HRVATSKA KONTROLA
ZRAČNE PLOVIDBE

Utjecaj struktura u zračnom prostoru na zrakoplovne postupke

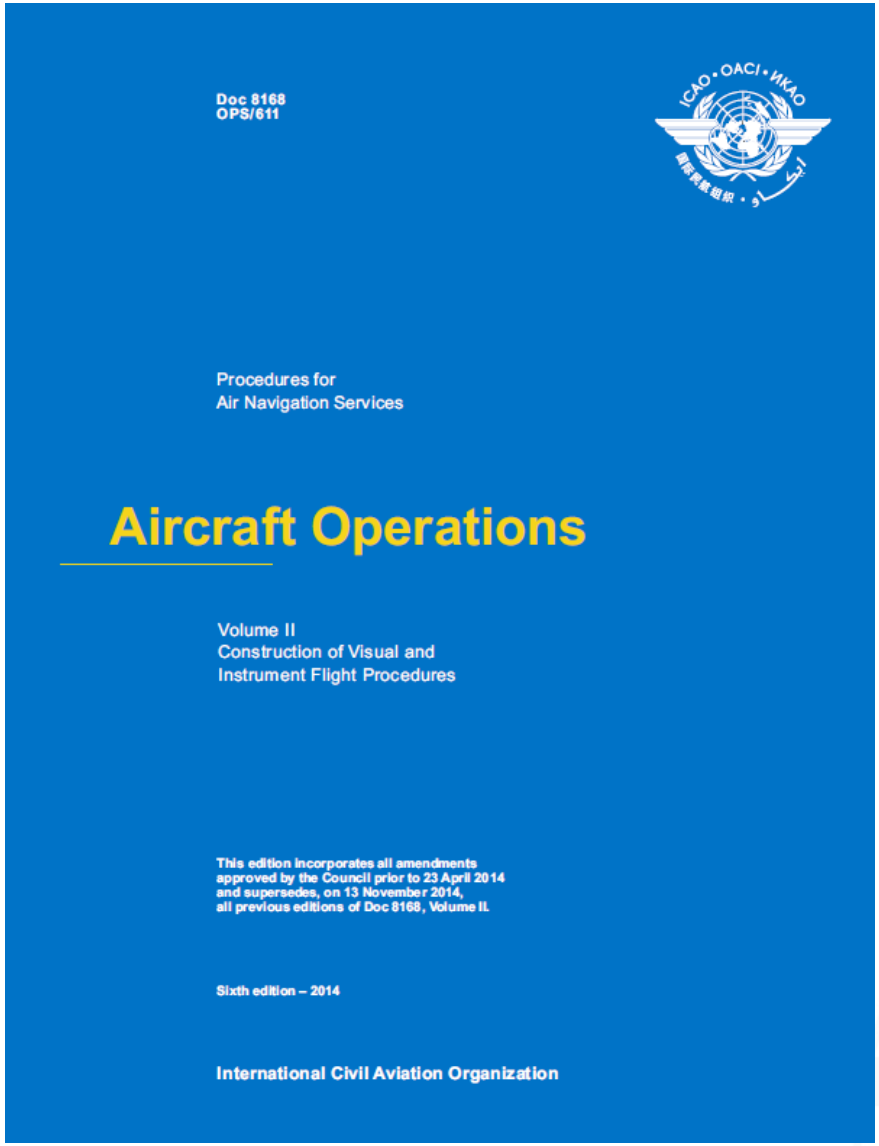
Vedran Beclin

Pravilnik o oblikovanju i utvrđivanju načina, postupaka i drugih uvjeta za sigurno uzlijetanje i slijetanje zrakoplova

Instrumentalna letna procedura – ILP (instrument flight procedure; IFP): standardizirani navigacijski postupak instrumentalnog odlaženja ili standardizirani navigacijski postupak instrumentalnog prilaženja

Doc 9931
AN/476
Continuous Descent Operations (CDO) Manual
ICAO
International Standards and Recommended Practices
Annex 14 to the Convention on International Civil Aviation
Aerodromes
Volume I
Aerodrome Design and Operations
Seventh Edition, July 2016
INTERNATIONAL CIVIL AVIATION ORGANIZATION
Doc 9905
Required Navigation Performance Authorization Required (RNP AR) Procedure Design Manual
Second Edition, 2016
International Standards and Recommended Practices
Annex 10 to the Convention on International Civil Aviation
Aeronautical Telecommunications
Volume I
Radio Navigation Aids
International Civil Aviation Organization
Annex 6 to the Convention on International Civil Aviation
Operation of Aircraft
Annex 4 to the Convention on International Civil Aviation
Aeronautical Charts
Doc 9613
AN/937
Performance-based Navigation (PBN) Manual
Doc 9906
AN/472
Volume 5
Quality Assurance Manual for Flight Procedure Design
Volume 5
Validation of Instrument Flight Procedures
Annex 15 to the Convention on International Civil Aviation
Aeronautical Information Services
Sixteenth Edition, July 2018
Manual on the Use of the Collision Risk Model (CRM) for ILS Operations
First Edition – 1980
Approved by the Secretary General and published under his authority
Doc 9997
AN/498
Performance-based Navigation (PBN) Operational Approval Manual
Doc 9906
AN/472
Quality Assurance Manual for Flight Procedure Design
Volume 1
Flight Procedure Design
Quality Assurance System
Doc 10066
PROCEDURES FOR AIR NAVIGATION SERVICES
Aeronautical Information Management
First Edition, 2018
INTERNATIONAL CIVIL AVIATION ORGANIZATION
Doc 9992
AN/494
Manual on the Use of Performance-based Navigation (PBN) in Airspace Design
Approved by the Secretary General and published under his authority
First Edition — 2013
International Civil Aviation Organization

Doc 8168 - PANS-OPS



HRVATSKA KONTROLA
ZRAČNE PLOVIDBE

Dizajn i analiza

SID – Standard Instrument Departure

STAR – Standard Instrument Arrival

IAP – Instrument Approach Procedure

En-route procedure

Holding

MSA – Minimum Sector Altitudes

TAA – Terminal Arrival Altitudes

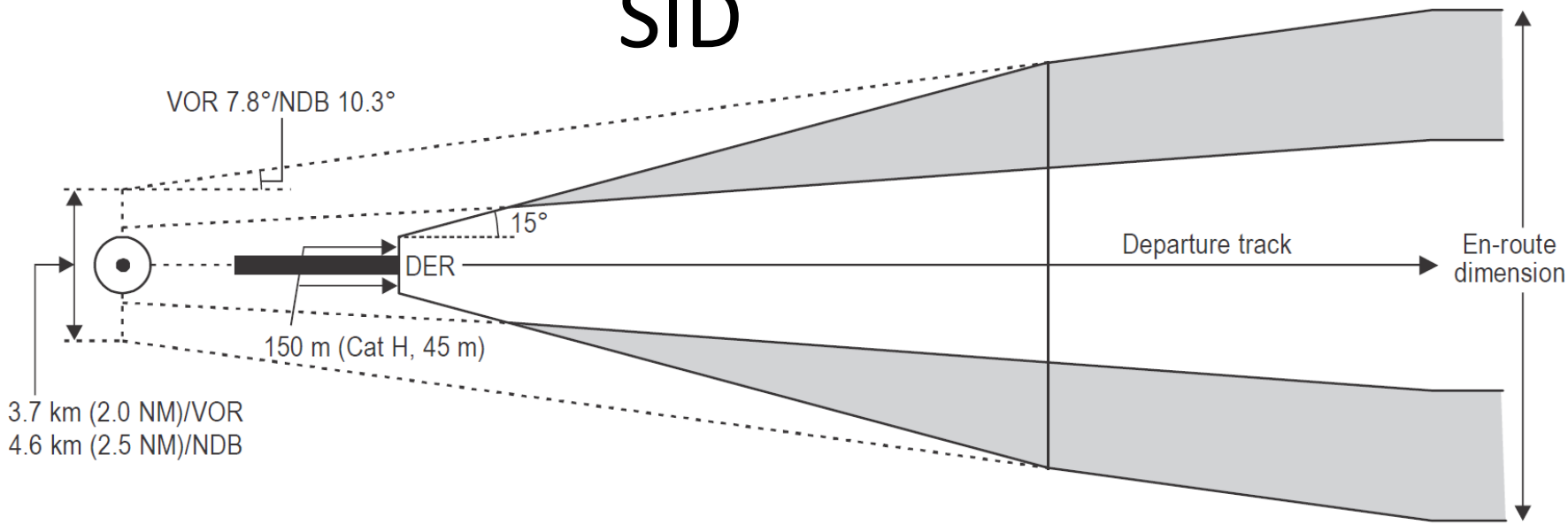
Visual Manoeuvring (Circling) Area

AMA – Area Minimum Altitude

ATCSMAC – ATC Surveillance Minimum Altitude Chart (MRVA – Minimum Radar Vectoring Altitude)

