

# Ramp Traffic Console (RTC) Capabilities and Use in Operational Environment (Part 1)

NASA ATD-2 Industry Workshop

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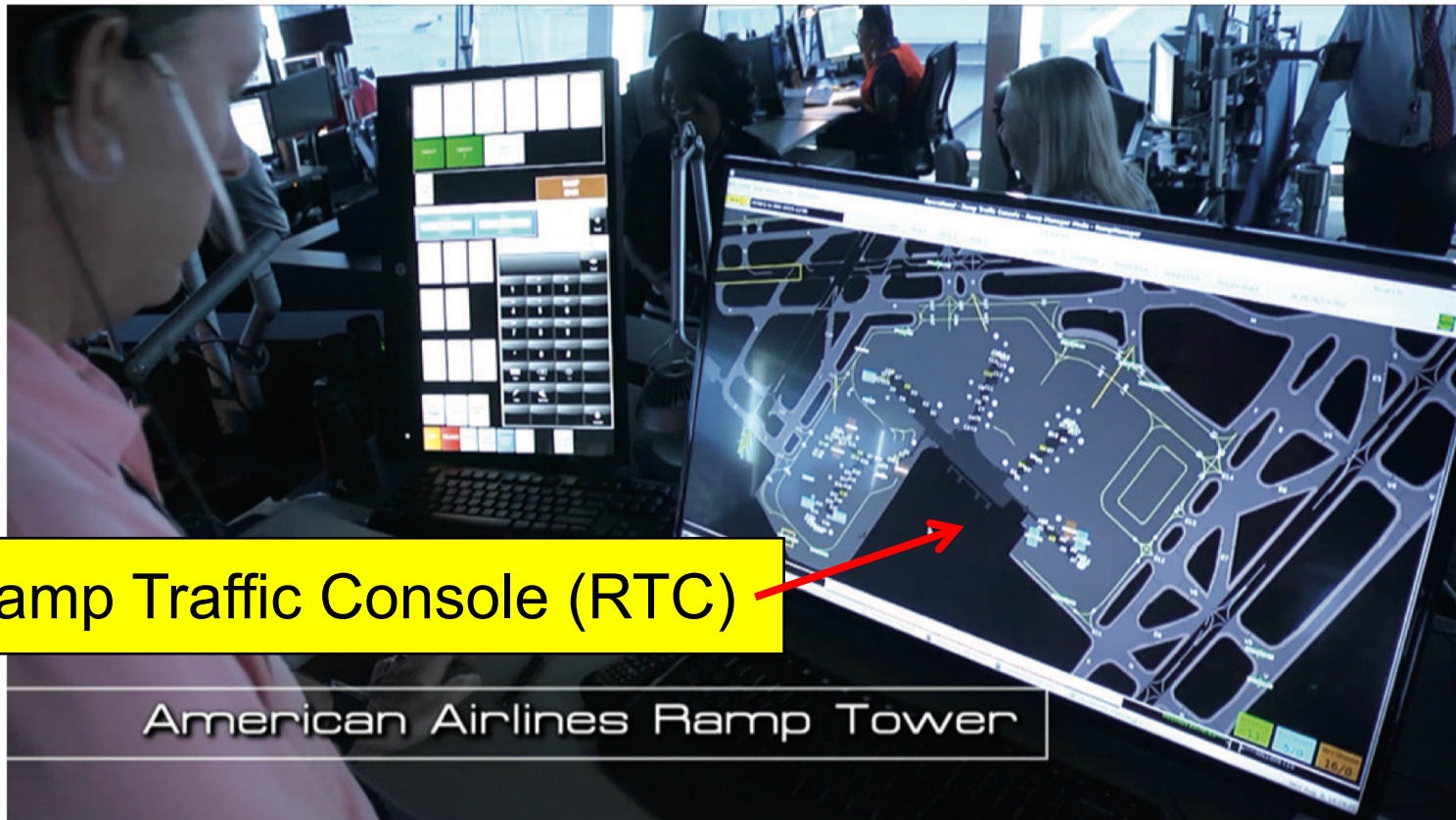
Lindsay Stevens (NASA ATD-2)

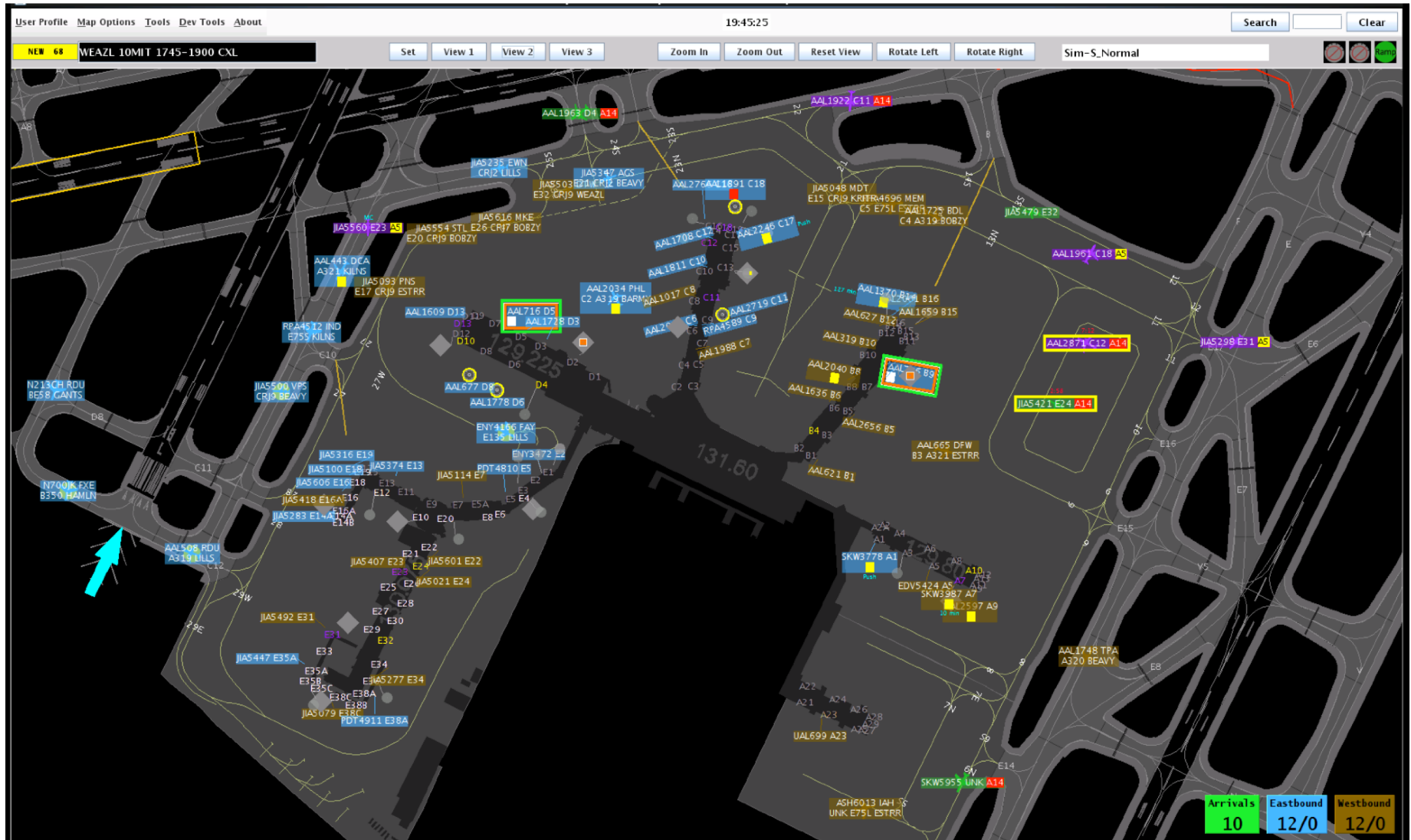


- **RTC Overview**
  - CLT AAL Ramp Tower
  - Color coding, symbology, icons, visual reminders
- **Operational Use Cases**
  - Surface Metering
  - EDCT (Expect Departure Clearance Time)
  - APREQ (Approval Request/Call for Release)
  - Ground Stops
  - Gate Conflicts
  - Flight Menu: Op Nec, Priority, Reposition
  - Right-Click Menus: Air Start, Emergency, Gate Closure

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- Ramp Traffic Console (RTC)
  - CLT: Four Ramp Sector Controllers (North, East, South, West)
- Ramp Manager Traffic Console (RMTC)
- Deployed to CLT AAL Ramp Tower: October 2017





The screenshot displays the ATD2 interface with a dark-themed airport map. At the top, there is a navigation bar with 'User Profile', 'Map Options', 'Tools', 'Dev Tools', and 'About'. The current time is 19:45:25. A search bar is on the right. Below the navigation bar, a status bar shows 'NEW 68' and 'WEAZL 10MIT 1745-1900 CXL'. A control bar contains buttons for 'Set', 'View 1', 'View 2', 'View 3', 'Zoom In', 'Zoom Out', 'Reset View', 'Rotate Left', and 'Rotate Right'. The map shows various aircraft positions with labels like 'AAL1963 D4 A14', 'AAL1922 C11 A14', 'JAS235 EWN', 'N213CH RDU B58 GANTS', 'N700K FXE B350 HAMLN', 'AAL508 RDU A319 LULLS', 'JAS316 E19', 'JAS100', 'JAS374 E13', 'E135 LULLS', 'E1Y3472', 'PDT4810 ES', 'JAS114 E7', 'AAL665 DFW B3 A321 ESTRR', 'AAL621 B1', 'JAS418 E16A E16', 'JAS283 E1-A17A E148', 'JAS407 E23', 'JAS501 E22', 'JAS021 E24', 'SKW3778 A1', 'EDV5424 A5 A7', 'SKW3987 A7', 'L7507 A9', 'AAL1748 TPA A320 BEAVY', 'JAS492 E31', 'JAS447 E35A', 'E35A', 'E35B', 'E35C', 'E38C', 'E38A', 'E388', 'JAS079 E18C', 'PDT4911 E38A', 'EAS277 E34', 'UAL699 A23', 'SKW5955 UNK A14', 'ASH6013 IAH UNK E75L ESTRR'. A large white-bordered box is overlaid on the map, containing three colored boxes with text: a green box with 'Arrivals 6', a blue box with 'Eastbound 8/0', and a yellow box with 'Westbound 7/0'. A cyan arrow points to a specific aircraft on the map. In the bottom right corner, a smaller version of the summary box is visible.

Arrivals	Eastbound	Westbound
6	8/0	7/0



The screenshot displays the ATD2 RTC interface. At the top, there is a navigation bar with 'User Profile', 'Map Options', 'Tools', 'Dev Tools', and 'About'. The current time is 19:45:25. A search bar is on the right. Below the navigation bar, a toolbar contains buttons for 'Set', 'View 1', 'View 2', 'View 3', 'Zoom In', 'Zoom Out', 'Reset View', 'Rotate Left', and 'Rotate Right'. The current simulation is 'Sim-5\_Normal'. The main area shows a map of an airport with various gates and taxiways. A cyan arrow points to gate 'A11'. A list of alerts is overlaid on the map:

- NEW 24** APREQ to DCA 1130-0200
- NEW 24** ORD GDP 1200-0359
- NEW 27** KILNS CLOSED
- NEW 27** LILLS 15MIT
- NEW 19** N\_Normal

At the bottom right, there are status indicators: 'bound', 'Westbound', '10', '12/0', and '12/0'. The map also shows labels for gates like 'N213CH RDU B558 GANTS', 'N700K FXE B350 HAMLN', 'AAL AG', 'AAL1963 D4 A34', 'A41922 C11 A14', and 'UNK E75L ESTR'.



