CSAY OBSTACLE HEIGHT CALCULATION

(A Free Open-Source Software)

Based

on

OBSTACLE LIMITATION SURFACE

(ICAO ANNEX – 14 VOL – I, 9th EDITION)

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CHAPTER 1 DEFINITION

1.1 Definitions as per ICAO Annex 14

1.1.1 Aerodrome

A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

1.1.2 Balked Landing

A landing manoeuvre that is unexpectedly discontinued at any point below the obstacle clearance altitude/height (OCA/H).

1.1.3 Aerodrome Reference point

The designated geographical location of an aerodrome

1.1.4 Clearway

A defined rectangular area on the ground or water under the control of the appropriate authority, selected or prepared as a suitable area over which an aeroplane may make a portion of its initial climb to a specified height.

1.1.5 Displaced Threshold

A threshold not located at the extremity of a runway

1.1.6 Obstacle

All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that:

a) are located on an area intended for the surface movement of aircraft; or

b) extend above a defined surface intended to protect aircraft in flight; or

c) stand outside those defined surfaces and that have been assessed as being a hazard to air navigation.

1.1.7 Obstacle Free Zone (OFZ)

The airspace above the inner approach surface, inner transitional surfaces, and balked landing surface and that portion of the strip bounded by these surfaces, which is not penetrated by any fixed obstacle other than a low-mass and frangibly mounted one required for air navigation purposes.

1.1.8 Obstacle Limitation Surface (OLS)

It defines the limit to which objects may project into the airspace

1.1.9 Runway

A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.

1.1.10 Runway strips

A defined area including the runway and stopway, if provided, intended:

a) to reduce the risk of damage to aircraft running off a runway; and

b) to protect aircraft flying over it during take-off or landing operations.

1.1.11 Threshold

The beginning of that portion of the runway usable for landing.

CHAPTER 2 OBSTACLE LIMITATION SURFACE

2.1 Types of Obstacle Limitation Surfaces

1. CONICAL SURFACE
2. INNER HORIZONTAL SURFACE
3. INNER APPROACH SURFACE
4. APPROACH SURFACE
5. TRANSITIONAL SURFACE
6. INNER TRANSITIONAL SURFACE
7. BALKED LANDING SURFACE
8. TAKEOFF CLIMB SURFACE
9. OUTER HORIZONTAL SURFACE

2.2 OLS requirement

Runway Category	Runway Sub-Category	Obstacle Limitation surface
Non-Instrument Runway		1. Conical surface 2. Inner Horizontal 3. Approach surface 4. Transitional surface
Instrument Runway	Non-Precision Approach Runway	1. Conical surface 2. Inner Horizontal 3. Approach surface 4. Transitional surface
	Precision Approach Runway Category I	Mandatory Surfaces (Shall be) 1. Conical surface 2. Inner Horizontal 3. Approach surface 4. Transitional surface *Optional Surfaces (Should be)* *1. Inner Approach surface* *2. Inner Transitional surface* *3. Balked landing surface*
	Precision Approach Runway Category II or III	1. Conical surface 2. Inner Horizontal 3. Approach surface 4. Transitional surface 5. Inner Approach surface 6. Inner Transitional surface 7. Balked landing surface

