

**REPUBLIC OF TURKEY**  
**MINISTRY OF ENVIRONMENT, URBANIZATION AND CLIMATE CHANGE**  
**General Directorate of Construction Affairs (GDCA)**

**“Seismic Resilience and Energy Efficiency in Public Buildings Project”**  
**GFDRR Grant No: TF0B6770 | Project ID: P175894**

**TERMS OF REFERENCE**  
**for**  
**Technical Assistance for Advanced Engineering Practices and Capacity Building**  
**(Ref: WB/CS-TA-02)**

**I. Introduction and Background**

Buildings with the greatest vulnerability to disasters are typically energy inefficient, as these buildings pre-date modern building codes, which is the case for a vast number of public buildings in Turkey. In order to improve the disaster resilience and energy savings in selected central government buildings, and to strengthen the institutional capacity to develop, finance and implement resilient and sustainable public buildings in Turkey, the Government of Turkey signed a loan agreement in the amount of USD 265 million for the Seismic Resilience and Energy Efficiency in Public Buildings Project (SREEPBP) that will be implemented by the Ministry of Environment, Urbanization and Climate Change (MoEUCC). The General Directorate of Construction Affairs (GDCA) under the MoEUCC has been delegated to assume overall responsibility for the SREEPBP including completion of the necessary activities to support project preparation as well as implementation for the six-year project period. The GDCA has established a project implementation unit (PIU) to administer all aspects of the Project including promoting public awareness, coordinating with the relevant ministries and beneficiaries, carrying out administrative, procurement, environmental and social requirements, financial management, monitoring, evaluation and reporting of the project.

Under separate consultancies, MoEUCC will hire consulting firms to conduct detailed retrofit design and supervision of 62 buildings within subproject WB/CS-DESSUP-01<sup>1</sup> and preliminary assessment and feasibility of 231 buildings within subproject WB/CS-TA-01<sup>2</sup>. In addition to the International Bank for Reconstruction and Development (IBRD) loan, advanced technical assistance and capacity building component of the Project will be supported through a Recipient Executed Trust Fund (RETF<sup>3</sup>) which is financed by the Government of Japan and managed by the Global Facility for Disaster Reduction and Recovery (GFDRR). This term of reference (Ref: WB/CS-TA-02) defines the objectives, scope of services, tasks, deliverables and anticipated schedule for the activities to be supported under the above-mentioned RETF.

**II. Project Objectives**

The SREEPBP would be implemented through three components: (1) investments in Central Government Buildings for seismic strengthening and energy efficiency (EE) improvement; (2)

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<sup>1</sup> [https://webdosya.csb.gov.tr/db/kamuguclendirme/duyurular/wb\\_cs-dessup-01---terms-of-reference-20220111155920.pdf](https://webdosya.csb.gov.tr/db/kamuguclendirme/duyurular/wb_cs-dessup-01---terms-of-reference-20220111155920.pdf)

<sup>2</sup> [https://webdosya.csb.gov.tr/db/kamuguclendirme/duyurular/wb\\_cs-ta-01---terms-of-reference-20220408134417.pdf](https://webdosya.csb.gov.tr/db/kamuguclendirme/duyurular/wb_cs-ta-01---terms-of-reference-20220408134417.pdf)

<sup>3</sup> The 36-month implementation period is expected to begin around Project Effectiveness

advanced technical assistance (TA) and capacity building; and (3) project implementation support. The activities envisioned under Component 2 of SREEPBP will benefit from the technical assistance of the Japan-World Bank Program for Mainstreaming Disaster Risk Management in Developing Countries implemented through the RETF. Grant funds will be available to support activities key to the development of a long-term integrated investment program aimed at the implementation of innovative approaches for improving energy efficiency and structural performance in public buildings through the support of the following technical assistance activities:

- a) Identifying innovative engineering approaches for strengthening existing buildings,
- b) Training and capacity building on innovative engineering approaches,
- c) Exploring global best practices for rapid engineering assessments of buildings.

### **III. Scope of Services**

The technical assistance should address limitations of ongoing retrofitting techniques, which do not provide integrated solutions and demonstrate innovative approaches for building renovation which are yet to be tested at scale. Despite an improving policy and regulatory environment, there are significant design and implementation challenges that need to be overcome for system-wide and transformational investment in resilient and sustainable public buildings. Moreover, by proactively identifying and implementing innovative approaches for renovation, there is an opportunity to minimize disruption to building occupants and reduce construction time and costs to achieve transformation of the public building stock at scale.

