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TO: Supervisor Bill Horn, Chairman
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Supervisor Ron Roberts

FROM: Richard E. Crompton
Department of Public Works

AIRFIELD DEMAND/CAPACITY ANALYSIS/SAFETY AND EFFICIENCY STUDY FOR GILLESPIE FIELD

Enclosed is the Airfield Demand/Capacity Analysis/Safety and Efficiency Study for Gillespie Field prepared in response Board action taken on October 29, 2014, Agenda Item No. 7, directing the Chief Administrative Officer to commence a safety and efficiency study for Gillespie Field if a new lease or sublease for aviation activities associated with flight schools is proposed, and defer any action on such leases or subleases, if acceptable to the Federal Aviation Administration (FAA), until the study is complete for Gillespie Field. The study concluded that given the current operational capacity and safety record of Gillespie Field, no safety or efficiency constraints warrant the limitation of aeronauticial activities at this time.

If you have any questions or need additional information, please feel free to contact me at (858) 694-2233 or Derek Gade, Assistant Director, at (858) 694-3897.

Respectfully,

Richard E. Crompton

RICHARD E. CROMPTON
Director

Attachment: Airfield Demand/Capacity Analysis/Safety and Efficiency Study for Gillespie Field

County of San Diego

Gillespie Field
El Cajon, California

Airfield Demand/Capacity Analysis Safety and Efficiency Study

Prepared by:
C&S Engineers, Inc.

FINAL – July 29, 2015

I. Introduction and Background

C&S Engineers, Inc., (C&S) has been tasked by the County of San Diego to prepare the Airfield Demand/Capacity Analysis Safety and Efficiency Study at Gillespie Field (SEE). C&S has provided planning and design services to airport clients across the country since 1968. The C&S aviation group includes staff solely dedicated to airfield and landside planning and have performed these services to numerous airports similar in size to Gillespie Field.

This study reviews the airfield capacity under its current runway and taxiway configuration and compares it to the Airport's existing aircraft operation totals from the past three years. The goal and result of this study is to provide an update on the Airport's ability to accommodate future levels of aircraft operations.

Previous efforts to estimate the airfield capacity of Gillespie Field were completed in the *Gillespie Field Airport Layout Plan (ALP) Update Narrative Report,* by P&D Aviation, 2005; and *Gillespie Field Constrained Aviation Activity Forecasts,* by Ricondo & Associates, Inc., 2008. These documents were the basis for the evaluation of the previous estimates and include the evaluation of the underlying assumptions used to derive those estimates. These are reviewed in detail later in this study

Meetings and discussions were held with Airport Management and the Air Traffic Control Tower (ATCT) to understand operational procedures, historical aircraft activity data, and airfield changes since the last capacity estimates were developed.

These meetings were held in March and April 2015 and included time for the observation of aircraft operations at the Airport. Information obtained from these meetings is included in this report to help supplement previous efforts.

Airfield Capacity – Airfield capacity is a measure of terminal area airspace and airfield saturation. It is defined as the maximum rate at which aircraft can arrive and depart an airfield with an acceptable level of delay. Measures of capacity include the following:

- **Annual Service Volume**: The annual capacity or a maximum level of annual aircraft operations that can be accommodated on the runway system with an acceptable level of delay. An airport's Annual Service Volume, or ASV, has been defined by the Federal Aviation Administration's (FAA) as "a reasonable estimate of an airport's annual capacity. It accounts for differences in runway use, aircraft mix, weather conditions, etc., that would be encountered over a year's time." Therefore, ASV is a function of the hourly capacity of the airfield and the annual, daily, and hourly demands placed upon it. ASV can be derived from predetermined tables within the FAA Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay* that is primarily based on the configuration of the airfield's runway system. Alternatively, ASV is estimated by multiplying the existing daily and hourly operation ratios by a weighted hourly capacity. The later approach is based on the availability of reliable, detailed aircraft operational data.
- **Hourly Capacity**: The maximum number of aircraft operations that can take place on the runway system in one hour taking into account the variables mentioned under the ASV estimate. Because of these variables and peaking considerations, it is not a simple division of time with the stated ASV and theoretical estimates can be higher than practical capacity when delay is not factored.

