# *Appendix E*

## San Diego International Airport Facilities and Operations

THIS PAGE INTENTIONALLY LEFT BLANK.

SAN DIEGO COUNTY REGIONAL AIRPORT AUTHORITY

# Table of Contents



# List of Tables



# List of Exhibits

THIS PAGE INTENTIONALLY LEFT BLANK.

# APPENDIX E
## San Diego International Airport Facilities and Operations

San Diego International Airport (SDIA or the Airport) is the primary air carrier airport in the San Diego region. The Airport is situated on 661 acres (some of which are State of California tidelands) and is surrounded by varying existing urban land uses. SDIA is operated by the San Diego County Regional Airport Authority (SDCRAA or the Airport Authority).

## E.1 AIRPORT LAYOUT PLAN

The Future Airport Layout Plan (ALP),[1] approved by the Federal Aviation Administration (FAA) in August 2021, is presented on **Exhibit E-1**. The ALP depicts all existing and planned Airport facilities, runway and taxiway safety areas, and the property boundary. It also includes data tables describing various components of the Airport.

Runway 9-27 is 9,401 feet in length and 200 feet in width. Displaced thresholds are required on each end of Runway 9-27, as depicted on **Exhibit E-2**, to ensure obstacle clearance by aircraft on approach to landing. This is needed because of the rising terrain and associated development to the east and to the west of the Airport. The Runway 9 threshold is displaced by 1,000 feet and Runway 27 threshold is displaced by 1,810 feet.

While the full runway length of 9,401 feet is available for takeoffs to the west on Runway 27, this is not the case for takeoffs on Runway 9. The primary reason is the absence of sufficient vacant land to provide the required Runway Safety Area (RSA) and Object Free Area (OFA) off the runway end. The required RSA and OFA must be provided along and adjacent to the east end of the active runway, shortening the runway length available for takeoff. Thus, the declared Takeoff Run Available (TORA) for Runway 9 is 8,280 feet.[2] This is illustrated in Exhibit E-2.

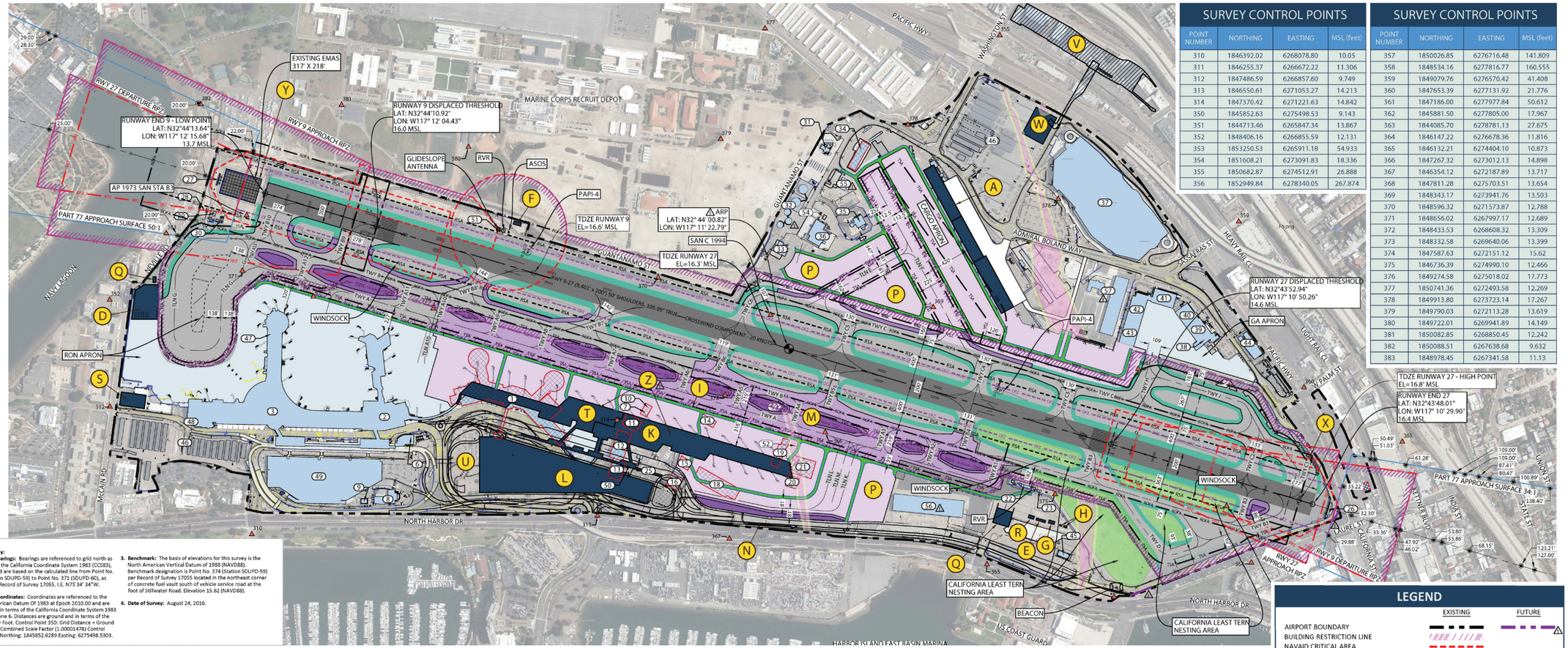
## E.2 AIRPORT OPERATIONS

This section discusses instrument flight procedures, runway use, existing operations, and aircraft activity forecasts for SDIA. The activity forecast includes projections for enplaned passengers as well as aircraft activity. The use of the runway system and the airspace in the immediate Airport vicinity is a key consideration in airport land use compatibility planning. FAA Air Traffic Control (ATC) procedures directly influence the patterns of airport noise exposure, airspace protection areas, aircraft overflights, and the location and configuration of safety zones. The instrument procedures at SDIA are directly relevant to the airspace protection factor of the Airport Land Use Compatibility Plan (ALUCP) as airspace surfaces are defined according to FAA criteria to meet obstacle clearance requirements.

