



Performance-based Navigation (PBN) Symposium

16–19 October 2012
ICAO Headquarters, Montréal

www.icao.int/Meetings/PBN-Symposium

PBN Collaboration - Role of Flight Ops

Captain David Deere
Standards Pilot – Flight Technical - WestJet
October 18, 2012

Effective PBN Development Perspectives
from the flight deck

Collaboration



Regulator

Designers

Airports

Avionics/Avionics
Manufacturers



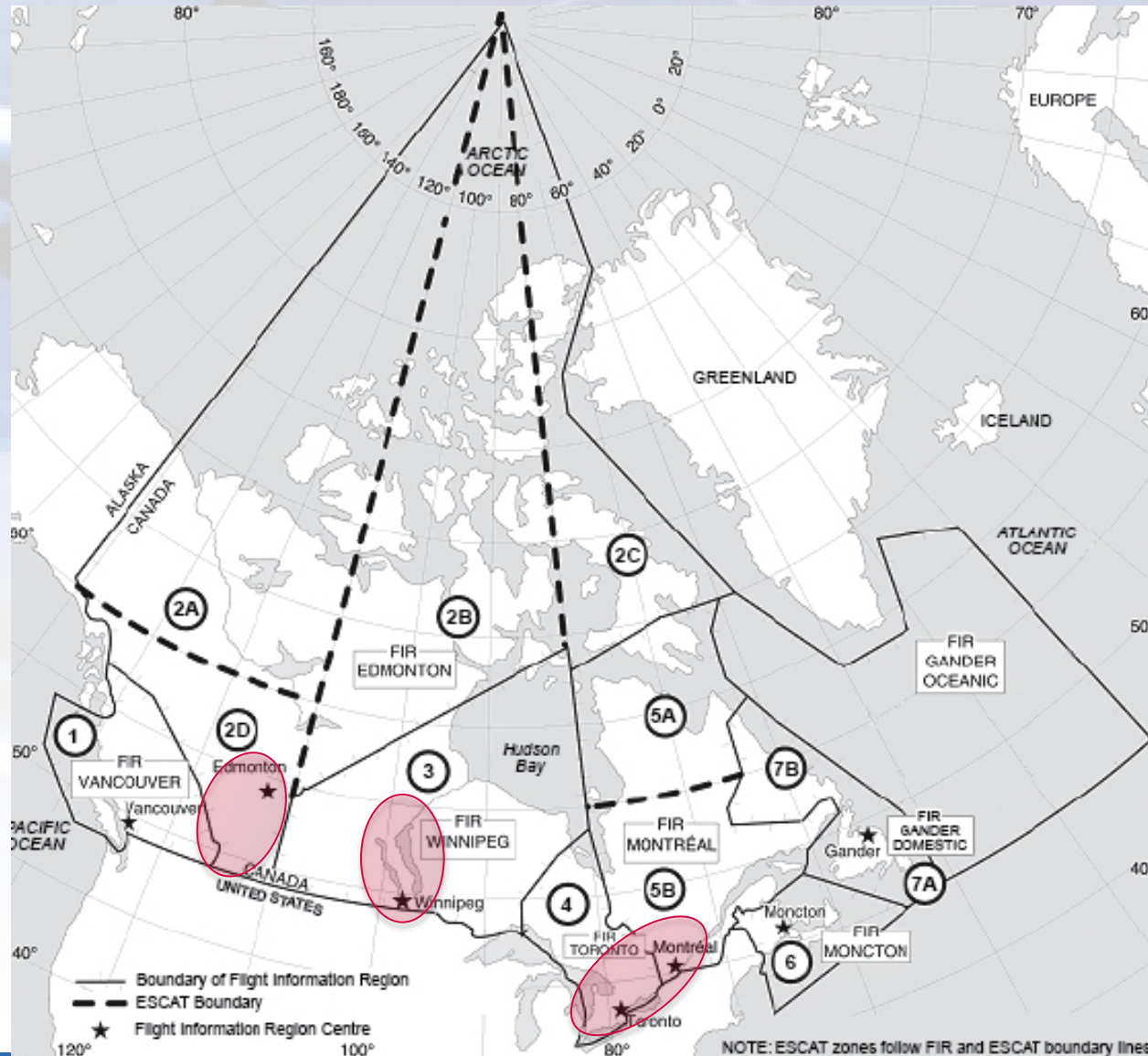
ANSP

Marketing

Community

Noise Committees

Canadian PBN Major Airspace Projects



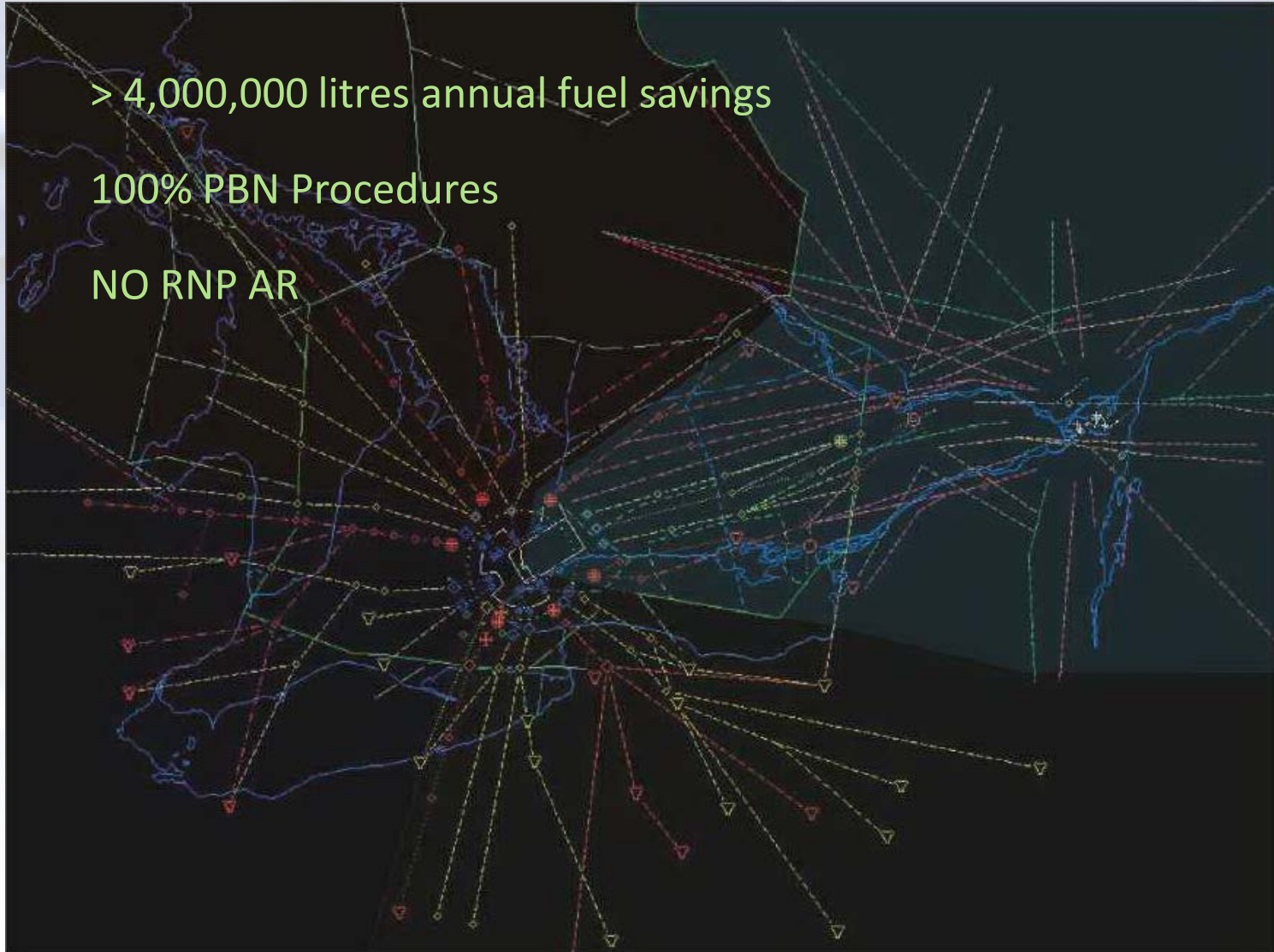
Windsor-Toronto-Montréal (WTM) Airspace & Services Project



