



# Runway Status Lights (RWSL)

## Unique Design Requirements

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# Agenda

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- RWSL Background
- Implementation Status
- RWSL Standards
  - Advisory Circular
  - Engineering Brief
  - FAA-STD-019E
- Design Challenges @ DFW

# Tenerife Accident

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## ■ Enhancing Runway Safety

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- Runway incursions recognized as a top safety issue by NTSB in 1990
- FAA created Runway Safety Program

*Recommendation: “An in-pavement lighting system to warn pilots of potential runway incursions or collisions”*

- Technology tested at DFW and SAN
- October 2008 – RWSL Implementation began
- First commissioned system at MCO

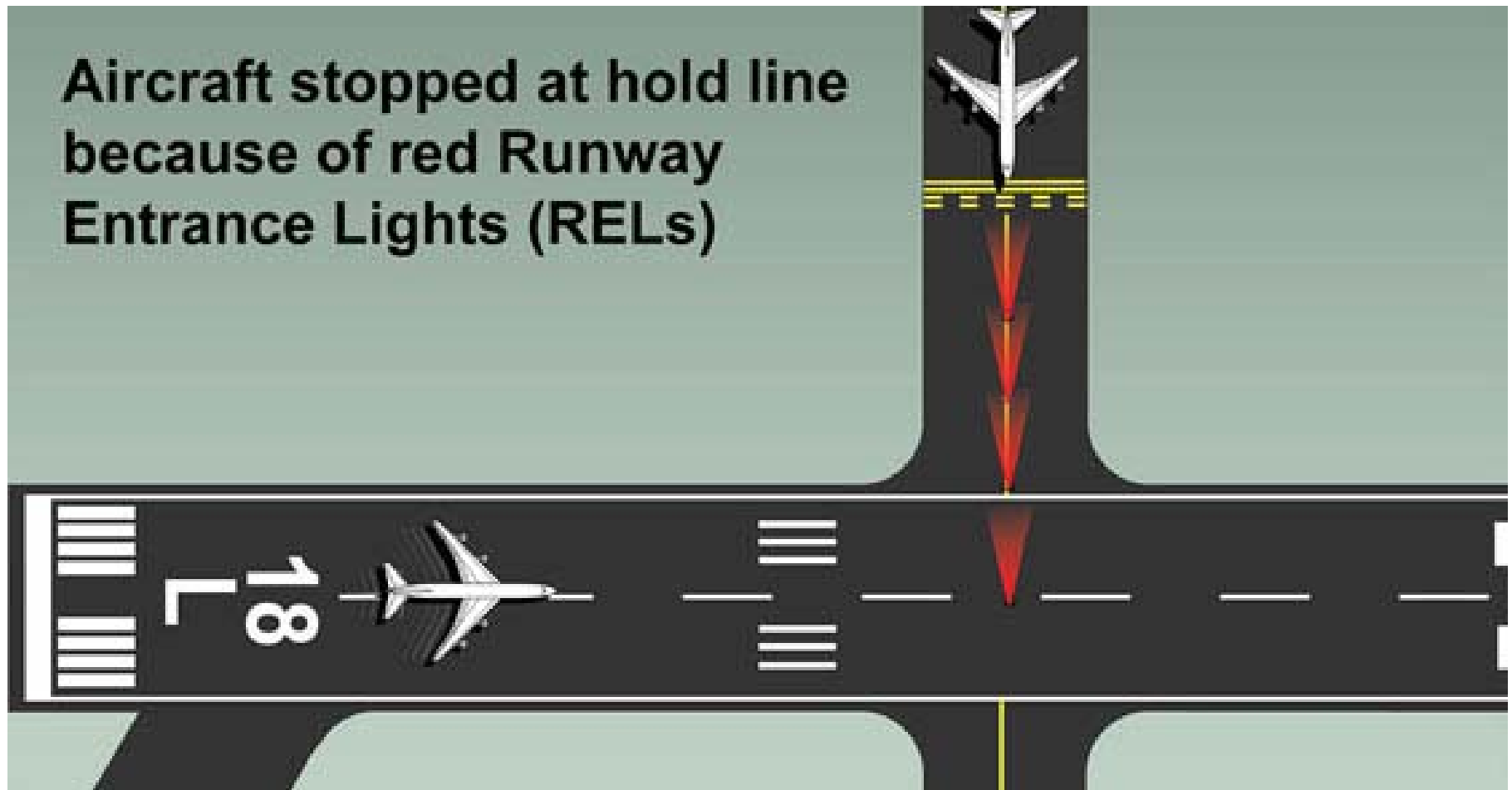
## How It Works

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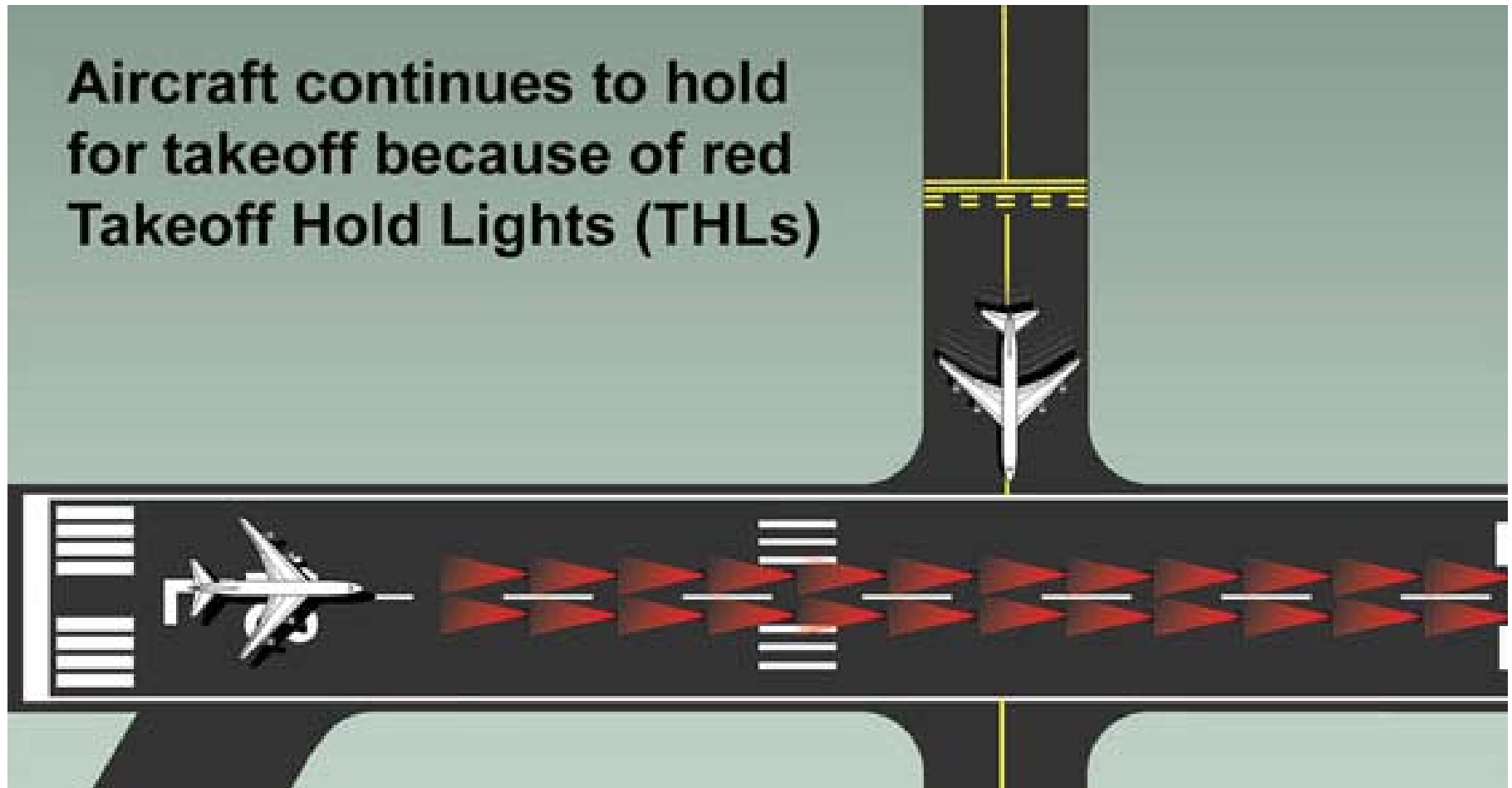
- Red lights embedded in the pavement to warn pilots when it's unsafe to cross, enter or begin takeoff on a runway
- Enabled by ASDE-X / ASSC surveillance radar
- No interference to air traffic operations