[1] San Diego County Regional Airport Authority, *San Diego International Airport, Airport Layout Plan*, August 3, 2021, sheet 5 of 12, Future Airport Layout Plan Drawing.

[2] San Diego County Regional Airport Authority, *San Diego International Airport, Airport Layout Plan*, August 3, 2021, sheet 2 of 12, Airport Data Sheet.

THIS PAGE INTENTIONALLY LEFT BLANK.




**Basis of Survey:**

1. **Basis of Bearings:** Bearings are referenced to grid north as defined by the California Coordinate System 1983 (CCS83), Zone 6, and are based on the calculated line from Point No. 374 (Station SDUPD-59) to Point No. 371 (SDUPD-60), as shown on Record of Survey 17055, I.E. N75°34' 34"W.
2. **Basis of Coordinates:** Coordinates are referenced to the North American Datum Of 1983 at Epoch 2010.00 and are expressed in terms of the California Coordinate System 1983 (CCS83), Zone 6. Distances are ground and in terms of the U.S. Survey Foot. Control Point 350: Grid Distance = Ground Distance X Combined Scale Factor (1.00001478) Control Point 350: Northing: 1845852.6289 Easting: 6275498.5303.
3. **Benchmark:** The basis of elevations for this survey is the North American Vertical Datum of 1988 (NAVD88). Benchmark designation is Point No. 374 (Station SDUPD-59) per Record of Survey 17055 located in the northeast corner of concrete fuel vault south of vehicle service road at the foot of Stillwater Road. Elevation 15.62 (NAVD88).
4. **Date of Survey:** August 24, 2016.

## SURVEY CONTROL POINTS

| POINT NUMBER | NORTHING | EASTING | MSL (feet) |
|---|---|---|---|
| 310 | 1846392.02 | 6268078.80 | 10.05 |
| 311 | 1846255.37 | 6266672.22 | 11.306 |
| 312 | 1847486.59 | 6266857.60 | 9.749 |
| 313 | 1846550.61 | 6271053.27 | 14.213 |
| 314 | 1847370.42 | 6271221.63 | 14.842 |
| 350 | 1845852.63 | 6275498.53 | 9.143 |
| 351 | 1844713.46 | 6265847.34 | 13.867 |
| 352 | 1848406.16 | 6266855.59 | 12.131 |
| 353 | 1853250.53 | 6265911.18 | 54.933 |
| 354 | 1851608.21 | 6273091.83 | 18.336 |
| 355 | 1850682.87 | 6274512.91 | 26.888 |
| 356 | 1852949.84 | 6278340.05 | 267.874 |

## SURVEY CONTROL POINTS

| POINT NUMBER | NORTHING | EASTING | MSL (feet) |
|---|---|---|---|
| 357 | 1850026.85 | 6276716.48 | 141.809 |
| 358 | 1848534.16 | 6277816.77 | 160.555 |
| 359 | 1849079.76 | 6276570.42 | 41.408 |
| 360 | 1847653.39 | 6277131.92 | 21.776 |
| 361 | 1847186.00 | 6277977.84 | 50.612 |
| 362 | 1845881.50 | 6277805.00 | 17.967 |
| 363 | 1844085.70 | 6278781.13 | 27.675 |
| 364 | 1846147.22 | 6276678.36 | 11.816 |
| 365 | 1846132.21 | 6274404.10 | 10.873 |
| 366 | 1847267.32 | 6273012.13 | 14.898 |
| 367 | 1846354.12 | 6272187.89 | 13.717 |
| 368 | 1847811.28 | 6275703.51 | 13.654 |
| 369 | 1848343.17 | 6273941.76 | 13.503 |
| 370 | 1848596.32 | 6271573.87 | 12.788 |
| 371 | 1848656.02 | 6267997.17 | 12.689 |
| 372 | 1848433.53 | 6268608.32 | 13.309 |
| 373 | 1848332.58 | 6269640.06 | 13.399 |
| 374 | 1847587.63 | 6272151.12 | 15.62 |
| 375 | 1846736.39 | 6274990.10 | 12.466 |
| 376 | 1849274.58 | 6275018.02 | 17.773 |
| 377 | 1850741.36 | 6272493.58 | 12.269 |
| 378 | 1849913.80 | 6273723.14 | 17.267 |
| 379 | 1849790.03 | 6272113.28 | 13.619 |
| 380 | 1849722.01 | 6269941.89 | 14.149 |
| 381 | 1850082.85 | 6268850.45 | 12.242 |
| 382 | 1850088.51 | 6267638.68 | 9.632 |
| 383 | 1848978.45 | 6267341.58 | 11.13 |

## EXISTING BUILDING AND FACILITIES TABLE

| BUILDING NUMBER | TOP ELEV MSL | DESCRIPTION |
|---|---|---|
| 1 | 48' | TERMINAL ONE (T1) |
| 2 | 55' | TERMINAL TWO (T2) EAST |
| 3 | 90' | T2 WEST |
| 6 | 47' | USO AND PARKING OPERATIONS BUILDING |
| 7 | 26' | TRITURATOR |
| 8 | 44' | HVAC PLANT |
| 9 | 32' | SWITCHGEAR BUILDING |
| 10 | 35' | WASH BAY |
| 11 | 50' | AIR CARGO BUILDING |
| 12 | 41' | SOUTHWEST AIRLINES PROVISRAY AIR CARGO BUILDING |
| 13 | 41' | AIR CARGO BUILDING |
| 14 | N/A | FUEL DISPENSING FACILITY |
| 15 | 47' | AIRLINE SUPPORT |
| 16 | 45' | AIRLINE SUPPORT |
| 18 | 65' | SDCRAA ADMINISTRATION OFFICE |
| 19 | 38' | SDCRAA MAINTENANCE SHOPS |
| 20 | 28' | SDCRAA FACILITIES MANAGEMENT OFFICE |
| 21 | 40' | SDCRAA SHIPPING AND RECEIVING |
| 22 | N/A | ELECTRIC VAULT & EMERGENCY GENERATOR |
| 23 | 22' | FAA COMMUNICATIONS |
| 25 | TBD | SWA CARGO |
| 26 | 34' | RUNWAY 9 LOCALIZER SHELTER, LOCALIZER ANTENNA, & DME ANTENNA |
| 27 | 19' | RUNWAY 27 LOCALIZER ANTENNA |
| 28 | N/A | ELECTRICAL UTILITY AREA |
| 29 | 22' | RUNWAY 27 LOCALIZER TRANSMITTER BUILDING (INSIDE ROFA) |
| 30 | 20' | RUNWAY 27 DME AND LOCALIZER ANTENNAS (INSIDE ROFA) |

