I·F·A·L·P·A
The Global Voice of Pilots

Runway Incursion: Pilots' Perspective

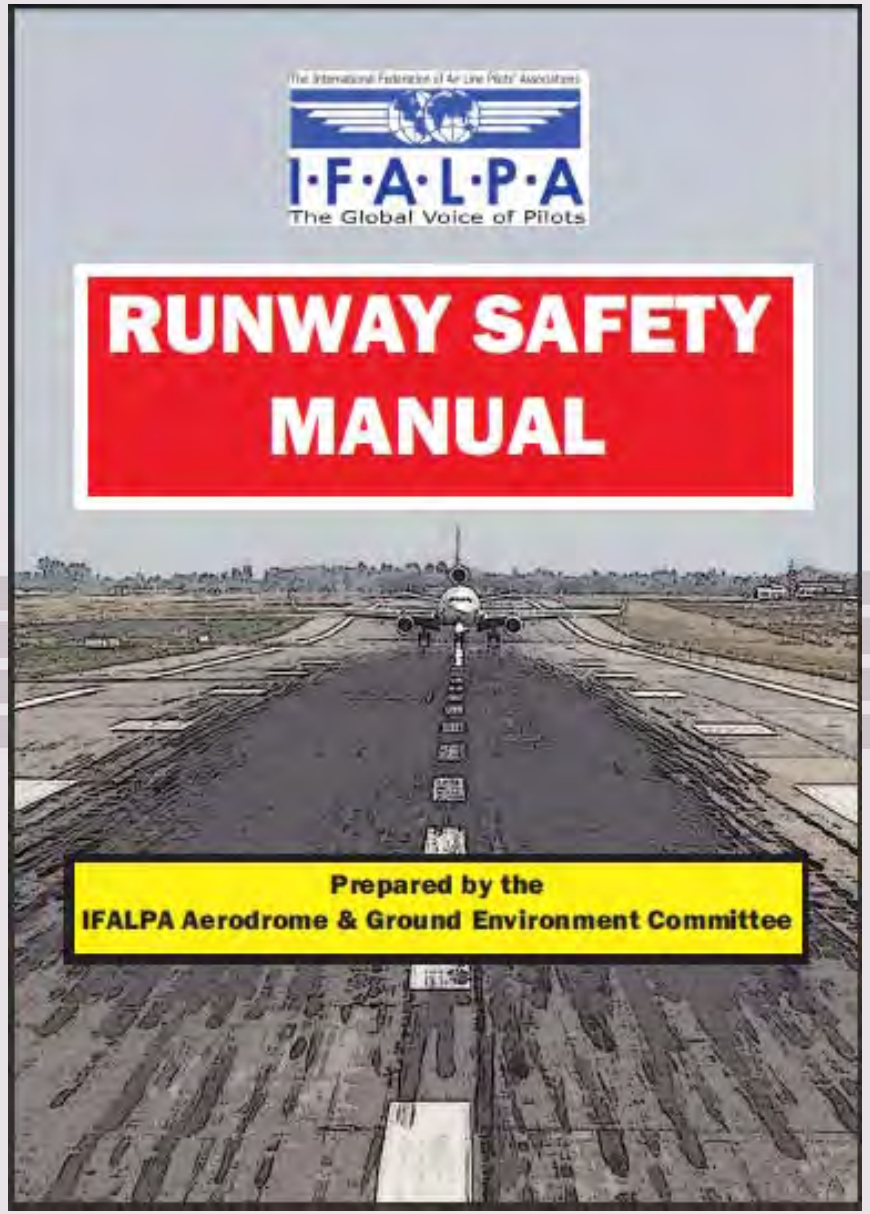
Captain Korn Mansumitchai
Executive Vice President (Asia/Pacific)

What is IFALPA?

- ***The International Federation of Air Line Pilots' Associations***
  - *Represents more than 100,000 pilots worldwide*
  - *Over 100 member associations*
  - *Permanent representation at the ICAO Air Navigation Commission*
  - *12 Specialist Committees*

IFALPA's Mission

The Mission of IFALPA is to be the global voice of professional pilots by providing representation, services and support in order to promote the highest level of aviation safety worldwide.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The Global Voice of Pilots
RUNWAY SAFETY MANUAL
Prepared by the
IFALPA Aerodrome & Ground Environment Committee

Runway Incursions: Today's Main Topics

- Communications Hazards
- Operational Hazards
- Visibility Hazards
- Airport Design Hazards
- Construction Hazards

Runway Incursions

Tenerife-The Worst Disaster in Aviation History

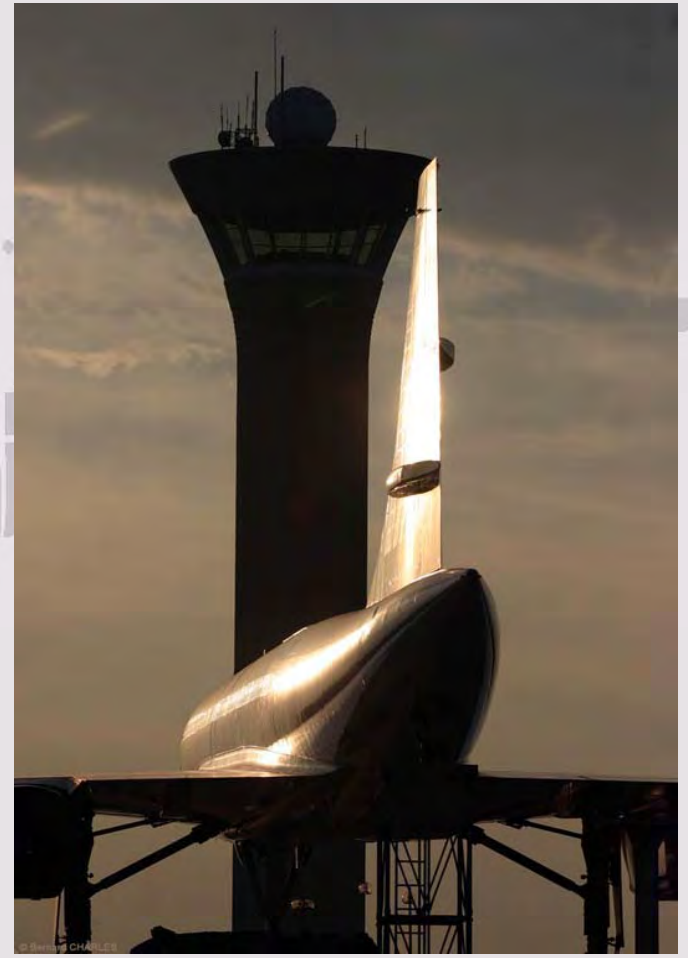

MD80/Citation runway collision, Milan – 2001
118 Dead

ICAO Definition

- Definition of Runway incursion:
  - ***Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft.***

Runway Incursions happen

- When situational awareness is lost because
- Errors are not caught in time
- Communications breakdown



… when humans err

- Pilots and Drivers entering or crossing a runway without a valid clearance
- Air Traffic Controllers giving a clearance to enter or cross an occupied runway

Runway Incursions

There are Three Types of Runway Incursions

Operational Errors — Air Traffic Controllers

Pilot Deviations — Commercial, General Aviation & Military

Vehicle & Pedestrian Deviations — Airport Authority Vehicles, ARFF (Fire Trucks), Tugs, Tenants' Personal Cars, Delivery Trucks, , Trash Trucks, Construction Vehicles, Pedestrians, Law Enforcement, Sightseers, etc.

It's still happening!