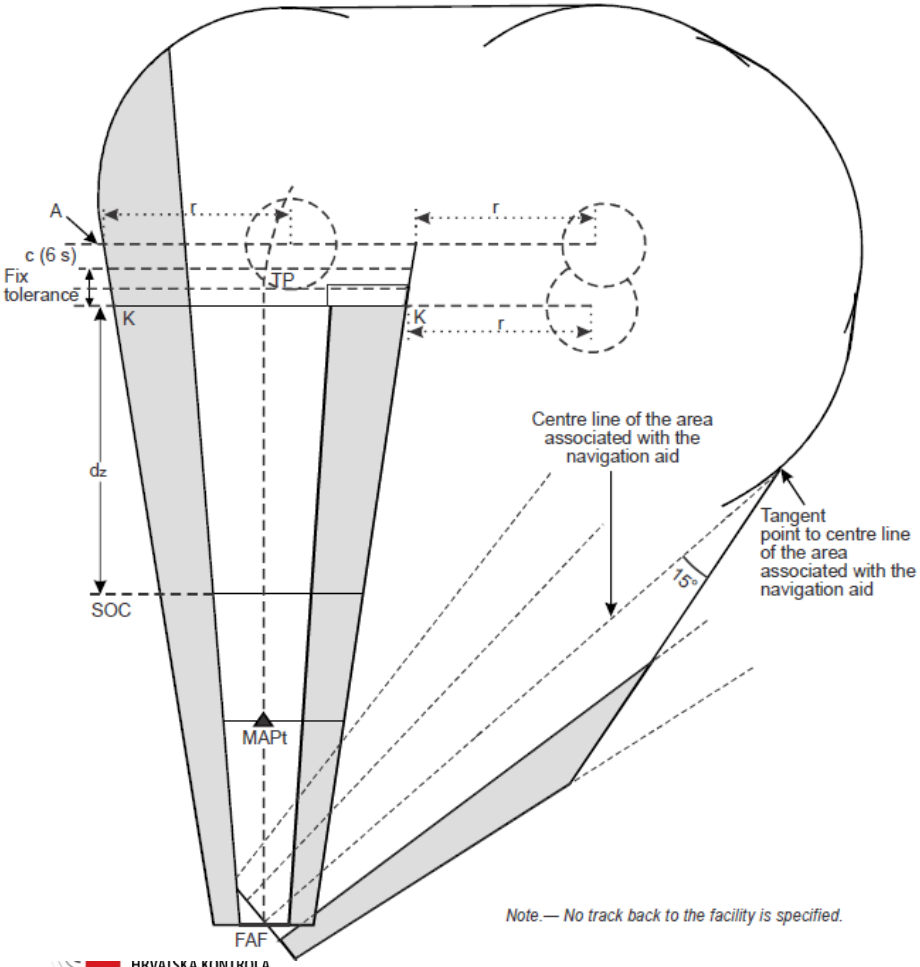
Zaštitna područja procedura

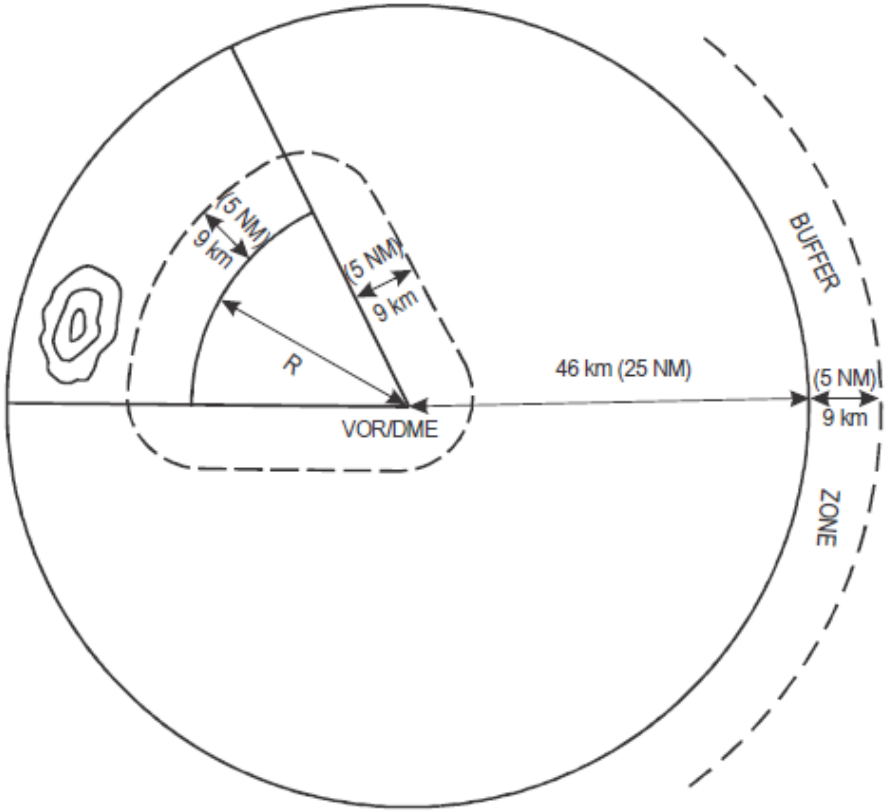
SID



Zaštitna područja procedura

Missed approach

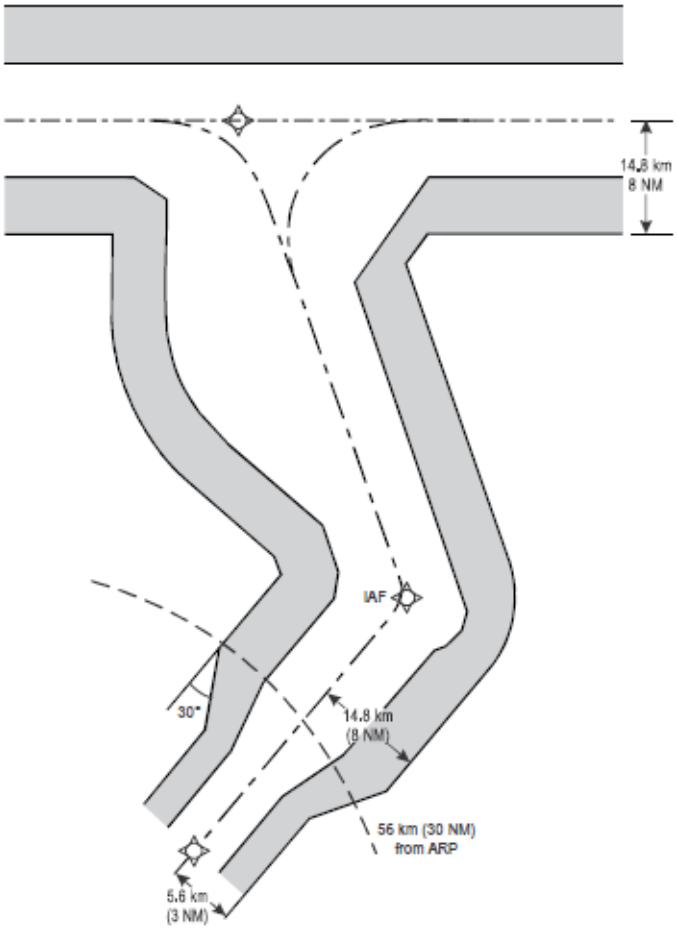




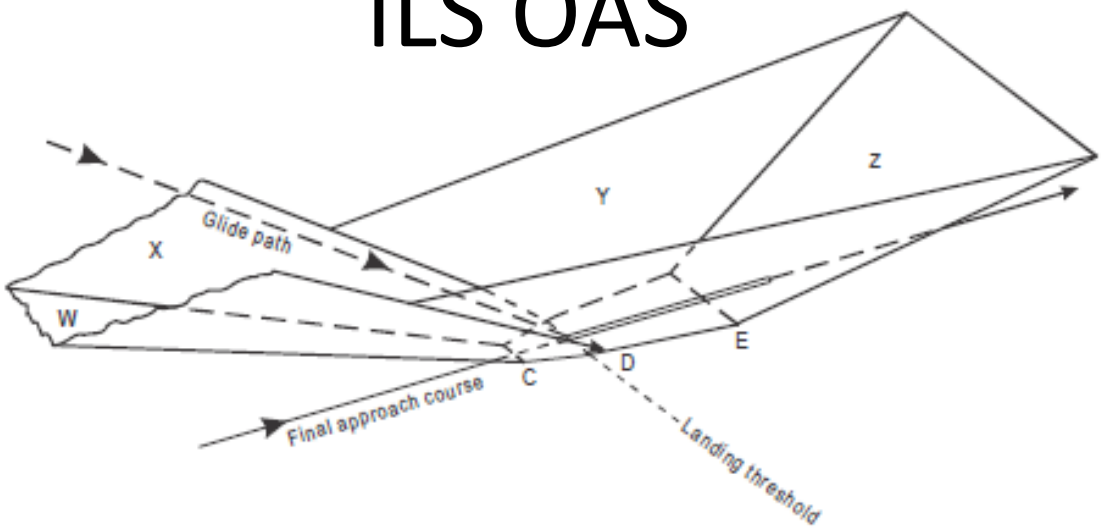
MSA

Zaštitna područja procedura

STAR



ILS OAS



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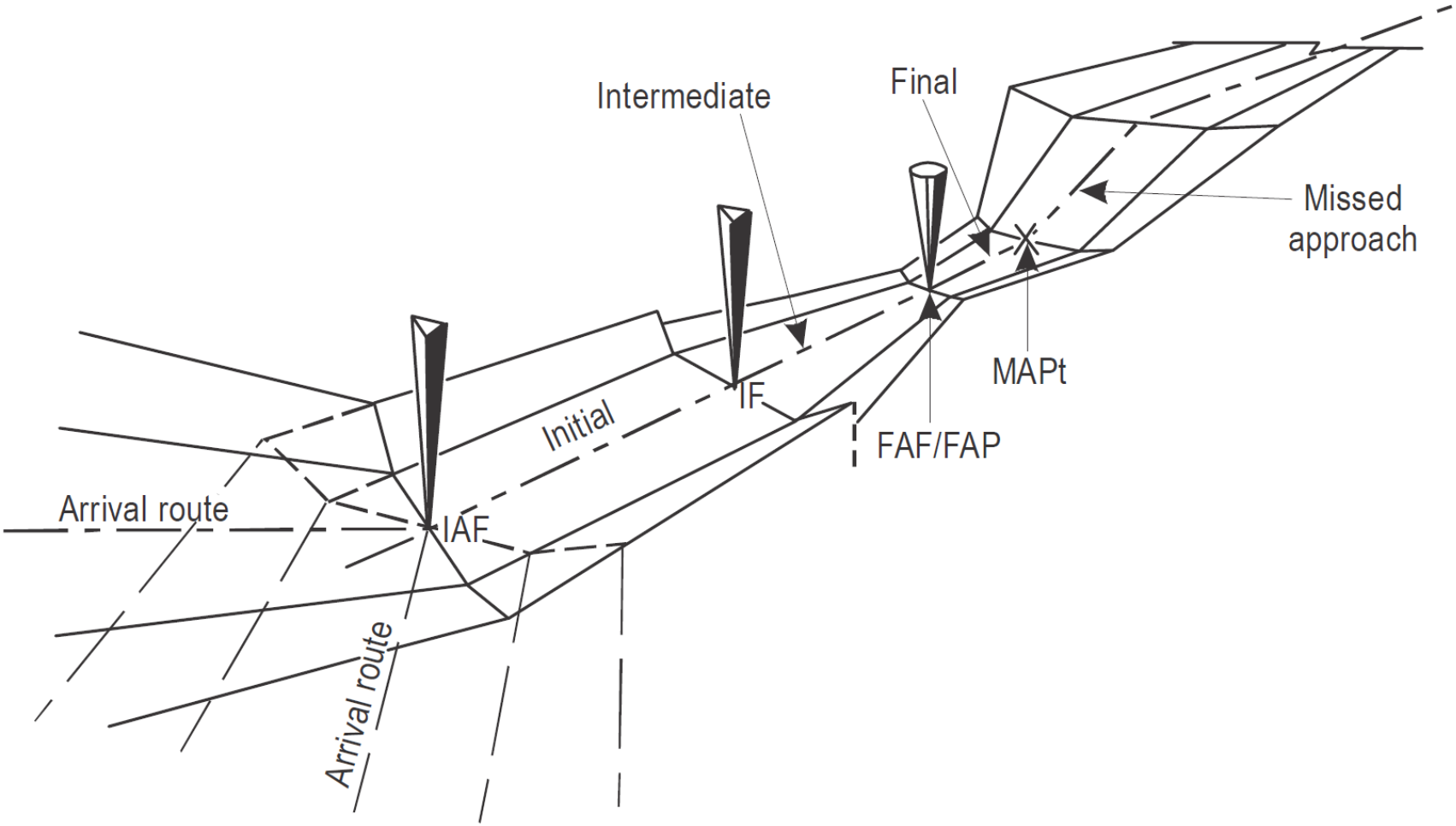
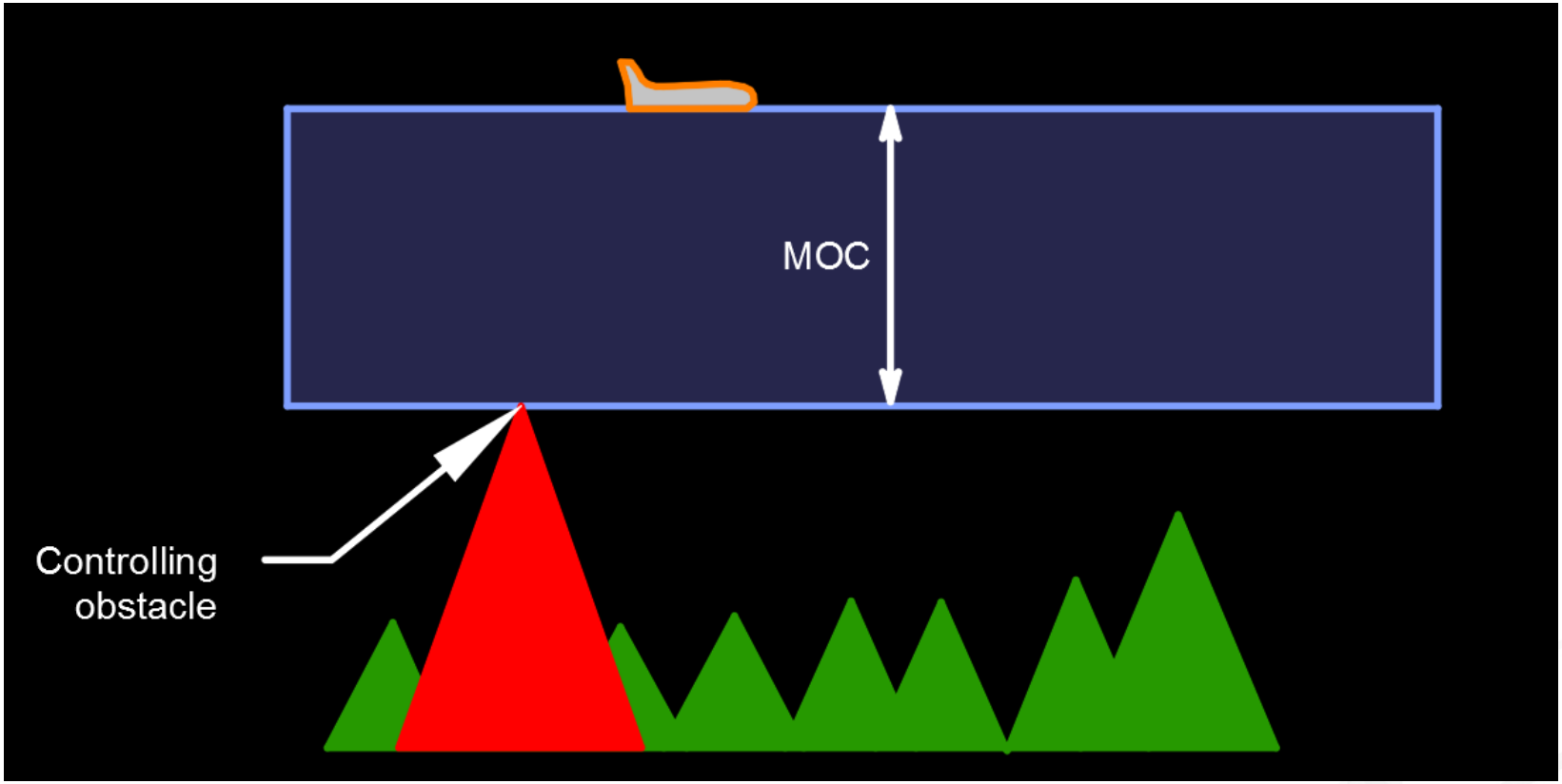
ZRAČNE PLOVIDBE