## EXISTING BUILDING AND FACILITIES TABLE

| BUILDING NUMBER | TOP ELEV MSL | DESCRIPTION |
|---|---|---|
| 31 | 14' | FUEL DISPENSING FACILITY ADMINISTRATION BUILDING |
| 32 | 46' | FUEL STORAGE TANKS |
| 33 | 35' | ARFF STATION |
| 34 | 48' | FEDEX SORT FACILITY |
| 35 | 152' | AIRPORT TRAFFIC CONTROL TOWER |
| 36 | 44' | CENTRAL RECEIVING AND DISTRIBUTION CENTER |
| 37 | 92' | RENTAL CAR FACILITY |
| 38 | 55' | SIGNATURE FLIGHT SUPPORT TERMINAL |
| 39 | 55' | SIGNATURE FLIGHT SUPPORT HANGAR 1 |
| 40 | 61' | SIGNATURE FLIGHT SUPPORT HANGAR 2 |
| 41 | 55' | SIGNATURE FLIGHT SUPPORT HANGAR 3 |
| 42 | 55' | SIGNATURE FLIGHT SUPPORT HANGAR 4 |
| 43 | 55' | SIGNATURE FLIGHT SUPPORT HANGAR 5 |
| 44 | TBD | SAN DIEGO WIND TUNNEL |
| 45 | 25' | RCC BUS / TAXI HOLD LOT BUILDING |
| 46 | TBD | SOLAR CAR PORT |
| 47 | TBD | RAMP CONTROL TOWER |
| 48 | TBD | T2 WEST FIS |
| 49 | TBD | T2 PARKING PLAZA |
| 50 | TBD | SWA PROVISIONING |
| 51 | TBD | GLIDESLOPE EQUIPMENT SHELTER |
| 52 | TBD | GUARD SHACK |
| 53 | TBD | ELECTRICAL BUILDING |
| 54 | TBD | ENVIRONMENTAL HAZMAT STORAGE TRAILER |
| 55 | TBD | AIRCRAFT FUEL STORAGE OPERATIONS FACILITY ⚠ |
| 56 | TBD | AIRLINE SUPPORT BUILDING ⚠ |
| 57 | TBD | FACILITIES MANAGEMENT DEPARTMENT CAMPUS ⚠ |

## FUTURE FEATURES

| FEATURE ID | DESCRIPTION |
|---|---|
| | AIRPORT SUPPORT FACILITIES |
| A | AIR CARGO DEVELOPMENT |
| D | WEST FUEL RACK |
| E | AIRFIELD LIGHTING VAULT |
| F | AUTOMATED SURFACE OBSERVATION SYSTEM (ASOS) |
| G | RUNWAY VISUAL RANGE (RVR) |
| H | RUNWAY STATUS LIGHTS (RWSL) SHELTER & MALS PAD |
| I | VEHICLE SERVICE ROAD (VSR) |
| | PHASE 1A |
| K | T1 REPLACEMENT TERMINAL - 19 GATES |
| L | T1 PARKING PLAZA |
| M | TAXIWAY B RELOCATION & TAXIWAY A CONSTRUCTION |
| N | ON-AIRPORT ACCESS ROADS |
| P | RON APRON |
| Q | SOLID WASTE FACILITY |
| R | TRITURATOR/WASH BAY |
| S | AIRPORT ADMINISTRATION BUILDING |
| | PHASE 1B |
| T | T1 REPLACEMENT TERMINAL - ADDITIONAL 11 GATES |
| U | RESERVED FOR FUTURE TRANSIT USE |
| | OTHER PROJECTS |
| V | INTERMODAL TRANSPORTATION CENTER |
| W | NORTH SIDE PASSENGER PROCESSING FACILITY |
| X | BLAST FENCE |
| Y | ENGINEERED MATERIALS ARRESTING SYSTEMS (EMAS) |
| Z | SOLAR PANELS ON ROOF OF T1 REPLACEMENT ⚠ |

## FUTURE TAXIWAY/TAXILANE DATA TABLE

| NAME | DIMENSIONS: TWY WIDTH ACTUAL-STANDARD | DIMENSIONS: SHOULDER WIDTH ACTUAL-STANDARD | TWY SAFETY AREA | OBJECT FREE AREA | TWY EDGE SAFETY MARGIN | TWY DESIGN GROUP | SEPARATION FROM TWY CL TO FIXED/MOVABLE OBJECT | LIGHTING |
|---|---|---|---|---|---|---|---|---|
| A | 50'-50' | 20'-20' | 118' | 186' | 10' | 4 | 93' | MITL |
| A1 | 125'-50' | 20'-20' | 118' | 186' | 10' | 4 | 93' | MITL |
| A2 | 125'-50' | 20'-20' | 118' | 186' | 10' | 4 | 93' | MITL |
| A3 | 271'-50' | 20'-20' | 214' | 320' | 15' | 6 | 160' | MITL |
| A4 | 137'-50' | 20'-20' | 118' | 186' | 10' | 4 | 93' | MITL |
| A5 | 137'-50' | 20'-20' | 118' | 186' | 10' | 4 | 93' | MITL |
| A6 | 108'-50' | 20'-20' | 118' | 186' | 10' | 4 | 93' | MITL |
| A7 | 124'-50' | 20'-20' | 118' | 186' | 10' | 4 | 93' | MITL |
| A8 | 160'-75' | 20'-20' | 214' | 320' | 15' | 6 | 160' | MITL |
| A9 | 182'-75' | 20'-20' | 214' | 320' | 15' | 6 | 160' | MITL |
| A10 | 182'-75' | 20'-20' | 214' | 320' | 15' | 6 | 160' | MITL |
| A11 | 136'-75' | 20'-20' | 214' | 320' | 15' | 6 | 160' | MITL |
| A12 | 136'-75' | 20'-20' | 214' | 320' | 15' | 6 | 160' | MITL |
| A13 | 136'-75' | 20'-20' | 214' | 320' | 15' | 6 | 160' | MITL |
| B2 | 75'-75' | 20'-20' | 214' | 320' | 15' | 6 | 160' | MITL |
| B3 | 94'-75' | 20'-20' | 214' | 320' | 15' | 6 | 160' | MITL |
| A3 (TLN) | 306'-320' | 0'-0' | 214' | 320' | 15' | 6 | 160' | MITL |
| A10 (TLN) | 50'-50' | 0'-0' | 118' | 186' | 10' | 4 | 93' | MITL |
| E (TLN) | 50'-50' | 0'-0' | 118' | 162' | 10' | 3 | 81' | MITL |
| G (TLN) | 276'-75' | 0'-0' | 214' | 276' | 15' | 5 | 160' | MITL |
| K (TLN) | 162'-50' | 0'-0' | 118' | 162' | 10' | 3 | 81' | MITL |
| L (TLN) | 162'-50' | 0'-0' | 118' | 162' | 10' | 3 | 81' | MITL |
| M (TLN) | 271'-50' | 20'-20' | 214' | 320' | 15' | 6 | 160' | MITL |