Runway Incursion Totals by quarter FY2011 vs. FY2010

Print Email

1st-QTR 2011

MONTH	OE/D	PD	VPD	TOTAL
OCT	10	43	19	72
NOV	16	46	10	72
DEC	13	45	13	71
Totals:	39	134	42	215

1st-QTR 2010

MONTH	OE/D	PD	VPD	TOTAL
OCT	13	41	11	65
NOV	6	54	9	69
DEC	7	36	15	58
Totals:	26	131	35	192

2nd-QTR 2011

MONTH	OE/D	PD	VPD	TOTAL
JAN	17	47	15	79
FEB	14	56	15	85
MAR	17	52	13	82
Totals:	48	155	43	246

2nd-QTR 2010

MONTH	OE/D	PD	VPD	TOTAL
JAN	9	41	18	68
FEB	11	43	13	67
MAR	11	61	13	85
Totals:	31	145	44	220

3rd-QTR 2011

MONTH	OE/D	PD	VPD	TOTAL
APR	15	59	20	94
MAY	21	47	5	73
JUN	12	47	31	90
Totals:	48	153	56	257

3rd-QTR 2010

MONTH	OE/D	PD	VPD	TOTAL
APR	19	55	16	90
MAY	13	54	15	82
JUN	17	63	18	98
Totals:	49	172	49	270

4th-QTR 2011

MONTH	OE/D	PD	VPD	TOTAL
JUL	17	46	12	75
AUG	11	42	15	68
SEP	15	63	15	93
Totals:	43	151	42	236

4th-QTR 2010

MONTH	OE/D	PD	VPD	TOTAL
JUL	19	69	16	104
AUG	21	64	19	104
SEP	10	48	18	76
Totals:	50	161	53	284

YEAR	OE/D	PD	VPD	TOTAL
Totals:	178	593	183	954

YEAR	OE/D	PD	VPD	TOTAL
Totals:	156	629	181	966

Data valid through 18-May-2012

Runway Incursion Totals by quarter FY2012 vs. FY2011

Print Email

1st-QTR 2012

MONTH	OE/D	PD	VPD	TOTAL
OCT	13	57	14	84
NOV	15	52	18	85
DEC	11	36	10	57
Totals:	39	145	42	226

1st-QTR 2011

MONTH	OE/D	PD	VPD	TOTAL
OCT	10	43	19	72
NOV	16	46	10	72
DEC	13	45	13	71
Totals:	39	134	42	215

2nd-QTR 2012

MONTH	OE/D	PD	VPD	TOTAL
JAN	18	49	13	80
FEB	0	49	10	70
MAR	1	66	21	109
Totals:	19	164	44	259

2nd-QTR 2011

MONTH	OE/D	PD	VPD	TOTAL
JAN	17	47	15	79
FEB	14	56	15	85
MAR	17	52	13	82
Totals:	48	155	43	246

3rd-QTR 2012

MONTH	OE/D	PD	VPD	TOTAL
APR	0	50	16	83
MAY	0	6	2	12
JUN				0
Totals:	0	56	18	95

3rd-QTR 2011

MONTH	OE/D	PD	VPD	TOTAL
APR	15	59	20	94
MAY	21	47	5	73
JUN	12	47	31	90
Totals:	48	153	56	257

4th-QTR 2012

MONTH	OE/D	PD	VPD	TOTAL
JUL				0
AUG				0
SEP				0
Totals:	0	0	0	0

4th-QTR 2011

MONTH	OE/D	PD	VPD	TOTAL
JUL	17	46	12	75
AUG	11	42	15	68
SEP	15	63	15	93
Totals:	43	151	42	236

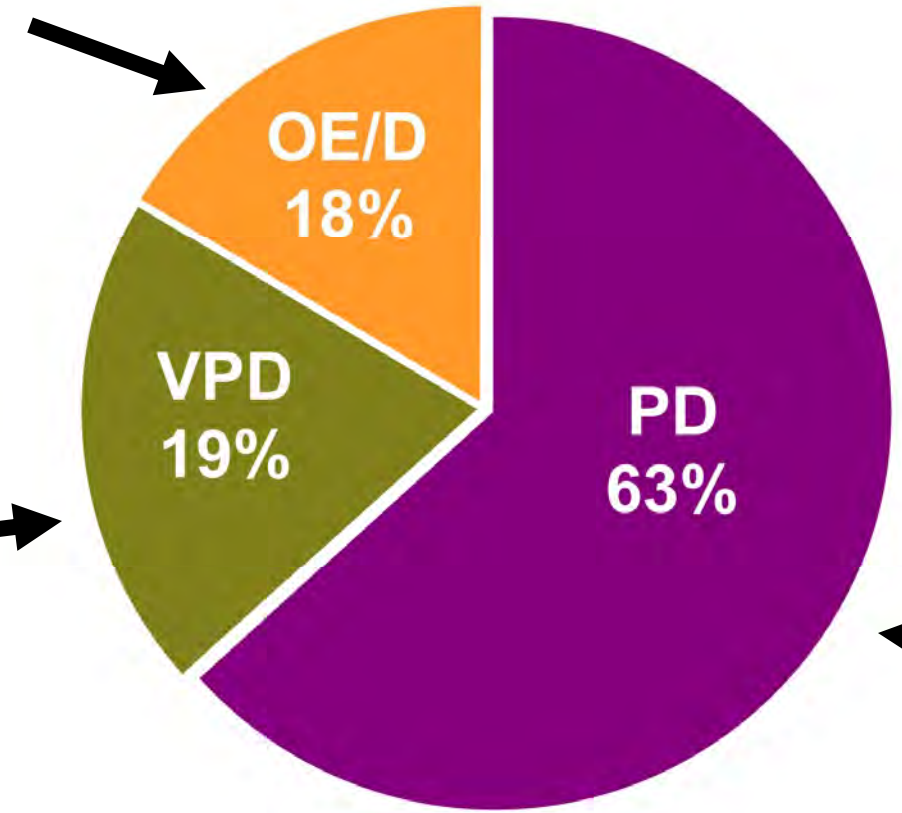
YEAR	OE/D	PD	VPD	TOTAL
Totals:	58	365	104	580

YEAR	OE/D	PD	VPD	TOTAL
Totals:	178	593	183	954

Data valid through 18-May-2012

Distribution by Type of Runway Incursions

AIR TRAFFIC CONTROLLERS



PD – 593
OE – 178
V/PD – 283

TOTAL 954

VEHICLE DRIVERS, PEDESTRIANS, AIRCRAFT BEING TOWED OR TAXIED BY MECHANICS

PILOTS

FY 2011

Contributory factors

- Controllers - more than one position
- Crew not familiar with the airport
- Deficient markings, signage and lighting
- Multiple rwy ops - closely spaced parallel
- Misapplied conditional clearance
- Inadequate driver training

Communication

Language Proficiency: The Trail of Wreckage

- Trident/DC-9 mid-air collision, Zagreb -1976
- Double B747 runway collision, Tenerife - 1977
- B707 fuel exhaustation, JFK - 1990
- B757 CFIT, Cali - 1995
- IL-76/B747 mid-air collision, India - 1996
- MD83/Shorts 330 runway collision, Paris/CDG -2000
- MD80/Citation runway collision, Milan - 2001
- …

  - The common element:
  - Lack of English language proficienc

Source: ADREP

Communication Hazards

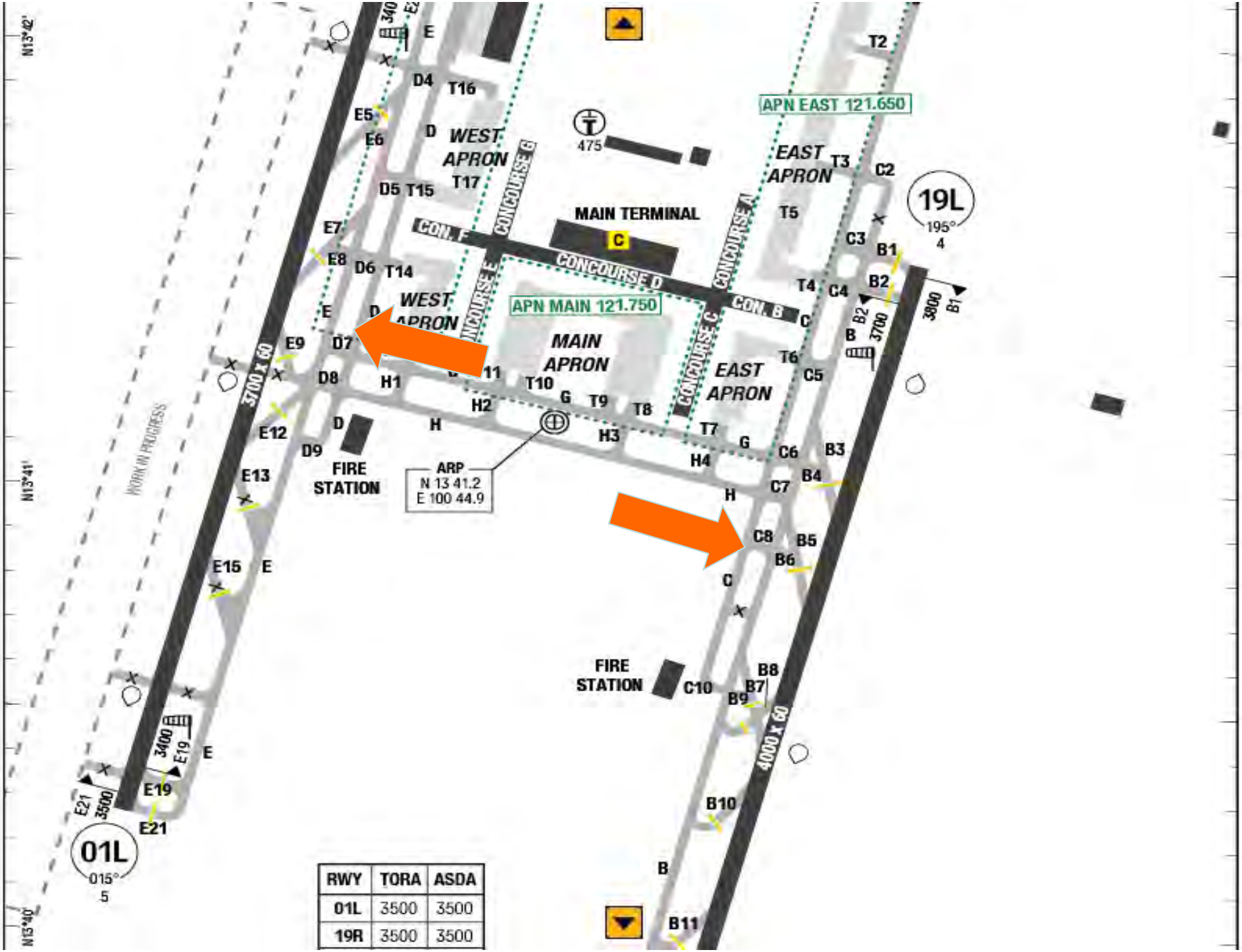
- Quality
  - Standard phraseology is not always used
  - Reception is not always clear
  - Frequency congestion – an increasing factor at many airports
- Flight crews must often communicate simultaneously with multiple people
  - Flight deck: checklists and briefings
  - Cabin crew: passenger safety or technical issues
  - Dispatch, AIRINC or other services related to operational issues
- Multiple tower / ground frequencies

Use ICAO Aviation English!

Conditional Clearances

Operational Hazards

- Workload issues that must be managed during taxi-out:
  - Completion of pre-departure checklists
  - Second engine start requirements
  - Coordinating amended ATC clearances
  - Complex taxi routing
- All have the potential to contribute to incursion risks



RWY	TORA	ASDA
01L	3500	3500
19R	3500	3500

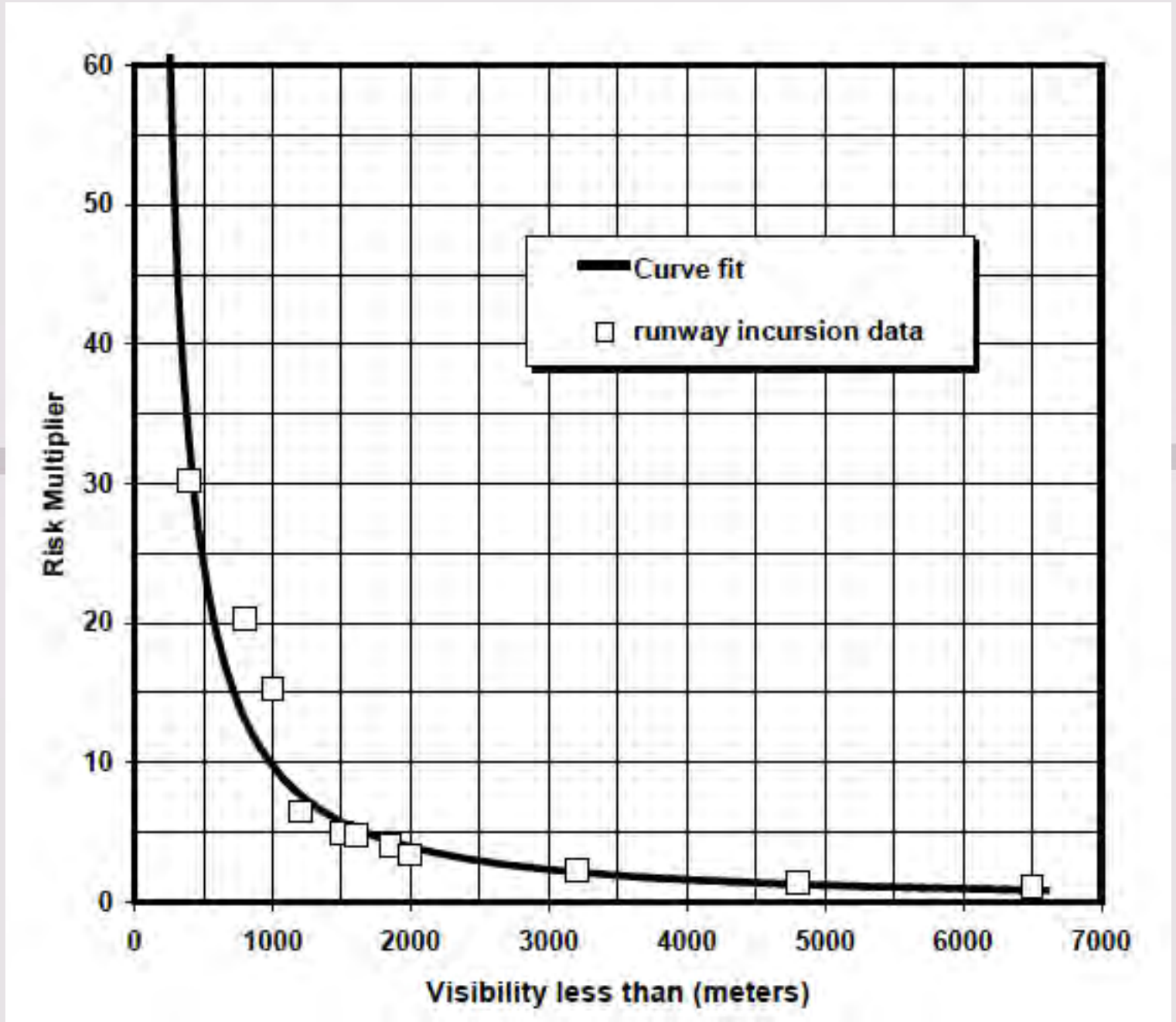
Cessna 441 Entered the Runway as an MD-80 was Departing

