Airspace Technology Demonstration 2 (ATD-2)

Evolving Operational Role (ATC and Operator) with TFDM in the 3T environment

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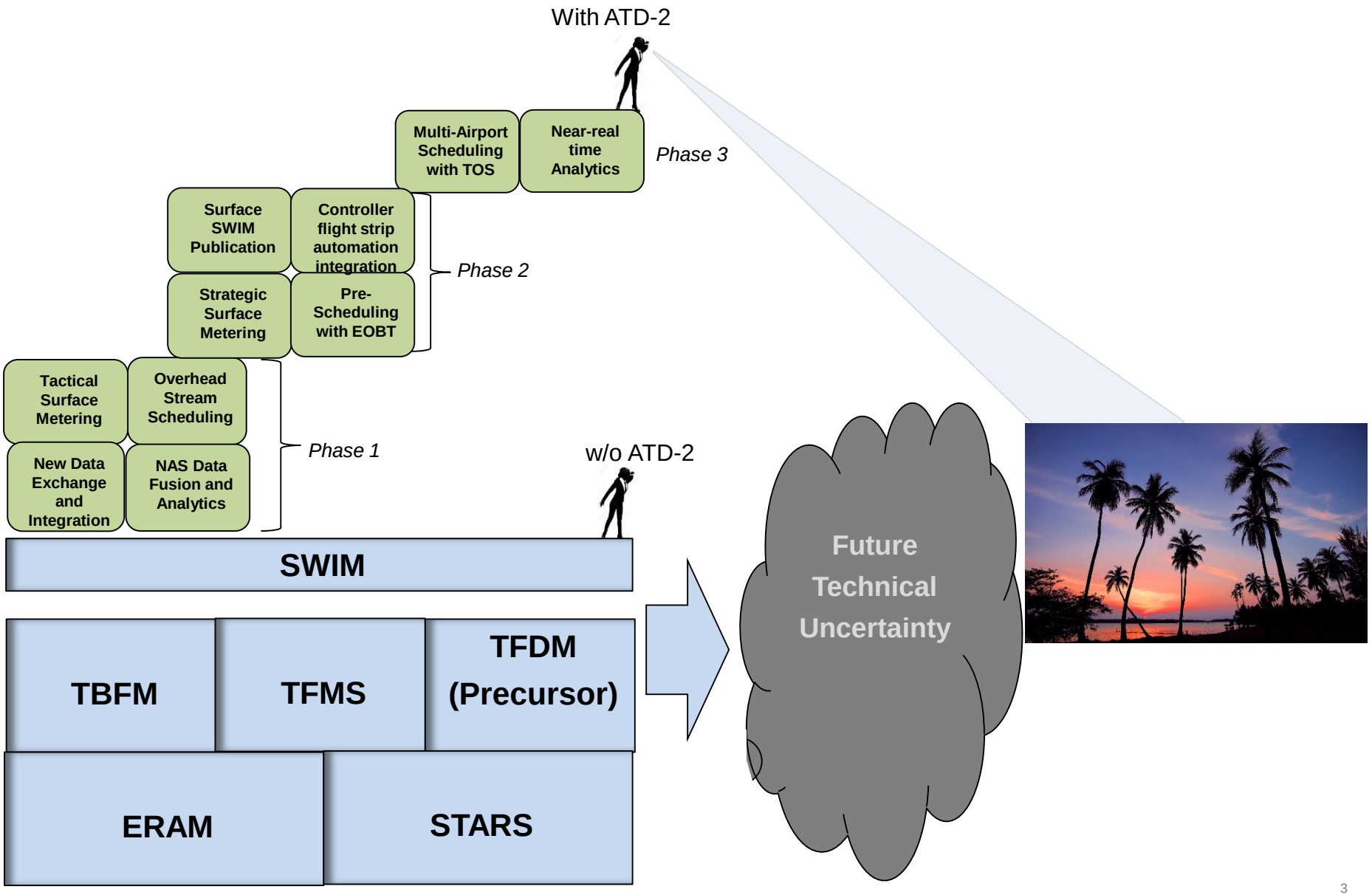
Evolving Operational Roles

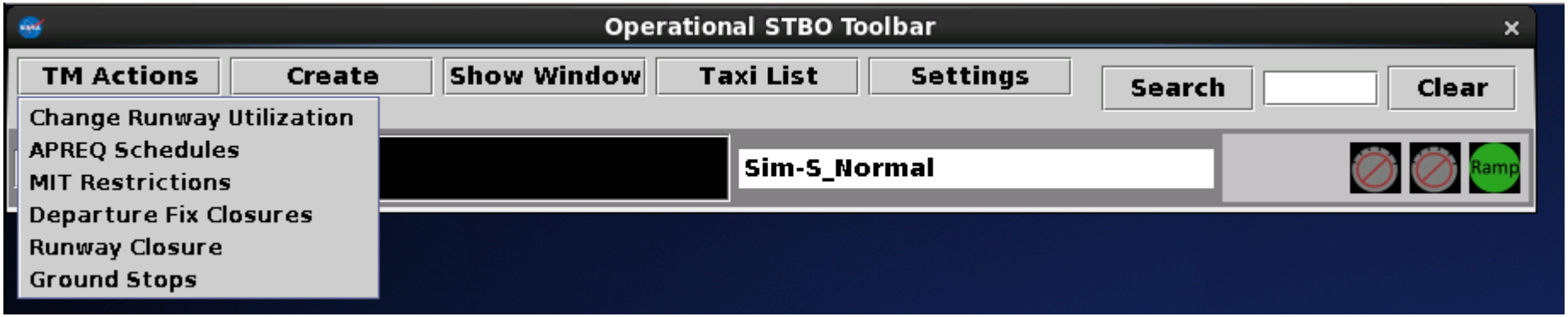
Connections without verbal communication:

1. Tower/Ramp verbal coordination reduced
2. Ramp situational awareness improved
3. Tower to configure surface metering through collaboration with ramp
4. Incoming TMI information gets passed to the ramp and the controllers instantaneously
5. “What If” capability has aloud the tower to sample configuration changes without implementing them
6. Airlines provided EOBT’s through TFMS

ATD-2 Provides a Unique Vantage Point into the Potential Future NAS

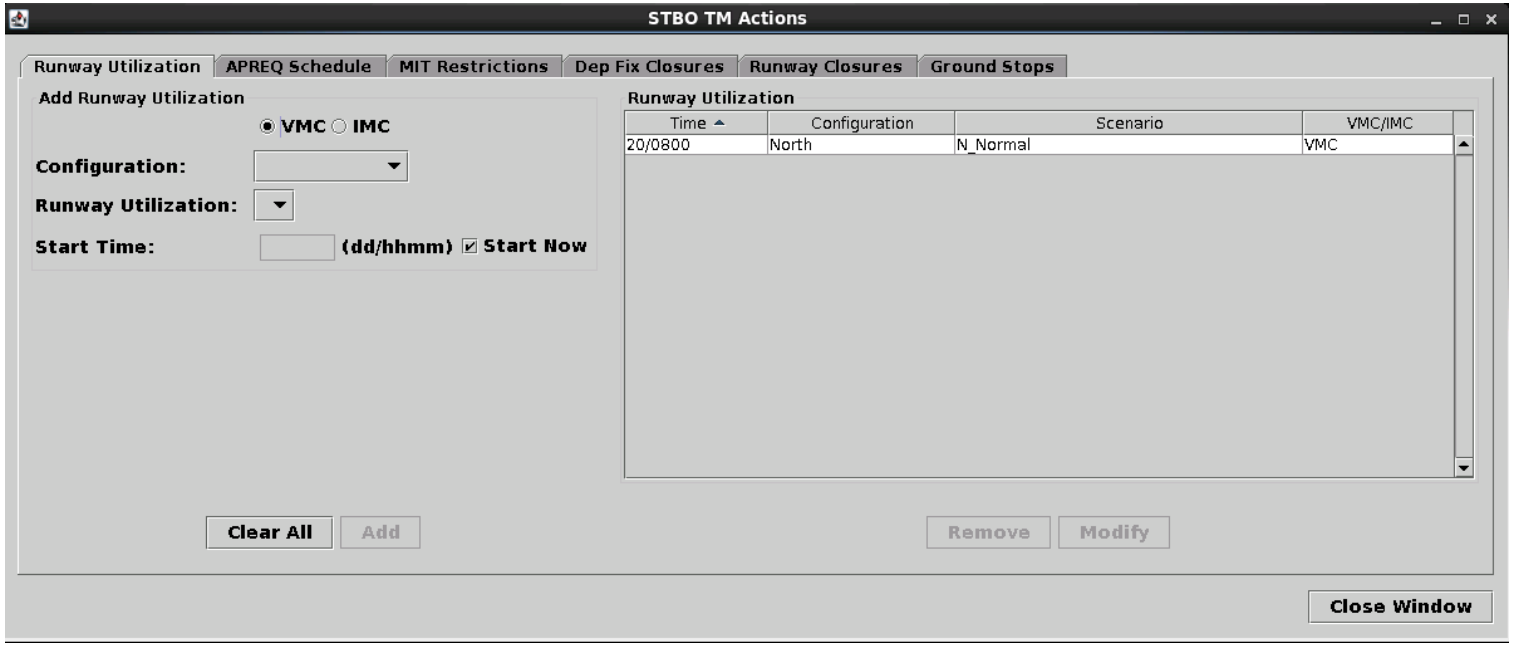


Surface Trajectory Based Operations (STBO) Client Traffic Management (TM) Actions Panel



- Traffic Management Action Panel
  - Utility to customize surface operations through restriction management
  - Augments available OIS and TFM data
  - Accessible from the STBO Client Toolbar
  - Schedule, Remove, and Modify TMI events
  - Supported TMI's
    - Runway Utilization
    - APREQ Schedules
    - MIT Restrictions
    - Departure Fix/Departure Gate Closures
    - Runway Closures
    - Ground Stops

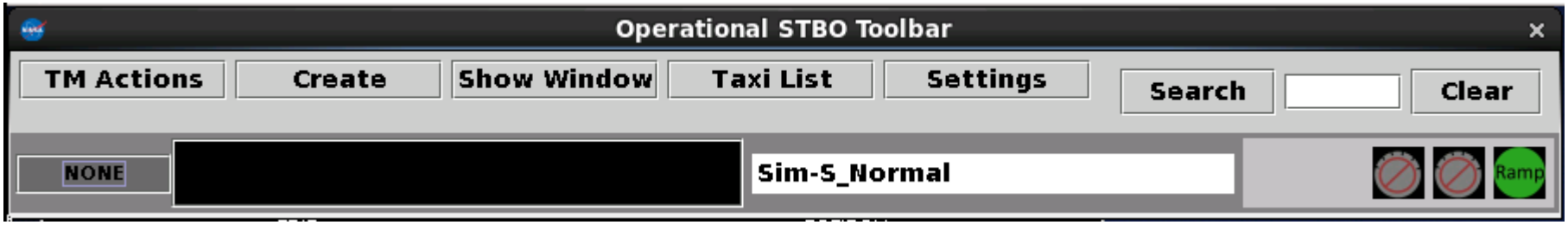
TM Action Panel – Runway Utilization



- Controls the surface arrival departure flow
- VMC/IMC: visual or instrument meteorological conditions
- Configuration: predefined set of runway groupings
- Runway Utilization: playbooks describing how the runways for a given configuration are to be used
- Start Time: time when the TMI becomes active
- End Time is not required because an airport must always have an active configuration, a configuration ends when the next scheduled configuration begins

