Chapter 2 -

Aviation Forecast Validation

INTRODUCTION

Aviation activity forecasts help determine if existing airport facilities have the capacity to meet future demand or if they will require modifications. Forecasts were produced in the Environmental Impact Report (EIR) and Environmental Assessment (EA) that supported adoption of the 2012 Airport Master Plan. Since this time, Sonoma County Airport (STS) has seen significant growth in enplanements and commercial operations. United and American Airlines now have consistent service to hub airports such as Dallas, Denver and Phoenix, offering more options to travel to eastern U.S. destinations. A recent Market Assessment Analysis shows that more routes and airlines are likely to serve STS in the near term. This will put considerable stress on a terminal facility that is currently undersized. This will also have a ripple effect on terminal area facilities such as the air carrier apron, Aircraft Rescue and Fire Fighting (ARFF), circulation, and passenger automobile parking. This Airport Layout Plan (ALP) update provides a chance to validate the forecasts from the 2012 Master Plan and update them and to review terminal and auxiliary facility expansion needs.

The aviation forecasts were generated in 2019 and submitted to the FAA prior to the COVID-19 pandemic. The pandemic has greatly disrupted aviation in the short term and its long-term effects are yet to be determined. Given the uncertainty related to COVID-19 and its potential sustained impact to aviation activity, there may be a future reevaluation of the forecast data depending on the timeline for facility implementation.

FORECAST VALIDATION OVERVIEW

The forecasts presented here will update and validate the 2012 Master Plan forecasts for aircraft operations and peak hour and annual enplanements associated with scheduled passenger service. Forecasts for general aviation (GA) operations, military operations, and based aircraft will be updated with the 2018 Federal Aviation Administration (FAA) Terminal Area Forecast (TAF) as the source for extended forecasts for these segments. Forecast validation will integrate review of the passenger service analyses prepared by the STS's air service consultant and consider the information in the preparation of forecast updates. The forecast validation follows a linear process that includes the following components:

- **Response to COVID-19:** This was added after draft forecasts were developed and submitted to the FAA. This section discusses the pandemic effect on enplanements at STS and offers scenarios for near-term recovery.

- **Community Profile:** Review of the socioeconomic factors that make up the catchment area and how socioeconomic factors affects passenger demand.
- **Forecast Data Review:** Review of the 2012 Master Plan forecasts, the 2019 Market Assessment Analysis by STS's air service consultant Landrum & Brown (L&B), and the Sonoma County Air Transportation Element of the Sonoma County General Plan.
- **Scheduled Commercial Service Forecasts:** Presentation of the preferred enplanement and operations forecast with the aviation activity profile, methodology, and assumptions.
- **General Aviation Forecasts:** Presentation of the preferred forecasts for GA activity based on established TAF rates.
- **Forecast Summary:** Presentation of standard summary tables the FAA requires.

The forecasts have a base year of 2018 and follow the FAA fiscal year (October to September). The forecast period is 20 years from the base year with reporting intervals of every five years. Data from the past ten years (2008 to 2018) is the basis of analysis of historical trends. The historic data period includes periods of economic expansion and contraction that help forecasts account for various economic conditions and gives a perspective on the effects of economic change on aviation activity.

Common Terms and Abbreviations

Some common terms and abbreviations used in this chapter are presented below. **Table 2-1** shows the abbreviations used through the chapter for airports with existing service, potential new routes, or comparative airports used in forecast methodology.

Table 2-1: Airport Designator Codes

Designator	Airport	Notes
SEA	Seattle-Tacoma International	Existing Service: Alaska
PDX	Portland International	Existing Service: Alaska
SAN	San Diego International	Existing Service: Alaska
SFO	San Francisco International	Existing Service: United
SNA	John Wayne, Orange County	Existing Service: Alaska
LAX	Los Angeles International	Existing Service: Alaska & American, seasonal
PHX	Phoenix Sky Harbor International	Existing Service: American
MSP	Minneapolis−Saint Paul International	Existing Service: Sun Country, seasonal, not daily
DEN	Denver International	Existing Service: United
DFW	Dallas/Fort Worth International	Existing Service: American
LAS	McCarran International, Las Vegas	Existing Service: Sun Country, seasonal, not daily; previously daily
SLC	Salt Lake City International	Potential Route: Near-term[1]
ORD	O'Hare International, Chicago	Potential Route: Near-term[1]
MRY	Monterey Regional	Comparative Airport
SBA	Santa Barbara	Comparative Airport
SMF	Sacramento International	Nearby Airport, within 2-hour drive
OAK	Oakland International	Nearby Airport, within 2-hour drive

Note: Not all markets with potential service are included in this table.

In the 2012 Master Plan Forecasts, aircraft operations were divided into two categories, based on seats:

- **Mainline Airline:** Jet aircraft operations with approximately 100 to 150 seats.
- **Regional Airline:** Operations by turboprops or small jets with fewer than 100 seats.

The FAA also breaks out airline types for forecasting but under different parameters:

- **Air carrier operations:** Represent either takeoffs or landings of commercial aircraft with seating capacity of more than 60 seats.
- **Air taxi / commuter operations:** Represent one category of aircraft with 60 or fewer seats. Commuter operations include takeoffs and landings by aircraft that transport regional passengers on scheduled commercial flights. Air taxi operations include takeoffs and landings of non-scheduled or for-hire flights.

In addition to airline types, the FAA uses two enplanement categories for forecasting purposes:

- **Air carrier enplanements:** Includes domestic enplaned passengers (originations and connections) of U.S. commercial air carriers and international enplanements for both U.S. and foreign flag carriers.
- **Regional enplanements:** Starting in FY 2003, includes enplanements for those airlines whose primary function is to supply passengers to mainline carriers, regardless of aircraft size.

Aircraft that are commonly referred to in this Chapter, with model type and typical seat numbers are shown in **Table 2-2**. These do not represent all aircraft that may operate at STS today or in the future.

Table 2-2: Common Aircraft Specifications

Aircraft Designation	Manufacture	Seats	Notes
CRJ-200	Bombardier	50	phased out by 2023
CRJ-700	Bombardier	66 to 78	
CRJ-900	Bombardier	76 to 90	
E175	Embraer	76 to 88	
Q400	De Havilland	68 to 90	
MRJ 90	Mitsubishi	76	delivery starting 2020
E175-E2	Embraer	80	delivery starting 2021
737-700	Boeing	126 to 140	
737-800	Boeing	160 to 189	

Source: Aircraft planning manuals and SeatGuru.com

RESPONSE TO COVID-19

The forecasts for STS were scoped and developed prior to the onset on the COVID-19 pandemic. The draft forecasts use base year 2018, and they were submitted to the FAA in December 2019 and reviewed while the pandemic surged. The FAA returned comments, which were minimal, in August of 2020.

Ensuing comments indicated these forecasts should address the pandemic. At that point, forecasts were revised to discuss impacts and the potential for near-term recovery specific to STS and to revise the preferred enplanement forecast.

The COVID-19 pandemic has had widespread effects on the global economy with uncertainty for the aviation industry. The aviation industry in the United States has been greatly affected with both domestic and foreign airlines cutting back on flights because of the sudden drop in demand for travel. Uncertainty about when the demand for air travel will return remains, specifically regarding the near-to-mid-term effects of the pandemic, when the industry will return to 2019 activity levels, and long-term growth.

Successful containment and mitigation of COVID-19 is essential for the airline industry recovery. As of December 2020, the spread of COVID-19 continues, with the U.S. topping the world record in number of confirmed COVID-19 cases, according to the U.S. Centers for Disease Control and Prevention. Fortunately, the Food and Drug Administration approved a COVID-19 vaccine in December 2020. However, the timetable for administering and distributing the vaccine to the threshold of population that will provide herd immunity remains uncertain.

2020 STS Operations

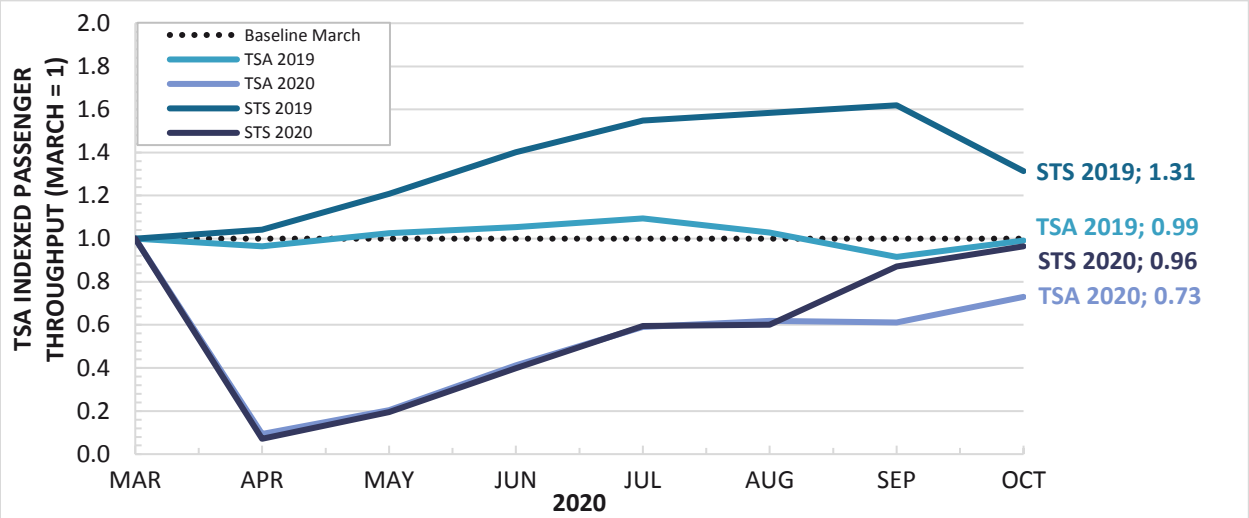
After the start of the COVID-19 pandemic and stay-at-home orders, STS passenger numbers dropped significantly, with 707 total enplanements during April 2020. The Transportation Security Administration (TSA) began reporting daily check point travel numbers in March 2020 and provides data for the same day in 2019 for comparison. **Figure 2-1** compares national indexed passenger throughput with STS passengers as reported by the TSA from March to October in 2019 and 2020. An index charts changes of variables relative to the baseline (March), which is equal to 1.0. An index greater than 1.0 indicates that the passenger number that month is above that of March, while an index below 1.0 shows that month had less passengers than in March.

Figure 2-1 helps illustrate enplanements at STS in 2020 compared to national enplanements, including:

- This drop in passengers at STS from March to April in 2020 was consistent with national trends for reduction in passenger travel.
- During the summer months as local and state travel restrictions were eased, enplanements at STS were at index 0.6 relative to baseline March, a similar rate to national passenger travel.
- In August 2020, enplanements at STS increased at a greater rate than national enplanements, moving closer to the March index, at 0.96 in October.

These trends, although small sample size, show that STS may recover at a rate faster than the national recovery. Of course, this is dependent on vaccine rollout, Sonoma County and California travel restrictions, passenger confidence, and economic health.

Figure 2-1: TSA Passenger Throughput Versus STS Passenger Records



Month	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
TSA 2019	1	0.964839	1.02503	1.054208	1.094	1.028838	0.915399	0.991971
TSA 2020	1	0.093542	0.203925	0.412123	0.590241	0.617768	0.611513	0.729563
STS 2019	1	1.041086	1.208608	1.40077	1.547597	1.584464	1.619039	1.313035
STS 2020	1	0.071295	0.19473	0.397922	0.594071	0.600456	0.870788	0.963821

Sources: Transportation Security Administration (TSA) passenger throughput, STS records

2008 Recession Recovery

A major driver to air travel demand, the economy goes through cycles of expansion and recession. Prior to the outbreak of COVID-19, the United States was experiencing a period of consecutive growth since the recovery from the 2008 Recession. According to the U.S. Bureau of Economic Analysis (BEA), beginning in June of 2009, Gross Domestic Product (GDP) rose every quarter until the first quarter of 2020. The BEA estimates that GDP in the United States decreased at an annual rate of 32.9 percent from the first quarter to the second quarter of 2020. The BEA also estimates a positive third quarter, where GDP increased at an annual rate of 33.4 percent over the second quarter as efforts continued to reopen businesses and activities resumed that were postponed or restricted due to COVID-19.

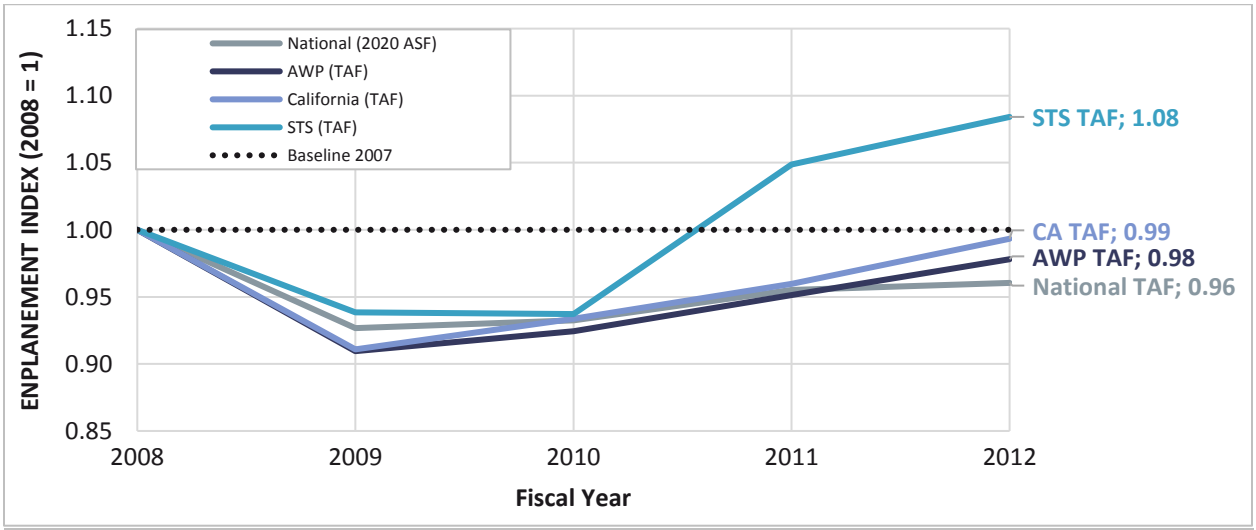
The economic downturn was preceded by widespread stay-at-home orders in early Spring of 2020, limiting travel and forcing non-essential businesses to close or limit production, resulting in economic activity to come to a near standstill. The effects of COVID-19 on the economy stopped a consecutive 11-year expansion of GDP in the U.S., the longest period of economic growth in history. While many regions have since begun reopening in late summer and early fall of 2020, the spread of COVID-19 continues to impact daily life and the economy as a result of social distancing guidelines and containment measures aimed to slow the spread of the virus.

One method of predicting when aviation demand may recover in the near-to-mid-term is to examine a previous period of declining demand and recovery. The most recent historical event that resulted in a significant decrease in aviation demand is the 2008 Recession brought on by the U.S. housing crisis. The Recession resulted in a significant drop in aviation demand, but not as significant as impacts from COVID-19 in 2020.

Relative to the national and state enplanement numbers during and after the 2008 Recession, STS recovered at a higher rate. **Figure 2-2:** shows the indexed enplanement records for STS, California, FAA Airports Western-Pacific Region (AWP), which consists of California, Nevada, and Arizona, and the United States from 2008 to 2012, with 2008 as the baseline year. This period covers the recession and recovery period. Years prior to 2007 have been excluded as STS did not have passenger service from 2004 to 2006. 2007 was the year service returned to STS but would be an outlier as a data point because service was just resuming. Enplanements at STS increased at an average annual rate of 2 percent from 2008 to 2012, while national enplanements decreased at an average of 1 percent annually, and California enplanements decreased at an average of 0.2 percent annually. Observing the historical enplanements at STS during the 2008 Recession and subsequent recovery, STS may be expected to recover at or better than state and national average rates post COVID-19.

STS has shown precedence in recovering from an economic event – the 2008 Recession – that negatively impacts air service demand. Enplanements recovering quickly from 2008 to 2012 followed by sustained growth shows the effects of the inelastic demand for air travel to and from STS as well as the potential for STS to see a relatively quick recovery from the COVID-19 pandemic. Thus, while COVID-19 has had a significant impact on air service in 2020, STS has the potential to recover from its effects quickly and continue growing on the trajectory it was in 2019.