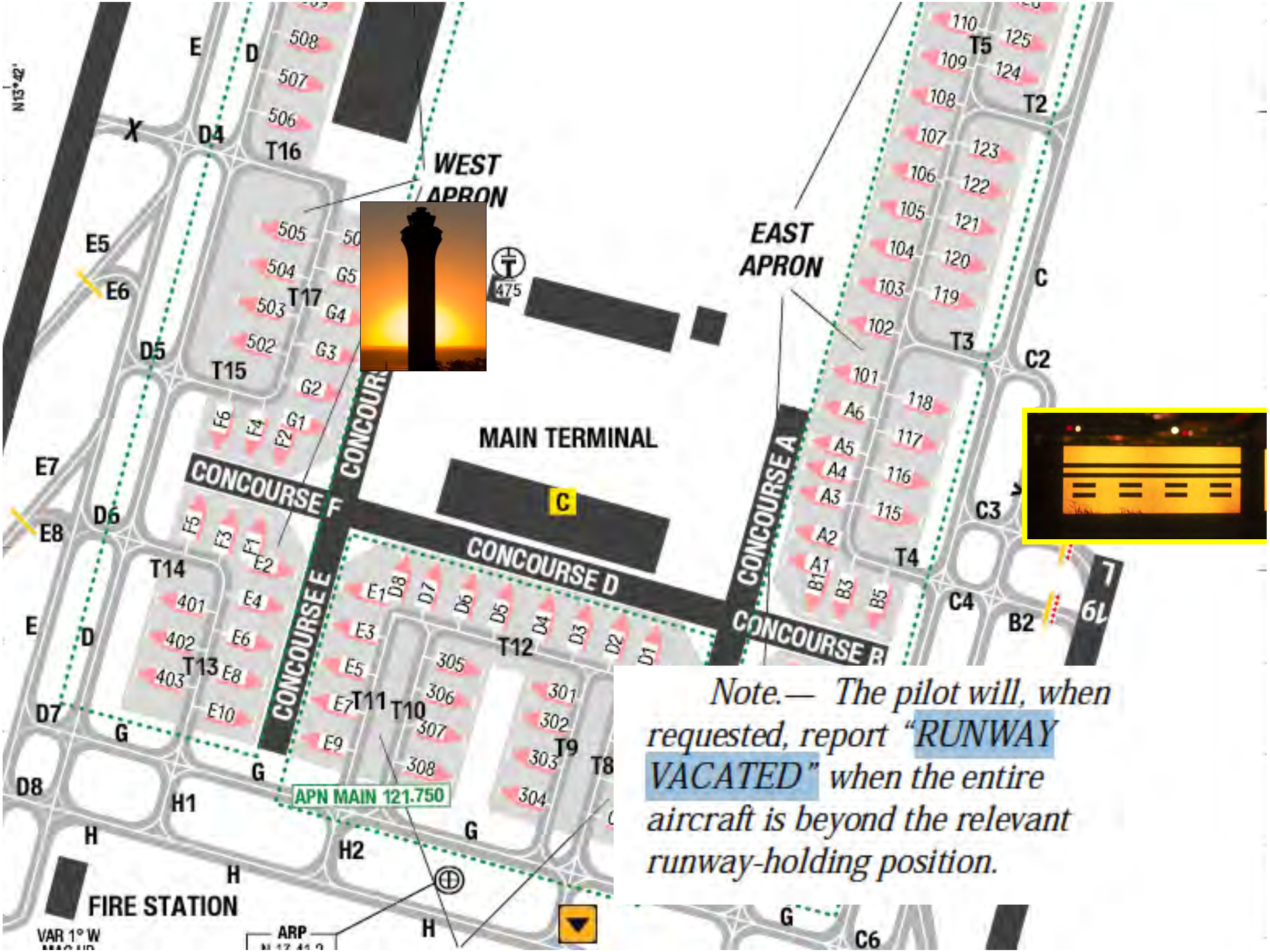
King Air and a B1900 “Met” at the Intersection of Two Runways

Visibility Hazards

- Flight crew disorientation
- CAT III landings have become routine, but the aircraft must still be taxied manually in low visibility operations
- Not only due to fog or other “low visibility” phenomena
- Visibility may be an issue in clear weather due to glare or reflection (snow or water) – potential for confusion issues when landing on closely spaced parallel runways
- Visibility hazards generally increase pilot workload and is a common contributing factor to incursion risk

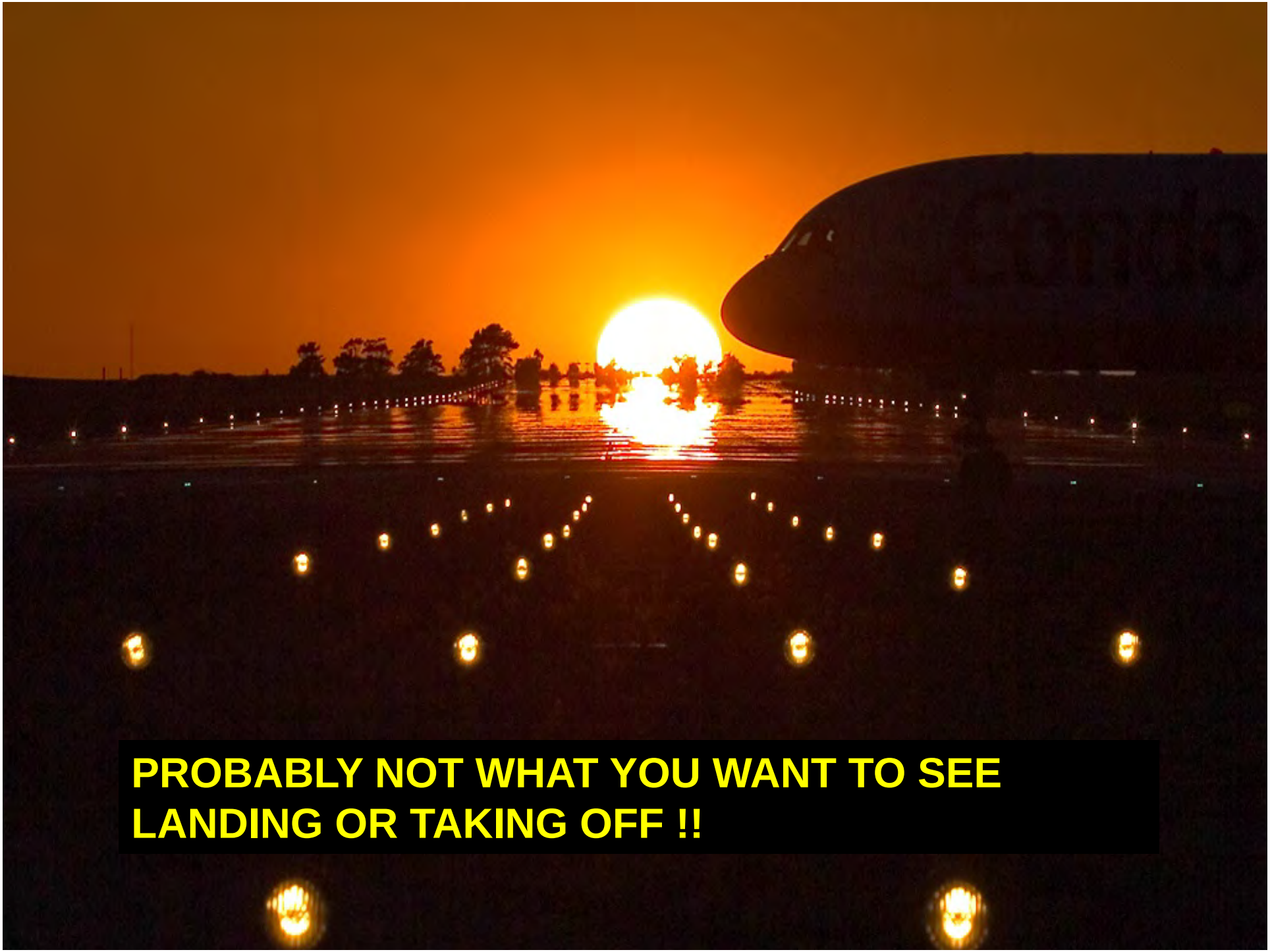
Visibility Hazards


60
50
40
30
20
10
0
Risk Multiplier
Curve fit
runway incursion data
0
1000
2000
3000
4000
5000
6000
7000
Visibility less than (meters)


WEST APRON
EAST APRON
MAIN TERMINAL
CONCOURSE F
CONCOURSE E
CONCOURSE D
CONCOURSE A
CONCOURSE B
C
T1
T2
T3
T4
T5
T9
T10
T11
T12
T13
T14
T15
T16
T17
APN MAIN 121.750
FIRE STATION
ARP
VAR 1° W
475
Note.— The pilot will, when requested, report "RUNWAY VACATED" when the entire aircraft is beyond the relevant runway-holding position.

…the HOLD POSITION SIGN May Be the <u>ONLY</u> Indication You Are Approaching the RUNWAY SAFETY AREA and the HOLD POSITION !!!

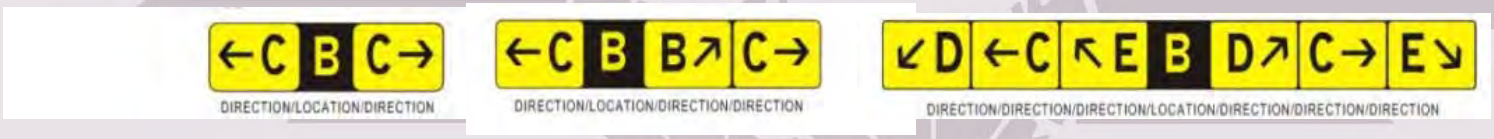

Where is the Hold Short Sign?
D
36-18
Where is the Hold Short Marking?
Low Sun Angles and Glare Can Drastically Affect Visibility of HOLD SHORT POSITIONS


PROBABLY NOT WHAT YOU WANT TO SEE
LANDING OR TAKING OFF !!

Signage

Signage may be complex, inadequate or not clearly visible

- Complexity



- Bad positioning / bad environment

Markings

Why are markings so important to pilots?

- Permanent
- Can’t be blown away
- Allow for low visibility operations

Markings

Pop quiz?

The three most important things about painted markings are?

