

Terms of Reference

Türkiye

Istanbul Seismic Risk Mitigation and Emergency Preparedness (ISMEP) Project

**Consultancy Services for Feasibility Studies and Retrofitting Design of
Hospitals/Healthcare Centers in İstanbul (ISDB2-CB2)**

1. INTRODUCTION AND BACKGROUND

Turkey is highly vulnerable to natural disasters, particularly earthquakes. In the 1999 Marmara earthquakes, the death toll reached over 17,000 with a direct economic impact estimated at about US\$5 billion, or around 2.5 percent of GNP. Within the nation's high-risk context, Istanbul is most vulnerable because of its seismic-prone location on the North Anatolian Fault, and its high population and commercial/industrial densities. According to recent assessments, the probability of a major earthquake affecting Istanbul in the next 30 years is 62%±12%, while the likelihood of such devastation in the next decade is 32%±12%. If a seismic event of the same magnitude as that in 1999 were to occur near Istanbul, the human suffering as well as the social, economic, and environmental impacts would be dramatically higher than in the Marmara region, as Istanbul is not only the financial, cultural and industrial centre of the country, but is also a nexus of inter-continental importance and home of about 15 million people. An interruption of Istanbul's social, economic and financial life would be felt for many years to come. Some sources estimate that the economic impact of such a disaster would be more than US\$20 billion.

In order to improve the city of Istanbul's preparedness for a potential earthquake through enhancing the institutional and technical capacity for disaster management and emergency response, strengthening critical public facilities for earthquake resistance, and supporting measures for better enforcement of building codes and land use plans, Istanbul Seismic Risk Mitigation and Emergency Preparedness (ISMEP) Project had been prepared by the Turkish Government. The International Bank for Reconstruction and Development (IBRD) and the Republic of Turkey signed a Loan Agreement in the amount of Euro 310.00 million (US\$400.00 million equivalent) on October 18, 2005 for the funding of ISMEP. The agreement became effective on February 3, 2006. Istanbul Governorship, Istanbul Project Coordination Unit (IPCU) is responsible for the implementation of this project. According to the mission reports "Project implementation is progressing well and in accordance with the agreed plan."

Since the budget allocated from the IBRD is not enough to cover all needed activities for the risk mitigation studies of Istanbul, the Republic of Türkiye signed an additional loan of an amount of 300.000.000 Euro with the European Investment Bank (EIB), 250.000.000 Euro with the Council of Europe Development Bank (CEB), 109.800.000 Euro with the International Bank for Reconstruction and Development (IBRD), 243.000.000 Euro with the Islamic Development Bank (IsDB), 300.000.000 Euro with the European Investment Bank (EIB),

250.000.000 Euro with the Council of Europe Development Bank (CEB), 250.000.000 Euro with the German Development Bank (KfW), 300.000.000 USD with the Asian Infrastructure Investment Bank (AIIB), 40.000.000 Euro with the ECO Trade and Development Bank (ETDB), 100.000.000 Euro with the Council of Europe Development Bank (CEB), 150.000.000 Euro with the Asian Infrastructure Investment Bank (AIIB), 55.000.000 USD with the Saudi Fund for Development (SFD), 140.000.000 Euro with the German Development Bank (KfW), 300.000.000 Euro, 330.000.000 Euro with the Council of Europe Development Bank (CEB), 500.000.000 Euro with the Islamic Development Bank (IsDB) and finally 250.000.000 Euro with the German Development Bank (KfW) to support financing of ISMEP activities.

ISMEP Project consists of: (A) Enhancement the effectiveness and capacity of the provincial and municipal public safety organizations in Istanbul to prepare for, respond to and recover from significant emergencies, those arising from earthquakes; (B) Seismic risk mitigation for priority public facilities to ensure their function and to reduce casualties in the event of earthquake through retrofitting of schools and other priority public facilities; (C) Enforcement of building codes made in implementation of land use plans to strengthen the institutional and technical capacity of the Metropolitan Municipality and selected district municipalities.

The project shall, among other activities, finance the structural retrofitting and reconstruction of selected essential public services buildings, including consideration of non-structural elements in order to reduce their vulnerability to seismic forces and the consequent risks to occupants. Essential public services buildings include those that serve a public function essential to the disaster response and recovery operations of the community and to social and community function in general, as well as buildings regularly used by large numbers of the public, where life-safety is of special concern.

2. PROJECT OBJECTIVES

The objective of the Project is to conduct vulnerability assessments and prepare preliminary and final structural retrofitting designs, including consideration of non-structural elements, architectural, mechanical and electrical designs, cost estimates, bills of quantities, specifications, tender documents and provide an overview synthesis of the feasibility of the program in terms of technical, economical criteria for the selected hospital/healthcare centers (a list of the buildings is given in Table-1 of the TOR) located in the province of Istanbul.

The Feasibility Study will assess the potential for demonstrating innovative technologies to reduce disruption and maximize economies.

3. DESCRIPTION OF THE CONSULTANT'S DUTIES

These Terms of Reference will cover feasibility studies, renovation works and technical assistance for retrofitting of selected hospital/healthcare centers having a total construction area as stated in Table-1 of the ToR. The tasks for the assignment are summarized as follows:

- Define a methodology for seismic vulnerability assessment of the buildings by using the available data, conducting survey studies and destructive and non-destructive tests and measurements as required,
- Assess existing buildings, and define the structural performance standard to be followed in design,
- Undertake seismic vulnerability assessment for each selected building according to Turkish regulation and standards (Where necessary, international regulations and standards may be applied subject to the prior approval of IPKB),
- Assess all the non-structural elements and take them into account during design stages,
- Assess existing architectural, mechanical, electrical elements and take them into account during design stages,
- Prepare survey designs, site soil investigation reports, material properties,
- Prepare preliminary designs and costs estimates for retrofitting of each selected building taking conventional and modern retrofitting techniques using “*Guidelines for Retrofitting of School and Hospital Buildings in Istanbul*” prepared by the technical committee and international experts of ISMEP for Concrete and Masonry structures and Rehabilitation of Non-Structural Components as the minimum standard and new specification for structures (Turkish Building Earthquake Code) published at Official Gazette on 18.03.2018 into consideration,
- Submit cost comparison and analysis for selected hospitals/healthcare centers considering cost of retrofitting to the cost of replacement ratio accepted by IPCU,
- Prepare the final designs, final cost estimates, Bill of Quantities and tender documents,
- Consider all available **officially written** demands of hospitals/healthcare centers’ administrations and reflect these all confirmed demands on final documents,
- Provide written approvals for all analysis, calculations and designs from an expert (as approval authority from university) who is also participated in the development of the March 2018 version of Turkish Building Earthquake Code,

In case of any change in TBEC 2018 or Turkish standards during all process (design phase, tender phase or construction phase), the Consultant shall revise studies.

