



Oakland International Airport Aviation Forecast

October 2020

Summary

- This document was prepared for the Port of Oakland to present an overview of the analysis of the historical traffic at OAK, as well as the methodology and results of the planning activity forecast.
- As a Medium Hub Airport, the Airport plays a critical role in the system of three commercial service airports serving the San Francisco Bay Area (“Bay Area”).
- The Bay Area is the 4th largest metropolitan population base in the country. OAK also serves as a connecting point on Southwest Airlines’ network.
- Annual and peak hour forecasts were prepared through 2035 with a base year of 2019.
- Forecasted enplaned passengers include both domestic and international traffic. Aircraft operations include Air Carrier, Commuter Air Taxi, General Aviation (“GA”), Military, and Cargo activity.
- Two consulting firms assisted OAK with this effort; InterVISTAS Consulting, Inc. prepared the Passenger-related activity forecasts, while Landrum & Brown prepared the Cargo, GA, and Military activity forecasts.
- The Planning Forecasts were developed in order to quantify future facility requirements within the planning horizon.
- The forecasts have been prepared using a combination of traditional top-down econometric modeling and bottom-up analysis of carrier networks and are “unconstrained,” meaning they do not take facility constraints or other outside limiting factors into consideration.

OAK Commercial Operations Catchment Area



Summary

- Prior to finalizing the forecast, the Coronavirus (COVID-19) pandemic began, which has had an immediate impact of aviation traffic at the Airport. The extent of the impact from COVID-19 on aviation traffic at OAK is not fully understood at the time of this study, but a recovery is anticipated within four years similar to other exogenous shocks, which is consistent with the broader industry consensus of the recovery.
- In order to quantify future facility requirements within the planning horizon, two planning activity levels (“PALs”) were identified for use in planning documents.
- These PALs correspond to annual levels of passengers and operations that can be used to test the ability of the existing facilities to accommodate those levels of demand at acceptable levels of service to the airlines and users of the Airport.

PAL Forecast Summary

OAK Planning Forecast in Calendar Years			
	Base Year 2019	PAL 1 Approx. 2025	PAL 2 Approx. 2035
Million Annual Passengers (“MAP”)	13.4	17.6	24.7
CAGR		4.7%	3.9%
Annual Airline Operations	113,272	132,830	181,270
CAGR		2.8%	3.0%
Freighter/Cargo Operations	20,698	22,600	24,400
CAGR		1.5%	1.0%
Business/General Aviation Operations	107,861	108,968	114,757
CAGR		0.2%	0.4%

Passenger Forecast Methodology

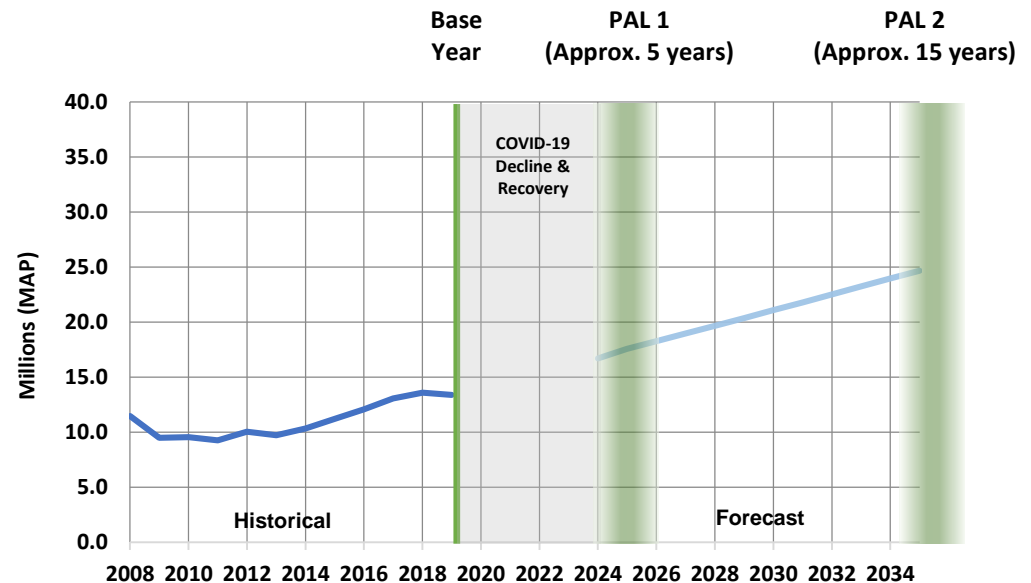
- The OAK passenger forecast was developed using a combination of both a bottom-up (short term) microeconomic methodology and a top-down macro-economic methodology to produce unconstrained forecasts. This methodology is similar to the previous master plan process and approach which took place in 2006.
- Given OAK's position in a multiple airport market, predicting future traffic levels at individual airports cannot be done in isolation and one must consider the trends and dynamics occurring at other airports in the region. That said, several key factors were analyzed as drivers for OAK unconstrained demand forecast, including:
 - The growing Bay Area Catchment Area
 - The shift in share toward Oakland as a result of the convenience of the airport to the fastest growing parts of the Bay Area
 - Southwest's position as a dominant carrier and network growth plans at OAK
 - Connecting passenger traffic was projected to achieve minimal growth, 1.5 percentage points, over the life of the forecast
- As a result, the forecast was developed using a two-step process:
 - A forecast of the O&D passenger activity in the Bay Area was developed based on historical relationships with macro-economic variables and airline market plans from the base year 2019 through 2035; and
 - The demand was allocated to OAK based on its historic share to the region and the short-term forecast.



