



PIP-II Coldbox Presentation Community Advisory Board Meeting

Alex Martinez, Cryoplant L3 Manager and CAM
September 26, 2024

PIP-II is a partnership of:

-  US-DOE
-  India-DAE
-  Italy-INFN
-  UK-STFC-UKRI
-  France-CEA, CNRS/IN2P3
-  Poland-WUST, WUT, TUL

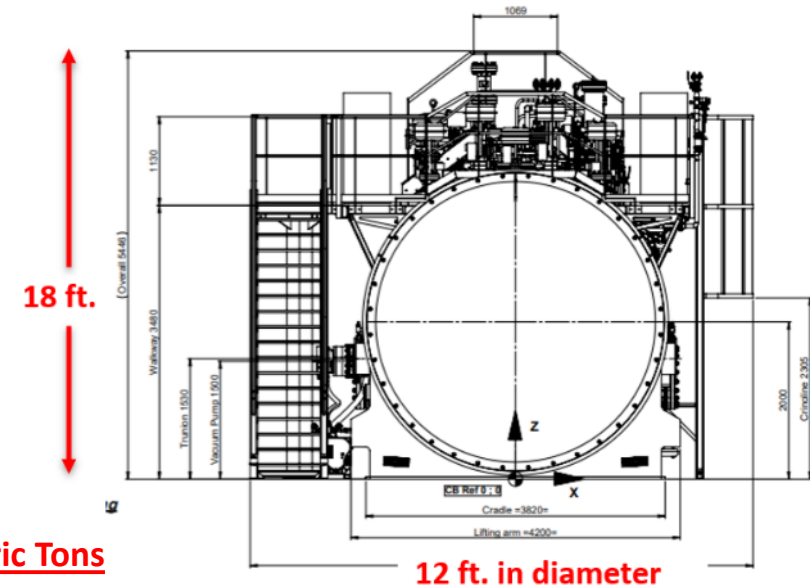
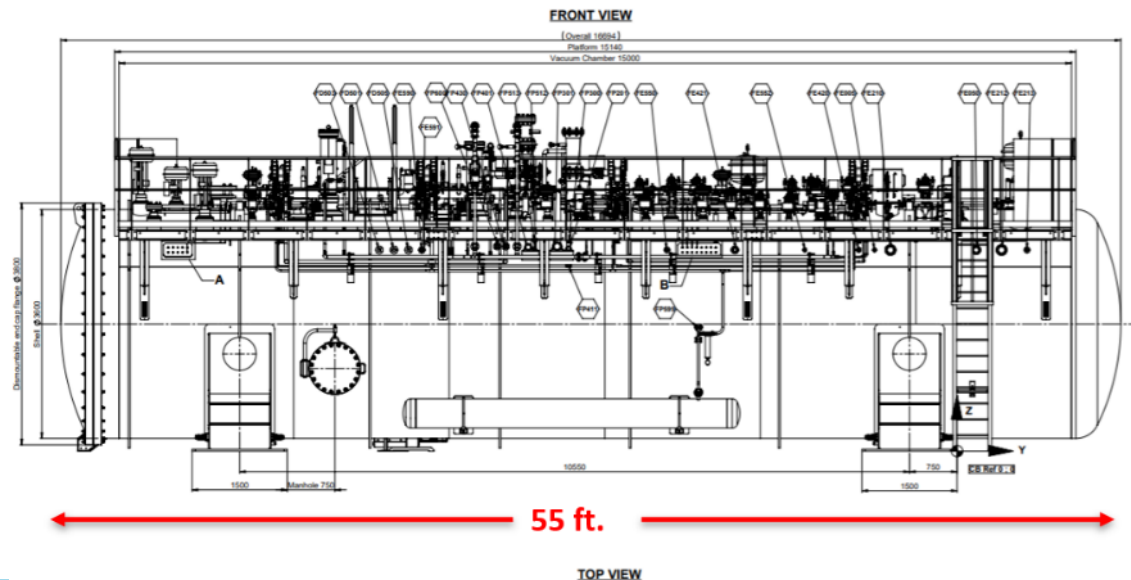
What is PIP-II?

- The Proton Improvement Plan-II (PIP-II) is an essential enhancement to the Fermilab accelerator complex, powering the world's most intense high-energy neutrino beam on its journey from Illinois to the Deep Underground Neutrino Experiment in South Dakota – a distance of 800 miles.
- PIP-II makes use of the latest advances in superconducting radio-frequency (SRF) technologies to accelerate particle proton beams
 - Located inside the Tevatron Ring, close to the Hi-rise
 - Keeping the PIP-II accelerating structures extremely cold is essential
 - Cryogenics plays a vital role in cooling the SRF cavities in the accelerator
 - The cavities in the cryomodules operate at 2 Kelvin (-456°F)



What is the PIP-II Coldbox?

