



# Runway Declared Distance Concept

CEE 4674 - Airport Planning and Design  
Fall 2023



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# Declared Distance Rationale

- *“An alternative to mitigate existing runway shortcomings and thus better meet design standards”*
- *“When it is not practical to meet all runway design standards”*
- *“Declared distance can be the used as interim condition”*
- Declared instances are reported for all runways at airports with turbofan and turboprop engine aircraft

Many runways at US airports were built decades ago before recent Runway Safety Area requirements were established





# Declared Distances

- Information on declared distances is contained in Appendix H of the **FAA AC 150/5300-13B**
- The declared distances are:
  - Takeoff Distance Available (TODA) applies to takeoff
  - Takeoff Run Available (TORA), applies to takeoff
  - Accelerate-Stop-Distance (ASDA), applies to a rejected takeoff
  - Landing Distance Available (LDA), applies to landing

3/31/2022

AC 150/5300-13B  
Appendix H

## APPENDIX H. DECLARED DISTANCES

### H.1 Application.

Declared distances represent the maximum distances available and suitable for meeting aircraft takeoff, rejected takeoff, and landing distance performance requirements.





# Impact of Declared Distances

- Declared distances may result in a displaced runway threshold and may affect the beginning and ending of the RSA, ROFA, and RPZ
- For runways without published declared distances, the declared distances are equal to the physical length of the runway unless there is a displaced threshold.
- With a displaced threshold, the LDA is shortened by the length of the threshold displacement in the direction of landing at that displaced threshold.
- Declared distances that use a clearway or stopway to increase TODA and/or ASDA can provide turbine-engine powered, transport category aircraft using that runway additional performance capability and increased maximum allowable takeoff weights in some operating conditions.

Source: FAA 150/5300-13B (Paragraph H.1.2)





# Declared Distance Application

- Declared distances apply to the certification and operation of **turbine-engine powered transport category** aircraft operating under;
  - 14 CFR Part 135 (Air taxi operations)
  - 14 CFR Part 121 (Commercial airline operations)
  - 14 CFR Part 91 (Private aircraft operations)
  - General Operating and Flight Rules, (turbine include turbojets or turboprop powered aircraft).



Challenger CL-300

Part 135 Operations



Part 121 Operations





# Declared Distances and Runway Design Standards

Declared Distance	Runway Design Standard
TORA	<ul style="list-style-type: none"> <li>• Departure RPZ</li> </ul>
TODA	<ul style="list-style-type: none"> <li>• Departure Surface</li> </ul>
ASDA	<ul style="list-style-type: none"> <li>• RSA</li> <li>• ROFA</li> </ul>
LDA	<ul style="list-style-type: none"> <li>• RSA</li> <li>• ROFA</li> <li>• Approach Surface</li> <li>• Approach RPZ</li> </ul>

Source: Appendix H in FAA AC 150/5300-13B





# Case Study: Roanoke/ Blacksburg Regional Airport



# Declared Distance Information

- Available in [airnav.com](http://airnav.com) database

## Runway Information

### Runway 6/24

Dimensions: 6800 x 150 ft. / 2073 x 46 m

Surface: asphalt/grooved, in good condition

Weight bearing capacity: PCN 76 /F/B/X/T

Single wheel: 150.0

Double wheel: 200.0

Double tandem: 310.0

Runway edge lights: high intensity

#### **RUNWAY 6**

Latitude: 37-19.334133N

Longitude: 079-59.039960W

Elevation: 1152.0 ft.

Traffic pattern: left

Runway heading: 057 magnetic, 049 true

Displaced threshold: no

Declared distances: TORA:6800 TODA:6800 ASDA:6800 LDA:6800

Markings: precision, in good condition

Visual slope indicator: 4-box VASI on left (3.00 degrees glide path)

Roanoke / Blacksburg Regional Airport  
Source: airnav.com

#### **RUNWAY 24**

37-20.058447N

079-57.969517W

1150.7 ft.

left

237 magnetic, 229 true

790 ft.

TORA:6800 TODA:6800 ASDA:6800

LDA:6010

nonprecision, in good condition

4-light PAPI on left (3.00 degrees glide path)

PAPI UNUSBL BYD 5 DEGS R OF CNTRLN DUE TO TRRN.





# Roanoke/Blacksburg Runway 06



Roanoke / Blacksburg Regional Airport  
Source: Google Earth

Runway 06  
TORA 6800 ft.  
TODA 6800 ft.  
ASDA 6800 ft.  
LDA 6800 ft.

