

Part 77 CAT RWY 18 =	A(V)
Primary Sur Wth =	250
Approach Length =	5000
Flare Angle =	5.71
Tan of Flare Ang =	0.1
Approach Slope =	20 :1
51 DSPLCD THLD Dist =	150
DSPLCD THLD Elev =	0
Hard Surf RW =	Y
Appr Sur Begins	200.0

- 1.) **RW Mag Br=** 180.0
- 2.) C/L Dep Br= 360.0
- 3.) LT Mag Br= 270.0
- 4.) RT Mag Br= 90.0
- 5.) Lt Edge Boundary Mag Br =
- 6.) Rt Edge Boundary Mag Br =

(7) Given Dist = Distance from RW End = 200

(8) Given Dist in (7); Calculates C/L OS Dist to Appr Edge = 125.00

Calculate your Ht Abv RW End at Survey Sta.
 SD = Measure or calculate dist to RW End = 5 (ft)
 Measure Angle to RW End = -90 (deg)

(9) Z Coordinate Ht. above Station = Slope Dist * (- Sin(Ang)) = 5.0 ft

Set Up Coord	X = <u>0.0</u>	Dsp Thr Coord	X = <u>0.0</u>
Survey Station	Y = <u>0.0</u>	At Sur St Set Up	Y = <u>150.0</u>
Sta # <u>1</u>	Z = <u>5.0</u>		Z = <u>5.0</u>

5010 Item 52 Select an Object Tree#1 5010 Item 53 M/L

(10) Record 3 Measurements:

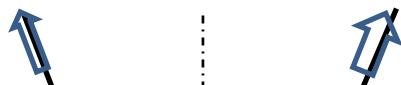
- a) Slope Distance to Object = 920 ft
- b) Vt. Ang to Object = 2.4 deg
- c) Mag Br or Hz Ang to Object = 348.3 deg

5010 Item 54 (HT Above RWY End) =	<u>44.0</u>	Ht Abv DSP	<u>44.0</u>
5010 Item 55 (Dist FROM RWY End) =	<u>900</u>	From DSP	<u>1050</u>
5010 Item 56 (Obj C/L Offset distance) =	<u>-185</u> R	CL OS	<u>-185</u>
5010 Item 57 (Obj CLNC Slope) =	<u>15 :1</u>	Cl Slope TO DSP	<u>23 :1</u>

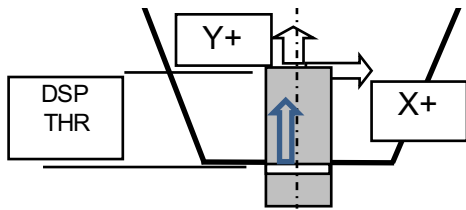
If Item 58 Close-In-Obst is "Y" Add Remarks: for Close-In-Obstructions and if Rwy has a displaced threshold add remark for CLNC slope to Disp Threshold

Survey Calculation for Set-Up Survey Sta. at RWY End

Ht. and Dist. are in Feet; Angles and Brgs. are in Dec. of Degree. C/L OS "L" or "R" Dir. viewed as Pilot Appr



Note:
If Runway has a Displaced Threshold



Relocate the Part 77 Cat Approach Surface to the start of the Displaced Threshold for evaluating the Clearance Slope to DSP

A
B
C
D
E

RUNWAY CAT	Pri Sur Wth
FAR Part 77 CAT	(FT)
A(V) / A(V)	250
A(V) / A (NP)	500
A(NP) / A(NP)	500
B(V) / B(V)	500
B(V) / C	500
B(V) / D	1000
B(V) / PIR	1000
C / C	500
C / D	1000
C / PIR	1000
D / D	1000
D / PIR	1000
PIR / PIR	1000

RWY End	A
Part 77 Category	Pri Sur Width
A(V)	250
A(V)	500
A(NP)	500
B(V)	500
B(V)	1000
C	500
C	1000
D	1000
PIR	1000

* for PIR Runway End
40:1 for remaining 40,0

In Ref to RW End
(Y or N)
FT from RW End

(Observed)

354.29

5.71

Enter the runway category defined by Part 77 for the most precise EXIS

Utility RWY constructed for propeller driven aircraft
of 12,500 pounds maximum gross weight and less.