*Initial evaluations showed a 70 percent reduction in runway incursions*

## Runway Entrance Lights (REL)

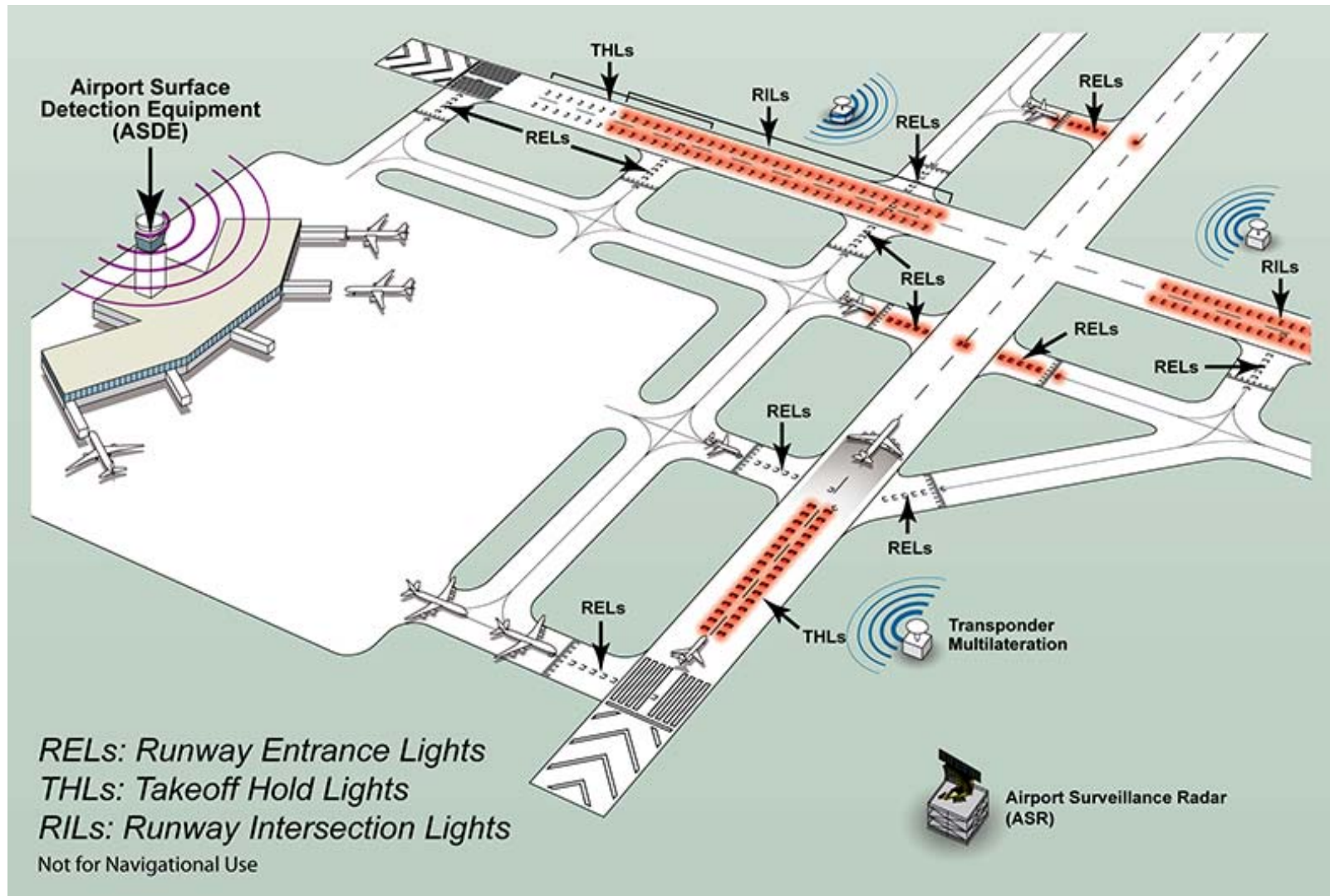


## Takeoff Hold Lights (THL)



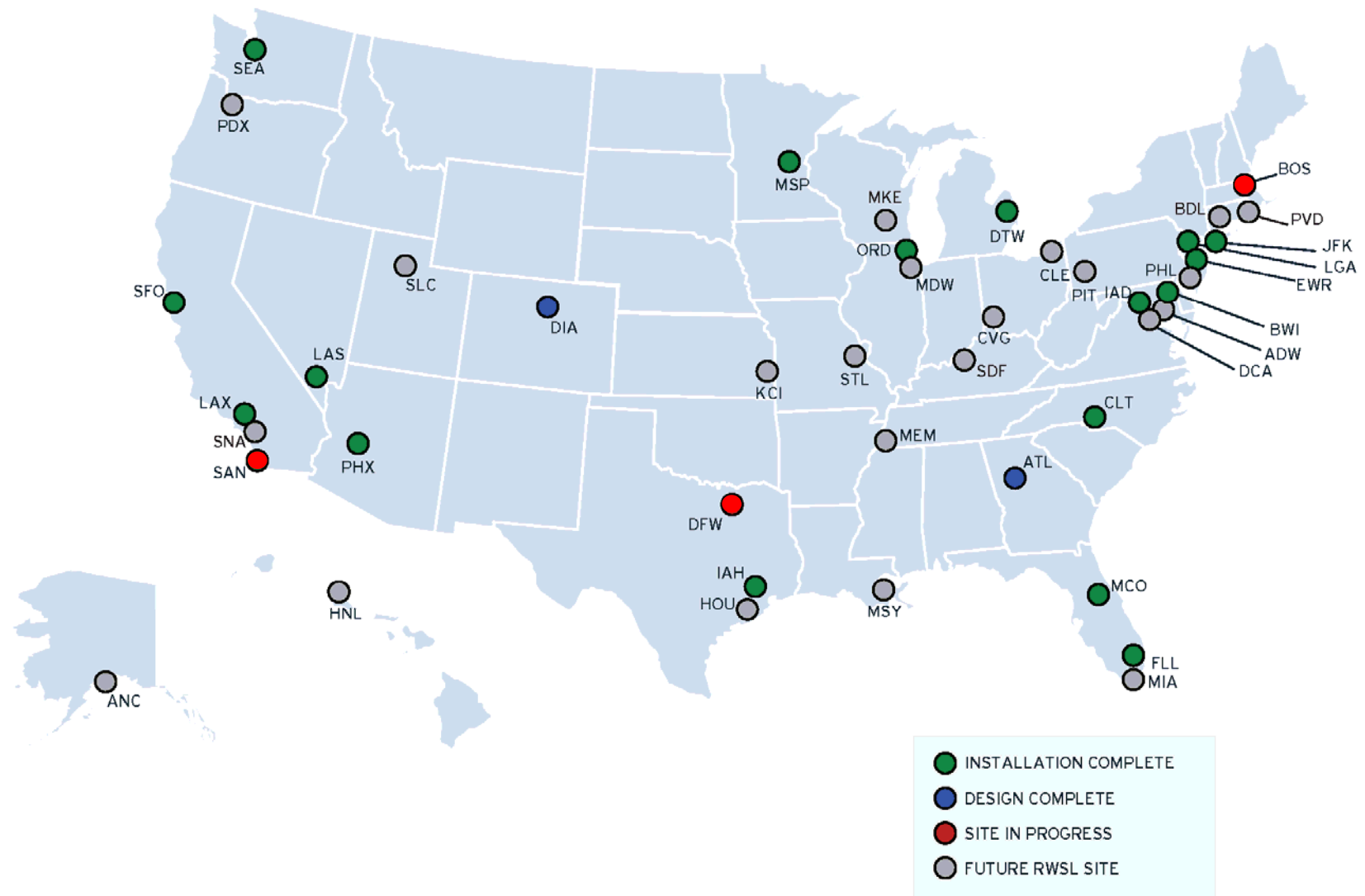


# Typical RWSL System



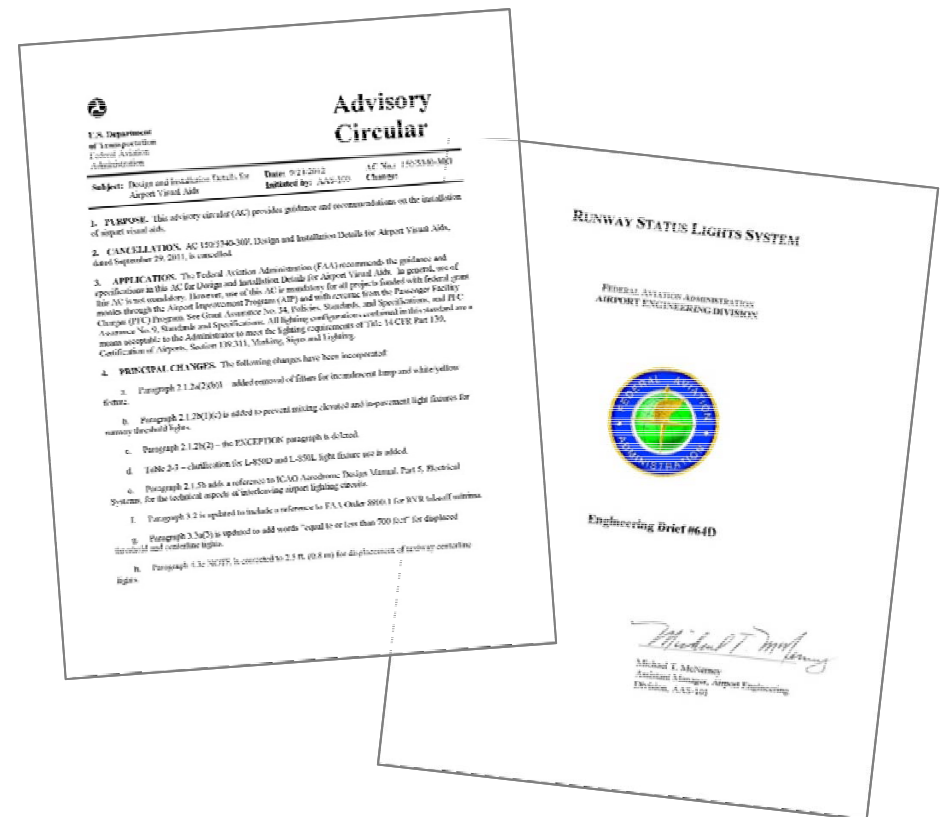


# Implementation Status



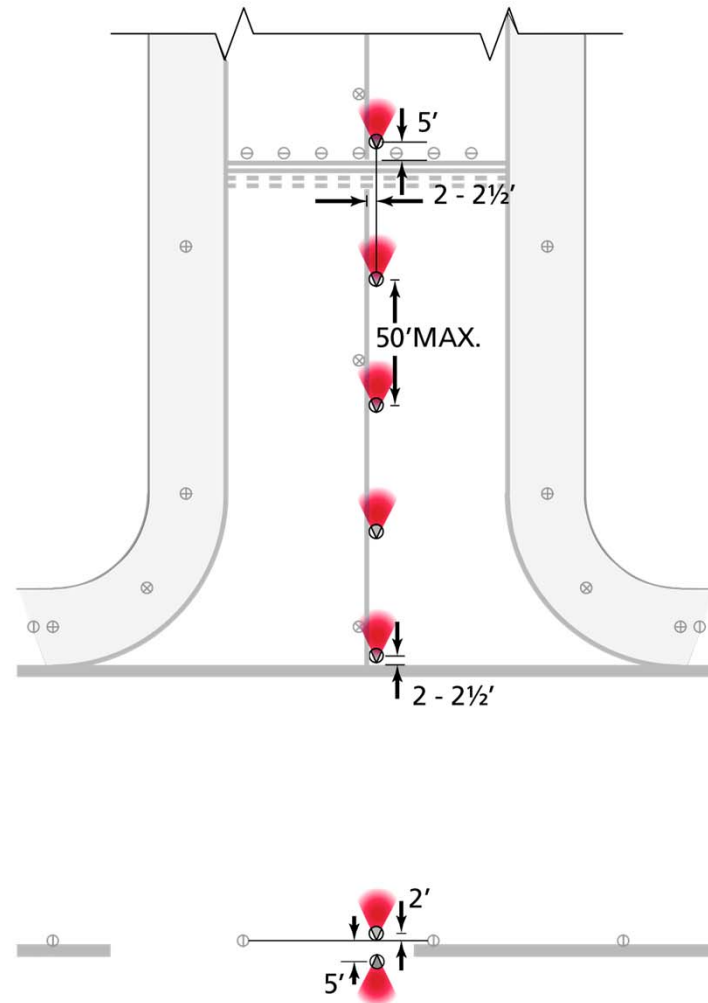
# RWSL Published Standards

- AC 150/5340-30H (Visual Aids), Appendix 7
  - System Purpose / Description
  - Array Geometry
  - Fixture Aiming
  - Equipment
  - Installation Methods
- Engineering Brief #64D
  - Detailed Geometry



## REL Geometry (Straight)

- 6 fixture array (minimum)
- 12.5 - 50' spacing
- Opposite Twy CL lights
- 2-2 ½' offset
- 5' prior to hold position
- 2-2 ½' prior to Rwy edge
- 2' or 5' off Rwy CL lights
- Twy angled 60° or more