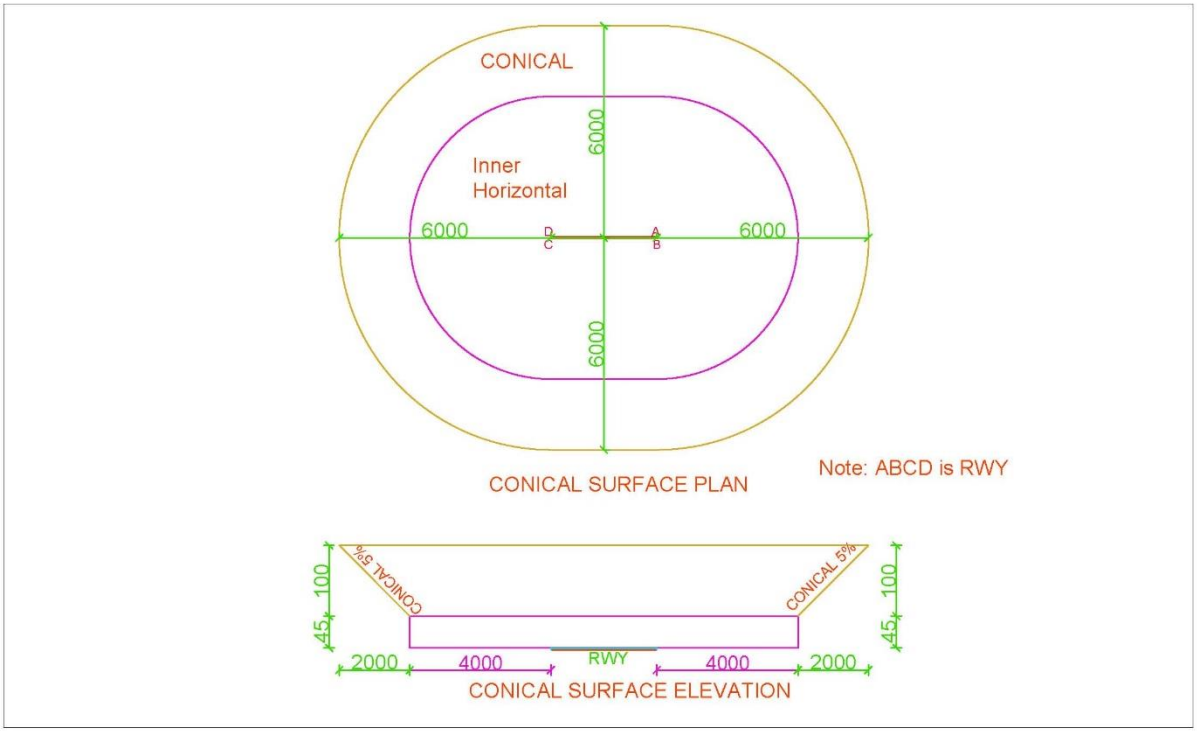
- Note – 1: Take off climb surface shall be established for all runways meant of Take off climb.

2.3 Details of each OLS

In this document, calculations and drawings shall be based on "**PRECISION APPROACH RUNWAY CAT II OR III**" based on Table 4-1 Dimensions and slopes of obstacle limitation surfaces — Approach runways of ICAO ANNEX – 14, Vol – I, 9th Edition.

