

Operational Activities

Delta – CDA/OPD Current Activities
November 2008



Delta CDA/OPD Operational Implementations....

May 2008: AIRE Initiative (Details to be briefed later by MITRE)

- 11 Total flights from Northeast
- Tailored the FLCON to the DIRTY OPD Profile

August – Present: CDA Phase 1.5

- Over 500 operations to date
- Spacing provided by ATC (15nm – 10nm)
- Added “Windows” to RNAV procedure
- Added additional partners: FedEx, AirTran and ASA
- Test will continue indefinitely
- Currently looking to move to daytime operations

Outstation OPDs:

- JAX
- SAV
- BHM
- PNS
- CHS (Joint project with the Air Force)

ATL CDA Phase 1.5

Flight Summary as of 11-6-08

Operations

- VIKNN = 49
- NOTRE = 18

Airline and Aircraft	Count
AirTran Airways B737-700	86
Delta Air Lines B737-700	11
Delta Air Lines B737-800	21
Delta Air Lines B757-200	124
Delta Air Lines B767-300	84
Delta Air Lines B767-400ER	24
FedEx A300	27
FedEx MD10	28

Airline	Total Flights Flown
AirTran	86
Delta	264
FedEx	55

CDA/OPD Operational Summary To Date

Savings:

Flight Time

- ~2 ½ minutes per flight

Fuel

- B737-700 show approximately a 700lb (106 gallons) savings per flight
- Test period to date with 500 flights (~10 per test day)
 - Fuel Savings = 53,000 gallons
 - Cost Savings = \$132,000 for the 500 flights
- Assuming 250 CDA/OPD operations per day in ATL
 - Fuel Savings for 1 year = 9.6M gallons
 - Cost Savings for 1 year = \$24.2M

Environmental

- Based on Recent IATA formulas 1:3.16T CO₂:
 - With 175T of fuel saved
 - 553T of CO₂ Emissions saved during this test

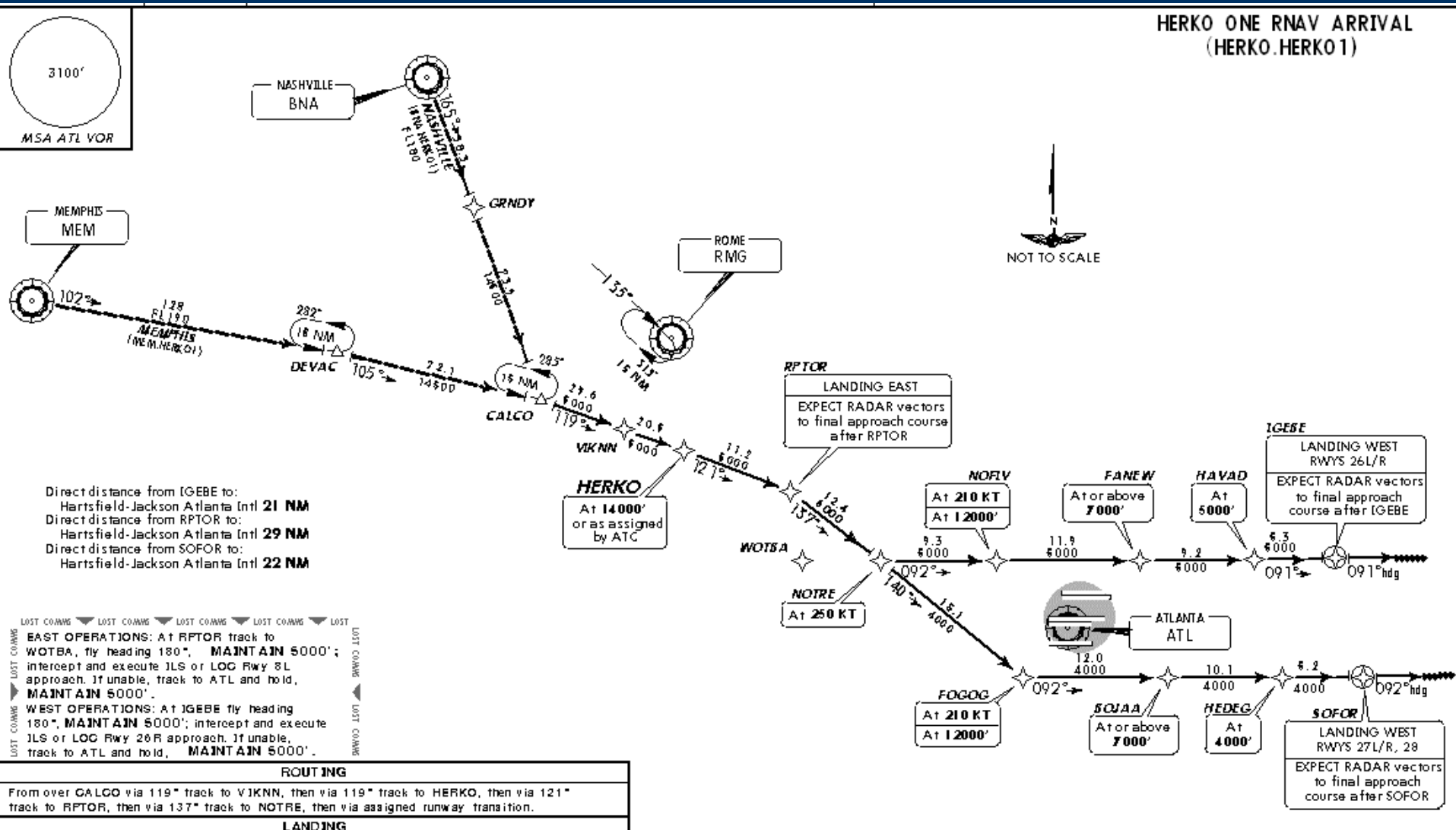
How did we accomplish these results?

Only through collaboration!!!!

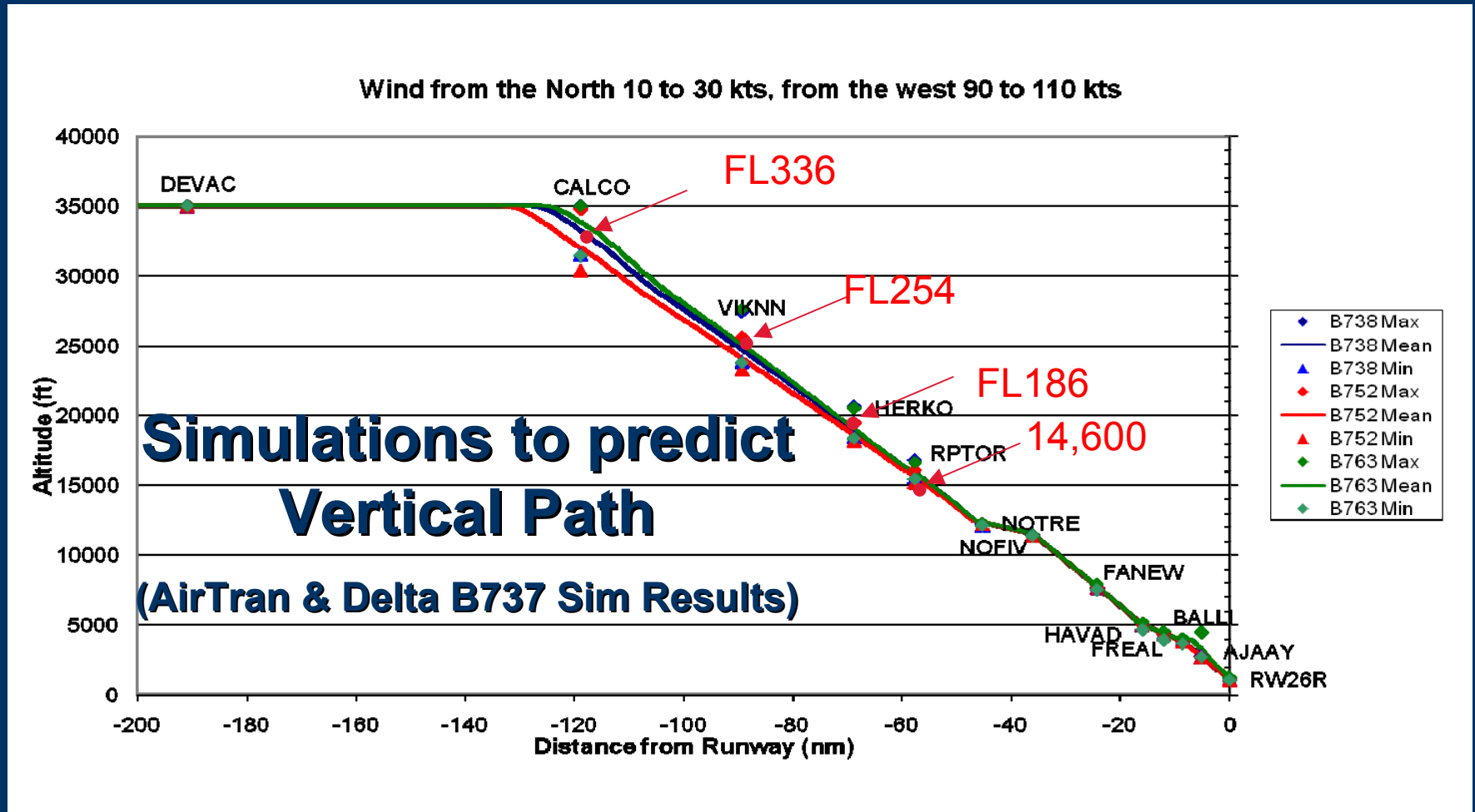


How do we accomplish these benefits?

Begin with established lateral paths



How do we accomplish these benefits?



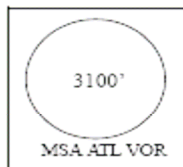
How do we accomplish these benefits?

KATL/ATL
HARTSFIELD-JACKSON ATLANTA INTL



RNAV STAR

ATLANTA APP CON
128.0
ATIS ARR
119.65



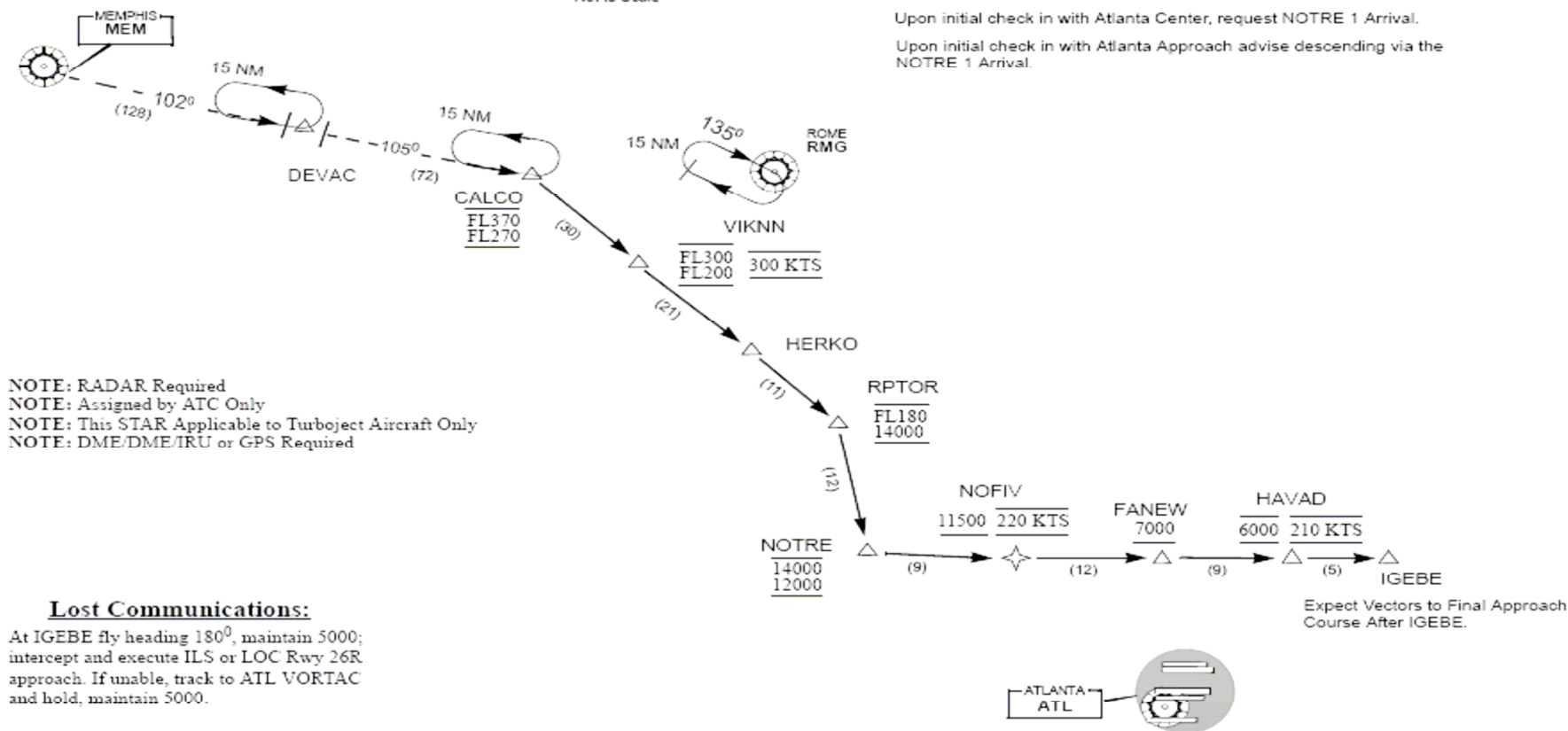
NOTRE RNAV ARRIVAL (NOTRE.NOTRE 1)

