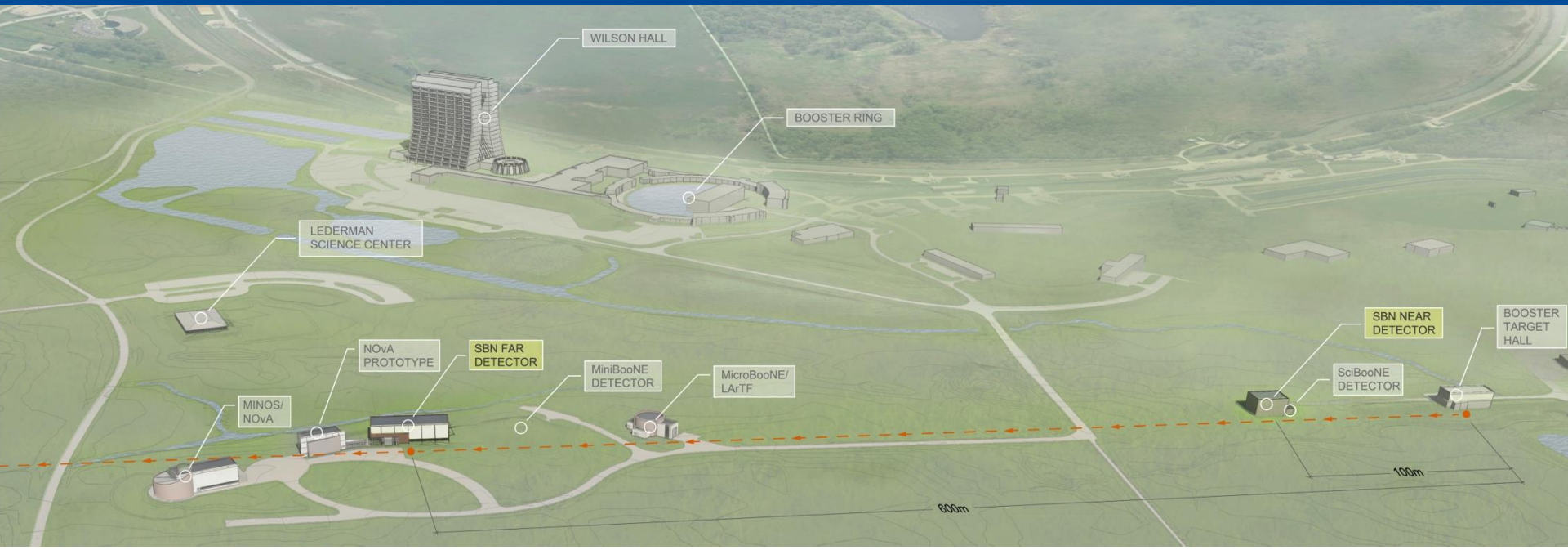
