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Deprem Sonrası İhtiyaçlara Mekânsal Yanıt: ODTÜ Acil Tasarım Stüdyosu
Spatial Response to Post-Earthquake Demands: METU Urgent Design Studio

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Highlights

- Depremden etkilenen bölgelerdeki acil ihtiyaçlara yönelik mekânsal çözümler
- ODTÜ Acil Tasarım Stüdyosu (ATS) çalışmaları ve prototipleri
- ATS ve "Shigeru Ban Architects / Voluntary Architects' Network" arasındaki iş birliği: Kâğıt Masura Ev
- ODTÜ ATS Ahşap Ev Ünitesi
- Addressing the primary spatial needs in earthquake-stricken areas
- METU Urgent Design Studio (UDS) works and prototypes
- Collaboration between UDS and "Shigeru Ban Architects / Voluntary Architects' Network" for the Paper Tube House
- METU UDS Wooden Housing Unit

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Özet

Şubat 2023'te Kahramanmaraş merkezli gerçekleşen depremler, bölgedeki 10 ili etkileyerek sayısız can ve mal kaybına sebep olmuştur. Bölgedeki halkın ihtiyaçlarını gözeten tasarımların acil olarak üretilmesinin ve alternatif mekânsal çözüm önerilerinin sunulmasının, afet sonrası süreçteki olumsuzlukların azaltılmasındaki rolü önem kazanmaktadır. Bu anlamda, ODTÜ öğrencilerinin ve akademisyenlerinin inisiyatifiyle kurulan Acil Tasarım Stüdyosu (ATS), deprem bölgesindeki öncelikli ve geçici mekânsal ihtiyaçlara cevap vermek, alternatif olarak yaşanabilir, sürdürülebilir, üretilebilir tasarım önerileri geliştirmek ve bunları yaparken alternatif malzemeler kullanmak hedefleri olan bir oluşumdur. Deprem bölgesinde var olan konteyner ve çadır mekanlarının verimliliğini ve kullanımını arttırabilmek adına mekân ayırıcıları tasarımı ile başlayan ATS projeleri, hayvan barınağı, barınma ve depolama için çadır tasarımı, tuvalet ve duş önerileri, ahşap ev projeleri ile devam etmiştir. Bu projelerden biri olan, ODTÜ Acil Tasarım Stüdyosu ve "Shigeru Ban Architects / Voluntary Architects' Network" iş birliğiyle üretilen Kâğıt Masura Ev depremden etkilenen bölgelerdeki acil konut ihtiyaçlarına hızlı ve etkili bir çözüm sağlamayı amaçlayan geçici bir barınma birimidir. Sonrasında öğrenciler tarafından tasarımı yapılan Ahşap Ev Ünitesi ile devam eden ATS çalışmaları, ODTÜ Mimarlık Fakültesi gönüllüleri tarafından kolektif olarak yürütülmüştür. Bu çalışmada ATS'nin Şubat ayından itibaren devam eden çalışmalarıyla ilgili deneyime dayalı bilgi aktarımı yapılması ve dayanışma ortamının sağlanması amaçlanmaktadır. Bu dayanışmanın yayılmasıyla afet sonrası ihtiyaçlara daha iyi çözümler sunabilmek için tasarım ve üretim sürecine devam edilmesi hedeflenmektedir.

Abstract

The February 2023 earthquakes centered in Kahramanmaraş had a profound impact, affecting ten provinces in the region and resulting in numerous casualties and significant property loss. Producing designs that cater to the urgent needs of the affected population and presenting alternative spatial solution proposals has become crucial in reducing the adverse effects during the post-disaster phase. In this context, the Urgent Design Studio (UDS), initiated by students

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and academics at Middle East Technical University (METU), aims to address the primary and temporary spatial needs in earthquake-stricken areas, develop alternative design proposals that are livable, sustainable, and reproducible, and utilize alternative materials in the process. UDS projects, starting with the design of interior dividers to enhance the efficiency and usability of container and tent spaces in the earthquake zone, have progressed to include designs for animal shelters, tent accommodations, toilet and shower facilities, as well as wooden housing projects. One of these projects, the Paper Log House produced in collaboration with "Shigeru Ban Architects / Voluntary Architects' Network," aims to provide a rapid and effective solution to the urgent housing needs in earthquake-affected areas. Subsequently, the efforts of the Urgent Design Studio (UDS) continued with the Wooden Housing Unit, designed by students and collectively executed by volunteers from the METU Faculty of Architecture. This paper aims to provide a knowledge-based transfer of significant experiences related to UDS's ongoing activities since February and to foster a supportive environment for solidarity. The goal is to continue working towards better solutions for post-disaster needs.

1. INTRODUCTION

In the wake of the earthquakes of February 2023, with their epicenter located in Kahramanmaraş, there arose an exigent demand for diverse yet fundamental spatial configurations. On the other hand, this event spurred the coming together of various groups, rallying to offer aid in every meaningful and feasible manner possible. The Urgent Design Studio emerged from the imperative to harness the knowledge of Middle East Technical University's Faculty of Architecture students in producing spatial solutions to meet the urgent demands of post-disaster areas. Originating as a student-led initiative, the solidarity demonstrated by organizations such as the METU Alumni Association served as a catalyst, instilling confidence in the potential effectiveness of such an organization.

