

Global Context

My project is connected to the global context of scientific & technical innovation because the primary part of scientific and technical innovation is about exploring the natural world (in my case earthquakes), finding ways to cope with earthquakes, and applying my knowledge and understanding to conducting an earthquake-resistant building. Innovations can minimize destruction and environmental damage and protect communities. Furthermore, this project involves basic knowledge on “adaptation, innovation, and problem solving in response to natural disasters.” For example, intense earthquakes that have taken place, such as the 2011 Tōhoku earthquake in Japan and the 2023 Maraş earthquake in Türkiye, proves how building designs can directly affect survival rates and infrastructure damage. These ideas are displayed through my success criteria. The focus is on constructing a model that acts along seismic forces (function), safe to use and live (safety), as well as authenticity of a Turkish apartment building (building and size) and affordable materials to be implemented in Türkiye (cost). By designing a building that exceeds/meets these criteria, the project demonstrates how scientific and technical innovation are directly aligned to improve and resilience within earthquake-prone regions.

Inspiration Goal

I got inspired to design an earthquake-safe building in Türkiye using Japan’s design principles by originally thinking of doing a sustainable model. However, I thought it would be too much of a cliché. It made me realize how I should incorporate the extent of the issue in Türkiye. This idea originally started when I found my love for art at the age of 9 years old. Ever since, I have had an interest in pursuing architecture. Growing up, I always heard how my father’s life had been affected by the 1999 Gölcük earthquake; he lost many loved ones, and his own home had collapsed. When the 2023 Maraş earthquake in Türkiye occurred, I saw how many casualties there were; approximately 45,000 people died. Seeing so many people get trapped under collapsed buildings and infrastructure made me feel so helpless, knowing that I could not be part of the solution. Even after 24 years, earthquake safety continues to be one of Türkiye's most prominent issues. Now that I can make a positive impact on the community, I need to execute it. Incorporation of Japanese design principles came from the idea of the knowledge that Japanese government has on advanced elements after centuries of experiencing earthquakes. However, it must be cost-effective to implement to Türkiye’s standards.

Learning Goal

My learning goal is to be able to comprehend how seismic-resistant buildings work. This knowledge is valuable for me because I come from a country where earthquakes put citizens’ lives at risk. This goal connects to my personal interest in architecture, engineering, and design. Additionally, to make my learning goal even more measurable, I specifically aim to be able to explain at least three earthquake resistant elements, same as energy dissipation, base isolation, and steel joints. I will compare earthquake preparedness and seismic design principles implemented in Türkiye and Japan. I will be

exploring cost-effective materials like engineered timber and reinforced concrete for this design. Furthermore, I will explain the physics behind at least one of the seismic principles in my design.

Product Goal

I will be designing a cost-effective earthquake-resistant building for Türkiye using Japan's advanced design principles. Türkiye is in a high-risk earthquake area. A plethora of buildings are poorly built, leading to casualties and damage to infrastructure. My design could improve safety for the civilians and residents who live in earthquake-prone areas in Türkiye. The target users include engineers, architects, and even the government. As they are responsible for designing safe buildings for the public, the use of affordable materials will also significantly decrease construction costs. The building will integrate earthquake resistant principles from Japan, such as flexible structures and energy-dissipating elements. I will know that I have succeeded when my design will be able to perform/demonstrate stability by using an earthquake simulator (or visible shaking) or otherwise structural analysis. I chose this goal because I have had an interest in architecture (more so art) since I was little and I intend to design similar designs in the future. When I witnessed an over 45,000 Turkish citizens die in the 2023 earthquake, as well as get trapped under debris and still be displaced from their homes to this day makes me empathize with their situation. Finding out about how poor construction practices and government failures were responsible for collapsing structures made me extremely upset about why structural reinforcements had not been succeeded in the first place. The final product will include a 3D architectural model, which will incorporate earthquake-resistant elements, cost-effective materials, Japanese technology, a shake table to show seismic forces and a test report to document the shake test results.

Success Criteria:

	Below Expectations	Meets Expectations	Exceeds Expectations
1) Function	The model collapses or detaches large pieces during shake tests. It includes barely any earthquake resistant elements and cannot stand after 3 shake tests.	The model remains stable after 6 shake tests (10 seconds each). At least 1-2 earthquake resistant elements are included and at least 1 Japanese element is included	The model remains completely stable after 10+ shake tests. The tilt angle of the model during shake tests must not exceed 10 degrees. Seismic principles like base isolation, steel joint solution, and kigumi are logically integrated and demonstrate how it improves stability.

