

WBS Dictionary for WBS 3.0, Conventional Construction

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WBS Code	WBS Name	WBS Definition
475.03	Conventional Construction	This summary item includes all phases of design, procurement, installation and construction for the Mu2e Conventional Construction subsystem.
475.03.01	Conceptual Design	Labor, materials, services and equipment required to prepare the Conceptual design required for CD-1. These activities have been completed.
475.03.01.01	Engineering, Design & Inspection	Delivers the technical design, cost estimate and schedule required for the Conceptual Design and CD-1. Activities are complete.
475.03.01.02	Management & Administration	Project management, planning and organization of the conceptual design phase for Conventional Construction. Activities are complete.
475.03.01.03	A&E	This WBS item includes the consultant A&E labor, material and services in support of CD-1. Activities are complete.
475.03.02	Preliminary / Final Design	A Technical Objective: The building and below grade areas are outfitted to provide the safe environment to construct, support and operate, the scientific equipment that comprise the experiment.
		B Scope: Labor, materials, services and equipment required to prepare the preliminary design and performance baseline required for CD-2 and the final design required for CD-3 for the Conventional Construction system. Deliverable for the Preliminary design is the performance baseline and contribution to the Technical Design Report. Deliverable for CD-3 is the final construction drawings and contract documents to be sent to potential bidders.
		C Deliverables: The deliverables include all of the required planning tools including but not limited to a P6 schedule, Basis of Estimates (BOE), WBS Definitions, Milestone Definitions, Risk tools, Value Engineering and Technical Design Chapter. Includes the process of EVMS. Also included are the contract documents for the Mu2e Conventional Facilities and preliminary contract documents for the Delivery Ring Upgrade and procured items.
		D. Relationships/interfaces to other WBS or Muon Campus elements: The Preliminary / Final Design must fulfil the requirements for space, equipment access, electrical power, and cooling of the other Mu2e subprojects. The below grade interfaces directly with the MC Beamline Enclosure project # 6-10-22.
		E. Assumptions: The Mu2e Conventional Construction and the MC Beamline Enclosure will be constructed at the same time by the same contractor.
475.03.02.01	Project Management	This WBS item provides for the management function for the Conventional Construction subproject during the Preliminary and Final Design phases. Includes resources for development of the performance baseline and final design.

475.03.02.02	Detector Facility Engineering & Design	Delivers items developed by Fermilab FESS Engineering in support of the Preliminary and Final design of the Mu2e Detector Hall facility as well as management of the design effort by the A&E firm.
475.03.02.03	Delivery Ring Engineering & Design	Delivers items developed by Fermilab FESS Engineering in support of the Preliminary and Final design of the Delivery Ring upgrades as well as management of the design effort by the A&E firm.
475.03.02.04	Detector Facilities A&E Administration	This WBS item delivers the selection and procurement of the A&E firm for Preliminary and Final design.
475.03.02.04.01	Detector Facility A&E Deliverables	This WBS delivers the final design documents from the A&E at the 30%, 60%, 90% and 100% levels.
475.03.02.05	Construction Sub-Contract Administration	This WBS item includes the effort to develop a Request for Proposals and to evaluate received proposals from subcontractors bidding on the Conventional Construction package.
475.03.02.06	Fermi Procured Items	This WBS item includes the effort to develop a Request for Proposals and to evaluate received proposals for items procured by Fermilab for the Conventional Construction subsystem.
475.03.03	Construction Phase Oversight	A. Technical Objective: The FESS/Engineering department will provide the construction management for the project, coordinating the subcontractor's construction subcontract. Field inspection, environment, safety and health, and quality control of construction activity will be the responsibility of the subcontractor. FESS/Engineering will provide quality and safety assurance during construction phase activities.
		Scope: This WBS item includes the management, administration and engineering required to oversee the construction activities on the Fermilab site associated with the Conventional Construction subsystem.
		C. Deliverables; The FESS/Engineering department will provide the construction management for the project, coordinating the subcontractor's construction subcontract. Field inspection, environment, safety and health, and quality control of construction activity will be the responsibility of the subcontractor. FESS/Engineering will provide quality and safety assurance during construction phase activities. The Fermilab Construction Coordinator will develop and issue the final acceptance documentation.
		D. Relationships/interfaces to other WBS or Muon Campus elements; Includes reporting to Project Management of the status and any related issues. Maintaining the quality requirements where technical equipment interfaces with the building.
		E. Assumptions: NA
475.03.03.01	Project Management	This WBS item provides for the management function for the Conventional Construction subproject during the construction phase. Includes resources for monitoring progress, processing change requests and ESH&Q oversight.