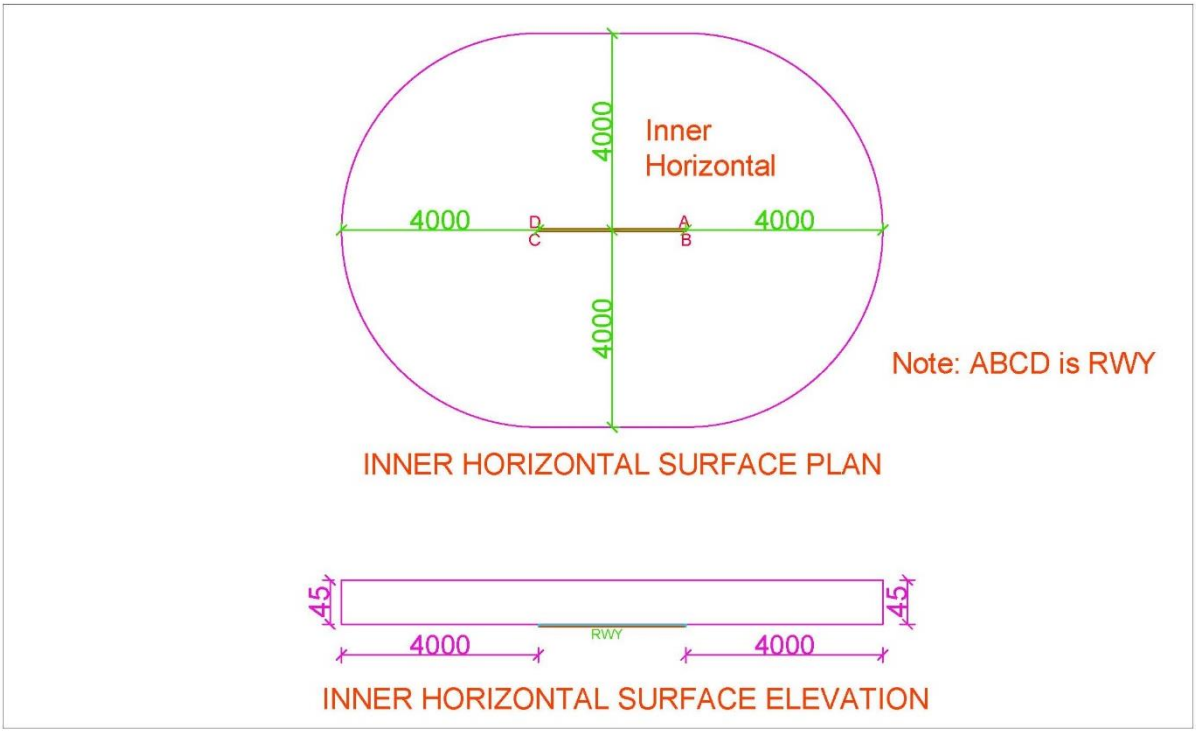
2.3.1 Conical Surface

Surfaces	Dimension
CONICAL	
Slope_%	5
Height_m	100



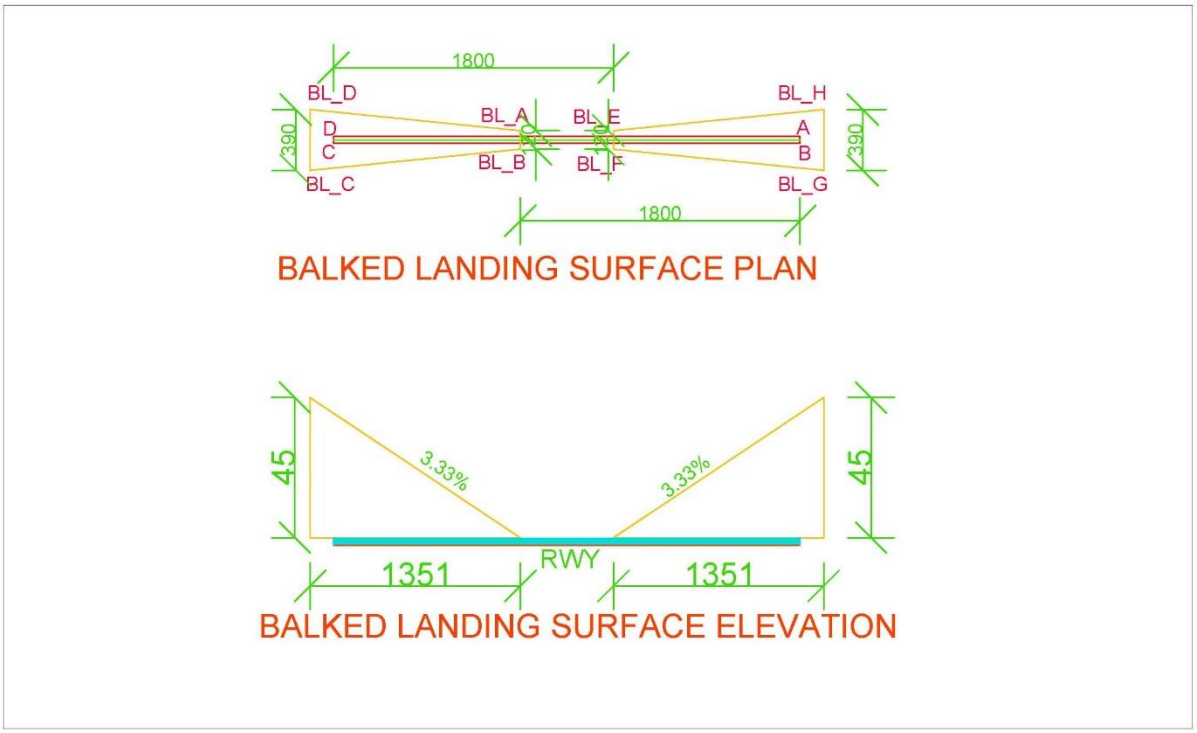
2.3.2 Inner Horizontal Surface

Surfaces	Dimension