Instrumentalni prilaz



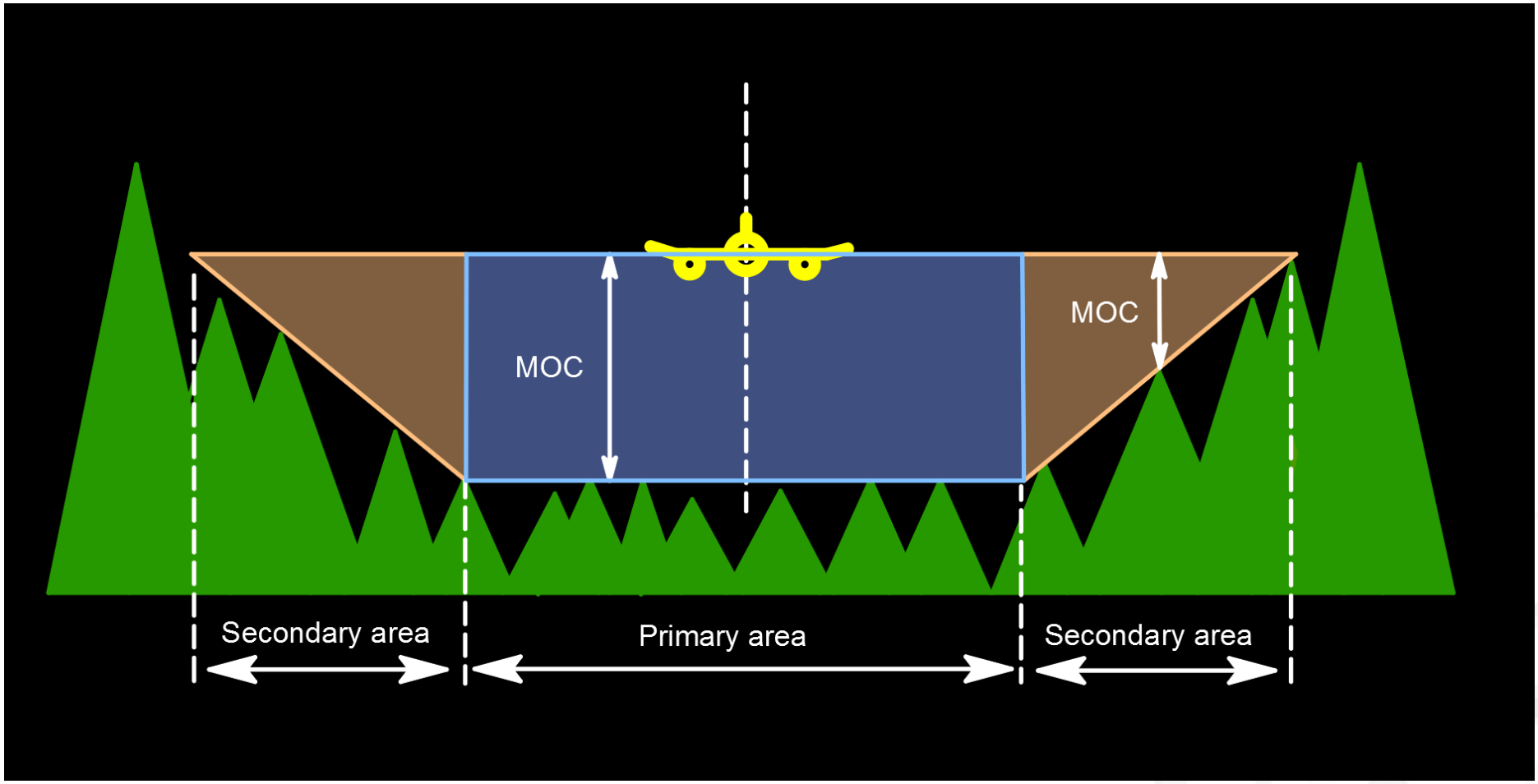
HRVATSKA KONTROLA ZRAČNE PLOVIDBE

MOC – Minimum Obstacle Clearance

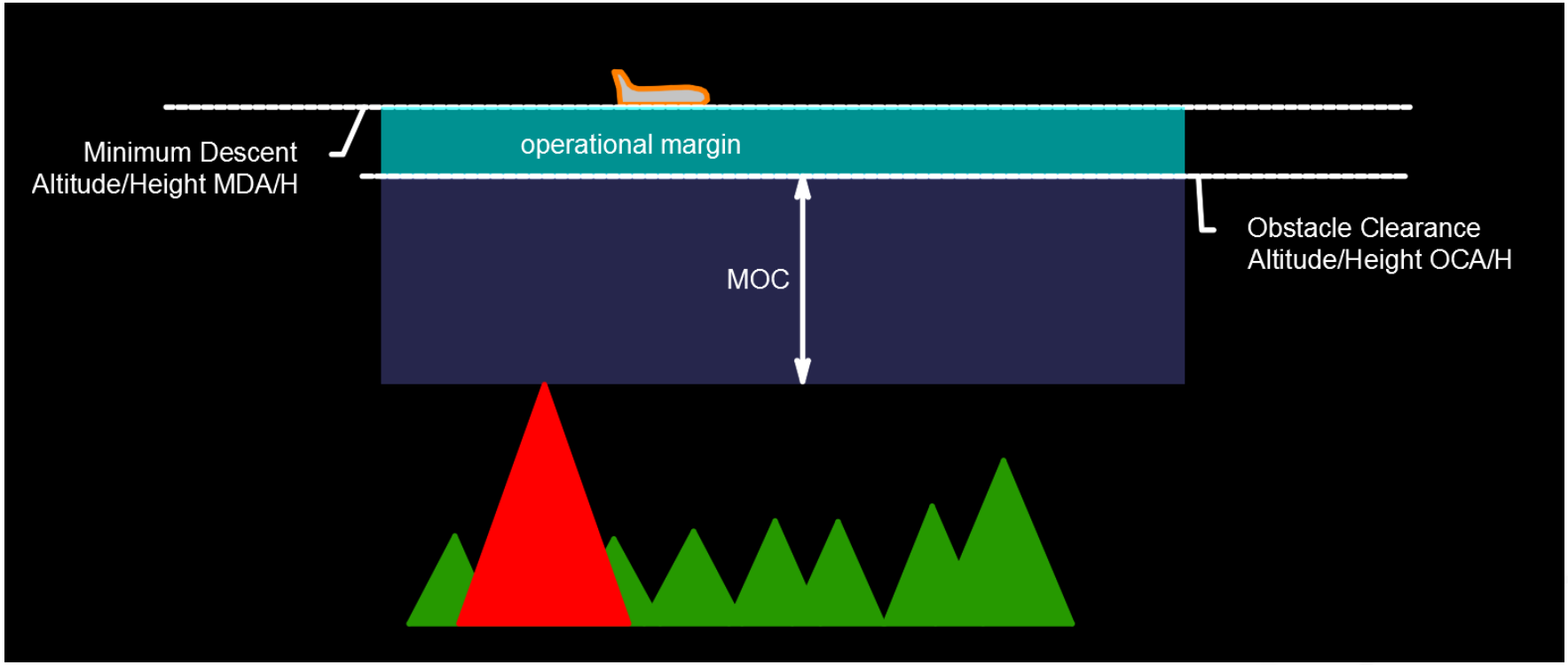


MOC – minimalna vrijednost (visina) koju dizajner procedura mora postići iznad prepreka i terena. MOC se razlikuje ovisno o proceduri i fazi leta.

Zaštitna područja



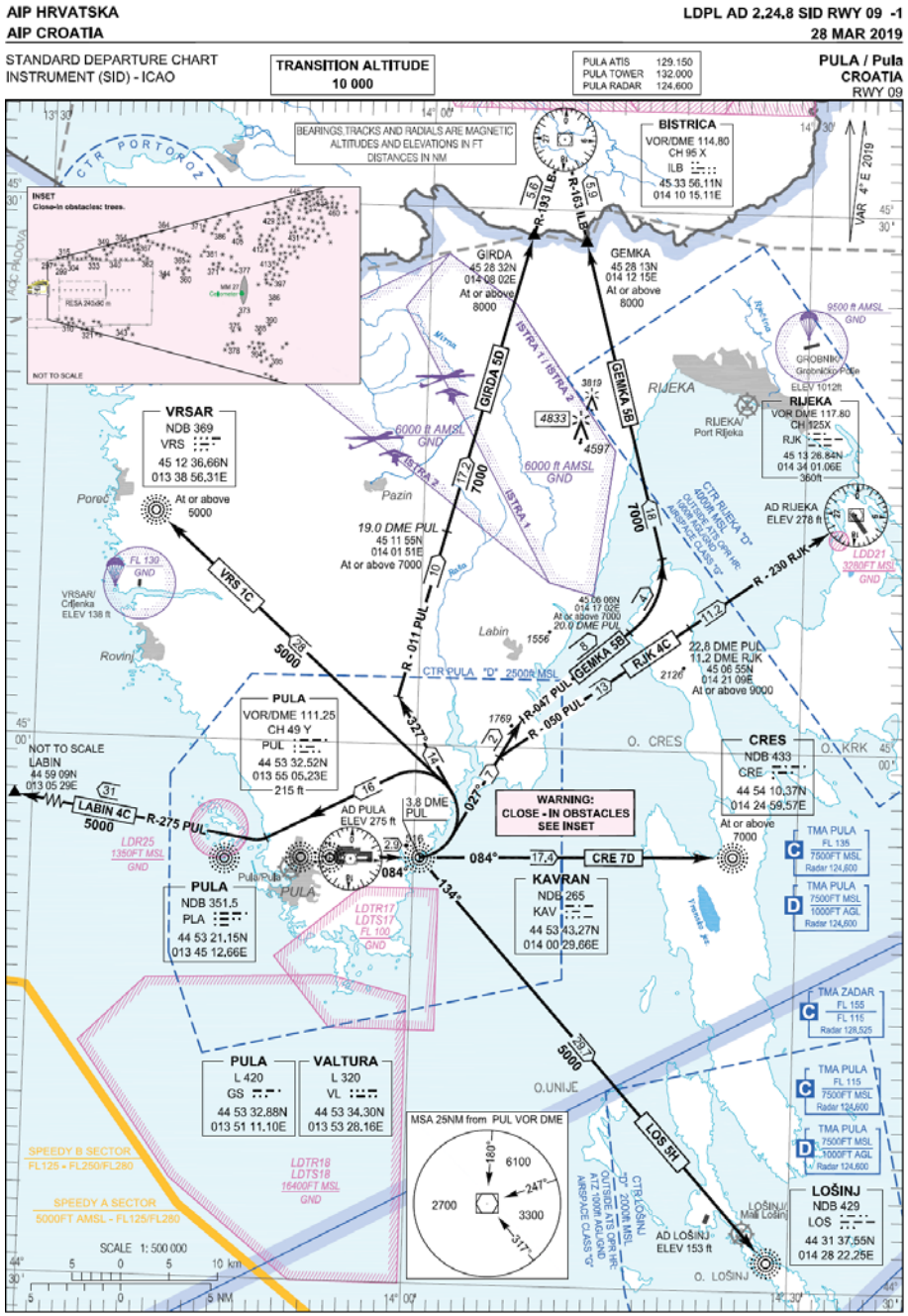
OCA/OCH



OCA – minimalna apsolutna visina na koju se zrakoplov može spustiti ili po kojoj može letjeti bez narušavanja MOC-a.
OCA/H – procedure design value
MDA/H – flight operational value

