ADVANCED TECHNOLOGY FOR RAMP LIGHTING FEATURING ATL & JFK

IES ALC

OCTOBER 22, 2019

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AGENDA

- ❑Purpose of this presentation
- ❑Industry Recommendations
- ❑Installations at ATL & JFK
- ❑Why Controls
- ❑Closing
- ❑Q&A

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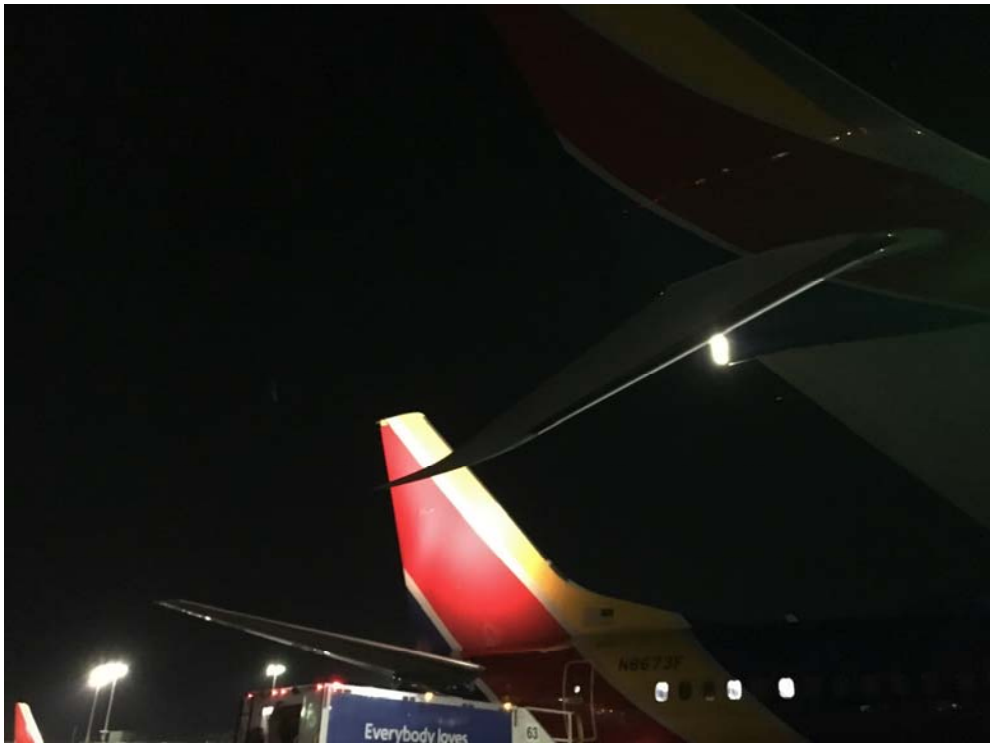
Perishable items left in the dark

Lighting should prevail beyond the nose

Maneuvering in tight spaces

Scimitar Winglet needs to be visible



737-800/Max Tail Stand

Belt Loaders want to see bag tags

Bag storage on #1 side of small craft

Light pollution is real

GA & FBO are equally important

Ramp: Current Lighting

Cargo Ramp: Current Lighting

Cargo Ramp: Current Lighting

BUT SAFETY SHOULD NOT BE A BUDGET ITEM

‘Accident waiting to happen’: After death, airport workers want safety improvements

BY LAUREN LINDSTROM AND HANNAH SMOOT

SEPTEMBER 24, 2019 12:11 PM, UPDATED SEPTEMBER 24, 2019 02:49 PM

An American Airlines flight was delayed almost an hour and a half this week after a passenger boarded the wrong plane at CLT.

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CHARLOTTE

Employees at Charlotte Douglas International Airport have asked the city for safety improvements in the same concourse where a worker was killed last month.

Donielle Prophete, vice president for CWA Local 3645, which represents 1,700 Piedmont Airlines agents, asked City Council on Monday for airport lighting and other safety upgrades after the nighttime death of 24-year-old employee Kendrick Hudson last month.

Prophete said visibility is especially poor near gates E30-38.

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INUSTRY RECOMMENDATIONS

Table 1: Recommended Light Levels (Horizontal, Vertical and Uniformity)

Lighting Locations and Tasks	Quantity		
	Horizontal illuminance (lux [fc] - average)	Vertical illuminance (lux [fc]- average)	Uniformity ratio (average to minimum)
Aprons[c]; Commercial, General Aviation, Cargo, Hangar			
Aircraft Stand			
Aircraft Parked Position	20 lux (2 fc)	20 lux[b] (2 fc)	4:1
Aircraft Service Area	*	NA	5:1
Aircraft Stands Group I or Code A	20 lux (2 fc)	20 lux[b] (2 fc)	5:1
Cargo Facility Loading and Unloading	50 lux (5 fc)	50 lux[b] (5 fc)	4:1
Mechanical checks, Maintenance and Repair	20 lux (2 fc)	20 lux[b] (2 fc)	4:1
Fuelling Operations	20 lux (2 fc)	20 lux[b] (2 fc)	4:1
Other Airside Areas[c]			
De-Icing Areas	Refer to **Table 3** in **Section 4.4**		
De-ice Storage Facility and Truck Loading			
Fuel Facilities			
Ground Service Equipment (GSE) Storage Areas	20 lux (2 fc)		4:1
Engine Run-up/Test Area (Hush House)	100 lux (10 fc)	100 lux (10 fc)	2:1
Landside Areas			
Departure, Arrival Areas	Refer to **Section 4.5** and **Annex A**		
Walkways from Parking Facility to Terminal			
Surrounding Road Systems			
Secure Access Point	Refer to **Table 4** and **Section 4.5.5**		
Parking (Exterior Only)			
Top level – R1[d]	15 lux (1.5 fc)	10 lux (1 fc)	4:1
Top level – R4[d]	10 lux (1 fc)	6 lux (.6 fc)	4:1
Pedestrian transaction area	20 lux (2 fc)	10 lux (1 fc)	4:1
Vehicle Transaction Area[a]	50 lux (5 fc)	NA	4:1
Parking lots – R4	10 lux (1 fc)	6 lux (.6 fc)	4:1
Other Exterior Lighting			

Table 3: Light levels for other airside areas.

Lighting Locations and Tasks	Elevation mm(in)	Illuminance Average Horizontal lux(fc)
Aircraft De-Icing	Varies	50 (5 fc)[ab]
Loading, unloading		
Pump area	Ground	50 (5 fc)[b]
General control area	Floor	150 (15 fc)[ab]
Control panel	1100(43 in)	200 (20fc)[ab]
Tank trucks, loading point	Point	100 (10 fc)
Tank fields		
Ladders and stairs	Floor	6 (.6fc)[b]
Electrical		
Outdoor switch yards, general substation	Ground	20 (2 fc)
Substation operating aisles	Floor	50 (5 fc)
Switch racks	1200 (47 in)	50 (5 fc)[b]

Notes for Table 3:

a. Designed with a combination of general lighting plus specialized supplementary lighting. These visual tasks generally involve the discrimination of fine detail for long periods of time and under conditions of poor contrast. The design and installation of the combination system should not only provide a sufficient amount of light, but also the proper direction of light, diffusion, color and eye protection. As far as possible it should eliminate direct and reflected glare as well as objectionable shadows.

b. Indicates vertical illuminance in addition to horizontal.

4.4.1.1 De-icing Areas All de-icing areas should have either permanent or portable nighttime lighting. Nighttime lighting should provide sufficient light for the de-icing crew's evaluation of nighttime de-icing treatment on wings and flaps. Lighting for de-icing operations should be adequate for visual inspection of all surfaces of the aircraft for ice. The inspection of the aircraft for ice is a dynamic effort and the equipment should move all around and over the aircraft; therefore, the eye height of the operator should glare to both aircraft, either on approach or moving on the airfield, and controllers in the ATCT. Where nighttime lighting structures are installed, designers should ensure that lighting systems are utilized with luminaires equipped with proper cutoff to reduce glare or obtrusive light that affects pilots and air traffic controllers.