This voluntary endeavor, driven by a commitment to tackle the multifaceted challenges of designing, planning, and producing solutions is tailored to meet the urgent spatial requirements within areas affected by the earthquakes. UDS aspires to apply the sensibilities garnered from formal architectural education into a realm where urgent solutions demand acute awareness of tangible realities. While its inception is intricately tied to the 2023 earthquakes, the prominent aim of UDS is to ensure the knowledge garnered becomes a transferable asset, poised to empower future actors in navigating spatial production challenges precipitated by both natural and human-induced disasters. Its commitment to open-source principles enables collaborative innovation and knowledge-sharing, promoting collective problem-solving and continuous improvement.

During its formative stages, UDS actively engaged with various organizations and initiatives renowned for their expertise in delivering spatial solutions to earthquake-affected regions. A consultation and introductory meeting was held with the organization Architecture for All (Herkes İçin Mimarlık), during which they presented their Earthbag project in Kahramanmaraş. Shigeru Ban Architects and the Voluntary Architects' Network participated in a collaborative meeting, sharing their specialized knowledge and experience in addressing spatial needs in post-disaster areas. Additionally, a meeting was conducted with CIFAL York, UNITAR, and Architecture Sans Frontières International to explore potential collaborative efforts. Finally, START TUDelft presented their ongoing projects and prototypes, contributing significant insights to the initiative.

The rationale behind forging such connections was twofold. Firstly, outreach efforts were directed toward engaging with actors, associations, and initiatives invested in addressing the urgent needs of earthquake-affected zones. Sustained communication with these entities served to inform design decisions by grounding them in the realities of the respective sites. Secondly, collaborative meetings were convened with groups and organizations, both already familiar with catering to temporary housing needs and emerging entities akin to UDS, focusing on post-disaster architectural production. These interactions facilitated a reciprocal learning process, wherein insights were exchanged to guide decision-making processes toward continuous improvement.

1.1. UDS Design Principles for Alternative Production

Through its continuously evolving design process, UDS has discerned a set of fundamental principles that underpin its approach to addressing urgent needs. Central to its mission is the development and implementation of alternative solutions tailored specifically for temporary housing units and essential physical facilities. Within this comprehensive framework, its primary focus lies in crafting designs that are not only based on offering functionality but also promote livability, sustainability, and ease of production. In pursuit of these objectives, UDS is committed to generating design proposals that seamlessly integrate into the existing fabric of affected communities while simultaneously mitigating environmental impact. To facilitate swift and efficient deployment, UDS is actively engaged in the development of design solutions, refining its designs to ensure rapid and effective

implementation on the ground. Moreover, its dedication extends to the exploration and utilization of alternative materials, including recycled/upcycled materials, bio-based materials, and repurposed waste materials. By embracing these innovative approaches, UDS seeks to minimize resource consumption, reduce waste, and foster greater resilience in disaster-affected areas. Ultimately, its overarching goal is to deliver environmentally friendly and socially responsible solutions that not only meet the immediate housing needs of affected populations but also lay the groundwork for sustainable development and resilience in the face of future challenges.

In its pursuit of holistic solutions for addressing urgent housing needs, UDS prioritizes several key principles aimed at optimizing efficiency, affordability, and sustainability. Firstly, UDS emphasizes the importance of economic viability and low-cost solutions to ensure accessibility for all affected communities. This entails the development of designs that are not only cost-effective but also offer ease of production, application, assembly, repair, and maintenance. Furthermore, UDS recognizes the significance of leveraging local knowledge, materials, human power, and equipment to streamline production processes and expedite project delivery. By harnessing local resources and expertise, UDS aims to foster community empowerment and resilience while minimizing logistical challenges and environmental footprints. In tandem with these efforts, UDS is dedicated to promoting sustainable practices and fostering a culture of environmental stewardship within affected communities. Modularity serves as another cornerstone of its designs, facilitating flexibility and adaptability to diverse contexts and evolving needs. Moreover, designs of UDS prioritize transformability and reusability, embracing principles of circularity to minimize waste and resource depletion.

Following the design and development process, manuals containing project-specific drawings, material specifications, and production guidelines were made publicly available as open-source resources on social media and various online file-sharing platforms. Sharing project documents aligns with UDS's core principles, aiming to empower diverse users to adopt and enhance these designs, thereby promoting more effective methodologies and alternative material applications. It is anticipated that individuals in earthquake-affected regions will access these manuals, enabling them to contribute to and implement the projects in ways that are most suitable for their local conditions. The open-source sharing model also facilitates the continuous improvement of these designs by incorporating feedback and contributions from a wide range of users, thereby enhancing their overall effectiveness and adaptability.

The incorporation of unconventional materials and design strategies was not merely an academic exercise; it was a pragmatic response to the urgent needs following the earthquake. In the immediate aftermath of the disaster, traditional manufacturers of common temporary shelters, such as tents or containers, were operating at maximum capacity to provide aid to those affected (TMMOB, 2023). On the other hand, the materials utilized in the production of these shelters held the potential to exacerbate the environmental challenges already faced in the disaster-stricken areas. Disposal of waste posed a significant difficulty in such contexts, and the use of certain materials in shelter construction risked leaving a lasting and detrimental footprint on the environment (Lauritzen, 1998). Therefore, UDS's approach has been centered around the selection of readily available materials, capable of being manipulated without sophisticated machinery, and offer versatility in their application across different structural elements.