Markings

Contrast

Contrast

Contrast

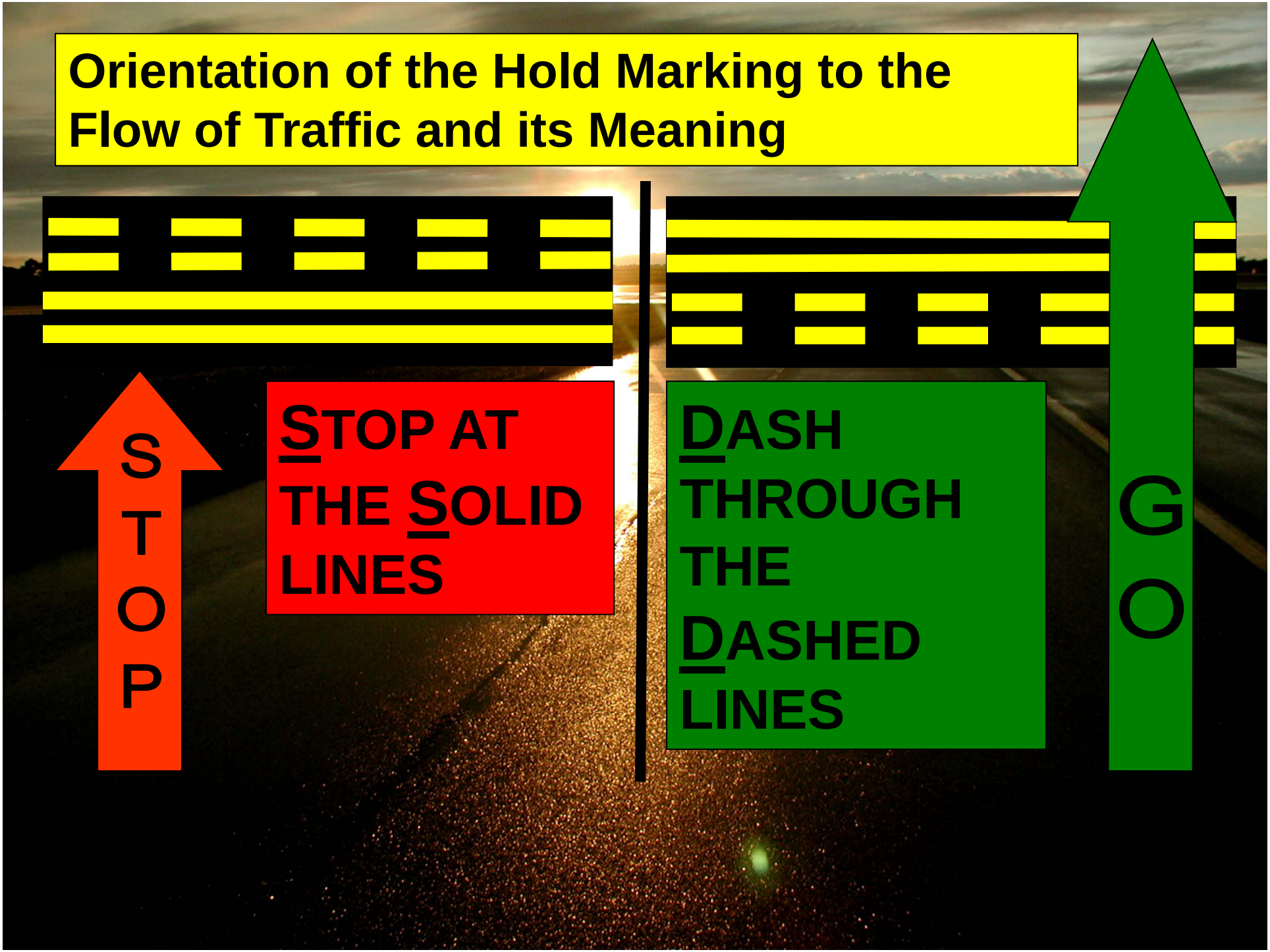
Markings

Let us take a look at some of examples of why contrast and many other aspects of signs and markings is so important

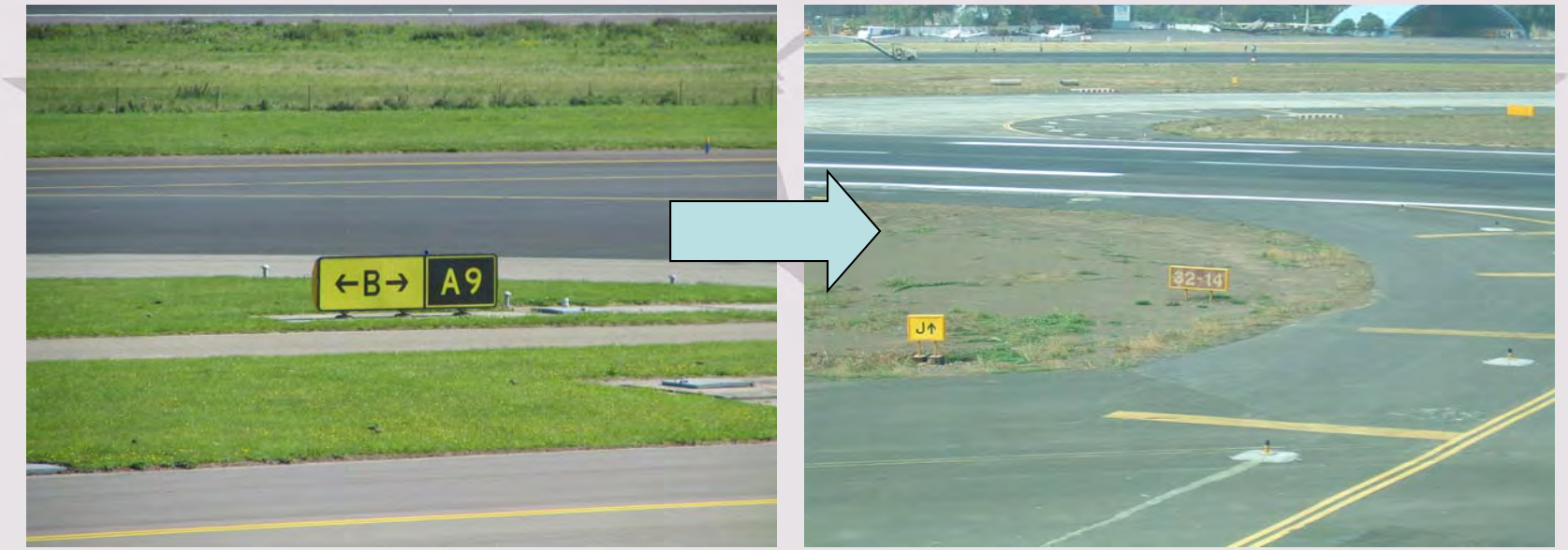

Uncontrasted Hold Bar
Look Hard it's Here!


This is much better!

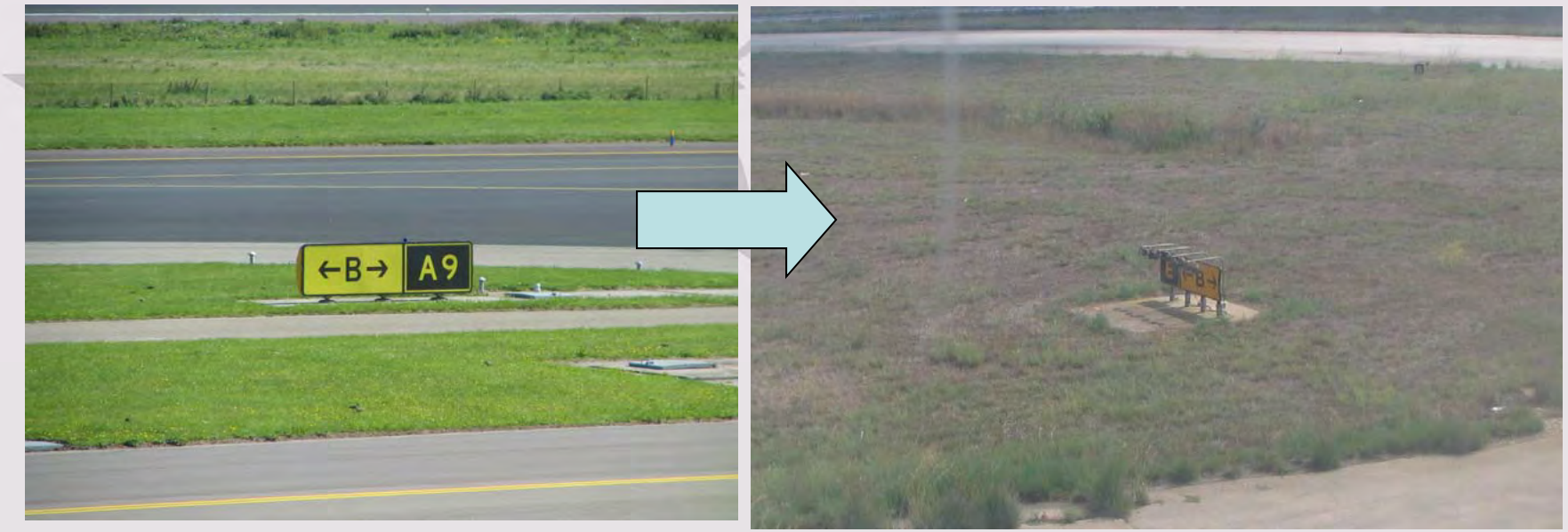

Which side is Runway?


Orientation of the Hold Marking to the Flow of Traffic and its Meaning
STOP
STOP AT THE SOLID LINES
DASH THROUGH THE DASHED LINES
GO

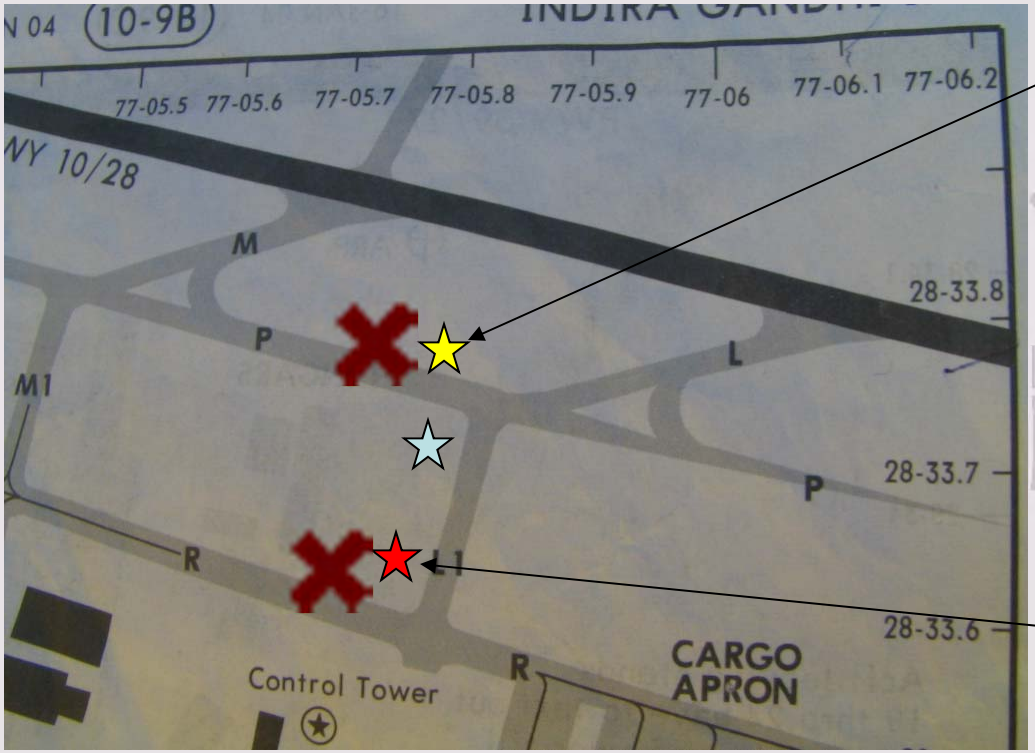
Signs are signs but……



Signs are signs but……



Signs Position!



What is the yellow “x” for?

Where do we go from here?

