Illuminating Engineering Society
Airfield Lighting Committee
October 2, 2018

SNC·LAVALIN

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AGING AVIATION INFRASTRUCTURE AND THE RUNWAY 9R—ALSF-2 PIER REPLACEMENT - PHILADELPHIA INTERNATIONAL AIRPORT -

.Chicago, Il.

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AMERICA'S AGING INFRASTRUCTURE

American Society of Civil Engineers 2017 Infrastructure Report Card:

"U.S. airports serve more than two million passengers every day. The aviation industry is marked by technologically advanced and economically efficient aircraft, however, the associated infrastructure of airports and air traffic control systems is not keeping up. Congestion at airports is growing; it is expected that 24 of the top 30 major airports may soon experience

"Thanksgiving-peak traffic volume" at least one day every week. With a federally mandated cap on how much airports can charge passengers for facility expansion and renovation, airports struggle to keep up with investment needs, creating a $42 billion funding gap between 2016 and 2025."

https://www.infrastructurereportcard.org/cat-item/aviation/

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AMERICA'S AGING INFRASTRUCTURE

Per American Society of Civil Engineers (ASCE) 2017 report:

America 's overall infrastructure grade: D+

Aviation infrastructure grade: D

https://www.infrastructurereportcard.org/cat-item/aviation/

The facts:

- **"Failure of Congress to regularly reauthorize FAA programs between 2007 and 2012 and again since 2015, has operated under a series of short-term authorizations, leading to delays in investment …"**
- **Investment has been consistently lagging in the past 18 years**
- **As of Wednesday (9/26) the Hose passed a five-year FAA reauthorization bill that flat funds the Airport Improvement Program and maintains the current cap on Passenger Facility Charges.**
- **Lack of political will and failure to invest will result in degradation of service and safety**

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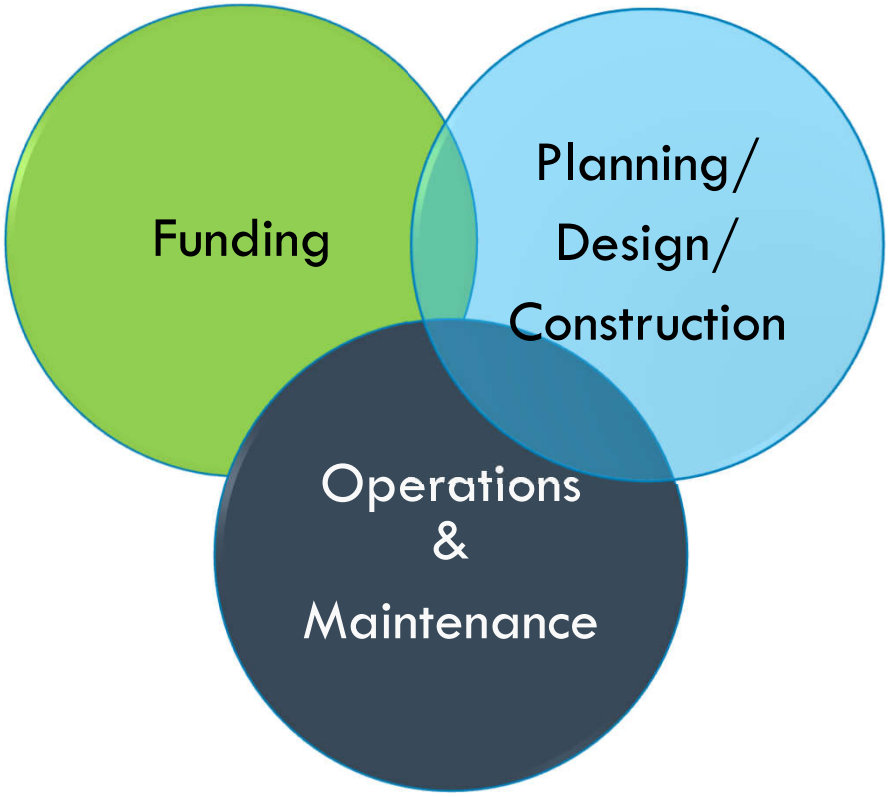
AVIATION'S AGING INFRASTRUCTURE



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AVIATION'S AGING INFRASTRUCTURE

Key Considerations for the future:

- **Climate:** Increased demands on site/drainage systems due frequency and intensity of storms, flood elevations, structures
- **Technological Advances:** Digital technologies, NextGen, Advanced system architectures, Internet of Things (IoT), Increasingly sophisticated aircraft
- **Safety and Security -** New threats: Cyber, Terrorism, Disease, Active shooter incidents
- **Ageing population -** Accessibility, accommodation, signage
- **User preferences:** Uber & Lyft, Mobile Devices, Crowd sourced data apps, expectation of highspeed Wi-Fi
- **Capacity:** Industry growth trends, larger aircraft

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ALSF-2 PROJECT OBJECTIVES

Specific improvements and repairs include:

- The installation and replacement of existing conduits, cabling, and the Low-Impact Resistant (LIR) Tower Systems at each ALSF light station.
- Resolution of OSHA compliance issues& Safety issues, maintenance issues
- Improve maintain ability and reliability of PHL's ONLY CATII approach
- In addition, the session will explore the construction of a new steel truss walkway Construct a new landside abutment
- demolition of the existing dilapidated wooden walkway structure.