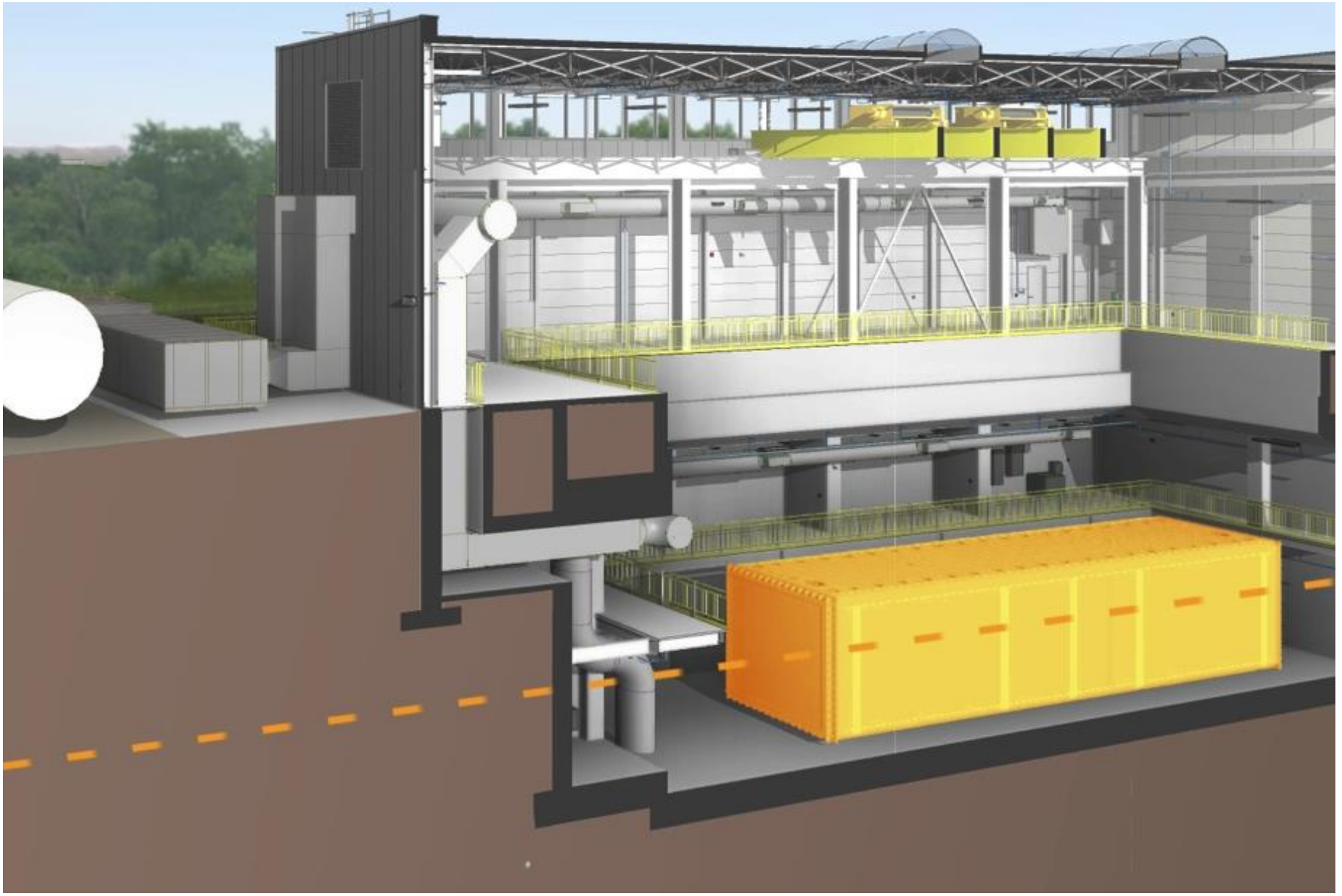


