

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



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John F. Kennedy International Airport- Runway 4L-22R RSA Compliance/Reconstruction

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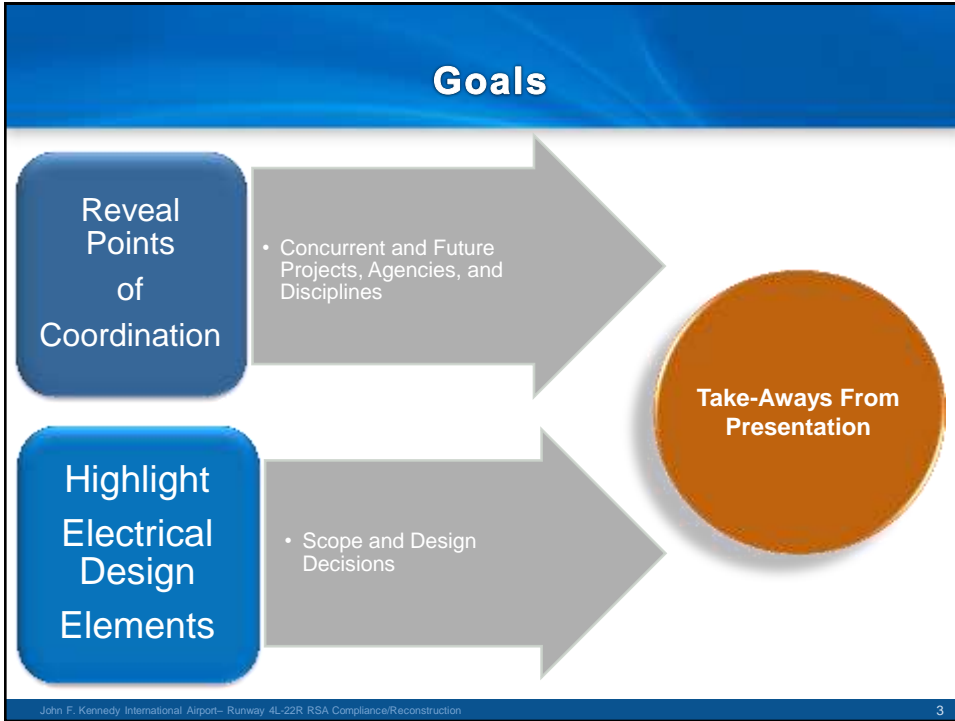
Agenda

- **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**



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PROJECT OVERVIEW



CH2MHILL

THE PORT AUTHORITY OF NY & NJ

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JFK Airfield Overview



RW 13L-31R

RW 13R-31L

TW A

TW B

RW 4L-22R

RW 4R-22L

Google earth

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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

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Proposed Runway 4L-22R



- | | |
|---|--|
| <ul style="list-style-type: none"> ■ New Runway 4L-22R <ul style="list-style-type: none"> – 12,079 ft long x 200 ft wide – Concrete Surface – Fully Compliant Runway Safety Areas <ul style="list-style-type: none"> • <i>With Declared Distances</i> – CAT I ILS Approaches <ul style="list-style-type: none"> • <i>Provisions for Future Upgrades to CAT II</i> | <ul style="list-style-type: none"> ■ Approximate Paving Design Quantities <ul style="list-style-type: none"> – PCC: 211,000 CY – Asphalt: 392,350 Tons |
|---|--|

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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



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Project Objectives

■ Capacity Enhancement

- Additional Entrance/Exit Taxiways
- Widen Existing Taxiway Fillets and Install New High-Speed Exit Taxiway



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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



