

## Technical Specifications (In-Cash Procurement)

# Technical Specifications for the design and construction of office Building B05

This document is the technical Specifications for the design and construction of office Building B05

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# 1 Purpose

## 1.1 Background

ITER is a joint international research and development project aiming to demonstrate the scientific and technological feasibility of fusion power for peaceful purposes. The seven members of the ITER Organization are: The European Union (represented by EURATOM), Japan, the People's Republic of China, India, the Republic of Korea, the Russian Federation and the USA. The ITER Organization is located in Saint Paul lez Durance – France. Further information is available on the ITER website: <http://www.iter.org>.

The ITER project is requiring a new office building with a capacity of around 275 desks.

## 1.2 Purpose

The ITER Organization intends to devise a turnkey contract to perform the design and construction of office accommodation on the ITER Site. The building shall have three storeys and a total internal floor surface of around 3,000 m<sup>2</sup>, comprising of offices for approximately 275 people.

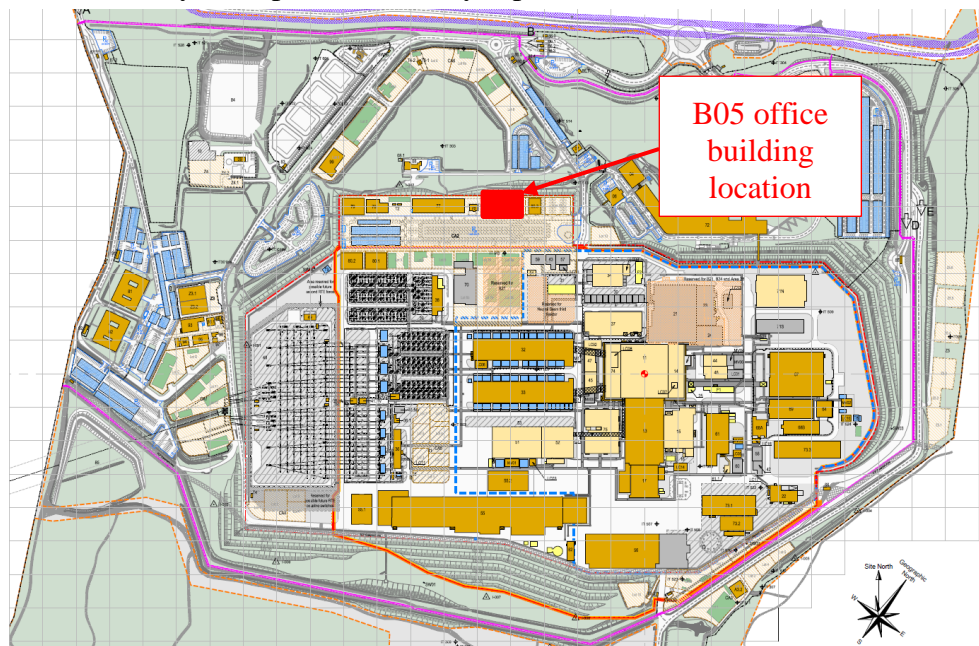
The purpose of this technical specification (this document) is:

- To provide the technical requirements for the design and the construction of the building at the ITER Site;
- To provide the Contractor background information that is necessary to commence, carry out and complete the project on the ITER Site, e.g. the ITER Site conditions;
- To specify applicable norms and regulations that the Contractor shall respect in order to meet the project performance requirements of the ITER Organization.

## 1.3 Location

This building 05 will be located at the northeast side of the contractor's area 2 (CA2).

This surface is currently a car park covered by asphalt.



*Figure 1: Location of the project on ITER site*

## 2 Scope

The Contractor shall carry out all of the design, supply, installation and construction of the works without restriction; therefore, the Contractor shall leave the installations in a perfectly completed and safe working order.

The Works shall be carried out with the appropriate equipment, complying with the applicable regulations in force at the time of the Works.

The scope includes all activities necessary to complete the Works in accordance with requirements defined in this specification, including but not necessarily limited to:

- Management of all (Sub) Contractor(s) activities.
- Geotechnical mission(s) to justify the hypothesis taken by the Contractor during the design phase.
- Design and construction of early preparatory works including several type of networks rerouting and installation.
- Earthworks, buried foundations and networks installation;
- Design and construction studies of the foundations, the building and the building services, including the electricity network, lighting, low current networks, fire detection, HVAC, sanitary installations and plumbing;
- Roof waterproofing;
- Supply and installation of ducts, manholes and networks and their connection to the existing networks: electrical power, low currents, optical fibre, supplies of potable and raw water, sanitary drainage, precipitation drainage;
- Supply and installation of the conduits and cable trays for low voltage and low currents;
- Supply and installation of the cables, plugs, cabinets, patch panels and all connections;
- HVAC equipment and connections in fluids, power and controls;
- Toilets and facilities, water supply and evacuation;
- Staircases for access to L2, L3 and roof;
- Joinery;
- Safety and wayfinding signage;
- Access control and security cameras;
- Exterior surface finishing works;
- Supply and installation of office furniture;
- Commissioning tests;
- Replacement or repair of any defects or non-compliances during the defects notification period and the warranty periods.
- Provision of a complete and comprehensive set of as-built documentation.

### 3 Acronyms and Definitions

The following acronyms may be found in this document:

A.E.V. -	French: <i>Le classement Air - Eau - Vent</i> / Air - Water - Wind classification
AIPR -	French: <i>Autorisation d'intervention à proximité des réseaux</i> / English: Certification to work in the vicinity of networks.
ARF -	Lightning Risk Analysis (ARF): Assessment of the elements to be protected.
APSAD	(Association Plénière des Sociétés d'Assurance Dommages - <i>Plenary Association of Damage Insurance Companies</i> );
BAES -	French: <i>Bloc Autonome Eclairage de Sécurité</i> / English: Block Autonomous Security Lighting.
BMS -	Building Management System
CODAC -	Control, Data Access and Communication
CRO -	Contract Responsible Officer
CPRHS -	Cask and Plug Remote handling system
CSTB -	French: <i>Centre Scientifique et Technique du Bâtiment</i>
DESP -	French: <i>Directive Equipments Sous Pression</i> / English: Pressure Equipment Directive.
DICT -	French: <i>Déclaration d'Intention de Commencement de Travaux</i>
DN -	French: <i>Diamètre nominal (intérieur)</i> / Nominal diameter (always interior).
EIC -	Environmental Important Component
EOTA -	French: <i>L'Organisation Européenne pour l'Agrément Technique</i>
FEM -	French: <i>Federation Européenne de la Manutention</i> / English: European Materials Handling Federation.
FDS -	Fire Detection System
FFL -	Finished Floor Level
FW -	Fire Water
GNT -	Gravel Non-Treated
HDMI	High-Definition Multimedia Interface
HVAC	Heating Ventilation and Air-Conditioning
HSPC -	Health & Safety Protection Coordinator
HP -	Hold Point
ID -	Industrial water Drainage
IDM -	ITER Document Management System
IMTF -	ITER Maintenance Test Facility
IPEG -	ITER Platform Earthing Gird Protection coordinator
HVAC -	Heating, Ventilation and Air Conditioning
HV -	High Voltage
IO -	The ITER Organization
LC -	Low Current
LV -	Low Voltage (power lines of 400V and below).
LOTO -	Lock-Out Tag-Out permit

MoM -	Minutes of Meeting
MV -	Medium Voltage ( $\geq 15\text{kV}$ )
NCR -	Non-Conformance Report
(NF) DTU -	(French Norm) Unified Technical Documents
NP -	Notification Point
PAS -	Public Address System
PDWS -	Precipitation Drainage Water System
PEHD -	High-density polyethylene.
PF/EP -	French: <i>Permis de Fouille</i> / English : Excavation Permit.
PIA -	Protection Important Activity
PIC -	Protection Important Class
PLC -	Programmable Logic Controller
PPE -	Personal Protective Equipment
PPSPS -	French: <i>Plan Particular de Sécurité et de Protection de la Santé</i> / English : Individual Health Protection and Safety Plan.
PRE -	Environmental Respect Plan
PTW -	Permit to Work
PW -	Potable Water
PWD -	Precipitation Water Drainage
QA -	Quality Assurance
RFI -	Request For Information
RT2012	Réglementation Thermique 2012 / <i>French regulation related to the thermal insulation;</i>
RW -	Raw Water
SAF -	Subcontractor Acceptance Form
Site -	Places provided by the ITER Organization where the Works are to be executed, and any other places specified in the contract as forming part of the Site.
SLAT -	Regulated power supply.
SSI -	French: <i>Système de sécurité incendie</i> / English: Fire safety system.
TE -	French: <i>Température Electrique</i> / English : Electrical temperature.
TF -	French: <i>Température Fuel</i> / English : Diesel temperature.
TGBT -	French: <i>Tableau General Basse Tension</i> / English: Main Low Voltage Distribution Board
TNS -	Terra Neutral Separate
TPC -	French: <i>Tube de Protection des Cables</i> / English: Duct to protect cable.
UPS	An Uninterruptible Power Supply (a battery back-up).
VGA	Video Graphics Array
Works -	The work and design to be executed by the Contractor, including temporary work and any variation(s), under the Contract.

## 4 Reference documents

- [1] Conceptual design of Building 05 (ITER\_D\_8PP44H)
- [2] Chemical Safety Management Tool - User Manual (ITER\_D\_W6EREY)
- [3] CAD instructions for companies (ITER\_D\_9PNNM4)
- [4] Permit to Work Procedure (ITER\_D\_UBET39)
- [5] Access procedure (ITER\_D\_S3893D)
- [6] ITER Internal Regulations (ITER\_D\_27WDZW)
- [7] PGCSPS Volume 1 – Health and Safety General Coordination Plan for the construction of ITER Project (ITER\_D\_T6V4RP);
- [8] Alert procedure (ITER\_D\_7LB8NY)
- [9] Environmental Management Plan (ITER\_D\_97W4PN)
- [10] Environmental requirements (ITER\_D\_97WRFP)
- [11] Global ITER Worksite Synthesis Drawing (ITER\_D\_2UFTW7)
- [12] In-Cash Procurement Technical and Management Documentation Exchange and Storage Procedure (ITER\_D\_G8UMB3)
- [13] ITER Policy on Safety, Security and Environment Protection Management (ITER\_D\_43UJN7)
- [14] Housekeeping instruction (ITER\_D\_XJKR3R)
- [15] Daughter PTW procedure for IO Areas under CNST/SIM coordination (ITER\_D\_2BW3ZV)
- [16] ITER Smoking policy (ITER\_D\_B7QCU8)
- [17] Lifting Instruction (ITER\_D\_YJ9MBD)
- [18] Work at Height Instruction (ITER\_D\_Y5X8R7)
- [19] ITER site meteorology (ITER\_D\_2UT36S)
- [20] ITER Procurement Quality Requirements (ITER\_D\_22MFG4)
- [21] Requirements for Producing a Quality Plan (ITER\_D\_22MFMW)
- [22] Procedure for management of Nonconformity (ITER\_D\_22F53X)
- [23] Procedure for the management of Deviation Request (ITER\_D\_2LZJHB)
- [24] Quality Classification Determination (ITER D 24VQES)
- [25] A8 - Appropriation phase - Equipment information required (ITER\_D\_25T7KP)
- [26] Subcontractor Acceptance Form (SAF) - template (ITER\_D\_4LXSYY)
- [27] B07 electrical input data (ITER\_D\_8T3D2J)
- [28] CA2 lot 10 input data for LC and LV existing networks (ITER\_D\_8TMTH9)
- [29] As built of the parking area (ITER\_D\_8U33QT)
- [30] Preliminary geotechnical mission for B05 (G2 AVP) (ITER\_D\_8PJH4U)
- [31] COORDINATION DRAWING –Temporary Networks Approximate Layout



## 5 Work Description

### 5.1 General requirements for all Works

The Contractor shall design and construct the herein described Works to comply with the Eurocodes, the applicable norms & standards, French Labour Codes and applicable DTU as well as follow the best industry practice to ensure their safe operation. The Works shall be compliant with the relevant health and safety regulations applicable in France and Europe.

The Contractor shall undertake his activities in accordance with good industry practice relevant the technical nature of the Works and to the location of the Site. His performance shall include all supplies and services necessary for the Works (including specialized plant, tools, qualified labour, power supply, transportation and handling mean, temporary works, etc.).

All installations delivered under this Contract shall be undertaken in accordance with the manufacturers' recommendations.

The design life of the buildings delivered under the Works shall be 20 years.

The building and its foundation shall be designed to withstand the local climatic conditions e.g. earthquake, snow and wind according to the Eurocodes (mainly 0, 1, 2, 3, 7 and 8).

The building structure shall be designed to be structurally independent from the existing B80.3 structure.

The building shall be secured and durable to protect the ITER activity against the risk of damage, theft, or loss.

The Contractor shall obtain IO's approval of their design before commencing the Works on the ITER Site.

The construction of the building shall be organized to minimize the impact on the existing parking area and to ensure the access and use of the existing building 80.3 by the others.

The Contractor shall be responsible for cleaning at his expense the Site access roads in case the Works make them dirty or soiled with regard to the weather conditions and the frequency of use. During the dry periods, the Contractor shall implement measures to limit the spreading of dust.

The Contractor shall aim to re-use the removed/recovered materials on the project as much as possible. The Contractor is responsible for an appropriate sorting and evacuation of all old, unused and temporary materials generated during the Works and their disposal from the Site to an authorize landfill.

The Site shall be appropriately clean by the Contractor on completion of the Works on the ITER site.

In due course, the Contractor shall provide all the control tests reports and results requested at the end of the Works. All statutory initial inspections shall be performed by a 3rd party

(independent checker) validated in advance by the IO. These records shall form a part of the as-built documentation submitted on completion of the Works.

## 5.2 Regulatory aspect

The new B05 office building should be considered as a permanent facility necessary for the construction of ITER. Therefore, in accordance to R421-5 of French Urban Planning Code.

The building shall comply with the RT 2012 code.

**The building permit (if any) will be fully and exclusively managed by the IO in parallel to this project, it is completely out of the contractor scope.**

## 5.3 Expression of the requirements

### 5.3.1 Building design

The Contractor shall develop the construction design of the offices building to meet the needs specified below and taking into account the conceptual design provided in attachment [1].

The building will be designed to accommodate at least 275 workstations which will be spread over 3 levels with a mix of single, double and multi-person offices.

In the offices, the minimum surface per workstation shall be 6.5 m<sup>2</sup> net.

An atrium shall be inserted to provide natural light to the middle rooms of each storey of the building.

The ground floor shall be designed to enable use the building later as laboratory or mechanical workshops in terms of bearing capacity (1t/m<sup>2</sup>), ceiling height and sound insulation.

The drawing [1] is a basis of design. It shall be adjusted (the size and the arrangement of the rooms, location of the building on the available surface) in order to optimize space and cost. For this purpose, the office arrangement can be slightly modified in terms of number and capacity if necessary, but, the location of the building footprint on the existing land cannot.

The proposed configuration shall allow an easy implementation of partition walls in multi-person offices (structure, openings, outlets, HVAC...).

### 5.3.2 Building use

The building shall provide the following rooms [1]:

#### **Ground floor (82 desks) – bearing capacity of the whole ground floor: 1t/m<sup>2</sup>:**

- 2 Entrances with airlocks;
- 1 open Copy area;
- 1 PPE storage room;
- 1 Female washroom and toilets;
- 1 Male washroom and toilets;
- 1 Toilet and wash room for disabled persons,
- 1 maintenance room with cleaner sink below the staircase;
- 1 cafeteria area;
- 1 Male changing room;
- 1 Female changing room;
- 1 low voltage room;

- 1 low current room;
- 1 Meeting room for 30 persons;
- 1 area reserved for Atrium with pedestrian access;
- 6 office for 2 persons;
- 5 offices for 4 persons;
- 3 offices for 5 persons;
- 5 offices for 7 persons;
- Stairs and adapted passage ways.

**First floor (97 desks):**

- 1 opened Copy area;
- 1 Female washroom and toilets;
- 1 Male washroom and toilets;
- 1 maintenance room with cleaner sink;
- 1 cafeteria area;
- 1 storage room;
- 1 low current room;
- 1 Meeting room for 20 persons;
- 1 Meeting room for 12 persons;
- 1 volume reserved for Atrium;
- 5 offices for 2 persons;
- 4 offices for 4 persons;
- 5 offices for 5 persons;
- 5 offices for 7 persons;
- 1 office for 11 persons;
- Stairs and adapted passage ways.

**Second floor (98 desks):**

- 1 opened Copy area;
- 1 Female washroom and toilets;
- 1 Male washroom and toilets;
- 1 maintenance room with cleaner sink;
- 1 cafeteria area;
- 1 storage room;
- 1 low current room;
- 1 Meeting room for 20 persons;
- 1 volume reserved for Atrium;
- 1 Meeting room for 12 persons;
- 1 volume reserved for Atrium;
- 6 offices for 2 persons;

- 4 offices for 4 persons;
- 9 offices for 5 persons;
- 2 offices for 7 persons;
- 1 office for 11 persons;
- Stairs and adapted passage ways.