Figure 2-2: Regional Comparison of Enplanement Indices



Fiscal Year	2008	2009	2010	2011	2012
National (2020 ASF)	1	0.926693	0.932586	0.955038	0.960463
AWP (TAF)	1	0.909509	0.924282	0.951419	0.978099
California (TAF)	1	0.910835	0.933556	0.959593	0.993347
STS (TAF)	1	0.938328	0.937162	1.048782	1.084169

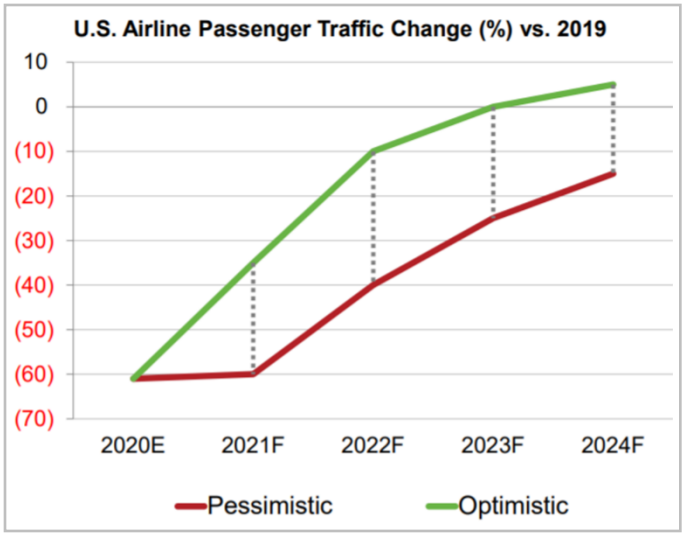
Sources: 2020 FAA Aerospace Forecast, 2020 TAF

Near-Term Recovery Scenarios

Near-term impacts and recovery are now included in the preferred enplanement and passenger aircraft operation forecasts. The preferred near-term recovery is based on local and national factors. It is recommended that STS monitor these forecasts for consistency to actual operations. If operations are significantly different once the pandemic is contained, than STS may need to revisit and revalidate. At that time, the forecast trajectory in the original three-phase forecast for enplanements and commercial operations may be valid again. Consultation with the FAA to update the forecasts to reflect this growth may be warranted at that time.

National analysis predicts various scenarios for returning to pre-pandemic levels of travel. Airlines for America (A4A), a trade group representing major north American airlines, predicts that national passenger volume will not return to 2019 levels prior to 2023-2024. **Figure 2-3** shows two passenger traffic recovery models developed by A4A: an optimistic model that shows passenger traffic returning to 2019 levels in 2023, and a pessimistic model that shows passenger traffic at 15 percent below 2019 numbers in 2024.

Figure 2-3: A4A Near-Term Passenger Traffic Models



Source: Airlines for America, Dec 2020

Similarly, in November 2020 the International Air Transport Association (IATA) forecasted global passenger enplanements to recover to 2019 levels by 2024. This forecast was developed prior to the vaccine being approved, but acknowledges the time it takes to deploy the vaccine and that COVID-19's economic impact will have lingering effects on passenger traffic recovery.

Sonoma County's tourism industry is one factor that can drive strong passenger traffic recovery. Leisure travel will likely surge after a full vaccine rollout and stay-at-home orders are lifted. Travelers have been under quarantine or social distancing measures for most of 2020, and many have been saving for getaway plans as restrictions lift and safety concerns decrease after being vaccinated. Another factor that would help drive strong recovery rates is the diverse market STS serves, with local, business, and leisure travelers. While there is uncertainty how steps made in remote working and technology during the pandemic will affect business travel in the long term, leisure travel has recovered more quickly both during the current pandemic and historically during downturns.

Two recovery scenarios for STS are presented: a conservative recovery, which is in line with the IATA projection of passenger demand returning to pre-COVID levels in 2024, and a strong recovery, which projects recovery in 2023.

Conservative Recovery

The conservative recovery at STS is factored primarily on the IATA's forecast that passenger enplanements will not recover to 2019 levels until 2024. The conservative recovery also assumes that vaccine rollout will be slow and disorganized and may not address new strains of COVID, which will lead to travel restrictions remaining in place and lower confidence to travel. Other factors include an economy that remains stagnant with lingering effects on joblessness and disposable income, business travel that remains below historical levels as companies conserve cash, and the onset of virtual meetings that displace future business travel.

Strong Recovery

A strong recovery at STS is predicated on the optimistic signs that STS has outperformed the national index for TSA throughput in 2020 and its historical tendency to recover from a global economic recession. STS also has a healthy mix of local, business, and leisure travel. This diversity in markets may help STS recover quicker than other markets that rely heavily on business or local travel. These factors would contribute to a strong recovery at STS:

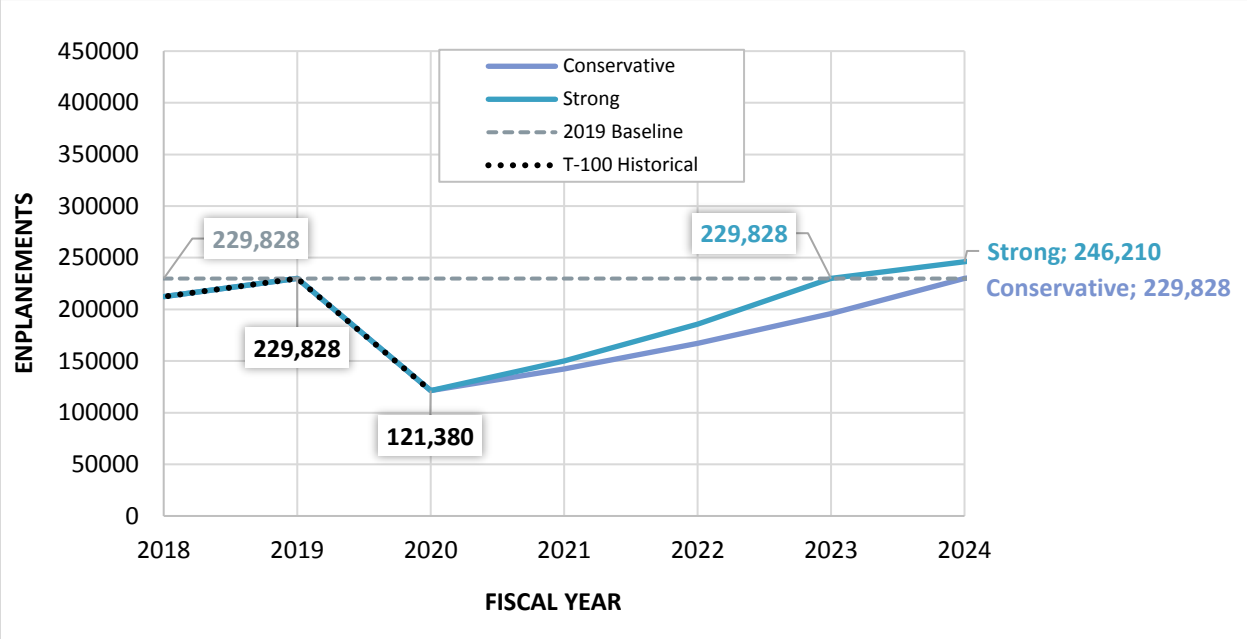
- Market diversity: The leisure market is forecasted to recover faster than business travel.
- Tourism market: Tourism decreased due to COVID-19 but is expected to rebound quickly after vaccine rollout.
- Domestic travel recovery: Domestic travel is expected to recover faster than international travel. While global markets are forecasted to return to pre-COVID levels in 2024 (IATA 2020), large domestic markets in North America are expected to drive recovery.
- Air service: STS continues to develop air service relationships and continues to market the airport to domestic and international carriers.

The approval of a vaccine in December 2020 with nationwide distribution is a promising development. Morgan Stanley Research recognizes the next 6–12 months contain risks from pandemic uncertainty, but historical trends suggest a faster rebound in passenger traffic. While cautious, based on recovery unknowns, Morgan Stanley Research predicts an optimistic timeline for domestic recovery thanks to pent-up demand, fewer competitors than in past global crises, and a more stable fuel-price outlook. Specifically:

- Based on current operational conditions, air travel demand could return to pre-COVID levels by late 2021 or early 2022.
- Airlines with high domestic leisure exposure, medium length of haul (500-2,800 miles), strong customer loyalty, and/or attractive fares will see demand come back first and have the best ability to play offense.
- Jet fuel prices should stay relatively low and steady over the next one to two years if crude oil prices hold steady.

Figure 2-4 shows the conservative and strong scenarios for near-term recovery at STS, with the strong recovery showing a return to 2019 enplanements in 2023, and the conservative recovery in 2024.

Figure 2-4: STS Recovery Scenarios



Fiscal Year	2018	2019	2020	2021	2022	2023	2024
2019 Baseline	229,828	229,828	229,828	229,828	229,828	229,828	229,828
T-100 Historical	212,463	229,828	121,380	-	-	-	-
Strong	-	-	-	150,164	185,774	229,828	246,210
Conservative	-	-	-	142,384	167,023	195,925	229,828

Source: Mead & Hunt, Inc.

COMMUNITY PROFILE

Sonoma County is a popular food and wine destination with multiple outdoor recreation attractions. STS serves as the only airport that has scheduled air service in the North Bay region. STS's primary service area includes Sonoma, Lake, and Mendocino counties, and parts of Humboldt, Marin and Napa counties. This makes STS a major point of access for visitors to Sonoma County and neighboring wine country communities, resorts, and businesses. STS has historically provided the community with connections through major hub airports such as SFO and LAX. The availability of these routes through STS provide the community an alternative to having to drive to the nearby larger airports like SFO, SMF, or OAK, the closest of which are SFO and OAK, each about 75 miles from STS. New service from STS to eastern hub airports in DEN and DFW has only increased airline and destination choices for passengers.

The community profile details the socioeconomic conditions of STS's catchment area, as shown in **Figure 2-5**. The catchment area is defined as the area from which an airport can reasonably expect to draw commercial air service passengers. Key socioeconomic indicators described in this section contribute to understanding the historical trends at STS for the past decade and the socioeconomic data used to help forecast aviation activity.

Figure 2-5: STS Catchment Area

Catchment Area Source: L&B 2019 Market Assessment Analysis

POPULATION

The State of California's Department of Finance provides projections of state, county, and local population. Decennial (10-year) census counts serve as benchmarks and estimates between census years. The Demographic Research Unit realigns ten-year growth patterns with bookend census data every decade. For example, the 2000 and 2010 censuses were used to adjust the population estimates for 2001 to 2009, while the current estimates are only benchmarked by the 2010 census until the 2020 census is completed.

The forecasted population data will be used in calculating enplanements per capita as a factor for the enplanement forecast. **Table 2-3** shows the population projections of the California Department of Finance for the next 20 years.

Table 2-3: Sonoma County Population Projections

Calendar Year	Population	Percent Change
2008	474,819	N/A
2013	493,454	3.9%
2018	502,866	1.9%
2023	518,482	3.1%
2028	536,490	3.5%
2033	553,463	3.2%
2038	567,702	2.6%
2008-2018 CAGR	**0.6%**	**N/A**
2018-2038 CAGR	**0.6%**	**N/A**

Source: California Department of Finance

EMPLOYMENT AND ECONOMIC DEVELOPMENT

Growth in air service demand can be directly tied to a growing local economy as more people travel for business and leisure. This increased demand can lead to possible growth in the number of nonstop routes offered at STS to popular hub airports and travel destinations. For example, when airlines find that many passengers are flying through STS to destinations such as Chicago or Hawaii by connecting through hub airports such as SFO or LAX, it becomes more likely that a nonstop route to the destination will be implemented.

The Sonoma County Economic Development Board uses the North Bay Business Journal Book of Lists to identify the top employers in the county. Top businesses in this list show the range of industries within Sonoma County. The local wine, tech, and health care industries are among the top contributors to the economy. These are the top employers with more than 1,000 employees in 2018:

- Kaiser Permanente – Integrated health care consortium with health plans and hospitals
- St. Joseph Health System – Not-for-profit organization healthcare service provider
- Keysight Technologies – Electronics test and measurement equipment software manufacturer
- Kendall-Jackson Winery – Vineyard and winery
- Sutter Santa Rosa Regional Hospital – Not-for profit hospital
- Amy's Kitchen – A natural and organic food manufacturer

Gross Regional Product (GRP)

GRP is the value of goods and services produced in Sonoma County and serves as an index for the health of the overall economy. GRP grows as more high-value goods are produced. The impact of one unit of a high-value good on the GRP is greater than one unit of a lower-value good, thus as the rate of production of high-value goods increases, GRP increases. The increase in GRP serves as an indicator of more commerce, which leads to an increase in business travel. The GRP per capita indicates that the 2007-2008 Great Recession decreased the GRP for Sonoma County an annual 0.4 percent from 2008 to 2013. The GRP per capita recovered to 2008 levels in 2013. **Table 2-4** shows Sonoma County's GRP for the past decade.

Table 2-4: Sonoma County Gross Regional Product

Calendar Year	GRP[1] ($ Millions)	Percent Change	GRP Per Capita[2]
2008	$24,798	N/A	$52,417
2013	$25,375	2.3%	$51,299
2018	$30,126	18.7%	$58,750
2023	$32,898	9.2%	$61,067
2028	$35,746	8.7%	$63,229
2033	$38,625	8.1%	$65,291
2038	$41,468	7.4%	$67,314
2008-2018 CAGR	**2.0%**	**N/A**	**1.1%**
2018-2038 CAGR	**1.6%**	**N/A**	**0.7%**

1 GRP represents 2018 dollars adjusted for inflation.
2 GRP per capita = GRP / Total Population
GRP Source: Woods & Poole
Population Source: California Department of Finance

At the more individual scale, income per capita is an indicator of the population's wealth. Income per capita in Sonoma County is expected to increase in the next two decades. The income per capita recovered to 2008 levels in 2013 and is projected to grow an average 0.83 percent annually. As citizens have more money to spend, they are more able to afford to travel and, especially by air. The increasing GRP per capita indicates the region's economic growth.

Woods & Poole (W&P) serves as the source data of these economic forecasts. W&P is an independent firm specializing in long-term county economic and demographic data projections. This data helps fill the gaps between official census years. W&P projections expect the county GRP to increase at a higher rate than the county population. This indicates an expected increase in production of high value goods and services such as growth in the tech and healthcare sectors.

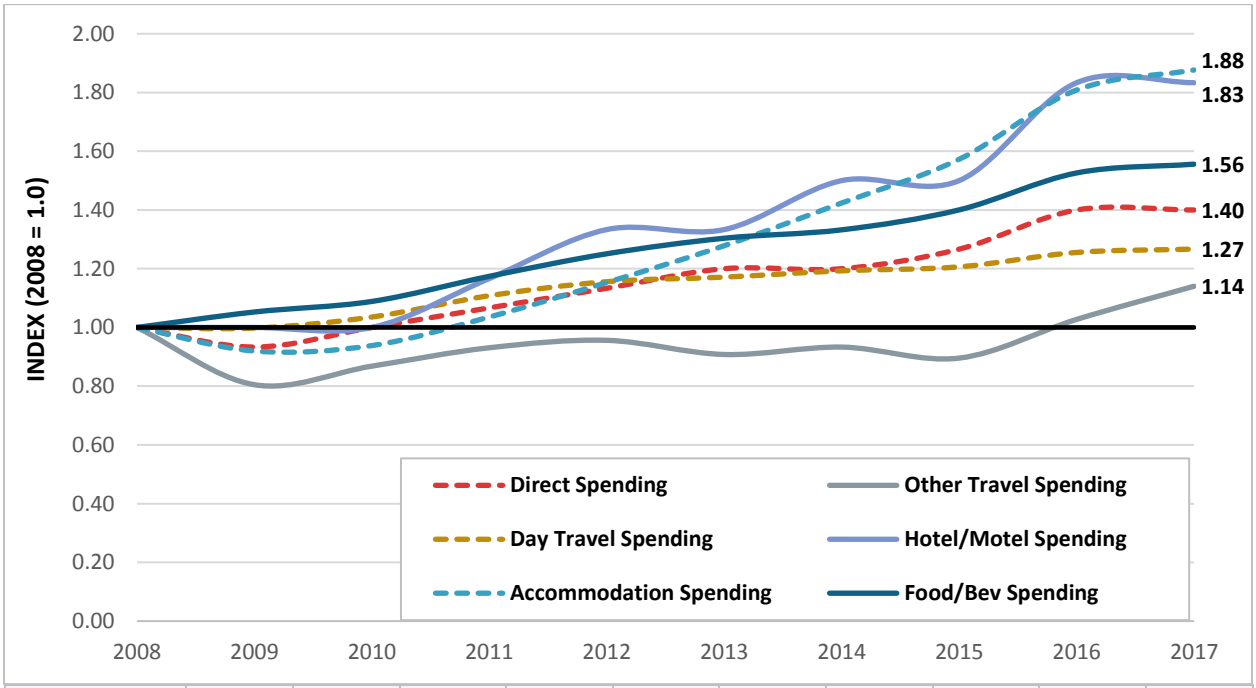
Tourism

Tourism is a mainstay of Sonoma County's economy. The Sonoma County region is known for its concentration of wineries, breweries, and vineyards, which attract both local and international travelers. Growing spending in tourism can lead to an increase in enplanements and demand for additional service or routes to and from STS. Tourism in the region has increased following the economic downturn of 2007-2008.