SBN Far Detector Installation & Integration

Fernanda G. Garcia, Steve Dixon, Andy Stefanik, Justin Tillman, John Voirin



SBN Far Detector Installation & Integration Overview

- The SBN **F**ar **D**etector **I**nstallation and **I**ntegration (SBN FD I&I) work package aims to develop and implement the plan for installation and integration of the ICARUS detector at FNAL over the next two years and be ready for beam data taking in CY2017

- The recently formed SBN FD I&I team has been active getting information and establishing the strategy
  - Level 2 manager took up her post in Nov 2015
    - Visited CERN and met CERN and INFN collaborators
  - Experienced skill personnel identified - Nov 2015
  - Majority of the team is not at full-time capacity on the project
    - Nevertheless the group is motivated and committed to the task
    - Team and leader are held accountable for results, not for efforts

SBN Far Detector Installation & Integration Scope

The SBN far detector installation and integration work package scope includes the following major points:

- Assembly of one warm cryostat
- **Installation of T600 detector** (more later on this presentation)
- Overseeing / joint coordination of cryogenic system installation
  - assembly and testing
  - cooperation between CERN and FNAL
- T600 commissioning & cool-down
- Detector support systems
  - readout support requirements
  - **grounding requirements** (more later on this presentation)
- Installation of cosmic ray tracker (Detector breakout session 2)
- Installation of overburden (Facility Infrastructure breakout session 1)

Firm up the high-level integration between the different subsystems is key to maintain schedule

Structuring the SBN Far Detector I&I task

WBS 40 SBN/4.1.1 – FD Installation and Integration

- Identify a *responsible* manager for each subsystem ✓
- Develop a *schedule*
  - Provisional schedule in progress ✓
  - "Living document" as our understanding matures
- Identify *budget* needs
  - First top-down (presented in this review) ✓
  - Updating to a bottom-up approach --> system managers define their budget in agreement with project leader
- Account for dependences on or links with other subsystems, schedule and budget
  - Level of granularity will depend on complexity of task
- Define the type and number of documents required for the project
- Define management and communication structure
  - Weekly meetings with managers ✓
  - Increase personnel recruitment in the next months

Resources

WBS 4

Cat James

WBS 4.1.1

Fernanda G. Garcia

Mechanical Support -
Andy Stefanik

Justin Tilman , John Voirin

Jim Kilmer

Electrical Support -
Linda Bagby

Bagda Baiboussinov

Cryogenic -
Mike Geynisman

Mike Zuckerbrot

Alignment -
Babatunde OShinowo

CRT -
Bob Wilson

David Warner

Input and advise from CERN and INFN colleagues are imperative throughout this process

Cooperation among institutions

- Active communication and close cooperation with CERN and INFN colleagues
  - Active communication about the planning process is helpful for maintaining consensus and keep the collaboration informed about the installation status
  - We will seek advice on alternatives to consider during the planning process
  - With the initial SBN FD I&I team in place, we can cultivate the cooperation and communication with CERN/INFN colleagues that will be essential for a successful installation
- We will rely on Claudio Montanari (ICARUS Technical Coordinator) and Marzio Nessi (CERN Head of Neutrino Platform) for our primary point of contact and anticipate a close collaboration with the entire team