ATC COMMUNICATION

Filed clearance is via the ERLIN 5 Arrival.

Upon initial check in with Atlanta Center, request NOTRE 1 Arrival.

Upon initial check in with Atlanta Approach advise descending via the NOTRE 1 Arrival.



NOTE: RADAR Required
NOTE: Assigned by ATC Only
NOTE: This STAR Applicable to Turbojet Aircraft Only
NOTE: DME/DME/IRU or GPS Required

Lost Communications:

At IGEBE fly heading 180°, maintain 5000; intercept and execute ILS or LOC Rwy 26R approach. If unable, track to ATL VORTAC and hold, maintain 5000.

CDA and Non-CDA Descent Profiles

Top of Descent Points Vary

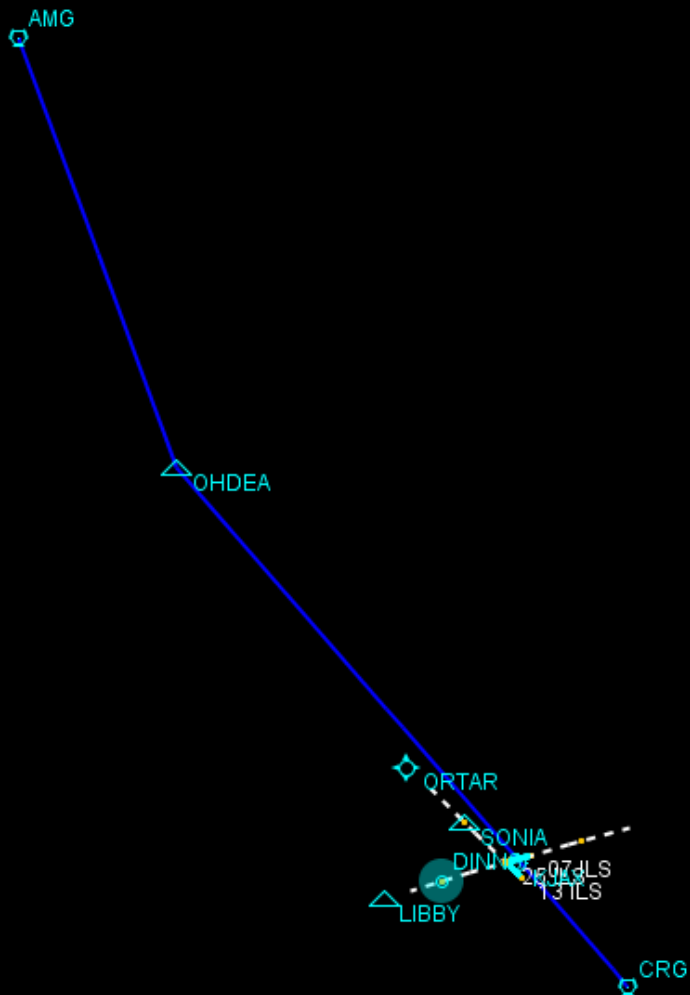


ATL Outstation OPD Project

Overview of CDA Development Process

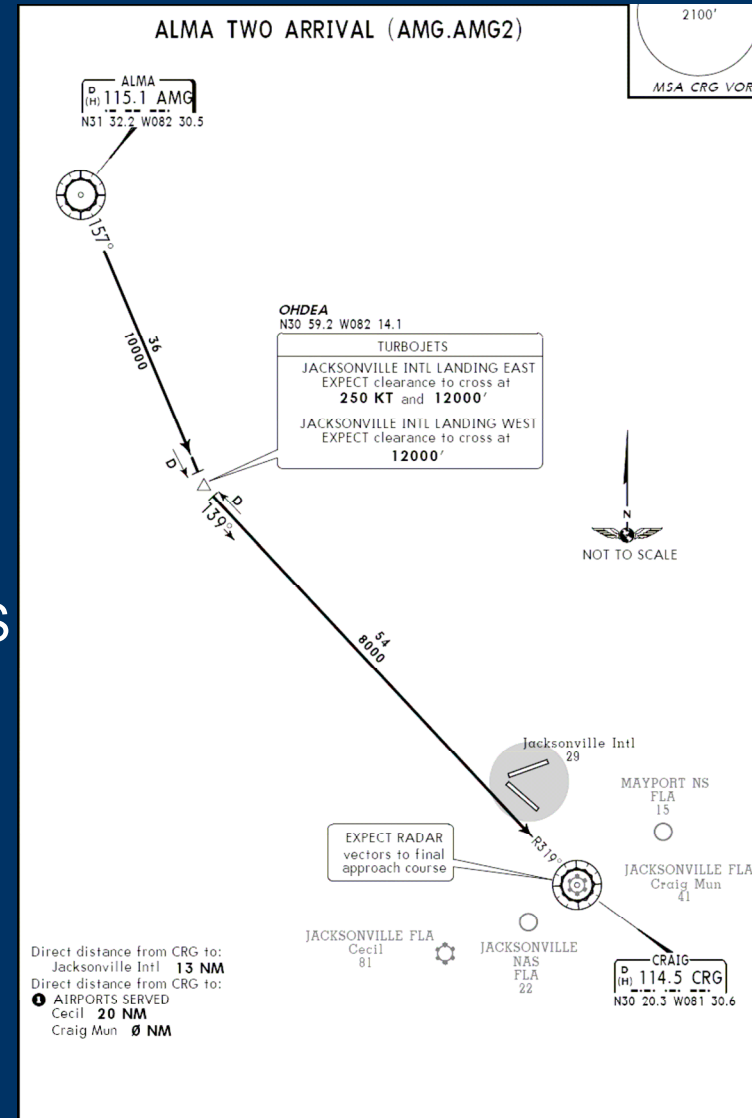
1. Examined 5 outlying airports to ATL
2. If a STAR is published, the STAR was used (KJAX). In absence of a published STAR, all paths were designed to lie within established radar tracks
3. Two different styles of arrivals were used: Runway Dependant and Non-Runway Dependant.
4. Simulator trials were performed on all paths
5. Data was collected and compared to established radar tracks
6. These slides are the results of the analysis

