National Transportation Safety Board
Office of Aviation Safety
Washington, DC 20594

DCA23LA125

AIR TRAFFIC CONTROL

Group Chair's Factual Report
September 11, 2023

TABLE OF CONTENTS

A. INCIDENT

Location: Queens, New York
Date: January 13, 2023
Time: 2044 eastern standard time (EST) [1]
0144 coordinated universal time (UTC)[2], January 14, 2023
Airplane 1: N914DU, Delta Air Lines flight 1943, a Boeing 737-900ER
Airplane 2: N754AN, American Airlines flight 106, a Boeing 777-200

B. AIR TRAFFIC CONTROL GROUP

Group Chair	Betty Koschig National Transportation Safety Board Washington, DC
Group Member	Tim Keck National Air Traffic Controllers Association (NATCA) Cleveland, OH
Group Member	Kevin Allegrini Federal Aviation Administration (FAA) Boston, MA

C. SUMMARY

On January 13, 2023, about 2044 EST, American Airlines flight 106, a Boeing 777-200, incurred on runway 4L at John F. Kennedy International Airport (JFK), Queens, New York causing Delta Air Lines flight 1943, a Boeing 737-900ER to abort takeoff. Of the 6 crew and 153 passengers on DAL1943, and 12 crew and 137 passengers on AAL106, there were no injuries. There was no damage to either aircraft. AAL106 was a Title 14 *Code of Federal Regulations (CFR) Part 121* scheduled international passenger flight from JFK to London Heathrow International Airport, London, United Kingdom (LHR). DAL1943 was a *CFR* Part 121 scheduled international passenger flight from JFK to Santa Domingo, Dominican Republic (SDQ).

D. DETAILS OF THE INVESTIGATION

On Tuesday, January 31, 2023, the air traffic control (ATC) group convened at JFK airport traffic control tower (ATCT). The group attended an in-brief conducted by

[1] All times are eastern standard time (EST) unless otherwise noted.
[2] UTC is an international time standard using four digits of a 24-hour clock in hours and minutes based on the time in Greenwich, England

the JFK acting Air Traffic Manager (AATM) and members of his staff. Also in attendance were representatives from the FAA's Safety Intelligence and Response Group, Eastern Service Area Quality Control Group, and Office of Runway Safety. The group reviewed data related to the incident and conducted interviews with the local control 2 (LC2) controller and the ground control (GC) controller. Between the interviews the group attended an ad hoc meeting with technical operations personnel to discuss the operation of the runway status light (RWSL)[3] system.

On Wednesday, February 1, 2023, the group reconvened at the JFK ATCT and conducted an interview with the cab coordinator (CC) and operations supervisor (OS). The group then concluded the on-scene phase of the ATC field investigation and completed the group field notes.

All interviews were recorded and provided for transcription[4].

E. FACTUAL INFORMATION

1.0 History of Flight

The factual data for this history of flight was compiled using the FAA source data provided in Attachments 2 through Attachment 9.

Figure 1 is the JFK airport diagram identifying the locations of taxiways Tango Alpha (TA), Hotel Bravo (HB), Alpha (A), Bravo (B), Kilo (K), and Juliet (J), and runways 4 left (4L), and 31 left (31L). The taxiways are circled in blue, and the runway departure ends are identified by orange rectangles. The area of the airport where the incident occurred has been magnified for clearer viewing.

[3] RWSL – Runway Status Lights System – The RWSL is a system of runway and taxiway lighting to provide pilots increased situational awareness by illuminating runway entry lights (REL) when the runway is unsafe for entry or crossing, and take-off hold lights (THL) when the runway is unsafe for departure.

[4] Interview transcripts were provided to the group for review on March 23, 2023. Completed transcripts are provided in Attachment 1: Interview Transcripts.

