

Assignment 1: Familiarization with Aviation Data Sources and Aircraft Classifications

Date Due: September 4, 2026

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Problem 1

Download the latest version of the FAA Advisory Circular 150/5300-13B with Change 1 (see the link on our home page). Read carefully Sections 1.1 to 1.2.3 and 1.6 of the advisory circular before answering the following questions.

Also, download the FAA Aircraft Characteristics Database at: https://www.faa.gov/airports/engineering/aircraft_char_database (second item in the home page).

ICAO_Code	FAA_Designator	Manufacturer	Model_FAA	Model_BADA	Physical_Class
A10	A10	FAIRCHILD	Fairchild A10	Fairchild A-10A	Jet
A124	A124	ANTONOV	Antonov AN-124 Ruslan	Antonov AN-124-100	Jet
A19N	A19N	AIRBUS	Airbus A319 Neo	Airbus A319 Neo	Jet
A20N	A20N	AIRBUS	Airbus A320 Neo	Airbus A320-271N	Jet
A21N	A21N	AIRBUS	Airbus A321 Neo	Airbus A321-251N	Jet
A306	A306	AIRBUS	Airbus A300 B4-600	Airbus A300B4-622	Jet
A30B	A30B	AIRBUS	Airbus A300-B2	Airbus A300B4-203	Jet
A310	A310	AIRBUS	Airbus A310	Airbus A310-204	Jet
A318	A318	AIRBUS	Airbus A318	Airbus A318-112	Jet
A319	A319	AIRBUS	Airbus A319	Airbus A319-131	Jet
A320	A320	AIRBUS	Airbus A320	Airbus A320-231	Jet

Aircraft Characteristics Database.

- a) Briefly state the differences between standards, recommended practice and requirements used in airport design.

*The **FAA standards** are physical characteristics, configurations and procedures to provide uniformity in design considering safety, capacity and environmental factors.*

***Recommended Practices** are supplemental measures to promote safety, improve capacity and efficiency. The recommended practices are discretionary from airport to airport.*

***Requirements** are obligations to meet Federal statutes and regulations.*

- b) Explain the differences between FAA and ICAO aircraft design groups when designing airports.

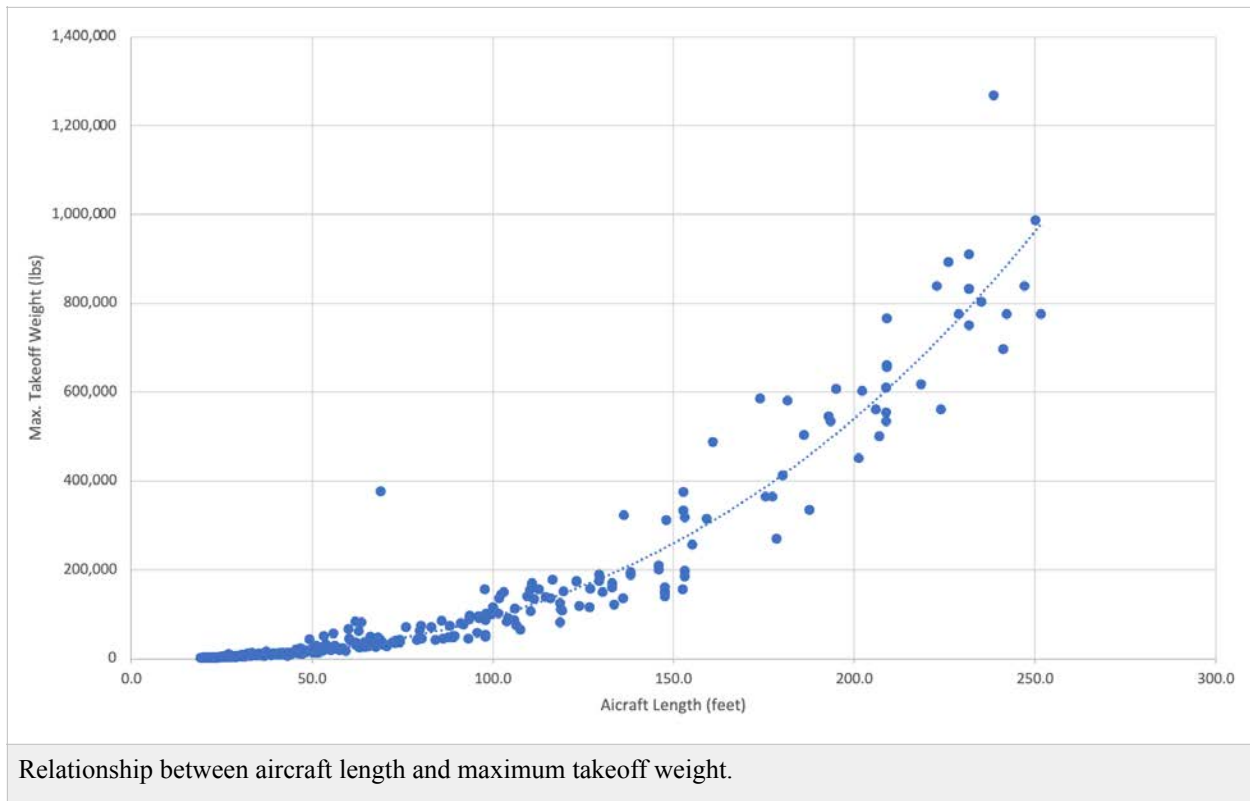
FAA uses tail height. ICAO uses Main gear width instead. Both use aircraft wingspan as the primary dimension for design standards.