Light pole height can be restricted by imaginary surface requirements. If such structures are restricted, it is suggested that portable nighttime lighting systems be used to permit visual/physical checks of the aircraft, thereby verifying that no snow/ice/frost contamination is present prior to takeoff. Portable nighttime lighting can be provided by de-icing operators (typically mounted on the de-icing vehicle) to provide high illumination to detect contamination.

De-icing fluids may have adverse effects on the materials used to construct the lighting system. An analysis of the de-icing fluid's effect on the materials should be completed prior to finalizing selection of the system materials.

4.4.1.2 De-ice Storage Facility and Truck Loading The lighting system designed should have an appropriate quantity of light in accordance with **Table 3** to perform the activity.

4.4.2 Fuel Facilities The lighting system designed should have appropriate quantity of light in accordance with **Table 3** to perform the activity. For information regarding fuel systems, the designer is referred to NFPA 407 – *Standards for Aircraft Fuel Servicing*.[35]

4.4.3 Ground Service Equipment (GSE) Storage Areas Lighting of ground vehicle storage and staging areas is recommended. When GSE storage and staging areas are remote from facilities, light poles should be provided and located so as not to pose an obstruction to aircraft movements. Refer to **Table 1** for the quantity of light in storage and staging areas. Where equipment can be stored in close quarters, better uniformity and higher illuminance levels can

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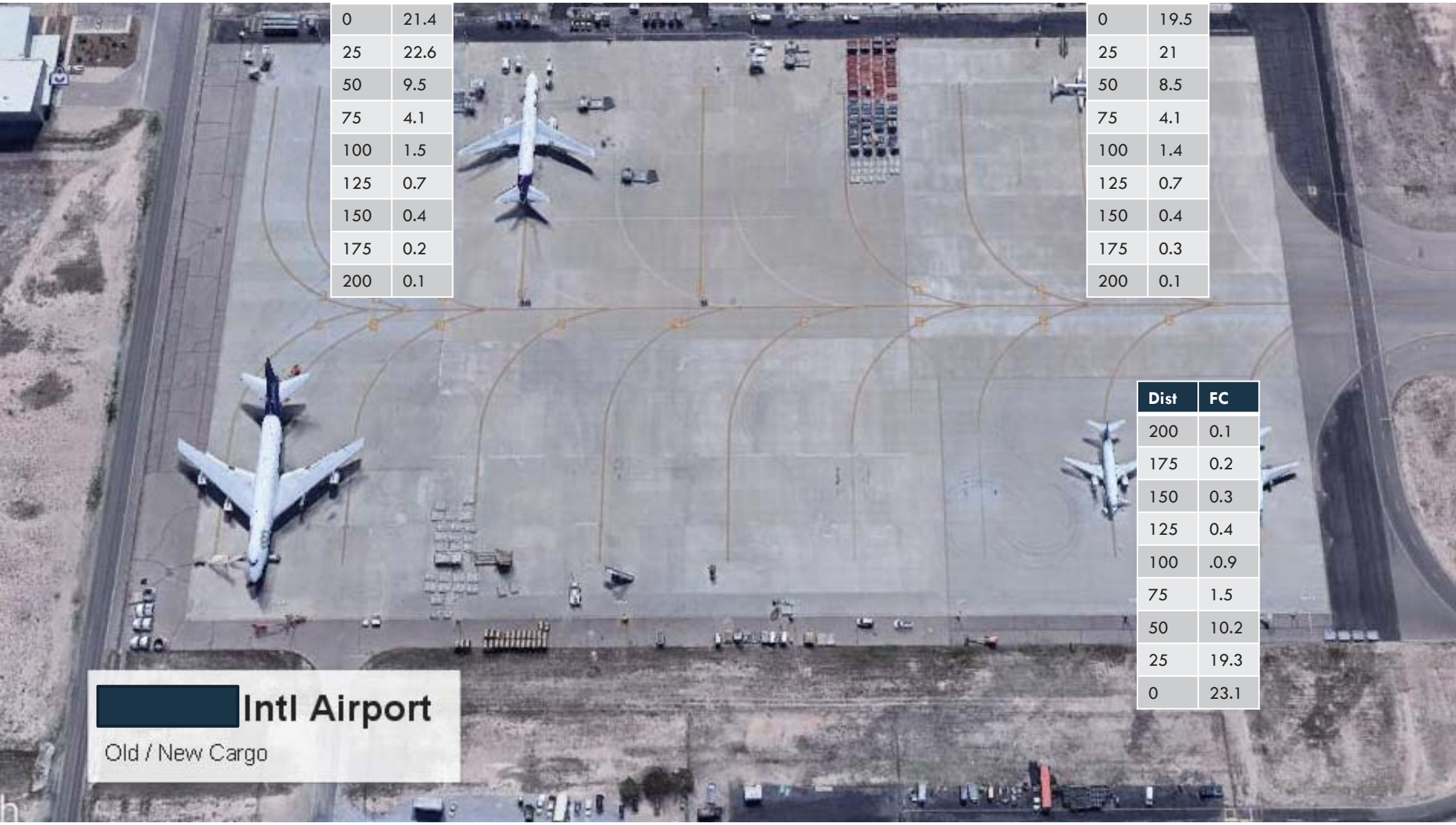
Terminal A
Gate A1-1

Terminal A
Gate A12

FC
2.91
2.94
2.90
1.58
0.94
0.55
0.44
0.29



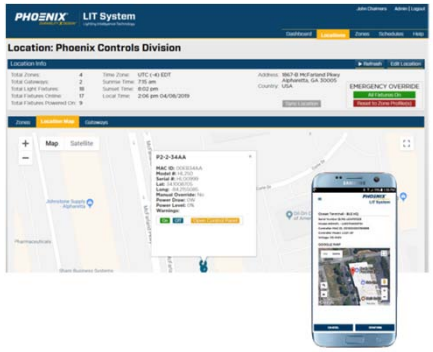
0	21.4
25	22.6
50	9.5
75	4.1
100	1.5
125	0.7
150	0.4
175	0.2
200	0.1

0	19.5
25	21
50	8.5
75	4.1
100	1.4
125	0.7
150	0.4
175	0.3
200	0.1

Dist	FC
200	0.1
175	0.2
150	0.3
125	0.4
100	.0.9
75	1.5
50	10.2
25	19.3
0	23.1

ADDITIONAL CONSIDERATIONS

- Considerations
  - SMS risk management/mitigation
  - Uniformity, min/max - IES, ICAO
  - Glare
  - Color temperature/clarity
  - Pole height and placement
  - Luminaire/Pole/System interface
  - Energy consumption
  - Systems integration
  - Zoning
- Early collaboration/site evaluation
- Complete solution