2. EARLY WORKS AND PROTOTYPES

Following the 2023 earthquakes, there arose an urgent demand for diverse spatial solutions to address. In its initial phases, UDS was structured into three groups, each with distinct responsibilities: The Communication and Coordination Group gathered information and facilitated communication with NGOs, associations, experts, and manufacturers, ensuring a steady flow of critical information. The Planning, Design, and Production Group focused on research, design, prototyping, logistics, and implementing solutions. The Presentation, Visualization, and Media Group prepared presentations, designed posters, manuals, and booklets, and managed social media platforms. Once these core groups were established and a collective organizational framework for sustaining the work was defined, UDS participants formed project-specific groups to tackle multiple challenges simultaneously. Each project group consisted of students from the Faculty of Architecture who were responsible for handling individual projects. The projects that had reached the prototyping stage were the Toilet/Shower Unit, Animal Shelter, PPRC Tent, and Interior Dividers.

Emphasizing practical and efficient design proposals, the UDS aims for solutions that can be quickly deployed and effectively address immediate needs. The exploration and use of alternative materials are crucial for ensuring sustainability and cost-effectiveness. A key principle is making solutions easy to build and replicable, enabling anyone, regardless of construction experience, to confidently assemble these structures. The projects also emphasize modularity to accommodate evolving requirements and minimize environmental footprint. Modular

designs allow components to be reused or reconfigured for different purposes, promoting resource efficiency and reducing waste. These designs are intended to be flexible and durable, ensuring they do not become obsolete or contribute to waste once their intended use is over. These guiding principles shape the studio's diverse projects.

The significance and aim of the proposed Toilet/Shower Unit lie in its ability to provide a rapid and efficient alternative to address the urgent need for sanitation facilities in areas affected by earthquakes. The utilization of OSB panels, employing a screwless interlocking system akin to a puzzle, constitutes a pivotal material and technical detail. The design's reliance on a screwless interlocking system ensures seamless assembly and installation, eliminating the necessity for specialized tools or infrastructure, thereby streamlining the deployment process (Figure 1). Additionally, the inclusion of a protective coating paint serves to bolster durability and weather resistance, thereby extending the lifespan of the unit and enhancing its suitability for outdoor applications. Moreover, the unit's utilization of durable materials, coupled with its adaptable nature, renders it suitable for both field and compost toilet configurations, catering to diverse sanitation needs across different environments. Its adaptability extends beyond rural settings to encompass urban locales, ensuring its applicability in a wide range of contexts. Importantly, the design prioritizes cost-effectiveness without compromising on quality, making it accessible to resource-constrained communities. Leveraging CNC technology enables rapid and efficient production, ensuring scalability and timely response to emergency situations. Collectively, these integrated features underscore the unit's comprehensive design approach, which emphasizes resilience, accessibility, and efficiency in addressing critical sanitation needs during times of crisis.

