



# BOE Discussion

Paul Derwent

17 May 2017

# Details

- Management will define:
  - level of BOE
    - Ties loosely with Control Accounts
      - R&D Phase: 1 BOE document
      - Construction Phase: several BOE documents
        - Project Management (covers LOE) at L4
        - Labor and M&S – 1 or 2
  - responsible party (L3 manager who made estimate)
  - pip2-docdb entry
    - **word form**, with some information preloaded
    - **Excel form**, with some information preloaded
      - resources (labor and M&S) for the task
        - Help Luisella and Joe in filling out P6
      - fill in contingency rule and estimate uncertainty
    - these two documents need to be **consistent in format** across the entire project
      - information also has to be consistent with what is in P6
  - Work with L3 manager on WBS dictionary element
    - Need to have consistent wording and approach

- BOE needs WBS defined
  - Describe work associated with scope
  - Have documents in docdb for many ★
  - Drafts for some ★
  - Spreadsheet for associated labor and M&S resources should be available today (?)

121 PIP-II Project		3202
121.1 PIP-II - Major Milestones		3202
+ 121.1.1	T0 Milestones (DOE Acquisition Executive for Critical Decision)	0
+ 121.1.2	T1 Milestones (DOE Program Office)	2069
+ 121.1.3	T2 Milestones (Fermilab Site Office)	2699
+ 121.1.4	I3 In-kind Milestones (Fermilab Directorate)	1132
+ 121.1.5	External Milestones	1439
★ 121.2 PIP-II - Project Management ★		2635
+ 121.2.1	PM - T3 Milestones (PIP-II Project Manager)	2635
+ 121.2.2	PM - Fermilab & USA Coordination (Fermi&USACoord)	2571
+ 121.2.3	PM - International Coordination (IntCoord)	2571
+ 121.2.4	PM - Business Office (BO)	2571
+ 121.2.5	PM - Environmental Safety, Health & Quality (ESH&Q)	2571
+ 121.2.6	PM - System Engineering & Electrical and Mechanical Integration (SE&EMI)	2571
121.3 PIP-II - Linac		2859
+ 121.3.1	Linac - Project Management (PM)	1130
+ ★ 121.3.11	Linac - CRYOgenics (CRYO)	2198
+ 121.3.22	Linac - Installation, Integration & Commissioning Coordination (I&I&CC)	0
+ 121.3.3	Linac - Warm Front End (WFE)	441
+ ★ 121.3.5	Linac - Single Spoke Resonator 1 (SSR1)	691
+ ★ 121.3.6	Linac - Single Spoke Resonator 2 (SSR2)	841
+ 121.3.7	Linac - Low Beta 650 (LB650)	353
+ ★ 121.3.8	Linac - High Beta 650 (HB650)	1044
+ ★ 121.3.9	Linac - Radio Frequency power (RF)	2859
121.4 PIP-II - Booster		63
+ 121.4.1	Booster - R&D Phase	63
121.5 PIP-II - Recycler/Main Injector		0
+ 121.5.1	R&MI - R&D Phase	0
★ 121.6 PIP-II - Conventional Facility ★		2320
+ 121.6.1	CF - Conceptual Design (for all PIP-II civil engineering works)	441
+ 121.6.2	CF - Site Preparation	857
+ 121.6.3	CF - Cryo Plant Building	1171
+ 121.6.4	CF - Utility Building	1066
+ 121.6.5	CF - High Bay Building	1293
+ 121.6.6	CF - Linac Tunnel (including Penetrations between Gallery and Tunnel)	1356
+ 121.6.7	CF - Linac Gallery	1543
+ 121.6.8	CF - Beam Transfer Line (to booster, excluding booster connection and including Bea	674
+ 121.6.9	CF - Booster Connection	1190
121.7 Template Procurement - 13 Mar 2017 - Iari		226
+ 121.7.1	General Procurement	226

# pip2-docdb : topic BOE

## PIP-II

### Document List by Topic

These documents on [Basis of Estimates](#) (subtopic of [Project Management](#)) are available:

PIP-II-doc-#	Title	Author(s)	Topic(s)	Last Updated
<a href="#">378-v2</a>	<a href="#">BOE Document for 121.3.8.2.9 HB650 2nd-4th CM Test</a> (Unapproved - No approved version)	<a href="#">Tom Nicol et al.</a>	<a href="#">Project Management</a> <a href="#">CD-1</a> <a href="#">BOE</a>	15 May 2017
<a href="#">375-v2</a>	<a href="#">BOE Document for 121.3.8.2.6, .7, and .8 HB650 2nd-4th CM Integration and Assembly</a> (Unapproved - No approved version)	<a href="#">Tom Nicol et al.</a>	<a href="#">Project Management</a> <a href="#">CD-1</a> <a href="#">BOE</a>	15 May 2017
<a href="#">372-v2</a>	<a href="#">BOE Document for 121.3.8.2.4 and .5 HB650 2nd-4th CM Cavities</a> (Unapproved - No approved version)	<a href="#">Tom Nicol et al.</a>	<a href="#">Project Management</a> <a href="#">CD-1</a> <a href="#">BOE</a>	15 May 2017
<a href="#">369-v2</a>	<a href="#">BOE Document for 121.3.8.2.3 HB650 2nd-4th CM Design</a> (Unapproved - No approved version)	<a href="#">Tom Nicol et al.</a>	<a href="#">Project Management</a> <a href="#">CD-1</a> <a href="#">BOE</a>	15 May 2017
<a href="#">366-v2</a>	<a href="#">BOE Document for 121.3.8.1.9 HB650 1st CM Test</a> (Unapproved - No approved version)	<a href="#">Tom Nicol et al.</a>	<a href="#">Project Management</a> <a href="#">CD-1</a> <a href="#">BOE</a>	15 May 2017
<a href="#">363-v2</a>	<a href="#">BOE Document for 121.3.8.1.6, .7, and .8 HB650 1st CM Integration and Assembly</a> (Unapproved - No approved version)	<a href="#">Tom Nicol et al.</a>	<a href="#">Project Management</a> <a href="#">CD-1</a> <a href="#">BOE</a>	15 May 2017
<a href="#">360-v2</a>	<a href="#">BOE Document for 121.3.8.1.4 and .5 HB650 1st CM Cavities</a> (Unapproved - No approved version)	<a href="#">Tom Nicol et al.</a>	<a href="#">Project Management</a> <a href="#">CD-1</a> <a href="#">BOE</a>	15 May 2017
<a href="#">357-v2</a>	<a href="#">BOE Document for 121.3.8.1.3 HB650 1st CM Design</a> (Unapproved - No approved version)	<a href="#">Tom Nicol et al.</a>	<a href="#">Project Management</a> <a href="#">CD-1</a> <a href="#">BOE</a>	15 May 2017
<a href="#">351-v3</a>	<a href="#">BOE Document for 121.3.8.1.2 and 121.3.8.2.2 HB650 Project Management and Coordination</a> (Unapproved - No approved version)	<a href="#">Tom Nicol et al.</a>	<a href="#">Project Management</a> <a href="#">CD-1</a> <a href="#">BOE</a>	15 May 2017
<a href="#">423-v3</a>	<a href="#">BOE Document for 121.3.6.1.2 and .2.2 SSR2 PM and Coordination</a> (Unapproved - No approved version)	<a href="#">Leonard Ristori et al.</a>	<a href="#">Project Management</a> <a href="#">CD-1</a> <a href="#">BOE</a>	15 May 2017
<a href="#">238-v9</a>	<a href="#">BOE Document for 121.6.2 CF Site Preparation</a> (Unapproved - No approved version)	<a href="#">Steve Dixon</a>	<a href="#">Conceptual Development</a> <a href="#">Civil Construction</a> <a href="#">Project Management</a> <a href="#">CD-1</a> <a href="#">BOE</a>	09 May 2017
<a href="#">244-v5</a>	<a href="#">BOE Document for 121.6.3 CF Cryo Plant Building</a> (Unapproved - No approved version)	<a href="#">Steve Dixon</a>	<a href="#">Conceptual Development</a> <a href="#">Civil Construction</a> <a href="#">Project Management</a> <a href="#">CD-1</a> <a href="#">BOE</a>	09 May 2017

53 documents in docdb – similar number to create

## PIP-II Document 265-v5

## BOE Document for 121.6.9 CF Booster Connection

(Document Status: Unapproved)

**Document #:**  
PIP-II-doc-265-v5

**Document type:**  
[Report](#)

**Submitted by:**  
[Steve Dixon](#)

**Updated by:**  
[Steve Dixon](#)

**Document Created:**  
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09 May 2017, 14:59

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**Abstract:**

BOE Document for 121.6.9 CF Booster Connection work scope including detailed design, final design, procurement and construction.