- The Coldbox is at the heart of the PIP-II cryogenic system
 - Provides the cooling to the cryomodules in the Linac
 - Large vessel containing a train of eight heat exchangers, turbines and compressors which cool room temperature helium gas to cryogenic temperatures, operating at 2 Kelvin (-456°F)
 - 55 feet long vessel by 12 feet in diameter and 100 tons
 - Provided as an In-Kind contribution from the Department of Atomic Energy in India – Bhabha Atomic Research Centre (BARC) and manufactured by Air Liquide Advanced Technologies in France under contract with BARC/FNAL



Coldbox Fabrication

- Fabrication at Air Liquide facilities in Sassenage, France
 - Contract Award and Design began in 2021
 - Fabrication started in September of 2023 and completed in August of 2024
 - Currently completing final leak tests and beginning packaging process
 - Transport journey begins in October with an expected delivery at Fermilab in December of 2024



Coldbox Transportation

- FNAL/PIP-II is responsible for Transportation of the Coldbox from the USA port of entry to FNAL
- Due to the size and weight of the Coldbox, transport by road over long distances is not possible
 - Shipped by sea arriving at the Port of New Orleans as entry port to the US
 - Coldbox to be transported up the Mississippi by barge to the Illinois river to Lemont and off-loaded to a transport trailer
 - Remaining 22 miles over road using custom transport trailer
 - Requires special permitting, road closures, traffic light/utility redirection, and off hours transport
 - Once on the Fermilab site, Coldbox will be transferred to a smaller more maneuverable trailer to reach its final location
 - Working with transport/rigging vendor to coordinate transport, rigging and logistics
- Similar to the transport route of the G-2 magnet move in 2013

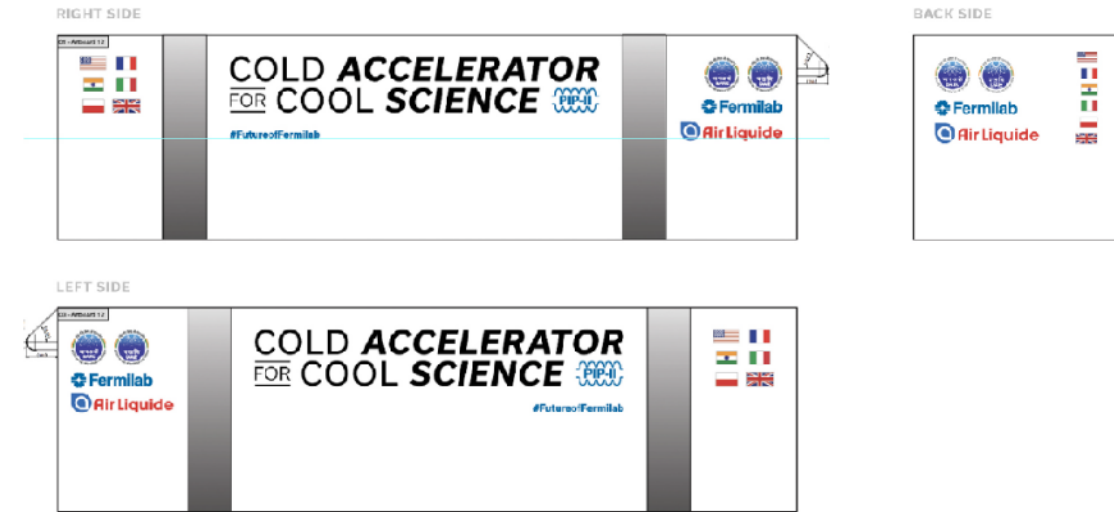
Coldbox Public Outreach

- Working with Fermilab's Office of Communications to publicize the Coldbox move
 - Good opportunity to show the public a glimpse of our work - describing the PIP-II project and our IKC collaborations
 - Website is being created to advertise, explain and monitor the status of the transportation
 - Banner/Wrap designed by Fermilab's Visual Media Services and printed/installed by Air Liquide on Coldbox during packaging stage
- Similar to G-2 magnet delivery in 2013
 - Similar transport plan (barged up the Mississippi river to Lemont and transported by road to Fermilab)



[G-2 YouTube LINK](#)