A(NP) - Nonprecision Instrument Approach (Utility Runway)

A(V) - Visual Approach (Utility Runway)

Approaches Surfaces: Greater than Utility RWY

B(V) - Visual Approach

C - Nonprecision Instrument Approach

Visibility Minimums grea

D - Nonprecision Instrument Approach

Visibility Minimums as l

PIR - Precision Instrument Approach

NOTE:

After the "utility" or "other than utility" category is determined for that run
for the type of approach and visibility minimums. This will determine the

Clearance Standards:

10' (Priv. Rd); 15' (Public Rd); 17' (Interstate Hwy); 23' (Railroad);

For Waterway and Other; an amount equal to the highest mobile object

The obstn clnc slope begins at the end of the primary surface, which is
For paved RWs, the primary surface extends 200 ft beyond the runway
For non-paved (unpaved) RWs, the primary surface ends at the RW end
Measure the obstn clnc slope from the end of the primary surface whetl

R

For paved/unpaved combination runways, each end of the primary surf
There are no close-in-obstructions on an unpaved surface runway (turf,

Remark example for 5010 Item 57 when there is a RWY End with a disp
A057 RWY 09 APCH SLOPE 25:1 DUE TO 24 FT TREE 600 FT FROM

Remark example for 5010 Item 58 when there is a Close-In-Obstruction
A058 RWY 18 HAS 4 FT HILL 150 FT FROM THE RWY END AND 100

aches RWY

THR

Accuracy Codes.	HORIZONTAL Tolerance Code
1	+20 ft (6 m)
2	+50 ft (15 m)
3	+100 ft (30 m)
4	+250 ft (75 m)
5	+500 ft (150 m)
6	+1,000 ft (300 m)
7	+1/2 NM (900 m)
8	+1 NM (1800 m)
9	Unknown

B	C	D	E	
Appr Lth (ft)	Fl Ang (deg)	Tan of FA (ratio)	Approach Slope	Outter Appr Width (ft)
5000	5.71	0.100	20:1	1250
5000	4.29	0.075	20:1	1250
5000	8.53	0.150	20:1	2000
5000	5.71	0.100	20:1	1500
5000	2.86	0.050	20:1	1500
10000	8.53	0.150	34:1	3500
10000	7.13	0.125	34:1	3500
10000	8.53	0.150	34:1	4000
50000	8.53	0.150	50:1/40:1 *	10000

app slope is 50:1 for first 10,000 ft and 40:1 for next 10,000 ft.

STING approach to each runway end.

later than 3/4 mile
 show as 3/4 mile

runway, look at the instrument approach procedures
 to correct Part 77 Category for that particular runway.

that that would normally traverse it.

the beginning of the approach surface.
 end.
 d.

whether or not that runway threshold has been displaced.

surface coincides with the corresponding end of the runway.
 (gravel, etc.).

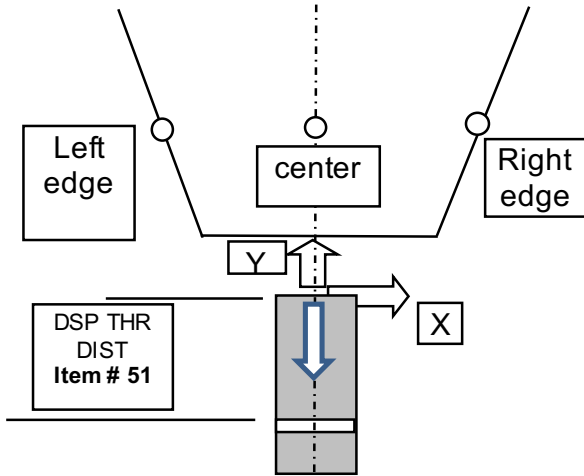
displaced threshold.
 DISPLACED THRESHOLD.

FT R.

VERTICAL

Code	Tolerance	
A	+3 ft	(1 m)
B	+10 ft	(3 m)
C	+20 ft	(6 m)
D	+50 ft	(15 m)
E	+125 ft	(38 m)
F	+250 ft	(75 m)
G	+500 ft	(150 m)
H	+1,000 ft	(300 m)
I	Unknown	

Survey Sheet for Field Work



RW End Approach Surface Data

- 50.) FAR 77 Cat _____
- Primary Sur Width= _____
- Flare Angle = _____
- Tan of Flare Ang = _____
- Approach Slope = _____
- 51 DISPLACED THR= _____
- 1.) Runway Mag Br= _____
- 2.) C/L Departure Mag Br= _____
- 3.) LT Direction Mag Br= _____
- 4.) RT Direction Mag Br= _____
- 5.) Lt Side App Sur Flare Mag Br = _____
- 6.) Rt Side App Sur Flare Mag Br = _____

Set-UP a Survey Observation Station (X , Y and Z coordinates)

(7) Y Coordinate = Distance from RW End = D = _____

Given a Dist "D" from RW End calculate CNTRL offset to Appr Boundary
 CNTRL offset (Lt Or Rt of C/L) = [(D - 200) * Tan of Flare] + 1/2 Pri Surface Width _____

(8) X Coordinate = CNTRL Offset to Appr Boundary _____

Calculate your Ht Abv RW End at Survey Sta.