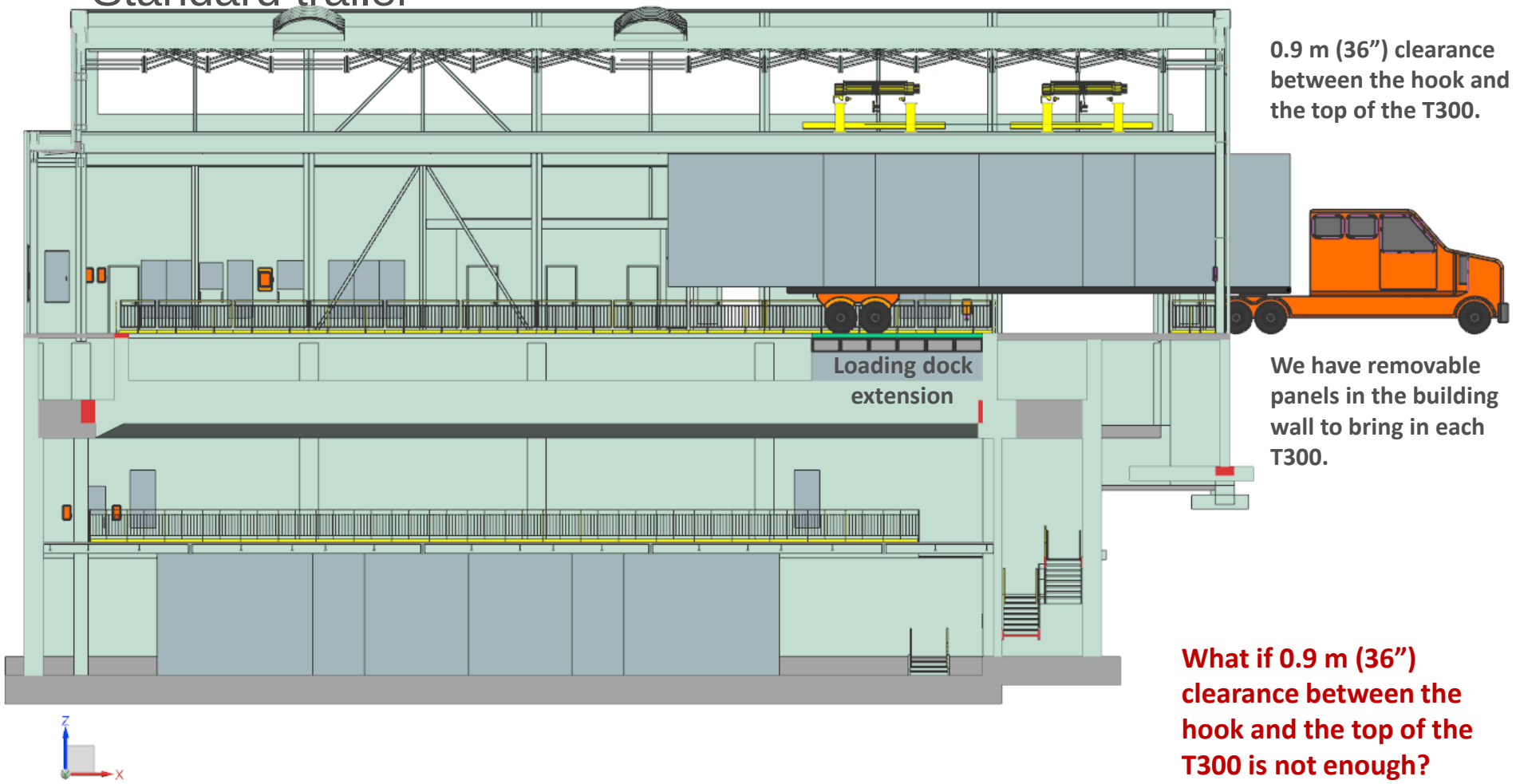
Some thoughts on how to install the T300 modules

Installation of the two T300 cold detectors

- The current installation plan is based on the following:
  - Each unfilled T300 detector weighs 45 metric tonnes (49.6 US short tons).
  - There are two building cranes; each crane has a capacity of 27.2 metric tonnes (30 US short tons).
  - We assume we will need a lifting fixture.
  - Fermilab personnel will install the T300s if no rigging contractors are required.
    - We have two other possibilities that depend on the equipment that Fermilab owns:
      - Use a rigging contractor for specific tasks.
      - Use a rigging contractor for the entire installation task.
  - We will work with Fermilab rigging and safety personnel as the installation plan develops. We have already started discussions with rigging personnel.
  - Installation will be in accordance with Fermilab Standards.