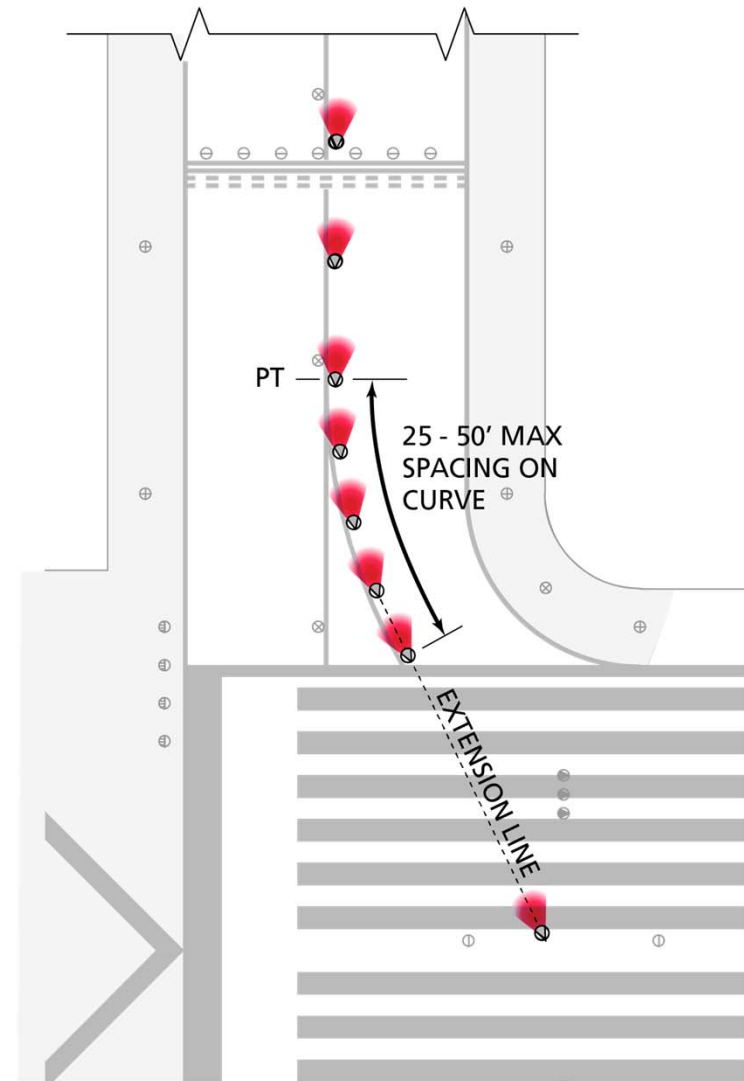


## REL Geometry (Curved)

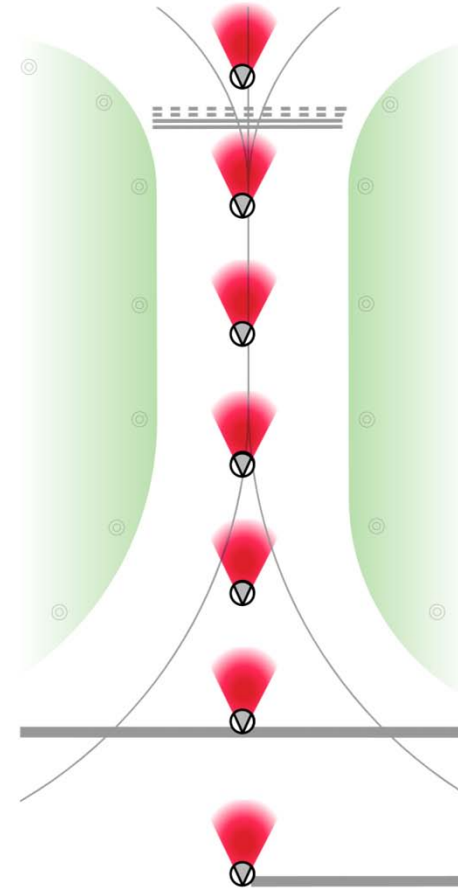
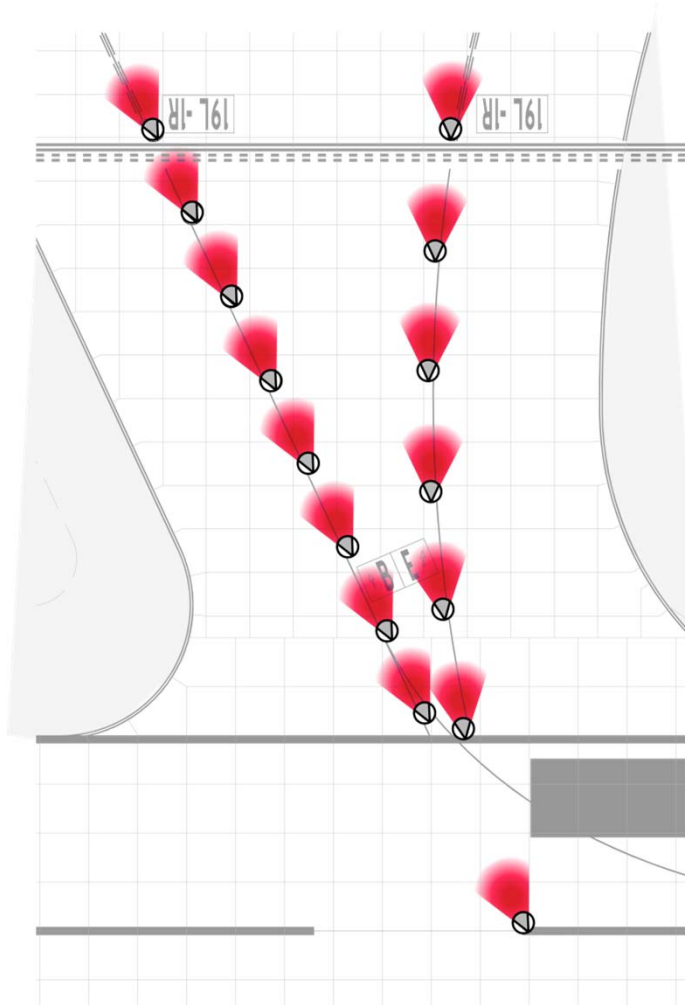
### ■ Spacing on curve (EB #64)

| Radius         | Max. Spacing      |                |
|----------------|-------------------|----------------|
|                | $\geq 1,200'$ RVR | $< 1,200'$ RVR |
| 75' to 399'    | 25'               | 25'            |
| 400' to 1,199' | 50'               | 25'            |
| $\geq 1,200'$  | 50'               | 50'            |