Understanding Sign Placement

- Signs are placed to convey a message
- Highway signs follow a different philosophy from Aeronautical ground signs
- Highway signs: “This way to xxxx”
- Aeronautical signs:

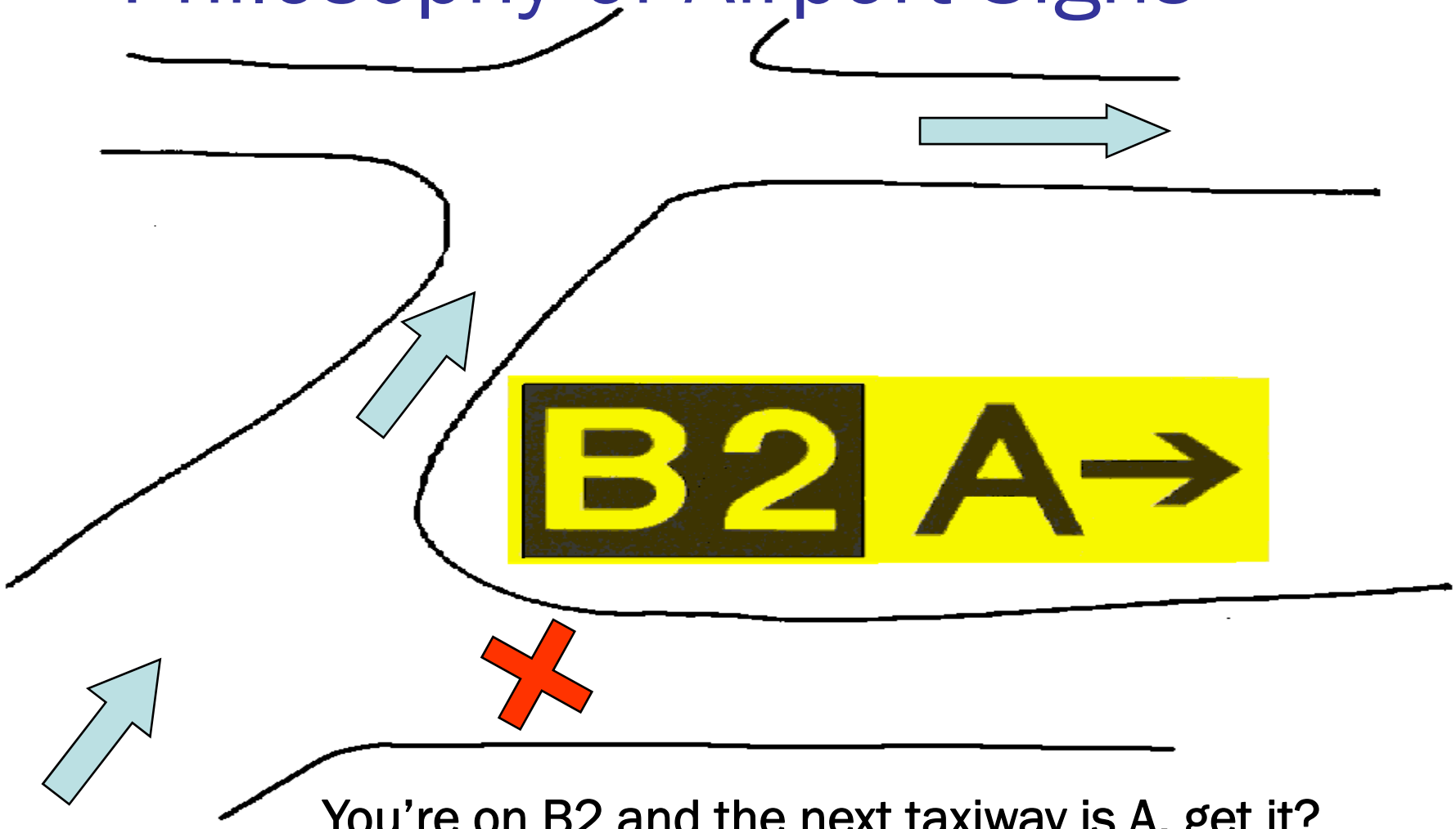
“You are here” + “The next way is xxxx” (Location+Direction)

- Human Factors: Stress and confusion

Philosophy of Highway Signs

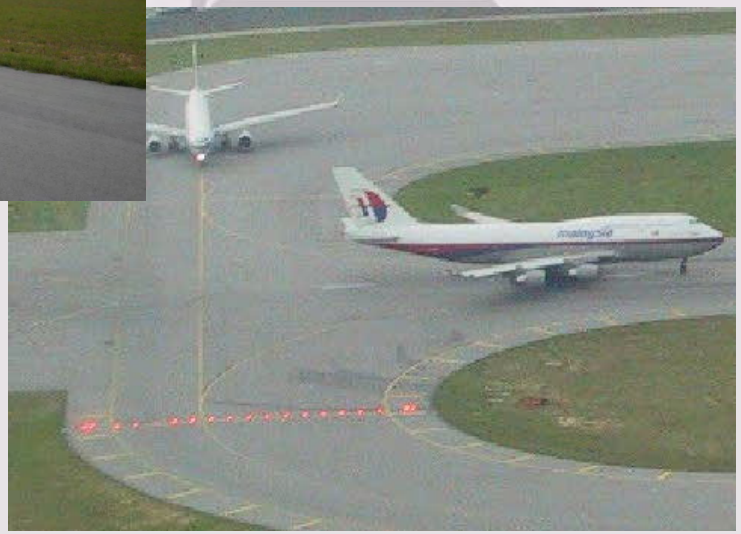
Please turn here, before the sign

Philosophy of Airport Signs



You're on B2 and the next taxiway is A, get it?

Ensure All Runway Markings, Signage & Holding Points Comply with ICAO



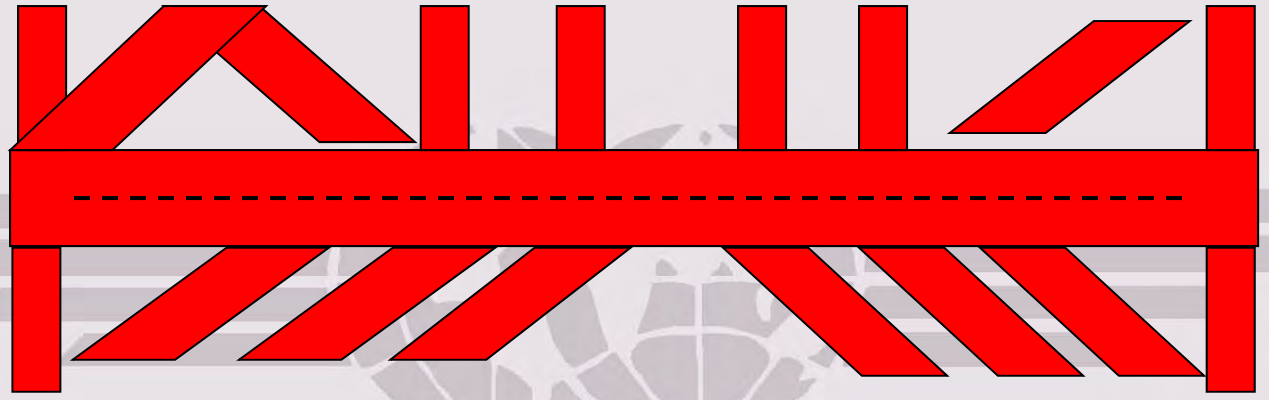
SO… Now What Do YOU LOOK FOR???

To Aid or Confuse?

Airport Design Hazards

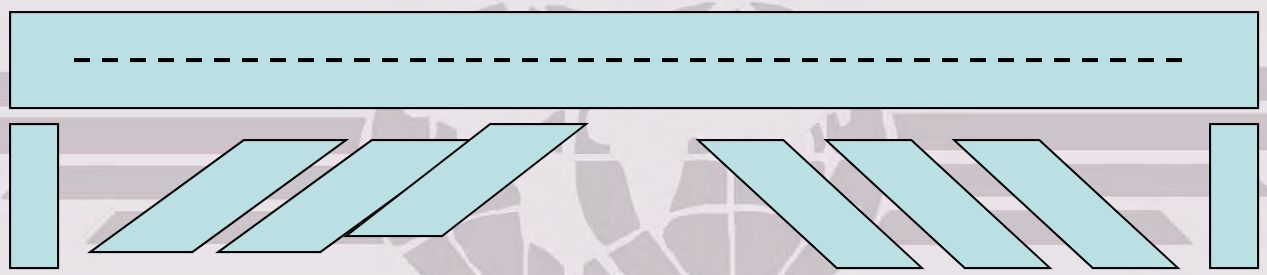
- Multiple runway and taxiway intersections
- Converging intersections at various angles
- Closely spaced parallel runways
  - Failure to hold short after landing
  - Runway confusion risk, especially for low visibility landing operations
- Runways in close proximity to terminal aprons

Bad design

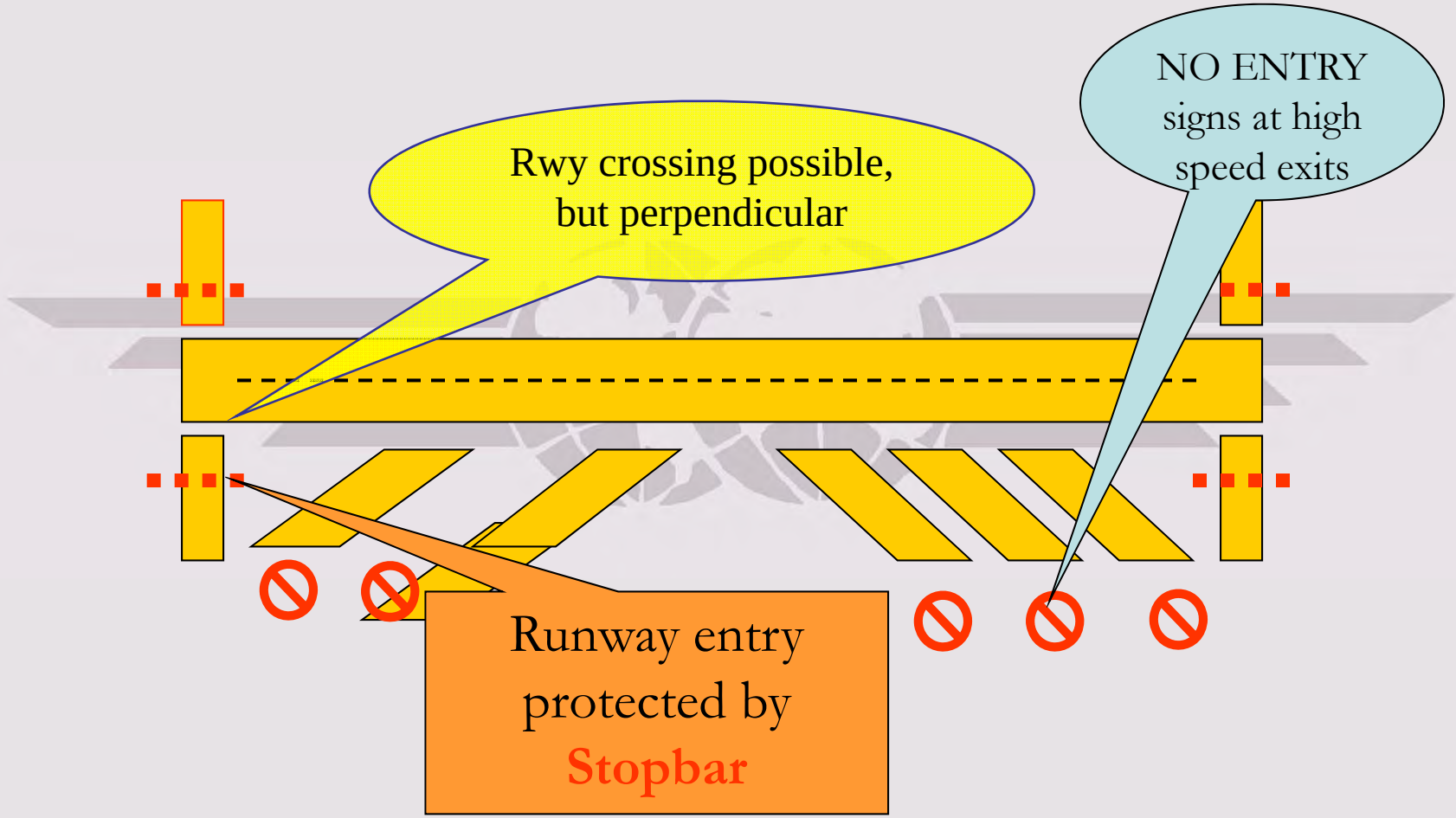


Lesson 1:Design Out The Hazard!