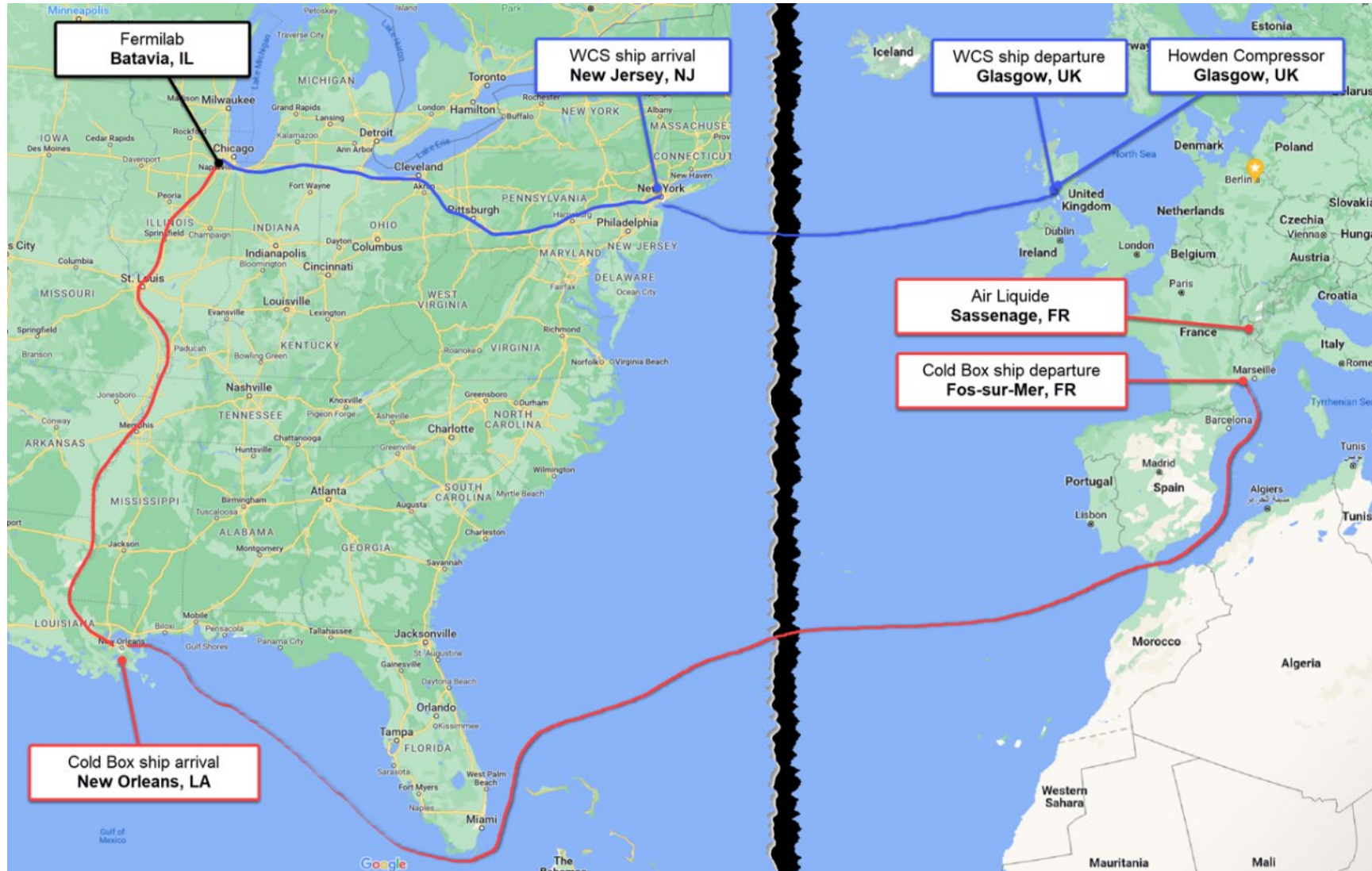
Banner Design



Coldbox Transportation and Schedule

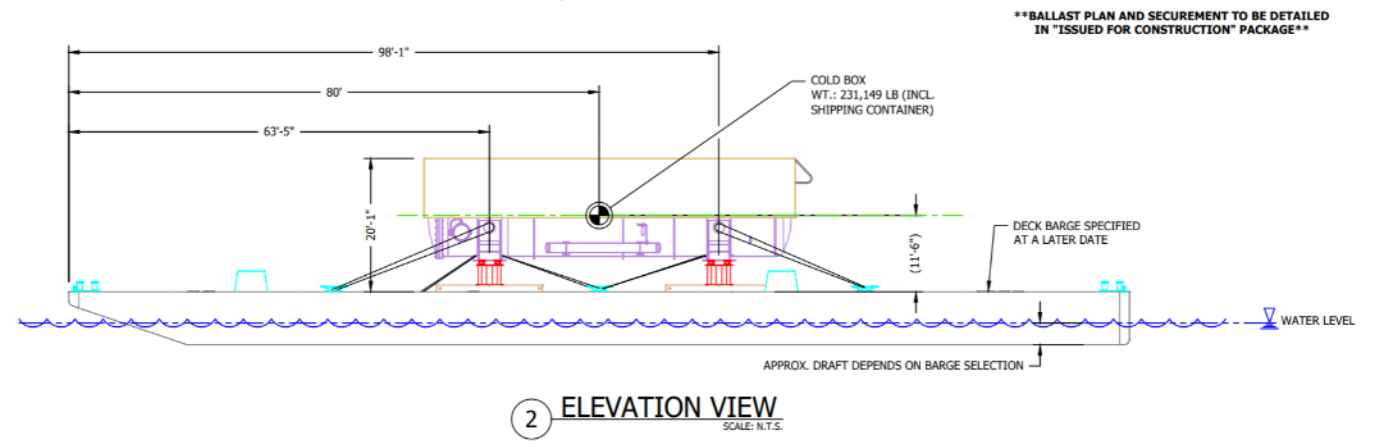
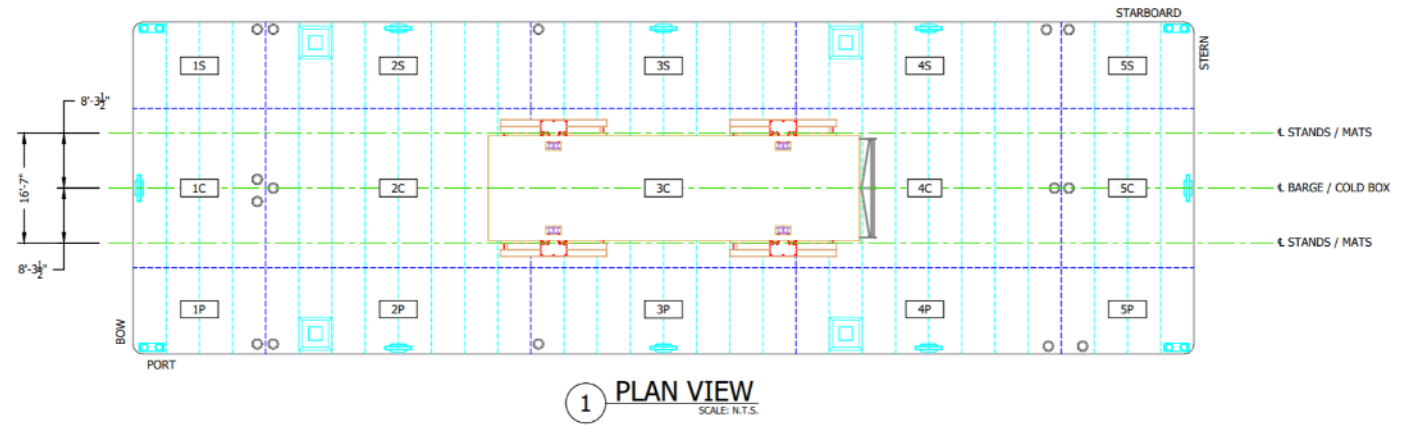
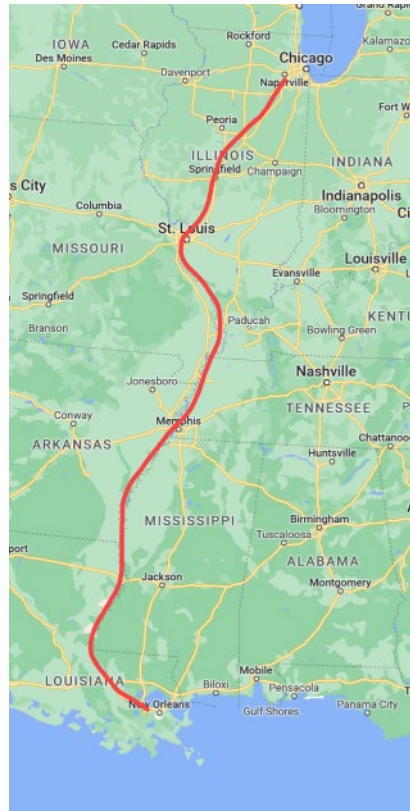
• Coldbox Delivery Timeline

- Pick-up of Coldbox at ALaT workshop (Sassenage, France): Mid-October
- Road transport from Sassenage to Rhône river in Lyon
- Transport by barge from Lyon to the port of Fos-sur-Mer near Marseille on the Mediterranean
- Atlantic crossing: 4 to 5 weeks
- Arrival at the Port of New Orleans (End of November or early December)
- Transport by barge up the Mississippi river to the Illinois river and dock in Lemont (approximately two-week duration)
- 22-mile road transport from Lemont to Fermilab
- **Potential East/Gulf coast longshoreman union strike scheduled for October 1st may impact these dates**