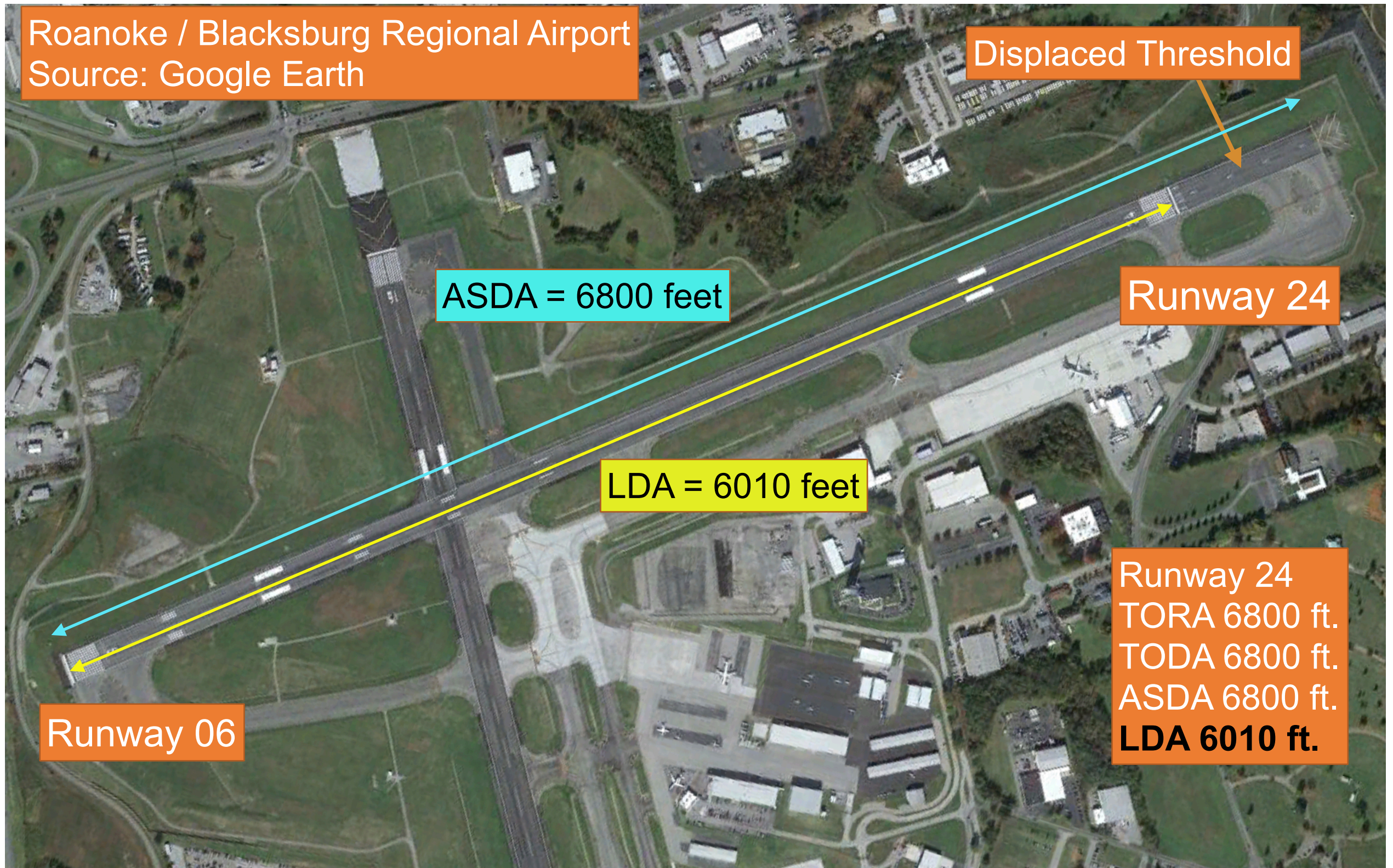
Runway 24

Runway 06





# Roanoke/Blacksburg Runway 24

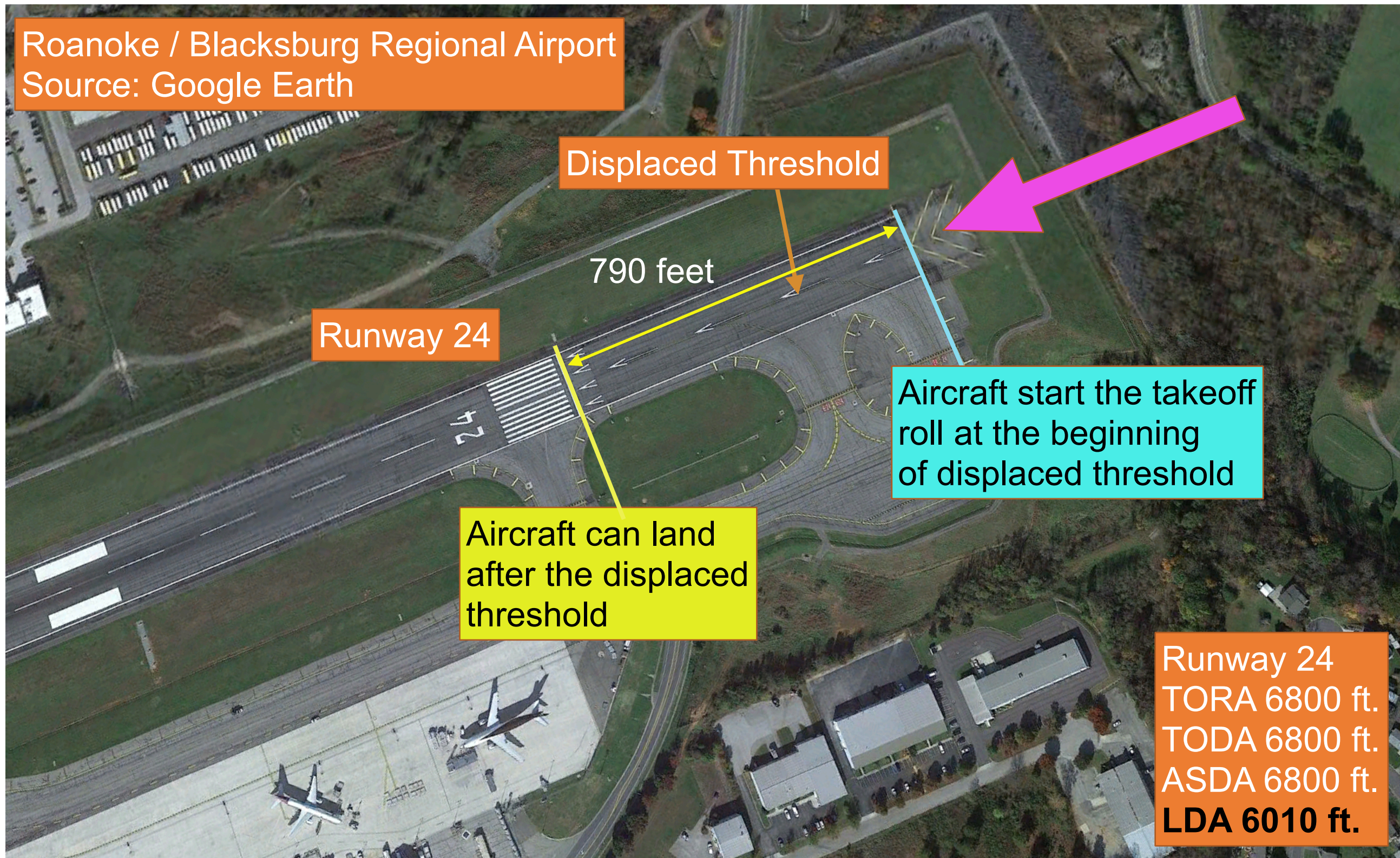






# Roanoke/Blacksburg Runway 24

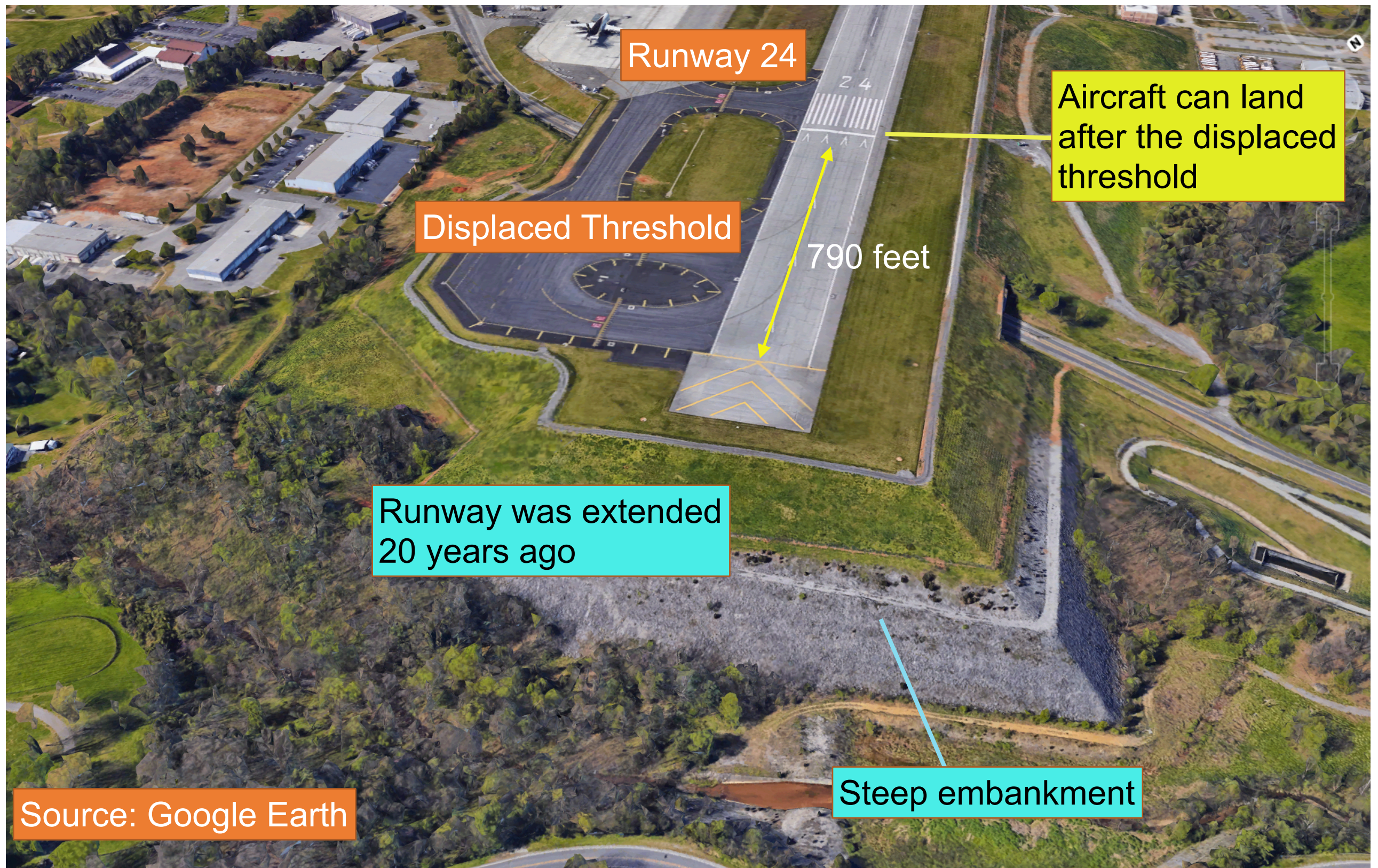
Roanoke / Blacksburg Regional Airport  
Source: Google Earth







# Roanoke/Blacksburg Runway 24







# Roanoke/Blacksburg Runway 06

Source: Google Earth



Runway 06

No Runway Safety Area

Aircraft start the takeoff roll at the beginning of displaced threshold

Runway 06  
TORA 6800 ft.  
TODA 6800 ft.  
ASDA 6800 ft.  
LDA 6800 ft.





# ROA Runway 06 Situation (No RSA)







# ROA Runway 06 Proposed Solution (Phase 1)

## VISION PHASE I

Meet Current FAA Standards

Interstate 581

Runway 06

Full 1,000' Runway Safety Area

Runway over I-581

New Taxiway Pavement

Full 1,000' Runway Safety Area

Source: <https://flyroa.com/master-plan/airfield.php>





# ROA Runway 06 Proposed Solution (Phase 2)

## VISION PHASE II

Runway Extended to 7,700'