Development Process – KJAX Example



Created
existing
STAR in
TARGETS

12-Feb-2009

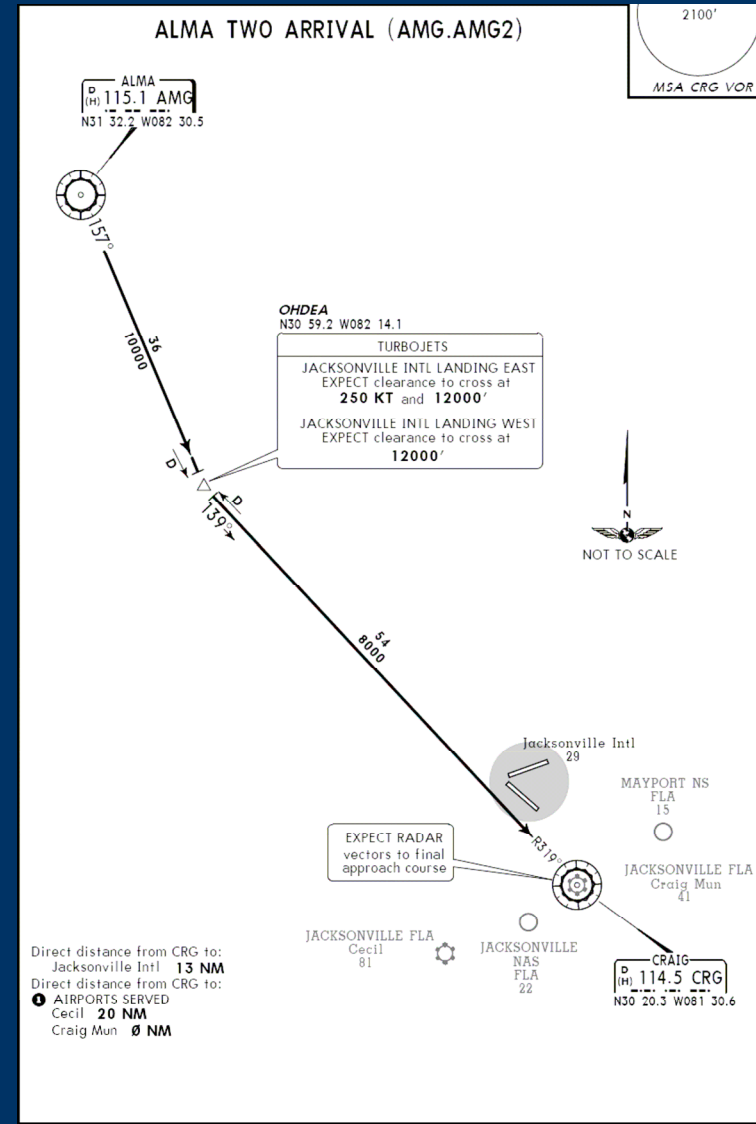


Development Process – KJAX Example

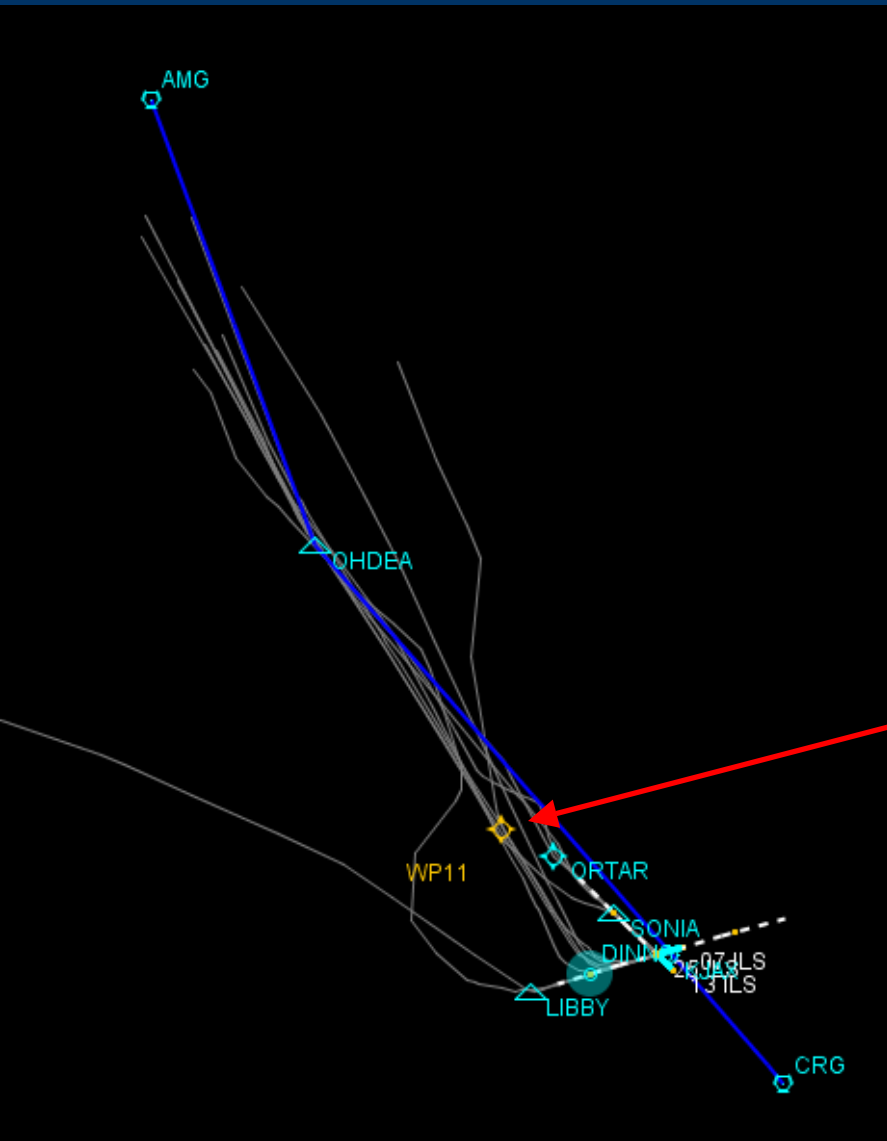


Overlaid
the
current
traffic flow
into KJAX

12-Feb-2009

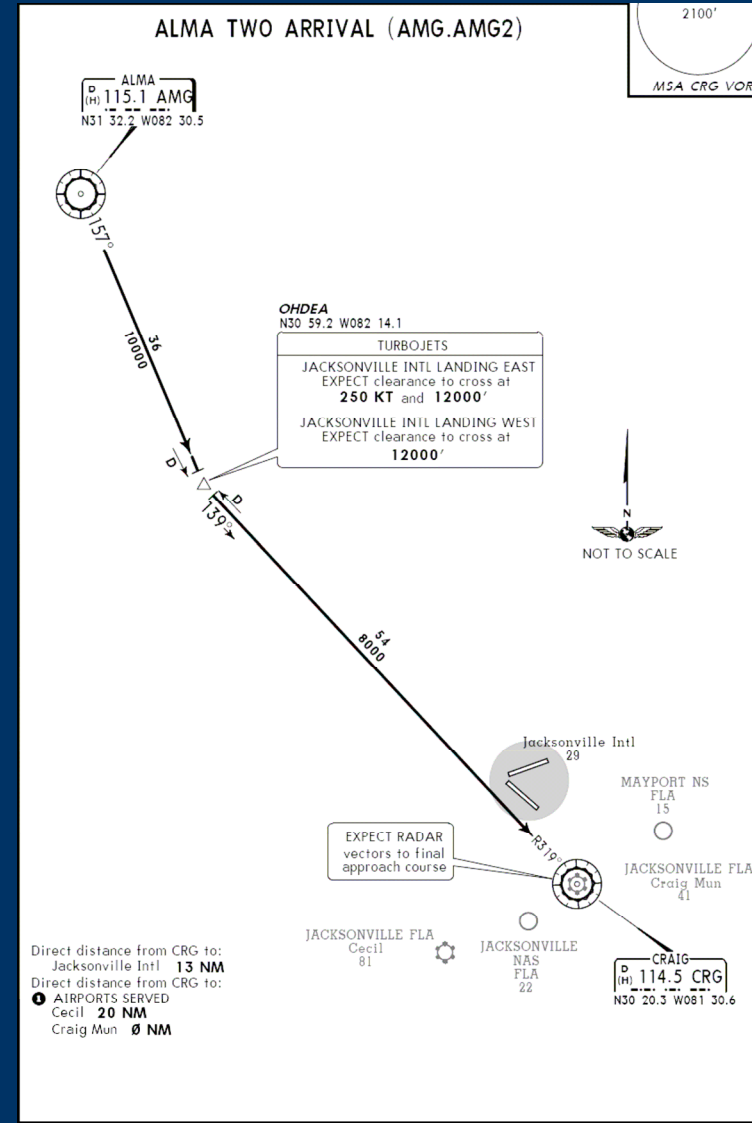


Development Process – KJAX Example

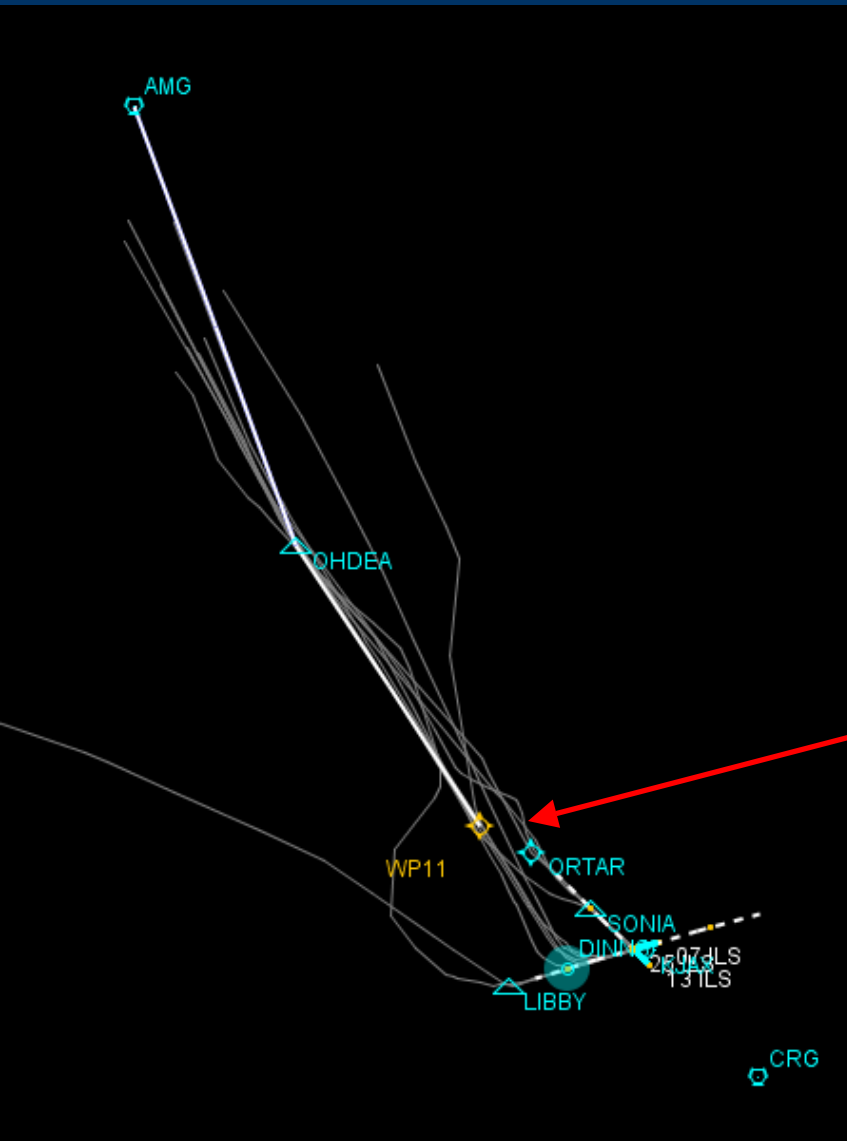


Added new endpoint along the procedure to establish end point

12-Feb-2009

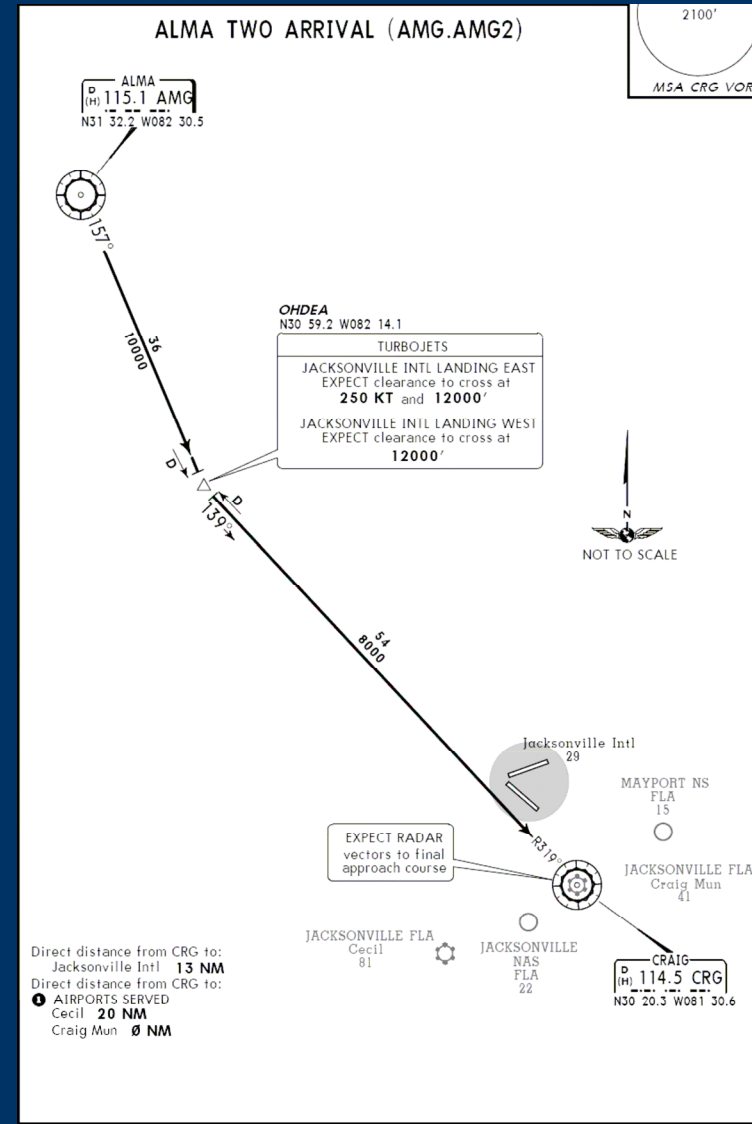


Development Process – KJAX Example



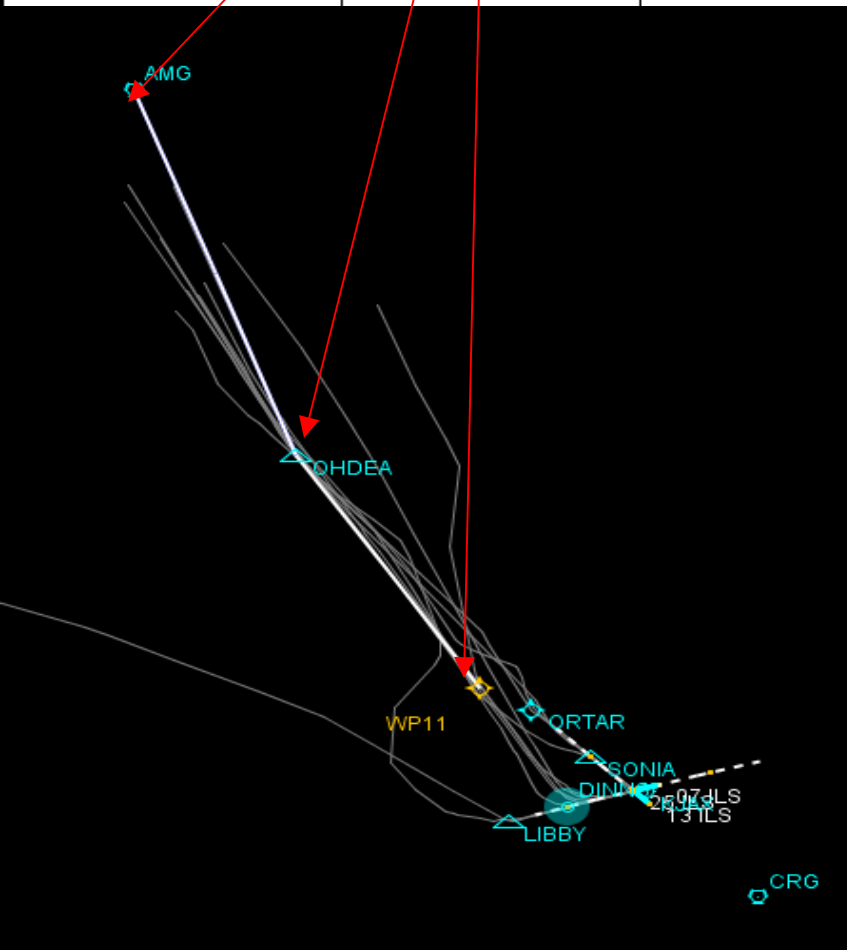
Connected
OHEDA to
WP11 to
end the
arrival