INNER_HORIZONTAL	
Height_m	45
Radius_m	4000



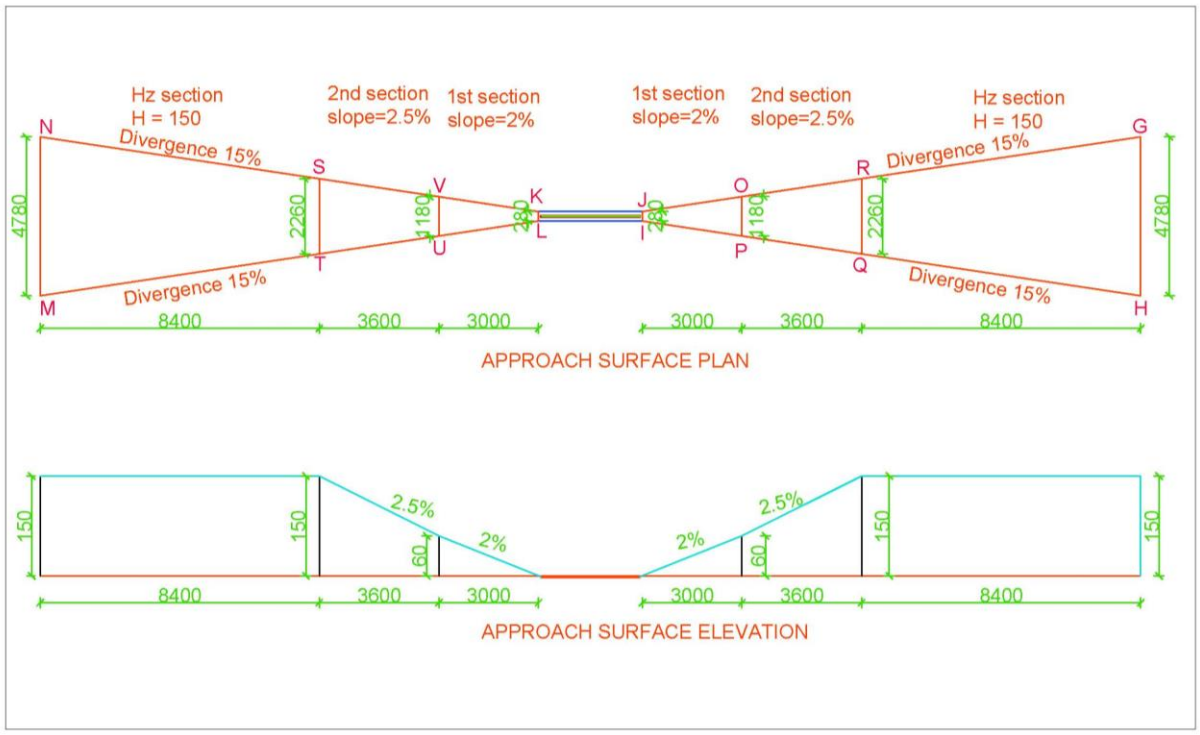
2.3.3 Inner Approach Surface

Surfaces	Dimension
INNER_APPROACH	
Width_m	120
Distance_from_threshold_m	60
Length_m	900
Slope_%	2