**Files in Document:**

- [BOE Document for 121.6.9 CF Booster Connection \(docx\)](#) (PIP-II BOE 121.6.9 CF Booster Connection.docx, 33.2 kB)

**Other Files:**

- [A - BOE Document for 121.6.9 CF Booster Connection \(pdf\)](#) (PIP-II BOE 121.6.9 CF Booster Connection - 09MAY17.pdf, 232.6 kB)
- [B - 121.6.9 BoE Calculation \(pdf\)](#) (BoE Calculation 121.6.9 - 09MAY17.pdf, 180.8 kB)

Get all files as [tar.gz](#), [zip](#).

**Topics:**

- [Project Management](#)
- [Civil Construction](#)
- [Project Management:DOE Reviews:CD-1](#)
- [Project Management:BOE](#)

**Authors:**

- [Steve Dixon](#)

**Notes and Changes:**

minor edits/grammar

**Related Documents:**

- PIP-II-doc-144: [PIP-II Project Assumptions Document](#)  
(Approved - 30 Mar 2017)
- PIP-II-doc-327: [CF: EDIA Percentage Calculation Memo](#)
- PIP-II-doc-318: [CF: AE Tasking Duration Assumptions](#)
- PIP-II-doc-187: [CF: MOU between PIP-II and FESS](#)
- PIP-II-doc-217: [BOE Document for 121.6.1 CF R&D Phase](#)  
(Unapproved - No approved version)
- PIP-II-doc-333: [CF: Conceptual Level Construction Package Cost Estimate](#)
- PIP-II-doc-345: [Contingency Rules for Basis Of Estimates](#)  
(Approved - 03 Apr 2017)
- PIP-II-doc-217: [BOE Document for 121.6.1 CF R&D Phase](#)  
(Unapproved - No approved version)
- PIP-II-doc-238: [BOE Document for 121.6.2 CF Site Preparation](#)  
(Unapproved - No approved version)
- PIP-II-doc-250: [OBSOLETE - BOE Document for 121.6.4.1.1 CF Utility Building Detailed and Final Design](#)  
(Unapproved - No approved version)
- PIP-II-doc-516: [BOE Document for 121.6.5 - CF High Bay Building](#)  
(Unapproved - No approved version)
- PIP-II-doc-256: [BOE Document for 121.6.6 CF Linac Tunnel](#)  
(Unapproved - No approved version)
- PIP-II-doc-262: [BOE Document for 121.6.8 CF Beam Transfer Line](#)  
(Unapproved - No approved version)

**Referenced by:**

- PIP-II-doc-327: [CF: EDIA Percentage Calculation Memo](#)
- PIP-II-doc-318: [CF: AE Tasking Duration Assumptions](#)
- PIP-II-doc-321: [CF: Construction Subcontract Duration Assumptions](#)
- PIP-II-doc-333: [CF: Conceptual Level Construction Package Cost Estimate](#)
- PIP-II-doc-244: [BOE Document for 121.6.3 CF Cryo Plant Building](#)  
(Unapproved - No approved version)
- PIP-II-doc-238: [BOE Document for 121.6.2 CF Site Preparation](#)  
(Unapproved - No approved version)
- PIP-II-doc-259: [BOE Document for 121.6.7 CF Linac Gallery](#)  
(Unapproved - No approved version)
- PIP-II-doc-253: [BOE Document for 121.6.4 CF Utility Plant](#)  
(Unapproved - No approved version)
- PIP-II-doc-217: [BOE Document for 121.6.1 CF R&D Phase](#)  
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**Other Versions:**

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[PIP-II-doc-265-v3](#)  
02 May 2017, 11:43  
Unapproved

[PIP-II-doc-265-v2](#)  
05 Apr 2017, 10:45  
Unapproved

[PIP-II-doc-265-v1](#)  
13 Mar 2017, 15:42  
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[PIP-II-doc-265-v0](#)  
13 Mar 2017, 15:41  
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- Docdb link: <https://pip2-docdb.fnal.gov:440/cgi-bin/ShowDocument?docid=265>

**PIP-II**  
**PIP-II Document 229-v3**  
**BOE Document for 121.2 Project Management**  
(Document Status: Unapproved)

**Document #:**  
PIP-II-doc-229-v3

**Document type:**  
[Report](#)

**Submitted by:**  
[Steve Holmes](#)

**Updated by:**  
[Steve Holmes](#)

**Document Created:**  
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**Abstract:**  
BOE Document for 121.2 Project Management

