.

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. The program restroom area includes a companion care restroom for each restroom module. There are no companion care restrooms in the terminal at present.

Secure Circulation. Secure circulation typically consists of the central corridor of the concourses and adjacent egress stairs. Although the Program is not based on a specific concept, the expanded terminal may have either single or double-loaded concourses. Terminal planning practice would recommend a 20-25-foot wide corridor for double-loaded concourses handling aircraft of the size range expected long term at GJT. If a single loaded concourse concept was selected for future development, the recommended concourse width would be reduced to 15 feet, assuming there are no significant uses across from the holdrooms and the number of gates served are limited. Ancillary uses would be located outside of these corridors.

The program area is based on an area per equivalent concourse length determined by gates expressed as NBEG. The actual amount of secure circulation required will depend on the terminal configuration.

Security Screening Checkpoint (SSCP). With the changes in security inspection procedures, processing rates have been greatly reduced at most airports. The TSA has also mandated new security screening checkpoint (SSCP) configurations. Passenger screening rates at GJT were taken on a spot basis in November 2010 which produced highly variable results. Discussions with TSA also indicate that throughput rates are highly variable, with high rates for business travel oriented peaks, and very slow rates (100 to 110 passengers/lane/hour) for Allegiant's peaks. The variability is due to both passenger experience with the SSCP protocols and the amount of carry-on bags.

With constantly changing procedures, planned introduction of advanced imaging technology (AIT) scanners, and an assumed high percentage of leisure travelers during peak periods, a throughput rate of 120 passengers/lane/hour has been used. This would not require a third lane until PAL IV. A sensitivity check was made at 150 passengers/lane/hour, but this only resulted in deferring the third lane until PAL V. Thus, it is recommended that the lower rate be used for planning.

The program area includes the actual SSCP equipment, divesting/bag repacking areas and TSA support space that is required at the checkpoint. This can vary by equipment configuration. Current TSA configurations require up to 65 feet by 30 feet wide (per pair of lanes) for the equipment plus additional space for document checking and passengers to re-pack their carry-ons. The program has assumed 85 feet for these functions. Additional area for TSA support at the SSCP (5 percent) has been included. The queuing area has been sized for a 15 minute maximum wait, or 25-30 feet deep.

General Public Circulation. Other public circulation includes the corridors, vertical circulation elements, and other architectural spaces which tie the public functional elements of the terminal together. The program area is based on a percentage of these functional areas: baggage claim, baggage service offices, holdrooms, concessions (excluding concession support area), and other public areas. The percentage is a first approximation and will also vary with the terminal configuration. The split between secure and non-secure (public) circulation is also a function of the terminal concept, however in the table it has been included as non-secure circulation.

The existing terminal has a passenger elevator and escalators at the main vertical circulation core. The escalators are old and parts have become difficult to get. Although the adjacent stairs are wide and very visible, the floor to floor height of the terminal discourages use by passengers, especially with carry-on bags. The main elevator is small and slow, so is not a viable alternative for most passengers. A second elevator in the northwest corner of the terminal is not visible to passengers and used primarily for deliveries. Although the escalators are a maintenance issue which the Airport would prefer to eliminate in a new terminal, the grade difference between the terminal roadways and aircraft parking apron may require escalators rather than ramps to maintain a desired level of service.

Dual elevators should be provided at the major vertical circulation node in the terminal to provide both redundancy and a proper level of service during regular operations. Elevators for concessions servicing would be separate from passenger elevators and are included in non-public circulation.

Other Areas

Information Counter. The Airport has an information counter staffed by volunteers. This is supplemented by advertising displays and an interactive information kiosk. The area is considered adequate.

Airport Administration/Operations Offices. Airport administrative offices are presently located on the third floor. Discussions with airport staff and a separate analysis indicate that the space is undersized and poorly configured[1]. It is the intention of the Airport to construct a new administration building, separate but in close proximity to, the terminal. The program table reflects the current shortfall of functional spaces identified in the administrative facilities report for the current level of activity but assumes that these functions will relocate out of the terminal in future years.

