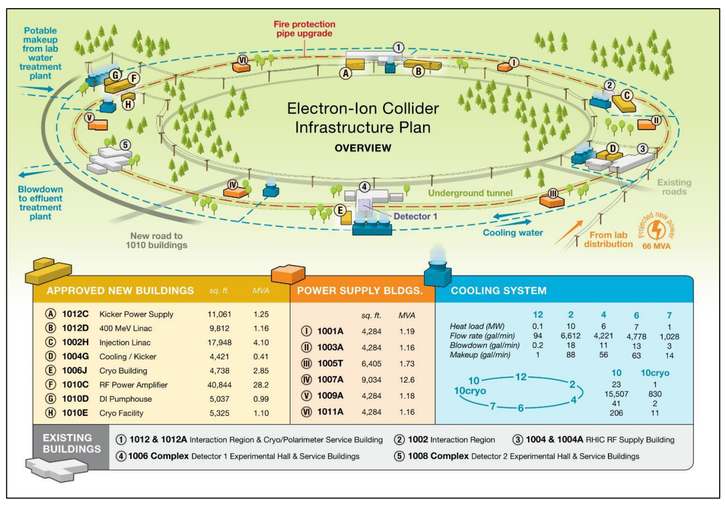
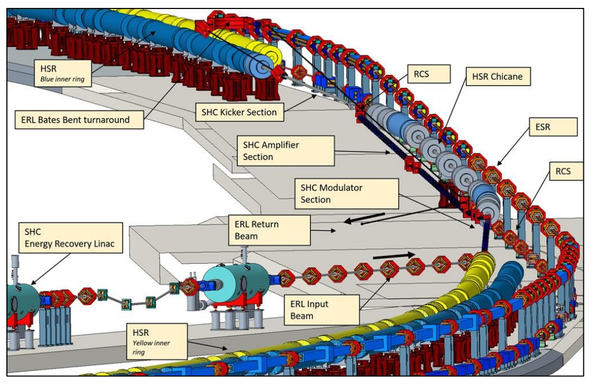
Planning of Relativistic Heavy Ion Collider (RHIC) Removals in preparation for the Electron Ion Collider (EIC)

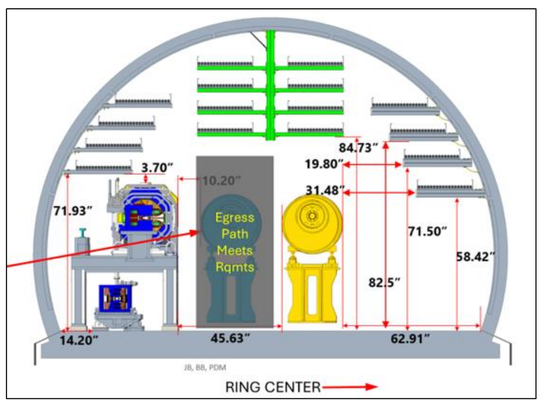
Christopher Pontieri
Systems Engineering Group