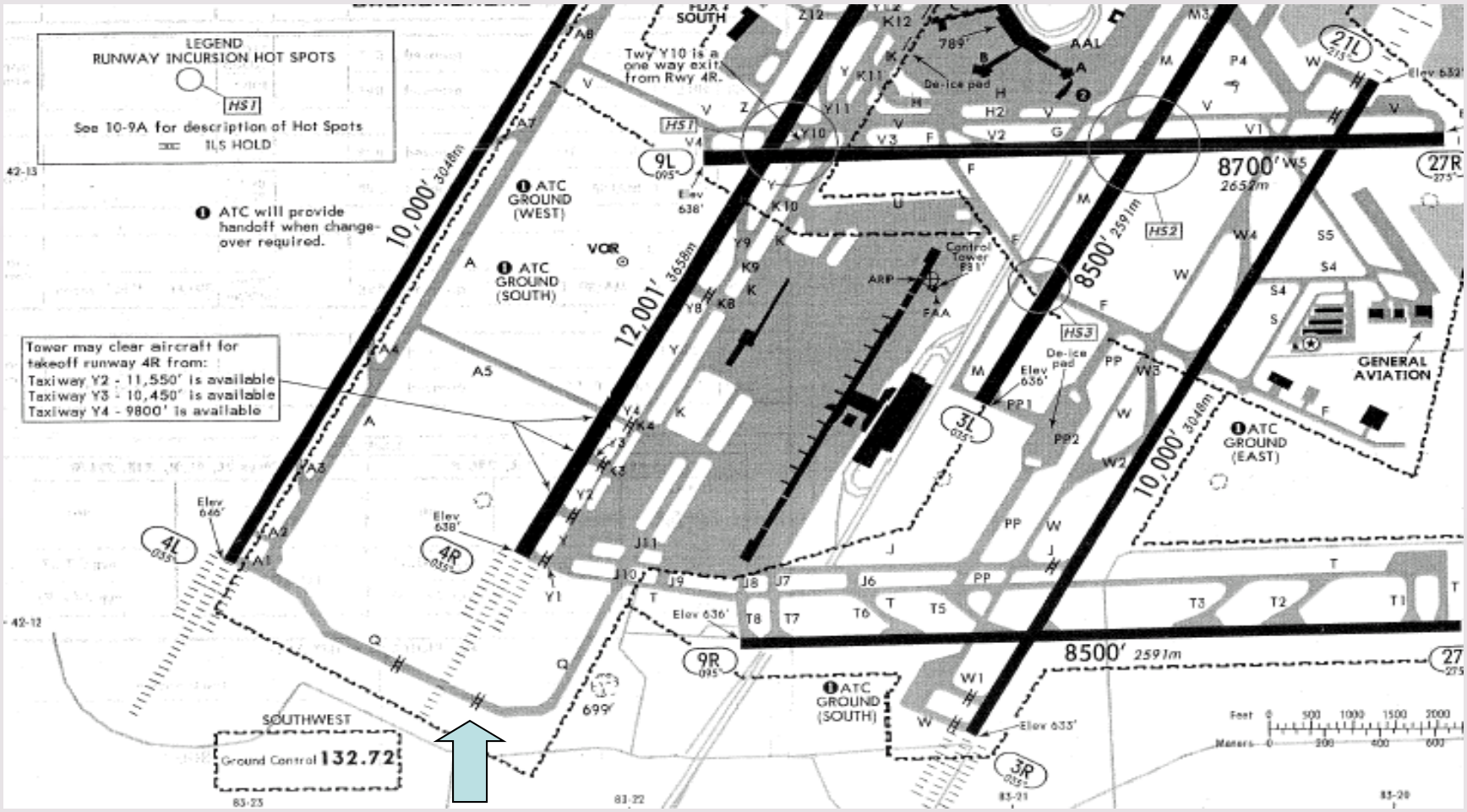
Good design



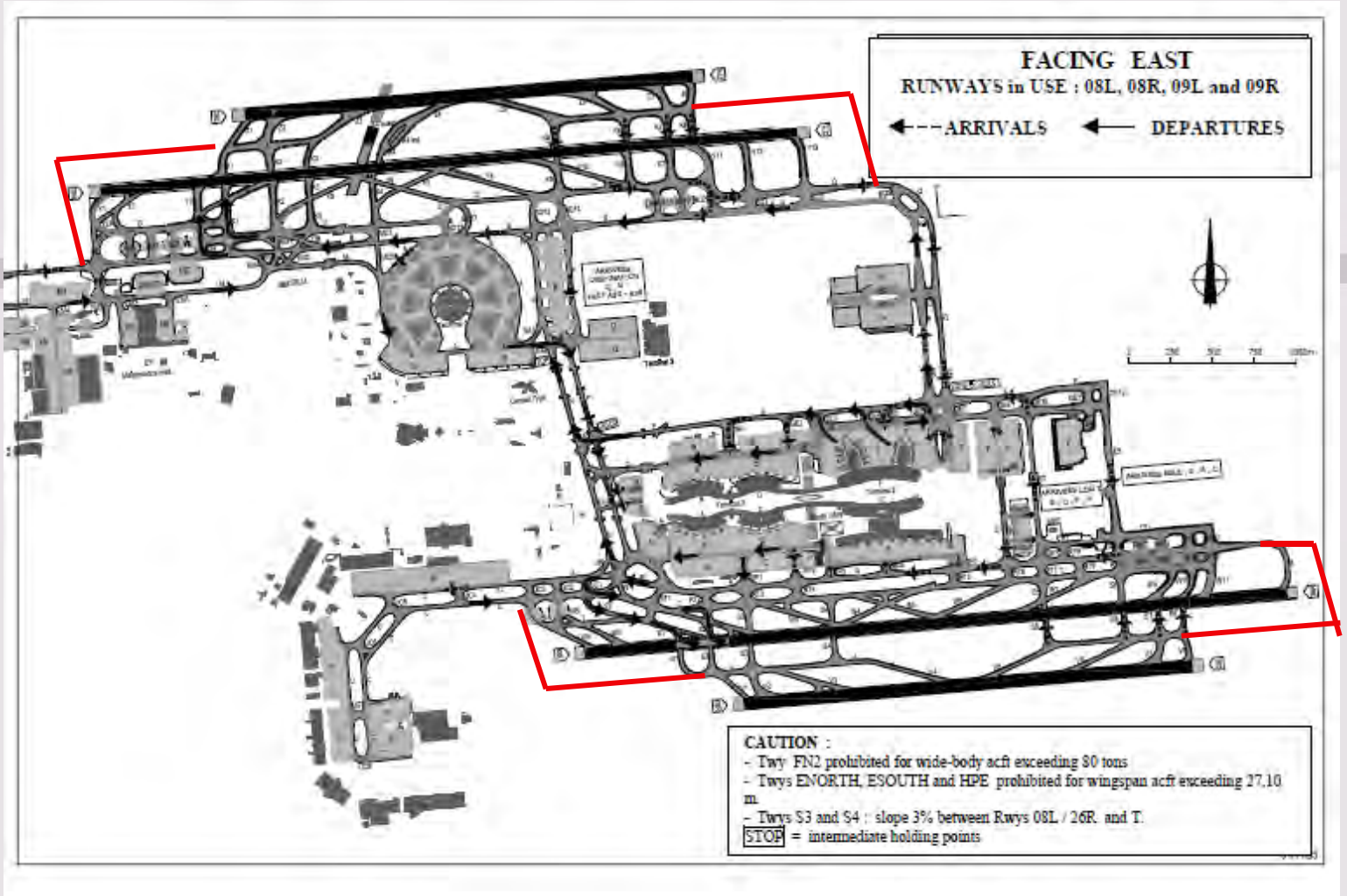
Cautious design



Perimeter Taxiway



DESIGN OUT avoid runway crossing by perimeter taxiways



LOW ENERGY crossing

Airport Design<->Procedures

"GOOD airport design beats Airport, ATC and Cockpit procedures."