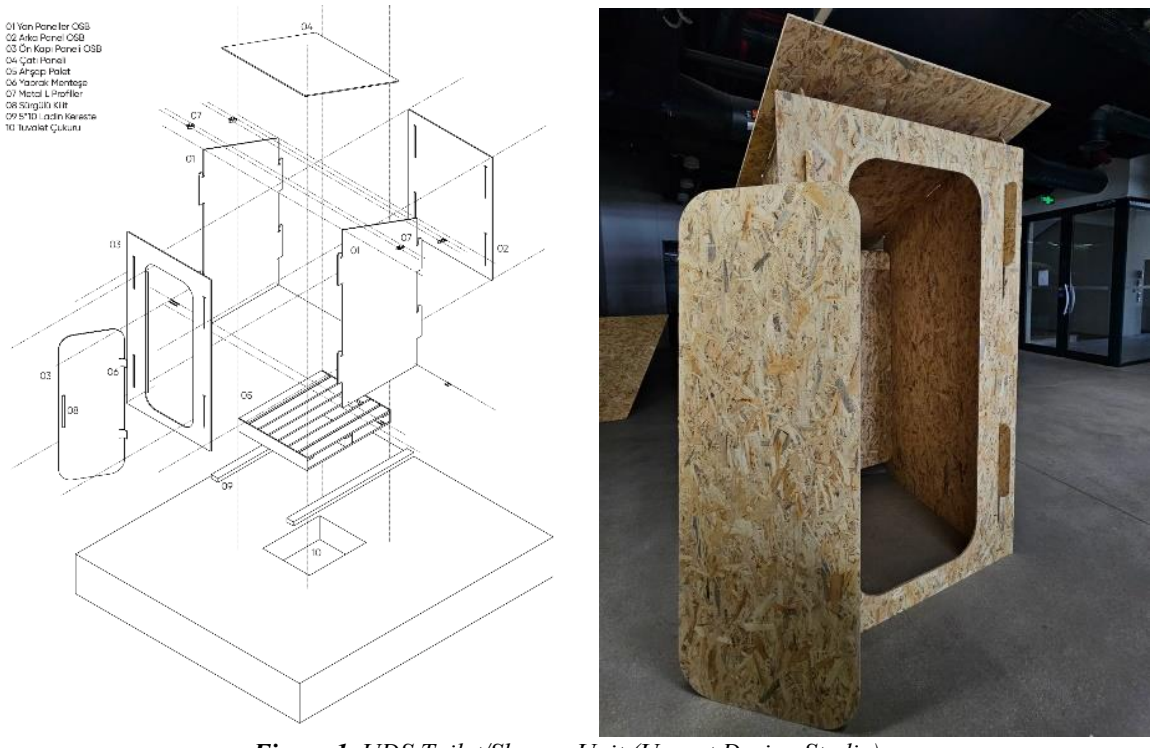

Figure 1. *UDS Toilet/Shower Unit (Urgent Design Studio)*

Another project was aimed at addressing the needs of pets displaced after the earthquake. The design of the Animal Shelter was primarily influenced by the objective of creating an alternative solution using different materials than those commonly available in the market. Due to the urgent need for an animal shelter, the design process was expedited to complete the cutting and assembly of the proposed materials within half a day. The selected materials and assembly details enable the shelter to be easily folded into a single panel and stacked horizontally for transportation. This design approach emphasizes the possibility for local individuals to construct the shelter themselves using open-source manuals, or for the shelter to be produced in different locations and efficiently transported to the site. Additionally, wood-based plywood panels were chosen to minimize environmental impact. The Animal Shelter utilized plywood, leaf hinges, polycarbonate sheets, and rivets to facilitate a balance between durability and portability, enabling the shelter to withstand outdoor conditions while remaining lightweight and easy to transport (Figure 2). The integration of leaf hinges facilitates quick assembly and disassembly, streamlining the deployment process without compromising structural integrity. Moreover, the incorporation of polycarbonate sheets enhances natural lighting and ventilation within the shelter. By meticulously considering material properties and technical specifications, the proposed design embodied a pragmatic solution to address the pressing need for animal shelters.

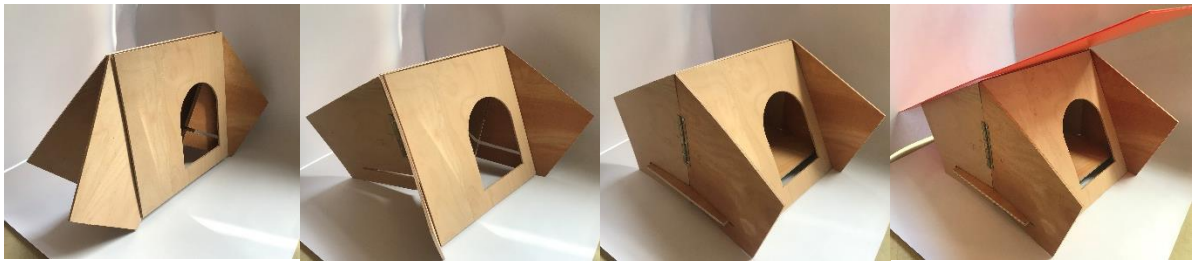

Figure 2. *Portable Animal Shelter Assembly (Urgent Design Studio)*

Another project is the PPRC Tent project which addresses the urgent shelter needs in areas affected by the earthquakes by proposing an alternative and cost-effective solution to traditional tent production. In this project, the PPRC pipes considered as the structural material for the tent were not environmentally sustainable. However, the rationale behind this material choice was due to the immediate inadequacy of existing tent production companies following the earthquake, their inability to meet the increased demand for shelter, and the substantial rise in tent prices. Consequently, it became imperative to propose an affordable and easily assembled alternative material, such as PPRC pipes, to traditional tent production. The utilization of PPRC pipes, PVC tarpaulin, fire-resistant and waterproof textiles, plastic clamps, ropes, and OSB panels are the materials of the PPRC Tent (Figure 3). While the prototype of the tent was successfully constructed, the decision to reduce costs by utilizing PPRC tubes instead of a steel structure proved to be impractical. The material's durability was compromised when exposed to heat, leading to undesirable outcomes. Consequently, further development of this prototype was halted, as the immediate need for tents in the area was no longer a pressing priority.

Figure 3. *PPRC Tent (Urgent Design Studio)*

One project that was promptly initiated was the Interior Dividers. Upon discovering that several families displaced by the earthquake were housed on METU campus, UDS offered to extend its support in any spatial or architectural capacity necessary. Their specific request was for a divider to be set up between the cafeteria and the adjacent play area, allowing children to play safely while remaining in close proximity to their families. This swift and efficient production process utilized materials such as slats, ropes, L profiles, hooks, and leaf hinges to ensure the timely completion of the project (Figure 4). The design, application and instillation of the divider all took place within the scope of a few days.

Figure 4. *Interior Dividers for Aysel Sabuncu Yaşam Merkezi, METU (Urgent Design Studio)*

While the development of these projects did not progress beyond the prototyping phase or implementation in earthquake-affected regions, they presented significant potential for informing UDS's future projects. Their conceptualization and execution provided invaluable insights into the utilization of specified materials, designs, and manufacturing on a larger scale, offering opportunities for refinement and optimization in future deployments. Moreover, these initiatives served as a focal point for defining the operational framework of the Urgent Design Studio (UDS), fostering resilience and sustainability within. Furthermore, the dissemination of these prototypes to the public underscores their potential for wider humanitarian application, inviting exploration and adaptation by interested parties seeking to address similar challenges.

The studio's goals encompass the implementation of temporary alternative solutions for urgent shelter and essential physical needs units. This includes devising practical, socially beneficial, and efficient design proposals, alongside the exploration of alternative materials. Projects undertaken within this framework range from designing space dividers to optimize spaces and tent structures for earthquake zones, to initiatives such as animal shelter designs, tent configurations for shelter and storage, toilet, and shower recommendations, as well as projects like the Paper Log House and Wooden Housing Unit. All projects have offered valuable opportunities for hands-on experience in various crucial aspects, including production processes, design experimentation, and comprehensive assessments of project feasibility in terms of time, skill requirements, and detailed analyses. However, the forthcoming section of this article will delve into the specifics of two projects: the Paper Log House and Wooden Housing Unit derived from the post-disaster spatial solution efforts of the UDS.