**Files in Document:**

- [PIP-II BOE 121.2 Project Management](#) (PIP-II BOE 121.2.x.1 Project Management R and D.docx, 29.9 kB)
- [PM BOE](#) (PM BOE\_R&D.xlsx, 20.2 kB)

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**Topics:**

- [Project Management](#)
- [Project Management:DOE Reviews:CD-1](#)
- [Project Management:BOE](#)

**Authors:**

- [Steve Holmes](#)

**Notes and Changes:**

Paul's comments on version

**Related Documents:**

- PIP-II-doc-345: [Contingency Rules for Basis Of Estimates](#)  
(Approved - 03 Apr 2017)

**Signoffs:**

- [Paul Derwent 1029](#)

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**Other Versions:**

[PIP-II-doc-229-v2](#)  
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# Details

- As WBS in RLS gets defined
  - WBS Dictionary definition
  - Create BOE documents in Docdb
  - L3: Email from me
- Reviewed by other members of the management team
- Drafts complete by ~ mid June – trail WBS definition by several weeks
- BOE workshop ~ mid July

Paul Derwent

Sent - FermiCloud April 11, 2017 at 2:48 PM



BOE Documents for SSR1

Details

To: Leonardo Ristori, Allan M Rowe, Cc: Dean A Hoffer

Leonardo & Allan

I have created BOE documents in the pip2-docdb with the following numbers:

Topic	WBS #	docdb #
SSR1	121.3.5.1.2 & .2.2	384
SSR1	121.3.5.1.3	387
SSR1	121.3.5.1.4	393
SSR1	121.3.5.1.5 & .6 & .7	396
SSR1	121.3.5.1.8	399
SSR1	121.3.5.2.3	402
SSR1	121.3.5.2.4 & .5	405
SSR1	121.3.5.2.6 & .7 & .8	408
SSR1	121.3.5.2.9	411

There are WORD documents there for you to edit, no information yet from P6. I have written a first pass WBS dictionary - you should expand and improve. Please download from the docdb! Dean and I would like your feedback on the information, process, etc so that the next group can have it somewhat easier. When you have a draft for review, put it back into the docdb as an updated version and let us know.

-Paul

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Paul Derwent

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# WBS Dictionary: Defining to Level 5

Activity ID	Dictionary Entry	Responsible Party	Named Party
121 PIP-II Project	In collaboration with international partners, the PIP-II Project will enhance the Fermilab accelerator complex to deliver higher-power proton beams to the neutrino-generating target that serves the LBNF/DUNE program, enabling a capability of 1.2 MW on target at 120 GeV. The PIP-II Project comprises a 800 MeV superconducting radio frequency (SRF) linac, transfer line to the Booster enclosure, upgrades to the Booster, Recycler, and Main Injector synchrotrons for increased intensity, associated buildings and infrastructure, and all project management.	PIP-II Project Manager	Steve Holmes
121.1 PIP-II - Major Milestones	This WBS entry covers all major milestones tracked by the project, no costs or effort are included in this section.	PIP-II Project Manager	Steve Holmes
121.2 PIP-II - Project Management	This WBS entry covers the labor, materials, travel, and fixed costs associated with operations of the PIP-II Project Office, including the offices of the Project manager and staff; the project support functions; coordination with international partners; environment, safety, and health; quality assurance; configuration management; and document control.	PIP-II Project Manager	Steve Holmes
121.3.5 Linac - Single Spoke Resonator 1 (SSR1)	This WBS entry covers design, procurement, fabrications and testing of the Single Spoke Resonator type 1 cavities and cryomodules. Final scope will be delivery of 2 tested CMs for installation.	PIP-II L3 SSR1	Leonardo Ristori
121.3.5.1 Linac - SSR1 1st Cryomodule	This WBS entry covers design, procurement, fabrications and testing of the prototype SSR1 cavities and cryomodule.	PIP-II L3 SSR1	Leonardo Ristori
121.3.5.1.1 Linac - SSR1 - 1st CM - T4 Milestones	This WBS entry includes major milestones for the prototype SSR1 cavities and cryomodule.	PIP-II L3 SSR1	Leonardo Ristori
121.3.5.1.2 Linac - SSR1 - 1st CM - Project Management and Coordination	This WBS entry covers aspects of project management for prototype SSR1 cavities and cryomodule including the overall coordination of the technical effort, project planning and scheduling, cost estimating, risk and contingency analysis, and reporting. It also includes travel costs for management and vendor visits during this phase. Design reviews? IPA Reviews?	PIP-II L3 SSR1	Leonardo Ristori
121.3.5.1.3 Linac - SSR1 - 1st CM - Design	This WBS entry covers design of the prototype SSR1 cavities and cryomodule. It includes dressed cavities, RF couplers, Cold mass, tuners, and cryomodule.	PIP-II L3 SSR1	Leonardo Ristori
121.3.5.1.4 Linac - SSR1 - 1st CM - Dressed CAVities qualification	This WBS entry covers labor and procurement for the processing, preparation, and testing of the prototype SSR1 dressed cavities. It includes the RF couplers, tuners, Helium vessel, magnetic shielding, processing, preparation, and power tests for the 6 cavities in the cryomodule.	PIP-II L3 SSR1	Leonardo Ristori
121.3.5.1.5 Linac - SSR1 - 1st CM - STRING integration	This WBS entry covers labor and procurement for the string assembly of the prototype SSR1 cryomodule.	PIP-II L3 SSR1	Leonardo Ristori
121.3.5.1.6 Linac - SSR1 - 1stCM - COLD MASS integration	This WBS entry covers labor and procurement for the coldmass components of the prototype SSR1 cryomodule. It includes cryogenic piping, strongback, cold instrumentation, additional components, and tooling.	PIP-II L3 SSR1	Leonardo Ristori
121.3.5.1.7 Linac - SSR1 - 1stCM - CryoModule final INTEgration	This WBS entry covers labor and procurement for the integration and assembly of the prototype SSR1 cryomodule. It includes the vacuum vessel, additional components, and tooling.	PIP-II L3 SSR1	Leonardo Ristori
121.3.5.1.8 Linac - SSR1 - 1stCM - CryoModule TEST in PIP2IT	This WBS entry covers labor for the power testing of the prototype SSR1 cryomodule. It includes transportation, installation, qualification, and removal.	PIP-II L3 SSR1	Leonardo Ristori