12-Feb-2009



Development Process – KJAX Example

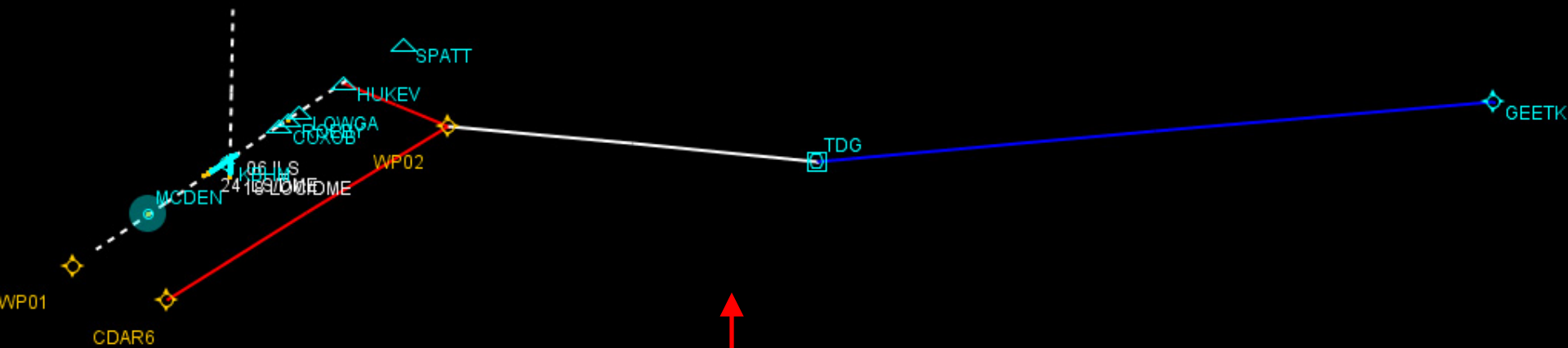
(21) Waypoint Name:	(22) Altitude:	(23) Airspeed/Groundspeed:	(24) Turn Anticipation Distance:	(25) Wind:
AMG	FL 216	300/498	4.1NM	330/80
OHEDA	10,400	300/426	1.5NM	330/80
WP11 N3038.5 W08156.5	5,000	200		



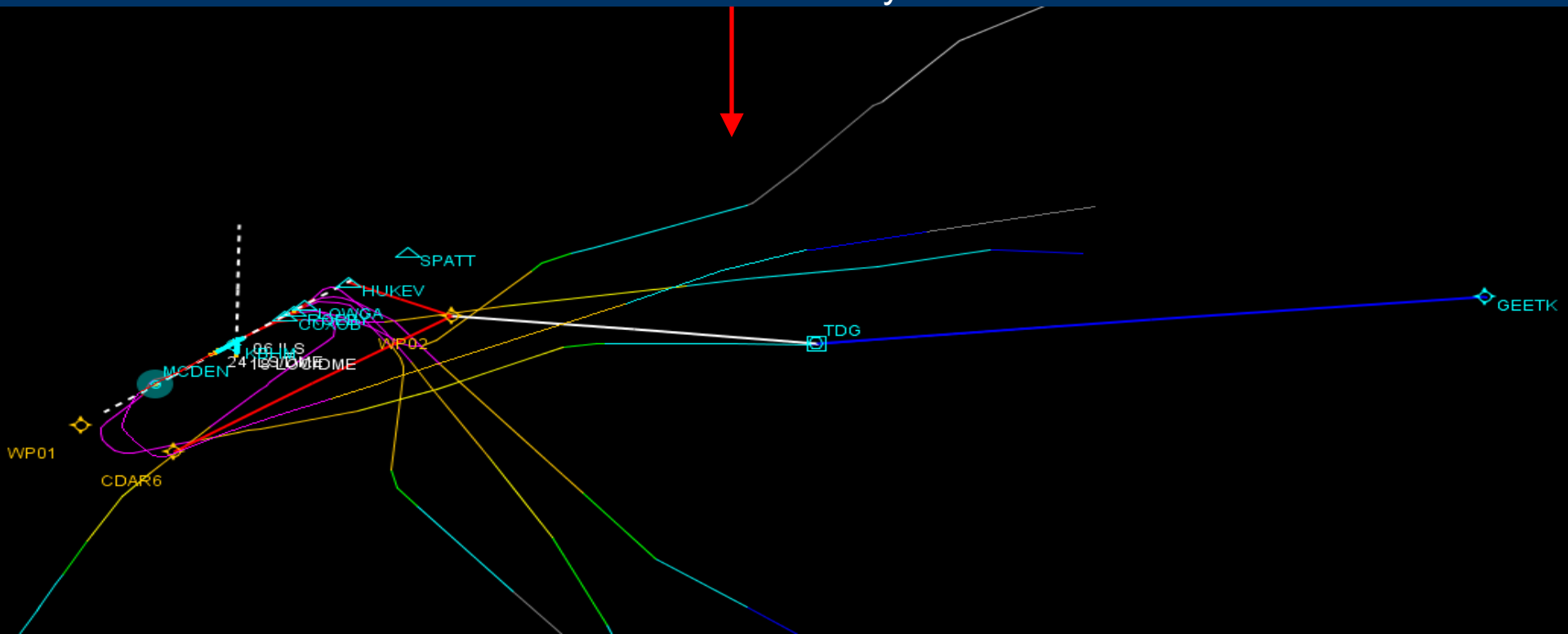
The final altitude at WP11 was set at 5,000' to allow for ATC flexibility and FMS path projection.

All simulator and FMS descent calculations were run with a computed idle path to a fixed altitude.

KBHM

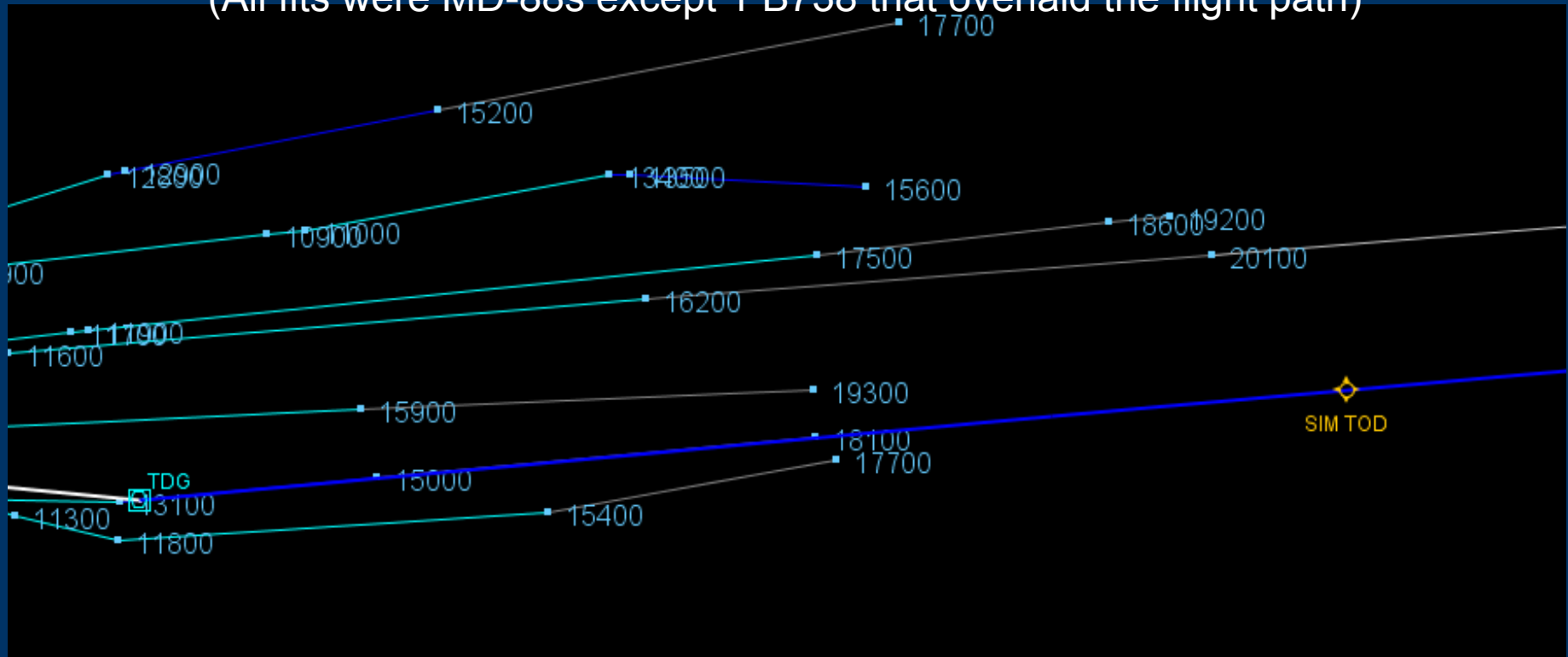


Runway Transitions connected to filed flight path.
Traffic Overlays



TDG Analysis

(All flts were MD-88s except 1 B738 that overlaid the flight path)