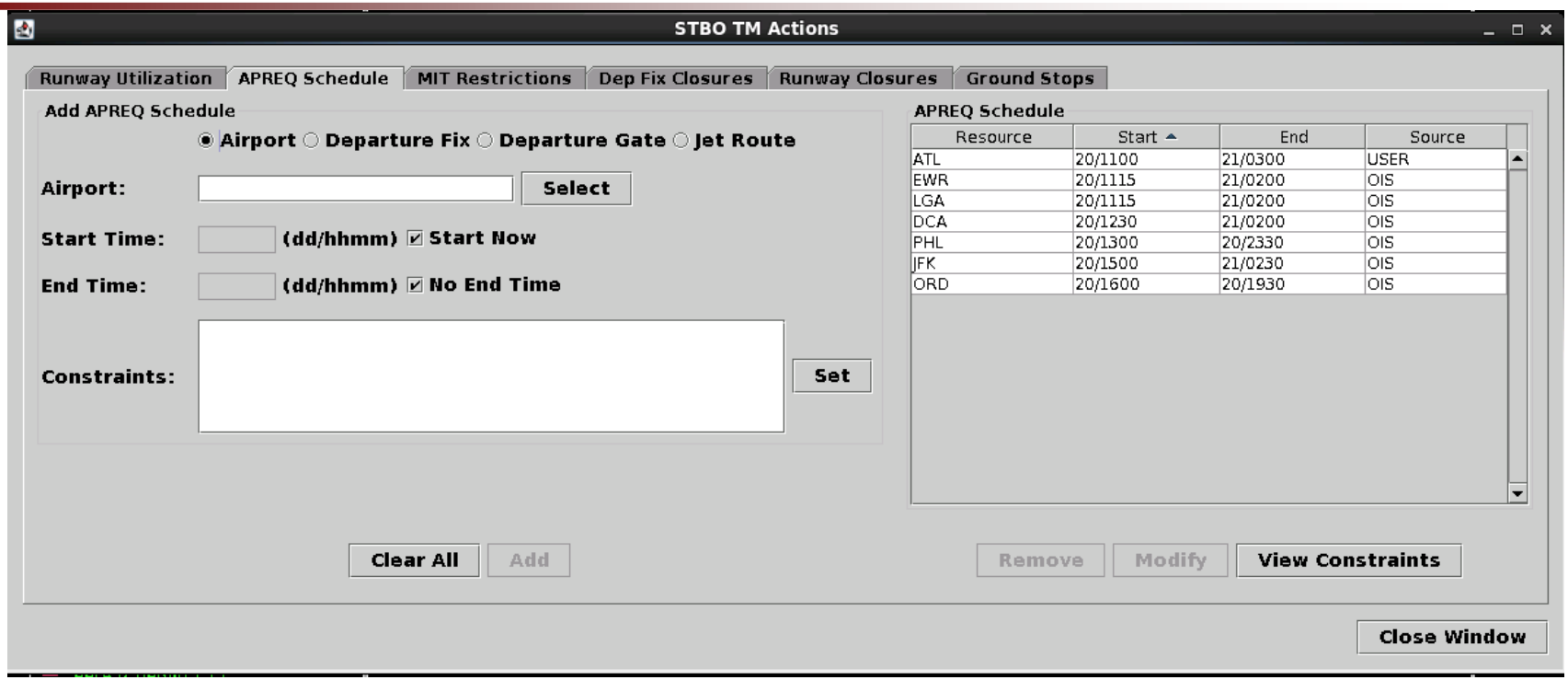
TM Action Panel – Runway Utilization

- Impact to STBO Client
  - Flights will switch runways to reflect the configuration change
  - Toolbar will show active configuration and runway utilization



- Impact to Ramp Traffic Console (RTC) Client
  - Flight will switch runways to reflect the configuration change

TM Action Panel - APREQ



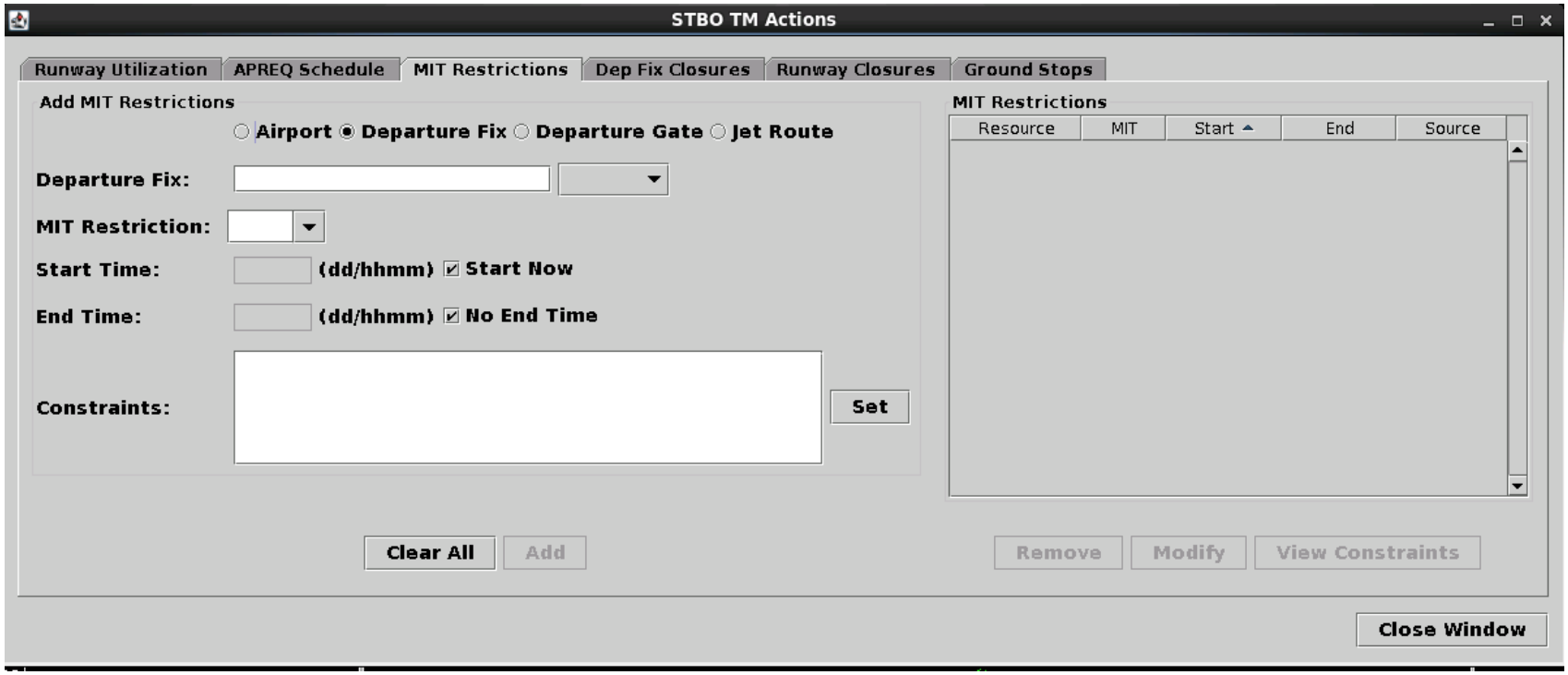
- Schedules resources requiring an approval request or call for release
- Select the type of resource to be constrained (Airport, Departure Fix, Jet Route)
- Start Time: time when the TMI begins
- End Time: time when the TMI expires
- Constraints: sub restrictions for a resource

TM Action Panel - APREQ

- Impact to STBO Client
  - Flights marked as APREQ constrained on timelines and map

- Impact to RTC Client
  - Flight strips marked as APREQ constrained

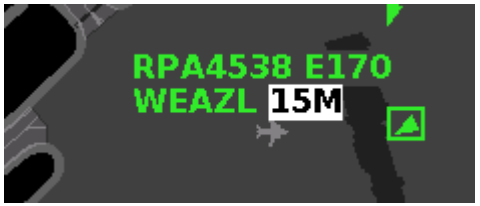
TM Action Panel – MIT Restrictions

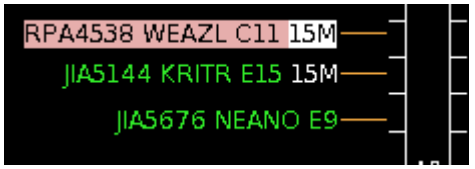


- Schedules resources subject to Miles in Trail
- Select the type of resource to be constrained (Airport, Departure Fix, Jet Route)
- MIT Restriction: flight separation in nautical miles
- Start Time: time when the TMI begins
- End Time: time when the TMI expires
- Constraints: sub restrictions for a resource

