

REPUBLIC OF CROATIA

MINISTRY OF PHYSICAL PLANNING, CONSTRUCTION AND STATE ASSETS

EARTHQUAKE RECOVERY AND PUBLIC HEALTH PREPAREDNESS PROJECT

TERMS OF REFERENCE

FOR CONSULTANCY SERVICES FOR REVIEW OF CONCEPTUAL DESIGN AND DEVELOPMENT OF MAIN AND DETAIL DESIGN FOR THE RECONSTRUCTION OF BUILDING A OF THE FACULTY OF ELECTRICAL ENGINEERING AND COMPUTING

Proc.ref.no.: MoPPCSA/ER&PHPP/C1.2.43/CS-QBS

I. PROJECT BACKGROUND

The Republic of Croatia (RoC) with financing from the International Bank for Reconstruction and Development (IBRD) through the Loan Agreement (Loan No. 9127-HR) is implementing the Earthquake Recovery and Public Health Preparedness Project (Project). Project Development Objective (PDO) is to assist Croatia with earthquakes reconstruction efforts in Zagreb and the surrounding areas, Sisak-Moslavina County and Karlovac County, improve institutional capacity for reconstruction, and strengthen national systems for public health preparedness. The project implementation period spans between 2020 and 2024 with extension expected until 2027. The Project comprises three components: (1) Earthquakes Recovery and Reconstruction; (2) Public Health Surveillance and Preparedness; and (3) Project Management. Part of the loan funds are intended to be used for reconstruction of buildings in health and educational sectors that are damaged in earthquake. The project is implemented by the Ministry of Physical Planning, Construction and State Assets (MoPPCSA) and the Ministry of Health (MoH), in coordination with other institutions. The Project Implementation Unit of the MoPPCSA (PIU 1) is responsible for Component 1, as well as civil works under Component 2.

The Faculty of Electrical Engineering and Computing is situated in the City of Zagreb, Trnje City District. It is the largest and the leading research and higher educational facility in Croatia in the field of electrical engineering, computing and information and communication technologies. The Faculty consists of 12 institutes and several services, and it is managed by the dean and the Faculty Council. The vision of the Faculty is to be integrated and competitive in the European higher education and research area, to create new forms of knowledge transfer to the economy and to initiate economic activity in Croatia.

The construction complex of Faculty of Electrical Engineering and Computing (FEEC) buildings in Unska 3 consists of buildings labelled A, B, C, D and E. The complex of buildings labelled A,

B and C together with the plot is protected as cultural heritage marked Z-5675 and based on Art. 93 of the GUP classified under group 3.b Protected civil buildings in the scope of the plan. These three buildings were built from 1961 to 1964:

- Building A was originally a two-story volume that was subsequently upgraded in the 80s. Total gross area of the building is 3.714 m² with floor plan dimensions 18.40 x 53.25 m. The purpose of the building is a student building with classrooms, a library, and a dining room.
- Building B is a one-story volume with area of 8.226 m² with floor plan dimensions 48 x 68 m. The building consists of dean's office, large lecture halls and laboratory.
- Building C is a skyscraper with 13 floors, area of 11.026 m², and floor plan dimensions 15.45 x 53.05 m. The purpose of the building is faculty institutes.

Since current workspace does not enable development and improvement of teaching processes, it needs to be increased. The planned intervention is envisaged as a reconstruction of the existing Building A with further expansion. The planned reconstruction within the existing dimensions does not affect the urban matrix. The building is being upgraded within the floor plan of the existing building which respects the construction of regular cubes while maintaining the existing visual identity of the nearby area.

Building A consists of 4 above-ground floors (G+3) and is approximately 15.6 m high in total. A study on structural condition was developed and it determined that the load-bearing structure does not meet necessary regulations, and that interventions on all constructive elements would be so invasive that almost no structural element would be preserved, i.e. nothing original would remain. The conservation study determined that, over a long period of time with multiple interventions, Building A retained the fewest original elements and that it is the least valuable part of the entire protected complex. Therefore, the reconstruction, i.e. the upgrade of Building A, which becomes a building with 9 above-ground and 3 underground floors, is foreseen. Floor plan is elaborated in detail in the Conceptual Solution (pp. 34) which is attached as **ANNEX 1** of this ToR.

From the Building C of the FEEC to the Faculty of Mechanical Engineering and Naval Architecture stretches the University Alley where several universities are located. From the urban concept of the University Alley comes the marking of the north and south sides of the Alley with skyscrapers, and the buildings towards the interior continue to pulse in terms of space and height in order to break the monotony of the street appearance. The reconstruction and upgrade of Building A becomes a counterpart to the buildings on the south side of the University Alley, more precisely the Library building of the Faculty of Humanities and Social Sciences.

Existing and future needs for parking spaces shall be achieved with construction of an underground garage. Almost all parking spaces on the ground floor shall be abolished, which will improve the

existing system of pedestrian areas and squares. The existing greenery on the west side, which becomes an integral element of the access square, is retained.

For this Sub-Project the following documentation is available:

- Conceptual Solution – **ANNEX 1**
- Conservation Study – **ANNEX 2**
- Expert Study – **ANNEX 3**
- Opinion from City of Zagreb, City Institute for the Conservation of Cultural and Natural Heritage – **ANNEX 5**
- Conceptual Design – **ANNEX 6**
- Special Requirements – **ANNEX 7**
- Location Permit – **ANNEX 8**

II. SERVICES OBJECTIVE

Consultancy services defined in this ToR will be financed under Component 1, sub-component 1.2. Rehabilitation and Reconstruction of Health and Education Facilities.

The primary objective of this consultancy services is to support the MoPPCSA and FEEC to:

- (i) prepare analysis of the existing documentation and conditions;
- (ii) prepare Inception Report;
- (iii) develop Design Brief;
- (iv) update of Conceptual Design, obtain Special Requirements and amendments to the Location Permit (if applicable);
- (v) develop the Main Design (supported by using of Building Information Modeling (BIM) technology) with detailed elaboration of all basic requirements for the building;
- (vi) obtain Building Permit;
- (vii) develop the Detail Design (supported by using of Building Information Modeling (BIM) technology) with detailed elaboration of all basic requirements for the building.

All deliverables related to this consultancy services shall be developed in accordance with all the relevant national environmental, Occupational (OHS) and Community Health and Safety (CHS) regulations and, World Bank Environmental and Social Policies (Environmental and Social Framework - ESF) requirements, the World Bank Environmental, Health and Safety Guidelines and Good International Industry Practice, the stricter ones prevailing. Inception Report, Monthly Reports, Conceptual Design (if applicable), Main Design and Detail Design shall be in line and consider, resulting measures and recommendations documented in the Environmental and Social

Assessment documents (more precisely Environmental and Social Management Plan (ESMP) as indicated in **ANNEX 8**), which will be prepared before contract signing.

III. SCOPE OF SERVICE AND TASKS

The Consultant will utilize pre-existing resources (data, plans, studies, project documents, etc.) when preparing the Main and Detail Design and conducting other services. Consultant will be responsible for preparation of Main Design and Detail Design all in line with the BIM principles. The Consultant shall take liability for the compliance of all provided services with applicable laws and regulations.

The complex of buildings labelled A, B and C together with the plot is protected as cultural heritage marked Z-5675 and based on Art. 93 of the GUP classified under group 3.b Protected civil buildings in the scope of the plan. In accordance with its provisions all operations on the cultural property can be undertaken solely in accordance with Special Requirements and Conservation Study.

The Consultant is responsible to establish a design team who is experienced in the preparation of architectural, structural, seismic, electrical, mechanical, hydro installation projects, fire protection and safety at work measures study, environmental protection, physics of the building and noise reduction project and landscaping projects, traffic simulation models and collaboration with all required specialists. Design phase shall be in accordance with BIM principles as stated in **ANNEX 9**. The Consultant shall indicate the key staff to be assigned in the preparation of designs and documents by indicating positions planned to be assigned for each staff in their proposal (BIM Execution Plan – BEP).

The scope of service shall concern both to the Consultant as well as its sub-Consultant/parties. The obligations with regards to adhering to the national legislation, World Bank policies (Environmental and Social Framework - ESF), procedures and guidelines (e.g., WB EHSG, GIIP) and other relevant documents (ESMF, ESMP, SEP) shall be transferred from the Consultant to its sub-Consultant/parties in case of them being hired.

The Consultant shall prepare and complete all architectural, engineering, and installation designs using BIM according to the requirements from **ANNEX 9**. The updated Conceptual Design (if applicable), Main Design and Detail Design shall ensure that all basic requirements for the building are met - mechanical resistance and stability, fire safety, hygiene, health and the environment, safety and accessibility during use, noise protection, energy management and heat conservation, and sustainable use of natural sources. The Consultant will prepare all necessary project documentation, updated Conceptual Design necessary for obtaining Special Requirements and issuing amendments to the Location Permit (if applicable), Main Design necessary for obtaining a

Building Permit and the Detail Design. The documentation must comply with the applicable laws and regulations, spatial planning conditions, and collected Special Requirements and Conceptual Design (**ANNEX 5**). The technical part of the Main and Detail Design contains a graphical, non-graphical data and documentation according to the Ordinance on the Mandatory Contents and Format of Construction Work Designs (Official Gazette 118/19, 65/20). The textual part of the Main and Detail Design contains all technical, technological, and other data, calculations and solutions proving that the building will meet the basic requirements for the building and other requirements and conditions that the building must meet.