User Profile Map Options Tools Dev Tools About 19:45:25 Search Clear

NEW 68 WEAZL 10MIT 1745-1900 CXL Set View 1 View 2 View 3 Zoom In Zoom Out Reset View Rotate Left Rotate Right Sim-S\_Normal

AAL473 A321 S  
BOBZY DEN  
B8 9 18C 2220

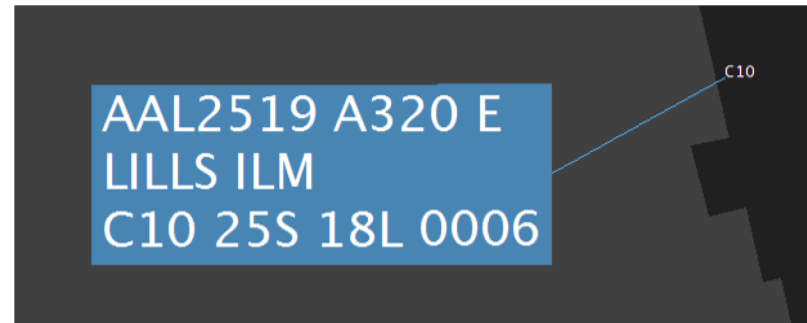
The screenshot displays the ATD2 RTC interface. At the top, there is a navigation bar with 'User Profile', 'Map Options', 'Tools', 'Dev Tools', and 'About'. The current time is 19:45:25. A search bar and a 'Clear' button are on the right. Below this, a status bar shows 'NEW 68' and 'WEAZL 10MIT 1745-1900 CXL'. A row of buttons includes 'Set', 'View 1', 'View 2', 'View 3', 'Zoom In', 'Zoom Out', 'Reset View', 'Rotate Left', 'Rotate Right', and 'Sim-S\_Normal'. The main area is a map of an airport with various aircraft labels. A large, semi-transparent box is overlaid on the left side of the map, containing the text: 'AAL473 A321 S', 'BOBZY DEN', and 'B8 9 18C 2220'. The map shows several aircraft in different colors and positions, with labels like 'AAL1370 B14 B16', 'AAL627 B12 B13 B14 B15 B16', 'AAL2871 C12 A14', 'JIAS421 E24 A14', 'AAL665 DFW B3 A321 ESTRR', 'KW3778 A1', 'EDV5424 A5 A7 A8 A9', 'SKW3987 A7', 'AAL1748 TPA A320 BEAVY', 'SKW5955 UNK A14', 'ASH6013 IAH UNK E75L ESTRR', 'JIAS492 E31', 'JIAS447 E35A', 'E27 E28 E29 E30 E31 E32 E33 E34 E35A E35B E35C E38C E38A E388 JIAS079 E38C PDT4911 E38A', 'AAL1961 C18 A3', 'JIAS298 E31 A5', 'AAL2656 B5', 'AAL1659 B15', 'AAL1370 B14 B16', 'AAL627 B12 B13 B14 B15 B16', 'AAL2871 C12 A14', 'JIAS421 E24 A14', 'AAL665 DFW B3 A321 ESTRR', 'KW3778 A1', 'EDV5424 A5 A7 A8 A9', 'SKW3987 A7', 'AAL1748 TPA A320 BEAVY', 'SKW5955 UNK A14', 'ASH6013 IAH UNK E75L ESTRR', 'JIAS492 E31', 'JIAS447 E35A', 'E27 E28 E29 E30 E31 E32 E33 E34 E35A E35B E35C E38C E38A E388 JIAS079 E38C PDT4911 E38A'. At the bottom right, there is a summary table:

Arrivals	Eastbound	Westbound
10	12/0	12/0



AAL473 A321 S  
BOBZY DEN  
B8 9 18C 2220

Westbound Departures (brown)



AAL2519 A320 E  
LILLS ILM  
C10 25S 18L 0006

Eastbound Departures (blue)



DAL2139  
B738 W  
2:59  
00:06:24  
A5

Arrival (green)



RPA4675  
E75L S  
17:45  
00:10:24  
C5

Arrival (w/ Gate Conflict) (magenta)

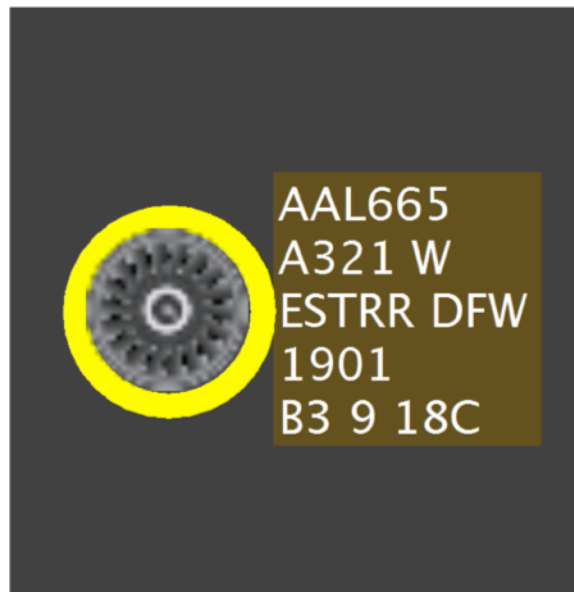
## Flight State

Parked at Gate



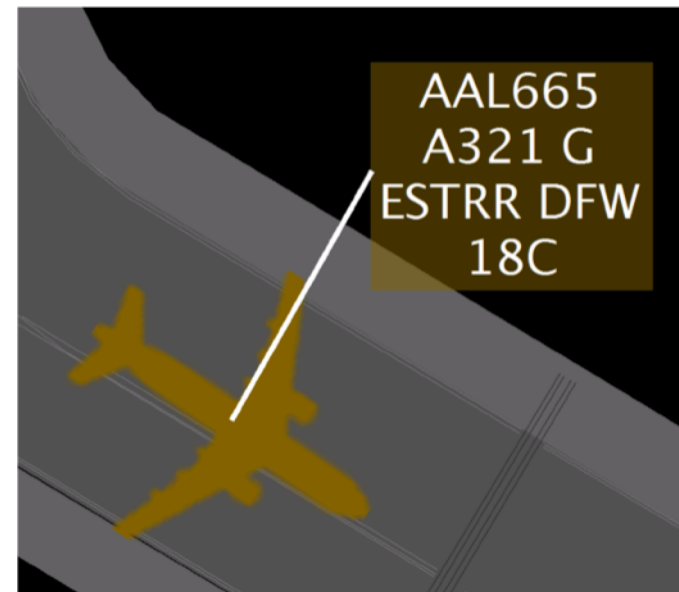
Flight Strip  
(tethered to gate)

Pushback/Spool-Up



Engine Icon

Taxi



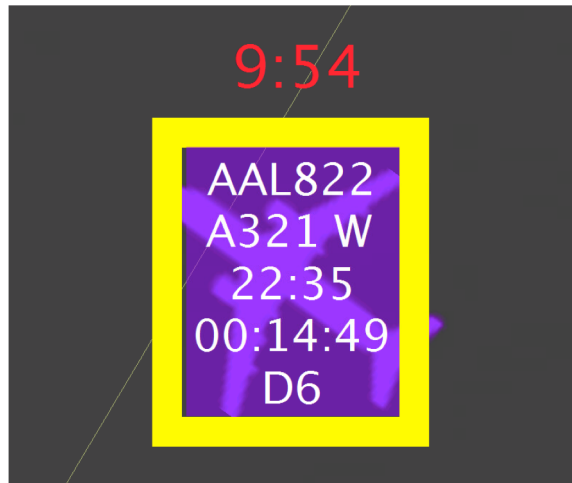
Flight Icon  
w/ Data Tag



Blue/White Border: B757 aircraft



Orange/White Border: Heavy aircraft



Yellow Border & Timer: Hardstand



Red Border & Timer: Pilot Ready

```
AAL1749 A319 S  
KRITR PIT  
B12 9 18C 0015
```

Departure Fix Closure

```
AAL1616 A319 C  
AKUNA STL  
C6 22 18L 1940
```

Departure Fix Change

```
JIA5033  
CRJ7 W  
A14 20:50  
00:19:43  
E31
```

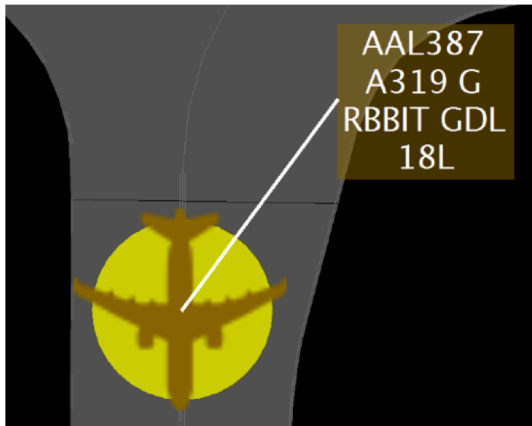
Arrival Flights ("A14")

```
AAL2804 B738 C  
AKUNA YYZ  
M35  
C33 42 17R 0006
```

Miles-in-Trail (MIT) Restriction

- **Long On Board (LOB)**

- Displayed for common situational awareness.
- For **departures**, the LOB timer starts at pushback: Current time minus Actual Off-Block Time (AOBT) until the departure takes off.
- For **arrivals**, the LOB timer starts at touchdown: Current time minus the Actual Landing Time (ALDT) until the arrival is in the gate.