TM Action Panel – MIT Restrictions

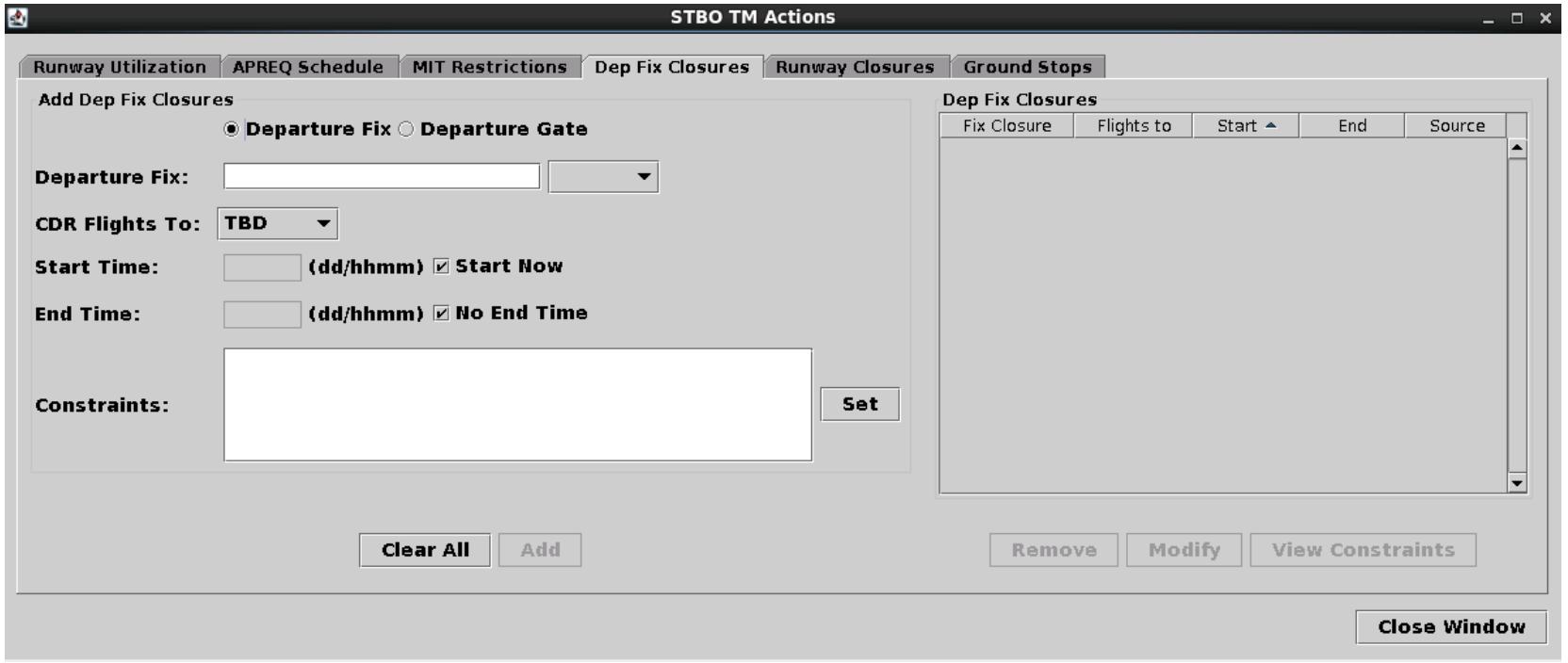
- Impact to STBO Client
  - Display the nautical mile separation next to the flight on the timeline and data block.





- Impact to RTC Client
  - Display the nautical mile separation as part of the flight strip

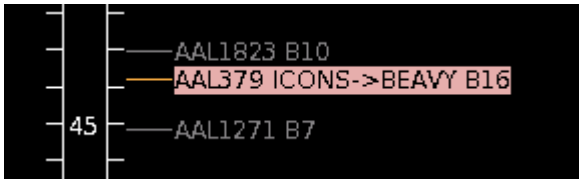
TM Action Panel – Departure Fix Closures



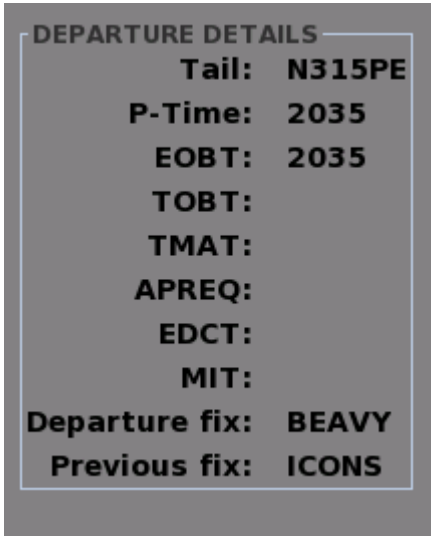
- Schedules departure fix closures
- Departure Fix: name of the departure fix to close
- CDR Flights To: coded departure route, TBD (to be determined) or no alternate specified
- Start Time: time when the TMI begins
- End Time: time when the TMI expires
- Constraints: sub restrictions for a resource

TM Action Panel – Departure Fix Closures

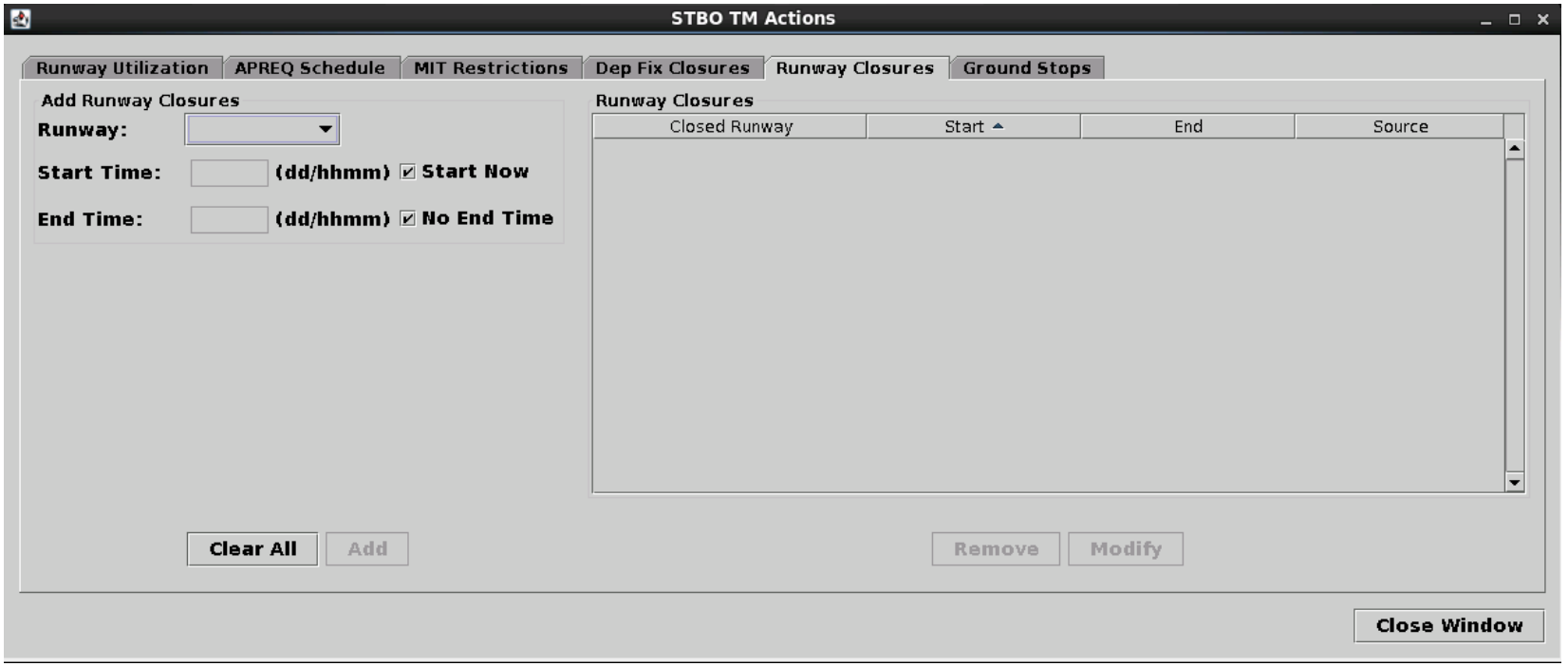
- Impact to STBO Client
  - When CDR is not provided, the flights are rescheduled 2 hours later as there is no valid fix assigned to the flight
  - If a CDR is provided, flights remain at scheduled time on timeline and show FIX → CDR as part of the timeline and map data block



- Impact to RTC Client
  - When CDR is not provided, continues to show closed fix highlighted red on the flight strip
  - When CDR is provided, continues to show previous fix on flight strip highlighted yellow on the flight strip. The flight property dialog shows both the previous and CDR fix.



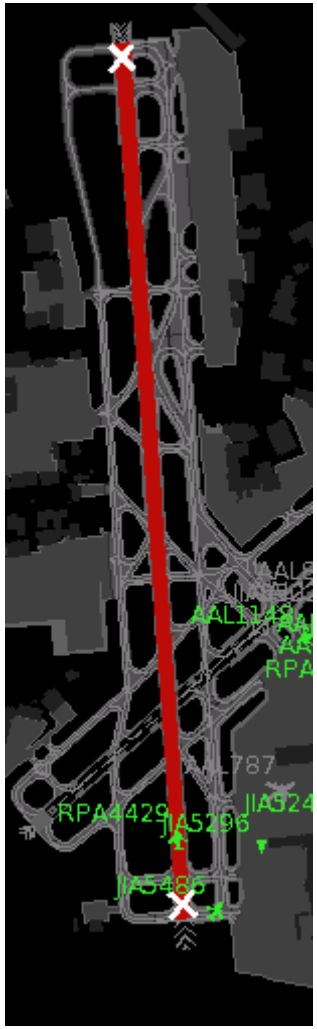
TM Action Panel – Runway Closures

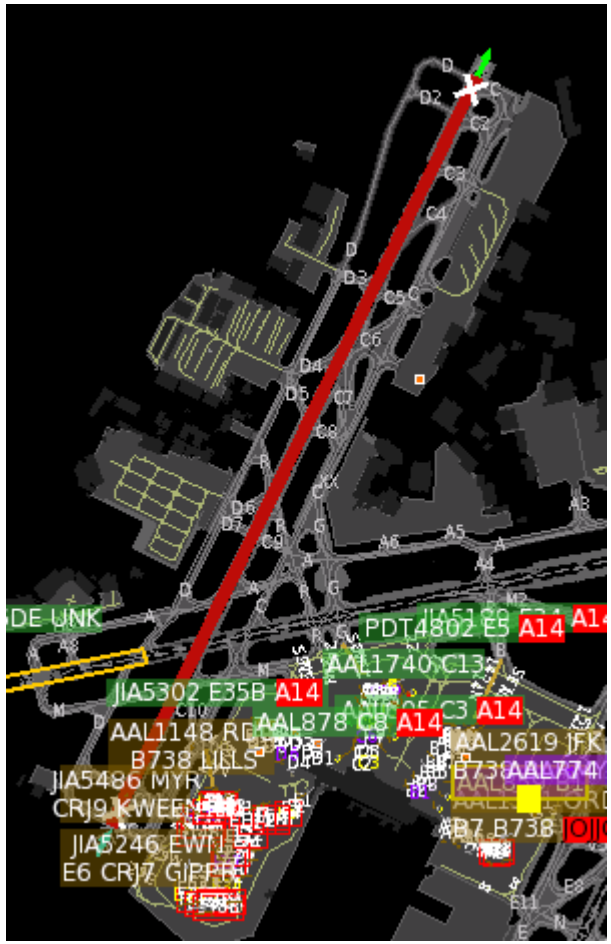


- Schedules runway closures
- Opposites are automatically closed
- Runway: list of runways for the given airport
- Start Time: time when the TMI begins
- End Time: time when the TMI expires