Planning Activity Levels

- There is a level of uncertainty associated with long-range demand forecasting and associated planning of airport facilities
- Planning activity levels (“PALs”) inform the future levels of passenger activity, air cargo tonnage, and aircraft operations at which facilities may trigger the need for additional capacity or other development, and may be used for analyzing the benefits of proposed development alternatives
- PALs help to disassociate projects from specific years as realized activity levels may occur earlier or later than the forecast predicts
- With PALs, airport management can accelerate or decelerate projects in the capital improvement program based on how demand occurs in the future
- PAL are established typically by:
 - Projecting a near-term increase in activity reasonably expected a few years into the future
 - Projecting an upper bound of activity reasonably expected over the time period being evaluated
 - Evaluating additional points of activity between these two bounds, as necessary

*OAK Passenger Forecast
(CY 2008-2035)*

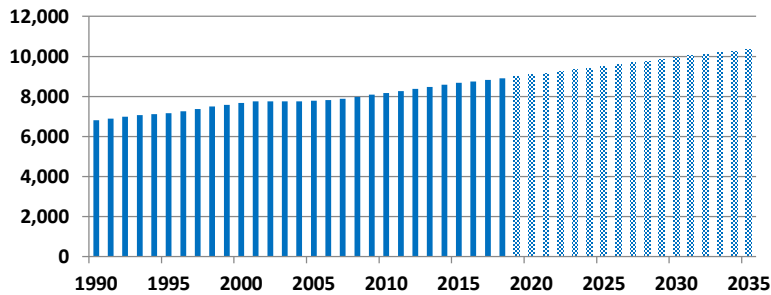


Note: The calendar years associated with PAL's are estimates

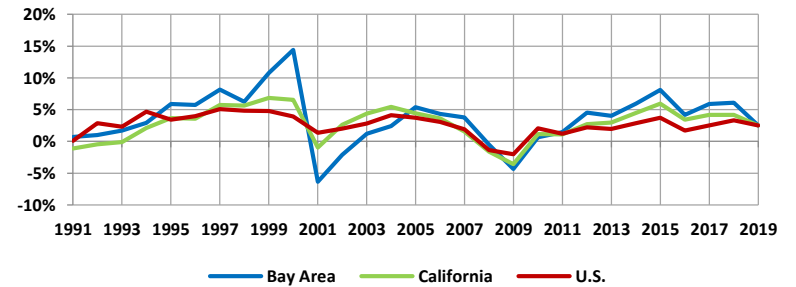
Socio-economic Data

- Air transportation is derived demand related to the underlying economic and demographic activity in the service area of the airport as well as key source markets of destination demand and shaped by the fleet and network decisions of airlines and other service providers in the market.
- This data provides the context for understanding historical trends and potential correlations between aviation traffic and the variables discussed for passenger activity, air cargo and GA.