> 4,000,000 litres annual fuel savings

100% PBN Procedures

NO RNP AR





- Stakeholders Meeting

- Who, What, Where, Why, When
- Develop CONOPS

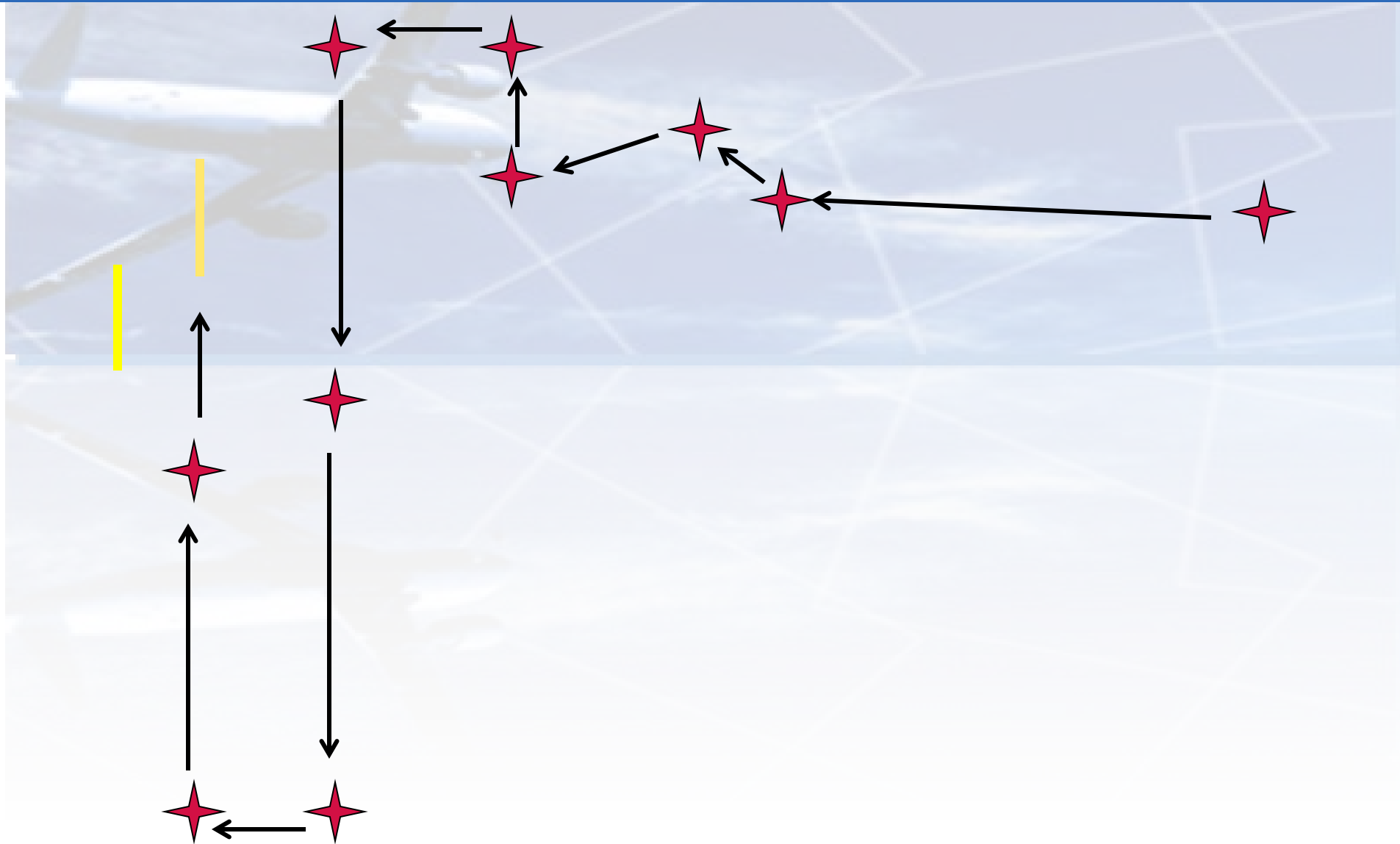
- Business Case

- Define Base Case
- Option Cases
 - Preliminary Designs
 - Corridors
 - Profiles