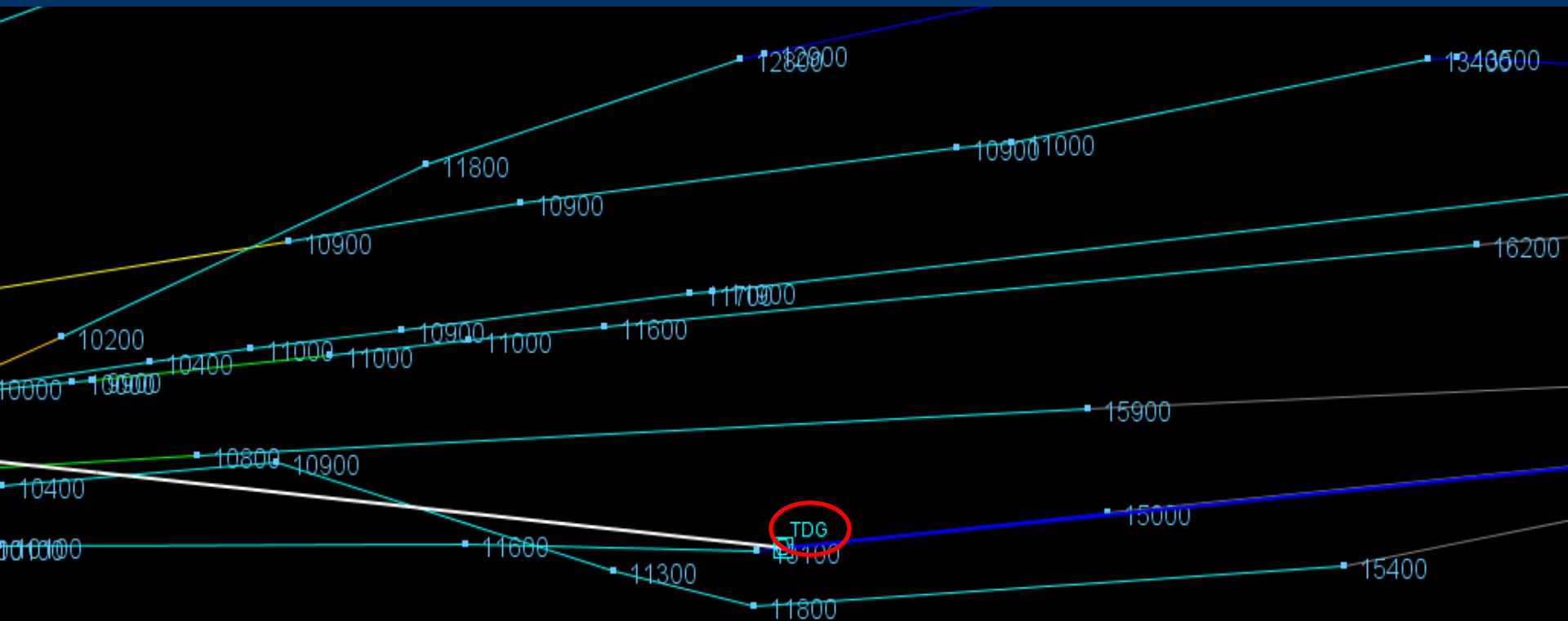


TOD from FL210 was 27nm from TDG on flight path route.

All flights present were MD-88s with the exception of a B738 that flew on top of the flight planned route.

TDG Analysis

(All flts were MD-88s except 1 B738 that overlaid the flight path)

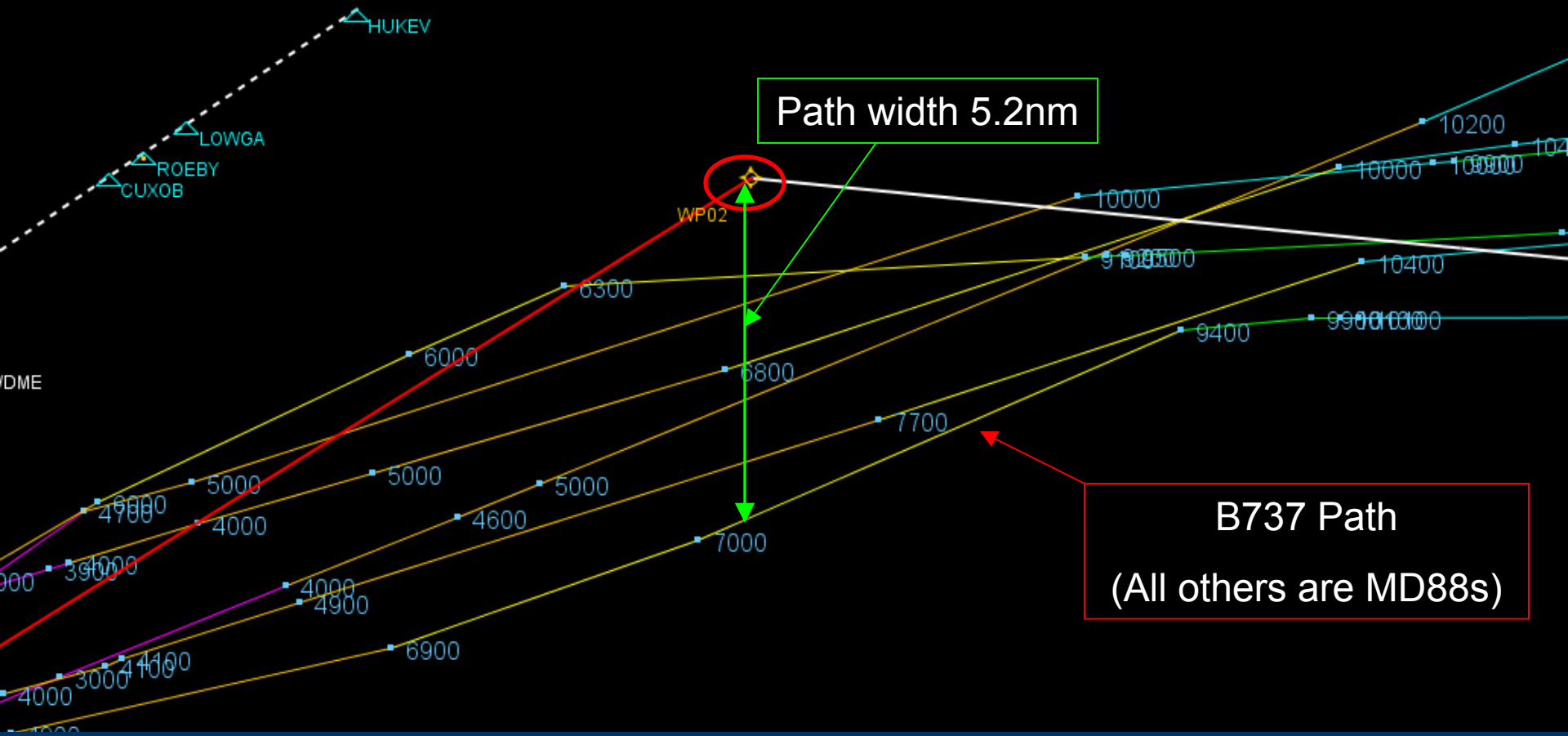


Sim runs for TDG to Rwy 6 altitudes were 13,400

Average altitudes abeam TDG ranged from 13,100 (B737) to 11,800 (MD88)

WP02 Analysis

(All flts were MD-88s except 1 B738 that overlaid the flight path)

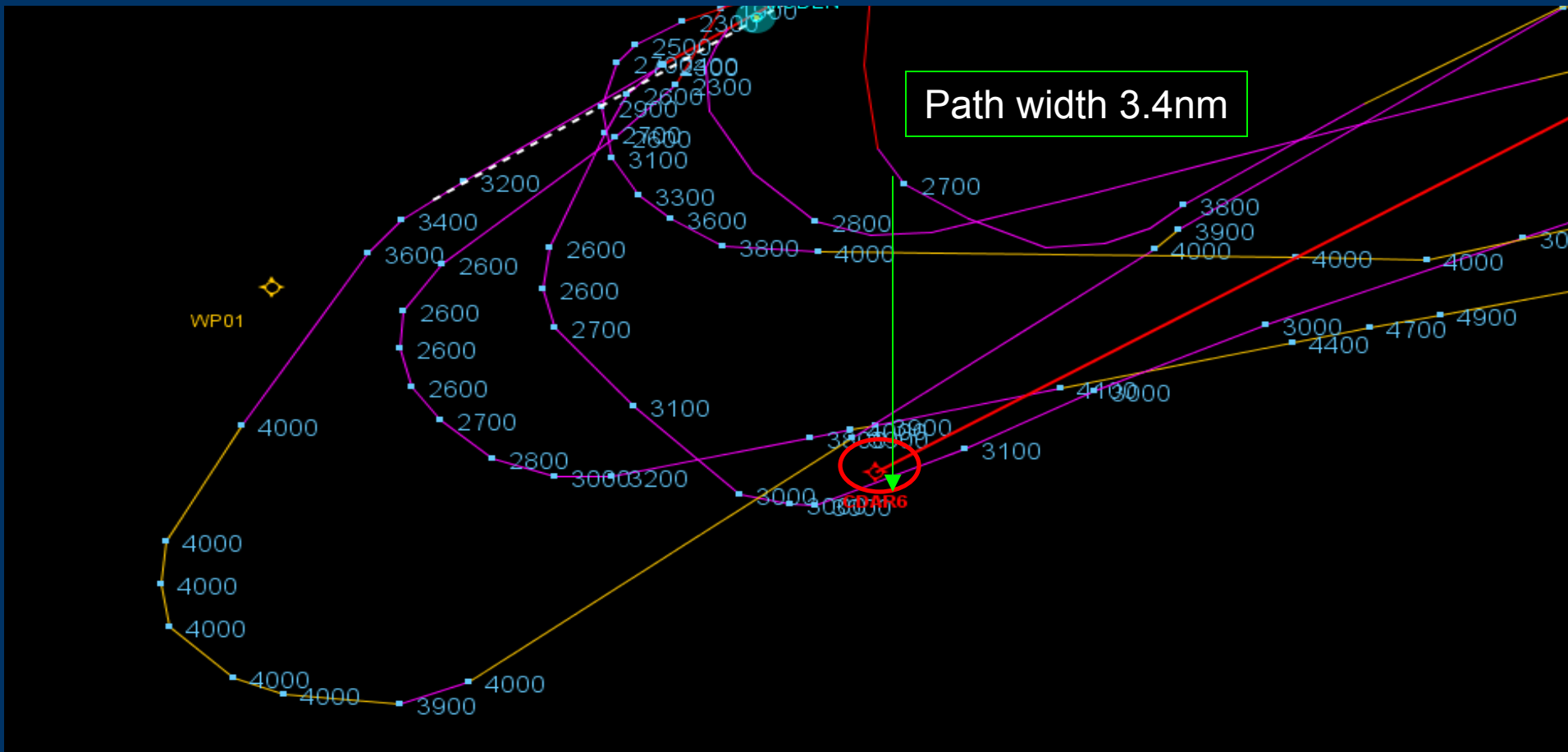


Sim runs for WP02 to Rwy 6 altitudes were 8,000

Average altitudes abeam WP02 ranged from 7,000 (B737) to 6,500 (MD88)

CDAR6 Analysis

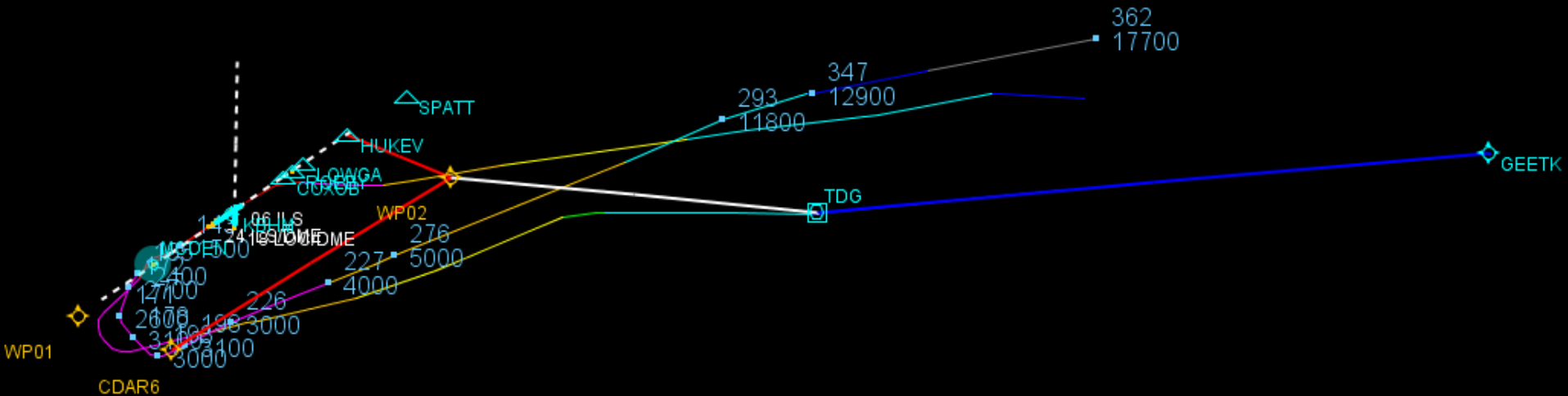
(All flts were MD-88s except 1 B738 that overlaid the flight path)



