Airfield Lighting, NAVAIDS and Electrical Designs for Runway 4L-22R at John F. Kennedy International Airport

The 2015 Airports Conference

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Agenda

- Introduction
  - Goals
- Project Overview
- Coordination
- Staging and Phasing Requirements
  - Complex Project Schedule
- Electrical & NAVAIDS Design Elements
  - Airfield Lighting/Signage
  - NAVAIDs
  - Underground Distribution
  - Switch House No. 1 Upgrades
- Conclusions & Acknowledgements
John F. Kennedy International Airport – Runway 4L-22R RSA Compliance/Reconstruction

Goals

Reveal Points of Coordination
• Concurrent and Future Projects, Agencies, and Disciplines

Highlight Electrical Design Elements
• Scope and Design Decisions

Take-Aways From Presentation

Multi-Faceted Project - Many Moving Parts

Coordinate Often and Early
PROJECT OVERVIEW

JFK Airfield Overview
**Runway 4L-22R Overview**

- Existing Runway 4L-22R
  - 11,531 Ft Long x 150 Ft Wide
  - Asphalt Surface
  - CAT I ILS Approaches
  - The Existing South End of the Runway Does not Comply With Current Runway Safety Area Requirements
  - A Main Departure Runway at JFK
  - The PANYNJ Civil Design Team Deemed The Pavement is Past Its Useful Life

**Proposed Runway 4L-22R**

- New Runway 4L-22R
  - 12,079 ft long x 200 ft wide
  - Concrete Surface
  - Fully Compliant Runway Safety Areas
    - With Declared Distances
    - CAT I ILS Approaches
  - Approximate Paving Design Quantities
    - PCC: 211,000 CY
    - Asphalt: 392,350 Tons
  - Provisions for Future Upgrades to CAT II
Project Objectives

- Runway Reconstruction
  - Widen Runway to 200 feet for Full Group VI Compliance
  - Convert Asphalt Runway Surface to Concrete and Raise 12"
  - Upgrade Airfield Lighting and Signage

- Capacity Enhancement
  - Additional Entrance/Exit Taxiways
  - Widen Existing Taxiway Fillets and Install New High-Speed Exit Taxiway
Project Objectives

- **Runway Safety Area Improvements**
  - Extend Runway 1000' to The North, Provide Full RSA Compliance
  - Displace Runway 4L Landing Threshold
  - Install New NAVAIDS Equipment and Shelters

COORDINATION
**Project Coordination**

- CAA Feeder Replacement Project
- Delta Airlines Terminal (Terminal 4)
- Runway Weather Information System (RWIS)
- Future Runway 13L-31R Rehabilitation and Improvements
- Runway Status Lights (RWLS)
- Future Taxiways A & B Rehabilitation
- Federal Aviation Administration (FAA) projects which required coordination
- PANYNJ projects which required coordination

**Utility Coordination:**

- CAA and NAVAIDS Feeder Replacement
- FAA FOTS Communication Loop
- Runway Status Lights

**Project Coordination**

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**Utility Coordination:**

- CAA and NAVAIDS Feeder Replacement
- FAA FOTS Communication Loop
- Runway Status Lights
The design team along with the client prepared illustrations such as this to communicate with the FAA BEFORE contract docs were signed.

These illustrations were helpful to determine who builds and who pays for construction.

Early in design process
The Client, FAA, & Design Team Prepared Guidelines / Rules:

• The RW 4L-22R contractor would install and set the NAVAIDs shelters and build the foundations.

• The RW 4L-22R contractor would construct the underground infrastructure for the NAVAIDs.

• The FAA would make final connections.
CONSTRUCTION PHASING & STAGING

Staging Requirements

- Four Primary Construction Stages
  - 43 Individual Sub-Stages
CONSTRUCTION PHASING & STAGING

First Stage: Construction North of Runway 13L-31R Intersection

- Runway 22R Temporarily Shortened to TW YA
- 10,000 feet take-off distance available
- Existing ILS Systems to Remain Operational at conclusion of the stage
- Active taxiway access through construction area

Second Stage: Construction of Runway 4L-22R & Runway 13L-31R Intersection

- Runway 13L-31R Closed
- Runway 22R Temporarily Displaced To TW F
- 9,000 Feet Take-off Distance Available
- 40 Day Duration
- Significant Liquidated Damages Enforced
CONSTRUCTION PHASING & STAGING