Total direct travel spending has increased an average 3.8 percent annually between 2008 and 2017 from $1.5 billion to $2.1 billion (Dean Runyan Associates for Visit California 2019). Accommodation spending showed the greatest increase in this period at an average annual rate of 7.2 percent, while food and beverage spending increased an average 5.0 percent annually.

The indexes in **Figure 2-6** show the economic impacts of travel spending in Sonoma County with 2008 as the baseline. Indexes show changes in variables relative to the baseline, so if the index is greater than 1.0, it has grown to a higher value than it was in 2008, while if it is below 1.0, it has decreased in value relative to 2008. **Figure 2-6** shows that travel spending increased between 2008 and 2017 with spending on accommodation (which includes hotels, vacation homes, and campgrounds) and food and beverage having increased the most. This growth in travel spending in Sonoma County helps explain the increase in the number of passengers going through STS and will also help determine if airlines can justify new routes and fill additional seats on larger aircraft.

Figure 2-6: Sonoma County Travel Economic Impacts



FY	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Direct	1.00	0.93	1.00	1.07	1.13	1.20	1.20	1.27	1.40	1.40
Day Travel	1.00	1.00	1.04	1.11	1.16	1.17	1.19	1.21	1.26	1.27
Accommodation	1.00	0.92	0.94	1.04	1.15	1.28	1.42	1.58	1.81	1.88
Other Travel	1.00	0.80	0.87	0.93	0.96	0.91	0.93	0.90	1.03	1.14
Hotel/Motel	1.00	1.00	1.00	1.17	1.33	1.33	1.50	1.50	1.83	1.83
Food/Bev	1.00	1.05	1.09	1.17	1.25	1.30	1.33	1.40	1.53	1.56

Source: Dean Runyan Associates for Visit California

Tourism has a significant impact on government tax revenue in the county due to the Transient Occupancy Tax (TOT), a tax charged to travelers when they rent a room at a hotel, at an inn, or at other lodging for stays fewer than 30 days. Annual total TOT revenue was the highest ever at $43.7 million in 2017. As of the writing of this forecast update, the 2018 TOT records have not yet been updated. The October 2017 wildfires cut the tourism season short but did not affect popular attractions such as wineries, breweries, and outdoor trails.

The main economic impact of the wildfire seemed to come from cancellations to accommodation reservations. However, the *2018 Sonoma County Annual Tourism Report* notes that temporary resettlement of displaced residents and influx of first responders helped offset reduction in visitor spending at restaurants and retail stores in the county.

FORECAST DATA REVIEW

The 2012 Master Plan generated the most recent forecast update. This section reviews the 2012 forecasts. This data will be compared to current operations and enplanements to show the precision of the previous forecasts. This section also reviews the Air Transportation Element (ATE) of the Sonoma County General Plan and the 2019 Market Assessment Analysis.

2012 Master Plan Forecasts

Airline service at STS resumed in 2007 after a period without service that started in 2001. Forecasts for air service enplanements and operations were developed shortly after commercial service resumed at STS in 2007. At that time, the forecasting effort was presented with challenges since most forecasting methods rely on historical data over the past 10 years to establish growth rates.

Table 2-5: 2012 Master Plan Forecast Summary

		2010	2015	2020	2025	2030
Mainline Airlines[1]	Annual Operations	0	3,358	3,925	4,504	5,270
	Average Daily Departures	0	4.6	5.4	6.2	7.2
	Annual Enplanements	0	128,202	150,848	174,005	204,415
	Daily Enplanements	0	351	413	477	560
Regional Airlines[1]	Annual Operations	4,380	2,774	2,920	3,212	3,395
	Average Daily Departures	6	3.8	4	4.4	4.7
	Annual Enplanements	92,659	72,734	78,782	88,368	95,324
	Daily Enplanements	254	199	216	242	261
Total[2]	Annual Operations	4,380	6,132	6,846	7,716	8,665
	Average Daily Departures	6	8.4	9.4	10.6	11.9
	Annual Enplanements	92,659	200,936	229,629	262,373	299,739
	Daily Enplanements	254	551	629	719	821
GA	Local Operations	23,987	53,020	55,833	58,796	61,916
	Itinerant Operations	46,751	84,057	91,728	97,298	103,203
	Based Aircraft	356	371	387	403	418

1 Mainline airlines defined as an aircraft with 100 to 150 seats and regional jests defined as aircraft with fewer than 100 seats.
2 Totals may not be accurate due to rounding.
Source: 2012 Master Plan

Because of these circumstances none of the more traditional approaches to projecting operational and passenger growth were regarded as suitable to the 2012 forecast effort. The traditional approaches included: market share of enplanements, time series analysis, enplanements per capita, and historical growth rate methodologies. The 2012 Master Plan stated that, "To the extent possible, the selected forecast should correlate with the County's General Plan 2020 Air Transportation Element." **Table 2-5 (above)** shows a forecast summary from the 2012 Master Plan.

Sonoma County Air Transportation Element

The ATE of the Sonoma County General Plan 2020 was approved in September 2008 and amended in January 2012. The purpose of the ATE was to "establish policies that will guide future growth and development of aviation activity and airport facilities in the County through the year 2020 in a manner consistent with the goals and policies established in other elements of the General Plan." The ATE looked to guide aviation facilities development and activity by outlining standards for determining consistency of airport plans with the County General Plan. The ATE was amended in 2012 to bring the forecast numbers in line with the 2012 Master Plan forecasts.

ATE Policies

The ATE outlined goals, objectives and policies as related to scheduled air service at STS (Section 5.5 of the ATE). Policy AT-5b specifically set a limit by air carrier service to 21 daily departures, with these allocations distributed between regional carriers and mainline carriers. The ATE defines regional carriers as turboprops and regional jets with 99 or fewer seats and mainline carriers are defined as passenger service jets with approximately 100 to 150 seats. The specific policy includes these stipulations (Sonoma County Permit and Resource Management Department, 2012):

- *All 21 departure allocations may be used by regional carriers.*
- *Mainline carriers may use no more than 7 departure allocations.*
- *Regional carriers shall not be required to give up a departure allocation that is already in use by or allocated to a regional carrier for a mainline carrier.*
- *At no time shall mainline carriers utilize more than 7 of the 21 departure allocations.*

These are other policies from the ATE applicable to passenger service that may be affected by the enplanement and operations forecasts:

- *Policy AT-5e: Any proposed improvement projects to accommodate air carrier passenger services shall be consistent with 15,200 annual operations and 573,000 annual passengers.*
- *Policy AT-5f: A review by the Board of Supervisors shall occur at such a time that the "review threshold" of 650 enplaned air carrier passengers per day averaged over a one-year period (474,500 annual passengers) is reached. The review anticipated by this section is not intended to require an amendment to the Air Transportation Element nor is it intended to require review of this element in its entirety; rather it is intended to trigger Board consideration of the environmental and health impacts and infrastructure needs of the Charles M. Schulz - Sonoma County Airport as it relates to its immediate environs.*

Note that the ATE refers to passengers, defined as the total arriving and departing passengers. Airport planning documents generally forecast enplanements, or departures only (or, one passenger). For STS forecasts, one enplanement equals two passengers (arrival and departure). The enplanement totals for Policy AT-5e are 286,500 and for Policy AT-5f, 237,250 enplanements.

The ATE will guide future growth and development of aviation activity and airport facilities in the County through the year 2020. With the ATE plan set to reach its lifespan, the preferred forecasts in this ALP update may be used to update the goals and policies of the ATE.

2019 Market Assessment Analysis

L&B produced a Market Assessment Analysis in March 2019. The 2019 Market Assessment Analysis is an independent analysis and forecast used to supplement and support the forecasts presented with this ALP update. The Analysis is an important source of data that shows how commercial enplanements and operations at STS are growing at a high rate, with near-term projections for specific routes. These are some of the key findings (Landrum & Brown 2019):

- *Catchment Area bookings increased about 12 percent versus 2015, reflecting strong regional economic growth. This growth was not even, as enplanements to Mexico were not as strong.*
- *Since 2015, STS has been the sixth fastest growing airport in the U.S., increasing enplaned passengers by almost 60 percent.*
- *STS generated traffic growth by mostly increasing share of bookings regionally from five percent to nine percent.*
- *Most of success to-date has been by attracting new service to markets largely reliant on point to point origin and destination traffic.*
- *With recent additions of DEN and DFW service, growth in east-west traffic flows will occur and will be driver of future air service growth.*

The Market Assessment Analysis recommended that STS:

- Work to increase capacity to recently announced new routes, including:
  - PHX: Increase frequency from 2x then 3x daily year-round service
  - DEN: Up-gauge to larger aircraft (CRJ to CR9/E175) and increase frequency from once daily to three times daily.
  - DFW: From seasonal to year-round, and eventually increasing frequency to 3x daily on CR9/E175 aircraft
- Target largest booked origin and destination markets with connecting traffic potential.
  - Chicago O'Hare and Salt Lake City service
  - Longer-term, Houston and Atlanta will be options
  - United, American, Frontier, Delta & Sun Country Airlines are all options
- Additionally, STS should aggressively recruit low cost carrier service to selected Hawaiian and Mexican points.
  - Primary Targets: Guadalajara & Hawaii service
  - Mexico: Focus will be VolarisAirlines, although VivaAerobus is also a target; driven by large Hispanic population base in catchment area
  - Hawaii: Alaska Airlines; strong STS demand to Hawaii

SCHEDULED COMMERCIAL SERVICE FORECASTS

Updated forecasts for passenger service are presented below, including both enplanements and scheduled commercial operations. The airline service profile introduces historical and current service and describes the sources of data used. This is followed by the forecasts for enplanements and operations with methodologies explained.

A pivotal change to the airfield at STS occurred in 2014 that has had a profound effect on air service: Runway 14/32 was extended to 6,000 feet. This made it possible for regional jets and mainline aircraft to operate to and from STS. This also made it feasible for destinations to be served that previously were not physically possible.

In the five years since Runway 14/32 was extended, STS has seen the addition of five airlines and five destinations. The 2019 Market Assessment Analysis anticipates that additional service will be added over the next several years. Over the next five years, additional service is expected as airlines introduce service to test the economic viability of new markets. In the five- to ten-year timeframe, the air service market at STS is expected to reach maturity. After this stage and the introduction of new service, the rate of growth is expected to slow to more closely match trends in California and the United States. Possible forecasting methodologies will be evaluated for their ability to address near-term rapid growth and slower growth as the market reaches maturity.

Airline Service Profile

The aviation activity profile provides context for historical trends in airport activity and attempts to explain the changes that have occurred. The profile serves as a baseline for the forecasts and includes information on passenger airline service and GA activity.

Airline service encompasses scheduled passenger flights and non-scheduled charter flights. The following sections describe the current airline service profile, opportunities for additional air service, passenger enplanements, and commercial operations at STS.

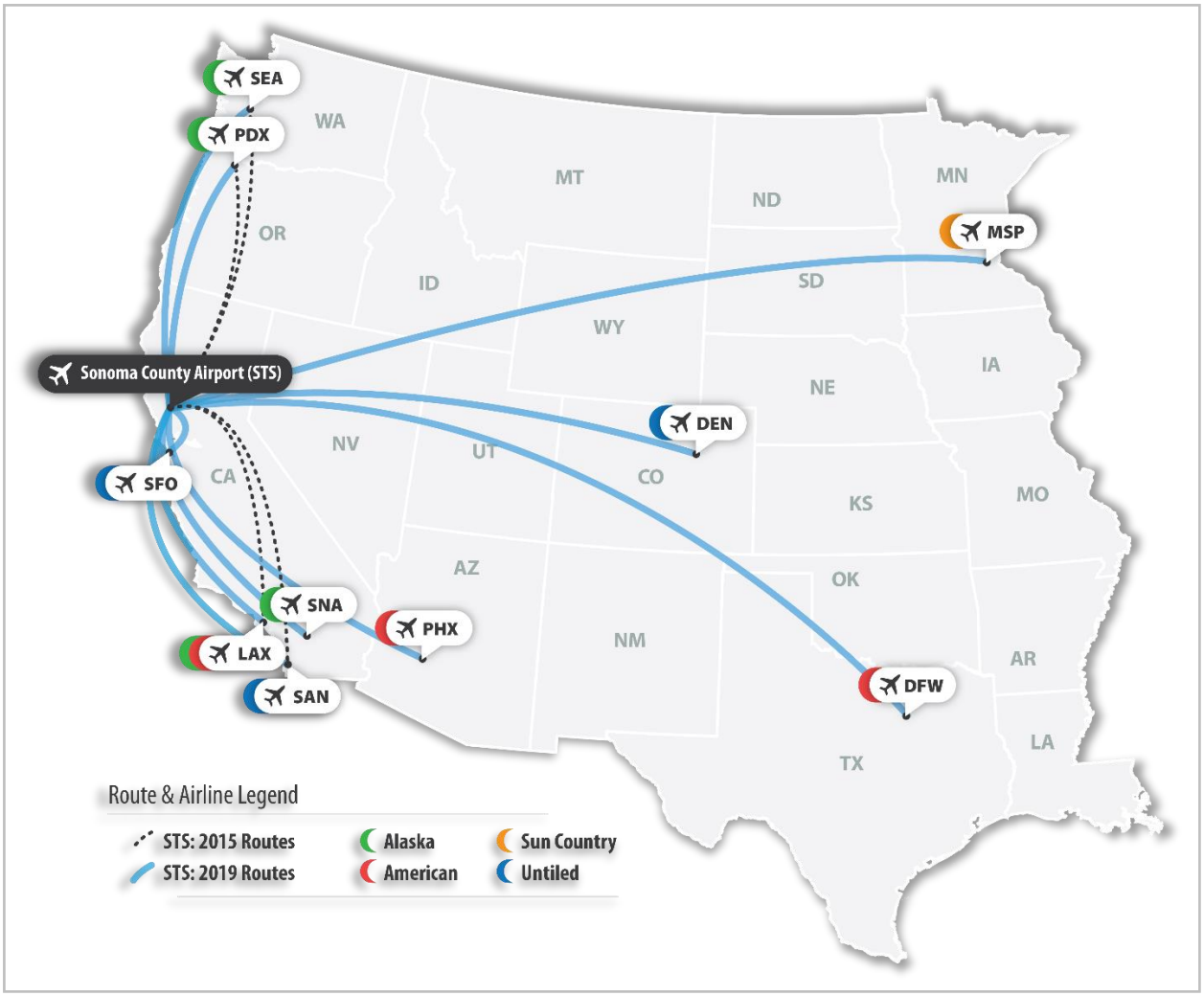
Tables are consolidated at the end of the section.

Airline Profile

After a period without air service starting in 2001, Horizon Air, a subsidiary of Alaska Airlines, began servicing STS as the sole airline from 2007 to 2016. In 2016 Allegiant Air began service at STS. American Airlines, United Airlines and Sun Country Airlines started service at STS in 2017.

Four scheduled passenger airlines served STS in 2018: Alaska Airlines, American Airlines, United Airlines, and Sun Country Airlines. Alaska Airlines' service is operated by regional airline Horizon Air and SkyWest Airlines, American Airlines is operated by SkyWest, Compass, Envoy, and Mesa Airlines, and SkyWest also operates United flights. A daily non-stop service to DFW began on June 6, 2019. Non-stop service at STS, as of July 2019, is shown in **Figure 2-7**. The comparison with the 2015 routes shows the growth in non-stop routes in the past four years.

Figure 2-7: STS 2015 & 2019 Route Map



Source: Mead & Hunt, Inc.

New Air Service Opportunities

Potential new service routes are identified in the 2019 Market Assessment Analysis. New air service opportunities would be accomplished by establishing non-stop service to hub airports and potentially leisure travel destinations. The Market Assessment identified SLC, ORD, and Hawaii as potential destinations, among others. Service to new hub airports may affect existing hub route load factors, for example, when passengers choose to fly to one of the new hub airports such as SLC rather than flying to LAX. Additionally, passengers would no longer have to fly from hubs such as SFO or LAX to destinations such as ORD non-stop. **Table 2-6** shows the market share for origin and final destinations (O&D) for passengers using STS.

Passenger Enplanements

The FAA TAF defines a passenger enplanement as a passenger who boards a scheduled commercial or chartered aircraft with more than nine seats for turboprops, or any number of seats for jet aircraft. Passenger enplanements include revenue and non-revenue passengers who paid taxes and passenger facility charges (PFC) for their carriage. Passenger enplanement counts do not include pilots, flight attendants, and any other members of the airline crew.