SD = Measure or calculate dist to RW End = _____ (ft)

Measure VT Ang to RW End = _____ (deg)

Sin (VT Ang) = _____

(9) Z Coordinate = Slope Dist * - Sin(VT Ang) = _____

Your Set Up (8) X = _____
 At Survey Station (7) Y = _____
 (9) Z = _____

5010 Item 52 Select an Object _____ 5010 Item 53 Marked/Lighted

- (10) Record 3 Measurements:
- a) Slope Dist to Object = _____
- b) Vt. Ang to Object = _____
- c) Mag Br to Object = _____

Calculations: (11) Horizontal Angle to Obj = (Mag Br to Obj - C/L DEP Br) = _____

(12) HZ Dist to Obj = Cos (Vt. Ang) * Slope Dist to Obj = _____

5010 Item 54 (Ht Abv RW) = Z + [Sin (Vt Ang) * Slope Dist] = _____

5010 Item 55 (Dist from Rwy) = Y + [Cos (Hz Ang) * HZ Dist to Obj] = _____

5010 Item 56 (Obj C/L Offset) = X + [Sin (HZ Ang) * HZ Dist to Obj] = _____

5010 Item 57 (Obj CLNC Slope) = Item 55 - 200ft (if hard suf rw) / Item 54 = _____

If Item 58 Close-In-Obst is "Y" Add Remarks: for Close-In-Obstructions

and if Rwy has a displaced threshold add remark for CLNC slope to Disp Threshold

RUNWAY CAT	Pri Sur Wth
FAR Part 77 CAT	(FT)
A(V) / A(V)	250
A(V) / A (NP)	500
A(NP) / A(NP)	500
B(V) / B(V)	500
B(V) / C	500
B(V) / D	1000
B(V) / PIR	1000
C / C	500
C / D	1000
C / PIR	1000
D / D	1000
D / PIR	1000
PIR / PIR	1000

RWY End

Part 77 Category	Pri Sur Width	Appr Lth (ft)
A(V)	250	5000
A(V)	500	5000
A(NP)	500	5000
B(V)	500	5000
B(V)	1000	5000
C	500	10000
C	1000	10000
D	1000	10000
PIR	1000	50000

* for PIR Runway End app slope is 5 40:1 for remaining 40,000 ft.

Enter the runway category defined by Part 77 for the most precise EXISTING approach

Approaches Surfaces:

PIR - Precision Instrument Approach

D - Nonprecision Instrument Approach

C - Nonprecision Instrument Approach

B(V) - Visual Approach

A(NP) - Nonprecision Instrument Approach (Utility Runway)

A(V) - Visual Approach (Utility Runway)

Visibility Minimums as low as 3/4 mile

Visibility Minimums greater than 3/4 r

Utility RW

of 12,50C

NOTE:

After the "utility" or "other than utility" category is determined for that runway, look at the for the type of approach and visibility minimums. This will determine the correct Part 77

Clearance Standards:

10' (Priv. Rd); 15' (Public Rd); 17' (Interstate Hwy); 23' (Railroad);

For Waterway and Other; an amount equal to the highest mobile object that would norm

The obstn clnc slope begins at the end of the primary surface, which is the beginning of For paved RWs, the primary surface extends 200 ft beyond the runway end.

For non-paved (unpaved) RWs, the primary surface ends at the RW end.

Measure the obstn clnc slope from the end of the primary surface whether or not that ru

For paved/unpaved combination runways, each end of the primary surface coincides wi There are no close-in-obstructions on an unpaved surface runway (turf, gravel, etc.).

Remark example for 5010 Item 57 when there is a Rwy End with a displaced threshold. A057 RWY 09 APCH SLOPE 25:1 DUE TO 24 FT TREE 600 FT FROM THE DSPLCD T

Remark example for 5010 Item 58 when there is a Close-In-Obstruction A058 RWY 18 HAS 4 FT HILL 150 FT FROM THE RWY END AND 100 FT R.

Accuracy Codes.