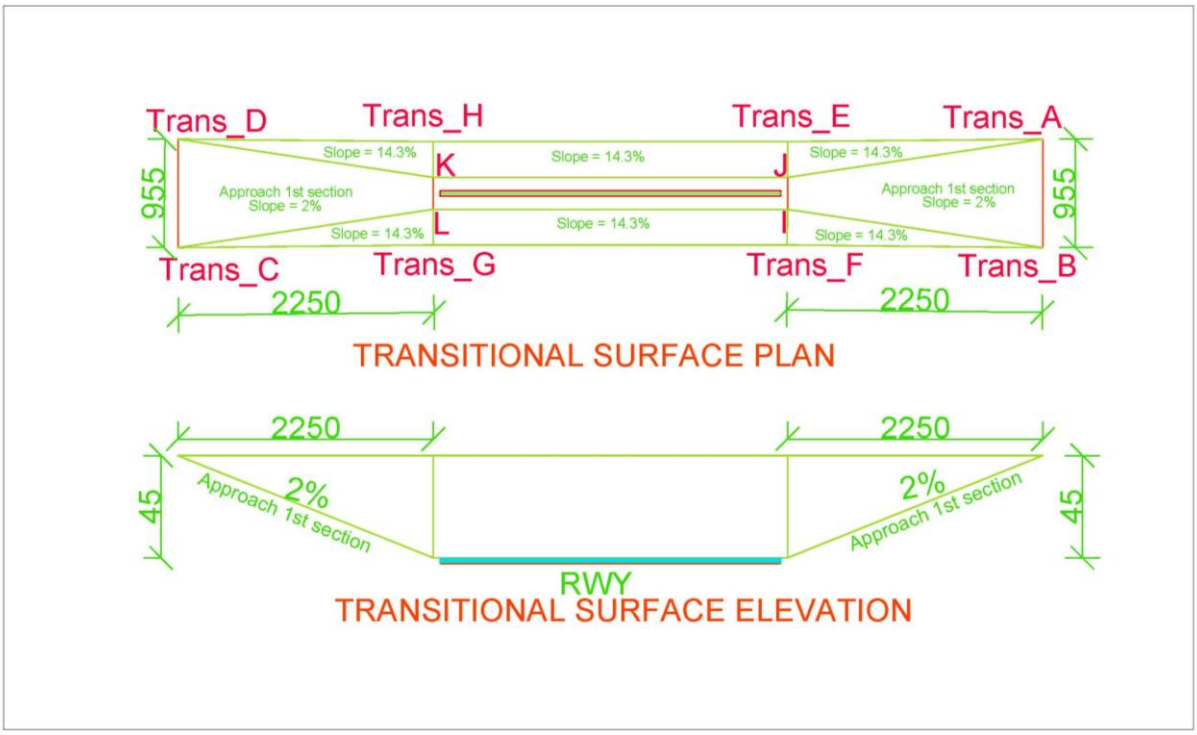
2.3.4 Approach Surface

Surfaces	Dimension	Surfaces	Dimension
Length_of_inner_edge_m	280	Second_Section	
Distance_from_threshold_m	60	Length_m	3600
Divergence_%	15	Slope_%	2.5
First_Section		Horizontal_Section	
Length_m	3000	Length_m	8400
Slope_%	2		