Additional Taxiway Pavements

Runway 06

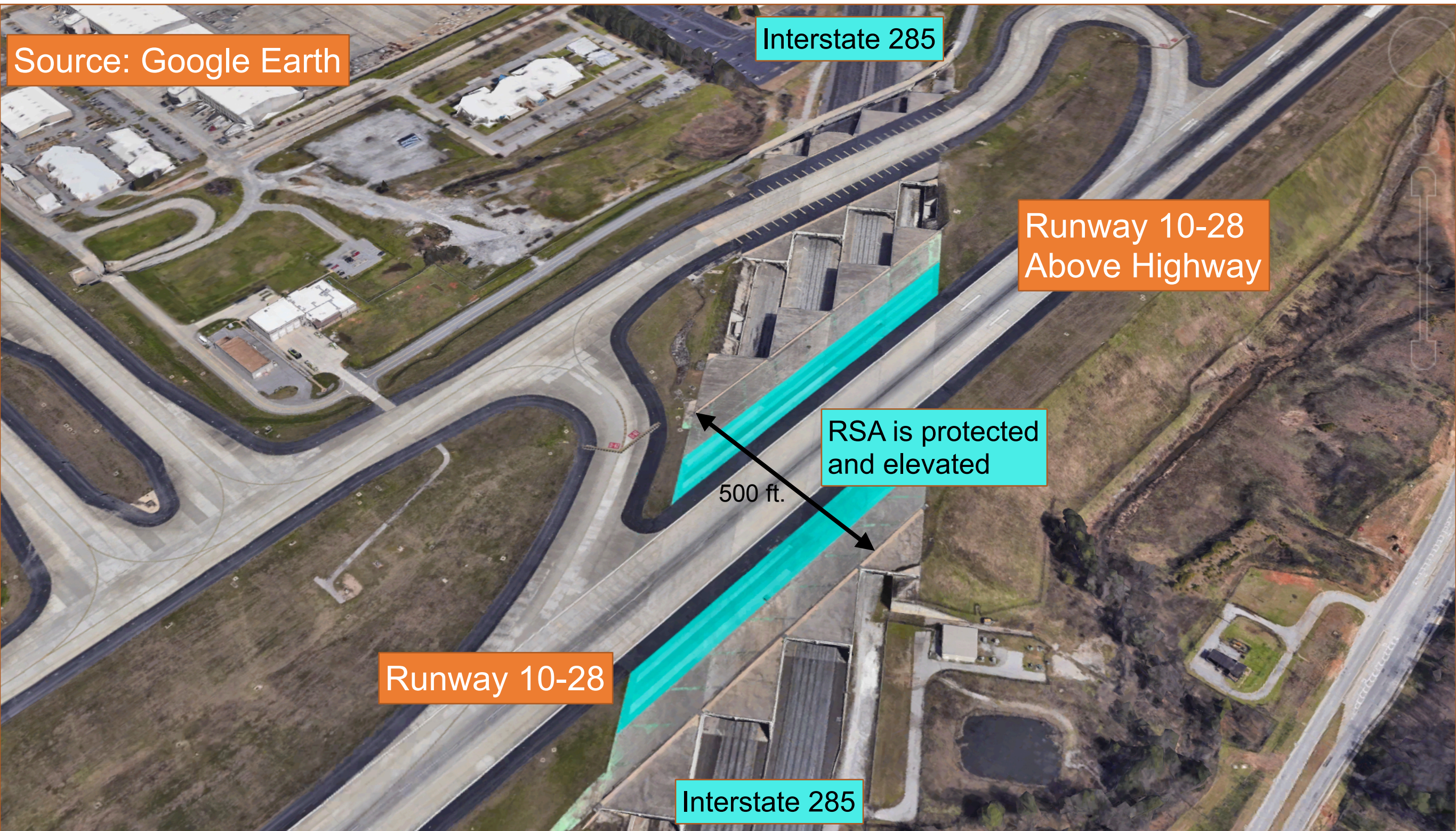
Interstate 581

Source: <https://flyroa.com/master-plan/airfield.php>





# Runway Over Interstate: ATL Runway 10-28







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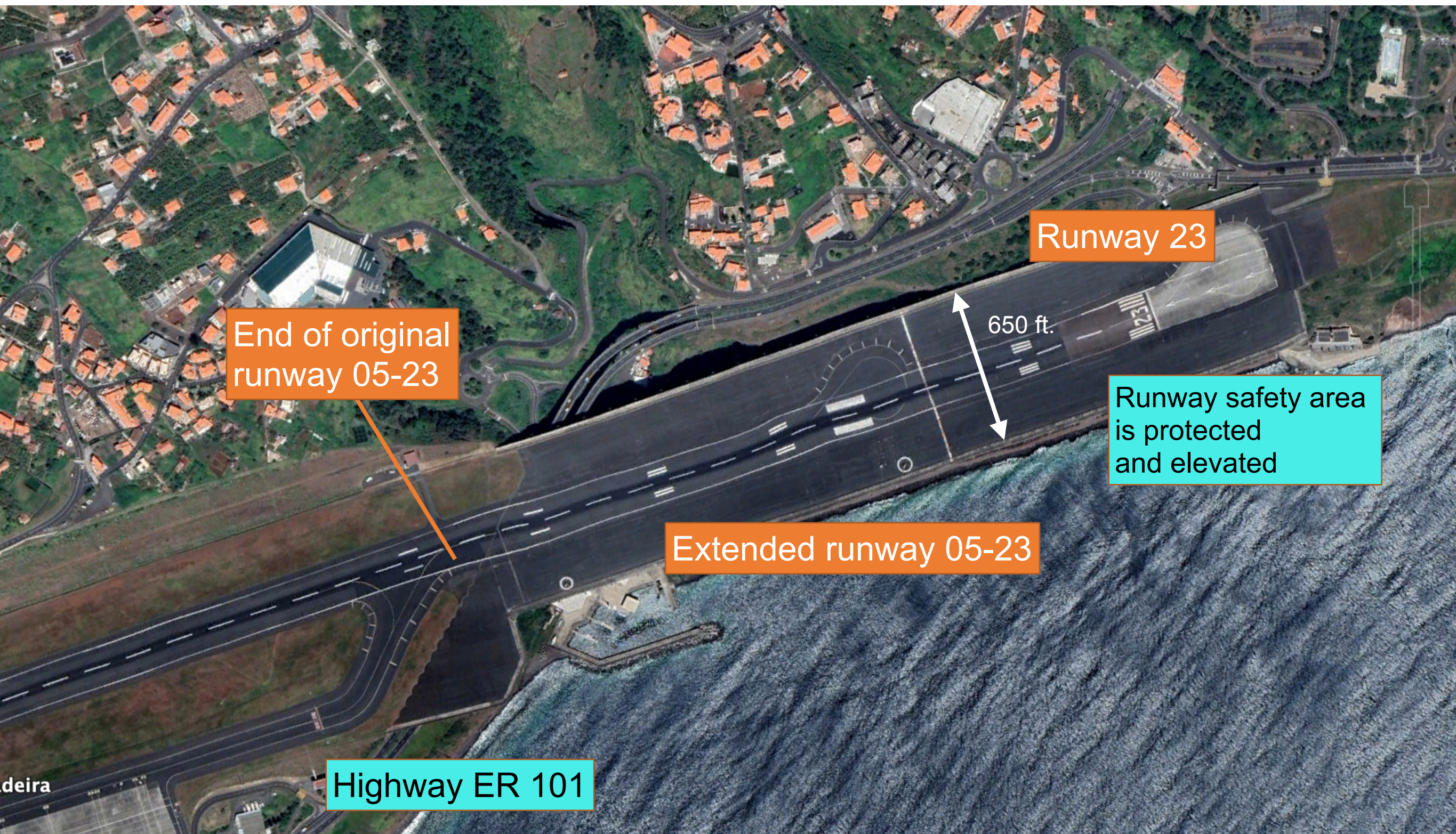


Runway 10-28  
Above Highway 285





# Elevated Runway: Funchal Airport (Madeira)







# Elevated Runway: Funchal Airport (Madeira)

Source: Google Earth

Extended runway 05-23

Highway ER 101





# Elevated Runway: Funchal Airport (Madeira)

Source: Google Earth



Extended runway 05-23

Highway ER 101





# Case Study: San Diego International Airport





# Declared Distance Information

- Available in [airnav.com](http://airnav.com) database

San Diego International Airport  
Source: airnav.com

## RUNWAY 9

Latitude: 32-44.227345N

Longitude: 117-12.261387W

Elevation: 13.9 ft.

Traffic pattern: left

Runway heading: 095 magnetic, 106 true

Displaced threshold: 1000 ft.

Declared distances: TORA:8280 TODA:9401 ASDA:8280 LDA:7280

Markings: precision, in good condition

Visual slope indicator: 4-light PAPI on left (3.30 degrees glide path)

RVR equipment: touchdown, rollout

Approach lights: MALSR: 1,400 foot medium intensity approach lighting system with runway alignment indicator lights

Runway end identifier lights: no

Centerline lights: yes

Touchdown point: yes, lighted

Instrument approach: ILS/DME

Obstructions: 31 ft. tree, 674 ft. from runway, 385 ft. left of centerline, 15:1 slope to clear  
APCH RATIO 44:1 TO DSPLCD THR.

## RUNWAY 27

32-43.800090N

117-10.498298W

16.4 ft.

right

275 magnetic, 286 true

1810 ft.

TORA:9401 TODA:9401 ASDA:9401 LDA:7591

precision, in good condition

4-light PAPI on right (3.50 degrees glide path)

PAPI UNUSBL BYD 5 DEG L & R OF CNTLN.

touchdown, rollout

MALS: 1,400 foot medium intensity approach lighting system

MALS RWY 27 THR TO 1400'.

no

yes

yes, lighted

LOC/DME

61 ft. sign, 250 ft. from runway, 500 ft. right of centerline

+40' LGT POLE 110' FROM RWY END 260' RIGHT.