If any alteration in any of the contract drawings, documents occurs during construction excavation for foundations of buildings, the Consultant shall prepare and submit such alteration drawings to the Client for approval, in an urgent manner not exceeding one-week duration supported by the necessary calculations and details. The Consultant shall, at no additional cost to the Client, revise the foundation and other structural element designs, including necessary details, if the existing contract drawings prepared by the Consultant are found to be inconsistent with actual site conditions.

Some buildings/blocks in the building list may be cancelled according to the requests from the administrations. The remaining payments for the cancelled buildings will not be made to the Consultant, and the Consultant shall not claim any payment or compensation for the cancelled portions of the Services.

4. METHODOLOGY AND SCOPE OF WORK

4.1. Methodology and Standards

In identifying a methodology for assessment and structural performance, Turkish Building Earthquake Code (TBEC 2018) published at Official Gazette on 18.03.2018 to be followed. Consultant will develop and present a method to approval of Client for undertaking field investigations, evaluations, and design, including the definition of a process and identifying the steps to be followed, the type of analyses to be done at each step, and the expected outcomes and deliverables at each step. The Consultant may also follow the “Guidelines for Retrofitting of School and Hospital Buildings in Istanbul” prepared by the technical committee and international experts of ISMEP for Concrete and Masonry structures and Rehabilitation of Non-Structural Components *as the minimum standard*.

Evaluation and design methodology proposed will include:

- the testing of existing materials and determination of strength and stiffness properties of existing lateral load and gravity load elements;
- determination of impact of previous damage and deterioration (i.e.- duress and corrosion effects);
- an indication of the design standards to be followed for evaluation of existing structural capacity of lateral-load elements and the building as whole;
- assessment of design conditions for retrofitting as well as opinions of technological professionals and academics (i.e. input ground motion at site, limit state during emergency response period);
- recommendation on structural performance criteria based on cost comparison and analysis considerations for relevant buildings;
- recommendation on assessment of non-structural, architectural, mechanical and electrical elements arising from structural retrofitting and from upgrading existing conditions

4.2. Detailed Scope of Work

The Consultant is responsible for the establishment of a design group who are experienced in the preparation of architectural, structural, electrical, mechanical, designs relevant with the retrofitting of the buildings. This group shall be a complete team including project management, structural engineering*, architecture, mechanical and electrical engineering, non-structural assessment and cost estimating, benefit-cost analyzing to support the development of tendering documents. Therefore, the Consultant shall separately indicate the staff to be assigned in the preparation of designs and documents by indicating positions planned to be assigned for each staff. **The consultant is expected to at least establish a small design and survey team in İstanbul if they do not have the main office in İstanbul.**

4.2.1. Assessment of Buildings:

Assessment of each building’s vulnerability to seismic activity will at least include:

a. Identification of methodology for assessment and standard of structural performance to be followed.

b. Assessment of building structure by the means of surveying and material testing;

- Survey structural, foundation, architectural, mechanical and electrical characteristics of the buildings using available data, measurements, and other best practice techniques such as destructive, non-destructive testing and Ground Penetrating Radar (GPR), as well as detailed additional surveys,
- All equipments and devices related to architectural, mechanical and electrical disciplines are needed to be determined and informed about their characteristics such as radiator panels, plugs, boiler, etc together with a table format. Also, roofs should be determined using by photos and detailed survey projects should be prepared for them considering the current situation.
- Propose the laboratories for Material Testing, which shall be approved and registered by T.C. Ministry of Environment, Urbanisation and Climate Change. The Consultant shall provide all necessary registration documents and submit those documents to the approval of the Client.
- Conduct destructive and non-destructive tests sufficient to define the condition of the building and at least as indicated in Turkish Building Earthquake Code 2018. The detailed methodology developed by the Consultant for tests and testing procedures which include the number and type of tests and repairing methods shall be approved by the Client. During the execution of the works in connection with inspection of the buildings, all costs incurred for the reinstatement of the areas affected by the tests conducted by Consultant shall be executed without any cost to the Client. Reinstatement of the disturbed places should be completed to the satisfaction of the Client, Material testing for masonry structures will be performed per ASCE, or alternatively by the approval of the Client, the minimum material properties (modulus and shear capacity) shall be used per the 2018 Turkish Building Earthquake Code.

Submit Material Test Report

An adequate material test report and documentation for approval shall include the following:

- Laboratory test results (destructive, non-destructive, geo-technical, etc.) for each individual building covering;
 - The name and address of the testing facility or laboratory.
 - A brief description of the materials inspected or tested.
 - The time, date, and place of each approval inspection and test.
 - The name and title of each person performing, supervising, and witnessing the inspections or tests.
 - The performance data for each test, including a description of each failure and required static and mechanic properties and findings.
 - A description and photographs of the procedures and apparatus used in the inspections or tests, or a reference to another document that contains an appropriate description or photographs.
- Surveys, all the architectural, structural, mechanical and electrical findings and information gathered through foundation pit openings.