Sim runs for CDAR6 to Rwy 6 altitudes were 3,000

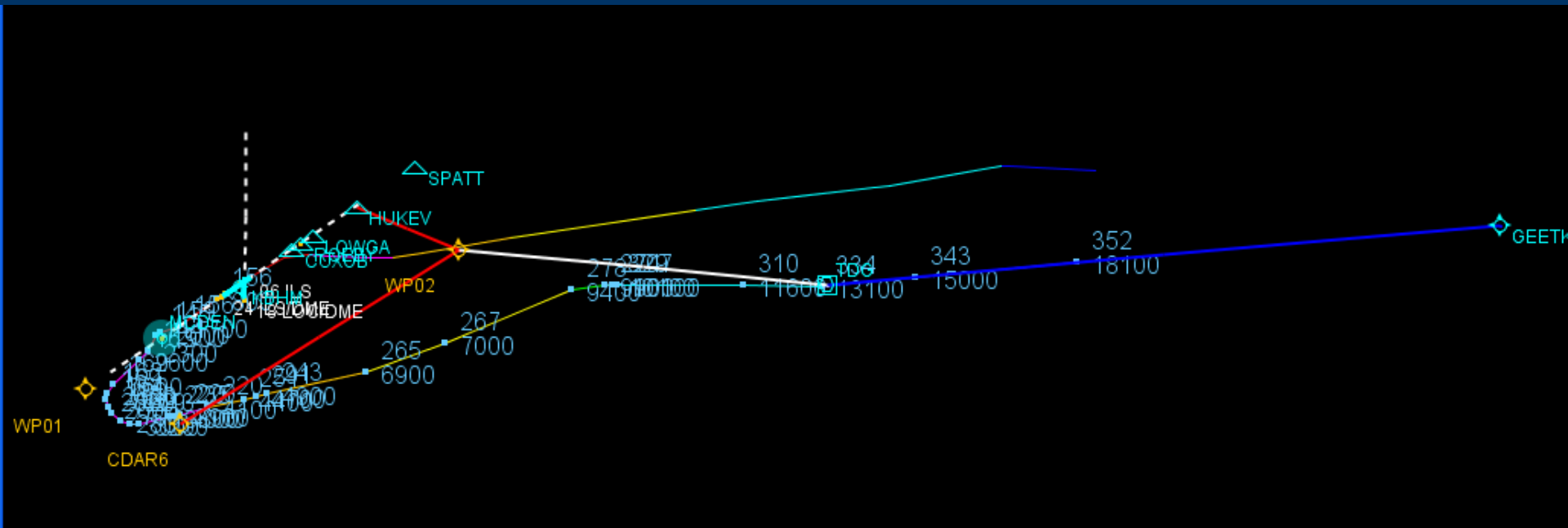
Average altitudes abeam CDAR6 ranged from 3,000 (B737) to 2,700 (MD88)

MD-88 Approach for Rwy 6



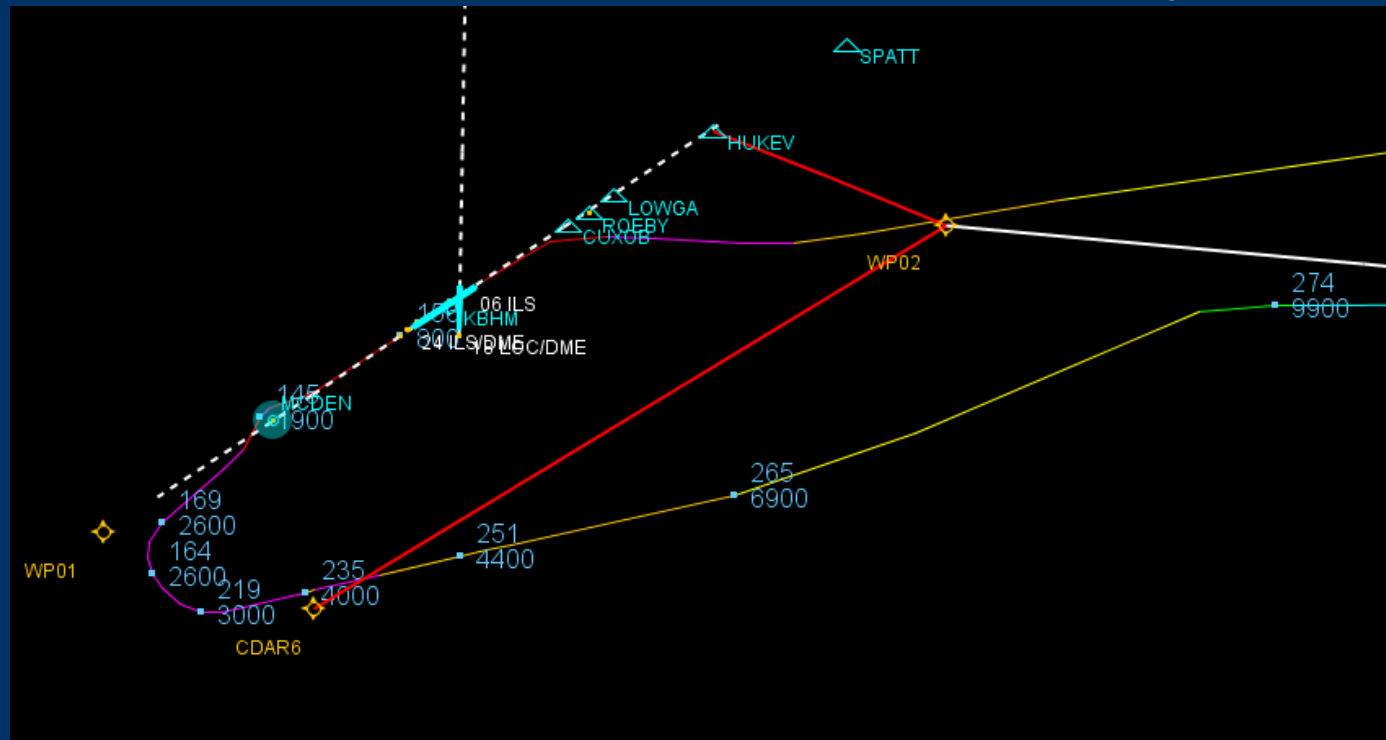
Waypoint	Actual Altitude	Simulator Altitude
GEETK	North of GEETK ~17,700	FL210
TDG	North of TDG 12,900	13,400
WP02		8,000
CDAR6		3,000

B737-800 Approach for Rwy 6



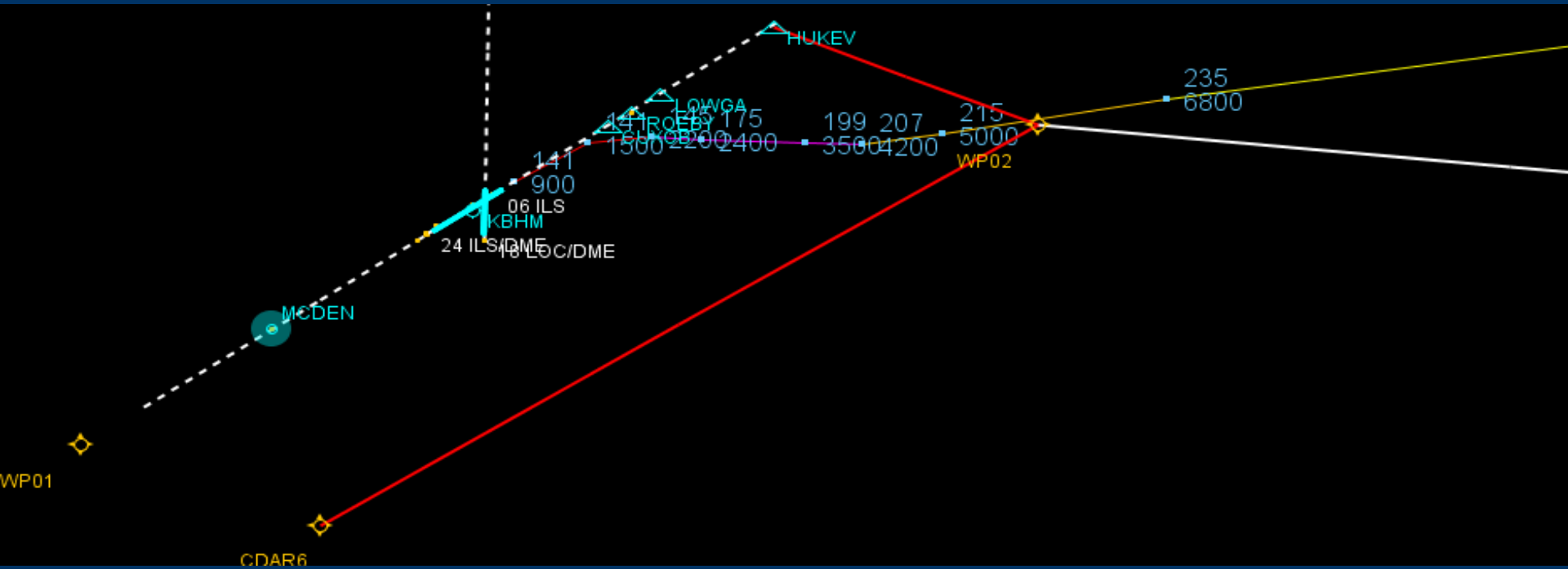
Waypoint	Actual Altitude	Simulator Altitude
GEETK	West of GEETK ~FL181	FL210
TDG	13,100	13,400
WP02	~8,500	8,000
CDAR6		3,000

B737-800 Approach for Rwy 6



Waypoint	Actual Altitude	Simulator Altitude
GEETK	West of GEETK ~FL181	FL210
TDG	13,100	13,400
WP02	~8,500	8,000
CDAR6	4,000	3,000

MD-88 Approach for Rwy 24



Waypoint	Actual Altitude	Simulator Altitude
GEETK	West of GEETK ~15,000	FL210
TDG	~11,000	10,280
WP02	~5,300	4,000
HUKEV	~4,000	3,450