Within the framework of the Project, the Consultant shall be required to (i) explore current seismic retrofit and energy efficiency practices and challenges in Turkey within the private and public sector (ii) identify proven best engineering practices for seismic retrofit and EE of existing buildings and for improved design of new buildings, minimizing the cost, construction time, and service disruption during works (iii) develop training programs (workshops, online and in-person training courses, seminars, etc.) and publish technical reports, handbooks and guidelines on identified engineering techniques for both existing and new buildings (iv) review global best practices for rapid, low-cost, robust, and consistent engineering assessments of buildings and the potential development of similar tools for use in Turkey (v) provide technical assistance for the application of selected retrofit techniques to a subset of public buildings that will be retrofitted under Component 1 of the SREEPB Project (vi) study feasibility of selected retrofit techniques on five (5) case study buildings that will be provided, (vii) organize a technical site visit abroad to investigate the best practices on retrofitted buildings.

The Consultant shall be responsible for the identification of proven and innovative seismic retrofit techniques practiced locally and globally, identify their pros and cons, examine their applicability on a larger scale considering the deficient building stock of Turkey and provide technical assistance for the application of the selected retrofit techniques to a subset of public buildings that will be retrofitted under Component 1 of the SREEPB Project, subject to their technical viability and cost-effectiveness with the guidance of this study.

### **IV. Description of the Consultant's Tasks**

#### ***Task 1: Preparation of Inception Report and Methodology***

The Consulting firm should submit an inception report no later than one month after contract signing which shall: (i) define the aims and objectives of the services to be provided; (ii) set out a detailed work program including anticipated places and dates of project services to be provided such as training programs and workshops; (iii) identify potential problems and possible solutions;

(iv) include a stakeholder analysis identifying other third party organizations involved in the project implementation process.

### **Task 1 Deliverable**

#### 1. Inception Report

### ***Task 2: Identify innovative and energy efficient engineering approaches for strengthening existing buildings and design of new buildings***

Traditional solutions to improve the structural strength and energy efficiency (EE) of buildings are often limited by three key factors: i) significant disruption and typically relocation of building occupants during renovation; ii) the long duration of renovation works and iii) high and often prohibitive costs that frustrate efforts to renovate and strengthen buildings at scale. However, new technologies are being developed that optimize EE and structural strengthening improvements. This task requires exploration of proven innovative technologies being applied locally and globally for strengthening existing critical buildings alongside EE measures, as well as new approaches for the design and construction of new disaster resilient and EE buildings.

Based on the researches conducted, a handbook shall be prepared on the review of current practices as well as local and global innovative best practices accounting for structural costs, benefits, opportunities, and challenges.

The Consultant shall organize a workshop to discuss and obtain feedback on the feasibility of identified innovative technologies and rapid assessment approaches to be used in Turkey including but not limited to attendees from academia, related boards and associations, professionals from the public and the private sector. Practical and pragmatic solutions shall be identified among proven innovative approaches to be applied within Component 1 of SREEPB in Turkey and technical assistance shall be provided during the design and construction stages.

Within the scope of Task 2;

**a) Explore the current practice in Turkey:** Under this activity, the Consultant shall conduct a desktop study exploring the drawbacks, advantages and learned lessons from existing technologies and methods applied in Turkey for strengthening existing buildings alongside EE measures. The study may not only cover the public sector buildings but also the private sector buildings.

**b) Explore and document innovative retrofitting practices:** Under this activity, the Consultant shall conduct a desktop study exploring the innovative technologies applied around the world and conduct literature for the review of current practice in Turkey for strengthening existing buildings alongside EE measures. The Consultant shall document the proven best practices and approaches at both national and international levels addressing associated investment costs, benefits, opportunities, challenges, environmental-social, occupational health and safety issues and lessons learned during their application.

These innovative technologies could include inter alia application of prefabricated panels that add strength and insulating materials to the exterior of reinforced concrete buildings, seismic and energy-efficient exoskeletons or double-skins and frames, seismic isolators and dampers, innovative column jacketing and bracing systems, innovative systems for earthquake resistant masonry enclosures and use of other alternative materials and methods.

**c) Explore and document innovative approaches for the sustainable design of new buildings:** Under this activity, the Consultant should explore and document innovative approaches that combine the objectives of seismic, disaster and climate resilient and net-zero

energy and low carbon footprint buildings (NZEB) for new construction globally.

There is also an opportunity to implement innovative approaches for the construction of new buildings aimed at optimizing EE, disaster resilience and climate adaptation in a cost-efficient manner. For disaster resilience, these innovative approaches could include, inter alia, fully base isolated buildings, application of new and sustainable green materials on the efficient use of raw materials, and technologies and approaches to maximize seismic resistance, designs to prevent and withstand multiple forms of hazard (such as raised finished floor level for floods and fastening techniques for high winds), custom-tailored solutions for site specific conditions. For EE, newly designed buildings could include passive energy measures such as optimized window-to-wall ratio, solar orientation, natural lighting, renewable energy and other measures as well as the introduction of low imbedded carbon construction materials.