- Last light on extension line
- 2' clearance to markings

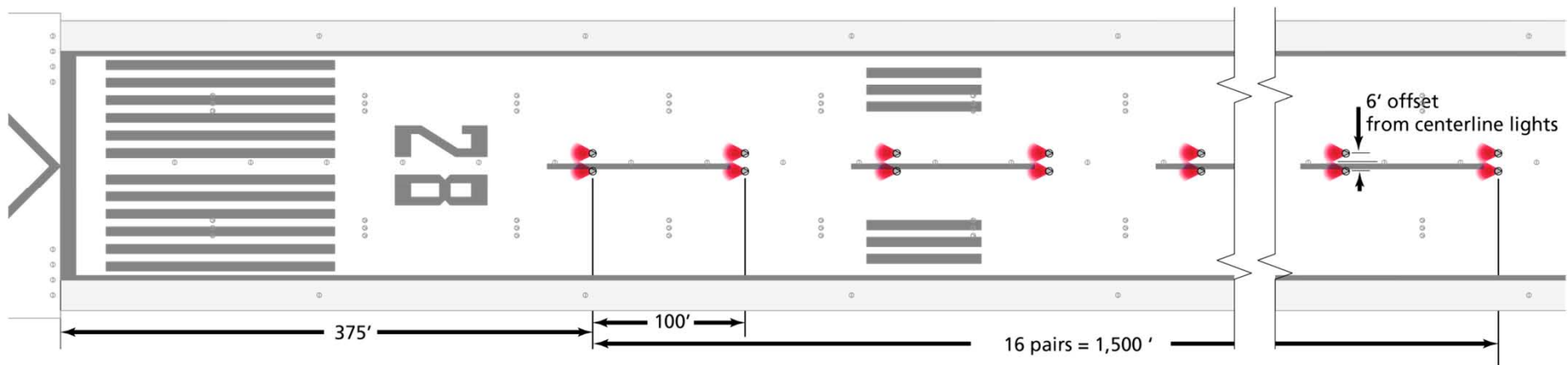


## REL Geometry (Multiple Paths)



## THL Geometry

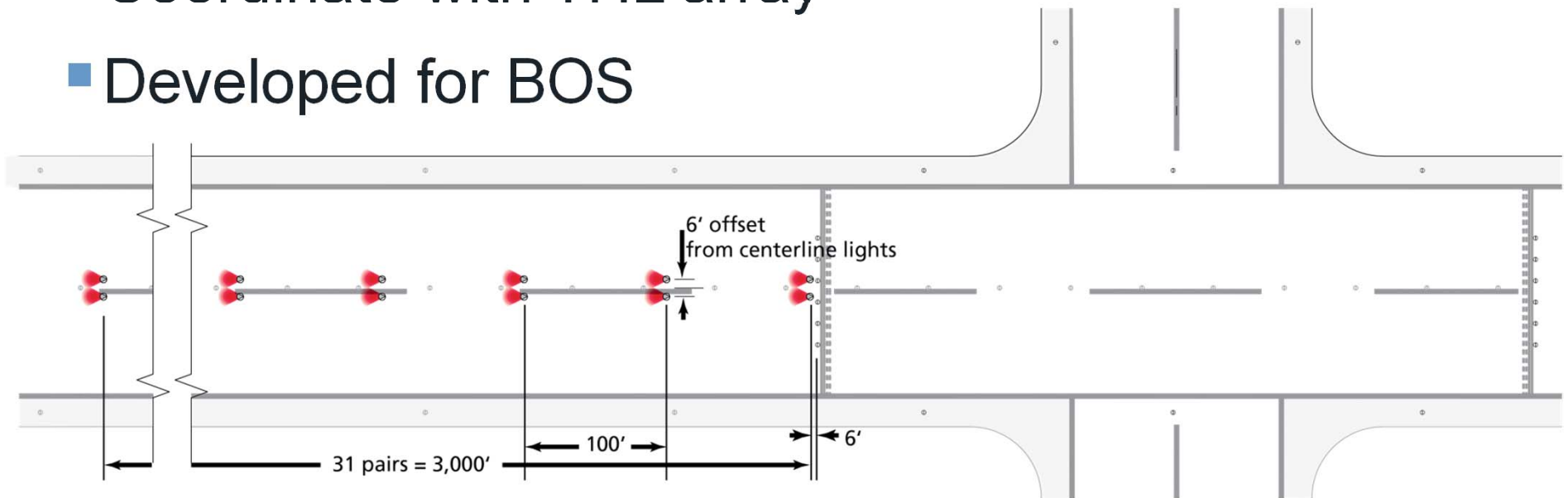
- 32 fixture (16 pairs) array
- Begin 375' (+/- 25') after runway threshold
- 6' offset from Rwy CL lights
- Spacing at 100' (+/- 2') = 1,500' total length
- Locate between Rwy CL lights





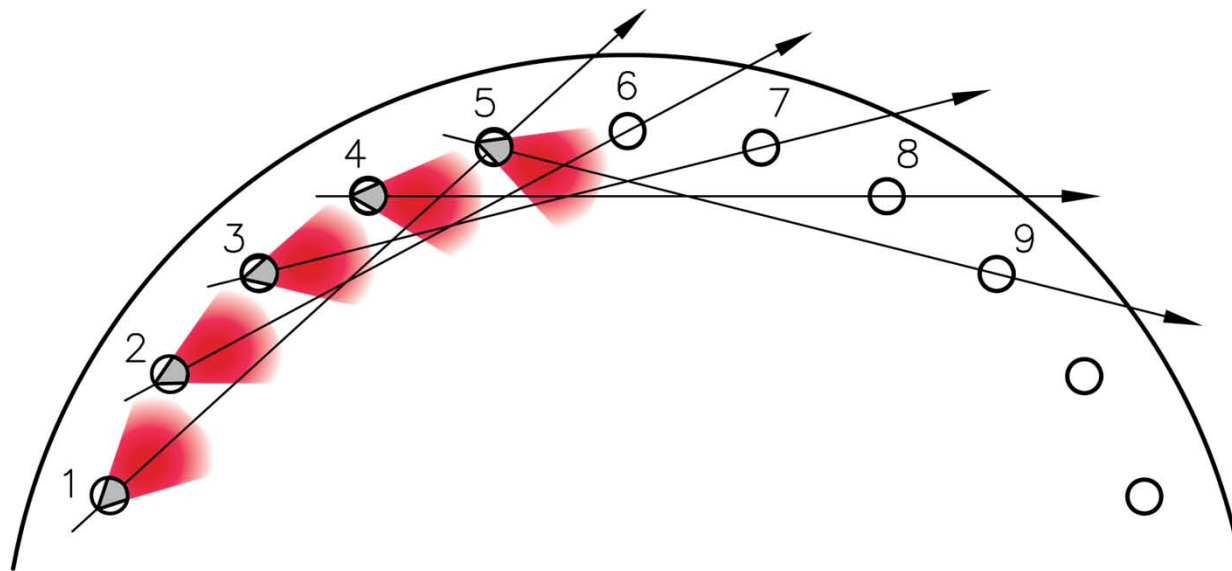
## RIL Geometry

- 62 fixture (31 pairs) array
- End 6' prior to LAHSO lights or hold marking
- Spacing at 100' (+/- 2') = 3,000' total length
- Coordinate with THL array
- Developed for BOS