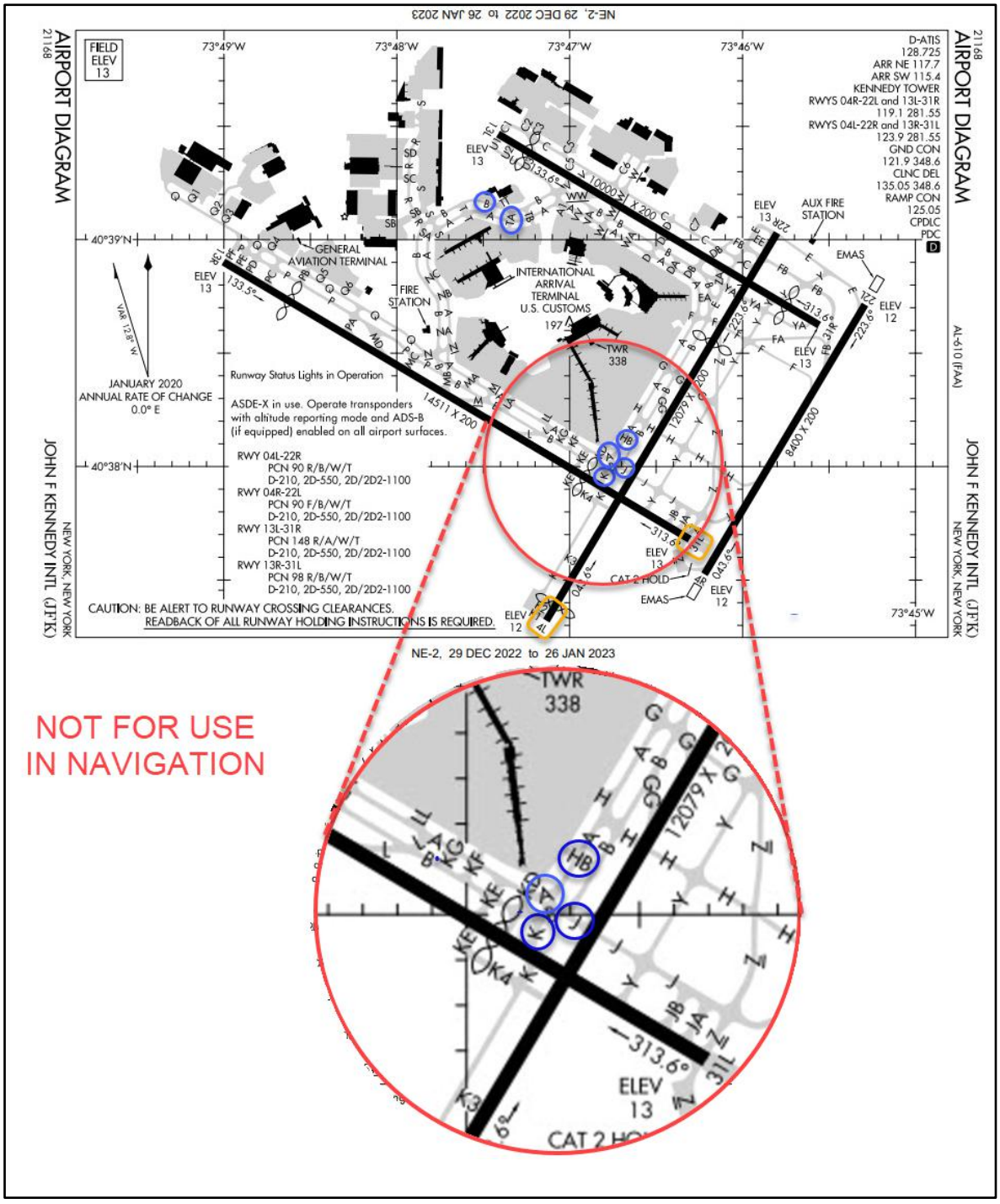

Figure 1. Airport diagram of the JFK airport with pertinent taxiways and runways identified with colored symbology.

About 2024, the crew of DAL1943 contacted the GC controller reporting they were at taxiway HB, and had automatic terminal information service (ATIS)[5] information whiskey (W). The GC controller instructed DAL1943 to taxi to runway 4L, via right turn on taxiway A, and to hold short of taxiway J. The crew acknowledged with a correct readback.

About 2028, the GC controller instructed DAL1943 to follow company traffic to their right, cross runway 31L at taxiway K, and monitor the tower frequency. The crew acknowledged with a correct readback.

About 2033, the crew of AAL106 contacted the GC controller, reporting they were at taxiway TA, and ready to taxi. The GC controller instructed the crew to taxi to runway 4L, via a left turn on taxiway B, and hold short of taxiway K. The crew responded, to hold short of taxiway Kilo.

About 2040, the GC controller instructed AAL106 to cross runway 31L at taxiway K. The crew acknowledged cross runway 31L at kilo.

Figure 2 illustrates the assigned taxi route of AAL106 indicated by the blue dashed line compared with the route the aircraft traveled according to ADS-B data and indicated by the solid red line. This information has been overlaid on satellite imagery of the pertinent area of the JFK airport.

[5] ATIS – Automatic Terminal Information Service – The continuous broadcast of recorded noncontrol information in selected terminal areas. Its purpose is to improve controller effectiveness and to relieve frequency congestion by automating the repetitive transmission of essential but routine information.

Figure 2. The assigned (blue) and actual (red) taxi routes of AAL106 overlaid on satellite imagery of the JFK airport.

About 2041, the LC controller provided DAL1943 a wake turbulence cautionary advisory and instructed the crew to line up and wait (LUAW)[6] on runway 4L at their discretion, and then advised of traffic crossing right to left downfield. The crew acknowledged with only the instruction to LUAW on runway 4L.

[6] LUAW – Line Up and Wait – Used by ATC to inform a pilot to taxi onto the departure runway to line up and wait. It is not authorization for takeoff. It is used when takeoff clearance cannot immediately be issued because of traffic or other reasons.

About 2043, the LC controller initiated a radio check with DAL1943. The crew responded with "loud and clear."

At 2044:17, the LC controller issued the wind from 350 degrees at 18 knots gusting to 24 knots, to DAL1943, and cleared the flight for takeoff from runway 4L. The pilot acknowledged with a correct readback.

FAA ADS-B data showed that DAL1943 began takeoff roll at 2044:33. At that same time AAL106 was turning from taxiway B to taxiway J. Figure 3 illustrates the location of both airplanes as DAL1943 began their takeoff roll by overlaying the ADS-B ground tracks of both AAL106 (red dots) and DAL1943 (blue dots) onto satellite imagery (yellow arrows are provided for directional reference only).

Figure 3. ADS-B ground tracks of AAL106 (red) and DAL1943 (blue) illustrating the location of both airplanes as DAL1943 began their takeoff roll.

Nine seconds later, at 2044:42, the Airport Surface Detection Equipment model-X (ASDE-X)[7], annunciated a *runway occupied alert* involving DAL1943 and AAL106.

Five seconds later at 2044:48, the LC controller advised DAL1943 their takeoff clearance was cancelled. The crew responded immediately that they were rejecting (cancelling takeoff). Figure 4 illustrates the location of both airplanes at the time ATC cancelled DAL1943' s takeoff clearance with overlaid ADS-B ground tracks of both AAL106 (red dots) and DAL1943 (blue dots) onto satellite imagery.