ALSF-2 CONFIGURATION

ALSF-2: Approach Lighting System with Sequenced Flashing Lights configuration 2

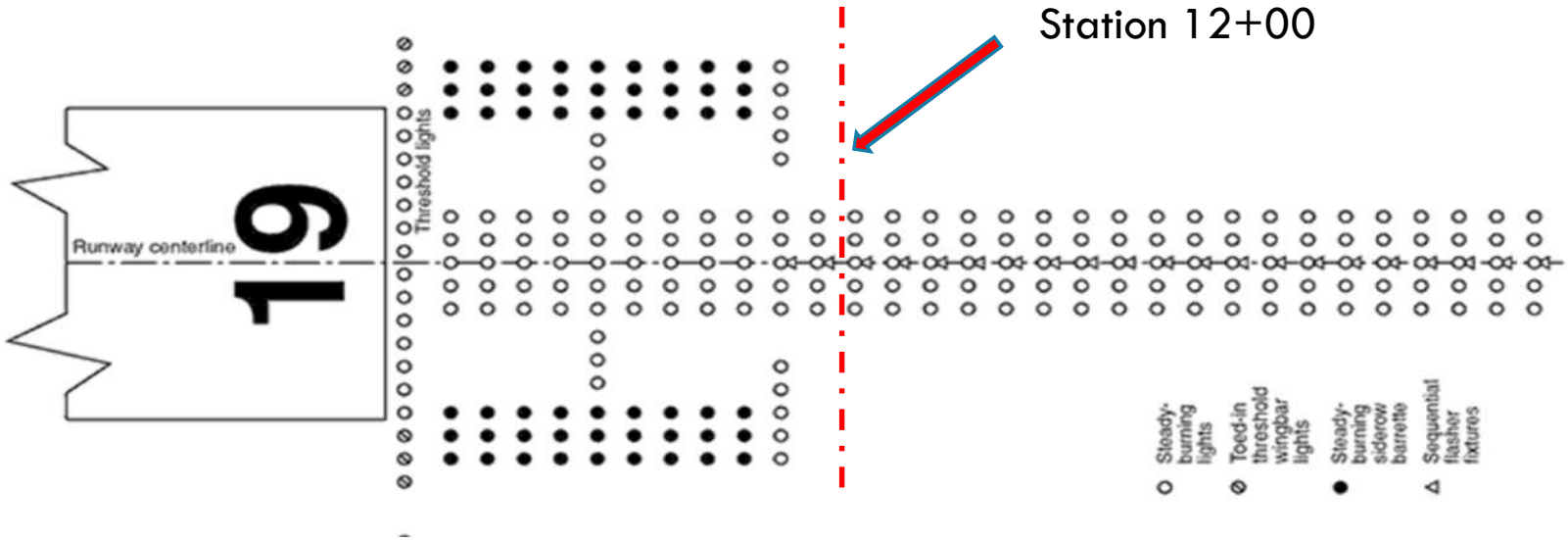

Image Source: Flightlight.com

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PECULIARITIES & CONSIDERATIONS

- Operations stipulated severely limited downtime of ALSF-2
- Project was located in a protected Tinicum Marsh & Wildlife Refuge
- Schedule were limited to migratory turtle movement - April 15th and October 15th
- Tidal movement /Variations of water depth
- Set-in up infrastructure to accommodate a future 5 loop ASLF-2, but reinstalled existing equipment & 3 loop system
- Raceway crossing under freight rail right of way
- System was originally installed in 1974, updated 1984 (Reconstructed 2017)

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PROJECT LOCATION

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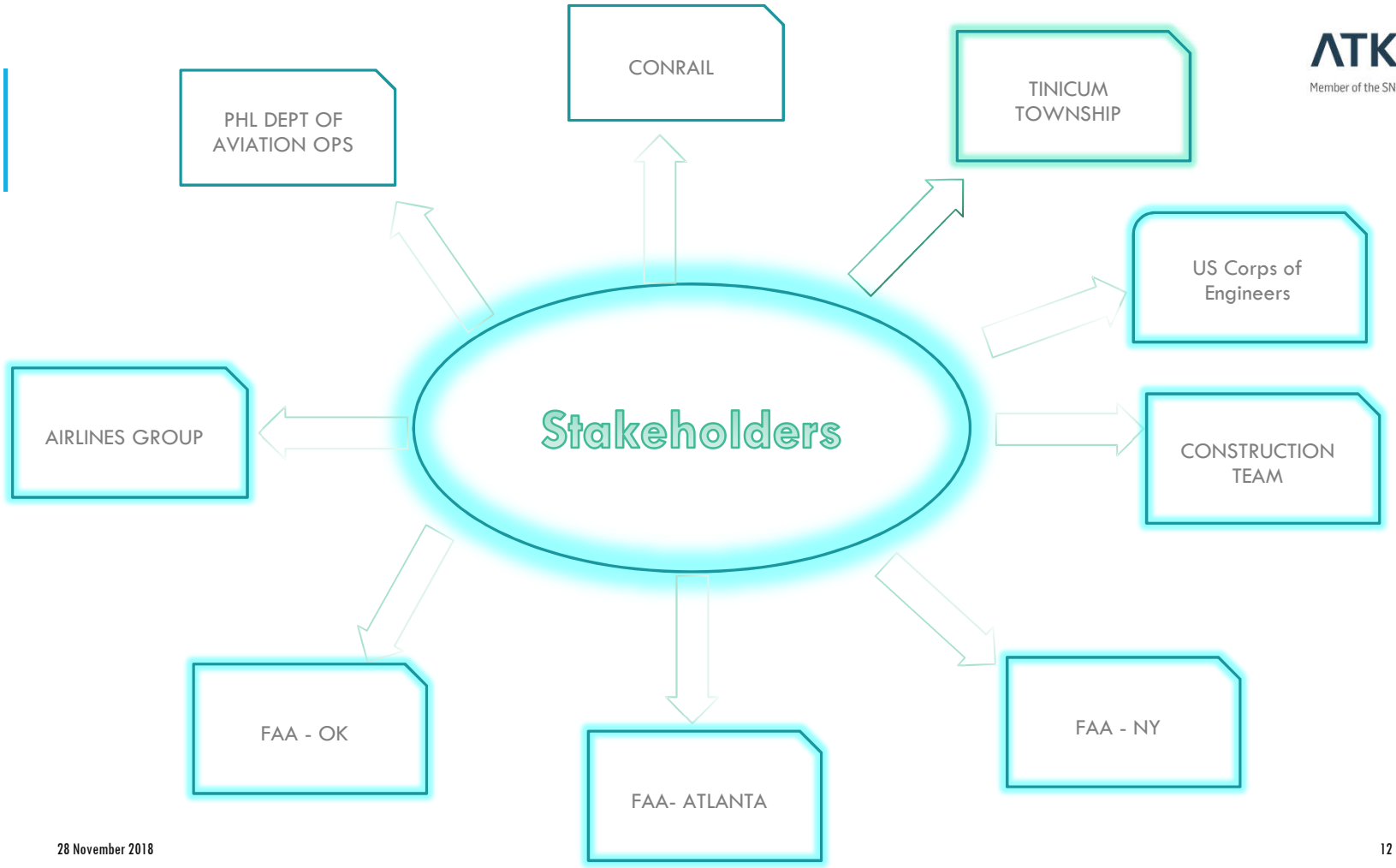