## PACS/SACS LOCATIONS

| DESIGNATION | TYPE | LATITUDE | LONGITUDE | ELEVATION |
|---|---|---|---|---|
| AP 1973SAN STA B3 | PACS | 32°-44'-11.75616" N | 117°-12'-17.53779" W | 9.5' |
| SAN C 1994 | SACS | 32°-44'-03.69278" N | 117°-11'-24.68198" W | 14.6' |
| SAN AP 1966 STA A3 | SACS | 32°-43'-47.77451" N | 117°-10'-38.57462" W | 11.8' |

0' 400' 800'

GRAPHIC SCALE: 1" = 400'

## LEGEND

| | EXISTING | FUTURE |
|---|---|---|
| AIRPORT BOUNDARY | | |
| BUILDING RESTRICTION LINE | | ⚠ |
| NAVAID CRITICAL AREA | | |
| RUNWAY THRESHOLD LIGHTS | | |
| GLIDESLOPE ANTENNA | | |
| RVR | | |
| ROTATING BEACON | | |
| ASOS | | |
| PAPI-4 | | |
| WINDSOCK | | |
| SURVEY MONUMENT | 150 | |
| TRAVERSE WAY POINT WITH ADJUSTED MSL ELEV. | | |
| AIRPORT REFERENCE POINT (ARP) | | |
| RUNWAY SAFETY AREA (RSA) | RSA | |
| RUNWAY OBJECT FREE AREA (ROFA) | ROFA | |
| RUNWAY OBSTACLE FREE ZONE (OFZ) | OFZ | |
| RUNWAY PROTECTION ZONE (RPZ) | RPZ | |
| TAXIWAY OBJECT FREE AREA (TOFA) | | TOFA |
| TAXIWAY SAFETY AREA (TSA) | | TSA |
| PRECISION OBSTACLE FREE ZONE (POFZ) | P O F Z | |
| FENCE | X X X | |
| BLAST FENCE | | |
| ROADWAY | | |
| FUTURE SERVICE ROADWAY | | |
| BUILDING NUMBER | 55 | |
| FEATURE NUMBER | | G |
| BUILDINGS TO BE DEMOLISHED | | |
| BUILDING | | |
| OFF AIRPORT BUILDING | | |
| RUNWAY | | |
| TAXIWAY | | |
| SHOULDER | | |
| APRON | | |
| FAULT ZONE | | |
| FAULT ZONE BUFFER | | |
| CALIFORNIA LEAST TERN NESTING AREA | | |



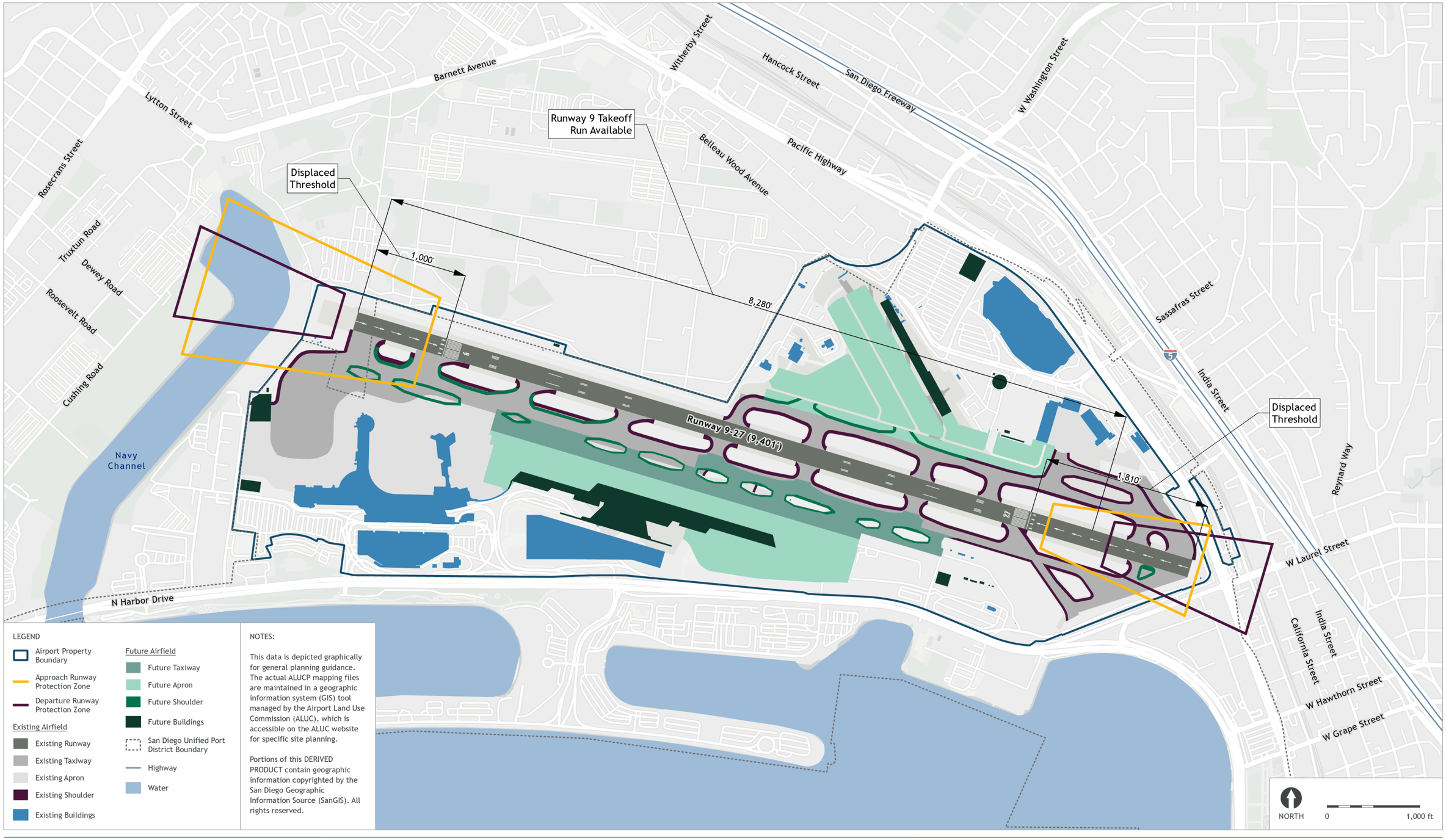
SOURCES: San Diego County Regional Airport Authority, *San Diego International Airport, Airport Layout Plan*, August 3, 2021, sheet 5, *Future Airport Layout Plan Drawing*.