2) Safety	The model includes sharp edges and flammable/toxic materials. Shake tests were not conducted before the presentation.	The model uses safe, nonflammable, and flexible materials. No sharp edges are present. A basic inspection was conducted for cracks or detachment. At least 3 shake tests were conducted.	The model is completely secure to handle and to display. Shake tests were properly documented before presentation (like tilt measurement and inspections of photos or videos).
3) Aesthetics	The model lacks realism and proportions, does not look like a residential building. The model lacks any symmetry.	The model is a clear residential building with a symmetrical layout, follows modern minimalism, has at least 6 visible windows and 1 entrance. At least 80% of surveyed participants must rate realism 4/5 or higher.	The model is highly realistic and proportionate. The style reflects a Turkish apartment building. At least 85% of surveyed participants rates of realism 4/5 or higher.
4) Cost	The supplies used to build the model exceed 200 QAR and rely on expensive and scarce materials. The model does not incorporate cost effective material in construction.	The supplies used are under 200 QAR; some are reused or recycled. Real-life building materials are incorporated and show general cost effectiveness and accessible in Türkiye.	The cost of supplies is under 200 QAR; at least 40% of materials are reused. All materials incorporated into building are cost-effective, widely available across Türkiye and realistic in terms of real construction concepts.
5) Size	The model exceeds 40x35cm (about 1.15 ft), lacks proper scaling, and does not include a proper layout.	The model does not exceed a size of 40x35cm, includes a clear layout or blueprint, and has a maximum of 4-5 floors. The scale is mostly consistent.	The model has an accurate proportional scaling, has a detailed layout, does not exceed the size limits, and demonstrates smart spatial planning and structural balance.

6) Customer	The model does not meet the needs of the target user. Surveys show that people disagree on the safety and affordability of the model.	The model addresses some of the customers' expectations. At least 80% of participants agree that the building looks safe and meets reasonable affordability. The target users, like construction companies, city planners, and families, have been considered during the construction of the design.	The model fully meets the customers' requirements. At least 90% of surveyed participants agree that the buildings look safe and include affordability. The target users like construction companies, city planners, and families are highly relevant, and the needs of customers have been researched.
-------------	---	--	--

Action Plan					
Action	Priority	Status	Start	End	Notes
Brainstorm Topic	Medium	Completed	September 4, 2025,	September 8, 2025,	Brainstorming was done by creating a mind map of topics I am interested in.
Start Research	Medium	Completed	September 6 2025	September 8, 2025	The research gives an idea of what I want the project to be.
Finding Research Sources/ Examples	Medium	Completed	September 8 2025	September 9 2025	Finding inspiration shapes my idea of the product.
ISMA RT Goal	Low	Completed	September 11, 2025	September 14, 2025	The ISMA RT goal helps me with the learning goal and prod goal.
Learning Goal and Product Goal	High	Completed	September 13, 2025	October 6, 2025	These goals help me understand want I want to communicate and learn.
Global Context	Medium	Completed	September 25, 2025	October 14, 2025	The Global Context helps to identify how

					Humans survive during natural disasters.
--	--	--	--	--	--

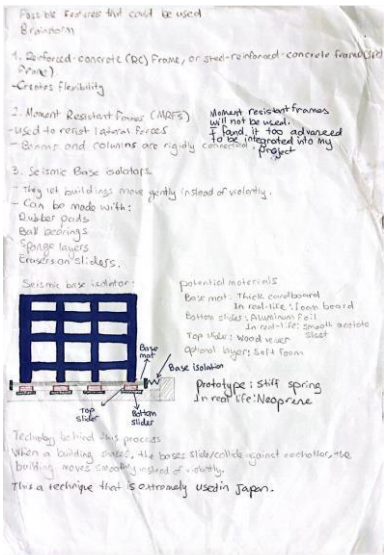
Success Criteria	High	Completed	October 2, 2025	October 20, 2025	The success criteria give me the ability to evaluate my product on a scale. Success criteria were done using prior knowledge about design specification points.
Action plan	High	Completed	October 16, 2025	October 21, 2025	Completing the action plan gives me the ability to see if I am on track.
Prototype	High	Completed	December 5, 2025	December 15, 2025	Helps me prepare materials and steps needed to construct a final model.
Final drawing of prototype	High	Completed	December 10, 2025	December 12, 2025	Final product drawing after feedback is given.
Gathering resources	High	Completed	December 15, 2025	December 18, 2025	Resources before construction were thought out carefully.
Final product	High	Completed	December 19, 2025	February 28, 2026	The product should be nearly finished.
Conducting physical earthquake test before presentation and documenting results	High	Completed	March 4, 2026	March 4, 2026	Conducted to make sure it does not collapse and shows stability.