A variety of techniques have been developed for the analysis of airfield capacity. The current technique accepted by the FAA is described in Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay*. The Airport Capacity and Delay Model (ACDM) prescribed in the AC uses the following inputs to derive an estimated airport capacity:

- Airfield layout and runway use
- Meteorological conditions
- Navigational aids
- Aircraft operational fleet mix
- Touch-and-Go (TGO) operations

The following provides available information regarding these inputs for Gillespie Field.

Airfield Layout and Runway Use

The existing airfield consists of three runways, see Figure 1:

- Two parallel runways:
  - Runway 9L/27R – 5,342' x 100'
  - Runway 9R/27L – 2,738' x 60'

The two parallels are separated by 417.4 feet according to the approved ALP; and

- Cross-wind Runway 17/35 – 4,145' x 100'

This runway intersects both parallel runways.

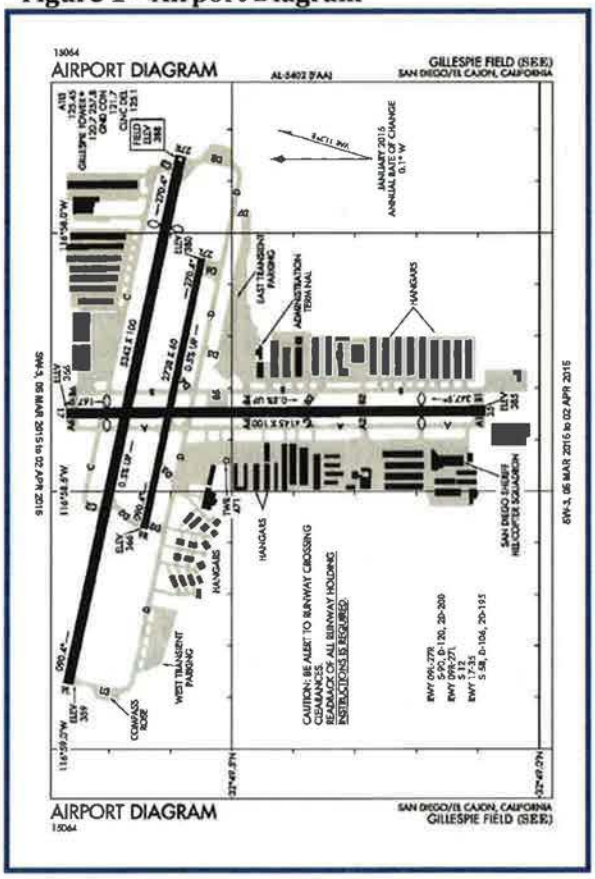
The Airport's existing runway configuration of two parallel runways with a 417 foot separation and a crosswind runway that intersects both of the parallels is consistent with Sketch 10 of Figure 2-1 in AC 150/5060-5. This will be utilized for capacity estimates as part of this study.

The capacity sketches in the Advisory Circular are based on the operational capability of airfields in those configurations. While separation between parallel runways is indicated, it is the way the system is operated that allows for variation (reductions/increases) in capacity, not the physical distance between the facilities. At SEE, the operational context allows for capacity as indicated in Sketch 10.

In addition, according to ATCT, a west flow of air traffic is the predominate flow of aircraft that utilizes Runways 27R and 27L. On an annual basis, due to predominate winds and other weather conditions less than 10 percent of all aircraft operations take place on Runway 17/35.

Runway 9R/27L is limited to daytime use as it does not have lights and jet operations are restricted due to its length.

Figure 1 – Airport Diagram



Source: FAA, March 6, 2015 to April 2, 2015

Meteorological Conditions

Aircraft navigate from one airport to another using Visual Flight Rules (VFR) or Instrument Flight Rules (IFR). The term VFR refers to rules that govern the procedures for conducting flight under visual meteorological conditions (VMC) where visibility is sufficient for pilots. The term

IFR refers to a set of rules governing the conduct of flight under instrument meteorological conditions (IMC) where pilots rely on instrumentation to navigate.
The capacity of an airfield can be negatively impacted based on poor weather conditions. Under Federal Aviation Regulations (FAR) Part 91, *General Operating Flight Rules*, VFR and IFR are defined as:

- **Visual Flight Rules (VFR)** – having flight visibility of at least 3 statute miles and remaining clear of clouds. This can also be referred to VMC, or Visual Meteorological Conditions.