All deliverables related to this consultancy services will be developed in line with the Project ESMF, WB ESF, WB Environmental Health and Safety Guidelines (EHSG) and GIIP, in particular those on life and fire safety, energy conservation, water conservation, hazardous materials and hazardous waste management, noise impact protection, emergency prevention and response, noise, indoor air quality, traffic safety, OHS, universal accessibility design and other applicable, as well as Good International Industrial Practices and national regulation stricter ones prevailing. No ES high-risk activities or impacts (as defined in the WB ES Directive for IPF and ESMF) will be supported/financed or can be a result of the design (including downstream impacts in the implementation, operational and dismantling period).

The Main and Detail Design shall comply with Eurocode 8. Design of structures for earthquake resistance and relevant national/international standards.

All necessary approvals required by the relevant authorities or municipalities for the designs shall be received by the Consultant on behalf of the Client.

Sustainability Assessments (similar to LEED, BREEAM or DGNB systems) will also be part of the responsibility of the Consultant. It is expected that, a smart approach towards energy efficient and climate resilience design is followed. LEED, BREEAM or DGNB certification is not part of the Services under this Contract.

The Consultant will prepare all graphical, non-graphical data, and documentation with due care and diligence during the envisaged periods not to cause any delay. All mentioned deliverables shall be prepared in coordination with MoPCCSA and considering requirements of the FEEC.

Consultant will also participate in public consultations on the Project's design, environmental and social aspects. Ensure that all relevant feedback from the public consultation process is incorporated into designs.

TASK 1: Development of post-appointment BIM Execution Plan (BEP)

Post-appointment BIM Execution Plan (BEP) is key document that defines the goals for the implementation of the BIM methodology in a project and shall be developed according to the requirements defined in the EIR (ANNEX 9) and in timely manner.

Submitted post-appointment BEP will be reviewed by the Client and approved or returned for revision and/or resubmission.

All deliverables during the project execution shall be in accordance with agreed post-appointment BEP.

TASK 2: Analysis of the existing condition and development of Inception Report

Before the commencement of the design works, the Consultant will be responsible to review existing studies, Conceptual Design (ANNEX 5) and collect the existing inputs and examine the construction sites together with the documents and information provided by the Client to make required analyses and evaluations. The Consultant shall review all existing studies conducted prior to commencement of the services including, structural assessments, earthquake damage assessment reports, geological and geotechnical studies, site plans, topographic and master plans as well as conceptual studies, conceptual drawings, initial and preliminary designs, and others. The Consultant shall also review all infrastructural systems (water, wastewater, sewage, electrical, mechanical, internal roads, landscaping etc), connection lines, their adequacy to the context, and reliability, their performance and capacity etc.

The Consultant will also collect relevant environmental information, e.g., presence of asbestos, lead pipes, radon releases, historical contamination, public safety risk related to demolition and construction etc. Relevant information shall be incorporated in design documentation as applicable. The consultant will integrate mitigation measures as part of design documentation. The Consultant will confirm that no additional land will be expropriated and that all construction activities will be within the existing footprint.

Before the commencement of the design development, the Consultant is expected to examine the construction site and collect the required inputs and cadastral documents topographical survey, deed, layouts, cadastral extract, existing approvals issued for Conceptual Design, occupation permits, plans, survey, etc to make the required analyses, evaluations, and design.

Consultant shall develop an Inception Report. The Inception Report shall include all relevant information and findings collected through conducted analyses and reviews and shall clearly set out the existing conditions and circumstances of the project implementation. The Inception Report

shall be in the form of a written narrative with appropriate photographic material discussing the feasibility of the project, special problems and opportunities.

TASK 3: Development of Design Brief

Consultant shall develop the Design Brief, which shall set out the key design and planning concepts of the new building in the form of layouts per each floor. It should outline the possible mode of operation, operational requirements of the facilities and systems, departments and service units, layout of rooms and spaces etc. Design Brief shall be developed in close collaboration with the Beneficiary (i.e., interviews, presentations, coordination meetings etc.).

Prior to start of development of the Main Design (or in parallel with Task 4 if applicable), the Consultant shall obtain a written consent from the Beneficiary on the Design Brief. The Design Brief shall be the basis for development of Main Design (or updated Conceptual Design if applicable).

TASK 4: Update of Conceptual Design, obtaining Special Requirements and issuing amendments to the Location Permit (if applicable)

Based on analysis of the existing conditions, if necessary, Conceptual Design shall be updated. The Consultant shall submit updated Conceptual Design for issuing Special Requirements (*HR: posebni uvjeti*) and take all necessary action to obtain them. If updated Conceptual Design impacts the location conditions, revision of the Location Permit is necessary and amendments to the Location Permit shall be obtained. Consultant shall also include costs of communication, as well as liaising with the authorities within the formal location permitting process, for which the Beneficiary will grant the power of attorney.

It is not required to develop updated Conceptual Design in BIM environment.

This task is optional and shall be performed only upon receiving a written request from the Client.

TASK 5: Purchase of BIM software licenses

On the Client's request the Consultant shall purchase licenses for BIM authoring software which will be used for development of BIM models (domain specific models and federated BIM model). As the Client at this point does not know which specific BIM authoring software the Consultant intends to use for development of BIM models this task shall be defined in later stages of this selection process i.e. during the negotiations.

TASK 6: Development of Main Design (including textual and graphical part, other studies necessary for obtaining Building Permit, and consolidated cost estimates)

The Consultant shall prepare the models, designs, drawings and documentation of the level of development of the Main Design (specified in the **ANNEX 9**), for all architectural, structural, electrical, mechanical, HVAC, fire protection, security system, elevator, physics of the building, and other components of the building in accordance with the approved Conceptual Design and submit to the Client for approval together with the required calculations, reports and implementation details considering technical requirement and international and national specifications in compliance with the building codes.

Main Design and other studies necessary for obtaining Building Permit will mandatorily include, but not be limited to:

1. Demolition Design
2. Architectural Design (in line with the BIM environment – **ANNEX 9**)
3. Structural Design (in line with the BIM environment – **ANNEX 9**)
4. Landscape and Horticulture Design (in line with the BIM environment – **ANNEX 9**)
5. Traffic Design including traffic areas and traffic signalization (in line with the BIM environment – **ANNEX 9**)
6. Mechanical and HVAC Design (in line with the BIM environment – **ANNEX 9**)
7. Plumbing, Water Distribution, Wastewater and Drainage, and Hydrant Network Installations Design (in line with the BIM environment – **ANNEX 9**)
8. Electrical Design including photovoltaic power station (in line with the BIM environment – **ANNEX 9**)
9. Electrical Design of external lighting and electronic communication infrastructure (in line with the BIM environment – **ANNEX 9**)
10. Electrical Design of Substation (in line with the BIM environment – **ANNEX 9**) (if applicable)
11. Sprinkler System Design (in line with the BIM environment – **ANNEX 9**)
12. Elevators Design (in line with the BIM environment – **ANNEX 9**)
13. Relocation of Existing Installations Design
14. Geodetical Design (in line with the BIM environment – **ANNEX 9**)
15. Equipment Design (in line with the BIM environment – **ANNEX 9**)
16. Geotechnical Study (in line with the BIM environment – **ANNEX 9**)
17. Geotechnical Design (in line with the BIM environment – **ANNEX 9**)
18. Physics of the Building and Building Energy Efficiency Study including Building Energy Certificate (in line with the BIM environment – **ANNEX 9**)
19. Noise Protection Study (in line with the BIM environment – **ANNEX 9**)

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20. Fire Protection Study (in line with the BIM environment – **ANNEX 9**)
 21. Safety at work study

The structure of the Main Design shall be proposed by the Consultant and shall include the reconstruction of the Building A and landscaping of the newly formed square.

When developing Traffic Design, it is necessary to develop an idle traffic calculation for all buildings on the cadastral parcel, both existing and newly planned, all in accordance with the obtained Special Requirements (**ANNEX 6**).

When developing Geotechnical Study, the Consultant will carry out required geotechnical investigation, by means of site surveys, soil tests, laboratory tests. Before the site surveys, soil tests, laboratory tests, the Consultant shall inform the Client in advance and obtain the approval from the Client about the location of the boreholes. Preparation works shall also be carried out in line with the WB ESF and be particularly mindful of OHS requirements, community health and safety as well as the sensitive location setting.

To effectively manage the project information, information model needs to be divided into its component parts according to the agreed data segregation and breakdown structure in the post-appointment BEP. The Main Design parts can be arranged through several design books/folders, i.e., some of the above designs contain several folders. The Main Design will necessarily contain the following parts, under the designs listed above.

