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Technical Specifications (In-Cash Procurement)

Technical Specification - Nuclear Civil Project management

This document aims at specifying the project management activities to be performed for the Hot Cell Complex (HCC) and the Tokamak Assembly Preparatory Building (TAPB) design and procurement phases.

Table of Contents

1 Purpose

This document aims at specifying the project management activities to be performed for the Hot Cell Complex (HCC) and the Tokamak Assembly Preparatory Building (TAPB) design and procurement phases:

1 – Procurement strategy and risk analysis for the HCC,

2 – Cost estimate and schedule for the HCC design and construction

3 – Definition of the list of deliverables for the HCC PDR and FDR

4 – Contractual follow-up of the TAPB1 construction contract

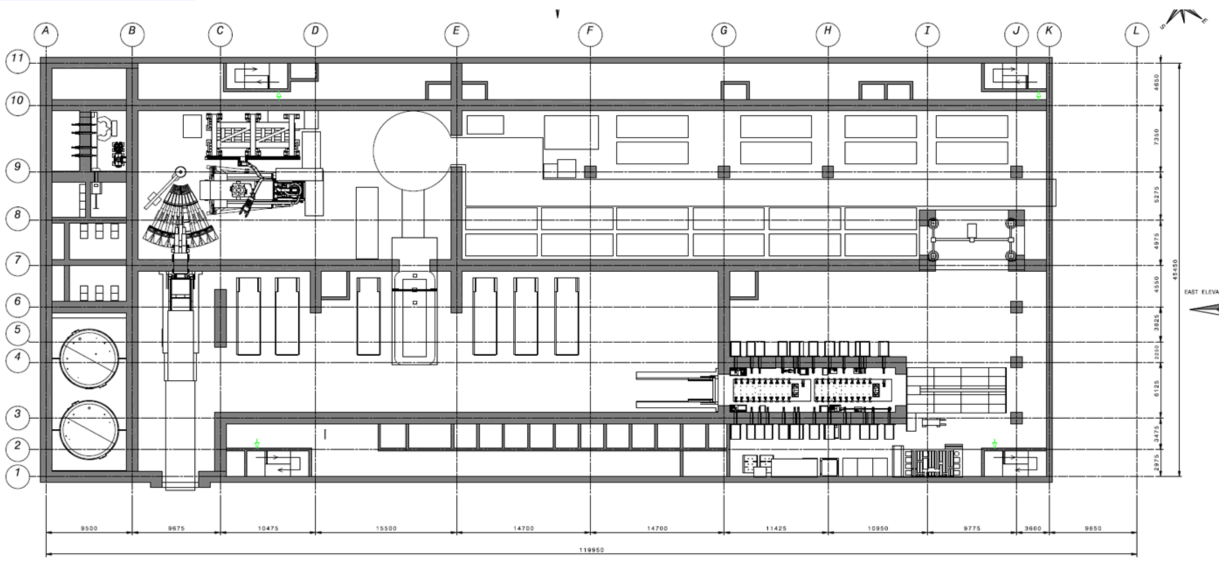
5 – Interfaces management of the HCC

2 Scope

2.1 Hot Cell Complex

The scope includes the overall Hot Cell Complex, including the building and the processes, in particular the Hot Cell Complex building, the Radwaste process and the Hot Cell Remote Handling System.

The Hot Cell Complex is described in ITER_D_X932PF - Description of Hot Cell Complex - Option 2. Hereunder are a few extracts of layout drawings ITER_D_WDYC63 - HCC - Option 2 - 2D drawing BUILDING#21 and ITER_D_WKF4X6 - HCC - Option 2 - 2D drawing BUILDING#23.