- **Instrument Flight Rules (IFR)** – having flight visibility less than 3 statute miles and a cloud ceiling of at least 2,400 feet. This can also be referred to IMC, or Instrument Meteorological Conditions.

Discussions with the ATCT indicate that the Airport is in VFR conditions approximately 90% of the time or more, while the remainder of the time is spent in IFR conditions (10% or less). Weather data was not reviewed for this input component and is not necessary given the predominance of VFR conditions at SEE.

Navigational Aids

The Airport has two published Instrument Approach Procedures (IAP). As a result of the Airport having predominately VFR weather conditions and the focus of this study on the maximum capacity of the facility under those conditions, these procedures only play a role in estimating the hourly capacity under IFR conditions, and the weighted capacity that will be calculated later in this effort. Current procedures include:

- RNAV (GPS) Runway 17
- LOC/DME-D

Based Aircraft Operational Fleet Mix

Airport management provided the existing based aircraft fleet mix as follows:

Figure 2 – Based Aircraft Fleet Mix

Aircraft Type	#	%
Single-engine	669	88%
Multi-engine	43	6%
Jets	14	2%
Helicopters	31	4%
Total	757	100%

Source: Airport Management, March 2015

This fleet mix is consistent with previous study efforts. The general aviation fleet mix (referenced by FAA as 0-20) will continue to be used in this analysis.

Touch-and-Go Operations

Touch-and-go operations are generally defined as an aircraft that lands and departs on a runway without stopping or exiting the runway. AC 150/5060-5 states:

> "Touch and go operations are normally associated with flight training. The number of these operations usually decrease as the number of air carrier operations increase, as demand for service approaches runway capacity, or as weather conditions deteriorate."

Touch-and-go operations are factored into the FAA's assumptions in determining the ASV and hourly capacities from Figure 2-1 in the Advisory Circular.

II. Review of Historical Capacity Estimates

Planning studies that address the capacity of the Airport have been completed in the past. Within the last 10 years, this includes an Airport Layout Plan Update Narrative Report and a Constrained Aviation Activity Forecast report.

The following summarizes the findings of the two previous capacity estimates that were completed for Gillespie Field.

a. Estimate from the 2005 Airport Layout Plan (ALP) Update Narrative Report:

Figure 3 – 2005 ALP Capacity Estimates

Annual Service Volume:
355,000 operations (takeoffs and landings)

Hourly Capacity:
VFR = 197 IFR = not reported

Average Hourly Capacity:
136 operations (takeoffs and landings)

Source: Airport Layout Plan Update Narrative Report, Gillespie Field, by P&D Aviation, 2005

Based on available information, key assumptions utilized in this estimate include:

- Runway configuration that assumes two parallel runways with a 417 foot separation and a crosswind runway that intersects both of the parallels similar to Sketch 10 of Figure 2-1 in FAA AC 150/5060-5.
- General aviation airport aircraft fleet mix.
- Peaking factors from FAA AC 150/5060-5: a daily demand ratio of 290, and hourly demand ratio of 9.

b. Estimate from the 2008 Constrained Aviation Activity Forecasts report:

Figure 4 – 2008 Forecast Capacity Estimates

Annual Service Volume:
355,000 operations (takeoffs and landings)

Hourly Capacity:
VFR = 197 IFR = 62

Average Hourly Capacity:
Not reported

Source: Constrained Aviation Activity Forecasts, Gillespie Field, by Ricondo & Associates, Inc., 2008

Based on available information, key assumptions utilized in this estimate include:

- Runway configuration that assumes two parallel runways with a 417 foot separation and a crosswind runway that intersects both of the parallels similar to Sketch 10 of Figure 2-1 in FAA AC 150/5060-5.
- General aviation airport aircraft fleet mix.
- Twelve (12) percent of daily operations would occur in the peak hour derived from the peak month, and Average Day Peak Month (ADPM) operations. The Ricondo & Associates report held this assumption constant as it was reported in the 2005 ALP Update Narrative report.