Transportation Security Administration (TSA) Offices. In addition to the passenger and baggage screening equipment and adjacent search areas, the TSA occupies space for general offices, training, agent break room, and storage. This is presently located primarily on the second floor of the terminal near the SSCP. Additional TSA offices are on the third floor, but these are related to regional TSA functions covering multiple airports in Western Colorado.

The terminal program for TSA space is limited to that needed to directly support the SSCP and checked baggage screening operations. Other TSA space could be located either in the terminal or elsewhere, such as the new Airport administration building.

Loading Docks. The terminal will require a loading dock and receiving area to allow deliveries from the public roadway system, as well as removal of trash generated by terminal users. TSA currently requires screening of concession deliveries before these are moved into or through secure areas.

The terminal has a small loading dock and receiving area which is accessed through the rental car ready/return lot. However, there are no adjacent storage areas for any of the concessions. All concessions supply and waste removal must go through public areas. The program area for the dock and receiving area is approximately twice the size of the existing area. In addition it is recommended that concessions storage areas be located near the loading dock to minimize movement through public areas of the terminal.

Non-Public Circulation. Non-public circulation provides access to airline operations, airport administration areas, concession support, and other areas typically not used by the traveling public, as well as restrooms used by airport tenants. The existing non-public circulation areas are mostly on the third floor of the terminal.

Non-public circulation also includes elevators for concessions servicing. These should be sized and rated for freight of the type required by the various concessions. Non-public circulation should be located so as to provide delivery and trash removal to as many concessions as possible without requiring passage through public spaces. The program area is based on 10 percent of

1 Administrative Facility Space Requirements; Jviation and Reno-Smith Architects; 2010.

non-public functional areas, and includes area for employee restrooms. This would allow a new terminal to have more segregation of deliveries and trash removal from public areas than at present.

Evolving security protocols may also require screening checkpoints for employees which could increase the amount of non-public circulation beyond these percentages.

Mechanical/Electrical/Utility. At the planning and programming stage, utilities areas are typically estimated as a percentage of the enclosed functional areas of a terminal. This will vary with the provision of central plant functions either within the terminal or remotely; and, in some cases, architectural design considerations which may limit the use of roof-top equipment, etc. Most newer terminals are in the range of 10-12 percent of functional areas, when the terminal has its own heating/cooling plant.

The existing terminal mechanical/electrical systems are equal to less than 5 percent of the functional area of the terminal. A separate systems evaluation conducted as part of this Terminal Area Plan study has detailed many shortcomings of the current systems (see Appendix A). For planning, a factor of 10 percent of functional areas has been used.

Janitorial/Storage/Shops. Janitorial, storage and shop space include the building maintenance functions which are required to be within the terminal building. In addition to typical janitorial functions, space must be made available to store any specialized maintenance equipment for the terminal, such as lifts for high ceiling areas.

At GJT, maintenance and storage areas are located in multiple locations in the terminal, and space shortages were noted for such things as storage for floor and ceiling maintenance equipment and general terminal maintenance functions. The existing over-all ratio of these spaces to the functional areas (1.3 percent) has been increased to 3 percent for planning to address these issues.

Structure/Non-Net Areas. Non-net areas are added to the recommended facility requirements to provide a better estimate of the total gross building footprint. Although the program areas are in terms of gross space, allowances must be made for exterior walls. It is also to be expected that buildings will have areas that are unusable, or occupied by special structures. For planning, a 3 percent factor has been used which is typical of small to medium sized terminals with conventional designs.

Terminal Building Requirements Summary

The total gross terminal area including all of the elements described previously is estimated as in the following table entitled *TOTAL GROSS TERMINAL REQUIREMENTS* for each of the forecast levels of activity:

The program area per gate (as expressed in terms of square feet per NBEG) is less than most small to medium sized airports. This is primarily due to the absence of airport administrative space in the terminal, and the assumption of continued simple EDS systems for checked baggage.

Table C9

TOTAL GROSS TERMINAL REQUIREMENTS

PAL	Gates	Area (SF)
I	5	89,600
II	5	93,900
III	6	102,100
IV	7	113,800
V	8	124,700

Source: *HIRSH ASSOCIATES.*

Note: *Existing Terminal Gross Square Footage is approximately 77,500.*

Airport Access and Vehicle Parking Requirements

The terminal loop roadway system at GJT was realigned and reconstructed in 2008. The passenger vehicle parking area was also recently realigned and reconstructed. The following sections examine the facility needs for both airport access and vehicle parking.

