PROJECT REPORT ON

AIRPORT

Submitted in partial fulfillment of the requirement of the degree of

CIVIL ENGINEERING

UNDER GUIDANCE OF

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It gives us a great pleasure to express our deepest sense of gratitude and indebtedness to our guide Ms. Manisha Sharma (Ass. Prof Dept of civil engineering) for her valuable support and encouraging mentality throughout the project.

We are also thankful to all the teaching and non teaching staff member of our department for providing us all the facilities in all our activities and for their valuable support during our studies.

PREFACE

An airport is an aerodrome with extended facilities, mostly for commercial air transport. Larger airports may have airport aprons, taxiway bridges, air traffic control centres, passenger facilities such as restaurants and lounges. Airports are vulnerable infrastructure to extreme weather, climate change caused sea level rise and other disasters.

My efforts and wholehearted co-operation of each and every one has ended on a successful note. I express my sincere gratitude to my mentor **ER. Manisha Sharma** who was assisting me throughout the preparation of this topic.

I thank him for providing me the reinforcement, confidence and most importantly the track for the topic wherever i needed it. I would like to equally thank all other who has helped me out and thank my project partner for their unstoppable and continues efforts as well as support.

CONTENTS

INTRODUCTION

An airport is an aerodrome with extended facilities, mostly for commercial air transport. Airports usually consist of a landing area, which comprises an aerially accessible open space including at least one operationally active surface such as a runway for a plane to take off and to land or a helipad and often includes adjacent utility buildings such as control towers, hangars, and terminals, to maintain and monitor aircraft. Larger airports may have airport aprons, taxiway bridges, air traffic control centers, passenger facilities such as restaurants and lounges, and emergency services. In some countries, the US in particular, airports also typically have one or more fixed-base operators, serving general aviation.

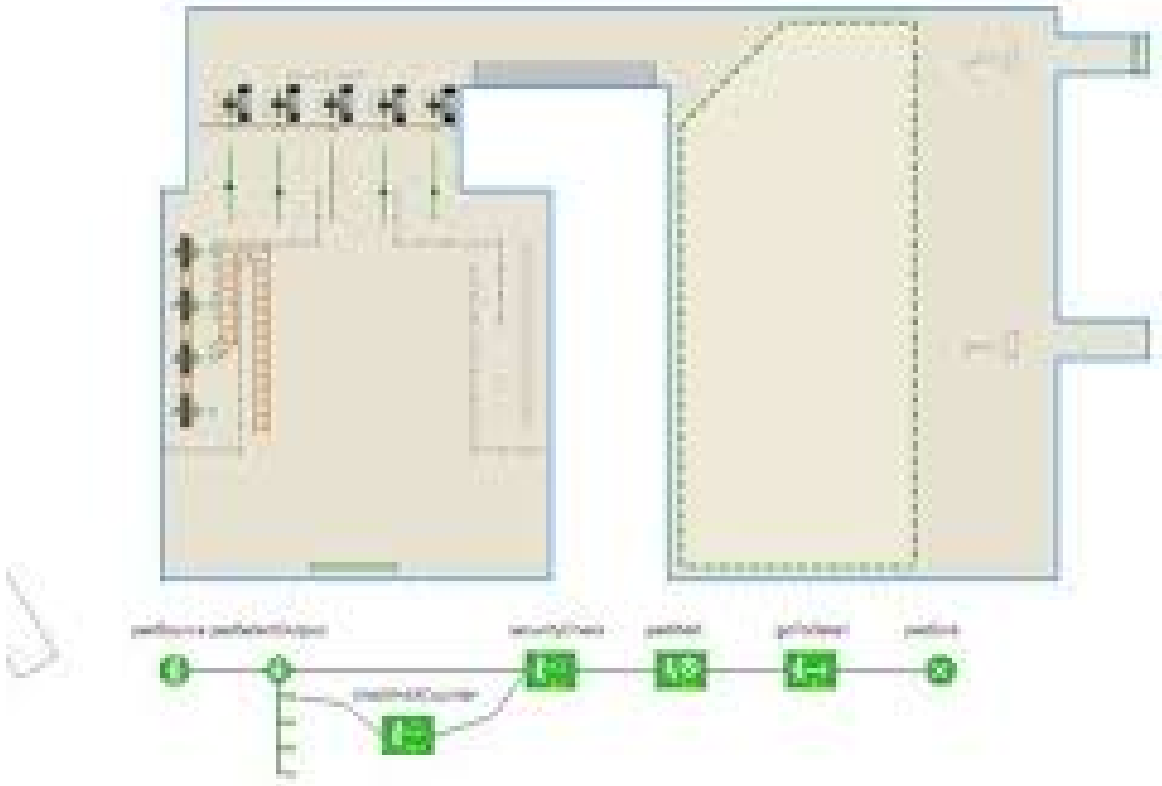

Figure 1.0

Figure 2.0

This is the airport plan been redesigned & made by our group where you can see Runway , taxiway, service way, boarding dock and many more.

Overview

airport, Site and installations for the takeoff and landing of aircraft. Early airports were open grass-covered fields, called landing fields, that allowed a pilot to head directly into the wind to aid a plane’s lift on takeoff and to decrease its speed on landing.

In the 1930s heavier airplanes required paved runway surfaces. Larger planes needed longer runways, which today can reach 15,000 ft (4,500 m) to accommodate the largest jet aircraft.

Air traffic is regulated from control towers and regional centres. Passenger and cargo terminals include baggage-movement and passenger-transit operations.

Design and Construction

Airport projects are involved with many considerations and issues hence they are highly collaborative. Designing of airport is taken up by architectural firms. The architects work in collaboration with civil engineers to come up with the Airport Layout Plans. The experts come up with master plans which is referred to for further developments.

To plan an airport, the AAI is concerned for three approvals –

- Technical Approvals
  - Review and approve Airport Layout Plan (ALP).
  - Review and acceptance of forecast.
  - Airspace and procedure changes.
  - Land acquisition.
- Financial Approvals
  - Funding for the airport is approved once the project gets clearance for safety, security, capacity, and airport access systems.
- Environmental Approvals
  - Review and assess environmental issues.
  - Find out solutions to address the environmental problems.