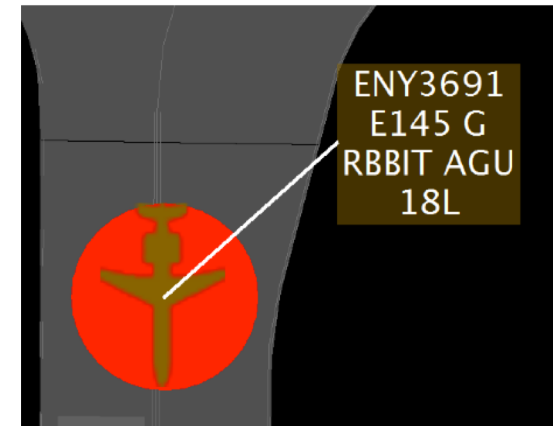
Yellow

LOB Timer:  
60 – 89 minutes



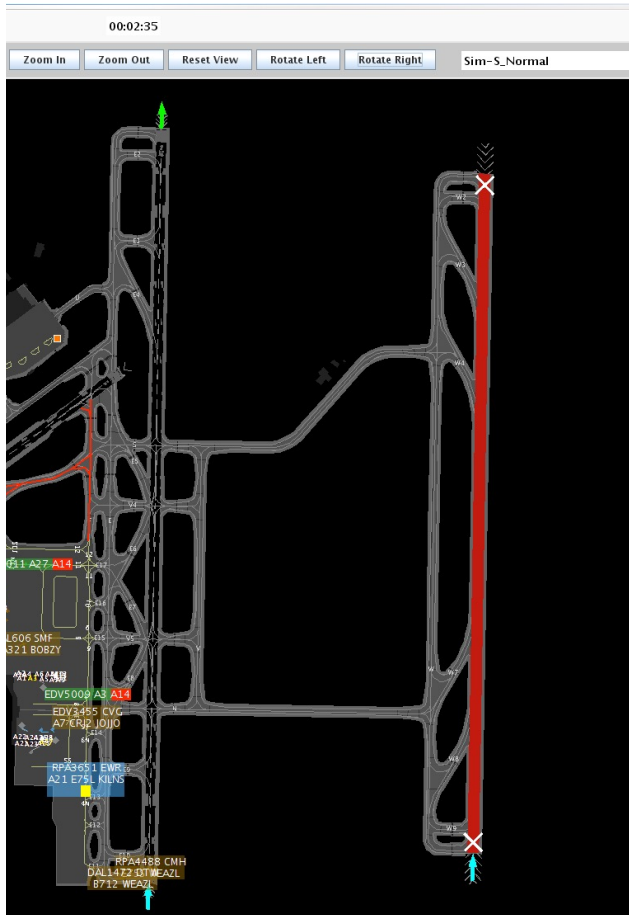
Orange

LOB Timer:  
90 – 119 minutes

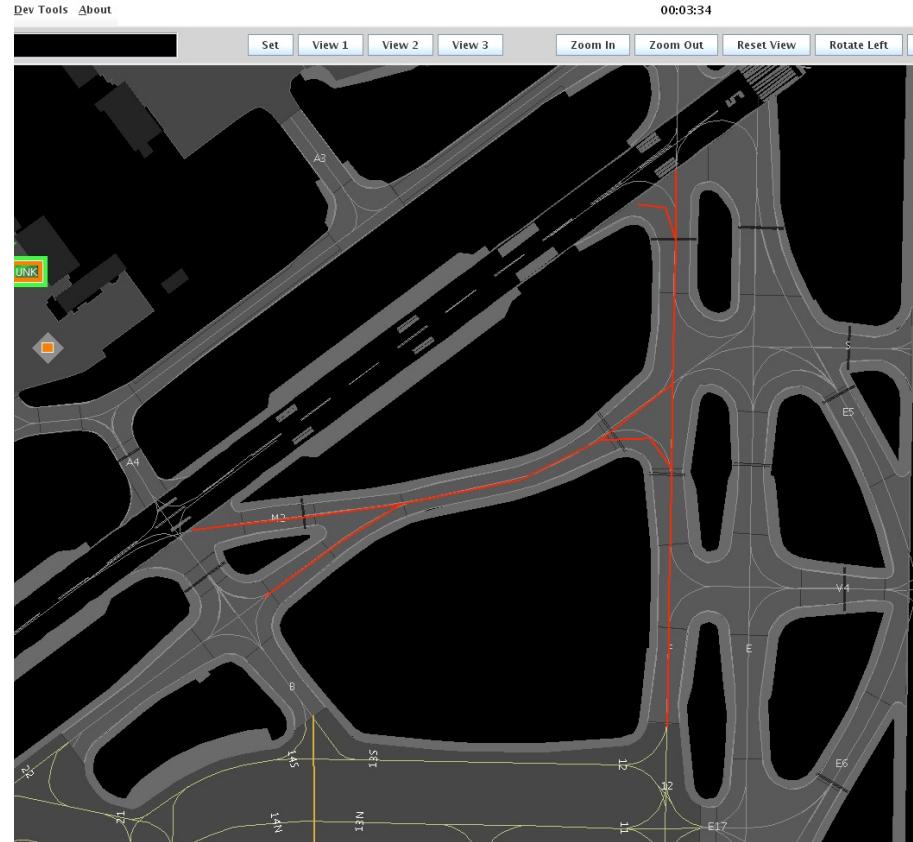


Red

LOB Timer:  
120+ minutes



Closed Runway  
(red highlight with white "X"s)



Closed Taxiway  
(red centerline)

## ATD-2 Scheduler

Gate Hold Advisories (Metering)  
Gate Hold Advisories (TMI)

## Commercial Airlines

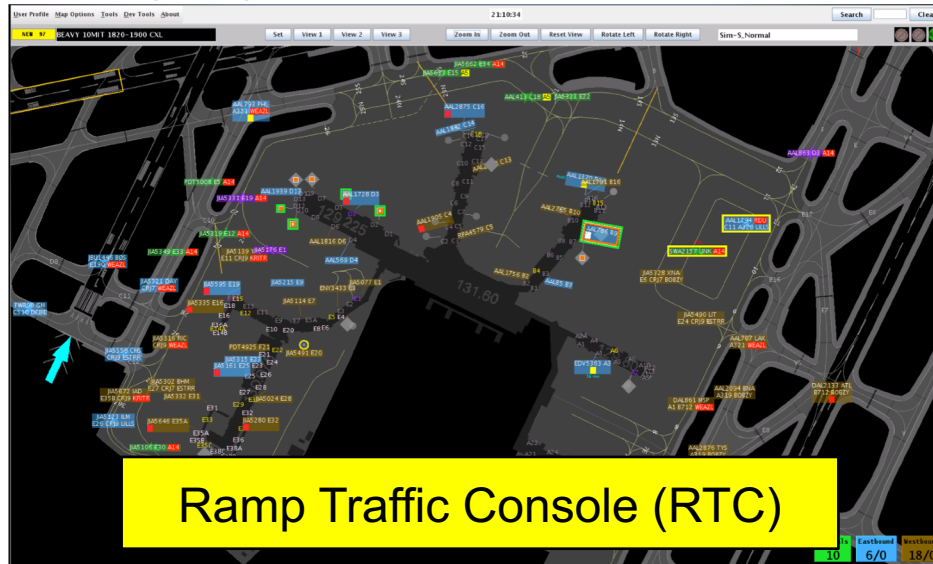
Earliest Off-Block Time (EOBT)  
P-Time

## FAA

EDCT  
APREQ  
Miles-in-Trail  
Ground Stops

## Airport Surface Surveillance

Aircraft Position  
Flight State  
Hardstand



Ramp Traffic Console (RTC)

## ATC Tower Input via STBO

Departure Fix Closures  
Airport Configuration  
Taxiway/Runway Closures  
APREQ Time

## Ramp Input into RTC

Priority Flights  
Emergency Status  
Flight State  
Flight Cancellations  
Runway Change for Op Nec

## Flight Deck

Runway Change  
for Op Nec.  
Pushback Delay





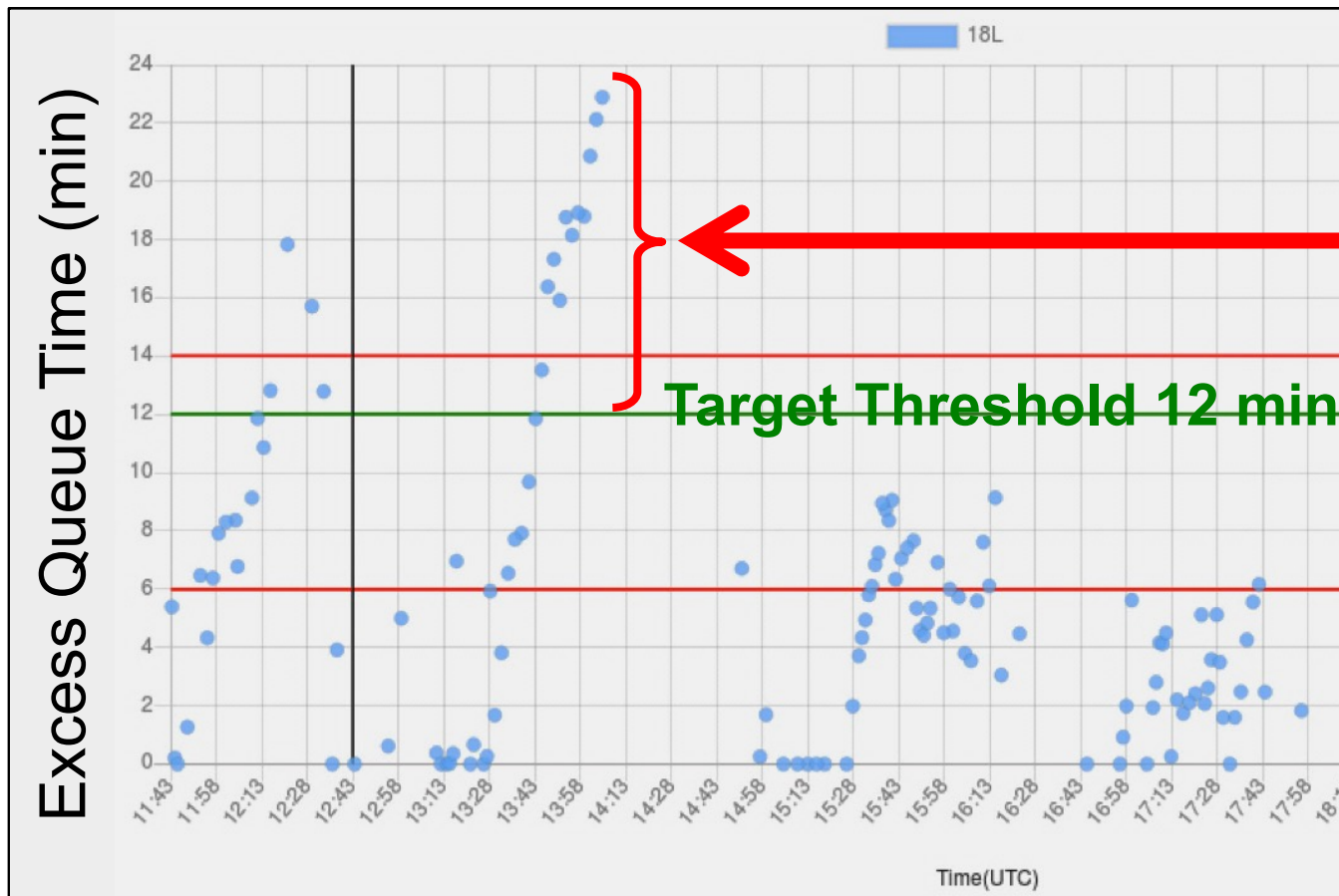
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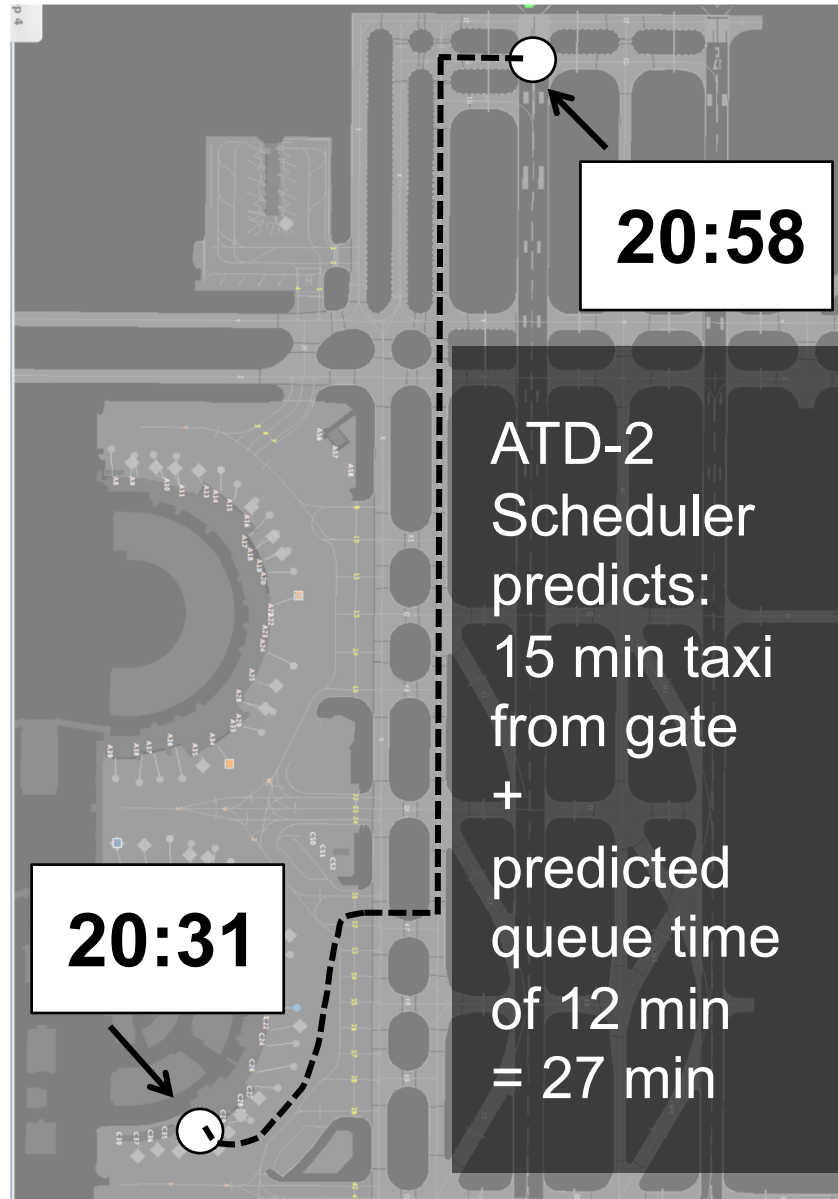
## Surface Metering