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EXISTING CONDITIONS

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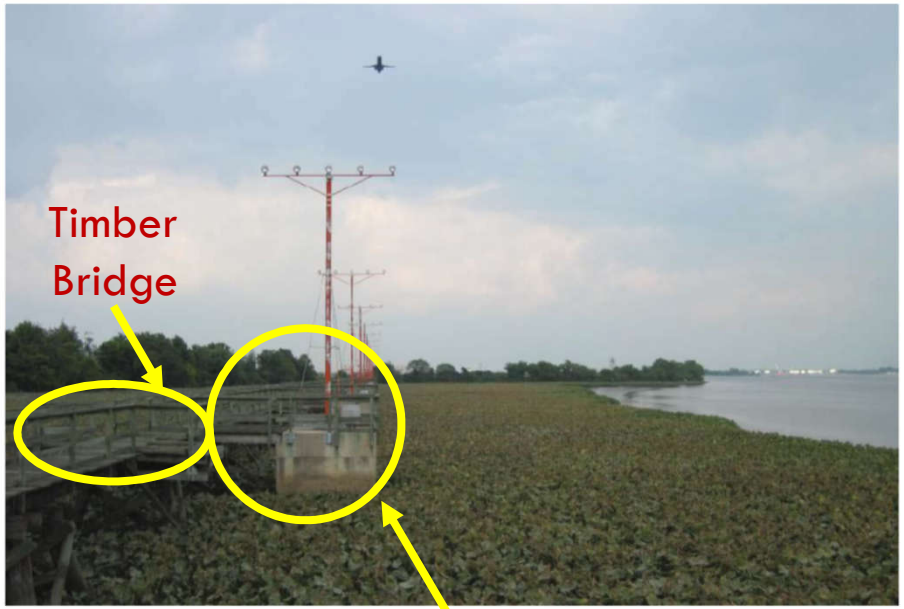

Timber Pile
Supported Pylons

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EXISTING CONDITIONS

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EXISTING CONDITIONS

Horizontal Crack

Warping

EXISTING CONDITIONS

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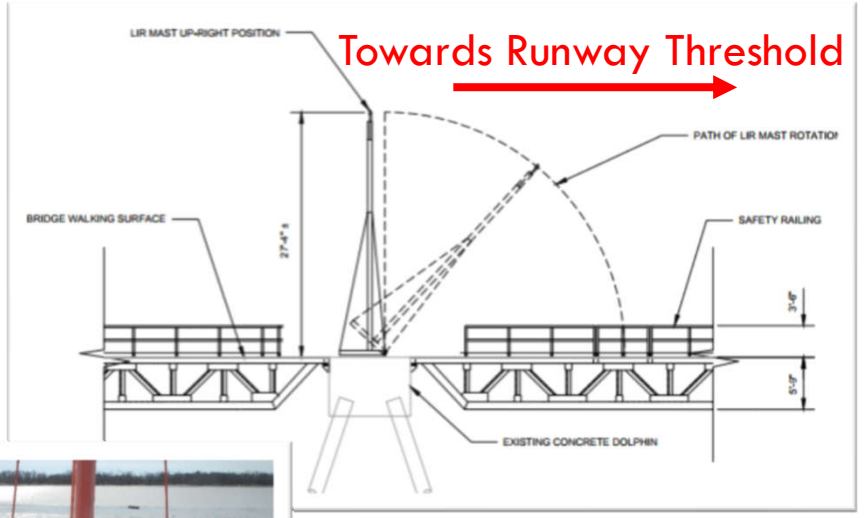
EXISTING CONDITIONS