III. Updated Demand Capacity Estimate

After review of the previous capacity estimates, this section develops an updated demand capacity estimate for Gillespie Field based on available information and resources that include the FAA Advisory Circular, as well as The Airport Cooperative Research Program's (ACRP), Report 79, *Evaluation Airfield Capacity*.

For the purposes of this estimate, runway infrastructure at the Airport has remained the same and Sketch 10 from Figure 2-1 in the FAA's guidance is still applicable. Based on available information, key assumptions utilized in this estimate include:

- Runway configuration that assumes two parallel runways with a 417 foot separation and a crosswind runway that intersects both of the parallels similar to Sketch 10 of Figure 2-1 in FAA AC 150/5060-5.
- General aviation airport aircraft fleet mix.

The results yield the following ASV and Hourly Capacities reported in Figure 2-1.

Figure 5 – ASV and Hourly Capacity Estimates

Annual Service Volume:
355,000 operations (takeoffs and landings)

Hourly Capacity:
VFR = 197 IFR = 59

Source: FAA AC 150/5060-5

ACRP's Report 79, *Evaluation Airfield Capacity* provides a spreadsheet tool to assist in calculating the ASV based on a weighted hourly capacity utilizing actual demand ratios from the Airport. The ACRP report states:

> "For the majority of airports, comparing an estimate of annual airfield capacity with estimates of annual demand for aircraft operations is sufficient to determine the need for airfield improvements.
>
> The annual capacity of an airfield does not equal hourly capacity multiplied by 24 hours in the day and 365 days in the year. Capacity provided during hours when there is little or no demand is not relevant. Estimates of annual capacity must account for variations in demand over the hours of the day and months of the year. Consequently, ASV was developed as an estimate of an airport's annual capacity to accommodate aircraft operations considering the variations in demand. ASV is not a hard ceiling number; rather, it is intended to be interpreted as the number of actual annual aircraft operations above which additional increases in aircraft operations would result in disproportionate increases in average aircraft delays."

To calculate ASV, a weighted average of the hourly capacity over the year is calculated using a formula provided in FAA's guidance and will be checked utilizing ACRP's spreadsheet tool. The following provides the formula and explains each of the formula's components.

ASV formula:
$ASV = C_w * D * H$

C_w = the weighted average hourly capacity of the airfield;

D = the ratio of annual to ADPM demand; and

H = the ratio of ADPM demand to peak-hour demand.

ADPM = Average Day Peak Month operations

The FAA and ACRP guidance recommend that ratios for D and H should be calculated using

data from airport records, but when data is not available, there are defaults that can be used. For this effort, these assumptions on data will be noted accordingly.

The ACRP guidance provides the following descriptions and information on the inputs:

> "The D factor measures seasonal variation in monthly demand, where a value of 365 would indicate that all months have the same demand. Very low D values (e.g., values less than 300) would indicate substantial seasonality typical of vacation destinations.
>
> The H factor measures variation over the hours of the day, where a value of 24 would indicate that all hours of the day have the same demand. Much lower H values (e.g., values less than 12) would indicate substantial peaking in demand over the hours of the day."

The following calculates each of these components (C_w, D factor and H factor).

To calculate the weighted hourly capacity for Gillespie Field, the following formula and inputs are defined and used:

$$C_w = \frac{(P_{n1} * C_{n1} * W_{n1}) + (P_{n2} * C_{n2} * W_{n2})}{(P_{n1} * W_{n1}) + (P_{n2} * W_{n2})}$$

C_w = weighted hourly capacity

n = number of operating scenarios. In this case we will utilize 2, VFR and IFR.

P = percent of time under a specific operating scenario. In this case we will utilize 90% VFR, and 10% IFR based on a discussion with ATCT.

C = hourly capacity of each operating scenario. Based on information from FAA's guidance, we will utilize VFR 197 operations, and IFR 59 operations.

W = FAA weighting factor. Based on the Airport's general aviation aircraft fleet mix index, the W factor for VFR is 1, and IFR is 4.