- CLT: Metering started Nov 2017
- Initially, Banks 2 and 3 at CLT; since expanded.
- Use short gate holds to reduce departure queue length.
- Bank 2 (example) (vary by bank):
  - 23% of departures were advised a gate hold.
  - 16% were actually held at the gate.
- Average gate hold is 6 minutes (Banks 2 and 3).

- Short gate holds to reduce time in departure queue.
- Surface Metering is triggered when the predicted Excess Queue Time exceeds the target threshold (e.g., 12 min).



Flights predicted to have more than 12 min of Excess Queue Time

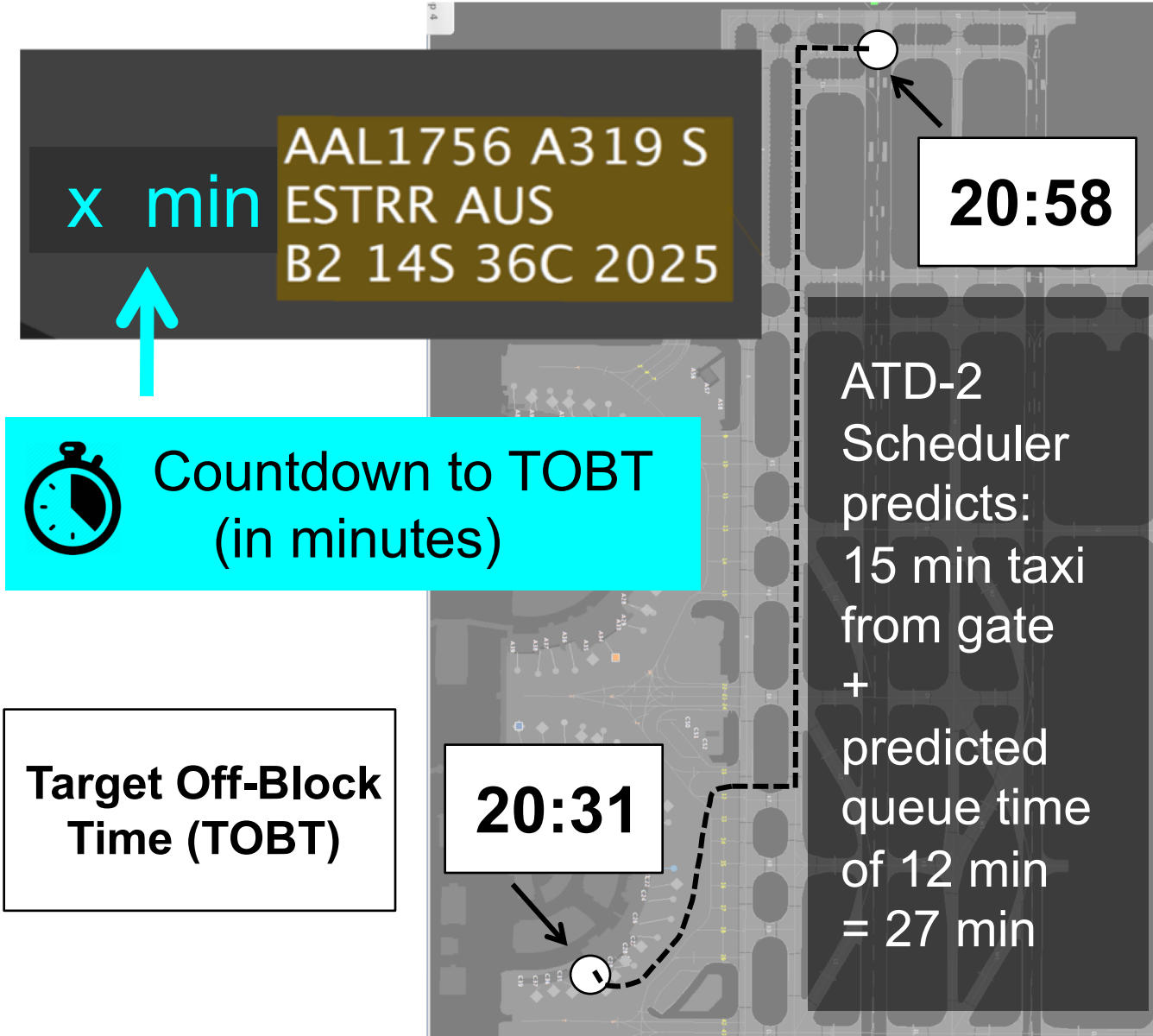


**Target Off-Block Time (TOBT)**

**20:58**

ATD-2 Scheduler predicts:  
15 min taxi from gate  
+ predicted queue time of 12 min  
= 27 min

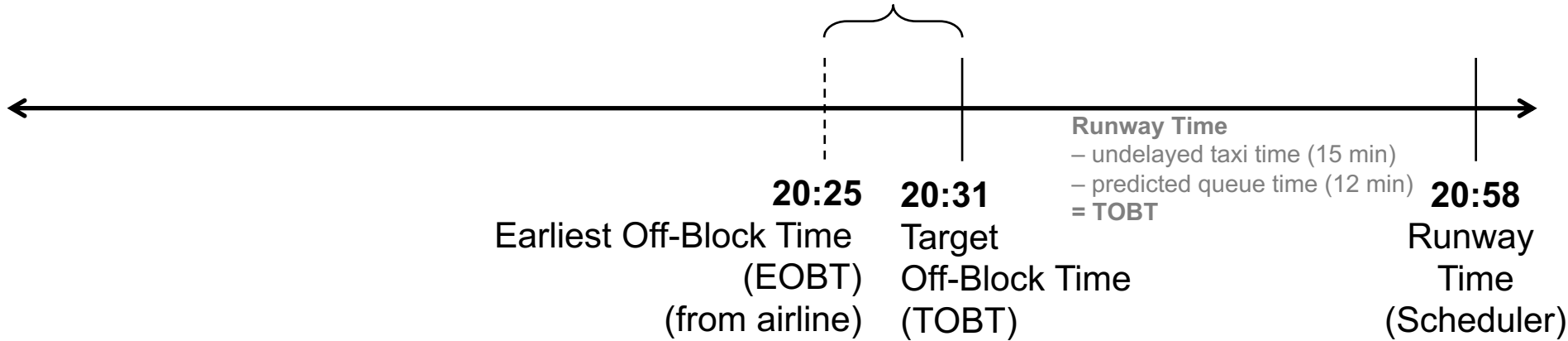
**ATD-2 Surface Scheduler** develops a runway schedule, from which TOBT is derived.



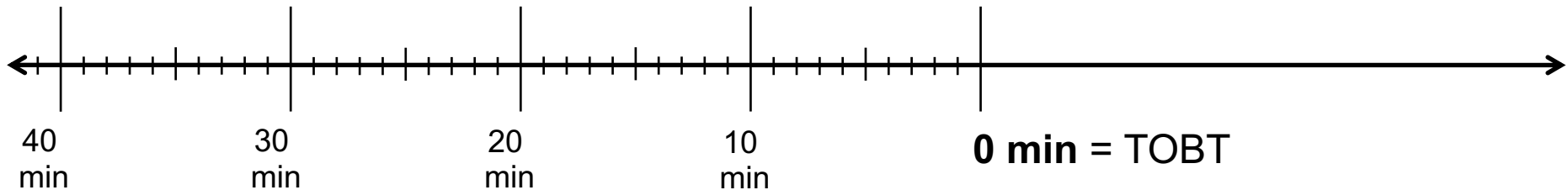
**ATD-2 Surface Scheduler** develops a runway schedule, from which TOBT is derived.

## Schedule

This flight is subject to Surface Metering,  
its Advised Gate Hold = 6 min



## RTC Display



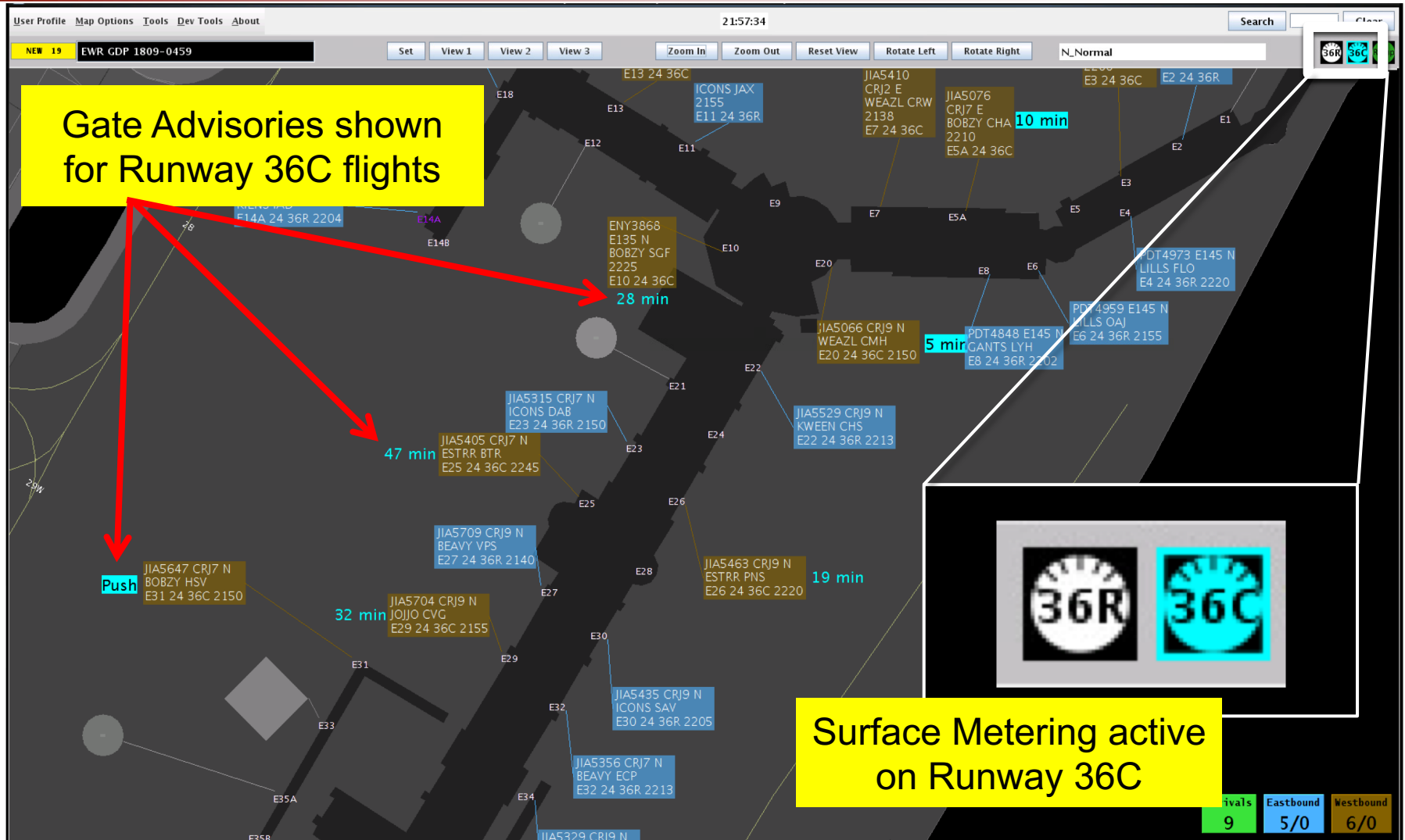
Countdown to TOBT (in minutes)