Airport – Terminal Configurations

The following configurations are adapted while designing the airport terminals –

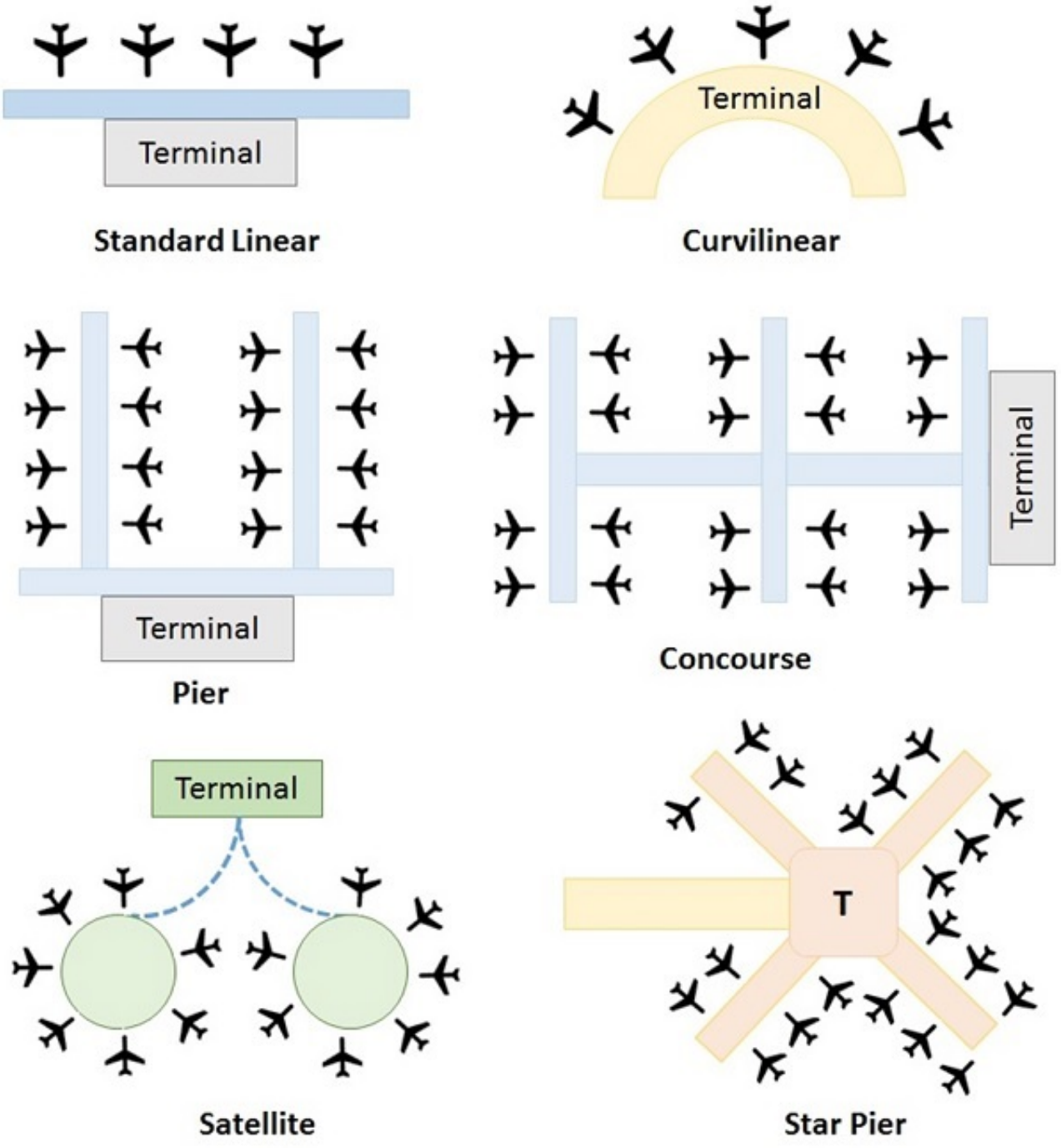

Figure 3.0

Parameters upon which airport undercome

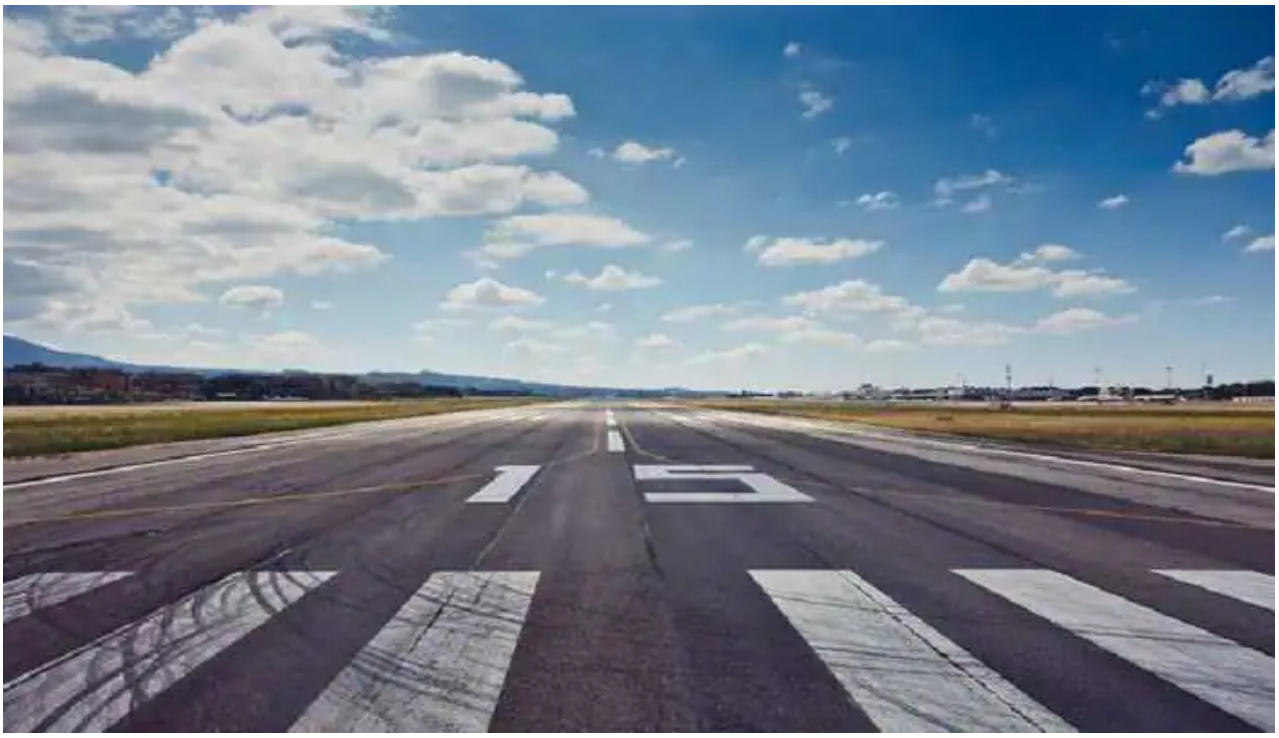

Figure 4.0

Visitor Area

This is the area where the passenger's family members can wait for them and the last area where the person without a ticket can go to. This area is made up of carbon fiber and cable wires because the airport goes through several changes as the decorum that's why the premises are not made up of concrete and bars except the pillars which are required to withstand the weight and make it shock and earthquake resistant.