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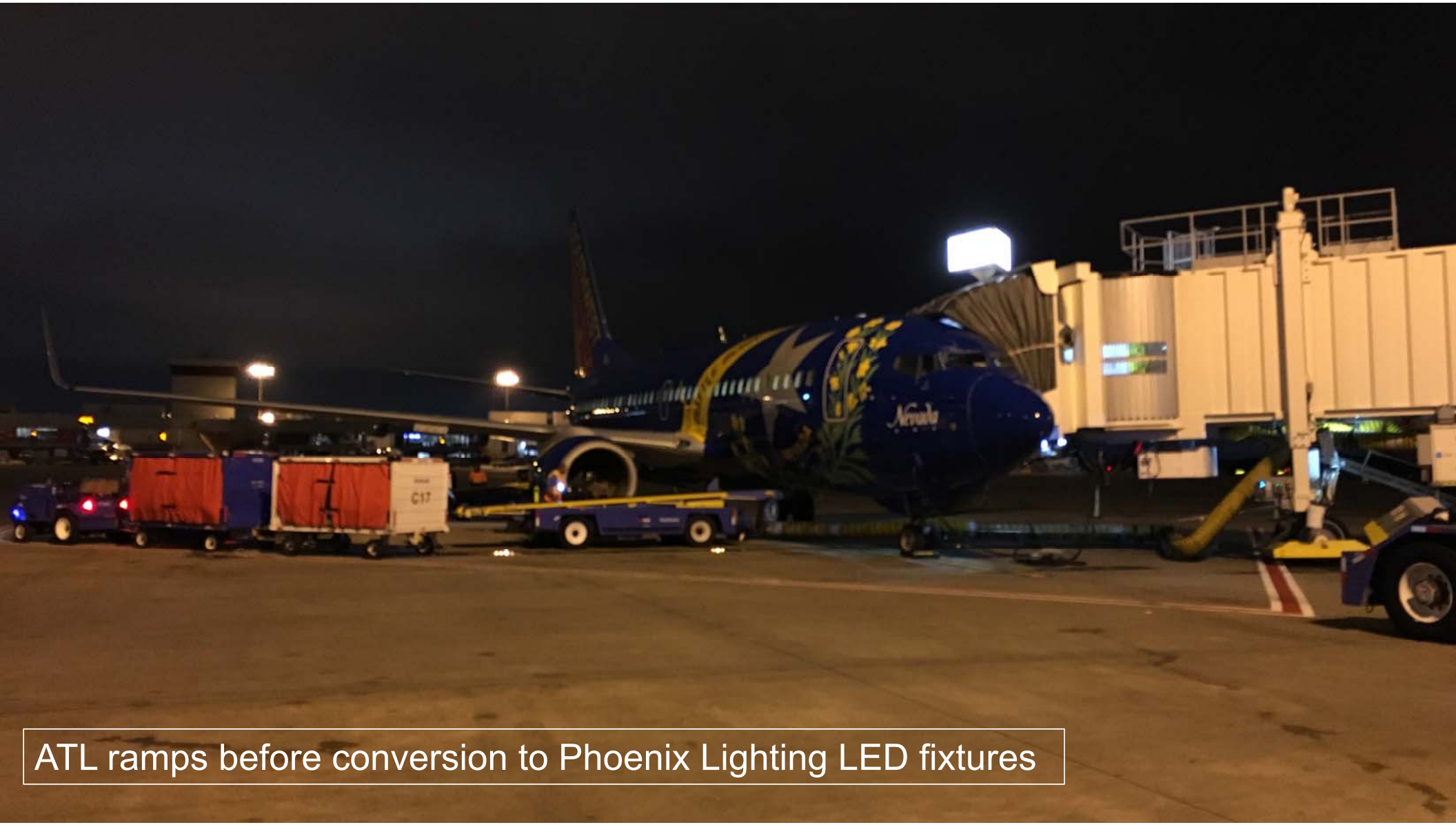
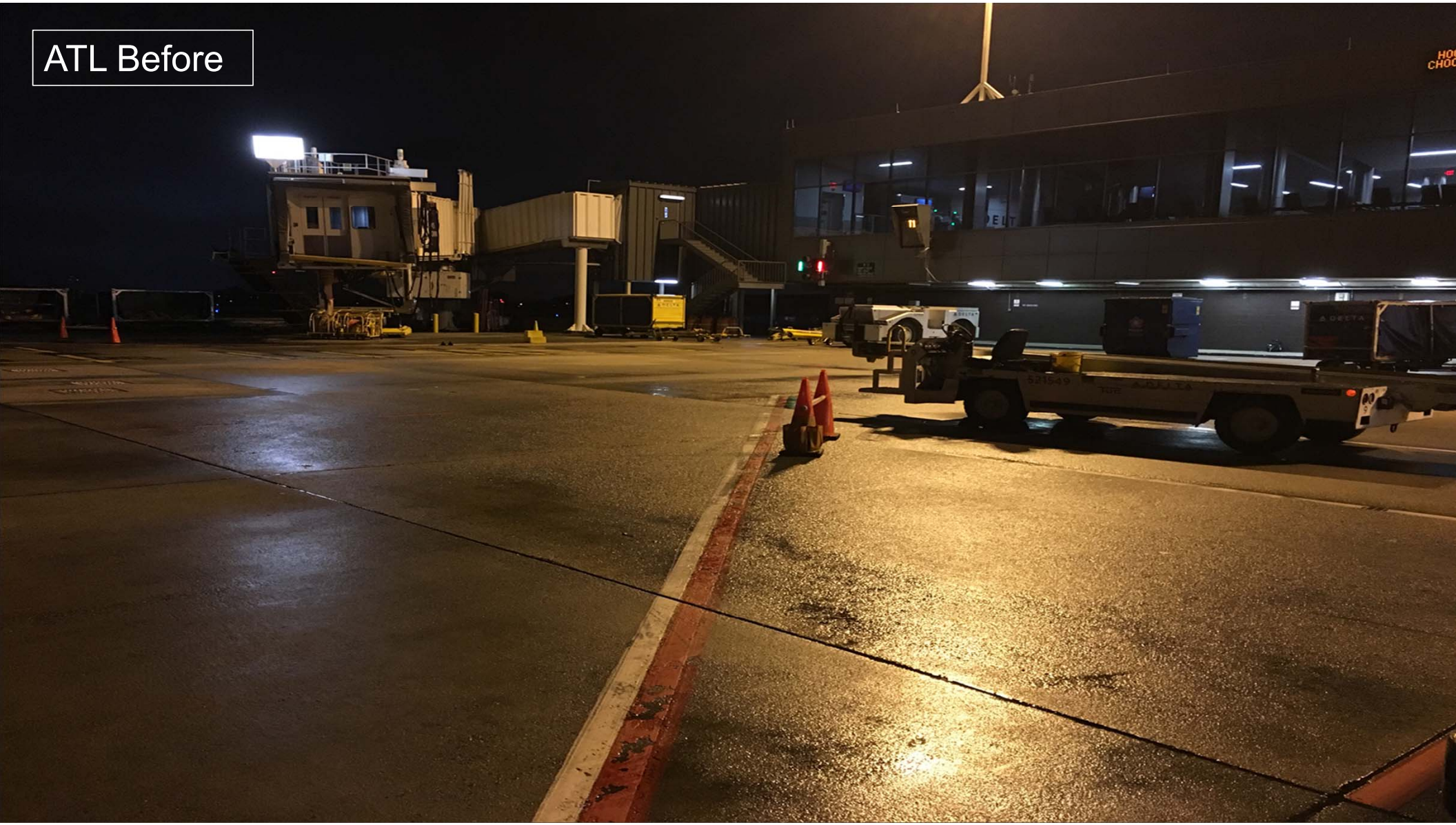
Visual Benefits of New LED Ramp Lighting and Controls

- **Ramp safety and security enhancements:**
  - Easier to see – and be seen; improved HD camera resolution
  - Strong light reflection off safety vests – wing walkers more visible
- **Productivity and efficiency gains:**
  - Easier to see for provo, beltloaders, jet bridges, and tugs
  - Easier to read luggage tags resulting in quicker turn
  - Improved visibility for pilot walk-arounds, no glare into flight deck
  - Better visibility for required maintenance/repair at gate
- **Phoenix Lighting LED fixture performance:**
  - Light levels 3-5X over previous fixtures, > 4.0 foot-candle average, 15+ years rated life of fixtures
  - Uniform light throughout the ramp – no dark spots or shadows
  - Excellent light below the wing
  - Outstanding light levels at/beyond the tail of the aircraft