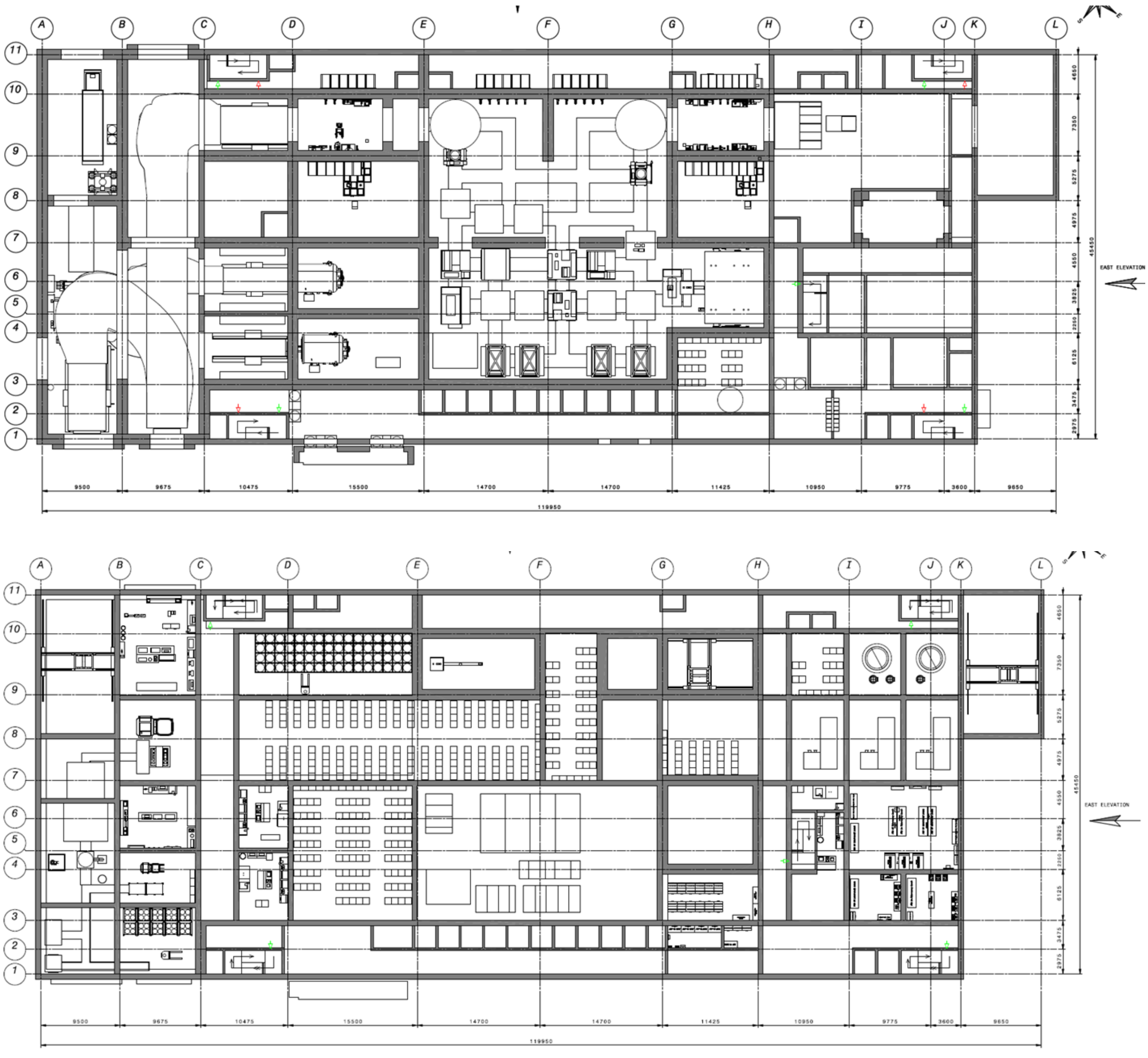


Figure 1 Building 21: B2, L1, and L2 levels (pre-concept)