Each corresponding design of a particular profession must contain an account of the estimated construction costs for the part of the building to which it relates. Construction costs estimation shall be consolidated in the Architectural Design.

The first folder of the Main Design shall include data for the calculation of municipal and water contributions in accordance with special regulations.

Main Design shall be developed in close cooperation with the Beneficiary and workshops/interviews with Faculty management shall be organized.

Mandatory drawings and schedules for Main Design stage are defined in the **ANNEX 9**.

All models, designs, studies, and other relevant documentation shall be submitted to the Client electronically through the project CDE (according to the requirements stated in the EIR and agreed post-appointment BEP) and be relevantly signed by authorized persons (certified engineers).

The Consultant shall deliver all required documents related to Main Design in up to 5 hard copies in Croatian and/or English language. Hard copies shall be delivered only on the Client's written request which shall indicate the number of copies required.

TASK 7: Issuing of Building Permit

The Consultant shall submit the Main Design and all other necessary documents required for issuing approvals (*HR: potvrde glavnih projekata*) and Building Permit and take all necessary actions to obtain it. The Consultant shall also include costs of communication, as well as liaising with the authorities within the formal building permitting process, for which the Beneficiary will grant the power of attorney.

TASK 8: Development of Detail Design (including textual and graphical part, technical specifications, and Bill of Quantities for Detail Design)

The Consultant shall prepare the models, designs, drawings and documentation of the level of development of the Detail Design (specified in the **ANNEX 9**), for all architectural, structural, electrical, mechanical, HVAC, fire protection, security system, elevator, physics of the building, and other components of the building in accordance with the approved Main Design and submit to the Client for approval together with the required calculations, reports and implementation details considering technical requirement and international and national specifications in compliance with the building codes.

Detail Design will mandatorily include, but not be limited to:

1. Demolition Design
2. Architectural Design (in line with the BIM environment – **ANNEX 9**)
3. Structural Design (in line with the BIM environment – **ANNEX 9**)
4. Landscape and Horticulture Design (in line with the BIM environment – **ANNEX 9**)
5. Interior Design (in line with the BIM environment – **ANNEX 9**)
6. Traffic Design including traffic areas and traffic signalization (in line with the BIM environment – **ANNEX 9**)
7. Mechanical and HVAC Design (in line with the BIM environment – **ANNEX 9**)
8. Plumbing, Water Distribution, Wastewater and Drainage, and Hydrant Network Installations Design (in line with the BIM environment – **ANNEX 9**)
9. Electrical Design including photovoltaic power station (in line with the BIM environment – **ANNEX 9**)
10. Electrical Design of external lighting and electronic communication infrastructure (in line with the BIM environment – **ANNEX 9**)
11. Electrical Design of Substation (in line with the BIM environment – **ANNEX 9**) (if applicable)

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12. Sprinkler System Design (in line with the BIM environment – **ANNEX 9**)
 13. Elevators Design (in line with the BIM environment – **ANNEX 9**)
 14. Relocation of Existing Installations Design
 15. Equipment Design (in line with the BIM environment – **ANNEX 9**)
 16. Geotechnical Design (in line with the BIM environment – **ANNEX 9**)
 17. Technical Protection System Design (in line with the BIM environment – **ANNEX 9**)
 18. Bill of Quantities
 19. Technical specification

The structure of the Detail Design shall be proposed by the Consultant and shall include the reconstruction of the Building A and landscaping of the newly formed square.

To effectively manage the project information, information model needs to be divided into its component parts according to the agreed data segregation and breakdown structure in the post-appointment BEP. The Detail Design parts can be arranged through several design books/folders, i.e., some of the above designs contain several folders. The Detail Design will necessarily contain the following parts, under the designs listed above.

Mandatory drawings, schemas and schedules for Detail Design stage are defined in the **ANNEX 9**.

Bill of Quantities for Detail Design shall be made in line with the requirements (including structure) defined in the EIR (**ANNEX 9**).

The Consultant shall develop detailed technical specifications of works, materials, systems, and equipment. The Specification shall be developed as instructions and input data for execution of works. The Specification shall clearly specify all the requirements over materials, works, systems and equipment that is subject to execution of works.

Detail Design shall be developed in close cooperation with the Beneficiary and workshops/interviews with Faculty management shall be organized.

All models, designs, studies, and other relevant documentation shall be submitted to the Client electronically through the project CDE (according to the requirements stated in the EIR and agreed post-appointment BEP) and be relevantly signed by authorized persons (certified engineers).

The Technical Protection System Design must not be part of the Detail Design and must not be delivered to the Client through CDE, but through secure channels in accordance with the

Regulation on the Conditions and Manner of Implementation of Technical Protection, Article 14 (OG 198/03).

The Consultant shall deliver all required documents related to Detail Design in up to 5 hard copies in Croatian and/or English language. Hard copies shall be delivered only on the Client's written request which shall indicate the number of copies required.

TASK 9: Development of the monthly reports

Monthly reports shall be prepared in accordance with the EIR and post-appointment BEP (ANNEX 9) and in timely manner.

Monthly reports are the monthly meeting preparation material and shall be submitted through the CDE. Submitted reports will be reviewed by the Client and approved or returned for revision and/or resubmission.

TASK 10: Participation on the meetings

The Consultant shall ensure the presence of its experts on the following meetings:

- Kick-off meeting, during which both the Client and the Consultant shall present their experts and agree on the forms of communication that they will use, the exact dates of monthly and other meetings etc. The kick-off meeting shall be held a few days after the date on which the contract governing the Consultant's engagement for the Services (hereinafter the Contract) enters into force.
- Monthly meetings, which shall be held a few days after the submission of the monthly report by the Consultant and according to the agreed post-appointment BEP.
- Ad-hoc meetings, which the Client or Consultant convenes or announces to the other party few days in advance in writing with a draft agenda for that meeting attached.
- Public consultations.

TASK 11: Other duties of the Consultant

In addition to the duties outlined in the proceeding paragraphs relating to the Project components, the Consultant shall also carry out the following duties on behalf of the Client:

- i) Investigate and obtain available data and information relating to the Project and to the specific components thereof.
- ii) Co-operate with and assist the Client as may be required in obtaining consents from third parties having rights or powers in connection with the Project.
- iii) Application to the local or other relevant authorities for the principal issues regarding the design of project components.
- iv) Prepare the necessary documents required for obtaining the Building Permit or other relevant authority and assist the Client.

- v) Provide recommendations to the Client by making necessary evaluations on investigations or tests that might be required for the proper designing of the works covered by the project.
- vi) Make any reasonable modification to documents, reports, etc. as may be approved by the Client during the various stages of approval.
- vii) Attend any meetings reasonably requested by the Client and provide any information or evidence reasonably required by the Client at any inquiries in connection with the Project.
- viii) Since the similar construction works may also be supervised by other Consultant in other sites, the Consultant shall co-operate with the other Consultant and join the meetings whenever required by the Client.
- ix) The Consultant shall take necessary measures for environmental, community and health and safety aspects and work closely with experts preparing ESMP for the sub-project.
- x) The Consultant is expected to utilize their existing resources to cover any accommodation for the Consultant' staff; vehicles, drivers, fuel and vehicle maintenance, unskilled labour needed as helpers for surveys and quality control.
- xi) The Consultant shall nominate technical auditor in line with local legislation.

IV. SUBMISSION AND TIME SCHEDULE FOR DELIVERABLES, CONTRACT DURATION, AND REPORTING REQUIREMENTS

The Consultant shall prepare and submit appropriate deliverables (designs, details, calculations, reports, specifications, models, studies, and other documents) to the Client for approval. All deliverables shall be submitted through the CDE according to the requirements in the EIR and post-appointment BEP.

Time schedule for deliverables is as follows (days listed below are calendar days):

No.	Name of deliverables	Days/Months	Responsible for submitting	Responsible for review and approval	Timeline for approval
1	Post-appointment BIM Execution Plan – BEP	fifteen (15) days after Commencement of Services	Consultant	Client	ten (10) days after submission
2	Inception Report	thirty (30) days after Commencement of Services	Consultant	Client	ten (10) days after submission

3	Design Brief	thirty (30) days after approval of Inception Report	Consultant	Client	ten (10) days after submission
4	Updated Conceptual Design (if applicable)	sixty (60) days upon receiving request from the Client	Consultant	Client	ten (10) days after submission
5	Special Requirements and updated Location Permit (if applicable)	N/A	N/A	N/A	N/A
6	Monthly reports	monthly	Consultant	Client	five (5) days after submission
7	BIM software licenses (if applicable)	thirty (30) days after Commencement of Services	Consultant	Client	ten (10) days after submission
8	Main Design	one hundred and eighty (180) days after approval of Design Brief	Consultant	Client	fourteen (14) days after submission
9	Building Permit	N/A	N/A	N/A	N/A
10	Detail Design	ninety (90) days after obtaining of Building Permit	Consultant	Client	fourteen (14) days after submission

Consultant shall ensure completion of the Consultant's services on time and without any delay. Also, all deliverables prepared in connection with the service (plan, workshop, study, dispositions, designs, details, calculations, reports, specifications) shall immediately upon completion be submitted to the Client for its review and approval. The Client will review and approve or return

deliverables for revision and/or resubmission within ten (10) working days or any other period defined by the Client upon receiving each of the deliverables.