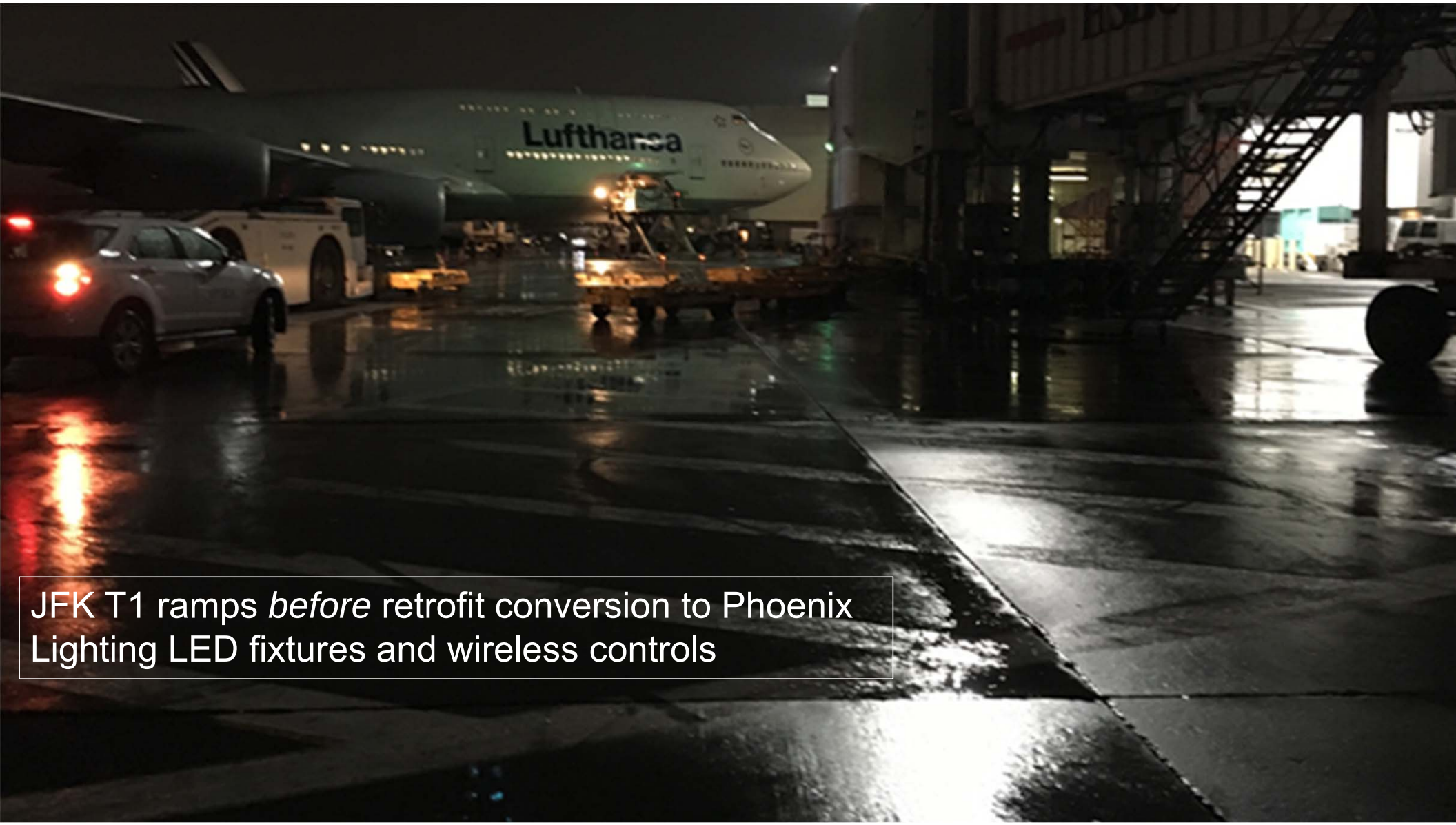
ATL ramps before conversion to Phoenix Lighting LED fixtures