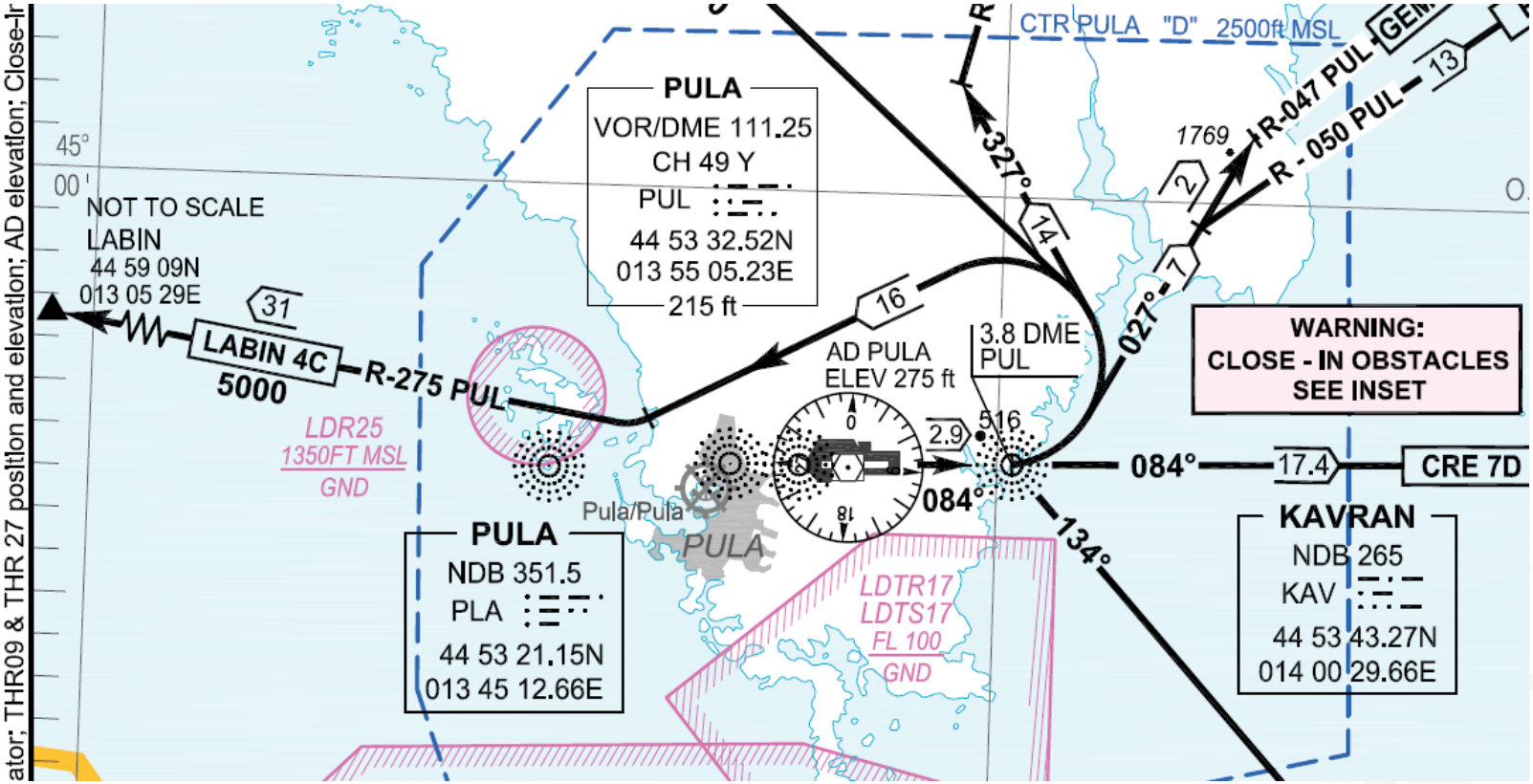
OCA/H ≠ MDA/H

SID – Standard Instrument Departure

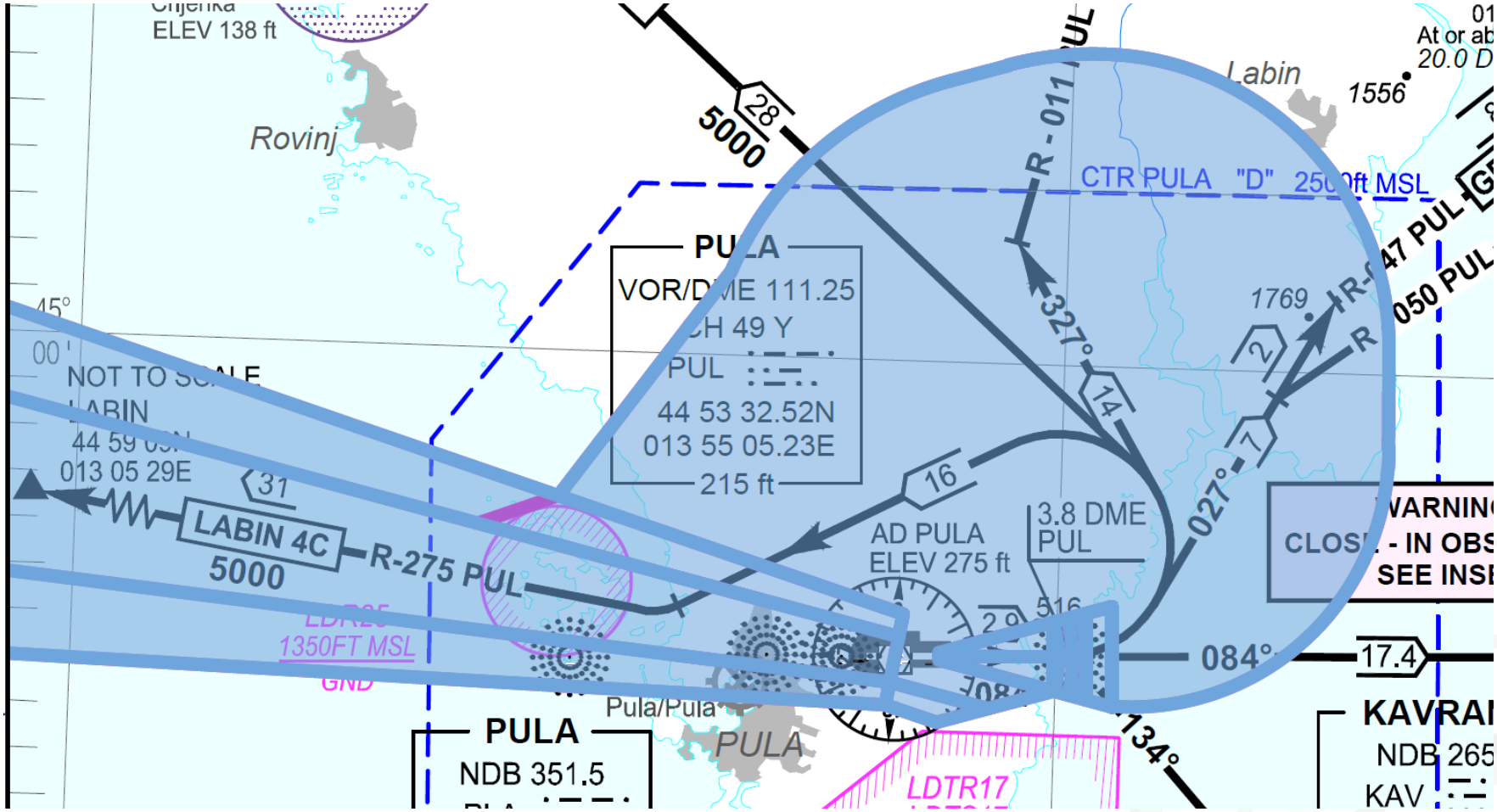


HRVATSKA KONTROLA
ZRAČNE PLOVIDBE

SID – Standard Instrument Departure

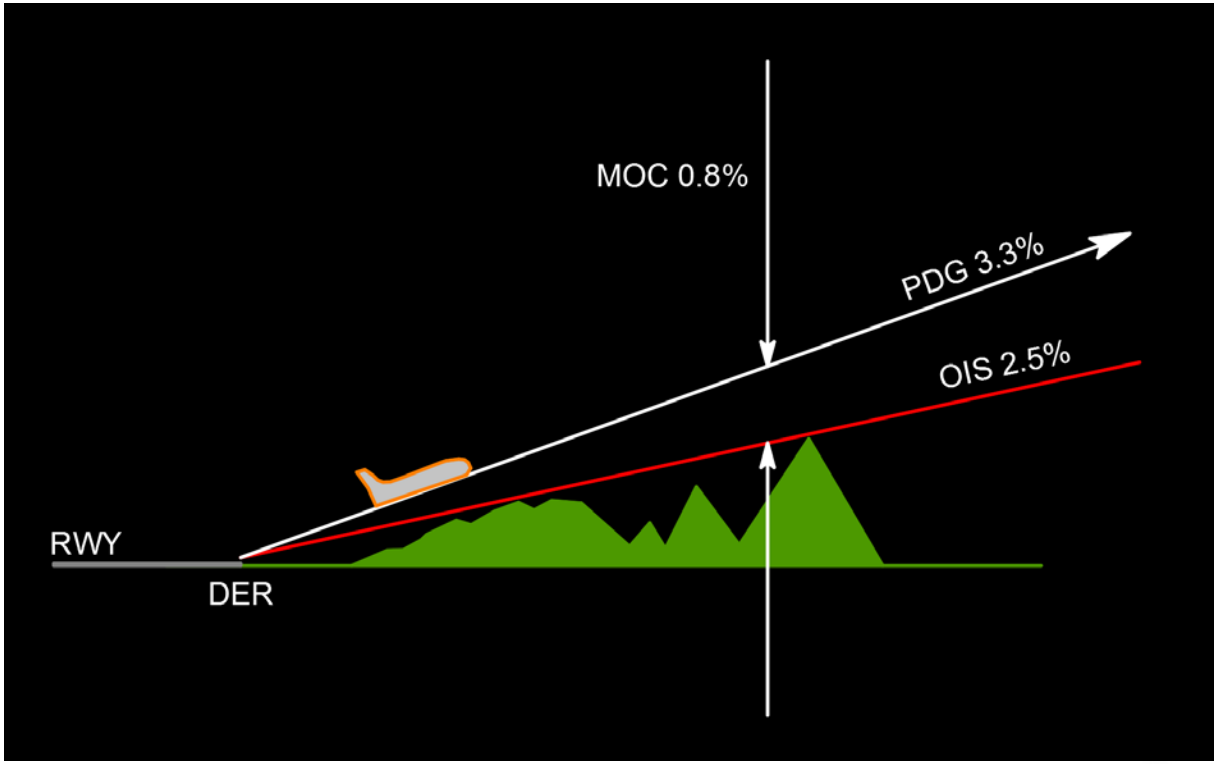


SID – Standard Instrument Departure



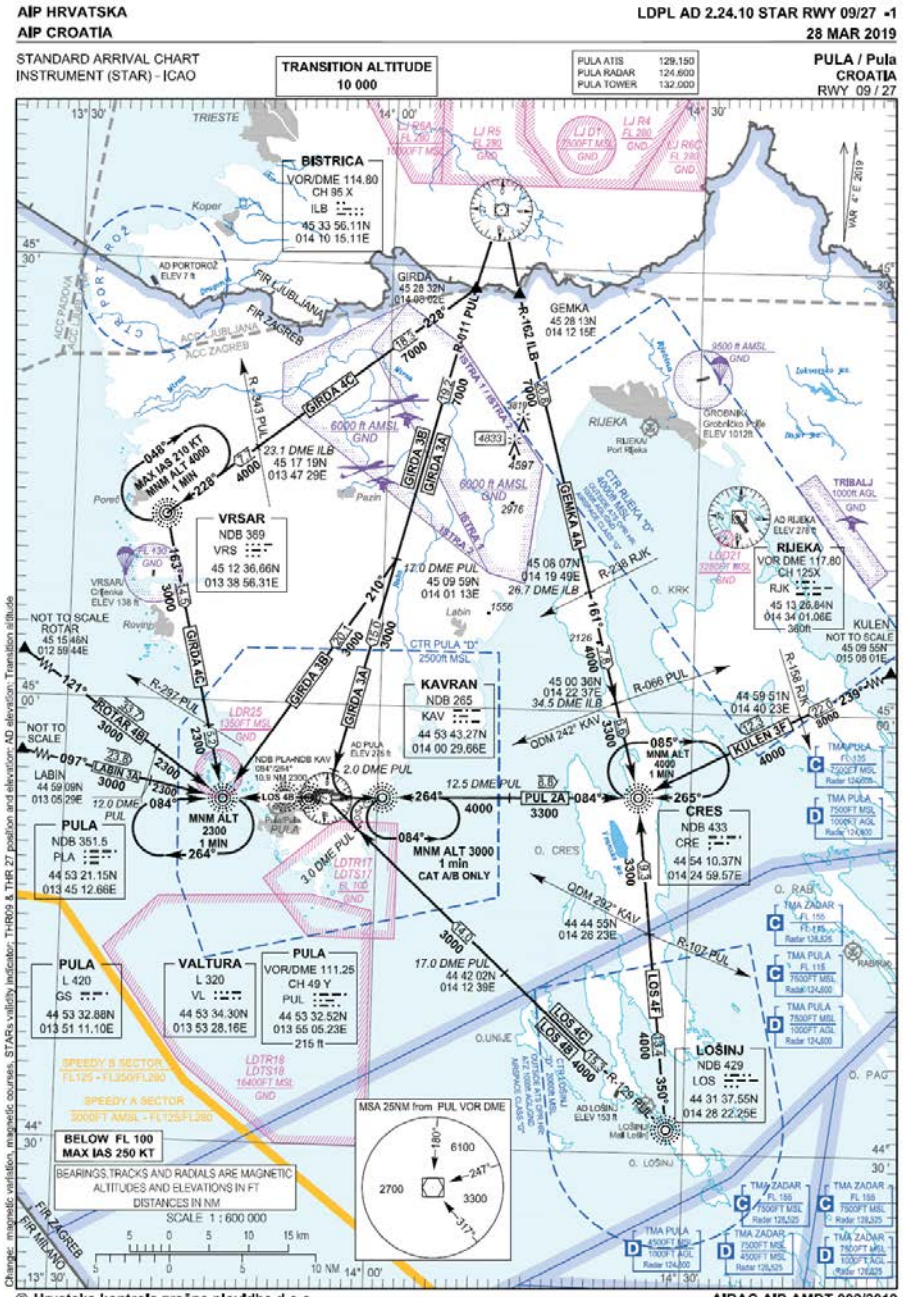
HRVATSKA KONTROLA ZRAČNE PLOVIDBE

SID – Standard Instrument Departure



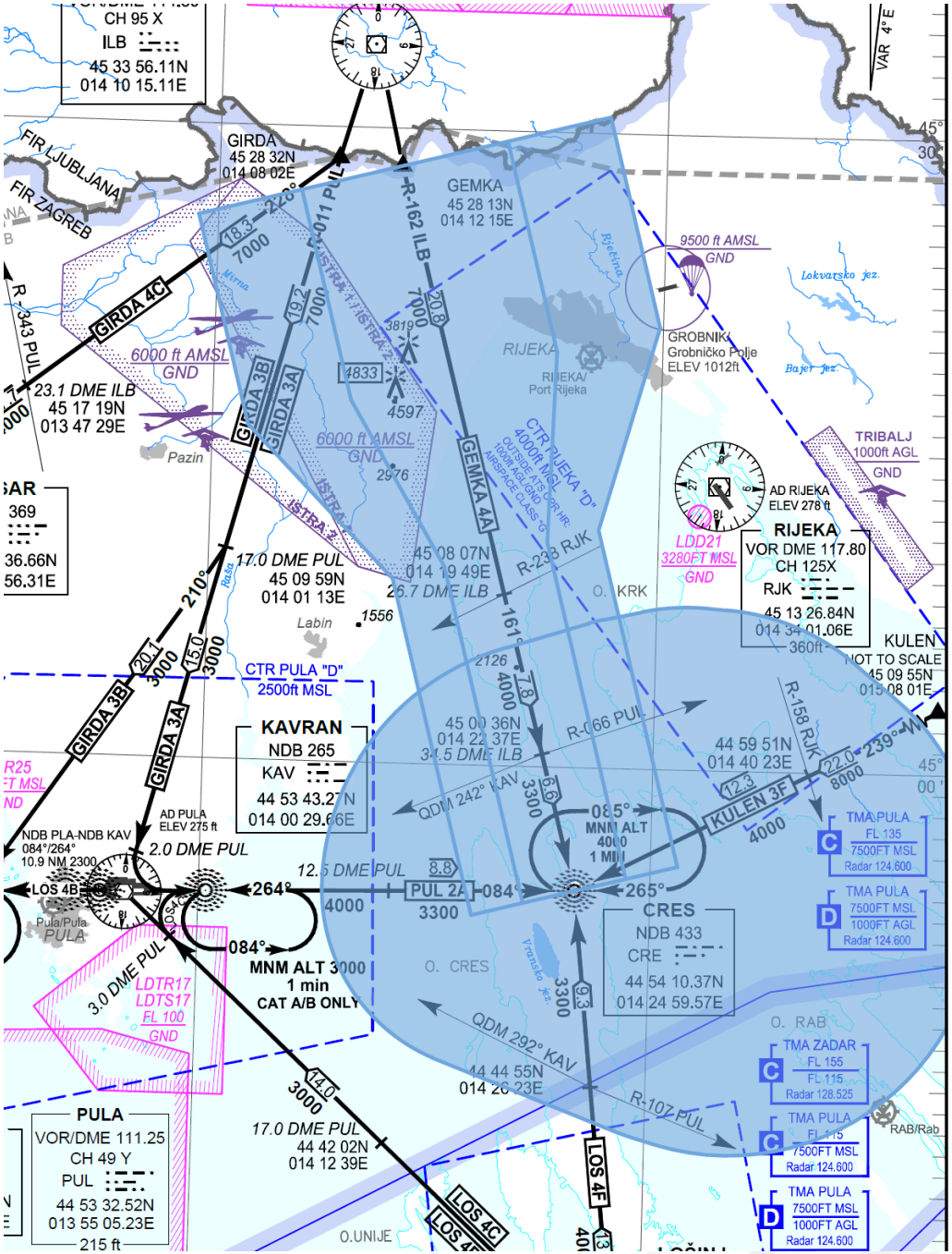