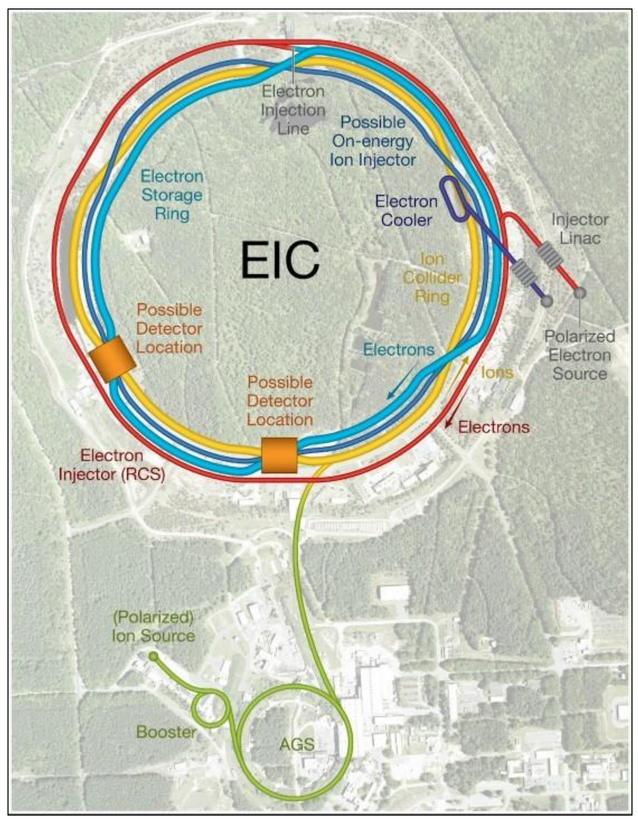
Electron Ion Collider

The Electron Ion Collider design will make use of existing ion sources, a pre-accelerator chain, a superconducting magnet ion storage ring, and other infrastructure of the Relativistic Heavy Ion Collider (RHIC). A new electron source and electron accelerator and storage rings will be added inside the existing collider tunnel so that interactions (collisions) can take place at points where the stored ion and electron beams cross.