**d) Explore Global Best Practices for rapid, low-cost engineering assessments of buildings:** Under this task the Consultant is expected to review local and global best practices for rapid, low-cost, robust and consistent engineering assessments of existing buildings and the potential development of similar tools for use in Turkey, aimed at rapidly and accurately identifying and managing buildings with the most urgent need for structural strengthening. It will consider approaches from Turkey, USA, Japan, New Zealand and other relevant countries to be agreed between the Client and the Consultant and the pros and cons of different approaches. Good practices in establishing incentives and mechanisms for local governments and stakeholders to implement the rapid, low-cost, robust and consistent engineering solutions with high accuracy, especially for renovation will also be explored. The road map should be prepared for the application of rapid, low-cost engineering assessments in Turkey and it should include ways to accelerate the adoption of new technologies and suggestions for corporate incentives to improve the application of assessment.

Within the scope of this section the Consultant shall;

- Compare different approaches for rapid, robust (led by engineers), and low-cost assessment of the seismic and structural safety of buildings at scale and the requirements to develop such systems (engagement with the engineering community, tools/systems etc.).
- Develop a roadmap on how these rapid, robust, and low-cost assessments could be developed in Turkey – including incentives, mechanisms, technical requirements, and capacities required to conduct these assessments.

**e) Organize a workshop:** After identifying innovative technologies and rapid assessment approaches that could be practically implemented within the Turkey context, the Consultant shall organize a workshop involving academics, consultants, contractors, non-governmental organizations and representatives of relevant public institutions and organizations, as well as private sectors. Before the workshop, the participants shall be provided with the documents defined in Task 2 (a), (b), (c) and (d). Summaries of working group discussions shall include but not limited to:

- Innovative retrofit techniques that could be practically applied in Turkey.
- The feasibility and comparison of rapid structural assessment techniques that could be practically applied in Turkey.
- Key considerations for the integration of innovative technologies into design TORs.

At least six (6) international experts to the satisfaction of the Client shall attend the workshop to present best practices and approaches utilized in their countries on rapid assessment and/or innovative retrofit approaches. The workshop should engage partners for the furtherance of the project and for future development of seismic resilience and energy efficiency of buildings in

Turkey. The workshop shall be held in a 5-star hotel in Antalya for 4 days with 100 people. The transportation, catering services and accommodation expenses of the participants and simultaneous translation shall be covered by the Consultant.

**f) Develop Case Studies:** The Consultant shall study feasibility of minimum three (3) innovative retrofit techniques proposed in the workshop's final report for the five (5) case study buildings. The structural, material, architectural, and geotechnical details of the buildings will be provided. For this purpose; a 3-D nonlinear computer model of the buildings shall be developed, a retrofit design for different retrofit techniques shall be proposed and performance assessment of the retrofitted building shall be conducted using the latest version of Turkish Building Earthquake Code. The comparison of analyzed case study buildings in terms of investment costs and economic value, measures implemented, and challenges shall be documented in the Case Study Report.

While conducting the activities under Task 2 the Consultant should ensure;

- Innovative and proven solutions for addressing natural hazards and climate change risks utilized
- Good practices, evidence, and results demonstrating effective disaster and climate resilience disseminated
- Partnerships and knowledge exchange facilitated
- Design and/or implementation of Disaster Risk Management (DRM) investments by national and sub-national governments and/or development partners enabled
- Selected innovative approaches applied and tested on a sub-set of the SREEPB financed buildings subject to their technical viability and cost-effectiveness.

### **Task 2 Deliverables:**

- 1) Analysis and evaluation reports including the aspects described in Task 2(a), (b), (c) and (d),
- 2) Roadmap on the implementation of innovative and energy efficient engineering approaches for existing buildings and design of new buildings,
- 3) Handbook on the current and innovative best practices for structural strengthening and EE in existing buildings and construction of new buildings,
- 4) Technical report including best practices for rapid, robust engineering assessments of buildings,
- 5) Working groups reports and the final report of the workshop.
- 6) Case study report.

### ***Task 3: Organize Technical Study Visit:***

The Consultant is required to organize a technical study visit abroad (Japan, New Zealand, USA) for a duration of 10 days with not less than 10 people in order to investigate the best practices on retrofitted buildings using innovative approaches. All arrangements, meetings and field visits regarding the subject will be held by the Consultant with the approval of the Client. Also all expenditures such as transportations both international and within the country visited, catering services and accommodation /not less than 4 star hotels) of the participants shall be provided by the Consultant.

