Status of ITER Buildings construction and next procurement steps

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Site, Buildings and Power Supplies Project Manager

IBF/15
25-27 March 2015
Palais du Pharo / Marseille / France
Overall responsibility

Manage the in kind contributions in the areas of Site Preparation, Buildings and Power Supplies

- **Contracts phase responsibilities**
  - Supervise the preparation of the tender documentation
  - Follow the calls for tenders
  - Ensure the follow-up of the contracts

- **Design and tendering phase responsibilities**
  - Design of all buildings (Civil works, HVAC, Mechanical equipment, handling, electrical, I&C), power supplies (Steady state and Pulsed Power) and site infrastructures
  - Ensure the Integration and the design implementation of IO requirement in respect of the French Nuclear Order
  - Integration into the 3D mock-up
  - Tender documentation based on IO requirement
  - Construction design only for Nuclear Buildings – Civil Engineering
  - Change management

- **Construction phase responsibilities**
  - Implementation of IO requirement
  - Integration of Contractor’s design (integration cell)
  - Approval of the construction design made by the Contractors (VISA)
  - Technical supervision of the works
  - Planning and coordination
  - As-built documentation
  - Assistance for acceptance of the works
  - Change management

- **Health and Safety Responsibilities**
  - Ensure the Owner responsibilities in the follow up of the Health and Safety contact
CURRENT STATUS OF ITER worksite

Approaching the peak of construction
CURRENT STATUS OF ITER

ITER after construction

Expected completion date 2
OVERVIEW OF THE SBPS SCOPE

ITER: 180 ha with 39 buildings and areas on the 40 ha platform

Reinforced Concrete Buildings
- 250 000 m³ of concrete (including 190 000 m³ for Nuclear buildings)
- 21 000 m² footprint
- 750 000 m³ building volume

Steel Frame Buildings
- 29 000 m² footprint

Power supplies (HV, MV, and LV distribution)
- Detailed design, installation and commissioning
- Procurement of the emergency generators, the cables, and 25% of the SSEN equipment
- Current arrangement: the remainder of the equipment are procured by other Domestic agencies (China and US)

Site infrastructures (Galleries, trenches, roads, bridges fences)
Support Contracts:
Architect Engineer ENGAGE – 250 M€ Contract signed in 2010
Support to the Owner ENERGHIA – 30 M€ Contract signed in 2010
Health and Safety Protection Coordination and Legal Inspection APAVE – 10 M€ Contract signed in 2010

Construction Contracts signed and on going:
TB00 – GTM 50 M€ Construction of the Tokamak Complex Seismic Isolation Pit + B2 slab and NUVIA 15 M€ Supply and Installation of Anti-Seismic Bearings – Contracts signed in 2010, works completed
TB01 – COMSA Site Adaptation – 20 M€ Contract signed in 2011, works completed
TBAlpha – COMSA Galleries and drainage works – 10 M€ Contract signed in 2012, works completed
TB02 – NKM NOELL – REEL Long Lead – Mechanical Handling – 35 M€ Contract signed in 2013
TB03 – VFR : Vinci Ferrovial Razel Main Civil & Finishing – 300 M€ Contract signed in 2012
TB04 – OMEGA: GdF Suez M+W Main M&E/Services – 500 M€ Contract signed in 2013
TB05 – Ferrovial D&B Package – 25 M€ Contract signed in 2013
TB06 – Ferrovial HV Electrical Equipment – 38 M€ Contract signed in 2014
TB07 – Ferrovial D&B Package – 15 M€ Contract signed in 2013
Geographical scope of Construction Contracts (TBs)

- TB09 & TB10 Hot Cells
- TB05 Magnet Power Conversion & Reactive Power Control buildings
- TB03 & TB04 Tokamak Complex & Assembly Hall
- TB06 High Voltage Electrical Equipment
- TB07 Cooling Towers
- TB08 Emergency Power Supplies
- TB12 NB bldgs
TB03 – CIVIL ENGINEERING AND FINISHING WORKS

Cranes installations September 2014 - January 2015
Short term program

✓ End of B2 walls B74 (63 plots) : May 2015
✓ End of B2 walls B14 (82 plots) : July 2015
✓ End of B2 walls B11 (100 plots) : Jan 2016
✓ Construction aspects ~ 250 plots
TB03 – CIVIL ENGINEERING AND FINISHING WORKS