Passenger enplanements are categorized as air carrier or regional enplanements, depending on the type of carrier operating the route. For example, passengers on a United A320 flown by United pilots would be categorized as air carrier enplanements, whereas passengers on a United CRJ-900 flown by SkyWest pilots would be categorized as air taxi enplanements.

Enplanements are recorded and categorized by the U.S. Department of Transportation (USDOT), Bureau of Transportation Statistics through T-100 reports. Estimates include both scheduled and non-scheduled enplaned passengers.

- **Air carrier enplanements:** Includes domestic enplaned passengers (originations and connections) of U.S. commercial air carriers and international enplanements for both U.S. and foreign flag carriers.
- **Regional enplanements:** Starting in FY 2003, the FAA included in the regional category enplanements for those airlines whose primary function is to supply passengers to mainline carriers, regardless of aircraft size. As of October 2002, all scheduled and non-scheduled operations using aircraft with 10 or more seats to transport regional passengers must report on T-100.

Historical enplanement data for STS is obtained from the USDOT T-100 database. The source of T-100 data comes from the T-100 forms that scheduled, charter passenger, and air cargo airlines fill out monthly. The T-100 data accounts for any operations that may take place outside of Air Traffic Control Tower (ATCT) operating hours (7 a.m. to 8 p.m.). Enplanements from 2008 to 2018 are shown in **Table 2-7**. Until 2016, all enplanements at STS were categorized as air taxi (regional) operations, since the airlines servicing STS were regional airlines, such as Sky West, Horizon, and Mesa airlines feeding the mainline carrier. In 2016, Allegiant and Sun County airlines – categorized as air carriers, began operating at STS.

T-100 vs TAF Enplanement Records

The FAA TAF is the official forecast that the FAA Headquarters prepares annually for each airport in the National Plan of Integrated Airport Systems (NPIAS). The TAF uses the FAA fiscal year (October to September). The TAF data comes from the USDOT T-100 database, ATCT records, and the FAA Form 5010, which airports submit annually to the FAA.

The TAF is a generally reliable source of information. However, TAF data tends to lag a year behind airport records and the more frequently updated T-100 data. The T-100 is more up to date and as a result, the forecast for scheduled air service is based on the more accurate data from the T-100. **Table 2-8** shows the difference between historical TAF and T-100 enplanement records.

Airline Operations

The seating capacity of the operating aircraft determines the type of commercial operations. Like enplanements, commercial operations are also separated into two categories. Enplanements are separated based on the size of aircraft with the definition provided by the FAA's TAF.

- **Air carrier operations:** Represent either takeoffs or landings of commercial aircraft with seating capacity of more than 60 seats.
- **Air taxi / commuter operations:** Represent one category of aircraft with 60 or fewer seats. Commuter operations include takeoffs and landings by aircraft that transport regional passengers on scheduled commercial flights. Air taxi operations include takeoffs and landings conducted on non-scheduled or for-hire flights.

Historical airline operation data for STS was also obtained from the T-100 database. Airline operations for 2008 to 2018 are shown in **Table 2-9**.

Actual Enplanements and Operations Versus 2012 Master Plan

Table 2-10 shows a comparison between the 2012 Master Plan forecasts and 2018 T-100 numbers for commercial operations and enplanements. This table helps illustrate the accuracy of the 2012 Master Plan forecasts. As shown, the enplanement totals from the 2012 Master Plan and actual (year 2018) are within a few thousand. However, the 2012 Master Plan shows a more even distribution of mainline and regional operations. Actual data shows almost 99 percent of operations at STS are by regional carriers. This results in more total commercial operations, since smaller aircraft are used to accommodate passenger demand.

Scheduled Passenger Airline Load Factor

Load factor is a metric that airlines use to determine performance and is a method for showing the difference between supply and demand. It is calculated by dividing the number of passengers (demand) by the number of available seats (supply). The load factor increases as demand approaches supply and decreases when supply increases faster than demand. Load factors at STS have ranged between 70 and 85 percent in the past 10 years. **Figure 2-8** shows the average load factor for passenger airlines for the past 10 years.

The average load factor for all scheduled flights from STS has declined each year since FY 2014. The average load factor in 2014 was 84.6 percent, in 2018 it had dropped to 73.8 percent. Some of this average decline may be due to low initial load factors associated with the introduction of new airlines and destinations. However, service to DEN and DFW introduced in 2019 saw load factors as high as 90 percent on average for both routes. While these high load factors suggest that there is unmet demand for additional passenger service at STS, they do not support the concept of low initial load factors being typical for newly introduced service. The short tenure of Allegiant and current low load factors for Sun County to Minneapolis-Saint Paul suggest that the market for service from ultra-low-cost carriers is still being defined. As is discussed in the section that follows, airlines balance load factors with fare prices when considering whether to initiate or continue service.

Table 2-6: Market Share for O&D Passengers at STS

Destination	PDEW[1]	Market Size
Los Angeles	238.8	87,162
New York City[2]	213.2	77,818
Chicago[3]	153.2	55,918
Denver	144.5	52,743
Newark	142.0	51,830
Atlanta	138.8	50,662
Boston	134.0	48,910
Dallas-Fort Worth	133.6	48,764
San Diego	124.2	45,333
Las Vegas	113.1	41,282
All Markets	**4,963.9**	**1,811,824**

1 PDEW: Passengers Daily Each Way
2 New York includes LaGuardia (LGA) and John F. Kennedy International (JFK).
3 Chicago includes O'Hare (ORD) and Midway (MDW).
New air service opportunities may also come from changes in aircraft equipment. Airlines are transitioning from smaller, 50-seat aircraft such as the CRJ-200 to larger regional jets like the E175, CRJ700 and 900, and narrow-body jets such as the Boeing 737. This increase in seating capacity makes longer routes possible and more viable, provided the market has demand to fly the routes and fill additional seats. Sun Country has been transitioning from the Boeing 737-700 (126 seats) to the 737-800 (183 seats). Skywest has both the Mitsubishi MRJ 90 and the Embraer 175-E2 (both 76-seat jets) on order with delivery starting 2020 and 2021, respectively.
Source: Landrum & Brown, STS 2019 Market Assessment Analysis

Table 2-7: STS Historical Passenger Enplanements

Fiscal Year	Air Carrier Enplanements	Regional Enplanements	Total Enplanements	Annual Total % Change
2008	0	96,782	96,782	N/A
2009	0	97,849	97,849	1.1%
2010	0	104,869	104,869	7.2%
2011	0	114,013	114,013	8.7%
2012	0	116,321	116,321	2.0%
2013	0	122,912	122,912	5.7%
2014	0	126,016	126,016	2.5%
2015	0	132,361	132,361	5.0%
2016	4,564	151,464	156,028	17.9%
2017	9,495	185,527	195,022	25.0%
2018	3,883	208,580	212,463	8.9%
CAGR[1]	N/A	8.0%	8.2%	N/A

1 CAGR: Compounded Annual Growth Rate
Source: 2018 USDOT T-100

Table 2-8: STS Historical Enplanement T-100 and TAF Comparison

Fiscal Year	T-100	2019 TAF	Total Difference	% Difference
2008	96,782	96,900	-118	-0.1%
2009	97,849	90,924	6,925	7.6%
2010	104,869	90,811	14,058	15.5%
2011	114,013	101,627	12,386	12.2%
2012	116,321	105,056	11,265	10.7%
2013	122,912	110,740	12,172	11.0%
2014	126,016	115,464	10,552	9.1%
2015	132,361	124,040	8,321	6.7%
2016	156,028	158,738	-2,710	-1.7%
2017	195,022	192,316	2,706	1.4%
2018	212,463	210,142	2,321	1.1%
CAGR[1]	**8.2%**	**8.0%**	**N/A**	**N/A**

1 CAGR: Compounded Annual Growth Rate
Source: 2018 USDOT T-100 and FAA TAF

Table 2-9: STS Historical Airline Operations

Fiscal Year	Air Carrier Operations > 60 seats	Air Taxi Operations ≤ 60 seats	Total Operations	% Change
2008	3,650	0	3,650	N/A
2009	3,474	0	3,474	-4.8%
2010	3,478	0	3,478	0.1%
2011	3,558	0	3,558	2.3%
2012	3,632	0	3,632	2.1%
2013	3,856	0	3,856	6.2%
2014	3,920	0	3,920	1.7%
2015	4,158	0	4,158	6.1%
2016	5,032	0	5,032	21.0%
2017	6,072	672	6,744	34.0%
2018	6,246	1,956	8,202	21.6%
CAGR[1]	**5.5%**	**N/A**	**8.4%**	**N/A**

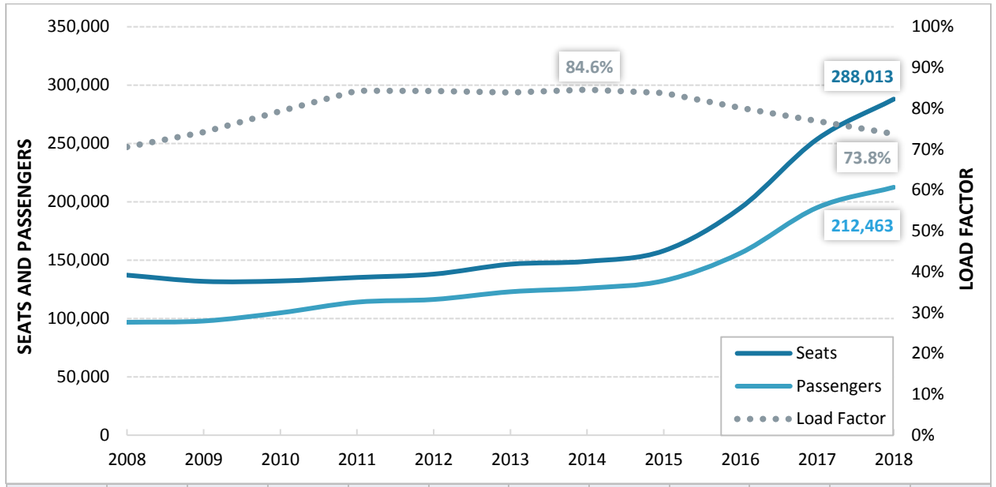
1 CAGR: Compounded Annual Growth Rate
Source: 2018 USDOT T-100

Table 2-10: Actual Enplanements and Operations Versus 2012 Master Plan

Carrier and Operations		2012 Master Plan			Actual
Carrier	**Operations**	**2015**	**20182**	**2020**	**2018**
Mainline Airlines[1]	Annual Operations	3,358	3,698	3,925	76
	Average Daily Departures	4.6	5.1	5.4	0.1
	Annual Enplanements	128,202	141,790	150,848	3,883
	Daily Enplanements	351	388	413	11
Regional Airlines[1]	Annual Operations	2,774	2,862	2,920	8,126
	Average Daily Departures	3.8	3.9	4	11.1
	Annual Enplanements	72,734	76,363	78,782	208,580
	Daily Enplanements	199	209	216	571
Total[3]	Annual Operations	6,132	6,560	6,846	8,202
	Average Daily Departures	8.4	9	9.4	11.2
	Annual Enplanements	200,936	218,152	229,629	212,463
	Daily Enplanements	551	597	629	582

1 Mainline airlines defined as an aircraft with 100 to 150 seats and regional jests defined as aircraft with fewer than 100 seats.
2 2012 Master Plan forecast year 2018 extrapolated using linear growth between 2015 and 2020.
3 Totals may not be accurate due to rounding.
Sources: 2012 Master Plan and T-100 data

Figure 2-8: STS Historical Average Load Factor, Available Seats, and Passengers



Category	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Seats	137,156	131,824	132,152	132,158	138,016	148,528	148,960	158,004	194,726	253,602	288,013
Passengers	96,782	97,849	104,869	114,013	116,321	122,912	126,016	132,361	156,028	195,022	212,463
Load Factor	70.6%	74.2%	79.4%	84.4%	84.3%	83.9%	84.6%	83.8%	80.0%	76.9%	73.8%

Data presented includes passengers, seats, and load factors for outbound travel.
Source: USDOT T-100.

Passenger Enplanement Forecast

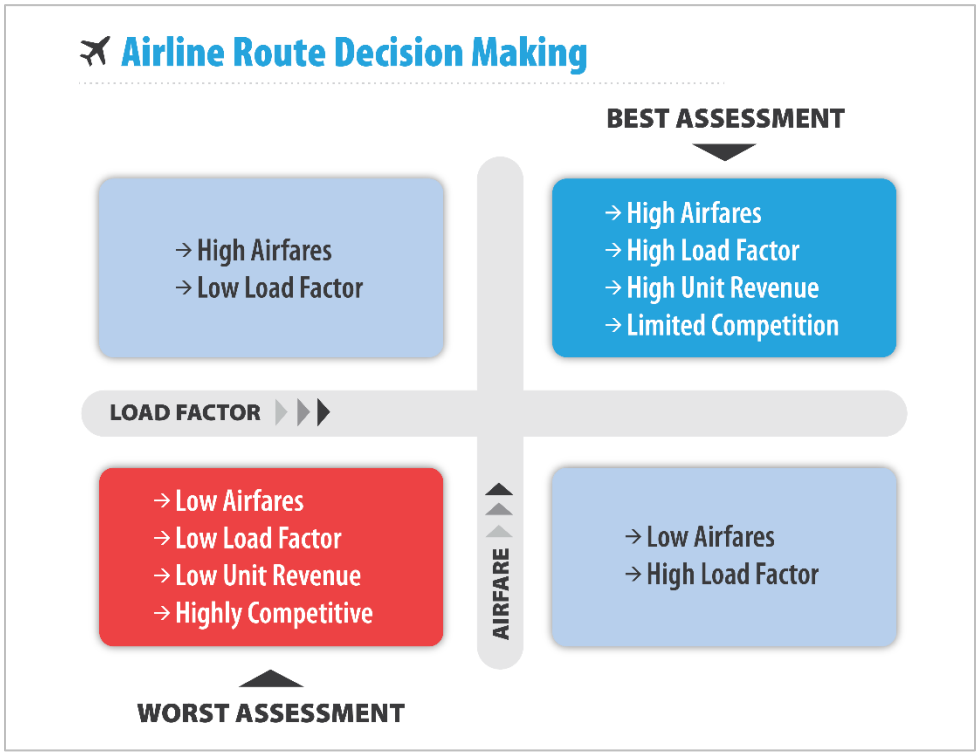
Enplaned passengers are an important forecasting metric, because the majority of airport revenues are generated directly or indirectly from enplaned passengers. At STS, enplanements have risen sharply over the past five years, and forecasting enplanements 20 years out may be uncertain for two reasons:

- STS is considered an emerging air service market that will mature within 20 years, making growth rates variable over this timespan.
- The lack of historical data available makes it a challenge to predict when the air service market at STS will mature.

Because of these uncertainties, various methodologies were considered. These are examined below, and a preferred methodology and enplanement forecast are identified.

When forecasting passenger enplanements in a market experiencing rapid growth, the addition of service to new destinations, and the addition of service by new airlines, it is important to understand how airlines evaluate potential new service. **Figure 2-9** presents a matrix of four classes of markets based upon their load factor and airfare. From an airline perspective the most desirable market is one where flights will be full (high load factors) and higher than average airfares can be charged. In contrast the least desirable market is one with lower load factors where average or below average fares can be charged.

Figure 2-9: Airline Route Decision Matrix



Source: Mead & Hunt, Inc.

As noted previously, the trend in load factors at STS is mixed as of June 2019. Average fares at STS are lower than fares at other regional airports, such as SBA and MRY. Competition is currently very strong at STS. These circumstances will change as the market at STS matures and ultimately reaches an equilibrium with other airlines in the region.

Enplanement Forecast Methodologies Considered and Rejected

To be useful in this forecasting effort, methodologies must be able to address rapid growth in the short term with slower growth rates as the market for air service matures at STS. The methodologies in this section were deemed unsuitable for the circumstances at STS.

2019 TAF

The 2019 TAF presents the FAA's current forecast for STS. The rapid growth in enplanements over the last few years has been reflected in significant year-to-year changes in the TAF for STS. The TAF forecasts for STS were updated during production of these forecasts, and now reflect the actual growth in enplanements that has occurred over the past three years. This is a significant change from the 2018 TAF: the 2018 TAF showed minimal change in enplanements in 2018 and 2019, low growth in the near term, and a compounded annual growth rate of 1.9 percent over the next 20 years. The 2019 TAF shows high growth in enplanements over the next 5 years before leveling off to a moderate growth rate over the planning period. The 2019 TAF has a compounded annual growth rate of 3.2 percent over the next 20 years. The 2019 TAF forecast was released prior to the COVID-19 pandemic that has decreased domestic and international airline travel.