# San Diego International Airport

Source: Google Earth

Runway 09

Runway 09  
TORA 8280 ft.  
TODA 9401ft.  
ASDA 8280 ft.  
LDA 7280 ft.

San Diego International Airport  
San Diego International Airport

Runway 27  
TORA 9401 ft.  
TODA 9401 ft.  
ASDA 9401 ft.  
LDA 7591 ft.

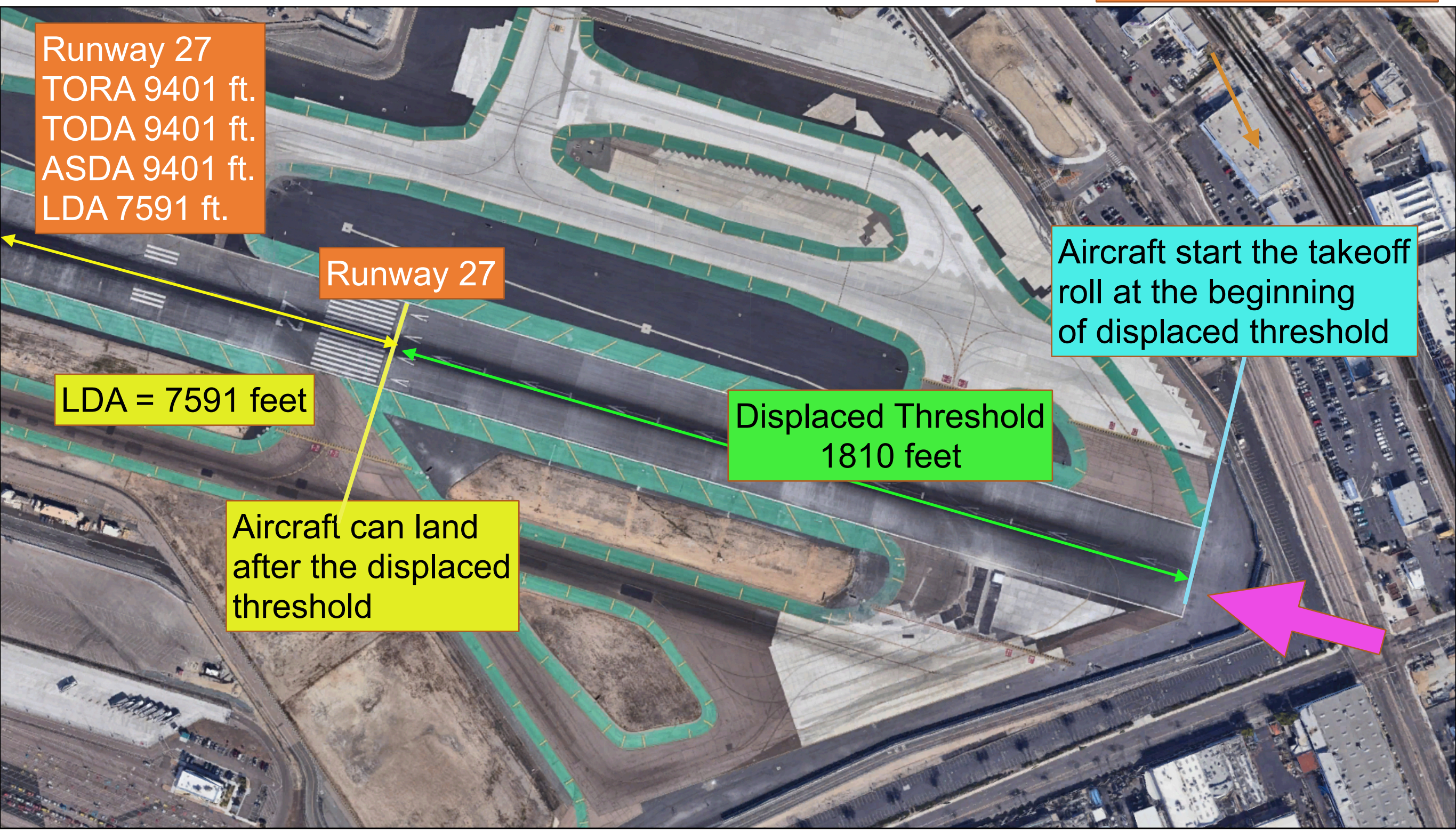
Runway 27





# San Diego Runway 27

Source: Google Earth



Runway 27  
TORA 9401 ft.  
TODA 9401 ft.  
ASDA 9401 ft.  
LDA 7591 ft.

Runway 27

LDA = 7591 feet

Aircraft can land  
after the displaced  
threshold

Displaced Threshold  
1810 feet

Aircraft start the takeoff  
roll at the beginning  
of displaced threshold





# San Diego Runway 27

Source: Google Earth

Runway 27  
TORA 9401 ft.  
TODA 9401 ft.  
ASDA 9401 ft.  
LDA 7591 ft.

Obstruction to navigation  
(parking garage)