ATL ramps after conversion to Phoenix Lighting LED fixtures

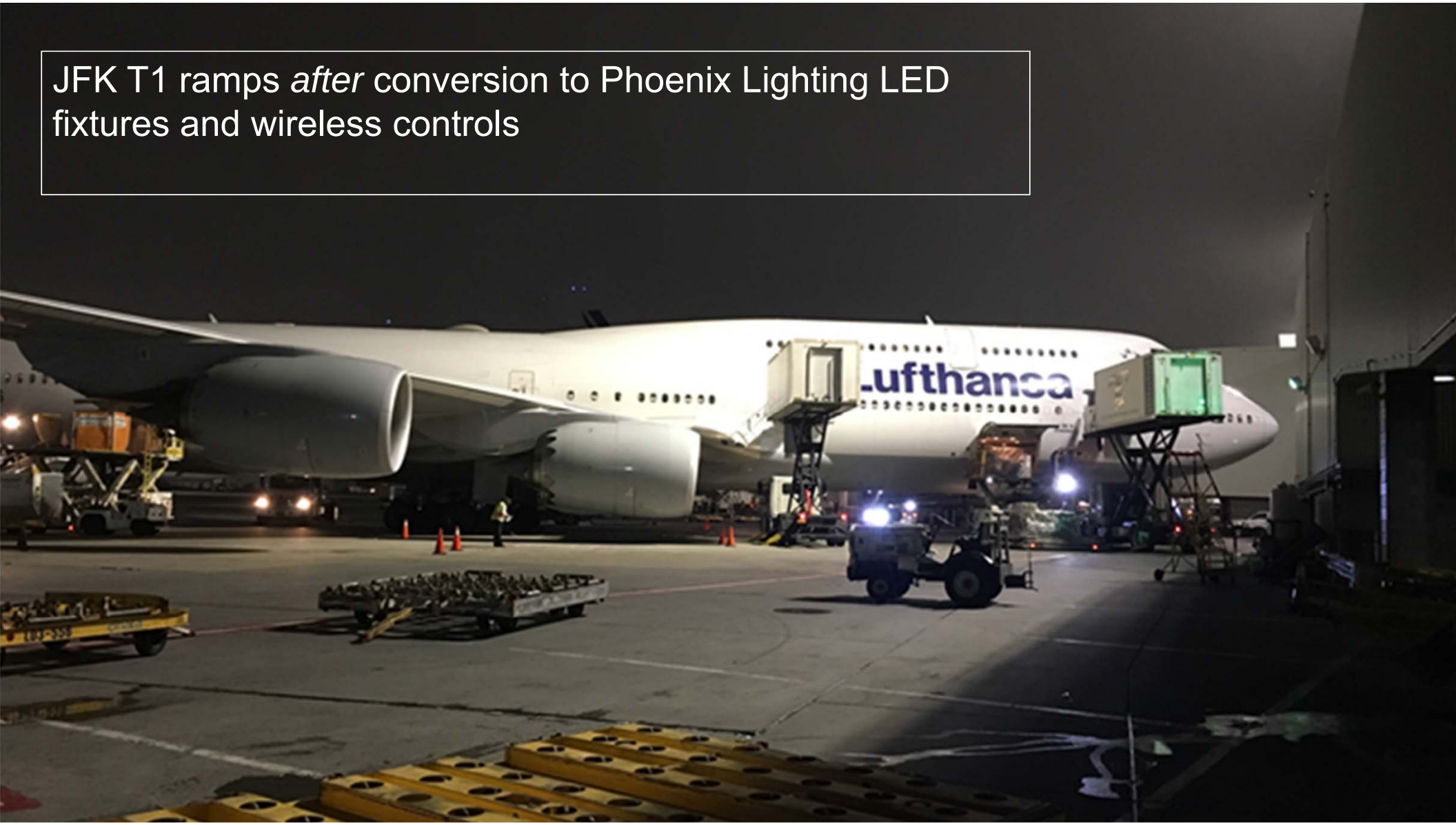

ATL Before

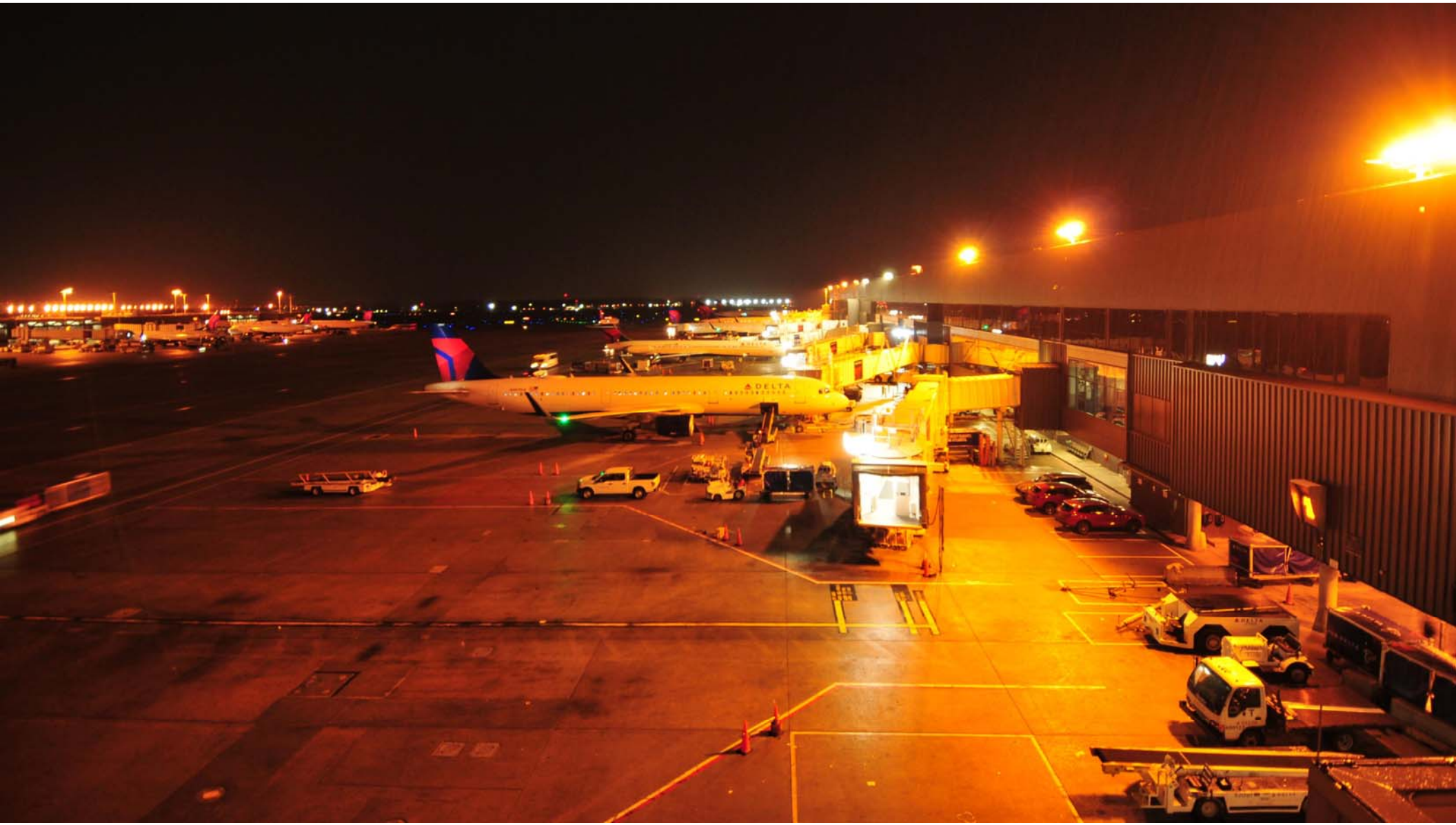
ATL After

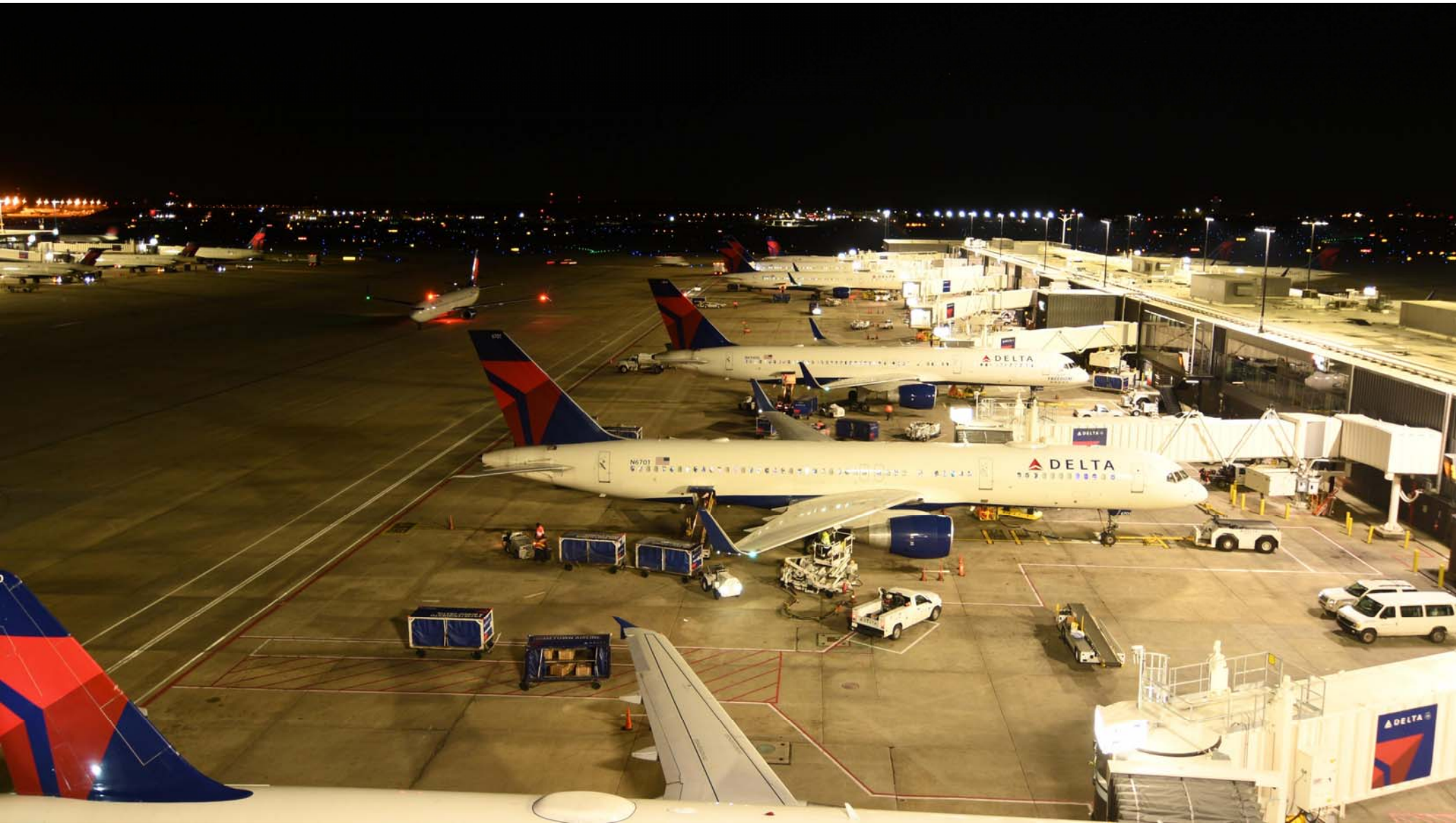
New LED fixtures provide bright, uniform lighting across the ramps and bring sharpness to ramp markings.



JFK T1 ramps *before* retrofit conversion to Phoenix Lighting LED fixtures and wireless controls


JFK T1 ramps *after* conversion to Phoenix Lighting LED fixtures and wireless controls