Model inspection and document results	Medium	Completed	March 4, 2026	March 4, 2026	The building was inspected for detached pieces or cracks.
Final Improvements to model	High	Completed	March 4, 2026	March 4, 2026	Final details or unclear areas should be improved.
Survey about Product	High	Completed	March 4, 2026	March 7, 2026	Provides me with feedback for evaluation.
Document and measure tilt angle	High	Completed	March 7, 2026	March 9, 2026	10 shake tests were conducted with a protractor app used.

Criterion B

Selecting ATL skills that are being used to reach my learning goal:

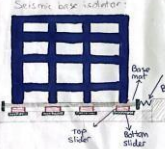
1. Thinking Skills



Pass the features that could be used Brainstorm

1. Reinforced-concrete (RC) Frame, or steel-reinforced-concrete frame (RC Frame)
 - Creates flexibility
2. Moment Resistant Frames (MRFs)
 - Used to resist lateral forces
 - Beams and columns are rigidly connected
 - *Handwritten note: Moment resistant frames will not be used. But it has advanced to be integrated into my project.*
3. Seismic Base Isolators
 - They let buildings move gently instead of violently.
 - Can be made with:
 - Double pendulums
 - Ball bearings
 - Spring layers
 - Grounds on sliders

Seismic base isolator:



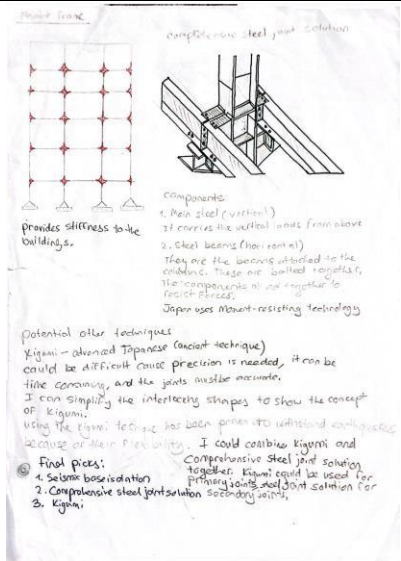
Potential materials:

- Base mat: Thick cast-in-place
- In real life: I can be used
- Bottom slides: Aluminum feet
- In real life: smooth neoprene
- Top slides: wood wear
- Optional: layers, ball bearings

Prototype: Shift spring in real life: Neoprene

Technology behind this process:

When a building shakes, the base slides/rolls against neoprene, the building moves smoothly instead of violently. This a technique that is extremely used in Japan.



Handwritten notes:

Reinforced-concrete (RC) Frame, or steel-reinforced-concrete frame (RC Frame)

Moment Resistant Frames (MRFs)

Seismic Base Isolators

Potential materials:

- Base mat: Thick cast-in-place
- In real life: I can be used
- Bottom slides: Aluminum feet
- In real life: smooth neoprene
- Top slides: wood wear
- Optional: layers, ball bearings

Prototype: Shift spring in real life: Neoprene

Technology behind this process:

When a building shakes, the base slides/rolls against neoprene, the building moves smoothly instead of violently. This a technique that is extremely used in Japan.