In the Contract, the Consultant shall assign all intellectual property rights of its work to the Client, including intellectual property rights of any deliverable which Client finds unacceptable and for which it refuses payment.

The estimated period for providing the services is fifteen (15) months for all services.

V. CONSULTANT FIRM'S MINIMUM QUALIFICATION AND EXPERIENCES

The Consultant shall be a firm or association of firms in the form of a joint venture or sub consultancy with the following qualifications (in case of joint venture, only the experience of the lead Consultant firm and joint venture members is considered for evaluation of Expressions of Interest):

- proven general experience in the production of project documentation for reconstruction or construction works (production of Main Design, Detail Design) in the last ten (10) years;
- proven specific experience in the production of project documentation (Main Design, Detail Design) for at least five (5) reconstruction or construction projects in the last ten (10) years. Acceptable projects are investments of at least EUR 10 million;
- experience in the production of project documentation for reconstruction or construction works for non-residential buildings/facilities¹ in the last ten (10) years is considered an advantage - projects which are being considered are investments for facilities/buildings of at least total gross area of 10.000 m²;
- experience in the production of project documentation for reconstruction or construction works for buildings that are registered as protected immovable cultural heritage in the last ten (10) years is considered an advantage; considering this assignment is related to a registered protected cultural heritage from the 20th century, preference is given to references which include buildings from that particular time period;
- experience in the production of project documentation for construction works for educational facilities/buildings in the last ten (10) years is considered an advantage - projects which are being considered are investments for facilities/buildings of at least total gross area of 10.000 m²;

¹ non-residential buildings are buildings which have no residential area or that area is less than 50% of the total usable floor area of a residential building). For purposes of evaluation of this requirement non-residential buildings are following buildings from the National Classification of Building Types: 121 Hotels and similar buildings, 122 Office buildings, 123 Wholesale and retail stores, 126 Buildings for cultural arts and entertainment, education, hospitals and other buildings for health care, according to the National Classification of Building Types - NKVG 12. 2001 - Methodological Instructions, no. 41, ISBN 953-6667-33-0. 2002 D28

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- experience in using BIM in the production of project documentation for reconstruction or construction works for buildings/facilities is considered mandatory - only buildings designs using BIM with issued Building Permits can be used as relevant qualifications and preference is given to projects for non-residential buildings/facilities¹;
 - experience with providing design services within European directives legal framework and metric system is mandatory;
 - the Consultant shall demonstrate an average annual turnover during the last two (2) years (2022 and 2023) of at least 2.000.000 EUR per year.

The credibility of mentioned experience shall be presented in a list of project references within the last ten (10) years with a description of design services provided (including information on contract value, contracting entity/client, project location/country, period of providing the services, description of the designed building, value of investment, total gross area of the designed building, percentage carried out by consultant in case of association of firms or subcontracting and main activities) and accompanied by certificates of orderly fulfilment of the contracts verified by other party from such contracts. In case of references related to registered protected immovable cultural heritage details on the building/s should be listed such as type of cultural heritage, classification, dating, location etc.

The credibility of mentioned experience for using BIM shall be presented in a list of references designed using BIM from the past ten (10) years that will contain the Main Design relevant information, country/province, project value, provided consultancy (in much detail as possible, but still concise), and other important technical attributes (like BIM software used etc.).

As proof for the required annual turnover the Consultant shall submit official financial statements which contain such relevant data (e.g. Profit and Loss Statement, Annual Financial Report, Audit Report etc.).

The Consultant shall have the organizational capacity (it is expected that the Consultant shall have at least ten (10) employees/sub-contracted experts for performing activities under this service) to perform this service as well as available appropriate skills among staff. It is expected that the Consultant submits information on their organizational capacity in their Expression of Interest. Consultants may associate with other firms to enhance their qualifications but should indicate clearly whether the association is in the form of a joint venture and/or a sub-consultancy. In the case of a joint venture, all the partners in the joint venture shall be jointly and severally liable for the entire contract, if selected. If the formation of an association is proposed, the rationale for, and benefits to the assignment of, the arrangement should be explained (outline proposed management coordination of the arrangement, including the role of each firm). Joint venture qualification parameters will be considered as a sum of individual qualifications of joint venture members.

Joint venture members must fulfil the following minimum qualification requirement subject to fulfilment of 100% qualification criteria as given above - each member shall meet not less than 25% of the qualifying criteria for annual turnover above on average for the last two (2) years (2022, 2023). This requirement is only for purpose of shortlisting.

VI. TEAM COMPOSITION AND QUALIFICATIONS OF KEY EXPERTS

Key experts must have sufficient competences, the staffing should comprise the skills and qualifications listed in this section, to fulfil the stated outputs and objectives.

Key experts may be from any of the joint venture members or subcontractors (or engaged otherwise by a leading company).

It is expected that the core team shall comprise of following key experts who meet listed qualification criteria:

Position K-1: Team Leader / Main Architect / Designer

General Qualifications

- a) university degree in architecture
- b) minimum fifteen (15) years of experience in design

Adequacy for the Assignment

- c) minimum ten (10) years as main designer/main architect
- d) experience as a main designer/main architect in design of at least two (2) non-residential buildings/facilities² in size larger than 10.000 m²
- e) has official permission according to applicable law³ for tasks of creating conceptual, main and implementation projects for works on immovable cultural property or fulfils the requirements
- f) experience in using BIM is considered as an advantage

Experience in the Region and Language

- g) experience with providing design service within European directives legal framework and metric system is mandatory
- h) excellent verbal and written communication skills in English are mandatory
- i) spoken and written communication skills in Croatian are considered as advantage

² non-residential buildings are buildings which have no residential area or that area is less than 50% of the total usable floor area of a residential building). For purposes of evaluation of this requirement non-residential buildings are following buildings from the National Classification of Building Types: 121 Hotels and similar buildings, 122 Office buildings, 123 Wholesale and retail stores, 126 Buildings for cultural arts and entertainment, education, hospitals and other buildings for health care, according to the National Classification of Building Types - NKVG 12. 2001 - Methodological Instructions, no. 41, ISBN 953-6667-33-0. 2002 D28

³ Rulebook on the Conditions for Obtaining Permissions for Carrying Out Work for the Protection and Preservation of Cultural Properties (Official Gazette no. 98/2018)

Position K-2: Senior Structural Engineer - Seismic and High-Rise Expert

General Qualifications

- a) university degree in civil engineering
- b) minimum ten (10) years of experience in civil engineering area

Adequacy for the Assignment

- c) minimum seven (7) years of experience in structural design
- d) experience as a structural engineer in design of at least two (2) non-residential buildings/facilities² in size larger than 10.000 m² that included application of structural measures for the protection of buildings against earthquakes (for areas defined as earthquake intensity of 7.5-8.0 degrees MCS scale or more)
- e) experience in using BIM is considered as an advantage

Experience in the Region and Language

- f) experience with providing design service within European directives legal framework and metric system is mandatory
- g) excellent verbal and written communication skills in English are mandatory

Position K-3: Mechanical Engineer

General Qualifications

- a) university degree in mechanical engineering
- b) minimum ten (10) years of experience as mechanical engineer

Adequacy for the Assignment

- c) at least seven (7) years of professional engineering experience in mechanical design
- d) experience as a mechanical engineer in design of at least two (2) non-residential buildings/facilities⁴ in size larger than 10.000 m²
- e) experience in using BIM is considered as an advantage

Experience in the Region and Language

- f) experience with providing design service within European directives legal framework and metric system is mandatory
- g) excellent verbal and written communication skills in English are mandatory

Position K-4: Electrical Engineer

General Qualifications

- a) university degree in electrical engineering
- b) minimum ten (10) years of experience as electrical engineer

Adequacy for the Assignment

⁴ non-residential buildings are buildings which have no residential area or that area is less than 50% of the total usable floor area of a residential building). For purposes of evaluation of this requirement non-residential buildings are following buildings from the National Classification of Building Types: 121 Hotels and similar buildings, 122 Office buildings, 123 Wholesale and retail stores, 126 Buildings for cultural arts and entertainment, education, hospitals and other buildings for health care, according to the National Classification of Building Types - NKVG 12. 2001 - Methodological Instructions, no. 41, ISBN 953-6667-33-0. 2002 D28

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- c) at least seven (7) years of professional engineering experience in electrical design
 - d) experience as an electrical engineer in design of at least two (2) non-residential buildings/facilities⁴ in size larger than 10.000 m²
 - e) experience in using BIM is considered as an advantage

Experience in the Region and Language

- f) experience with providing design service within European directives legal framework and metric system is mandatory
- g) excellent verbal and written communication skills in English are mandatory

Position K-5: Fire Protection Engineer

General Qualifications

- a) university degree in technical field
- b) minimum seven (7) years of professional experience

