

## Kansai International Airport (KIX) Demand and Capacity Analysis 2021

### 1. Introduction

#### 1.1 Airport Characteristics

Kansai International Airport (IATA: KIX, ICAO: RJBB), which was opened in 1994, is an important international hub for the country, providing one of the largest networks for both domestic and international routes with complete 24-hour operations. The airport is considered as a gateway for the Kansai area, including Osaka, Kyoto, Kobe, Nara, and other cities in the western part of Japan, with 31 million passengers in 2019.

#### 1.2 Airport Infrastructure



Japan's first full-scale offshore airport, KIX, is a world-class, 24-hour operating facility with two 4,000 meter-class runways.

#### 1.3 Air Space limitation

The limit of ATMs per hour is 45 due to air space limitations and agreements among local communities. Also, Runway B is basically used for landing only. This limitation was established based on the understanding of local communities.

Under the agreement within stakeholders regarding the noise impact, there are strict restrictions on air routes around KIX; e.g.) Airplanes should make every effort to fly over sea area and not fly over the land area when passing at low altitudes. Also, air space around KIX is limited as there are other airports (ITM/UKB) located close to KIX, which hinders 2 runways from being made the best use of.

Therefore, in order to increase the number of ATMs per hour further, it is necessary to implement an environment impact assessment, coordinate air space in the region, and reach an agreement among local communities such as local governments, the

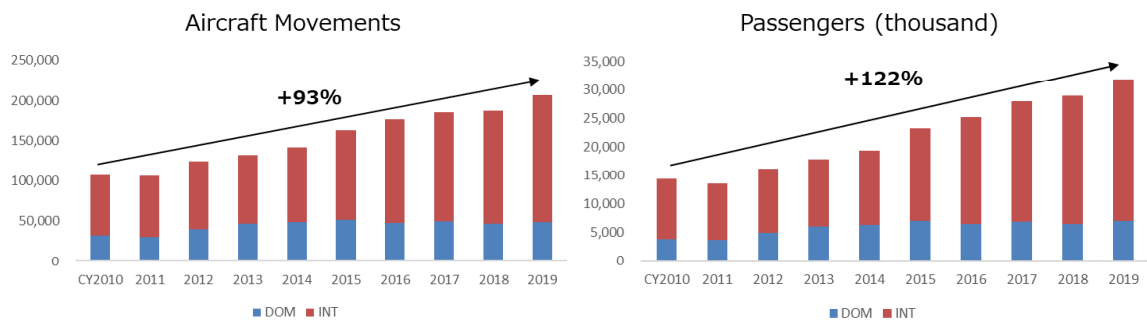
business community, etc., which is expected to be a long process which may take years.

## 2. Air Traffic Analysis

### 2.1 Aircraft Movements and Passengers

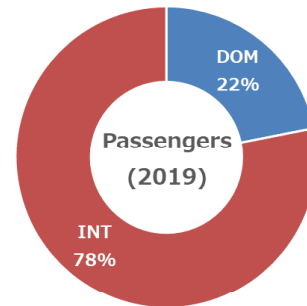
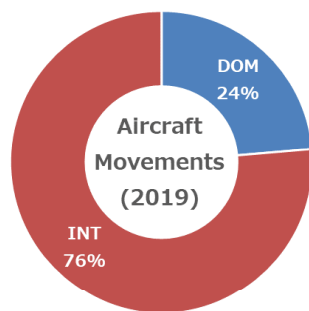
The statistical data and graphs for aircraft movements and passengers from 2010 to 2019 are shown below. Thanks to the remarkable growth in the number of international traffic, the total number of aircraft movements and passengers has grown by 93% and 122%, respectively, in the last ten years. Though these figures drop in 2020 due to the COVID-19 pandemic, they will soon recover to 2019 levels after the travel market returns to normal as approx. 73% of the international passenger flights are between KIX and Asian countries where the demand is expected to recover rapidly once the crisis is over.