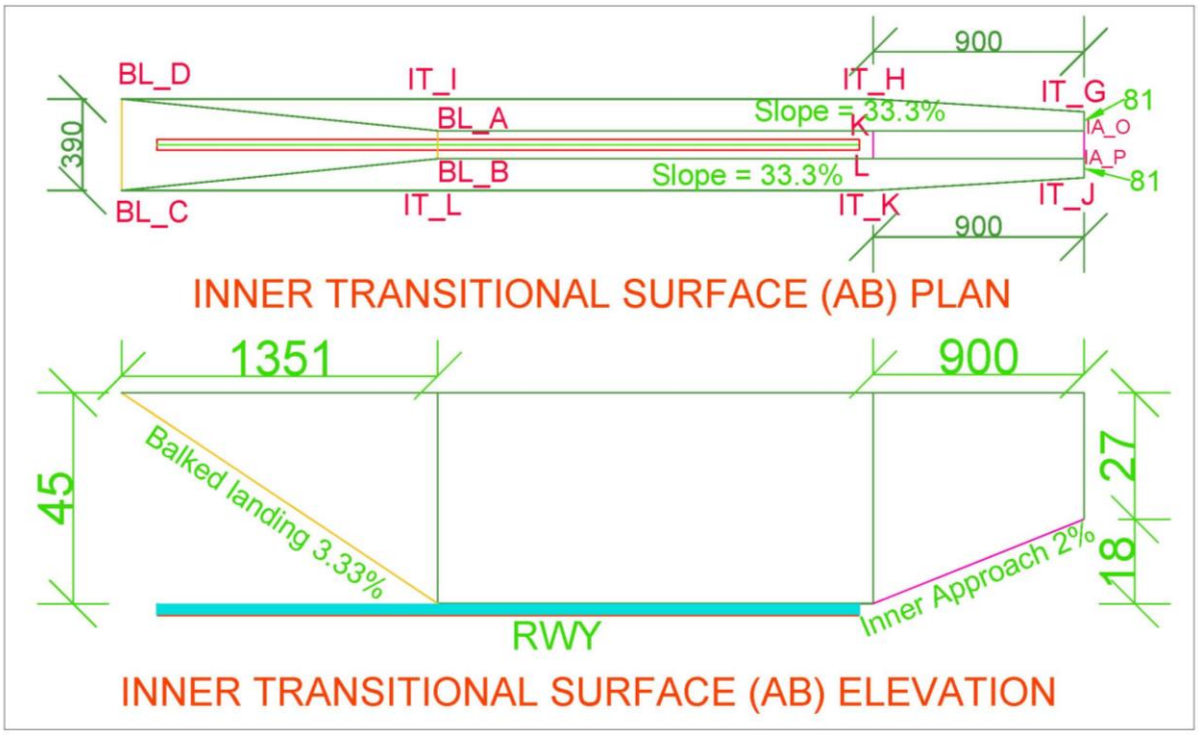
2.3.5 Transitional Surface

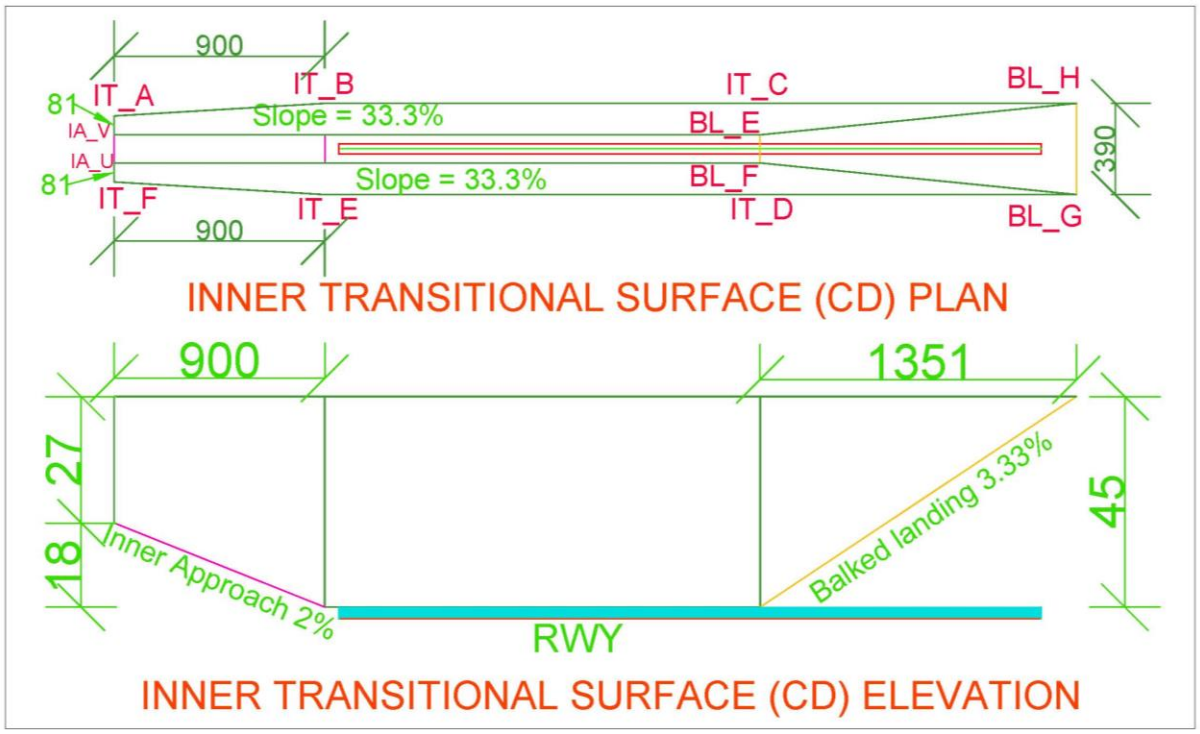
Surfaces	Dimension
INNER_TRANSITIONAL	