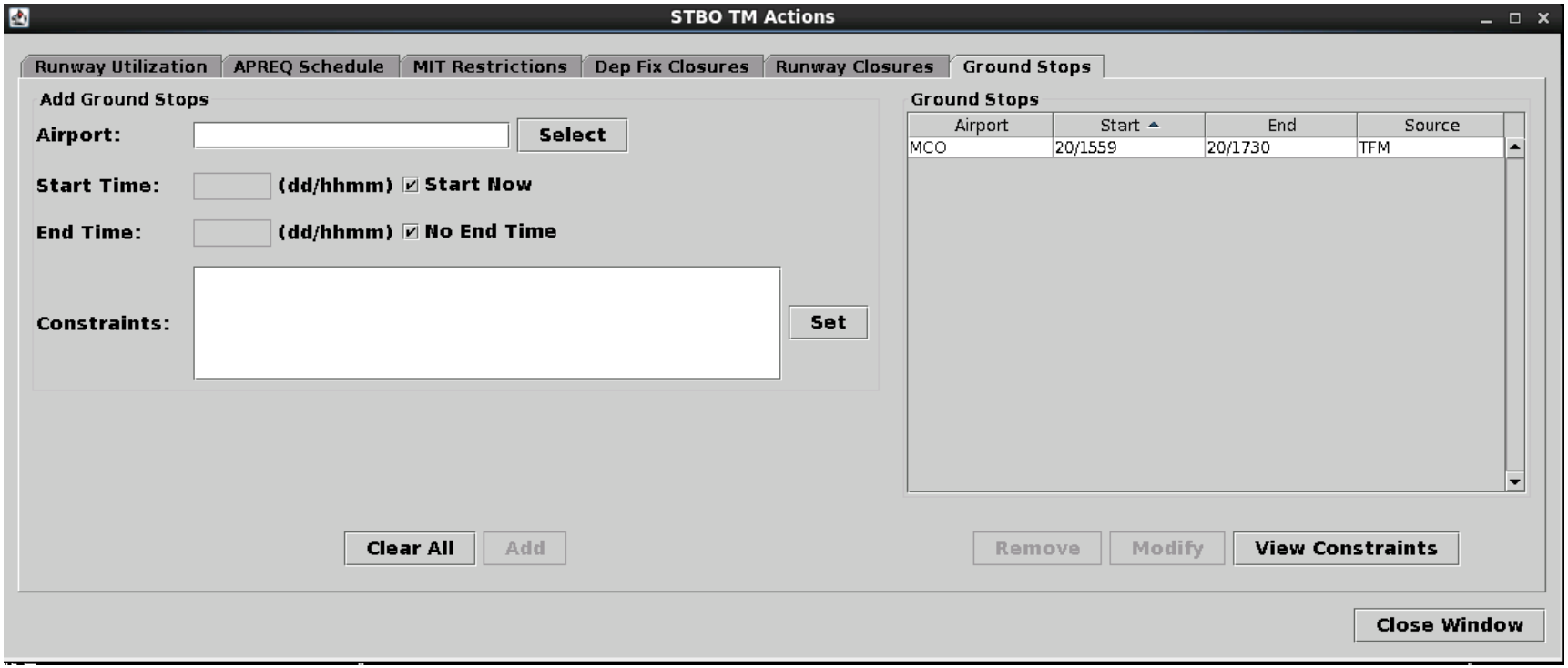
TM Action Panel – Runway Closures

- Impact to STBO Client
  - Flights will be automatically reassigned to another runway
  - Runway shows blocked out in red on STBO map
- Impact to RTC Client
  - Runway shows blocked out in red on RTC map





TM Action Panel – Ground Stops

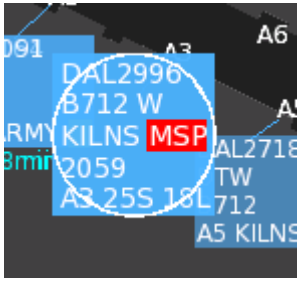


- Schedules ground stop programs
- Select the airport running the ground stop program
- Start Time: time when the TMI begins
- End Time: time when the TMI expires
- Constraints: sub restrictions for a resource

TM Action Panel – Ground Stops

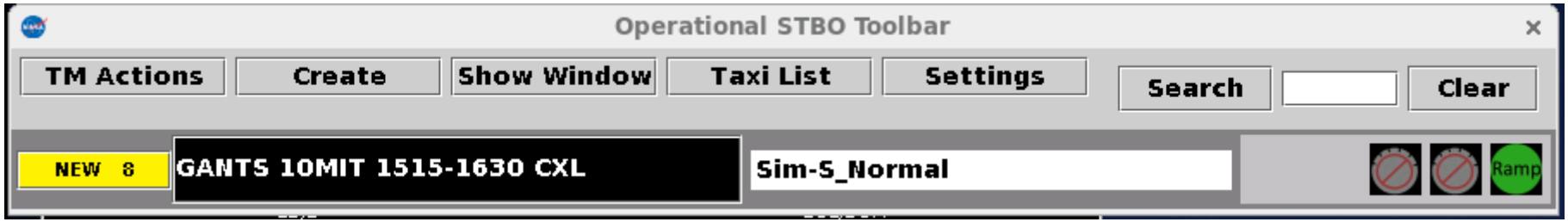
- Impact to STBO Client
  - If no end time is provided, the flight is removed from scheduling and disappears from the timeline
  - If an end time is provided, the flight will show ‘GS’ next to the timeline and map data blocks

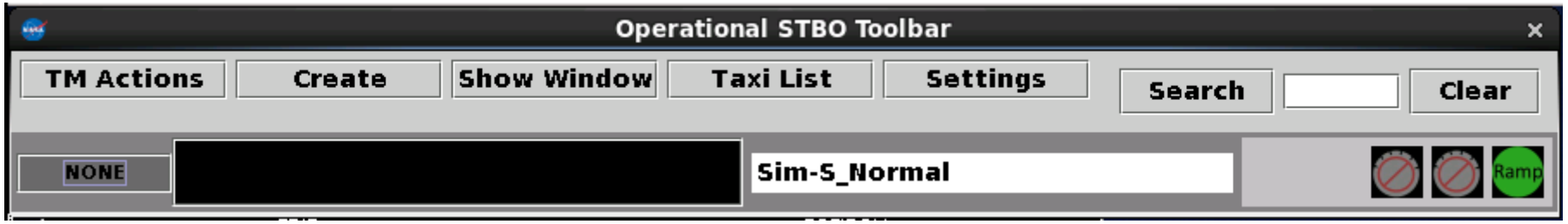
- Impact to RTC Client
  - The flight strip will show the destination airport highlighted in red



STBO TM Notification Panel

- Integrated into the RTC and STBO toolbars
- Supports acknowledgement of TMI changes
  - Click the yellow button labeled “New #” to acknowledge updates.
  - Button will display as “None” if no updates to acknowledge
- Provides quick view of updates
  - Indicator of unacknowledged TMI’s
  - Time-sharing view of unacknowledged TMI’s
- Detailed table view of TMI’s