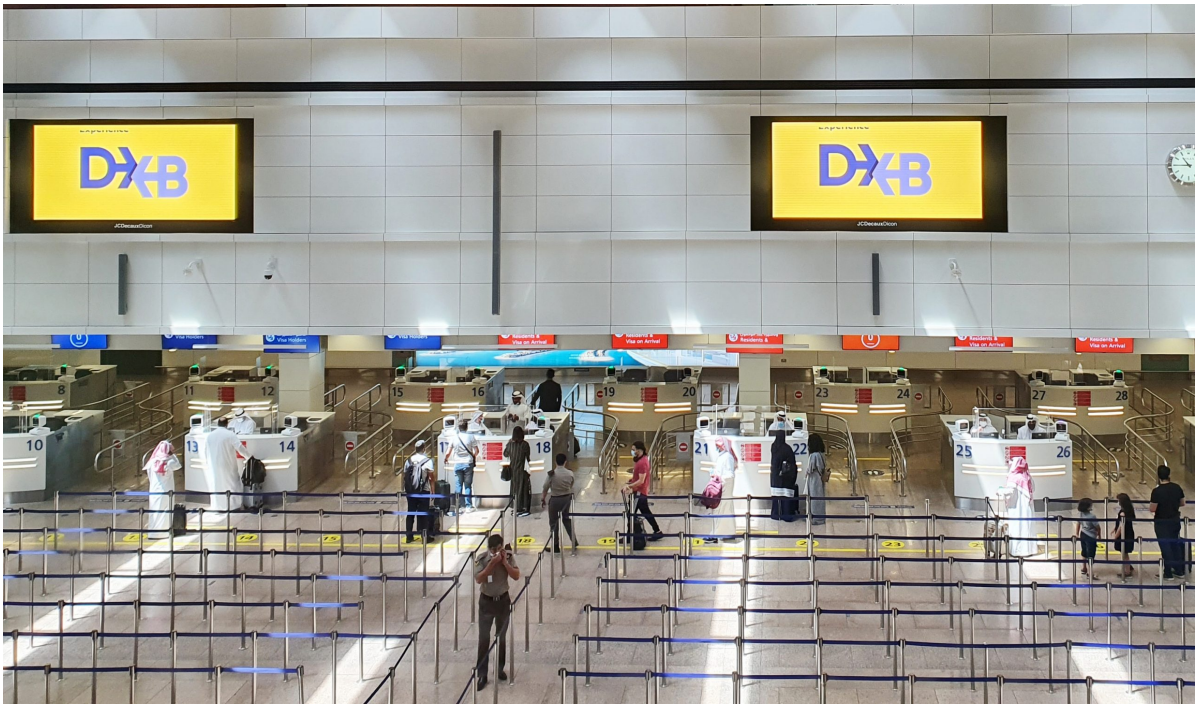

Figure 5.0

PUBLIC CONCOURSE

An airport terminal is a building at an airport. It is where passengers are able to get on and off aircraft. Inside the terminal, passengers can buy tickets, leave or pick up their luggage, and be checked by security staff. The buildings that provide access to the airplanes through gates are usually called concourses. However, the words "terminal" and "concourse" are sometimes used to mean the same thing. Small airports have only one terminal, while large airports can have several terminals and/or concourses. At small airports, the single terminal building usually has all of the functions of a terminal and a concourse.