- c) Why would the Taxiway Design Group be important in airport design?

TDG is important because it provides information about the physical characteristics of the aircraft landing gear features (CMG and MGW). Such characteristics determine geometric design standards.

- d) Use all the aircraft in the Aircraft Characteristics Database and make a plot of the aircraft length (x-axis) versus the aircraft maximum takeoff weight (labeled as MTOW). Label the axes accordingly and comment if there is any correlation between the two parameters. Comment on the observed trend.

Note a strong correlation between the aircraft length and the maximum takeoff weight. The plot is shown below including a third-order polynomial fit (R-square is 0.944 which is a good fit). Two outliers are the Airbus A380 (double decker) and the Northrup B2 (a tailless strategic bomber).



- e) Why is wake turbulence classification important in airport design? Comment.

Wake turbulence standards dictate the in-trail separation between aircraft while landing on the same runway. In-trail separation is an important factor in runway capacity. This is important in airport design.

Problem 2

Answer the following questions using the FAA Aircraft Characteristics Database at: https://www.faa.gov/airports/engineering/aircraft_char_database.

- a) A new general aviation airport is planned to have a 6000-foot long runway. The Global Express 6000 - FAA Designator GLEX (see Figure 1) is expected to be the critical aircraft. Find the ADG, AAC, RDC, and TDG code for the airport. The airport is expected to have an Instrument Landing System with a visibility lower than one statute mile but not lower than 3/4 statute miles.

Use the Aircraft Characteristic Database

ADG - III, AAC - C, TDG - 2B, Visibility is 4,000 feet (see Table 1-3 in FAA AC 150/5300-13b). RDC is then C-III -4000 (combine AAC, ADG, and visibility).

- b) An airport in Asia is designed to accommodate the Boeing 787-9 (see Figure 2). Find the ICAO Aerodrome Reference Code (Element 2) to define the size of the terminal gates.

Code element 2 is E.

- c) Find the airport ADG, AAC and TDG codes allowing an airline to conduct operations with Boeing 777-200 aircraft (see Figure 3). Assume the visibility minima is 1/2 statute mile. State the ICAO Aerodrome Reference Code (Element 2) for the Boeing 777-200.