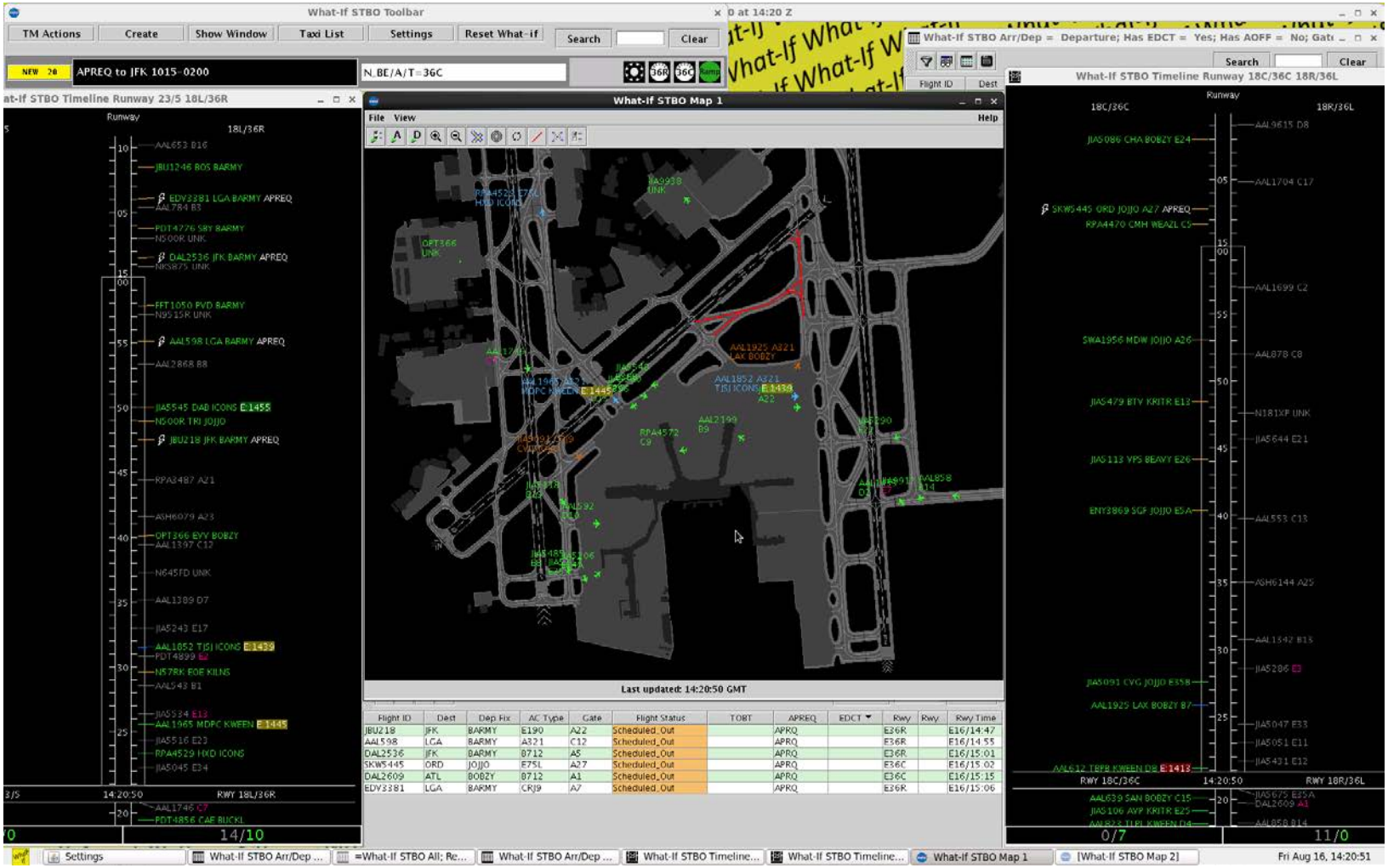
Notification Table - Detailed

Notifications

Reported	Event Type	Description	Event Start	Event End	Details
5/16/18 1523	Fix	GIPPR 7MIT	5/16/18 1515	5/16/18 1630	OIS: EXCL PROP TURBO
5/16/18 1523	Fix	GANTS 7MIT	5/16/18 1515	5/16/18 1630	OIS: EXCL PROP TURBO
5/16/18 1523	Fix	PEKNN 7MIT	5/16/18 1515	5/16/18 1630	OIS: EXCL PROP TURBO
5/16/18 1523	Fix	KILNS 7MIT	5/16/18 1515	5/16/18 1630	OIS: EXCL PROP TURBO
5/16/18 1523	Fix	RUNIE 7MIT	5/16/18 1515	5/16/18 1630	OIS: EXCL PROP TURBO
5/16/18 1523	Fix	LILLS 7MIT	5/16/18 1515	5/16/18 1630	OIS: EXCL PROP TURBO
5/16/18 1523	Fix	BARMY 7MIT	5/16/18 1515	5/16/18 1630	OIS: EXCL PROP TURBO
5/16/18 1523	Fix	MERIL 7MIT	5/16/18 1515	5/16/18 1630	OIS: EXCL PROP TURBO
5/16/18 1508	TMI	APREQ to JFK	5/16/18 1500	5/17/18 0200	OIS: INCL JET BARMY KILNS
5/16/18 1441	TMI	APREQ to PHL	5/16/18 1130	5/16/18 1441	Cancelled
5/16/18 1410	Fix	BUCKL OPENED	5/16/18 1410		OIS: EXCL PROP TURBO
5/16/18 1410	Fix	BUCKL CLOSED	5/16/18 1319	5/16/18 1410	Cancelled
5/16/18 1410	Fix	TREAL OPENED	5/16/18 1410		OIS: EXCL PROP TURBO
5/16/18 1410	Fix	TREAL CLOSED	5/16/18 1319	5/16/18 1410	Cancelled
5/16/18 1410	Fix	ANDYS OPENED	5/16/18 1410		OIS: EXCL PROP TURBO
5/16/18 1410	Fix	ANDYS CLOSED	5/16/18 1319	5/16/18 1410	Cancelled

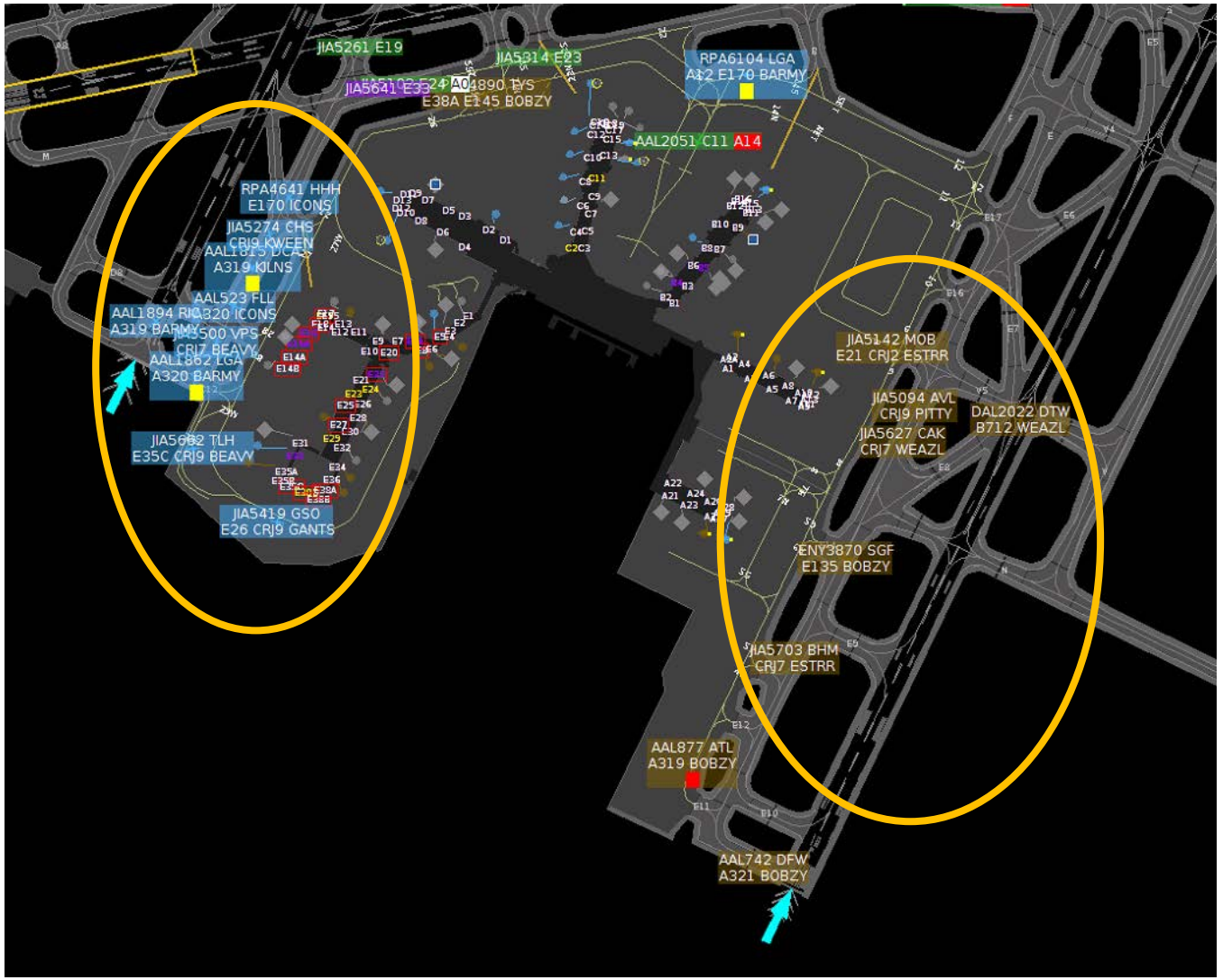
- Open detailed view by single clicking the time-shared text area on the toolbar
- Selecting any row will acknowledge all TMI's
- Colors
  - White: TMI has been acknowledged by the user
  - Yellow: TMI has been changed and waiting user acknowledgement
  - Blue: TMI expired before the scheduled end time

“What If” Display



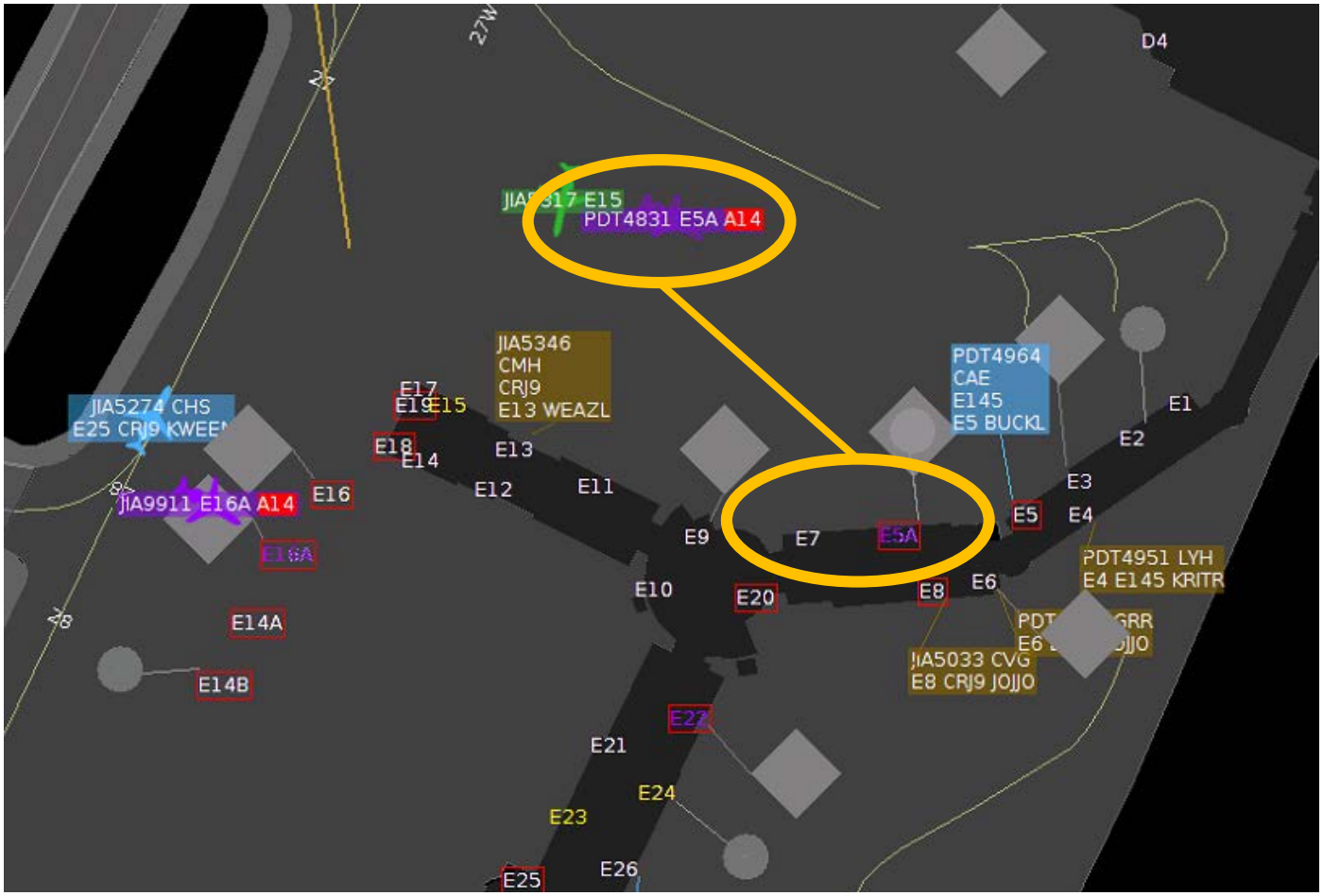
Ramp Traffic Console – Departure Runway Coloring