- A complete test report prepared by the testing laboratory covering all of the testing results conduct for assessment of the materials for each concrete core samples, steel exposure and soil investigation boreholes. (This test report shall be kept on file, as long as the consultancy and construction works for related building are in force, and for at least one year after the construction completed). The testing facility shall also keep a set of drawings and specifications describing the material inspected and tested. The test report, drawings, and specifications shall be made available on request to the Client. The test report shall include:
 - At least one photograph that shows an overall view of the equipment or material submitted for approval and other photographs that show.
 - Design details;
 - Each occurrence of damage or deformation to the equipment or material that occurred during the approval tests

c. Assessment of building structure by the means of calculations, analysis and observations;

- Compile the sets of information to program the subsequent phases of the studies,
- Review all available construction documents for the building, including original structural and architectural drawings and specifications, any significant modifications or upgrades,
- Identify structural defects, apparent detailing problems and structural configurations that cause unacceptable performance,
- Perform a preliminary assessment to quantify the probable performance of the building structure to resist the effects of ground shaking,
- Prepare computer models of existing buildings and analyse the buildings using linear and/or non-linear analysis methods, by an acceptable and an international structural analysis program in 3-D (three dimensional), for the required performance levels defined in TBEC 2018,
- The Consultant may also follow the “Guidelines for Retrofitting of School and Hospital Buildings in Istanbul” prepared by the technical committee and international experts of ISMEP for both concrete and masonry structures and rehabilitation of non-structural Components *as the minimum standard*.
- Compare available capacity and ductility with respect to seismic demand,
- Discuss the adequacy of the seismic-force-resisting system considering strength, ductility, and configuration issues,
- Use judgement coupled with the necessary levels of analyses and tests,
- Develop an inventory of critical non-structural components, including building utility equipment (power supply, HVAC systems), operating equipment, ceilings, building fascia panels, elevators, and fire protection systems,
- Assess mechanical and electrical systems and give information on operational deficiencies and specific findings for the buildings. (i.e: such as electrical system failure, non-operational elevator)

d. Assessment of site-specific geo-technical conditions

- Conduct geotechnical investigation by site surveys, soil tests, laboratory tests, and prepare the geotechnical report complying with the current specifications and regulations in the format and content of T.C. Ministry of Environment, Urbanisation

and Climate Change. Before the site surveys, soil tests, laboratory tests, the Consultant shall inform the Client in advance, and take the approval of the Client about the location and number of the new boreholes.

- Refer to available generalized geotechnical data, such as found on regional macrozonation / microzonation maps produced by the Istanbul Metropolitan City Municipality and other organisations for initial estimates. The consultant shall also refer to any existing data from previous/existing reports and or from reports on adjacent buildings (most campuses have more than one building so there are some relatively generic soils),
- Perform a seismic hazard analysis for the site to identify the location of the site relative to significant faults, and to estimate the probable intensity of ground acceleration as a function of return period,
- Perform studies to determine the liquefaction potential; settlement and swelling potential of soil,
- Based on the above studies, the existing hospital/healthcare center buildings shall be evaluated into the following earthquake performance levels* categories:
 - Immediate Occupancy – Limited Damaged (*Sınırlı Hasar*)
 - Life Safety – Controlled Damaged (*Kontrollü Hasar*)

***The performance criteria used in analysis and calculations shall be determined according to the earthquake design class specified in the TBEC 2018.**

Submit Assessment Report

- The Consultant shall carry out all the services for the Assessment Stage and submit an Assessment Stage Report indicating their findings and assessment with respect to the services outlined above, to the satisfaction of the Client,
- The Consultant shall provide and submit with the Assessment Report all the cadastral information [deed, layouts, cadastral extract, building permits, occupation permits, plans, survey, etc – (*tapu, çap, kroki, istikamet rölevesi, vaziyet planı, vs*) for all the buildings within the assessment phase.

Further to above;

- The consultant shall identify the minor defects and faults such as leakage of water at basements, defects in plasters and roofs, deterioration in wet areas, etc. after consultation with the relevant administrations and report these to IPCU for all the buildings.
- The Consultant shall submit fact-finding report (*tespit tutanağı*) signed between the principal and/or directorates of the relevant hospitals/healthcare centers and the Consultant's representative for:
 - Structural and architectural survey
 - Material tests for Concrete core and reinforcement samples and reinstatement of the areas affected
 - Electrical and mechanical survey

- Site soil investigations and boreholes.
- The foundation types for the buildings shall be determined by means of inspection pits in both inside and outside of the buildings as per the requirement of TBEC 2018 and approval of Client. But, it is very convenient that the inspection pit might not indicate the type of the foundations for that structure exactly. During design progress necessary alternatives shall be considered. The inspection pits will be opened outside and/or inside of the buildings considering that the physical condition of the building allows the studies inside of the buildings or not. Otherwise alternative solutions will be applied for the internal studies.

If any alteration in any of the contract drawings, documents occurs during construction excavation for foundations of hospital/healthcare center buildings, the Consultant shall prepare and submit such alteration drawings and BoQ to the Client for approval, in an urgent manner not exceeding one-week duration supported by the necessary calculations and details. Consultant undertakes to amend foundation designs, provide details and perform redesign if existing contract drawings prepared by the Consultant are not applicable without any cost to Client.

4.2.2. Operational Planning Stage:

The Consultant; based on the information provided by the Client regarding the Draft Spatial Requirements, the requirements of the MoH, previous statistical information and Data available in Assessment stage shall describe the basic elements of the operational renovation design. This operational concept shall include;

1. Operational concept elements with a descriptive character towards the chosen architectural design approach (i.e. human traffic flows, staff traffic flows, logistic traffic flows)
2. Operational concept elements with an anticipatory character towards the later commissioning planning stages (i.e. delivery and storage rooms of logistic goods, delivery schedules)

In summary this report shall be a space program listing all functional spaces, including circulation, and indicating the area required for each function/space as well as their functional requirements and interdependence with other space/function. This should be in the form of a detailed space program and functional block diagram. The program and functional diagram will be the basis for the designs.