Walls pouring

✓ Target for B1 start June 2015
TB03 – CIVIL ENGINEERING AND FINISHING WORKS

B2 Bioshield mock-up

✓ 400 kg of steel per m³
Assembly building

- Target:
  Ready for crane rails installation: October 2015
3D view of the Assembly Hall: October 2015
Other buildings – objectives for 2015

• Building 61 – Site Services Building
  • Construction started
  • Building weather tight planned in Oct 2015
  • First TB04 activities planned in **Oct 2015**

• Building 15 – RF Heating Building
  • Construction Design Review ongoing
  • Start of Works planned in **May 2015**

• Building 17 – Cleaning Facility Building
  • Construction Design Review ongoing
  • Start of Works planned in **May 2015**

• Building 51-52 – Cryoplant Buildings
  • Construction Design Review ongoing
  • Start of Works planned in **May 2015**
Location of 750t and 50t Tokamak Cranes & Cask Lift

- Building 13
  - Assembly Building
- Building 11
  - Tokamak Hall
- West Rails of 750t Cranes
- West Rails of 50t Cranes
- Cask Lift operates in NE corner of B11
Scope of Supply: Cask Transfer Lift & Tokamak Cranes

Tokamak Assembly Cranes
✓ 2 x 750t cranes each with for assembly of large items within Tokamak machine
  – Span 45.2 m, lift height 49 m, 1 Lifting Beam capacity 1,500t
✓ Introduction of the 2 x 750t cranes forecasted March 2016
✓ Hand over in Building 13: September 2016
✓ Construction Design approved in Feb 2015 for 750t Bridge Girders, Trolleys, Drums
✓ Fabrication started

Cask Transfer Lift
✓ 120t capacity lift for handling the Cask with its nuclear load, 30 m vertical travel
  ➢ Final design Review in December 14
  ➢ Construction Design Review forecasted in July 2015
TB04 Scope of Works (Suez – M+W)

ITER Organization
Configuration Management Model

3D site layout with Tokamak Complex, Auxiliary Buildings and PF Coils construction building

IBF/15 - March 25-27 2015 - Palais du Pharo/ Marseille/ France
TB04 – Mechanical & Electrical Services

Design Documentation : # 10,000 documents

State of progress and 2015 objectives

- Quality, Configuration and Project documentation delivered, approved and implemented with particular focus on Nuclear Safety
- Basis of Design studies delivered end of June 2014

Basis of Design # 500 documents
Definition Design # 1,000 documents

- Definition Design studies on going:
  - Target: all buildings design completed by the end of the 2015
  - Tokamak complex June 2015

- Construction Design studies TO BE PERFORMED IN 2015
  - B61, B15, B13/B17, ...
  - First 4 Load Centers: LC 05 / 01 / 02 / 14,

- First works on site: Kick-Off planned in October 2015 for
  - B61
  - LC 05

Construction Design # 3,000 documents
Execution Design : 6,000 documents
TB04 – HVAC, mechanical & electrical services

HVAC

Tokamak Building (11)

Tritium Building (14)

Diagnostic Building (74)

HVAC

Cryo plant (51/52)

LV Load Center SSEN
Main works to be performed: Magnet power conversion Building 32, 33 and Reactive power control Building 38

Signature date: 27 November 2013.
Commencement date: 8 January 2014
Final Design Review competed
Construction design on going
Start of Construction mid 2015
The transformer is procured by the US Domestic Agency and manufactured in Korea.

The 87-ton transformer is part of ITER's steady state electrical network and will connect, along with three identical components, the AC electrical distribution system to the 400kV switchyard.

The transformer has been delivered on Wednesday 14 January 2015.

Target: 1st pit completed by March 15
Scope of Supply:

- Construction of Building 36 (including equipment), galleries and special foundations inside Substation Area (in red on the map)
- Installation (Supply from US and Ch DAs) of Substation Area Equipment (in red on the map)
- Installation (Supply from US DA) of MV Load Centres (in blue on the map)
- Supply and installation of cables (option)
- Supply and installation of LV Load Centres (option) and electrical distribution inside the buildings (Sub Distribution Boards and Panels) (in the blue area of the map except in TB04 buildings)
- Supply and installation of Cable trays (option, all areas except in TB04 buildings)
- Civil works, equipment and services for buildings 46 and 47 (option)
- Supply and Installation of Investment Protection diesel generators (option)