x min

AAL1756 A319 S  
ESTRR AUS  
B2 14S 36C 2025

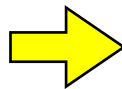
**Push**

AAL1756 A319 S  
ESTRR AUS  
B2 14S 36C 2025



Data Exchange:

**ATD-2 Surface Scheduler**



**RTC display in Ramp Tower**



18 min

AAL1756 A319 S  
ESTRR AUS  
B2 14S 36C 2025

## Gate Hold Advisory:

- Countdown to TOBT in min increments
- Advisory can change (jump) in accordance with TOBT changes

7 min

AAL1756 A319 S  
ESTRR AUS  
B2 14S 36C 2025

## Static Time Horizon (STH):

- At 10 min (configurable) prior to TOBT:
  - TOBT is frozen
  - Continues to count down to TOBT
  - Frozen (black text, cyan highlight).

Inverted colors; highlighted background = Frozen

Push

AAL1756 A319 S  
ESTRR AUS  
B2 14S 36C 2025

## Pushback Advisory:

- At TOBT, countdown = 0 min
- **PUSH** is indicated

Flight Deck calls for Pushback





## Pilot Calls 'Ready' prior to TOBT:

- Ramp Controller makes input into RTC
- Select "Hold" form right-click menu

## Putting a Flight on Hold:

- 1) Freezes advisory (black text, cyan highlight).
- 2) Advisories are shown in *min:sec*
- 3) **Red Border** is shown around flight strip.

## Gate Hold Advisory:

- Within 2 minutes of the TOBT, highlight turns orange.

## Pushback Advisory:

- At TOBT, **PUSH** is shown (pulses).
- Red Timer: *min:sec* past TOBT.



User Profile Map Options Tools About 01:49:23 Search Clear

NEW 8 APREQ to ATL 1000-0300 Set View 1 View 2 View 3 Zoom In Zoom Out Reset View Rotate Left Rotate Right Sim-S\_Normal 18L 18C Ramp

8C 0219

N

2350

067 CRJ7 N

ZY XNA

9 18C 023

E26

E25

E28

E29

E32

**18L METERING IS OFF**  
Holds are no longer recommended for metering

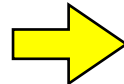
Eastbound 6/1 Westbound 10/0

## Traffic Management Initiatives (TMIs)

- Expect Departure Clearance Time (EDCT)
- Approval Request/Call for Release (APREQ/CFR)
- Gate Hold Advisories for TMI flights are always displayed -  
- not limited to Surface Metering.
- TMI flights are not subject to Surface Metering.
- TMI Gate Hold Advisories are in support of the wheels-up time.

Data  
Exchange:

**FAA**



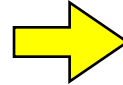
**RTC display in Ramp Tower**

## Expect Departure Clearance Time (EDCT)

- EDCT wheels-up time populates automatically.

Data  
Exchange:

FAA



RTC display in Ramp Tower

**Gate Hold  
Advisory:**  
Countdown to  
TOBT



55 min

AAL1893 A319 E  
KRITR LGA  
E2306  
C12 24 36C 2145

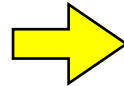
C12

## Approval Request/Call for Release (APREQ/CFR)

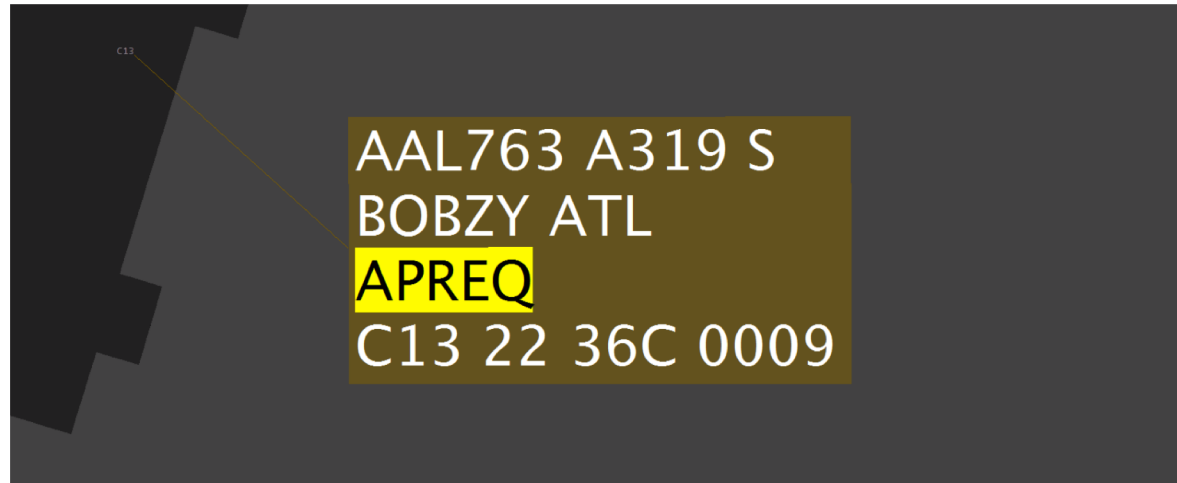
- APREQ indication populates automatically, prior to negotiation of the APREQ time.

Data  
Exchange:

**FAA**



**RTC display in Ramp Tower**





## Approval Request/Call for Release (APREQ/CFR)

- Pilots contact Clearance Delivery just before pushback to initiate negotiation (electronic) of the APREQ time.



AAL763 A319 S  
BOBZY ATL  
A0032  
C13 22 36C 0009

2 min

**Gate Hold Advisory:**  
Countdown to TOBT

- **Approval Request/Call for Release (APREQ/CFR)**
  - If the APREQ has not been negotiated before pushback, the “APREQ” field is highlighted in red.



## Ground Stop at Destination Airport

- Ramp Controller can communicate to Flight Deck for re-planning.



JIA9930 CRJ7 N  
WEAZL **DCA**  
E29 24 36C 2030

AAL745 A321 E  
KILNS **EWR**  
C8 24 36R 0211

ASH6212  
E75L W  
ESTRR **IAH**  
1545  
A27 4 18C

Ground Stop at Destination (examples)

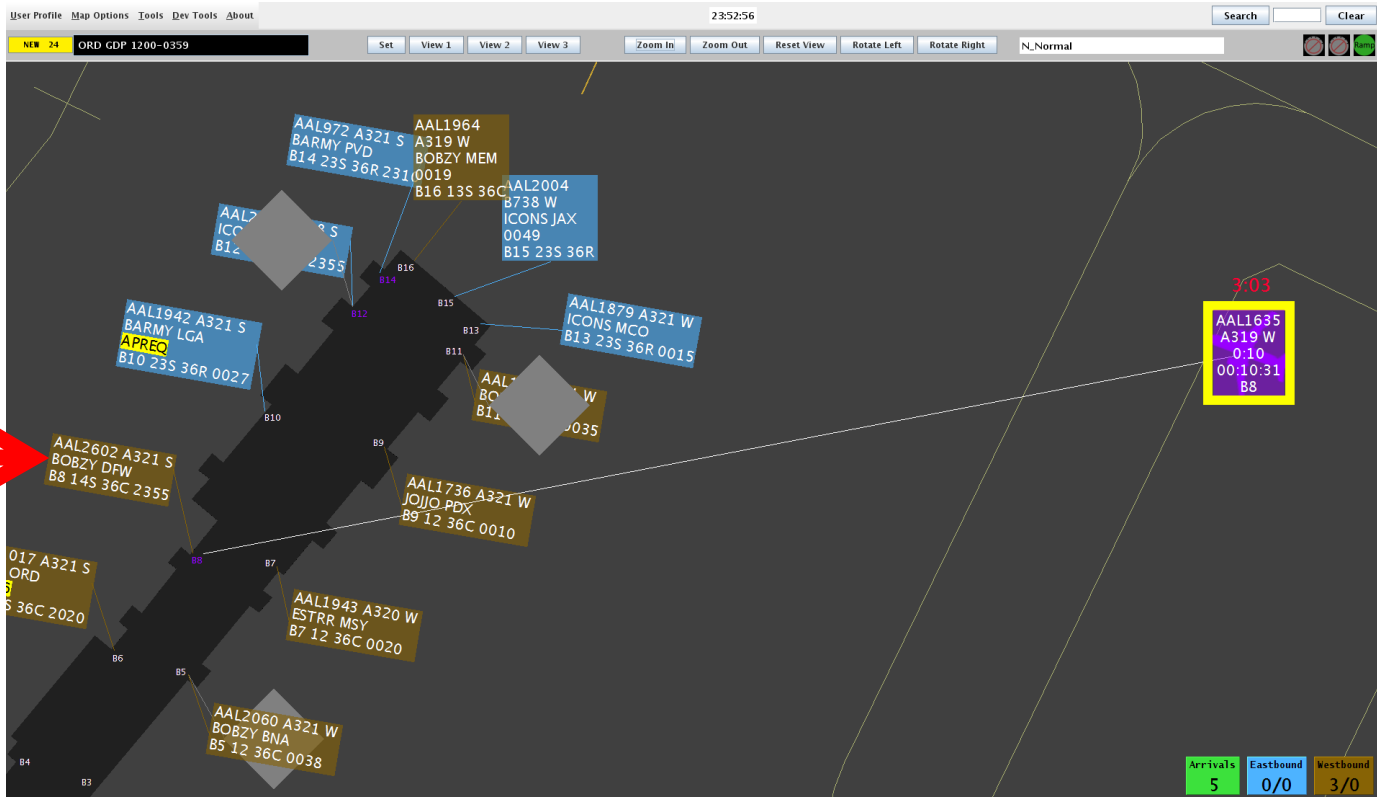


## Gate Conflict

- Magenta arrival and gate number indicate a gate conflict.
- Is indicated 10 min (configurable) prior to wheels-down.
- Indication removed at pushback + 5 min (configurable).

Departure flight is parked at Gate B8.

Inbound Arrival for Gate B8 parked in Hardstand.