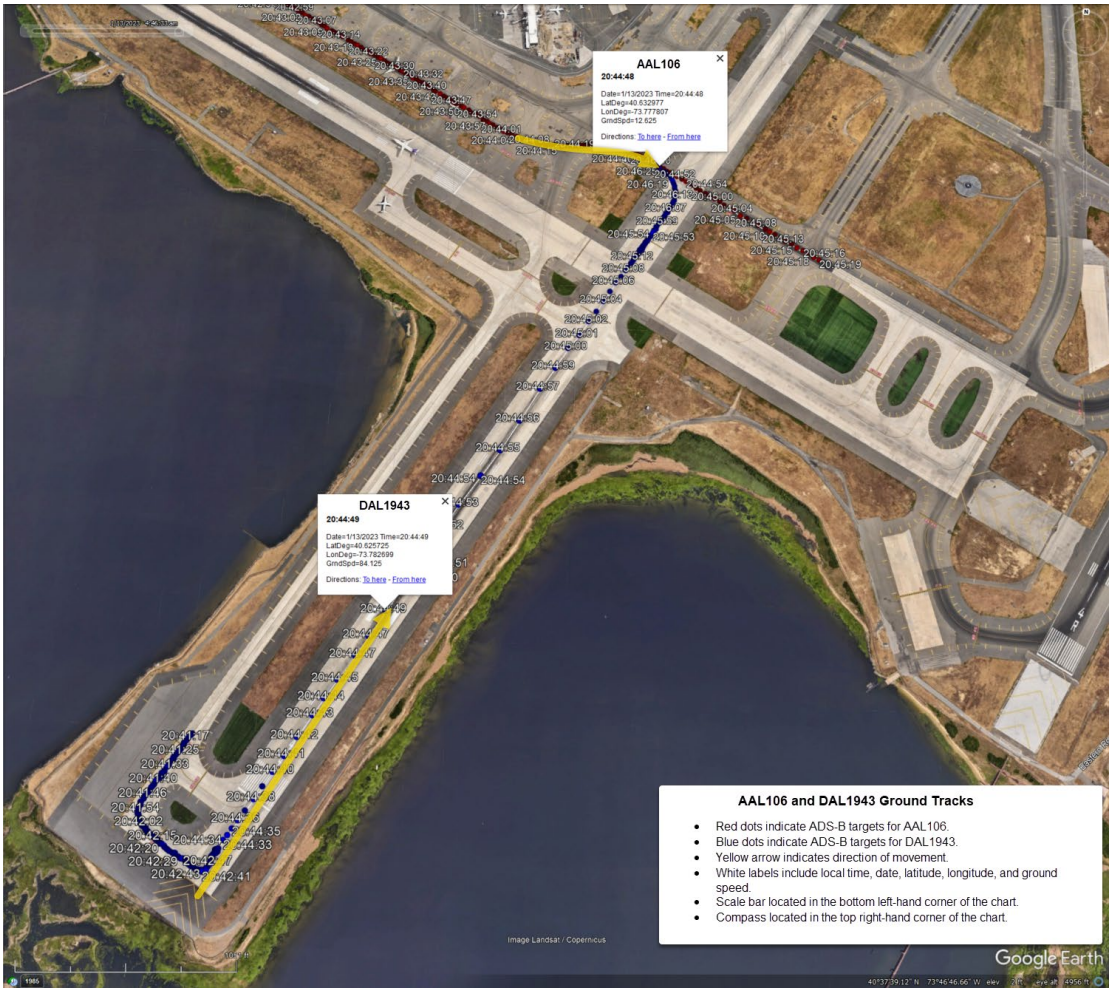

Figure 4. ADS-B ground tracks of AAL106 (red) and DAL1943 (blue illustrating the location of both airplanes when ATC cancelled the takeoff clearance for DAL1943.

[7]ASDE-X Airport Surveillance Detection Equipment – Model-X – Surveillance equipment is specifically designed to detect aircraft, vehicular traffic, and other objects, on the surface of an airport, and to present the image on a tower display. Used to augment visual observation by tower personnel of aircraft and/or vehicular movements on runways and taxiways. The ASDE−X system uses an X−band surface movement radar, multilateration, and ADS−B.

About 2045, the crew of DAL1943 said “alright then delta nineteen forty-three.” The LC controller asked the crew of DAL1943 if they were able to taxi or if they needed a couple of minutes to run checks. The crew responded that they could clear the runway.

Figure 5 illustrates the location of both airplanes at the time AAL106 cleared the hold short markings located on the east side of runway 4L on taxiway J with overlaid ADS-B ground tracks of both AAL106 (red) and DAL1943 (blue) onto satellite imagery. According to ASDE-X data, the closest proximity was 1,038 ft.