# BOE Reviewers: Tentative

WBS		L3	Reviewers
121.2	Project Management / Office	Steve Holmes	Paul Derwent, Dean Hoffer
121.3.1	Linac Project Management	Fernanda Garcia	Steve Holmes
121.3.2	Linac Accelerator Physics	Valeri Lebedev	Shekhar Mishra
121.3.3	Linac Warm Front End	Lionel Prost	Shekhar Mishra
121.3.4	Linac HWR	Allan Rowe	Shekhar Mishra, Fernanda Garcia
121.3.5	Linac SSR1	Leonardo Ristori	Shekhar Mishra, Fernanda Garcia
121.3.6	Linac SSR2	Leonardo Ristori	Shekhar Mishra, Fernanda Garcia
121.3.7	Linac LB650	Tom Nicol	Shekhar Mishra, Fernanda Garcia
121.3.8	Linac HB650	Tom Nicol	Shekhar Mishra, Fernanda Garcia
121.3.9	Linac RF Power	Dave Peterson	Lionel Prost
121.3.10	Linac RF Integration	Brian Chase	Lionel Prost, Jim Patrick
121.3.11	Linac Cryo	Arkadiy Klebaner	Allan Rowe, Shekhar Mishra
121.3.12	Linac Warm Units	Alex Chen	Curtis Baffes
121.3.13	Linac Magnet PS	Bruce Hanna	Lionel Prost
121.3.14	Linac Beam Transfer Line	TBD	Curtis Baffes, Allan Rowe
121.3.15	Linac Beam Abort Line	TBD	Curtis Baffes, Allan Rowe
121.3.16	Linac Instrumentation	Vic Scarpine	Jim Steimel
121.3.17	Linac Controls	Jim Patrick	Jim Steimel
121.3.18	Linac Vacuum	Alex Chen	Curtis Baffes
121.3.19	Linac Safety Systems	John Anderson	Shekhar Mishra
121.3.20	Linac Test Infrastructure	Jerry L, Joe O, Alex M, Leonardo R	Jim Steimel, Bruce Hanna, Dave Peterson
121.3.22	Linac Installation, Integration, Commissioning	Curtis Baffes	Shekhar Mishra, Fernanda Garcia, Allan Rowe, Jim Steimel
121.4	Booster	Ioanis Kourbanis	Lionel Prost
121.5	RR/MI	Ioanis Kourbanis	Lionel Prost
121.6	Conventional Facilities	Steve Dixon	Steve Holmes, Shekhar Mishra