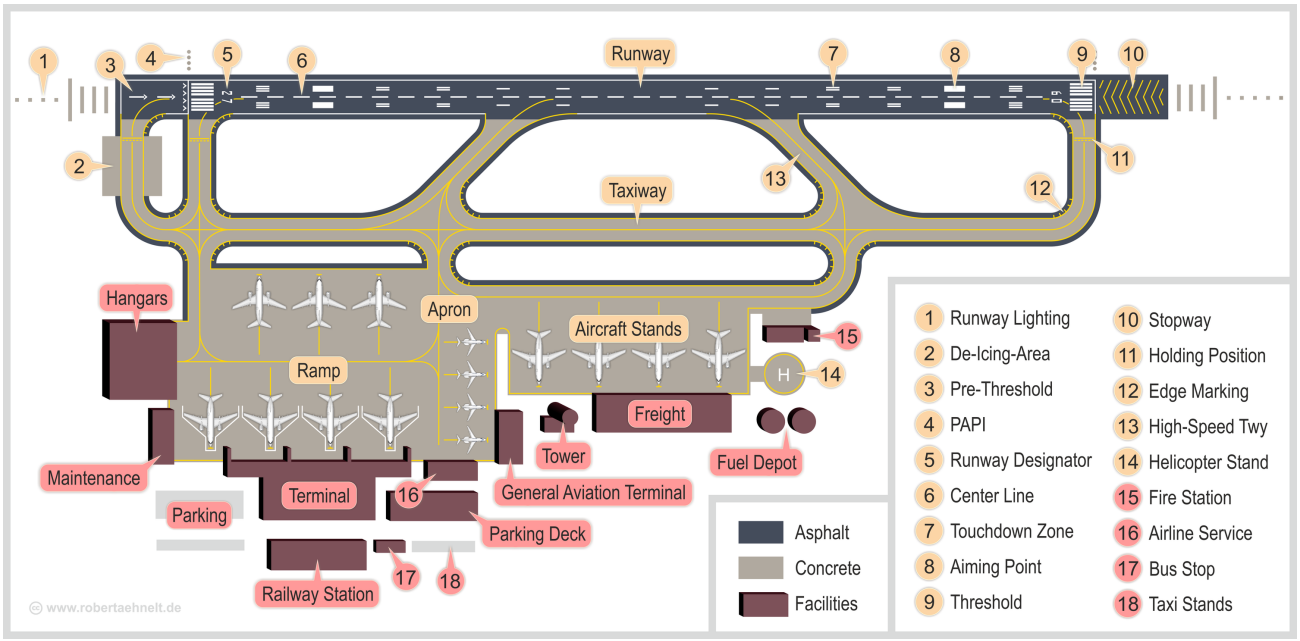

Figure 6.0

APRON

The airport apron, apron, flight line, ramp, or tarmac is the area of an airport where aircraft are parked, unloaded or loaded, refueled, boarded, or maintained. Although the use of the apron is covered by regulations, such as lighting on vehicles, it is typically more accessible to users than the runway or taxiway. However, the apron is not usually open to the general public and a permit may be required to gain access. By extension, the term apron is also used to identify the air traffic control position responsible for coordinating movement on this surface at busier airports.

The apron is designated by the ICAO as not being part of the maneuvering area but included in the movement area.[3] Aircraft stand taxi lanes (providing access to aircraft stands) and apron taxiways (taxi routes across the apron) are located on the apron.[3] All vehicles, aircraft, and people using the apron are referred to as apron traffic

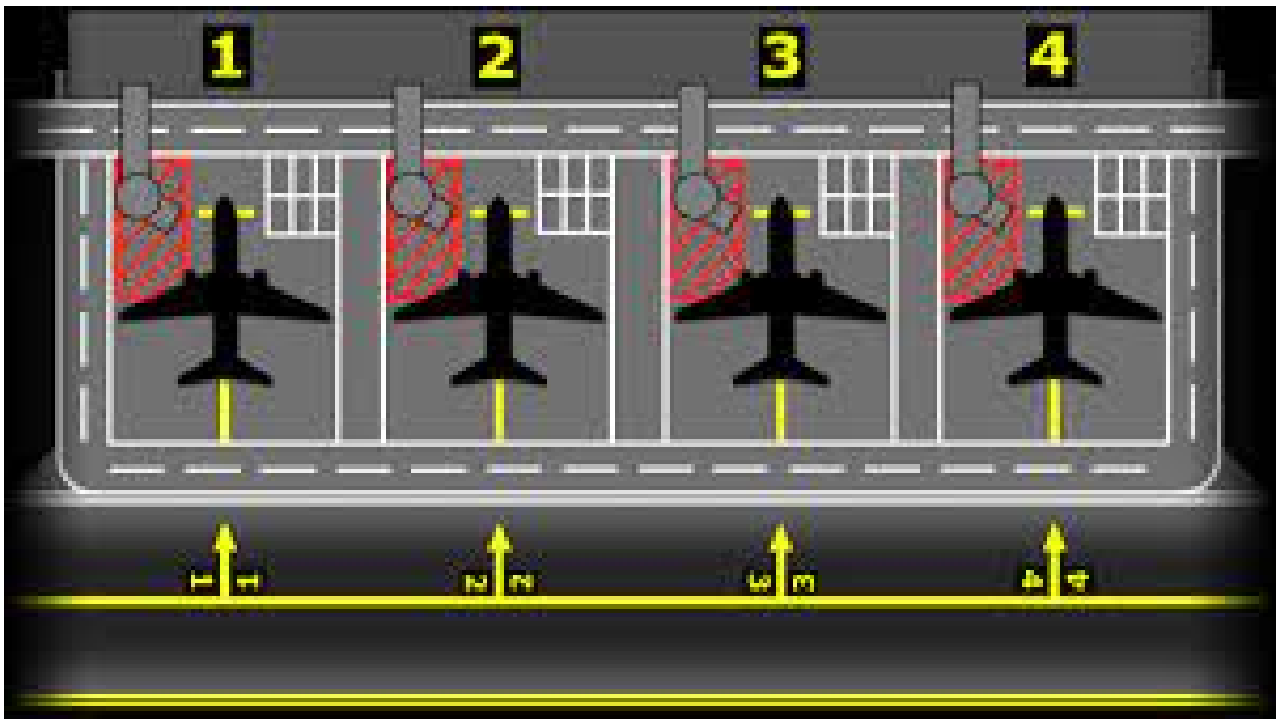

Figure 7.0

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Figure 7.1

RUNWAY

According to the International Civil Aviation Organization (ICAO), a runway is a "defined rectangular area on a land aerodrome prepared for the landing and takeoff of aircraft". Runways may be man-made surfaces (often asphalt, concrete, or a mixture of both) or a natural surface (grass, dirt, gravel, ice, sand, or salt).

Runways, as well as taxiways and ramps, are sometimes referred to as "tarmac", though very few runways are built using tarmac. Takeoff and landing areas defined on the surface of the water for seaplanes are generally referred to as waterways. Runway lengths are now commonly given in meters worldwide, except in North America where feet are commonly used.

LETTER SUFFIX

If there is more than one runway pointing in the same direction (parallel runways), each runway is identified by appending left (L), center (C) and right (R) to the end of the runway number to identify its position (when facing its direction)—for example, runways one-five-left (15L), one-five-center (15C), and one-five-right (15R). Runway zero-three-left (03L) becomes runway two-one-right (21R) when used in the opposite direction (derived from adding 18 to the original number for the 180° difference when approaching from the opposite direction). In some countries, regulations mandate that where parallel runways are too close to each other, only one may be used at a time under certain conditions (usually adverse weather).

For example, in Los Angeles, this system results in runways 6L, 6R, 7L, and 7R, even though all four runways are actually parallel at approximately 69°. At Dallas/Fort Worth International Airport, there are five parallel runways, named 17L, 17C, 17R, 18L, and 18R, all oriented at a heading of 175.4°. Occasionally, an airport with only three parallel runways may use different runway identifiers, such as when a third parallel runway was opened at Phoenix Sky Harbor International Airport in 2000 to the south of existing 8R/26L—rather than confusingly becoming the "new" 8R/26L it was instead designated 7R/25L, with the former 8R/26L becoming 7L/25R and 8L/26R becoming 8/26.