2.1. Paper Log House

Esteemed Japanese architect Shigeru Ban, acclaimed for his receipt of the 2014 Pritzker Prize, is recognized as a pioneer in the integration of paper-based materials for architectural frameworks, notably exemplified by his innovative utilization of paper logs. Although Ban had earlier experimentations with paper logs, at the 1989 World Design Expo he erected the inaugural paper log structure, the Paper Arbor. Following its disassembly, an assessment conducted of the paper logs' endurance against adverse weather conditions, it was noted that despite encountering severe wind and rain, the compressive resilience of paper logs had amplified (McQuaid, 2006). A mere two years after the erection of his inaugural permanent paper log structure, the Library of a Poet, received official endorsement through the revision of Japan's Building Standard Code. Since then, the utilization of paper logs has been witnessed across a spectrum of architectural compositions, spanning from provisional shelters in the aftermath of calamities to architectural pavilions (Ban, 2017). Initiating endeavors within disaster-stricken regions to meet the exigency for post-catastrophe provisional habitation and to refine existing solutions, Ban has conceptualized and realized projects encompassing emergency shelters, paper log houses, places of worship, educational facilities, and paper-based partition systems, with paper logs serving as the fundamental building medium (Shigeru Ban Architects, 2024).

Among Ban's earliest endeavors in post-disaster design intervention was his proposal in 1995 at the Byumba Refugee Camp in Rwanda, wherein he advocated for emergency shelters constructed from paper logs on behalf of the United Nations High Commissioner for Refugees (UNHCR) (UNHCR, 1995). Rigorous assessments evaluating durability, moisture resilience, and resistance to termite infestation culminated in the erection of fifty such units by 1999. In response to the Kobe earthquake in 1995, Ban once again employed paper logs for shelter units. These units featured foundations comprising of sandbags, walls, and roofing structures crafted from paper logs, and roof coverings composed of PVC tarpaulins. Following the Düzce earthquake of 1999, Ban proposed a similar intervention, albeit tailored to accommodate variances in climatic conditions, material accessibility, and social requirements. In collaboration with Mozaik Design these provisional habitation units were assembled utilizing contributions from Turkey and Japan, constructed by local communities and architecture students, resulting in the realization of seventeen units (McQuaid, 2006) (Figure 5).

Figure 5. *Paper Log Houses Built in Düzce in 1999* (ArchDaily Team, 2020)

The latest iteration of the Paper Log House is a collaborative effort between the METU Urgent Design Studio (UDS) and Shigeru Ban Architects & Voluntary Architects' Network. Its design and construction details vary from its predecessors by introducing innovative wall and roof panel. Originating as a prototype designed and fabricated in Japan to address the February 2023 earthquakes, the design underwent adaptation by the Urgent Design Studio to accommodate local exigencies such as material availability, durability, cost-effectiveness, accessibility, dimensional appropriateness, climate considerations, and specific requirements of disaster-stricken areas. Every aspect of the project ranging from the selection of foundation materials, such as plastic crates tailored to the wood type utilized in plywood production for the floor panels, to the determination of screw dimensions, were decided and implemented by the volunteers of UDS. Operating within the constraints of identified materials, the project details underwent iterative refinement, culminating in the redevelopment of the implementation strategy.

The paper log procurement process was facilitated through financial backing provided by the Voluntary Architects' Network, administered via the METU Istanbul Alumni Association. Upon the arrival of the paper logs at the METU Architecture Faculty on April 3rd, 2023, the prototype construction was initiated. In the subsequent week, plywood, Oriented Strand Board (OSB) panels, and timbers were cut to requisite dimensions with the aid of volunteers, under the guidance of technicians at the Central Workshop of METU (Figure 6a). Following this, volunteers started to form floor panels, wall panels, and roof panels in the workshop of the METU Faculty of Architecture (Figure 6b). The construction process involved several stages, beginning with the fabrication of timber frames and the attachment of plywood and OSB panels to these frames. Precision cutting of insulation materials was carried out using hot cutting machinery, followed by the application of waterproofing measures such as painting paper logs and panels. Additionally, intricate tasks included cutting window apertures in wall panels and openings in roof panels using jigsaws. These construction processes provided invaluable experiential learning opportunities, predominantly for the volunteers involved. Furthermore, the deployment of practical solutions such as the development of a screw template to expedite screw positioning on panels, and the utilization of a Computer Numerical Control (CNC) machine for the fabrication of assembly elements, significantly streamlined and enhanced the construction process (Özer et al., 2023).

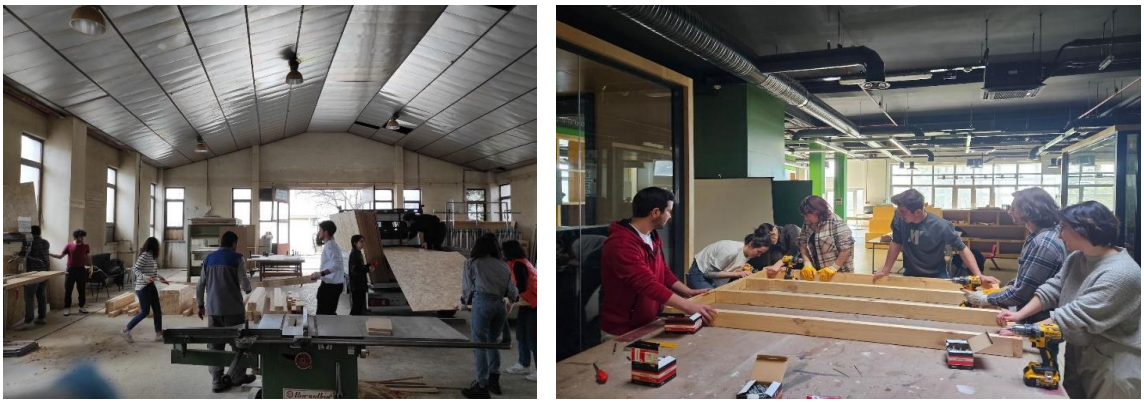

Figure 6. *6a. Sizing of materials in METU Central Workshops (Ağırsoy, 2023) (left), 6b.Preparation of building panels at METU Faculty of Architecture Workshop (Aydemir, 2023) (right)*