		CY2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Aircraft Movements	DOM	31,750	30,230	40,160	46,932	48,411	51,487	47,899	49,814	46,882	48,892
	INT	75,147	75,771	83,865	84,991	93,154	112,019	129,210	135,360	140,232	157,885
	TTL	106,897	106,001	124,025	131,923	141,565	163,506	177,109	185,174	187,114	206,777
Passengers (thousand)	DOM	3,867	3,609	4,860	5,997	6,301	6,964	6,476	6,849	6,514	6,982
	INT	10,486	9,916	11,253	11,814	13,053	16,254	18,761	21,139	3,867	24,934
	TTL	14,353	13,525	16,114	17,811	19,354	23,218	25,237	27,988	28,953	31,916



### 2.2 International Ratio

The percentage of international flights in aircraft movements and passengers in 2019 is shown below. As shown, international traffic accounts for three-quarters in both categories.



### 2.3 Domestic Flight Routes

There were approx. 70 domestic passenger flights (round-trip) per day to/from 17 destinations operated by 6 airlines in the peak period of the 2019 summer schedule. Primarily, KIX is serving major trunk routes such as KIX-Haneda, KIX-Sapporo (Chitose), and KIX-Okinawa (Naha).

### 2.4 International Flight Routes

There were 1,433 international passenger flights (round-trip) per week to 75 destinations operated by 63 airlines in the peak period of the 2019 summer schedule. Out of 1,433 flights, 494 flights (34%) are services to China which is the largest destination of KIX, followed by Korea with 348 flights and Southeast Asia with 197. KIX offers a wide range of flight network throughout Asia.

Another feature of KIX is that KIX is one of the largest hubs of the Low-Cost Carrier (LCC) networks in Japan. There were 20 LCCs who operated international flights to/from KIX in the 2019 summer schedule, and they operated 531 weekly flights, which is 37% of all international passenger flights at KIX.

## 3. Passenger Terminal Buildings and Cargo Areas

KIX has two passenger terminal buildings that accommodate both international and domestic flights. One of them is dedicated to LCCs. KIX also has areas designated for international/domestic cargo handling.

Cargo activity is a key asset of KIX, and international cargo flights represent 137 flights per week in the 2019 summer schedule.

### 3.1 Passenger Terminal Building

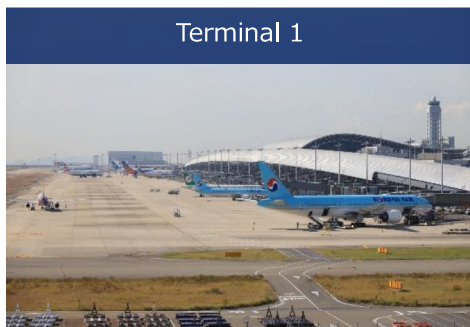
#### (1) Terminal 1 (T1)

Terminal 1, which was opened in 1994, is located on the 1<sup>st</sup> airport island. It is

directly connected with the railway stations of JR and Nankai Railway. The building has four stories and one underground with a gross floor area of 303,943 sqm. It accommodates international and domestic flights by Full-Service Carriers (FSCs) and LCCs.

## (2) Terminal 2 (T2)

Terminal 2, which was opened in 2012 and expanded in 2017, is located on the 2<sup>nd</sup> airport island. It can be accessed by a free shuttle bus from Terminal 1 or cars. Limousine bus service is also available to/from major cities in the Kansai region. Terminal 2 is a two-storied building with a gross floor area of 67,111 sqm. Four LCCs, namely, Peach, Spring Airlines, Jeju Air, and T'way Air, operate at Terminal 2.



## 3.2 Cargo Areas

The international cargo area is mainly located at the southwest end of the 1<sup>st</sup> airport island with 26.4 ha. KIX-Medica, Japan's first drug-only constant-temperature warehouse in an airport, is located in this area. The domestic cargo area is located at the northeast end of 1<sup>st</sup> airport island with a site area of 4.5 ha.

FedEx operates its second regional Asian hub on the second island.



#### 4. Aircraft Parking Stands

Terminal 1 has 41 aircraft stands, consisting of 31 stands for international, 7 for domestic, 3 as swing (both for INT and DOM); on top of that, 11 remote stands serve mainly Terminal 1. Terminal 2 has 20 stands in total, 6 for international, 8 for domestic, and 6 as swing. Cargo Area has 22 stands.