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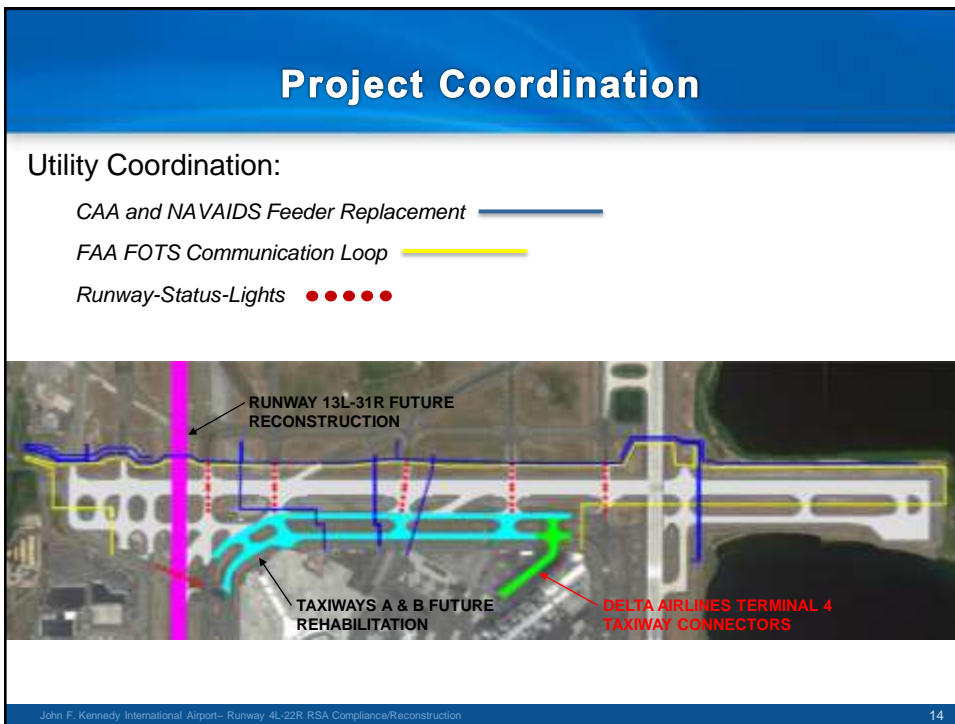
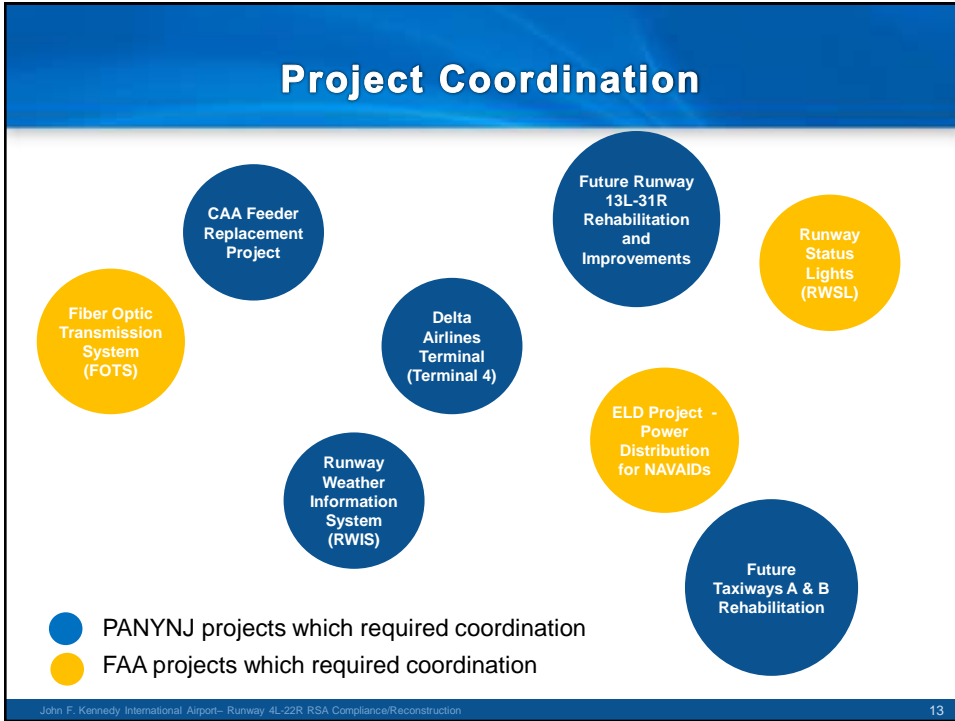
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COORDINATION



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Project Coordination



- 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.

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Project Coordination - NAVAIDS



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.

