

## RUNWAY STATUS LIGHTS

### What are Runway Status Lights (RWSL)?

RWSL are comprised of red in-pavement airport lights which signal a potentially unsafe situation on taxiways and runways. The system is automated based on inputs from surface and terminal surveillance systems.

The system is comprised of two areas: Runway Entrance Lights (RELs) provide a warning signal to aircraft crossing or entering a runway from intersecting taxiways; Takeoff Hold Lights (THLs) provide a warning signal to aircraft in position for takeoff.

### What are Runway Entrance Lights (RELs)?

Runway Entrance Lights (RELs) are a string of lights located around the center of taxiways/runway crossings and illuminate red when there is high-speed traffic on or approaching the runway to signal that it is unsafe to enter the runway.

### What are Takeoff-Hold Lights (THLs)?

Takeoff Hold Lights (THLs) are located in the center of the runway at takeoff hold point. They are laid out as 16 double rows of lights, for a total of 32 lights making up each THL group. The lights will illuminate red when there is an aircraft in position for departure and the runway is occupied by another aircraft or vehicle.

### What are the benefits of RWSL?

The RWSL system was initiated to:

- Aid in the reduction and severity of runway incursions
- Increase situational awareness for aircrews and airport vehicle drivers
- Serve as an added layer of safety while accommodating individual airport operations without impacting traffic flow

RWSL automatically provide a clear, prompt indication of runway status directly to pilots and ground vehicle operators. The RWSL system is designed to supplement existing air traffic controller tools and procedures without increasing the controller workload. RWSL acts as an independent safety enhancement and does not replace air traffic control issued clearance. The RWSL system provides a vital layer of redundancy in runway safety and is a reinforcement of controller guidance.

## **How do the lights work?**

The lights are automated based on inputs from terminal and surveillance systems. The lights will illuminate red to serve as a warning signal for pilots and/or vehicle operators to indicate that it is unsafe to enter, cross, or begin takeoff on a runway. Runway Status Lights indicate runway status only; they do not indicate clearance. Pilots and vehicle operators should continue to follow standard rules of clearance required from controllers prior to proceeding.

## **What precautions should be taken if verbal clearance is received from the Tower, but the lights are illuminated?**

Pilot/vehicle operators should hold short of the runway and advise ATC they are holding for red lights.

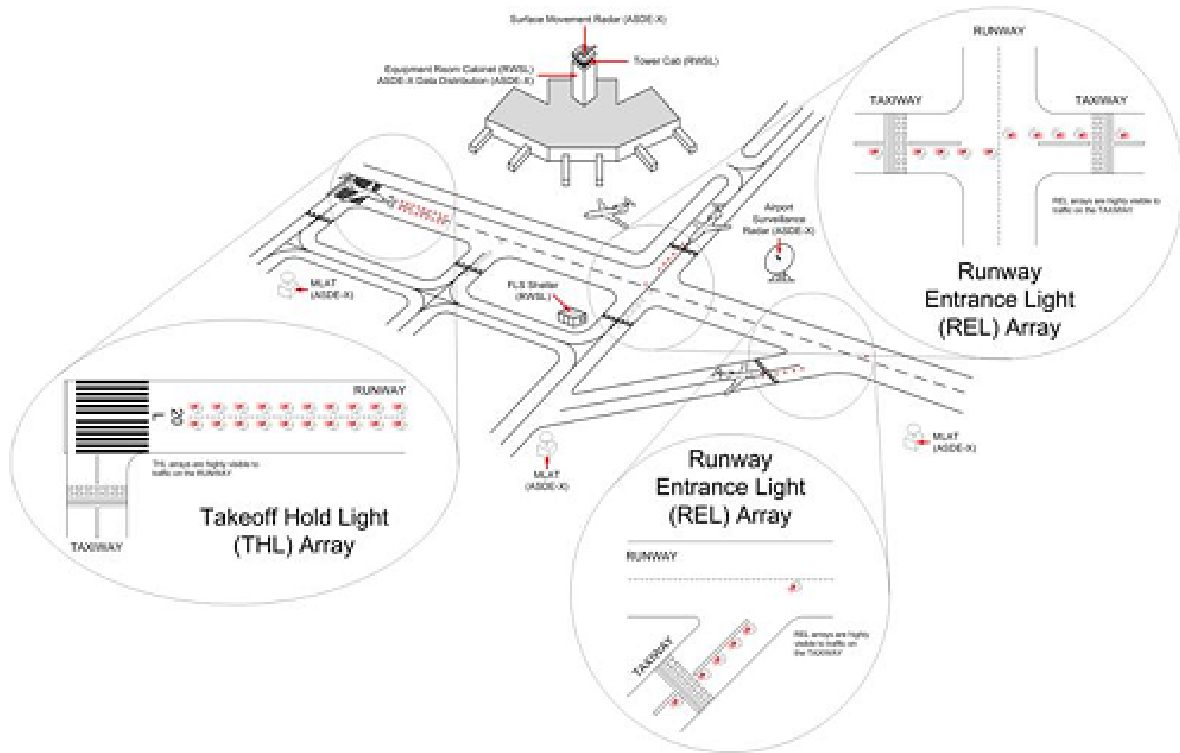
## **What airports are receiving RWSL?**