FIGURE 8.0

FIGURE 8.1

RENUMBERING

Runway designations may change over time because Earth's magnetic lines slowly drift on the surface and the magnetic direction changes. Depending on the airport location and how much drift occurs, it may be necessary to change the runway designation. As runways are designated with headings rounded to the nearest 10°, this affects some runways sooner than others. For example, if the magnetic heading of a runway is 233°, it is designated Runway 23. If the magnetic heading changes downwards by 5 degrees to 228°, the runway remains Runway 23. If on the other hand the original magnetic heading was 226° (Runway 23), and the heading decreased by only 2 degrees to 224°, the runway becomes Runway 22

TORA[17][18]

Takeoff Run Available – The length of runway declared available and suitable for the ground run of an airplane taking off.[19]

TODA[17][18]

Takeoff Distance Available – The length of the takeoff run available plus the length of the clearway, if clearway is provided.[19]

(The clearway length allowed must lie within the aerodrome or airport boundary. According to the Federal Aviation Regulations and Joint Aviation Requirements (JAR) TODA is the lesser of TORA plus clearway or 1.5 times TORA).

ASDA[17][18]

Accelerate-Stop Distance Available – The length of the takeoff run available plus the length of the stopway, if stopway is provided.[19]

LDA[17][18]

Landing Distance Available – The length of runway that is declared available and suitable for the ground run of an airplane landing.[20]

EMDA[21]

Emergency Distance Available – LDA (or TORA) plus a stopway.

THERE AER STANDARD FOR RUNWAY MARKING

The runway thresholds are markings across the runway that denote the beginning and end of the designated space for landing and takeoff under non-emergency conditions.[23]
The runway safety area is the cleared, smoothed and graded area around the paved runway. It is kept free from any obstacles that might impede flight or ground roll of aircraft.
The runway is the surface from threshold to threshold (including displaced thresholds), which typically features threshold markings, numbers, and centerlines, but excludes blast pads and stopways at both ends.

Blast pads are often constructed just before the start of a runway where jet blast produced by large planes during the takeoff roll could otherwise erode the ground and eventually damage the runway.
Stopways, also known as overrun areas, are also constructed at the end of runways as emergency space to stop planes that overrun the runway on landing or a rejected takeoff.
Blast pads and stopways look similar, and are both marked with yellow chevrons; stopways may optionally be surrounded by red runway lights. The differences are that stopways can support the full weight of an aircraft and are designated for use in an aborted takeoff, while blast pads are often not as strong as the main paved surface of the runway and are not to be used for taxiing, landing, or aborted takeoffs.[24] An engineered materials arrestor system (EMAS) may also be present, which may overlap with the end of the blast pad or stopway and is painted similarly (although an EMAS does not count as part of a stopway).[24]

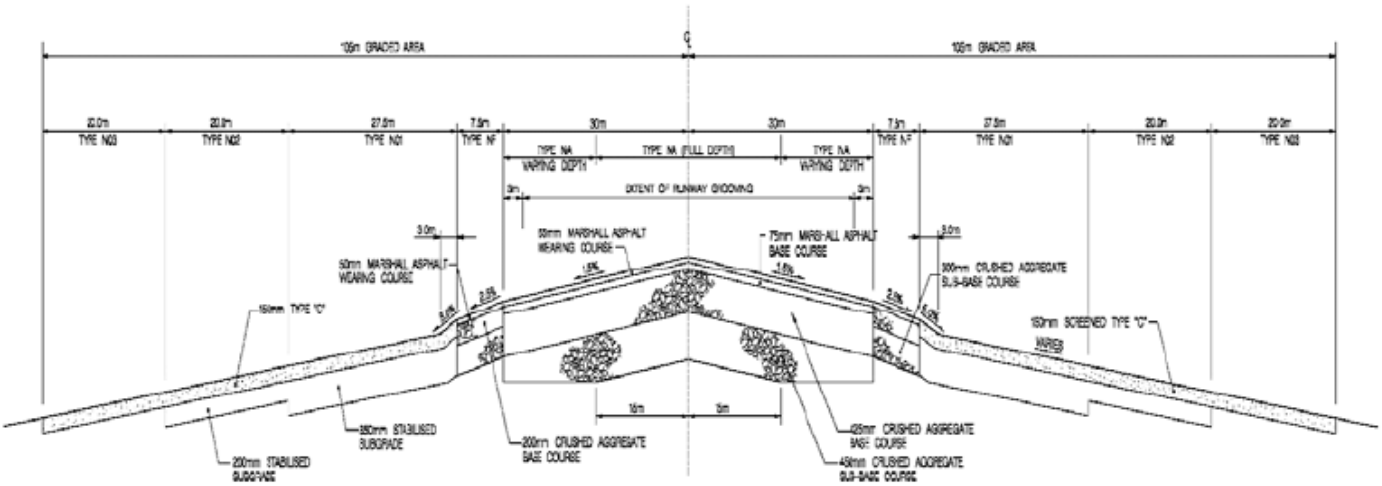
Displaced thresholds may be used for taxiing, takeoff, and landing rollout, but not for the touchdown. A displaced threshold often exists because of obstacles just before the runway, runway strength, or noise restrictions making the beginning section of the runway unsuitable for landings.[25] It is marked with white paint arrows that lead up to the beginning of the landing portion of the runway. As with blast pads, landings on displaced thresholds are not permitted aside from emergency use or exigent circumstance.

Clearway is an area beyond the paved runway, aligned with the runway centerline and under the control of the airport authorities. This area is not less than 500 ft and there are no protruding obstacles except for threshold lights provided that they aren't higher than 26 inches.