HORIZONTAL Tolerance

VERTICA

Code

+20 ft

Code

1 +50 ft (6 m)

A

2 +100 ft (15 m)

B

3 +250 ft (30 m)

C

4 +500 ft (75 m)

D

5 +1,000 ft (150 m)

E

6 +1/2 NM (300 m)

F

7 +1 NM (900 m)
8 Unknown (1800 m)
9

G
H
I

Appr Wth (ft)	Approach Slope	Fl Ang (deg)	Tan of FA (ratio)
1250	20:1	5.71	0.100
1250	20:1	4.29	0.075
2000	20:1	8.53	0.150
1500	20:1	5.71	0.100
1500	20:1	2.86	0.050
3500	34:1	8.53	0.150
3500	34:1	7.13	0.125
4000	34:1	8.53	0.150
10000	50:1/40:1 *	8.53	0.150

0:1 for first 10,000 ft and

to each runway end.

;
nile

' constructed for propeller driven aircraft
) pounds maximum gross weight and less.

instrument approach procedures
Category for that particular runway.

rally traverse it.

f the approach surface.

nway threshold has been displaced.

th the corresponding end of the runway.

'HLD.

.L
Tolerance

- +3 ft (1 m)
- +10 ft (3 m)
- +20 ft (6 m)
- +50 ft (15 m)
- +125 ft (38 m)
- +250 ft (75 m)

+500 ft (150 m)
+1,000 ft (300 m)
Unknown

Example for Survey Control Station Set Up at RWY END
Coord: X = 0; Y = 0; Z = Ht Abv RWY End (Eye Ht of Observer)

Enter the Part 77 Cat Approach Dimensions from Chart
(Pri Sur Wth; Appr Lth; Flare Ang; Tan of FA; Appr Slope)

IF RWY End has a Displaced Threshold enter Dsp Thr Distance
And Dsp Thr Elev In Reference to the Rwy End Elev (+ Abv/ - Bw)

1 Observe and **Record** RWY C/L Mag Bearing (Compass Reading)
Program Calculates #s 2, 3, 4, 5, & 6. (#2 is the C/L Departure E

Equations (7) and (8)

Placing a Dist from the Rwy End in equation (7), formula (8) calc
the C/L OS Dist to the left or right edge of the Approach Bounda

Calculate your Eye Ht Abv the RWY End at a Sur Sta.

Enter the Measured Slope Dist to the Rwy End from Sur Sta

Enter the Measure Vt Angle to Rwy End from Sur Sta

Equation (9) calculates Your Eye Ht abv the RWY End (Z Coord

Record Your Control Station:

Enter Your Survey Station Set-Up Coords (X ; Y ; and Z)

Item 52 Sight Obj from Survey Station to evaluate Object's HT and Loca

- #10 a) Measure and record **Slope Distance to Object**
b) Measure and record **Vertical Angle to Object**
c) Measure and record **Magnetic Bearing to Object**

Item 54 Calculates the Object's Ht above Rwy End

Item 55 Calculates the Object's Distance From Rwy End

Item 56 Calculates the Object's C/L OS (Left or Right of Extended Rwy C

Item 57 (Obj CLNC Slope = (Item 55 - 200ft for hard surface Rwy) / Item

Item 58 Close-In-Obst if "Y" Add Remark
And if Rwy has a displaced threshold
Add remark for APCH SLOPE to Displaced Threshold

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d)

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C/L)

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Field Work Survey Sheet (Mar 2022)

Part 77 RW Cat 18/36 =	A(V)
Primary Sur Wth =	250
Approach Length =	5000
Flare Angle =	5.71
Tan of Flare Ang =	0.1
Approach Slope =	20 :1
51 DSPLCD THLD Dist =	170
Dsp Thr EI ref to RW End	1.33
Hard Surf RW (Y / N) =	Y
RW End to Appr Sur Dist	200.0

1.)	RW Mag Br	45.0
2.)	C/L Dep Br	225.0
3.)	LT Mag Br	135.0
4.)	RT Mag Br	315.0
5.)	Lt Boundary Mag Br	219.29
6.)	Rt Boundary Mag Br	230.71

(7) Dist From RW End (Y Coord) =

(8) CNTRL O/S to Appr Boundary (X Coord)

Eye HT above the RW End at Survey Sta Set Up

Measure Slope Distance to RW End =	4.88 (ft)
Measure VT Angle to RW End =	-90 (deg)

(9) Z Coordinate (Ht Abv Sur Sta in ref to RWY END)