Regression Analysis

Regression analysis uses historical data to measure the degree of correlation between two or more variables. Regression takes strongly correlated variables and uses the forecasted values to help predict another. Recent history at STS and the 2019 Market Assessment Analysis indicate a high potential for sharp, near-term growth from additional service. A single, daily flight by a regional airline can add more than 27,000 seats annually. As current enplanements at STS number in the 200,000s, adding one flight would represent sharp growth relative to existing enplanements.

Regression modeling of county population, service area population, GRP, and county employment were considered. However, these factors are very stable and do not reflect the rapid, short-term changes that STS has been experiencing. As a result, regression modeling was not used because of its inability to reflect these short-term changes.

Market Share Analysis

Market share analysis projects enplanements at STS as a percentage of enplanements forecast for a larger geographic area, such as the region, state, or nation. The forecasts for the larger geographic area are typically those made by the FAA, but other sources could be used. This method has the same limitation as the regression method. It is unable to reflect sharp, near-term growth, and as a result, was not used in forecasting.

Enplanement Forecast Methodologies Evaluated

Three forecasting methods based on more STS-specific data and conditions were tested and compared.

TAF Rate

The compounded annual growth rate from the 2019 TAF, 3.2 percent from 2019 to 2038, was applied to the 2018 T-100 enplanement number. This methodology has the advantage that it uses the growth rates forecasted by the FAA specifically for STS. In the five years since the main runway was extended, passenger enplanements have grown about 60 percent. However, a five-year history is too short to establish a long-term trend. Various economic factors may cause year-to-year volatility and could result in loss of service on some routes. Such factors include:

- Shift of passengers from Alaska Airline's flights to connect to a hub airport for a direct flight to the destination airport.
- Discontinuance of service on a new route after a trial period, if an airline believes that greater revenues could be realized on another route.
- Cyclical national economic downturns.

Over the 20-year forecast period, these and other factors can be expected to introduce variability that will reduce the average growth rate from the previous five-year trend. The TAF forecasts a 3.2 percent compound average growth through 2038. Applying this growth rate to the 2018 T-100 enplanement count yields a 2038 forecast of 400,371 enplanements. Initial growth may be delayed due to the COVID-19 pandemic. However long-term projections remain for the TAF rate methodology with the assumption that air travel will return to pre-COVID levels.

2012 Master Plan Rate

The constant growth rate from the 2012 Master Plan forecast was applied to the 2018 T-100 enplanement number. The 2012 Master Plan growth rate was based upon projections made by air service specialists at that time. Air service had only been reestablished for three years at the time that 2012 Master Plan was written. This duration provided limited ability to evaluate the plausibility of the project service increases. As a result, the 2012 Master Plan forecast rate could not have been informed by the growth in air service and enplanements since 2016. As shown in **Table 2-10** above, the 2012 Maser Plan forecast proved to be an effective forecast methodology, even lacking historical data. Applying the 2012 Master Plan rate to the 2018 T-100 enplanements is retained for evaluation.

Three-Phase Methodology

This methodology uses a Three-Phased approach. The first five years include consideration of the flights added in 2018 and 2019, and the routes the Market Assessment Analysis identified as most likely to be added. This period is expected to experience a rapid growth rate similar to the last four years. The second phase, which addresses the subsequent five-year period (2023-2028), uses a per capita enplanement rate based upon a peer airport as a goal for 2028. During this period enplanements increase in a linear manner and reach a benchmark tied to the peer airport in 2028. The growth rate during the second phase will be slower than in the first five years. In the third phase, or last 10 years of the forecast, the 2019 TAF growth rate for 2028-2038 is used to represent growth in a mature market.

The following paragraphs discuss the forecasts for these periods in greater detail. This rapid growth in phase one will likely be delayed due to the COVID-19 pandemic. However, long-term projections remain for the three-phase methodology with the assumption that air travel will return to pre-COVID levels.

The first phase from 2019 to 2023 reflects the potential new routes the airport expects to add in the next five years. Potential service mentioned in the 2019 Market Assessment Analysis includes service to SLC and ORD in the next two to three years, which helps further connect STS to the eastern U.S. Conversely, service to ORD or other cross-country routes may not be feasible for airlines, but these destinations and additional enplanements may be realized with additional daily service to DEN, PHX or DFW.

The second phase of the Three-Phase forecast is a transition from rapid initial growth in enplanements to rates reflecting a maturing market. The growth rate for this phase considered two peer airports identified as having markets like STS: SBA and MRY. These airports were considered as potential peer airports due to:

- **Proximity to larger commercial service airports:** STS is located approximately 75 miles from SFO. SBA to LAX is approximately 105 miles, and MRY to SJC is approximately 75 miles.
- **Similar population profiles:** According to updated census data, Sonoma County's population is 504,000 people. Monterey County has 438,000 people, and Santa Barbara County has 448,000 people. Although this does not include the entire population for each catchment area, these county population numbers represent a significant portion of the catchment area and show that each county has a similar population.
- **Tourist destinations:** Each airport and the surrounding area is attractive to tourists for similar reasons: the California coast, wineries, parks, cosmopolitan towns, historic sites, and outdoor activities such as golf, hiking, camping, or biking.
- **Relatively affluent areas:** Each area also has a strong population base that can support a non-hub airport. The economies of each county where the airports are located were compared to the rest of California. The GRP and income were compared by standardizing both variables on a per capita basis to account for any population and size differences by county. Both GRP per capita and income per capita for Sonoma, Santa Barbara, and Monterey Counties are higher than the state averages in **Table 2-11**.

The goal was to identify a peer airport(s) with a mature market. The rate of enplanements per capita in the peer airport would be used as a benchmark for STS. Once this benchmark is reached, STS's market would be considered mature. Subsequent growth would follow broader regional and national trends.

The 2028 enplanements per capita for Santa Barbara County and Monterey County were calculated and compared to the current ratio of STS. Their respective ratios were:

- STS: 0.42 enplanements per capita
- SBA: 0.83 enplanements per capita
- MRY: 0.41 enplanements per capita

Although MRY shares many characteristics with STS, it has been rejected as a peer airport. Its per capita enplanement ratio is lower than STS's current rate. Because STS is experiencing rapid growth in enplanements, its enplanement per capita ratio is expected to continue to grow.

Table 2-11: Peer Airport GDP and Income Comparison

Year	Sonoma County		Santa Barbara County		Monterey County		California Average by County	
-	GRP[1]/Capita (Millions)	Income/ Capita	GRP[1]/Capita (Millions)	Income/ Capita	GRP[1]/Capita (Millions)	Income/ Capita	GRP[1]/Capita (Millions)	Income/ Capita
2008	$0.052	$52,301	$0.057	$54,986	$0.051	$49,314	$0.049	$44,134
2009	$0.050	$50,086	$0.058	$53,059	$0.052	$48,734	$0.047	$42,224
2010	$0.050	$49,806	$0.056	$52,909	$0.052	$48,485	$0.047	$42,612
2011	$0.050	$51,002	$0.057	$55,342	$0.050	$48,471	$0.048	$44,022
2012	$0.049	$51,958	$0.057	$56,693	$0.051	$49,120	$0.048	$45,579
2013	$0.051	$53,005	$0.058	$55,239	$0.053	$49,596	$0.049	$45,168
2014	$0.054	$55,090	$0.059	$57,215	$0.053	$51,356	$0.051	$47,037
2015	$0.058	$59,139	$0.061	$60,698	$0.056	$55,712	$0.053	$49,979
2016	$0.059	$60,760	$0.060	$60,202	$0.056	$56,335	$0.055	$50,884
2017	$0.058	$60,758	$0.062	$60,905	$0.057	$54,930	$0.055	$51,737
2018	$0.060	$61,656	$0.063	$61,947	$0.057	$55,640	$0.056	$52,550

1 GRP per capita = GRP / Total Population
GRP Source: Woods & Poole
Population Source: California Department of Finance

SBA's enplanement per capita ratio is almost double STS's, which is judged to be unrealistic for STS to achieve. The somewhat greater driving distance to its major hub competitor (LAX) may be the reason that SBA can achieve this high enplanement ratio. For forecasting purposes, the market at STS will be considered mature when it reaches 85 percent of the per capita enplanement ratio for SBA, or 0.71 enplanements per capita. It is assumed that STS will reach this mature market ratio by 2028. A linear projection from the 2023 forecast to 2028 was used.

The third phase of the Three-Phase Methodology assumes that the STS market will have reached maturity in 2028, at which point the third phase would begin. From that point on, enplanements are expected to grow at a rate reflective of the larger regional or national market. The growth rate of 1.9 percent from years 2028-2038 in the 2019 TAF was used for the third phase to represent the growth rate for a mature market at STS.

Figure 2-10 shows the three different forecasting methods compared to the 2019 TAF forecast, with the past 10 years of enplanement data from the T-100 historical records.

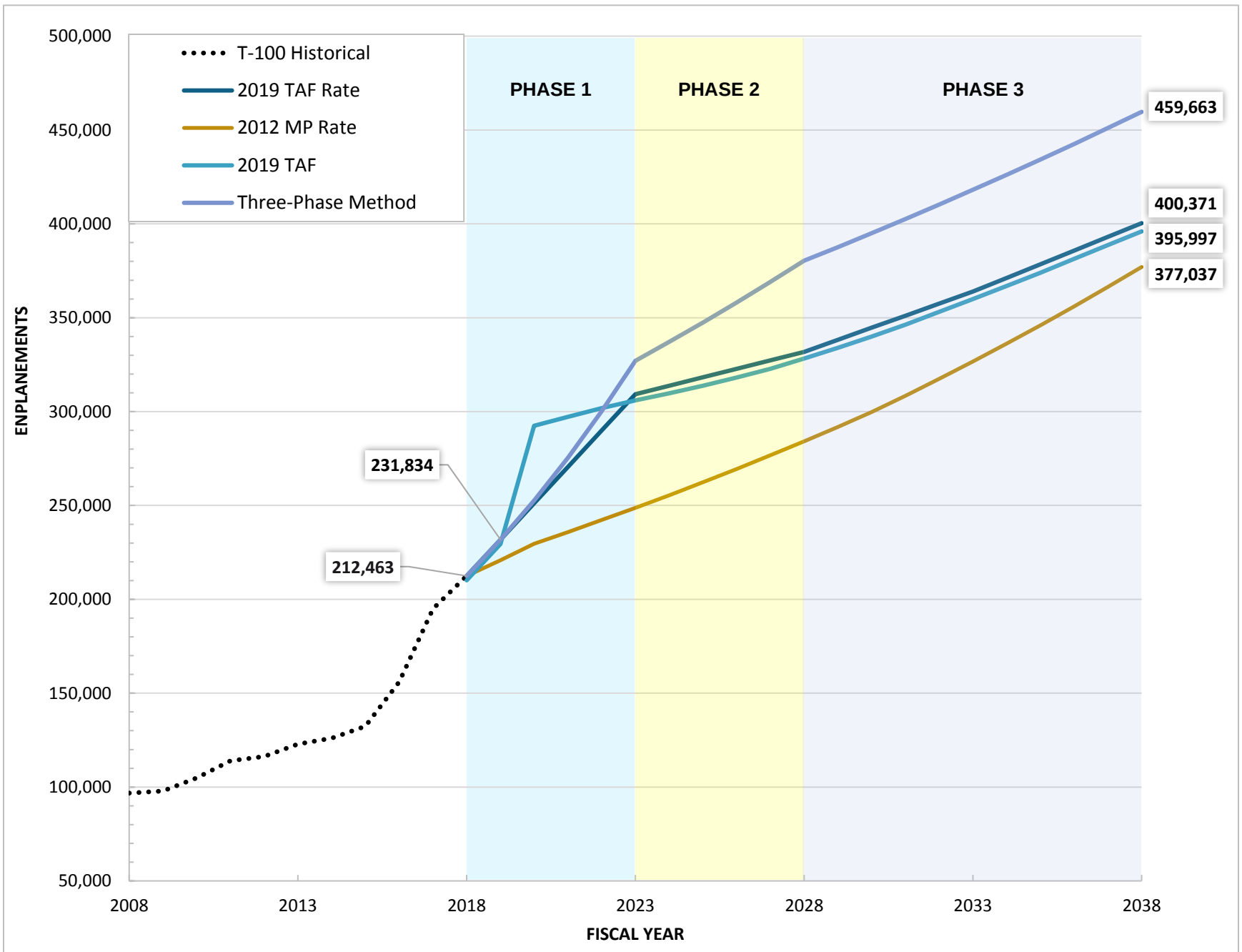
COVID Adjusted Forecast Alternatives

Following the initial draft and analysis of the forecast methodologies presented above, these were updated to consider the effects the COVID-19 pandemic has had on air travel in 2020. A comprehensive Response to COVID section appears at the beginning of this chapter, with near-term recovery scenarios discussed. This section applies these recovery scenarios and presents revised alternative forecasts. **Figure 2-11** shows the 2019 TAF and the 2012 Maser Plan rate with revised enplanement forecast alternatives: the three recovery scenarios account for COVID's influence on the demand.

The new alternative enplanement forecasts show these three different recovery scenarios and then apply the Three-Phase method growth rates after returning to 2019 enplanement levels.

- **Conservative Recovery:** Predicts a return to 2019 enplanements in 2024, with shorter time frames for Phase 1 from 2024 to 2026 and Phase 2 from 2026 to 2029. The Phase 3 growth rate (1.9 percent) is applied from 2029 onward.
- **Strong Recovery:** Return to 2019 enplanements in 2023, with the original five years of growth in both Phase 1 (7.1 percent) from 2023 to 2027 and Phase 2 (3 percent) from 2027 to 2031. The Phase 3 growth rate (1.9 percent) is applied from 2031 onward.
- **Aggressive Recovery:** Return to 2019 enplanements in 2021, with five years of Phase 1 plus-growth (8.8 percent), and six years of Phase 2 growth (3 percent). A lower Phase 3 growth rate of 1.5 percent is applied from 2031 onward, assuming a more mature market.

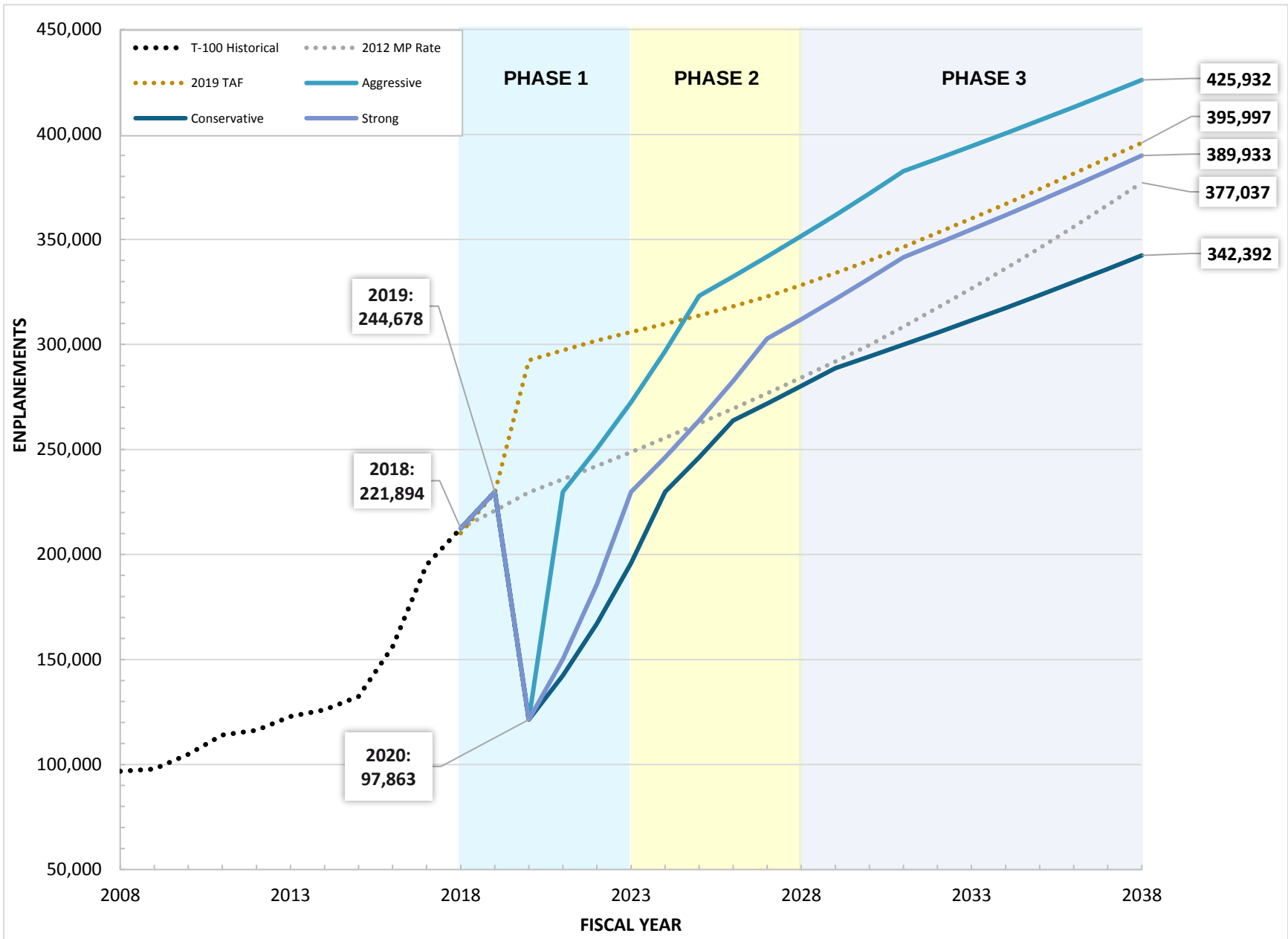
Figure 2-10: Alternative Passenger Enplanement Forecasts