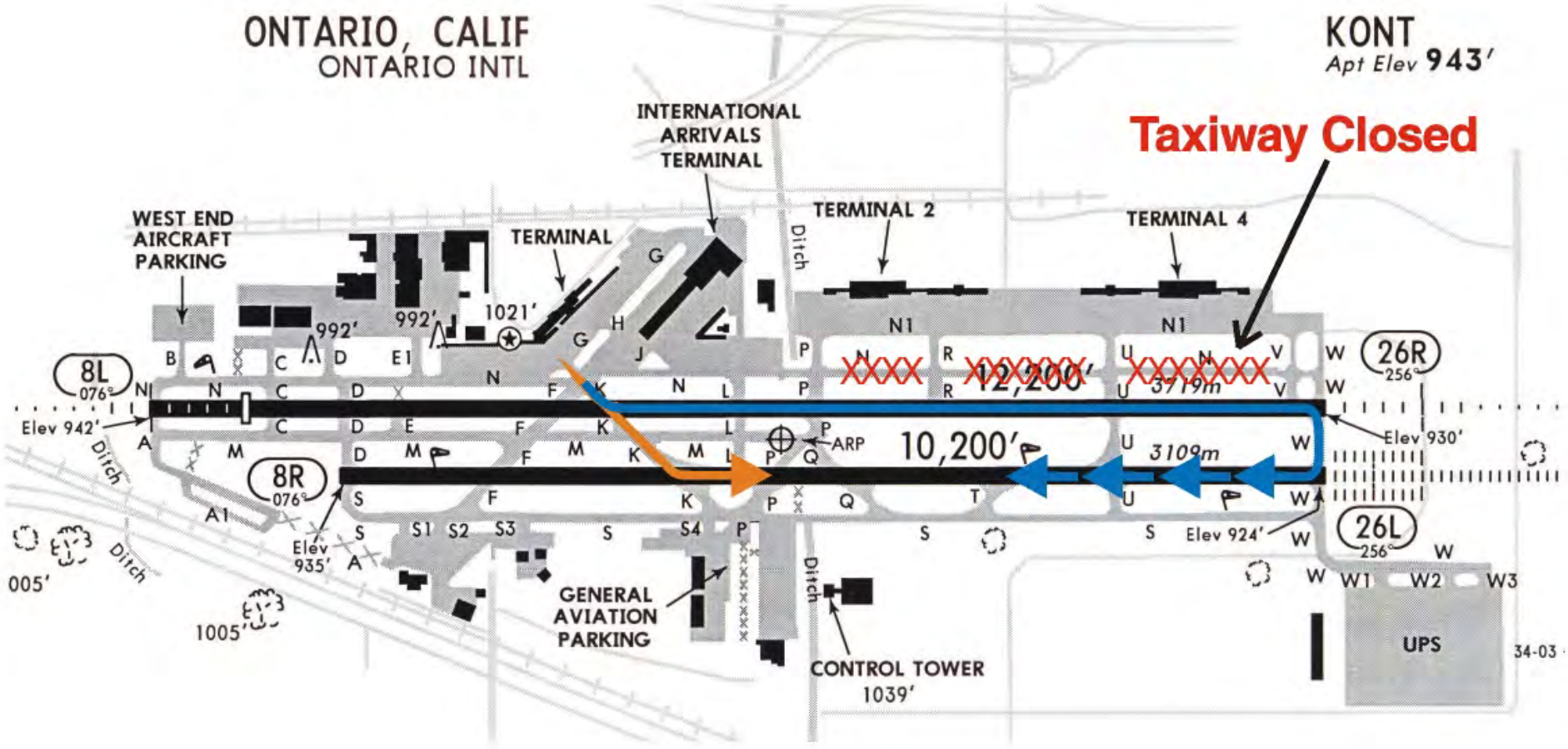
Construction Hazards

Hazards appear when part of the airport becomes non-operational

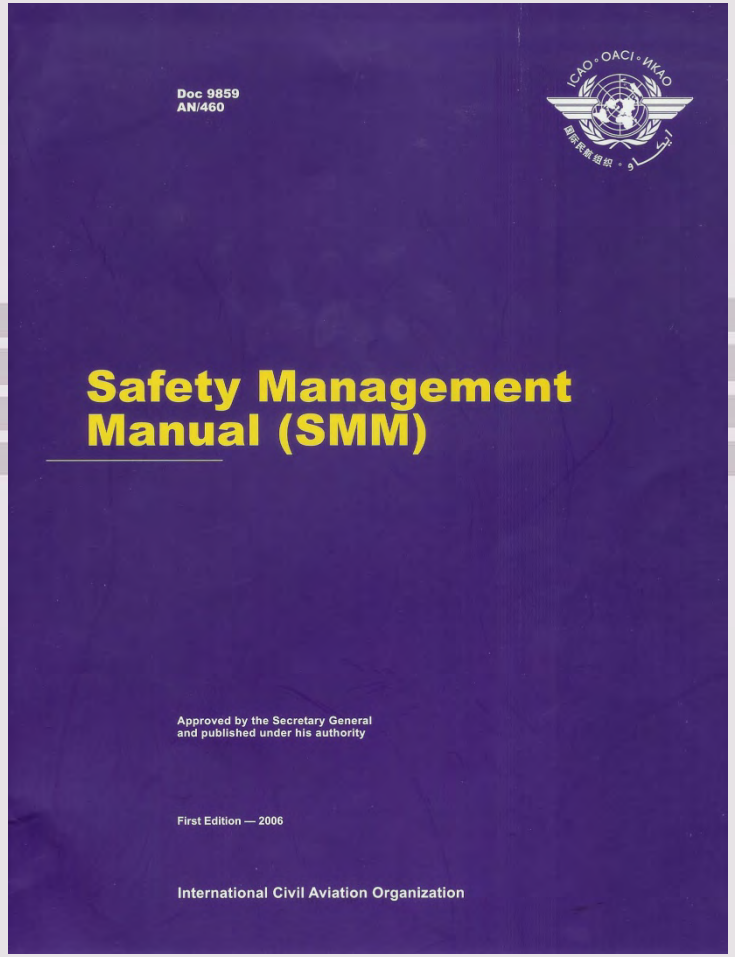
- Non-routine operations necessitating use of unfamiliar taxi routes
- Taxi routes that may result in more frequent runway crossings more frequently due to closed taxiways
  - The more crossings, the higher the incursion risk
- Increased use of intersection take-offs
- Runway confusion – potential for operations on closed runways

Do not use runways as taxiways and vice versa!

EASY TO BECOME CONFUSED!



Carry Out a Safety Risk Assessment



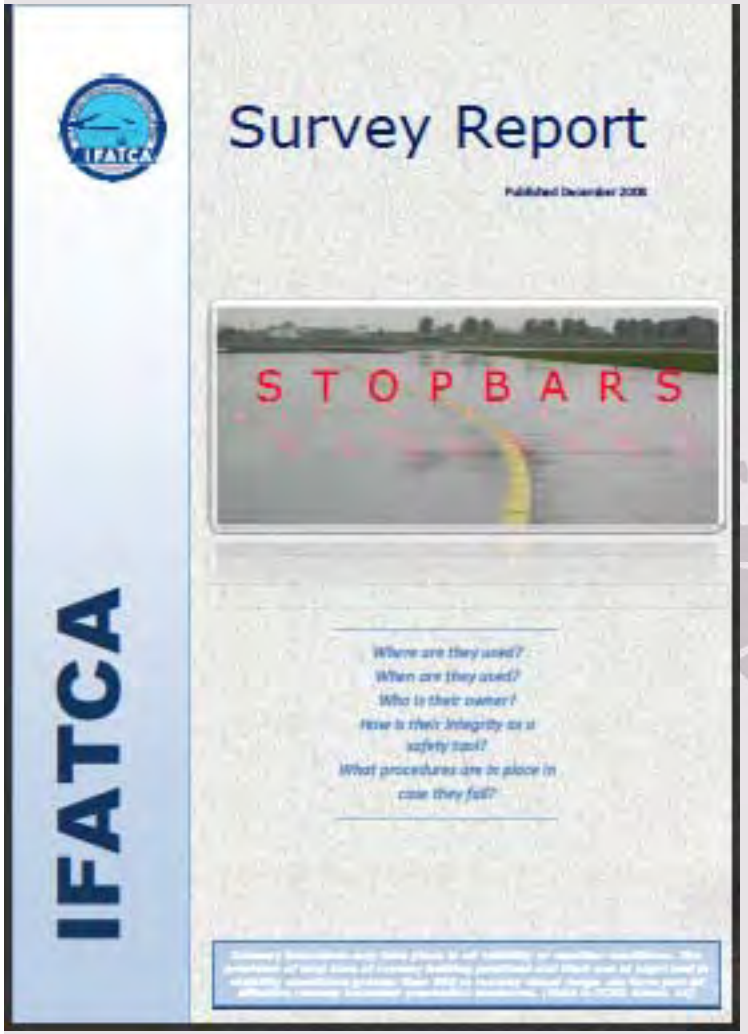
Just Culture

- How can we have the non-punitive reporting system in this region
- How is the feedback channeled to the relevant authority
- How can we changed the system in States such as Italy where many individuals identified in Milan Linate accident in 2001 were issued jail terms

LRST- Some things that you can do!

- Take offs and (Runway crossings) only at perpendicular entries
- Runway entries protected by stopbar (Traffic light principle-Do not Cross!)
- Runway exits protected by no entry signs
- Do not use Runways as taxiways (+ vv)
- Produce “Hot Spot”Charts
- ICAO Markings, Signage and Lighting

Stopbar used as traffic lights



- 70 A/Ps in 29 countries
- Inconsistent and insufficient ICAO provisions
- 56 A/P has STOPBAR
- 6 Permanently ON
- 23 Used only in LVP
- 8 only use during NIGHT
- No contingency procedure
- R/T vs. Follow-me Car

Stop Bars mean STOP

Stop Bars are a final safety net in runway incursion prevention – NEVER cross a red stop bar

Runway Safety Focal Group

Contingency for U/S stop bars

What are pilots to do?

- Challenge!
- Work with the airport to ensure alternative access
- Develop proper procedures
- Request a marshaller/”Follow Me”

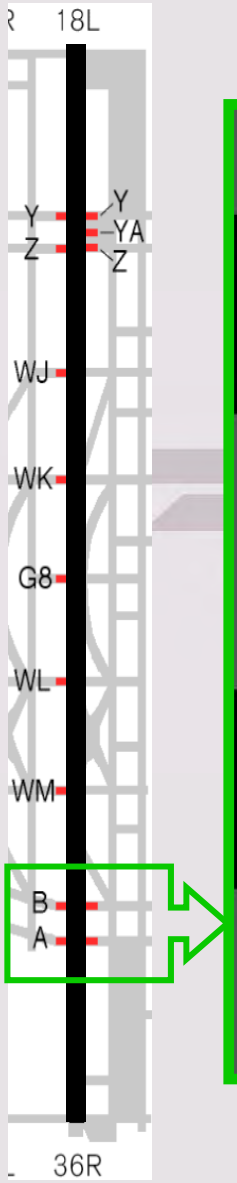
Make Sure Closed Runways are properly marked and signed

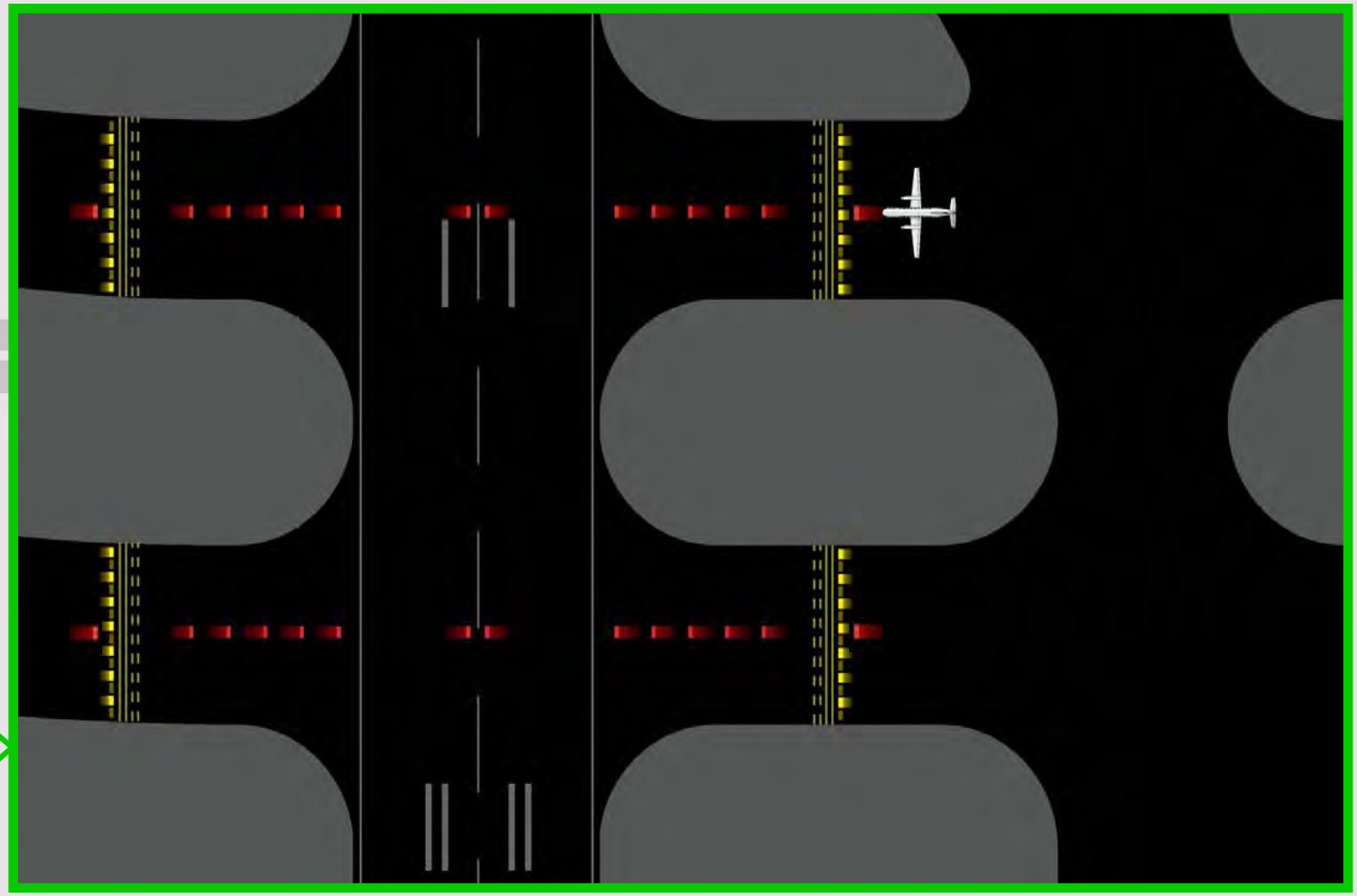
Identify+ Notify “Hot Spots”

Better still; fix the problem!