Displaced Threshold  
1810 feet

Runway 27





# San Diego Runway 27

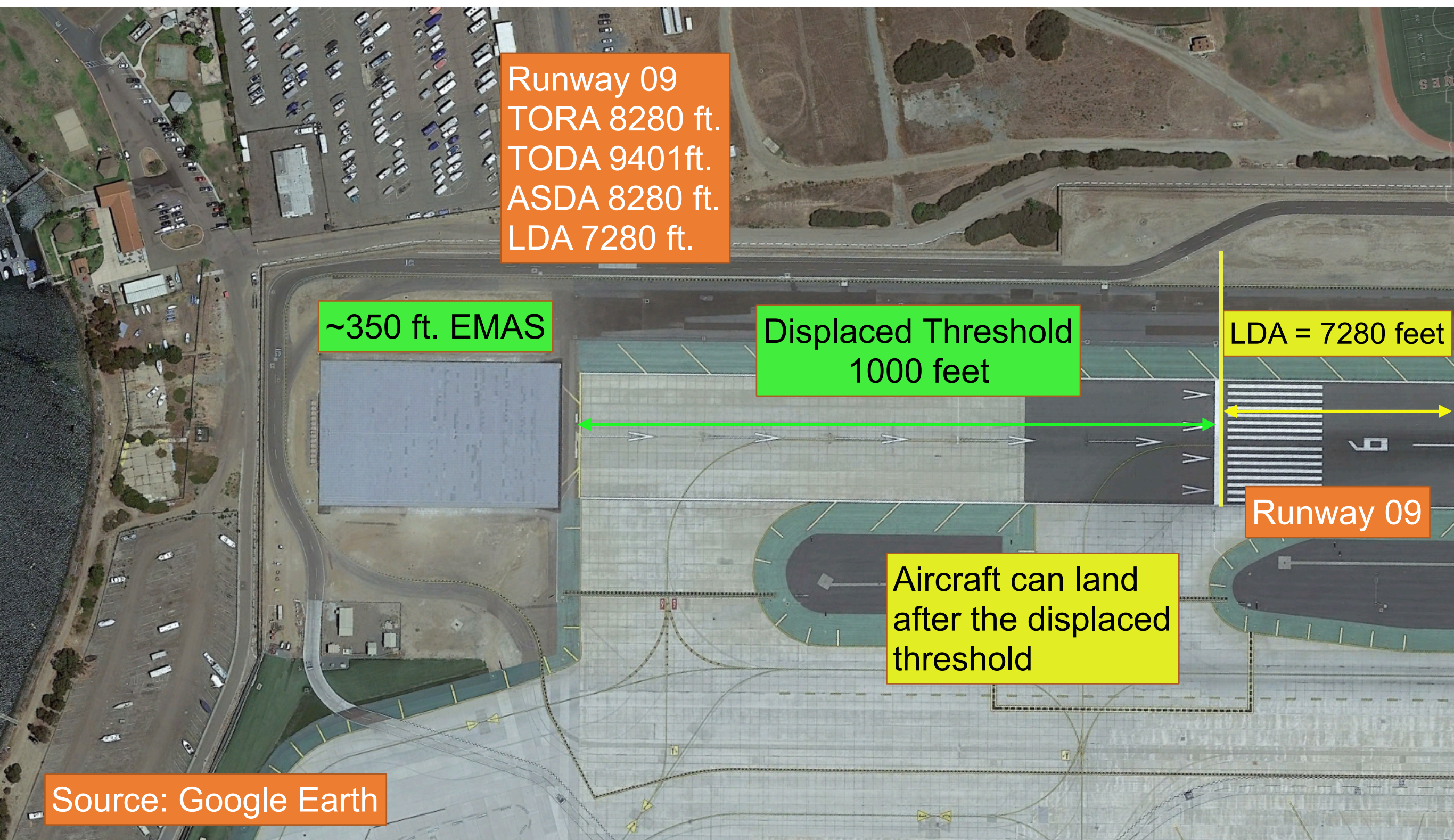
Source: Google Earth







# San Diego Runway 09



Runway 09  
TORA 8280 ft.  
TODA 9401 ft.  
ASDA 8280 ft.  
LDA 7280 ft.

~350 ft. EMAS

Displaced Threshold  
1000 feet

LDA = 7280 feet

Runway 09

Aircraft can land  
after the displaced  
threshold

Source: Google Earth





# Topics to Discuss in Class

1. Why is the EMAS on the departure end of runway 27?
2. LDA distance published in SAN for runway 27
3. Can the water considered part of RSA?





# Discussion of Three Questions

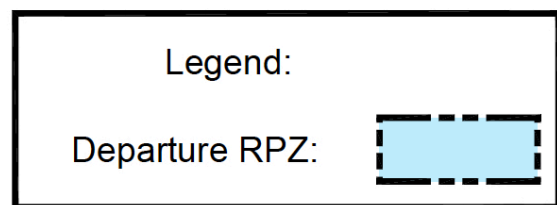
1. The EMAS on the departure end of runway 27 is to prevent a departing aircraft overrun to go into the water
  - ASDA is 9401 feet because the EMAS substitutes the RSA area requirement
  - The ~350 foot EMAS is not standard for the critical aircraft (Boeing 787-8 or Airbus A350-900)
2. LDA distance published in SAN for runway 27
  - The LDA for runway 27 uses the EMAS on the landing end of the runway to take credit for LDA (7591 feet)
3. Can the water considered part of RSA?
  - No. Water cannot be used as RSA.



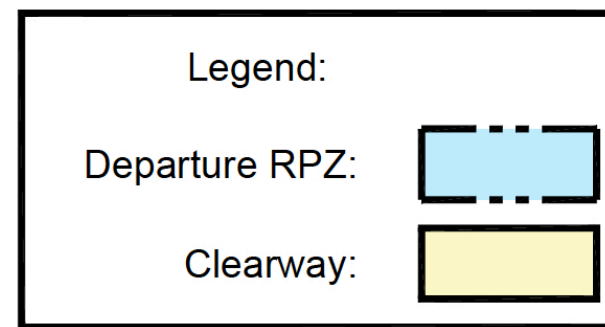
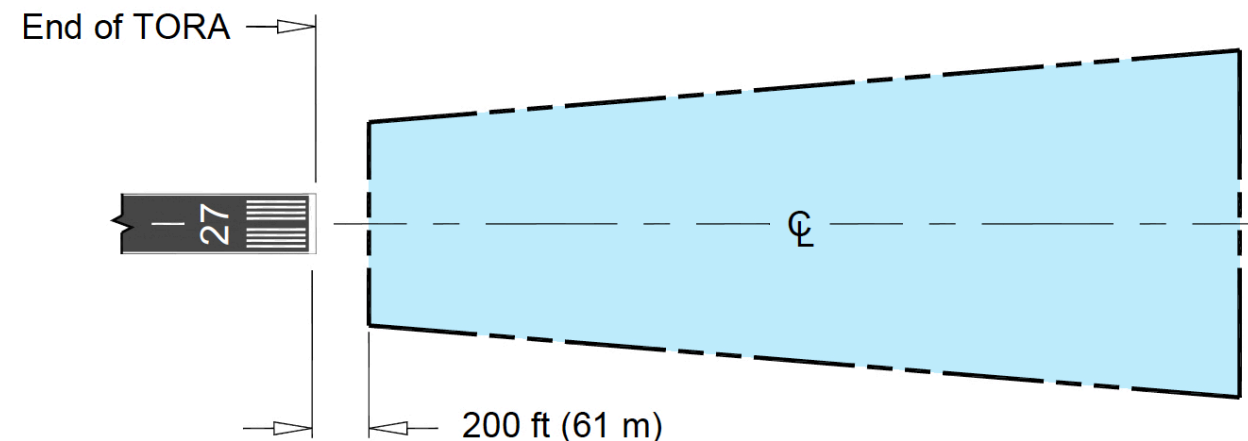


# Modified Departure End Due to Incompatible Land Use in Departure RPZ

Typical End of Takeoff Runway Available (TORA)