/Volumes/ricondo/Shared/oDrive/Corporate/Creative Services/01 Projects/01 Client Projects/2024/SAN/21141229-5.3.5_E-1_E-2/SDIA_ALUCP_AppE_ExhE-1.indd

**EXHIBIT E-1**

FUTURE AIRPORT LAYOUT PLAN

THIS PAGE INTENTIONALLY LEFT BLANK.




AIRPORT LAND USE COMMISSION

SOURCES: Esri Community Maps Contributors, San Diego Unified Port District, SanGIS, California State Parks, Esri, TomTom, Garmin, Foursquare, GeoTechnologies, Inc., METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA, USFWS, April 2024 (basemap); San Diego County Regional Airport Authority, *San Diego International Airport, Airport Layout Plan*, August 2021 (Airport property boundary, airfield, buildings; runway protection zone); San Diego County Regional Airport Authority, 2023 (San Diego Unified Port District Boundary); US Census Bureau, 2022 (roads), County of San Diego, Planning and Development Services, LUEG-GIS Services, 2018 (water).

File Location: Project:P:\GIS\Projects\SAN\MXD\SAN_ALUCP_2024_Maps\SAN_ALUCP_AppendixE_20240515.aprx Layout: SAN_ALUCP_AppE_ExhE-2_RunwayProtectionZonesAndDisplacedThresholds_20250109

**EXHIBIT E-2**

RUNWAY PROTECTION ZONES AND DISPLACED THRESHOLDS

THIS PAGE INTENTIONALLY LEFT BLANK.

### E.2.1 Standard Terminal Arrival Procedures

Standard Terminal Arrival Route (STAR) procedures apply to aircraft operating under Instrument Flight Rules (IFR).[3] STARs simplify communications between pilots and ATC and facilitate the transition from en route (an assigned federal airway route where the aircraft is level prior to starting descent to a destination) to instrument approach procedures (the final approach procedure to the runway that starts at an initial approach fix or point in space). FAA ATC will instruct pilots to divert from the standard procedure when necessary to safely separate aircraft or for other safety and efficiency reasons. Seven STARs are published for SDIA that apply to IFR aircraft en route from all directions to join final approaches for Runway 9-27.

- BARET FIVE – An Area Navigation (RNAV)[4] procedure for arrivals coming from the northeast to Runway 9 and Runway 27.
- COMIX TWO (RNAV) – An RNAV procedure for arrivals coming from the north and northwest.
- HUBRD ONE – A procedure for arrivals coming from the north and northwest.
- LUCKI ONE (RNAV) – An RNAV procedure for arrivals coming from the east and northeast.
- PLYYA ONE (RNAV) – An RNAV procedure for arrivals coming from the north and northwest.
- SHAMU ONE – A procedure for arrivals coming from the north and northwest to Runway 9.
- TOPGN TWO (RNAV) – An RNAV procedure for arrivals coming from the east and northeast.

### E.2.2 Instrument Approach Procedures

Instrument approaches provide lateral and vertical guidance to the runway during a descent using ground-based equipment and the navigational instrumentation available on the aircraft. They also provide guidance for missed approaches when pilots are unable to see the runway at the minimum decision altitude (the point where a pilot decides to continue descending to the runway or cancel the approach and begin to climb). The following published instrument approach procedures are available at SDIA:

[3] IFRs are rules governing the procedures for conducting instrument flight. IFR is also a term used by pilots and controllers to indicate type of flight plan. US Department of Transportation, Federal Aviation Administration, Pilot/Controller Glossary, https://www.faa.gov/air_traffic/publications/atpubs/pcg_html/glossary-i.html#:~:text=INSTRUMENT%20FLIGHT%20RULES%20(IFR)%2D,(See%20VISUAL%20FLIGHT%20RULES.) (accessed February 24, 2023).

[4] RNAV is a method of navigation which permits aircraft operation on any desired flight path within the coverage of station-referenced navigation aids or within the limits of the capability of self-contained aids, or a combination of these. US Department of Transportation, Federal Aviation Administration, Advisory Circular 90-100A, *US Terminal and En Route Area Navigation (RNAV) Operations*, April 14, 2015.