### 5.3.3 *Environmental criteria for the design and the construction*

The Contractor shall design and construct the building in accordance with the environmental criteria and guidelines defined in the EU green public procurement ([https://ec.europa.eu/environment/gpp/index\\_en.htm](https://ec.europa.eu/environment/gpp/index_en.htm)).

## 5.4 **Functional requirements**

### 5.4.1 *Building location*

The distance between the building and the west end of existing building 80.3 shall be 3m to allow a sufficient access in between the two facades.

The distance between the north façade of the building and the edge of the embankment isting shall be approximately 4m, if not a geotechnical justification shall be provided to grant its stability.

The south facade of the building shall be aligned with one of the adjacent Building 80.3 to keep the main pedestrian path of the CA2 area fully available without path width reduction.

### 5.4.2 *Passage ways in the building*

The number, width, design and location of passage ways and exits shall be in compliance with provisions from the French Labour Code safety section. The distances to reach stairways from elevated floors shall not exceed 40 meters.

### 5.4.3 *Interior staircase*

Interior steel staircases, designed in compliance with the French labour Code, shall be provided and set up for accessing levels L2 and L3.

The metal frame shall be lacquered. The steps shall be coated with a PVC cover in harmony with the floor cover in corridors and equipped with non-slip treads.

### 5.4.4 *Accessibility and disabled toilets*

The adapted access for disabled persons is required on the ground floor only.

Approach ramps complying with the standards shall be installed outside as necessary. The bearing capacity of this ramp shall be 1t/m<sup>2</sup>.

One toilet for disabled persons shall be installed on the ground floor.

### 5.4.1 *Building entrances*

The main entrance shall be located on the south east corner of the building.

The two entrances are voluntaries inserted in the building envelope to protect the double leafs doors against the strong wind. For each entrance, an airlock shall be done with a second automatic sliding door. Accesses shall be flush without any step.

### 5.4.2 Exterior staircase

The staircase shall meet the applicable norms and standards, in particular NF E85-015 and EN ISO 14122-3. The Blondel's formula shall be used for the calculation of the stairs dimensions considering that the step tread shall be between 280 mm – 320 mm and the step riser/height shall not exceed 160mm. The usable width of the stairs shall be minimum 1500 mm. The service loads to be considered in the staircase design is minimum 350 kg/m<sup>2</sup>.

The steel structure and its protection (treatment and painting) shall be adapted to the external conditions.

Handrails shall be installed on the both side of the stairs flight(s).

The external staircase shall be located on the south east side of the building. The staircase shall – refer to [1]:

- i. Be enclosed in the building footprint,
- ii. Be finished with same colour than the façade to grant a perfect visual harmony. The metal frame shall be lacquered,
- iii. Have each step equipped with non-slip treads,
- iv. Allow the access to L2, L3 and the roof,
- v. Control the access to the roof level with a closed double door signaled with informative panel at the L3 level.

### 5.4.3 Roof waterproofing

The roof shall be perfectly waterproof.

In case of modular building, particular attention shall be brought to the junctions of each of the units commonly affected by leaks.

Waterproofing tests prior to Taking-Over will be required.

## 5.5 Preparatory Works prior to the construction of B05 building

B05 building will be built on an existing parking area (CA2) constructed of asphalt with several underground networks. Prior to start the building construction, the Contractor shall undertake several preparatory works to relocate the existing networks and to prepare the platform subgrade within the footprint of the new building, as follows:

1. Creation of the potable water (PW) network connection,
2. Creation of the raw water (RW) network connection,
3. Creation of the Low voltage (LV) network connection,
4. Creation of the Low current (LC) network connection,
5. Creation of the sanitary drainage (SD) network connection,
6. Extension of the existing precipitation water drainage network to connect the rain water of the building,
7. Adaptation of the existing outdoor lighting network and removal of abandoned networks,
8. Adaptation of the existing low current network and removal of abandoned network,
9. Complete scrapping of the existing asphalted area and evacuation of the output materials.

In addition, as early as possible, the Contractor shall performed a complementary geotechnical investigation(s) on the Site to confirm their design hypothesis and the geotechnical information provided by the IO – refer to the annexes [29] and [30].

### 5.5.1 *General requirements for underground Works & buried networks*

The Contractor shall perform a full topographic survey of the Site to base their design and drawing(s) on the in-situ topographic coordinates.

Before the beginning of the above mentioned preparatory works, the Contractor shall properly identify the existing networks located in the Site based on [11] and [31]. Then, **after a site detection campaign done by a specialized compagny**, the Contractor shall mark on Site all the existing buried networks positions (X, Y, Z coordinates) prior to start any excavation. The Site Supervisor (s) and the excavator driver(s) shall be AIPR certified to be able to work in the vicinity of the existing buried networks. The rule of prudent approach shall be followed at any time. The Contractor shall obtain an approval from the IO through the Permit To Work (PTW) process before commencing any excavation for the networks modifications and construction in the vicinity of existing ITER Organization facilities.

The earthworks shall be designed and carried out in such a way that they do not affect or cause any damages to the existing facilities (by landslide, vibrations, etc.) on the Site and in the areas surrounding it. Any ground movement linked with the excavations and modelling of the existing platform and its embankments shall remain within the Site provided to the Contractor. The surplus material shall be evacuated from the Site and off the ITER site.

The manholes shall be implemented in at least 50m intervals along all pipelines or ducts and at each change of direction (vertically or horizontally).

All implemented manholes shall be EN124/D400 class minimum.

Manholes shall be clearly identified by screwed on aluminium engraved plates showing: identification number (provided by the IO); valve rotation sense and operating pressure.

Triangle-shape manhole covers shall be avoided. All covers shall be in one piece only (rectangular or square) to avoid the cover falling inside the manholes. For the LC standard chamber, the two triangular covers shall be permanently fixed together to create one cover.

The new gravity network shall be water-tight (including its connections to the existing network).

Ducts shall be high-density polyethylene (PEHD), outer corrugated profile, smooth inner, cuff link in end, TPC-type.

Duct size shall be of internal diameter 63 mm for the low current (LC) and 200 mm diameter for low voltage (LV) and medium voltage (MV) networks, unless otherwise specified.

The ducts and pipelines are to be installed and left clean with no remaining debris or being blocked inside. All ducts or pipeline ends shall be kept closed / protected against any contamination by water, debris or dust.

In general, any buried networks (mainly Potable water and Raw water pipelines) shall be designed and laid in the freeze-free depth necessary to protect them from the frost (e.g. deeper than 0.8m from the ground surface level in any place). The pipelines shall be designed and laid down with some slope in accordance to the applicable norms and standards.

All control valves shall be water type (sizing to be defined by the Contractor). Control valve equipment shall meet the NF EN 12845 + A2 Standard requirements and shall include the installation of a by-pass for each control valve.

Rules for distance between buried (utilities) networks and rules for proximity between networks and plants shall be respected (refer to NF P98-332).

The Contractor is responsible for updating the reference drawings and documentations related to the modifications of the existing networks in accordance to the Works performed.

### 5.5.2 Potable Water (PW) – network connection

The Contractor shall connect the building to the existing potable water (PW) network available in a manhole n°70A2PW-MFI-0355 on a valve of 1” male after a meter, located on the North side of B05 – refer to the figure 2 below.

#### PW system requirements:

- i. The piping shall be correctly identified to avoid any confusion with the raw water network;
- ii. In accordance to the depth and the routing, the network shall be protected against the frost;
- iii. All the networks products shall be compatible with drinkable water;
- iv. At the delivery point in the building, a pressure reducer, strainer, anti-pollution check valve and isolation valve have to be installed and shall be easily accessible;
- v. All the adaptation of the existing belongs to the Contractor;
- vi. Tightness test and drinkability tests (D1 and D2 types) shall be performed at the completion of the Works.



*Figure 2: Potable water connection point in existing manhole*

### 5.5.3 Raw Water (RW) - network connection

The raw water of the building will be supplied by Raw Water (RW) existing network running on the middle berme of the North embankment. The new pipeline will be buried and will roll up the slope till the CA2 platform level – refer to the figure 3 below.

All Works for the raw water (RW) network must be carried-out taking into account the applicable laws, standards and codes.

During the works, this branch can be locked out but the impacted shall be limited as much as possible.

#### RW system requirements:

- i. The piping shall be correctly identified to avoid any confusion with the raw water network;
- ii. In accordance to the depth and the routing, the network shall be protected against the frost;
- iii. An excavation survey of the existing RW to find pipeline: PEHD 160mm diameter (DNe)
- iv. Verify the pipeline (IMPORTANT: hold point - convene the ITER Organization Responsible Officer (IO RO) prior to process further);
- v. Connection shall be done with a direct chipping with DN40 PEHD pipe on the existing RW pipeline PEHD 160mm diameter (tapping saddle with buried valve);
- vi. After the laying of the new DN40 PEHD pipe in the embankment, the contractor shall refurbish the slope (topsoil + anti erosion net) and the common pedestrian path on the berme (30cm of GNT + Spray and Chip coating);
- vii. Install a manhole 80x80cm with one valve and one meter at the extremity of RW pipe PEHD 40mm diameter (DN40);
- vii. From this new manhole, the contractor shall have to lay the pipe till the delivery point in the building where a pressure reducer, strainer, anti-pollution check valve and isolation valve have to be installed and shall be easily accessible;
- viii. Tightness tests of new network shall be performed in accordance with Fascicule 71 preconisation with a tolerance loss of maximum 0.2 bars for test compliancy.

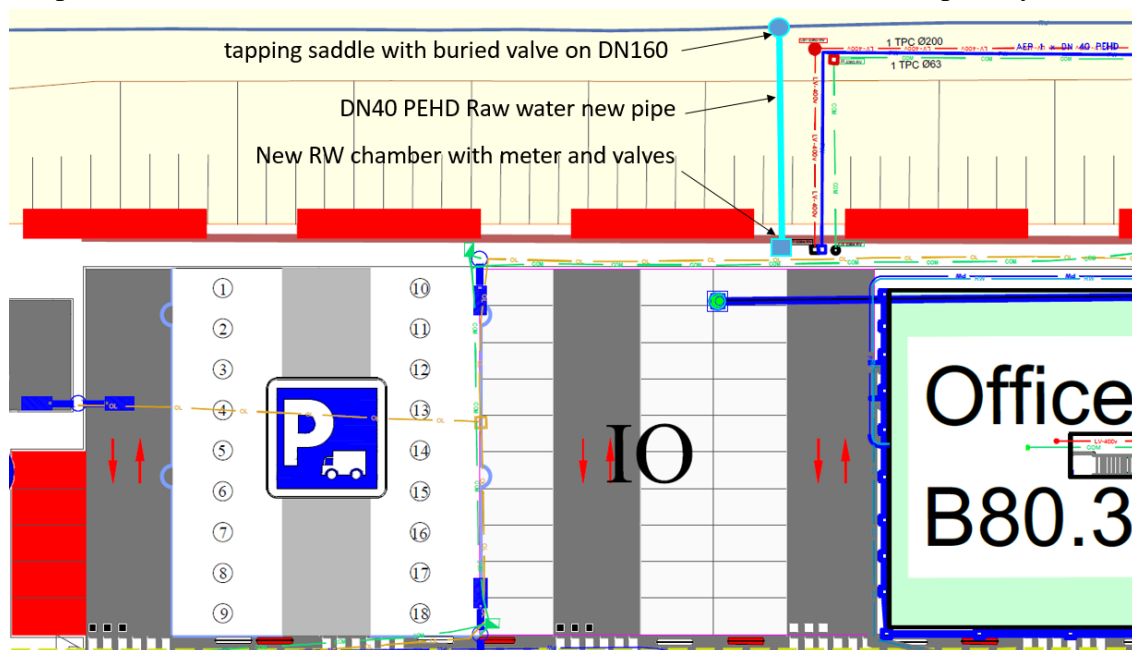


Figure 3: Raw water connection on existing network



#### 5.5.4 Low Voltage (LV) - network connection

The Contractor will have to connect the low voltage room of the building to the existing delivery chamber n°7000ES-RQ-0364 which is directly connected to the lot electrical cabinet n°7007ES-BD-0004 where a 250A switch supplied from the building 07 are available to supply the new building.

##### LV system requirements:

- i. After the lock-out of the existing LV electrical network, the Contractor shall lay ducts 200mm diameter until the future Low voltage room location,
- ii. Refurbish the existing after the end of the works,
- iii. All the adaptation of the existing belongs to the Contractor;

In addition, depend on the design of the main building electrical supply line – refer to 5.16.3, the Contractor shall perform the necessary civil works to lay additional ducts and manholes to interconnect the building 07 and the new building 05. This works shall include the refurbishment of all the surfaces impacted.

#### 5.5.5 Low Current (LC) - network connection

The Contractor will have to connect the low current room of the building to the existing delivery chamber n°7000ES-RK-0364 where a 12FO monomode 9/125 terminated by LC connector in a waterproof junction box with 20m spare length is available to supply the new building.

##### LC system requirements:

- i. The Contractor shall lay ducts 63mm diameter until the future Low current room location,
- ii. Refurbish the existing after the end of the works,
- iii. All the adaptation of the existing belongs to the Contractor;

#### 5.5.6 Sanitary Drainage (SD) - network connection

The Contractor shall connect the building to the existing sanitary drainage network (SD) running all along the south façade.

The connection shall be done in a manhole n°7000SD-RG-0212 located on the road – refer to [11].

##### SD system requirements:

- i. Gravitational network with a minimum gradient of 2%,
- ii. PVC CR8 pipes Ø to be defined in accordance the standards and the needs (DN100 minimum),
- iii. All the networks shall be water tight,
- iv. In the existing manhole n°7000SD-RG-0212, the pipe shall end with backflow preventer (“clapet de nez” type);
- v. A new accessible airtight chamber shall be created before the building with a double check valve with the possibility to isolate the network,

- vi. The networks shall be installed as per the standards to allow vehicle circulation; and, the contractor shall refurbish the asphalted area as found at the end of the works;
- vii. Associated to ITV report, the tightness test of the network will be carried out essentially according to method L (testing in the air). The use of tests following the method W (testing in the water) will be limited to one control to manholes not equipped with waterproof buffer and pipelines in case of failures following method L. The control of the flow of water will be carried throughout the whole course of the network.
- viii. The building network shall be properly ventilated to avoid any bad smell as per the applicable DTU60.1.

### 5.5.7 *Precipitation Water Drainage (PD) – network connection*

The Contractor shall connect the building to the existing precipitation water drainage (PD) system running all along the south façade.

The Contractor shall manage the rain water by installing buried gravitational network connected to existing PD system. No aerial and visible network will be allowed. The downpipes to serve the building 05 shall be located inside the building envelope and shall be connected underground to the existing PD networks in the area.

This global management of the rain water shall be designed and performed to avoid any water ingress inside the building and its basement. If necessary, grating gutters shall be installed in front of all the pedestrian accesses, and the external staircase.

The final design shall be defined at the design stage by the Contractor and shall be validated by the IO. A proper calculation note shall be submitted justifying the conception by taking into account the same hypothesis than the existing network (centennial event to be considered).

On completion of the Works, the new precipitation water drainage networks shall be checked to prove its perfect functionality. The Contractor shall performed a video inspection (ITV) and a tightness test of the network according to the method L (testing by the air). Network testing with the method W (testing in the water) shall be limited to control the manholes and pipelines in case of reported failures following the method L testing. These controls of the flow of water shall be carried out throughout the whole course of the PD network. The ITV shall be performed up to the main collectors of the area. In case of any obstructions and/or solid materials presence, it will be the duty of the Contractor to clean the network and test it again.

The Contractor shall avoid to pollute the existing PD.

The connections can be done in two available manholes n°6100PD-RG-0564 and n°6100PD-RG-0565 located on the road – refer to [11].

#### PD system requirements:

- i. Temporary management of the rain water during the preparation and/or construction Works shall be included in the Contractor's scope;
- ii. Gravitational network with a minimum gradient of 2%,
- iii. PVC CR8 pipes Ø to be defined in accordance the standards and the needs (DN100 minimum),
- iv. All the networks shall be water tight,

- v. On completion of the PWD network Works / section of the Works (as appropriate), the above requested tests shall be performed.

### 5.5.8 Outdoor Lighting (OL) - network modifications and requirements

The Contractor shall remove two (2) candelabums and the associated outdoor lightning (OL) network located on the project footprint shall be rerouted around the building to grant a continuity of service for the other candelabums connected to this line. All the works associated to this network deviation and modification are in the scope of the contractor.

OL system requirements – refer to [11] & [31] and figure 4 below:

- i. After the lock-out of the OL electrical network and physical disconnection of the wires, the Contractor shall dismantle the existing two (2) candelabrum and pulling back their associated wires for potential reuse. When necessary, the old ducts and chambers shall be removed from the ground. The contractor will have to store the candelabrum on ITER site at a location defined by the IO in due course;
- ii. Rerouting of the network by installing two new D90 buried ducts with associated chambers for each change of direction;
- iii. Pulling of wires in the new networks and perform the candelabrum connection. Waterproof junction boxes can be allowed in an accessible chamber to reconnect the cables;
- iv. On completion of the modification works, an legal initial inspection shall be performed by an independent checker (Viel) to ensure an appropriate execution of the works.
- v. The other remaining candelabrum of the area shall remain in service. The Contractor shall test if they work properly on completion of the Works.