Airport Access Requirements

The *2009 Airport Master Plan Update* included an analysis of the airport access roadway capacity. The analysis concluded that the terminal loop roadway system had a capacity in the neighborhood of 1,200-2,400 vehicles per hour, at a LOS in the C to D range. The terminal loop roadway system was reconstructed in 2008 including improvements to both Walker Field Drive and Falcon way. According to the *2009 Airport Master Plan Update*, this roadway system appears to have adequate capacity to accommodate forecasted passenger traffic throughout the planning period. Currently, Walker Field Drive is a two lane road from Horizon Drive until just before the terminal building where the road becomes a three lane road. However, is recommended that for planning purposes, space be reserved to potentially add a fourth vehicle lane to Walker Field Drive in front of the terminal building.

Vehicle Parking Requirements

Automobile parking at Grand Junction Regional Airport includes four types of users:

- Public parking for passengers, and their well-wishers and meeter/greeters
- Rental car parking for ready cars and for returning vehicles
- Terminal Employees
- Other airport tenants

Forecast demands have been estimated for each category based on available data for GJT. These are summarized in the following table entitled *AUTO PARKING DEMAND ESTIMATES*. The facility parking requirements for each Planning Activity Level are then summarized in the table entitled *AUTO PARKING REQUIREMENTS*.

Table C10
AUTO PARKING DEMAND ESTIMATES

		Spaces	Spaces per Million Enplanements
A. Public Parking			
2009 Summer Average Peak Overnight Demand		600	
Estimated Daytime Peak = ___% more than overnight			
	30% =	780	
	40% =	840	
2009 annual enplanements = 231,600 Planning factor range			3,370 to 3,630
B. Rental Car Parking			
Current Active Ready/Return Spaces:		146	
2009 annual enplanements = 231,600 Planning factor			630
C. Terminal Employee Parking			
Estimated Airport Staff		20	
Estimated Concessions Staff		8	
Estimated Airline Peak Staff		32	
TSA Terminal Operations, 6/SSCP lane plus 3/EDS plus 3		24	
Total		*84*	
2009 annual enplanements = 231,600 Planning factor			360
D. Office Building Tenant Parking			
Office building typical parking demand: 1 space per 400 SF of offices			
Estimated tenant office 12,000 SF		30	
Estimated tenant office 24,000 SF		60	

Source: *HIRSH ASSOCIATES.*

Table C11
AUTO PARKING REQUIREMENTS

			Spaces per Planning Activity Level				
		Existing	I	II	III	IV	V
Public Parking Spaces							
	Low	650	840	1,010	1,180	1,350	1,520
	High	650	910	1,090	1,270	1,450	1,630
Rental Car Ready/Return Spaces							
		260	160	190	220	250	280
Terminal Employee Spaces							
		N/A	90	110	130	140	160
Office Tenant Spaces							
	Low	30	30	30	30	30	30
	High	60	60	60	60	60	60

Source: *HIRSH ASSOCIATES.*

Public Parking

The Airport has one main public lot containing approximately 650 spaces. This count includes 20 oversized (length) spaces which could be re-striped to add an additional 20 standard length spaces. There is an adjacent unpaved overflow lot with capacity for approximately 250 cars, giving the airport a peak capacity of approximately 910 spaces. However, it is estimated that if this lot was paved and landscaped in a manner similar to the main lot, it would accommodate approximately 160 spaces for a total potential capacity of 810-830 spaces. This would be subject to more detailed parking area design.

Parking occupancy data was requested from the parking operator (Republic) for June through August 2009. This was selected by the Airport as representing the busiest months when Frontier Airlines served the Airport. The data included the daily overnight counts, and the total number of tickets issued and collected each day. Since the data was only available on a daily basis, the accumulation pattern during the day was estimated based on typical patterns and the schedules at GJT.