The outputs of the Operational Planning Report will cover the below mentioned subjects at least;

- Single Room Program
- Central Disposal
- Central Administration
- Central Bed Cleaning / Cleaning Service
- Basic Ward Structure

- Pharmacy
- Laundry
- Kitchen / Staff Canteen
- Overview Departmental Allocation
- Accident & Emergency Department
- Specialty Centers
- Logistic System Study
- Maintenance
- Central Storage / Transport Service
- Central Sterilization
- Outpatient Department
- Central Imaging Group
- Central Operation Department
- Central Laboratory / Pathology

4.2.3. Preliminary Design Phase:

Preliminary design and cost estimate studies will at least include:

- Development of preliminary design for retrofitting options:
 - Note sensitive areas of the building, such as historic spaces, traffic corridors, etc. that may not be impacted by seismic upgrade measures,
 - Discuss restrictions on placement of retrofit elements, relative to building appearance and functionality concerns,
 - Conduct meetings with the Client to review the alternatives and to agree on the appropriateness of the recommended approach,
 - Develop conceptual-level upgrade designs for each retrofitting alternative by taking Turkish Building Earthquake Code 2018 into consideration and identify the design criteria by using performance-based engineering,
- Consider alternative technologies, such as, fibre carbon elements and other innovative techniques that might reduce disruption and maximize economies, presenting potential positive and negative issues related to such technologies,
- Perform structural engineering calculations with added or modified structural elements to remedy seismic deficiencies in the building relative to the selected performance levels and confirm that the overall size and scope of the recommendations are appropriate,
- Prepare computer models of retrofitted buildings and analyse the buildings using linear and/or non-linear analysis methods, by an acceptable and an international structural analysis program in 3-D (three dimensional), for all the required performance levels defined in TBEC 2018,
- Prepare conceptual-level sketches showing recommended upgrades for non-structural components,
 - Identify functional design and space allocation issues that impact the retrofit activity and the economic assessment, such as redesign for modernization/upgrading needs, that may influence the longer-term viability of the facility or may point to relocation or consolidation of functions to other structures;

- Masonry structures shall be analysed in accordance with the requirements of TBEC 2018 and alternatively followings shall be considered;
 - The in-plane behaviour of the URM structure to be analysed per ASCE41 (ABK Methodology) or other methodologies submitted by Consultant and approved by the Client. Sliding shear, rocking, and diagonal shear behaviours to be considered.
 - The out-of-plane behaviour of the URM structure to be analyzed by using height and thickness ratio per ASCE41 or other methodologies submitted by Consultant and approved by the Client.
 - Mathematical modelling. Depending on the floor material, one of the following approaches to be used.
 - Concrete floors to be modelled as rigid diaphragms. All forces will be transferred per lateral rigidity of components.
 - Wood floors will be modelled as flexible diaphragms. All forces will be transferred per tributary area of components.
 - Minimum unsupported distance between walls, vertical concrete column elements and new concrete shear walls shall also be considered.
- After determining the necessary data for existing foundation type of the building, the drawings of existing foundation along with rehabilitation and retrofitting schemes shall be indicated by analysing the foundation using soil-structure interaction diagrams. Check global and local overturning at foundations, approximate overturning resistance versus uplift and flexural capacity of the foundation members. The effect of new shear walls on the foundation shall be considered by providing calculations for overturning and punching effects.
- Development of cost estimates for retrofitting and associated work (Prepare preliminary cost estimates for the recommended seismic upgrade work, for each alternative criterion, together with required collateral upgrades);
 - Calculate retrofitting costs by using the outcomes of the structural model prepared in accordance with new Specifications and unit price guidelines of Ministry of Public Works or market costs.
 - Calculate replacement cost for each building using latest unit prices and costs of Ministry of Public Works and Settlement in Türkiye for reconstruction of the buildings, and indicate ratio of retrofitting cost to replacement cost; for each alternative developed,
- Preparation of cost comparison and benefit-cost analysis:
 - Compare costs considering approximately 0.40 in general as an acceptable ratio of the cost of retrofitting to the cost of replacement, as well as other factors that are relevant to particular cases and repairing costs demanded by the user of the building combined with retrofitting costs to replacement cost,
 - Calculate benefit-cost analysis in accordance with the benefit and cost elements determined, in cooperation with Client.
- The Consultant shall carry out all the services for the Preliminary Design Stage and submit a Preliminary Design Stage Report indicating their findings and designs with respect to the services outlined above, to the satisfaction of the Client. It will indicate the scope of the study, the findings with regard to building deficiency and performance, and the recommendations for alternative levels of upgrade, as well as any

recommendations for additional investigation to be performed as part of final design. Include schematic drawings documenting the upgrade recommendations and cost estimating worksheets in an appendix.

- Retrofitting projects shall be prepared for all buildings, regardless of their technical or economic feasibility, unless instructed otherwise by the Client.

Although the conditions outlined below are applicable to hospitals/medical centers, there are sections relevant to hospitals/healthcare centers as well. At this stage, the consultant will assess all buildings based on their specific characteristics.

The space program, elaborated in Preliminary Design Stage and acknowledged by the Client is to be detailed (room by room) by the Consultant, resulting in a final room requirements program. Wherever necessary, amendments regarding functional or operational aspects will complete the room program.

In the scope of this stage, the Consultant shall prepare the site plans and preliminary designs (architectural renovation, structural, mechanical, HVAC, electrical, electronical, IT, CCTV, telephone system, landscape, furniture, fixture & equipment (incl. medical equipment), Medico-technical, geotechnical, kitchen and laundry, fire protection etc.) of the **Hospitals/Healthcare Centers** together with the preliminary design for onsite and offsite infrastructure connections (road, electricity, communication, water supply, sewerage, storm water, natural gas, traffic plan etc.) and submit to the Client for approval. This submission shall also include a detailed preliminary design stage report giving all details of studies. The Consultant shall also collect relevant data, contact with the relevant Authorities and get their pre-consent for preliminary designs of infrastructure connections of the subject buildings before submitting the designs for approval to the Client.

After the Client approval, the Consultant shall have obtained the consent/approval of the relevant Authorities and/or their local branches (IBB Fire Department for fire protection, IBB Transportation Department for traffic, etc.) to proceed the final design stage. In case of any requirements from the relevant Authorities, the Consultant will follow the required procedures and provide necessary studies without any extra cost to the Client.

Besides that, in case of any requirements from the Protection Councils or Boards and Bosphorus Development Committee, the Consultant will follow the required procedures and study for the special designs without any extra cost to the Client.

Preliminary design will include at least the following;

Architectural Renovation Design

The Consultants shall prepare the renovation designs for hospitals and healthcare centers in accordance with TS 12813, relevant international standards, applicable EU legislation, and the regulations and requirements of the Ministry of Health, as well as the requirements of the İstanbul Provincial Directorate of Health and the administrations of the hospitals and healthcare centers.