Slope_%	14.3



2.3.6 Inner Transitional Surface

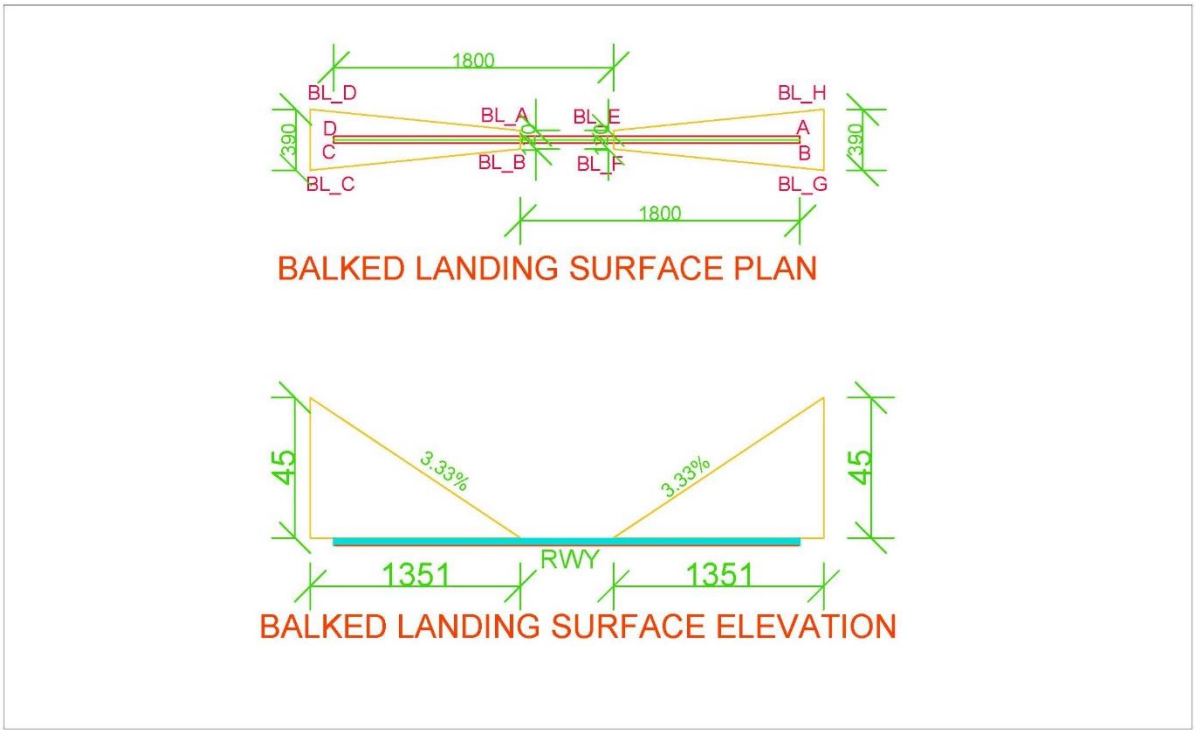
Surfaces	Dimension
TRANSITIONAL	
Slope_%	33.3