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CONSTRUCTION PHASING & STAGING



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CONSTRUCTION PHASING & STAGING

Staging Requirements

- Four Primary Construction Stages
 - 43 Individual Sub-Stages



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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



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CONSTRUCTION PHASING & STAGING

- 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

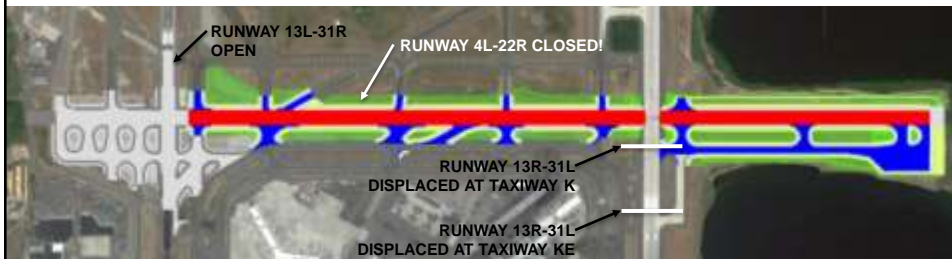


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CONSTRUCTION PHASING & STAGING

- 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**

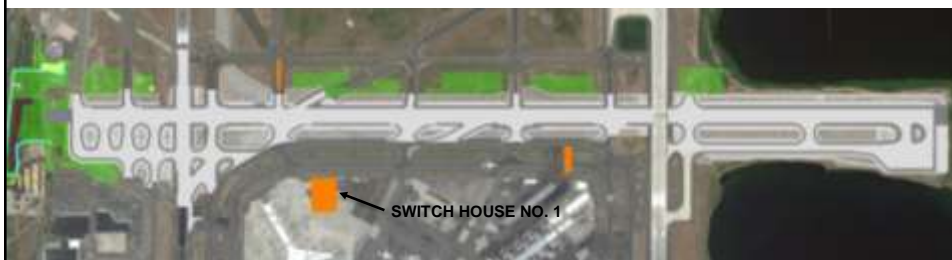


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CONSTRUCTION PHASING & STAGING

- 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**



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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

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CONSTRUCTION PHASING & STAGING

← 43 DIFFERENT STAGES →

↑
162 WORK ITEMS
↓

Work Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43						
1. ...																																																	
2. ...																																																	

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ELECTRICAL DESIGN ELEMENTS



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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



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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



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LED Guidance Signs

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



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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

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Underground Distributions

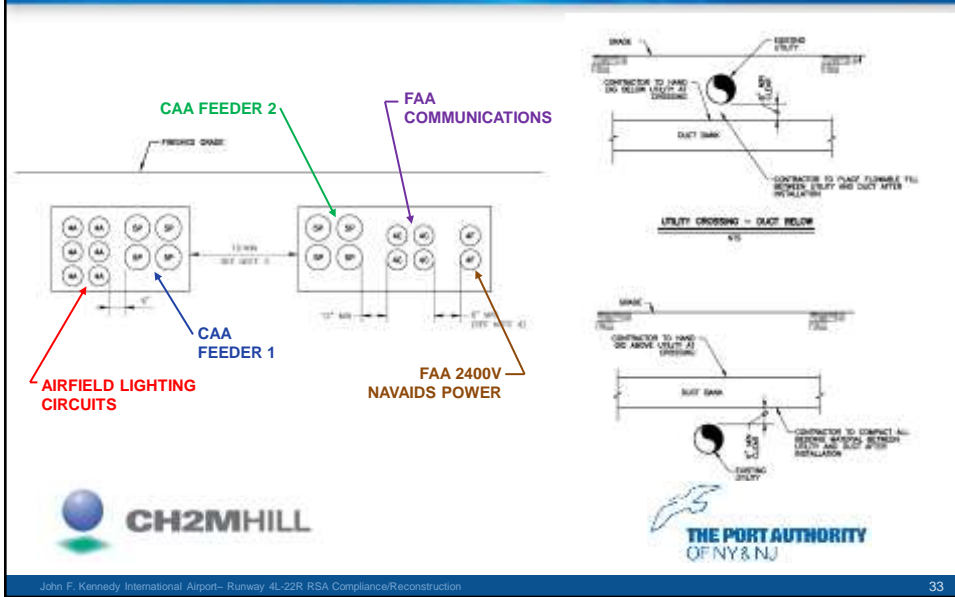
- Fiberglass & PVC Conduits
- All Conduits/Ductbanks Concrete Encased
- Varying Lighting Protection Measures
- Dedicated Handhole/Manhole Systems
- 627,000 Feet Of Conduit
- 424 Handholes
- 122 Manholes
- 700,000 Feet Airfield Lighting Cable
- 27,500 Feet Medium Voltage Cable
- 16,000 Feet Communications Cable