Figure 1: Brainstorming of Seismic elements

Figure 2: Brainstorming of Seismic elements

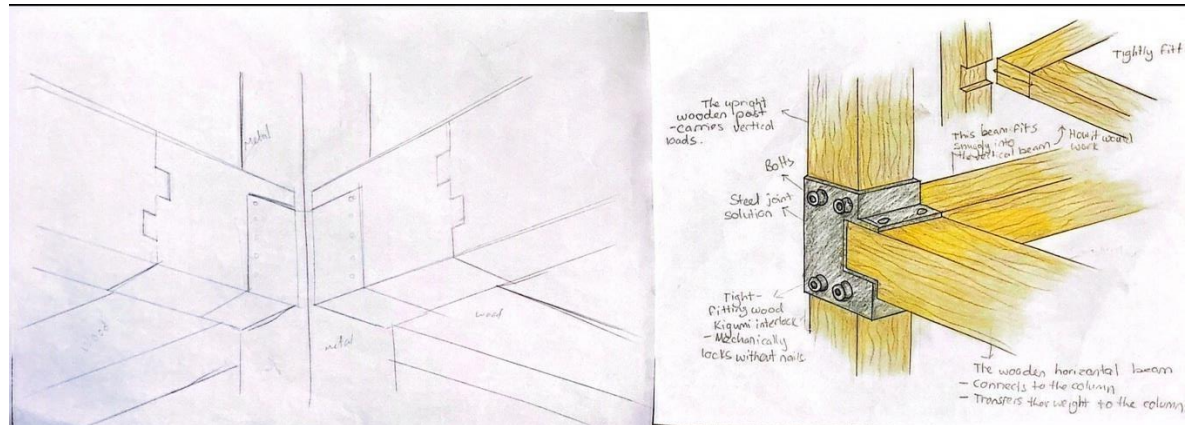


Figure 3: Draft and final drawing of Steel Joint Solution x Kigumi

Figure 1

First, the way I effectively used my critical thinking skills is through brainstorming design ideas to find the most suitable design plan for my building. An effective way of thinking was defining and explaining the purpose of these techniques in a way where I can comprehend them. I specifically researched websites and references to be able to jot down ideas. I brainstormed different cost-effective materials that could be used in my design. I decided to visually represent my ideas through detailed hand-drawn diagrams instead of only writing explanations because a lot of structural systems are mechanical and complicated. Visually representing them allows me to show how joints can connect beams and columns together, and how a building can respond during an earthquake (seismic base isolation). Annotating my base isolation diagram helped me simplify and communicate complex ideas effectively. This shows my critical thinking skills because I compared multiple design options and evaluated what would work the best according to my design.

Figure 2

As I continued to draw components, I learned how force works on these designs. I managed to adapt Japanese technology by focusing on their main components. I made sure not to replicate them exactly and instead simplify them into layered components to demonstrate shock absorption. I ended up choosing Kigumi, a comprehensive steel joint solution (an approach that integrates aspect of steel joint design) and seismic base isolation. I decided not to include a reinforced concrete frame because I could not justify it in a way where I could understand and apply it. By the end of investigating these different elements, through just critical thinking, I realized that I could combine comprehensive steel joint solutions and kigumi (hybrid) together. However, my ability to choose elements did not simply come from researching and brainstorming, I learned about the Kigumi technique during my time in Japan, which was commonly seen to be implicated in old temples that managed to withstand earthquakes after all those years. Having an observant eye is what made me able to implicate the idea of Kigumi into a modern building. My critical thinking skills allowed me to be able to adapt kigumi to a residential building while also maintaining why reinforced concrete would not be suitable.

Figure 3

Through my prior brainstorming, I produced a first draft and final drawing. In my first draft, the horizontal beams and the vertical column lacked detail. The first drawing failed to show how loads from the horizontal beam would transfer safely to the column, the kigumi element utilized in the center of the timber structure appeared to be unstable. By analyzing the weaknesses of this drawing, I came to the realization that this structure would not function well if it were applied to a real-life structure. Through the improved version, I redesigned the joint by adding a steel joint with bolts and a tight beam fit using Kigumi. This massive change showed how vertical columns are stabilized by the beam, making the structure more secure. I used creative thinking skills to transform my rough first sketch into a detailed and stable design. I experimented by combining materials that usually would not be combined, like timber and steel. In addition, I used annotations and texture to accurately communicate how each part of the joint solution works. Through these creative decisions, it allowed me to visualize the structure in a way where it is easier to interpret and function. I transferred my prior knowledge from physics and design into this project. From physics, I applied my understanding of forces, especially on how vertical loads travel from horizontal beams into a supporting column. From design and art, I made sure to utilize my drawing skills and proportions to express my ideas. By identifying the weaknesses in my draft, I used my decision making, analyzing, and problem-solving skills because I systematically acknowledged the problems and developed a safer and smarter structure.