900
BL_D
IT_I
IT_H
IT_G
81
IA_O
IA_P
81
390
BL_A
Slope = 33.3%
K
BL_B
Slope = 33.3%
L
BL_C
IT_L
IT_K
IT_J
900
INNER TRANSITIONAL SURFACE (AB) PLAN
1351
900
45
Balked landing 3.33%
27
18
Inner Approach 2%
RWY
INNER TRANSITIONAL SURFACE (AB) ELEVATION


900
81
IT_A
IT_B
IT_C
BL_H
IA_V
Slope = 33.3%
BL_E
IA_U
81
Slope = 33.3%
BL_F
390
IT_F
IT_E
IT_D
BL_G
900
INNER TRANSITIONAL SURFACE (CD) PLAN
900
1351
27
18
Inner Approach 2%
Balked landing 3.33%
45
RWY
INNER TRANSITIONAL SURFACE (CD) ELEVATION

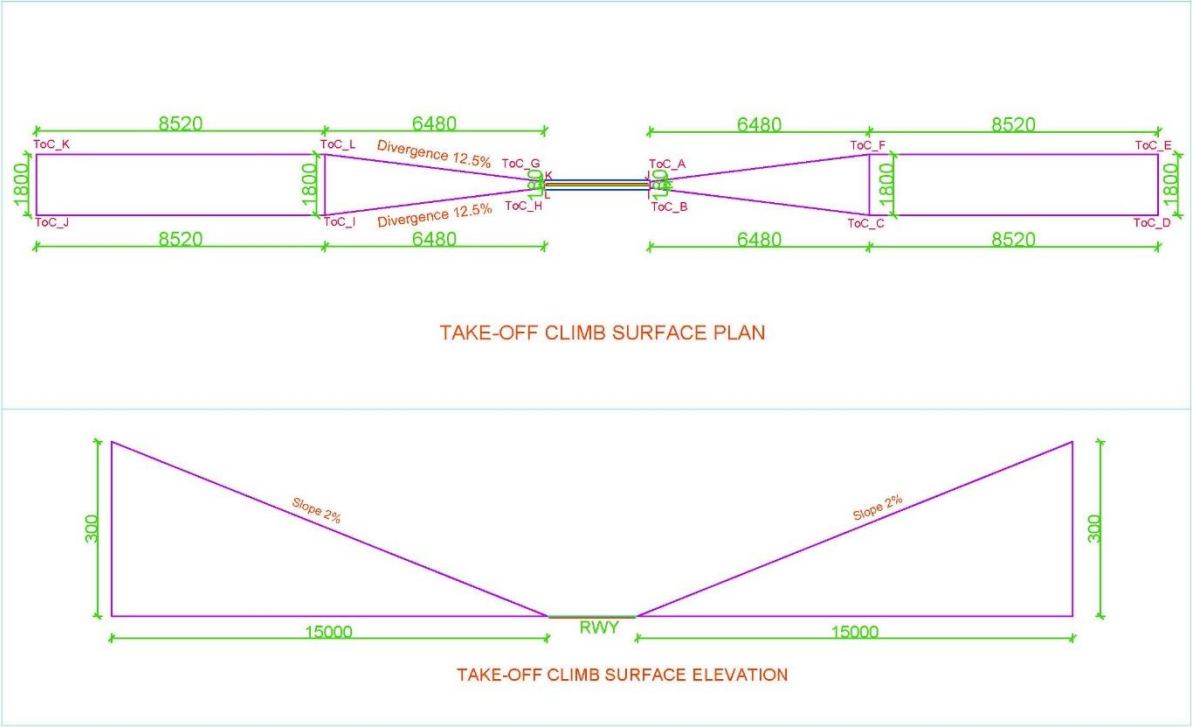
2.3.7 Balked Landing Surface

Surfaces	Dimension
BALKED_LANDING	
Length_of_inner_edge_m	120
Distance_from_threshold_m	1800
Divergence_%	10
Slope_%	3.33



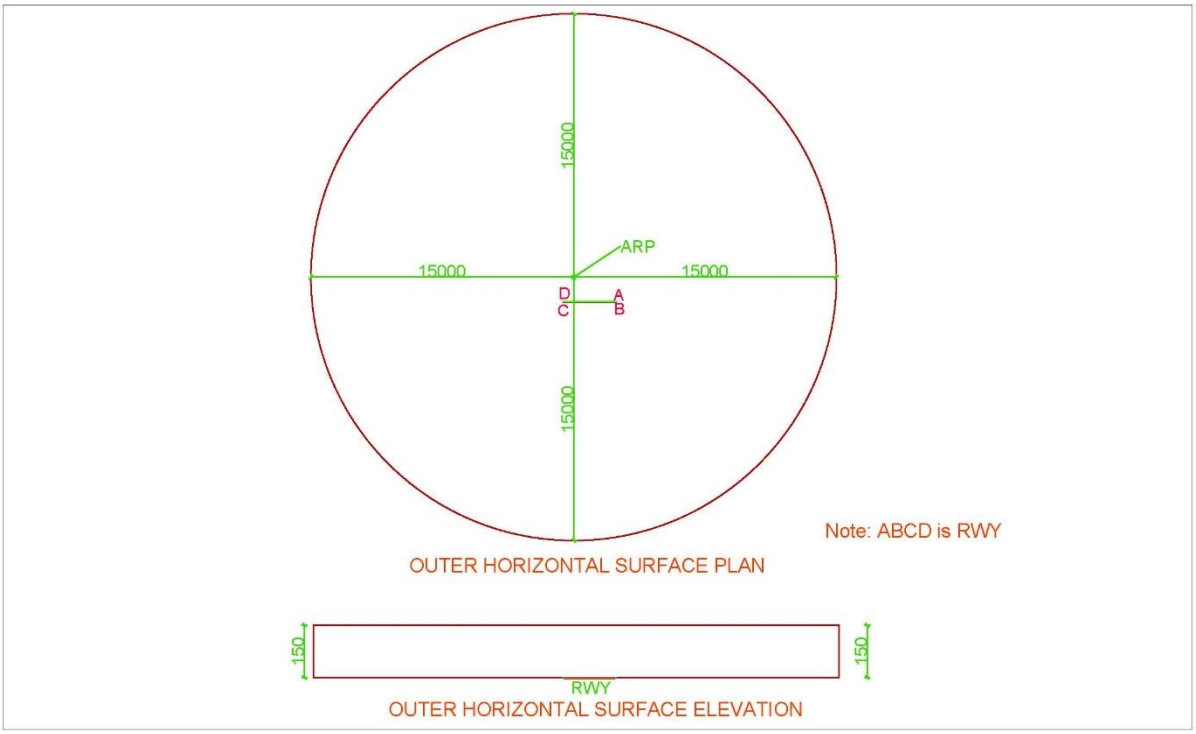
2.3.8 Take Off Climb Surface

Surfaces	Dimension
TAKE_OF_CLIMB_SURFACE	
Length_of_inner_edge_m	180
Distance_from_RWY_End_m	60
Divergence_%	12.5
Final_Width_m	1800
Length_m	15000
Slope_%	2



2.3.9 Outer Horizontal Surface

Surfaces	Dimension
Center at	ARP
Radius_m	15000


15000
15000
15000
ARP
D
C
A
B
Note: ABCD is RWY
OUTER HORIZONTAL SURFACE PLAN
150
150
RWY
OUTER HORIZONTAL SURFACE ELEVATION