- Baltimore-Washington International Airport
- Boston Logan International Airport
- Charlotte Douglas International Airport
- Chicago O'Hare International Airport
- Dallas/Ft Worth International Airport
- Denver International Airport
- Detroit Metro Wayne County Airport
- Ft. Lauderdale/Hollywood Airport
- George Bush Intercontinental Airport
- Hartsfield-Jackson Atlanta International Airport
- John F. Kennedy International Airport
- LaGuardia Airport
- Las Vegas McCarran International Airport
- Los Angeles International Airport
- Minneapolis-St. Paul International Airport
- Newark International Airport
- Orlando International Airport
- Philadelphia International Airport
- Phoenix Sky Harbor International Airport
- San Diego International Airport
- San Francisco International Airport
- Seattle-Tacoma International Airport
- Washington Dulles International Airport

## **When will the system be deployed?**

The RWSL system is scheduled to go operational at Orlando International Airport by 2011. The 23 sites are planned to be in service by the end of 2016.

RWSL is a fully automated system that provides runway status information to pilots and surface vehicle operators to indicate when it is unsafe to enter, cross, or takeoff from a runway. The RWSL system processes information from surveillance systems and activates Runway Entrance Lights (REL) and Takeoff Hold Lights (THL) in accordance with the motion and velocity of the detected traffic. REL and THL are in-pavement light fixtures that are directly visible to pilots and surface vehicle operators. RWSL is an independent safety enhancement that does not substitute for an ATC clearance. Clearance to enter, cross, or takeoff from a runway must still be issued by ATC. Although ATC has limited control over the system, personnel do not directly use, and may not be able to view, light fixture output in their operations.



**Runway Entrance Lights (REL):** The REL system is composed of flush mounted, in-pavement, unidirectional fixtures that are parallel to and focused along the taxiway centerline and directed toward the pilot at the hold line. A specific array of REL lights include the first light at the hold line followed by a series of evenly spaced lights to the runway edge; and one additional light at the runway centerline in line with the last two lights before the runway edge (See FIG 2-1-9). When activated, these red lights indicate that there is high speed traffic on the runway or there is an aircraft on final approach within the activation area.

1. Operating Characteristics - Departing Aircraft:

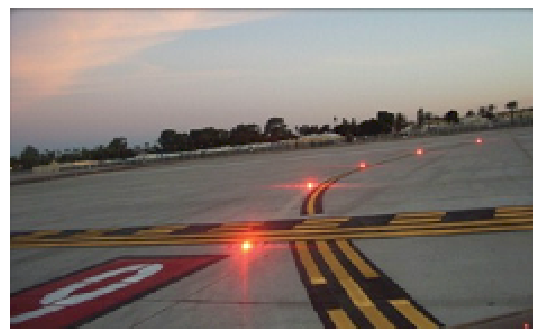
When a departing aircraft reaches 30 knots, all taxiway intersections with REL arrays along the runway ahead of the aircraft will illuminate (see FIG 2-1-9). As the aircraft approaches a REL equipped taxiway intersection, the lights at that intersection extinguish approximately 2 to 3 seconds before the aircraft reaches it. This allows controllers to apply "anticipated separation" to permit ATC to move traffic more expeditiously without compromising safety. After the aircraft is declared "airborne" by the system, all lights will extinguish.

2. Operating Characteristics - Arriving Aircraft:

When an aircraft on final approach is approximately 1 mile from the runway threshold all sets of REL light arrays along the runway will illuminate. The distance is adjustable and can be configured for specific operations at particular airports. Lights extinguish at each equipped taxiway intersection approximately 2 to 3 seconds before the aircraft reaches it to apply anticipated separation until the aircraft has slowed to approximately 80 knots (site adjustable parameter). Below 80 knots, all arrays that are not within 30 seconds of the aircraft's forward path are extinguished. Once the arriving aircraft slows to approximately 34 knots (site adjustable parameter), it is declared to be in a taxi state, and all lights extinguish.