## RWSL Fixture Aiming

- Unidirectional aiming
- Utilize “imaginary” fixture locations



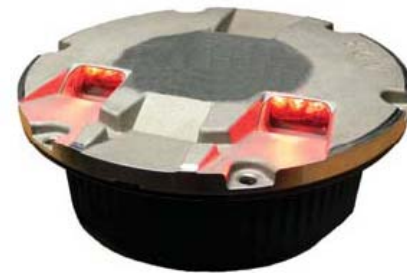
UNIDIRECTIONAL LIGHT ON CIRCULAR CURVE

## Equipment (Fixtures)

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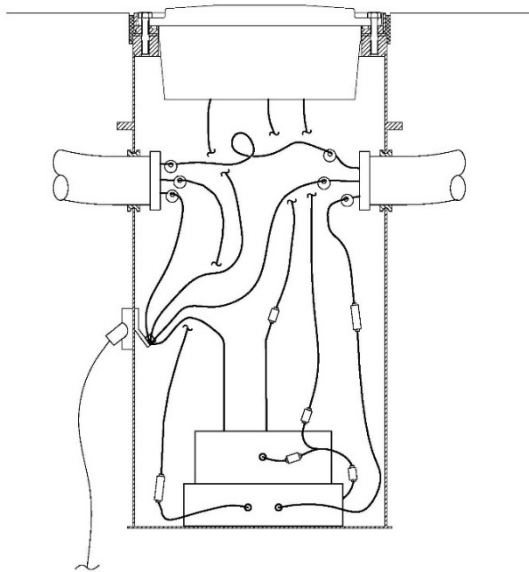
- LED fixtures standard
- With or without heaters
- Incandescent fixtures optional

| RWSL Light | Fixture Type |
|------------|--------------|
| REL        | L-852S       |
| THL        | L-850T       |
| RIL        | L-850T       |



## Equipment (Other)

|               | REL   | THL | RIL |
|---------------|---|-----|-----|
| Mounting Base | L-868 (Class I, Size B, 24" deep)             |     |     |
| Transformer   | L-830 (-3/-4 LEDs, -18 Incandescent)          |     |     |
| ILC           | <i>Power Line Carrier Data Communications</i> |     |     |
| CCR           | L-828 / L-829                                 |     |     |



## ■ FAA-STD-019E

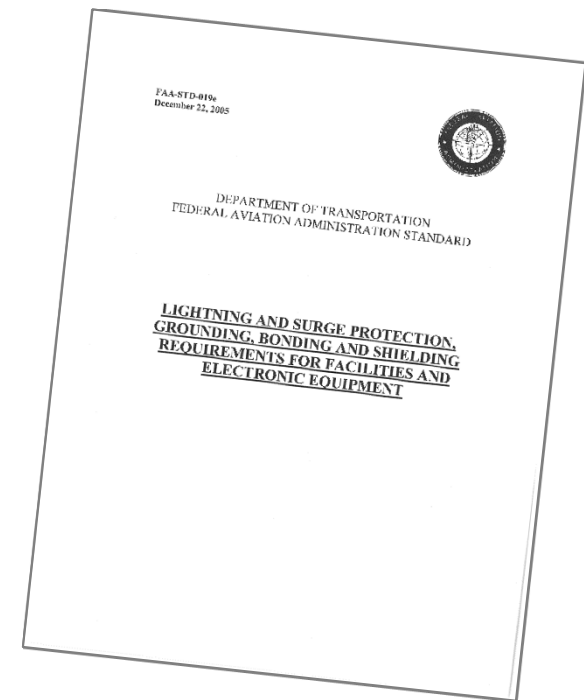
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### FAA-STD-019E

“...design, construction, modification or evaluation of facilities and equipment.”

### AC 150/5340-30H

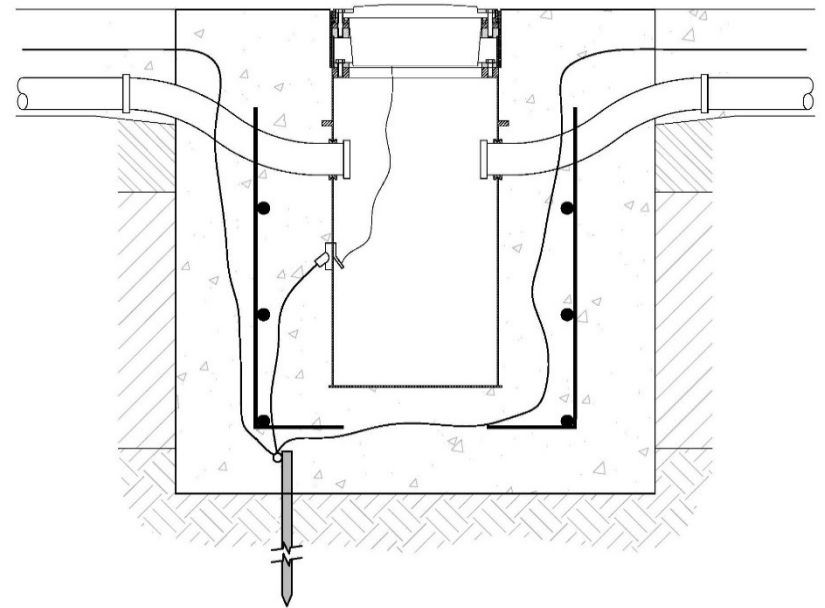
“...ensure that all installation guidelines, methods and techniques in this AC are followed...”