During the three peak months, the average overnight counts ranged from 497 to 533 vehicles. On the busier days - usually Thursdays through Sundays - the overnight counts peaked at 666 vehicles, but only exceeded 600 vehicles on 8 of the 92 days. Therefore, 600 was used as the overnight peak for planning. The actual peak occupancy would have occurred during the day after departing passengers park, and before arriving passengers leave the lot. This is estimated to be between 30 percent and 40 percent more than the overnight occupancy. This would be result in a demand for 780 to 840 spaces, and is consistent with the use of the overflow lot. It is recognized that 'super peaks' around certain holidays would generate additional parking demands, however it is expected that these demands would be accommodated in temporary lots or off-airport.

Public parking demands are typically forecast based on annual enplanements, using a factor of spaces per million annual enplanements. For GJT, 2009 activity was used as the basis. This results in a planning ratio of between 3,370 and 3,630 spaces per million annual enplanements. The parking estimates indicate that the existing parking lot - if fully developed to the Airport's standards - would just meet the low range estimate for PAL I.

Rental Car Parking

Rental car parking consists of ready/return (R/R) spaces near the terminal, and inventory vehicle parking which is usually remote from the terminal in the individual rental car (RAC) company service areas. Only R/R spaces have been forecast for this study since the RAC companies and the Airport have developed a plan for a consolidated maintenance and vehicle storage area west of the terminal roadway loop.

The estimates for R/R spaces are located adjacent to the terminal on the west side. The R/R lot consists of two zones. There is a primary active R/R area with 146 individually signed and numbered spaces for each company. These are used by customers to pick-up or return cars. The balance of the lot (114 spaces) is also used by the RAC companies but not for direct customer activity. Rental car activity is busiest during the summers when Grand Junction has more tourists. Because this Study was conducted during off-peak months for RAC activity, it was not possible to obtain actual hourly rentals and returns from which to estimate the combined demand for R/R spaces of the six companies. Based on discussions with the RAC companies, however, it was indicated that the active R/R spaces were adequate for current peak season operations. Based on that assumption, a planning factor was developed using the 2009 annual enplanements in a manner similar to that used for public parking. The forecast for R/R spaces would indicate that if the existing RAC lot on the west side of the terminal was fully used for active customer R/R spaces, there would be sufficient capacity though PAL IV. This assumes, however, that the spaces would be periodically re-allocated between companies based on market share and any new companies that might establish an on-airport presence.

Terminal Employee Parking

Terminal employee parking is required for airport administration, airlines, TSA and other tenants who operate in the passenger terminal. One space per person is assumed as follows:

- Airport administrative and operations employees were estimated from the staffing plan contained in the Facility Space Requirements report[2], plus an allowance for maintenance and operations personnel.
- Peak shift concessions staff was estimated for the Subway restaurant and news/gift shop.
- Airline peak shift staffing was estimated since most of the airlines did not respond to the terminal facilities planning questionnaire. The existing estimate used a typical ratio for smaller airports (8 staff per peak period gate). No flight crews are assumed to be based at GJT which would add to parking demand.
- TSA terminal operations staff was estimated for two SSCP lanes and three EDS units operating at peak periods, plus supervisors. Regional TSA staff were included in office tenant parking discussed below.

These assumptions totaled 84 spaces. A factor of spaces per million annual enplanements was developed similar to that for public parking and applied to forecast levels of activity.

Office Building Tenant Parking

As part of a new administration building, the Airport plans to construct additional rental offices which may be leased to TSA, FAA or others with interests on the Airport. A range of 12,000 to 24,000 SF of gross additional space has been discussed. The Grand Junction Development Code requires one parking space per 400 gross square feet of building area. This ratio has been applied to the range of potential additional rental space.

Facility Requirements Summary

It is important to note that the recommendations in this chapter on Terminal Area Facilities Requirements were developed to understand which facilities improvements might be needed to serve passengers using commercial flights and the passenger terminal. The information presented in this chapter will be utilized in following chapters to develop a recommended Conceptual Development Plan for the terminal area which considers potential demand and community/environmental influences.

[2] Administrative Facility Space Requirements; Jviation and Reno-Smith Architects; 2010.