- Third Stage: Construction of Runway 4L-22R South of Runway 13L-31R
  - Runway 4L-22R Closed
  - Runway 13R-31L Displaced at Taxiways K & KE
  - 165 Day Duration

CONSTRUCTION PHASING & STAGING

- Fourth Stage: Work Outside Runway 4L-22R Paving Limits
  - NAVAIDS installed and flight checked
  - Primary North/South Ductbank And Cable Runs
  - Switch House Regulator/ALCMS Installation
CONSTRUCTION PHASING & STAGING

- All existing NAVAIDS to be operational while Runway is open
  - Temporary FAA Communication Cables
- Four Temporary Threshold Installations
- Airfield Lighting Circuits To Be Operational For All Open Taxiways
  - Circuit Loop-out Drawings
  - Temporary Connections To Regulators

CONSTRUCTION PHASING & STAGING
ELECTRICAL DESIGN ELEMENTS

Runway Lighting

- Runway Edge Lights
  - 100’ Light Spacing
  - Interleaved Circuits
  - Dedicated Handhole System
- LED Touchdown Zone Lights
  - Added For Safety Enhancements/Future CAT II
- LED Runway Centerline Lights
- LED Runway Guard Lights
  - In-Pavement and Elevated
### LED Taxiway Lighting

- LED Taxiway centerline lights
  - All centerlines, all movements
  - L-852K fixtures for < 1200' RVR operations
- LED Taxiway Edge Lights
  - High-Speed Exits
- Taxiway Reflectors
  - All Taxiway Edges, Reduced Spacing

### LED Guidance Signs

- 193 New LED Guidance Signs
- Precast Sign Foundations
- Dedicated Sign Circuits
Proposed NAVAIDS

- Runway 4L
  - Localizer
  - Glide Slope
  - RVR
  - PAPI (relocated)
  - REILS

- Runway 22R
  - Localizer (offset)
  - Glide Slope
  - RVR
  - PAPI (new)
  - DME

Proposed NAVAIDS

- All New Shelters, Pre-purchased And Delivered
  - Shelters Designed With Skids For Flood Protection
- NAVAIDS Designed By CH2M HILL, Installed By PANYNJ Contractor
- Full CAT I Compliance On Both Ends
  - Provisions For Future CAT II
- All NAVAIDS Powered Via Dual-feed Automatic Transfer Switchgear
Underground Distribution

- Common-Use Ductbanks and Cables
  - PANYNJ Airfield Lighting
  - PANYNJ 5kV CAA Feeders
  - PANYNJ Communications
  - PANYNJ Low-Voltage Feeders (*RPU Sites*)
  - FAA 2400V NAVAIDS Feeder
  - FAA Communications (*Copper*)
  - FAA Communications (*FOTS*)
  - FAA Low-Voltage Feeders (*NAVAIDS Shelters*)

- Future Provisions
  - PANYNJ 5kV Feeder Re-distribution
  - FAA RWSL System
  - FAA FOTS Loop Completion
  - Runway 13L-31R Reconstruction

Underground Distributions

- Fiberglass & PVC Conduits
- All Conduits/Ductbanks Concrete Encased
- Varying Lighting Protection Measures
- Dedicated Handhole/Manhole Systems
- 627,000 Feet Of Conduit
- 424 Handholes
- 122 Manholes
- 700,000 Feet Airfield Lighting Cable
- 27,500 Feet Medium Voltage Cable
- 16,000 Feet Communications Cable
SWITCH HOUSE NO. 1 UPGRADES

- Remove Switch Gear CCRs RS-1 And RS-2 (16 CCRs)
- Remove Spare Standalone CCRs A, B, C, D, & E (5 CCRs)
- 21 Total CCRs removed

SWITCH HOUSE NO. 1 UPGRADES

Install RS-1, RS-2A, RS-2B: 24
Install Free Standing CCRs: 12
Total CCRs Installed: 36
Total CCRs Added To SWHS 1 (New – Removals): 15
All CCRs are Ferroresonant Type
SWITCH HOUSE NO. 1 UPGRADES

- Switch Gear Style CCRs

CONCLUSIONS
Conclusions

Take-Aways From Presentation

Multi-faceted Project - Many Moving Parts

Coordinate Often And Early

Thank You!

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