DELTA


DELTA
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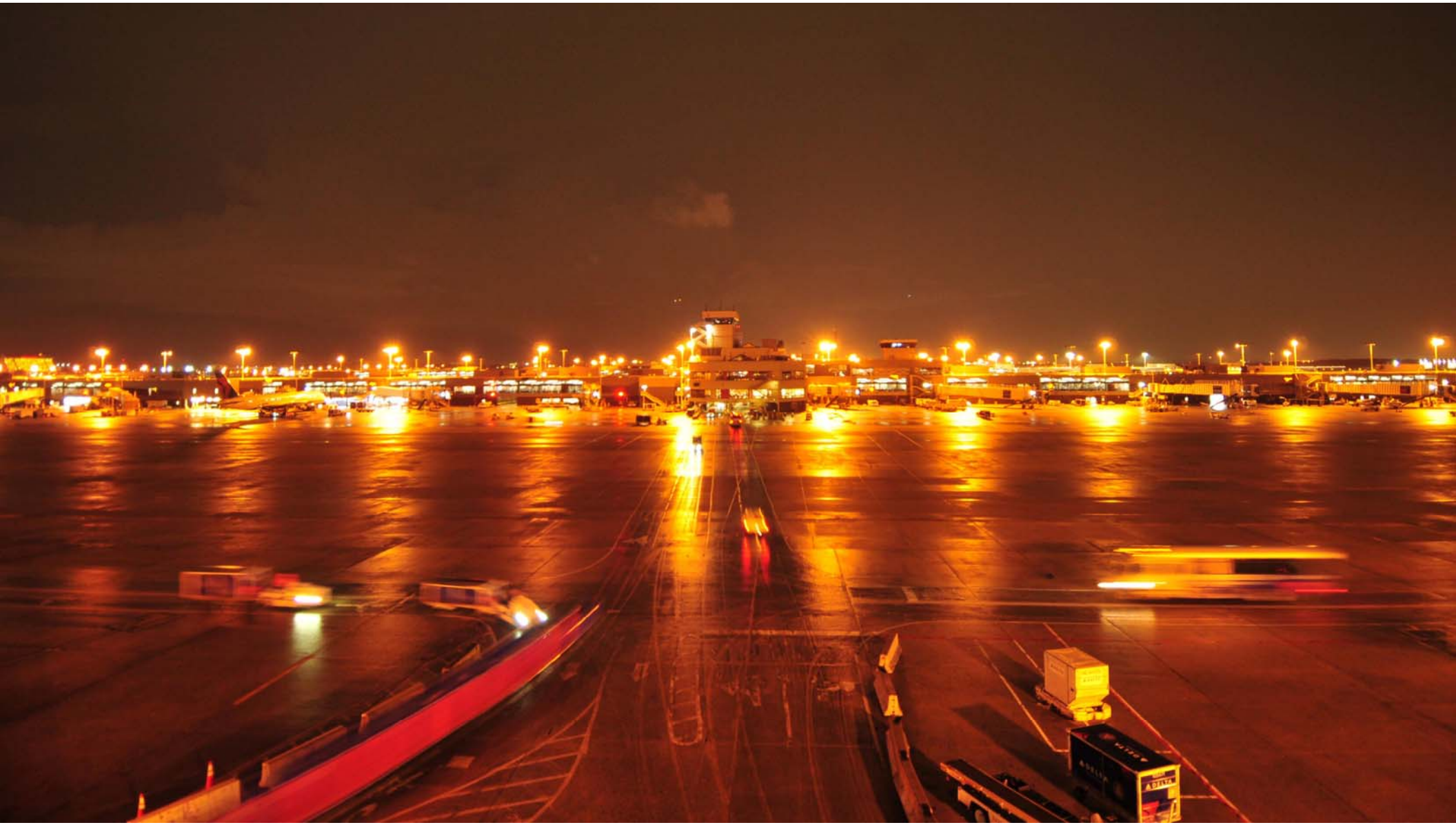
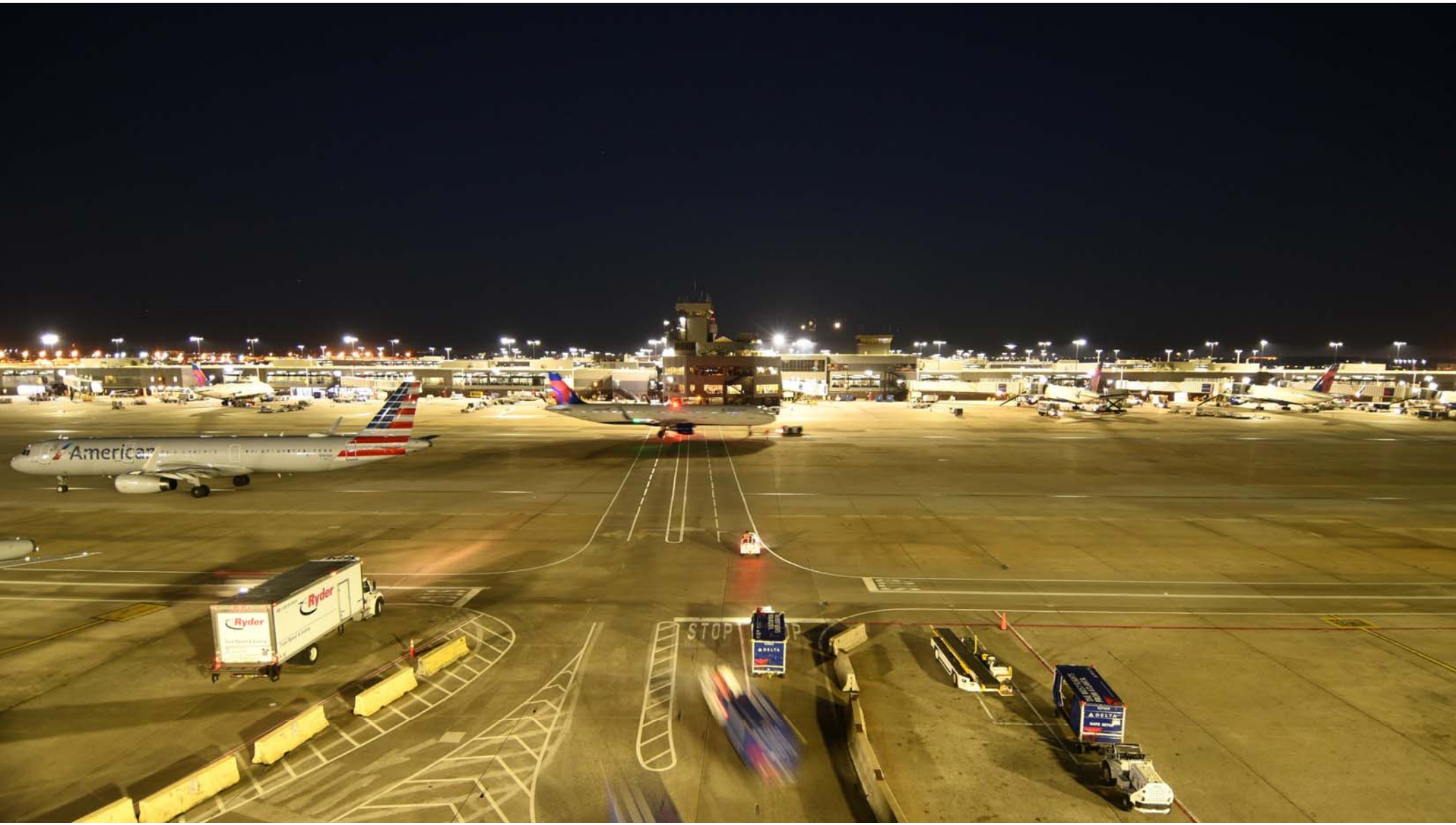
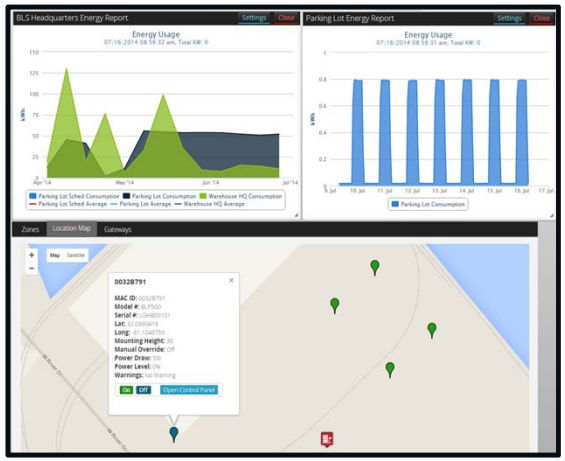
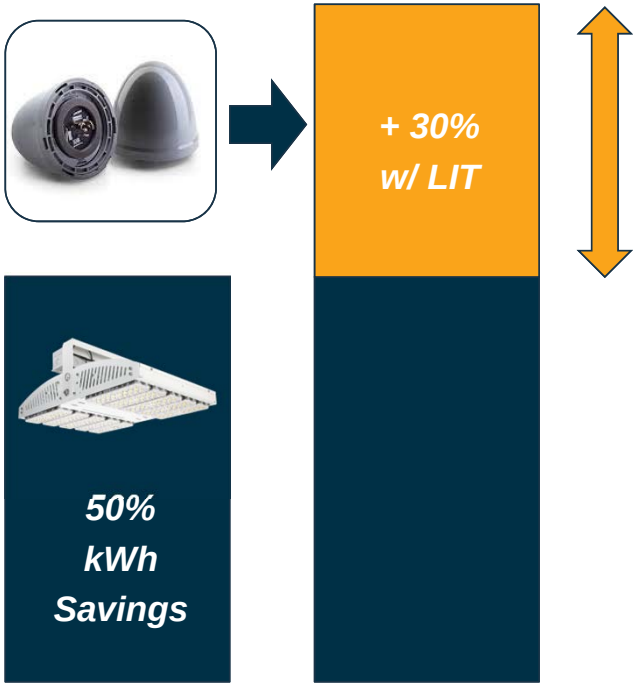