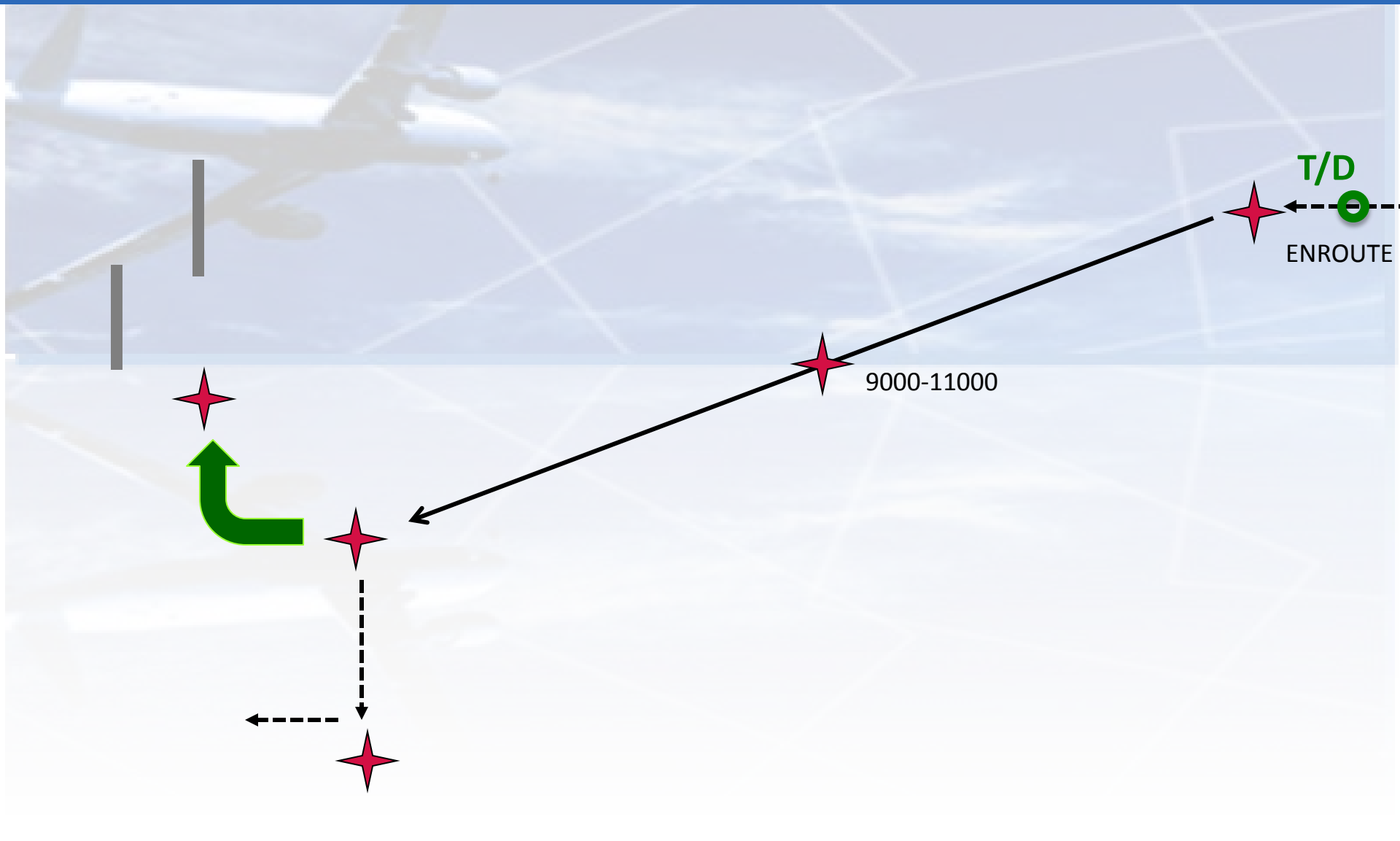


- Top of Descent
(ANY PATH REVISIONS INSIDE T/D WILL IMPACT PBN EFFICIENCIES) AVOID ATC SILOS
- Waypoint Speed & Altitude Restrictions
 - (LIMIT # , PERFORMANCE BASED)
- Altitude Windows
- Connectivity
- Aircraft Performance
- Ease of execution