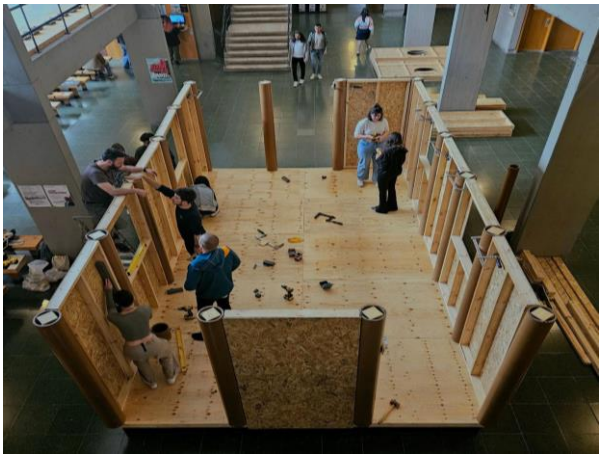

Figure 7. *Installation of the first Paper Log House in the inner gallery of METU Faculty of Architecture (Yılmaz, 2023)*

After the fabrication of architectural components, the materials were conveyed to the METU Faculty of Architecture on April 25th, with the assembly of the Paper Log House commencing within the inner gallery of the faculty (Figure 7). The assembly process encompassed several sequential steps, commencing with the placement of plastic crates filled with sand, followed by the attachment of floor panels to these crates. Subsequently, detailed efforts were invested in determining and affixing assembly elements onto the floor panels, facilitating the integration of paper logs with both the floor and wall panels. Afterwards, roof elements were positioned and assembled, culminating in the laying and securing of tarpaulin over the roof panels to conclude the installation process, as depicted in Figure 8.

Figure 8. *Paper Log House (Kapusuz, 2023) (left and bottom right), (Ünal, 2023) (top right)*

On Wednesday, May 3rd, following Shigeru Ban's presentation titled "Balancing Architectural Studies and Social Contributions," the opening ceremony of the Paper Log House transpired (Figure 9). Post-inauguration, the prototype underwent dismantling within an approximate timeframe of three hours, following which the materials were loaded onto a truck for transportation to Hatay (Figure 10). After an overnight journey, both materials and volunteers arrived at Hatay's Bohşin Village. With the collaborative efforts of UDS volunteers, METU Faculty of Architecture personnel, and the Mozaik Design team, the reconstruction of the Paper Log House transpired within approximately 12 hours, situated within the premises of Bohşin Primary School (Figure 11). Envisioned as an educational space for intelligence and skill-based activities, this facet conferred an additional layer of significance to the project (Özer et al., 2023).

Figure 9. *Shigeru Ban's presentation titled "Balancing Architectural Studies and Social Contributions" at METU Faculty of Architecture (Yılmaz, 2023)*

Figure 10. *Dismantling of the prototype to be transported to Hatay after the opening (Günhan, 2023)*

Figure 11. *Re-installation of the Paper Tube House in the yard of Bohşin Primary School (Kantarcı, 2023) (top and bottom left), (Çalıkuşu, 2023) (top right), (Ağırsoy, 2023) (bottom right)*

The Paper Log House project exemplifies the dedication to exploring alternative materials, prominently featuring the innovative use of paper logs as a primary structural component. Coupled with the repurposing of plastic crates as foundational elements, the project emphasizes resource efficiency and sustainability. This dual approach ensures that the structures are not only cost-effective but also resilient against diverse environmental conditions, reflecting UDS's commitment to practical, environmentally responsible design solutions for disaster-affected regions.

2.2. Wooden Housing Unit

The creation of the Wooden Housing Unit stems from the necessity for shelter in post-disaster areas. Since February, the Urgent Design Studio has been dedicated to addressing urgent needs in post-disaster regions, particularly in temporary housing. Collaborating with Shigeru Ban Architects, the studio constructed three "Paper Log House" units, adapted to local conditions such as materials and logistical requirements, and is currently developing its design, the Modular Wooden Unit. Recognizing the shortcomings in current decision-making processes, which often result in ad hoc approaches and diverse socio-environmental issues, the studio is developing the Wooden Housing Unit (Figure 12). This innovative solution follows a modular principle, enabling flexibility in physical dimensions and functions, aiming to tackle social, environmental, and economic issues for sustainable solutions. As an alternative to container living units, it offers advantages like cost-effectiveness and flexibility while enhancing overall living space quality. Additionally, the proposed plan of transporting building components in pieces reduces logistics costs, enabling simultaneous deployment to post-disaster zones — a promising solution for effective, sustainable, and quality post-disaster housing.