On the same principle, the low current network (empty duct and chambers) following the same track than OL shall be rerouted. The contractor as substitute shall install two ducts DN63.

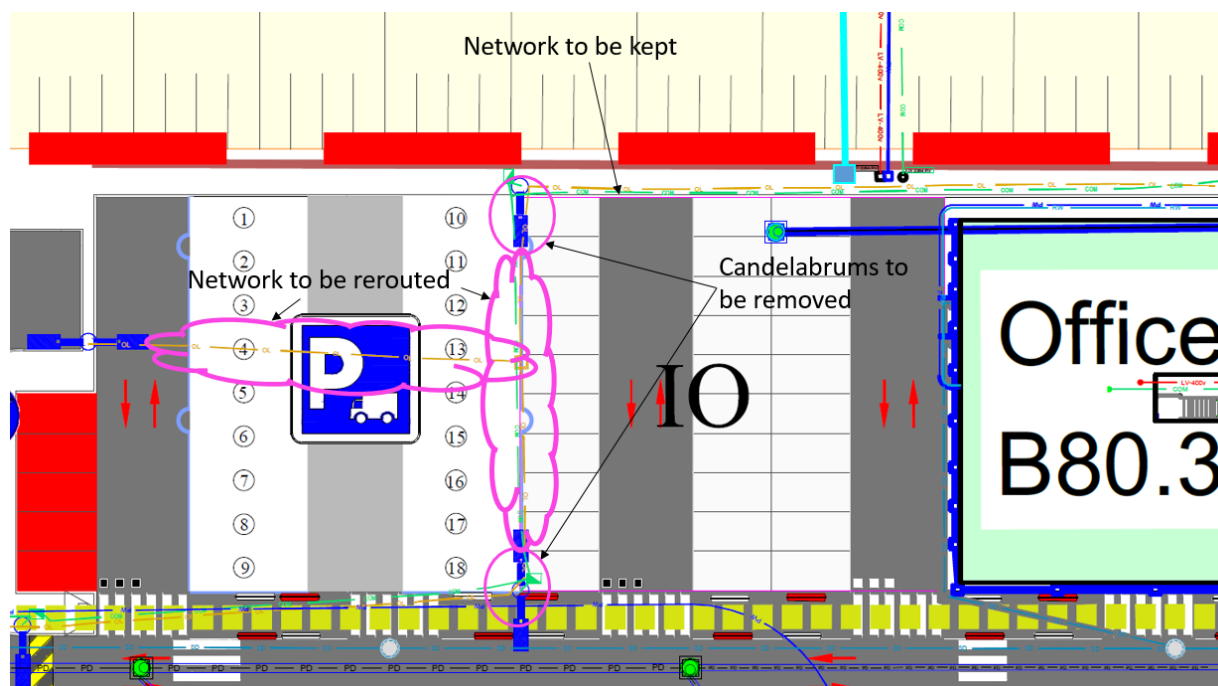


Figure 4: OL and existing LC networks modification works

### 5.5.9 Earthing & lightning networks - modifications and requirements

As detailed in 5.11 after, The Contractor shall design and install an earthing protection for the structures of B05 and its equipment. The design of the earthing protection systems shall provide a safe environment for the personnel and the functional purpose for the equipment in the building to avoid any electrical hazards. The use of double or multiple earthing points shall be avoided, as this can create some loops for eddy currents and produces electromagnetic noise. As minimum, a earthing protection loop shall be laid in the excavation for the building foundation.

#### Earthing and lightning systems requirements:

- i. All operators or subcontractors performing the lightning works shall be qualified for this scope (QUALIFOUDRE certification).
- ii. The network shall be constructed of the copper cables buried at 1m depth. The cables diameters shall be confirmed during the design phase by an appropriately qualified designer.
- iii. All the buried connections and interconnections of this network shall be done by aluminothermy welding.

### 5.5.10 CA2 parking area – removal

The Contractor shall remove the existing car park coating and subgrade prior to start the foundation works for B05 structure. The structure is composed of 5 cm of BBSG wearing course, 10cm of GNT 0/20 and 40cm minimum of backfilling material (C1B5) treated with lime – refer to [29].

#### CA2 removal works requirements:

- i. The demolishing / removal methodology chosen by the Contractor shall limit the production of dust and prevent any damage to the existing surrounding structures and infrastructures;
- ii. The contractor shall perform net cut in the asphalt prior to remove it using an adapted saw;
- iii. The removed material shall be reused in the Works on the project as much as possible, or, appropriately sorted and evacuated from the Site to an authorize landfill;
- iv. Temporary management of the rain water on Site during the demolition/removal Works shall be included in the methodology of the Works.

## 5.6 Building foundations

The Contractor is fully responsible for the design of the foundations.

The foundation design shall be duly justified based on the geotechnical and physical characteristics of the area. If necessary, the Contractor could perform the appropriate geotechnical mission(s) to validate its hypothesis and justify its calculation. Preliminary geotechnical information of the area are provided in appendixes [29] and [30].

At the design stage, the Contractor shall submit a hypothesis note which shall be validated by the IO prior to the construction works commencement.

Taking into account the preparatory (early) Works described in Section 5.5 above, the design of foundations shall take into account the presence of the existing networks to protect them from any damages by the Works – refer to [11] and [31].

The foundations shall be constructed at the free frost level following the applicable norms and standards.

During the execution of the foundations, the Contractor shall be responsible for implementation of all the necessary measures to:

- a) Ensure the stability of the embankments.
- b) Prevent any settlement or collapse on the existing structures and utilities.
- c) Reinforce the existing structures if and where necessary (including during the temporary works stage).
- d) Manage the evacuation of rain water using a dedicated temporary network - it shall composed of a pump and settlement tank.
- e) Keep a safe access for pedestrian and vehicles at all times.
- f) Implement a proper fencing off for the working area / excavation zone in accordance to the progress and the risk related to the Works.

Any ground movement linked with the excavations and modelling of the existing platform shall remain within the Site boundaries. The surplus materials shall be evacuated by the Contractor from the ITER site to a dedicated deposit area.

The cleaning of roads around the Site shall be at the expense of the Contractor based on the weather conditions, the roads cleanliness and the frequency of their use. During dry periods, the Contractor shall implement the measures to limit the spreading of dust from the Site.

## 5.7 External envelope

The building external envelope structure shall be designed and constructed such that full functionality is maintained under all climatic conditions that could reasonably be expected during the design life of the building. Eurocodes shall be applied.

The Contractor shall consider in the design the local weather conditions [19].

To keep a good visual homogeneity, the façade shall be **fully uniform** without surface discrepancies in the colour, texture and shape with the aim to obtain an acceptable harmony, the construction method and system shall be visible from outside.

The Contractor shall choose the type of walls, the roof structures, the doors and the windows in order to provide sufficient thermal insulation to comply with the RT2012. The whole insulation shall be done with Rockwool with a fire classification A1.

The building steel structure shall be painted (if any) with an anti-corrosive protection coating system, AFNOR classification to be selected by the Contractor in accordance to the exposition.

During the design phase, the Contractor shall provide the IO with the thermal calculation notes to support its design of the building with the controlled indoor temperature as specified in this technical specification. The energy consumption shall be optimized and reduced as much as possible.

The colour for the building external envelope shall be standard white (RAL to proposed by the Contractor for IO approval). The colours of all elements constituting the visible parts of the building will be subject to prior approval of the ITER Organization.

The building roof shall be equipped with collective guardrails if there is no acroterion sufficiently height to consider it as collective protection to avoid guardrails installation (preferred solution).

The access to the roof shall be with stairs (no cat ladder allowed). This staircase will be located on the South east side of the building. For maintenance and operation system, we shall be able to walk on the whole surface. For the roofs, fixed in accordance to the support, a Rockwool insulation with a fire classification A1 following the Eurocodes shall be implemented below the waterproofing layer for the insulation, its thickness shall be defined by the contractor to be comply with RT2012.

The Contractor shall implement a roof access by the exterior staircase equipped with a lockable gate to avoid unauthorized access; the lock shall be included in the keys organization chart.

In addition, collective guardrails shall be installed all around the Atrium at the room level.

The Contractor shall choose the type of doors, smoke exhaust and windows in order to provide sufficient thermal insulation and to avoid condensation inside the building. The choice shall follows the A.E.V. classification in accordance to the region, the site and the exposition; and shall grant RT2012 classification.

## 5.8 External Windows

The Contractor shall supply and install external windows following the below main requirements:

- Windows PVC or Aluminium, double glazed insulation compliant with RT2012;
- Sun protection of the Southern and Western facades obtained by implementation of glass with a solar gain inferior to 25% (in the mass);
- Turn and tilt window;
- Rolling shutters with orientable aluminium slats, isolated, with crank command. The aluminium trunk shall be insulated and invisible from outside;
- Windows dimensions and location to be validated by the ITER Organization;
- Ventilation rulers built-in;
- Windows selection shall follows the A.E.V. classification in accordance to the region, the site and the exposition.
- All windows shall be equipped with a device to block them in open position.

The size and the number of windows shall comply with the NF X 35-102 and the circular of 11 April 1994, especially:

- The glazed surface representing at least  $\frac{1}{4}$  of the largest external wall;
- No workstation in a zone located at more than 6 m from a window (considered as “blind rooms”).

## 5.9 External pedestrian doors

The buildings shall be equipped with the insulated doors to allow the ingress and exit of the pedestrians in the building; they shall have also the function of emergency exits. The quantity, size and locations of the pedestrian doors (emergency exits) shall be designed by the Contractor to be compliant with the applicable norms and regulations as well as the French Labour Code.

The required minimum number of the pedestrian doors and their positions are given in [1]:

- I. Four (5) doors to be implemented at ground level – two per air locks:
  - a) one (1) main entrance door double leafs in the south east corner;
  - b) one (1) main entrance door double leafs in the north west corner;
  - c) one (1) automatic sliding door in the airlock of the south east corner;
  - d) one (1) automatic sliding door in the airlock of the south east corner;
  - d) one (1) access door to the atrium area;
- II. One (1) main entrance door double leafs for the Level 2 in the south east corner;
- III. One (1) main entrance door double leafs for the Level 3 in the south east corner;

The double leafs pedestrian doors shall meet the requirements listed below:

- i. Two leaves (double-leaf door) and automatic sliding doors with the clear opening dimensions: W=1940 mm x H=2500 mm at ground floor and W=1940 mm x H=2200 mm for the levels 2 and 3. The access door to the atrium area shall be a double-leafs door unequal with clear dimensions: W=930+430 mm x H=2004 mm.
- ii. The frame colour shall be chosen by the IO at later stage;
- iii. Aluminium glass door compliant with anti-breakage SP10 double laminated glazing (securit glass);
- iv. Each door shall be equipped with a door closer and door stopper (located as far as possible from the hinge side to avoid an arm lever effect), in addition, the door will be equipped with a device to block it in the open position.
- v. Interior and exterior stainless steel baton door handle and a key hole for European cylinder. The locks to be provided by the Contractor after validation of the organigram by the IO (Bricard brand);
- vi. Thermal insulation shall be designed in accordance to RT2012 and in line with the defined indoor conditions;
- vii. Fixing devices shall be in steel and base plates in galvanised steel;
- viii. Doors shall be equipped with a strip seal to prevent the ingress of water except for the indoor doors. The strip seal shall be compatible with / allow the disable person access;
- ix. An autonomous emergency-lighting unit shall be installed minimum 10cm above each door frame;
- x. The system must avoid tripping hazard or provide appropriate warning-safety signage.
- xi. Pedestrian doors (except the atrium door and automatic sliding doors) shall be equipped with badge readers and ant-intrusion system connected to the access control system to secure the building access– refer to Section 5.17.6.

The automatic sliding pedestrian doors shall meet the requirements listed below:

- i. Minimum clear opening dimensions: W=1940 mm x H=2500 mm;
- ii. The aluminium frame colour shall be chosen by the IO at later stage;
- iii. Aluminium glass door compliant with single laminated glazing (securit glass);

- iv. Each door shall be equipped with safety battery, control panel, ant panic function and easy manual safety unlocking system – in any case door shall be compatible with the emergency exit function;
- v. No rails on the floor;
- vi. Compatible for intensive use of 4000 cycle/day minimum.

## 5.10 Fire extinguishers

The Contractor shall define the type, number and location of the fire extinguishers according to APSAD R4 regulations. A dedicated fire protection mission shall be performed by the Contractor at the design stage to confirm the building design and to position the devices appropriately. The Contractor shall take into account the investment protection aspect in the definition of extinguishing agent (i.e. CO<sub>2</sub> preferred to the powder ABC where possible according to the risks). Provision and distribution of the fire extinguishers shall be in the scope of the Contractor.

The signalization panel of each fire extinguisher shall be fluorescent. All fire extinguishers shall be equipped with the identification plates providing the key details (unique ID number, type, size and date of fabrication as a minimum).

## 5.11 Fire instructions

The building shall be furnished with intervention and evacuation plans in accordance with the French standard NF X08-070. These plans shall be bilingual (English and French).

The safety register shall be provided and installed by the Contractor (the location to be confirmed by the IO at the design phase).

An emergency stop button to switch off the electricity inside the building shall be available next to the intervention plan. One (1) emergency stop button to switch off the HVAC of the building shall be installed too to be able to confine the building (the location to be confirmed by the IO at the design phase).

## 5.12 Smoke exhaust system

The B05 building shall be equipped with an adequate smoke exhaust system for the inner staircase fitting for purpose of an office building. The systems shall be compliant with all statutory requirements and the French Labour Code, in particular the Decree No. 92-332 of the 31<sup>st</sup> of March 1992.

The smoke exhaust system shall follow the below requirements:

- i. Smoke exhaust hatches shall:
  - a) Be properly thermally insulated to avoid any condensation on their surfaces;
  - b) Be installed with a fixed steel grating (1200 Joules resistant);
  - c) Be equipped with individual sensors indicating their position (Open/Closed);
  - d) Have the opening panel made of translucent polycarbonate of 30 mm minimum thickness;



- e) Open automatically in the situation when the indoor temperature reaches 140°C at the roof level.
- ii. Smoke exhaust control panel shall:
  - a) be equipped with a pneumatic system with gas;
  - b) be equipped with a visual device to signal the gas cartridge infill level;
  - c) allow to carry out two (2) openings and one (1) closure per cartridge.
- iii. Smoke exhaust cables network shall be made of copper.

The location of the smoke exhaust panel in the building shall be at the main entrance next to the intervention plan, its exact location shall be agreed with the IO during the design stage.

The final site acceptance test for the smoke exhaust system shall be performed with the IO and the concerned authority to ensure that the system works properly and meet the above requirements.

### 5.13 Lightning protection

The Contractor shall provide an adequate lightning protection to the building, to their equipment (cubicles, HVAC system...) and the electrical supply and controls installed under the Works.

The design of the lightning protection systems shall provide a safe environment for personnel and avoid electrical hazards. The design Tool SESshield/CDGES for Lightning Protection studies is mandatory. The building shall be fitted with necessary protection against lightning risks in order to allow the continuity of the works inside during thunderstorms.

All operators (or subcontractors) performing the lightning works shall be adequately qualified for this job (= possess the QUALIFOUDRE certification).

At the design stage, the Contractor shall perform a lightning risk analysis (ARF) prior to design the lightning protection system. The Contractor shall provide all supportive calculation notes for their lightning protection design with a final conformity report performed by the 3<sup>rd</sup> party independent checker prior to the Works commencement on the Site.

The Contractor shall take into consideration the requirements listed in Section 5.5.9 above for the design and implementation of the extended lightning and earthing protection networks.

### 5.14 Internal structure

#### 5.14.1 Floors

The floor shall be waterproof structure design to withstand the following loads:

- 250kg/m<sup>2</sup> for the levels 2 and 3;
- 1000kg/m<sup>2</sup> for the level 1 (ground floor);

The thermal insulation shall be compliant with the RT2012.

Respecting the seismic recommendation of the area, insulation with rupture of cold bridges by introduction of an insulating material between the perimeter structure and the floor.

The floor covering shall be of thermoplastic type, of a colour to be approved by the ITER Organization, equipped with matching skirting, with hot welded junctions and compliant with the U4P3E2/3C2 classification in all rooms. It shall be built with fungistatic and bacteriostatic sanitized treatment and shall have an impact sound reduction of 20dB. PVC plinths shall be installed all along the bottom of the walls with non-visible fixation adapted to the support.

In case a concrete slab, the raw concrete surface of the floor slab shall be treated with a pore sealer; and, a self-levelling smoothing compound for floor shall be poured on its top.

For the Atrium floor, the contractor shall create a solid waterproof floor (raw base) with a system of diamond slope and a floor drain siphon to collect rainwater and send them to the pluvial drainage network with a minimum diameter of 100mm. The final level of this floor shall be minimum 20cm lower than the ground floor level to house the green structure.

Then, on this raw base, the contractor shall create a green floor respecting the following requirements:

- Final level of the green floor, extensive type, to be at the building ground floor level minus 2cm;
- Bearing capacity of the concrete slab of 350kg/m<sup>2</sup> minimum;
- Design of the structure compliant with DTU;
- Structure shall be composed of: drain layer → filter layer → top soil – thickness in accordance to the standard,
- The concrete slab shall be properly waterproofed to avoid any water infiltration.