T1						
DOM		Swing	INTL			TTL
<=Code C	<=Code E	<=Code E	<=Code C	<=Code E	<=Code F	
0	7	3	2	24	5	41

T2			
DOM	Swing	INTL	TTL
<=Code C	<=Code C	<=Code C	
8	6	6	20

Remote			Cargo		Others
<=Code C	<=Code E	<=Code F	<=Code E	<=Code F	
6	4	1	16	6	12

For further detail, please refer to Appendix 1: Location of aircraft stands.

#### 5. Current Airport Constraints

##### 5.1 Hourly Movements

The number of aircraft movements at KIX is capped at 45 per hour. The hourly movements are further limited to 36 per hour during fire-break hours.

\*Fire-break hours

summer: 14:00-14:50 and 20:00-20:59 / winter: 13:00-13:59 and 20:00-20:59

#### **< Runway Movement rate >**

<b>1. RESTRICTION PER HOUR</b>	<b>45</b>
<b>2. RESTRICTION FIREBREAKS (twice a day)</b>	<b>36</b>

#### **<Notes>**

The maximum number of departures per hour are 32 and that of arrivals are 25.

##### 5.2 Noise Abatement Measures

KIX was established 5km offshore to consider the noise problem. Thanks to this measure, there is currently no major problem with noise. Besides, airplanes must climb up to 8,000 feet over the sea area before passing through the land area to further reduce noise caused by take-offs.

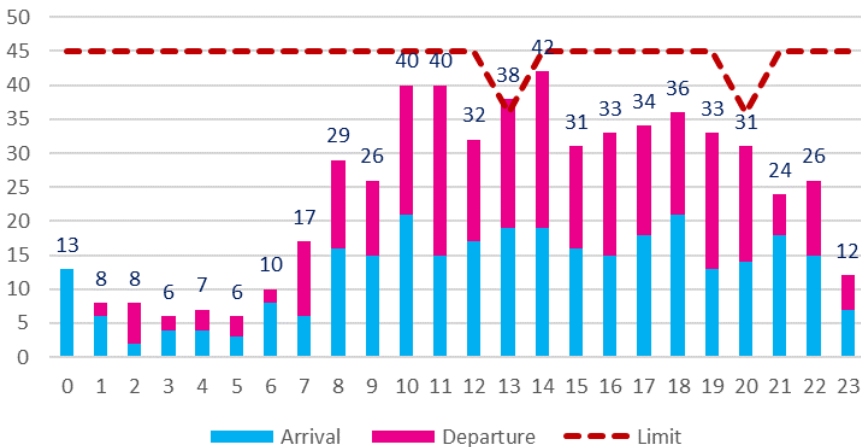
## 6. Capacity Analysis for summer 2017

### 6.1 Runway Capacity

The peak week in 2017 was the 3<sup>rd</sup> week of September, and the peak day was found to accommodate 582 flights. The hourly operations for departures and arrivals on that day are shown below. The peak operation of 42 is recorded at 14:00, and the ratio of slot utilization was more than 90% in 2 hours.

Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
Limit	45	45	45	45	45	45	45	45	45	45	45	45	45	36	45	45	45	45	45	36	45	45	45	45	-
Arrival	13	6	2	4	4	3	8	6	16	15	21	15	17	19	19	16	15	18	21	13	14	18	15	7	305
Departure	0	2	6	2	3	3	2	11	13	11	19	25	15	19	23	15	18	16	15	20	17	6	11	5	277
Total	13	8	8	6	7	6	10	17	29	26	40	40	32	38	42	31	33	34	36	33	31	24	26	12	582
slotutilization	29%	18%	18%	13%	16%	13%	22%	38%	64%	58%	89%	89%	71%	106%	93%	69%	73%	76%	80%	73%	86%	53%	58%	27%	