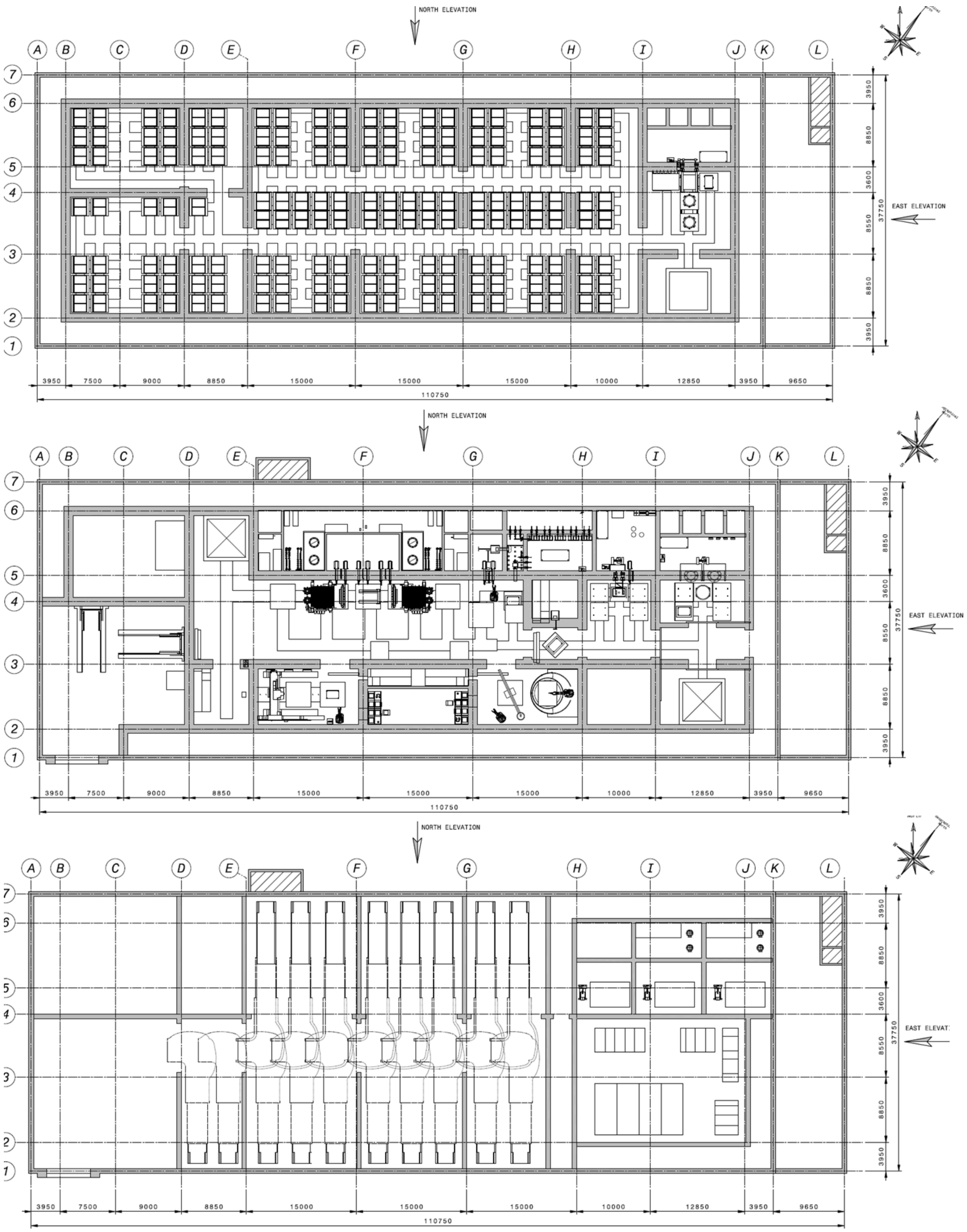


Figure 2 Building 23: B2, L1, and L3 levels (pre-concept)

The table in appendix summarizes main features of the Hot Cell Complex, illustrating the level of complexity and the required skills for this contract.

2.2 Tokamak Assembly Preparatory Building

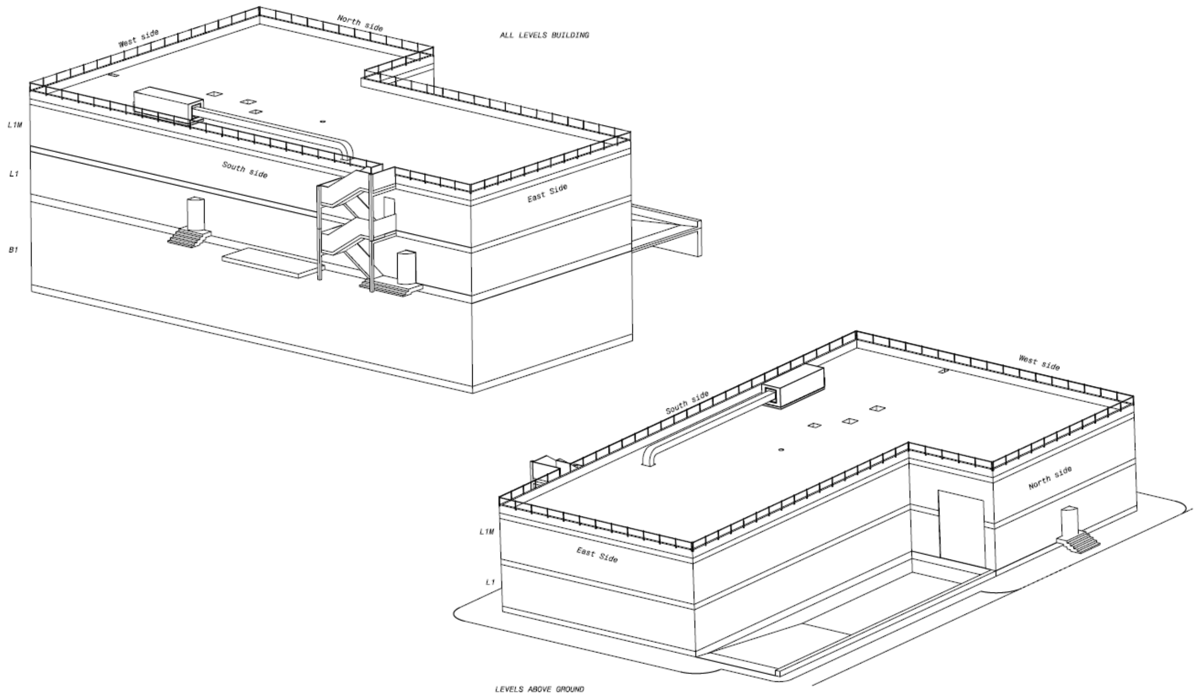
The functions of the Tokamak Assembly Preparation Building are listed below:

1 - To transfer storage containers

2 - To store containers of Beryllium First Wall (FW)

3 - To Perform the Trial Fit

The layout of the building is the following:



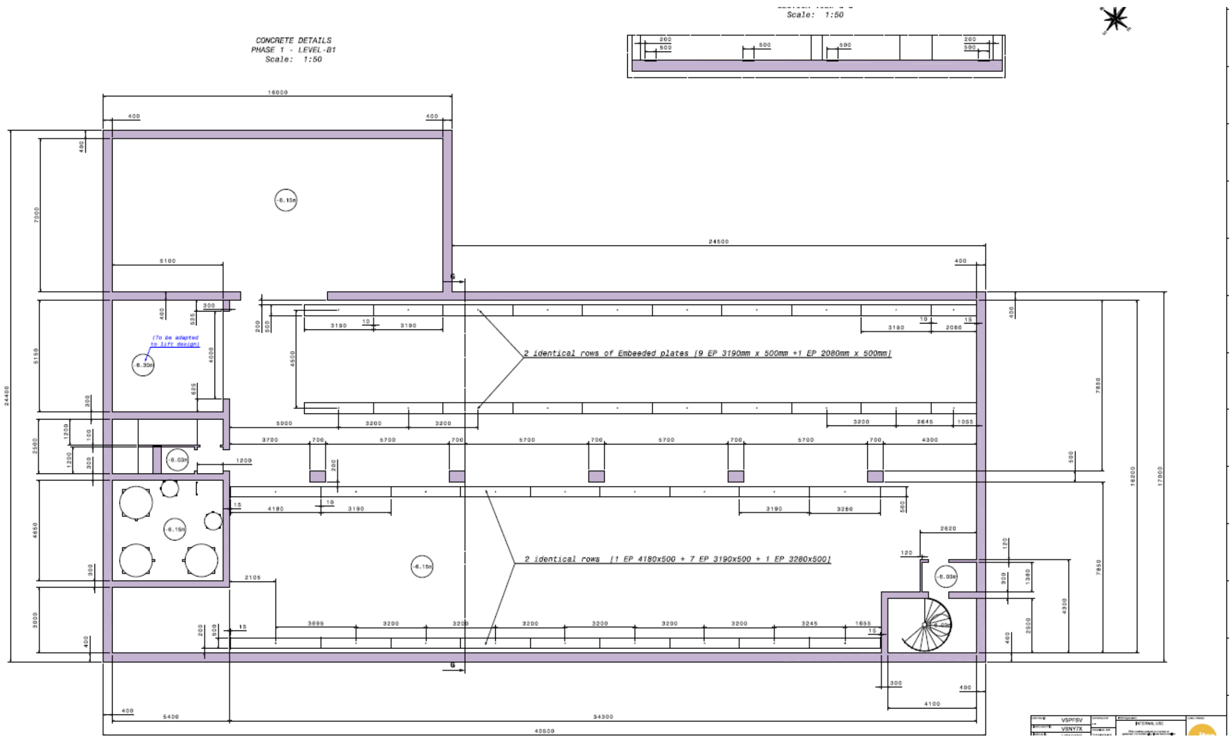


Figure 3 TAPB layout

The overview of the conceptual design is given at the following link: ITER_D_UZWSWY - 0 TAP Building - Safety overview of the conceptual design

The TAPB will have two functions corresponding to two phases of activity:

- Phase 1: Support to Tokamak Installation from 2020 to 2024,
- Phase 2: Support to perform the Beryllium First Wall (Be FW) trial fits and storage of the Be FWs, from 2025 to 2028,

The TAPB configuration during phase 1 works is called TAPB1.

The TAPB configuration during phase 2 works is called TAPB2.

3 Definitions

For a complete list of ITER abbreviations see: ITER Abbreviations (ITER_D_2MU6W5).