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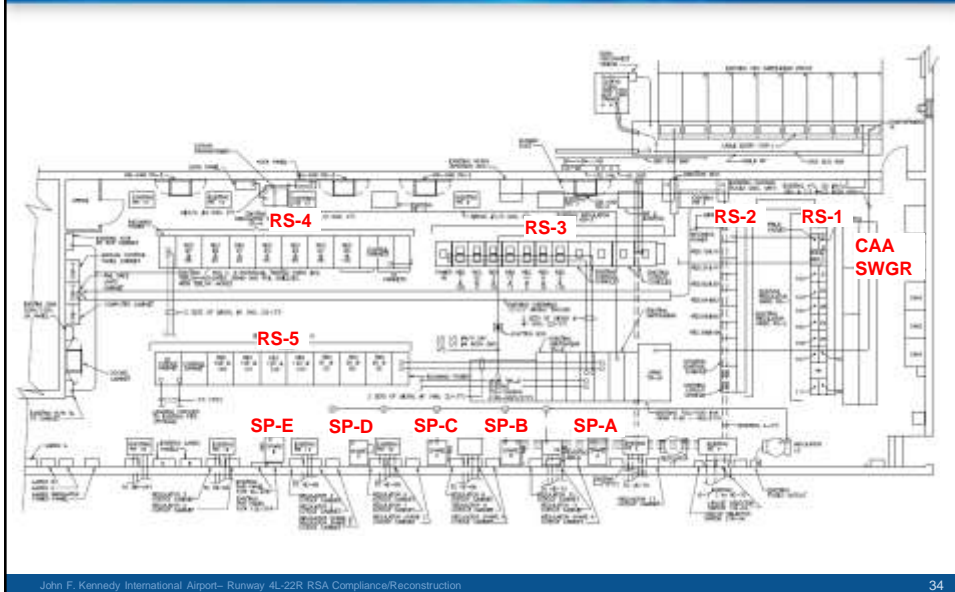
Underground Distribution



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SWITCH HOUSE NO. 1 UPGRADES



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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

The diagram shows a detailed floor plan of the switch house with various components labeled. Red boxes with an 'X' indicate the locations of components to be removed: RS-1, RS-2, RS-3, RS-4, RS-5, SP-A, SP-B, SP-C, SP-D, SP-E, and CAA SWGR. The plan includes various electrical symbols, busbars, and structural elements.

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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

The diagram shows a detailed floor plan of the switch house with various components labeled. Blue boxes indicate the locations of components to be installed: RS-1, RS-2A, RS-2B, FS-1, FS-2, FS-3, FS-4, FS-5, FS-6, FS-7, FS-8, FS-9/FS-10, and FS-11/FS-12. The plan includes various electrical symbols, busbars, and structural elements.

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SWITCH HOUSE NO. 1 UPGRADES



- Switch Gear Style CCRs

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CONCLUSIONS




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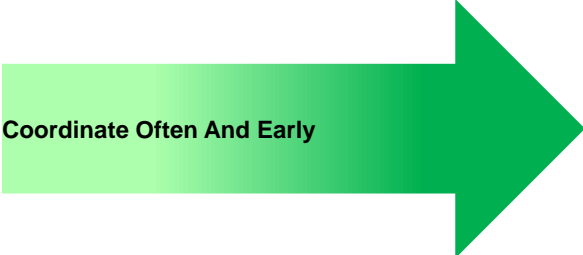
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Conclusions

**Take-Aways From
Presentation**



**Multi-faceted Project -
Many Moving Parts**



Coordinate Often And Early

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Thank You!



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Anna Stachula
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Project Manager*





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