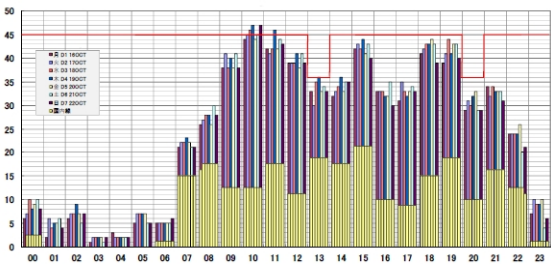
Hourly Aircraft Movement (Arrival / Departure)



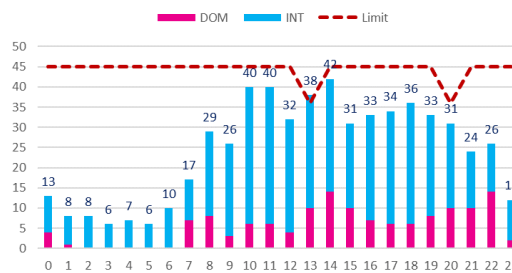
### 6.2 Terminal and Spot Capacity

Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
Limit	45	45	45	45	45	45	45	45	45	45	45	45	45	36	45	45	45	45	45	36	45	45	45	45	-
INT	9	7	8	6	7	6	10	10	21	23	34	34	28	28	28	21	26	28	30	25	21	14	12	10	446
DOM	4	1	0	0	0	0	0	7	8	3	6	6	4	10	14	10	7	6	6	8	10	10	14	2	136
Total	13	8	8	6	7	6	10	17	29	26	40	40	32	38	42	31	33	34	36	33	31	24	26	12	582

【Submission】 KIX Slot Request (S17)



Hourly Aircraft Movement (International / Domestic)



(1) Domestic Flights

No constraints in capacity.

(2) International Flights

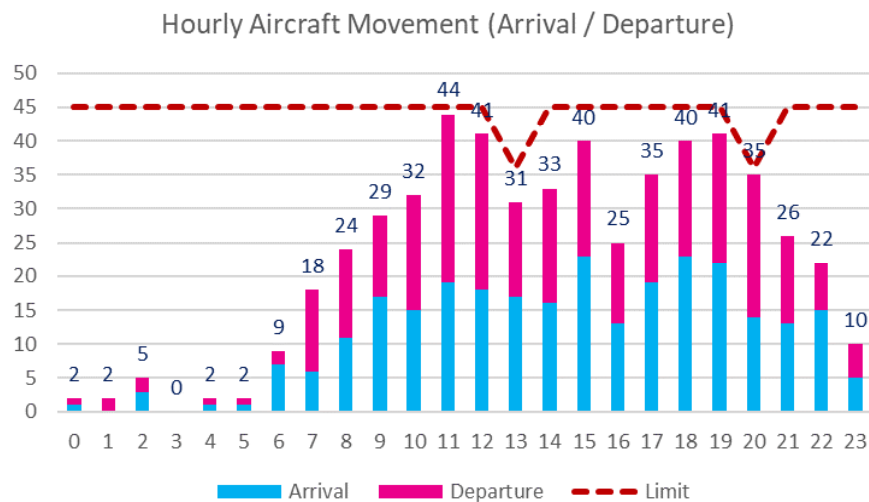
The airport facilities such as check-in counters and security screening areas are getting congested due to the rapid increase in international flights. Still, the congestion did not force airlines to adjust or give up their preferable flight schedule.