4 References

Acronyms:

- C-R: Contractor Responsible. See Contract specifications for definition of duty.
- C-TRO: Contractor Task Responsible Officer. See Contract specifications for definition of duty.
- IO-RO: ITER Organization Responsible Officer. See Contract specifications for definition of duty.
- IO-TRO: ITER Organization Task Responsible Officer. See Contract specifications for definition of duty
- PBS: Project Breakdown Structure

5 Estimated Duration

The contract duration shall be one year and shall commence after the official start date and upon the mutual agreement of both parties. The services shall be performed on-site at IO.

6 Work Description

6.1 Context

6.1.1 HCC

The pre-conceptual design of the Hot Cell Complex (HCC, cf. Figure 1 and Figure 2) is being developed by IO. It is based on the existing conceptual design which was performed in 2017 in the frame of an engineering contract, and which outcome was to have one single building.

The main change is now to host radwaste processing and components maintenance functions in two separate buildings.

Therefore, the following activities are being performed:

- Design activities of the HCC buildings,
- Design activities of the Radwaste and Remote Handling System located within the HCC,
- Safety analysis based on the Hot Cell Complex design.

A contract for the conceptual design of the Hot Cell Complex buildings and services will be started in Q2 2019, while series of contracts have been launched in order to study the Radwaste and Remote Handling Systems located within the Hot Cell Complex. The requested work is focused on these buildings design activities, cost and procurement optimization.

6.1.2 TAPB

Preliminary and final design activities for TAPB1 and preliminary design for TAPB2 shall be completed in 2018. This enables the construction design of TAPB1 to be finalized in early 2019, to be followed by the execution design phase.
In parallel, the excavation will start in April 2019.
The call for tender of the construction phase shall start in early 2019, with a start of contract expected by the end of the first semester.

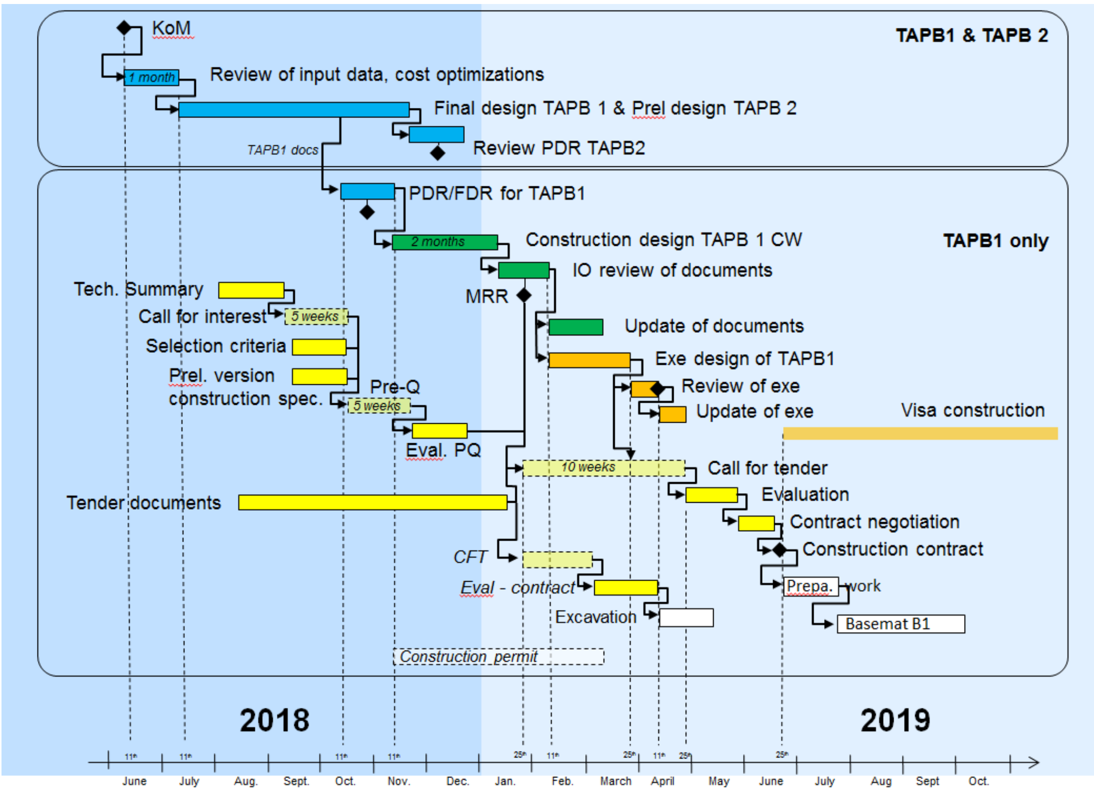


Figure 4 TAPB schedule extract

The work to be performed corresponds to these phases of TAPB activities.

6.2 Objective of the contract

The objective of the contract is broken down into 7 deliverables which correspond in fact to five types of activities as described below.