Category	Phase	Year	T-100	2019 TAF Rate	2012 MP Rate	2019 TAF	Three-Phase
Historical	T-100 Historical 2008-2018	2008	96,782	-	-	-	-
		2009	97,849	-	-	-	-
		2010	104,869	-	-	-	-
		2011	114,013	-	-	-	-
		2012	116,321	-	-	-	-
		2013	122,912	-	-	-	-
		2014	126,016	-	-	-	-
		2015	132,361	-	-	-	-
		2016	156,028	-	-	-	-
		2017	195,022	-	-	-	-
Forecast	Phase 1 2019-2023	2018	-	212,463	212,463	210,142	212,463
		2019	-	231,834	220,879	229,413	231,834
		2020	-	251,206	229,629	292,404	252,672
		2021	-	270,577	235,834	297,218	275,383
		2022	-	289,949	242,207	301,805	300,135
	Phase 2 2024-2028	2023	-	309,320	248,751	305,941	327,111
		2024	-	313,827	255,473	309,790	337,132
		2025	-	318,334	262,376	313,760	347,569
		2026	-	322,841	269,456	318,111	358,103
		2027	-	327,347	276,727	322,804	369,072
		2028	-	331,854	28,495	328,229	380,378
	Phase 3 2029-2038	2029	-	338,268	291,864	333,988	387,648
		2030	-	344,682	299,739	339,955	395,057
		2031	-	351,096	308,460	346,355	402,608
		2032	-	358,511	317,434	353,109	410,303
		2033	-	363,925	326,670	359,949	418,145
		2034	-	371,214	336,174	366,905	426,137
		2035	-	378,503	345,954	374,020	434,282
		2036	-	385,792	356,020	381,426	442,583
		2037	-	393,082	366,378	388,728	451,042
		2038	-	400,371	377,037	395,997	459,663

Sources: Mead & Hunt, FAA 2019 TAF, 2012 Master Plan and T-100 data

Figure 2-11: Alternative Passenger Enplanement Forecasts



Category	Phase	Year	T-100	2019 TAF	2012 MP Rate	Conservative	Strong	Aggressive
Historical	T-100 Historical 2008-2018	2008	96,782	-	-	-	-	
		2009	97,849	-	-	-	-	
		2010	104,869	-	-	-	-	
		2011	114,013	-	-	-	-	
		2012	116,321	-	-	-	-	
		2013	122,912	-	-	-	-	
		2014	126,016	-	-	-	-	
		2015	132,361	-	-	-	-	
		2016	156,028	-	-	-	-	
		2017	195,022	-	-	-	-	
Forecast	Phase 1 2019-2023	2018	-	210,142	212,463	221,894	221,894	212,463
		2019	-	229,413	220,879	244,678	244,678	229,828
		2020	-	292,404	229,629	121,380	97,863	121,380
		2021	-	297,218	235,834	142,384	150,164	229,828
		2022	-	301,805	242,207	167,023	185,774	250,260
	Phase 2 2024-2028	2023	-	305,941	248,751	195,925	229,828	272,508
		2024	-	309,790	255,473	229,828	246,210	296,734
		2025	-	313,760	262,376	246,210	263,761	323,113
		2026	-	318,111	269,456	263,761	282,562	332,322
		2027	-	322,804	276,727	271,840	302,703	341,793
		2028	-	328,229	28,495	280,168	311,976	351,534
	Phase 3 2029-2038	2029	-	333,988	291,864	288,750	321,533	361,553
		2030	-	339,955	299,739	294,269	331,382	371,857
		2031	-	346,355	308,460	299,893	341,533	385,455
		2032	-	353,109	317,434	305,625	348,061	388,383
		2033	-	359,949	326,670	311,467	354,713	394,403
		2034	-	366,905	336,174	317,420	361,493	400,517
		2035	-	374,020	345,954	323,487	368,402	406,725
		2036	-	381,426	356,020	329,669	375,444	413,029
		2037	-	388,728	366,378	335,971	382,620	419,431
		2038	-	395,997	377,037	342,392	389,933	425,932

Sources: Mead & Hunt, FAA 2019 TAF, 2012 Master Plan and T-100 data

Preferred Enplanement Forecast Method

Forecasts developed in the initial draft, pre-COVID-19, were eliminated from consideration. However, the Three-Phase method for emerging airport markets was retained for STS enplanement forecasts and applied to the recovery models. This presumes that STS will follow the Three-Phase method for an air service market after recovery from effects of the pandemic, similar to that of peer airports experiencing air service growth.

The preferred forecast method for this ALP update is the **Strong Recovery – Three-Phase method**. The Airport is seeking FAA approval of this forecast. This is represented in blue in **Figure 2-11** above, with 5-year increments and 2019 TAF comparison shown in **Table 2-12** below.

Table 2-12: Preferred Passenger Enplanement Forecast – TAF Comparison

Fiscal Year	Forecast	2019 TAF	TAF Difference	% Difference
2018	212,463	210,142	2,321	1.1%
2019	229,828	229,413	415	0.2%
2020	121,380	292,404	-171,024	-58.5%
2023	229,828	305,941	-76,113	-24.9%
2028	311,976	328,229	-16,253	-5.0%
2033	354,713	359,949	-5,236	-1.5%
2038	389,933	395,997	-6,064	-1.5%
CAGR[1]	**3.1%**	**3.2%**	**N/A**	**N/A**

1 CAGR = Compound Annual Growth Rate
Source: Mead & Hunt and FAA TAF and T-100 data

The difference between the preferred forecast and the TAF in five years (+10 percent) and ten years (+15 percent) are not above the threshold for review. The Strong Recovery – Three-Phase Methodology provides a COVID-19 recovery model with STS returning to 2019 enplanement levels in 2023 and then follows the Three-Phase model for emerging air service markets. The strong recovery is based on:

- **Market diversity:** The leisure market is forecasted to recover faster than business travel.
- **Tourism market:** Tourism decreased due to COVID-19 but is expected to rebound quickly after vaccine rollout.
- **Domestic travel recovery:** Domestic travel is expected to recover faster than international travel. While global markets are forecasted to return to pre-COVID levels in 2024 (IATA), large domestic markets in North America are expected to drive recovery.
- **Air service:** STS continues to develop air service relationships and be aggressive in marketing the airport to domestic and international carriers.

High Forecast for CEQA Reviews

The forecast generated by the preferred Strong Recovery – Three-Phase methodology is moderate and valid for FAA planning purposes. However, this is considered too conservative for the purpose of environmental review under the California Environmental Quality Act (CEQA). Given the rapid growth in flights being offered pre-pandemic and the resultant increases in passenger enplanements during the last five years, it is credible that this growth will continue once STS recovers to 2019 enplanement levels. Therefore, the Aggressive Recovery – Three-Phase method is selected for the high forecast for CEQA review.

- **Aggressive Recovery:** Return to 2019 enplanements in 2021, with five years of Phase 1 plus-growth (8.8 percent), and six years of Phase 2 growth (3 percent). A lower Phase 3 growth rate of 1.5 percent is applied from 2031 onward, assuming a more mature market.

This would result in higher long-term enplanements and airline aircraft operations. This could result in impacts (e.g., noise and traffic) being higher than in the preferred Strong Recovery – Three-Phase forecast. Use of this forecast as a high forecast would fulfill the statutory requirement that the CEQA document inform decision-makers and the public of reasonably foreseeable impacts. The Three-Phase enplanement forecast is shown in **Table 2-13** in five-year increments.

Table 2-13: Passenger Enplanement Forecast – Three-Phase

Fiscal Year	Forecast
2018	212,463
2023	272,508
2028	351,534
2033	394,403
2038	425,932
CAGR[1]	**3.5%**

1 CAGR = Compound Annual Growth Rate
Source: Mead & Hunt and T-100 data

Planning Activity Levels

Most facility improvements being proposed with this ALP Update are not capacity driven. The Runway 20 RIM and taxiway geometry improvements are driven by incursion mitigation. The current ARFF facility constrains terminal expansion, for which near-term terminal expansion is already FAA approved and in design. Long-term terminal expansion, landside improvements, and hangar development will be tied to planning activity levels (PAL) that are outlined below.

PALs focus on the need to plan for aviation activity levels, rather than specific timelines. Proposed development is then linked to activity milestones that are defined in terms of PAL, rather than future calendar years. **Table 2-14** shows PALs for STS that will trigger terminal and landside improvements, based on enplanements.

Table 2-14: Proposed Planning Activity Levels

Planning Activity Level	Enplanements	Associated Milestone
PAL 1	230,000	Return to 2019 activity levels
PAL 2	300,000	21 Daily Departures
PAL 3	350,000	Phase 1 Ultimate Terminal
PAL 4	396,000	FAA 20-year Forecasts
PAL 5	426,000	Ultimate High (CEQA) Forecast, Phase 2 Ultimate Terminal

Source: Mead & Hunt, Inc.

Passenger Airline Operations Forecast

The TAF classifies scheduled operations in two categories: air carrier and air taxi. Air carrier aircraft have 60 or more seats, while aircraft with fewer than 60 seats are considered air taxi aircraft. The forecast for air taxi operations in this section only reflects scheduled passenger airline operations using aircraft with fewer than 60 seats such as the CRJ-200. This section does not include general aviation air taxi operations, for charter or business jet operations, which are included in the GA forecast section that follows.

Operations Forecast Methodologies

Two operations forecasts have been prepared using the Strong Recovery and Aggressive Recovery – Three-Phase methods. Passenger airline operation forecasts were updated to account for the downturn in operations and expected recovery from COVID-19. The assumptions used for each methodology are included in this section.

Airlines are expected to add service to meet demand. Airlines aim to profit by keeping yields high, thus the average load factors for air taxi/commuter operations are expected to increase, and airlines will manipulate their pricing model to sell as many seats at as high a price as possible. The industry-wide shift away from 50-seat aircraft to new 70-seat and larger aircraft is reflected in each operations forecast. Air carrier operations increase over time, reflecting new routes, while air taxi/commuter operations (fewer than 60 seats) will decrease to zero as the 50-seat CRJ-200 is phased out by 2028. Beyond 2028, all future passenger service operations at STS are classified as air carrier operations.

While most airline aircraft will have 76 seats, a percentage of flights by aircraft with more than 90 seats will slightly increase the average number of seats. While the percentage of operations by aircraft with more than 90 seats will remain small (less than 1 percent), these operations will cause the average seats per departure to increase slightly over the 20-year forecast period. The operations forecasts are based on the following assumptions:

- Air taxi aircraft (aircraft with fewer than 60 seats) will be retired by 2028 following the FAA Aerospace Forecast projection of airlines removing 50 seat jets in favor of 70-90 seat jets after 2020. It is expected that regional and narrow-body jets will replace the smaller 50 seat jets. This was projection updated from 2023 to 2028 after revising forecasts for COVID-19.
- The average number of seats per departure will increase over time as smaller jets with fewer than 60 seats are replaced by larger aircraft. Airlines adjust flight frequency to keep load factors high. However, as airlines transition to larger aircraft, load factors are expected to decrease temporarily during the adjustment period.

- Load factors for flight hub routes will decrease with added direct routes. Direct (non-stop) routes to destinations that previously required connections allow for passengers to bypass flights to airports such as LAX or SFO. Additionally, new routes to airports such as DEN or DFW may be preferable for passengers flying east. Lower load factors will lead to airlines adjusting the number of flights to raise load factors. Airlines may also reduce aircraft size if the smaller aircraft can cover the route.

Strong Recovery – Three-Phase Operations Methodology

Since airlines are expected to add service to meet demand, the passenger airline operations forecasts are a function of the preferred enplanement forecast. Future airline operations are calculated by applying the Strong Recovery – Three-Phase method passenger enplanements forecast to assumptions of the average number of seats per aircraft and average load factors. The Strong Recovery – Three-Phase method operations forecast is the preferred forecast for FAA review. **Table 2-15** presents the preferred forecast for scheduled passenger airline operations. Note the reduction in total operations in the short term reflects the phasing out of 50-seat jets in favor of 70- to 90-seat jets after 2020. This is only a temporary loss in operations since the increase in enplanements will result in more operations of larger aircraft in the long term.

Table 2-15: Scheduled Passenger Aircraft Operations – Preferred Forecast for FAA Review

Fiscal Year	Total Enplanements	Air Taxi/Commuter			Air Carrier			Total Operations
		Operations	Avg Load Factor	Avg Seats	Operations	Avg Load Factor	Avg Seats	
2018	212,463	1,948	60.2%	50	6,254	76.3%	77	8,202
2019	229,828	1,200	67.2%	50	6,688	79.0%	78	7,888
2020	121,380	802	53.4%	50	4,578	54.2%	78	5,380
2023	229,828	367	70.0%	50	7,080	80.1%	78	7,447
2028	311,976	100	70.0%	50	9,156	85.0%	81	9,256
2033	354,713	0	0.0%	0	10,240	85.0%	82	10,240
2038	389,933	0	0.0%	0	11,241	85.0%	82	11,241
CAGR[1]	**3.1%**	**N/A**	**N/A**	**N/A**	**3.0%**	**0.5%**	**0.3%**	**1.6%**

1 CAGR: Compound Annual Growth Rate
Note: Operations account for arrivals and departures. Enplanements only account for passengers on departing flights.
Source: Mead & Hunt, USDOT T-100 Database, and Airport Provided Data

Table 2-16: Preferred Passenger Aircraft Operations – TAF Comparison

Fiscal Year	Forecast	2019 TAF[2]	Difference	% Difference
2018	8,202	6,730	1,472	21.9%
2023	7,447	9,067	-1,620	-17.9%
2028	9,256	9,762	-506	-5.2%
2033	10,240	10,704	-464	-4.3%
2038	11,241	11,775	-534	-4.5%
CAGR[1]	**2.0%**	**2.8%**	**N/A**	**N/A**

1 CAGR = Compound Annual Growth Rate
2 Operations for FAA TAF based on air carrier itinerant operations
Source: Mead & Hunt and FAA TAF and T-100 data

The preferred passenger aircraft operations forecast is compared to the 2019 TAF in **Table 2-16**. The difference between the preferred operations forecast and the TAF in five years (10 percent) and ten years (15 percent) are not outside the threshold for review.

Aggressive Recovery – Three-Phase Operations Methodology

The Aggressive Recovery operations forecast is calculated by applying the Aggressive Recovery – Three-Phase passenger enplanements forecast to assumptions about seats per departure and load factors. The approach in the Aggressive Recovery methodology differs slightly from the Strong Recovery methodology in that enplanements were allocated to specific routes based upon the Market Assessment, and that STS will recover to pre-COVID-19 enplanement levels in 2021. The inputs used to project the number of operations were:

- Existing and potential routes are identified using the 2019 Market Assessment Analysis and T-100 data.
- Existing airline fleet information and aircraft manufacturer order books were referenced in identifying the aircraft flying potential routes. The routes are defined by the average number of seats in the types of aircraft that typically fly the route. For example, Horizon Air uses the Q400 and the E175 (both have 76-seat capacity) for the LAX route, so all operations are accounted for in the 60-76 seat aircraft category.

The Aggressive Recovery – Three-Phase passenger airline operations forecast assumes that airlines will add service to meet the level of demand in the Aggressive Recovery enplanement forecast. The Aggressive Recovery – Three-Phase forecast will be used as a high forecast for CEQA review. The forecast by operation type shown in **Table 2-17** satisfies FAA requirements for reporting air taxi and air carrier operations.