Flight strips color coded by runway assignment



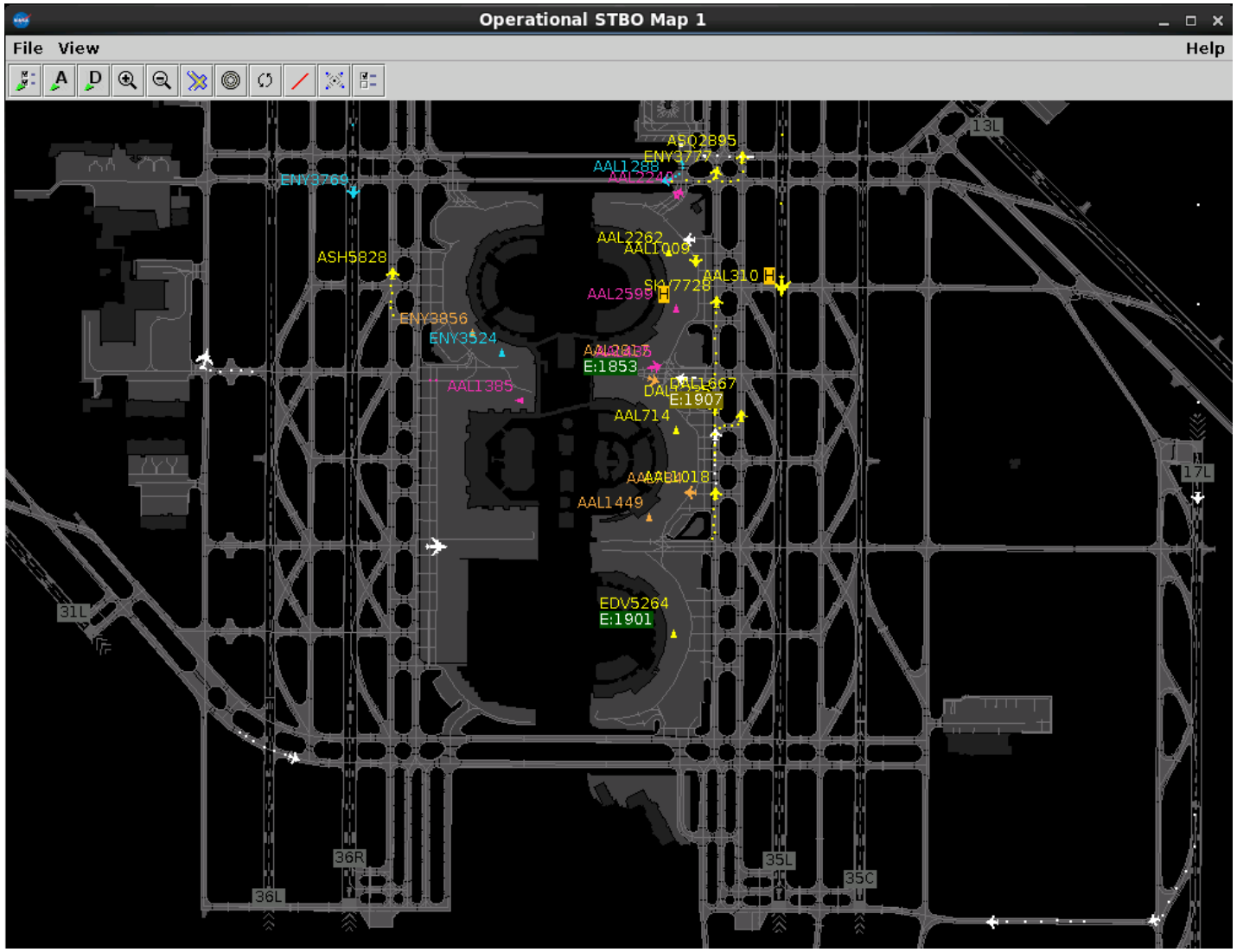
Ramp Traffic Console – Gate Conflict

- Automatic detection of gate conflicts
- Conflicts show as a purple flight strip and gate label