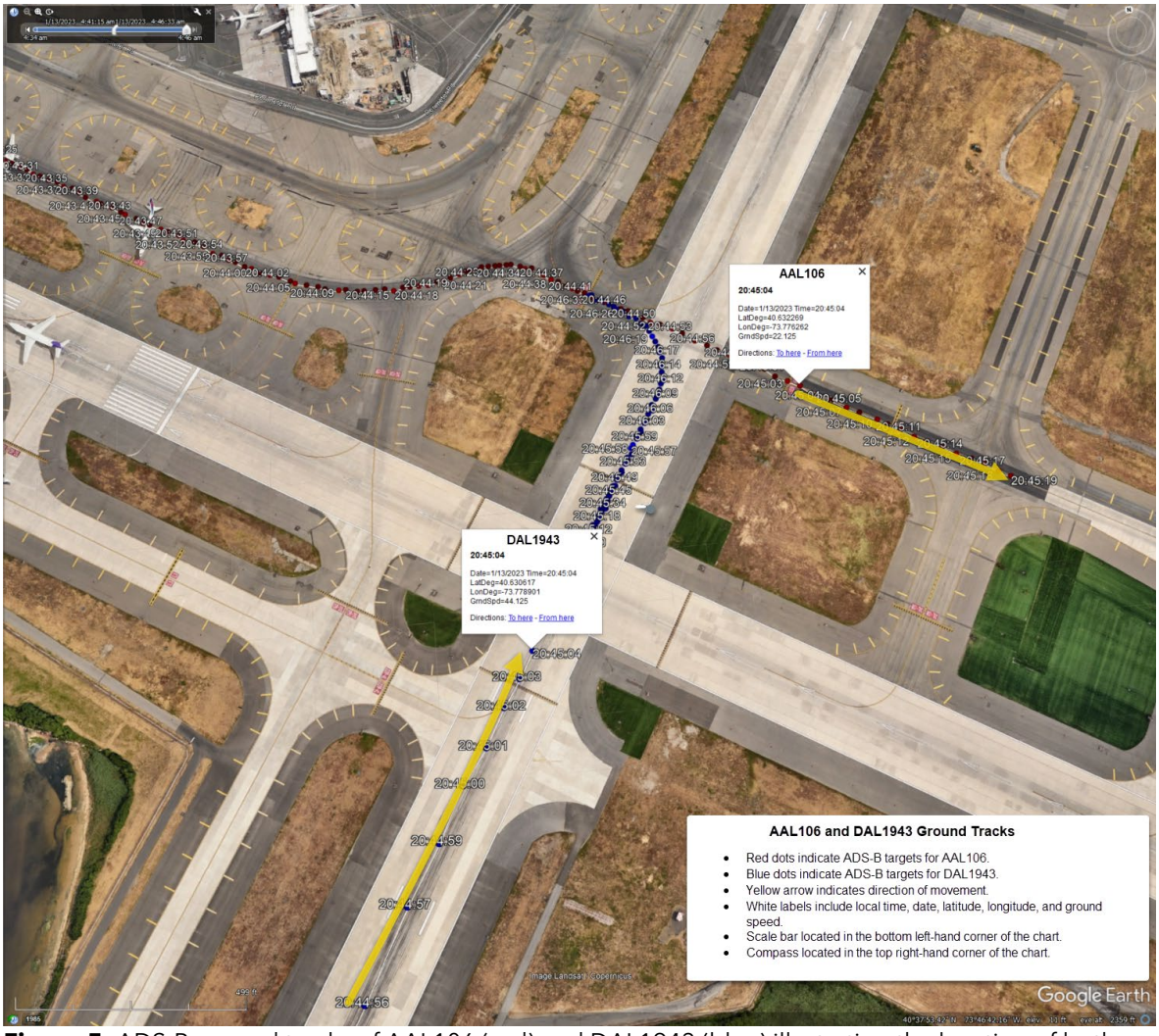

Figure 5. ADS-B ground tracks of AAL106 (red) and DAL1943 (blue) illustrating the location of both airplanes when AAL106 cleared the hold short markings on the east side of runway 4L.

The LC controller then instructed the crew of DAL1943 to turn left on taxiway J, and remain clear of runway 4L. The crew acknowledged with a correct readback, after which the LC controller asked the crew to say intentions. The crew said that they

would need to go somewhere to run some checks and make a couple of phone calls. The LC controller instructed DAL1943 to taxi right on taxiway B, and hold short of taxiway HB. The crew acknowledged with a correct readback.

About 2046, the LC controller advised the crew of AAL106 that they had a possible pilot deviation and to standby for a phone number.

About 2047, the crew of AAL106 contacted the LC controller and stated that the last clearance they were provided had cleared them to cross the runway and asked if that was correct. The LC controller stated they would have to review the ATC audio tapes, but they had been instructed to taxi to runway 4L, and informed the crew that they were currently holding short of runway 31L. The crew responded with their callsign.

About 2049, a position relief briefing was conducted on the LC position, and the incident LC controller was relieved by another controller.

2.0 Airport Information

John F. Kennedy International Airport (referred to as JFK airport) was located in Jamaica, Queens, in the south-eastern part of New York City about 12 miles southeast of Manhattan.

JFK airport was operated by the Port Authority of New York and New Jersey, which managed three other major airports in the New York metropolitan area; Newark Liberty International Airport, LaGuardia Airport, and Teterboro Airport. JFK airport had 4 runways and 6 operating airline terminals that were served by 128 aircraft gates.

2.1 Airport Hot Spot

A "hot spot" is a runway safety related problem area on an airport that presents increased risk during surface operations. Typically, it is a complex or confusing taxiway/taxiway or taxiway/runway intersection. The area of increased risk has either a history of or potential for runway incursions or surface incidents, due to a variety of causes, such as but not limited to airport layout, traffic flow, airport marking, signage and lighting, situational awareness, and training.

Hot spots are depicted on airport diagrams as open circles or polygons designated as "HS 1", "HS 2", etc., and are briefly described in the Airport Diagram Hot Spots Chart Supplement. Hot spots will remain charted on airport diagrams until such time the increased risk has been reduced or eliminated.

JFK airport did not have any hot spots charted for the airport on the date of the incident, as evident in Figure 1.