- Runway 9
  - Instrument Landing System (ILS)[5]
  - Localizer (LOC)[6]
  - RNAV (Global Positioning System [GPS])
- Runway 27
  - LOC
  - RNAV (GPS)
  - RNAV (Required Navigational Performance [RNP][7])

In addition to the instrument approaches, a visual approach is published for Runway 27. A visual approach provides ground references for the pilot as a means to navigate along a specified flight path. The Sweetwater Visual Approach is defined with respect to large-scale landmarks and supplemented with navigational fixes. The procedure is intended for aircraft arriving from the northwest to enter a downwind pattern to Runway 27 staying north of Snapdragon Stadium, turn right on a base turn after passing State Route 125 near Mount Helix toward the final approach and then turn right again over the southern portion of the Sweetwater Reservoir to join the final approach to Runway 27. It also includes GPS waypoints that pilots may load on the navigation system to provide additional guidance to stay along the proposed path.

### E.2.3 Departure Procedures

FAA publishes Standard Instrument Departure procedures (SIDs), which facilitate standard maneuvers that departing aircraft follow to aid in providing efficient use of a busy airspace. SIDs simplify communication between pilots and ATC by eliminating the need for ATC to relate a detailed series of instructions verbally to pilots. FAA ATC will instruct pilots to divert from the standard procedure when necessary to safely separate aircraft or for other safety and efficiency reasons.

Currently, there are nine SIDs for SDIA.

- BORDER SEVEN – A procedure using ground-based navigational aids or FAA ATC radar vectors for departures from Runway 9 and Runway 27 destined to the east and northeast.
- CWARD TWO (RNAV) – An RNAV procedure for departures from Runway 27 destined to local airports to the north and northwest (termed as tower en route traffic).
- ECHHO TWO (RNAV) – An RNAV procedure for departures from Runway 9 and Runway 27 destined to the

[5] ILS is a precision radio navigation system that provides short-range guidance to aircraft to allow them to approach a runway at night or in bad weather. US Department of Transportation, Federal Aviation Administration, Ground-Based Navigation – Instrument Landing System (ILS), https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gbng/ils#:~:text=The%20Localizer%20generates%20and%20radiates,and%20right%20of%20the%20centerline (accessed February 24, 2023).

[6] The localizer generates and radiates signals to provide final approach azimuth [angular distance measured on a horizontal circle in a clockwise direction from magnetic north] navigation information to landing aircraft. US Department of Transportation, Federal Aviation Administration, Ground-Based Navigation – Instrument Landing System (ILS), https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gbng/ils#:~:text=The%20Localizer%20generates%20and%20radiates,and%20right%20of%20the%20centerline (accessed February 24, 2023).

[7] RNP is RNAV with the addition of onboard performance monitoring and alerting capability. US Department of Transportation, Federal Aviation Administration, Flight Operations Group, Performance Based Navigation (PBN) Guidance & Approval, https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/afx/afs/afs400/afs410/pbn (accessed February 24, 2023).

north and northwest. Used for Runway 27 departures only when FAA ATC is assigning Runway 9 for landings.

- FALCC ONE – A procedure for departures from Runway 9 and Runway 27 destined to the north, northwest, and west. Used for Runway 27 departures only when FAA ATC is assigning Runway 9 for landings.
- MMOTO TWO (RNAV) – An RNAV procedure for departures from Runway 9 and Runway 27 destined to the west. Used for Runway 27 departures only when FAA ATC is assigning Runway 9 for landings.
- PADRZ TWO (RNAV) – An RNAV procedure for departures from Runway 27 destined to the north, northwest, and west when FAA ATC assigns arrivals to Runway 27.
- PEBLE SIX – A procedure for departures from Runway 27 destined to the north, northwest, and west when FAA ATC assigns arrivals to Runway 27.
- SAYOW TWO (RNAV) – An RNAV procedure for departures from Runway 9 destined to the east and northeast.
- ZZOOO THREE (RNAV) – An RNAV procedure for departures from Runway 27 destined to the east and northeast.

### E.2.4 Runway Use

The primary factor affecting runway use at airports is weather, in particular, the wind direction and wind speed. Cloud ceiling height and visibility also play major roles for SDIA related to runway use because Runway 9 is the only runway that has a precision instrument approach procedure. Additional factors that may affect runway use include the position of the terminal and aircraft parking ramps relative to the runways and obstacles requiring higher takeoff climb gradients off one runway than the other.

West flow, with arrivals from the east and departures to the west on Runway 27, is the preferred operating configuration at SDIA because of prevailing winds, the relatively steep climb requirements for departures to the east, and the airfield layout. A west flow operation optimizes aircraft ground movement given the terminal location and taxiway system. On rare occasions when weather conditions do not favor operations on Runway 27, the Airport operates in an east flow configuration with arrivals and departures on Runway 9. Under certain cloud ceiling and/or visibility conditions, the Airport operates in a contra-flow configuration with arrivals from the west to Runway 9 and departures to the west on Runway 27.[8]

Based on analysis undertaken for the most recent Title 14 Code of Federal Regulations (CFR) Part 150, *Airport Noise Compatibility Planning*, study for SDIA, average annual runway use, accounting for all runway operating configurations, was as follows:

- Arrivals and departures on Runway 27 – approximately 98.02 percent of annual operations
- Arrivals and departures on Runway 9 – approximately 1.98 percent of annual operations[9]

[8] For example, during foggy conditions with winds from the west, arrivals need to use the Runway 9 ILS since Runway 27 lacks a precision approach. Many departures prefer to depart to the west on Runway 27 either because of the wind direction or because of the steeper climb gradient required for Runway 9 departures.

[9] San Diego County Regional Airport Authority, *14 CFR Part 150 Update, Noise Exposure Maps and Noise Compatibility Program, Final Report*, May 2022, p. 4.12.

Runway use percentages can vary somewhat from year to year, and time of the year (e.g., summer vs. winter), just as weather varies with the seasons and from year to year, but the overwhelmingly dominant use at SDIA involves arrivals and departures on Runway 27.

## E.2.5 Airport Activity Forecast

The most recent aviation demand forecasts for SDIA were prepared in 2019.[10] Forecasts and demand scenarios were presented for enplaned passengers, air cargo tonnage, and aircraft operations, including operations for passenger and all-cargo airlines, general aviation, and military aircraft. Using calendar year 2018 as the base year, annual forecasts and demand scenarios were prepared for four future demand years—2023, 2028, 2033, and 2050.