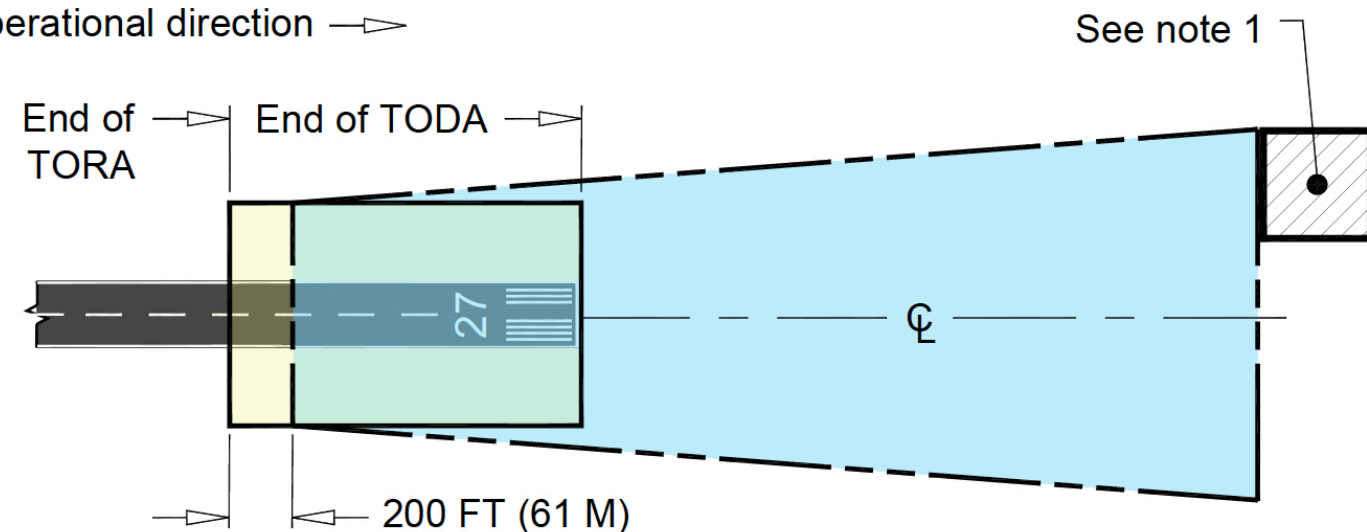


Operational direction →



Modified End of Takeoff Runway Available (TORA)

Operational direction →

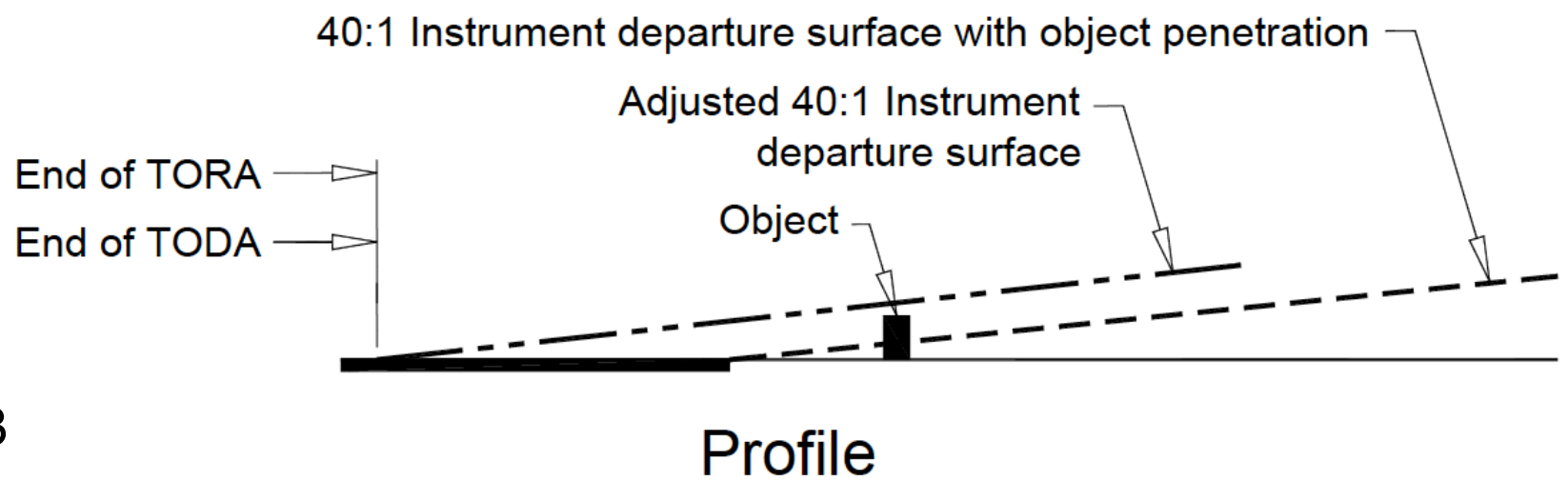
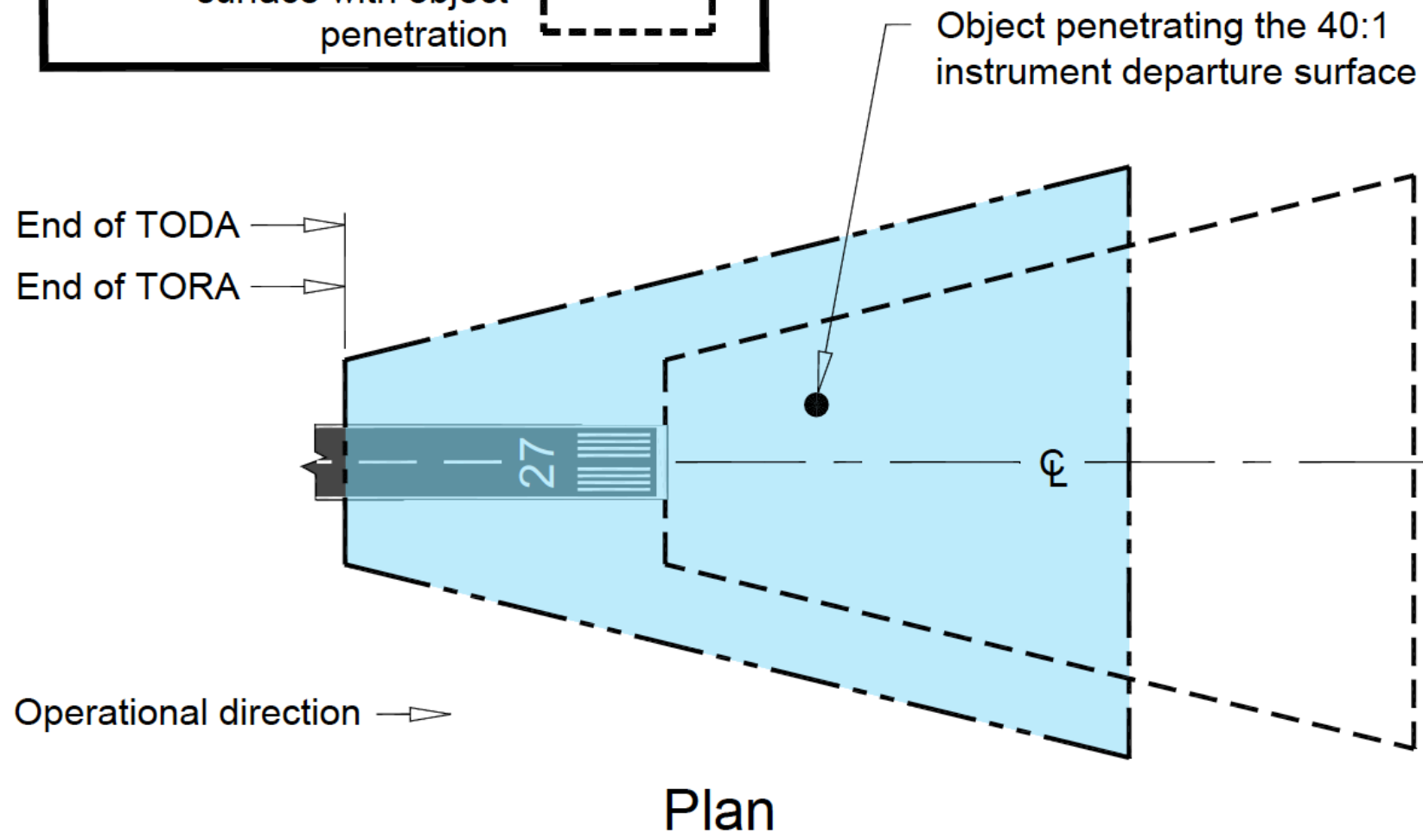
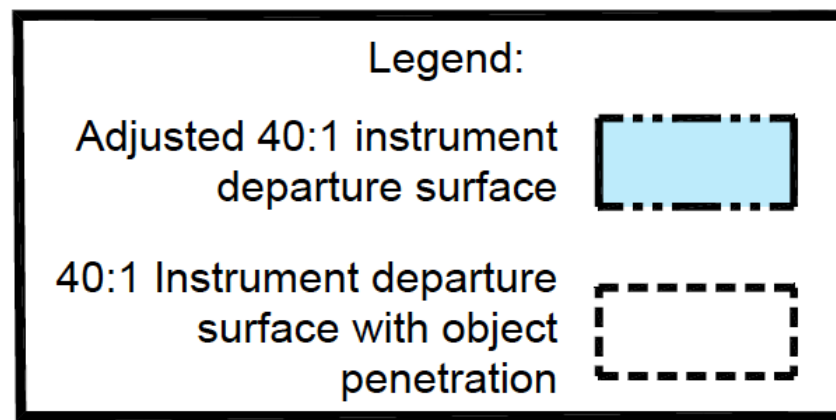