American
Ryder
Ryder
STOP

ADVANCED CONTROLS TECHNOLOGY

- Intelligent light control
- Scheduling by zones
- Asset Management
- Data collection and reporting





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LIGHTING ASSETS

- **Asset Node**
  - Auto-discovery of 2.4GHz wireless mesh network
  - Industry standard 7-pin twist-lock receptacle compliant
  - Power, dimming control, and +/- 2% accuracy energy metering
- **Edge Node**
  - Manages mesh network assets with secure AES 128-bit encryption
  - Site to cloud up to 250 nodes
  - Flexible wired or wireless network connectivity
- **Motion Node**
  - Integrates as mesh network asset
  - Offers dim/on/off control based on motion
  - 50’ range and 270 degrees field of view

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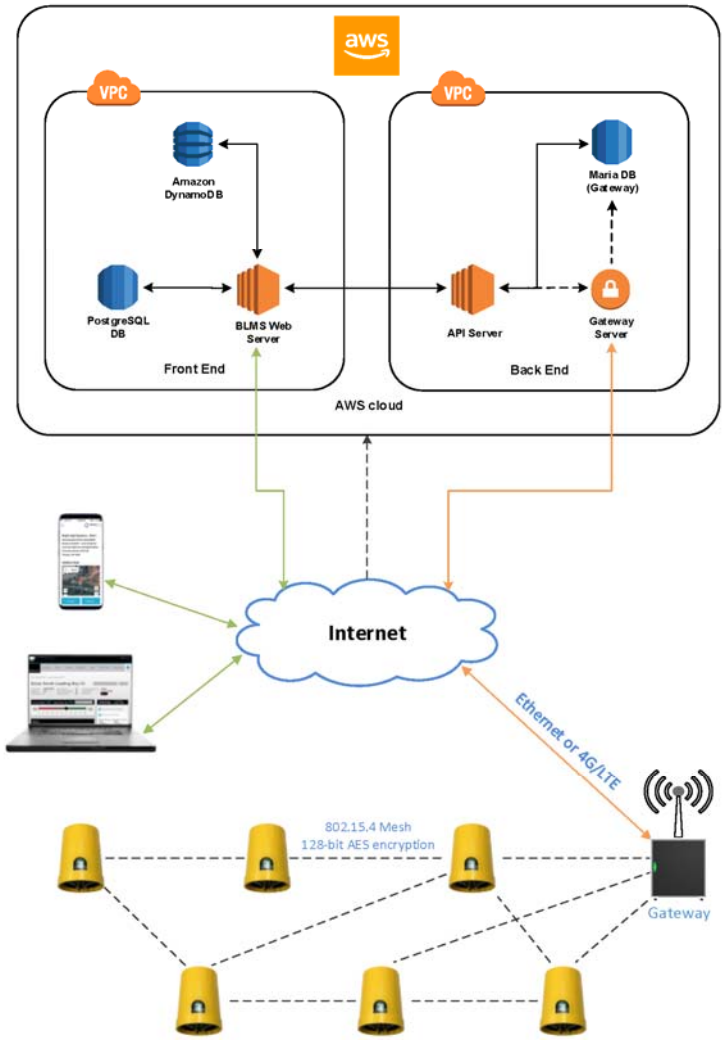
ARCHITECTURE

802.15.4 Mesh Network

- Self-healing, 2.4 GHz wireless
- 250 lights per gateway
- 128-bit AES encryption
- ANSI C136.41 twist-lock compatible

Cloud Infrastructure

- No software!
- Centralized, scalable using AWS
- Multi-availability zone support
- HTML5, CSS3 web application
- Simplified user experience
- Accessible anywhere!
- 24/7 monitoring & technical support



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ASSET TRACKING MADE EASY

1. Open app and scan QR code on wireless controller, then scan fixture label

2. Attach controller to light fixture via twist-lock

3. Raise ring and energize fixture for auto-discovery by gateway – done!

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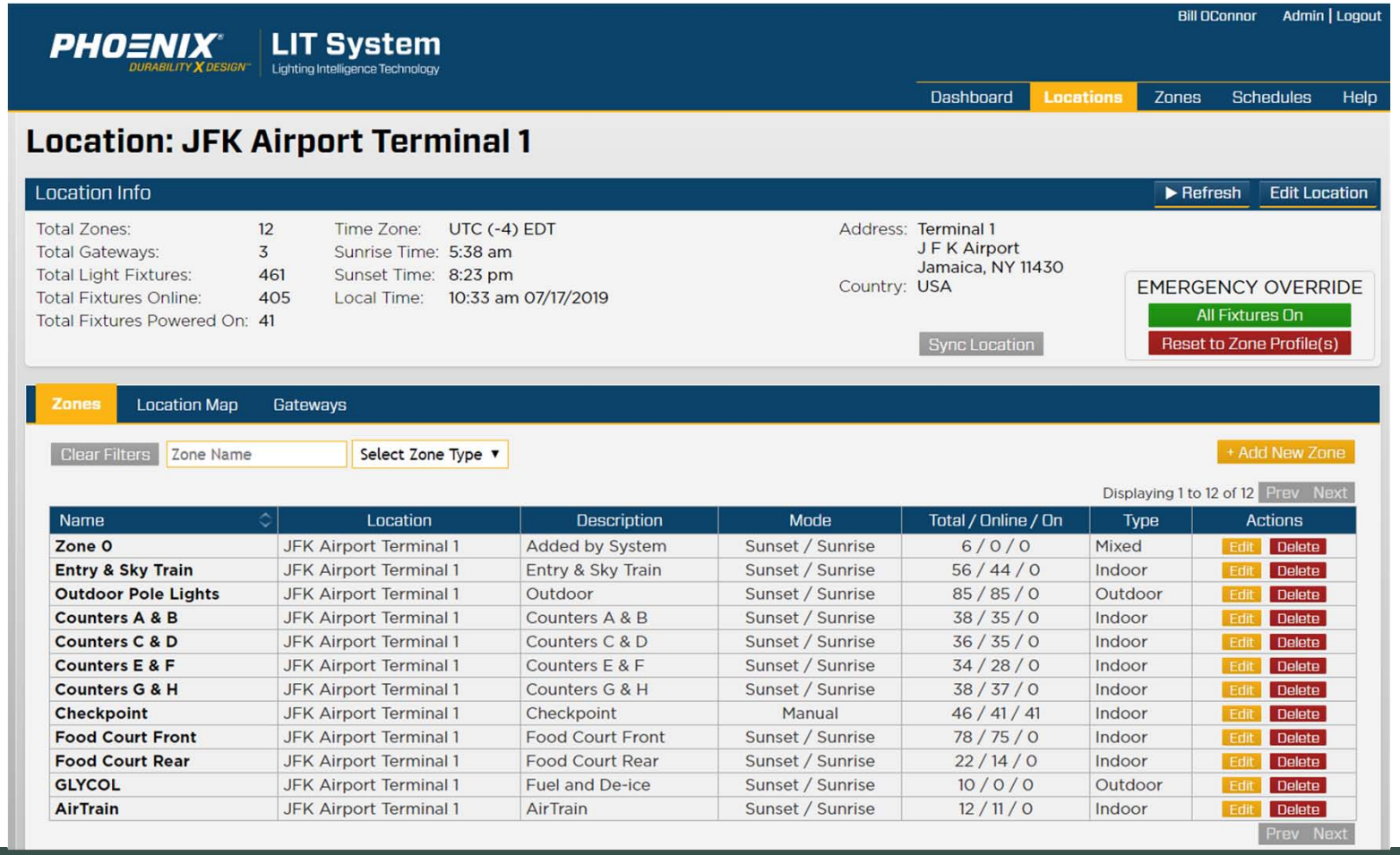
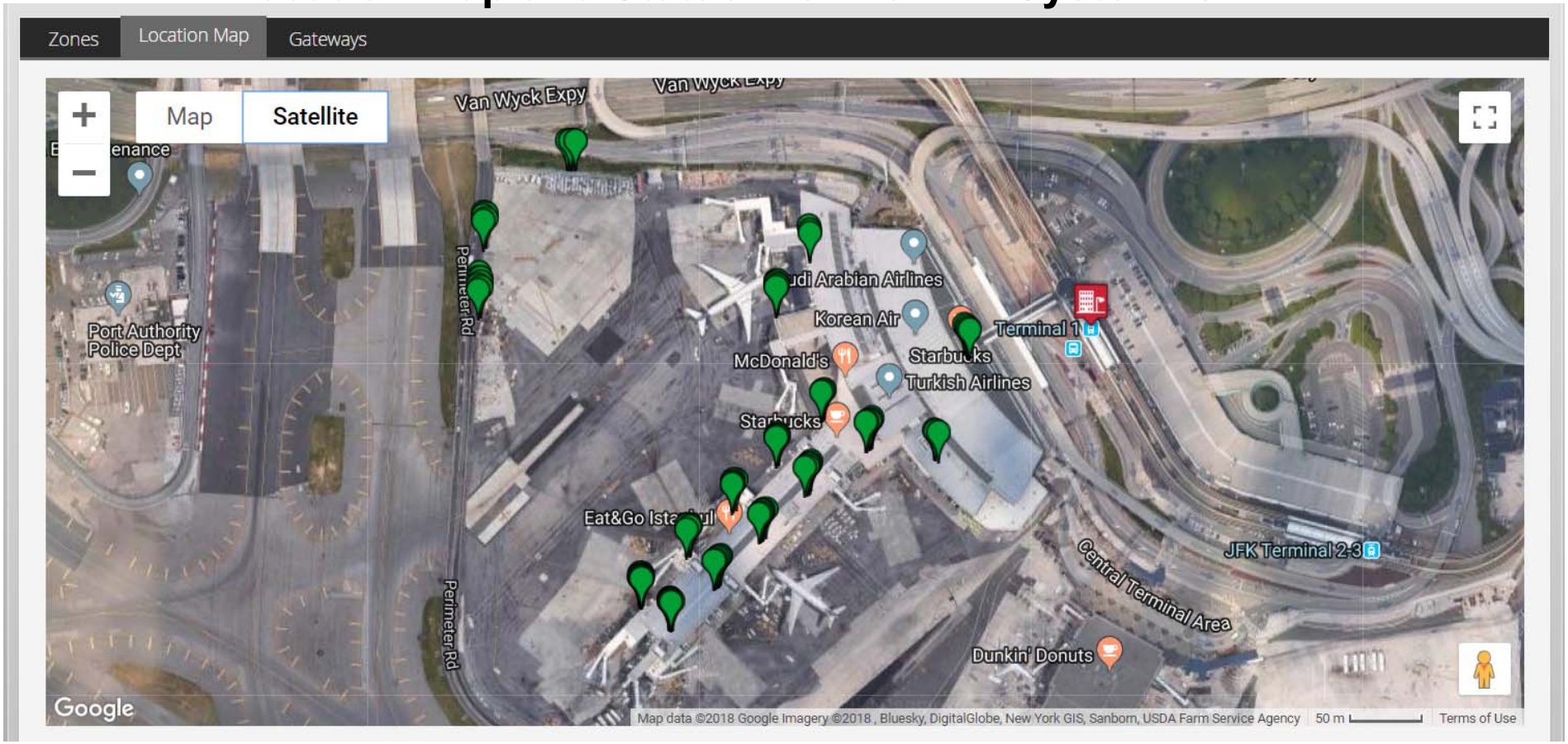
LIT System: Home Page for JFK Terminal One