The Consultants shall prepare a Renovation Design considering the;

- Information collected in Assessment Stage Report,
- Guideline for Minimum Design Criteria in Turkish Healthcare Facilities (Türkiye Sağlık Yapıları Asgari Tasarım Standartları Kılavuzu)
- Related International Standards and Regulations,
- Inputs of the Client, Provincial Directorate of Health and Ministry of Health.

After that, the Consultant shall submit renovation designs of the buildings to the Client for approval (in 1/500 (floor plans) and 1/1000 scale (site area)). Renovation design will include at least the following;

All buildings will be designed according to the standards stipulated in “The Regulations on Accessibility Monitoring and Auditing which was enforced in Türkiye in accordance with the regulation no. 28713” together with all its updates.

Working with the client, the Consultant will develop a space program listing all functional spaces, including circulation, and indicating the area required for each function/space as well as their functional requirements and interdependence with other space/function. This should be presented for approval by the client in the form of a detailed space program and functional block diagram. The program and functional diagram will be the basis for the renovation designs.

Finally, the Renovation Design by revisions will be chosen and must be approved by the Client, the Provincial Directorate of Health for refinement and development.

- a. **Site Plan:** Preliminary site planning, including the required security, locations of the building(s), site access
- b. **Floor Plans:** Floor plans of the building.
- c. **Sections:** Preliminary sections of building mass.
- d. **Exterior Elevations:** Preliminary elevations of all façades
- e. **Interior Space Layout:** Basic planning of the interior spaces of the buildings, including the relationships between functional areas.
- f. Elevator concept
- g. **Landscaping:** Completed space program extended to total gross area.
- h. **Façade Design:** Façade specification including the thermal and shading load value.

2. Structural and Seismic Design

- a. Floor plans
- b. Sections
- c. Details
- d. Column schedule
- e. Material Characteristics
- f. Important Design Loads
- g. Movement Joint Concept
- h. Bracing System

- i. Slabs
- j. Foundation
- k. Fire Protection
- l. Seismic Hazard and Target Performance Levels
- m. Earthquake Ground Motion
- n. Modal Analysis with 3D-Model
- o. Equivalent Lateral Loads
- p. Inter-storey Drifts

3. Fire Protection Design

- a. Floor plans
- b. Fire Zones & Means of Egress Plans
- c. Occupant Load Analysis
- d. Fire escape route

4. Mechanical Design

- a. Site Plan
- b. Sanitary and Plumbing
- c. Hygienic Water System
- d. Medical Gas
- e. Fire Fighting
- f. HVAC-Heating & Cooling
- g. HVAC-Ventilation
- h. Smoke Ventilation
- i. Building Automation System
- j. Kitchen
- k. Laundry
- l. Tri-generation Units
- m. Heating Loads
- n. Cooling Loads
- o. Equipment schedule of the Central Energy Plant

5. Electrical Design

- a. Floor plans
- b. Sections
- c. Paralleling Emergency Generator Systems
- d. Medium Voltage Energy Distribution System (MV Switchgears, MV Substations)
- e. LV Energy Distribution System
- f. Lighting System
- g. Socket System
- h. Uninterruptable Power Supply (Ups) System
- i. Isolated Power Systems
- j. Fire Alarm System
- k. Emergency Announcement System
- l. Telephone System
- m. Data System
- n. TV System

- o. Closed Circuit Television (CCTV) System
- p. Card Access System
- q. Main Clock System
- r. Nurse Call System
- s. Building Management System
- t. Energy Scada System
- u. Grounding System
- v. Lightning System
- w. Operation Rooms Control Panels
- x. Transaction and Queue Management Systems
- y. Information Display System
- z. Way Finder Kiosks System

6. Infrastructure/Utility Design

All existing off-site and on-site public utility support services shall be identified. All additional off-site and on-site utility support services shall be identified, including the public utility support services used and connected to, and all other utility support services that must be developed as part of this project including but not limited to;

- a. Potable Water
- b. Waste Water
- c. Rain Water
- d. Electrical Power
- e. Natural Gas

7. Medical Design

8. Interior Design

9. Kitchen, Laundry and Logistic Design

10. Reports

- a. Architectural Design Report
- b. Fire Protection Design Report
- c. Geotechnical Report
- d. MEP Design Report
- e. Structural and Seismic Design Report
- f. Infrastructural Design Report
- g. Shoring Design Report
- h. **Cost Estimation:** The Consultant will prepare a construction cost analysis using Local Construction Market Prices, local unit prices, bill of quantities (BoQ), technical specifications and detailed quantity surveys.

11. Other Services: (Not limited to) Water tanks, car parks, medical waste storage area, watchman's cabins, heating centers transformer and generator buildings, perimeter walls, interior and exterior signage etc. shall be considered within the scope of the project.

Within this stage, a Technical Room Sheet for highly equipped rooms (a description of the technical requirements of the defined rooms in relation to the major equipment to be installed) should be prepared for approval by the client to have a confirmed basis for going into the detail design.

4.2.4. Final Design Phase:

The final design phase studies, including retrofitting designs will be applied over all the buildings for the retrofitting alternative approved by the Client during the preliminary phase. The Consultant shall prepare the final designs and system/detailed drawings for all sub-disciplines mentioned in the Preliminary Design stage.

a. Preparation of Final Designs and Tender Documents,

The consultant shall:

- Complete the detailed structural and non-structural designs of the buildings, architectural (including comparative drawings before and after retrofitting) and engineering services (all mechanical and electrical services, including but not limited to: heating, hot and cold-water supply systems, fire protection, electrical supply system, gas distribution, power and service sockets, telephone/television/radio, lifts, etc.) related with retrofitting and collateral works,
- Develop construction documents, including drawings and specifications, together with supporting calculations, to implement the recommended structural upgrades, together with all required collateral upgrades,
- Prepare the site plan drawings similar to Annex-1 for each building within the campus, considering the given measurements and details.
- Propose detailed temporary measures to be taken during the construction (retrofitting and other studies) and phasing plans in order to minimize disruption of the public services in the buildings,
- Submit final bill of quantities, all related design calculations, and relevant final cost comparison analysis. Prepare BoQ's in compliance with unit price guidelines of T.C. Ministry of Environment, Urbanisation and Climate Change and other relevant state authorities and market prices. BoQ's prepared by the Consultant should be in compliance with pricing preambles, technical specifications and other relevant parts of the tender documents to be prepared, Relevant BoQ's and Technical specifications shall be prepared by the Consultant in detail and shall be submitted to the Client for approval, following the decision of the Client on which parts of these works shall be integrated to the relevant parts of the tender documents.
- In parallel to the Preliminary Design Stage and Final Design and System/Detailed Drawings Stage stipulated above, the Consultant shall prepare complete tender documents related with the construction contract in accordance with the World Bank guidelines and standard bidding documents. Tender documents shall include but not limited to the Conditions of Contract, Form of Bid, technical specifications, bills of quantities, final designs, system/detailed drawings and etc.