ATL OPD Project - Summary

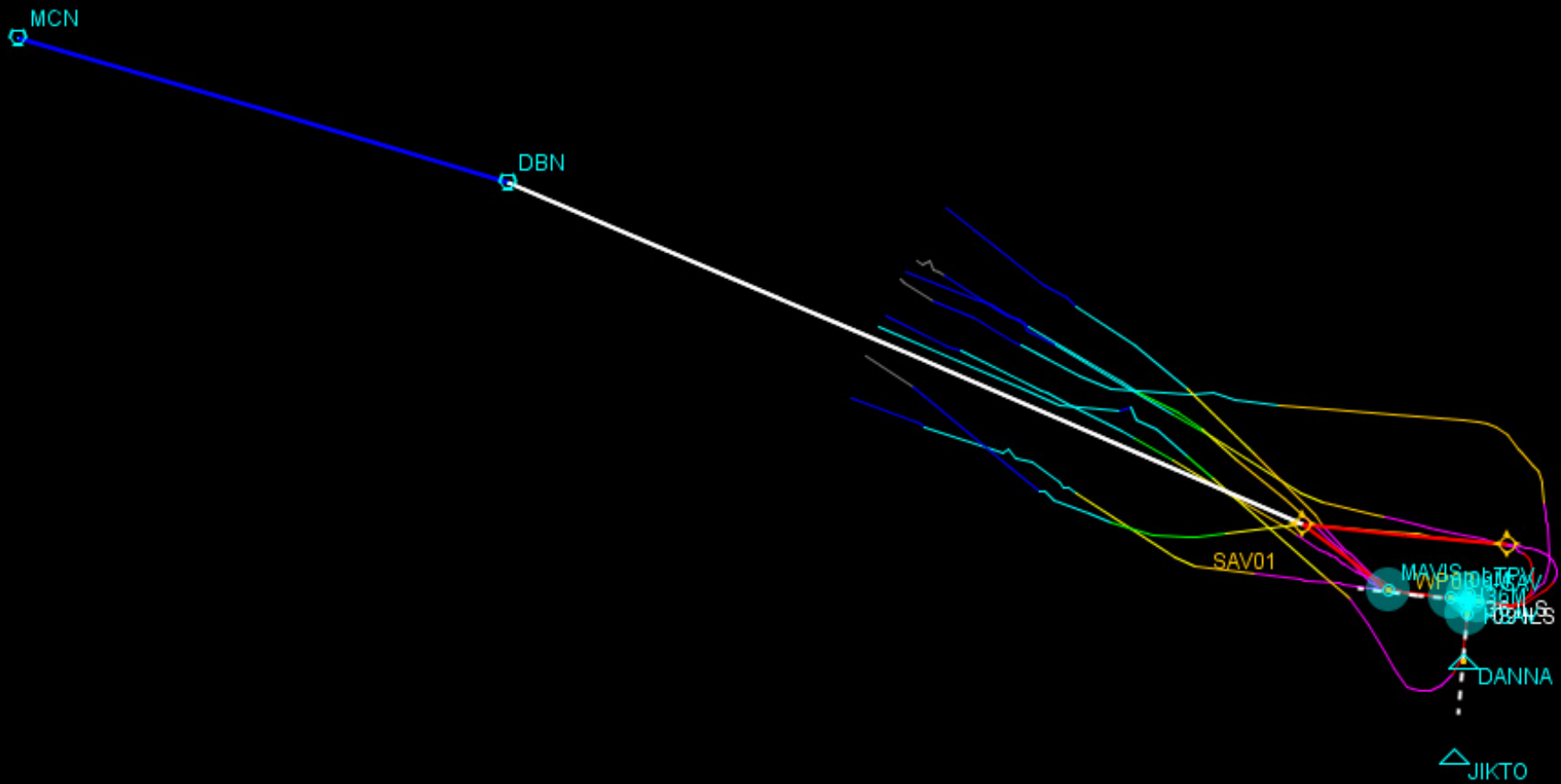
- Reduction today in fuel burn and emissions, is possible
- Modern aircraft have had many of the facilitating tools since the 1980s, but current designs to not utilize these
- Can be accomplished without aircraft automation –
 - (Ex. CRJ traffic into LAX via Chartage)
- Will require a new approach to doing business
 - Amendments to criteria
 - Allowing pursuit of waivers
 - Allowing departures to climb above arrivals
 - Rewriting LOAs
- Must have collaboration with all stakeholders focused on the end goal

***The success of “NextGen” depends on the bridges we build today
from the “NowGen”***



Questions?

KSAV

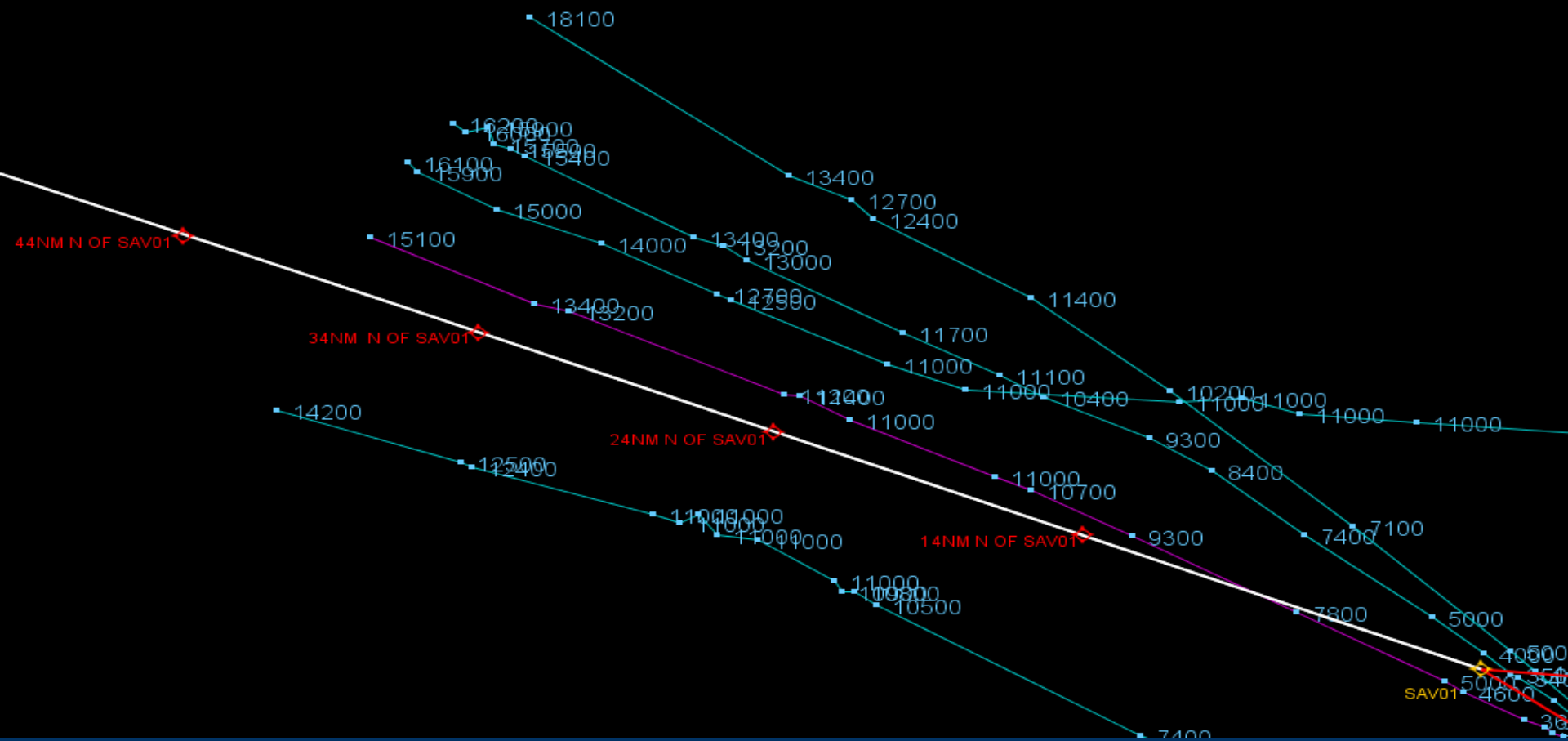


Without an existing STAR, we used current flight track data to establish a common path.

The blue/white line is the filed Flight Plan for each aircraft.

The rainbow colored lines are the actual flight tracks.

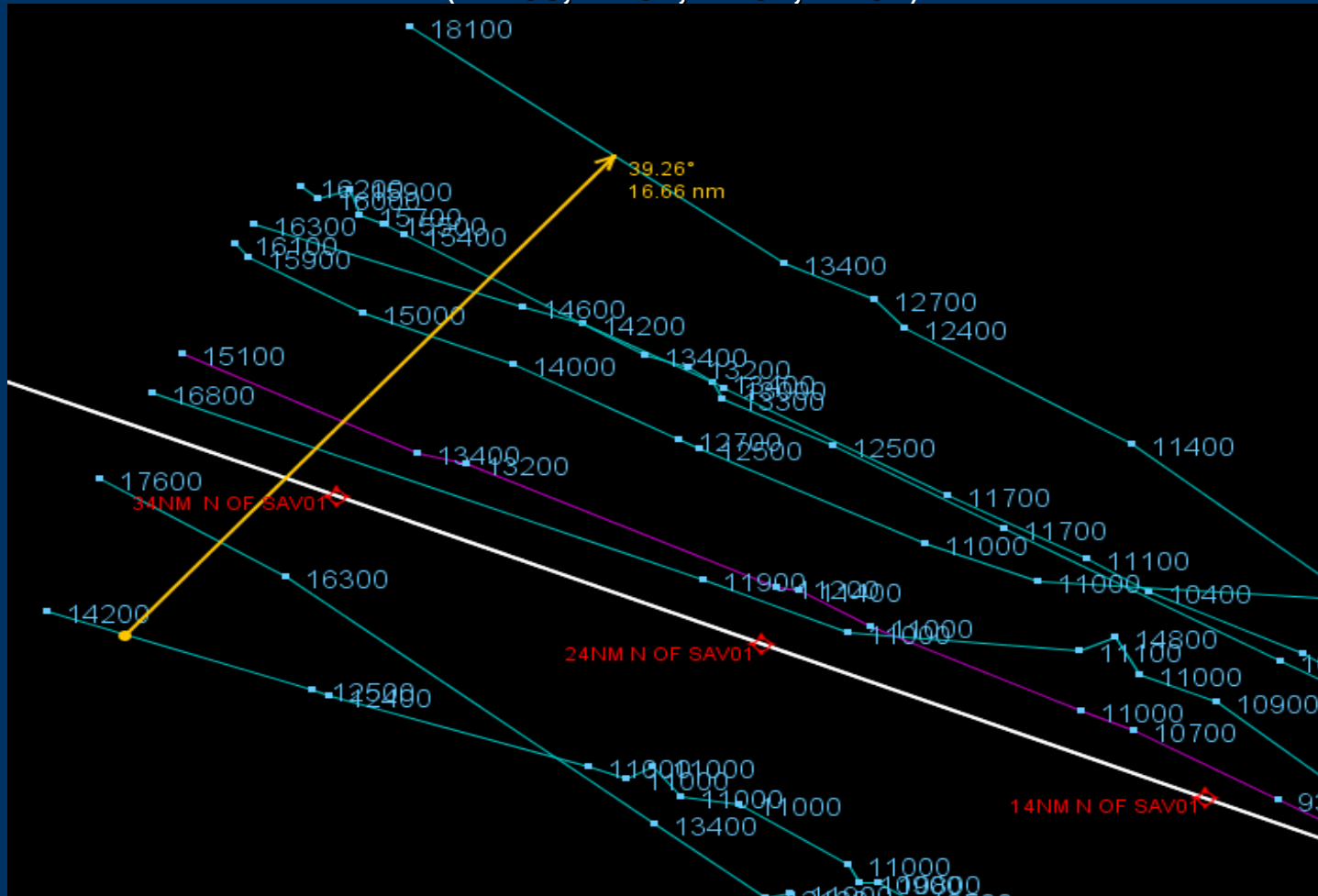
All Traffic Comparison vs. Simulator runs to ILS 27



Waypoint	Actual Altitude	Simulator Altitude
44nm N of SAV01	~ > FL180	FL183
34nm N of SAV01	17,000 – 14,000	15,520
24nm N of SAV01	13,500 – 11,000	12,500
14nm N of SAV01	11,100 – 10,400	10,200
SAV01	7,300 – 7,000' for a/c near path	6,800

Close Up Analysis at 34nm North of SAV01 – All Runways

(MD88, B737, B757, B767)