On June 15, 2023, hot spot 1 (HS1) was charted and added to JFK airport; it is depicted on the JFK airport diagram, and described in the Airport Diagram Hot Spots Chart Supplement.

Figure 6 is the JFK airport diagram depicting the charted location of HS1, which is highlighted in yellow. The brown circle identifies the charted location, and the brown box identifies the charted name as "HS1".

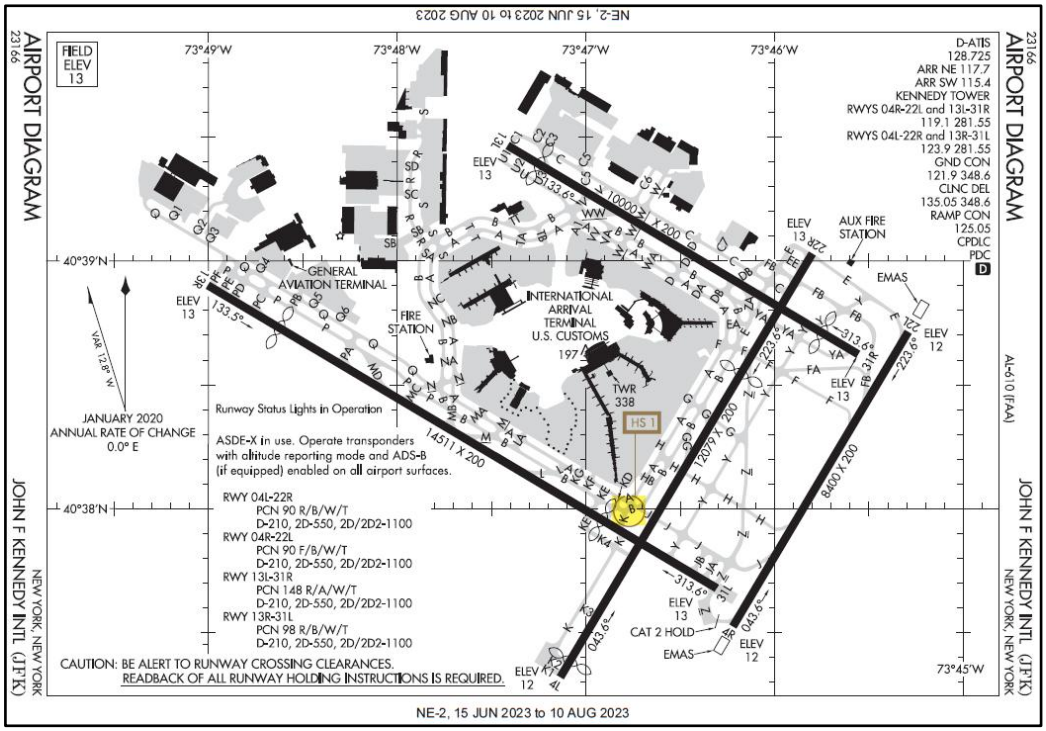

Figure 6. JFK airport diagram depicts the charted location of HS1.

Figure 7 is the excerpt from the Airport Diagram Hot Spot Chart Supplement that provides the description of HS1 at JFK airport.

NEW YORK

NEW YORK		
JOHN F KENNEDY INTL (JFK)	HS 1	Maint vigilance Twy K and Twy J complex int close proximity to Rwy 04L and Rwy 31L.

NE, 15 JUN 2023 to 10 AUG 2023

Figure 7. Excerpt from the Airport Diagram Hot Spot Chart Supplement that described HS1 at JFK.

2.2 Airport Traffic Control Tower

The ATCT at JFK airport was 320 ft. high, and was built in 1992. Figure 8 is a Google Earth aerial view screen capture identifying the location of the ATCT on the airport. The JFK tower cab layout overlaid on the right side of the figure identifies the location of the LC and GC positions.