Installation of the two T300 cold detectors

- Standard trailer

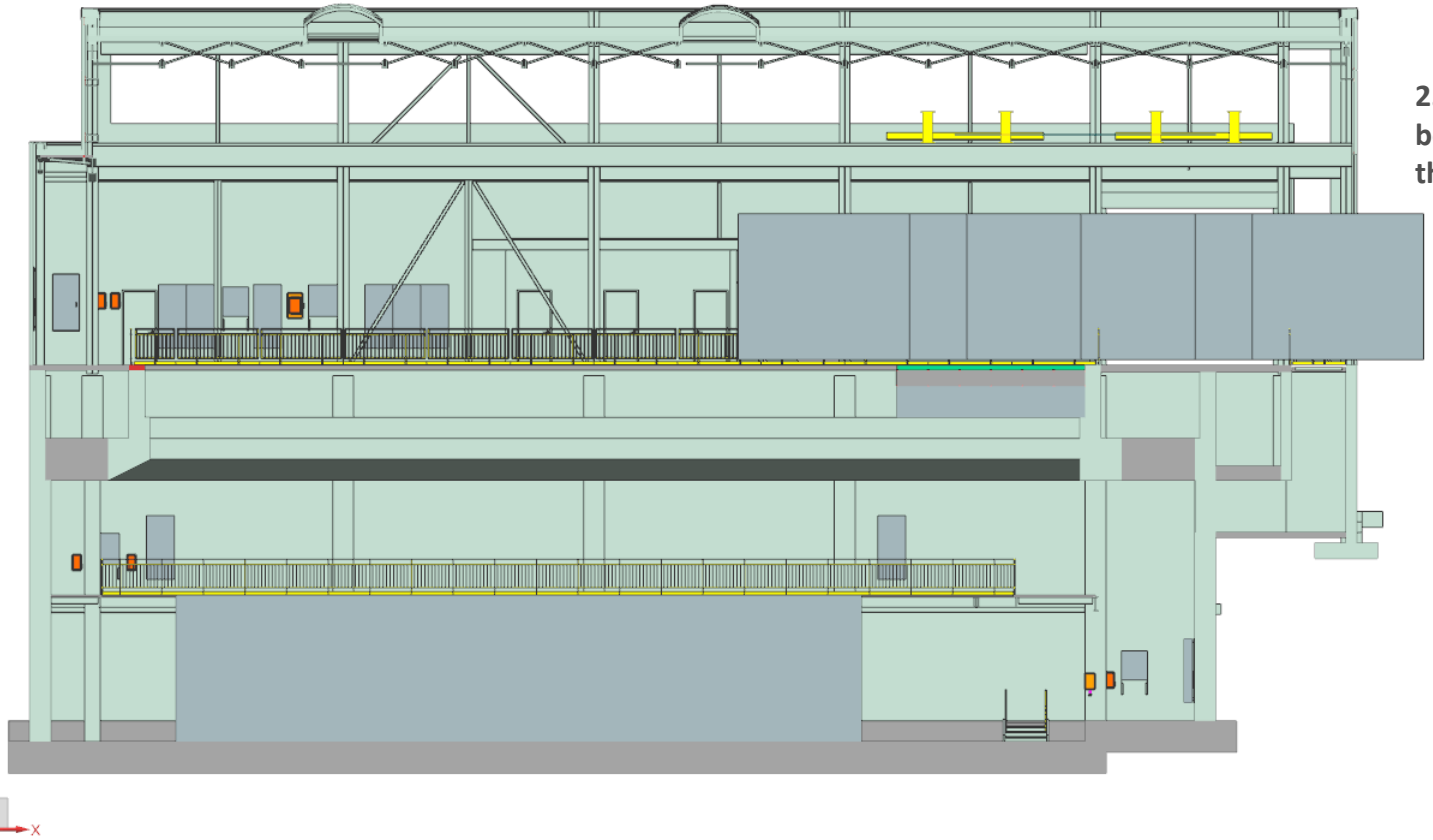


Installation of the two T300 cold detectors

- Low-boy trailer: Not an option to increase the lifting clearance between the crane hook and the T300.