### **Task 3 Deliverable:** Study visit report

#### ***Task 4: Technical assistance for the practical implementation of selected techniques on a subset of buildings in Turkey:***

Under Component 1 of the SREEPB Project, two (2) pilot buildings will be selected and two (2) different innovative techniques will be designed and supervised by a separate consultant and constructed by a contractor. The Consultant shall assist and provide technical assistance during the design and construction stages and prepare a Technical Evaluation Report for the selected buildings. In addition, guidelines that include the technical details required for the design and application of these approaches for the building to be retrofitted using the two (2) identified techniques shall be prepared. The Consultant shall give trainings to the experts of the design company, work in coordination, organize periodic meetings, assist the technical designs, and conduct site visits not exceeding three (3) times per each construction site. Upon request of the Client, additional site visits might be necessary to provide assistance in administering and resolving grievances. Tenth months after the Contract signature, this task shall be started. The consultancy services and construction of these pilot buildings shall be parallel to be able to execute this task.

While conducting the activities under Task 3 the Consultant should ensure that;

- Knowledge products to support disaster and climate resilience are utilized
- Innovative solutions for addressing natural hazards and climate change risk are utilized
- Good practices, evidence, and results demonstrating effective disaster and climate resilience are disseminated
- Capacity for risk-informed policy formulation in formal institutions are improved
- Use of disaster and climate risk information in decision-making and policy change is increased

#### **Task 4 Deliverables:**

1. Technical Evaluation Report
2. Detailed design and application guidelines considering the application of selected innovative retrofit techniques in Turkey.

#### ***Task 5: Outreach and dissemination on Innovative Engineering Approaches***

Under this task the Consultant is expected to develop a training program and share best practices and learning on advanced and innovative engineering practices aimed at architects, engineers, and construction personnel, etc. from design and construction firms as well as public sector experts, PIU, students studying engineering and architecture departments of universities, relevant institutions, etc. The training program should be developed for subjects underlined in Task 2 (a), (b) and (c). This program shall consider online learning as well as in person one (1) day seminar to be held in MoEUCC conference hall in Ankara with the participation of not less than 300 professional. The training should include a formal feedback process to promote future improvement of knowledge transfer on seismic strengthening and EE of buildings. While developing the program, the Consultant shall try to increase the number of female engineers in key technical roles through targeted outreach and representation.

Review of existing regulations associated with structural strengthening, disaster and climate resilience and energy efficiency improvements, and associated compliance, assessed against global best practice as well as need for regulatory improvements to accelerate, improve, enforce or monitor enhanced energy efficiency, safety and resilience of both public and private buildings in Turkey shall be discussed.

**Task 6 Deliverables:**

1. Training program and materials, and participant feedback with memorandum on improving future outreach.

**V. Time Schedule**

This assignment is expected to initiate in the first half of 2023 and finalized in a period of 28 months. The Consultant shall submit all the documents in a timely manner to complete the services on time without any delay.

**Table.1:** Table of Deliverables

<b>Task</b>	<b>Deliverable</b>	<b>Deadline</b>	<b>Submission Requirement</b>
1	Inception Report	30 days	All documents shall be published in Turkish and English and is expected to be made available publicly given its relevance globally.
2	Handbook on review of current and innovative practices for structural strengthening and EE in existing buildings and for construction of new buildings	240 days	
	Technical Report about rapid assessment approaches		
	Workshop Final Report	20 days	
	Case Study Reports	120 days	
3	Study visit report	30 days	
4	Technical Evaluation Report	120 days	
5	Guidelines	600 days	

## **VI. Facilities provided by the consultant**

The Consultant must ensure that its professional staff has adequate support and equipment. All costs for equipment and administrative and logistic support must be covered by the Consultant and included in the bid price, including:

- All costs arising from the activities of its staff during the contract period, including accommodation, allowances, transportation, insurance, etc.
- Automotive, equipment, equipment for field and lab tests, office supplies, hardware and software (software for modeling and static/dynamic analysis of critical structures) etc.
- All communication costs, including fax, email, telephone, etc.
- All the equipment, instruments, services and logistical support required for the implementation of the contract, and any costs incurred during its preparation of documents and drafts, copying, printing, qualified translation, interpretation etc.
- Technical equipment at the monitoring site.
- Appropriate approvals, permissions and precautions shall be taken to protect the health and safety of workers during field works. Employees shall work using personal protective equipment suitable for the job after receiving occupational safety training.
- The Consultant shall provide simultaneous translation during the activities such as workshop, training and technical visit if needed.
- Handbook, technical report, guidelines and case study report will be printed 200 copies for each.
- The Consultant is responsible for having key expert(s) and representatives available at any meetings reasonably convened by the Client including but not limited to periodical progress meetings to be held at least once a month, kick-off meetings with consultants of the Project and meetings with World Bank authorities. Any information or evidence reasonably required by the Client at meetings that might be held in connection with the Project shall be provided. Minutes of meetings shall be prepared and shared with the Client no later than two days after each meeting.