$SD * (-\sin(\text{Ang})) =$ 4.9

Set Up Coor	X =	<u>0.0</u>	Back Sight	X bs=	<u>0.0</u>	DSP	X =
Survey Static	Y =	<u>0.0</u>	Sta Coord	Y bs=	<u>-170.0</u>	THR	Y =
Sta #	Z =	<u>5.0</u>	Sta#	BS Dir BR	<u>45.0</u>	Coord	Z =

(10) Record 3 Measurements:

	#52 OBJECT	Tree	fence	Build Corner
	#53 Obj (M/L)			L
a)	SD	<u>130</u>	<u>109</u>	<u>287</u>
b)	VT ANG	<u>8.3</u>	<u>1.6</u>	<u>3.3</u>
c)	Mag BR	<u>268.1</u>	<u>216</u>	<u>251</u>
		RW END	RW END	RW END
Item 54	Ht abv RW End =	<u>24.0</u>	<u>8.0</u>	<u>22.0</u>
Item 55	Dist _ RW End =	<u>94</u>	<u>108</u>	<u>258</u>
Item 56	= C/L OS dir	<u>88</u> L	<u>-16</u> R	<u>126</u> L
Item 57	= CLNC Slope			<u>2 :1</u>
		DSP THR	DSP THR	DSP THR
	Ht Abv DSP THR	<u>22.7</u>	<u>6.7</u>	<u>20.7</u>
	Dist From DSP THR	<u>264</u>	<u>278</u>	<u>428</u>
	CL OS dir	<u>88</u> L	<u>-16</u> R	<u>126</u> L
	Appr Slope TO DSP THR	<u>11 :1</u>	<u>41 :1</u>	<u>20 :1</u>

-1050

0.00

ft

0.00

170

3.7

Build Corner

RW END

5.0

0

0 R

DSP THR

3.7

170

0 R

46 :1

Field Work Survey Sheet (Mar 2022)

Part 77 RW Cat 18/36 = _____
 Primary Sur Wth = _____
 Approach Length = _____
 Flare Angle = _____
 Tan of Flare Ang = _____
 Approach Slope = _____
51 DSPLCD THLD Dist = _____
Dsp Thr EI ref to RW End _____
 Hard Surf RW (Y / N) = _____
 RW End to Appr Sur Dist _____

1.) **RW Mag Br** 180.0
 2.) C/L Dep Br 360.0
 3.) LT Mag Br 270.0
 4.) RT Mag Br 90.0
 5.) Lt Boundary Mag Br 360
 6.) Rt Boundary Mag Br 360

(7) **Dist From RW End (Y Coord) =** _____
 (8) **CNTRL O/S to Appr Boundary (X Coord)** _____

Eye HT above the RW End at Survey Sta Set Up

Measure Slope Distance to RW End = _____ (ft)
 Measure VT Angle to RW End = _____ (deg)

(9) **Z Coordinate (Ht Abv Sur Sta in ref to RWY END)** $SD * (-\sin(\text{Ang})) =$ 0.0

Set Up Coor	X =	_____	Back Sight	X bs=	_____	DSP	X =
Survey Statc	Y =	_____	Sta Coord	Y bs=	_____	THR	Y =
Sta #	Z =	_____	Sta#	BS Dir BR	_____	Coord	Z =

(10) Record 3 Measurements:

#52 OBJECT	_____	_____	_____
#53 Obj (M/L)	_____	_____	_____
a) SD	_____	_____	_____
b) VT ANG	_____	_____	_____
c) Mag BR	_____	_____	_____

Item 54 Ht abv RW End =	<u>0.0</u>	RW END	<u>0.0</u>	RW END	<u>0.0</u>	RW END
Item 55 Dist _ RW End =	<u>0</u>		<u>0</u>		<u>0</u>	
Item 56 = C/L OS dir	<u>0</u>	R	<u>0</u>	R	<u>0</u>	R
Item 57 = CLNC Slope	<u>#DIV/0!</u>		<u>#DIV/0!</u>		<u>#DIV/0!</u>	
Ht Abv DSP THR	<u>0.0</u>	DSP THR	<u>0.0</u>	DSP THR	<u>0.0</u>	DSP THR
Dist From DSP THR	<u>0</u>		<u>0</u>		<u>0</u>	
CL OS dir	<u>0</u>	R	<u>0</u>	R	<u>0</u>	R
Appr Slope TO DSP THR	<u>#DIV/0!</u>		<u>#DIV/0!</u>		<u>#DIV/0!</u>	

-1050

0.00

ft

0.00

0

0.0

RW END

0.0

0

0

R

#DIV/0!

DSP THR

0.0

0

0

R

#DIV/0!