Use the Aircraft Characteristic Database

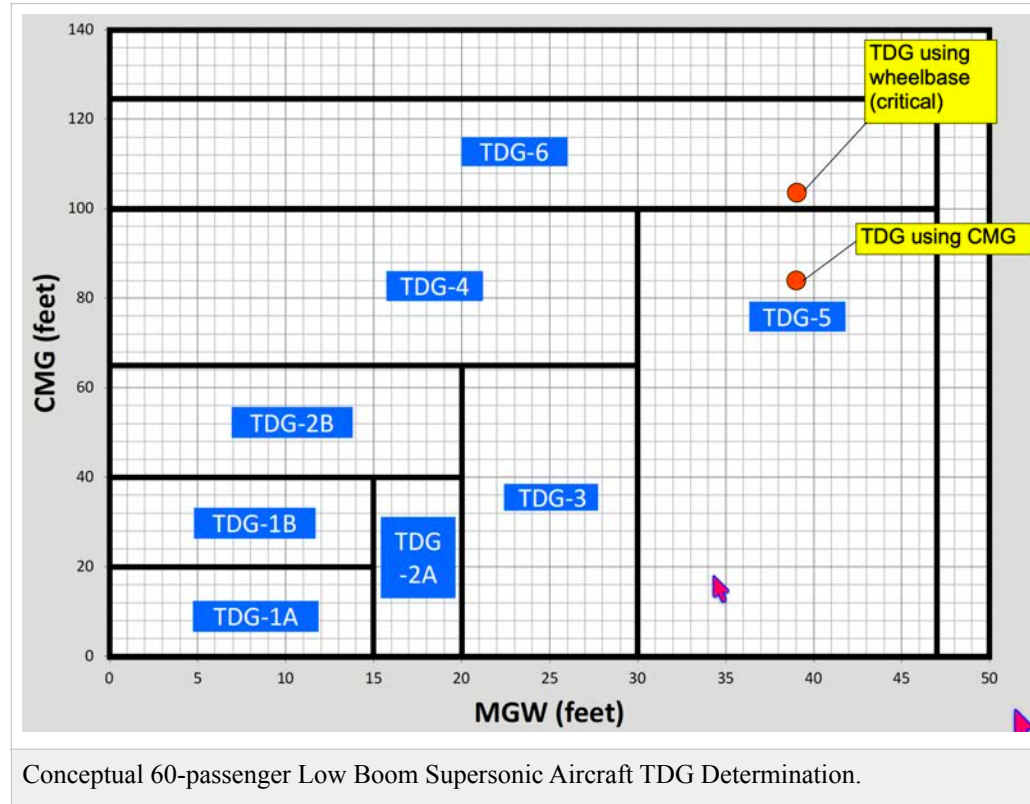
ADG - V, AAC - C, TDG - 5, Visibility is 2,400 feet (see Table 1-3 in FAA AC 150/5300-13b). RDC is then C-V -2400 (combine AAC, ADG, and visibility).

- d) A new airport project identifies the Boeing 737-8 Max (see Figure 4) as the critical aircraft for the future facility. Find the ADG, AAC and taxiway design groups to design the airport.

The Boeing 737-8 Max identifier is B38M in the Aircraft Characteristic Database. ADG - III, AAC - D, TDG - 2B.

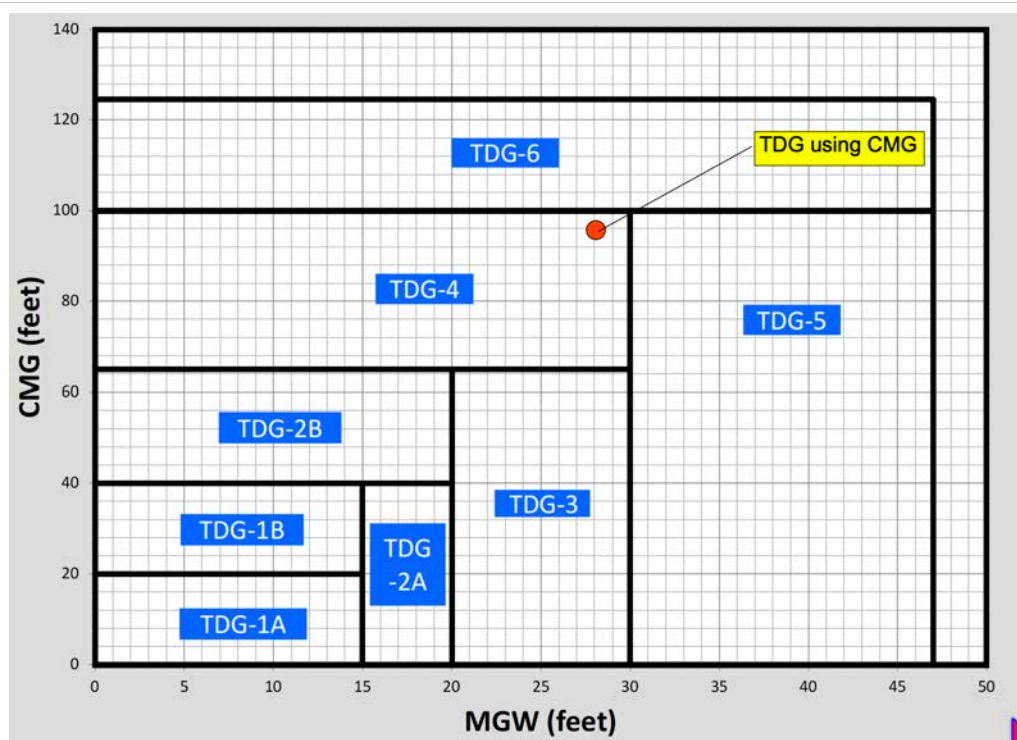
e) NASA Langley has been working on [supersonic low-boom aircraft designs](#) (see Figure 5). For the 60-passenger supersonic configuration shown in Figure 5, find the ADG, AAC and TDG groups to design the airport. The estimated landing speed of the low-boom design is 160 knots. Comment on the physical features of the aircraft to be accommodated at existing airport gates.