OSHA NON-CONFORMANCE

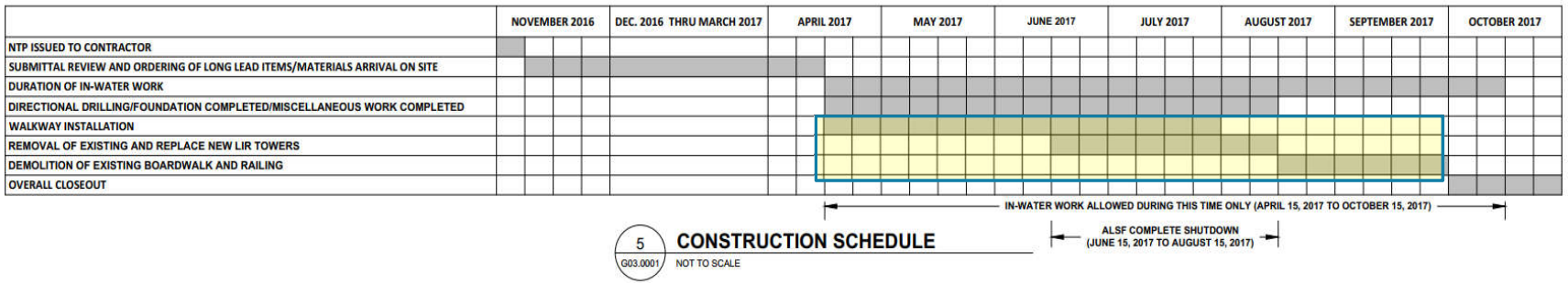
Existing < 3 feet walkway

NON CONFORMANCE WITH FAA STANDARDS



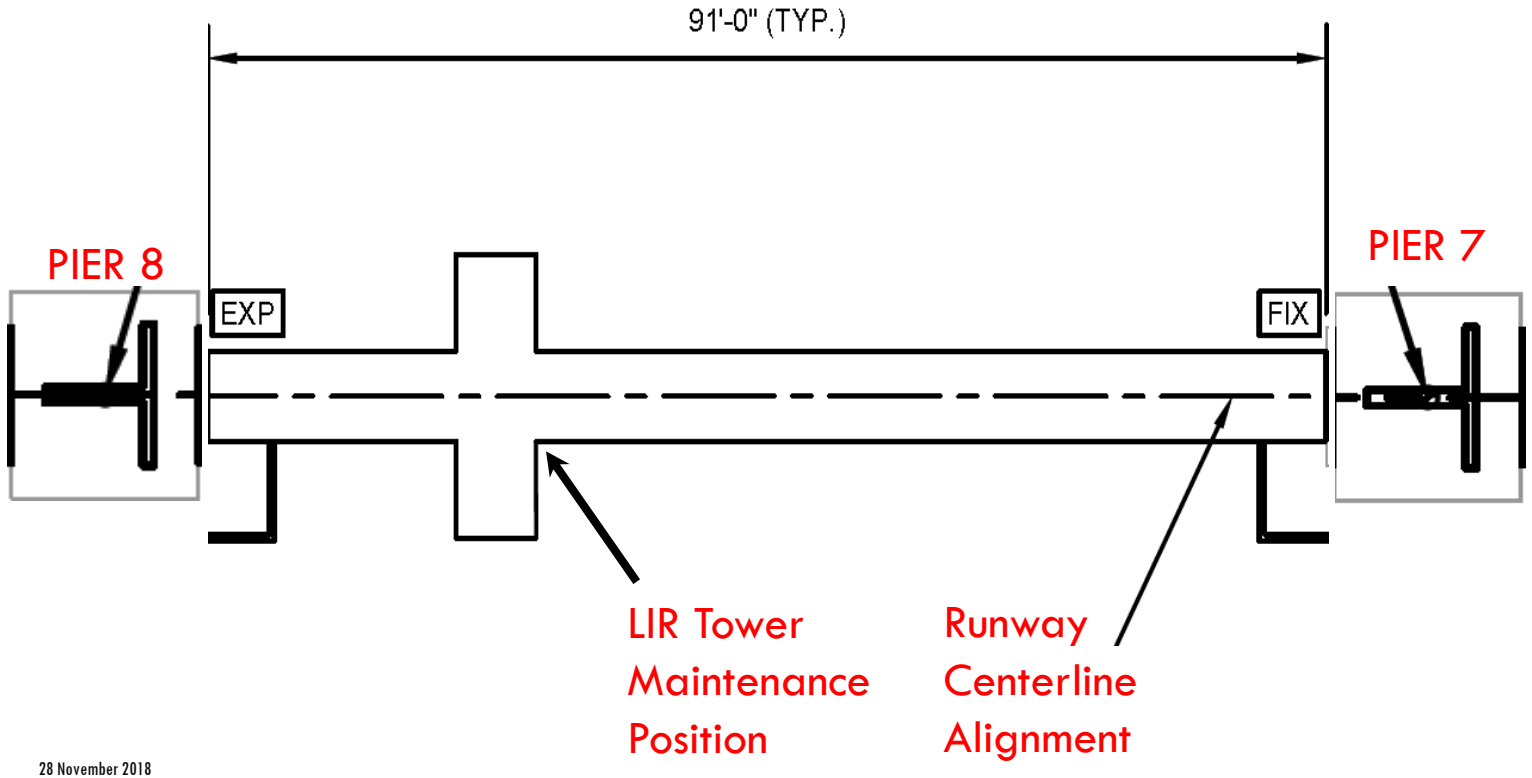
BUDGET AND SCHEDULE

- OPTION #1 Phased Construction – *10 months*
  - Construction Cost – $9 Mil
- OPTION #2 Remove the Existing Bridge – *8 months*
  - Construction Cost – $10 Mil