Table 2-17: Scheduled Passenger Aircraft Operations – High Forecast for CEQA Review

Fiscal Year	Total Enplanements	Air Taxi/Commuter			Air Carrier			Total Operations
		Operations	Avg Load Factor	Avg Seats	Operations	Avg Load Factor	Avg Seats	
2018	212,463	1,948	60.2%	50	6,254	76.3%	77	8,202
2023	272,508	436	70.0%	50	8,395	80.1%	78	8,830
2028	351,534	113	70.0%	50	10,317	85.0%	78	10,430
2033	394,403	0	0.0%	0	11,457	85.0%	81	11,457
2038	425,932	0	0.0%	0	12,222	85.0%	82	12,222
CAGR[1]	**3.5%**	**N/A**	**N/A**	**N/A**	**3.4%**	**0.5%**	**0.3%**	**2.0%**

1 CAGR: Compound Annual Growth Rate
Note: Operations account for arrivals and departures. Enplanements only account for passengers on departing flights.
Source: Mead & Hunt, USDOT T-100 Database, and Airport Provided Data

The air carrier category includes aircraft that are fewer than 100 seats, which are defined by the ATE as regional jets, and those greater than 100 seats, known as mainline aircraft. To allow comparison with the 2012 Master Plan/ATE forecasts, operations are separated into regional jets and mainline aircraft in **Table 2-18**.

Table 2-18: Scheduled Passenger Aircraft Operations – High Forecast for ATE Review

Fiscal Year	Total Enplanements	Regional Jets (Fewer than 100 seats)			Mainline Jets (100 or more seats)			Total Operations
		Operations	Avg Load Factor	Enplanements	Operations	Avg Load Factor	Enplanements	
2018	212,463	8,101	72.5%	208,580	101	70.3%	3,883	8,202
2023	272,508	8,724	85.0%	265,725	106	85.0%	6,783	8,830
2028	351,534	10,142	85.0%	333,185	288	85.0%	18,350	10,430
2033	394,403	11,058	85.0%	368,967	399	85.0%	25,436	11,457
2038	425,932	11,690	85.0%	392,017	532	85.0%	33,915	12,222
CAGR[1]	**3.5%**	**1.9%**	**0.8%**	**3.2%**	**8.7%**	**1.0%**	**11.4%**	**2.0%**

1 CAGR: Compound Annual Growth Rate
Note: Operations account for arrivals and departures. Enplanements only account for passengers on departing flights.
Source: Mead & Hunt, USDOT T-100 Database, and Airport Provided Data

Peak Passenger Airline Departures

ATE Objective AT-5.2 is to "provide a balance of scheduled air carrier services at the Charles M. Schulz – Sonoma County Airport not to exceed a total of 21 departures per day." As a means of implementing this objective, ATE Policy AT-5f directs that "a review by the Board of Supervisors shall occur at such a time that the "review threshold" of 650 enplaned air carrier passengers per day averaged over a one-year period (474,500 annual passengers) is reached. This threshold for consultation could have been reached in 2020; airlines were inquiring about additional departures for summer 2020 until the pandemic reduced activity.

This section describes the methodology and peak airline departures forecasts to support consultation with the Board of Supervisors. The peak departure forecast utilizes the Three-Phase forecast in combination with peak month enplanements, average seats, and load factors to forecast daily peak departures. It is expected that peak departures will occur in the months with peak enplanements.

Peak Month Enplanements

Based upon Airport records, peak passenger volumes generally occur at STS in summer months. Over the last five years (2016-2020) the percentage of STS enplanements during the peak month has ranged between 10.3 percent to 11.3 percent of annual enplanements. This is an increase from the previous five-year period, where the percentage of enplanements in the peak month ranged from 9.3 percent to 9.9 percent of annual enplanements.

The peak month percentages from the most recent five-year period are used in forecasting peak month enplanements, because these percentages best reflect the emerging trend in seasonal variation. The increase from the previous five-year period likely reflects the increase in the percentage of passengers who are travelling for vacations, which are concentrated during the summer months. Airlines will also test market new flights during peak months to maximize revenue. It is expected that daily departures by airline aircraft will be the highest during these peak months. The low peak departure forecast uses 10.5 percent of annual enplanements, and the high peak departure forecast uses 11.5 percent.

Average Aircraft Capacity

Airline aircraft with as few as 50 seats and as many as 186 seats service STS. However, as a regional airport, most airline aircraft operating at STS have around 76 seats. Given the population of STS's service area, it is expected that aircraft of this size will remain the most common airline aircraft serving STS through the 20-year forecast period. It is possible that seasonal, high-volume routes may see up-gaging by the introduction of 90-passsenger seat aircraft, and up to 186-seat aircraft. However, this is not expected to alter the peak departure forecast since these routes are already accounted for.

Peak Month Load Factor

Average passenger load factors directly affect the number of daily departures for a given volume of passengers. High and low forecasts of peak departures utilized load factors based upon the range that STS has experienced over the last five years. This high load factor was 84.6 percent in 2014; the low was in 2018 at 73.8 percent. This variability reflects the initially low load factors that often occur with the introduction of new service. That is, when new service is introduced, the average number of passengers in each flight is initially low. During a period when many new flights are being added, the average load factor for the Airport will be reduced. The high peak departure forecast assumed a 73 percent load factor, while the low peak departure forecast assumed an 80 percent load factor.

Daily Peak Departure Forecast

The low and high peak departure forecasts are presented in **Table 2-19**. The enplanement forecast for peak departures is based on the Aggressive Recovery – Three-Phase method. This reflects the downturn in enplanements in 2020 and recovery to 2019 enplanements in 2021.

For the peak departure forecast, enplanements from the Aggressive Recovery – Three-Phase method are used as the base for projecting peak departures. The high peak departure forecast assumes a 73 percent load factor, while the low peak departure forecast assumed an 80 percent load factor. Since enplanements are the same for both forecasts, a high load factor means more passengers on fewer flights. Conversely, a lower load factor using the same number of enplanements will result in more flights. Therefore, applying the low load factor results in the 'high' peak departure forecast.

Under the high forecast (low load factor), STS will reach 21 daily airline departures in 2024 and 29 daily departures by 2038. The low forecast (high load factor) predicts 21 daily departures by 2029 with 25 departures by 2038. The peak departure forecast was updated to account for the COVID-19 pandemic. The pandemic likely delays STS reaching the 21-departure threshold for two or three years beyond the original projections developed pre-COVID-19.

The following factors could contribute to STS seeing a return to 2019 activity levels quicker with departures reaching the 21-daily threshold in summer of 2022 or 2023.

- STS was not considered to be a mature market in 2019, as discussed in the Airline Service Profile section above. The rate of growth from 2015-2019 may continue once vaccine rollout is complete and more people feel safe to travel again.
- Enplanements and activity have followed the 2012 Master Plan high forecast since 2012.

- Airlines already established at STS were inquiring about additional spots right up until the COVID-19 pandemic hit.
- STS is in talks with a yet-to-be named airline to add service in spring 2021.
- The leisure market is forecasted to recover faster than business travel, and tourism is expected to rebound quickly after vaccine rollout, as discussed in the Response to COVID-19 section.
- Low-cost carriers are returning to 2019 passenger levels quicker than the legacy carriers and adding additional service in 2021.
  - Allegiant has embarked on the second-largest network expansion in its history while adding over 30 new non-stop routes.
  - Southwest Airlines is expanding its network with new services at over 15 airports including vacation destinations.

Table 2-19: Daily Peak Departure Forecast

Annual1		High Forecast						Low Forecast					
Year	Enplanements	Enplanements			Average		Departures	Enplanements			Average		Departures
		Peak Month %	Peak Month	Daily	Seats	Load Factor	Peak Daily	Peak Month %	Peak Month	Daily	Seats	Load Factor	Peak Daily
2018	212,463		24,433	814			15		22,309	744			12
2019	229,828		26,430	881			16		24,132	804			13
2020	121,380		13,959	465			8		12,745	425			7
2021	229,828		26,430	881			16		24,132	804			13
2022	250,260		28,780	959			17		26,277	876			14
2023	272,508		31,338	1,045			19		28,613	954			16
2024	296,734		34,124	1,137			**21**		31,157	1,039			17
2025	323,113		37,158	1,239			22		33,927	1,131			19
2026	332,322		38,217	1,274			23		34,894	1,163			19
2027	341,793		39,306	1,310			24		35,888	1,196			20
2028	351,534	11.50%	40,426	1,348	76	73%	24	10.50%	36,911	1,230	76	80%	20
2029	361,553		41,579	1,386			25		37,963	1,265			**21**
2030	371,857		42,764	1,425			26		39,045	1,302			21
2031	382,455		43,982	1,466			26		40,158	1,339			22
2032	388,383		44,664	1,489			27		40,780	1,359			22
2033	394,403		45,356	1,512			27		41,412	1,380			23
2034	400,517		46,059	1,535			28		42,054	1,402			23
2035	406,725		46,773	1,559			28		42,706	1,424			23
2036	413,029		47,498	1,583			29		43,368	1,446			24
2037	419,431		48,235	1,608			29		44,040	1,468			24
2038	425,932		48,982	1,633			29		44,723	1,491			25

1 Annual Enplanements: High Forecast for CEQA Review
Source: Mead & Hunt, USDOT T-100 Database, and Airport Provided Data

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GENERAL AVIATION FORECASTS

The GA forecasts for the next 20 years are based upon the 2018 FAA TAF projections. The forecasting method utilizes airport-provided historical records and applies the TAF projections for 5-, 10-, 15-, and 20-year to the relevant forecast periods. This allows accounting for the variances in historical operation counts while keeping TAF expectations for GA operations.

Tables are shown at the end of this section.

General Aviation Operations

GA refers to flight activities that do not include scheduled air services. GA activities do include, but are not limited to, flight training, recreational flying, private and corporate air transportation, and flight testing.

General Aviation Businesses

GA businesses include companies that offer services to the flying public (e.g. fixed-based operators [FBOs]), companies that design and build aircraft, and companies that use aircraft as part of their services (e.g. aerial photography, scenic tours). STS has two FBOs and several Specialized Aviation Service Operations. The following are the businesses located at STS:

- Sonoma Jet Center – FBO with fuel, maintenance, hangars, catering, and concierge service
- KaiserAir Santa Rosa – FBO with aircraft management, charter service, fuel, and line service
- Barron Air Maintenance – Fixed-wing and helicopter maintenance
- Helico Sonoma – Helicopter company with a Part 91 flight school and tour/transport service
- North Coast Air – Flight training, FAA testing center, rentals, and scenic air tours
- Propjet Aviation – Turbine and piston aircraft service
- Ram Aviation – Flight training, rentals, and scenic air tours
- REACH – Air ambulance
- Vine Jet – Aircraft sales, jet charter, and aircraft management service

Airport Versus TAF Operations Records

STS provided historical operations records from the ATCT, and these records are compared to the 2018 TAF in **Table 2-20**. This data includes itinerant operations for air taxi, GA activity, and military operations, plus local activity for GA and military. Like T-100 data, the ATCT records do not match the TAF records for some years. Airport-provided ATCT operation counts are a primary source of operations considered to be more accurate, and therefore, will be used for forecasting purposes.

Air taxi operations shown in **Table 2-20** include takeoff and landings by aircraft with 60 or fewer seats conducted on non-scheduled, or for-hire flights. These do not include operations by scheduled air taxi flights, which are included in the passenger airline operations forecast above.

Itinerant Operations

Itinerant operations are those that originate and terminate at different airports. These operations include business travelers coming to and from the community, recreational pilots, and student pilots performing cross country training flights, Coast Guard training operations with fixed-wing aircraft, and helicopter aircraft flying instrument approaches. In addition to typical itinerant operations, STS experiences seasonal CAL FIRE flight training and fire suppression operations. **Table 2-21** shows the historic itinerant air taxi, GA, and military operations at STS.

STS has historically seen a significant number of itinerant air taxi operations by charter flights and non-scheduled airlines. These operations include on-demand air taxi services by light jet aircraft and do not include operations by scheduled air taxi flights. Air taxi operations have increased an average of 5.7 percent annually in the past decade.

Itinerant GA operations have been decreasing at an average annual rate of 4.1 percent for the past ten years. This is a faster rate of decline than the national rate provided by the 2018 FAA Aerospace Forecast, which has declined an average 2.3 percent annually.

Local Operations

Local GA operations are those that originate and terminate at the same airport and are generally performed by pilots practicing takeoffs and landings. These include touch-and-go operations where the aircraft lands, slows, and then accelerates to take off without leaving the runway. Touch-and-go operations count as two operations: a landing and takeoff. Local operations vary based on the level of flight training at the airport and the activity level of the resident GA community. There are two flight schools located at STS that contribute to the high number of local GA operations.

Table 2-22 shows the historic local operations at STS. STS local GA operations have declined annually in the past decade. This is in line with national local GA trends, which have declined at a slower rate, an average 2.1 percent annually in the same time period. STS experiences a small number of military local operations through Coast Guard training.

Based Aircraft

Based aircraft are aircraft stored at STS, either in hangars or on a tie down apron. This does not include itinerant aircraft temporarily stored at the airport. The FAA categorizes based aircraft by engine type: single-engine piston, multi-engine piston, jet aircraft with turbine engines (including turboprops and turbojets), helicopters, and other, which includes experimental sport, glider, and ultralight aircraft.

Table 2-23 shows the historical based aircraft at STS by aircraft type. Data from 2008 through 2017 shows based aircraft according to the FAA TAF. Data for 2018 was provided by the airport and reflects the increase in jets based at STS in 2018, although this jump in the number of jets did not all happen between 2017 and 2018. It is important to acknowledge the presence of these based jets, and use airport data for forecasting, since jets utilize more space and facilities at STS. The 2018 totals for based aircraft will be used for forecasting.

Itinerant GA Operations Forecast

The GA itinerant operations forecast is based on the FAA TAF forecasts. Itinerant operations for 2023 and beyond match the FAA TAF forecast totals. Overall itinerant operations are expected to increase in the next 20 years by 0.5 percent annually. **Table 2-21** shows the forecasted itinerant operations for the next 20 years by operation type. Total data for 2018 is slightly different than the TAF due to using ATCT data for air taxi totals.

Local Operations Forecast

Table 2-25 shows the forecasted local operations for the forecast period. Local operations for 2023 and beyond match the FAA TAF forecast totals. Local operations are projected by the FAA TAF forecast to increase slowly over the next 20 years. As with itinerant operations, military activity is determined by U.S. Department of Defense and is projected to remain flat.

Based Aircraft Forecast

Pilots choose between airports to base aircraft at by the types of services and facilities offered. STS offers airline service, precision approach capabilities, and the longest runway in Sonoma County. The availability of hangars and proximity of the airport to residences, Santa Rosa's business, and government facilities can also influence pilots' preference for STS.

The based aircraft forecast utilizes the FAA TAF for the total based aircraft count over the forecast period. However, the FAA TAF for aircraft models does not reflect current airport data for based jets, and shows no growth in turboprops, jets, and helicopters. Hangar construction at STS in 2018 and interest from aircraft owners indicate more short-term interest in turboprop, helicopter, and jet storage at STS. The based aircraft forecasts should reflect this interest to properly plan for large hangar development as part of this ALP update.

An alternative method is to use the FAA Aerospace Forecast 2019-2039 rates for turboprop, turbo jet, and helicopters and reduce the growth rate for piston aircraft. As shown in **Table 2-23** above, no single-engine aircraft have been added in nine years at STS. The TAF differs from the 2012 Master Plan forecast, which expected an increase in jets and helicopters while piston aircraft would remain flat. **Table 2-26** summarizes the forecast for based aircraft by aircraft classification with the supplemental rates. The forecast for total based aircraft remains consistent with the TAF, while the composition of based aircraft is determined by the FAA Aerospace Forecast 2019-2039 rates.