Bay Area Population
(CY 1990-2035, thousands)

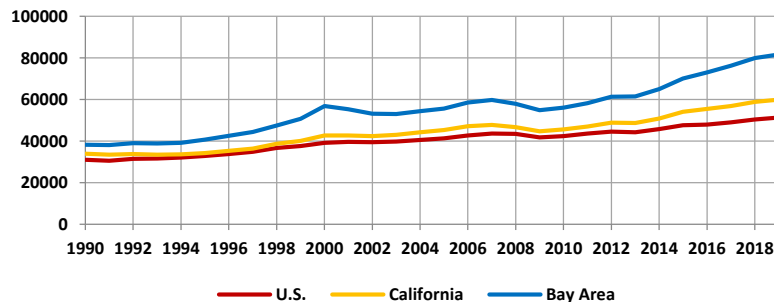


Year-Over-Year Change in GRP
(CY 1990-2019)

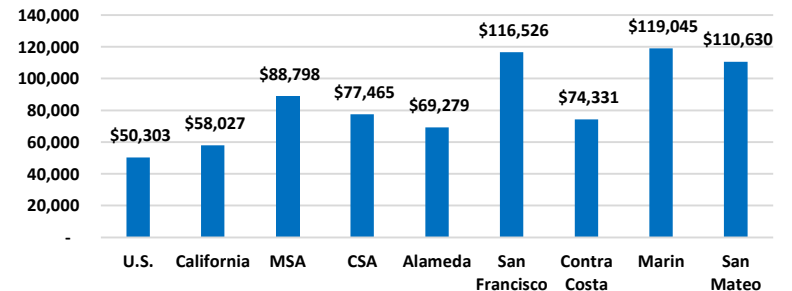


Note: GRP = gross regional product

Total Personal Income Per Capita
(in 2012 USD, CY 1990-2019)



2019 Estimated Average PCPI
(in 2012 USD)



Note: PCPI = Per capita personal income

Passenger Forecast Methodology

Short-term (bottom up)

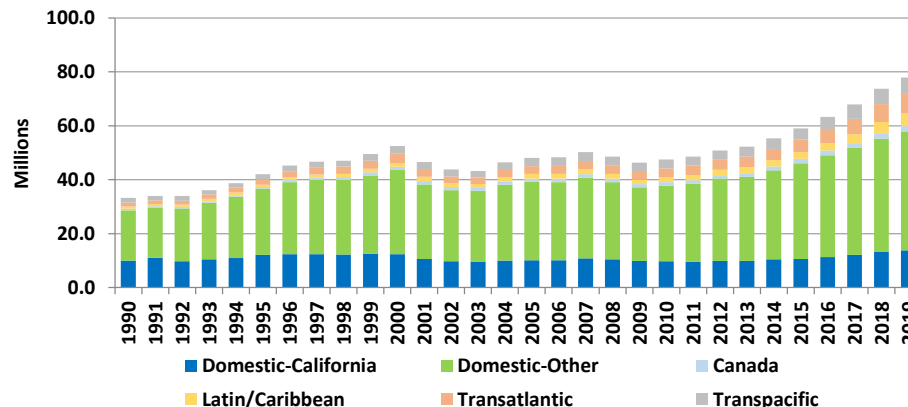
- The bottom-up approach is used in the short-term forecast as estimates of economic activity in the near term tend to diverge, and the published capacity of the airline is more reliable.
- The bottom-up forecast developed for OAK was based on the short-term network and fleet planning decisions by airlines currently serving and likely to serve the airport, most notably Southwest Airlines (“WN”).
- In 2020-2021, based on published schedule data, the forecast projects an increase in WN’s capacity share, as a result of other airlines reducing capacity at the airport. The forecast then anticipates both WN and other airlines will increase capacity, which will return WN’s share to similar levels seen in 2019.
- Industry intelligence was incorporated to estimate share of connecting traffic at each airport.
- At present, passenger traffic is being negatively impacted by COVID-19. However, for the purpose of this forecast analysis, calculations assume that traffic will recover four years following the event, as seen with other exogenous-shock events.
- Despite the impacts of COVID-19, a recovery is anticipated within four years similar to other exogenous shocks. With that said, OAK does not anticipate a to change the PAL1, however it does introduce additional uncertainty as to when (what year) the PAL will be triggered