6.2.1 Procurement strategy and risk analysis for the HCC

The contractor shall define the procurement strategy for the HCC, in particular for PDR and FDR studies which will be performed after the conceptual design studies. This strategy shall be based on a benchmark with similar nuclear facilities, with stringent procurement rules.

A risk analysis shall be implemented to support this strategy, and it shall cover as well the construction phase and the commissioning of the HCC.

This activity corresponds to the Deliverable D1.

6.2.2 Cost estimate and schedule for the HCC design and construction

A comprehensive cost estimate covering the design and the construction stages is expected. This estimate will be closely connected to a long-term schedule that will highlight the links and major milestones for the HCC. A dedicated note will detail the assumptions taken into consideration for this work.

This activity corresponds to the Deliverable D2.

6.2.3 Definition of the list of deliverables for the HCC PDR and FDR

The contractor will propose and define a list of deliverables for the preliminary and final design phases. These phases will be conducted in the frame of one single architect/engineer contract to be launched after the completion of the conceptual design.

The list of deliverables shall cover the whole scope of the studies, i.e. the buildings and systems on one hand, and the RH and RW processes on the other hand.

This activity corresponds to the Deliverables D4 and D6.

6.2.4 TAPB 1 construction contract follow-up

The contractor shall propose a list of contractual recommendations in order to manage in a timely and cost-effective manner the TAPB1 construction contract. After the start of this construction contract, a review of the cost and schedule will be prepared and regularly updated together with the risk register.

This activity corresponds to the deliverables D1, D3, D5, and D7.

6.2.5 Interfaces management of the HCC

The contractor shall propose and describe a process for the management of the interfaces between the buildings and the process inside the HCC during the PDR/FDR phase.

The aim is to be able to detect as soon as possible the impact of any design change from one side. This optimized interfaces management shall limit the impact on the construction phase, allowing to define and anticipate the best installation sequence.

This activity corresponds to the deliverables D4 and D6.

7 Responsibilities

7.1 Contractor's Responsibilities

In order to successfully perform the tasks in this Technical Specification, the Contractor shall:

• Strictly implement the IO procedures, instructions and use templates;

• Provide experienced and trained resources to perform the tasks;

• Contractor's personnel shall possess the qualifications, professional competence and experience to carry out services in accordance with IO rules and procedures;

• Contractor's personnel shall be bound by the rules and regulations governing the IO ethics, safety and security IO rules.

7.2 IO's Responsibilities

The IO shall:

• Nominate the Responsible Officer to manage the Contract;

• Organise a monthly meeting(s) on work performed;

• Provide offices at IO premises.

• Provide a standardized IT working environment (laptop, screen, keyboard, webcam and headset).

8 List of deliverables and due dates

D #	Description	Due Dates
D1	Procurement strategy of the HCC based on a benchmark with comparable nuclear facilities. Risk analysis for the HCC, from PDR/FDR studies to construction and commissioning. Contractual recommendations for TAPB 1 construction contract follow-up	T0 + 3 months
D2	Cost estimate and schedule for the HCC design and construction, with a dedicated note to detail the working assumptions.	T0 + 5 months
D3	Contractual follow-up for TAPB 1 construction (first version) - Cost - Schedule - Risk register	T0+7 months
D4	Preliminary list of deliverables for HCC design: Buildings and process: - Deliverables for PDR - Deliverables for FDR Preliminary interfaces management note for the HCC Description of the process for the management of the interfaces between the buildings and the process of the HCC.	T0 + 9 months

D #	Description	Due Dates
D5	Contractual follow-up for TAPB 1 construction (intermediate version) - Cost - Schedule - Risk register	T0 + 10 months
D6	Final list of deliverables for HCC design: Buildings and process: - Deliverables for PDR - Deliverables for FDR Final interfaces management note for the HCC Description of the process for the management of the interfaces between the buildings and the process of the HCC.	T0 + 11 months
D7	Contractual follow-up for TAPB 1 construction (final version) - Cost - Schedule - Risk register	T0 + 12 months

To be noted that the priorities between the different Deliverables to be issued could be changed at the KoM or during the duration of the contract, as per IO request and in agreement with the contractor.