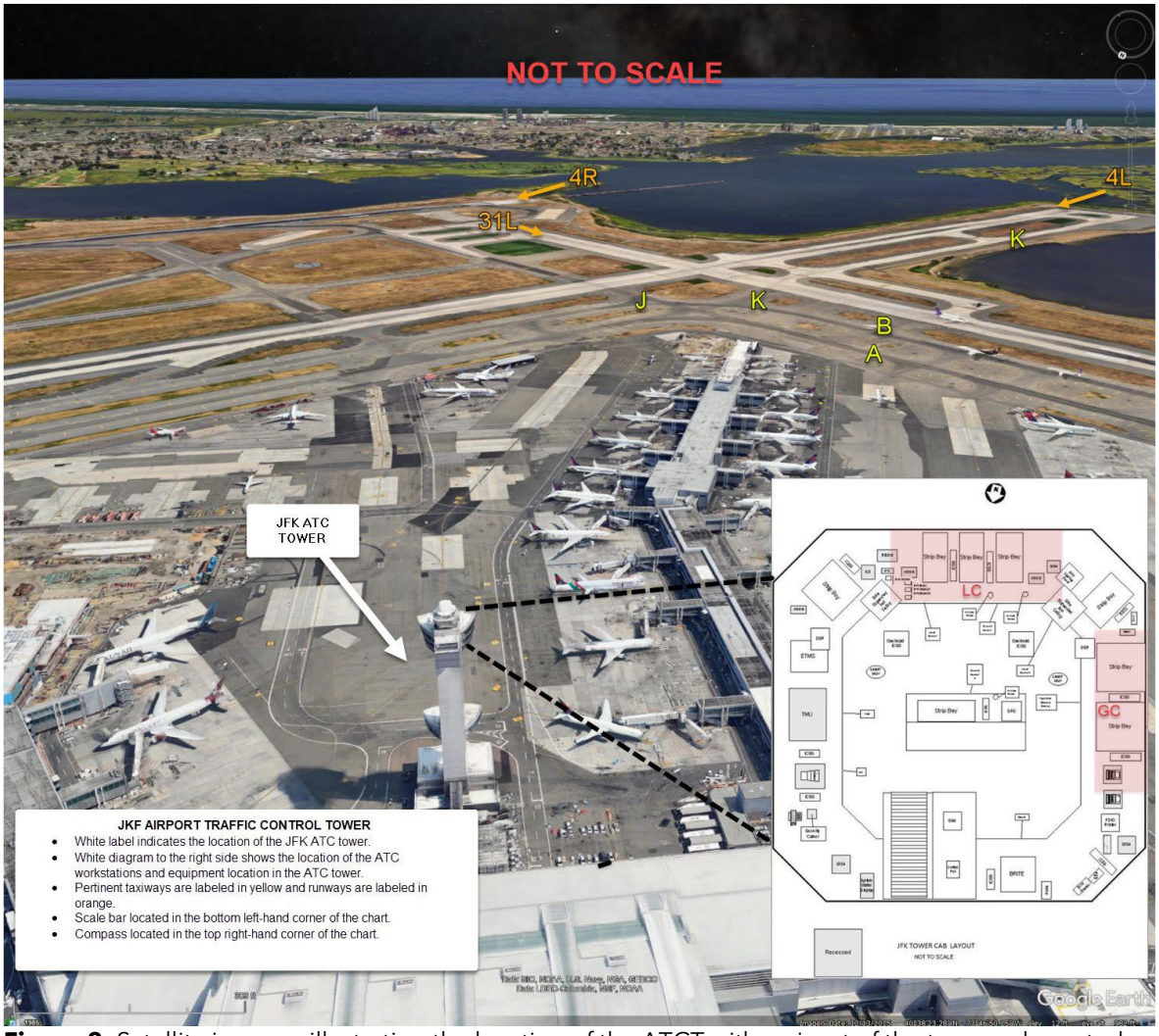

Figure 8. Satellite imagery illustrating the location of the ATCT with an inset of the tower cab control position layout for reference, and markings to identify pertinent runways and taxiways.

Figure 9 is the JFK tower cab layout identifying all workstations and associated equipment in the tower cab.

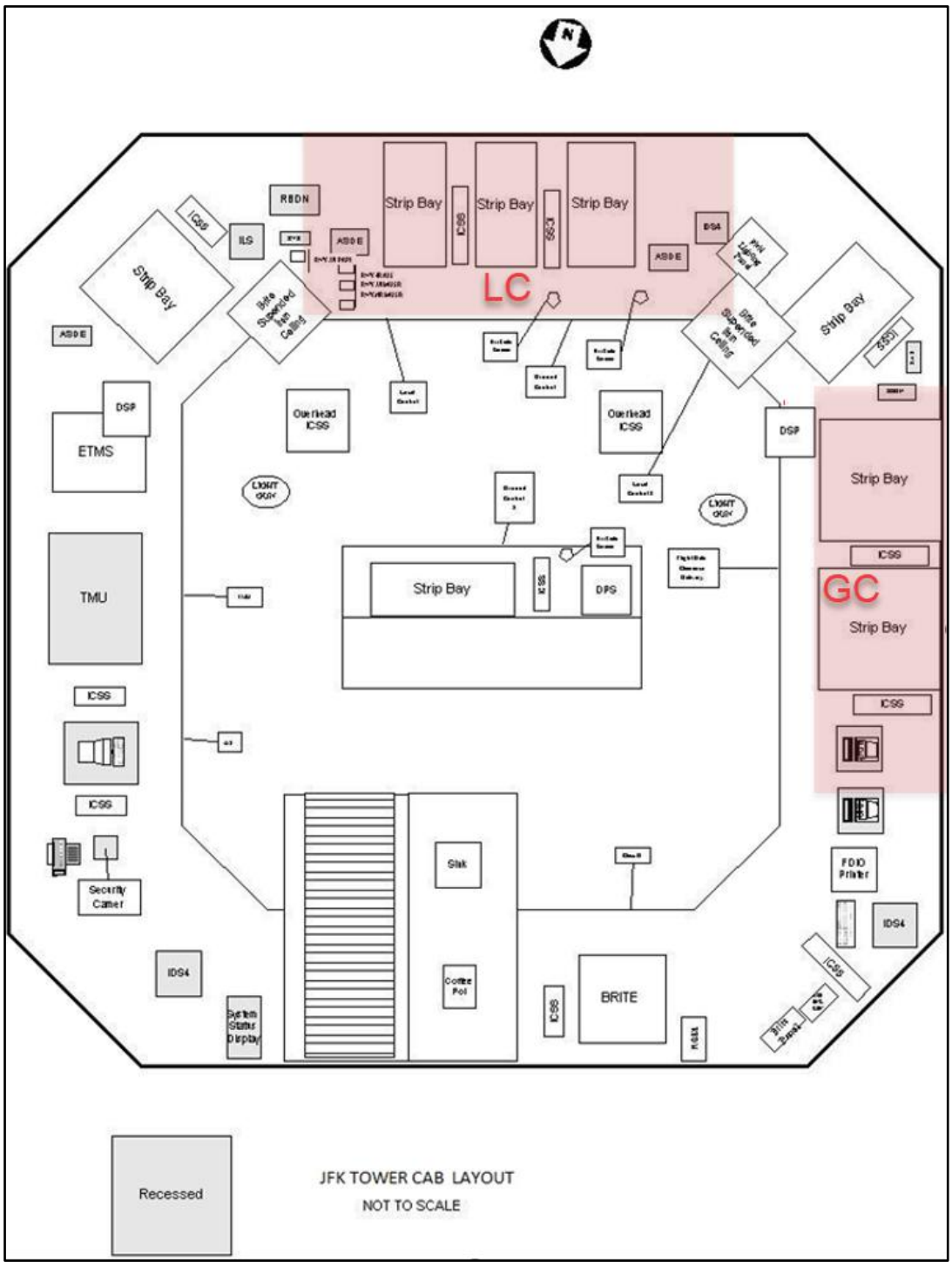

Figure 9. JFK ATCT tower cab control position layout.