#### 5.14.2 *Ceilings*

The Contractor shall implement a false ceiling made of acoustic tiles in all rooms as follow:

- Ceiling tile: 600 mm x 600 mm, colour white (RAL to be defined by the IO at later stage), Rockwool type, with fire reaction A1 minimum;
- Service space void above the false ceiling sufficient to pass all the services;
- Acoustic reduction shall be 21dB (class A as per ISO 354);
- Easy removable false ceiling system.

The usable height of the ceilings with regards to the finished floor shall not be less than:

- 2.75m for the level 1;
- 2.5m for the levels 2 and 3.

#### 5.14.3 *Interior walls*

The interior walls shall follow the below requirements:

- The interior partitions shall be designed to provide a minimum of 44 dB (A), and, all the partitions shall go up to the structural ceiling, above the level of the false ceiling;
- The insulation thickness of the internal partitioning walls shall be 48mm Rockwool with fire reaction A1;
- Cladding on the both side can be pasteboard or steel type with a smooth painted finishing with colour white (RAL to be defined by the IO at later stage) granting a good acoustic insulation;

- The wall's claddings shall be fully watertight, shock resistant and easily cleanable for the following specific rooms: Toilets rooms, Atrium, Maintenance rooms, cafeteria areas around the wet points and storage rooms;
- Next to each internal doors to access to office rooms, storage rooms, meeting rooms or cafeteria rooms, a fixed window directly integrated to the main doorframe shall be installed to provide a visual inside the rooms. The window shall have a single transparent 44.2 securit glass and shall be on the full height of the door.

#### 5.14.4 *Internal pedestrian doors*

The buildings shall be equipped with the internal pedestrian doors.

The quantity and locations of the pedestrian doors shall be designed by the Contractor to be compliant with the applicable norms and regulations as well as the French Labour Code. The size of the doors shall comply with the safety requirements in terms of the number of occupants of the room.

The double leafs pedestrian doors shall meet the requirements listed below:

- Single leaf door with the clear opening dimensions: W=930 mm x H=2040 mm. The access doors to the LV & LC rooms and storage rooms shall be single leaf door with the clear opening dimensions: W=930 mm x H=2500 mm for level 1 (ground floor); W=930 mm x H=2200 mm for level 2 and 3.
- The door shall be isoplane acoustic type 42dB, full core with shop-painted metallic joinery. The colour shall be chosen by the IO at later stage;
- Each door shall be equipped with door stopper, in addition, for the sanitary rooms (toilets) a door closer shall be installed too;
- Interior and exterior stainless steel baton door handle and a key hole for European cylinder; except the toilets doors with shall be equipped with actuator lock from inside with visual colour indicator outside see detailed after. The locks to be provided by the Contractor after validation of the organigram by the IO (Bricard brand);
- In addition, the doors of the meeting rooms shall be equipped with internal deadbolt lock;
- Doors shall not be equipped with a strip seal;
- Doors of toilets cabins fitted with:
  - Safety locks which can be easily operated by the user and easily released from outside for access in case of emergency (turn and release);
  - Roller latch lock;
  - Occupied indicator;
  - Pull handle.

#### 5.15 **Door keys**

The Contractor shall deliver all necessary keys and accessories for normal usage of the joinery.

The locks of all doors shall be integrated to the BRICARD organization chart already implemented on Site. The Building B05 keys organization chart shall be submitted for approval by the ITER Organization. It shall include a building master key, an offices sub-master key and a technical room sub-master key.

The lockable door of the roof access will also be integrated in the key chart.

The Contractor shall supply:

- 3 keys for each single lock;
- 3 keys of the building master key;
- 3 keys of the offices sub-master key;
- 3 keys of the technical room sub-master key.

The Contractor will remain responsible for all keys until the Taking-Over of the Works.

## 5.16 Plumbing

### 5.16.1 *Water distribution inside the building*

The Contractor has to design and installed the following water distribution inside the building:

- For the potable cold and hot potable water, an accessible distribution clarinet per room shall be installed with a valve per circuit and its identification,
- The distribution networks shall be in multicouche with adapted welded junction and supports according to the manufacturers;
- The design and the diameter of the pipes shall be defined in accordance to the standards and the use;
- For toilets areas, all the taps shall be time-controlled, push button of the Presto type or similar and equipped with water-saving aerators;
- All maintenance plumbing devices (water heater, sanitary drainage collector and inspection hatches, isolation valves...) shall be regrouped in technical ducts hidden (Non-visible piping) but easily accessible (lock integrated in the keys organization chart) for maintenance purposes;
- The potable water circuits shall supply the following points:
  - All the Sinks of the building,
  - All the showers,
  - In case of need, protected interconnection to supply the toilets flush in case of raw water lock out.
- On the same principle, for the raw water, a distribution clarinet shall be installed with a valve per circuit and its identification to supply toilets flush and one free frost delivery point in the atrium with a garden valve on the wall.

### 5.16.2 *Water evacuation inside the building*

The Contractor has to design and installed the following water evacuation inside the building.

- The sanitary network shall collect the sewage water coming from the all the toilets rooms, changing rooms, maintenance rooms and cafeteria rooms. The Contractor has to design and installed the internal associated gravity network to collect this water. The design and the diameter shall be defined in accordance to the standards and the use;
- The networks shall be designed to avoid any bad smell inside the building. Primary and secondary blowhole network shall be installed with material conform to the DTU.
- The networks shall be in PVC with adapted glued junction and supports according to the manufacturers;
- All maintenance sanitary pipes shall be regrouped in technical ducts hidden (Non-visible piping) but easily accessible (lock (if necessary) integrated in the keys organization chart) for maintenance purposes;

### 5.16.3 *Production of hot potable water*

The Contractor shall enable the production of warm water for all the toilets, maintenance rooms and cafeterias, by electric warm water boilers, including:

- Supply, installation and electrical connection of boilers, capacity depending on the distribution in the building to be designed by the contractor;
- The temperature of warm water in the tanks shall be at least 55°C in order to avoid any risk of development of legionella.

### 5.16.4 *Sanitary equipment*

The Contractor shall supply and install all the equipment and connections to the evacuation and feeder systems (dual-flush toilets supplied by the raw water network and the rest of the equipment by the potable water network) including:

- Dual-flush toilets with white glazed ceramic bowls supplied by the raw water network;
- All equipment for disabled persons;
- White glazed ceramic lavatories with mirrors above;
- Cold/warm water mechanic mixer taps and slop sink for maintenance in all cleaning rooms;
- Cold/warm water thermostatic mixer taps for hand washers sinks in all toilets and changing rooms;
- For the shower, the cabin shall be waterproof with a minimum receiver size of 90x90cm. The cabins shall be closed by single leaf transparent security glass door. The taps shall be thermostatic mixer type. Each single shower room shall be equipped with: one towel handle, soap handle, four patters fixed on the door.
- Kitchenette set in each cafeteria, equipped with single sink & plate rack, cold/warm water thermostatic mixer taps, microwave oven and built-in refrigerator;
- In each cafeteria, pending connection points from the potable water network for the following equipment that IO will install :
  - 1 vending machine (500W / Ø) (dim : W0.8xD0.9xH1.8m)
  - 1 coffee machine (2000W / valve 3/8 gaz ) (dim : W0.6xD0.9xH1.8m)
  - 1 water fountain (200W / valve 3/8 gaz) (dim : W0.4xD0.4xH1 m)
- Accessories (mirrors, flaps, patter, electric hand dryers, ...);
- Autonomous water heater located in hidden but easily accessible areas for maintenance purposes;
- Centralized mechanical ventilation;
- Connecting the equipment to the supply points with isolation valve in hidden but easily accessible areas for maintenance purposes.

The gender ratio to be used to size the sanitary facilities is the following: 50% (male) 50% (female).

## 5.17 Heating, ventilation and air-conditioning (HVAC)

The heating, ventilation and air conditioning systems (HVAC) implemented under the Works shall be electrical (no gas or fuel sources allowed), and, they shall be designed according to the total electrical power capacity of the building. The HVAC system proposed by the contractor shall be in accordance with RT2012 rules, no standard electrical heater is allowed.

The systems shall be compliant with all statutory requirements, the applicable norms and standards and the French Labour Code. The equipment shall be CE marked.

The HVAC units shall be installed on the roof of the building on cradle supports adapted to the roof waterproofing complex.

An access to the different parts of the systems shall be ensured to allow a safe and appropriate maintenance.

The design shall mitigate as much as possible the noise and vibration disturbance generated by the HVAC systems. The duct lagging shall be implemented accordingly.

The HVAC systems shall be supervised and controlled by the BMS system of the building.

All HVAC units shall be supplied with a cooling gaz with GWP lower than 675 (GWP of R32).

The evacuation of condensate water shall be via a connection to the sanitary drainage network.

The installations shall be designed for the following target temperatures, for outside temperature of + 35°C in summer and - 10°C out in winter and a relative humidity of 80% - refer to [20]:

- In the offices, the cafeteria, the storage, the toilets, the common corridors and the meeting rooms: winter, 21+/-2°C, summer, 26+/-2°C;
- In the technical rooms (LV and LC rooms): 20°C +/-1°C all year round;

### 5.17.1 *Offices, cafeterias, common corridors, meeting rooms and storage rooms*

The systems shall be air-conditioning heat pump inverter type (preferred multi splits).

The interior units shall be wall-mounted type or ceiling-mounted type with one remote control or control panel for independent heating and air-conditioning in each room.

Each local unit shall also be connected to a central control panel, located in the LV room allowing a rapid regulation setting of the whole building.

In order to allow any future modifications, the number and the location of the interior units of each large office shall be determined according to the partitioning feasibility.

### 5.17.2 *Low current and Low voltage rooms*

The Contractor shall design, supply, install, connect and perform the commissioning of the HVAC system with the following characteristics:

- Independent HVAC system;
- Reliable and continuous operation 24/7;
- Cooling power equal or higher than 12kw (heat loads generated by the equipment listed above);
- Temperature set point is 20 °C +/-1°C all year round;
- COP equal or higher than 3.5;
- The noise level of the interior HVAC units shall not exceed 70dB;

- Suitable local control panel with a future implementation of a remote control and/or monitoring system (Modbus RTU interface);
- Automatic free cooling function to save energy:
  - depending on the outdoor hygrometry ( $20 \% < HR_{\text{outdoor}} < 80\%$ ) and temperature ( $T_{\text{outdoor}} < 15^{\circ}\text{C}$ );
  - Filtered (air quality) inlet from the crawl space;
  - Ceiling extraction controlled by the main HVAC unit.

### 5.17.3 Ventilation

The Contractor shall design according to the French labour Code, supply and install dual flow ventilation systems ensuring optimum indoor air quality and energy savings in the workshop, the meeting rooms, the toilets and the cafeteria, as follows:

- The boxes of air extraction shall be located on the roof of the building;
- The ducts shall not be apparent in the building and shall be thermal insulated;
- The PVC grids of air intake and exhaust installed in the false ceilings;
- The air intake shall be of an adjustable humidity control type;
- Control by programming clock;
- The Ventilation units shall be supervised by the BMS system of the building
- The air flows to be taken into account are those of the relevant standard/code (refer to table below):

	Meeting room	Isolated Toilet	Grouped Toilets
Ventilation flow	30m <sup>3</sup> /h/pers	30m <sup>3</sup> /h/room	30 + 15 N m <sup>3</sup> /h

N: number of sanitary units (toilet) in the room.

An emergency stop button shall be installed in the entrance hall to stop all mechanical ventilations in order to allow the confinement of the building.

## 5.18 Electrical power installations

### 5.18.1 Design hypothesis and constraints

- i. TNS is the nominal electrical system to be applied.
- ii. The electrical source will be the LV switchboard of the Building 07 – refer to section 5.16.3.
- iii. During the design phase, the Contractor shall provide the IO with the total power balance and the calculation notes (in CANECO and pdf versions) of the electrical equipment to be installed in the building – refer to 5.16.2 section;
- iv. The Contractor shall make sure the electrical installations are compliant with applicable norms (e.g. NF C15-100 in particular). All electrical installations shall meet the statutory requirements.
- v. If the building is a metallic structure, an equipotential belt (with copper braids or cables) shall be implemented between all the metallic columns.

- vi. All LV/LC electrical cabinets installed in the building under the Works shall be appropriately earthed.
- vii. The design and the data sheets of the products used for the earthing protection shall be approved by the IO at the design stage prior to their installation.
- viii. All installations and equipment shall be CE marked.
- ix. Each equipment shall be tagged with an ITER numbering provided by the IO.

For all the necessary input data related to the existing electrical networks – refer to appendixes [27] and [28].

#### 5.18.2 *Power balance and sizing*

The Contractor shall provide the following documents:

- Building Power Balance with a spare capacity of 30%;
- Electrical calculation notes developed with Caneco and especially the update of the B07 calculation note;
- Studies as well as the electrical drawings and especially the update of the B07 one-line diagram;
- The block diagram of the complete electrical network.

#### 5.18.3 *Electrical connection to B07 main LV switchboard (TGBT ITER)*

The Contractor shall design, supply, implement and connect to the B07 substation, the supply cables of the building. The cable routing could be done through the existing ducts, referred to in Appendix [28].

If this routing is not suitable, the Contractor shall include the necessary ducts in the civil works.

The connection will be made to the main LV switchboard (TGBT) of B07. For this purpose, the Contractor shall design, supply and install the necessary additional electrical drawer(s). There are currently several available but unequipped spaces to implement new drawer units (refer to Appendix [27]). The added drawer unit(s) shall be identical to the existing drawer (breaker, breaker contact position, measuring unit of Diris A40 type, test blocks, cabling to the building monitoring system cabinet...) described in Appendix [27].

All Works requiring a power cut of the main switchboard shall be scheduled on Saturday in coordination with the ITER Organization.

Currently, the lot is supplied by a power line of approx. 220m from 1x250A – 4P breaker with associated capacity and PE which ends in the lot 10 electrical cabinet. This line can be replaced by the contractor to create the new power line of 630A from B07 by pulling back all the existing cables. This existing line can be used by the contractor upon request during the whole works.

#### 5.18.4 *Main electrical switchboard and distribution cabinets*

The Contractor shall supply and install the main electrical switchboard in the low voltage room and all necessary distribution cabinets.

The ratings and time current tripping curves will be defined based on the appliances to be protected. The installation will be calculated so as to guarantee total selectivity. An insulation fault on an electrical circuit should not cause isolation of more than a ¼ of the facilities per sector.



The switchboard, the boxes and the cabinets shall be designed to receive at least 30% of additional equipment.

The main electrical switchboard shall be equipped with a lightning protection in accordance to the ARF recommendation; and, energy meters on all main feeders (HVAC/lighting/electrical outlets...).

**NOTA for all the above points:**

Respect  $L1+L2+L3 \leq 500$  mm thus consider having a surge arrester including its protection.

All the breakers shall be monitored: SD/OF information.

The Contractor shall forecast the connecting switchboard columns in between columns to connect the breakers passing by electrical terminals until a wire section of 25 mm<sup>2</sup>.

### 5.18.5 Cabling and marking

All the LV links will be carried out in copper U100R2V wiring.

All the switchgear (protective devices, relaying, terminal boards, cables etc.) will be tagged.

### 5.18.6 Equipment and electrical plugs

The Contractor shall supply, install and connect all the plugs 16A 2P+pin earth. The fittings shall be of standard brand Legrand Mosaic 45 with screws or equivalent.

The plugs shall be embedded in white conduits and/or integrated at posts (meeting rooms). They shall be positioned depending on the chosen location of equipment and furniture for ease of access, and against risk of trips and falls.

The Contractor shall plan for a departure of 16A from the cupboards with a differential of 30mA, for 5 socket-outlets maximum.

The distribution of low current and low voltage networks shall be uncoupled. The interference problems shall be taken into account in the routing of cables. The dimension of the conduits shall allow a space reserve of 30%.

This feeding system shall be easily adaptable for new connections.

The estimated numbers of normal outlets are the following:

Location	Number of normal outlets	Number of uninterruptible outlets
Offices	3 / desk	Ø
Meeting rooms	2 on sockets tower each supplied by a specific feeder 1/participant on meeting table with the power supply lines from the socket tower 1 in ceiling for screen 1 in ceiling for beamer 4 in ceiling for video 1 / entrance	Ø
Printer areas	4	Ø
Cafeterias	4 2 for vending (0.5KW) and coffee (2KW) machines	Ø

	supplied by a specific feeder (16A) 1 for water fountain (0.2KW)	
Corridors	1 / 10m	Ø
Sanitary facilities	2 + 1 power supply for hand dryer	Ø
Low voltage room	5	2
Low current rooms	5	2 8 / rack 1 power supply for FDS 1 power supply for PAS
Cleaners' rooms	2	Ø
Building Entrances / exits	2	Ø

The setting out of the plugs shall be submitted to ITER Organization approval by the Contractor on the basis of the final furniture arrangements.

### 5.18.7 Distributions and cable trays

The distribution is laid out on cable trays of type:

- Cable basket or under tubes IRO in common areas;
- Ventilated/perforated in the technical rooms and the workshops.