Standardni PDG od 3.3% daje MOC koji odgovara 0.8% udaljenosti od DER-a

STAR – Standard Instrument Arrival



HRVATSKA KONTROLA
ZRAČNE PLOVIDBE

STAR – Standard Instrument Arrival



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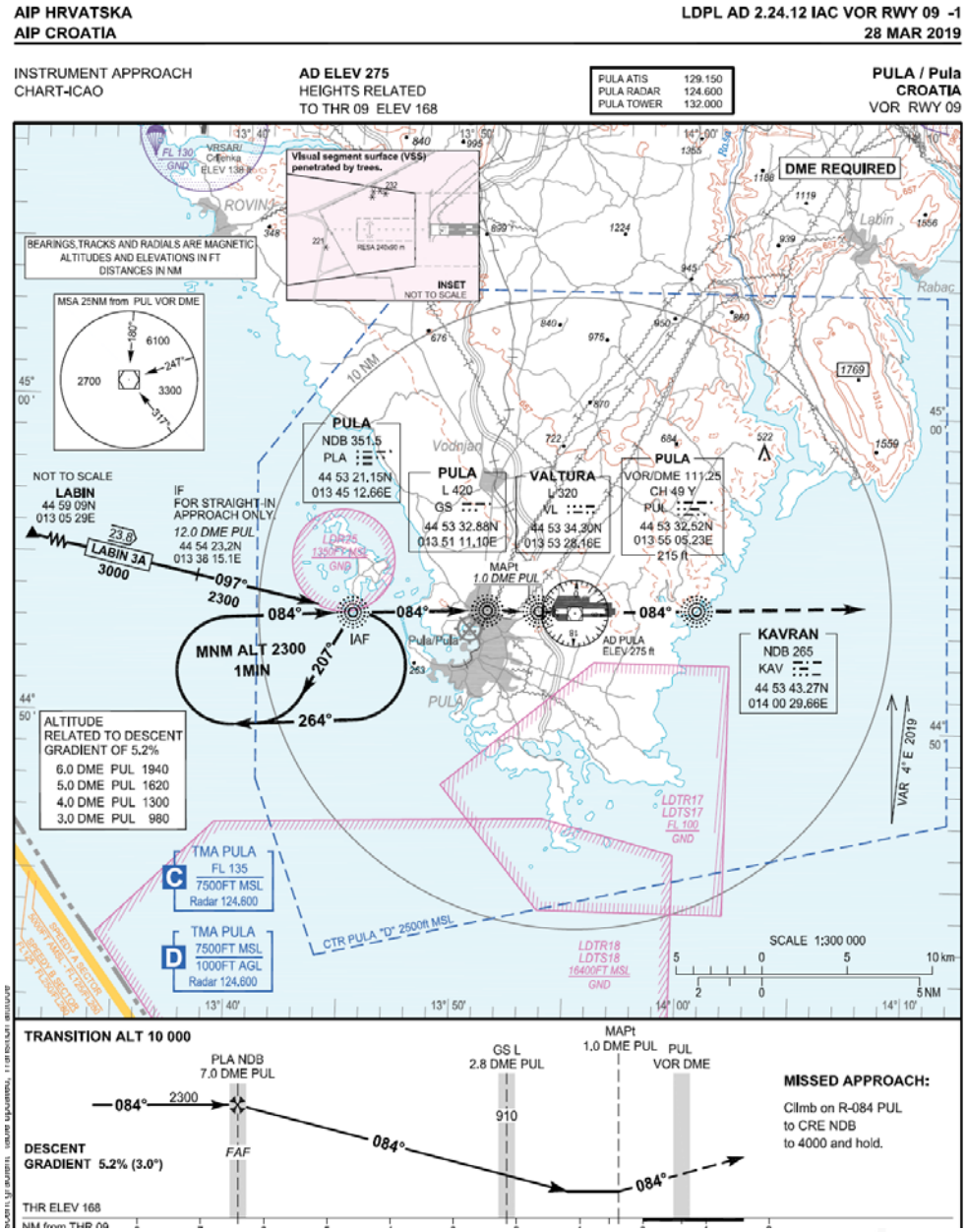
IAP – Instrument Approach Procedure



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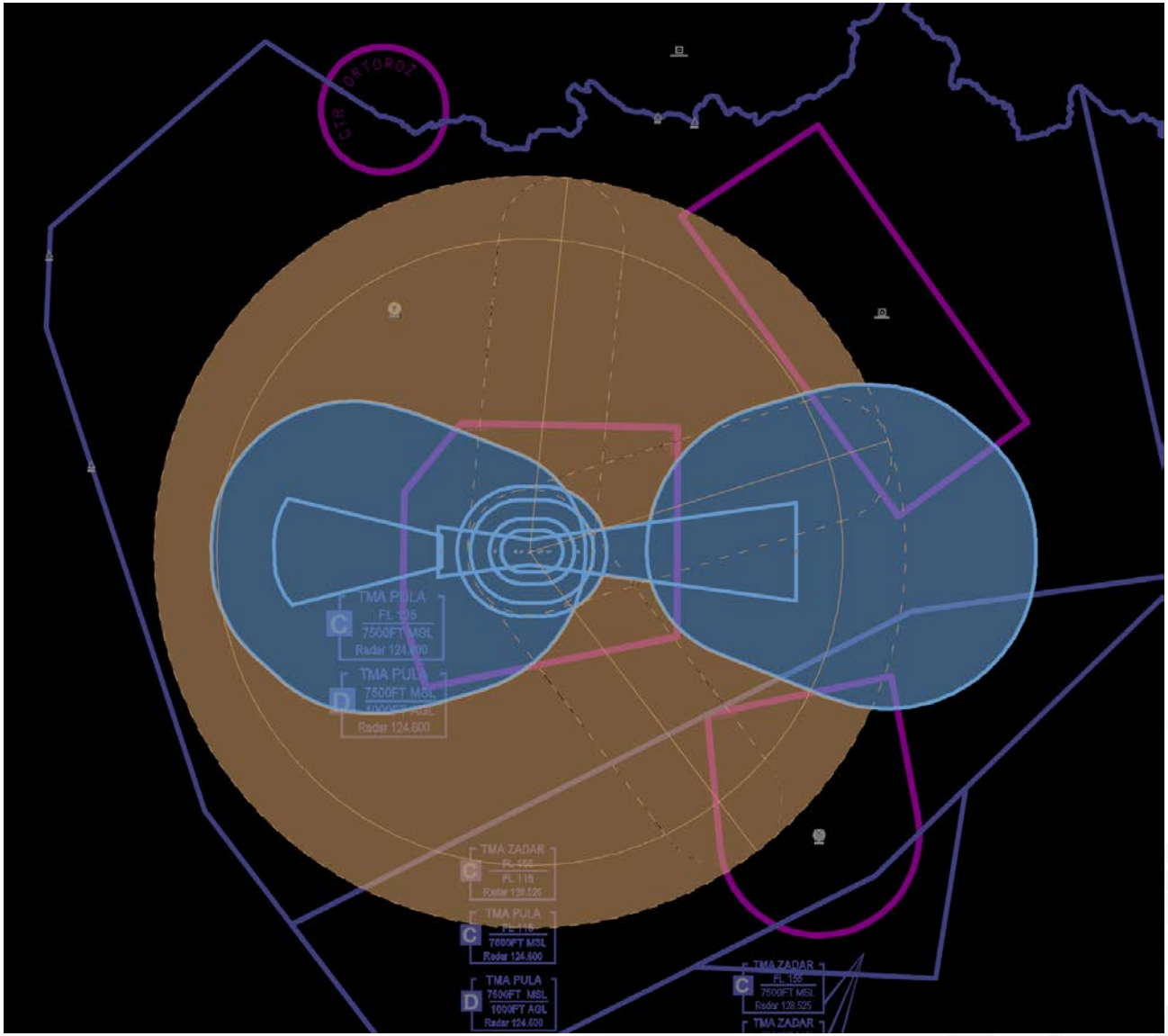
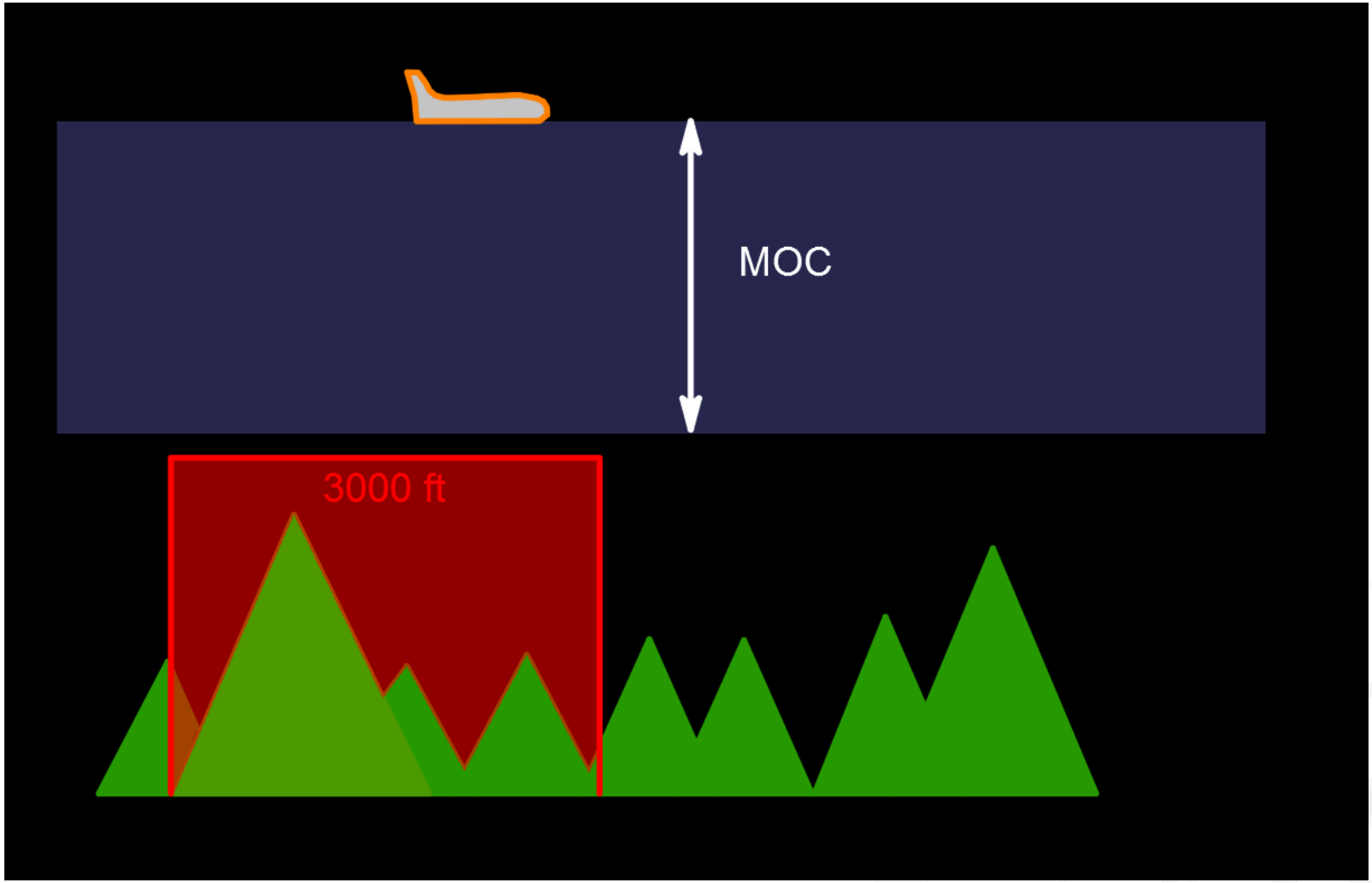
IAP – Instrument Approach Procedure