## 7. Capacity Analysis for summer 2018

### 7.1 Runway Capacity

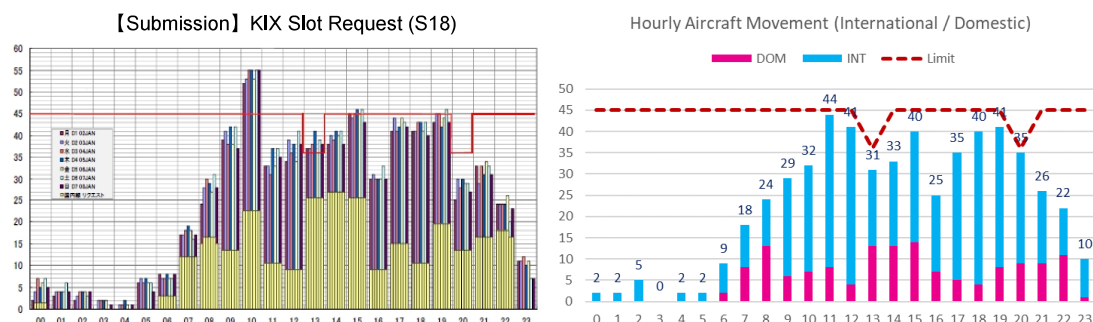
The peak week in 2018 was the 2<sup>nd</sup> week of August, and the peak day was found to accommodate 548 flights. The hourly operations for departures and arrivals on that day are shown below. The peak operation of 44 is recorded at 11:00, and the ratio of slot utilization was more than 90% in 4 hours.

Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
Limit	45	45	45	45	45	45	45	45	45	45	45	45	45	36	45	45	45	45	45	45	36	45	45	45	—
Arrival	1	0	3	0	1	1	7	6	11	17	15	19	18	17	16	23	13	19	23	22	14	13	15	5	279
Departure	1	2	2	0	1	1	2	12	13	12	17	25	23	14	17	17	12	16	17	19	21	13	7	5	269
Total	2	2	5	0	2	2	9	18	24	29	32	44	41	31	33	40	25	35	40	41	35	26	22	10	548
slot utilization	4%	4%	11%	0%	4%	4%	20%	40%	53%	64%	71%	98%	91%	86%	73%	89%	56%	78%	89%	91%	97%	58%	49%	22%	



### 7.2 Terminal and Spot Capacity

Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
Limit	45	45	45	45	45	45	45	45	45	45	45	45	45	36	45	45	45	45	45	36	45	45	45	45	-
NT	2	2	5	0	2	2	7	10	11	23	25	36	37	18	20	26	18	30	36	33	26	17	11	9	406
DOM	0	0	0	0	0	0	2	8	13	6	7	8	4	13	13	14	7	5	4	8	9	9	11	1	142
Total	2	2	5	0	2	2	9	18	24	29	32	44	41	31	33	40	25	35	40	41	35	26	22	10	548



## (1) Domestic Flights

No constraints in capacity.

## (2) International Flights

Many requests concentrated on peak hours, making some airlines change their flight schedule as they could not secure their check-in counters. Kansai Airports introduced Smart Lanes to ease the congestion in the security inspection area. The Smart Lanes can handle 4 people simultaneously, so that the waiting time at the area was getting much shorter than before.

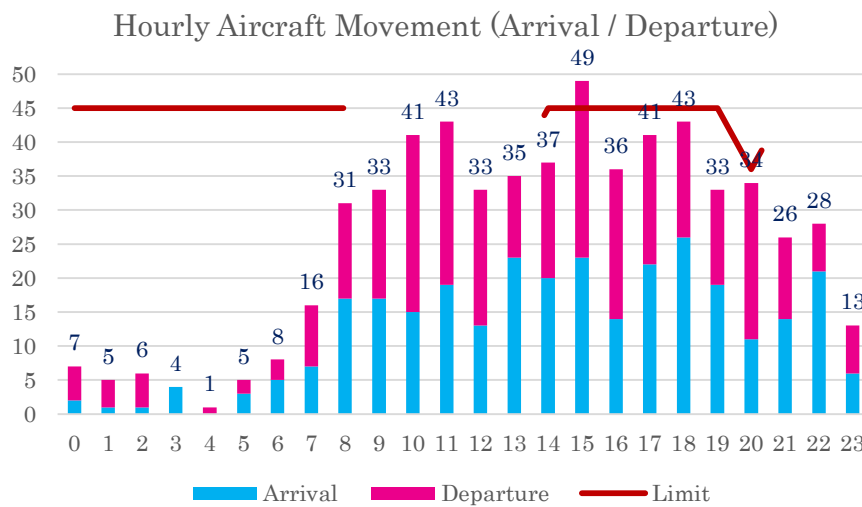
## 8. Capacity Analysis for summer 2019

### 8.1 Runway Capacity

The peak week in 2019 was the 3<sup>rd</sup> week of August, and the peak day was found to accommodate 608 flights. The hourly operations for departures and arrivals on that day are shown below. The peak operation of 49 is recorded at 15:00, and the ratio of slot usage was more than 90% in 7 hours.

Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
Limit	45	45	45	45	45	45	45	45	45	45	45	45	45	36	45	45	45	45	45	36	45	45	45	45	-
Arrival	2	1	1	4	0	3	5	7	17	17	15	19	13	23	20	23	14	22	26	19	11	14	21	6	303
Departure	5	4	5	0	1	2	3	9	14	16	26	24	20	12	17	26	22	19	17	14	23	12	7	7	305
Total	7	5	6	4	1	5	8	16	31	33	41	43	33	35	37	49	36	41	43	33	34	26	28	13	608
slot utilization	16%	11%	13%	9%	2%	11%	18%	36%	69%	73%	91%	96%	73%	97%	82%	109%	80%	91%	96%	73%	94%	58%	62%	29%	



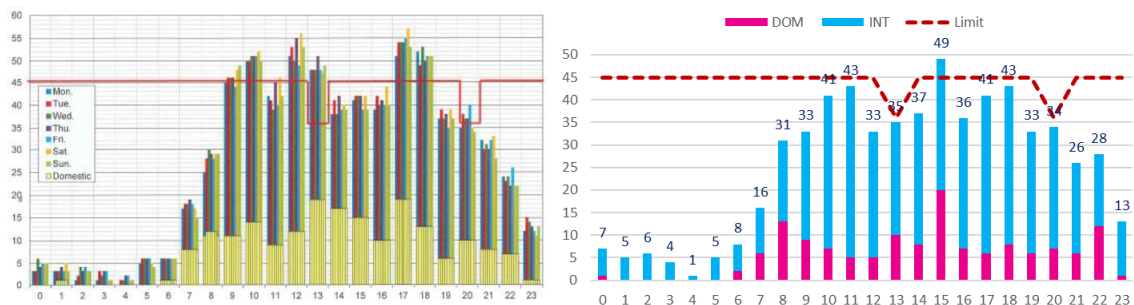


## 8.2 Terminal and Spot Capacity

Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
Limit	45	45	45	45	45	45	45	45	45	45	45	45	45	36	45	45	45	45	45	45	36	45	45	45	-
NT	6	5	6	4	1	5	6	10	18	24	34	38	28	25	29	29	29	35	35	27	27	20	16	12	469
DOM	1	0	0	0	0	0	2	6	13	9	7	5	5	10	8	20	7	6	8	6	7	6	12	1	139
Total	7	5	6	4	1	5	8	16	31	33	41	43	33	35	37	49	36	41	43	33	34	26	28	13	608

【Submission】KIX Slot Request (S19)

Hourly Aircraft Movement (International / Domestic)



### (1) Domestic Flights

No constraints in capacity.

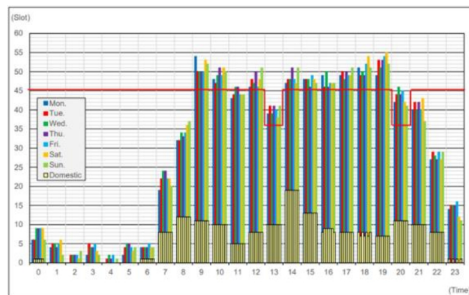
### (2) International Flights

Due to the remarkable increase in flights, airlines could not secure their check-in counters for their new flights in the daytime. Some of the airlines were required to change their operating schedule to unfavorable times, and others postponed launching new flights to the next season. Kansai Airports introduced KIOSKS and encouraged passengers to use the machines, but it did not solve the problem.