PBN Design Considerations

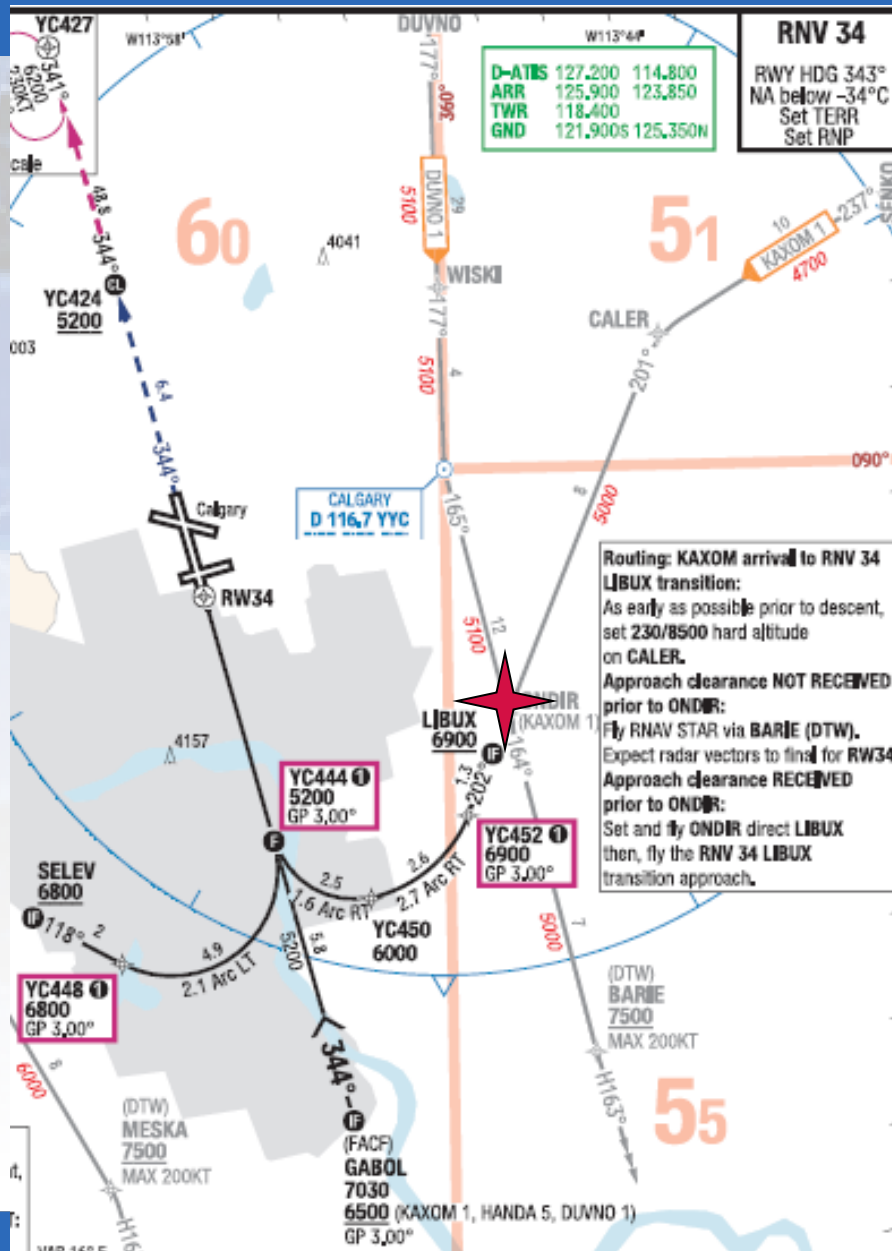


PBN Design Considerations



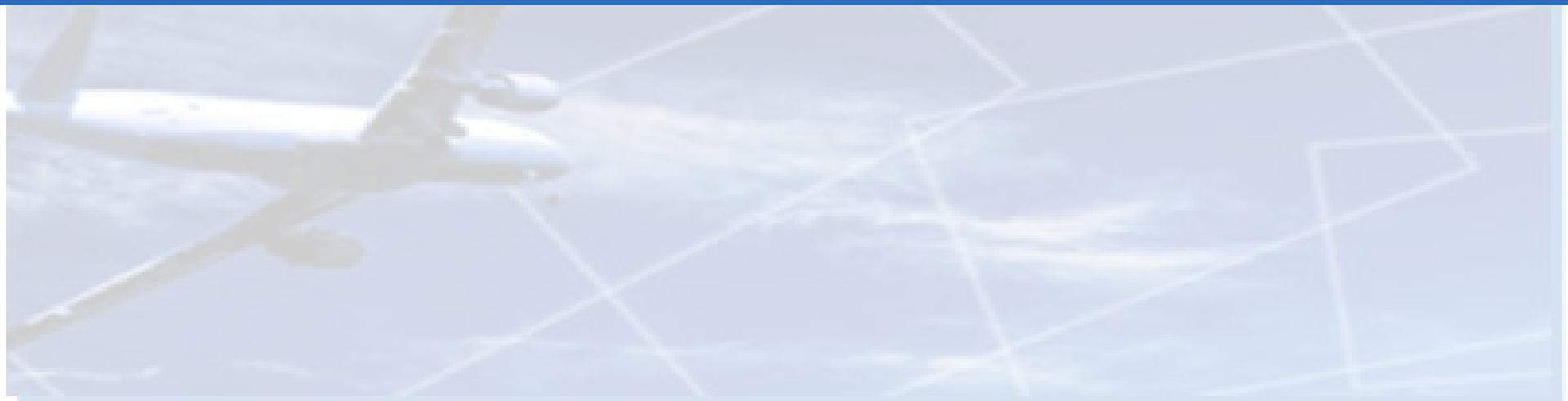
PBN Design Considerations

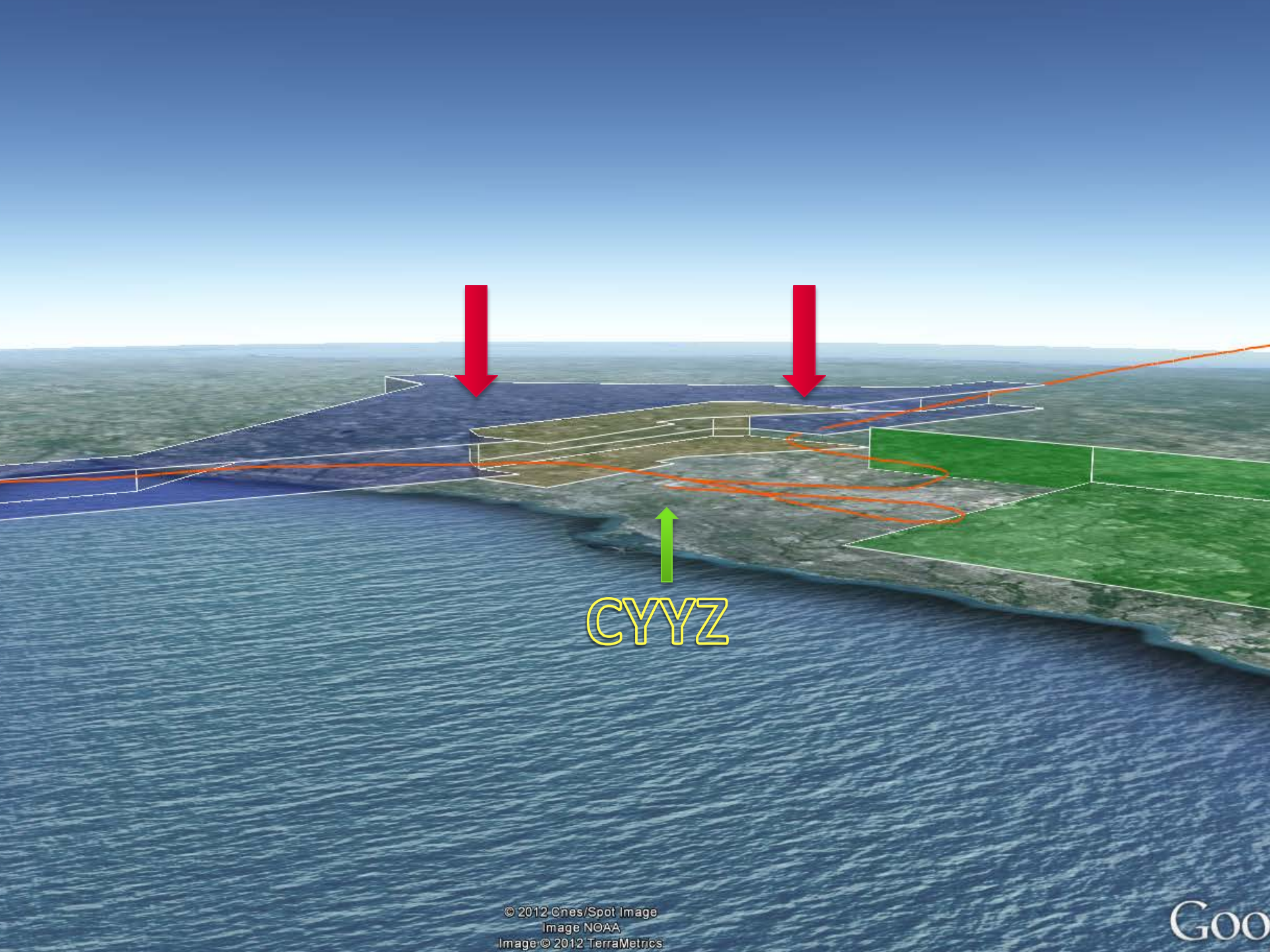
CYYC RNP AR 34



PBN Design Considerations

PBN efficiencies vs. ATC Sector Boundaries





CYYZ



ACT	RTE	LEGS	1/4
298°		368NM	
SSM		.775/FL390	
120°		158NM	
DANNY		.774/FL390	
157°		80NM	
YMS		261/15371	
152°		11NM	
FLINE		250/12000	14000
152°		14NM	
DEBGO	<CTR>	250/	8161
RNP/ACTUAL-----		MAP	CTR
1.00/0.05NM		STEP	>

INIT REF RTE CLB CRZ DES

MENU LEGS DEP ARR HOLD PROG EXEC