9 Acceptance Criteria

These criteria shall be the basis of acceptance by IO following the successful completion of the services. These will be in the form of monthly progress reports as indicated in section 8, table of deliverables and further detailed below:

- Report and Document Review criteria.
- Reports as deliverables shall be stored in the ITER Organization's document management system, IDM by the Contractor for acceptance.
- Technical Responsible Officer is the Approver of the delivered documents.
- The Approver can name one or more Reviewers(s) in the area of the report's expertise.
- The Reviewer(s) can ask modifications to the report in which case the Contractor must submit a new version.
- The acceptance of the document by the Approver is the acceptance criterion.
- The acceptance criteria of the document correspond to:
    - Justified and documented comments,
    - Lessons learned of existing nuclear facilities,
    - Detailed assumptions and methodology for the cost and schedule and for the risk analysis,
    - Relevance and completeness of the list of deliverables for HCC design,

- Reference to existing technologies and proven solutions used in nuclear field,
- Reference to existing and applicable Norms and Standards,

10 Specific requirements and conditions

Significant experience in:

- Design and construction of nuclear buildings
- Management of associated contracts with value over 10 M€
- Design integration of nuclear process and building systems into a facility
- Supervision of building engineering and review of technical documentation
- Procurement strategy
- Management of construction tenders
- Risk analysis in design, construction and financial fields
- Experience with FIDIC contracts
- Experience and ability to deal with claims, commercial management
- Knowledge of French rules for nuclear, civil and safety approach
- Construction and commissioning of nuclear buildings,

At least 10 years' experience is required in these fields of expertise.

The contractor shall present in the offer:
- a resource loaded schedule, in line with the delivery dates given in section 8,
- a resource estimate for each of the Deliverables,

11 Work Monitoring / Meeting Schedule

The work will be managed by means of Progress Meetings and/or formal exchange of documents transmitted by emails which provide detailed progress. Progress Meetings will be called by the ITER Organization, to review the progress of the work, the technical problems and the planning. It is expected that Progress Meeting will be held weekly or biweekly. Progress meetings will involve C-R, C-TROs, IO-RO and IO-TROs.

The main purpose of the Progress Meetings is to allow the ITER Organization/RHRM Division and the Contractor Technical Responsible Officers to:

a) Allow early detection and correction of issues that may cause delays;
b) Review the completed and planned activities and assess the progress made;
c) Permit fast and consensual resolution of unexpected problems;
d) Clarify doubts and prevent misinterpretations of the specifications.

In addition to the Progress Meetings, if necessary, additional meetings to address specific issues to be resolved may be requested by the ITER Organization.

For all Progress Meetings, a document (the Progress Meeting Report) describing tasks done, results obtained, blocking points and action items must be written by the Contractor. Each report will be stored in the ITER IDM in order to ensure traceability of the work performed.

12 Delivery time breakdown

See Section 8 – Deliverables and Due Date

13 Quality Assurance (QA) requirements

The organisation conducting these activities should have an ITER approved QA Program or an ISO 9001 accredited quality system.

The general requirements are detailed in ITER Procurement Quality Requirements (ITER_D_22MFG4).

Prior to commencement of the task, a Quality Plan must be submitted for IO approval giving evidence of the above and describing the organisation for this task; the skill of workers involved in the study; any anticipated sub-contractors; and giving details of who will be the independent checker of the activities (see Procurement Requirements for Producing a Quality Plan (ITER_D_22MFMW)).

Documentation developed as the result of this task shall be retained by the performer of the task or the DA organization for a minimum of 5 years and then may be discarded at the direction of the IO. The use of computer software to perform a safety basis task activity such as analysis and/or modelling, etc. shall be reviewed and approved by the IO prior to its use, in accordance with Quality Assurance for ITER Safety Codes (ITER_D_258LKL).

14 CAD Design Requirements (if applicable)

CAD requirements are listed below but no CAD work is formally requested in the frame of this contract.

If CAD design tasks are involved, the following shall apply:

The Supplier shall provide a Design Plan to be approved by the IO. Such plan shall identify all design activities and design deliverables to be provided by the Contractor as part of the contract.

The Supplier shall ensure that all designs, CAD data and drawings delivered to IO comply with the Procedure for the Usage of the ITER CAD Manual (2F6FTX), and with the Procedure for the Management of CAD Work & CAD Data (Models and Drawings 2DWU2M).

The reference scheme is for the Supplier to work in a fully synchronous manner on the ITER CAD platform (see detailed information about synchronous collaboration in the ITER GNJX6A - Specification for CAD data production in ITER Contracts.). This implies the usage of the CAD software versions as indicated in CAD Manual 07 - CAD Fact Sheet (249WUL) and the connection to one of the ITER project CAD data-bases. Any deviation against this requirement shall be defined in a Design Collaboration Implementation Form (DCIF) prepared and approved by DO and included in the call-for-tender package. Any cost or labour resulting from a deviation or non-conformance of the Supplier with regards to the CAD collaboration requirement shall be incurred by the Supplier.

15 Safety requirements

ITER is a Nuclear Facility identified in France by the number-INB-174 ("Installation Nucléaire de Base").