## Gate Conflict (Adjacent Gate closed to Heavy)

- An aircraft at D1 closes D2 to Heavy aircraft.

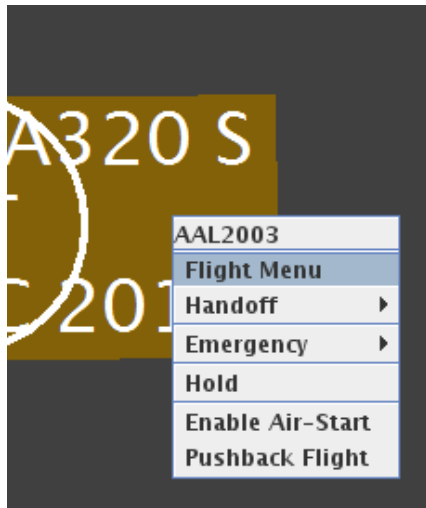


Heavy A330  
inbound for  
Gate D2.

Aircraft  
parked at  
adjacent  
Gate D1.

## Flight Menu

- Provides an interface to change flight status, flight properties.
- Provides access to more schedule information.



Flight Menu
✖

### AAL2003 A320 PIT

**SURFACE**

Hardstand:

Bypass:

Gate:

Spot:

Runway:

**DEPARTURE DETAILS**

Tail: N679AW

P-Time: 2010

LOBT: 2010

EOBT: 2010

TOBT:

TMAT:

APREQ:

EDCT:

MIT:

Departure fix: WEAZL

Previous fix:

**METERING STATUS**

Exempt from metering

Freeze Advisory

**PRIORITY STATUS**

Priority Flight

**FLIGHT STATUS**

Normal

Suspend Flight (problem of uncertain duration; flight expected to proceed at problem resolution)

Returning to Gate (pushed flight has problem severe enough to require return to the gate)

Cancel Flight (cannot be undone)

**STRIP**

Move To Gate (overrides old/bad track)

Reposition (disables tether to gate)

Remove Flight Strip (Aircraft is not at this airport)

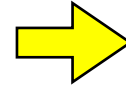
**SCRATCH PAD**

## Runway Change for Operational Necessity

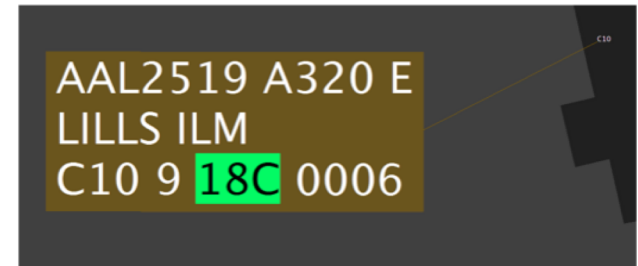
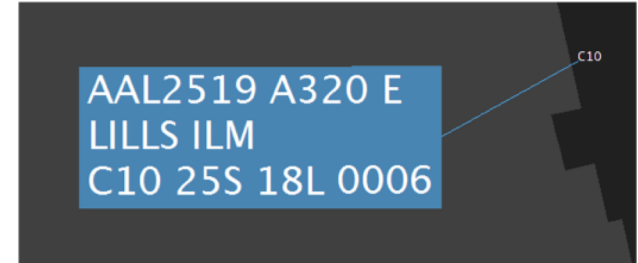
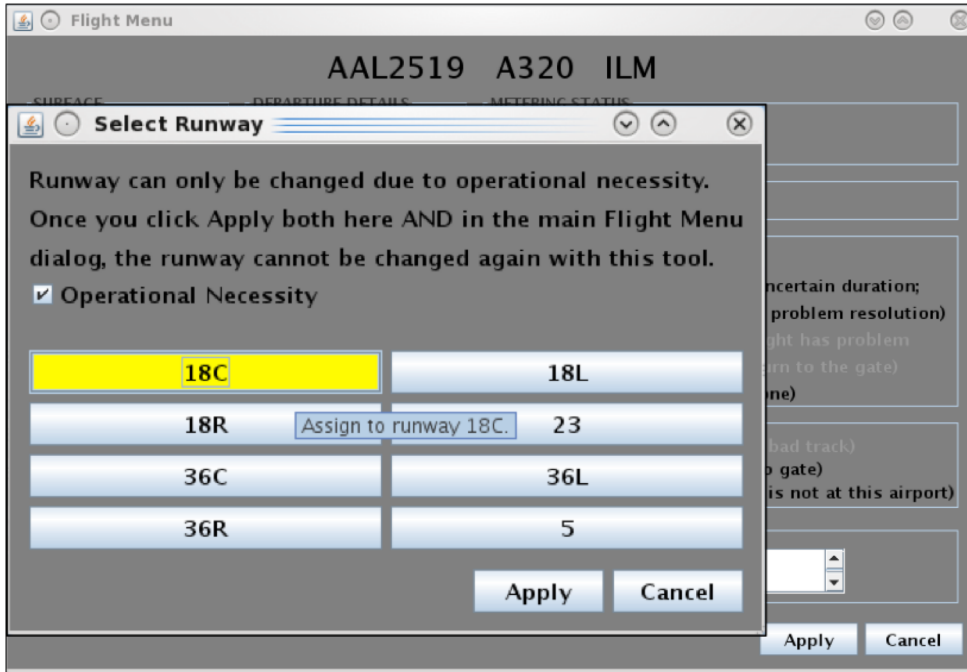
- At CLT, ATCT allows Ramp to input a change for Op Necessity
- Not applicable at all airports.

Data Exchange:

**Ramp Input into RTC**

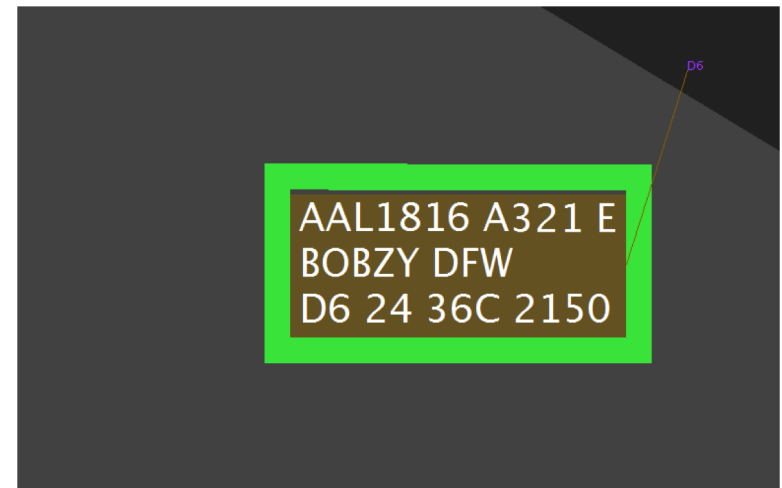
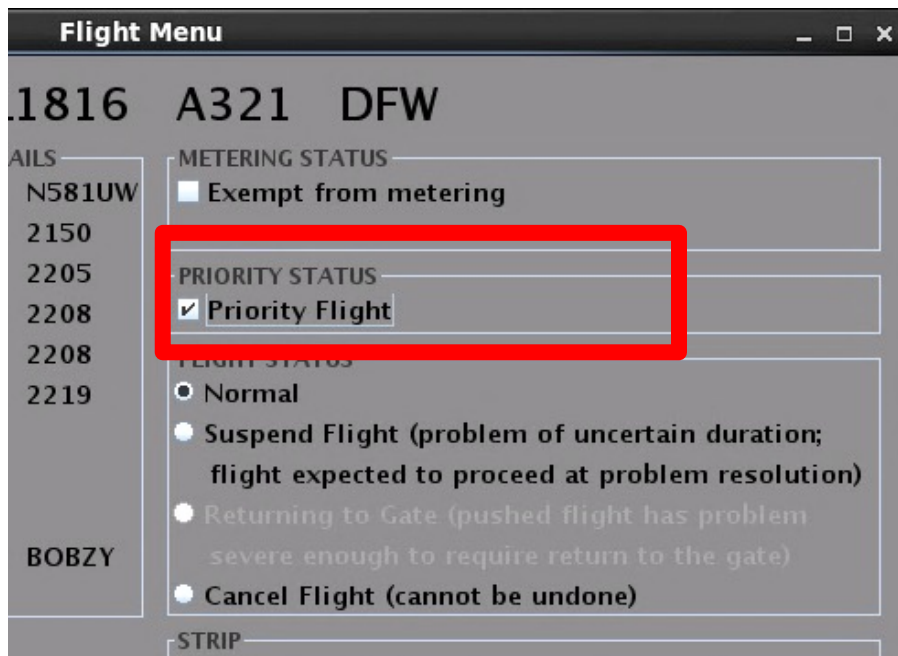


**ATC Tower (STBO)**



## Priority Flight

- Ramp Manager/Ramp Controllers can designate a flight as a priority flight using the Flight Menu on the RTC.
- Priority flights are scheduled ahead of other flights within the same airline during Surface Metering.
- Ramp Manager can add a daily list on RMTTC.



## Reposition Flight

- Manage repositioned flights on RTC.

STRIP

- Move To Gate (overrides old/bad track)
- Reposition (disables tether to gate)**
- Hangar**
- North Hardstand
- South Cargo
- West Hardstand
- Remove Flight Strip (Aircraft is not at this airport)

AAL656 A319 S  
ESTRR MSY  
**Hang** 18C 1840

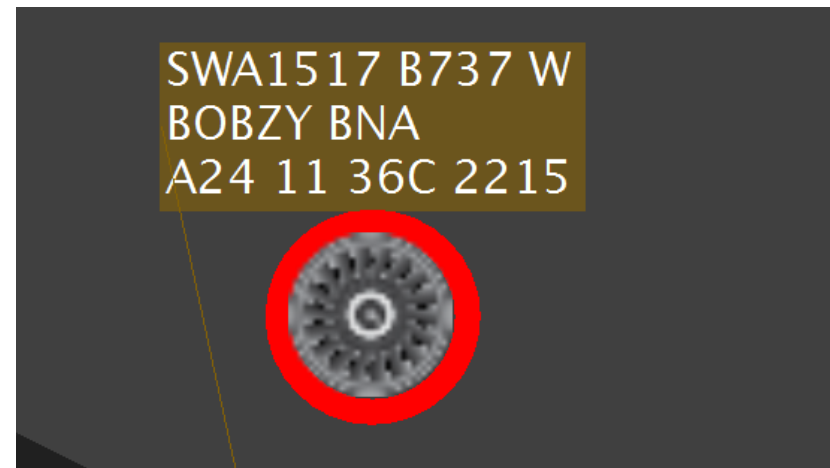
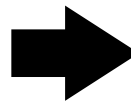
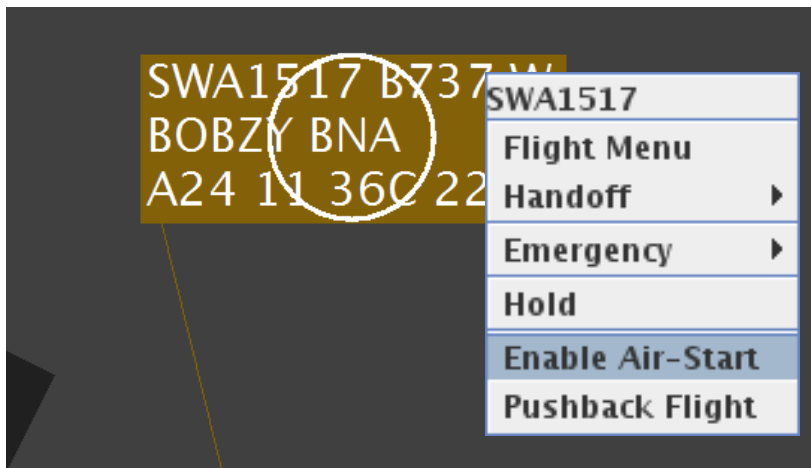
Hangar