When more than 2 cables follow the same path, they shall be laid out on cable trays, at a rate of 2 maximum layers of cables placed side by side. They shall be fixed by collars of the Rilsan type or equivalent.

The cable trays are of a certain dimension so as to leave a reserve of 30% of the width and have a wing of 5cm.

Each element of the cable shelf is supported by at least two cantilevers, with a deflection of less than 2cm per meter.

In the zones at risk of shock, the mechanical protection of the cables - by cover or tube - is maintained until 2.00 m above floor level.

### 5.18.8 Internal lighting

The lighting shall be compliant with the French Labour Code, be designed in accordance to NF EN 12464-1 and meet the below listed requirements:

- The installation shall be CE marked.
- LED Colour shall be of natural tone: 4000.
- LED lifetime shall be minimum 50,000 hours.
- The protection level in accordance to the areas (wet or dry).

Lighting levels will respect the recommendations from the standard NF EN 12464-1 and will be calculated according to the NFC 71.121:

Room type	Minimum lighting level (lux)
Corridor	100
Staircase	100

Office / meeting room / storage	500
Maintenance rooms	500
Sanitary facilities	200

Table of minimum lighting levels

The Contractor shall include in the Works:

- Calculation of the number of lights;
- Supply and installation of economic lighting of LED type;
- Implementation of dimmable LED lighting in the offices / meeting rooms / CSD workshop and offices usable as a workshop;
- Supply and installation of small equipment / fittings, of MOSAÏC type from Legrand or equivalent;
- Controls of simple switch type in the technical / meeting rooms / workshop and offices;
- Control by presence detectors in the corridors, toilets and cafeterias;
- PVC conduits fixed against the walls for apparent routes. The routes shall be covered as soon as possible.
- For the wet areas the electrical regulations shall be respected.

During the test and commissioning period, the illuminances of the different areas shall be checked by the third party (an Independent Checker). For the Taking-Over by the IO, a global report shall be submitted to the IO to confirm that the requirements are met without observation.

The lights shall be positioned to grant an immediate and easy access for maintenance works.

#### *5.18.9 External lighting*

The contractor shall install the necessary lights to ensure a lighting level of at least 100lux:

- at the entrances of the building,
- in the exterior staircase,
- all around the building, at 5m distance, illuminance level taken at any point 1m above the FFL,

The lighting shall be compliant with the French Labour Code, be designed in accordance to NF EN 12464-1 and meet the below listed requirements:

- i. The installation shall be CE marked,
- ii. LED Colour shall be of natural tone: 4000,
- iii. LED lifetime shall be minimum 50,000 hours,
- iv. The protection level shall be minimum IP 68,
- v. Wall-mounted,
- vi. Controlled by the BMS monitoring system to be set in accordance to time and the period of the year.

During the test and commissioning period, the illuminances of the different areas shall be checked by the third party (an Independent Checker). For the Taking-Over by the IO, a global report shall be submitted to the IO to confirm that the requirements are met without observation.

The lights shall be positioned to grant an immediate and easy access for maintenance works.

### 5.18.10 *Emergency lighting*

The buildings shall be equipped with a fixed installation of emergency lighting (autonomous emergency lighting) in corridors and staircases, in accordance with the decree of 26 February 2003 relating to the circuits and installations of safety and circular DRT n° 2003\_07 of 2 April 2003 concerning the application of the decree of 26 February 2003.

The Contractor shall supply, install and connect safety lighting, as follows:

- Autonomous blocks of emergency lighting “Emergency exit” 60 lumens;
- Operate by remote control blocks “Emergency exit”;
- Displayed in conformity with the NFC 71800;
- 2 blocks separated by a maximum of 15m shall be used to mark out the direction to the outside exit (written in English);
- 1 block above each fire exit;
- 1 block spaced every 15m in corridors.

### 5.18.11 *Earthing and lightning protection*

The Contractor shall provide a calculation note justifying the earthing and lightning protection of the building – refer to section 5.11.

The Contractor shall provide and install the earthing of the installations and all metallic bodies (modular structures, roof cover, staircases, guard railing, and electrical cupboards...) which shall be installed in the ground network buried in a trench.

The Contractor shall include a lightning protection for the electrical equipment in compliance with standards and recommendations for protection against the direct and indirect effects linked to lightning.

### 5.18.12 *Emergency shutdown button*

The Contractor shall supply and install in the entrance hall, an emergency shutdown button ensuring the electrical isolation of the entire building. It shall be key lockable and of LEGRAND 38098 type or equivalent.

## 5.19 **Low current**

The building shall be connected to the existing Low Current (LC) network available for the lot 10 of the CA2 area where a 12 strand SMF fibre with LC connectors to link the IT network in Building B07 LC room. The cable routing shall be done by the contractor as described in previous section 5.5.5.

The LC network shall be connected and distributed for provision of the following systems in the building:

- a) IT network,
- b) Wi-Fi network,
- c) Fire Detection System (FDS),
- d) Building Monitoring System (BMS),
- e) Public Address System (PAS),

- f) Access control system,
- g) Security cameras system,

### 5.19.1 IT network

The Contractor shall design, supply and implement the entire distribution of the IT network in the building.

For this purpose, the “server type “ rack(s) (19” GIGARACK Serie 250 42U type A 2000x800x1000 or equivalent) of the low current room of each floor shall be sized with a spare capacity of 30% to house the following components:

- The necessary optical fibre patch panels with movable drawer and LC connectors to distribute the following optical fibre links which shall be installed – refer to [28]:
  - 12x SMF strands from B07 to the ground floor;
  - 6x SMF strands from ground floor to second floor;
  - 6x SMF strands from ground floor to third floor.
- Reflectometry tests shall be performed at the end for all the fibre installed;
- The necessary RJ45 patch panels to distribute the following analog links which shall be installed for the future connection of emergency phones. :
  - A 16-pair telephony cable shall be installed between B07 telecom cable area and B05's ground floor low current room on a dedicated RJ45 patch panel,
  - 10x Cat.6 cables from ground floor to first floor;
  - 10x Cat.6 cables from ground floor to second floor.

The analog phones will be provided and installed later by the ITER Organization.

- Necessary quantities of RJ45 patch panels for the patching of all required RJ45 plugs including a spare capacity of 30%;
- The Contractor shall supply and install all necessary RJ45 and optical fibre patch cords which will be required to achieve the patching;
- The manageable IT switch(es), Cisco 2960-X type, equipped with SFP and PoE stackable modules including links if several switches are needed in the LC room. These manageable IT switches will be provided and install by the ITER Organization;
- The Contractor shall design, supply and install a grid inverter to assist all the LC systems in case of electrical switch off. It should be an UPS with a minimum capacity of 3kVA (APC SMX750I type) in the rack feeding important system as: BMS (WAGO), PAS (TSIP), IT switch, Access control with an autonomy of 2h mini at 300W ((x1 SMX48RMBP2U);
- All cables shall be properly sorted using a specific rack in the cubicle.
- All plugs and cables shall be uniquely numbered in the cubicles and at their connection points in the patch panels for identification.

The Contractor shall supply, install and connect the totality of the installations for data processing and the telephone with RJ45 plugs category 6, for the following requirements:

Location	Number of RJ45 plugs	Other IT link
Offices	2 / desk	
Storage room	1/entrance (from the CSD LC cabinet)	

Meeting room	1(chairman /VC monitor) 3 (chairman) 1 in ceiling for beamer 2 in ceiling for VC	(chairman /VC monitor) 1 x HDMI 1x RJ45
Printer areas	4	
Cafeterias	2	
Corridors	1 / staircase access (wall mounted) 1 / in the middle of each corridor (Emergency phones) 4/ floor in ceiling for wireless access points	
Low voltage room	2	
Low current rooms	2	
Building Entrances / exits	2 / access	

### 5.19.2 Wi-Fi network

The Contractor shall implement a wireless network distribution in the whole building by installing a Wi-Fi system with necessary cables as follows for each level:

- i. Minimum 4 x Cat.6 RJ copper cables from IT switch in the low current room to Wi-Fi bornes locations (to be-confirmed by the IO at the design phase);
- ii. Minimum 4 x Wi-Fi access points (supplied by the IO), installed and fixed by the Contractor (including the cables connection between the access points and antennas);
- iii. Minimum 4 x Wi-Fi indoor antennas per the access point (supplied by the IO), installed and connected to the access point by the Contractor (including the service openings creation and backfilling, the cables connection and fixation).

The Wi-Fi antennas shall be placed in B05 to provide 100% coverage of the area. As conceptual design, we can considered one antenna mounted on the false ceiling of the common corridor at each angle at each level.

### 5.19.3 Fire Detection system

The Contractor shall implement a fire detection system (FDS) category A fully integrated and connected to the IO Fire Detection System (DEF system) of the ITER site. All information from this system shall be monitored and controlled through the master system installed in the Building 03. The system shall include:

- Smoke detectors and action indicators in the corridors, cafeterias, cleaning rooms, offices usable as a workshop and rooms with specific risks;
- Manual releases of alarm fixed at 1.50 m above the ground and installed close to the exits at each level;
- Sirens of evacuation (could be through the public address system) in quantity and in adequate locations for satisfactory audibility.

The following rooms shall be considered with specific risks of fire and shall therefore be compliant with the corresponding construction rules:

- Low voltage room;
- Low current rooms;

All cable penetrations through fire-rated floors and walls shall be performed with pre-formed firestop solutions.

The Contractor shall design, supply and install fire detection as follows:

- Manual triggers, sirens, visual devices and smoke sensors as per the requirements given above,
- All devices shall be connected to IO Fire detection System (DEF system),
- The FDS in the new building shall be connected to the ITER site network,

All devices shall be DEF brand and shall be interconnected physically by using appropriate wire to perform a FDS loop inside the building.

The Contractor shall design, supply and install fire detection as follows:

- Add a fire Detection Panel in the LC room of the ground floor,
- Add a new fire detection station (ECS forte DEF) in the cabinet connected to VisioDEF system via Moxa using available connection on IT switch inside the building,
- Add a repetitor panel display at the main entrance of the building,
- Connect this new FDS station to the FDS network inside the building (FDS loop of interconnection between sensors and triggers),
- Pull necessary cables (CR1-C1 9/10e) inside the workshop to create the FDS loop,
- Perform necessary test and commissioning to proof to the IO that the system is working,

**Nota: The Contractor shall provide all the technical documents and drawings concerned by this new network.**

All devices shall be connected to IO Fire detection system (DEF system). An evacuation sound alarm has to be installed too to inform locally the users.

#### 5.19.4 *Building Monitoring system (BMS)*

The Contractor shall implement a monitoring system as listed below:

- i. Two (2) new independent PLCs, in a dedicated electrical box in the low current room of the building at the L1 level, by installing:
  - a) PLC-input power: PLC Power supply made by independent breakers, with 2x Micro-UPS DC – SDC-M 24V / 55 W DIN2 PACK 3G), each one to power one PLC independently;
  - b) PLC input connection: 2 x Network Cat.6 cables, one from each PLC to IT Switch of the building,
- ii. Monitoring of the low voltage networks

- a) SD/OF of the breakers,
- b) Electrical meters,
- c) External light system setting and control,
- iii. Monitoring of HVAC systems: Modbus protocol to monitor all HVAC units installed in the building by the Contractor (for all points of monitoring available on the BMS are required, in particular Fault synthesis);
- iv. Monitor the positions of the smoke exhaust hatch,
- v. Monitor the position and status of the automatic sliding doors,

The Contractor shall be responsible for the BMS software update, hardware and cabling implementation and installation.

#### 5.19.5 Public Address System (PAS)

The building shall be equipped with a Public Address (PA) system. The PA speakers shall be implemented to allow the broadcast of site PA system message inside and outside the building.

The system shall be compliant with NF S61-936 and EN 54 standards and integrated into the global system developed on the ITER site. It shall include a local panel/microphone in L1 Low current room which shall allow diffusion throughout the entire building with a distinction of interior and exterior messages. The diffusion of a vocal message or pre-recorded sound alarms shall also be possible from the main command post B03. The Contractor shall supply and install the loudspeakers, in quantity and in adequate locations for satisfactory audibility. The Contractor has an obligation of result. This system could be shared for the fire alarms.

The following specifications shall be followed:

- i. TSIP device shall be installed in an IT rack and connected to power and IT port plug;
- ii. For the PA system indoor coverage, several speakers mounted on the false ceiling of the common corridor each level

The PA lines running indoor shall be appropriately protected and secured (e.g. using the indoor cable trays).

The noise level of the PA system shall be adapted regarding the expected ambient noise.

The Contractor shall be responsible for programming the existing *Vox@net* system to incorporate the above PA installation and commission the system (including the well function check).

*Note: The installation, programming and commissioning activities will require an access to some existing buildings on the Iter Site, e.g. B03 where the PA server is situated. These activities will require additional administrative tasks to be carried out by the Contractor prior to access being granted by the ITER Organization to B03 (e.g. Prevention Plan, PTW, LOTO, PRE etc. – refer to ITER templates).*

#### 5.19.6 Access control system

The Contractor shall design and implement an access control system in the building, as follows:

- i. Furniture of a new dedicated access cubicle Wall mounted box ACM5/6 self-protected against opening with Two (2) PSXU-TS and with indicator lights One (1) PSX680LEDFC in the ground floor low current room;
- ii. This box shall be equipped with:



- a) Four (4) AP7803 AEOS Blue Door Controller – *Nedap* + twelve (12) licenses for access and two (2) SAM-Cards with licence transparent mode + Users licenses;
  - b) Two (2) AP7831 AEOS Blue Door Controller – *Nedap* + 24 intrusion licenses;
- iii. Furniture of a new dedicated power supply box ACM2-1210 self-protected against opening in the ground floor low current room;
- iv. This power supply box shall be equipped with:
  - a) Two (2) PSXU-TS
  - b) Two (2) PSXU-ARM
  - c) Two (2) PDB801
  - d) One (1) PSXM-1210 and/or One (1) PSXM-2410
  - e) Two (2) FX1218 or 1x FX1218+2x FX1212
- v. Four (4) building main access double leafs doors shall be equipped with complete access control system, as follow:
  - a) One (1) outdoor badge reader *NEDAP*: CVX190;
  - b) One (1) electromagnetic lock (type: SewosyEF550 CTC + ZL);
  - c) One (1) push button (type: BOPOIS);
  - d) One (1) BBG (type: BBMV2C);
  - e) Two (2) opening detectors (type: IM1640PAG) + junction box BRA7X2VVS.
- vi. Design, procurement and installation of the necessary *SYTI* wires to interconnect all access control system;
- vii. All junction boxes shall be auto protected (in series with the door opening sensor auto protection);
- viii. For double leaf doors equipped with an intrusion sensor, each leaf shall be equipped with an opening sensor;
- ix. Furniture of 2000 badges licences;
- x. Test and commissioning of the global system with the support of the IO;
- xi. Update of all the documentations related to this system.

#### 5.19.7 *Security camera control system*

The Contractor shall design and implement a security camera control system in the building, as follows:

- i. Security cameras shall control the main building accesses and surrounding, as follow:
  - a. One (1) AXIS Q3536-LVE camera to control the ground floor south east access;
  - b. One (1) AXIS Q3536-LVE camera to control the ground floor north west access;
  - c. One (1) AXIS Q3536-LVE camera to control the level 2 south east access through the external staircase;
  - d. One (1) AXIS Q3536-LVE camera to control the level 3 south east access through the external staircase;
  - e. Three (3) AXIS P1465-LE camera installed on the south west corner of the building to control the external surrounding areas: infirmary area, west B05 façade, and common pedestrian path/ road of CA2;

- f. Three (3) AXIS P1465-LE camera installed on the north east corner of the building to control the external surrounding areas: north B05 facade & path, Pb6 parking, and, path in between B05 & B80.3;
- ii. Design, procurement and installation of the necessary wires to interconnect all security camera control system. Cameras shall be connect in the LC room;
- iii. Installation and connections of all the cameras with the necessary supports and memory cards,
- iv. Setting and configuration of all the cameras with the IO support,
- v. Furniture of the necessary Licences XProtect Corporate Device License (DL);
- vi. Furniture of the Contrat Cares Plus 3 years;
- vii. Test and commissioning of the global system with the support of the IO;
- viii. Provide of all the documentations related to this system.

## 5.20 Signage

The Contractor shall:

- Supply and install all the mandatory safety signs;
- Supply and install “way finder” signage;
- Supply and install the identification tags for all rooms.

This signage shall be bilingual (English/French) and conform to the ITER Standard.

The room identification tags shall be 150 x 150 mm with removable transparent cover to allow inserting paper signs, metallic frame.

## 5.21 Supply and installation of office furniture

The Contractor shall supply and install the furniture items described below.

### 5.21.1 Codes and Standards

All furniture and associated equipment must conform to the minimum requirements as prescribed in the relevant European and French design codes and standards (or similarly approved international design codes and standards) for such items, including but not limited to:

- ISO 14001 – Environmental Management Systems
- EN 120 – Wood-based Panels. Determination of formaldehyde content. Extraction method called the perforator method
- EN 438 – High-Pressure Decorative Laminates (HPL), Parts 1 – 4
- EN 527 – Office Furniture – Work tables and desks, Parts 1 – 3
- EN 717 – Wood-based Panels. Determination of formaldehyde release
- EN 1335 – Office Furniture – Office work chair, Parts 1 – 3
- EN 14073 – Office Furniture – Storage furniture, Parts 1 – 3
- EN 15372 – Furniture – Strength, durability and safety – Requirements non-domestic tables
- EN 15373 – Furniture – Strength, durability and safety – Requirements non-domestic seating

It is also preferable for environmentally-friendly products to be used where applicable, with certification provided by international organisations, for example, the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC).

