Space and Installation Planning

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APS Upgrade

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Background
SPACE REQUIREMENTS
Space Planning Requirements Collection

Meet with Technical Group

Requirements Collection

Feedback and Planning

Acquire and Outfit space

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Pre-Installation Activities

- Assembly and Test Space for:
  - Magnet Measurement & Characterization
  - Diagnostics Equipment
  - Vacuum Component
  - Power Supplies
  - Controls
  - Plinths
  - Front Ends
  - Insertion Devices
  - Beamlines

Extends into the Removal and Installation Phase
Pre-Installation Activities

- Storage Space for:
  - Magnets
  - Vacuum
  - Assembled Plinths
  - Power Supplies
  - Front End Assemblies
  - Insertion Devices
  - Installation tools and supplies
  - Beamlines?

Transient storage through plinth assembly
APS Upgrade Space Requirements

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Space Timeline

Start 2018-03-01

Front Ends 2018-03-01 - 2023-06-30

Magnets 2018-04-01 - 2022-02-28

Vacuum Components 2019-03-01 - 2022-02-28

Power Supplies 2019-10-01 - 2022-02-28

Multipurpose Staging 2020-04-01 - 2022-04-01

Plinths 2020-04-01 - 2023-04-06

Insertion Devices 2020-06-01 - 2023-04-06

Diagnostics 2021-02-01 - 2022-02-28

Finish 2023-04-06

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Actions

- Work with ANL Infrastructure Services to identify candidates
- Get concurrence with Technical Groups on site selection
- Modify and adapt selected areas for APS-U needs
REMOVAL AND INSTALLATION PLANNING
Component Database

- Developed by Controls
  - Library of standard components
  - Create “instances” of actual components
  - Create “Assemblies” of instances into larger structures (FODO, DLM, etc.)
  - Utilizing QR codes for easy access to database information

- Components and designs
- Reference documents, drawings and manuals
- Procurement information
- QA and procedure travelers
- Test and measurement data
- Future maintenance data

APC-U / CDB
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Inventory Requirements Identification

- Identification of significant storage requirements
  - Maximum storage space of near 35,000 sqft

- Significant quantities of equipment
  - 1,300 Magnets
  - 18,000 cables (total lengths TBD)
  - 120 assembled plinths
  - 2,200 power supplies
  - 400 power supply controllers
  - Installation supplies (grout, tools, etc.)

Identified need for additional support in:
- Receiving
- Acceptance
- Logistics

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Next Steps

- Further refine the information, in terms of numbers, cable type
- Develop specifics for length, terminations, and locations
- Develop specific installation plans
Issues

Removal and Installation

- Need for accurate data on what is present
  - APS has abandoned cables in place
  - Lack of drawings and certainty of knowledge
- Cable trays are not well organized
  - Labelling issues
  - Some segregation, but little confidence
- LOTO
- Cable manufacturing
Electrical Engineer for Installation

Responsibilities

- Maintain APS-U cable list
- Define what the status is of all cable trays in the tunnel, including contents.
- Determine what work will be necessary, with respect to cable trays, on the mezzanine.
- Become familiar with the LOTO process at APS and the various technical groups with electrical responsibilities.
- Utilize this familiarity and their personal experience to work with these groups to lead the effort of creating a specific electrical LOTO process for the removal and installation.
- Manage cable manufacturing and labelling for the Upgrade, ensuring quality.
- Create specific plans for the removal and installation of every electrical/cable system for the upgrade.
- Ensure work is planned and executed according to APS-U, ANL, and DOE safety standards.
Interface Control

- Removal and Installation has interfaces with all technical and operational groups
  - Remove the old
  - Install the new

- Assembly and Installation mediate the interface between many technical groups

- Interface control document to be revised to include:
  - Scope responsibilities
  - List of all systems/components to be installed
  - Block diagrams with in/out flows and labels indicating responsibilities
  - List of drawings and instructions required
Installation Planning Processes

Interface Management

Meet
Define Interfaces
Diagram

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Installation Planning Processes

Block Diagram

- Works with Interface Control Documents
- Shows electrical, data, mechanical (gas/water/vacuum) connections between components and to outside systems

Also can be used to identify owners and responsibilities.
Physical Models

- Space issues in the tunnel need to be addressed
  - Informs the amount of work to be performed in the removal and installation
  - Where are interferences?
  - Is there more to remove or move?

- Actions:
  - Build a physical model of the BLS chamber (largest device) and to do fit tests.
  - Develop 1/10th scale 3D model of tunnel for installation planning and validation
Installation

- Coordination and Plan development with technical groups
  - Assist in developing tools and methods
  - Feedback and input into installation plans
- Workforce acquisition and training
- Finalize Transport, Storage, and Staging plans
- Integrated Installation Plan Development
  - Compare and contrast against current plan
  - Evaluate timeline and effort

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Removal

- Coordination with Operational groups
- Tunnel and Mezzanine Inventory
- Review and Finalize Removal and Disposal plans