Pavement surface

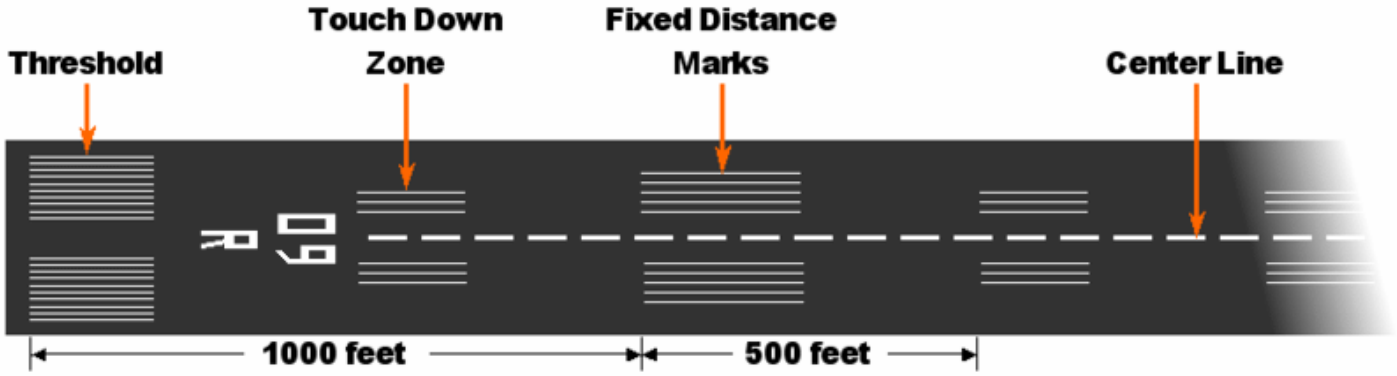
A Mahan Air Airbus A310 using reverse thrust in rainy weather at Düsseldorf Airport

Runway pavement surface is prepared and maintained to maximize friction for wheel braking. To minimize hydroplaning following heavy rain, the pavement surface is usually grooved so that the surface water film flows into the grooves and the peaks between grooves will still be in contact with the aircraft tires. To maintain the macrotexturing built into the runway by the grooves, maintenance crews engage in airfield rubber removal or hydrocleaning in order to meet required FAA friction levels.



MARKING

There are runway markings and signs on most large runways. Larger runways have a distance remaining sign (black box with white numbers). This sign uses a single number to indicate the remaining distance of the runway in thousands of feet. For example, a 7 will indicate 7,000 ft (2,134 m) remaining. The runway threshold is marked by a line of green lights.



Visual runways are used at small airstrips and are usually just a strip of grass, gravel, ice, asphalt, or concrete. Although there are usually no markings on a visual runway, they may have threshold markings, designators, and centerlines. Additionally, they do not provide an instrument-based landing procedure; pilots must be able to see the runway to use it. Also, radio communication may not be available and pilots must be self-reliant.

Non-precision instrument runways are often used at small- to medium-size airports. These runways, depending on the surface, may be marked with threshold markings, designators, centerlines, and sometimes a 1,000 ft (305 m) mark (known as an aiming point, sometimes installed at 1,500 ft (457 m)). While centerlines provide horizontal position guidance, aiming point markers provide vertical position guidance to planes on visual approach.

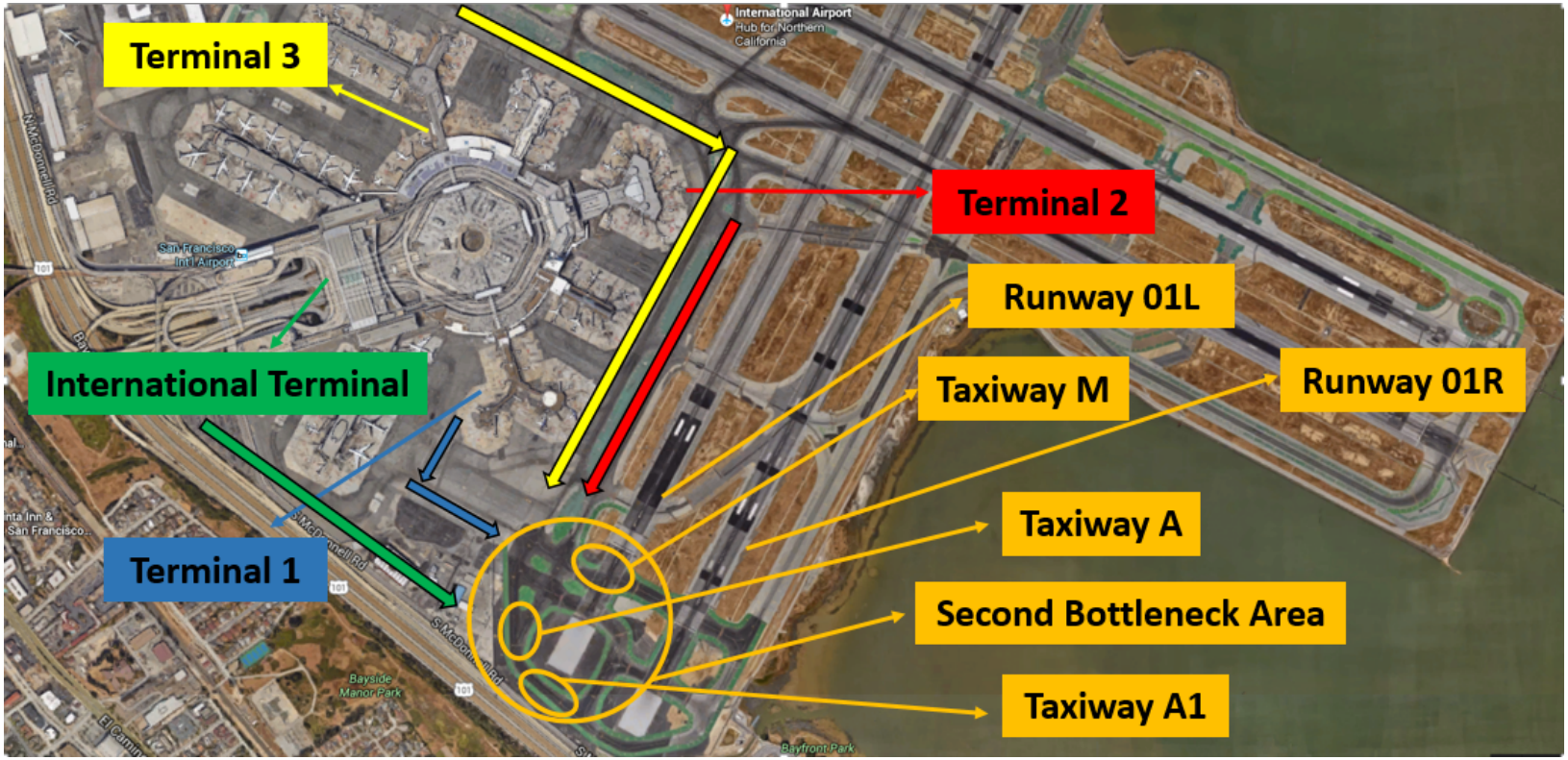
Precision instrument runways, which are found at medium- and large-size airports, consist of a blast pad/stopway (optional, for airports handling jets), threshold, designator, centerline, aiming point, and 500 ft (152 m), 1,000 ft (305 m)/1,500 ft (457 m), 2,000 ft (610 m), 2,500 ft (762 m), and 3,000 ft (914 m) touchdown zone marks. Precision runways provide both horizontal and vertical guidance for instrument approaches.