2.3 Airport Surveillance Detection Equipment – Model X

JFK airport was equipped with the ASDE-X system. The ASDE-X alerts air traffic controllers of potential runway conflicts by providing detailed coverage of movement on runways and taxiways. Controllers are presented this information on a color display depicting aircraft and vehicle positions as icons overlaid on a map of the airport's runways/taxiways and airport approach corridors. The system continuously updates the map of the airport movement area that controllers can use to enhance their situational awareness. It's particularly beneficial at night or during inclement weather when visibility is poor.

The ASDE-X system is also equipped with visual and aural alarms that will alert controllers of possible runway incursions or incidents. The safety logic system is an integral part of the software system for ASDE-X. This software predicts the path of aircraft landing and/or departing, and/or vehicular movements on runways. [8] Figure 10 is a screen capture of the JFK ASDE-X display while the runway occupied alert was active for DAL1943 and AAL106.

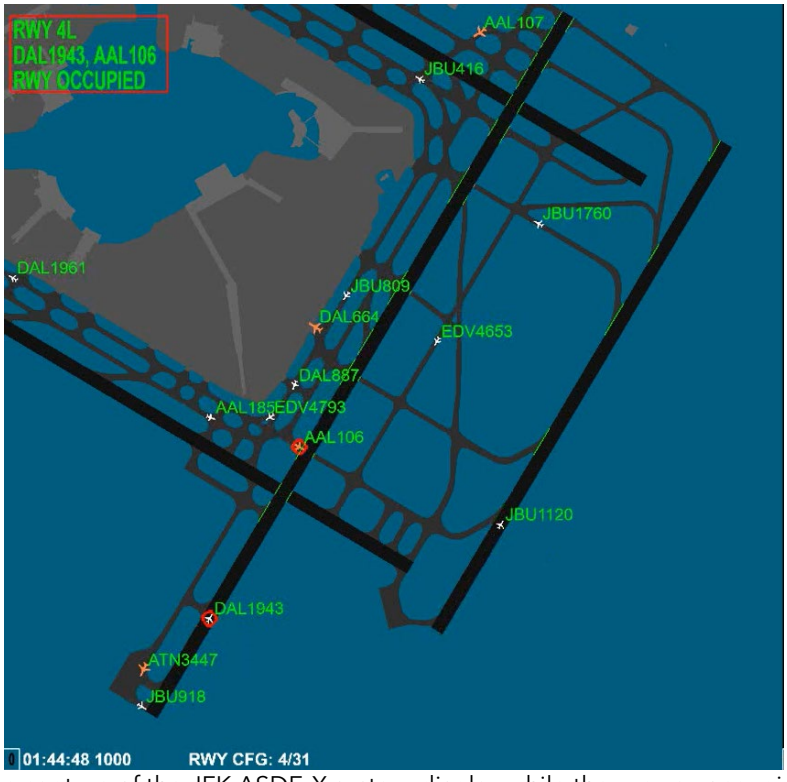

Figure 10. Screen capture of the JFK ASDE-X system display while the runway occupied alert was active for DAL1943 and AAL106.

[8] Information retrieved on July 16, 2023 from Airport Surface Detection Equipment, Model X (ASDE-X) | Federal Aviation Administration (faa.gov)

3.0 Automatic Dependent Surveillance – Broadcast

ADS-B data for AAL106 and DAL1943 was provided by the FAA and is included in attachment 8.

4.0 Weather Information

Weather conditions around the time of runway incursion were as follows:

JFK weather observation at 1951 EST, wind from 320 degrees at 18 knots, visibility 10 miles or more, ceiling overcast at 2,600 ft above ground level (agl), temperature 5 degrees Celsius (C), dew point temperature -1 degrees C, altimeter 29.69 inches of mercury. Remarks, automated station with a precipitation discriminator, sea-level pressure 1005.3-hectopascals (hPa), temperature 5.0 C, dew point -1.1 C.

The raw Meteorological Aerodrome Report (METAR) and Terminal Aerodrome Forecast (TAF) reports current during the period surrounding the incident were:

SPECI KJFK 132346Z 32015KT 10SM OVC027 05/M01 A2967 RMK AO2=

METAR KJFK 132351Z 32017KT 10SM OVC027 05/M01 A2967 RMK AO2 SLP047 T00501011 10111 20050 51026=

METAR KJFK 140051Z 32018KT 10SM OVC026 05/M01 A2969 RMK AO2 SLP053 T00501011=

Time of runway incursion: 0144Z

METAR KJFK 140151Z 32017G26KT 10SM OVC030 04/M02 A2970 RMK AO2 PK WND 34026/0145 SLP058 T00441017=

TAF KJFK 132320Z 1400/1506 32014G20KT P6SM SCT025 BKN035 BKN250TEMPO 1400/1403 BKN 030 FM140400 35013G19KT P6SM BKN040 FM141600 35015G21KT P6SM BKN050=

According to astronomical conditions as reported by the United States Naval Observatory, sunset occurred at 1650 EST, with the end of civil twilight at 1720 EST, thereby confirming this runway incursion occurred during official nighttime. At that time, the Moonrise was expected at 2325 EST and the moon was 29 degrees below the horizon at an azimuth of 66 degrees and provided no illumination.