The Low-Boom Aircraft is ADG - III, AAC - D, TDG - 6 using the wheelbase as the critical parameter. TDG would be 5 if we use the CMG dimension. Since geometric design features are driven by the wide turns of the aircraft, the wheelbase is the most dimension that would be useful in geometric design.



f) A Colorado-based company called Boom has been working on a supersonic aircraft design called [Overture](#) (see Figure 6). The wingspan of the Overture is quoted at 106 feet. And the main gear width is estimated to be 28 feet. Find the ADG, AAC and TDG groups to design the airport. The estimated landing speed of the Overture is 163 knots.

The Boom Overture is ADG - III, AAC - D, TDG - 4 using the CMG as the critical parameter. TDG would be 5 if we use the CMG dimension. Since geometric design features are driven by the wide turns of the aircraft, the wheelbase is the most dimension that would be useful in geometric design.



Boom Overture Supersonic Aircraft TDG Determination.



Figure 1. Global Express 6000. Source: A. Trani.



Figure 2. Boeing 787-9 Taxiing at Houston Intercontinental Airport (IAH). Source: A. Trani.



Figure 3. Boeing 777-200 Departs Charlotte International Airport (CLT). Source: A. Trani.



Figure 4. Boeing 737-8 Max in Tow at John F. Kennedy Airport (JFK). Source: A. Trani.

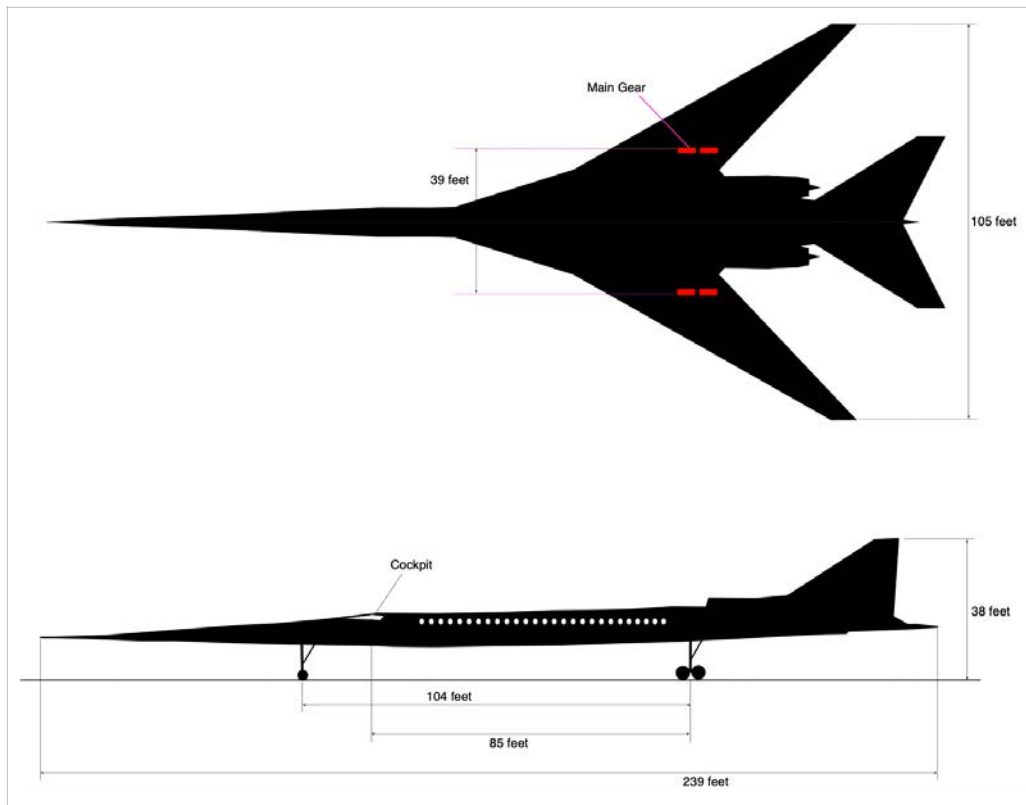


Figure 5. Conceptual 60-passenger Low Boom Supersonic Aircraft. Source: NASA Langley.