TAXIWAY

Taxiway centerline lead-off lights – installed along lead-off markings, alternate green and yellow lights embedded into the runway pavement. It starts with green light at about the runway centerline to the position of first centerline light beyond the Hold-Short markings on the taxiway.

Taxiway centerline lead-on lights – installed the same way as taxiway centerline lead-off Lights, but directing airplane traffic in the opposite direction.

A taxiway is a path for aircraft at an airport connecting runways with aprons, hangars, terminals and other facilities. They mostly have a hard surface such as asphalt or concrete, although smaller general aviation airports sometimes use gravel or grass.


Terminal 3
Terminal 2
Runway 01L
Taxiway M
Runway 01R
International Terminal
Taxiway A
Second Bottleneck Area
Terminal 1
Taxiway A1
International Airport
Hub for Northern
California
San Francisco
Int'l Airport
Bayside
Manor Park
Bayfront Park

RAMP

A ramp is a dedicated space at an airport (either the home airport or alternate airport) that acts as a parking pad for an aircraft. The ramp is typically paved and leased by a particular company for storing, holding, and tying down their aircraft. Some people refer to ramps as an apron. Both terms are interchangeable and are typically correct. Some even refer to a ramp as a hangar; however, a ramp does not exist under a closed structure. It is simply an open, paved area. Planes transition from the taxiway to parking and vice versa in this space.

A Ramp’s Purpose

The ramp is generally home to pre-flight activities. This can include:

Loading and unloading cargo and passengers on board

Refueling

Cleaning

Restocking supplies

AIRCRAFT SHED

A hangar is a closed building structure to hold aircraft or spacecraft. Hangars are built of metal, wood, or concrete.

BOARDING AREA

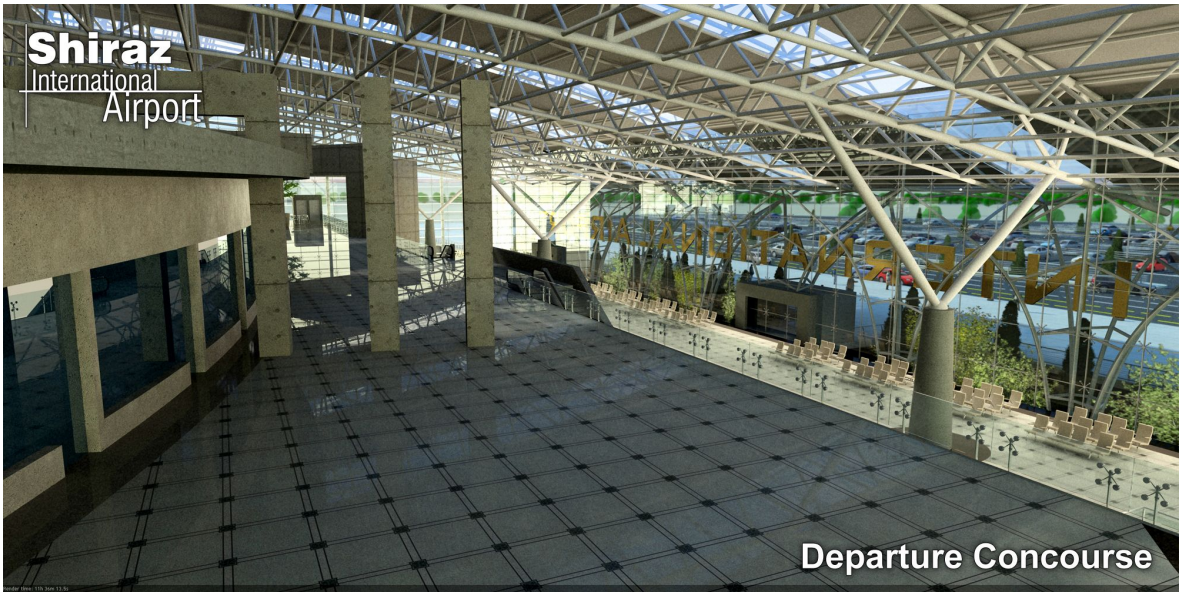
A gate is the portion of an airport that connects an aircraft with its payload. Commercial airport gates have airside components to facilitate passenger boarding and aircraft ground handling. Gates may include a waiting area for passengers before boarding their flight.

BAGGAGE RECLAIM AREA

In airport terminals, a baggage reclaim area is an area where arriving passengers claim checked-in baggage after disembarking from an airline flight. The alternative term baggage claim is used at airports in the US and some other airports internationally.

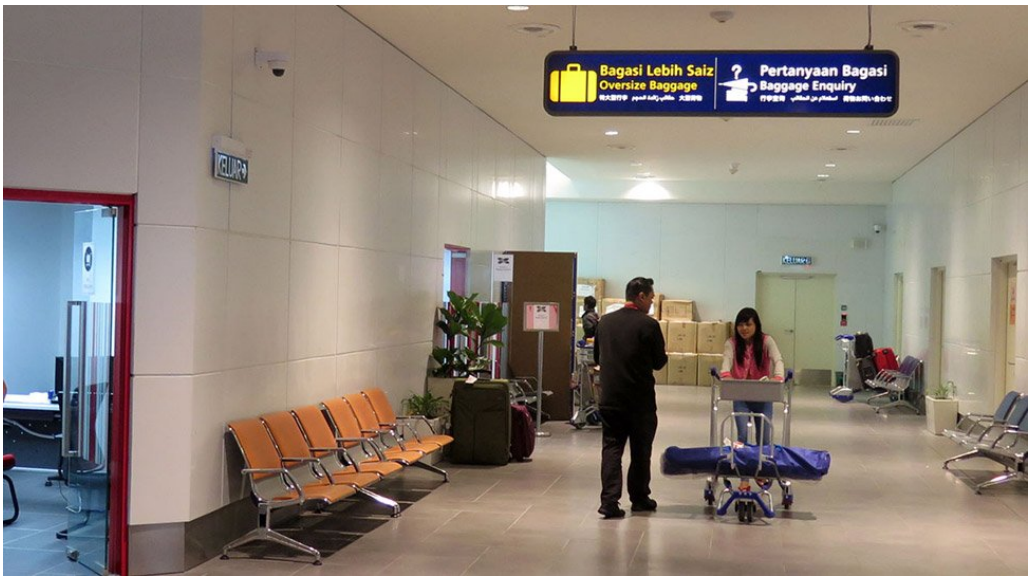
DEPARTURE CONCURSE

departure concourse Examples Stem Match words But the tracks were still there, running out of the basement departure concourse below the main hall. Literature For domestic flights, three gates (65, 66, and 67) in the main building are connected to both the main departures concourse and to a separate domestic check-in facility.