Adequacy for the Assignment

- c) at least five (5) years of professional engineering experience in fire protection design
- d) experience as a fire protection engineer in design of at least two (2) non-residential buildings/facilities⁵ in size larger than 10.000 m²
- e) certified in accordance with applicable laws⁶ as Fire Prevention Specialist (must be included in the official List of natural persons authorized to prepare fire protection studies)
- f) experience in using BIM is considered as an advantage

Experience in the Region and Language

- g) experience with providing design service within European directives legal framework and metric system is mandatory
- h) excellent verbal and written communication skills in English are mandatory

Position K-6: BIM Manager

General Qualifications

- a) university degree in technical field
- b) minimum seven (7) years of professional experience in construction industry

Adequacy for the Assignment

- c) at least three (3) years of professional engineering experience in using BIM

⁵ non-residential buildings are buildings which have no residential area or that area is less than 50% of the total usable floor area of a residential building). For purposes of evaluation of this requirement non-residential buildings are following buildings from the National Classification of Building Types: 121 Hotels and similar buildings, 122 Office buildings, 123 Wholesale and retail stores, 126 Buildings for cultural arts and entertainment, education, hospitals and other buildings for health care, according to the National Classification of Building Types - NKVG 12. 2001 - Methodological Instructions, no. 41, ISBN 953-6667-33-0. 2002 D28

⁶ Rulebook on Authorizations for the Preparation of Fire Protection Studies (Official Gazette 141/11)

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- d) experience in using BIM in the production of project documentation for reconstruction or construction works i.e. experience in at least two (2) projects; preference is given to projects for non-residential buildings/facilities⁵

Experience in the Region and Language

- e) experience with providing design service within European directives legal framework and metric system is mandatory
- f) excellent verbal and written communication skills in English are mandatory

Following experts are considered non-key experts who meet listed qualification criteria:

Geomechanics Supervising Engineer shall have:

- a) university degree in civil engineering
- b) at least seven (7) years of performing professional geotechnical work
- c) at least five (5) years of performing professional geotechnical work for construction purposes

Coordinator for Health and Safety at Work shall have:

- a) university degree in relevant field such as architecture, engineering, construction management, or a related field
- b) certificate of completed expert exam for the coordinator for health and safety at work
- c) at least five (5) years of professional experience in construction

According to the Conservation Study (**ANNEX 2**), all designers who will work on the reconstruction design must have permission from the Ministry of Culture and Media to carry out work on the protection and preservation of cultural assets (Official Gazette of the Republic of Croatia No. 69/99, 151/03, 157/03-corrected, 87/09, 88/10, 61 /11, 25/12, 136/12, 157/13, 152/14, 44/17, 90/18, 32/20, 62/20, 117/21 and 114/22). According to the Special Requirements (**ANNEX 6**) obtained from the City of Zagreb, City Institute for the Conservation of Cultural and Natural Heritage, Main Design shall be developed by a natural person who has the permission of the Ministry of Culture and Media to carry out work on the protection and preservation of cultural assets (OG 98/18, 119/23).

Team Leader / Main Architect / Designer will be responsible for the integrity and coordination among all projects and designers, as well as leading and being responsible for the performance of all Consultants under this ToR.

In addition to the minimal required project staff defined above, the Consultant shall assess and provide other sufficient design and supporting staff.

VII. OFFICIAL LANGUAGE

The language for communication and for project deliverables (graphical data, non-graphical data, and documentation) shall be English while the language of the Building Permit application shall be Croatian. Deliverables shall be bilingual.

VIII. LIST OF ANNEXES

ANNEX 1 – Conceptual Solution (submitted as a separated file)

ANNEX 2 – Conservation Study (submitted as a separated file)

ANNEX 3 – Expert Study (submitted as a separated file)

ANNEX 4 – Opinion from City of Zagreb, City Institute for the Conservation of Cultural and Natural Heritage (submitted as a separated file)

ANNEX 5 – Conceptual Design (submitted as a separated file)

ANNEX 6 – Special Requirements (submitted as a separated file)

ANNEX 7 – Location Permit (submitted as a separated file)

ANNEX 8 – Detailed Specifications for Environmental and Social aspects

ANNEX 9 – Exchange Information Requirements (EIR)

ANNEX 8 – Detailed Specifications for Environmental and Social aspects

The World Bank developed an Environmental and Social Framework (ESF) setting out the World Bank's commitment to sustainable development through application of Bank Policy (defined in the ESF) and a set of Environmental and Social Standards (ESSs) that are designed to support borrowers' projects, with the aim of ending extreme poverty and promoting shared prosperity.

The ESSs set out the mandatory requirements and outputs that apply to the borrower and projects. They present set of obligatory guidelines and instructions with the main objective to foster efficient and effective identification and mitigation of potentially adverse environmental and social impacts that may occur in the development projects, with proper stakeholder engagement and sustainable management. WB ESS, supported by WB Group Environmental, Health and safety Guidelines (ESHG) and Good International Industry Practice (GIIP) are applied in parallel to the national policies where, as a rule, the stricter one prevails.

Based on the ESF requirements E&S Management Framework (ESMF) was prepared to guide the overall due diligence and E&S sustainable and ESF compliant Project implementation. These guidelines, as confirmed by the sub-project E&S screening procedures, triggered mandatory preparation of a separate Environmental and Social Management Plan (ESMP) for the activity subject of this ToR. Final draft ESMP, shall be World Bank approved and publicly consulted prior to contract negotiation process. The finalized ESMP will be an integral part of contracting for development of Main and Detailed Design. The ESMP will be prepared by PIU, and it will refer to all identified ES risks of Sub-Project implementation, for which mitigation measures need to be included in the design phase and will focus in more details on radon indoor emission, cultural heritage protection and implementation of energy efficient, light pollution climate change prevention and climate resilience design (similar to LEED, BREEAM or DGNB) and other identified E&S risks.

Client will be obliged to ensure compliance of Main and Detail Design with the relevant World Bank Environmental and Social Standards, World Bank Environmental, Health and Safety Guidelines and Good International Industry Practice and the measures and recommendation from the ESMP.

Regarding stakeholder engagement, it will be defined in ESMP and SEP. At least one public consultation should take place in the Detail Design phase. Part of the services is participation in stakeholder engagement activities including public consultation.

ANNEX 9 – Exchange Information Requirements (EIR)

1. INTRODUCTION

Building Information Modeling (BIM) is a process for creating and managing information on a construction project throughout its whole life cycle. In doing so, BIM model is the basis of BIM process which represents physical and functional characteristics of a facility. Thus, BIM model integrates all the graphical and non-graphical data and enables a centralized repository as well as place for sharing information among project stakeholders. The Client demands BIM usage on this project to enable improved design and construction coordination and collaboration; cost and risk reduction; space and facilities management.

1.1. Document purpose

The Exchange Information Requirements (EIR) is an important element of BIM implementation on the project level and is used to set out clearly to the project team what information (models, documents, and data) is required at each stage of the project. In first instance, during the design stage, the project BIM Execution Plan (BEP) will provide a detailed account of how the deliverables stated in the EIR are to be achieved, each team member's responsibility and allocation of said deliverables according to discipline and specialism. Thus, the EIR sets out all information deliverables (models, documents, and data) including traditional project documents, surveys, reports, and appraisals.

Consultant shall adopt BIM for planning and designing, ensure all deliverables are in full compliance with the clauses of this EIR to achieve the objective to the satisfaction of the Client. Consultant shall cooperate and work closely with other project parties and the Client and its representatives to ensure that the designs and deliverables are in full compliance with the specified BIM requirements and that the deliverables are submitted on time, high quality and within budget. Consultant is required to resolve any discipline-based and interdisciplinary conflicts in the BIM models and ensure the BIM models are accurate and verified.

1.2. Responding to this document (EIR)

This EIR should be responded via the pre-appointment and post-appointment BIM Execution Plan (BEP). Thus, the BEP is a direct response to the EIR. The pre-appointment BEP must be prepared by shortlisted Consultants during the preparation of their Technical Proposals (in the phase which takes place after evaluation of Expressions of Interest) while the post-appointment BEP is produced 15 days after Commencement of Services only by the contracted Consultant (as stated in previous section of this ToR). Therefore, any reference to the pre-appointment BEP in this document relates to the phase of preparation of Technical Proposals and all requirements on preparing the pre-appointment BEP will be part of the Request for Proposal (which is issued to shortlisted Consultants).

During the phase of preparation of Expression of Interests interested Consultants should only elaborate their experience in using BIM as indicated in the Request for Expression of Interest.

1.3. General Project Information

General project information is stated in the first paragraph of ToR (I. Project Background).

2. INFORMATION MANAGEMENT

In this section general requirements for information management are stated.