475.03.03.02	Engineering Design & Inspection	This WBS activity includes the Construction Management, Construction Coordination, and the engineering resources to effectively oversee construction activities associated with Mu2e Conventional Construction.
475.03.03.03	Construction Sub-Contract Administration	Delivers the purchase order for a fixed price subcontract to construct the Detector Facilities and the effort to administer the contract throughout its duration.
475.03.03.03.01	Detector Facilities Sub-Contract Admin.	Delivers the purchase order for a fixed price subcontract to implement the Delivery Ring Upgrades and the effort to administer the contract throughout its duration.
475.03.03.03.02	Delivery Ring Sub-Contract Admin.	Delivers purchase orders for items procured directly by Fermilab. Includes the electrical items for installation by one of the fixed price subcontractors, the 1500 and 750 KVA transformers, new 2000 Amp Switchboards, 15 KV cable, 15 KV splices and terminations to be installed by the building's subcontractors. Also includes the two overhead cranes and the T&M effort to relocate existing Fermilab transformers and 2000 Amp Switchboards.
475.03.03.03.03	Fermi Procured Items and T&M Sub-Contract Admin.	This WBS includes the Fermilab labor to support, administer and oversee the detector hall construction contract.
475.03.03.04	A&E Management	This WBS item includes management and oversight of the A&E subcontract during Construction.
475.03.03.04.01	A&E Deliverables	This WBS item includes the technical support from the A&E firm to produce shop drawings and respond to change requests. Included are field visits to assist in resolving construction issues.
	Construction	
475.03.04	Mu2e Conventional Facilities; Detector Hall	A. Technical Objective
475.03.04.01		Scope: This WBS item delivers buildings in accordance with the contract documents entitled Mu2e Conventional Facilities, FESS Eng. Project Number 6-10-2.
		C. Deliverables: A complete functioning facilities to build, operate and maintain the Mu2e technical equipment.
		D. Relationships/interfaces to other WBS or Muon Campus elements: The below grade interfaces directly with the MC Beamline Enclosure project # 6-10-22.
		E. Assumptions: NA.
475.03.04.01.01	Div. 01 General	Includes all contracted labor, materials, tools, equipment, and services needed to construct the detector hall.
475.03.04.01.02	Div. 02 Site Construction	Includes all contracted labor, materials, tools, equipment, and services needed to prepare the site for construction including excavation, backfill, utilities, site demolition, paving and walks. Includes all soil and erosion controls.