OFFICE AND SERVICE AREA

Processing of Airport Proposals By Service Area Offices EFFECT ON AIR TRAFFIC CONTROL OPERATIONS The air traffic office must conduct an airspace review to evaluate the effect on the safe and efficient utilization of airspace by aircraft and the effect that such proposals may have on the movement and control of air traffic, associated resources (personnel, facilities and equipment), and ATC program planning.



HISTORY OF AIRPORT

Most people know the origin story of the airplane — the Wright brothers, Kitty Hawk, and the rest. But do you know anything about the history of the runways that make flight possible?

When you consider air travel, the last thing you're probably thinking about is the runway at takeoff. It's easy to focus on airplanes — they're an incredible feat of engineering and the vehicle needed for flight, after all — but the runways planes depend on for takeoff and landing deserve some attention, too. Without a stable surface, the experience of traveling via airplane would be a much more stressful one.

Let's take a trip back in time to learn a little bit more about the history of the runway. Read on for some fascinating insights into one of the most essential parts of aeronautics — the one that stays solidly in one place.


21R
21VA

TERMINAL BUILDING

Also known as airport terminal, these buildings are the spaces where passengers board or alight from flights. These buildings house all the necessary facilities for passengers to check-in their luggage, clear the customs and have lounges to wait before disembarking. The terminals can house cafes, lounges and bars to serve as waiting areas for passengers. Ticket counters, luggage check-in or transfer, security checks and customs are the basics of all airport terminals. Large airports can have more than one terminal that are connected to one another through link ways such as walkways, sky-bridges or trams. Smaller airports usually have only one terminal that houses all the required facilities.

RUNWAY LENGTH

The length of the runway is determined by the aircraft, maximum takeoff weights, engine capabilities, landing and braking capabilities, flap settings, and required safety factors. For example, the runway length for landing must be capable of permitting safe braking if touchdown occurs one third the length of the runway past the threshold.

The runway must also be long enough to meet the obstacle-free capability to permit each aircraft to take off with one engine out. The stopping zone must include ample stopping distance in case the pilot chooses to abort takeoff just before rotating to become airborne (called stopway)

As discussed, the runway safety areas are a must for airport control. Figure 5.4 shows the stopway, to prevent accidents at the end of the runway, and the clearway, also called the runway protection zone.

The altitude of the airport and the temperature also have a significant impact on the airport runway length, because lift capability is proportional to the air density, which diminishes as the altitude and temperature increase. Figure 5.5 illustrates how dramatic that change is for a Boeing 727-200 with a JT8D-15 engine, a takeoff weight of 150,000 pounds, and its wing flaps set at 20 degrees. The requirement for longer runways increases significantly as the altitude of the site above sea level increases

At an average temperature of 65 degrees Fahrenheit, the increase is from 4900 feet at sea level to 8660 feet at an altitude of 8000 feet, or about 370 feet

AIRPORT LAYOUT PLAN

The airport layout plan is a graphic representation to scale of existing and future airport facilities on the airport. An example is presented in Fig. 5.14 It will serve as the airport's public document, giving aeronautical requirements as well as pertinent clearance and dimensional data and relationships with the external area. The airfield configuration of runways, taxiways, aprons, and the terminal are shown schematically.

APPROACH AND RUNWAY CLEAR ZONE PLAN

The approach and clear zone drawing permits the planner to determine how the airport will interface with the surrounding area in terms of safe flight. An example is presented in Fig. 5.15 It includes:

- Area under the imaginary surfaces defined in U.S. Code FAR, Part 77 *1975+
- Existing and ultimate approach slopes or slope protection established by local ordinance
- Runway clear zones and approach zones showing controlling objects in the airspace
- Obstructions that exceed the criteria
- Tall smokestacks, television towers, garbage dumps, landfills, or other bird habitats that could pose a hazard to flight

OTHER PLANS

Terminal Area Plan

The terminal area plan usually consists of a conceptual drawing showing the general plan for the terminal, including its possible expansion. Under some changes the terminal modification will have a major impact on the taxiway and apron and will be reflected in an altered ALP. Noise Compatibility Plan

Using future airport traffic, noise contours should be generated to identify future impacts of noise in the community. The plan would include alternative takeoff tracks and operational constraints. It would also identify buildings and other facilities that might potentially need to be moved or soundproofed.

CONCLUSION

CONCLUSION The airport industry is constantly evolving and in- novating in response to the ever changing demands of safety and security, technology, public demand, cus- tomer service, government requirements, and tenant needs.

There has been atremendous surge in the percentage of people who are now traveling longer distances andbecoming frequently flyers more than ever before. As far as changes in travel preferencesmillennial are found to be willing to spend more on business travel than other generationswhen it comes to business travel. Globally the aviation industry is consumers over 200million tons of jet fuel per year (IBIS World, 2016). There is an increasing demand forinternational flight and airport are beginning to grow and airports now have a system tocomply with passengers with connecting flights, it is very important for airport tostandardize their processes in order to minimize passenger confusion benefiting the foottraffic of airport and making the airlines more profitable.The airline industry is focusing on Safety, Efficiency and Environmentalperformance and matching investment with returns, joining forces to ensure thatgovernment policies, avoiding counter-productive taxation, supporting furtherliberalization and growth, Give tools to access markets and consolidate where it makesbusiness sense, making aviation business sense and try to build a safe, secure andprofitable environment, and become a stronger contributor to the social and economic

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This project report entitled " AIRPORT" By Ankan Khatua, Khushail Aadil, Kunwar Prateek raj, Euodias namatai gambiza is approved for the diploma in civil Engineering.

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