Source: Figure H-2 FAA AC 150/5300-13B

Source: Figure H-3 FAA AC 150/5300-13B



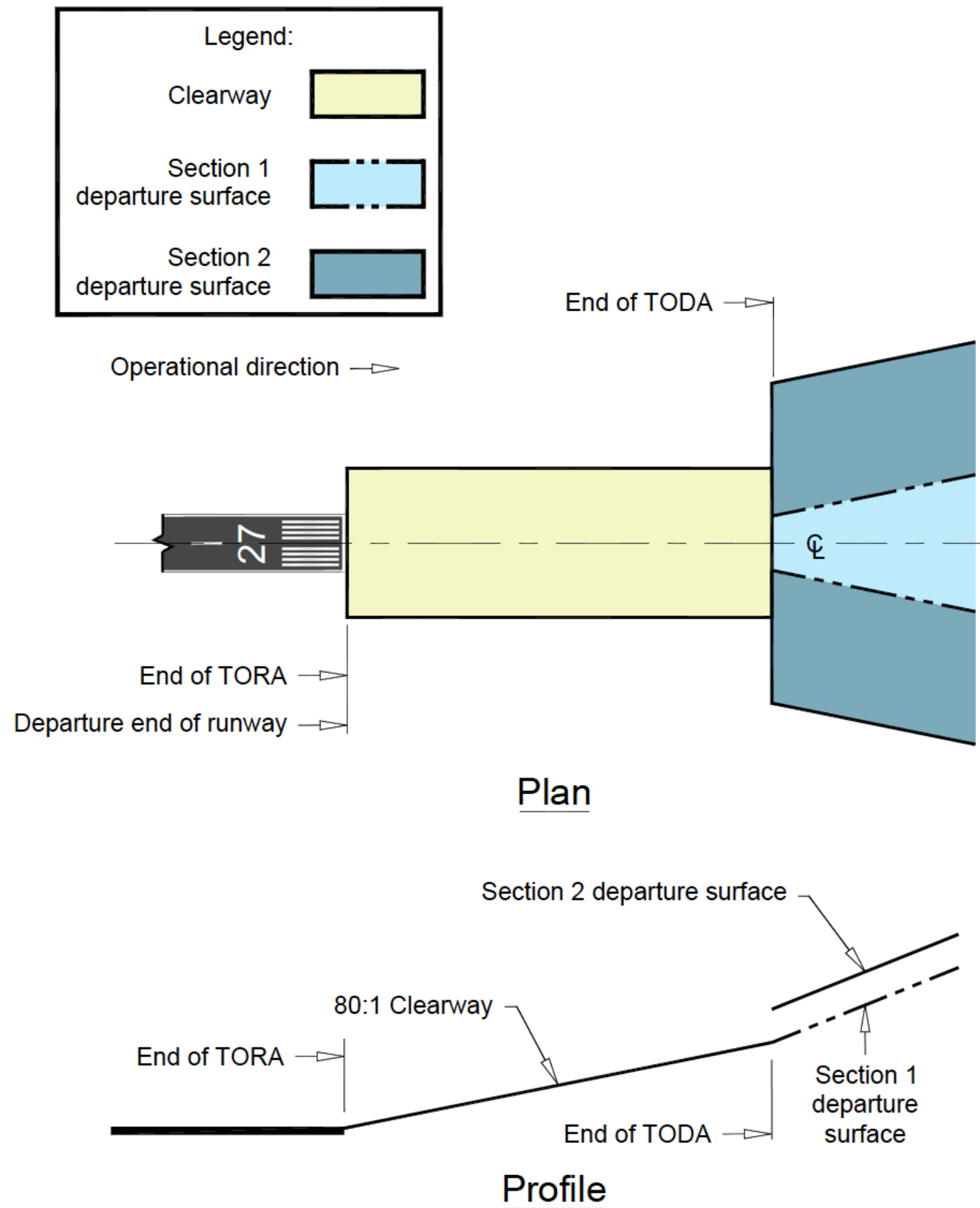
# Modified End of TORA and TODA due to Object Penetration on Departure Surface



Source: Figure H-5 FAA AC 150/5300-13



# Extended TODA with Clearway



Source: Figure H-7 FAA AC 150/5300-13B