

**DUNE Conceptual Design Review Charge**

**Near Detector**

**68? July 2020**

The DUNE Near Detector (DUNE-ND) will be used to constrain systematic uncertainties associated with the DUNE long-baseline neutrino oscillation measurement. The current concept for the DUNE-ND consists of a ‘Day-1’ suite of near detector elements necessary for achieving a 3-sigma observation of maximal CP-violation and an upgrade path that ensures statistics-limited oscillation measurements over the proposed 10−20-year program of long-baseline neutrino measurements. The DUNE-ND will be located in a new underground hall to be built on the Fermilab site. The facility is being designed to support the full suite of detector elements needed to carry out the long-term program including the Near Detector LAr TPC (LArTPC-ND), Muon Spectrometer, and SAND Beam Monitor. Based on currently available resources, the ‘Day-1’ DUNE-ND is defined to include LArTPC-ND, a dedicated (temporary) muon spectrometer (TMS), and the ‘Day-1’ SAND Beam Monitor (magnet and calorimeter). Critical supporting infrastructure for these detector elements include the cryostat and cryogenic systems for LArTPC-ND; PRISM movement system for LArTPC-ND and TMS, which enables ‘off-axis’ measurements; and the cryogenics system for the superconducting SAND Beam Monitor magnet. The DUNE-ND facility and cryogenics systems are the responsibility of LBNF and do not fall directly within the scope of this review.

The committee is requested to review the design of the baseline elements for this ‘Day-1’ DUNE-ND (LArTPC-ND, TMS and ‘Day-1’ SAND Beam Monitor) and determine if these meet conceptual design (30%) requirements as outlined in the LBNF/DUNE Review Plan ([EDMS-2173197](https://edms.cern.ch/document/2173197)). The committee is asked whether the design documentation provided for the review (as summarized in [EDMS-xxxxxx](https://edms.cern.ch/document/2366627/1)) is sufficient for advancing to the preliminary design stage for these components.

As part of the review, the committee should assess the following questions for the ‘Day-1’ DUNE-ND:

1. Are the DUNE-ND requirements sufficiently well understood and documented and are they sufficiently complete for proceeding with the designs of each element?
2. Do the designs address detector requirements? Are the designs feasible? Are the key technical specifications for the major DUNE-ND elements understood and addressed?
3. Have interfaces between detector elements been identified? Are the interfaces with the cryostat, cryogenic systems, facility, and installation sufficiently understood?
4. Are the scope and institutional responsibilities for the major elements defined? Is all essential scope covered?
5. Are plans for prototyping tests sufficient to validate viability of the designs?
6. Do conceptual engineering models or schematics provide sufficient information to ascertain constructability and functionality? Do conceptual engineering calculations validate the design?
7. Have installation plans been sufficiently developed to give confidence that the detector elements can be installed?
8. Have appropriate manufacturing methods been identified and have rough cost and schedule estimates been developed? Is the schedule to move forward towards preliminary design, prototyping, and production realistic?

**Review Findings:**

The committee should present its findings, comments, and recommendations in a closeout meeting with DUNE Technical Coordination on 8 July 2020. The committee should provide a final written report by 24 July 2020.