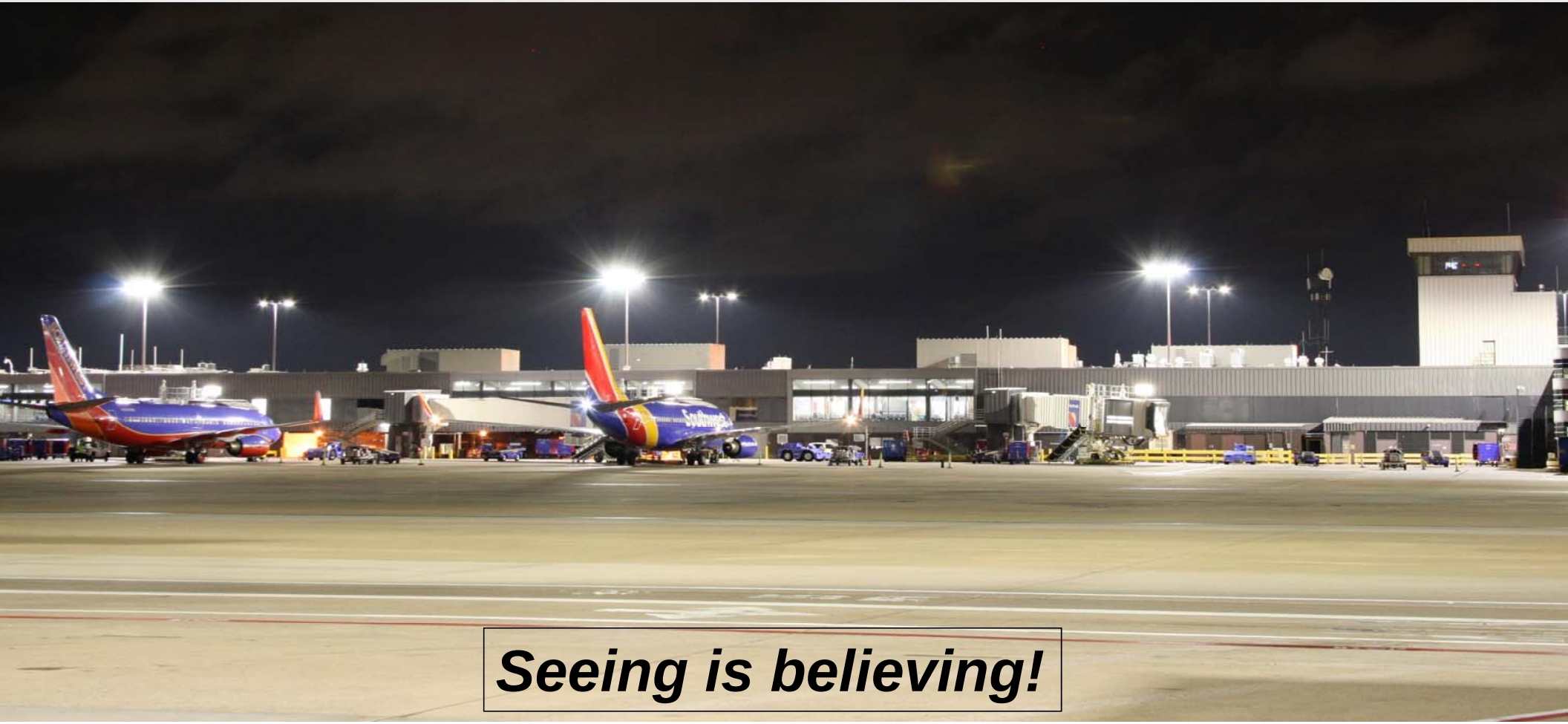
Location Map and Status View for LIT System: JFK T1



Industry Leading *White Glove Service*

- Hands-on project management: before, during, and after the sale
- Pre-install survey – current lighting levels analysis, infrastructure observations, anticipated results via complete AGI32 photometric layout from our in-house LC
- On-site assistance during initial phase of installation – training of installers, confirmation of mounting and aiming, coordination of gateway installation with contractor and airport IT
- Commissioning:
  - Instant visibility of fixtures via commissioning phone app – quick, easy, accurate
  - LIT onboarding that includes user administration, establishing zone profiles, programming per airport preferences
  - On-site network communication verification and LIT training for airport staff
- Post-install follow up to ensure satisfaction of solution, tweak programming, provide all requested documentation, PR release for airport authority

Safety Improvements Security Enhancements Energy and Maintenance Cost Savings
Sustainability/Environmentally Friendly



Seeing is believing!

Our team welcomes the opportunity to work with you to immediately bring transformational results of enhanced ramp safety, improved productivity, significant energy savings, and tangible sustainability.

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