Passenger Forecast Methodology

Long-term (top-down)

- In order to estimate long term trends for OAK and the Bay Area, InterVISTAS examined the statistical relationship between economic trends and historical traffic volumes.
- Over the long term, the relationship between the economic and demographic drivers is more reliable.
- Regression analysis was used to establish the relationships between the independent variables and Origin & Destination (“O&D”) passenger activity in the Bay Area which was broken out by region: Intra-California, other Domestic, Canada, Latin, Trans-Atlantic, and Trans-Pacific.
- While California is geographically large and has significant intra-state traffic, historical growth is being driven primarily by domestic traffic to and from points outside of California.

*Bay Area O&D Passengers
(CY 1990-2019)*



Drivers of Growth

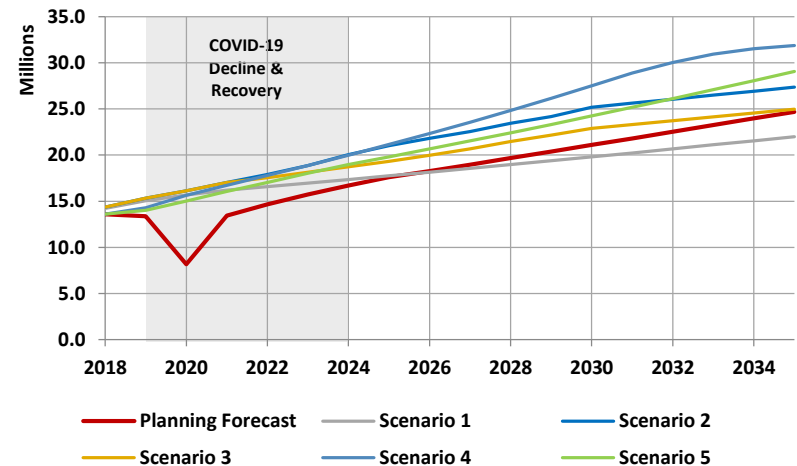
The growth drivers outlined below are the 3 primary underlying drivers of the forecast. Each driver can be adjusted which would result in changes to the forecast. The primary growth assumptions in the planning scenario include:

- Continued economic growth in the Bay Area
 - Economic growth in downtown OAK is increasing faster than the bay area average
 - The economy of Oakland has diversified to include more technology and biotechnology businesses
- OAK's increased share of Bay Area traffic to returns to levels seen during the previous peak in 2007
 - OAK is the most convenient airport to the largest segment of the population in the Bay Area and has the largest catchment area of the three bay area airports
 - Ground access to OAK is improved with the BART extension to the terminal
 - OAK is the most convenient airport for tourists to Wine Country
- Southwest Airlines continued commitment to OAK
 - OAK is home to Southwest's largest operation in the Bay Area and where the airline plans the highest increases in capacity.
 - Southwest is the largest airline in the domestic United States, so is frequently the dominant airline in the vast majority of the markets it serves.
 - Between 2018 and 2019, WN increased capacity by 3.4%, and following review of the published schedule data as well as additional discussions with the airline, Southwest confirmed their commitment to OAK.

Discussion of Scenarios

- A range of forecast scenarios were explored that analyzed various (a) underlying economic growth, (b) the fleet and network plans of airlines serving and likely to serve the airport, and the timeline over which they are implemented, (c) the amount of Bay Area traffic OAK will be able to capture, and (d) assumptions around real air fares over the forecast period.
- This analysis resulted in scenarios that are both higher and lower than the planning forecast. The planning forecast, represented by the red line in the graph below, was selected because it is consistent with consensus economic forecasts, the fleet and network plans of airlines serving the airport, historical airfare performance over time, and an eventual return to OAK's 2007 share of Bay Area traffic.
- Alternate forecast scenarios:
 - **Scenario 1** – assumed more modest economic growth in the medium term. OAK does not reach 2007 share of Bay Area traffic; and WN to add incremental capacity over time.
 - **Scenario 2** – assumed more robust economic growth over the medium term. OAK projected to achieve a higher share of Bay Area traffic; and WN to implement an aggressive capacity plan.
 - **Scenario 3** – assumed more robust economic growth in the first 10 years only. OAK's share of Bay Area traffic reaches 2007 levels, without exceeding it; and WN to implement a moderate capacity increase.
 - **Scenario 4** – assumed economic growth reaches the upper estimates of the census forecast of the Bay Area. OAK's share of the Bay Area exceeds its historical share achieved in 2007; and WN very aggressively adds capacity to meet high rates of economic growth and OAK's increased catchment share.
 - **Scenario 5** – assumptions are similar to Scenario 3 with higher economic growth, and restored Bay Area traffic share. However, WN capacity deployment occurs in later years.