Coldbox Barge Transport

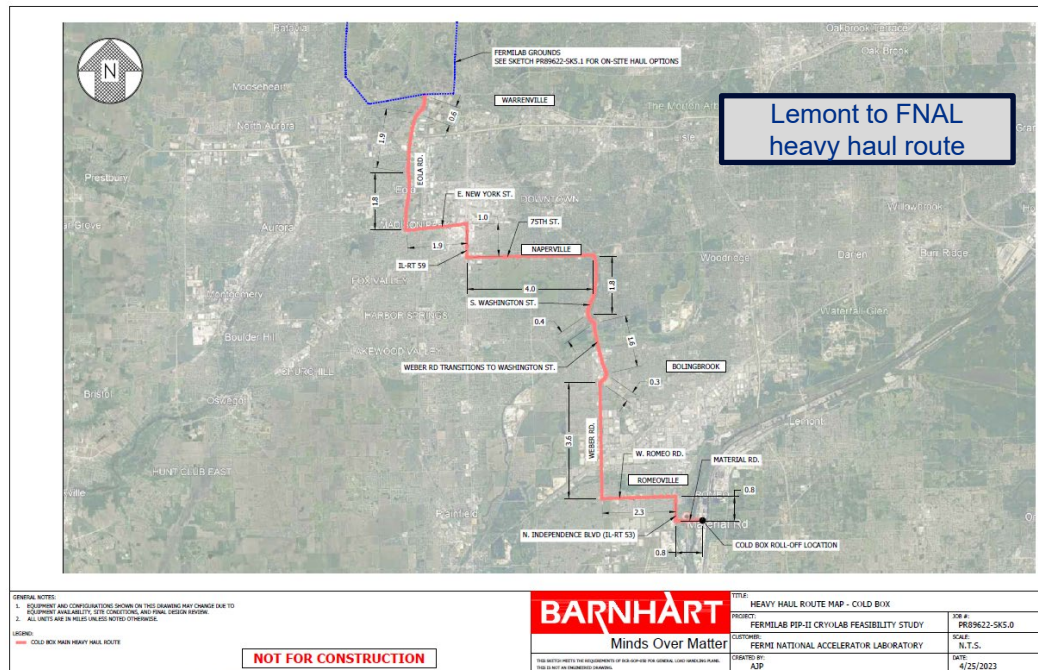
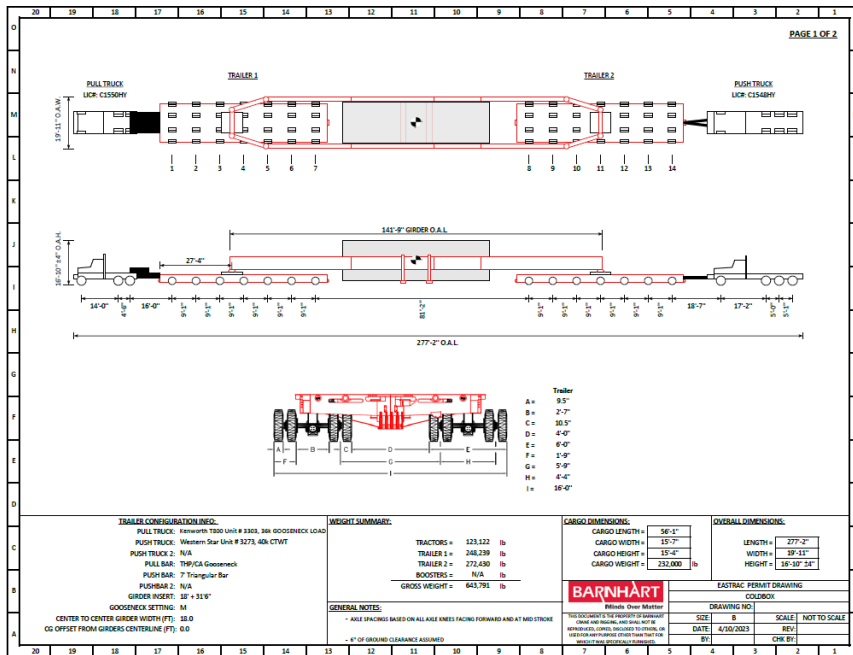
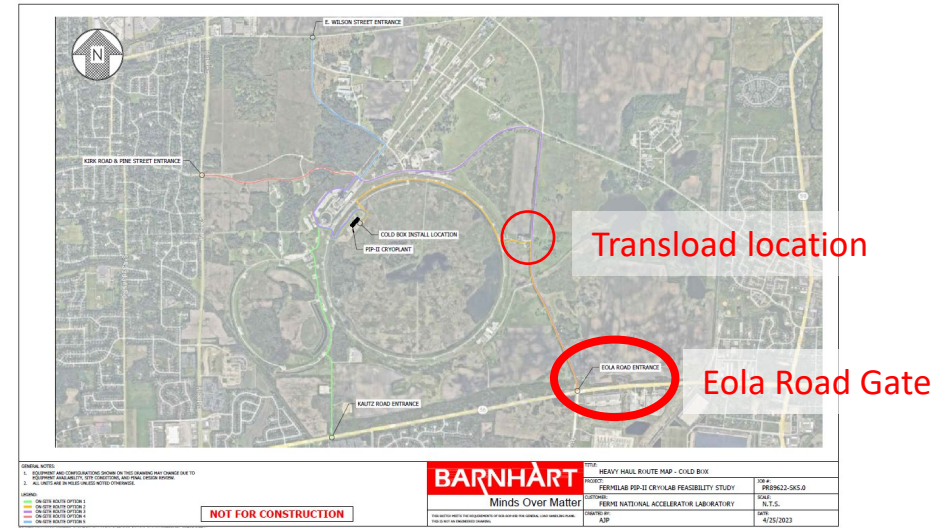
- Coldbox is off loaded at the Port of New Orleans and placed on a river barge on the Mississippi
- Travels up the Mississippi River to the Illinois River
- Off loaded at Lemont