- The Consultant shall prepare the tender documents in close cooperation with the Client and with due care and diligence. Any of the items in these documents shall not contradict with each other and all material specifications shall be in accordance with the specifications of the first-class materials satisfying the Turkish standards, otherwise international standards.
- The Consultant shall submit fact-finding report signed between the principal and/or directorates of the relevant hospitals/healthcare centers and the Consultant's representative indicating that the principal and/or directorate is informed about and agreed on the Final Architectural, Structural, Mechanical and Electrical works subject to tendering following the decision of the Client on the works approved to be integrated to the relevant parts of the tender documents.
- Provide field investigations and engineering design services for the modernization of existing architectural aspects of the hospitals/healthcare centers by providing exterior thermal sheathing (mantolama), standard bathrooms for disableders, ramp for disableders...etc and optimum energy utilization.
- Provide engineering services for the modernization of existing heating system by investigating existing conditions, evaluate system performance, develop recommendations, and generate construction drawings and specifications to upgrade the existing system to the new requirements. Design to upgrade existing heating, ventilation system for hospitals/healthcare centers, including electrical services to support all mechanical renovations. Verify existing heating loads in the building. Use heat loads analysis to include psychometrics for each zone for compliance with the new Turkish Heating Ventilation requirements of human comfort zone. The upgrade shall involve increasing the capacity of the current heating system, and, where applicable, converting it to a natural gas-based system.
- Provide field investigations and engineering design services for the modernization of existing electrical system by investigating existing conditions, evaluate system performance, develop recommendations, and prepare Design Documentation. The upgrade shall be designed to reduce the load on the existing electrical distribution system and to provide additional branch circuits to accommodate the anticipated increase in building demand. Energy Evaluations and Studies; Code Compliance Optimum Energy Utilization; and Utility Design Systems shall be considered. Upgrade existing building's fire detection, alarm and communications systems to meet current code regulations.

4.2.5. Preparation of Tender Documents For Works Contract:

The Consultant shall prepare complete tender documents related with the construction contract in accordance with International Financial Institutions (IFI's) such as the Asian Infrastructure Investment Bank (AIIB), World Bank (IBRD), Islamic Development Bank (IDB), European Investment Bank (EIB), Council of Europe Development Bank (CEB), KfW etc. guidelines and Standard Bidding documents in parallel to the previous stages stipulated above. Tender documents shall include but not limited to the Conditions of Contract, Form of Bid, Technical Specifications, Bill of Quantities (BoQ's), final designs, system/detailed drawings and etc, The tender documents should be prepared according to the International competitive Bidding with

unit-priced contracts and/or Lump-sum contracts if required. All the tender documents should be both prepared in English and Turkish with due diligence in translation.

The BoQ's will be prepared using the Prices issued by Ministry of Environment and Urbanization and Local Construction Market Prices and detailed quantity surveys. If possible, the Consultant will use the Prices issued by Ministry of Environment and Urbanization and if not, he will use market prices by showing how this price is collected via proforma invoice etc. with the detailed analyses sheets.

The Consultant shall prepare the tender documents in close cooperation with the Client and with due care and diligence. Any of the items in these documents shall not contradict with each other and all material specifications shall be in accordance with the specifications of the Turkish standards and/or international standards. The local materials and the local methodology where the local workers easily can adapt and enhance the economic condition of the local market, should be preferred.

The Consultant shall prepare the designs, plans, technical specifications, BoQ's, tender documents etc. and all additional documents, detailed designs in such a way that the necessity for variation orders during the construction stage is minimized.

The Consultant shall promptly implement any reasonable modifications to the documents, reports, or other deliverables as requested or approved by the Client during the various approval stages.

5. TIME SCHEDULE & CONSULTANT'S INPUTS

The Consultant shall submit all the documents in a timely manner to complete the services on time as soon as possible. The consultancy services for the various components of the Project shall be completed within 360 calendar days. The stages of the Project are described below;

ASSESSMENT of BUILDINGS referred in "Item 4.2.1." above have to be completed within 120 calendar days after the Effective Date of the Contract and approved by the Client within 15 days after the assessment phase.

OPERATIONAL PLANNING referred in "Item 4.2.2." above have to be completed within 150 calendar days after the Effective Date of the Contract.

PRELIMINARY DESIGN referred in "Item 4.2.3." above have to be completed within 270 calendar days after the Effective Date of the Contract.

FINAL DESIGN referred in "Item 4.2.4." above have to be completed within 320 calendar days after the Effective Date of the Contract and approved by the Client within 15 days after completion of the final design phase.

THE PREPARATION OF TENDER DOCUMENTS FOR THE WORKS contract referred to in “Item 4.2.5.” above shall be completed within 360 calendar days from the Effective Date of the Contract.”

The estimated number of professional staff-months required for the assignment is approximately 160 staff/months (excluding support staff such as but not limited to draftsman, survey and site investigation staff, nonstructural assessment staff, destructive and non-destructive testing teams, drivers, clerks, typists etc.). Since this is just an indicative value, the Consultant shall estimate and propose the number of key professional staff months and support staff months that are necessary for the various components and for various phases of the Project. If the staff-months are not given in the Technical Proposal, the Consultant’s Proposal may be considered non-responsive.