**OAK Passenger Forecast Scenarios
(CY 2018-2035)**

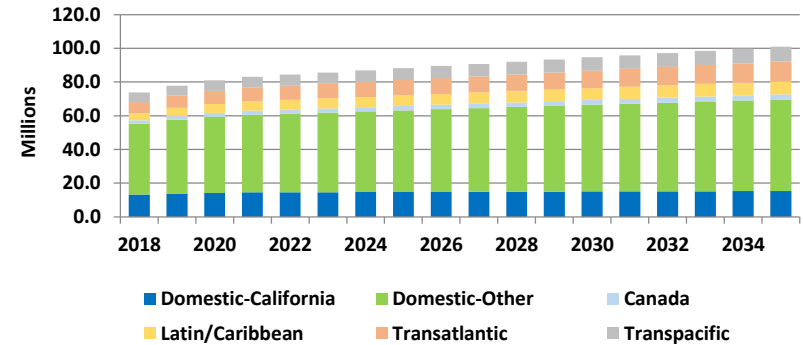


Passenger Forecast Results

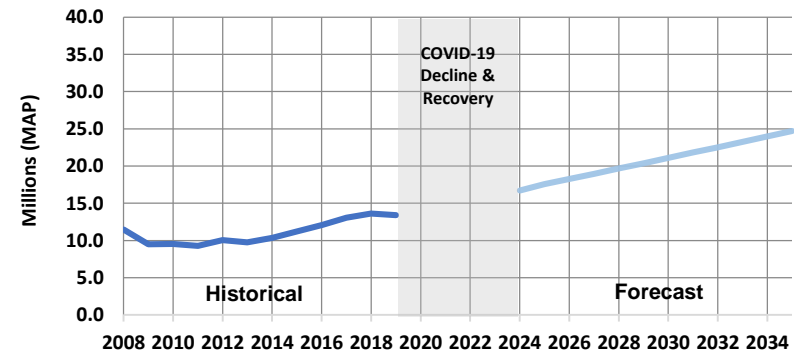
Passenger Forecast Results

- The Bay Area O&D passenger traffic is forecast to increase at 1.9% from 2019-2035.
- Similarly, the FAA 2018 Aerospace Forecast predicts that U.S. traffic will increase 1.9% per annum from 2018-2038.
- Once O&D passenger demand for the Bay Area is projected, traffic was then allocated to OAK.
- The forecast anticipates a return to OAK’s historical share of Bay Area O&D passengers prior to the 2008/2009 Global Financial Crisis.
- OAK’s passenger traffic is forecast to increase at a rate of 3.9% per annum between 2019 and 2035, reaching 24.7 million passengers in 2035.

Forecast of Bay Area O&D Passengers (CY 2018-2035)



OAK Passenger Forecast (CY 2008-2035)



Commercial Passenger Operations

Commercial Passenger Operations

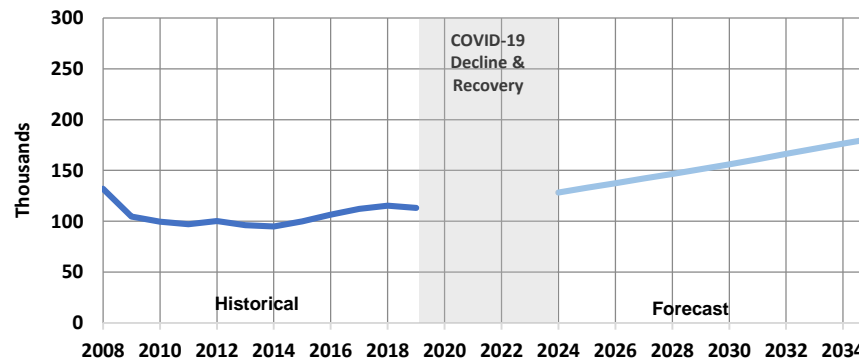
- Forecasts of annual commercial passenger aircraft operations are based on forecast passenger traffic demand. Passenger aircraft landings depend on the average aircraft size and average load factor (i.e. average passenger per flight), as represented by the formula below:

$$\text{Passenger Aircraft Operations} = (\text{Passenger Forecasts}) / (\text{Average Aircraft Size} \times \text{Average Load Factor})$$

where $\text{Average Aircraft Size} \times \text{Average Load Factor} = \text{Average Passengers per Aircraft Movement}$

- Southwest Airlines is increasing the gauge of aircraft it uses at OAK, as are other airlines serving the Airport. Overall, the average seats per departure increase from 149 in 2019 year to 167 in 2035.
- The passenger operations forecast includes a near-term impact and recovery with respect to the COVID -19 pandemic, thus showing the large drop in traffic for 2020 with a quick recovery.
- OAK's commercial passenger operations are projected to increase at a rate of 3.0% per annum between 2019 and 2035, reaching 181,270 operations in 2035.

OAK Commercial Passenger Operations Forecast
(CY 2008-2035)

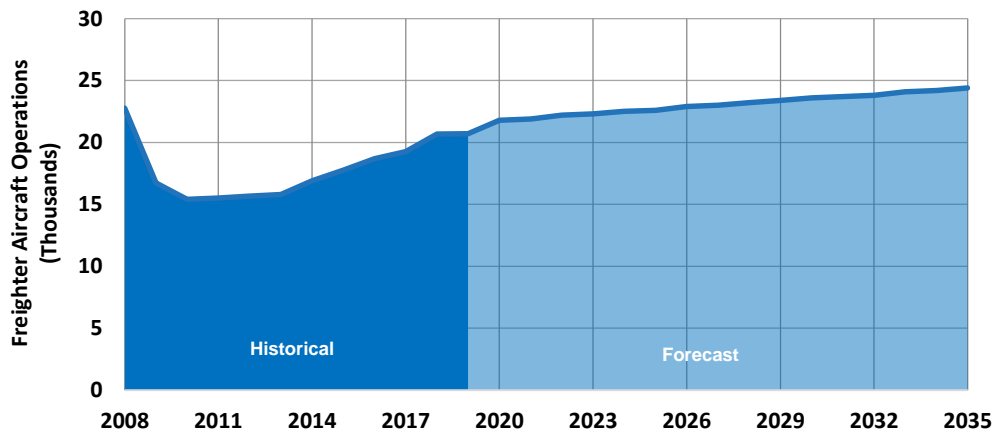


Freight and Cargo Operations

Freighter and Cargo Operations

- Freighter operations at the Airport represent activity by all-cargo dedicated aircraft used only to transport goods to and from OAK.
- These freighter operations may be performed by a range of aircraft from a smaller feeder aircraft to large dedicated freighters like a Boeing 757, 767, 777 or MD11 aircraft.
- Total freighter operations (domestic and international), are forecast to increase from 20,698 operations in 2019 to 24,400 in 2035, representing a growth rate of 1.0% per annum.
- Unlike the declines experienced in passenger traffic and operations due to COVID-19, air freight traffic has fared significantly better. Freighter operations have been vital in keeping global supply chains functioning and have seen an increase in 2020.

OAK Freighter Operations Forecast
(CY 2008-2035)



General Aviation Operations

General Aviation Operations

- General aviation aircraft operations represent the non-commercial and non-military segments of air traffic at the Airport.
- The primary segments identified and forecast in this study are large business aviation (large aircraft of more than 12,500 pounds), small business aviation (smaller aircraft of 12,500 pounds or less), and small general aviation (small aircraft of 12,500 pounds or less).
- General aviation operations are projected to grow at an CAGR of 0.4% through 2035.