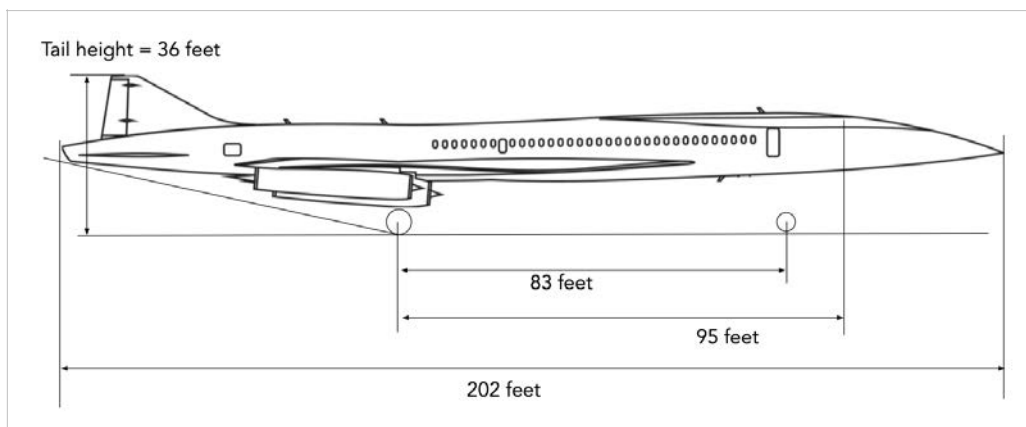


Figure 6. Boom Overture Supersonic Aircraft. Source: Boom.

Problem 3

Identify the commercial aircraft presented in Table 1. Find the FAA Aircraft Design Group (ADG), Taxiway Design Group (TDG), Aircraft Approach Class (AAC), and Consolidated Wake Turbulence (CWT) categories. Here is a list of possible choices (more choices than pictures to add a little challenge): Embraer Phenom 300 (E55P), Cessna Citation Latitude (C68A), Boeing 787-8 (B788), Boeing 737-800 (B738), Boeing 717-200 (B712), Beechcraft King Air 350 (B350), Cessna 172 (C172), Airbus A320-200 (A320), Pilatus PC-12 (PC12), Cirrus SR-22 (SR22), and Airbus A321neo (A21N). Use the FAA Aircraft Characteristics Database to get information about ADG, TDG, AAC.

To help you identify the aircraft use my web site which contains similar pictures with annotations (<https://photos.app.goo.gl/8bdSvdwPQU7IHIDi2>). Other good sites to help identify aircraft are Airliners.net <http://www.airliners.net> and Jet Photos <http://www.jetphotos.net>.

Table 1. Aircraft for Problem 3.

Picture	Aircraft Name	ADG	TDG	AAC	CWT
	Airbus A320-200 A320	III	3	C	F
	Pilatus PC 12 PC12	II	2A	A	I
	Airbus A321neo A21N	III	3	C	F
	Beechcraft King Air B350 B350	II	2A	B	H
	Cirrus SR22 SR22	I	1A	A	I

Picture	Aircraft Name	ADG	TDG	AAC	CWT
	Cessna Citation Latitude C68A	II	1B	B	H
	Cessna 172 C172	I	1A	A	I
	Boeing 737-800 B738	III	3	D	F
	Boeing 787-8 B788	V	5	D	B

Problem 4

True or false (T/F) or short answer (SA) section.

Question	True / False or Short Answer
Number of airports in the National Plan of Integrated Airport Systems (SA).	~3300
In the mid-1920s, Ford built a successful commercial aircraft. Name the aircraft (SA).	Ford 4-AT Ford 5-AT (higher engine power)
Los Angeles International Airport (LAX) was reconfigured in the late 1950s to accommodate jet aircraft (T/F).	TRUE
Turboprop aircraft operated in the late 1950s required 7,900 feet of runway when operated at sea level conditions (T/F)	FALSE

Question	True / False or Short Answer
The US fleet of regional jet aircraft increased more than ten-fold between 2000 and 2022 (T/F).	TRUE
The introduction of the Boeing 747-100 in 1969 doubled the passenger capacity of the previous generation of jet aircraft (e.g., Boeing 707-300) (T/F).	TRUE
Name of the aircraft introduced in 1936 that changed commercial aviation with more than 11,000 airframes produced (SA).	Douglas DC-3
The average runway length of the NPIAS airports in the US is 5,600 feet (T/F).	FALSE
Most of the commercial air travel between continents in the late 1930s was done using flying boats (T/F).	TRUE
The Douglas DC-8-50 required a runway length of 6,500 feet (T/F).	FALSE