Signature date: 18 December 2014
Commencement date: 24 January 2015
Design on going
Start of Construction 3rd QTR 2015
2015 objectives:

• Assemble and fill with oil the first High Voltage transformer soon after the completion of the oil retention pit (2nd QTR 2015).
• Complete the Definition Design of Building 36 by 2nd QTR 2015.
• Complete the Execution Design of PBS 61 infrastructure works in area 41 by 3rd Quarter 2015 and start works soon after.
• Start the assembly and erection of the electrical components in area 41 before the end of 2015.
TB07 – OPE-429 Design & Build buildings 64, 67, 68 and 69

Current Progress:

✔ Final Design accepted in September 2014
✔ Start of the construction design 4\textsuperscript{th} November 2014 and delivered in February 2015
✔ Construction start expected June 2015

Dates

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ferrovial
Next procurement steps

- **On-going or to be launched in 2015:**
  TB13 – Electrical equipment and Buildings – Expressions of interest currently under evaluation
  TB16 – Site Infrastructure Works - Expressions of Interest currently under evaluation – Signature in September 2015
  TB11 – Completion Works – Launch of call for expressions of interest end - Q3 2015
  TB12 – Buildings 24, 34 and 37 – Launch of call for expressions of interest - Q3 2015

- **Subsequent Phase:**
  TB09 – Hot Cells – Civil – Procurement strategy under preparation
  TB10 – Hot Cells – M&E Handling – Procurement strategy under preparation
Scope of Supply: around 100 M€

- **Supply and installation** of emergency Power distribution, diesel generators and tanks (SIC baseline and IP option), LV and MV cables and cable trays (SIC and IP)
- Foreseen options: **Design and Build** of Buildings 42(IP) and 43 (IP), 46 and 47: MV Distribution Buildings and Buildings 59 & 60 IP Generator Buildings.

**Procurement Process:** Restricted procedure

**Input:** Tender Design

**Type of contract:** FIDIC Contractual Conditions
### Key Dates:

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Scope of Supply: around 50M€

Execution Design and Construction of:

- Concrete service trenches (galleries)
  - Internal dimensions (width in mm x height in mm) ranging from: smallest 2200 x 1650, largest 2700 x 5500 and 4300 x 2850
  - Average thickness of the walls: 300 mm
  - Length of service trenches to be implemented: 3000 m

- Precipitation Drainage (concrete pipe works)

- Special Foundations:
  - Reinforced concrete foundations for load centers including blast walls
  - Reinforced concrete slabs for tanks or other equipment
  - Inclusions expected: rails, embedded plates or others
  - Example of dimensions to be considered (width in mm x length in mm): e.g. Laydown area 17 slab: 48200 x 45300

Procurement Process: Restricted Procedure

Input: Construction Design

Type of contract: FIDIC Contractual Conditions
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Scope of Supply: around 50 M€

Design and Build of Buildings:
- 24 (Personnel Access Control Building), concrete and steel building;
- 34 (NB Power Supply Building) and 37 (NB High Voltage Power Supply Building), steel buildings.

Planned in 2015
2015 CONSTRUCTION MILESTONES

Week 10

D-10

1st pit ready for Transformer storage
Procured by the US Domestic Agency and manufactured in Korea, the 87-ton transformer is part of ITER’s steady state electrical network and will connect, along with three identical components, the AC electrical distribution system to the 400kV switchyard. The convoy arrived at ITER at 4:00 a.m. on Wednesday 14 January 2015. Reinforcement work on going.

D-111

Tokamak Complex - Start of B1 level
The first pillars of the Diagnostic Building (B74) were poured last week. Reinforcement works for the bio-shield wall of the Tokamak bldg. have also started. The construction of Walls in Bldg. 74 and 14 are progressing. This work is part of T803, it is performed by the consortium Vinci Ferrovial Razal.

D-227

B61 weathertight
The main walls of the gallery are completed, preparatory works for the deep foundations of the building (piling) are ongoing and required excavations for the electrical pits are being executed in parallel, all these activities are required to perform thereafter the ground level concrete slab of the building.

D-231

B13 ready for crane rails installation
The steel frame of the Assembly Hall building is starting to take shape with the third level sections of the massive columns being erected in the east facade and west facade has started erection. Preparatory works for the assembly of the roof on the floor have started as well. Thereof will be lifted in one piece once assembled.
Thank you for your attention

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