2. Research Skills

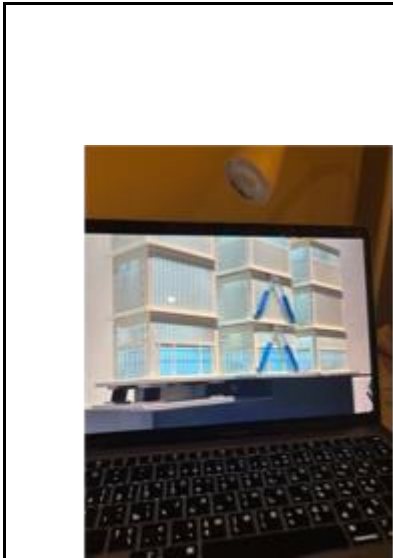


Figure 4: Investigating seismic forces from videos

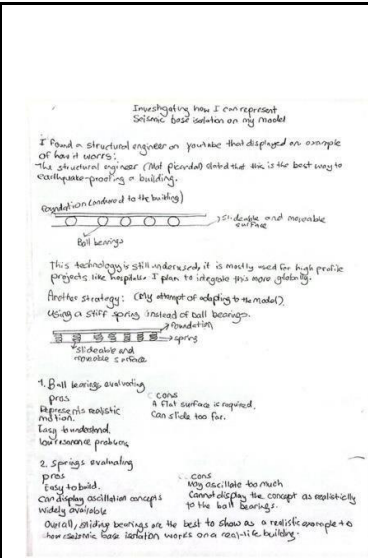


Figure 5: Investigating how to display base isolation on building

Appendix A
Figure 6: Interviewing expert on seismic knowledge

Figure 4

I used videos that highlights models displaying the certain seismic element I was searching for (not just seismic base isolation), online tutorials for shake tables, articles (like the BGS and the BBC), and expert advice to research not only elements, but to start from somewhere. It was extremely important to use more than one type of information literacy because information can be misleading or inaccurate in several cases. I made sure these sources were reliable and credible by checking the credentials of the authors, using MYBIB, comparing multiple

sources and I made sure to check that the information matched one another. Furthermore, being able to get a visual example (videos) helped me set an image in my head of how my model should look like. The video displaying the movement of the building shaking made the concept of seismic base isolation much easier to understand. This demonstrates effective research skills because I used multiple sources, including videos and articles, to evaluate information effectively. Additionally, I took inspiration and studied many modern minimalistic Turkish apartment buildings to grasp the typical materials, layouts, and features. I asked myself questions like: Which materials are commonly used in Turkish apartment buildings? What features do they all have in common? How are the windows and balconies arranged? Should timber tiling also be incorporated into my design? Asking analytical questions allowed me to make informed decisions about the realism, aesthetics, and size of my design.

Figure 5

A certified structural engineer (Mat Picardal) that I found online helped me understand how base isolation works in buildings. Through that, I tested ideas compared to the effectiveness of springs or ball bearings and how they can be incorporated in my model to show authenticity. In the end, as seen in figure 5, I brainstormed a pros and cons list to help me get to a decision. I ended up choosing ball bearings because they allowed for smoother movement and prevent oscillations like springs would. This evidence strengthens investigation as I systematically analyzed the options and applied the expert advice I had received to make a reasonable decision.

Figure 6

One of the most essential pieces of information literacy I received was interviewing a Japanese civil engineer and architect living in Türkiye, named Yoshinori Moriwaki. I came across this expert from a relative who is a building consultant, recommended I interview someone he knew through his work. The 7 interview questions I developed (appendix A) helped guide my conversation with the expert and gather relevant information. A valuable piece of information I learned between the differences of Japan and Türkiye is that Japan focuses on prevention and damage reduction, whereas Türkiye focuses on post-earthquake response. He recommended that I design a structure that is not only strong, but also smart and flexible. Through this, I decided that it was necessary to do a symmetrical plan layout to reduce torsion, making sure that two sides of the building were the same. I realized I needed to treat this small building just like a real one, which involved implementing a small center of gravity, so I decided to divide the base floor into quadrants and add a coin into each division, ensuring that the bottom of my building is heavier than the top. This interview influenced my design decisions. Based on explanations I received from the expert, I decided to focus on demonstrating base isolation in my model, as the expert even stated that this would be a highly effective seismic element. This led me to choose ball bearing for the base. I realized that interviewing gave me insights that sources online would never be able to provide. I also realized that research is not only about finding information online, but it is about evaluating sources and asking the correct questions.

Through my interview, investigating base isolation and watching videos of seismic forces being applied to seismically stable models demonstrated my research skills because I systematically gathered information and analyzed it and according to that, I made logical decisions.