2.1. Standards and classification

The relevant standards for BIM usage on the project are listed below:

1. HRN EN ISO 19650-1:2019 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) -- Information management using building information modelling -- Part 1: Concepts and principles (ISO 19650-1:2018; EN ISO 19650-1:2018).
2. HRN EN ISO 19650-2:2019 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) -- Information management using building information modelling -- Part 2: Delivery phase of the assets (ISO 19650-2:2018; EN ISO 19650-2:2018).
3. HRN EN ISO 19650-3:2020 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) -- Information management using building information modelling -- Part 3: Operational phase of the assets (ISO 19650-3:2020; EN ISO 19650-3:2020).
4. HRN EN ISO 19650-4:2022 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) -- Information management using building information modelling -- Part 4: Information exchange (ISO 19650-4:2022; EN ISO 19650-4:2022).
5. HRN EN ISO 19650-5: 2020 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) -- Information management using building information modelling -- Part 5: Security-minded approach to information management (ISO 19650-5:2020; EN ISO 19650-5:2020).
6. HRN EN ISO 16739: 2016 Industry Foundation Classes (IFC) for data sharing in the construction and facility management industries (ISO 16739:2013; EN ISO 16739:2016)
7. HRN EN ISO 16739-1:2020 Industry Foundation Classes (IFC) for data sharing in the construction and facility management industries -- Part 1: Data schema (ISO 16739-1:2018; EN ISO 16739-1:2020).
8. HRN EN ISO 29481-1:2017 Building information models -- Information delivery manual -- Part 1: Methodology and format (ISO 29481-1:2016; EN ISO 29481-1:2017).

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9. HRN EN ISO 29481-2:2016 Building information models -- Information delivery manual -- Part 2: Interaction framework (ISO 29481-2:2012; EN ISO 29481-2:2016).
 10. HRN EN ISO 29481-3:2022 Building information models -- Information delivery manual -- Part 3: Data schema (ISO 29481-3:2022; EN ISO 29481-3:2022).
 11. HRN EN ISO 12006-3:2022 Building construction -- Organization of information about construction works -- Part 3: Framework for object-oriented information (ISO 12006-3:2022; EN ISO 12006-3:2022).
 12. HRS CEN/TS 17623:2021 BIM Properties for lighting -- Luminaires and sensing devices (CEN/TS 17623:2021).
 13. HRN EN ISO 23386:2020 Building information modelling and other digital processes used in construction -- Methodology to describe, author and maintain properties in interconnected data dictionaries (ISO 23386:2020; EN ISO 23386:2020)
 14. HRN EN ISO 23387:2020 Building Information Modelling (BIM) -- Data templates for construction objects used in the life cycle of any built asset -- Concepts and principles (ISO 23387:2020; EN ISO 23387:2020).
 15. ISO 15686-4:2014 Building Construction — Service Life Planning — Part 4: Service Life Planning using Building Information Modelling.
 16. BS 1192-4:2014 Collaborative production of information Part 4: Fulfilling employer's information exchange requirements using COBie – Code of practice.
 17. http://docs.buildingsmartalliance.org/MVD_COBIE/.

The classification system which will be used on the project must be comply with the ISO standard:

1. HRN EN ISO 12006-2:2020 Building construction -- Organization of information about construction works -- Part 2: Framework for classification (ISO 12006-2:2015; EN ISO 12006-2:2020).

Acceptable classification system which shall be used are e.g., Uniclass (<https://www.thenbs.com/our-tools/uniclass-2015>) or OmniClass (<https://www.csiresources.org/standards/omniclass/standards-omniclass-about>).

When defining Level of Information Need and Level of Development listed standards should apply:

1. HRN EN ISO 17412-1:2020 Building Information Modelling -- Level of Information Need -- Part 1: Concepts and principles (EN 17412-1:2020).
2. BIMForum (2023) Level of Development Specification [Online]. Available at: <https://bimforum.org/wp-content/uploads/2023/10/LOD-Spec-2023-Part-I-2024-02-27.pdf> and <https://bimforum.org/wp-content/uploads/2023/10/LOD-Spec-2023-Part-II-2024-02-28.xlsx>

2.2. BIM uses

The BIM uses in the design phase are listed below:

1. Design authoring is a process in which 3D software (design authoring tools and audit tools) is used to develop a BIM model based on criteria that is important to the translation of the building's design.
2. Design reviews is a process for stakeholders to view a model, images, and drawings from the models or animated walk-throughs of the project, provide feedback and validate numerous design aspects such as meeting the Client's requirements.
3. Drawing generation is a process of using BIM to produce 2D drawings while all 2D drawings shall be generated from the BIM authoring software and tools directly. A registration list showing the relationship between the information models and 2D drawings shall be created to indicate whether each 2D drawing is generated from the BIM or not. Any 2D drawings which are produced from non-BIM authoring software or tools shall be prepared in accordance with the standards for 2D drawings. In case any drawing is not created natively in the BIM authoring software it should be linked to the information models.
4. Quantity Take-Offs (QTO) generation is a process in which BIM is used to assist in the generation of accurate QTO and Bill of Quantities (BoQ).
5. Engineering analysis (structural, ventilation, lightning, energy, fire, civil and other analysis) is a process that uses the information model to assist, analyse and optimise different design options to determine the most effective engineering solution to meet design codes and Client's requirements.
6. Sustainability evaluation is a process in which a BIM project is evaluated based on sustainable criteria (e.g., Leadership in Energy and Environmental Design – LEED). Process may include energy simulations, calculations, etc.
7. Code validation is a process in which code validation software is utilized to check the model parameters against project specific codes.
8. Model coordination/Clash detection is a process in which model elements are analysed using clash detection software to detect potential conflicts in design to update the design and eliminate potential system collisions prior to starting on site.

2.3. Common Data Environment (CDE) establishment and implementation

The Common Data Environment (CDE) is a way of allowing information to be shared efficiently and accurately between all members of the project team –including graphical information (2D and 3D), models, non-graphical information, or documentation. Structure of CDE shall enable the collaboration and data exchange between all project stakeholders. It is important to note that all versions of the data in CDE (BIM models, project information, reports, drawings, etc.) are the property of the Client.

CDE will be established by the Client and shall be utilised throughout the project stages specified by the Client. Individual login accounts with appropriate permissions for each person using the CDE shall be provided to the involved project stakeholders. All project stakeholders and supply chain organisations are required to use CDE and defined procedures for data sharing through the CDE shall be in accordance with post-appointment BEP.

Licenses and BIM training for the Consultant will be provided by the Client and this is not part of this consultancy services. The Client will provide the Consultant with 6 licences for BIM software collection for design review (including CDE).

CDE implementation strategy shall be defined in BEP, standard for metadata including status codes, revision codes, authorization codes, and classification code should be proposed. Proposed standards must be in accordance with the HRN EN ISO 19650 series of standards. Overview of the CDE implementation strategy must be proposed in pre-appointment BEP, while detail establishment and implementation process will agree in post-appointment BEP. In doing so, the CDE must contain four identified functional sections: work in progress (WIP), shared, published, and archive according to the HRN EN ISO 19650-4 to support workflows for:

- check, review, and approve process by task team;
- review, approve, and authorization process by lead Consultant;
- review and accept process by Client.

2.4. Security

The project BEP should set out the process for monitoring, managing, and complying with the Client security mandate, including adherence to any standard or processes for data sharing. The following security standards should be followed in respect of the proposed BIM project, defined in accordance with the business impact levels (Not Protectively Marked, Protected Restricted, Confidential). All the information about the project must not be shared with third parties and must be considered as confidential, until the Client decides otherwise.

A data security protocol should be established to prevent any possible data corruption, virus infections, and data misuse or deliberate damage by project team members, other employees, or outside sources. Adequate user access rights should be established to prevent data loss or damage during file exchange, maintenance, and archiving. BIM project data residing on network servers should be subjected to regular back-ups.

All supply chain organisations are required to adopt the security requirements as detailed in the post-appointment BEP.

- all project information must be shared via the project CDE;
- the use of CDs, USB drives is not permitted;

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- the use of other online document exchange tools is not permitted;
 - project documents must not be shared via email;
 - all CDE users must have their own username and password;
 - the Consultant have confirmed their company security standards as part of the BIM Capability Assessment.

2.5. Planning of work and data segregation

To effectively manage the information model, it needs to be divided into its component parts. This is defined as an information breakdown structure which is a pre-determined method to identify manageable units of information to be used across a project life cycle. The high-level breakdown starts at the three identified components of an information model which are graphical model, non-graphical information, and documentation. Organization of the information in the BIM model should relate to the requirements related to required Level of Information Need (specified in addition).

The BIM model should be properly segregated per discipline and spatial-wise (e.g., project, buildings, disciplines, levels, zones, systems, elements) and should include all the necessary element attributes and properties, to be ready for the accompanying BIM uses, but also to be usable for the further project phases, the clash detection analysis, the production of the QTO, etc. Further, specific attributes shall be linked to the model elements. The library of BIM objects used in the BIM models must be organised and categorised according to the classification system compliant to the HRN EN ISO 12006-2. Also, BIM objects sheets for all BIM objects used in the BIM models prepared according to the standard template provided by the Consultant and approved by the Client.

Due to the scale and complexity of the project, the Consultant may separate the project and discipline models by zone, by subdividing the project into separate areas or levels. These zones will aid each team to model their discipline more efficiently by reducing the individual BIM file sizes. The zones and the zone file name codes shall be determined by the Consultant and approved by the Client during the design stage when the overall scale and complexity of the project is understood.