N1 LIMIT FIX A B C D E

PREV PAGE NEXT PAGE F G H I J

1 2 3 K L M N O

4 5 6 P Q R S T

7 8 9 U V W X Y

0 1/2 Z SP DEL / CLR

BRT



Simulations

- ✓ ANSP in TAAM,
 - ✓ Operators in FFS
-
- Safety & Efficiency
 - Flyability
 - Ease of Execution
 - Contingencies
 - Connectivity*
-
- **WITH ATC!**

Connectivity



CYOW DCT YOW TUKIR IMEBA1 CYYZ

Connectivity



CYYZ ARRIVALS 1/7

STARS	APPROACHES
IMEBA1<SEL>	ILS 05
TRANS	LOC 05
TUKIR<SEL>	RNV 05
	ILS 06L
	LOC 06L
<ERASE	ROUTE>

INIT REF RTE CLB CRZ DES

MENU LEGS DEP APPR HOLD PROG EXEC

M1 LIMIT FIX A B C D E

PREV PAGE NEXT PAGE F G H I J

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4 5 6 P Q R S T

7 8 9 U V W X Y

0 / Z SP DEL / CLR

Other lessons learned in the PBN Collaboration Process



- Implementation by Big bang or by Sector
- No last minute changes prior to publication without testing
- Understand FMS capabilities & logic – accommodate majority – don't design to least capable box
- Sim Trials - Test database vs. manual FMC entries
- Flexibility (AIS Publication – plan resources for revisions next cycle)

Pilot Training

Beyond the Ops Spec.