### 5.21.2 *Definitions*

The following terminology is applied in this section, in accordance with European Standards CEN/TR 14699 and EN 438-1:

- *High-pressure decorative laminate(s) (HPL)*: sheet(s) consisting of layers of cellulosic fibrous material (normally paper) impregnated with thermosetting resins and bonded together by a high pressure process;
- *Levelling device*: Device for making minor alterations to the height of a supporting element in order to achieve stable contact between the furniture and the floor;
- *Office desk*: Unit predominantly designed for office tasks to be undertaken in a seated position;
- *Office work chair*: Piece of seating furniture for one person with a back rest and armrests;
- *Meeting chair*: Piece of seating furniture for one person with a back rest and without armrests;
- *Workstation*: Assembly comprising display screen equipment, which may be provided with a keyboard or input device and/or software determining the operator/machine interface, optional accessories, peripherals including telephone, modem, printer, document holder, work chair and work desk or work surface, and the immediate work environment;
- *Work surface*: Upper surface of a work top;
- *Work top*: Part of a piece of furniture which provides for a work surface.

### 5.21.3 *Future purchasing*

All schemes that are presented to IO, and as such the final chosen scheme, should have a manufacturer's catalogue life of at least 10 years minimum so that any future purchasing by IO, as necessary, will be of the same type as the furniture delivered in the initial installation phase.

### 5.21.4 *Guarantee*

All selected furniture items/equipment should come with a sufficient guarantee concerning performance, durability etc. that is suitable for the environment in which they are to be used.

### 5.21.5 *Operation and maintenance manuals*

For each furniture item, operation and maintenance manuals shall be provided.

### 5.21.6 *Scope of Work*

The Contractor shall supply and install the office Building B05 furniture similar or equivalent to the ones equipping the existing buildings. The services shall include:

- The provision of furniture installation drawings showing the exact location of the furniture in the different rooms (to be agreed at design stage with IO);
- Transport and the delivery to the site, unpacking and the assembly of furniture;
- Intermediate storage of furniture if required to meet the delivery schedule;

- The provision of adequate protection of the rooms during delivery and installation activities, where necessary. This concerns in particular floors, walls, ceilings, stairs, doors and windows;
- The removal and disposal of packing and protection materials.

### 5.21.7 *Office / Workshop furniture*

#### 5.21.7.1 *Office desks*

Office desks shall have the following minimum features:

- Conformance with EN 527-1/2/3, or similar internationally approved standards;
- Adjustable height of office desks, in an approximate range of 650 mm to 850 mm;
- White legs;
- Work tops:
  - Minimum plan dimensions: 1600 mm (L) x 800 mm (D) ;
  - A minimum thickness of 20 mm;
  - A minimum panel density of 650 kg/m<sup>3</sup>;
  - Conformance with EN 120 and EN 717, or similar internationally approved standards, with regards to formaldehyde content and release;
  - Good level of abrasion and scratch resistance in accordance with EN 438, or similar internationally approved standards;
  - Birch HPL work surface.
- Levelling devices;
- Cable management features;
- Modular capability to connect adjoining pieces;
- Modesty panels.

Additional side desks to constitute an L shape are required, with the following minimum features:

- Connectable to the main office desk;
- Minimum plan dimensions: 800 mm (L) x 600 mm (D).

#### 5.21.7.2 *Office work chairs*

Office work chairs (1 per desk) shall have the following minimum features:

- Grey fabric finishing of the seat and back rest;
- Arm rests adjustable in height;
- Dimensions in conformance with EN 1335-1 – Office work chair Type A;
- Safety requirements, adjusting devices, information for use etc. in conformance with EN 1335-2;
- Soft wheel casters for hard surfaces such as linoleum;
- Marking of the chair with the following information:
  - Name or label of manufacturer;
  - Type designation;
  - Year of construction.

The chairs shall be tested in accordance with EN 1335-3 or similar internationally recognised standards.

**5.21.7.3 Drawer units**

Drawer units (1 per desk) shall have the following minimum features:

- Under desk : ~600 mm (H);
- Rectangular shape, plan dimensions: 600 mm (L) x 400 mm (W);
- Monochrome white laminate finishing;
- Wheeled units;
- Equipped with removable security locking features;
- 3 drawers per unit.

**5.21.7.4 Cupboards**

Storage cupboards shall have the following minimum features:

- Conformance with EN 14073, or similar internationally approved standards;
- Approximate dimensions :
  - 2000 mm (H) x 1200 mm (W) x 430 mm (D) for full-height cupboards (1 per 2 desks);
  - 1000 mm (H) x 1200 mm (W) x 430 mm (D) for half-height cupboards (1 to be installed in the offices with an odd number of persons).
- Shutter style doors (i.e. non-outwardly opening doors);
- Moveable shelving:
  - Minimum 5 shelves for full-height cupboards;
  - Minimum 3 shelves for half-height cupboards.
- Levelling devices;
- Equipped with removable security locking features;
- Monochrome white finishing.

**5.21.7.5 Whiteboards**

Whiteboards (1 per office and 1 in the meeting rooms) shall have the following minimum features:

- Approximate dimensions: 900 mm (H) x 1200 mm (W);
- Magnetic surfaces;
- Supports for pens;

Whiteboards are to be delivered by the Contractor but not mounted on the walls.

**5.21.7.6 Coat hooks**

Coat hooks (1 per desk in offices, 4 in meeting rooms, 1 per toilet) shall be wall mounted and provide the possibility of hanging at least 2 coats.

They are to be delivered by the Contractor but not mounted on the walls.

**5.21.8 Meeting room furniture****5.21.8.1 Modular meeting room tables**

Modular meeting tables, 14 tables per meeting room, 1 table in each printer area having the following minimum features:

- Dark grey desk top;

- Rectangular shape, plan dimensions: 1400 mm (L) x 700 mm (W);
- Modularity such that tables can be connected to one another to form an appropriate layout;
- Participant's tables equipped with connection box including 2 No. 220V power sockets to allow use of computers during meeting sessions;
- Chairman's table equipped with a connection box including:
  - 3 No. 220V power sockets
  - 3 No. RJ45 network sockets
  - 1 No. HDMI connection point (point to point cable mentioned in Appendix A25)
  - 1 No. RJ45 connection point (point to point cable mentioned in Appendix A25)
  - 1 No. VGA connection point (point to point cable mentioned in Appendix A25)
  - 3.5mm Jack connection point (point to point cable mentioned in Appendix A25)

#### **5.21.8.2 Meeting chairs**

Meeting chairs, 30 chairs per meeting room having the following minimum features:

- Padded seat and backrest;
- Black fabric finishing;
- Stackable.

#### **5.21.9 Cafeteria furniture**

All cafeteria furniture shall be designed for heavy duty use and easy to clean.

##### **5.21.9.1 Poser tables**

The poser tables (2 per cafeteria) allow a small number of people to congregate within the cafeteria spaces. These tables shall have the following minimum features:

- Conformance with EN 15372, or similar internationally approved standards;
- Birch HPL circular table top;
- White foot;
- Approximate dimensions: 1000 mm (H) x 600 mm (ø).

##### **5.21.9.2 Bar stools**

2 bar stools per poser table

The minimum requirements are given below:

- Conformance with EN 15373, or similar internationally approved Standards;
- White legs;
- Approximate seat height: 700 mm.

## 6 Site constrains

### 6.1 Site data

#### 6.1.1 *Geotechnical data*

The soil characteristics of the Site and the G2 AVP geotechnical report for the project can be found in the reference documentations [30].

The Contractor shall perform a geotechnical mission during the design phase at its expense to justify its design hypothesis and to ensure the stability of the building's structure. The geotechnical follow-up verifications and controls shall be performed during the Works execution by the Contractor.

A complete mission G3 is expected to be performed to support the design in its phases accordingly.

#### 6.1.2 *Existing buried networks*

The existing buried networks in the Site of the Works are illustrated in [11], [29] and [31].

The Contractor shall ensure that the existing buried networks are not altered or damaged by the Works.

As described in Section 5.5, prior to the commencement of any Works in the vicinity of the existing buried networks, the Contractor shall first properly identify the existing networks located in the area using the drawings, then, after the Site investigation(s) and detection campaign, the Contractor shall mark on site all the existing networks positions (X, Y, Z) prior to start any excavation.

#### 6.1.3 *Forest and protected trees*

Some storage areas are located in the vicinity of a forest. Smoking is strictly prohibited in this area.

During dry periods, the Contractor shall implement measures to limit the spreading of dust as well as reduce the fire risk.

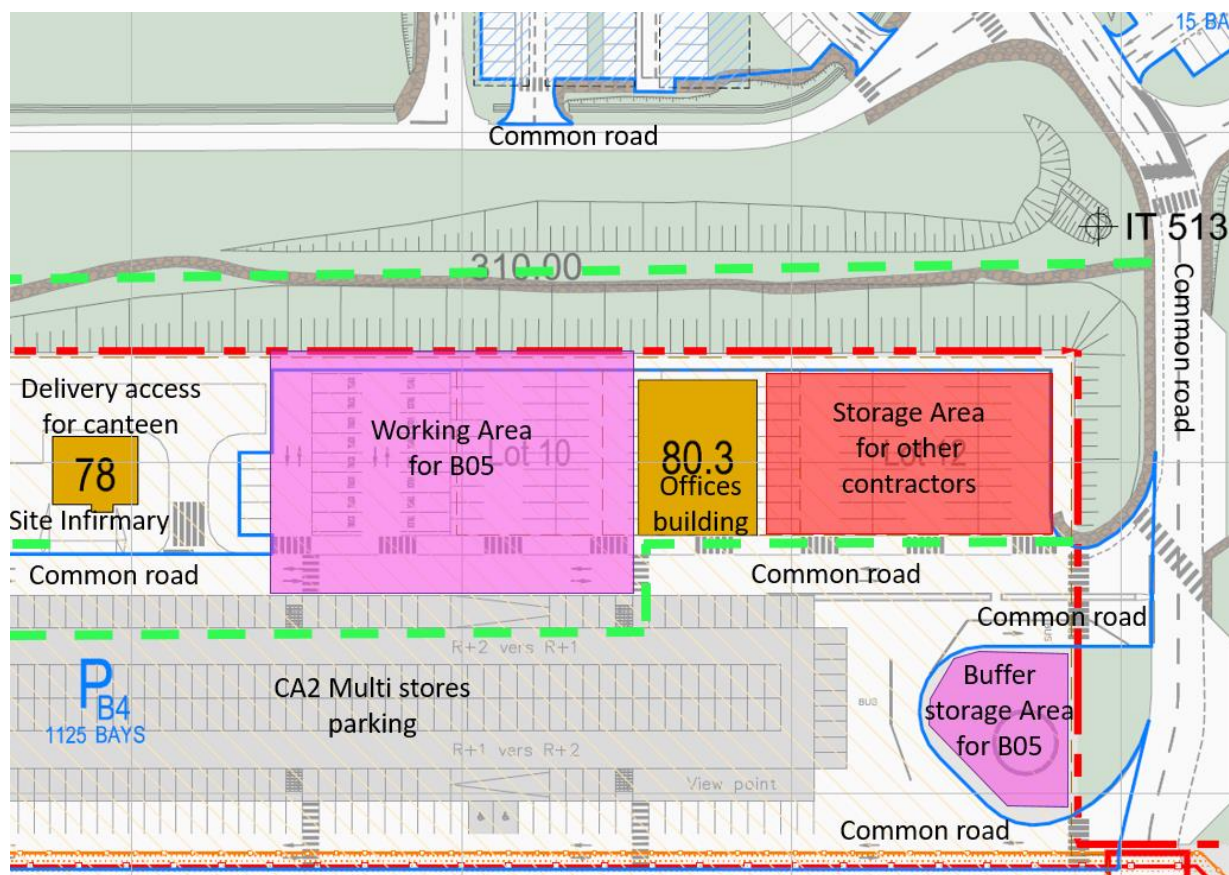
The working area is not subject to the Prefectural Order regarding access to the forest but the CA3 lot 5 area yes. In case of works within area subject to the order, the works shall respect the access conditions associated to the daily fire risk level communicated during the summer months by the Prefecture, every evening for the next day, as follows:

- **Green**: works allowed with caution during all the day;
- **Yellow**: works allowed from 05:30hrs to 13:00hrs only with particular cautions;
- **Orange**: access allowed but works forbidden;
- **Red**: access forbidden – fire risk too high.

The Contractor shall take into account this risk and adapt its working hours and/or methodology accordingly, as necessary.

## 6.2 Interfaces and Site constraints

The Contractor will face the interfaces with other contractors and users during the Works on the ITER site.



*Figure 5 - Main interfaces to be considered in the Site.*

The Site of B05 extension project is surrounded by different areas with high constraints – refer to *Figures 5* above:

- i. On the west side, there is the site infirmary where a vehicle access shall granted at any time. In addition there is the delivery access for the site refectory which shall remain available at any time too.
- ii. On the North side, there is the embankment of the CA2 where a common pedestrian path is passing on its berm. The impact on this pedestrian path is subject to IO approval and shall be limited as much as possible.
- iii. The South side of the Site is the main multi storeys parking of the CA2. No impact is allowed on it or its accesses.
- iv. On the east side, there is the Office building 80.3 which is use by several contractors on site; and, net to this building there are storage areas reserved for other contractors working on ITER site.

Due to the constraints listed above, the Contractor shall forecast as much as possible to erect building within the Site with a methodology minimizing the impacts on surrounding areas. All these points shall be considered in the design proposal of the Contractor. Particular conditions



could be requested, such as working outside of normal working hours or during the weekends. The additional cost shall be borne by the Contractor.  
All the temporary means to mitigate the impacts on the other entities shall be forecasted by the Contractor.

The Contractor is expected to have a very proactive approach to ease the coordination of this busy area crossing by lot of pedestrian and personal cars. A particular attention is necessary on the signalization and the closure of the worksite.  
Any impact on a surrounding area or the existing IO's assets shall be notified to the IO and Health & Safety Coordinator as soon as possible.