Applying these inputs to the formula for the Airport results in the following weighted hourly capacity:

$$C_w = \frac{(.90 * 197 * 1) + (.10 * 59 * 4)}{(.90 * 1) + (.10 * 4)}$$

$$C_w = \frac{177.3 + 23.6}{0.9 + 0.4}$$

$$C_w = \frac{200.9}{1.3}$$

C_w = 154.5 operations

The next step calculates the D factor (ratio of annual demand to average daily demand). For this, monthly operations data was obtained from the Airport for the 2014 calendar year. Within that time period, August 2014 was identified as the busiest month with 21,249 total aircraft operations. To generate the Average Day Peak Month (ADPM or average daily demand), 21,249 is divided by 31 (days in the month).

$$ADPM = \frac{21{,}249}{31}$$

$$ADPM = 685$$

$$\text{D factor} = \frac{\text{Annual Demand}}{\text{Average Daily Demand}}$$

$$\text{D factor} = \frac{199{,}837}{685}$$

D factor = 292

While the D factor is below 300, this is consistent with ATCT discussions that daily demand can vary having an inconsistent (seasonal) effect.

The next step calculates the H factor (ratio of average daily demand to average peak hour demand). The average daily demand of 685 derived previously will be used here. Because hourly data was not available for this analysis, a 12% peak hour factor utilized in previous capacity assessments will also be utilized here.

$$\text{H factor} = \frac{\text{Average Daily Demand}}{\text{Average Peak Hour Demand}}$$

Average Peak Hour Demand = 685 * 12%

Average Peak Hour Demand = 82.2

$$\text{H factor} = \frac{685}{82.2}$$

H factor = 8.3

Here the H factor is lower than 10 which indicates substantial peaking in demand over the hours of the day. Again, this is consistent with ATCT discussions.

The final step uses the three main inputs generated above to calculate the ASV for Gillespie Field as:

$$ASV = C_w * D * H$$

ASV = 154.5 * 292 * 8.3

ASV = 374,500

The ACRP Report 79 capacity estimating tool was utilized to confirm this output. The results can be found in the appendix of this report.

Sensitivity Testing

Since the peak hour factor of 12% was carried forward from previous estimates and was not able to be confirmed from actual data, sensitivity testing was completed to analyze the results if this peak hour factor were to change.

Two additional percentages were analyzed: 10% and 14%. Ten percent is a common industry standard in assessing peak hour factors. And since this was two percent lower than previous studies, it was decided to test the opposite spectrum and add two percent to get 14%.

10% - Sensitivity Test

Average Peak Hour Demand = 685 * 10%

Average Peak Hour Demand = 68.5

$$\text{H factor} = \frac{685}{68.5}$$

H factor = 10

ASV = 154.5 * 292 * 10

ASV = 451,140

14% - Sensitivity Test

Average Peak Hour Demand = 685 * 14%

Average Peak Hour Demand = 95.9

$$\text{H factor} = \frac{685}{95.9}$$

H factor = 7.14

ASV = 154.5 * 292 * 7.14

ASV = 322,114

Since the ASV estimate of 374,500 calculated from a 12% peaking factor most closely resembles the FAA AC ASV of 355,000, this should be the best capacity estimate for SEE.

IV. Actual Aircraft Operations Demand versus Capacity

This effort looked to review previous airfield capacity estimates as well as produce an updated estimate based on recent operational data that was available. As a result, the previous efforts have been confirmed with an updated Annual Service Volume. This section now compares these estimates to annual operations data for the last three years (2012, 2013 and 2014).

Figure 6 – Annual Operations versus ASV

Year	Actual Annual Operations	Annual Service Volume[1]	Annual Capacity Ratio
2014	199,837	355,000	56.3%
		374,500	53.4%
2013	183,991	355,000	51.8%
		374,500	49.1%
2012	184,512	355,000	52.0%
		374,500	49.3%

Note: [1] Top is ASV reported in Figure 2-1 from the AC. Bottom is ASV calculated using weighted hourly, D factor and H factor. Source: C&S Engineers, Inc., Airport Management (2012-2014 operations data) and FAA Advisory Circular 150/5060-5 and ACRP Report 79.