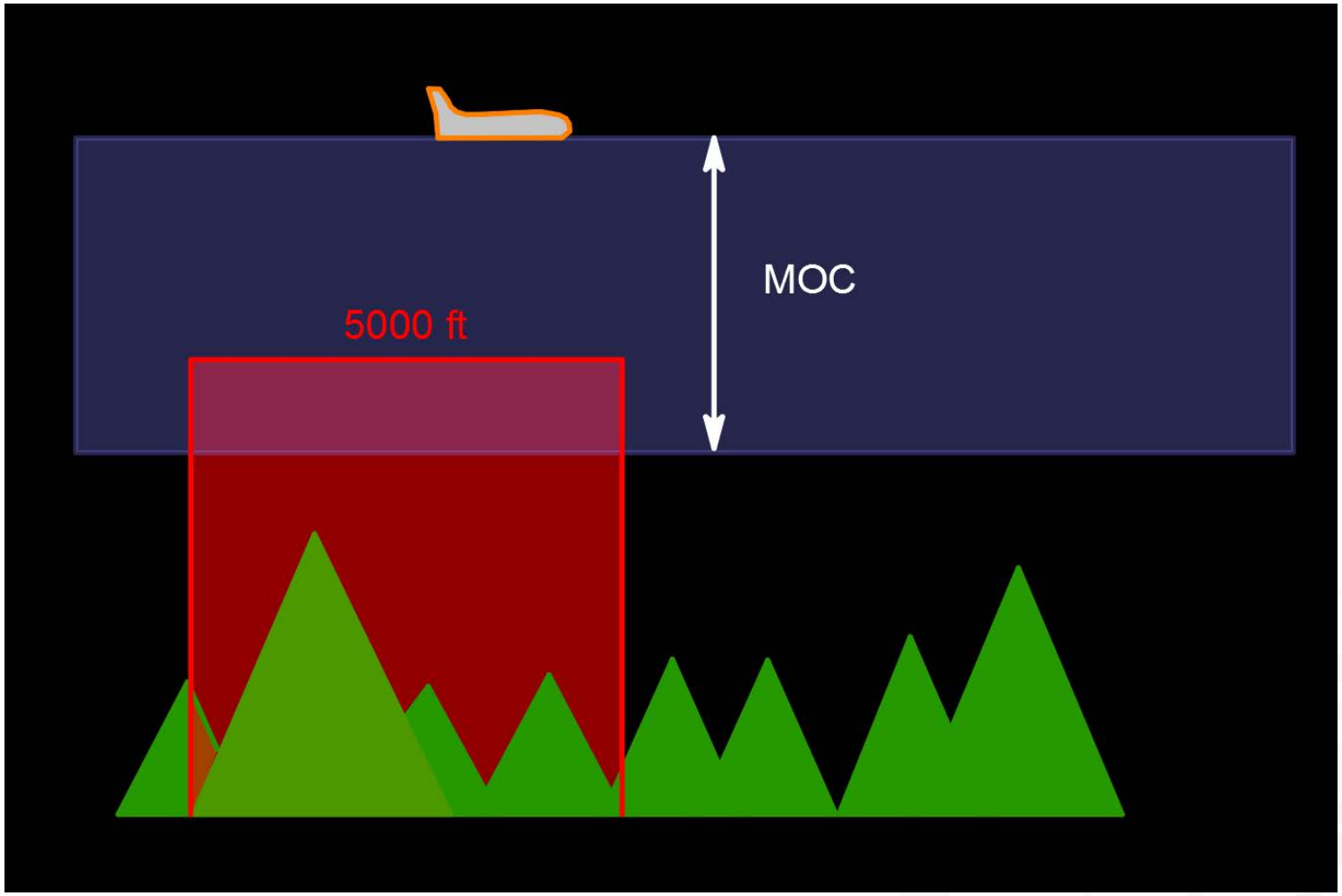


HRVATSKA KONTROLA
ZRAČNE PLOVIDBE

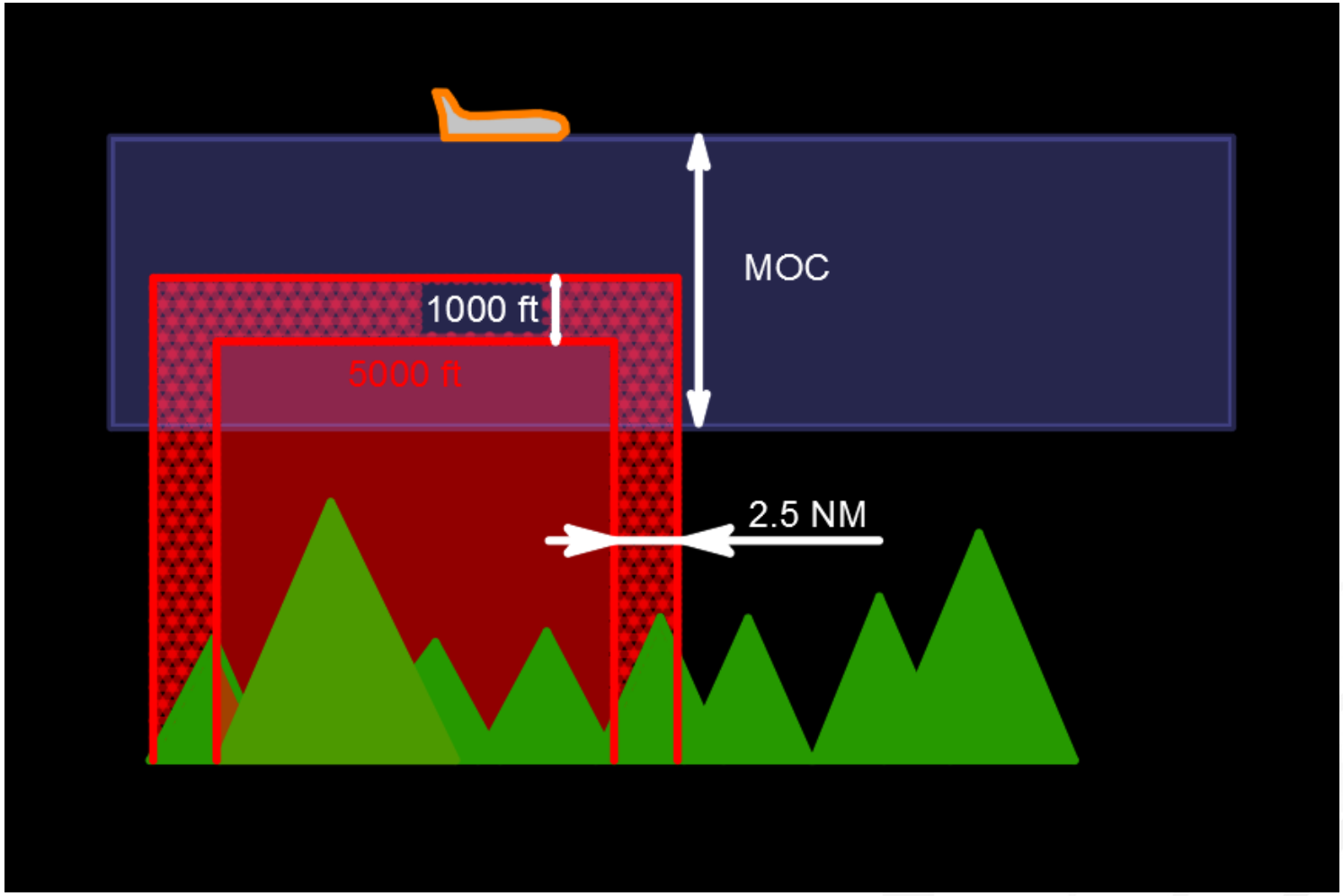
Primjer 1 - Utjecaj zone na proceduru



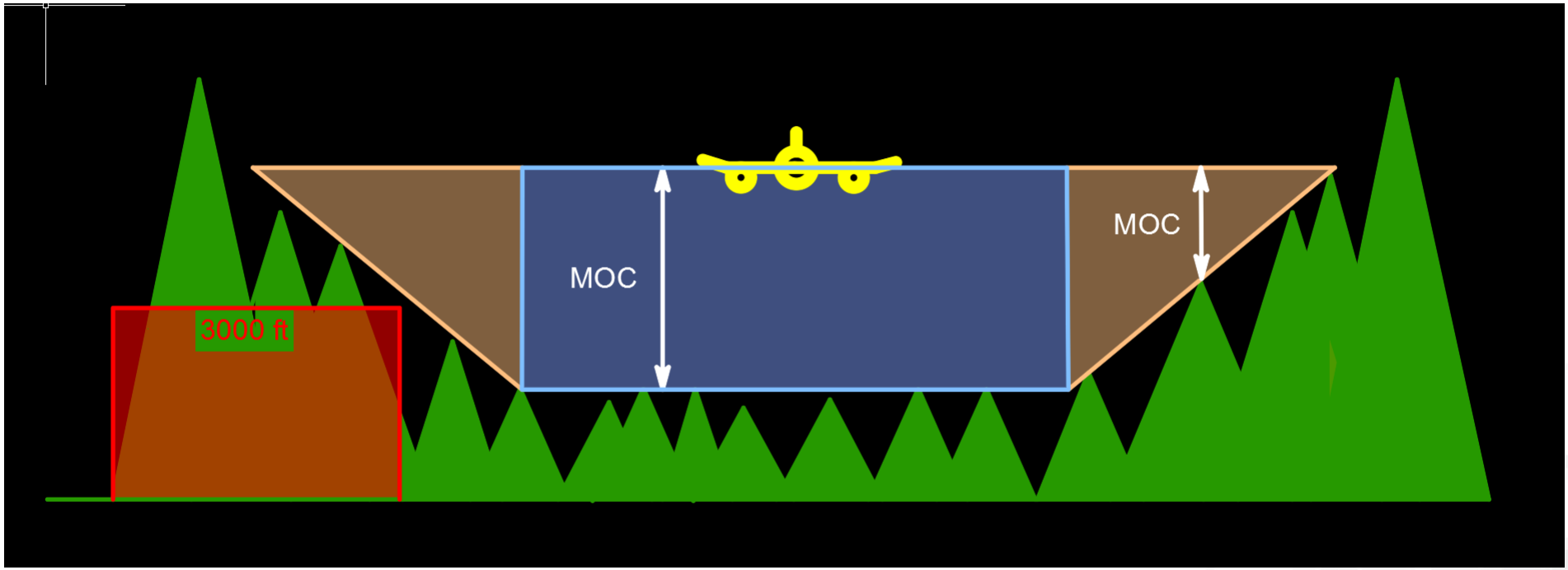
Primjer 2 - Utjecaj zone na proceduru



Primjer 3 - Primjena dodatnih horizontalnih i vertikalnih buffera