The table including key staff titles, minimum required experience and qualifications should be as follows:

TITLE	TOTAL ESTIMATED STAFF-MONTHS	PROFESSIONAL EXPERIENCE (YEARS)	SPECIFIC EXPERIENCE ON THE RELATED ASSIGNMENT (YEARS)
Project Manager (1) <i>(Preferably architect. - having hospital design and renovation experience)</i>	12	10	≥5
Structural Engineers (1)	10	10	≥2
Civil Engineers (2)	24	5	≥2
Seismic Engineer (1)	2	10	≥2
Non-structural Retrofit Expert (1) <i>(Preferably having hospital design experience)</i>	3	5	≥2
Design Architects (3) <i>(having hospital/healthcare center building design experience)</i>	36	10	≥2
Interior Design Specialist <i>(Experience in min two (2) hospital projects)</i>	3	10	≥5
Operational Planning Specialist <i>(having hospital design experience & having Medical and/or Architect diploma also experienced in the same field.)</i>	4	10	≥5
Geotechnical Engineer (1)	2	10	≥2
Environmental Engineer (1)	2	5	≥2
Mechanical Engineer (2) <i>(at least one mechanical eng. should have hospital design experience)</i>	20	10	≥2

Electrical Engineer (2) <i>(at least one electrical eng. should have hospital design experience)</i>	20	10	≥ 2
Cost and Planning Engineers (1)	8	10	NA
Topographical Engineer (1)	2	10	NA
Fire Protection Specialist	3	10	≥ 5
Medical Equipment Specialist <i>(Experience in min two (2) hospital projects.)</i>	2	10	≥ 5
Facade Specialist <i>(Experience in min two high-rise building projects)</i>	3	10	≥ 5
Kitchen & Laundry Specialist <i>(Experience in min two (2) hospital projects)</i>	2	10	≥ 5
Occupational Health and Safety Specialist <i>(International documentation experience is preferred)</i>	2	This staff will be employed as per the Law 6331 published for Health and Safety regulations and having at least Class B Certificate	
Sub Total (C)	160		

* Responsible structural engineer shall be assigned only for this contract scope and shall have an experience in seismic retrofitting design of a total of at least 30.000 m² in 10 different buildings. Additionally, structural engineer must have a M.Sc. and/or Phd. degree in structural/seismic engineering.

6. REPORTING REQUIREMENTS

The requirement for the submission of reports, drawings and other documentations are given in Time Schedule & Consultant's Inputs section. All the reports, drawings, calculations and other documentations that are not mentioned in Time Schedule & Consultant's Inputs section shall be submitted in digital form. The Consultant shall provide hard copies of all documents free of charge, upon request by the Employer.

The reports, drawings, calculations and all other documents submitted by the Consultant to the Client for review and approval shall be reviewed and approved or sent back to the Consultant for modification or asked for some other action by the Client within 15 calendar days.

All the reports, drawings, and other documentations shall be prepared in both Turkish and English Languages. The metric system of weights and measures shall be used. Report and drawing submittal format shall be in accordance with the "Reports and Drawings submittal format" of the Client. Consultant shall prepare executive summary for all reports similar to Annex-2.

Overall, the following reports shall be prepared by the Consultant;

1. Material Test Report;

- a. Material Test Report covering Soil investigation, Geotechnical and Geophysical Studies, Surveying, Concrete Core Sampling and Exposure of the Steel, Ferro-scan Readings along with all the architectural, structural, mechanical and electrical findings and information gathered through Foundation pit openings.

2. Assessment Report

- a. Assessment Findings, Methodologies (executive summary, structural, architectural, mechanical and Electrical findings, retrofit performance criteria, Analysis and calculations, 3-D models, design recommendations and approach, etc.) as described above.
- b. Approval documents from the relevant administrations regarding the performed tests and their demands for the hospitals/healthcare centers as described above.

3. Operational Planning Report

4. Preliminary Design Report

- a. Preliminary structural and non-structural analysis, calculations and designs for different retrofitting alternatives and recommendations including structural, architectural, mechanical and Electrical findings and deficiencies submitted in Assessment Report
- b. Cost and cost comparison estimates for structural and non-structural works and all other steps described above.

5. Final Design Report and Drawings

- a. Detailed structural retrofitting designs
- b. Detailed non-structural retrofitting designs
- c. Detailed architectural, mechanical and electrical designs.
- d. Final costs and cost comparisons for alternatives

6. Tender Documents (in accordance with the Islamic Development Bank guidelines and standard bidding documents)

- a. Conditions of Contract, Form of Bid, Technical Specifications
- b. Bill of Quantities, Pricing Preambles, Final Designs, etc.

7. SUPPORT TO BE PROVIDED BY THE CLIENT TO THE CONSULTANT

Subject to their availability to the Client, architectural and structural drawings of the building blocks in Table-1 of the TOR, reports will be provided by the Client to the Consultant free of charge. On the completion of the Services to be performed, the Consultant shall return all such drawings and documents received, to the Client.

In addition, the Client will where possible assist the Consultant in obtaining approvals and permissions from the other State Authorities in respect of carrying out the Services.

SCHEDULE No. 1
Submission of Reports, Drawings and Documents

The Consultant shall submit to the Client the various reports, drawings and documents that are either specified or implied in these Terms of References in respect of the various components and stages of the Project as described in the Terms of References.

In relation to the ongoing stages of the Consultant' work the submission requirements given below should be allowed by the Consultant as a guideline for the extent and type of documentation that will be required by the Client during the performance of the Services.

Submission Requirements

General

Format of Reports : A4 or A3 including where appropriate drawings reduced to A3 size

Format of Drawings : A1 size (unless otherwise required or agreed)

Scale of Drawings : To be agreed with the Client.

One draft copy of all reports and drawings shall firstly be submitted to the Client for discussion purposes following which the Consultant shall be required to prepare the final copy, incorporating any amendments arising from such discussions.