Total General Aviation Operations Forecast (CY 2018-2035)

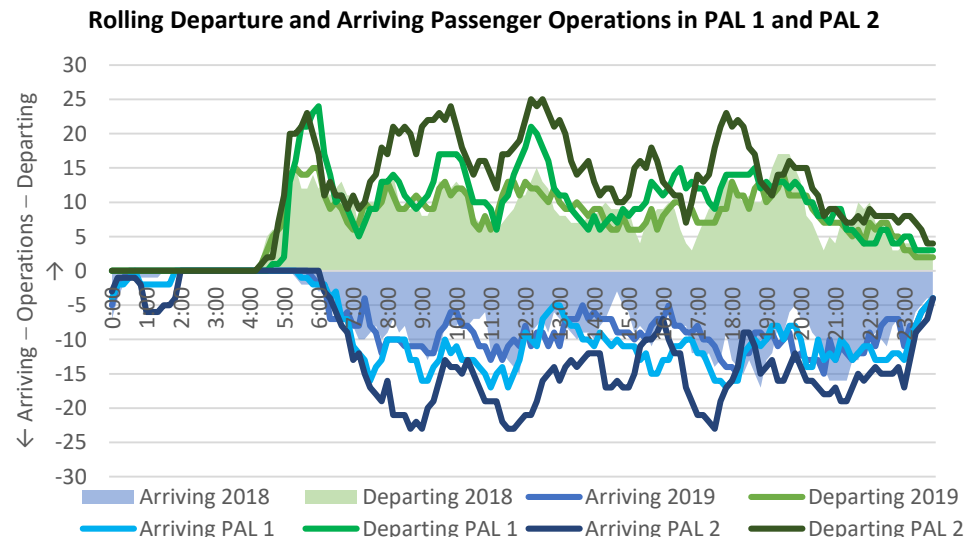
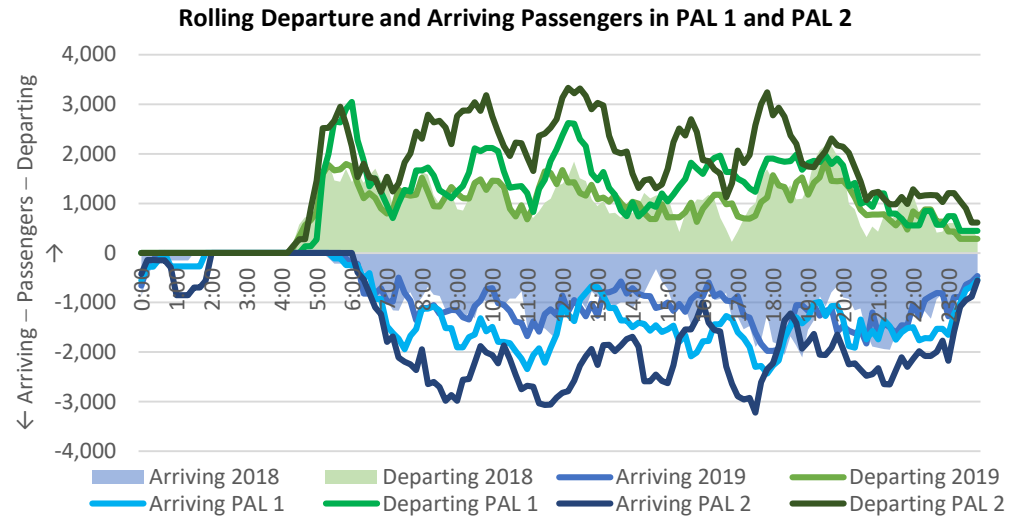
Year	Business Aviation		General Aviation		Total Operations
	Large Aircraft	Small Aircraft	Itinerant	Local	
2018	19,404	16,458	27,705	40,832	104,399
2019	22,428	14,226	32,499	38,708	107,861
2025	26,176	19,040	25,068	38,685	108,968
2030	29,327	20,812	24,303	37,505	111,947
2035	32,278	22,269	23,675	36,535	114,757
CAGR '19-35	2.3%	2.8%	-2.0%	-0.4%	0.4%