Self-management skills

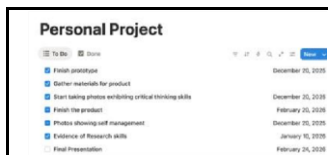


Figure 7: Personal project checklist



Figure 8: Model prototype

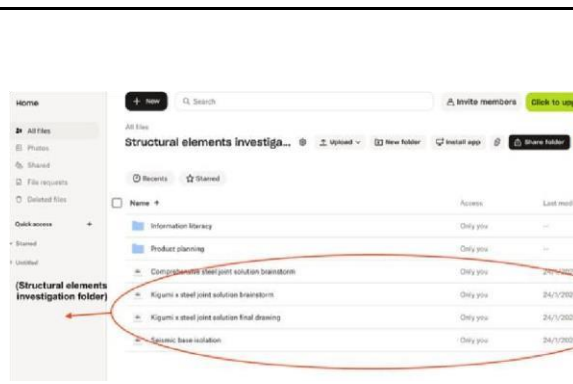


Figure 9: Criterion B evidence organizer

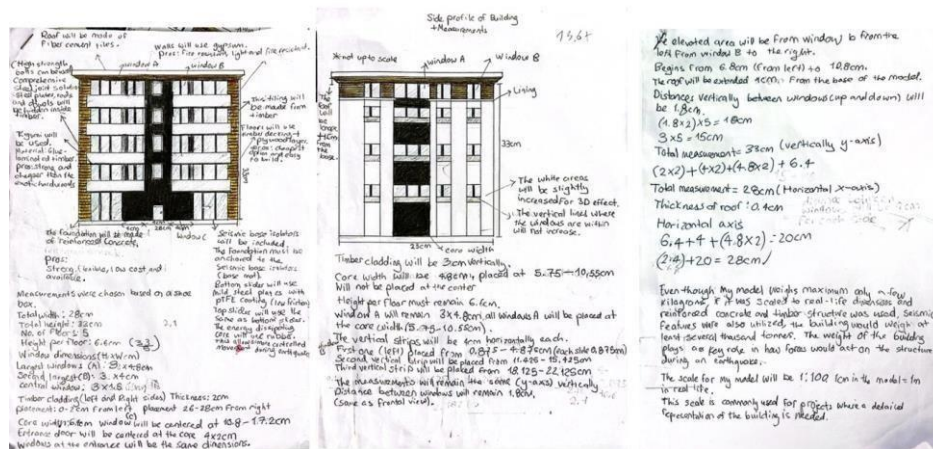


Figure 10: Drawing, measurements, and scale proportionality of model

Figure 7

To manage my organizational skills, I used the checklist website as my reminder to finish my product submissions. This checklist website helps me set a reminder of how behind I truly am on my tasks. The reminders are also one of my most effective ways to stay on task, I always make sure to set the priority high so that I can also receive notifications on my phone, keeping me alert of my duties. Additionally, to manage my time effectively, I made sure instead of spending my time drawing during my spare time, I used that time to execute my different drawing ideas of my building design. This helped me have a better envision of how my building should look like. The Notion reminders help me break large tasks into manageable steps by allowing me to divide submissions into time bound actions. Instead of viewing a submission date as an overwhelming task, I divided them into individual steps with its own reminder, making the caseload feel much more achievable. As a result of these reminders, I worked at a better pace and met deadlines efficiently. Setting reminders highlighted my self-management skills because it enabled me to break down large tasks into manageable steps.

Figure 8

My next photo that was extremely effective for my organizational skills was my prototype. The main purpose of creating the prototype before the final model was to map out the final measurements of my product, making me

visualize how the measurements will be and giving me the ability to have the idea on how I must begin my model, guiding me with my future planning decisions. Furthermore, I realized how models must be thought out carefully and slowly to ensure all features are clean and noticeable to the audience. By using the prototype, I could test my design ideas related to proportion, scale, and the layout of the model. I managed to do this by mapping out how the final size of my model will look like onto the prototype to ensure I have a 3D visual that can be achievable. The prototype allowed me to test spacing between structural elements, ensuring they are realistic and proportionate. Creating the prototype helped me organize the stages needed, like planning, testing, and the final product. This prototype helped me realize that I needed a final sketch of my design, measurements page, and a change of materials. Even though this prototype was not planned for time, I took it as a learning opportunity and not as a failure or a waste of time. Creating the prototype shows my organizational skills because it enabled me to plan, test, and revise measurements before building the final model. It also changed how I would approach the making of the final product.