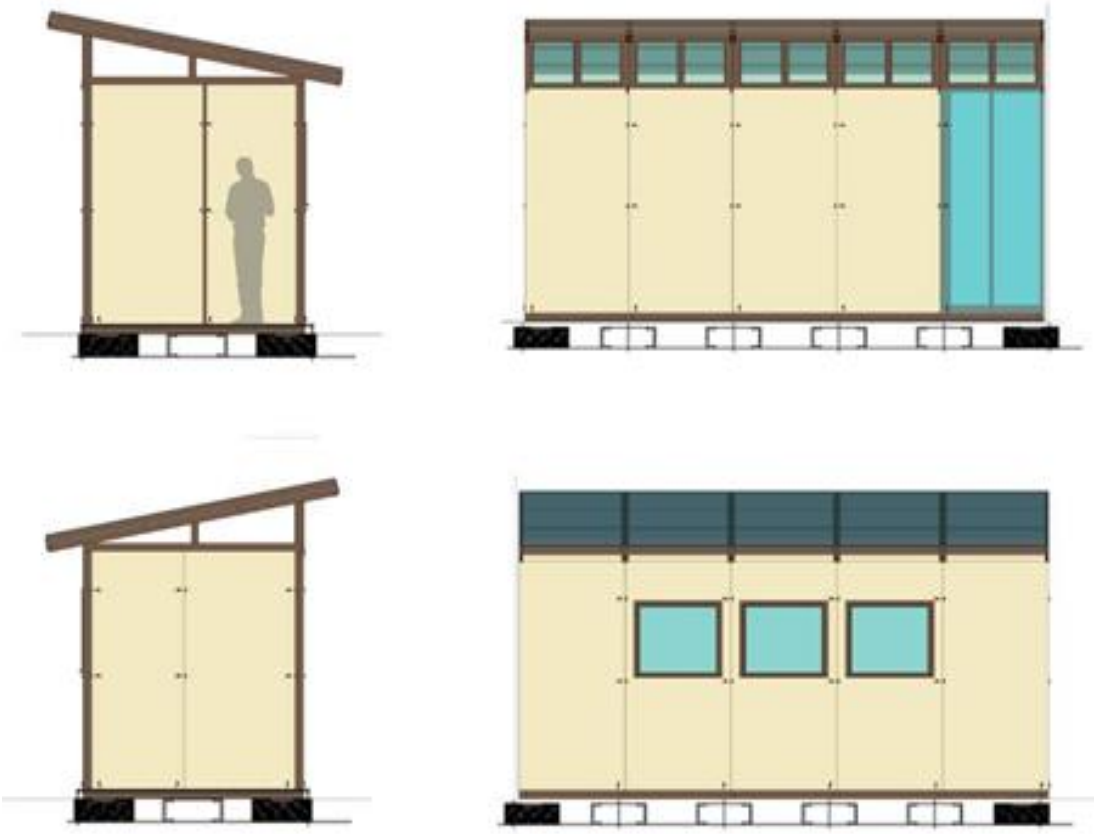

Figure 12. *Elevations of the Wooden Housing Unit (Urgent Design Studio)*

The Wooden Housing Unit aims to fill the gap in post-disaster housing by providing systematic design guidelines and offering versatility. The design emphasizes ease of assembly and potential for future spatial evolution, envisioning the transformation of temporary shelters into user-responsive architectural structures. The design philosophy of the unit is rooted in modularity to ensure rapid installation and adaptability, with panels forming the unit (Figure 13a). These panels, composed of three different materials - OSB panels, solid wood timber, and insulation material - are transformed into sandwich panels through a framework of 80x80 mm solid wood timber. Insulation material with a thickness of 80 mm is inserted between the panels to ensure thermal insulation. The roof

panels, after being coated with a waterproofing layer, are covered with polycarbonate sheets to further enhance water resistance. Panels are horizontally connected using clamps and vertically connected using 80x80 mm struts

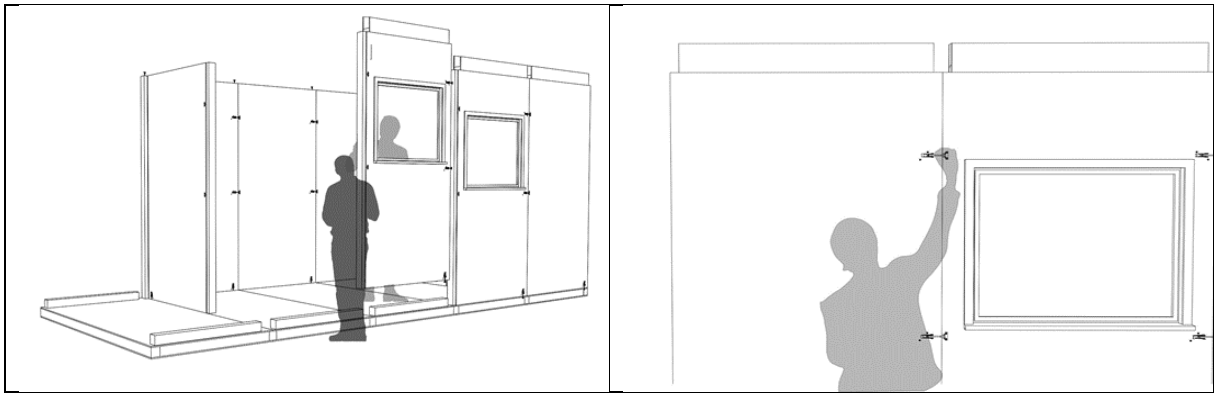

Figure 13. *13a.Digital demonstration of the panels that are forming the unit (left), 13b.Digital demonstration of horizontally connecting the panels with using clamps (right) (Urgent Design Studio)*

Installation of the unit is designed to minimize on-site construction, with pre-built panels facilitating efficient assembly. Floor, wall, and ceiling panels are interconnected using clamps, ensuring structural integrity and ease of installation. The uniformity of the solid panels facilitates standardization in production, reducing both labor and production costs while also enhancing structural stability. Furthermore, the design features connections that do not require specialized craftsmanship. Panels are attached to solid wood frame elements using clamps, ensuring ease of assembly.