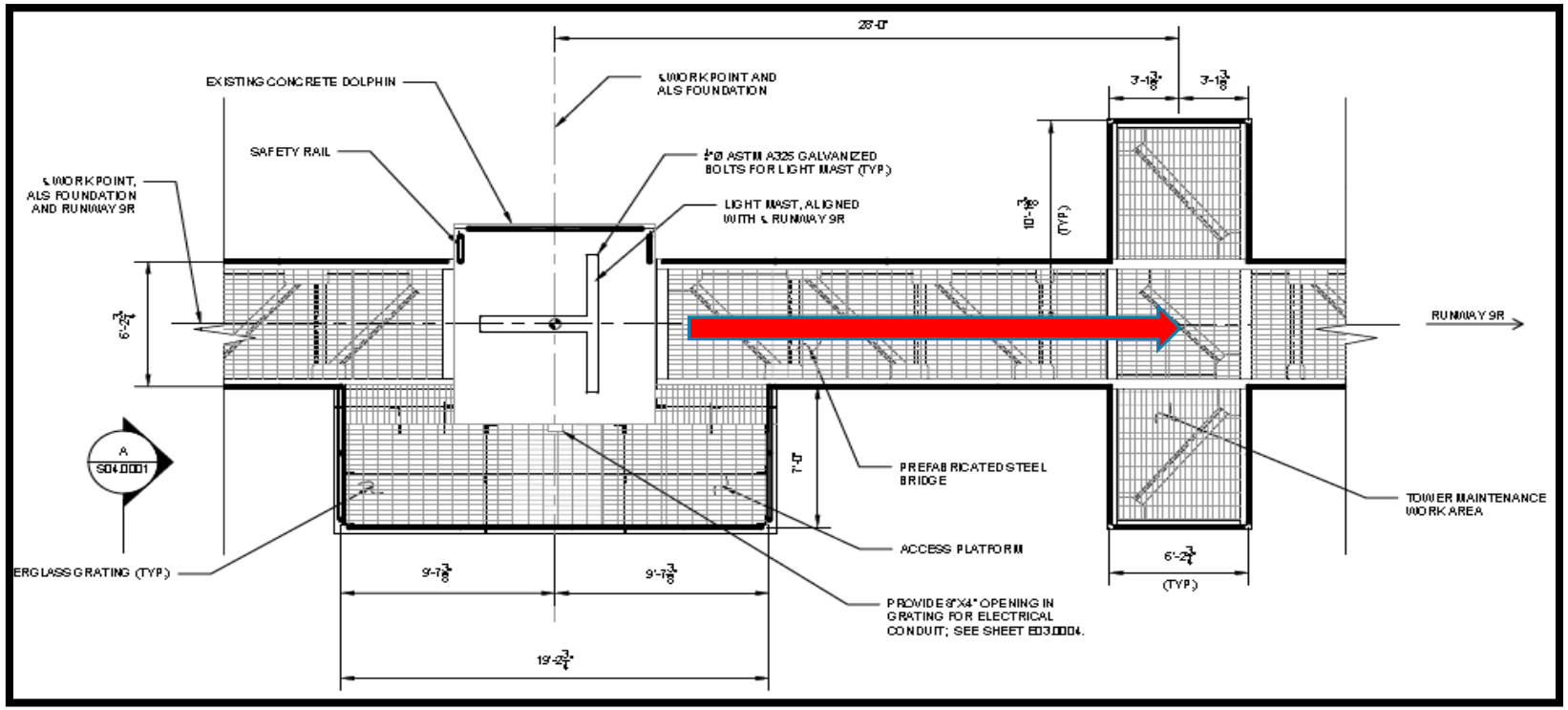


13. ***ANY IN-STREAM CONSTRUCTION ACTIVITIES SHOULD TAKE PLACE BETWEEN APRIL 15, 2017 TO OCTOBER 15, 2017 IN ORDER TO ALLOW TURTLES TO AVOID THE PROJECT AREA WHILE THEY ARE ACTIVE. THIS WILL BE IN ACCORDANCE WITH PENNSYLVANIA FISH AND BOAT COMMISSION.***

PROPOSED STRUCTURAL CONFIGURATIONS - INITIAL



PROPOSED STRUCTURAL CONFIGURATIONS - FINAL



ELECTRICAL DESIGN ELEMENTS

CRITICAL FACTORS:

- Maintenance of Operations
- Right of way coordination under roadways, AOA fence and Rail ROW
- Configuration of accessible maintenance points from deck
- Incorporate infrastructure for a 5 loop ALSF-2 System
- Update of raceways to PVC coated RGS
- Efficient use of conduit bends – Limit to 270° between pull points
- Design to enable prefabrication