3. What a pilot would observe: A pilot at or approaching the hold line to a runway will observe REL illumination and extinguishing in reaction to an aircraft or vehicle operating on the runway, or an arriving aircraft operating less than 1 mile from the runway threshold.

Whenever a pilot observes the red lights of the REL, that pilot will stop at the hold line, or along the taxiway path and remain stopped. The pilot will then contact ATC for resolution if the clearance is in conflict with the lights. Should pilots note illuminated lights under circumstances when remaining clear of the runway is impractical for safety reasons (i.e., aircraft is already on the runway), the crew should proceed according to their best judgment while understanding the illuminated lights indicate the runway is unsafe to enter or cross. Contact ATC at the earliest possible opportunity.



**Takeoff Hold Lights (THL):** The THL system is composed of in-pavement, unidirectional fixtures in a double longitudinal row aligned either side of the runway centerline lighting. Fixtures are focused toward the arrival end of the runway at the "line up and wait" point, and they extend for 1,500 feet in front of the holding aircraft (see FIG 2-1-9). Illuminated red lights provide a signal, to an aircraft in position for takeoff or rolling, that it is unsafe to takeoff because the runway is occupied or about to be occupied by another aircraft or ground vehicle. Two aircraft, or a surface vehicle and an aircraft, are required for the lights to illuminate. The departing aircraft must be in position for takeoff or beginning takeoff roll. Another aircraft or a surface vehicle must be on or about to cross the runway.

### 1. Operating Characteristics - Departing Aircraft:

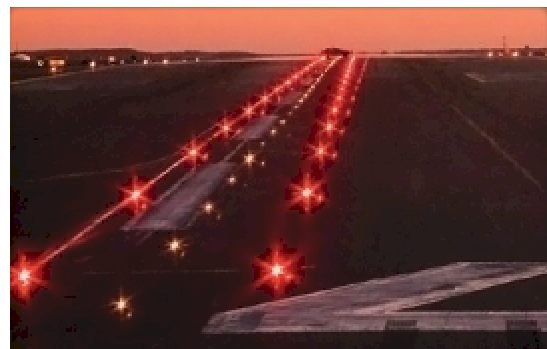
THLs will illuminate for an aircraft in position for departure or departing when there is another aircraft or vehicle on the runway or about to enter the runway (see FIG 2-1-9.) Once that aircraft or vehicle exits the runway, the THLs extinguish. A pilot may notice lights extinguish prior to the downfield aircraft or vehicle being completely clear of the runway but still moving. Like RELs, THLs have an "anticipated separation" feature.

#### NOTE-

When the THLs extinguish, this is not clearance to begin a takeoff roll. All takeoff clearances will be issued by ATC.

2. What a pilot would observe: A pilot in position to depart from a runway, or has begun takeoff roll, will observe THL illumination in reaction to an aircraft or vehicle on the runway or about to enter or cross it. Lights will extinguish when the runway is clear. A pilot may observe several cycles of illumination and extinguishing depending on the amount of crossing traffic.

3. Whenever a pilot observes the red lights of the THLs, the pilot will stop or remain stopped. The pilot will contact ATC for resolution if any clearance is in conflict with the lights. Should pilots note illuminated lights while in takeoff roll and under circumstances when stopping is impractical for safety reasons, the crew should proceed according to their best judgment while understanding the illuminated lights indicate that continuing the takeoff is unsafe. Contact ATC at the earliest possible opportunity.



## Pilot Actions:

1. When operating at airports with RWSL, pilots should turn the transponder "ON" with Altitude Enabled when operating on all Taxiways and Runways. This ensures interaction with the FAA surveillance systems which provide information to the RWSL system.
2. Never cross over illuminated red lights. Under normal circumstances, RWSL will confirm the pilot's taxi or takeoff clearance. If RWSL indicates that it is unsafe to takeoff from or taxi across a runway, immediately notify ATC of the conflict and confirm your clearance.
4. Do not proceed when lights have extinguished without an ATC clearance. **RWSL verifies an ATC clearance, it does not substitute for an ATC clearance.**

## ATC Control of RWSL System:

1. Controllers can set in-pavement lights to one of five (5) brightness levels to assure maximum conspicuity under all visibility and lighting conditions. REL and THL subsystems may be independently set.
2. The system can be shutdown should RWSL operations impact the efficient movement of air traffic or contribute, in the opinion of the ATC Supervisor, to unsafe operations. Whenever the system is shutdown, a NOTAM must be issued, and the Automatic Terminal Information System (ATIS) must be updated.