5.0 Air Traffic Control Procedures

5.1 Duty Priority

FAA order 7110.65Z, *Air Traffic Control*, paragraph 2−1−2, Duty Priority, provided procedures and guidance for controllers in prioritizing their duties and stated in part:

> a. Give first priority to separating aircraft and issuing safety alerts as required in this order. Good judgment must be used in prioritizing all other provisions of this order based on the requirements of the situation at hand.
>
> NOTE−
> Because there are many variables involved, it is virtually impossible to develop a standard list of duty priorities that would apply uniformly to every conceivable situation. Each set of circumstances must be evaluated on its own merit, and when more than one action is required, controllers must exercise their best judgment based on the facts and circumstances known to them. That action which is most critical from a safety standpoint is performed first.
>
> b. Provide support to national security and homeland defense activities to include, but not be limited to, reporting of suspicious and/or unusual aircraft/pilot activities.
>
> c. Provide and/or solicit weather information in accordance with procedures and requirements outlined in this order.
>
> d. Provide additional services to the extent possible, contingent only upon higher priority duties and other factors including limitations of radar, volume of traffic, frequency congestion, and workload.

5.2 Pilot Acknowledgment/Read Back

FAA order 7110.65Z, *Air Traffic Control*, paragraph 2−4−3, Pilot Acknowledgment/Read Back, prescribed procedures for controllers to ensure correct receipt and readback of ATC instructions by pilots and stated in part:

> Ensure pilots acknowledge all Air Traffic Clearances and ATC Instructions. When a pilot reads back an Air Traffic Clearance or ATC Instruction:
>
> a. Ensure that items read back are correct.

b. Ensure the read back of hold short instructions, whether a part of taxi instructions or a LAHSO[9] clearance.

c. Ensure pilots use call signs and/or registration numbers in any read back acknowledging an Air Traffic Clearance or ATC Instruction.

NOTE−
1. ATC Clearance/Instruction Read Back guidance for pilots in the AIM states:

a. Although pilots should read back the "numbers," unless otherwise required by procedure or controller request, pilots may acknowledge clearances, control instructions, or other information by using "Wilco," "Roger," "Affirmative," or other words or remarks with their aircraft identification.

b. Altitudes contained in charted procedures, such as departure procedures, instrument approaches, etc., need not be read back unless they are specifically stated by the controller.

c. Initial read back of a taxi, departure or landing clearance should include the runway assignment, including left, right, center, etc., if applicable.

2. Until a pilot acknowledges a controller's clearance or instruction, a controller cannot know if a pilot will comply with the clearance or remain as previously cleared.

5.3 Tower Team Position Responsibilities

FAA order 7110.65Z, *Air Traffic Control*, paragraph 2−10−3, Tower Team Position Responsibilities, described the team concept and the primary responsibilities of the tower team and stated in part:

a. Tower Team Concept and Intent: There are no absolute divisions of responsibilities regarding position operations. The tasks to be completed remain the same whether one, two, or three people are working positions within a facility/sector. The team, as a whole, has responsibility for the safe and efficient operation of that facility/sector.

b. Terms: The following terms will be used in terminal facilities for the purpose of standardization.

1. Tower Cab: The area of control responsibility (delegated airspace and/or airport surface areas) of the tower team, and the team as a whole.

[9] LAHSO − An acronym for "Land and Hold Short Operation." These operations include landing and holding short of an intersecting runway, a taxiway, a predetermined point, or an approach/departure flightpath.

2. Tower Position(s) (LC or GC): That position which is in communications with the aircraft and ensures separation of aircraft in/on the area of authority.

3. Tower Associate Position(s): That position commonly referred to as "Local Assist," "Ground Assist," "Local Associate," or "Ground Associate."

4. Tower Cab Coordinator Position (CC): That position commonly referred to as "Coordinator."

5. Flight Data (FD): That position commonly referred to as "Flight Data."

6. Clearance Delivery (CD): That position commonly referred to as "Clearance."

c. Primary responsibilities of the Tower Team Positions:

1. Tower Position(s) (LC or GC):

(a) Ensure separation.

(b) Initiate control instructions.

(c) Monitor and operate communications equipment.

(d) Utilize tower radar display(s).

(e) Utilize alphanumerics.

(f) Assist the Tower Associate Position with coordination.

(g) Scan tower cab environment.

(h) Ensure computer entries are completed for instructions or clearances issued or received.

(i) Ensure strip marking is completed for instructions or clearances issued or received.

(j) Process and forward flight plan information.

(k) Perform any functions of the Tower Team which will assist in meeting situation objectives.

F. ATTACHMENTS

Attachment 1: ATC Interview Transcripts
Attachment 2: ATC Local Control Audio
Attachment 3: ATC Ground Control Audio
Attachment 4: ATC Operations Supervisor Position Audio
Attachment 5: ATC Traffic Management Coordinator Position Audio
Attachment 6: ATIS Recording Audio
Attachment 7: ATC Recorded Phone Line Audio
Attachment 8: ADS-B Data

Attachment 9: ATC Facility Administrative Documents

Submitted by:

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