ELECTRICAL DESIGN

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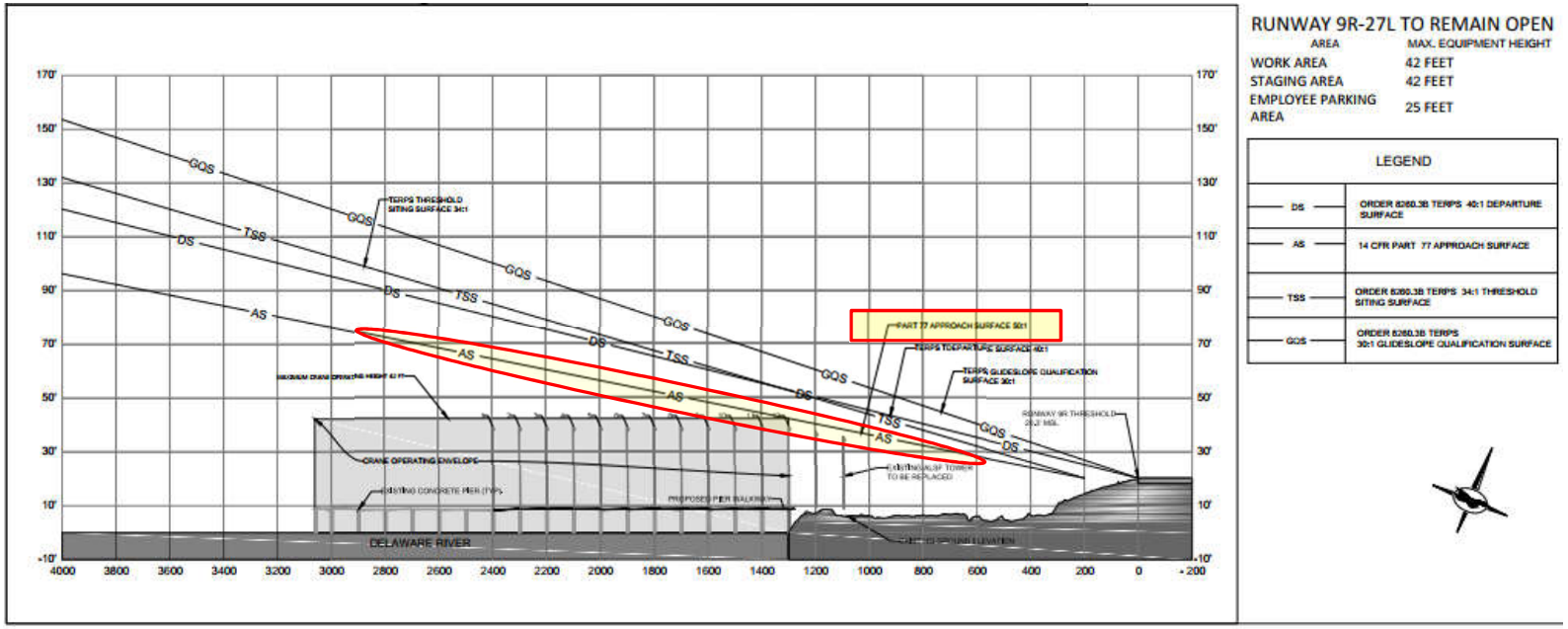
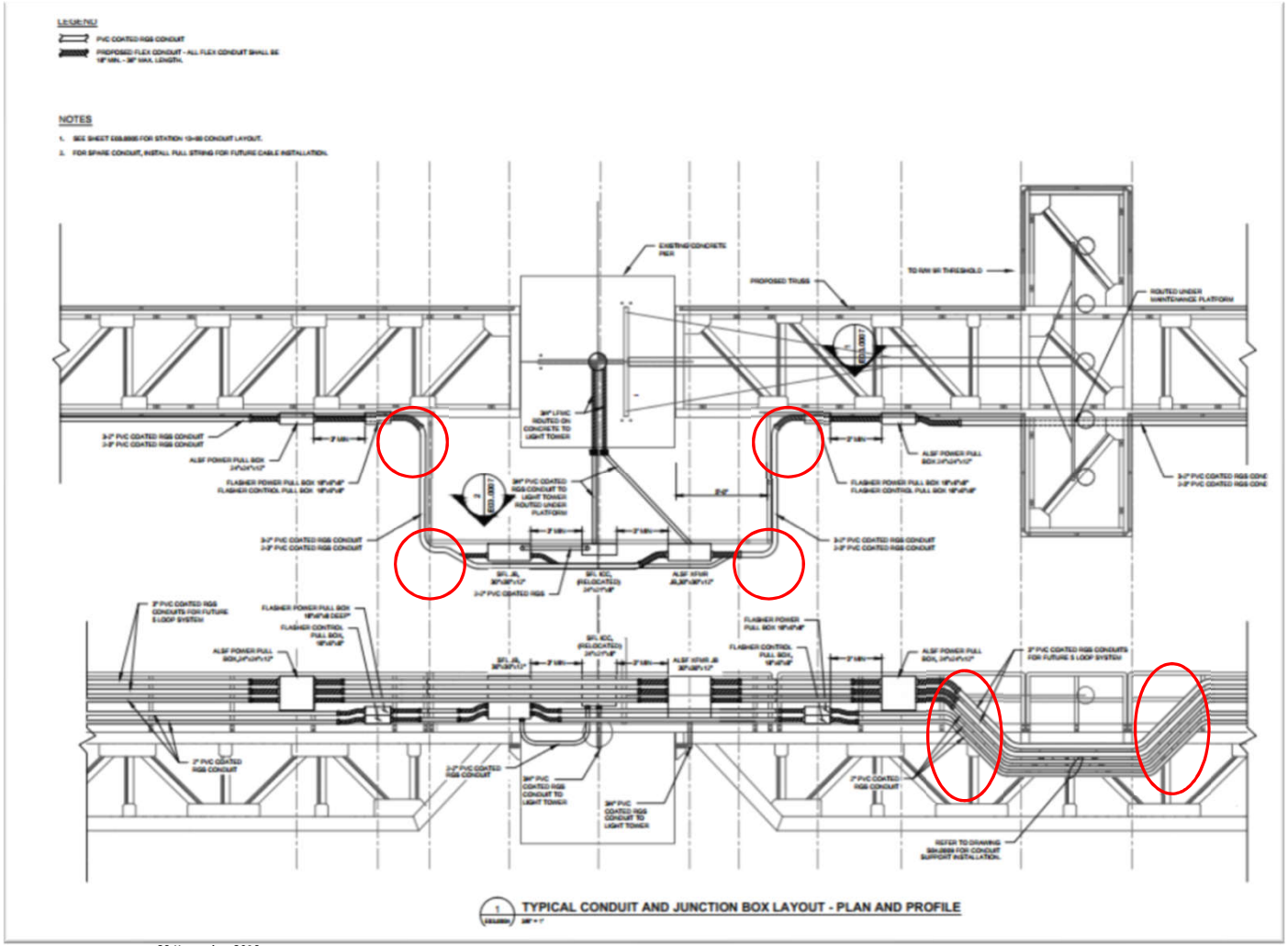


RUNWAY 9R-27L TO REMAIN OPEN

AREA	MAX. EQUIPMENT HEIGHT
WORK AREA	42 FEET
STAGING AREA	42 FEET
EMPLOYEE PARKING AREA	25 FEET

LEGEND	
DS	ORDER 8260.3B TERPS 40:1 DEPARTURE SURFACE
AS	14 CFR PART 77 APPROACH SURFACE
TSS	ORDER 8260.3B TERPS 34:1 THRESHOLD SITING SURFACE
GOS	ORDER 8260.3B TERPS 30:1 GLIDESLOPE QUALIFICATION SURFACE