Coldbox Transport from Lemont to FNAL

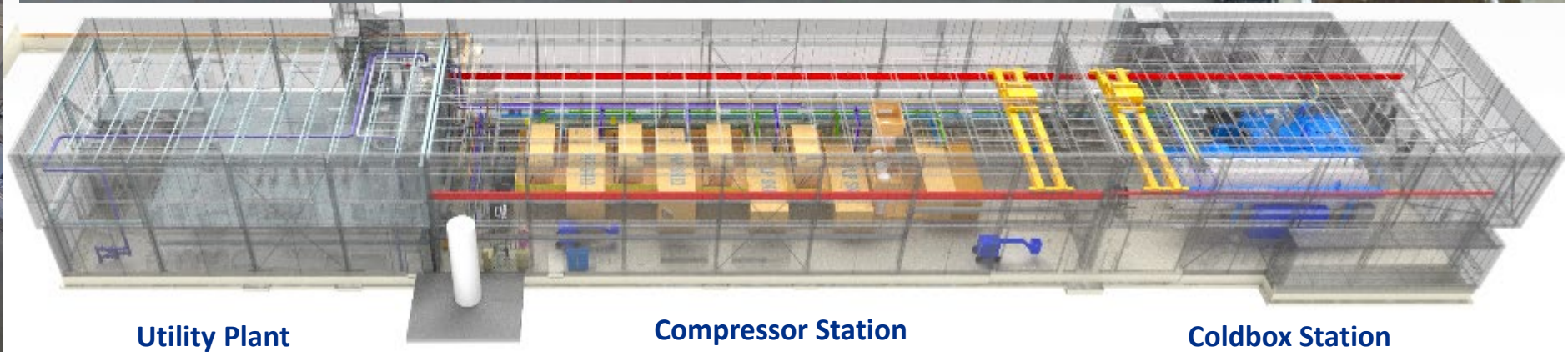
Sequence with multi-day duration:

- 22-mile road transport from Lemont to Fermilab campus, estimated speed ~10 mph
- Heavy haul rig enters via Eola Road and transloads at the parking near intersection of Eola with East Road and off loads to shorter more maneuverable trailer for onsite transport

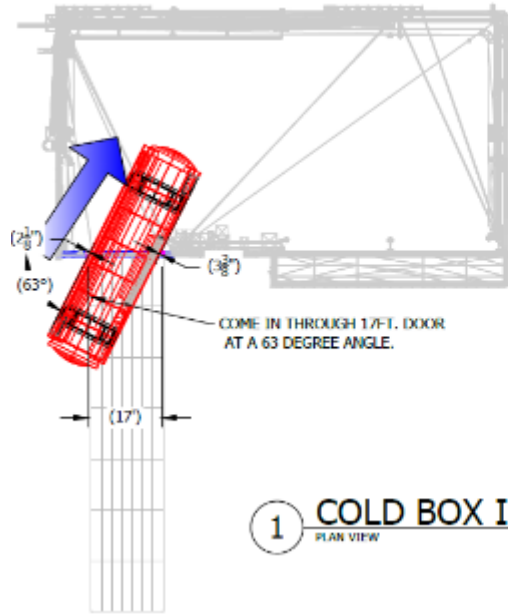


Cryoplant Building

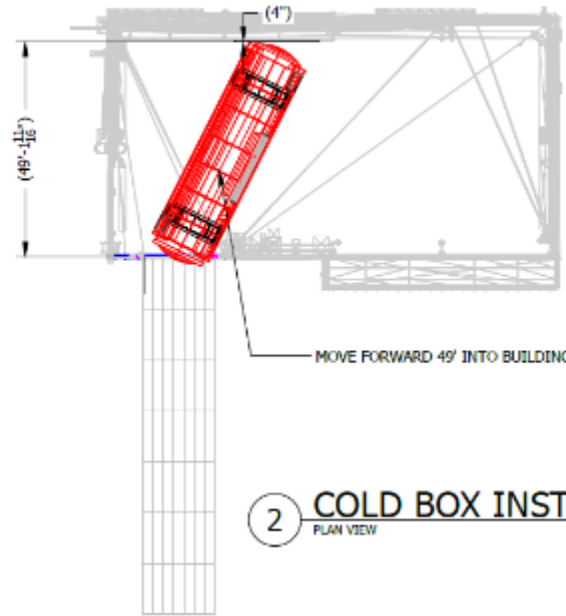
- Houses full Cryogenic System
- Coldbox located in far North room
- Coldbox to be rigged through rollup door on the East side