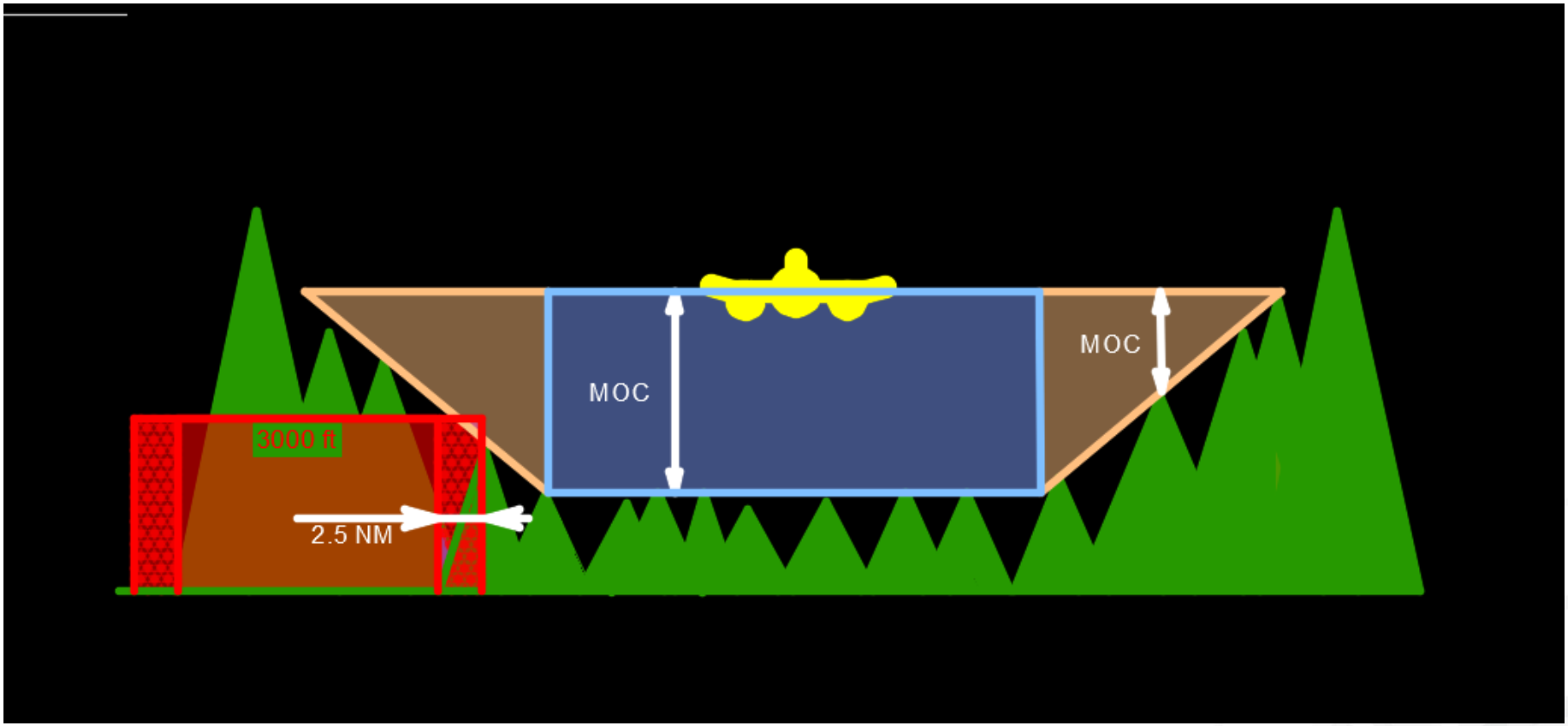


Primjer 4 - Utjecaj zone na proceduru – bez buffera

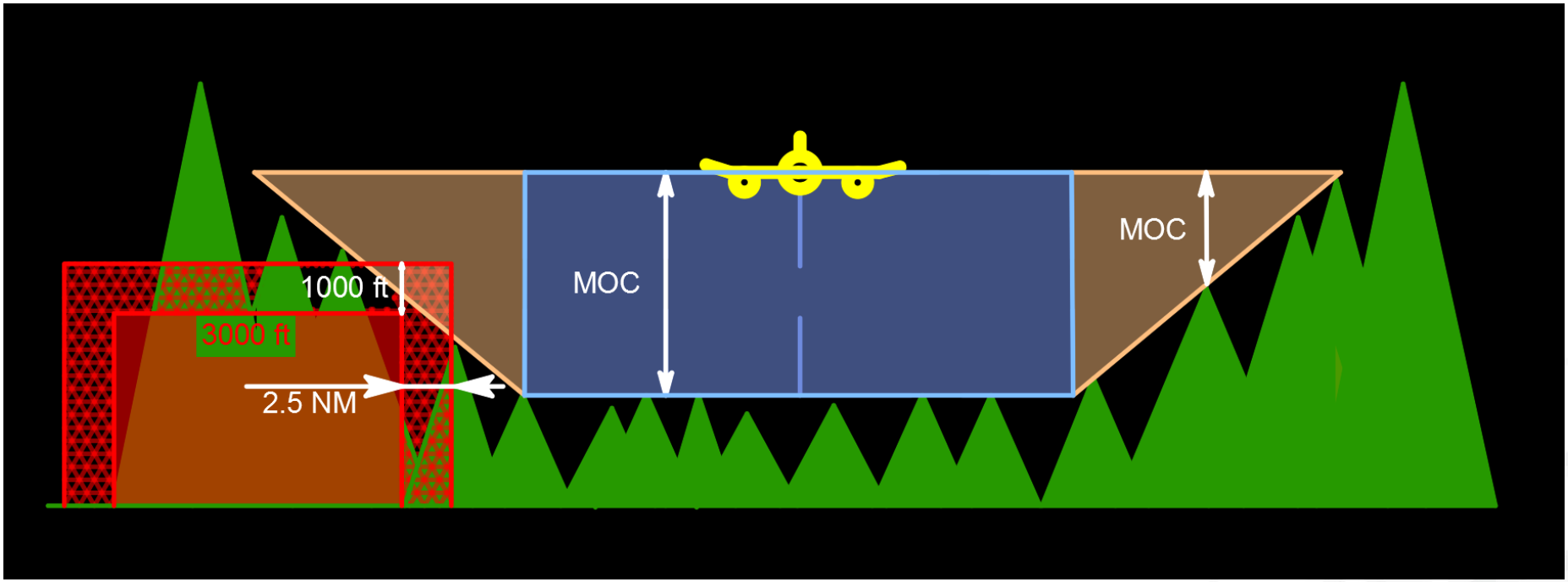


HRVATSKA KONTROLA ZRAČNE PLOVIDBE

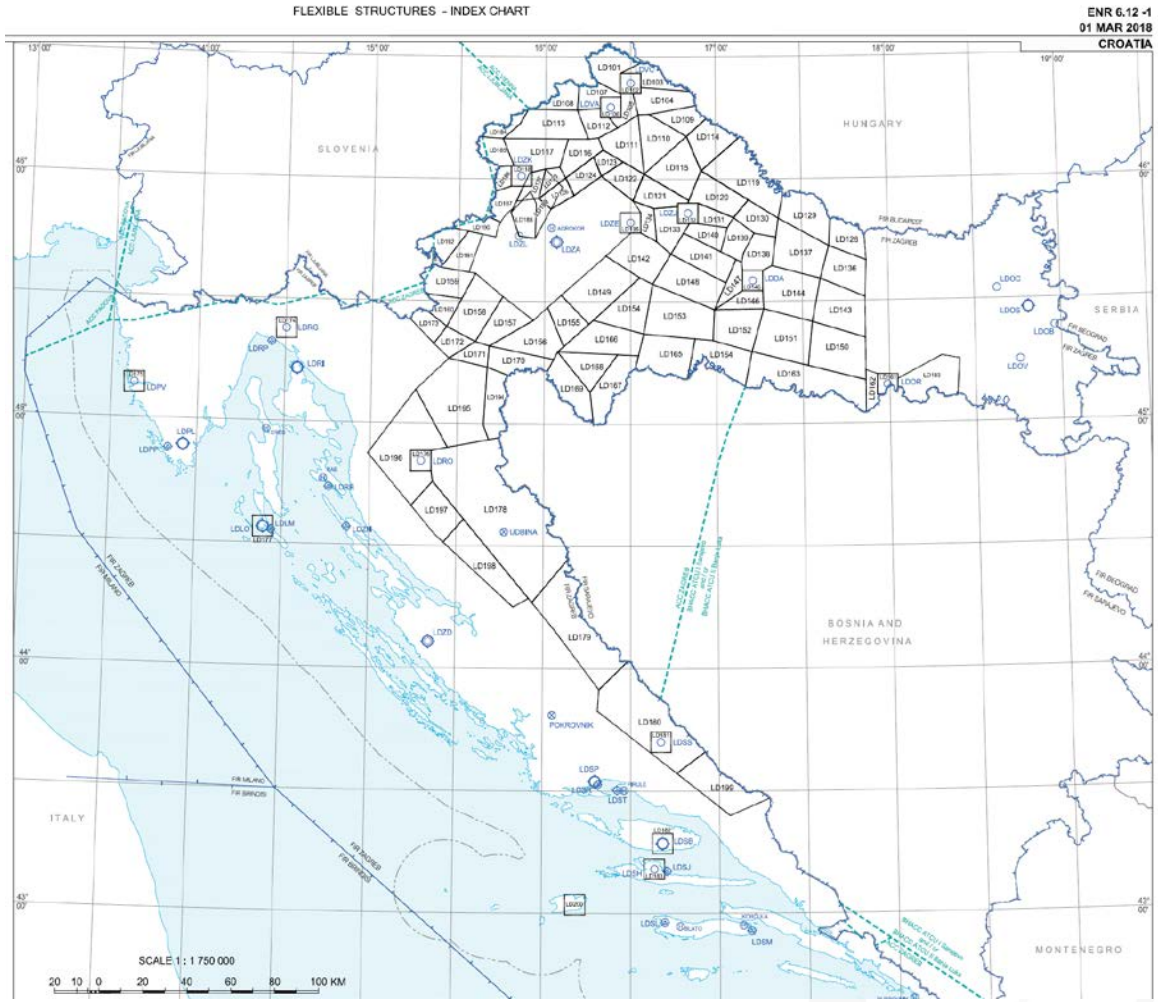
Primjer 5 - Utjecaj zone na proceduru – samo horizontalni buffer