Installation of the two T300 cold detectors

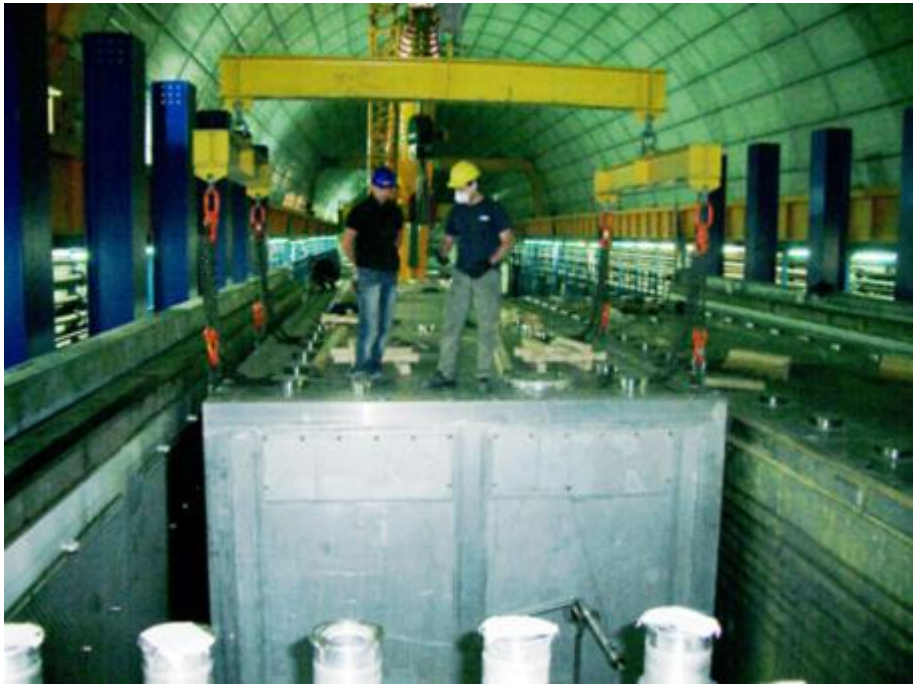
- Use rigging contractor to lift the T300 off the truck and to place it on track rollers so it can be rolled into the building. Fermilab personnel does the rest of the installation work.



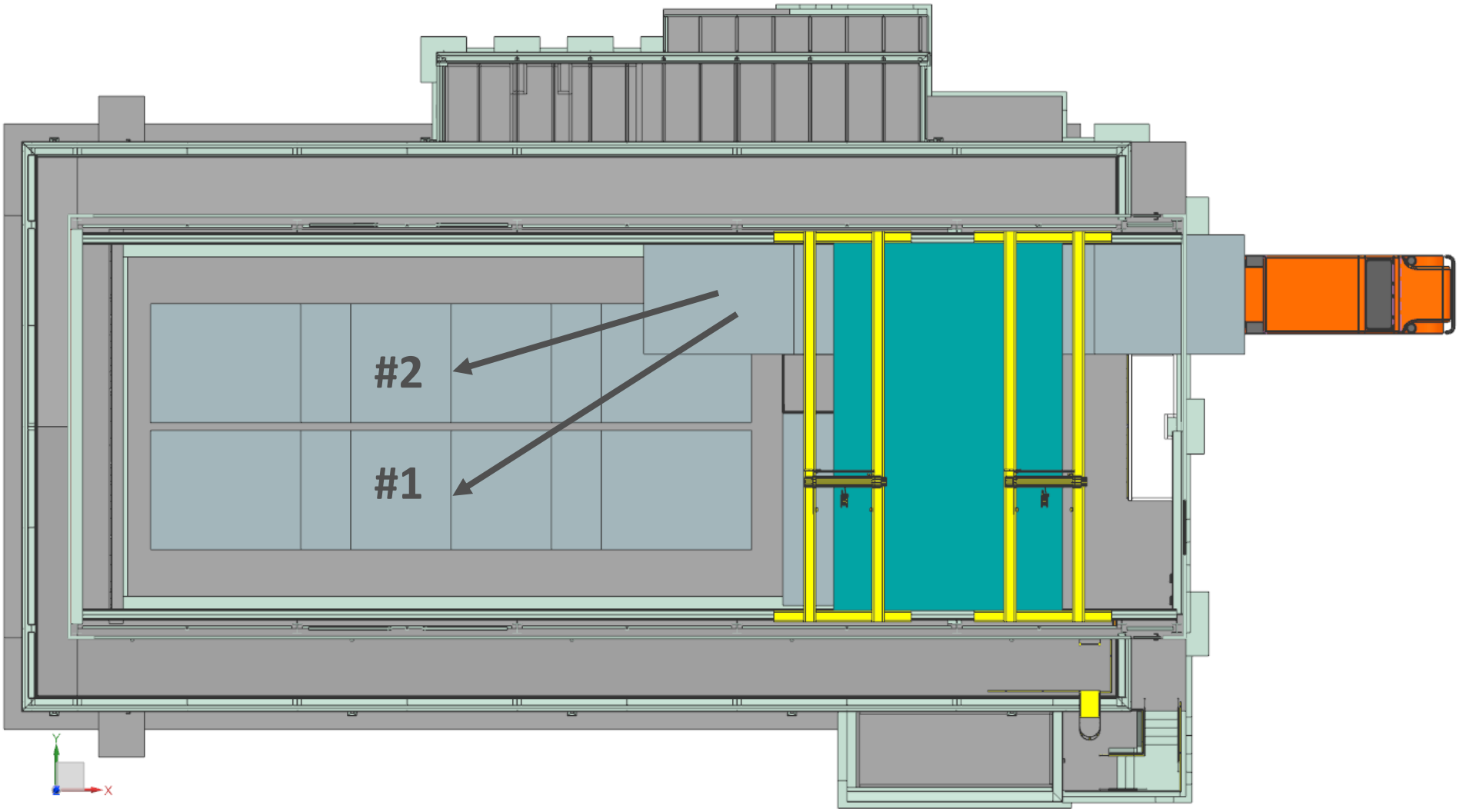
2.2 m (90”) clearance between the hook and the top of the T300.