Figure 9

My next photo that was found to be highly effective for my management skills was my criterion B evidence organizer. Creating labeled folders helped me keep my work in one place to avoid confusion. I separated my files into categories like information literacy, element brainstorming and product planning so that stages of my project were easy to access and made sure that even if the physical evidence might be lost, I can always have the digital version. Separating photos into different folders helped me divide them in a way I could understand. For example, I placed all my ideas for how my building was going to look (use of ball bearings and sketches of the building) into the product planning folder. This folder structure made it easier to find specific files to avoid wasting time while searching for them and to reduce stress during deadlines. As the personal project progressed, I continued to improve my organizational skills by adding the latest photos and folders to reflect on my ideas. This organized system not only improved my workflow but also enhanced the overall quality of my final structure. Because all my ideas and measurements and elements were all organized into one place, I was able to make better decisions during construction and avoid inaccuracies in proportions and placements of elements. Having easy access to my drafts and measurements allowed me to refine my design rather than rush it; this resulted in a visually accurate and appealing model.

Organizing digital files shows my management skills as it improved my workflow and reduced mistakes.

Figure 10

Throughout my personal project, I applied self-management skills effectively, specifically regarding my organization and time management skills. To manage my learning process effectively, I created a structured and time sensitive timeline by dividing my building process starting from research, planning, and drafting the drawing and budgeting materials. Breaking this project into these small stages prevented me from feeling overwhelmed by the complexity of structural engineering concepts. Organization skills were equally important in achieving my product goal, which was to design an earthquake resistant and cost-effective building model incorporating Japanese techniques. After my struggles with the prototype, I carefully organized the measurements of my building and the calculations to avoid errors, asymmetry, and confusion during construction. Regardless, when I encountered challenges like incorrect proportions, I demonstrated perseverance by remeasuring and readjusting measurements instead of risking the accuracy of my residential building. Drafting my building helped me envision how it was meant to look in its final form. By annotating the parts of my building, I managed to incorporate material use and evaluate their benefits. It ensured that I did not overspend while maintaining structural quality.

The drawings ensured that I would prepare my materials beforehand. When drafting these drawings, I made sure to check if they aligned with the expectations of the success criteria. Furthermore, the drawings helped me realize the amount of time I needed to spare each session in order to be up to date, for example, the front view of my drawing involved a 3D core width and balconies, which helped me realize that I should spare a lot more time on the front view rather than the side view. Additionally, I made sure to incorporate the weight and scale into my planning. I considered that if this were made in real life, the building would weigh several thousand tons. Knowing that, I accounted that the best scale would be 1:100 because most buildings suit this scale (1 centimeter (about 0.39 in) is equal to 1 meter). Planning my drawings strengthened my organizational skills because it ensured accuracy in my final product, proper use of materials, and prompt task completions.

Criterion C

At the start of my personal project, my learning goal was to comprehend how seismic resistant buildings work, are designed, and what elements would make a building safer, and how engineers can reduce damage to infrastructure during earthquakes. I needed to learn how I can apply this knowledge of seismic principles by designing my very own earthquake resistant residential model. After the completion of my project, I can confidently say that I have achieved my learning goal through my design process. Throughout my research, I have learned about different seismic/energy dissipating elements like seismic base isolation, shear walls, cross bracing, steel joint solution, and kigumi. Prior to starting my project, I only had a broad understanding that buildings could be designed to resist earthquakes and damage. However, I did not have any understanding about how forces move through a structure or how design elements can significantly reduce infrastructure damage. After my project, I can easily explain how seismic forces travel through buildings and how structural reinforcements can improve stability. My process journal demonstrates clear progress and evidence of my learning growth. For example, in the preliminary stages of my process journal (October entries) involved basic definitions and the attempt to comprehend seismic elements. As my research progressed, in my December and January entries (like the kigumi and steel joint hybrid) and the planning sketches, I began to apply the knowledge I apprehended into my very own design. Furthermore, I was able to use what I learned to make real choices in my design (theoretical knowledge) which was something that I was unable to do prior to this project. For example, when choosing which seismic elements would be ideal to display in my design, I analyzed each one about what would be the most realistic to show for a residential building and what would not necessarily get in the way of aesthetics; steel joint solution would not have been ideal to represent because I would have to show the of layout/structure of the building while also having to consider that I must consider stability. This clearly demonstrates how my thinking changed from just interpreting simple concepts to applying them at an engineering level. Throughout my project, I developed several key ATL skills like research, critical thinking, and self-management skills. The most important ATL skill that I improved was my research skills. At the beginning, I had to rely on basic explanations and examples about seismic proof buildings. As I progressed deeper into the project, I started to compare different seismic resistant elements, accurately brainstorming their advantages, disadvantages, and how it can be a real-life application. This made me think more critically and creatively rather than just gathering information found online. I had to justify my choices of what elements would be more effective from an engineering point of view. Continuing further, my management skills are deeply strengthened by organizing my research, evidence collection, and making sure I stay within the budget. Thus, improving my discipline and progressing my ability to work independently. An additional skill I developed was my problem-solving skills. During the making of my model, I faced plenty of structural challenges, like trying to make sure the building is stable, symmetrical, and at

least one seismic element being present on the model. Instead of starting again, I reinforced certain areas. This challenge strengthened my ability to think critically while under pressure. Another key skill that was developed was time management. Design planning, budgeting, handling research, and making of the design required careful scheduling. I underestimated how long this building model would take to construct. By reflecting, I learned to distribute sufficient time for myself to work.