## Requirements of FAA-STD-019E

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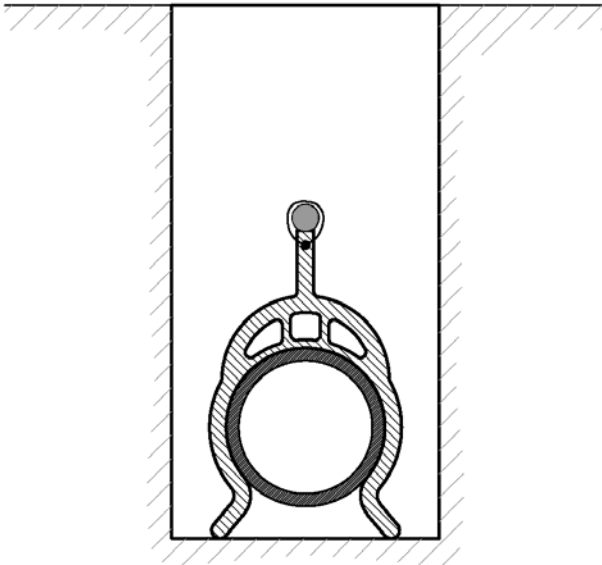
- #1/0 bare copper guard wire and base can bonding jumper
- Ground rods at 90' spacing
- 10 ohm Earth Resistance
- Exothermic welds
- Crimped connectors





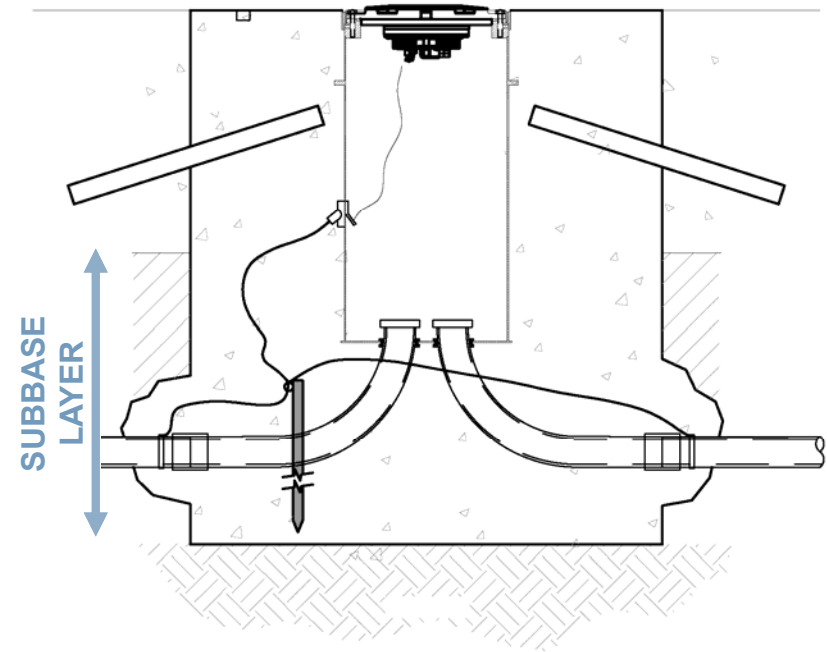
## DFW Challenges: Carlon Spacers

- Guard Wire Positioning
  - 10" above conduit
  - Carlon conduit spacers
  - Provides consistent positioning



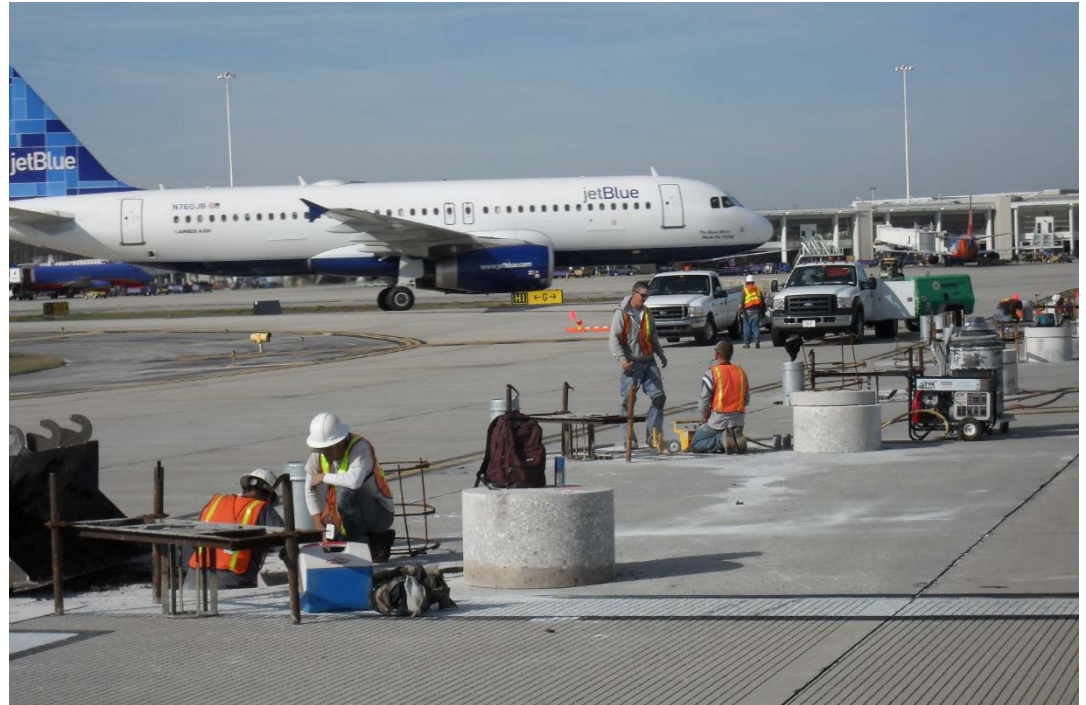
## DFW Challenges: HDD

- Horizontal Directional Drilling (HDD)
  - Conduit in subbase layer
  - Minimize pavement impact
  - Reduce closure duration
  - Compatible with nighttime shifts



## DFW Challenges: HDD

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## DFW Challenges: HDD Conduit

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### ■ Gila-Duct Conduit

- Armored
- Suitable for HDD
- Replaces lightning protection of guard wire





## Summary

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- RWSL guidance provided in AC 150/5340-30
- Supplemental information in EB#64
- FAA-STD-019E takes precedent
- Critical to confirm details prior to implementation