Two series of forecasts, unconstrained and constrained, were prepared. The unconstrained forecast represents market -driven demand for air service, which is the level of activity the Airport could expect if it had no facility or operational constraints. However, SDIA is subject to various constraints that will remain throughout the foreseeable future, including the single runway, the limited land available for Airport expansion, and a nighttime departure curfew.[11] Thus, the unconstrained forecasts are theoretical and are not realistic projections of actual future Airport activity. For that reason, a constrained forecast was developed to evaluate the potential for the Airport to meet as much of the unconstrained forecast demand as possible given the actual facility and operational constraints.

In developing a constrained forecast, it is necessary to determine the capacity of the existing Airport facilities. At SDIA, the single runway is the major facility constraint. Runways have finite capacity, and runway demand and capacity are fundamental drivers of airport facility requirements. The capacity of a runway is measured in terms of hourly, daily, and annual aircraft operations at an acceptable level of delay. As the demand (the number of landings and takeoffs) increases, congestion (delay) increases. As described in the 2019 forecast, SDIA has a limit of 50 operations per hour,[12] and SDIA's Annual Service Volume (ASV)[13] ranges between 262,000 and 292,000 operations. For SDIA to operate at a sustained rate of 50 operations per hour, one landing or takeoff would need to occur approximately every 72 seconds.[14]

As operations near the capacity limits, delays due to congestion become more frequent and of longer duration. Airports experiencing severe delays due to congestion are not able to fully accommodate increased demand for air service. According to the FAA, average annual all weather delay per operation of 15 minutes or

[10] LeighFisher, *Draft Final Technical Memorandum, Aviation Activity Forecast Update, San Diego International Airport*, April 2019.
[11] SDIA's Airport Use Regulation restricts departures by any aircraft between the hours of 11:30 p.m. and 6:30 a.m. and gate departures between the hours of 11:15 p.m. and 6:15 a.m.
[12] LeighFisher, *Draft Final Technical Memorandum, Aviation Activity Forecast Update, San Diego International Airport*, April 2019, p. 28.
[13] ASV is a reasonable estimate of an airport's annual capacity. It accounts for features of the runway-taxiway system and differences in runway use, aircraft mix, and weather conditions that would be encountered over a year's time. US Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5060-5, *Airport Capacity and Delay*, paragraph 1-3, September 23, 1983.
[14] LeighFisher, *Draft Final Technical Memorandum, Aviation Activity Forecast Update, San Diego International Airport*, April 2019, p. D-4.

more may be considered excessive at a hub airport.[15] Sustained delays in excess of 20 minutes are rarely observed.[16]

As delays increase, aircraft operators and passengers will make adjustments, as possible:

- Airlines – increase load factors; switch to larger aircraft to accommodate more passengers per flight; cancel or consolidate flights to the same market during peak delay periods; or adjust schedules to shift flights to less congested periods, which may lead to an increase in operations in the nighttime shoulder hours (departures from 10:00 p.m. to 11:30 p.m. and arrivals after 10:00 p.m.) and departures from 6:30 a.m. to 7:00 a.m.[17]
- Passengers – use alternative airports; use other means of transportation (e.g., automobile or train); or avoid some trips.[18]
- Operators of General Aviation Aircraft – operate during less busy times of day; or switch to less congested airports in the metropolitan area.

The results of a 2004 forecast modeling and delay / capacity analysis[19] showed that SDIA operates with relatively moderate delay levels up to 250,000 annual operations where average annual all-weather delays reach 10 minutes per operation. Delays of 20 minutes per operation occur at 285,000 annual operations. Above that level of operations, average delays increase at an accelerating rate, reaching 22 minutes at 290,000 operations and 28 minutes at 300,000 operations. The relationship of annual operations with delay is graphically illustrated in **Exhibit E-3**.

The constrained forecast for SDIA was based on an analysis of capacity and operational limits and the likely adjustments by airlines to continue serving as many passengers as possible. The constrained forecast, which was approved by the FAA on June 19, 2019, is the "preferred" forecast recommended for airport planning and is the forecast scenario used for all analyses in the ALUCP.[20]

**Table E-1** presents historical data through 2022 and constrained demand forecasts through 2050. The forecast indicates that by 2028, the 266,000 operations would be nearing annual Airport capacity. By 2050, the projected 290,100 operations would be at the practical annual capacity limit, a 38 percent increase in operations from 2022. The table indicates that the number of enplaned passengers will increase by 86 percent from 2022 to 2050, reflecting the projected increase in the number of passengers per flight.

[15] A "hub airport" is a commercial service airport with over 0.05 percent of annual US commercial enplanements (US Department of Transportation, Federal Aviation Administration, Airport Categories, https://www.faa.gov/airports/planning_capacity/categories, accessed September 19, 2023).