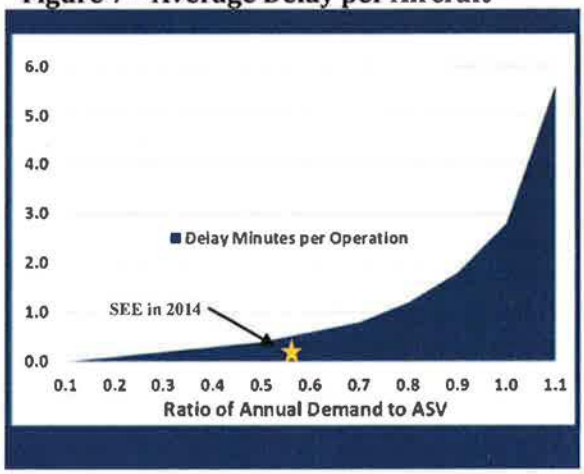
Figure 6 indicates that Gillespie Field has theoretical capacity to accommodate additional aircraft operations. But it should be noted that within the existing operational activity, peak demand can create operational delays.

In 2007, when aircraft operations were just over 300,000, many aircraft experienced delays and the east transient ramp was routinely used to hold departing aircraft due to traffic utilizing both 27L/R which resulted in both run-up areas reaching capacity.

As FAA AC 150/5060-5 states: *"As demand approaches capacity, individual aircraft delay is increased. Successive hourly demands exceeding the hourly capacity result in unacceptable delays. When the hourly demand is less than the hourly capacity, aircraft delays will still occur if the demand within a portion of the time interval exceeds the capacity during that interval. Because the magnitude and scheduling of user demand is relatively unconstrained, reductions in aircraft delay can best be achieved through airport improvements which increase capacity."*

Consistent with the previous Ricondo & Associates study and FAA guidance, delay in relation to the ratio of annual demand to ASV occurs at the Airport at the current level of operations. Figure 7 provides the operational delay curve and the Airports position given the 2014 capacity ratio range of 53.4-56.3%.

Figure 7 – Average Delay per Aircraft



Source: C&S Engineers, Inc., Airport Management and FAA Advisory Circular 150/5060-5

In addition, the Airport maintains policies to help reduce operational impacts, these include:

- Discourage touch and go and jet operations from 10PM to 7AM
- Encourage flight training operations at other airports
- Encourage TGO operations on Runway 27R when able
- Runway 17 is preferred noise abatement departure when tower closed

V. Aircraft Safety

A review of accident reports published by the National Transportation Safety Board (NTSB) was conducted for Gillespie Field Airport. According to the NTSB, an accident is defined as "an occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and all such persons have disembarked, and in which any person suffers death or serious injury, or in which the aircraft receives substantial damage." Since 2005, there have been 25 accidents within the Class D Airspace surrounding SEE. This includes seven accidents associated with flight training. It has been over five years since the last reported flight school related accident. Over the ten year review period (2005 to 2014) analyzed, this equates to 1.1 accidents for every 100,000 operations.

For comparison, accidents associated with general aviation operations were reviewed at the national level during the same time period to determine an overall average of accident per operation. According to NTSB published information, nationally, 5.15 accidents occurred for every 100,000 operations. This rate is nearly five times higher than the accident rate calculated for SEE.

Figure 8 – Accident per Operation (2005-2014)

	Aircraft Operations	Accidents	Accident per Op Ratio
U.S. (GA Only)	288,093,244	14,852	5.15/100,000
Gillespie Field	2,266,368	25	1.1/100,000

Source: NTSB Aviation Accident Database & Synopses

Figure 9 – SEE Historical Aircraft Accidents

** Note: Reported flight instruction accident (3/13/10) was a bird strike.*

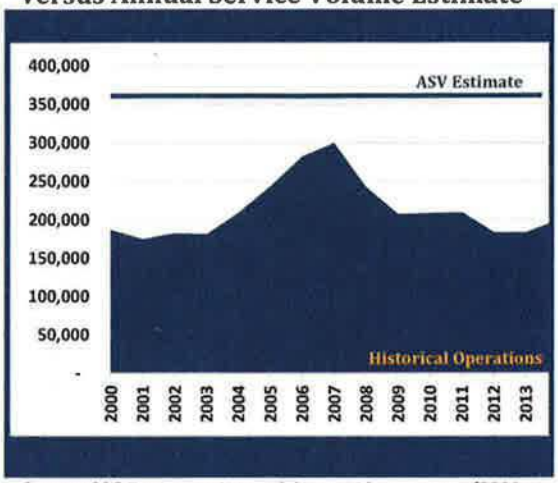
Source: NTSB Aviation Accident Database & Synopses

VI. Demand/Capacity/Safety Summary

Based on this analysis, Gillespie Field has capacity for additional aircraft operations. This includes both the operations of itinerant or local (e.g. flight training) aircraft. General aviation operations at Gillespie Field have historically been completed with fewer reported accidents than are attributed to general aviation operations nationally.