T300 Lifting Fixture

- ICARUS lifting fixture.



T300 Installation Route



Installation of the two T300 cold detectors

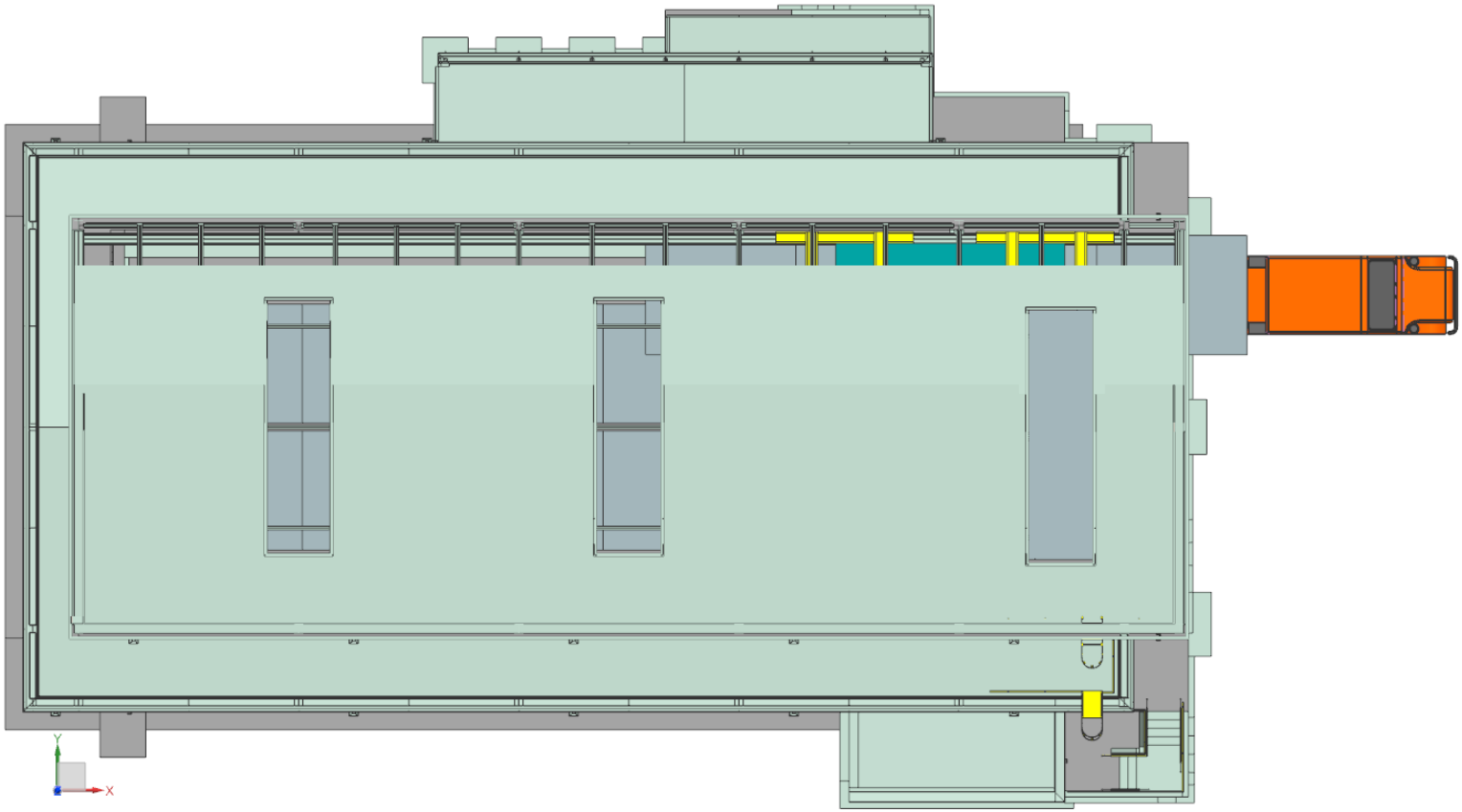
- Obtain information for all components of the T600 Detector that we need to install:
  - 3D models and drawings in a workable electronic format.
  - Weights, especially the T300 because the T300 sets building carne capacity.
  - Lift points, especially the T300 because we need a special fixture to lift it and the weight of the lifting fixture adds to the load on the crane. The T300 and its fixture set building crane hook height.
  - Will CERN provide the T300 lifting fixture?
  - Will CERN provide lifting and assembly fixtures for all of the other components?
  - Support points under the T300 so we know where to place rollers in case we must roll the T300 into the building on rollers and bar track.

Potential problems with our current installation plan

- CERN provides one crane but the second crane is not funded yet.
- If we do not have the second building crane then we must hire a rigging contractor to install the T300s and hire them again to remove the T300s when the experiment is decommissioned.
- We need to learn if we will have the second building crane or not so we can start the process of issuing an RFQ for a rigging contractor.
- We are looking for a building crane on the Fermilab site that will fit in the Far Detector Building and that we can borrow for installation and removal of the T300s.

Potential problems with our current installation plan

- We currently have three skylights in the building roof to facilitate installation in the event we have only one building crane.



Conclusions

- SBN Far Detector installation and integration plans have started
  - Team recently formed to develop the plan
    - Personnel will increase as we continue working on this
  - Preliminary structure on management and communication is in place
  - Provisional schedule exists
    - Accumulating and updating information on tasks, schedule, and manpower as the team learn more about installation
  - Effort focus on the most urgent needs
    - Ongoing development of a plan for T600 detector installation

SBN Far Detector – Detector Grounding

- Maintain separate detector and building grounds is vital to the success of the experiment
  - Isolate the detector from all other electrical systems
  - Minimize ground loops
- Initial ground plan requirements are specified in SBN docdb #589
  - Authored by SBN Program Electrical Coordinator Linda Bagby
- A measurement of the resistance-to-ground will be provided by the contractor as a deliverable after beneficial occupancy
  - To achieve desirable sensitivity of the detector a xx ohm specification is required
- Two separate ground structures are required: one for the detector and one for the detector building
  - The detector building ground structure is to be composed of rebar imbedded in the concrete
  - Copper tie points, connected to the rebar, will run along the walls of the detector building