### 6.3 Installation on the Site

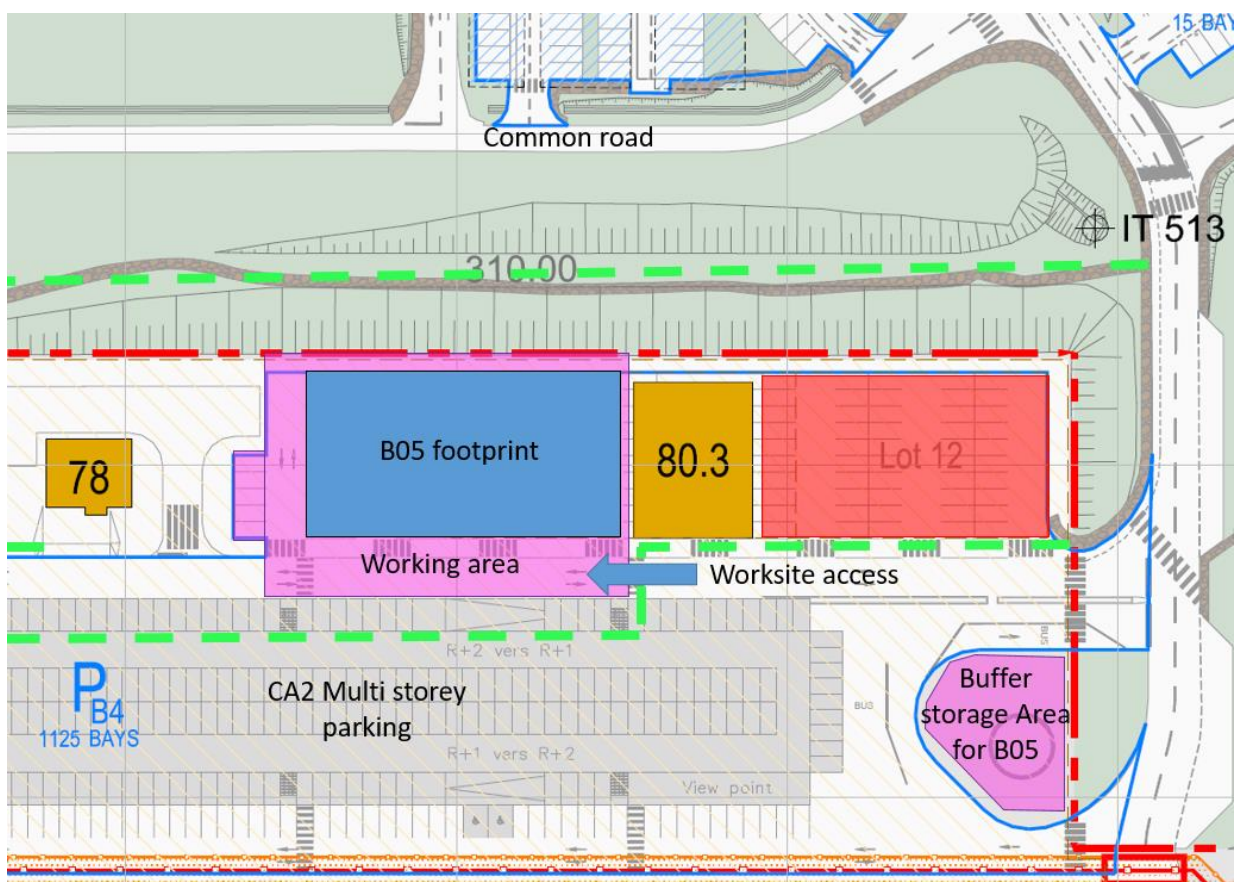


Figure 6 - Working area (the Site) and storage area allocated to the Contractor

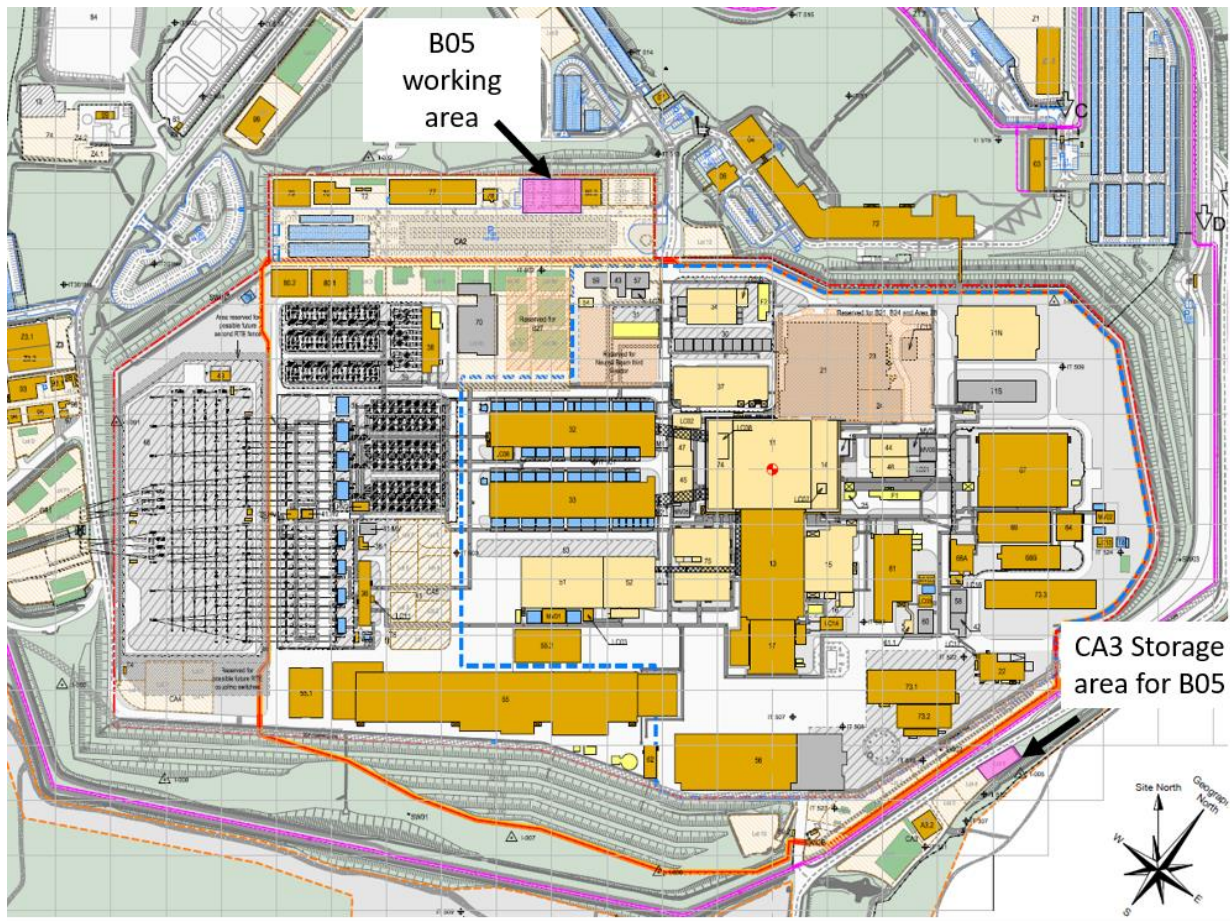


Figure 7 – CA3 Storage area allocated to the Contractor for B05 construction

### 6.3.1 Facilities provided by the IO

#### 6.3.1.1 The areas and access

The below listed areas and accesses will be provided by the IO to the Contractor during the Works:

- I. Access to the ITER construction platform and the Site will be possible by entering the ITER site via the entrance B from the North and /or the entrance D from the East;
- II. **The Site is formed of the planned B05 footprint and the working area around it** - refer to the purple area in *Figure 5 & 6* above → approximate surface of  $54 \times 34 \text{ m} = 1,800 \text{ m}^2$ .
- III. Storage and/or temporary offices area in CA3, Lot 5 - refer to the brown area in *Figure 7* above → approximate surface of:  $500 \text{ m}^2$ .

There are the following utilities available there:

- a. Electrical connection - power available through an existing electrical cabinet;
  - b. Precipitation drainage releasing point - available through an existing grating;
  - c. Raw water DN40 and potable water DN32 - available after connection works.
  - d. *Note:* Any connection works are to be performed by the Contractor.
- IV. A pedestrian path is available in between the Site and the CA3 Lot 5, 15min walk.

**Note:** The IO shall not provide waste and wastewater connections to the Site.

The Site and all working / storage areas shall be closed/fenced-off by the fences (type HERAS / 2m high panels) properly secured and maintained to resist the wind forces by the Contractor. If necessary, for specific activities (e.g. excavation works), the fences and their protection could be requested to be reinforced by the HSPC and the IO.

Prior to the establishment of the Site (fencing off and indication of the Contractor's working area), the Contractor shall perform the following preparation works:

- Main deviation of the pedestrian path of the CA2 running south side of B05 façade to direct the pedestrian flux below the CA2 multi storey parking: fences, signalisation, informative panels, marking;
- Closure of a part of the CA2 north parking road by creating two temporary dead end: fences, signalisation, informative panels, marking;

On completion of the Works, the Contractor shall recreate the existing pedestrian path and common road by marking the floor as it was. All markings shall be compliant with the French regulations and applicable norms and standards. The paint shall be a thermoplastic resin with a guaranteed lifespan of at least one (1) year. The visibility of the markings shall be of Class B2 and shall be white in colour. All markings shall be retro-reflective.

#### **6.3.1.2 Electricity provision**

The Contractor will be authorised to use the LV electrical network available on the ITER Site required for the Works at ITER's expense under condition that its consumption is considered as normal (no abusive use by the Contractor).

Electricity provision to the Site can available after an electrical connection to CA2 lot 10 electrical cabinet and/or CA3 lot 5 electrical cabinet – to be confirmed by the IO in due course. Any temporary electrical worksite installation (the connection works and provision of any required equipment) shall be foreseen in the scope of the Contractor.

However, in the case it is not feasible for the IO to provide the electrical power supply to the Site, the Contractor shall provide its own power generator at his own expense.

#### **6.3.1.3 Water provision**

Potable and Raw water required for the Works, Site facilities, tests and commissioning can be provided by the ITER Organization under condition that its consumption is considered as normal (no water networks leakage or abusive use by the Contractor). The connection points are located close to the north edge of CA2 embankment (definitive connections points for B05) and/ or on the north side of CA3 lot 5.

#### **6.3.1.4 ITER site welfare facilities**

The IO will provide to the Contractor an access to the existing welfare facilities on the ITER site. This includes the sanitary buildings with showers and toilets facilities (but no lockers) and the worksite canteen, all located at CA2 which is next to the worksite.

### 6.3.2 *Facilities provided by the Contractor*

The Contractor shall provide and manage the following facilities during the Works on the Site:

- i. Temporary fences (type HERAS / 2m high panels) to fence off the Site perimeters.
- ii. All temporary Works measures required for the delivery of B05 project including but not limited to:
  - a) any mitigation measures to reduce the impact of the Works on the Site surroundings (e.g. solid fence panels / tarpaulin to reduce a dust spread during the excavation activities / earthworks).
  - b) mobile traffic lights, road signs, GBA concrete block, etc., to ensure the safety and security of the Site and its surroundings.
- iii. Any temporary office / gathering facilities and portable chemical toilets for the Contractor's team on the Site.
- iv. Provision of the potable / drinkable water for the Contractor's team on the Site.

## 6.4 **Applicable codes and standards**

The Contractor shall comply with French design and construction standards or with European design and construction standards if such European standards exist and they are broadly equivalent to the French standards.

Unified Technical Documents (DTUs) and NF DTU specifications and calculation rules shall be considered as good industry practice and be applied to the Contract.

In case the Contractor's manufacturing process is not compliant with the DTU specifications, it shall provide a European (or French) technical assessment from EOTA (or CSTB) it complies to.

The Contractor shall comply with the machinery directive 2006/42/CE. The equipment, when required, shall be CE marked.

For all products and materials subject to quality standards, the Contractor must use only the products and materials that comply with said standards and be able to present evidence of compliance on the IO's request.

This building will be considered as temporary for the duration of the ITER Worksite. Therefore and according to R421-5 of the French Town Planning Code, it will be exempt from administrative formalities linked to this code (especially building permit).

In performing the contract the Contractor shall comply with applicable laws and standards, in particular those listed below.

Applicable French regulations:

- French decrees, laws and circulars;
- French Labour Code;
- The Construction Code ("Code de la construction") ;
- The Town and Planning Code ("Code de l'urbanisme");
- The Public Health Code ("Code de la santé publique") ;
- Regulations applicable to the building accessibility for disabled persons (applicable only to the ground floor);
- The Highway and Roads Code ("Code de la route");
- The Environmental Code ("Code de l'environnement");



- The decree of 8 January 1965, relating to the protection measures applicable to the organisations whose personnel carries out building work;
- The Water Law (“Loi sur l’eau”);
- Prefectural orders 15-2007 and 45-2009;
- EU regulation 305/2011 concerning construction products and the CE requirements;
- And any other applicable laws.

## 6.5 Coordination of the Works

The Works shall be coordinated to ensure that they do not affect or are affected by any other contractors’ activities in B05 and its surroundings.

The relevant coordination meetings are held by IO CRO at the ITER site on a weekly basis, at which the Contractor shall be present.

## 6.6 Site facilities, cleaning and maintenance of the Site

The Contractor shall provide its own temporary Site facilities in conformity with the decree of January 8<sup>th</sup>, 1965, modified by the decree n°95608 of May 6<sup>th</sup>, 1995. The Contractor shall secure the Site with a perimeter fence.

The temporary Site facilities shall be located in the area close to the working area. In the case where the Contractor plans to connect its facilities to the existing networks, it shall seek the IO’s agreement first. The Contractor shall be responsible for all necessary studies and works to implement these connections. The Contractor shall install relevant meters to ensure accurate monitoring of the consumptions.

The ITER Organization shall not provide waste and wastewater connections to the Site.

The Contractor shall be able to present the regulatory control reports of its premises without observations.

The roads and the areas around the Site footprint shall be maintained in a good condition and a constant state of cleanliness. The Contractor shall take all necessary measures (e.g. using a scrubber, scraper, sweeper, karcher...) to mitigate them appropriately clean. Should any said cleaning fail to be performed, it will be performed by a third party on the IO’s request but at the expense of the Contractor.

The Contractor shall manage and be in charge of the necessary actions to ensure:

- I. An appropriate housekeeping on the Site and the areas provided to the Contractor by the IO for the Works duration including keeping clean and tidy the pavements and access paths leading to those areas used by the Contractor.
- II. Systematic removal, as and when they are produced, of any waste (e.g. improper cuttings, rubble, demolition products, packaging, etc.) from the Site and any working area, produced by itself or by its subcontractor(s).
- III. Performing of the Works in a clean manners.
- IV. Reinstatement of the Site after the Works completion.
- V. Removal of the Contractor’s plant and equipment as well as dismantling of any temporary facilities implemented on the Site and in the areas provided to the Contractor by the IO.
- VI. Thorough general cleaning of the areas affected by the Works prior to the Taking-Over.

## 6.7 Protection of existing facilities

The Contractor shall ensure that existing facilities are not damaged by the Contractor while executing the Works and that suitable protection is put in place when working in the vicinity of the existing facilities.

In case of any damages to the existing facilities and/or third party assets caused by the Works execution, the Contractor shall reinstate them to their original condition (using the same materials as much as possible) or cover the cost of the remedial works performed by others.

## 6.8 Security of the Site

The Contractor shall be responsible for the security of the Site and his belongings on the ITER site.

The Contractor shall secure the Site with a perimeter fence.

The Contractor shall establish a point of contact within his organisation that shall be available 24/7 (including weekends, bank holidays and site closure days) to deal with any incidents concerning the Contractor's Site in a fast and effective manner. The Contractor shall provide the IO with the direct contact details of this person and/or an on-call duty telephone number.

## 6.9 Health and safety requirements

The Contractor shall respect the French Labour Code and apply the nine general safety principles listed in article L4121-2 thereof.

The Contractor shall also comply with the following documents and all proceedings arising therefrom:

- a) ITER Internal Regulations – refer to [6];
- b) General health and safety coordination plan (PGC SPS) Vol. 1 - IO&F4E – refer to [7];
- c) Housekeeping Instruction – refer to [14];
- d) Lifting Instruction – refer to [17];
- e) Work at Height Instruction – refer to [18];
- f) Chemical product management procedure – refer to [2];
- g) Alert procedure – refer to [8];
- h) Smoking policy – refer to [16].

The IO has placed a contract to provide the services of a Health and Safety Protection Coordinator (HSPC) during the ITER construction works. This contract has been established with APAVE under the authority of the IO Safety Department. The HSPC is mandatory for construction projects performed under the French Decree 94-1159. The HSPC defines the health & safety rules applicable on the ITER site, reviews the specific health and safety plans (PPSPS), perform the common inspections and co-ordinates activities from a health & safety perspective.

The Contractor's Work will be subject to regular inspections by the HSPC (APAVE) and/or the IO Safety Representative(s) to ensure compliance with the health & safety practices, including but not limited to working at heights, housekeeping and storage of hazardous materials.

In case the Works involve the use / and or storage of chemical products on the ITER Site, the Contractor shall comply with the chemical product management procedure [2] and fill in a

designated chemical product acceptance form minimum ten (10) working days in advance of planned used/delivery on the Site.

The Contractor and its subcontractor(s) shall establish a specific health and safety plan (PPSPS) using the ITER template (in French) and transmit it to the HSPC at least 15 working days (8 working days for subcontractor) prior to the planned commencement of the Works on the Site.

The on-Site Works cannot start before a Common Inspection is carried out by the HSPC with the Contractor (and its subcontractor, when applicable), and the inspection report is issued by the HSPC, in accordance with R4532-13 and R4532-14 of the French Labour Code.

All Contractor and subcontractor's staff must follow a newcomer's safety training course within six (6) working days after their permanent access badges to the ITER site are issued. The newcomer's safety training course is held by HSPC (APAVE) on the ITER site at least once a week. Failure to attend to this course within the required period of six (6) days by the Contractor's staff granted the permanent badges will result in an automatic blocking of their access to the ITER site until the course is taken.

This training course does not relieve the Contractor of his responsibilities with regards to the training of its own staff for their work stations and the general safety rules in accordance with articles L.4141-1 and following of French Labour Code.

The Contractor shall pay specific attention to the safe and respectful behaviour of its on-Site personnel. This includes supplying and wearing of appropriate personal protective equipment (PPE). The IO draws the Contractor's attention to the fact that sanctions may be applied to the Contractor's staff contravening the safety rules.

All the required equipment to create a safe environment for the Works shall be provided by the Contractor.

## 6.10 Nuclear Safety - Environmental protection

ITER is a basic nuclear facility (in French: "*Installation Nucléaire de Base*") identified in France by the number INB-174 and subject to the French Order of 7<sup>th</sup> February 2012, relating to the general technical regulations applicable to basic nuclear facilities.

In the performance of the Contract, it is anticipated that the Contractor will perform or participate in the following so-called: "Protection-Important Activities" (PIA), as defined by the above mentioned Order:

- Activities for the protection of the environment;
- Waste management.

For these activities, the Contractor shall comply with environmental protection requirements and procedures applicable at the ITER Site, as described in [9] and [10].

The Contractor shall ensure that these activities are carried out by Suitably Qualified and Experienced Persons. For this purpose, the Contractor shall make the necessary provisions for training course(s) in order to maintain the required skills and qualifications for its staff and, whenever necessary, to develop them. In case these activities are carried out by the subcontractor(s), the Contractor shall ensure that its sub-contractor(s) make analogue provisions for their own staff.

Furthermore, the ITER Policy on Safety, Security and Environment Protection Management – refer to [13] - presents the strategical objectives of the IO for protecting the interests mentioned under Article L593-1 of the French Environmental Code, must be circulated, known, understood and applied by all staff of the Contractor and cascaded down in the managerial lines of the Contractor's organisation and its sub-contractor(s)'.