## **VII. Support to be provided by the client to the consultants**

- The Client provides required information of the buildings for the case study buildings.
- If any delay or no response received from the beneficiary or other third parties during the execution of aforementioned tasks, the Consultant shall inform the Client in a timely manner with indicating the possible grounds. The Client will accelerate the process or give consent to proceed the task.

## **VIII. Team Composition & Qualification Requirements for the Key Staff**

The Consultant shall provide experienced staff with proven technical and managerial competence and experience in the **Innovative Engineering Approaches for strengthening existing buildings and design of new buildings**, structural and energy efficiency assessments, related to the latest Turkish Earthquake Code and Energy Performance Regulation in Buildings. The Consultant shall separately indicate the task assignments for each staff.

### **i) Consultant Profile:**

The Consultants should be in consulting business, have structural and energy retrofit experience within the scope of services and be open to working with innovative technologies, demonstrate sound administrative and financial capacity and availability of the key experts for the performance of the services described in this TOR.

The attention of interested Consultants is drawn to Section III, paragraphs, 3.14, 3.16, and 3.17 of the



World Bank's "Procurement Regulations for IPF Borrowers" November 2020 and The Bank's 'Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants,' (revised as of July 01, 2016) ('Anticorruption Guidelines').

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.

**ii) Team Composition:**

The working language of the project is English. All the team members assigned by the Consultant must possess proficiency in the English language. Day-to-day communication language will be Turkish or English at the field level to ensure smooth communication among all participants, direct and indirect of the Project.

All key staff and support staff shall be mobilized immediately after the contract signature. Key and support staff qualifications shall include but not be limited to the following table.

All expatriate staff who will work in Turkey should obtain a work permit and all who are resident for more than 90 days should obtain a non-resident visa. The consultant will obtain all required permits, visas for all expatriate staff at his own cost. Furthermore, the Consultant will be responsible to ensure that all proposed personnel are eligible to obtain such permits and visas. The information related to visas can be obtained from the embassies and consulates of Turkey. The Client will assist the consultant for the issue of work permits. The Consultant is required to obtain all the necessary permits, approvals, payment of all fees and contributions, as well as all the other elements necessary for the work of his professional staff who is engaged at his own expense for the performance of this Contract.

**Table 1. Staff Qualification Requirements**

<b>All Tasks: Technical Assistance for Advanced Engineering Practices and Capacity Building</b>	
[KS.1] – Team Leader (1)	Civil Engineer with minimum fifteen (15) years of professional experience includes at least ten (10) year experience in similar works and five (5) years working experience in a manager position.
[KS.5-6-7] - Structural Engineer (3)	Civil Engineer (Structural Engineer M.Sc. or above) with a minimum of ten (10) years of professional experience, includes at least five (5) year experience in similar works and specialized in structural retrofitting.
[KS.8-9] - Architect (1):	Architect with a minimum of ten (10) years of professional experience, includes at least five (5) years of experience in similar works.
Civil Engineer (1)	Civil Engineer with a minimum of ten (10) years of professional experience, includes at least five (5) year experience in similar works and site practice on retrofitting and reconstruction, preferably with knowledge on construction materials.
[KS.11] - Mechanical Engineer (1):	Mechanical Engineer having ten (10) years of professional experience including five (5) years of similar works experience.
[KS.12] - Electrical Engineer (1):	Electrical Engineer having ten (10) years of professional experience including five (5) years of similar works experience.
[KS.16] - Academic Advisor (1)	Professor/Authority/University Experts with the appropriate and specialized qualifications in similar works who have participated in similar projects. Publication of papers on SCI Indexed journals, proceedings on international conferences and book chapters on specified areas will be asset.

[TS] - Technical Support Staff	To assure the required services at least one (3) Environmental Engineer (1), Social Expert (1), OHS Expert (1) shall be assigned in addition to input from the Key Experts.
[AS] -Administrative Support Staff	Support staff for the administrative services shall be proposed additionally as required (clerks, drivers, secretary, etc.)
<u>Similar Works</u> includes experience on innovative retrofit techniques and rapid structural assessment.	