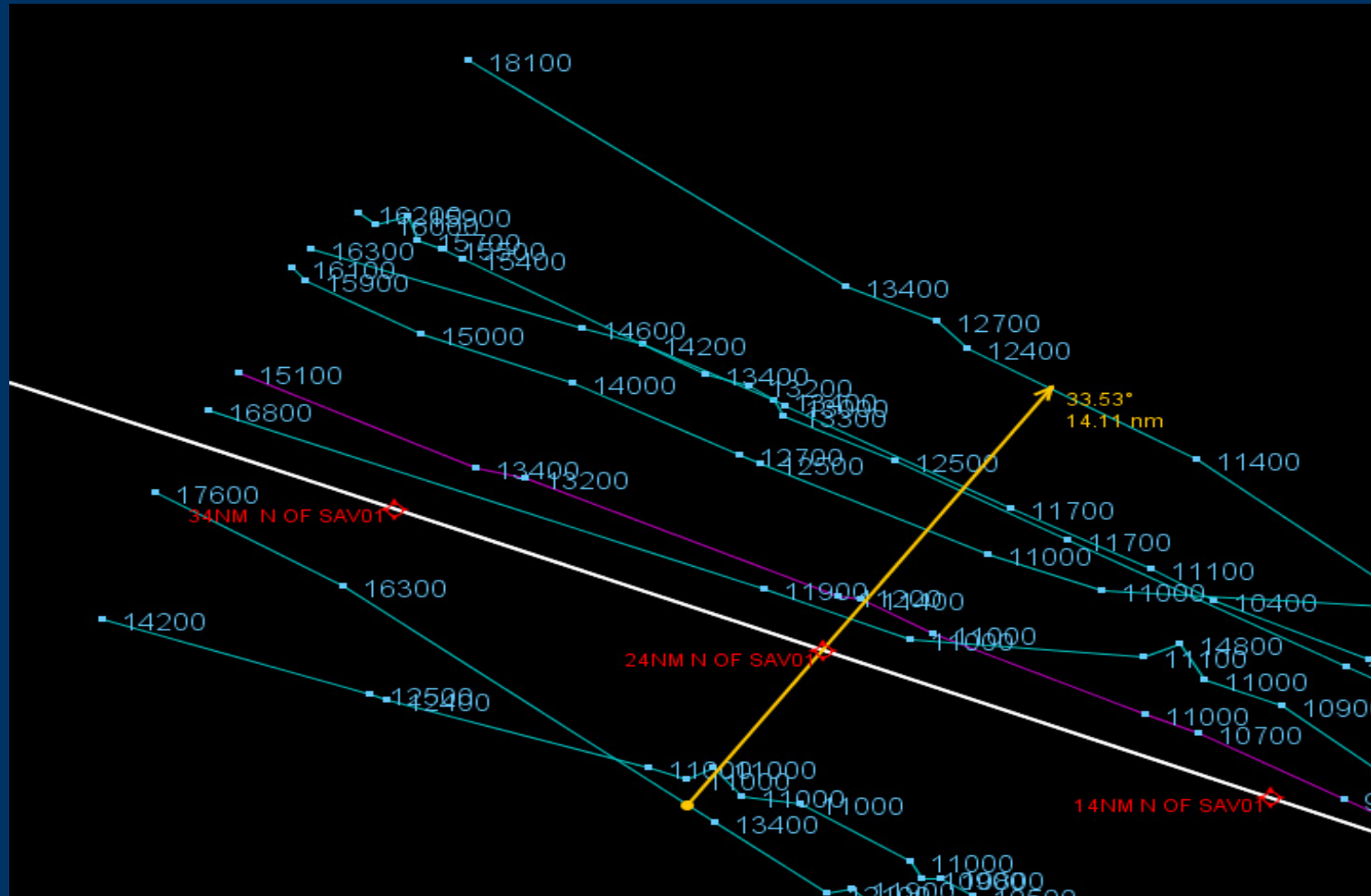
Simulator run altitudes at 34nm North of Wpt SAV01 were 15,200'

Actual average altitudes (Traffic to all runways) 34nm North of Wpt SAV01 show 14,000' – 17,000'

Traffic flow width 16.6nm

Close Up Analysis at 24nm North of SAV01 – All Runways

(MD88, B737, B757, B767)



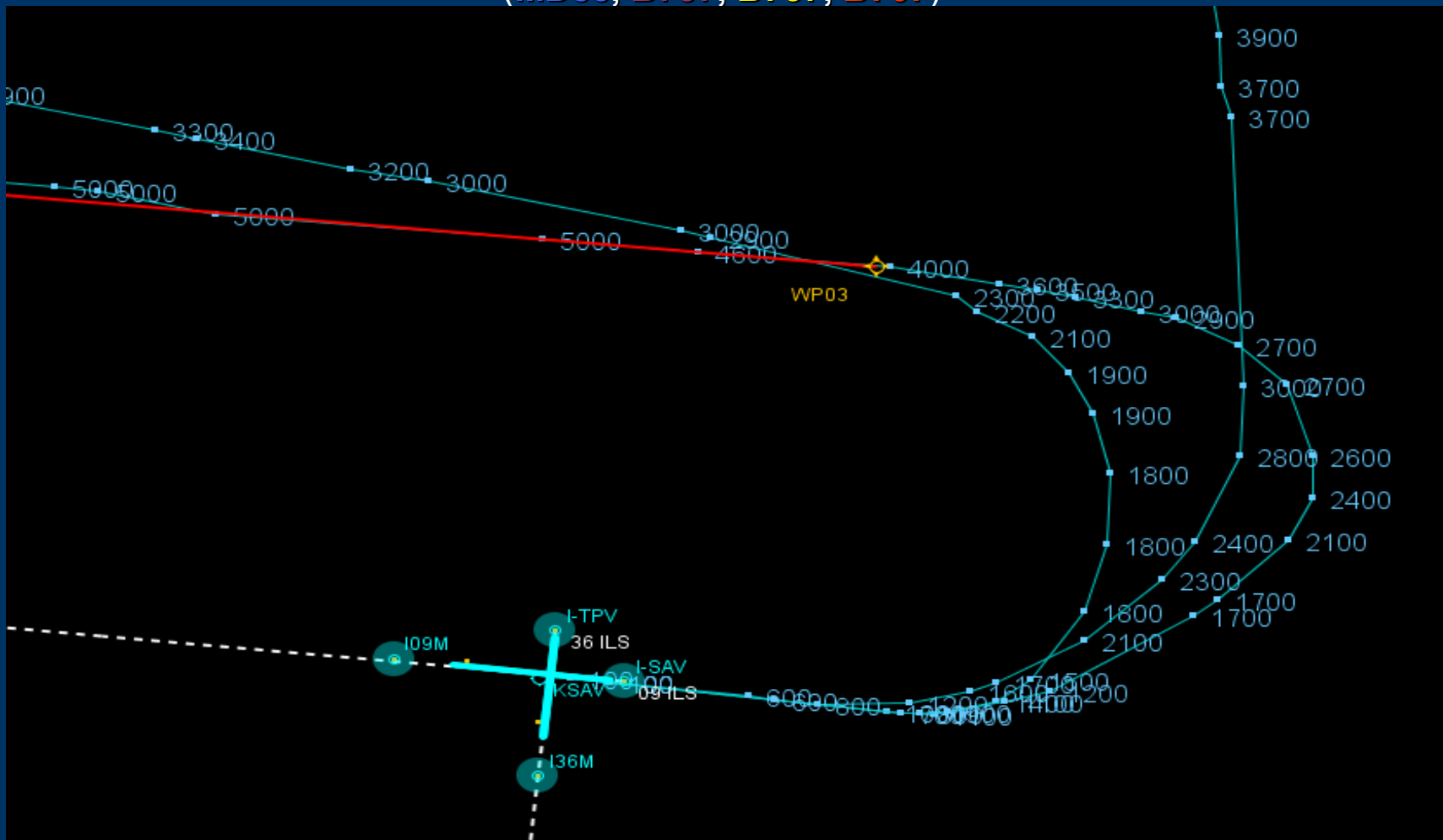
Simulator run altitudes at 24nm North of wpt SAV01 were 12,500'

Actual average altitudes (Traffic to all runways) 24nm North of wpt SAV01 show 13,500' – 11,000'

Traffic flow width 14.1nm

Close Up Analysis at WP03 – ILS 27

(MD88, B737, B757, B767)

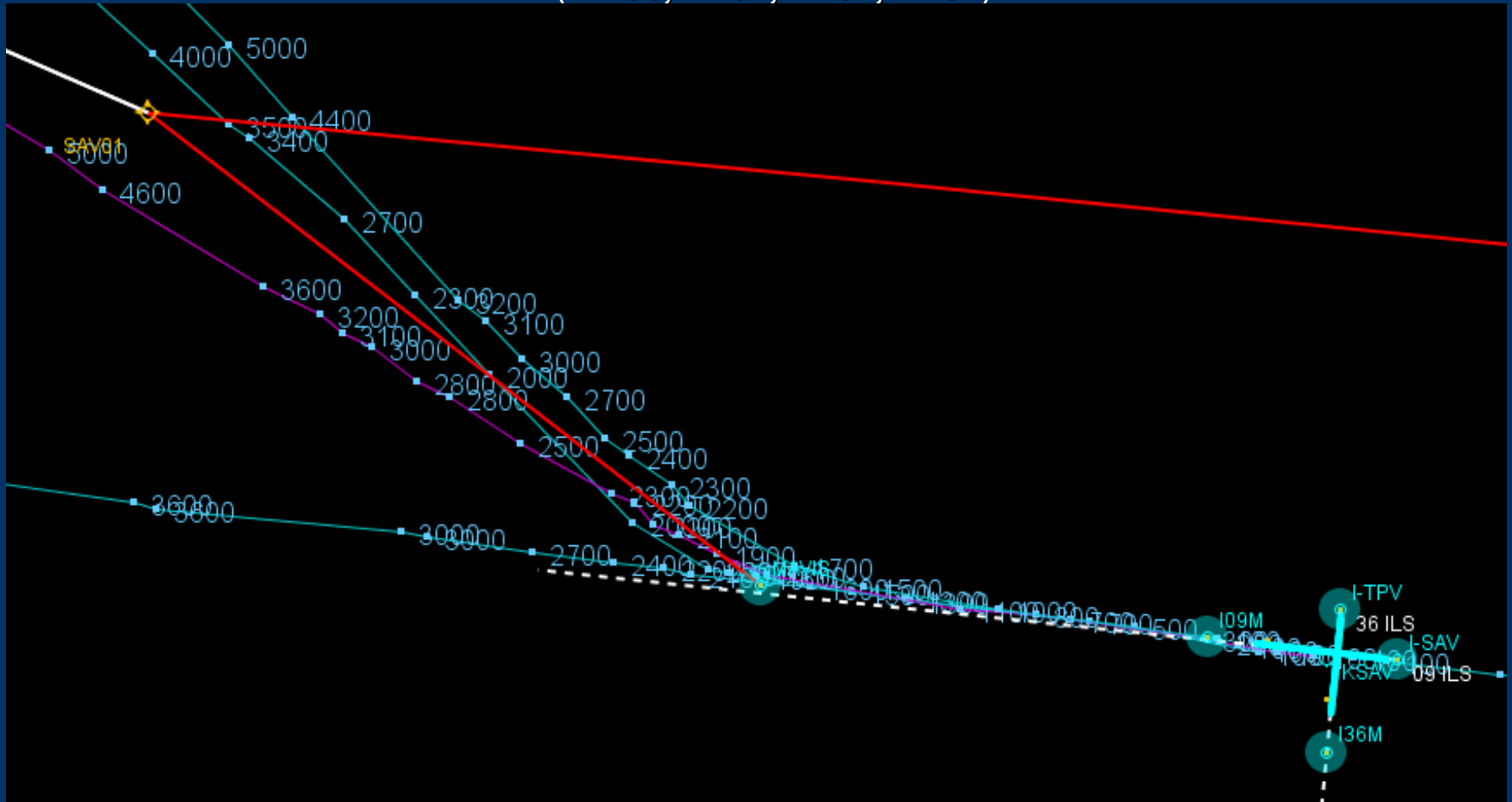


Simulator run altitudes at WP03 were 3,000' (established for the ILS)

Actual average altitudes at WP03 show 4,000' – 2,600'

Close Up Analysis at SAV01 – ILS 9

(MD88, B737, B757, B767)



Simulator run altitudes at SAV01 were 5,100'

Actual average altitudes at SAV01 show 5,000' – 4,600'