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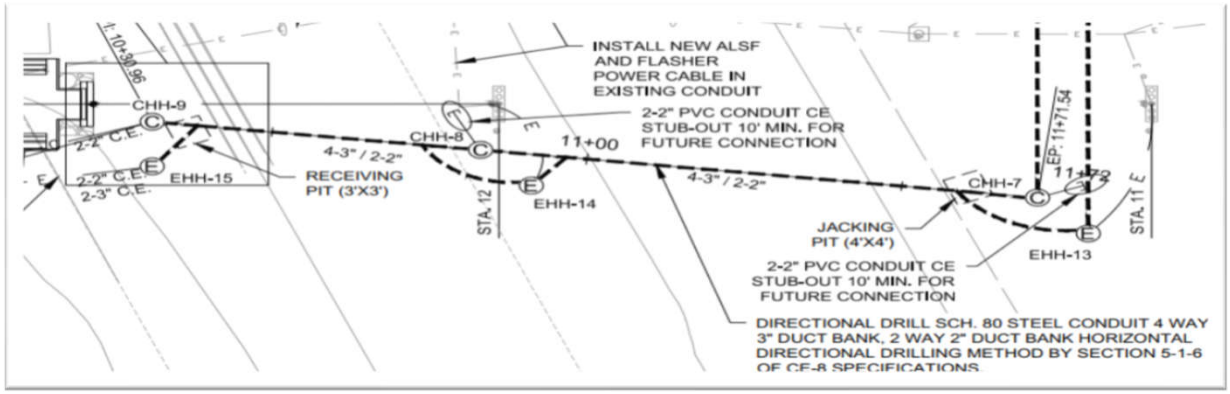
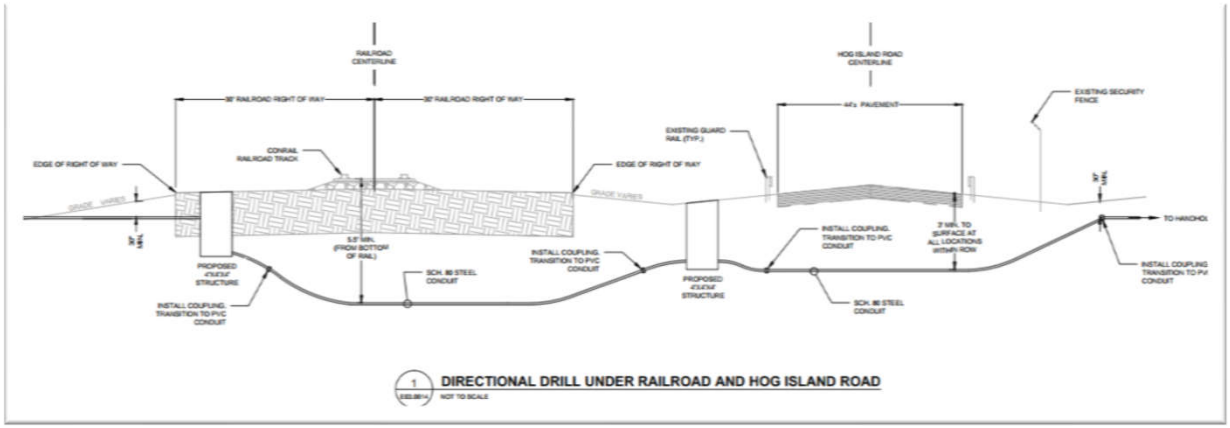
Design Challenges:

- Flexible structure
- Multiple bends/transitions
- Max at 270°
- Accessibility for maintenance
- 6' clear walkways
- Raceways to Support a 5 loop system (future)

ELECTRICAL DESIGN

- Jacked 12” Steel casing W/Schedule 40 PVC Grouted
- Ducts bored
- 5’6” Min below rail
- 3’ Min below roadway





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STRUCTURAL FABRICATION

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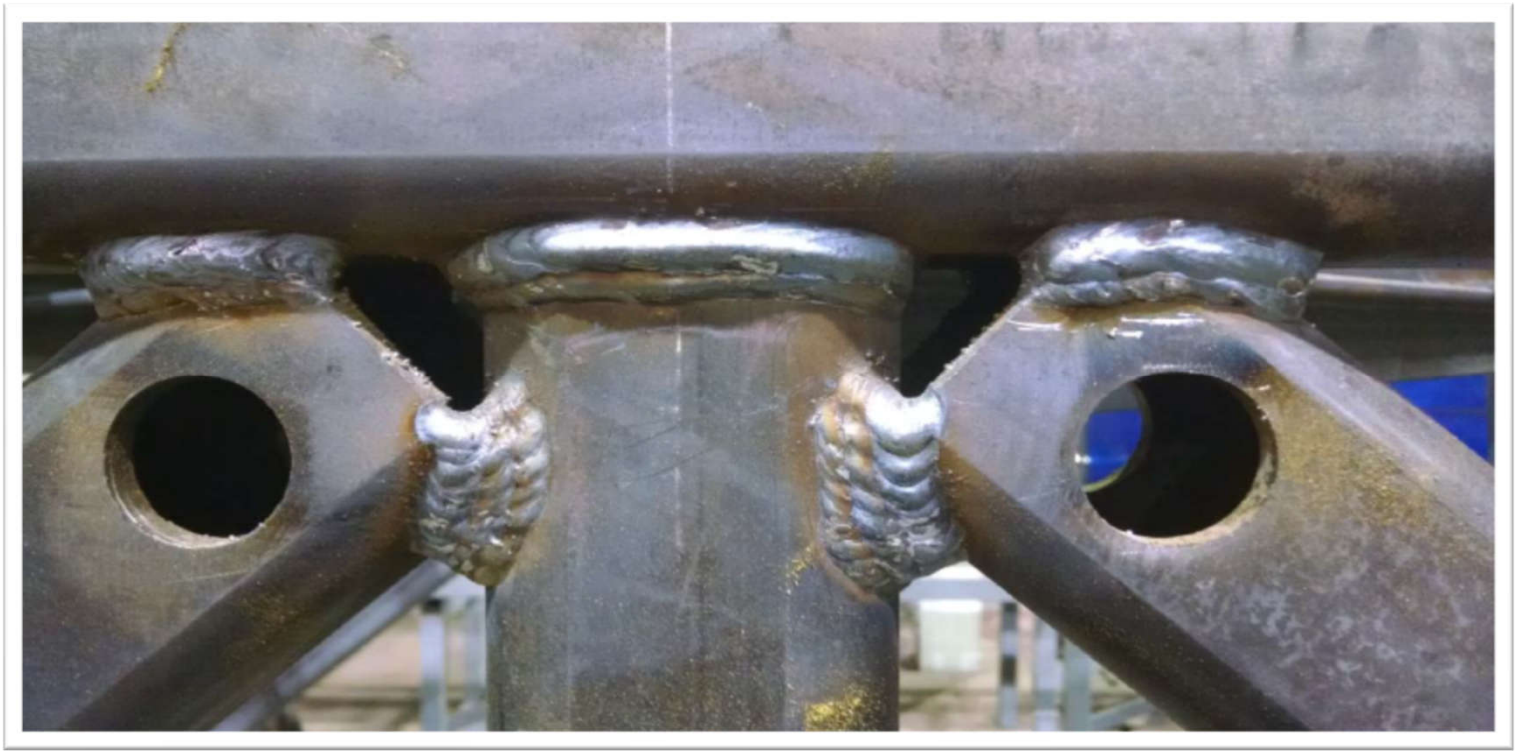