- Pilot (& ATC) Acceptance



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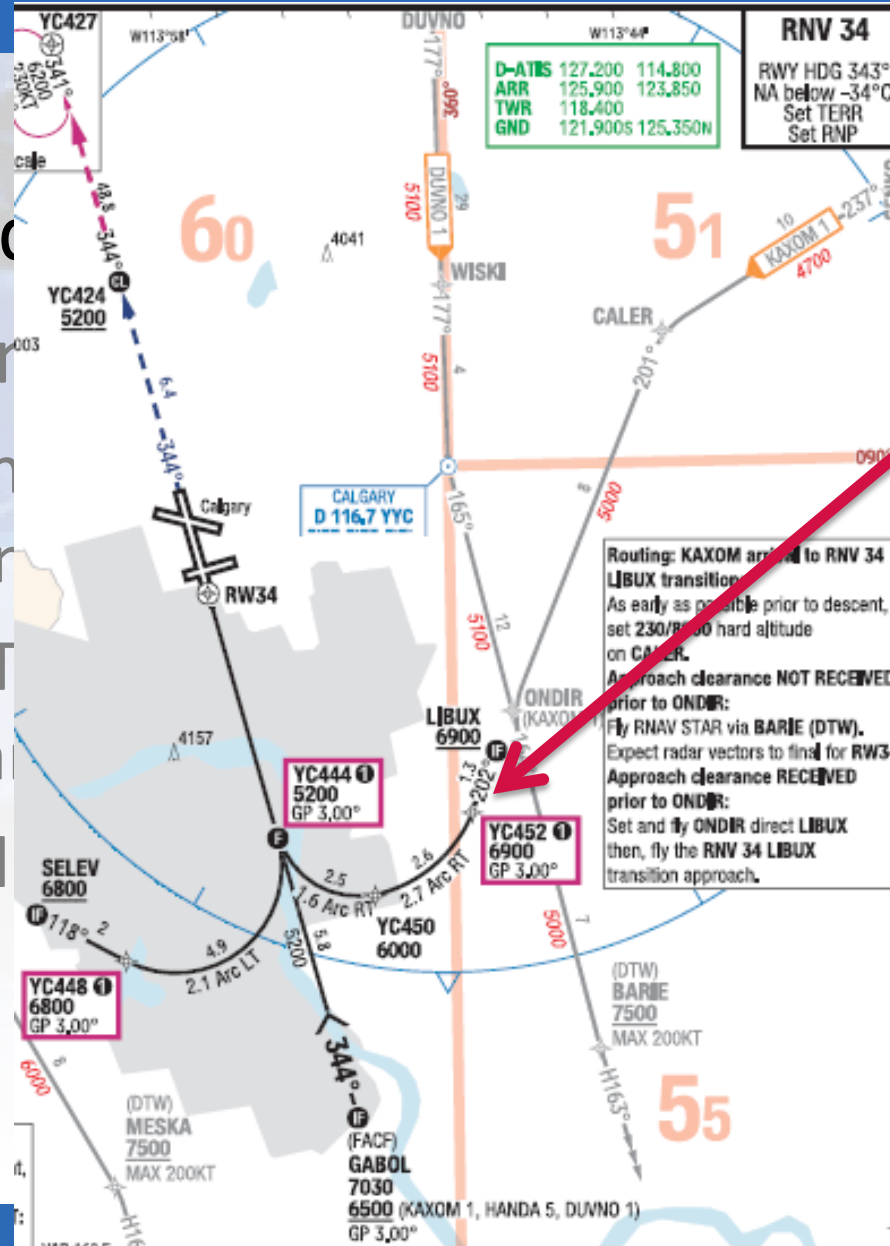


Pilot Training

Beyond the Ops Spec.



- Pilot procedure
- Pilot (mis)information
 - Understanding separation
 - making ATIS benefits a
 - Uncontrolled



ATC

Delegate

DISCO.

Pilot Training

Beyond the Ops Spec.



- Pilot procedure drift
- Pilot (mis)interpretation –
 - Understanding the profiles (altitudes for ATC separation or obstacle)
 - making AT or ABV altitudes HARD can negate benefits and/or intent of design
 - **Uncontrolled airport destination. = RTE DISCO.**

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