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Table 2-20: STS Historical Operations - Airport and TAF Comparison

Year	Itinerant Air Taxi[1], General Aviation & Military Operations				Local General Aviation & Military Operations				Total Air Taxi[1], General Aviation & Military Operations			
-	Airport	TAF	Δ	%Δ	Airport	TAF	Δ	%Δ	Airport	TAF	Δ	%Δ
2008	67,667	67,667	0	0.00%	36,532	36,532	0	0.00%	104,199	104,199	0	0.00%
2009	55,744	56,081	-337	-0.60%	31,406	31,660	-254	-0.80%	87,150	87,741	-591	-0.70%
2010	49,580	49,713	-133	-0.30%	23,709	23,773	-64	-0.30%	73,289	73,486	-197	-0.30%
2011	49,699	49,866	-167	-0.30%	22,504	22,622	-118	-0.50%	72,203	72,488	-285	-0.40%
2012	51,667	51,667	0	0.00%	26,851	26,851	0	0.00%	78,518	78,518	0	0.00%
2013	49,666	49,666	0	0.00%	22,839	22,839	0	0.00%	72,505	72,505	0	0.00%
2014	50,305	50,305	0	0.00%	24,660	24,660	0	0.00%	74,965	74,965	0	0.00%
2015	51,321	52,105	-784	-1.50%	24,914	24,914	0	0.00%	76,235	77,019	-784	-1.00%
2016	49,168	51,494	-2,326	-4.70%	21,996	22,996	-1,000	-4.50%	71,164	74,490	-3,326	-4.50%
2017	49,527	49,863	-336	-0.70%	27,816	27,816	0	0.00%	77,343	77,679	-336	-0.40%
2018	49,707	51,681	-1,974	-4.00%	27,321	27,321	0	0.00%	77,028	79,002	-1,974	-2.50%
CAGR[2]	**-3.00%**	**-2.70%**	**N/A**	**N/A**	**-2.90%**	**-2.90%**	**N/A**	**N/A**	**-3.00%**	**-2.70%**	**N/A**	**N/A**

Source: STS ATCT records and FAA TAF

Table 2-21: STS Historic Itinerant Operations

Year	GA Air Taxi[1]	GA	Military	Total
2008	4,603	62,682	382	67,667
2009	5,118	50,399	227	55,744
2010	5,373	43,895	312	49,580
2011	5,721	43,626	352	49,699
2012	5,230	46,058	379	51,667
2013	5,181	44,225	260	49,666
2014	5,505	44,424	376	50,305
2015	5,790	45,018	513	51,321
2016	7,087	41,335	746	49,168
2017	7,544	41,477	506	49,527
2018	8,046	41,034	627	49,707
CAGR[2]	**5.7%**	**-4.1%**	**5.1%**	**-3.0%**

1 GA Air Taxi operations include takeoff and landings by aircraft with 60 or fewer seats conducted on non-scheduled, or for-hire flights. These do not include operations by scheduled air taxi flights, which are included in the passenger airline operations forecast above.
2 CAGR: Compound Annual Growth Rate
Source: STS ATCT records

Table 2-22: STS Historic Local Operations

Year	GA	Military	Total
2008	36,472	60	36,532
2009	52,712	23	52,735
2010	46,025	48	46,073
2011	47,133	22	47,155
2012	54,375	8	54,383
2013	36,472	60	36,532
2014	31,348	58	31,406
2015	23,709	0	23,709
2016	22,474	30	22,504
2017	26,839	12	26,851
2018	22,821	18	22,839
CAGR[1]	**-4.6%**	**-11.3%**	**-4.6%**

1 CAGR: Compound Annual Growth Rate
Source: STS ATCT records

Table 2-23: STS Historic Based Aircraft Count

Fiscal Year	SEP[1]	Jet	MEP[2]	Helicopter	Other	Total	% Change
2008	300	7	40	1	2	350	N/A
2009	300	7	40	1	2	350	0.0%
2010	267	5	39	1	0	312	-10.9%
2011	267	5	39	1	0	312	0.0%
2012	267	5	39	1	2	314	0.6%
2013	267	5	39	1	2	314	0.0%
2014	267	5	39	4	0	315	0.3%
2015	267	5	39	4	0	315	0.0%
2016	267	5	39	4	0	315	0.0%
2017	267	5	39	4	0	315	0.0%
2018	270	20	40	4	0	334	6.0%
CAGR[3]	**-1.0%**	**-11.1%**	**0.0%**	**14.9%**	**-100.0%**	**-0.5%**	**N/A**

1 SEP: Single Engine Piston
2 MEP: Multi-Engine Piston
3 CAGR: Compound Annual Growth Rate
Source: 2019 FAA TAF and STS ATCT records (2018 data)

Table 2-24: STS Itinerant Operations Forecast

Fiscal Year	GA Air Taxi[1]	GA	Military	Total	TAF Total	Difference
2018	9,020	41,034	627	50,681	50,681	0
2023	7,963	45,160	467	53,590	53,590	0
2028	8,478	46,654	467	55,599	55,599	0
2033	9,079	48,203	467	57,749	57,749	0
2038	9,685	49,800	467	59,952	59,952	0
CAGR[2]	**0.4%**	**1.0%**	**-1.5%**	**0.9%**	**0.8%**	**N/A**

1 GA Air Taxi operations include takeoff and landings by aircraft with 60 or fewer seats conducted on non-scheduled, or for-hire flights. These do not include operations by scheduled air taxi flights, which are included in the passenger airline operations forecast above.
2 CAGR: Compound Annual Growth Rate
Source: STS ATCT records (2018 data), 2019 FAA TAF

Table 2-25: STS Local Operations Forecast

Fiscal Year	GA	Military	Total	TAF Total	Difference
2018	22,821	242	23,063	23,063	0
2023	26,383	220	26,603	26,603	0
2028	26,428	220	26,648	26,648	0
2033	26,473	220	26,693	26,693	0
2038	26,518	220	26,738	26,738	0
CAGR[1]	**0.8%**	**-0.5%**	**0.7%**	**0.7%**	

1 CAGR: Compound Annual Growth Rate
Source: STS ATCT records (2018 data), 2019 FAA TAF

Table 2-26: STS Based Aircraft Forecast

Year	SEP	Jet	MEP	Helicopter	Other	Total	TAF Total	Difference
2018	270	20	40	4	0	334	315	19
2023	270	22	43	4	0	339	331	8
2028	270	25	45	5	0	345	345	0
2033	279	28	48	5	0	360	360	0
2038	287	31	52	6	0	375	375	0
CAGR[1]	**0.4%**	**2.2%**	**1.3%**	**1.7%**	**0.0%**	**0.6%**	**0.9%**	

1 CAGR: Compound Annual Growth Rate
Source: STS ATCT records (2018 data), 2019 FAA TAF and FAA Aerospace Forecast 2019-2039

Table 2-27: Operations by Airport Reference Code – 2018

ADG	AAC				
Category	**A**	**B**	**C**	**D**	**Total**
I	2,757	2,313	451	38	**5,559**
II	779	4,081	3,754	422	**9,036**
III	0	5,003	1,098	276	**6,377**
Total	**3,536**	**11,397**	**5,303**	**736**	-

Source: Traffic Flow Management System Count Report, FAA Fiscal Year 2018

Table 2-28: Critical Aircraft Pool – Scheduled Passenger Aircraft

Aircraft Designation	AAC	ADG	Notes
CRJ-200	C	II	Current United service. Phased out by 2028.
CRJ-700	C	II	Current AA service.
CRJ-900	C	III	Current AA service.
E170-200	C	III	Current Alaska Air, AA service.
Q400	C	III	Current Alaska Air service.
MRJ 90	C	N/A[1]	Delivery starting 2020.
E175-E2	C	III	Delivery starting 2021.
737-700	C	III	Current Sun Country (MSP). Potential Hawaii, ORD, ATL routes.
737-800	D	III	Current Sun Country (MSP). Potential Hawaii, ORD, ATL routes.

1 Approach speed for the MDJ 90 not yet published
Sources: FAA AC13A, Appendix 1 and FAA Aircraft Characteristics Database (v2-201810)
The most demanding scheduled passenger aircraft operation at STS in 2018 is the Boeing 737-800. Other non-commercial D-III aircraft operating in 2018 at STS include the Gulfstream V, and Gulfstream VI.

CRITICAL AIRCRAFT

The forecasts detailed above will guide capacity planning as part of this ALP update. Other planning metrics, such as runway design surfaces and taxiway setbacks are determined by the critical aircraft using the airport. The critical aircraft is the most demanding type or group of aircraft with similar characteristics that operate more than 500 operations at an airport annually, excluding touch-and-go operations. At STS, scheduled passenger aircraft and corporate jets are the largest aircraft regularly using the airport and will determine the critical aircraft. Aircraft operated by Cal Fire are not eligible to determine the critical aircraft because the FAA does not consider military or government aircraft for this metric.

The critical aircraft is categorized by the airport reference code (ARC) that is determined by the aircraft approach category (AAC) and the airplane design group (ADG). The critical aircraft is used as a reference to scale and design improvement projects and facility requirements at the airport. This will determine runway and taxiway design surfaces and airfield setbacks.

Operations data by aircraft type is obtained through the Traffic Flow Management System Count (TFMSC). The TFMSC only captures operations with flight plans filed, so most operations by single-engine piston aircraft are not included in the TFMSC. However, the TFMSC can be expected to capture most operations by jet and turboprop aircraft. **Table 2-27**, on the previous page, identifies the operations by AAC and ADG at STS in 2018.

Based on operation numbers, the existing ARC for STS is D-III, based on over 500 operations in the AAC D and ADG III categories. However, no single aircraft type in AAC D has more than 500 operations; rather, the entire AAC D category has more than 500 combined operations. To determine the specific critical aircraft, operations data from commercial operations is analyzed. Aircraft orders and the 2019 Market Assessment Analysis show the aircraft in **Table 2-28**, on the previous page, regularly using STS in 2018 and over the forecast period, with ADG and AAC.

The future critical aircraft may be determined by observing the future operations for specific aircraft models, and the 2019 Market Assessment Analysis that details specific routes and equipment anticipated to be operating at STS. However, predicting specific aircraft models using STS is inexact. Specific routes and equipment will vary seasonally and by demand. The future critical aircraft and ARC is expected to remain the Boeing 737-800. For this ALP update, the critical aircraft for existing and future operations for the airport and both runways is the Boeing 737-800.

Planning for specific areas (terminal, hangars, aprons) may be determined by a specific aircraft. For instance, a corporate jet or multi-engine piston aircraft may be the most demanding aircraft using a specific general aviation area, and this will drive design and setbacks in that area. As areas are evaluated in the ALP Report, other specific aircraft models and design codes may be considered for those specific areas.

FORECAST SUMMARY

- The forecasts were revised to account for impacts from reduction in air travel from the COVID-19 pandemic. Near-term growth will be delayed. Recovery models for STS show a return to 2019 levels between 2021 and 2023.
- Long-term projections are optimistic that air travel will return to pre-COVID levels and growth will continue at pre-2019 rates until STS reaches a mature market.
- Pre-COVID-19 growth in air service demand at STS can be directly tied to a growing local economy as more people travel for business and leisure. This increased demand can lead to possible growth in the number of nonstop routes offered at STS to popular hub airports and travel destinations.
- Commercial enplanements and operations at STS are growing at a high rate, specifically:
  - Catchment area bookings increased about 12 percent between 2015 and 2019.
  - Since 2015, STS has been the sixth fastest growing airport in the U.S., increasing enplaned passengers by almost 60 percent.
  - With recent additions of DEN and DFW service, growth in east-west traffic flows will occur and will be a driver of future air service growth.
  - Passenger enplanements have grown by 8 percent (CAGR) over the past 10 years.
- Given the rapid growth in flights being offered and the resultant increases in passenger enplanements during the last five years, it is credible that this growth will continue in the near term, once STS recovers from the COVID-19 pandemic.
- Enplanements will continue to increase over the 20-year forecast period. Most scheduled service will be provided by regional jets. The 50-seat regional jets will be retired within 10 years. The dominant class of airline aircraft will be those with about 76 seats.
- Enplanements may reach the ATE threshold for review by the Board of Supervisors in 2024, after STS recovers and returns to pre-COVID growth rates for air carrier operations.
  - This will trigger review of maximum daily departures. Under the high forecast, STS will reach 21 daily airline departures in 2024 or 2025 and 30 daily departures by 2038.
- Airline operations will grow during the forecast period, post-COVID. With the retirement of the 50-passenger regional jets, all airline operations will be classified by the FAA as *air carrier* operations.
- Operations by general aviation aircraft are expected to grow at less than 1 percent per year during the forecast period.
- The number of based aircraft is expected to grow from 334 to 360 over the next 20 years. Single-engine piston aircraft will continue to account for over 80 percent of based aircraft. However based jets and turboprops are expected to grow at a faster rate than piston aircraft.
- The existing and future critical aircraft is the Boeing 737-800 and the ARC for STS is D-III.

A summary of the forecasts for FAA approval are presented below. **Table 2-29** details the preferred forecast and TAF comparison. **Table 2-30** and **Table 2-31** show a summary of the preferred forecast for FAA approval.

Table 2-29: Forecast/TAF Comparison – Charles M. Schulz—Sonoma County Airport

Category	Forecast Distance	Year	Airport Forecast	TAF	AF/TAF (% Difference)
Passenger Enplanements	Base yr.	2018	212,463	210,142	1.10%
	Base yr. + 5yrs.	2023	229,828	305,941	-24.90%
	Base yr. + 10yrs.	2028	311,976	328,229	-5.00%
	Base yr. + 15yrs.	2033	354,713	359,949	-1.50%
Commercial Operations	Base yr.	2018	17,222	15,750	9.30%
	Base yr. + 5yrs.	2023	15,410	17,030	-9.50%
	Base yr. + 10yrs.	2028	17,734	18,240	-2.80%
	Base yr. + 15yrs.	2033	19,319	19,783	-2.30%
Total Operations	Base yr.	2018	81,946	85,732	-4.40%
	Base yr. + 5yrs.	2023	87,640	89,260	-1.80%
	Base yr. + 10yrs.	2028	91,503	92,009	-0.50%
	Base yr. + 15yrs.	2033	94,682	95,146	-0.50%

NOTES: TAF data is on a U.S. Government fiscal year basis (October through September).

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Table 2-30: Preferred Forecast Worksheet and Summary A. Forecast Levels and Growth Rates - Base Year 2018: Charles M. Schulz—Sonoma County Airport

Category	Forecast Distance					Average Annual Compound Growth Rates			
Year(s)	**Base Year**	**+ 1yr.**	**+ 5yrs.**	**+ 10yrs.**	**15yrs.**	**Base yr. to +1**	**Base yr. to +5**	**Base yr. to +10**	**Base yr. to +15**
Passenger Enplanements									
• Air Carrier	2,126	5,315	3,948	3,887	3,911	150.00%	13.20%	6.20%	4.10%
• Commuter	210,337	224,513	225,880	308,089	350,803	6.70%	1.40%	3.90%	3.50%
Total enplanements	**212,463**	**229,828**	**229,828**	**311,976**	**354,713**	**8.20%**	**1.60%**	**3.90%**	**3.50%**
Operations									
• Itinerant									
– *Air carrier (Commercial)*	6,254	6,688	7,080	9,156	10,240	6.90%	2.50%	3.90%	3.30%
– *Commuter/air taxi (Commercial)*	10,968	9,163	8,330	8,578	9,079	-16.50%	-5.40%	-2.40%	-1.30%
– *General aviation*	41,034	43,195	45,160	46,654	48,203	5.30%	1.90%	1.30%	1.10%
– *Military*	627	467	467	467	467	-25.50%	-5.70%	-2.90%	-1.90%
• Local									
– *General aviation*	22,821	26,627	26,383	26,428	26,473	16.70%	2.90%	1.50%	1.00%
– *Military*	242	220	220	220	220	-9.10%	-1.90%	-0.90%	-0.60%
Total operations	**81,946**	**86,360**	**87,640**	**91,503**	**94,682**	**5.40%**	**1.40%**	**1.10%**	**1.00%**
Operations Statistics									
• Instrument Operations	25,302	27,243	26,341	29,013	30,958	-3.40%	-0.70%	0.60%	0.90%
• Peak Hour[1] Operations	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
• Cargo/mail (enplaned + deplaned tons)	154	180	180	180	180	16.80%	3.20%	1.60%	1.00%
Based Aircraft by Type									
• Single Engine (Non-jet)	270	270	270	270	279	0.00%	0.00%	0.00%	0.20%
• Multi Engine (Non-jet)	40	41	43	45	48	2.50%	1.30%	1.30%	1.30%
• Jet Engine	20	21	22	25	28	5.00%	2.20%	2.20%	2.20%
• Helicopter	4	4	4	5	5	0.00%	1.70%	1.70%	1.70%
• Other	0	0	0	0	0	0.00%	0.00%	0.00%	0.00%
Total based aircraft	**334**	**336**	**339**	**345**	**360**	**0.60%**	**0.30%**	**0.30%**	**0.50%**

Note 1: Peak Hour forecasts will be presented in the Terminal Area Planning document.

Table 2-31: Preferred Forecast Worksheet and Summary B. Operational Factors - Base Year 2018: Charles M. Schulz—Sonoma County Airport

Category	Forecast Distance				
Year(s)	**Base Year**	**+ 1yr.**	**+ 5yrs.**	**+ 10yrs.**	**15yrs.**
Average aircraft size (seats)					
• Air carrier	77	78	78	81	82
• Commuter	50	50	50	50	0
Average enplaning load factor					
• Air carrier	76%	85%	85%	85%	85%
• Commuter	60%	80%	0%	0%	0%
GA operations per based aircraft	191	208	211	212	207

Note 1: Peak Hour forecasts will be presented in the Terminal Area Planning document.

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