At the height of historical operations in 2007, SEE reached 300,391 total operations according to Airport Management records. This is 100,554 operations, or approximately 50% more operations than the 199,837 that occurred in 2014. See Figure 10 for a comparison of historical operations from the past 15 years to the Annual Service Volume Estimate of 355,000 annual operations.

Figure 10 – SEE Historical Operations versus Annual Service Volume Estimate



Source: C&S Engineers, Inc. and Airport Management (2000 - 2014 data).

As noted previously from discussions with airport management, aircraft did encounter delays during peak periods in 2007. At this time, SEE was operating at over 80% of its capacity and according to the delay curve in Figure 7, average delays would have approached approximately 2 minutes per aircraft.

Given the current operational capacity and safety record of Gillespie Field, no safety and efficiency constraints warrant the limitation of aeronautical activities, at this time. FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems*, December 2000, provides guidelines for airports to consider airport capacity enhancements. Based upon FAA Order 5090.3C, when an airport reaches 60% of its estimated capacity, planning should be conducted in order to assess future activity levels and any improvement or mitigations that may be required to accommodate future demand. This is usually done through a Master Plan so that when the airport gets to 80% of its estimated capacity, these planned improvements or mitigations can be implemented.

The existing runway and surrounding airspace can only process so many aircraft at any given point in time. Demand beyond what the system can process in a safe manner will result in delays on the ground for aircraft. In some cases, mostly flight training, these delays will impact user decisions as to when they will conduct their training operations. As a result of the cost to conduct flight training, student pilots do not prefer to pay for operating aircraft in a delay situation, therefore they will chose times with the least delay impacts that accommodate their training needs. These decisions may be to conduct their training operations at other airports which is already encouraged by airport management.

While Gillespie Field has existing capacity, peak hour delays may occur and will continue to impact user demands and their decision to use the airfield at any given point in time.

Annual Service Volume Estimation (ASV)

0.0	Calculated Cells
0.0	Input Cells
0.0	Linked Cells (within this worksheet)
150,000	Output Cells

Use the capacities determined in the capacity model to estimate ASV

ASV Calculations: {D * H * Cw = ASV}

D Factor	H Factor	Cw	ASV
292.0	8.3	154.5	374,500

D = Annual Demand/Avg. Peak Month Daily Demand
H = Avg. Peak Month Daily Demand/Avg. Peak Hour Demand

Fleet Mix Index: 0-20 (C+3D)%
(C = Large Aircraft (i.e. Large-TP + Large-Jet + Large-757), D = Heavy Aircraft)

Weighted Average Capacity Calculations:

Runway use / weather	Hourly Capacity	% Occurrence	% Max Capacity	Weighting Factor	P*C*W	P*W
VMC (Optimal)	197.0	90.0%	100.0%	1	177.3	90.0%
IMC (Instrument)	59.0	10.0%	29.9%	4	23.6	40.0%
other 1			0.0%	4	0.0	0.0%
other 2			0.0%	0	0.0	0.0%
other 3			0.0%	0	0.0	0.0%
	(C)	(P)		(W)		
			Weighting Factors USED			
		100.00%			200.9	130.0%

Source: ACRP Report 79 - Airfield Capacity Estimation using Spreadsheet Models

Weighting Factors

	VMC Mix	IMC Mix Indexes		
% of Max Cap	0 - 180	0-20	21-50	51-180
91+	1	1	1	1
81 - 90	5	1	3	5
66 - 80	15	2	8	15
51 - 65	20	3	12	20
0 - 50	25	4	16	25

Above Table is from AC 150/5060-5, Airport Capacity and Delay Table 3-1

Cw = 154.5