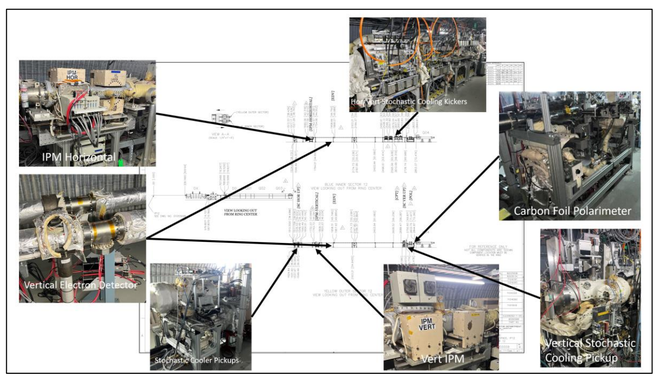


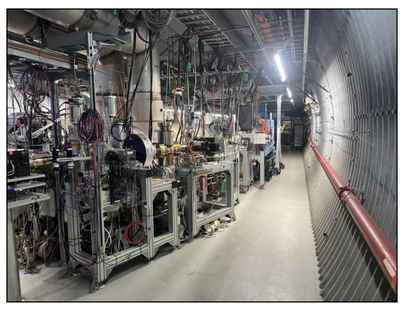


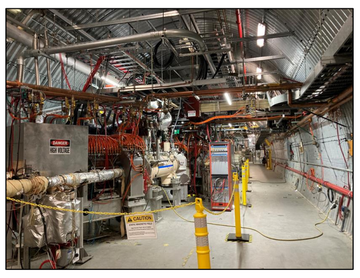




Example of Beamline Components/Magnets



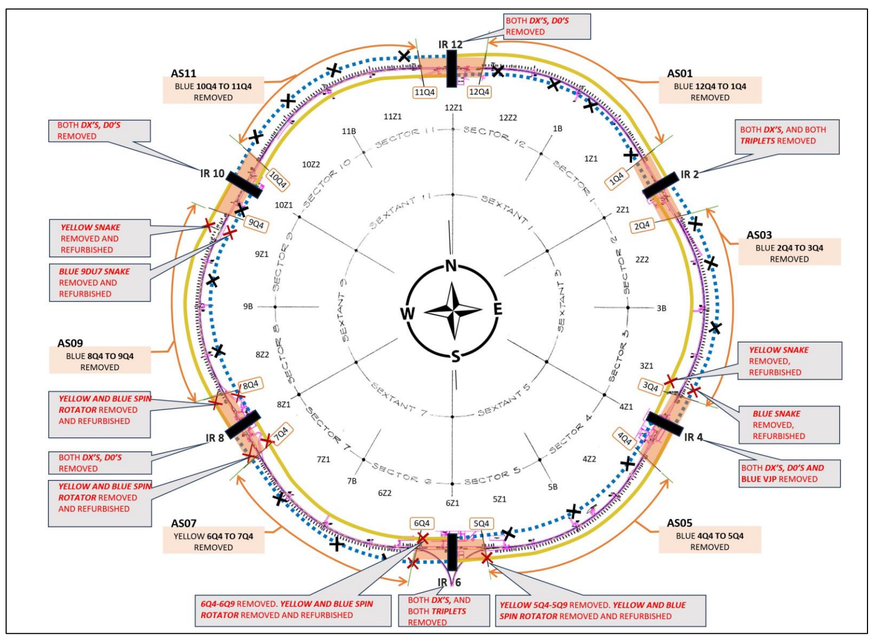




RHIC Removals

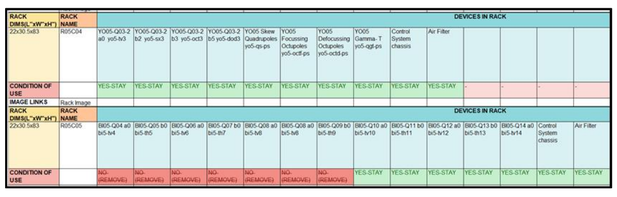
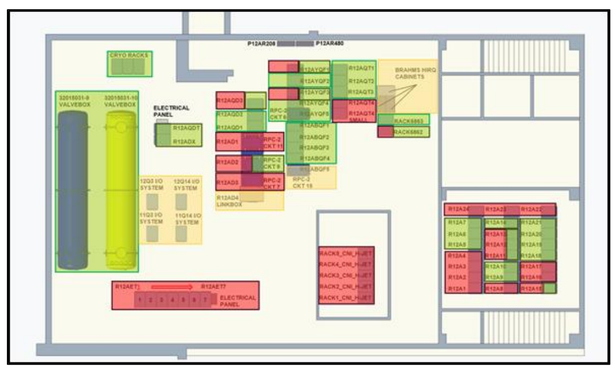
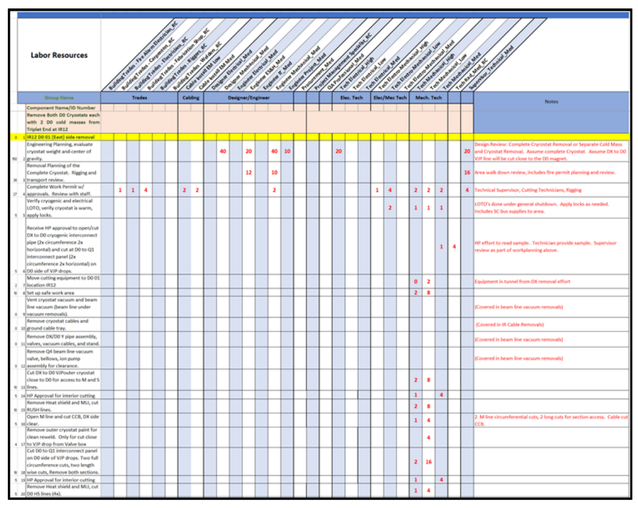
The removal of RHIC beam line and support building accelerator systems and components for re-assignment to new locations in EIC, storage for future use as spares, or disposal. The removals portion of the project covers tunnel removals of copper RF cavities & SRF cryomodules, RHIC ring & transfer line SC and conventional magnets, beam line instrumentation devices, beam injection & extraction systems, beam collimators & dumps, vacuum systems, power supplies, and cables. The Work Breakdown Structure (WBS) is location based rather than systems based, it is divided into 12 elements; 6 Interaction Regions and 6 Arc Sectors. Each area combines tunnel tasks with related support building tasks and has specific requirements for component removals.

- Interaction Region (IR)
  - DX, D0, Triplets
- Arc Sectors (AS)
  - ~72 SC magnets per arc, 400+ total
  - Blue arc alternates between inner and outer radius
- Warm Beamline Components
  - Instrumentation
- Electronics Racks
- Cables



Removals Map of RHIC

Removals Planning

Our first step was to identify the items that were generalized in the WBS. Each of these systems required a system manager to be assigned, that would ultimately be responsible for confirming the components that are set to be removed. Our process started with the development of a user-friendly spreadsheet that allowed the system mangers to identify very detailed tasks for their component removal, and identify the labor resources required to disconnect, remove, and transport the components in a safe, efficient manner. Labor hours were totaled and passed off to project controls to input in the Project Workbook (PWB), to develop a labor estimate for removals. System mangers were asked to provide details of their components that included size and weight, a comprehensive list will be created to assist in developing a storage strategy for potentially reusable components. Material costs for disassembly, rigging, transport, and disposal are also being accounted for.

- Bottoms up estimate
  - Labor estimate spreadsheets from RHIC system managers
  - Detailed tasks to ensure proper representation of removal estimate
  - Spreadsheets used for review drilldowns
- Equipment identification
  - Location to determine available space for new EIC components (tunnel)
  - Rack identification helps to determine service building space