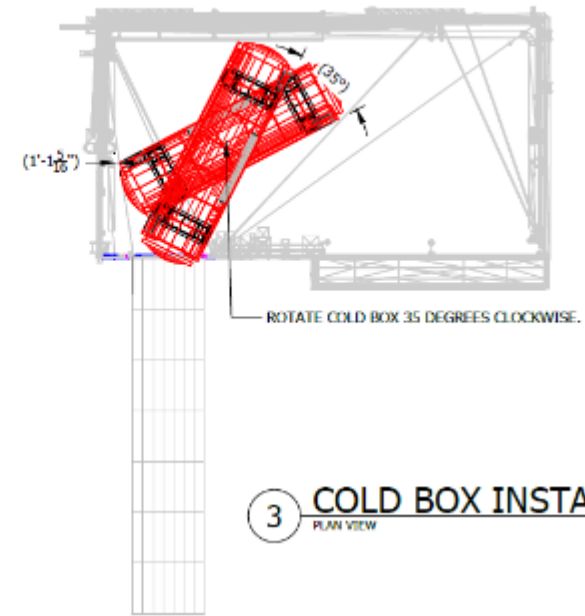
Coldbox Rigging into Building – through rollup door



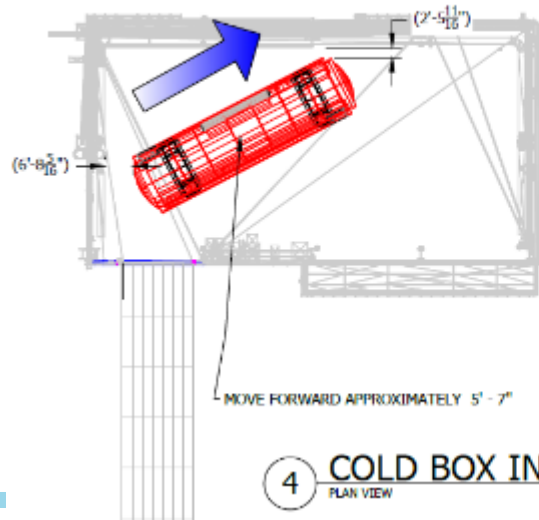
1 COLD BOX INSTALL
PLAN VIEW



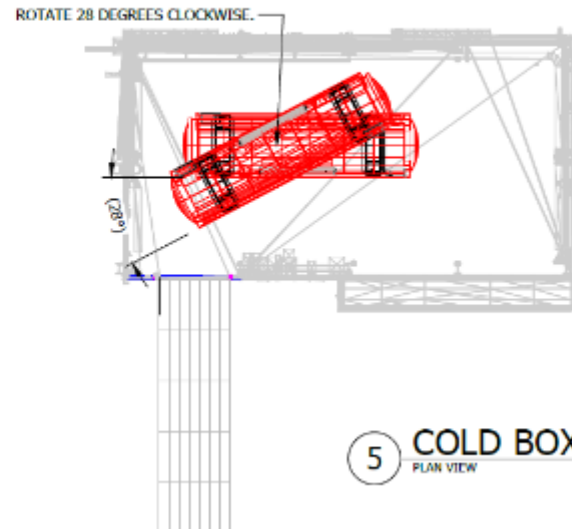
2 COLD BOX INSTALL
PLAN VIEW



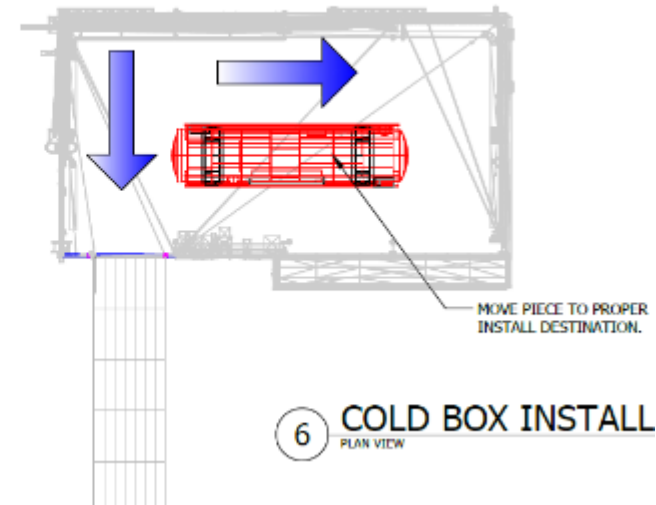
3 COLD BOX INSTALL