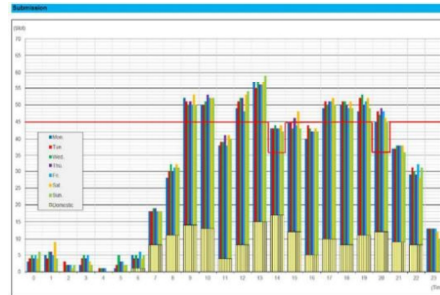
## 9. Slot Request in 2020 & 2021

We are in the middle of demand drop due to COVID-19. However, looking at the slot requests in W20 and S21 (requests made after the crisis started.), there are a lot of time periods when the number of requests exceeds the limit of 45 per hour as shown in the below charts. In preparation for the recovery, it is necessary at this moment to introduce the slot coordination process in line with a level 3 airport in order to cope with a number of slot requests KIX currently has.

【Submission】 KIX Slot Request (W20)



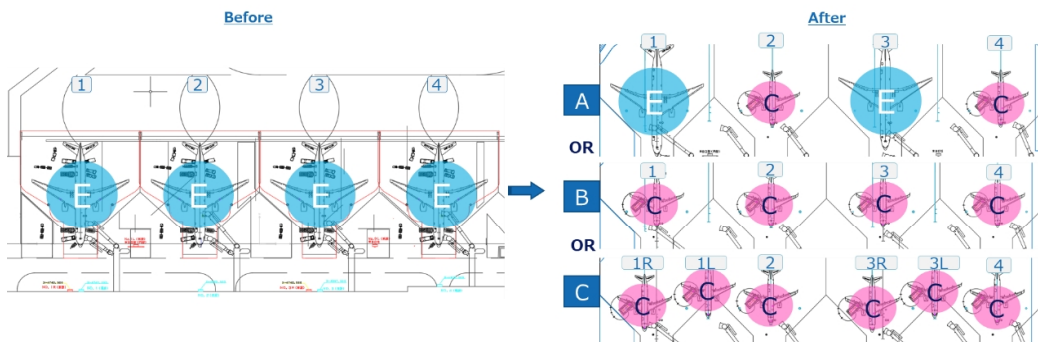
【Submission】 KIX Slot Request (S21)



## 10. Future Airport Expansion Plan

### 10.1 Renovation of aircraft stands for flexible uses (Aircraft Stands: #1-2, #3-4)

By installing new PBBs between existing aircraft stands, the stand can be used flexibly depending on the size of aircraft parked at these stands. It enables the airport to accommodate more aircraft at the same time. The construction works have already been completed, and the stands will be used when we enter a recovery phase after the downturn in demand due to COVID-19.



### 10.2 Future of Terminal 1 (Terminal 1 Renovation)

In the face of growing international inbound demand and ahead of the Osaka World Exposition in 2025, Kansai Airports has launched its Terminal 1 renovation

works. The program will expand KIX terminals' international capacity to over 40 million passengers by Osaka World Exposition in 2025.

#### 10.3 Lifting the limit of hourly aircraft movement

Kansai Airports is coordinating with local stakeholders towards increasing the number of hourly aircraft movements as mid-/long-term measures because the slot request from airlines exceeds several time periods in the daytime and the ratios of slot utilization were continuously close to the limit in 2019. It is expected to take more than 5 years to complete the project as it is necessary to implement an environment impact assessment, coordinate air space in the region, and reach an agreement among local communities such as local governments, the business community, etc. The discussion was supposed to start in 2020 but not yet due to the COVID-19 crisis.

### 11. Conclusion

KIX is categorized as a Level 2 airport, but there is severe congestion, close to Level 3 on a steady basis. Though the flights have been temporarily decreased due to the impact of COVID-19, we assume that the number of flights will be back to the pre-COVID level when the air travel market recovers since there are many slot requests that exceed the limit.

Kansai Airports (KAP), the operator of KIX, and local stakeholders have been discussing the expansion of runway/air space capacity, namely the increase in the limit of hourly ATMs from 45. However, it is not expected to happen in the short term as the coordination for the expansion takes time. Therefore, alternative measures are needed until the capacity expansion project is completed.

Also, by changing the category of KIX at the earliest timing, airline schedulers can recognize KIX as a congested airport before the market recovery. It also enables schedulers to know the historic slots they hold at KIX before returning to KIX.

Therefore, Kansai International Airport should be categorized as a Level 3 airport by IATA.

Appendix 1 Location of aircraft stands