475.03.04.01.03	Div. 03 Concrete	Includes all contracted labor, materials, tools, equipment, and services needed to construct reinforced structural concrete slabs, walls, footings and piers. Includes reinforced and non-reinforced concrete for utilities and equipment support.
475.03.04.01.04	Div. 04 Masonry	Includes all contracted labor, materials, tools, equipment, and services needed to construct the masonry walls.
475.03.04.01.05	Div. 05 Metals	Includes all contracted labor, materials, tools, equipment, and services needed to construct the steel structures.
475.03.04.01.06	Div. 06 Wood & Plastics	Includes all contracted labor, materials, tools, equipment, and services needed to construct the misc. wood and plastic structures.
475.03.04.01.07	Div. 07 Thermo & Moisture Protection	Includes all contracted labor, materials, tools, equipment, and services needed to construct the metal wall panes, roofing and misc. items associated with moisture protection.
475.03.04.01.08	Div. 08 Doors & Windows	Includes all contracted labor, materials, tools, equipment, and services needed to construct the doors, hardware frames and windows.
475.03.04.01.09	Div. 09 Finishes	Includes all contracted labor, materials, tools, equipment, and services needed to apply and install the finishes including painting, ceiling and flooring.
475.03.04.01.10	Div. 10 Specialties	Includes all contracted labor, materials, tools, equipment, and services needed to construct the specialty items including the raised floor.
475.03.04.01.14	Div. 14 Cranes & Elevators	Includes all contracted labor, materials, tools, equipment, and services needed to construct the elevator and to install the two 30 ton overhead bridge cranes.
475.03.04.01.15	Div. 15 Mechanical	Includes all contracted labor, materials, tools, equipment, and services needed to install the plumbing, HVAC, Process Piping, drainage and fire protection.
475.03.04.01.16	Div. 16 Electrical	Includes all contracted labor, materials, tools, equipment and services needed to construct primary power, electrical distribution equipment, stand-by power, lighting, receptacles, panelboards, transformers, grounding, fire detection, wires and conduits.
475.03.04.02	Delivery Ring Upgrades	A. Technical Objective: Provide additional power distribution in AP-30 for beamline power supplies.
		B. Scope: Delivers the HVAC and electrical services upgrades for the Delivery Ring in AP-30 for the upstream beamline power supplies.
		C. Deliverables: A 1200 Amp electrical service at the north end of the AP-30 Service Building.
		D. Relationships/interfaces to other WBS or Muon Campus elements
		E. Assumptions
475.03.04.02.02	Div. 02 Site Construction	Includes all contracted labor, materials, tools, equipment and services needed for site construction including excavation, backfill, utilities, site demolition, paving and walkways. Includes all soil and erosion controls measures.
475.03.04.02.03	Div. 03 Concrete	Includes all contracted labor, materials, tools, equipment, and services needed to construct reinforced structural concrete slabs, walls, footings and piers. Includes reinforced and non-reinforced concrete for utilities and equipment support.

475.03.04.02.15	Div. 15 Mechanical	Includes all contracted labor, materials, tools, equipment, and services needed to construct the ventilation system in the AP Enclosures.
475.03.04.02.16	Div. 16 Electrical	Includes all contracted labor, materials, tools, equipment, and services needed to construct primary power, electrical distribution equipment, grounding, wire and conduits.
475.03.04.03	Fermi Procured Items and T&M	A. Technical Objective: Eliminate schedule impacts by the direct procurement of certain long lead items. Use T&M for schedule flexibility and higher level of quality control.
		B. Scope: Delivers electrical components, overhead cranes and shielding blocks that are supplied by Fermilab to the subcontractor for installation. Also delivers certain T&M work associated with the extinction monitor and absorber.
		C. Deliverables: A complete functioning facilities to build, operate and maintain the Mu2e technical equipment.
		D. Relationships/interfaces to other WBS or Muon Campus elements: The Preliminary / Final Design must fulfill the requirements for space, equipment access, electrical power, and cooling of the other Mu2e subprojects.
		E. Assumptions: None
475.03.05	Project Close	A. Technical Objective: Provide the document configuration control, lessons learned, and financial close of all work packages.
		B. Scope: Includes commissioning of building systems, documentation of as-build contract documents, and close of all project/task codes. Document lessons learned.
		C. Deliverables
		D. Relationships/interfaces to other WBS or Muon Campus elements
		E. Assumptions
475.03.05.01	Engineering, Design & Inspection	Delivers as-built drawings, complete and approved radiation shielding drawings, subcontractor assessments, commissioning.
475.03.05.02	Management & Administration	Delivers lessons learned, archiving of all files. Initiates financial close of all open task codes.