Peak Period Activity Methodology

- Design day flight schedules (“DDFS”) are beneficial for establishing peak period demands used to calculate facility requirements and test facility sizing
- To support both terminal facility planning and airfield facility planning, two design day flight schedules were developed:
 - PAL 1, anticipated to occur around 2025,
 - PAL 2, anticipated to occur around 2035
- DDFS was developed using 2018 and 2019 actual activity as a base with forecasts informed by:
 - annual increases in the relevant activity
 - trend analysis of how activity during the peak periods tends to increase vis-à-vis annual increases
 - consultations with the relevant Airport users
- Average day peak month (“ADPM”) enplanements and deplanements were calculated (July)
- A weekday published airline schedule representative of the average day was selected as the basis for future flight schedule development, supplemented with load factor, origin-destination, and connecting passenger information
- While peak month and day growth factors were held constant due to little historical change at OAK, the peak hour was allowed to vary throughout the planning period so as not to constrain organic schedule growth or force hub carriers to schedule flights that do not align with their hubbing strategies
- Design day flight schedule growth is built up using a two-layered approach:
 - New flights (operations) are added to either existing or new markets to meet the projected increase in operations and contribute to the projected increase in passengers
 - Existing flights are up-gauged to larger aircraft, which also increases passengers but not does not affect the operational profile
- Similar overall methodology to derive peak period for freighter, general aviation, and military operations

Peak Period Activity Results

- Southwest is a well-established carrier at OAK with growth expected to occur through additional frequencies to existing destinations as well as new frequencies to unserved markets
- The morning "head-start" departure peak between 5:00am and 7:00am increases in PAL 1 and PAL 2, but there is not a pronounced increase in late evening arrivals
- Despite increases during other times of the day, one of the largest departure peaks continues to be around midday, allowing airlines an additional frequency to reach their hubs primarily located east of OAK
- To account for the evolving shifts in airline network planning and hub strategies, which was provided as input from the airlines during consultation, the daily schedule profiles at PAL 1 and PAL 2 do not grow uniformly



Comparison to the Federal Aviation Administration’s Terminal Area Forecast

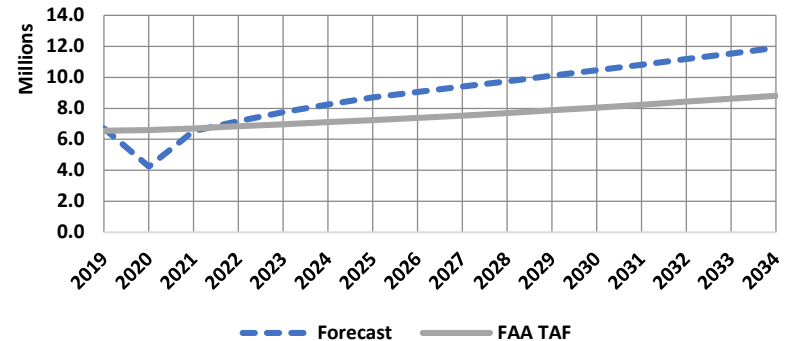
The Federal Aviation Administration’s (“FAA”) Terminal Area Forecast (“TAF”)

- The Terminal Area Forecast (“TAF”) is the official FAA forecast of aviation activity for U.S. airports.
- Forecasts are prepared annually for air carrier, air taxi/commuter, general aviation, and military enplaned passengers and operations.
- The forecasts are prepared to meet the budget and planning needs of the FAA and provide information for use by state and local authorities, the aviation industry, and the public.

Traffic Forecast Results Compared to TAF

- The OAK Aviation passenger forecast is projected to increase at an average growth rate over the forecast period is 3.9% per year, reaching 11.9 million enplaned passengers in FY 2034.
- The OAK Aviation forecast varies from the passenger enplanements in the TAF by a growing margin over time. This variance is due to several factors, including FAA's underestimation of the base year (2019), which accounts for 2.2% of the variance and that carries through the horizon of the forecast.
- Additionally, the FAA TAF does not include the impact of the global pandemic experienced in 2020.
- By 2034, the TAF is showing 35% fewer passengers than the OAK forecast.
- The OAK forecast projects operations to grow at a rate of 2.3% per annum from 2019 to 2024, while the TAF assumes a 1.7% growth over the same period.
- By 2034, there is a difference of roughly 19,600 aircraft operations between the forecasts, or a variance of 8.5%.

OAK Enplaned Passenger Forecast vs. FAA TAF (FFY 2019-2034)



Commercial Aircraft Operations Forecast vs. FAA TAF (FFY 2019-2034)