(i)	Material Test Report	1 copies
(ii)	Assessment Report and all attachments	1 copies
(iii)	Preliminary Design Report and all attachments	1 copies
(iv)	Final Design Report, Drawings and all attachments	1 copies
(v)	Tender Documents	1 copies

The Consultant shall submit also the electronic copy (3 external SSD hard disc) of all the above documents. If necessary, the Consultant shall submit the above documents as hard copies with no charge. All the reports, manuals and other documentations shall be prepared in both **Turkish and English Language**. The metric system of units for weights and measures shall be used. The drawings shall be submitted in the format, labeling, grouping and details as required by the Client. The plot size, parcel, map sheet for all buildings shall be listed and integrated into the drawings and other required documents.


In addition to the above numbers, the Consultant shall submit a set of reproducible copy of Final Design Drawings.


As indicated in the General Conditions of Contract all the drawings, reports, plans, specifications, and any other documents produced under this Contract are the property of the Client and therefore the Consultant shall also submit all the originals of the drawings and the other documents.

TABLE- 1
LIST OF HOSPITALS/HEALTHCARE CENTERS

NO	DISTRICT	NAME OF THE HOSPITALS/HEALTHCARE CENTERS	APP. CLOSED AREA (sqm)
1	Kadıköy	Göztepe Merdivenköy Community Health Clinic	17.500,00 m ²
2	Kağıthane	Kağıthane State Hospital	11.000,00 m ²
3	Küçükçekmece	Mehmet Akif Ersoy Thoracic, Cardiovascular Surgery Training and Research Hospital	25.000,00 m ²
4	Silivri	Selimpaşa Emergency Aid and Traumatology Hospital	8.000,00 m ²
5	Şişli	Hamidiye Etfal Training and Research Hospital	58.000,00 m ²
6	Üsküdar	Dr. Siyami Ersek Thoracic and Cardiovascular Surgery Training Research Hospital	25.600,00 m ²
7	Avcılar	Murat Kölük State Hospital	18.725,00 m ²
			163.825,00 m²

Annex II

YUNUS EMRE PRIMARY SCHOOL					
Project Code	:			KFW-CB1.1	
District	:			Küçükçekmece	
Address	:			Cumhuriyet Mah. 2.Arıkuşu Sok. No:48 Küçükçekmece/İstanbul	
Cadastral Block	:			-	
Cadastral Map Sheet	:			35	
Cadastral Parcel No	:			1735, 1736, 1737, 1738, 1739, 1740	
Construction Year	:			1976	
Number of Classroom	:			18	Number of Students : 1595
Total Area	:			2000 m ²	Number of Floors : GF + 3NF
Structural System	:	Reinforced Concrete			
Concrete Strength	:	5.30 MPa (Existing) 14.20 MPa (Retrofitted)	Rebar – Corrosion : S220 - < %10 (Existing) S420 - < %10 (Retrofitted)		
Soil Class	:	ZD	Allowable Bearing : 3.00 kg/cm ²		
Subgrade Modulus	:	1500 t/m ³	Liquefaction : Unavailable		
Total Retrofit & Repair Cost / Demolish & Rebuilt Cost			: 44%		
Recommendation			: Demolish/Rebuild		
<p>Within the scope of the KFW-CB1.1 project administered by the Istanbul Project Coordination Unit (IPCU), seismic and functional assessment and retrofitting design of the building has been completed and documented. The seismic assessment and retrofitting procedure is based on national and international earthquake codes. According to the performance evaluation of existing buildings in TBEC 2018, this building shall meet “<i>Life Safety Performance Level (LS)</i>” for DD-1 earthquake ground motion level and the “<i>Immediate Occupancy Performance Level (IO)</i>” for DD-3 earthquake ground motion level.</p> <p>The assessment shows that the school building does not satisfy the minimum requirements of TBEC 2018 in its current state. The most appropriate retrofit scheme for the unsafe building has been prepared in the preliminary design phase and the performance of Yunus Emre Primary School has been developed to satisfy the minimum requirements of TBEC 2018. Preliminary cost estimation has been done and the rate of retrofit to rebuild the structure is seen to exceed 40%.</p> <p>As a result, it is recommended to demolish and rebuild the building.</p>					
Prepared By	Checked By	Approved By			

CELAL AVŞAR SECONDARY SCHOOL			
Project Code	: ISDB-CB1.3B		
District	: Maltepe		
Address	: Altıntepe Mah.İnceyol Sok. No:1 Küçükyalı Maltepe/İstanbul		
Cadastral Block	: 15155		
Cadastral Map Sheet	: G22-A-03-D-4-C		
Cadastral Parcel No	: 247		
Construction Year	: 1999		
Number of Classroom	: 28	Number of Students	: 704
Total Area	: 4250 m ²	Number of Floors	: BF + GF + 3NF
Structural System	: Reinforced Concrete		
Concrete Strength	: 5.30 MPa	Rebar – Corrosion	: S420 - < %5
Soil Class	: ZB	Allowable Bearing	: 2.40 kg/cm ²
Subgrade Modulus	: 4000 t/m ³	Liquefaction	: Unavailable
Total Retrofit & Repair Cost / Demolish & Rebuilt Cost		:	19%
Recommendation		:	Retrofit & Repair
<p>Within the scope of the ISDB-CB1.3B project administered by the Istanbul Project Coordination Unit (IPCU), seismic and functional assessment and retrofitting design of the building has been completed and documented. The seismic assessment and retrofitting procedure is based on national and international earthquake codes. According to the performance evaluation of existing buildings in TBEC 2018, this building shall meet “<i>Life Safety Performance Level (LS)</i>” for DD-1 earthquake ground motion level and the “<i>Immediate Occupancy Performance Level (IO)</i>” for DD-3 earthquake ground motion level.</p> <p>The assessment shows that the school building does not satisfy the minimum requirements of TBEC 2018 in its current state. The most appropriate retrofit scheme for the unsafe building has been prepared in the preliminary design phase and the performance of Celal Avşar Secondary School has been developed to satisfy the minimum requirements of TBEC 2018. Preliminary cost estimation has been done and compared with the new building cost to reach a recommendation decision about the appropriateness of this retrofitting option.</p> <p>In the Final Design Phase, the detailed design projects for retrofitting and renovation works have been prepared for the buildings that are decided to be retrofitted. The final costs have been calculated. Cost of repair and renovation works which deemed necessary has also been calculated.</p> <p>As a result, it is recommended to retrofit and upgrade the building.</p>			
Prepared By	Checked By	Approved By	