An Environmental Respect Plan (PRE) shall be produced using the ITER template in [10] and provided by the Contractor at a minimum of ten (10) working days prior to the start of the on-site Work.

The Contractor shall issue a monthly environmental report, by the 5th day of each month, forming part of a monthly report, containing the information for the previous month – refer to Section 8.4.2. This report shall be submitted to the IO and HSPC representatives.

### **6.11 Access to the Site**

The Contractor shall follow the procedures and any administrative formality to enter the ITER site and to carry out the Work on the Site.

Access to the ITER Site is subject to the entrance and exit control measures, as defined in the ITER site access procedure – refer to [5]. The Contractor shall manage his accesses using HELIOS system in a timely manner.

Specific controls are applied to personnel entering the site. For security purposes, access may be refused or withdrawn for any Contractor's representative without justification.

Regular access hours for the ITER construction site are from 05:30hrs to 22:30hrs (Mondays to Saturdays).

Access to the ITER site outside regular access hours could be possible but only for specific activities – subject to the IO's discretion.

### **6.12 Permit To Work**

Prior to commence any Works on the ITER site, some Permit To Works (PTWs) will be required to be raised by the Contractor for the IO's representatives validation in accordance with the Permit To Work Procedure - refer to [4] and [15].

### **6.13 Language**

All communication with the IO shall be in the English language, unless otherwise stated.

The Contractor shall ensure that his management team is represented by at least one (1) person who can effectively communicate in English (orally and in writing).

Also, there shall be at least one person (1) capable to communicate in English present on the Site at all times.

### **6.14 Quality Assurance**

The Contractor shall have an ITER approved Quality Assurance (QA) Program or an ISO 9001 accredited quality system.

The general requirements are detailed in [ITER Procurement Quality Requirements](#) - refer to [20].

Prior to commencement of the Works, a Contractor's Quality Plan must be submitted for the IO's approval. It shall provide the evidence of the above required quality system and describing the Contractor's organisation for the Works; the skill of their personnel involved in the Works / project; any anticipated sub-contractor(s) and their scope; and give the details of who will be the independent checker of the activities / deliverables – refer to [Procurement Requirements for Producing a Quality Plan](#) [21].



The Contractor shall obtain written agreement from the IO to any modifications to the design, scope and/or the requirements described in this specification. Deviations and non-conformities shall be processed in accordance with [Procedure for management of Nonconformities](#) – refer to [22] and [Procedure for the management of Deviation Request](#) – refer to [23]. The Contractor shall commit to process non-conformities reports (NCR) and associated remedial and corrective actions expeditiously. The list of the NCRs and the deviation requests (DRs) shall be included in the monthly report issued by the Contractor – refer to Section 8.4.2.

The project will be realised under Quality Class 3 as described in [Quality Classification Determination](#) - refer to [24].

## 7 Meetings

A kick-off meeting shall be convened at the IO site within five (5) days following the Contract signature.

The Contractor shall delegate a representative to be present on the Site during the Works, particularly when the on-Site activities are to commence and are ongoing.

The Contractor shall participate in weekly and monthly meetings with the IO and the HSPC representative (when deemed required), to discuss the Works progress and any project related matters. During the design phase these meeting may be held remotely (via Microsoft Teams) but during the construction site, they will be held on the Site. The IO will establish such sequence of meetings and issue the invitation(s) to the Contractor in due course. At these meetings, the Contractor shall present a report/schedule detailing its current and foreseen activities (with 2-week look-ahead) versus the current (approved) Schedule of Works. For each meeting, the Contractor shall record the minutes of the meeting (MoM) and distribute them to all Parties who attended the meeting via ITER Document Management system (IDM) – refer to Section 8.2 - for the IO's approval within two (2) working days following the meeting.

With regard to the monthly meetings, the Contractor shall provide to the IO such information and documentation as the IO deems necessary to determine the progress, quality and status of the Works. As a minimum, a current monthly report shall be provided by the Contractor to the IO in advance (at least 2 working days before) to each meeting – refer to Section 8.4.2.

The Contractor shall be available to participate in any ad-hoc meetings on the IO request. The Contractor might be asked to issue a formal record of the as-hoc meetings.

## 8 Contractor Deliverables

### 8.1 List of planned document deliverables

At the beginning of the Works under the contract, a list of planned document deliverables shall be established between the IO and the Contractor. For this purpose, the Contractor shall submit a drafted list of deliverables and their planned issue dates within one (1) week after the signature of the contract, using the ITER template (Excel table) – to be provided by the IO in due course.

The list shall be updated by the Contractor during the course of the Contract.

## 8.2 Documents formats and data exchange

All documentation delivered to the IO shall be in English (unless requested otherwise, as stated in this specification) using Microsoft Office standards or Adobe PDF. For any specific software used (e.g. CANECO, AutoCAD, etc.), the deliverables shall be provided in their native and pdf versions.

Adobe PDF documents shall have the texts recognition and include bookmarks.

The electrical diagrams shall be delivered in See Electrical Expert format.

The Contractor shall ensure that all documents deliverables are uniquely identified and traceable (provided with the project unique reference numbering system including their revision and the issue dates, were applicable).

All deliverables (except the drawings and diagrams in Adobe PDF format) shall be transmitted through ITER Document Management System (IDM) / Contractor's Document Exchange Area, as detailed in the [In-Cash Procurement Technical and Management Documentation Exchange and Storage Procedure](#) – refer to [12].

Drawings and diagrams in Adobe PDF format shall be exchanged in the System for the Management of Diagrams and Drawings (SMDD), a “sister” to IDM.

## 8.3 Documents review and approval

The Contractor shall allow ten (10) working days for a review period by the IO.

In case the IO disapproves a document or has comments and requests its new revision, the Contractor shall update and resubmit the deliverable within five (5) working days, taking into account the IO's comments. For each following-up review period by the IO, the Contractor shall allow five (5) working days.

The review period shall start the following day after the uploaded deliverables have been signed in by the Contractor in IDM and/or SMDD.

The Works performance without the IO's approval or in the absence of approved relevant documents shall be sanctioned by a stop of the Work order until the situation has been rectified. All consequences of the Work stoppage shall be borne by the Contractor.

## 8.4 Contractor's deliverables

### 8.4.1 *Early Deliverables*

#### **Contractor's Quality Plan**

Before submitting any other deliverable, the Contractor shall submit and have approved by the IO, the Contractors Quality Plan - refer to Section 6.14 and [21]. It is therefore important that the Contractor submits his Quality Plan as soon as possible after the Contract Commencement Date.

#### **Schedule of Works**

The Contractor shall submit a Schedule of Works (Programme) which should show as a minimum the main activities to be carried out for the design, procurement, mobilization, preliminary design, construction design, on-Site construction, commissioning, preparation of as-the built documentation and the Taking-Over.

The time required by ITER Organization to review the deliverables shall be taken into account by the Contractor when preparing the Schedule of Works. The Schedule of Works shall be compatible with the Time for Completion of the Works.

The Schedule of Works and its updates (if required) shall be provided to the IO's approval.

### **Performance Security**

The Contractor is to provide the Performance Security to the IO within two (2) weeks since the Commencement Date, as specified in the Contract.

#### **8.4.2 Monthly Reports**

A Monthly Report shall be submitted by the Contractor for acceptance by the IO five (5) working days after the end of each calendar month.

The Monthly Report shall contain:

- a) A narrative description of activities that have taken place over the period including photographic evidence of the progress of the Works.
- b) An update of the Schedule of Works (if required) showing the actual progress against the planned progress.
- c) In the case the Works are not progressing in accordance with the Schedule of Work, the report shall contain a detailed explanation of how the Contractor intends to recover the Schedule.
- d) A list and status of all RFI's submitted by the Contractor.
- e) A list and status of all DRs submitted by the Contractor.
- f) A list and status of all NCRs (raised by the Contractors or others) affecting the Works.
- g) A list and status of all IO requested Variations to the Works.
- h) A list of health and safety statistics including:
  - i. number of worked hours on the Site;
  - ii. total number of workers curves as well as the number of hours worked per week;
  - iii. all accidents (including environmental issues / observation sheets) occurring on the Site (or elsewhere if connected to the Works);
  - iv. the number of accidents with lost working days;
  - v. the number of lost working days per accident;
  - vi. a brief report of the causes of accidents or incidents as well as the corrective measures implemented following the accidents or incidents;
  - vii. an assessment of the training and safety awareness courses carried out during the month.
- i) A list of environmental statistics - refer to [9] - including:
  - i. electricity consumption;
  - ii. potable water consumption;
  - iii. raw water consumption;
  - iv. fuel consumption;

- v. quantities of waste generated, distinguishing between hazardous waste, non-hazardous waste, inert waste, concrete laitance and the overall percentage of recycled waste.

#### 8.4.3 *Deliverables required prior to Commencement of Works at the Site*

The documents listed below shall be submitted by the Contractor (and where appropriate each sub-contractor) for approval by the IO no later than ten (10) working days prior to the Commencement of Works at the Site (unless stated otherwise):

- a. Environmental Respect Plan (PRE) – in the ITER template – refer to [10].
- b. The documentation list including their deliverables schedule (1<sup>st</sup> draft, to be updated during the course of the Contract) .
- c. List of subcontractor(s);
- d. Third party control entity selected for the independent self-control and acceptance tests performance (for approval by the IO).
- e. General layouts of B05 building: the facades and top plan views of the building including their expected foundations system, the networks routings and the main equipment.
- f. Permit to Work (PTW) request(s) – refer to [4].
- g. Access requests for personnel to the ITER Site – refer to [5].
- h. The Contractor Site installation plan (French: *Plan d'Installation de Chantier*).
- i. List of subcontractors and relevant Subcontractor Acceptance Form (SAF) – using ITER template – refer to [26].
- j. List of suppliers.
- k. PPSPS for the Works performed by the Contractor and each sub-Contractor(s) – in the ITER template (bilingual – English & French) – refer to [7].

*Note:* The submission shall be minimum 15 (8 for the subcontractors) working days prior to the planned Works on the Site.

#### 8.4.4 *Preliminary design deliverables*

The ITER Organization requires the Contractor to submit the preliminary deliverables in order to ensure that the Contractor has understood the scope of Works and for the IO to assess whether the Contractor's proposed solutions meet the ITER Organization's requirements.

The Contractor shall submit the following documents for the IO's acceptance (non-exhaustive list):

- a. A list of all controls, checks and testing that the Contractor intends to carry out in order to satisfy the requirements;
- b. Contractor's Quality Control Plan detailing the list of controls, checks and testing which shall be marked-up by the IO to indicate those where the IO intervention points (Hold Points – HPs / Notification Points – NPs) are required.
- c. Preliminary Design Report describing all Works to be undertaken (e.g. civil, structural, mechanical and electrical). This report shall include confirmations of the total electrical power capacity/consumption required.
- d. Preliminary Design drawings illustrating:
  - i. General arrangement drawing(s) for all the Works.

- ii. Plan(s) and views of the building's structure and its foundations.
- iii. Sufficient cross-sections through the building in order to demonstrate that the requirements defined in this technical specification have been met (e.g. for the FFL surface, workshop clearance envelope, insulation of the walls and roofs, etc.).
- iv. External buried networks (RW / PW / LV / LC/ PWD/ SD) and the platform preparation drawings with useful cross-sections and details for the singular points.
- v. Layout(s) of the electrical and mechanical buildings fit-out including the electrical networks (LV and LC) distribution inside the building.
- vi. PWD network including the locations of the roof gullies, downpipes, any horizontal drains and the connections to the existing precipitation drainage network.
- vii. Layout(s) of the lightning and earthing protection system.

#### 8.4.5 *Construction design deliverables*

The IO requires the Contractor to submit the construction design deliverables in order to ensure that the accepted preliminary design has been developed accordingly and that the as-built records of the Works will meet the IO's requirements.

The Contractor shall submit the following documents for acceptance by the IO (non-exhaustive list):

- a. All construction design drawings suitable for the execution of the Works on the Site.
- b. Final Design Report - updated with the calculation notes and material definitions for the structural, insulation and fit-out elements of the Works. The report shall include all electrical calculations (in both, CANECO and pdf formats), load lists and one-line diagrams and other information necessary for the future statutory inspections prior to the commissioning.
- c. Updated Contractor's Quality Control Plan (if necessary).
- d. Evacuation Plans and an Intervention Plans of the building.

The construction design deliverables can be submitted to the IO in phase manner to suit the planned construction schedule. However, no construction activity shall start before the relevant construction design deliverable has been approved by the IO.

Below a non-exhaustive list of expected documents to be provided by the contractor:

- **For civil works:**
  - Layout plan;
  - Plan of spoil/fill and assessment of quantities;
  - Geotechnical study reports (G2/G3);
  - Calculation of the building design loads (exploitation, climatic and of seism) and load take down, for design of foundations and checking of structures;
  - Detailed design of the foundations, setting out and reinforcement plan;
  - Design and plans of the metallic structures: offices, roof-covered areas, staircases; if prefabricated, supply of the products design loads;

- Checking of the arrows and the Eigen frequencies under working loads of the floors of the offices;
- **For buried services:**
  - Layout of installations;
  - Plans of earthworks;
  - Design note for the wet networks (estimate of the loads, diameters, slopes);
  - Construction plans of the ducts networks (electrical power, low current, optical fiber), of the hydraulic networks (drinking water, raw water, waste water, rain water) with connections to the existing, underground drainage;
  - Construction plan for earthing.
- **For the HVAC:**
  - Note for heat balances according to the Thermal Regulation 2012 (RT2012);
  - Dimensioning of the equipment and technical documentation;
  - Execution drawings of the networks and terminals;
  - Power loads estimates and plans for electric connections.
- **For the electrical power:**
  - Notes for the assessments of power requirements;
  - Notes of calculations using the software Caneco BT;
  - Setting out plans of electrical sockets;
  - Calculation note of the cables and the electrical control panels and technical documentation;
  - Line diagrams.
- **For plumbing:**
  - Note for the balance of fluids;
  - Plans of construction of the networks for each fluid;
  - Dimensioning and technical documentation of each product;
  - Power loads estimates and plans for the necessary electrical connections.
- **For low current:**
  - Setting out plans for RJ 45 sockets;
  - Line diagrams;
  - Diagrams of connection.
- **And applicable to all disciplines:**
  - Nomenclature of the Works;
  - Execution drawings or detailed workshop drawings of the Works;
  - Reports of tests and approvals;
  - Samples of materials at the request of the ITER Organization;
  - All required documents for the execution of the work.

#### 8.4.6 *Deliverables required during the execution of the Works*

The Contractor shall provide the following documents during the execution of the Works:

- a. Results of all control tests performed by the Contractor during the execution of the Work.
- b. Reports of tests and their results approvals (performed by the external body / independent checker).  
*Note:* In the case of negative results, the Contractor shall provide a written explanation of the corrective actions the Contractor intends to undertake to the IO's satisfaction.
- c. Contractor's Quality Plan status statements relating to the controls by the IO (HPs/NPs).
- d. Monthly progress reports – refer to Section 8.4.2 above.
- e. All required documents regarding with the Contractor Safety Plan or the environmental specifications of the IO or necessary to the traceability of the Work.

#### 8.4.7 *As-built documentation*

Upon completion of the Works, and prior to Taking-Over, a complete as-built files shall be provided by the Contractor, including (non-exhaustive list):

- a. Detailed as-built drawings for all Works executed taking into account any changes implemented during the construction Works. The drawings shall be revised as a final "as-built" version.
- b. Final design report including all calculations notes.
- c. Registers of all NCRs, RFIs, DRs and Variations raised during the execution of the Contract (including the reports).
- d. Results and statements of all controls, checks and tests executed during the Works including the commissioning legal inspection reports issued by the independent checkers for the followings:
  - Electrical installations,
  - Lightning protection,
  - Illuminance levels check,
  - DESP ( HVAC system),
- e. Technical notes and materials technical data sheets with precise references of all equipment installed under the Works (e.g. manufacturer, types, and precise references) – filled in the Excel table, refer to [25] above.
- f. Material & equipment guarantees, compliance certificates attesting that the installations are in conformity with the provisions of the safety regulations.
- g. All necessary documents for the *operational and maintenance folder* defining the activities that are required to comply with manufacturers' recommendations, including the user manuals and operation instructions, the general schedule of maintenance inspections, the list of space parts, etc. for all equipment.
- h. As-built update of update existing installation documents,
- i. Worksite pictures folder documenting the as-built status of the Contractor deliverables.

All as-built deliverables shall be provided by the Contractor in an electronic format (Adobe PDF and native file) through IDM and SMDD – refer to Section 8.2 and [12]- as well as on an external hard drive / USB key.

The Contractor shall endeavour to provide all required as-built documentation prior to an issue by the IO the Taking-Over Certificate.

The Contractor shall allow for a review period by the IO of twenty (20) working days.

## **9 Taking-Over by the IO**

The Works shall be taken-over by the IO when they have been completed in accordance with the Contract. Some exceptions for minor outstanding works and defects, which will not substantially affect the use of the Works for their intended purpose, could be done – subject to the IO's discretion.

The Works shall not be considered as completed for the purposes of Taking-Over until the required as-built documents have been submitted (via IDM / SMDD) by the Contractor to the IO.