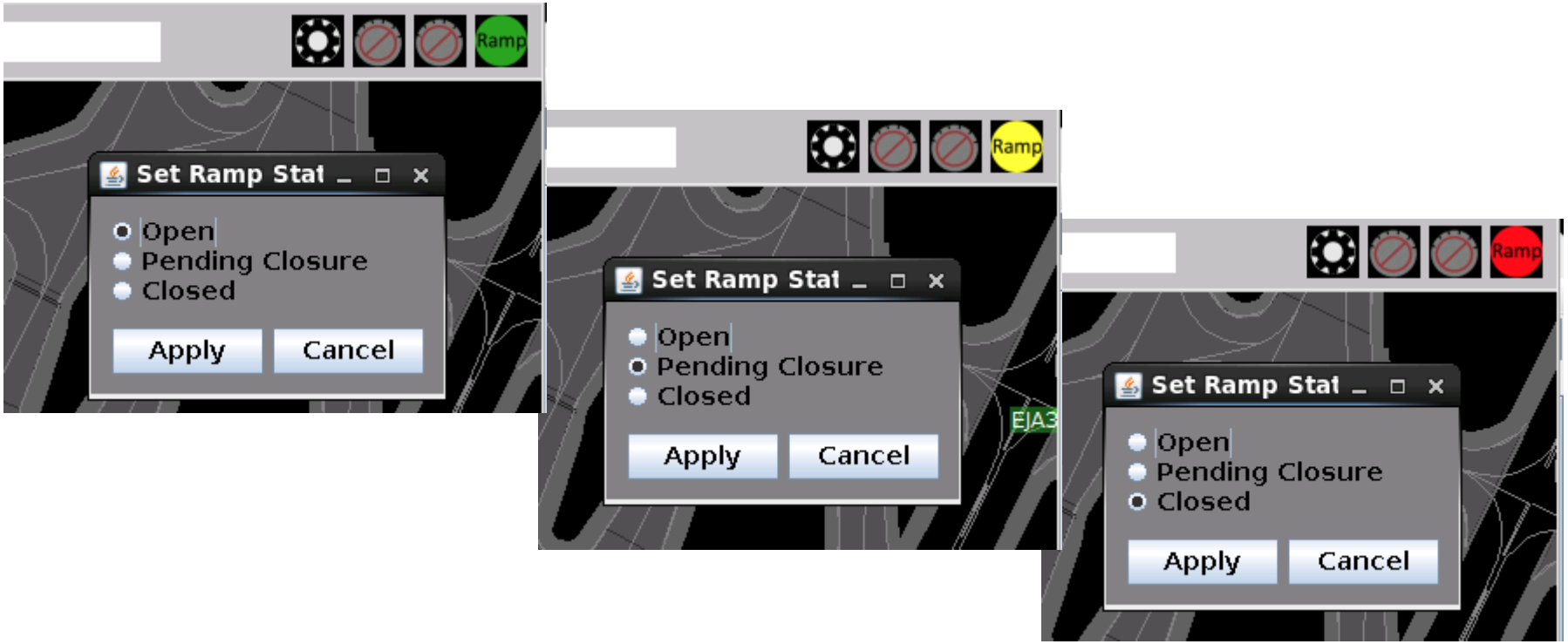
STBO Client – Departure Fix Coloring

Flight data tags color coded by departure fix

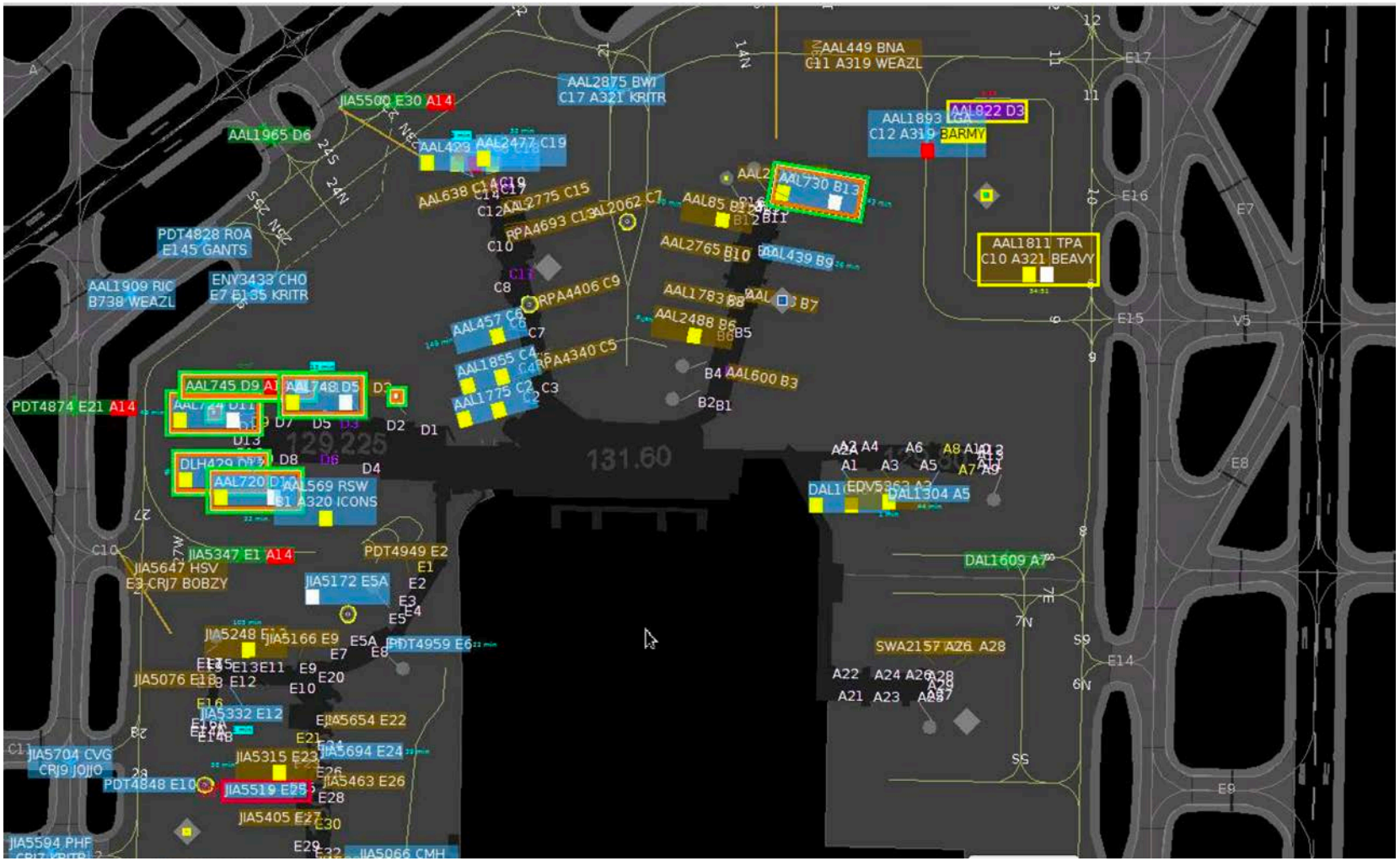


RTC – Ramp Closures

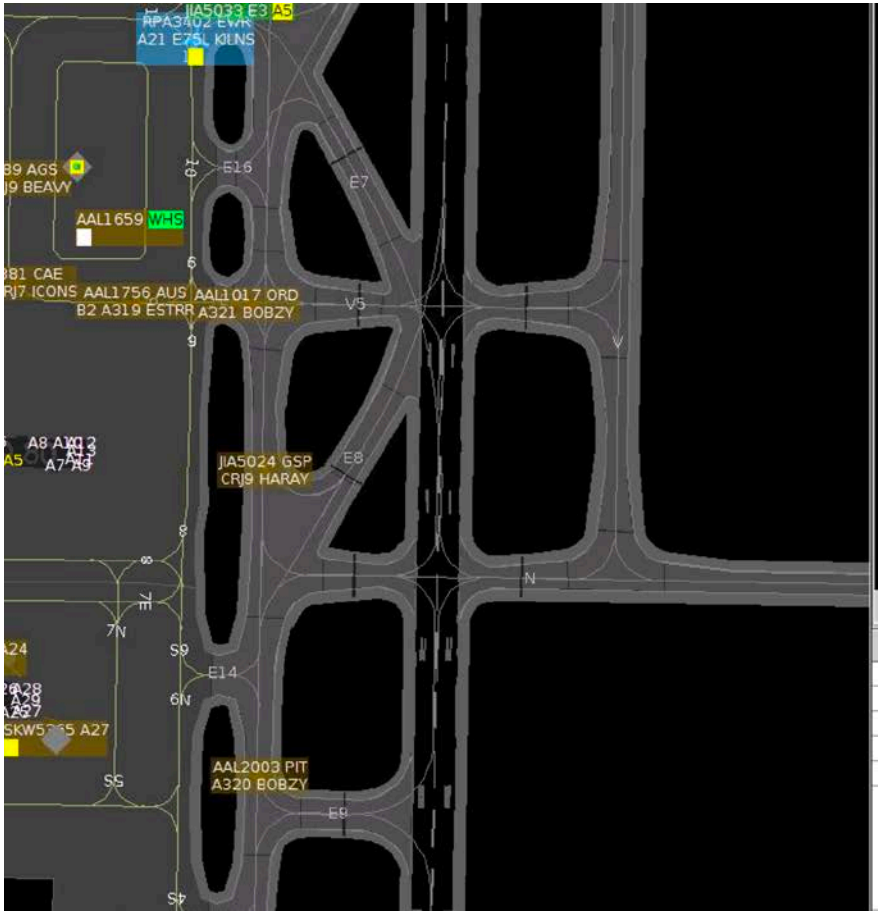
- Schedules and notification of ramp closures
- Does not directly impact flight scheduling
- Used to notify of impending weather or other emergency events



KILNS/BARMY in SWAP



RMTC Monitoring Fix Closures

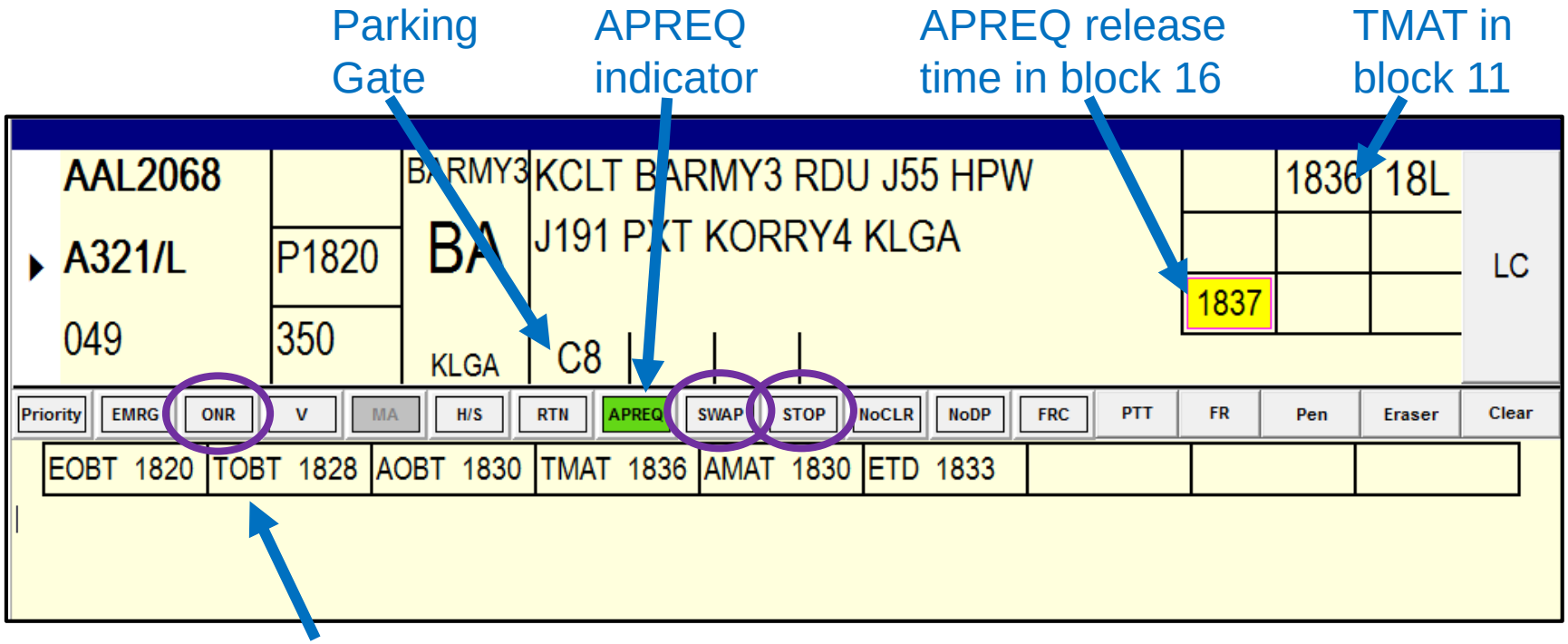


Last updated: 21:03:41 GMT

LILLS	KWEEN	ICONS	BEAVY	ESTRR	BOBZY	JOJJO	WEAZL	KRITR
-	-	-	-	10	10	-	-	-
						->WEAZL	->TBD	->TBD
2	1	6	2	4	7	0	0	0
2	1	6	2	4	7	0	0	0
2	1	6	2	4	7	0	0	0
	AAL672	JIA5383 AAL677	AAL1609	AAL778 AAL1756	AAL1017 AAL2003 AAL2687			

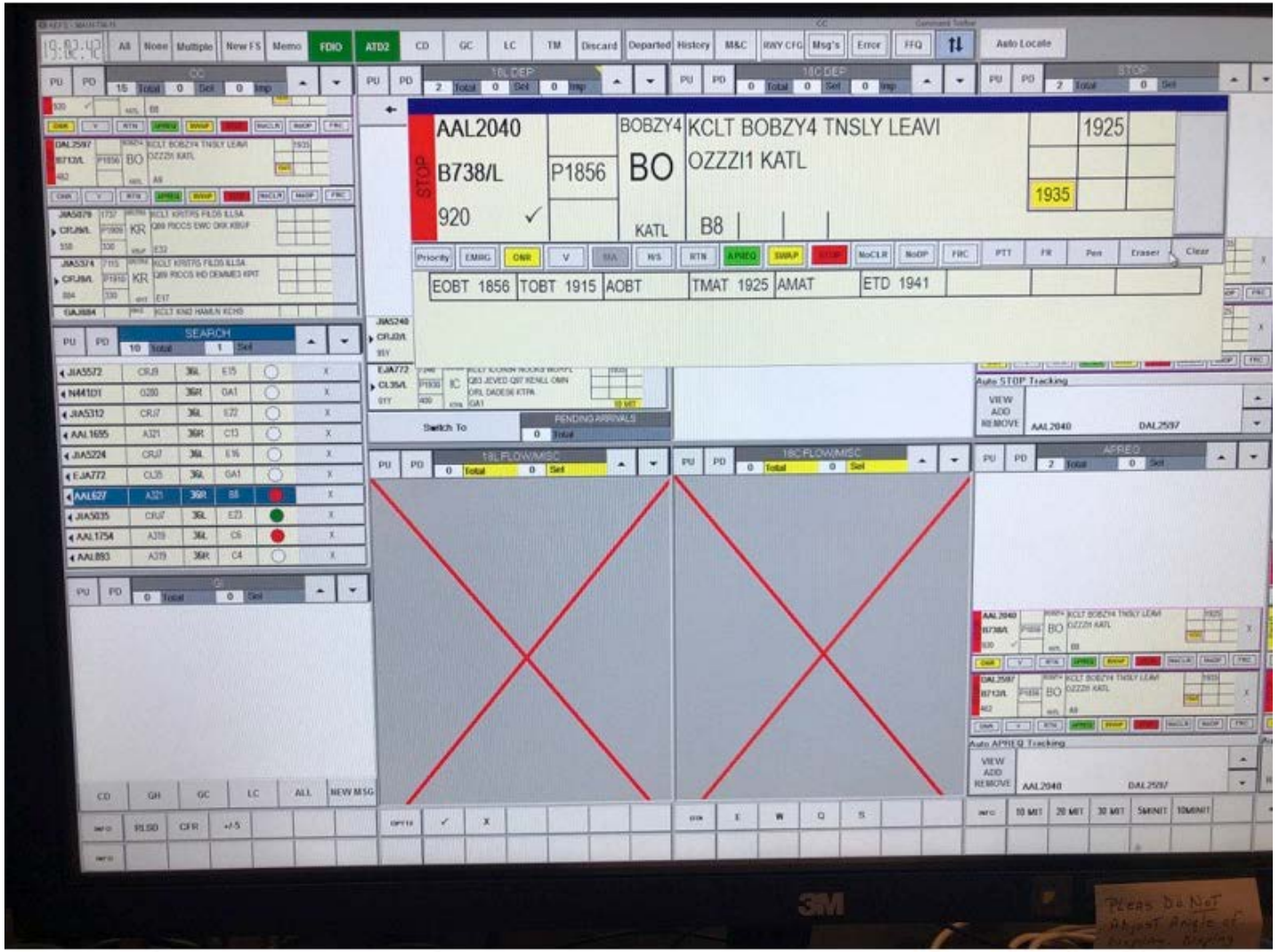
Data Exchange and Integration- Controller View

- ATD-2 and Advanced Electronic Flight Strips (AEFS) began two-way real-time data sharing at CLT on 9/20/2018. This is going well!
- AEFS sends information from controllers back to ATD-2, which shares this on the TTP SWIM feed



- As controllers make updates, you get them on TTP SWIM!