The Consultant must propose Model Federation Strategy within pre-appointment BEP where proper information breakdown structure which will further enable creating and managing the federated BIM model should be identified. Proposed Strategy should be analysed in detail in post-appointment BEP.

Limit for file size shall be defined in the post-appointment BEP to enable smooth collaboration and coordination process (it is proposed not to exceed the limit of 500 Mb).

2.6. BIM Personnel

There are commonly two key roles in a project with BIM adoption namely BIM Manager (Key Expert) and CDE/Data/Document Manager.

1. The BIM Manager shall take lead on the BIM execution and oversee the BIM process of the project. It should be ensured that the BIM Manager shall work independently from the role of its respective discipline lead (e.g., BIM Coordinators). BIM Manager is key expert and requirements for this position are defined in the ToR.
2. CDE/Data/Document Manager shall:
 - a. design and manage the CDE including processes and procedures;
 - b. establish, agree, and implement the rules of the information structure and manage the standards for the information model;
 - c. ensure compliance with information requirements and provide support on non-compliance;
 - d. manage the information model to meet integrity and security standards in accordance with the requirements of the EIR and agreed post-appointment BEP;
 - e. be a point of reference for all data/information management problems on the project;
 - f. make sure that all the information produced, and the model attributes are compatible with the standard methods and procedures of the project;
 - g. provide clear instructions to the project team on what information is requested, by whom and for what purpose, who will generate and manage the information, how often and what actions must be taken upon receipt of the information;
 - h. ensure that information and documents are strictly controlled and efficiently disseminated between the parties envisaged through the CDE;
 - i. customize and keep the collaborative platform updated, manage documents and service users;
 - j. ensure adequate transmission of documents.

It is desirable that the named CDE/Data/Document Manager has a minimum one year of practical experience in CDE implementation and management.

Further, when defining BIM Personnel, it is required that Consultant specify roles, and responsibilities for all project staff, including all Key Experts and CDE/Data/Document Manager.

Thus, in pre-appointment BEP proposed organisation breakdown structure of delivery team and delivery team capability and capacity assessment should be given.

All Key Experts and CDE/Data/Document Manager, and additional staff shall be included in organizational breakdown structure defined in pre-appointment BEP and post-appointment BEP

according to the requirements in the ToR and EIR. It is not required to appoint or name the CDE/Data/Document Manager in the Expression of Interest or in the Technical Proposal, but it is mandatory that he/she is appointed and approved by the Client at least seven (7) days after Commencement of Services.

2.7. Collaboration process

The success of a BIM enabled project delivery process is highly dependent upon the level at which the entire design team can collaboratively produce and manage information for the duration of the project. The project collaboration process shall be outlined in the pre-appointment BEP and should be sufficient to demonstrate competence and capability, while in post-appointment BEP details of collaboration process should be presented. All processes must follow HRN EN ISO 19650 standard series, utilising the described information exchange through the CDE.

In doing so, it is recommended to use open data standards such as BIM Collaboration Format (BCF) used to exchange snippets of models with comment and mark-up can aid in this process whilst providing an audit trail of issues and resolutions.

Each discipline should develop a starter model for a partner discipline (e.g., defining the structural model in conjunction with the architecture). This shall be done in a separate model which can then be referenced as required to allow the development of the continued design.

The pre-appointment BEP response should include as a minimum detail of:

- description of the roles and relationships of the subjects involved in the project (recommended using flow diagrams);
- frequency and formats of information exchanges;
- format and extent of model sharing at every stage of the project;
- frequency and details of model review workshops and other collaborative working practices;
- frequency and details of design reviews using the federated model.

2.8. Coordination process

Project quality and de-risking through model and information co-ordination is a key objective and requirement from Client. The purpose of this section is to define the project coordination process including quality control requirements. Proposal for Information Delivery Strategy should be part of pre-appointment BEP. Information Delivery Strategy shall include presentation of strategy for generation of all project deliverables (graphical, non-graphical data, and documentation) and their interconnections.

For interdisciplinary coordination, the models will be aggregated into a single federated coordination model, through the exchange of files. The BIM Manager shall manage the process of bringing all the various models together into a single federated model. This means a model consisting of linked but distinct component models and other data sources that do not lose their identity or integrity by being so linked. A change to one component model in a federated model does not create a change in another component model in that federated model. If all designers are using the same modelling platform, then this could be undertaken within the native file format, or through export into an open transfer format (e.g., Industry Foundation Classes - IFC).

If different platforms are used project review tools should be used to integrate and validate merged models. The Client will provide the Consultant with 6 licenses for BIM software collection for design review which shall be used for the coordination process. The method for creating and managing the federated model should be agreed and documented in the project post-appointment BEP. The Consultant must explain (with a diagram) how each of the model contribute to the overall Model Federation Strategy and thus present the strategy for federated model delivery. Client must always have an updated, read-only copy of the overall model.

The coordination of data and information between the different graphic models must be guaranteed through:

- clash detection (analysis and control of physical and information interferences);
- model and code checking (analysis and control of information inconsistencies);
- resolution of interferences and inconsistencies.

The project clash detection and avoidance process must be detailed in the project post-appointment BEP. This will include but not limited to software utilisation, responsibility service, outputs, technical query workflow, tolerance strategy, and clash resolution process. Delivery will be undertaken through regular sharing of model data (through the project CDE) as outlined in the post-appointment BEP in the form of native files and other agreed exchange formats. Prior to sharing all data shall be checked, approved, and validated.

The Consultant shall run clash detection analysis between specific model itself and between all pairs of disciplines in the BIM (coordination) model. Clash detection analysis should be performed for hard (when two or more components sharing the same place) and soft (when an element is not given the spatial or geometric tolerance) clashes. Details for performing clash detection analysis will be agreed and specified in the post-appointment BEP.

The coordinated or federated models, generated as the sum of the models from the individual disciplines and subjected to the process of controlling the inconsistencies that generate interference (clash detection), must be accompanied by a summary report, which will briefly describe the progress and the main problems, solved or to be solved, related to the model. The 3D federated

model should be created using adequate BIM tool which enables clash detection process conducting (hard and soft clash detection, report creation, output verification, etc.).

The Consultant must publish and share a federated model monthly as a preparation for the monthly report and meeting. Thus, the delivery of the reports will be in accordance with the publication of the models. The Clash Detection Report must show all the detected clashes. Once the clashes have been uniquely identified, it will be assigned to the responsible party, who will determine its resolution. The coordination activities of the interferences and inconsistencies found, both geometric and normative, must proceed until all those detected have been eliminated.

After the coordination phase of the models and establishment of final versions of models, 2D drawings extracted from the models must be available to Client for approval. Working drawings must be extracted from the BIM model as needed during the project.

2.9. Compliance plan

Compliance plan should include:

1. Quality Assurance Plan
 - Quality Assurance Plan shall be included as part of the project information production methods and procedures in the pre-appointment and post-appointment BEP, outlining the quality assurance for the BIM process, BIM compliance and asset attributes checking. A Quality Assurance Plan for BIM shall be established to ensure appropriate quality control on information and data accuracy.
 - The quality control deliverables as a part of the Quality Assurance Plan shall include the following contents: model compliance checking procedure and report according to the BIM standards, methods and procedures which are stated in the BEP, clash analysis procedure and clash analysis reports.
2. Design validation
 - Design validation shall be performed among concerned stakeholders such as design consultants, Client and other relevant stakeholders to provide their feedback to validate multiple design aspects by reviewing the models, documentation, etc. The deliverables shall include the following: design validation procedure and design validation report.
3. Compliance check of project deliverables
 - Compliance check of the deliverables shall be done before every submission by the personnel (recommended BIM personnel) of the Consultant working on the project and other personnel (recommended BIM personnel) of the Consultant independent from the project team.

2.10. Training requirements

The BIM Personnel included in project delivery must have adequate BIM knowledge and skills. BIM training for BIM software collection for design review (including CDE) will be provided by the Client and this is not part of this consultancy services.

2.11. Health and safety

This includes the utilization of BIM to identify and reduce health and safety hazards/risks in design phase through early identification and mitigation. Environmental and Social requirements are defined in the separated document Environmental and Social Management Plan (ESMP).

3. TECHNICAL MANAGEMENT

In this section general requirements for technical management are stated.

3.1. Hardware and software requirements

The requirements for the software, hardware and network bandwidth for modelling, coordination and visualisation on workstation, desktop, notebook computers and mobile devices should be determined. The minimum requirement varies for different applications, project sizes and operating systems. The actual needs of a project must be determined on a case-by-case basis. The hardware and software to be used shall enable the project participants to deliver the required BIM uses in a productive and efficient manner. The specification and functional performance of the hardware shall refer to the requirements of the software to be adopted in the project. Thus, this section communicates any constraints or specific IT requirements, which may need additional resources or non-standard solutions.

The Consultant should provide hardware specification inclusive desktop, notebook computers, mobile devices, BIM data servers, workstations and viewing platforms, etc. The specifications should include recommendations for the operating system, CPU, memory, video cards, hard disk space and network speeds. The following hardware specification should be considered in post-appointment BEP.