AAL246 B738 S  
ICONS PBI  
**SC** 36R 1520

South Cargo

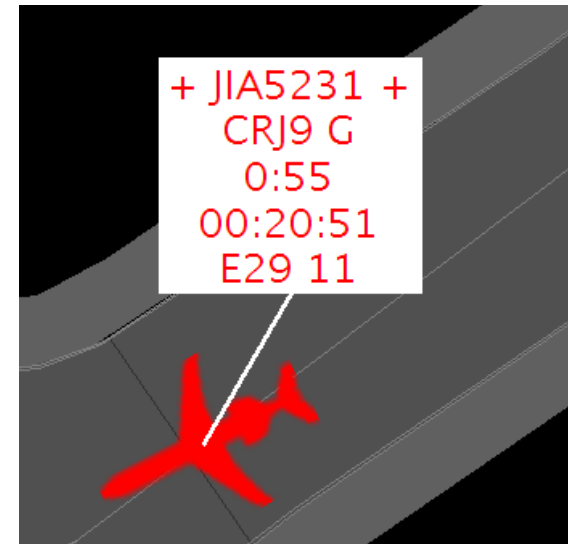
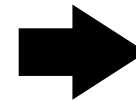
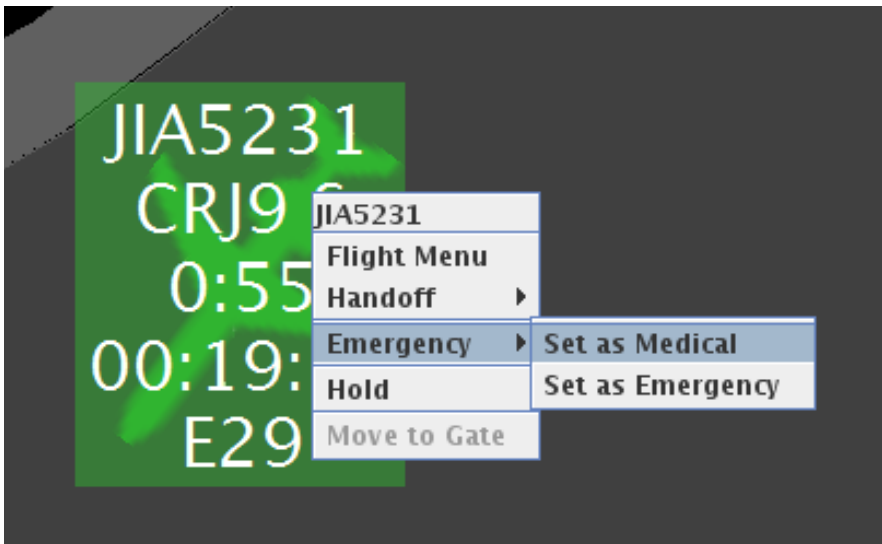
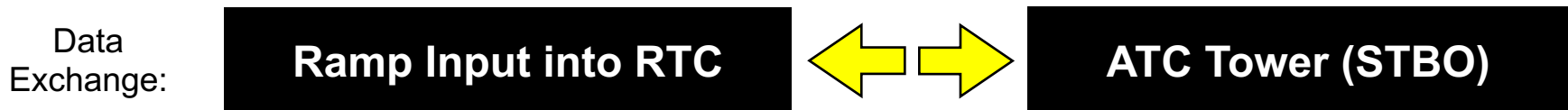
## Air-Start

- Indicate flights that require an air-start in RTC
- Access from right-click menu.
- Engine icon with red border.



## Emergency

- Mark a flight for a general or medical emergency.

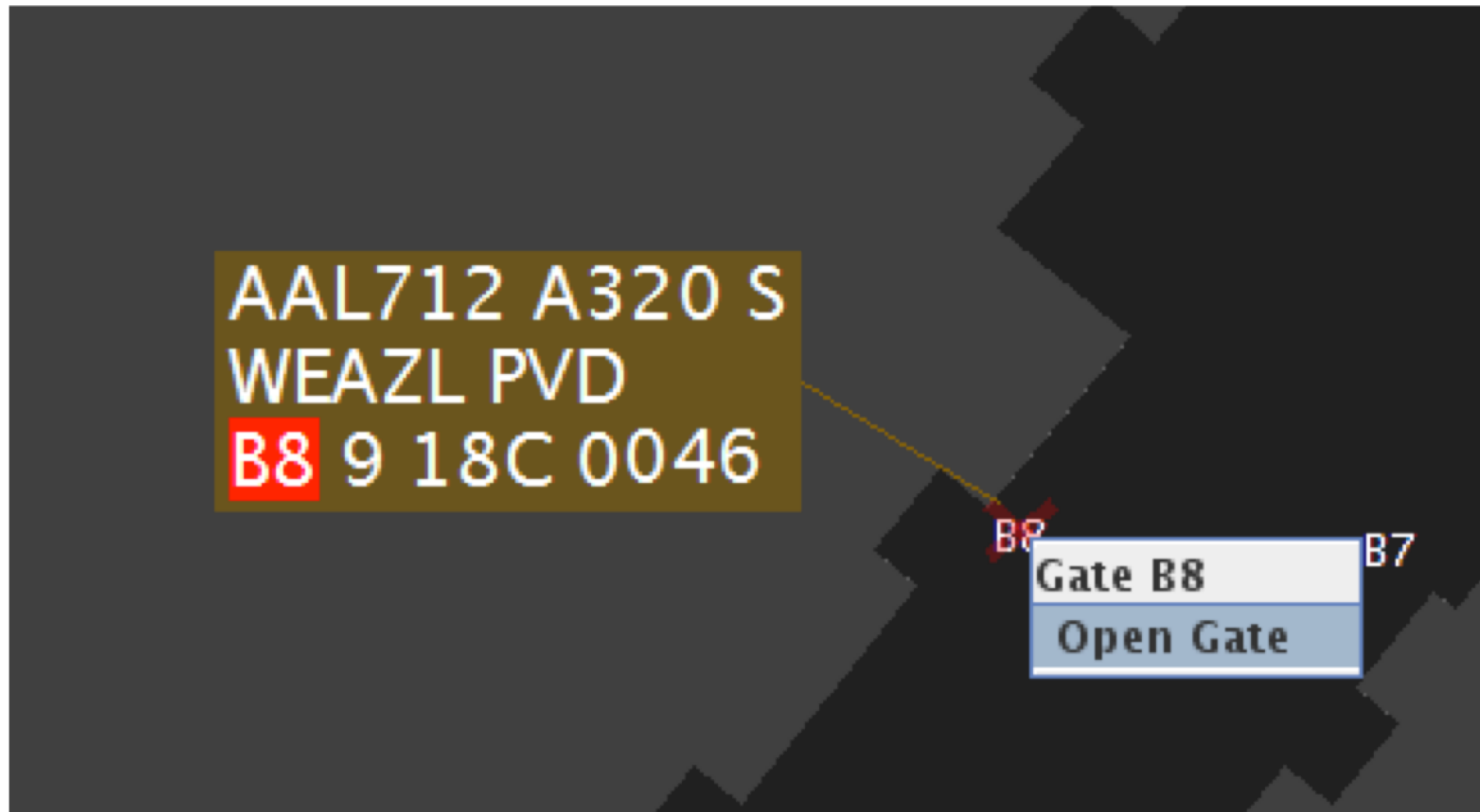


Emergency (Medical)



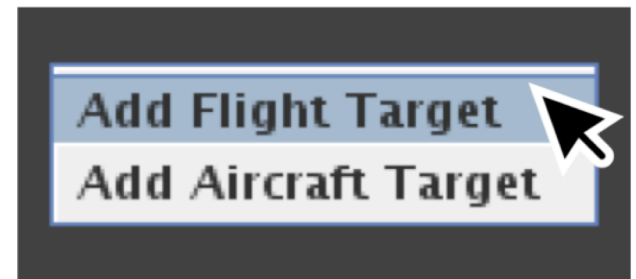
## Gate Closure

- Indicate gate closures in RMTC.

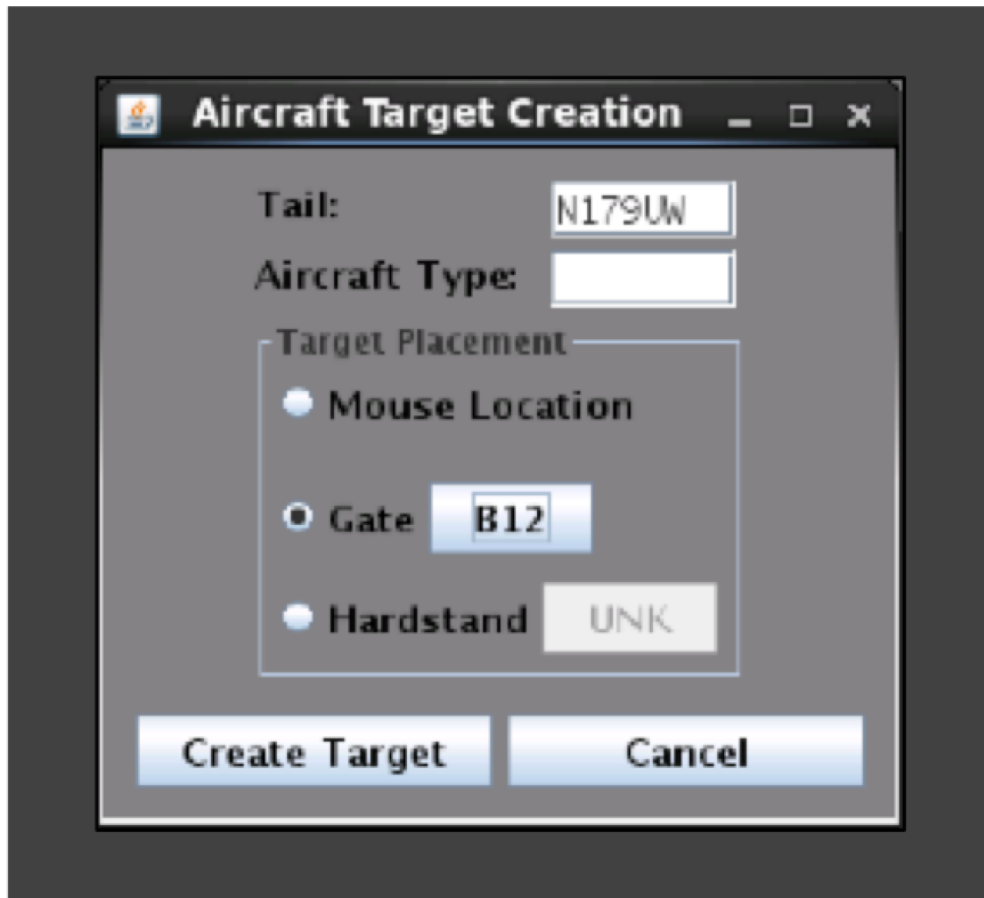




- Create flight strips for flights that are in the database, but missing from the RTC map.



- Create targets for aircraft not in the database.