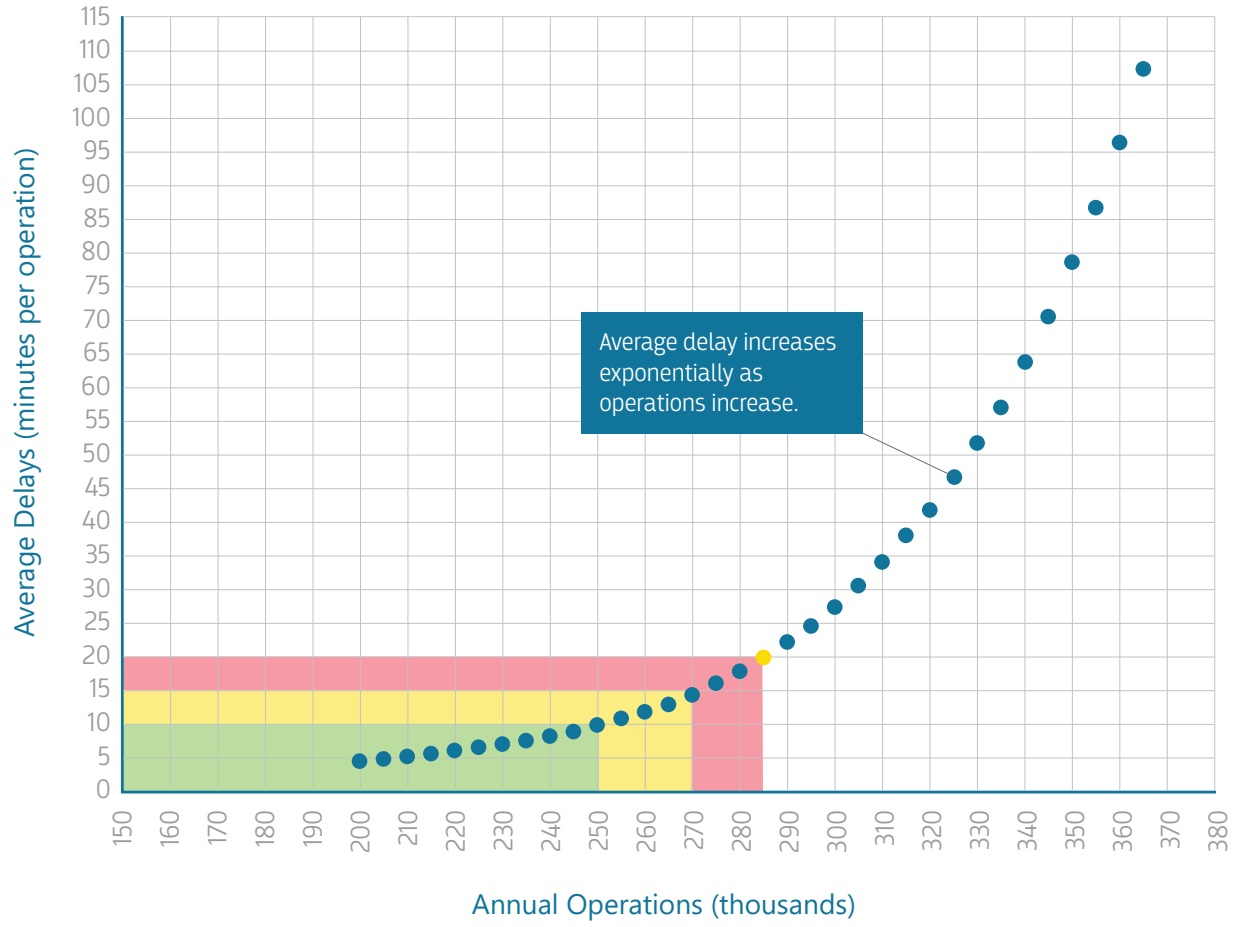
[16] US Department of Transportation, Federal Aviation Administration, Office of Aviation Policy and Plans, *FAA Airport Benefit-Cost Analysis Guidance*, September 16, 2020, p. 45. Note that average delays per operation reflect the averaging of minimal delays in non-peak hours with very long delays at peak hours.

[17] Airport regulations prohibit departures after 11:30 p.m. and before 6:30 a.m.

[18] US Department of Transportation, Federal Aviation Administration, Office of Aviation Policy and Plans, *FAA Airport Benefit-Cost Analysis Guidance*, September 16, 2020, p. 45.

[19] SH&E, Inc., *Final San Diego International Airport Aviation Activity Forecasts*, San Diego County Regional Airport Authority, June 2004.

[20] LeighFisher, *Draft Final Technical Memorandum, Aviation Activity Forecast Update, San Diego International Airport*, April 2019, Appendix C.




SOURCES: SH&E, Inc., *Final San Diego International Airport Aviation Activity Forecasts, San Diego County Regional Airport Authority,* June 2004; reproduced in LeighFisher, *Draft Final Technical Memorandum, Aviation Activity Forecast Update, San Diego International Airport,* April 2019, p. D-7.

/Volumes/ricondo/Shared/oDrive/Corporate/Creative Services/01 Projects/01 Client Projects/2024/SAN/21141229-5.3.5_E-1_E-2/SDIA_ALUCP_AppE_ExhE-3.indd

**EXHIBIT E-3**

AVERAGE DELAY PER OPERATION RELATED TO ANNUAL AIRCRAFT OPERATIONS UNDER ALL WEATHER CONDITIONS

Table E-1 Constrained Aviation Demand Forecast Summary

| Year | Enplaned Passengers[1] | Aircraft Operations | Cargo & US Mail (tons) |
|---|---|---|---|
| **Historical** | | | |
| 1980 | 2,587,723 | 146,691 | 27,590 |
| 1985 | 4,023,699 | 162,412 | 31,857 |
| 1990 | 5,609,104 | 212,314 | 68,127 |
| 1995 | 6,686,144 | 226,994 | 97,667 |
| 2000 | 7,915,899 | 206,889 | 153,370 |
| 2005 | 8,692,694 | 220,210 | 187,705 |
| 2010 | 8,485,447 | 190,136 | 127,261 |
| 2015 | 10,053,206 | 194,215 | 178,921 |
| 2020[2] | 4,629,628 | 132,545 | 143,940 |
| 2021 | 7,808,999 | 162,828 | 146,547 |
| 2022 | 11,125,342 | 210,250 | 136,644 |
| **Forecast** | | | |
| 2028 | 16,919,000 | 266,000 | 257,400 |
| 2033 | 18,927,000 | 277,230 | 279,800 |
| 2050 | 20,321,000[3] | 290,100[4] | 335,400 |

Notes:

1 Enplaned passengers are those boarding aircraft at San Diego International Airport.

2 The marked decline in activity in 2020 reflects the first year of the COVID-19 pandemic. Activity began recovering in 2021.

3 Enplaned passengers are forecast to increase by 86 percent from 2022 to 2050.

4 Operations are forecast to increase by 38 percent from 2022 to 2050.

Sources: LeighFisher, *Draft Final Technical Memorandum, Aviation Activity Forecast Update, San Diego International Airport*, April 2019 (Table 5-1, 2050 forecast); San Diego County Regional Airport Authority, SDIA Ops Counts 1970-Present.xlsx, February 2024 (historical data).

THIS PAGE INTENTIONALLY LEFT BLANK.