PLAN VIEW



4 COLD BOX INSTALL
PLAN VIEW

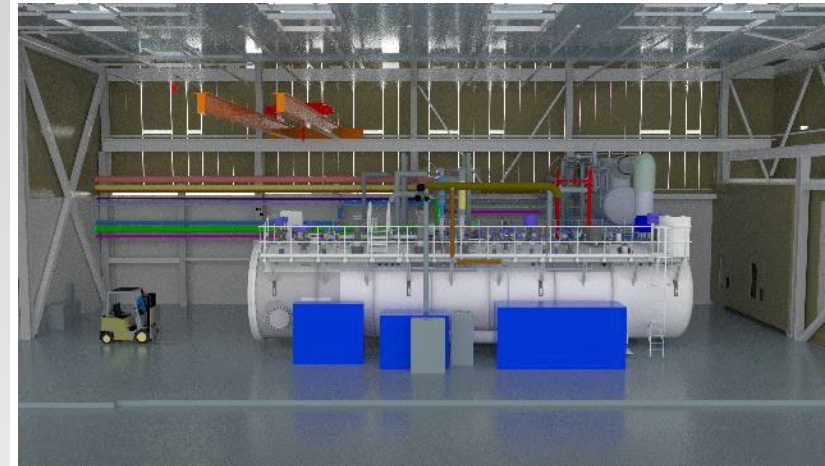
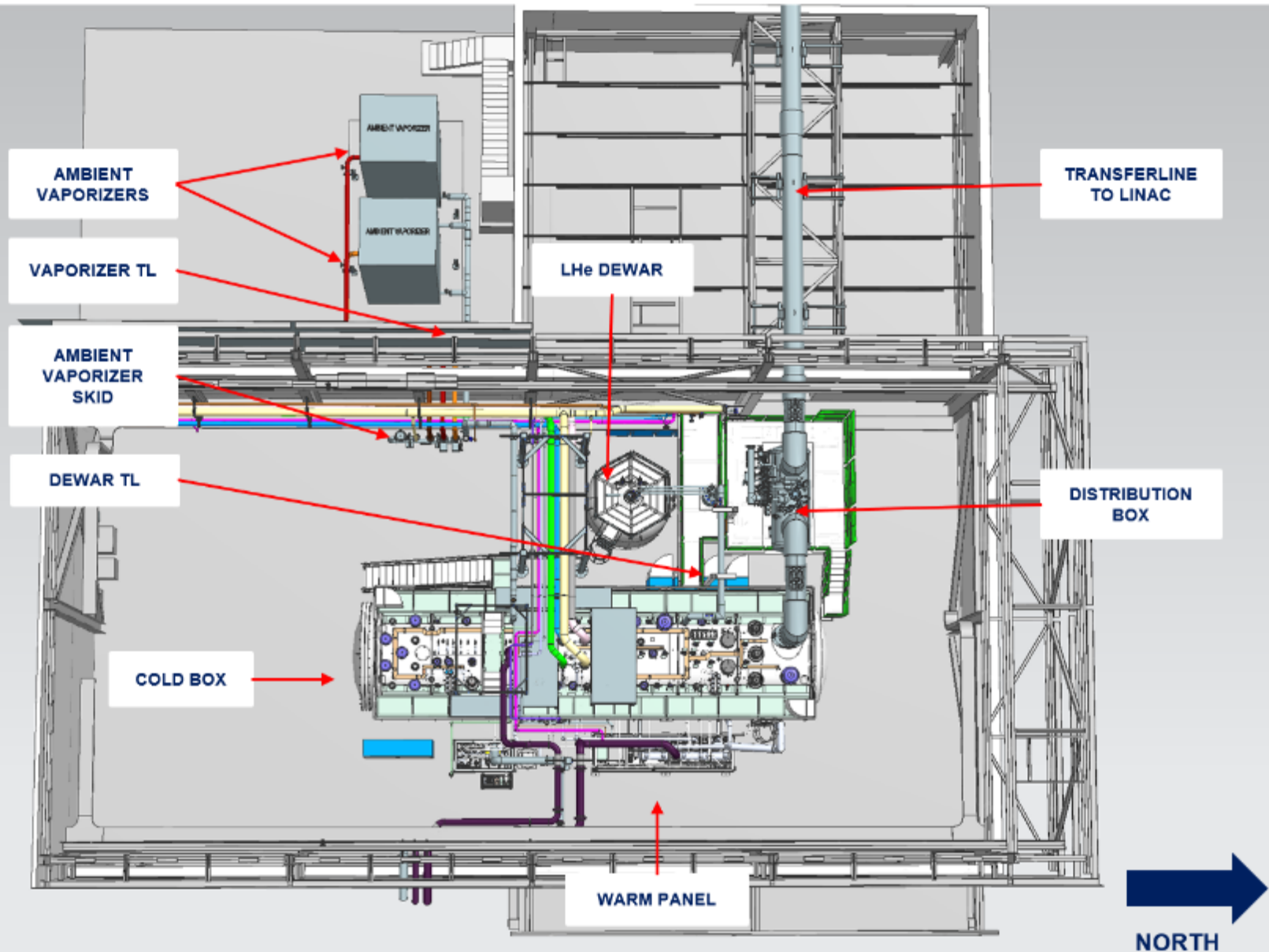


5 COLD BOX INSTALL
PLAN VIEW



6 COLD BOX INSTALL
PLAN VIEW

Coldbox Final Location



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/showcase/pip-ii/