**Aircraft Target Creation**

Tail:

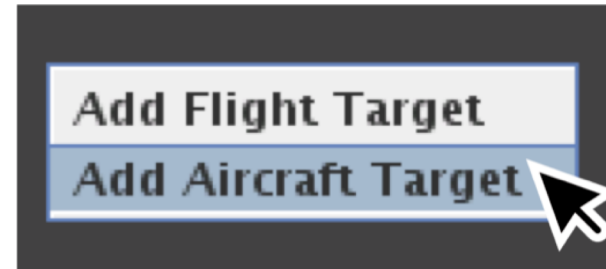
Aircraft Type:

Target Placement

Mouse Location

Gate

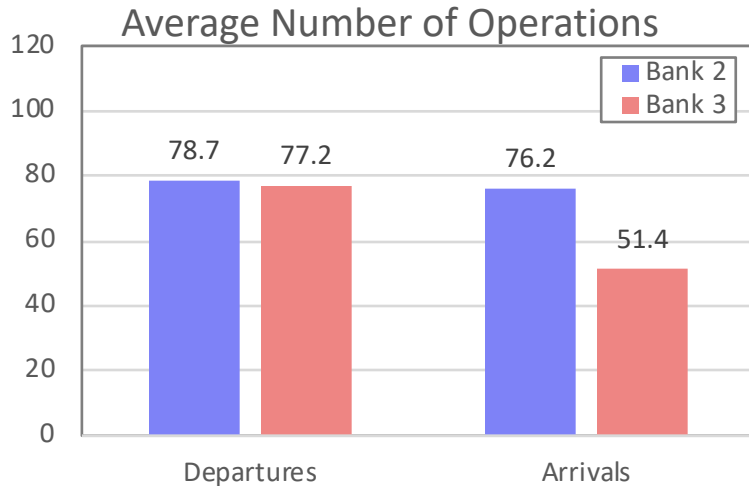
Hardstand



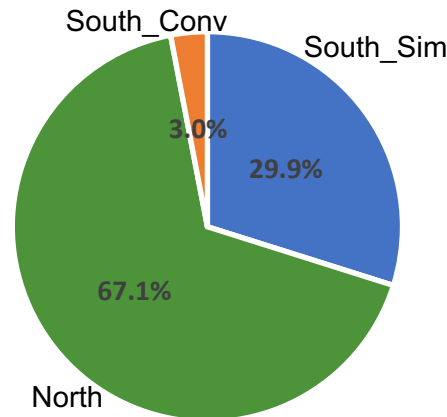
# Q&A

# Backup Slides

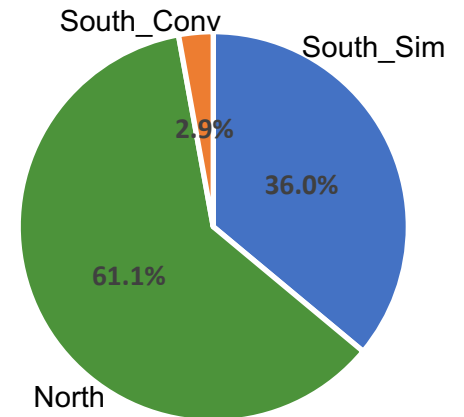
- Surface metering started in late Nov 2017 (Phase 1C)
  - Bank 2 was metered in 419 of 548 (76.5%) days since 2017-11-29
  - Bank 3 was metered in 325 of 466 (69.7%) days since 2018-02-19
- Bank 2 and Bank 3 have similar number of departures
- Bank 2 has 48.3% more arrivals than Bank 3 which causes increased surface congestion



Bank 2 Flow (Since 2017-11-29)



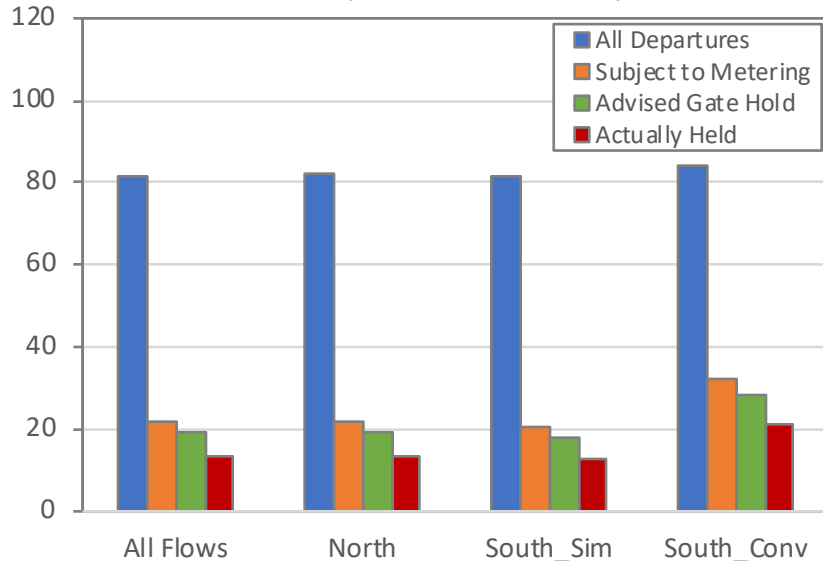
Bank 3 Flow (Since 2018-02-19)



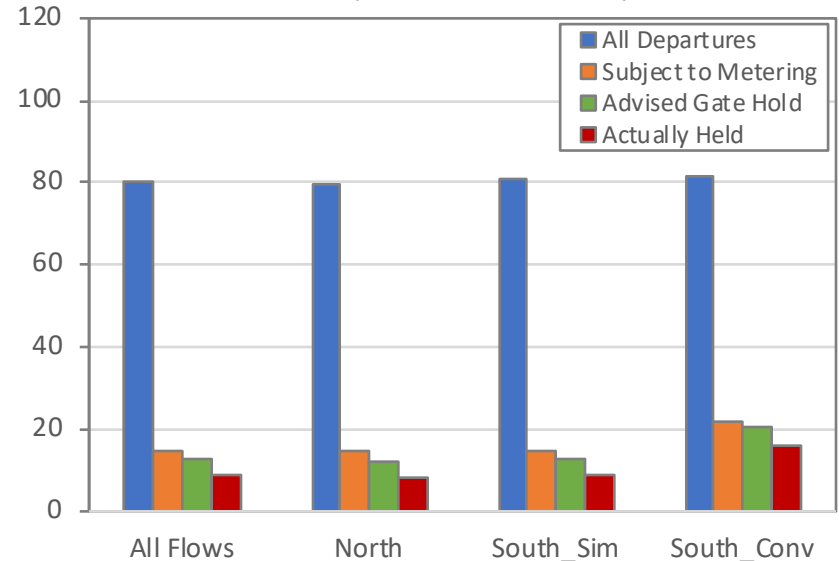


- More departures were subject to metering and held at the gate in bank 2 compared to bank 3
- Among all the departures in Bank 2 (Bank 3)
  - 26.7% (18.5%) of departures were subject to metering
  - 23.4% (15.9%) of departures were advised a gate hold
  - 16.3% (10.8%) were actually held at the gate

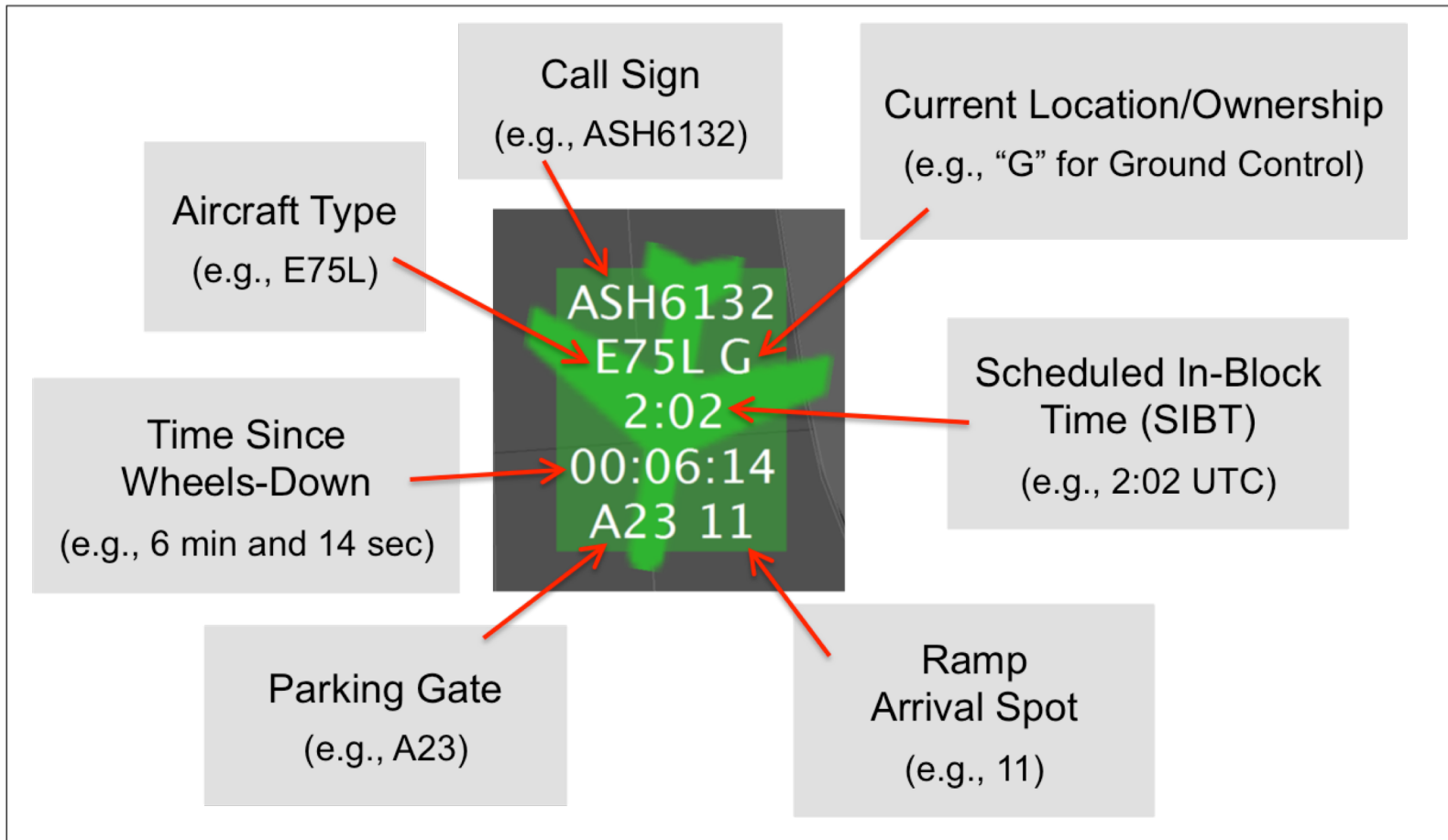
Bank 2 (since 2017-11-29)



Bank 3 (since 2018-02-19)



- Arrival Data Tag / Flight Strip





ATC Tower to Ramp	Ramp to ATC Tower	Both Directions
Airport Configuration and Runway Utilization	Runway Change for Operational Necessity	Gate Conflicts
Miles-In-Trail	Flight Cancellations	Return to Gates
EDCTs	Ramp Closure	Lengthy Taxi Delays
Approval Request / Call for Release	Aircraft Pushback	Metering Information
Departure Fix Closures	Flight Status	Long on Board / Tarmac Rule
Ground Stop	Spot Assignments	Emergency Flights
Runway Closures	Scratchpad Notes	
Runway Changes		