Primjer 6 - Utjecaj zone na proceduru – dodatni horizontalni i vertikalni buffer

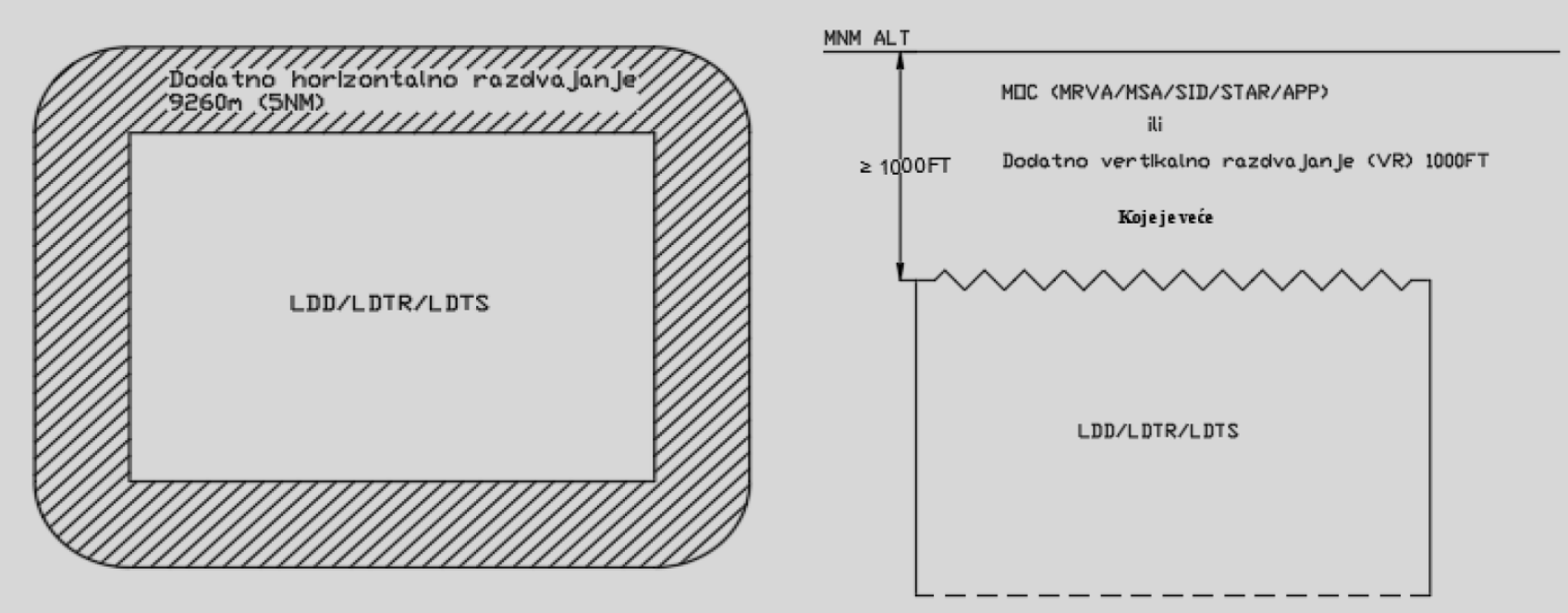


Flexible structures - analiza

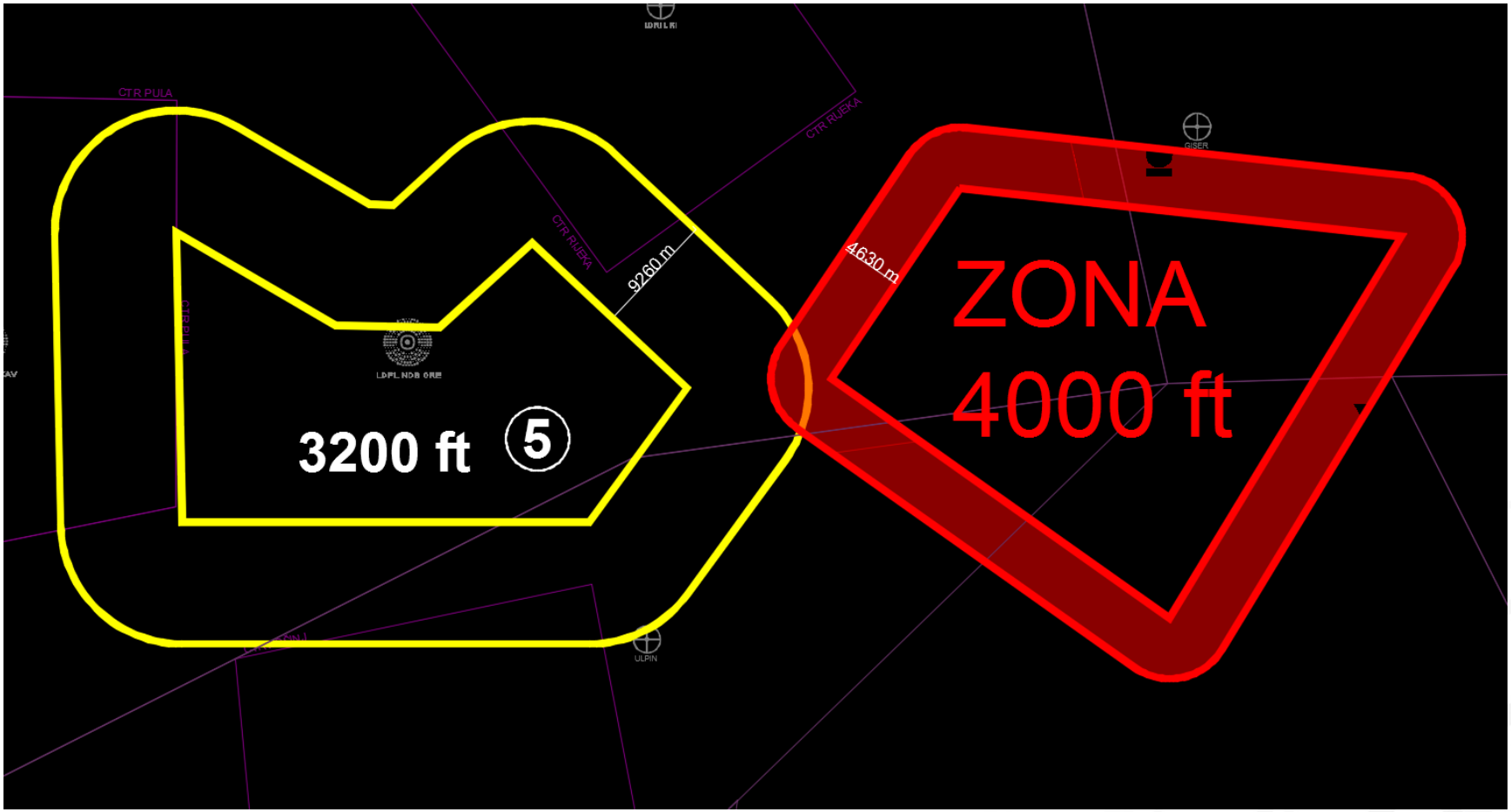


HRVATSKA KONTROLA ZRAČNE PLOVIDBE

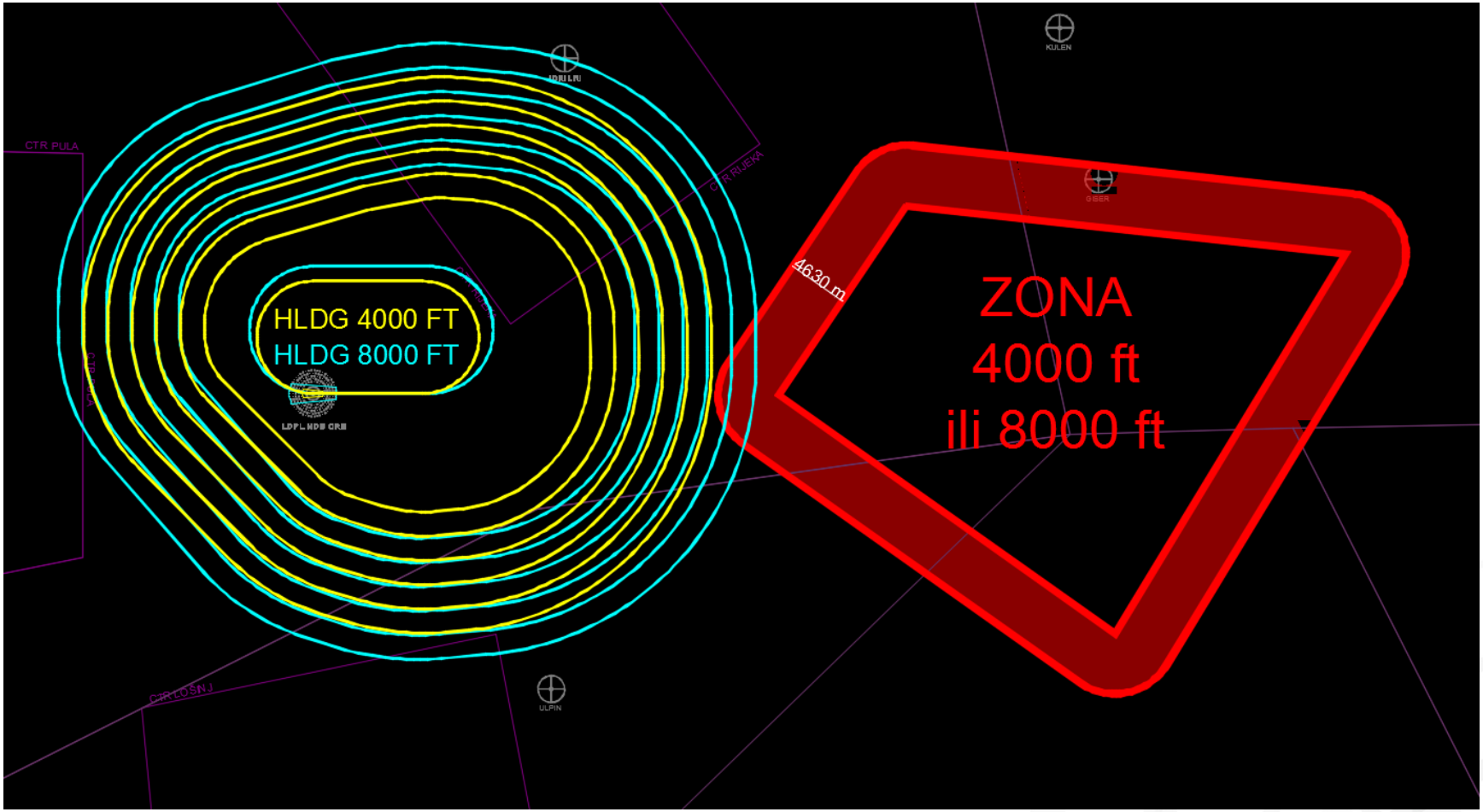
Flexible structures - analiza

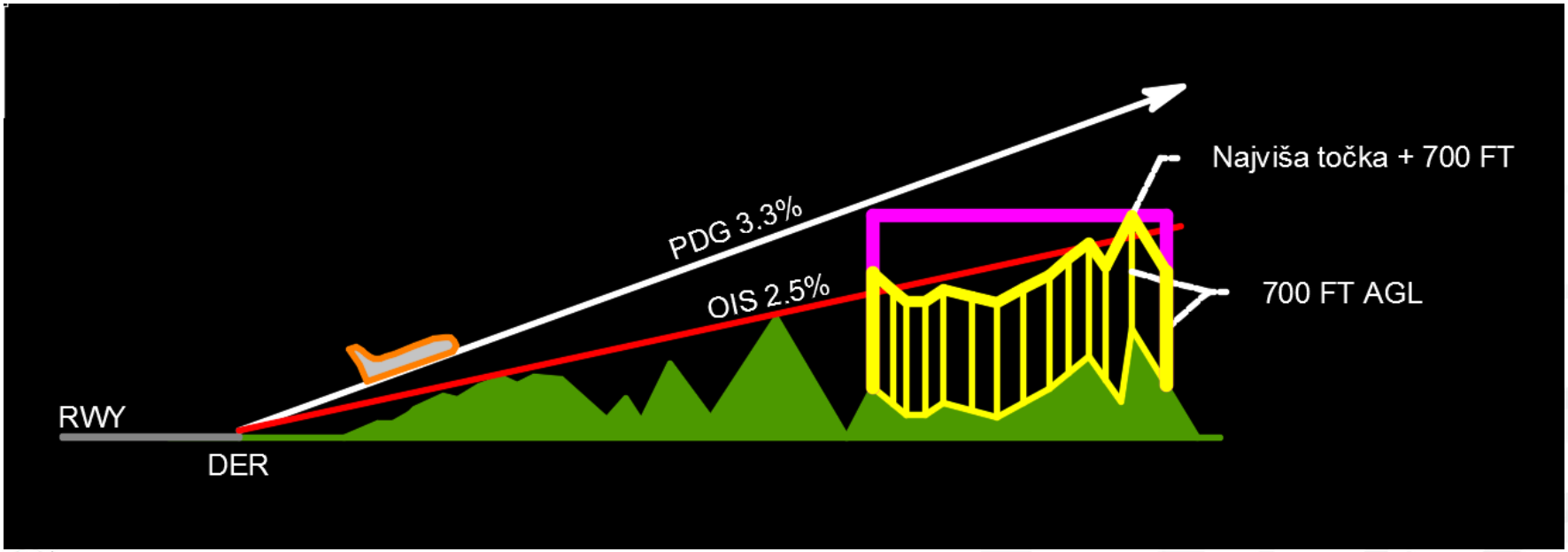


ATCSMAC


CTR PULA
CTR RIJEKA
CTR RIJEKA
9260 m
4630 m
ZONA
4000 ft
3200 ft
5
LDPL NDB ORE
GISER
ULPIN

HOLDING


CTR PULA
CTR RIJEKA
CTR LOSINJ
KULEN
GSER
ULPIN
HLDG 4000 FT
HLDG 8000 FT
4630 m
ZONA
4000 ft
ili 8000 ft

Dostava podataka za analizu

1. Točne koordinate i visine
2. Dostavljati zone s apsolutnim visinama – **MSL**, izbjegavati AGL