AEFS Gate Conflict



Latest Status of Pre-Scheduling with EOBT

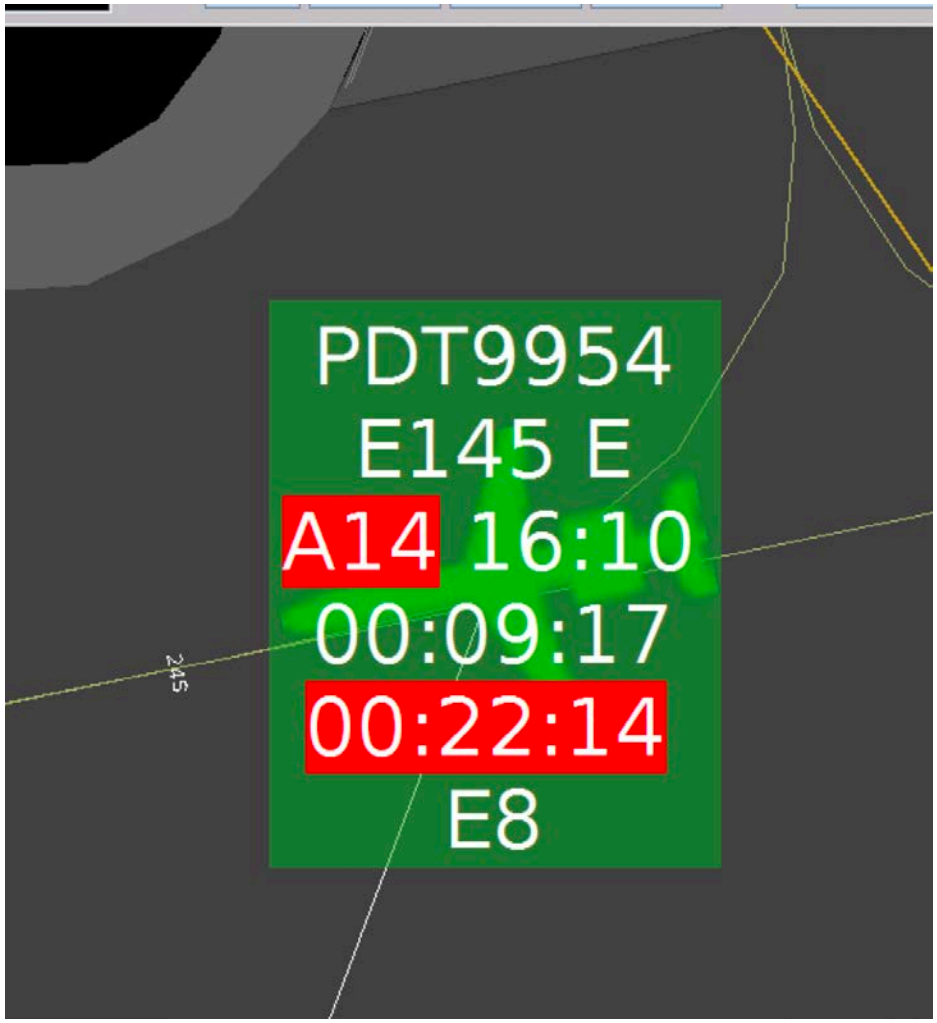
- Lesson: Substantial calibration is required
  - ATD-2 scheduler required buffers that go beyond existing FAA requirements
  - The ATD-2 team considers the ‘tuning’ stable and near-optimal (from a system wide perspective) based upon analysis and ATC & Operator input

- Positive feedback on pre-scheduling with EOBT
  - From ZTL, TFDM, AAL and DAL

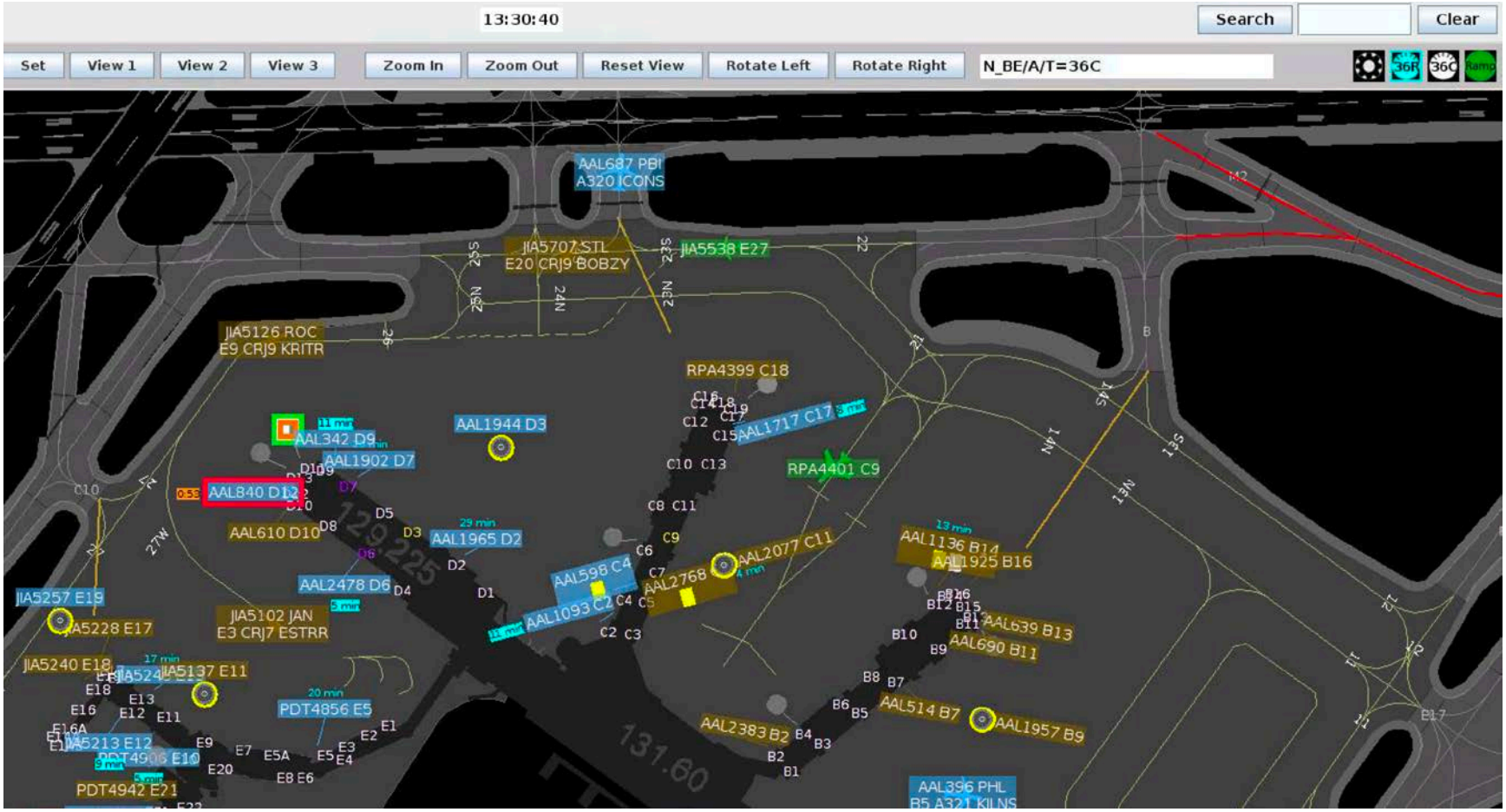
- Allowing a smaller buffer for flights with EOBTs encouraged greater Operators participation since pre-scheduling began

- ZTL has periodically allowed fully automated scheduling in IDAC
  - This reflects confidence in the OFF time predictions/compliance from CLT
  - ATD-2 ***machine*** scheduler predictions to FAA TBFM ***machine*** scheduling, with the TMCs at ZTL and CLT supervising this operation, and results published on SWIM TTP
  - Area where there appears to be universal agreement on increased automation

RMTC can view delays



Surface Metering On and Active for 36R



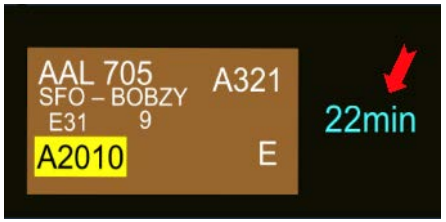
Metering and Early Freeze

Backup

- Questions?

Honor Restrictions with Greater Fuel Efficiency

- Target Movement Area Entry Times (TMATs) are important both for surface metering and to make overhead stream slot reservation



- How long can I ***hold at the gate*** and still make my APREQ or EDCT time?

Airline and Airport Operators will gain access to these data elements through TTP SWIM

- *"TargetedOffBlockTime"*
- "TargetMovementAreaEntryTime"

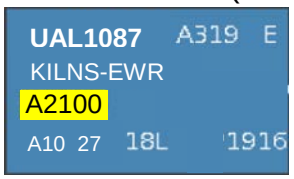
Data Exchange and Integration- Operator View

ATC to Operator

- Real-time traffic management initiatives
- Airport configuration coordination
- Runway intent information

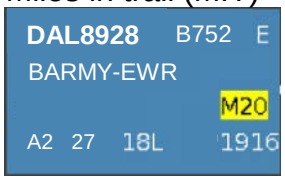
SWIM

Call for release (APREQ)

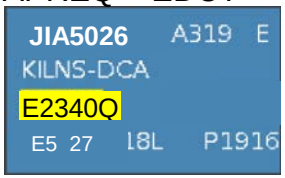


Ground delay (EDCT)

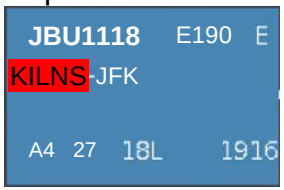
Miles in trail (MIT)



APREQ + EDCT

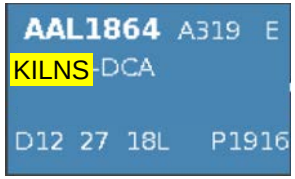


Dep Fix closure

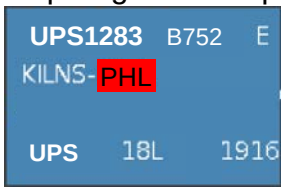


ATC runway change

Dep Fix change (CDR)

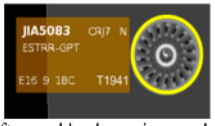


Airport ground stop

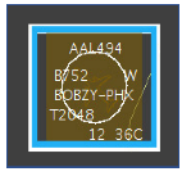


Ramp Tool Colors and Symbology

Arrivals are green



After pushback, engine symbol indicates spool up state



757 aircraft has blue and white border

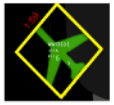
Sector ownership

Westbound departures are brown, eastbound are blue

Hollow icon (if no surveillance)

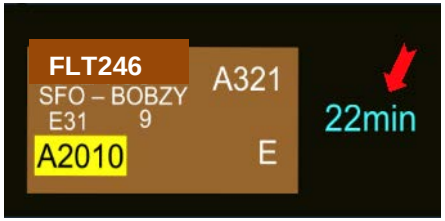
Heavy aircraft has orange and white border

Priority flight has green border



A flight assigned to the hardstand has yellow border

Super type aircraft has thick white border



- How long can I ***hold at the gate*** and still make my APREQ or EDCT time?