Fermi National Accelerator Laboratory

Fermilab

# PIP-II Site Preparation
# Functional Requirements Specification

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## Document Approval

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## Revision History

| Revision | Date of Release | Description of Change |
|---|---|---|
| Rev - | 25 October 2017 | Initial Release |
| Rev A | 19 June 2018 | Updated to Revised Format |
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# Table of Contents

## 1. Purpose

An FRS describes the programmatic or project needs and/or requested behavior of a system or component. The document typically outlines what is needed by the end user as well as the requirements and requested properties of inputs and outputs. The FRS specifies the functions that a system or component must perform and establishes consensus among stakeholders on what the system is expected to provide.

## 2. Scope

This FRS addresses the functional requirements of the Site Preparation conventional construction including utility infrastructure, site work, roads and site restoration.

## 3. Acronyms

| | |
|---|---|
| FESHM | Fermilab ES&H Manual |
| FRCM | Fermilab Radiological Control Manual |
| FRS | Functional Requirements Specification |
| L2 | WBS Level 2 |
| L3 | WBS Level 3 |
| PIP-II | Proton Improvement Plan II Project |
| SCD | System Configuration Document |
| SP | Site Preparation |
| TC | Teamcenter |
| WBS | Work Breakdown Structure |

## 4. Reference

| # | **Reference** | **Document #** |
|---|---|---|
| 1 | Conventional Facilities Engineering Process Document Management | ED0002857 |
| 2 | Conventional Facilities System Configuration Document (SCD) | ED000xxxx |
| 3 | Fermilab Engineering Manual | NA |
| 4 | Fermilab Environmental Safety and Health Manual | NA |
| 5 | Fermilab Radiological Control Manual | NA |
| 6 | PIP-II Project Assumptions | PIP-II-doc-144 |
| 7 | PIP-II – Fermilab Interface Document | PIP-II-doc-528 |

## 5. Key Assumptions

The assumptions for the Site Preparation (SP) work includes:

1. The PIP-II Project Assumption document (PIP-II-doc-144) contains the detailed list of the requirements for the SP work;

## 6. Functional Requirements

| Requirement # | Requirement Statement |
|---|---|
| F-121.06.02-001 | The SPshall provide a safe environment for employees and the public. |
| F-121.06.02-002 | The SP shall provide and extension of the existing Fermilab utility infrastructure to the PIP-II site. This includes electrical, domestic water, industrial cooling water, sanitary sewer, chilled water and data/communication. |
| F-121.06.02-003 | The SP shall provide an extension of the existing Fermilab road network. |
| F-121.06.02-004 | The UPB shall comply with the overall character of the PIP-II campus. |

## 7. Safety Requirements

The system shall abide by all Fermilab ES&H (FESHM) and all Fermilab Radiological Control Manual (FRCM) requirements including but not limited to:

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| Pressure and Cryogenic Safety |
| • FESHM Chapter 5031 Pressure Vessels |
| • FESHM Chapter 5031.1 Piping Systems |
| • FESHM Chapter 5031.5 Low Pressure Vessels and Fluid Containment |
| • FESHM Chapter 5031.6 Dressed Niobium SRF Cavity Pressure Safety |
| • FESHM Chapter 5032 Cryogenic System Review |
| • FESHM Chapter 5033 Vacuum Vessel Safety |
| Electrical Safety |
| • FESHM Chapter 9110 Electrical Utilization Equipment Safety |
| • FESHM Chapter 9160 Low Voltage, High Current Power Distribution Systems |
| • FESHM Chapter 9190 Grounding Requirements for Electrical Distribution and Utilization Equipment |
| Radiation Safety |
| • FRCM Chapter 8 ALARA Management of Accelerator Radiation Shielding |

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| • FRCM Chapter 10 Radiation Safety Interlock Systems |
| • FRCM Chapter 11 Environmental Radiation Monitoring and Control |
| General Safety |
| • FESHM Chapter 2000 Planning for Safe Operations |
| Construction Safety |
| • FESHM Chapter 7010 ES&H Program for Construction |
| • FESHM Chapter 7030 Excavation |
| • FESHM Chapter 7060 Fall Protection |
| • FESHM Chapter 7070 Ladder & Scaffold Safety |
| Environmental Protection |
| • FESHM Chapter 8011 Groundwater Protection – Excavations and Wells |
| • FESHM Chapter 8012 Sedimentation and Erosion Control Planning |
| • FESHM Chapter 8025 Wastewater Discharge to Sanitary Sewers |
| • FESHM Chapter 8026 Surface Water Protection |
| • FESHM Chapter 8050 Domestic Water Protection |

Any changes in the applicability or adherence to these standards and requirements require the approval and authorization of the PIP-II Technical Director or designee.

In addition, the following codes and standards in their latest edition shall be applied to the engineering, design, fabrication, assembly and tests of the given system:

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| ASME B31.3 Process Piping |
| ASME Boiler and Pressure Vessel Code (BPVC) |
| CGA S-1.3 Pressure Relief Standards |
| NFPA 70 – National Electrical Code |
| IEC Standards for Electrical Components |

In cases where International Codes and Standards are used the system shall follow FESHM Chapter 2110 Ensuring Equivalent Safety Performance when Using International Codes and Standards and requires the approval and authorization of the PIP-II Technical Director or designee.

Additional Safety Requirements that are not listed in the general list above shall be included in the Requirements table in the Functional Requirements section.