The development of the Wooden Housing Unit by the Urgent Design Studio (UDS) embodies a commitment to innovation and sustainability in post-disaster housing solutions. Through this design, UDS seeks to address urgent shelter needs through a modular design approach that emphasizes flexibility, cost-effectiveness, and environmental responsibility. By prioritizing ease of assembly and adaptability, the design not only enhances living conditions in temporary shelters but also envisions long-term transformation into architectural structures. This holistic approach aims to mitigate socio-environmental impacts while offering scalable housing solutions for disaster-affected communities.

3. THE ROLE OF UDS IN ARCHITECTURAL EDUCATION

The formation of the Urgent Design Studio (UDS) in response to the immediate requirements of earthquake-stricken regions transformed into the commencement of an endeavor directed towards sustaining the studio beyond immediate crises. Recognizing our initial lack of expertise in crisis-oriented design, UDS's foremost objective is to impart the knowledge amassed during its tenure to subsequent generations, thereby ensuring a smoother transition and more expedient response in future emergencies. Embracing students from diverse academic backgrounds and levels of education, as well as the valuable support from METU Faculty of Architecture faculty members, has broadened UDS's reach and facilitated its integration into formal education. In addition to seminars and presentations tailored for undergraduate students, the establishment of a structured internship program has further solidified the connection between UDS and undergraduate education, providing invaluable opportunities for hands-on learning and practical application in crisis contexts. Through these concerted efforts, UDS endeavors to not only address immediate needs but also cultivate a lasting legacy of preparedness and expertise for generations to come.

UDS has reinstated the esteemed tradition of architectural internships within the Department of Architecture at METU. Drawing inspiration from the historical legacy of METU Architecture Department's practical summer internships, which originated in the late 1950s, persisted until 1974 (Ünalın et al., 2023), experienced a revival in the early 2000s, and unfortunately lapsed thereafter. The establishment of this new initiative represents an effort to revive and perpetuate this time-honored practice. The earlier applied internship framework fostered an environment conducive to experimentation, alternative methodologies, participatory approaches, and community engagement, thereby enabling students to recognize the symbiotic relationship between architectural academia and professional practice. By instilling practical skills and competencies, this internship aimed to augment the professional development of architecture students. METU Faculty of Architecture spearheaded an internship model that later evolved into an integral component of architectural pedagogy. Throughout the summer months, students actively engaged in internships centered on real-world building design and construction projects at a 1:1

scale. This compulsory internship program organized by the faculty members, enabled immersive experiences which provided students with invaluable practical exposure, enriching and complementing their theoretical understanding of architecture (Ünalın et al., 2023).

In the summer of 2023, the internship model was implemented for the construction of the Paper Log House, with all the first-year architecture students dedicating two weeks to building a single unit. Over the course of a month, two separate groups undertook the construction of two houses from the ground up within the confines of the Faculty of Architecture at METU. Following completion, these houses, akin to the initial prototype, were disassembled and transported to Hatay, where they were reconstructed by volunteering first-year students. With the addition of these two units, a total of three Paper Log Houses were erected in various schools across Hatay, all of which remain in active use to this day. By affording students the opportunity to participate in the construction of an actual house during their inaugural year of architectural education, and witnessing its immediate impact in addressing a pressing need, this hands-on experience provided insight into the practical and physical facade of architecture in the formative years of their professional identities. UDS was further integrated into the teaching program in the Department of Architecture in the form of an undergraduate elective, reinforcing the longevity of this initiative.

4.CONCLUSION

The Urgent Design Studio has been dedicated to addressing the immediate and paramount needs evident in earthquake-affected areas. Through the collaborative efforts of its volunteers, it has evolved into a platform for ongoing education. Coming together every day after the months following the February 2023 earthquake, it has persisted with the continuous efforts of its members. Allowing the flexibility for each member to integrate their work in UDS into their packed schedules as students of architecture, this system has persevered on the very concept of personal responsibility. Participants in the project groups convened at times of their own choosing to determine the division of labor and continued to develop the projects on a voluntary basis.

In conclusion, UDS exemplifies a proactive and multifaceted approach to addressing the immediate challenges posed by natural disasters, particularly in its response to the earthquake-affected zones. It demonstrates a commitment to practicality, sustainability, and adaptability through innovative design strategies. These include the prioritization of modularity (as evidenced by the Wooden Housing Unit's use of identical panels and clamps for ease of installation and expansion), the exploration of alternative methods (as demonstrated in the PPRC Tent), and the promotion of ecologically friendly materials as alternatives to conventional ones (as seen in the Paper Log House).

The implementation of projects such as the Wooden Housing Unit exemplifies this comprehensive approach by aiming to provide both immediate relief and long-term solutions to the evolving housing needs of affected communities. The consideration of future expansions and modifications in the developed designs also informs the selection of materials. In this context, the efficient utilization of wood facilitates the production of modular units adaptable to specific requirements. Additionally, drawing from open-source project manuals, users can readapt projects using materials suitable for their individual needs or readily available within the region. By fostering a culture of continuous education and collaboration, UDS not only fulfills its immediate mission but also lays the groundwork for resilient and sustainable practices in future disaster response efforts.

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