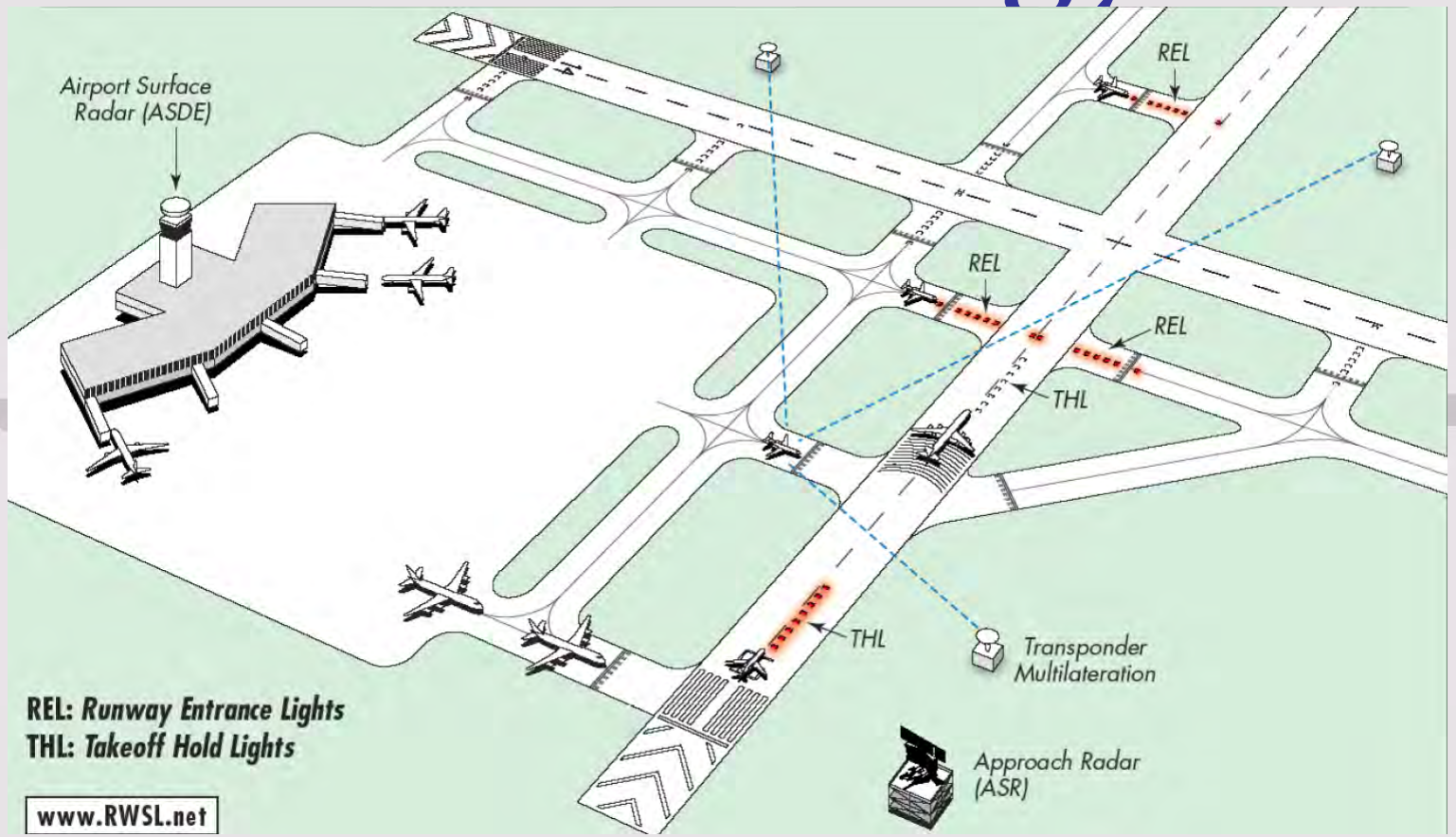
Runway Status Lights (RWSL)

If Lights are RED, Stop.





Technology



- RELs and THLs turn on and off automatically, driven by fused multi-sensor surveillance
- RELs turn on when it is unsafe to enter runway; visible from taxi hold position
- THLs turn on when it is unsafe to takeoff; visible from takeoff hold position (and final)

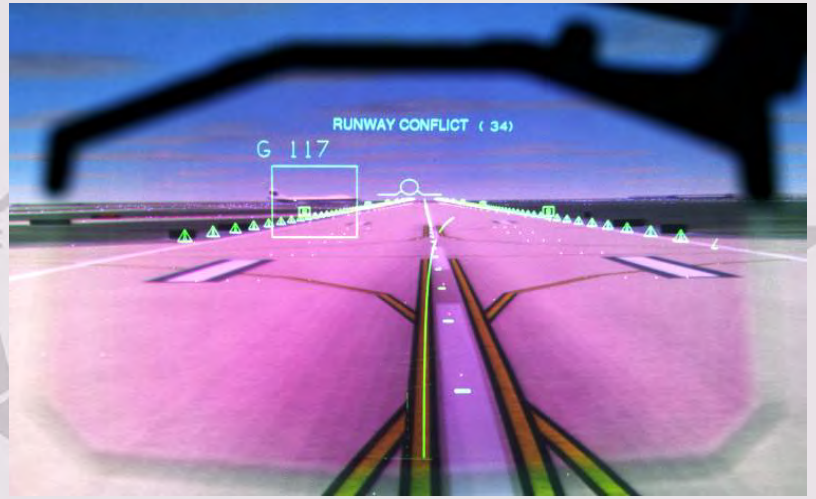
New Technology
Ground Marker Project

- Description
  - Provides a voice message to the cockpit indicating precise surface location via existing avionics
  - Extends ILS marker system to surface (i.e., ground marker)

Existing Technology- Runway Incursion Monitoring and Conflict Alert System

- Safety net detects conflict
- Passed to controller
- Understood by Controller
- Decide on recovery actions
- Pass to Pilot(s)

What is needed



Simultaneous positional information
Simultaneous proximity warning for Pilots, Controllers and Drivers

Technology is only part of the answer
Pilots can do more for safety,
but not everything !

For the most success…

Work as a Local Runway Safety Team!

Airport Liaison Representative Programme

Objective:

To enhance SAFETY and EFFICIENCY at airports served by ALL IFALPA pilots!

Airport Liaison Representative Programme

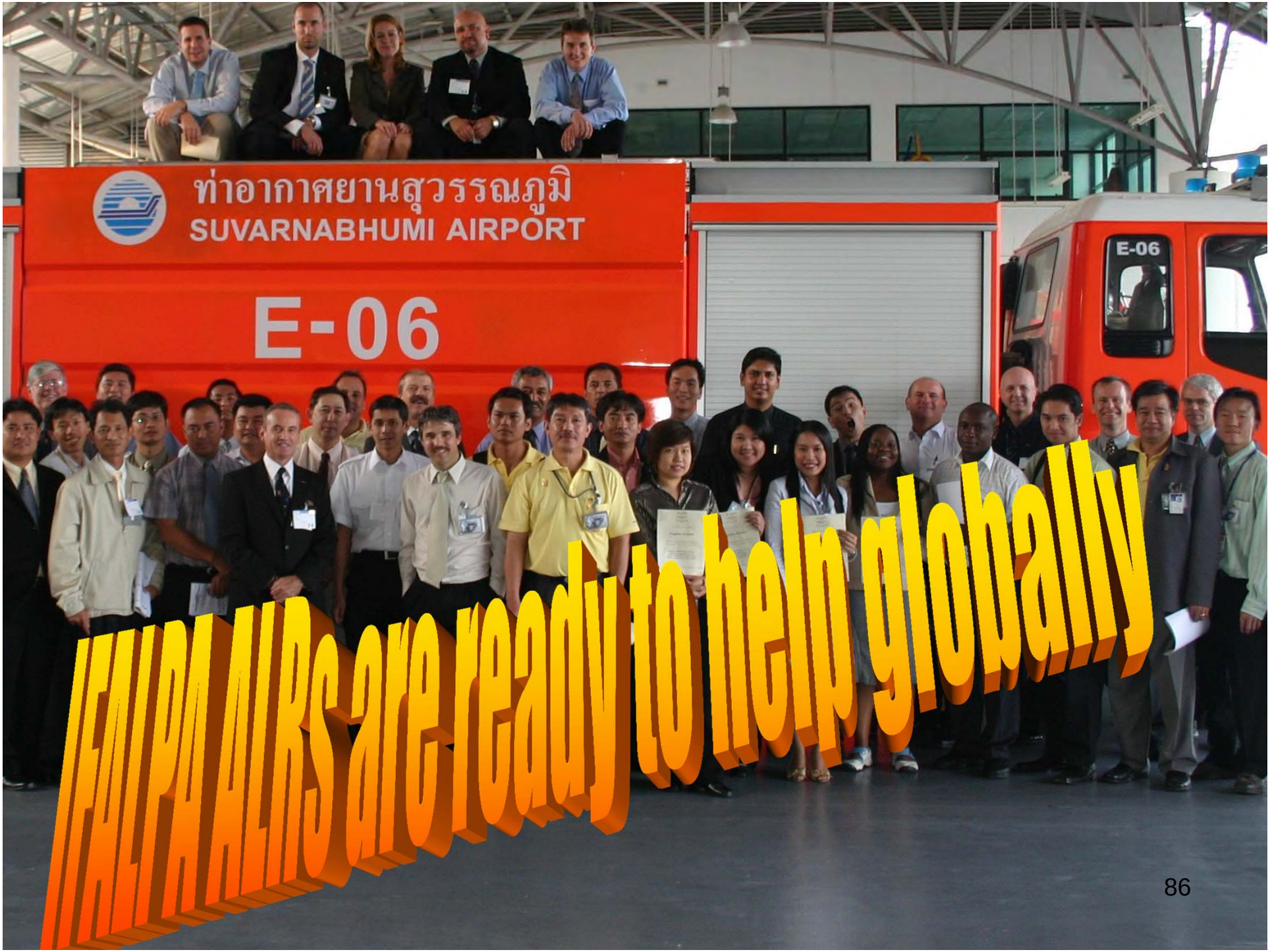
- This Objective will be accomplished by:
  - Building a rapport with airport personnel so that potentially troublesome plans can be identified before implementation, and current shortcomings can be rectified.
  - Providing a resource for airport personnel by providing a pilot's perspective of issues during planning and operations.

Vienna Airport

Liaison Visit

Visit to CENTRAIR


EHAB
☺


ท่าอากาศยานสุวรรณภูมิ
SUVARNABHUMI AIRPORT
E-06
E-06
IFALPA ALRs are ready to help globally

Questions?

Thank you!