For Protection Important Components and in particular Safety Important Class components (SIC), the French Nuclear Regulation must be observed, in application of the Article 14 of the ITER Agreement.

In such case the Suppliers and Subcontractors must be informed that:

- The Order 7th February 2012 applies to all the components important for the protection (PIC) and the activities important for the protection (PIA).
- The compliance with the INB-order must be demonstrated in the chain of external contractors.
- In application of article II.2.5.4 of the Order 7th February 2012, contracted activities for supervision purposes are also subject to a supervision done by the Nuclear Operator.

For the Protection Important Components, structures and systems of the nuclear facility, and Protection Important Activities the contractor shall ensure that a specific management system is implemented for his own activities and for the activities done by any Supplier and Subcontractor following the requirements of the Order 7th February 2012.

16 Appendix: Main features of the Hot Cell Complex

	Demonstrable skills and experience	Main features of the Hot Cell Complex facilities
Nuclear civil engineering of complex large scale project	High technology project	First-of-a-kind or research construction projects
	Strong links with industry and potential Plant manufactures	Wide range of disparate leading edge/high-tech systems and equipment to be designed for in the Preliminary and Construction Design stages in order to avoid risk of change during suppliers manufacturing design.
	International projects	ITER stakeholders are China, the European Union, India, Japan, Korea, Russia and the United States. It corresponds to 35 different nations. The project language is English and safety documentation to be delivered to the French safety authority shall be in French and English.
	Engineering/design	Design and overall integration of : - Building structure. Volume HCC 290,000 m^3 nuclear concrete building (B21 and B23) - Approximately 600 rooms within the HCC, - Building systems, e.g. Heating, Ventilation, and Air Conditioning (HVAC), fire protection, electrical distribution, Instrumentation & Control (I&C), liners, red zone cooling, - Mechanical heavy handling, e.g. cranes, doors, trolleys,
Hot Cells expertise	Numbers of hot cells / red zones	15 different hot cells in HCB, in total volume of red zones / C4 ventilation class = 26,000 m^3
	Management of irradiated and contaminated components	Contact dose rate = 250 Sv/h due to activation in the Tokamak. Contamination of tritiated and activated dust on In Vessel components and IRMS Constant efforts to prevent spread of dust in red zones (from design stage to operational procedures), ALARA
	Tritiated environment	High level of tritium concentration > 4000 DAC in red zones Red zone / C4 areas fully covered by stainless steel liner, with an gap between the wall and the liner
	Nuclear maintenance	10 different hot workshop, 300 m^2 average each, dealing with hands-on maintenance on components after remote decontamination, ALARA
	Remote heavy handling in red zone	Handling of various heavy components, non-exhaustive list: – Equatorial Port Plug (50t, 3.5m length x 2.4 m x 2m),

	Demonstrable skills and experience	Main features of the Hot Cell Complex facilities
		– Upper Port Plug (25t, 6 m length), – Divertor (9t, 3.5m length, 2m high, 0.8m wide), – Vacuum Cryopump (2.9m length, 1.7m diameter), – Oversized Neutral Beam components up to 8m length, 3m high and 3.3m wide Two lines of defence: high reliability of heavy transfer systems and mitigation means in case of unexpected load drop.
	Docking of transfer casks	Transfer and docking of Remote Handing Transfer Cask, large size docking door: 2m x 2.4m
Radwaste management	Treatment of radioactive solid waste	Orders of magnitude during 20 years operation: – 1000 tons of MAVL waste – 100 tons FMA-VC – 100 tons purely tritiated waste – 10 tons TFA
	Treatment of radioactive liquid effluent	Orders of magnitude: 200 m^3 / year
	Radwaste process remotely controlled	Type B radwaste process located in the red zones / C4 areas shall be fully remotely controlled (no man access).
Hot Cell Remote Handling	Complex remote operation	Port Plug refurbishment, example of tasks to be performed fully remotely: – tilting 90° of 50t port plugs, – removal of subcomponents, – welding and control, – testing.
	Hot Cell Remote Handling	Design and integration of: – Tens of heavy duty long range manipulator, fully powered by electrical motors, – Few telescopic power manipulators, – Shielded windows, – Lighting and viewing systems, – Frames and handling tools, Buffer storage, remote decontamination, hands-on maintenance.
	Centralized control system	Functions such as ventilation management, remote transfers, remote refurbishment of In Vessel Components, remote waste treatment, shall be controlled from a centralized control room located in the Personal Access Control Building
	Seismic requirement	High seismic requirement (2 to 3 g acceleration in different dimensions) on building structure and part of the building system and process which is seismic classified according to the safety analysis