Further, the Consultant should identify versions of licensed operating systems as well as other IT limitations as these can all impact the authoring software versions to be used. It should also be recognised that specific authoring tools are not backward compatible and that the BIM and CAD software, along with versions, that will be used by the design team be agreed before starting the project. The models should be created using suitable BIM authoring software applications that allow the assembly of data-rich models and the production and checking of co-ordinated drawings and documentation. To allow for interoperability, the BIM authoring tools should be compliant with open data exchanges such as IFC. Also, inherent model data must be extractable in a .xls (or

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- the project origin point;
 - the base point;
 - the rotation angle of the project should reflect True North (if Project North is created it should only be used for identified sheet views and not used for any model coordination);
 - datum information;
 - other necessary information (e.g., offset information, intersection of grids, etc.);
 - ground floor;
 - International System of units – SI.

If a model is produced in a local co-ordinate system due to software functionality or limitations, the BIM coordinator or modeller that produced the file shall be responsible for providing clear instruction and documentation as to the origin x, y, z and bearing translations accompanying their BIM submission. Each discipline shall be conscious that referenced data has been produced from the perspective of the Client and may not be changed.

3.4. Level of Information Need (LOIN)

Level of Information Need (LOIN) provides a structured approach to define the level of detail, dimensionality, location, appearance, parametric behaviour, accuracy, and reliability of model elements. According to HRN EN 17412 the LOIN refers to the three components of the information model which are graphics, information, and documentation. Graphics refers to the graphical representation which deals with geometric representation, symbology, and visualisation and in this project should be analysed. Information identifies the properties (requirements, specifications, product definitions, object methods, parametric parameters, materials, generic or manufactured product criteria, etc.) to be attached to each type of object to meet the intended uses. Documentation identifies the properties to be attached to each type of object to meet the intended uses.

Level of detail (LoD) and level of information (LoI) shall be proposed by the Consultant and accepted by the Client. When defining level of detail Consultant shall develop Model Element Library where Consultant must represent the model elements for each phase of the project. During development of BIM models, dimensions, service space and connections for each specific equipment shall be defined and presented. When defining level of information, specific attributes for each type of element shall be defined in form of table (LoI matrix). Machine readable standards (e.g., Information Delivery Specification – IDS) are acceptable and could also be provided by the Consultant. Basis for development of Model Element Library and level of information is BIM forum document LOD Specification 2023.

LOD specification for Main Design:

1. Architectural Design

LOD 300

2. Structural Design	LOD 300
3. Landscape and Horticulture Design	LOD 200
4. Traffic Design including traffic areas and traffic signalization	LOD 300
5. Mechanical and HVAC Design	LOD 300
6. Plumbing and Water Distribution Design	LOD 300
7. Wastewater and Drainage	LOD 300
8. Hydrant Network Installations Design	LOD 300
9. Electrical Design	LOD 300
10. Sprinkler System Design	LOD 300
11. Elevators Design	LOD 200
12. Geodetical Design	LOD 300
13. Equipment Design	LOD 200
14. Geotechnical Design	LOD 300

LOD specification for Detail Design:

1. Architectural Design	LOD 400*
2. Structural Design	LOD 400*
3. Landscape and Horticulture Design	LOD 300
4. Interior Design	LOD 400
5. Traffic Design including traffic areas and traffic signalization	LOD 400*
6. Mechanical and HVAC Design	LOD 400*
7. Plumbing and Water Distribution Design	LOD 400*
8. Wastewater and Drainage	LOD 400*
9. Hydrant Network Installations Design	LOD 400*
10. Electrical Design	LOD 400*
11. Sprinkler System Design	LOD 400*
12. Elevators Design	LOD 300
13. Equipment Design	LOD 400*
14. Geotechnical Design	LOD 400*
15. Technical Protection System Design	LOD 400*

*Or the first lower if not applicable to the specific BIM elements.

Generation of listed drawings and schedules are mandatory for Main Design stage, but not limited to:

- general layout plans;
- blow up sections / elevations;
- details and schedule of drawings;
- drawings of each profession;
- equipment schedules.

Generation of listed drawings is mandatory for Detailed Designs stage, but not limited to:

- detailed architectural drawings;
- elevation drawings (rooms);
- shop drawings and schemes;
- detailed structural drawings (formwork and reinforcement plans);
- detailed MEP drawings;
- detailed HVAC drawings;
- landscape and horticulture drawings.

Further, the BoQ and technical specifications shall follow structure which enables clear connection of BoQ (cost items), technical specifications, QTO and 3D elements, but also allows automated quantity verification and control using BIM tools. BoQ and technical specifications shall be model based. BoQ (cost items) shall be extracted from the BIM model and shall be organized as follows:

1. type of work (e.g., preparation works, concreting works, brickwork, etc.);
2. type of element (e.g., walls, slab, beam, etc.);
3. specific element properties (e.g., wall thickness, cross section dimensions, etc.);
4. position of element (e.g., ground floor, first floor, etc.).

Every cost item in BoQ and item in technical specifications shall have associated appropriate classification code which indicates the connection of the cost item and specific BIM elements.

Model-based QTO should be extracted from the established BIM models and must follow above defined structure of the BoQ. Further, every QTO item must be associated with appropriate cost item (through the same classification code) providing clear information about related quantity of each cost item. Thus, QTO item and BoQ item must consider the same elements within the BIM model.

More detailed instruction for LOIN definition will be agreed in post-appointment BEP where Consultant must represent the data model for each phase of the project. The final LOIN for graphical, non-graphical information and documentation shall be decided in cooperation with the Client.

4. COMMERCIAL MANAGEMENT

In this section general requirements for commercial management are stated.

4.1. Information exchange

The Client must communicate the timing and content complete information exchanges between the delivery team and Client. Further, information exchanges should be aligned with work stages. Through the different stages, it is necessary that all the information exchange should happen within a CDE.

At a project level, the frequency of required information exchanges should be defined in the post-appointment BEP (within the project Master Information Delivery Plan – MIDP) and should be in accordance with the specified data exchange formats, milestones, and defined project deliverables.

For the entire duration of the contract, the lead Consultant is responsible for adequacy and compliance of information exchanged by any sub-Consultant with the contents of this document.

4.2. Project deliverables (related to the BIM environment)

The required project deliverables are listed below (requirements for each project deliverable have been stated in previous part of this document):

1. pre-appointment BEP;
2. post-appointment BEP;
3. BIM Models of the Main Design and Detail Design (each discipline shall carry out its own BIM model with geometries and alphanumeric information according to required LOD at particular project stage) – agreed versions and final models;
4. federated BIM model of the Main Design and Detail Design – agreed versions and final model (after solving the clashes);
5. monthly report;
6. drawings generated from BIM models of the Main Design and Detail Design - as needed during the project and final version of drawings;
7. model-based BoQ with belonging model-based QTO reports, technical specification and other related documentation – extracted from the established BIM models of the Detail Design.

4.3. Ownership of the data in CDE

During the project, the Consultant must produce, in addition to the documentation, all the files in native format and in the related exchange formats (e.g., IFC) with the copyrights, to allow Client any future revisions of the same. All versions of the data in CDE (BIM models, project information, reports, drawings, etc.) are the property of the Client. Furthermore, all project deliverables shall be in accordance with the law and the requirements included in other contractual documents (inclusive EIR).

4.4. Acceptance criteria

Acceptance criteria are defined in previous sections in the ToR.

4.5. Responsibilities matrix

The purpose of this section is to bring to the attention of the project team the allocation of roles associated with the management of the model and project information. Consultant (lead Consultant

and task team) should identify (within an Information Management Service Matrix) the information management roles and assigned to them the information management functions. The matrix shall identify at least a simplified approach of which of the roles is responsible for each task, by indicating a tick or cross against the matrix. Ideally, the tasks should be allocated using a full RACI responsibility service approach indicating either:

- Responsible for undertaking activity (R);
- Accountable for activity completion (A);
- Consulted during activity (C);
- Informed following activity completion (I).

In doing so, Consultant should define project delivery and information management roles with their responsibilities and authority within pre-appointment BEP. In post-appointment BEP, the responsibilities matrix shall be updated with the names and contact details of the individuals fulfilling the necessary project and task roles. The authorities for the different roles related to the production and management of information models shall be defined in the responsibility matrix.

4.6. BIM capability and capacity assessment

The Client should provide a delivery team and task team capability summary assessment along with a proposed risk register and mobilisation plan, including training requirements if such a need is identified through the assessments. The assessment must be part of pre-appointment BEP and shall include:

- details of BIM workload and resourcing (delivery and task teams);
- proposed approach;
- BIM capability assessment;
- Information and Communication Technologies (ICT) capability assessment;
- information delivery capability assessment;
- capacity assessment;
- security assessment.

Where delivery and task teams do not have the appropriate skills, software, or resource available, this should be mitigated through risk assessment, procurement, and training preferably through the mobilisation stage. Any identified risks would be carried through to the Risk register and where possible, mitigated through the mobilisation activity.