Short Baseline Neutrino Project

BASIS of ESTIMATE FORM (BoE)

SBN-docDB Number:

Date of Estimate: 22.12.2014

Prepared by: I. Kreslo

WBS Number: 2.5	**Control Account (CTC):**	**CAM:**

WBS Title: Cosmic-ray detector construction

WBS Dictionary Definition:

Cost Type:

_x_ M&S _x_Labor

Cost Estimate Method:

_x_Engineering Estimate

__Vendor Quote or Vendor Survey

_x_ Prior Purchase or Experience Source: _Scintillator order in 2014_____

__Other (Please describe) : _____

__Catalog Price Source:_____

Supporting Documents: Scintillator pilot order (OrderSaintGobain.jpeg), CITIROC FE ASIC pilot order (QuotationCitiroc.pdf).

Task Duration: **700 days**

Task M&S Cost (FY15)**: 2250000**

Task M&S Contingency (% and the contingency rule applied)**:**
25% (M3, M4)

Task Labor (Resource type & work hours or % for duration of task)**:** 12640 hours

Task Labor Contingency (% and the contingency rule applied)**:** 25% and L4

Assumptions:

- See SBN-doc-186 for project key assumptions
- Costs are in FY2015 dollars and do not include indirects.
- Durations are in working days.
- 85% efficiency assumed for labor hours. 1 FTE = 1768 hours for an average year.
- Add your assumptions here for the BOE

Task Table

WBS	WBS Title	Duration (days)	M&S ($)	M&S Contingency (% and rule)	Labor resource and % effort or total hours for each labor resource	Total labors (hours)	Labor Contingency (% and rule)
2.5.1	Cosmic-ray detector engineering design	150	$10,000	30% and M4	Mech. Eng. - 1200 hours; Tech. - 1000 hours	2200	25% and L4
2.5.2	Cosmic-ray detector readout elevtronics design	180	$10,000	30% and M4	Elec. Eng. - 1440 hours; Elec. Tech. - 1000 hours	2440	25% and L4
2.5.3	Fermilab design review - L4 milestone						
2.5.4	Cosmic ray tagger detector and electronics fabrication and assembly	500	$2,230,000	20% and M3	Mech. Eng. - 4000 hours; Tech. - 4000 hours	8000	25% and L4
2.5.5	Delivery of the cosmic-ray detector for Installation – L4 milestone						
	Total		$2,250,000			12640	

Details of Estimate

The estimate is based on the cryostat outer dimensions stated at slide 8 of DocDB 262-v2, assuming coverage scheme, given in DocDB 192-v1, with the assumption of 7 planes of X-Y coordinate sensitive scintillating arrays.
The cost of scintillator is calculated on the basis of the order of prototype strips as for December 2014 (see the order attached as OrderSaintGobail.jpeg).

The more detailed calculations are given in the Comments.
The design of the readout electronics will require 1440 hours of an Electronics Engineer and 1000 hours of the technical personnel on the assembly and testing of the prototype and final production R/O boards. The design of the mechanical structure will go in parallel and require 1200 hours of a Mechanical Engineer and 1000 hours of a technical personnel.

The cost of the readout electronics is based on the order of CITIROC ASICS in November 2014 (see the quote attached as QuotationCitiroc.pdf).

Contingency

The contingency for a dominating part of the cost (cost of the scintillator material) is given according to M3, based on extrapolation of the existing order.

The cost of manufacturing and the cost of the electronics design is given according to M4, based on the previous experience of design of the similar system for T2K experiment in 2012-2013.

Comments

Component	unit	units requited	cost USD per unit	total cost, USD		cryostat	
						W,m	7.07
Scintillator	m2	786.874284	2750	2163904.281		L,m	8.587
Kuraray W11	m	7868.74284	5	39343.7142		H,m	6.748
CITIROC	pc	40	150	6000			
FPGA	pc	40	100	4000		Scintillating strip width,m	0.1
PCB	pc	40	100	4000			
Consolidator	pc	14	200	2800			
cables etc				10000			
total, USD				2230047.9952			