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STRUCTURAL FABRICATION

BRIDGE PLACEMENT

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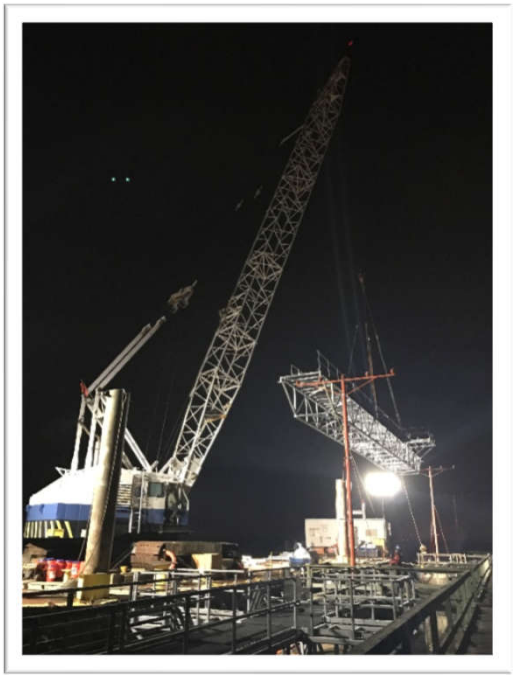

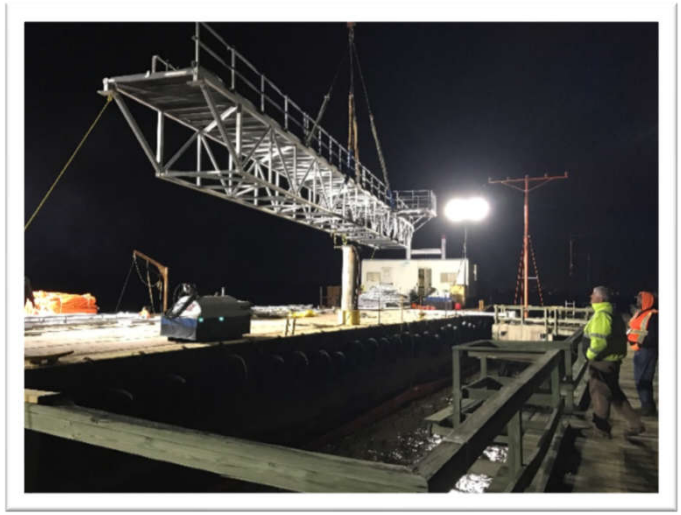

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FINAL CONDITION

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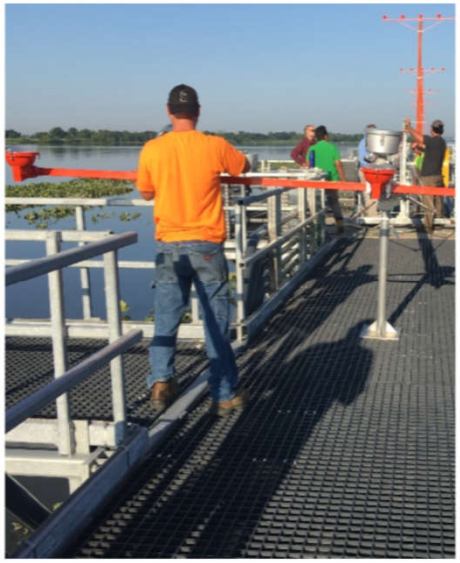


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FINAL CONDITION

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FINAL CONDITION

FINAL THOUGHTS:

2017

2018

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FINAL THOUGHTS

- Technology is advancing at rapid pace, airports are evolving rapidly
- Funding remains flat for the foreseeable future
- Lack of political will and industry lobbying inhibits our ability to advance technically
- Success is truly a collaboration of Airports, FAA, Designers, Suppliers and Builders
- Under the current circumstances, creative solutions for design and construction are essential
- Advocate, plan ahead and INNOVATE!

THANK YOU

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