In terms of the IB Learner Profile, I strongly developed as an inquirer. I was genuinely interested in how engineers reduce damage in areas of risk. This curiosity encouraged me to explore beyond the basic information and understanding I have like how materials affect earthquake resistance, force distribution, and solutions. I also progressed as a Reflective learner. I made sure to consider feedback carefully.

Overall, the personal project has allowed me to develop a sense of independence, organizational skills, research skills, and critical thinking. This reflective experience has further strengthened my interest in pursuing architecture and has taught me how much of an impact a design can contribute to solving real world problems like earthquake safety. Therefore, the personal project has allowed me to become a better person and an even better student.

When evaluating my product against the success criteria, I can confidently say that model exceeded expectations across multiple categories. In terms of functionality, the building remained stable after 6+ shake tests; the tilt angle remained under 10 degrees. To confirm this, I measured the stability of the model by using a protractor app that included a 90-degree angle as a reference. The tilt did not exceed past 2.7 degrees, even after 10 shake tests lasting 10 seconds each (an example can be seen on appendix B), meaning it clearly met the exceeded expectations category. A precaution I took to guarantee accuracy was to keep the camera at an eye-level shot with the model. Steel joint solution and kigumi (hybrid) were not represented on the building but conceptually incorporated into the design to represent how forces are absorbed and redistributed across the building.

Appendix C

Seismic base isolation was accurately shown on the model by involving metal balls by rolling them on the model base. This method allows for the testing of the systems' performance, therefore reducing the impact on the model. This testing can provide a realistic application for real-world building projects. To further show seismic forces, I constructed an earthquake shake table based on an online video. The shake table gave me the opportunity to apply vibrations to the building to test how my structure responded to such forces. This testing method allowed me to evaluate the stability of my structure and base isolation system.



No. Of Shake Tests	Left (°)	Right (°)	Maximum Tilt (°)
1	88.2	91.8	1.8
2	89.1	90.9	0.9
3	88.2	91.8	1.8
4	89.1	90.9	0.9
5	87.3	92.7	2.7
6	89.1	90.9	0.9
7	88.2	91.8	1.8
8	89.1	90.9	0.9
9	89.1	90.9	0.9
10	89.1	90.9	0.9

Regarding safety, the model was fully secure to be displayed by prior shake tests. All materials were nonflammable and carefully glued to prevent detachment and flaky pieces. Inspections and shake tests (appendix B) took place to confirm that the stability was tested and proven rather than just assumed.

In terms of aesthetics, the model certainly exceeded expectations by realistically resembling the architectural style of a typical Turkish apartment building while still maintaining a symmetrical plan layout and proportionality.

A feedback survey was conducted with 10 participants; the participants were a combination of classmates and relatives who had knowledge about my project. Participants were to rate the realism of my building on a scale of 1 to 5. The feedback I received from the survey supported this reasoning as over 85% of 10 surveyed participants had rated the realism as 4/5 or higher. This means that I effectively balanced the functionality of the design and aesthetics.



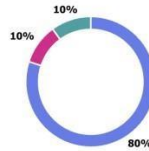
The model exceeded expectations of size by remaining with a limit of 40x35 cm (about 1.15 ft), and accurate proportionality was used throughout the structure. The base size was 33x28 cm (about 11.02 in). The floors, windows and reinforcements were aligned and followed spatial planning rather than randomly assembling. I made sure to have all the measurements of the model both from the horizontal axis and the vertical axis. Therefore, strengthening the realism and the structural integrity of the design. Over 90% of 10 surveyed participants agreed that the building looked safe.



The total cost of the materials ended up being 362 QAR, which exceeded my initial budget; the meeting and exceeding expectations section required the budget of the model to be under 200 QAR. Meaning that my project only reached the below expectations category. However, some items such as laminated paper and popsicle sticks were borrowed from school to reduce expenses. Additionally, other materials like the wooden board, pipes, and screws were essential to maintain the model's realism and display seismic forces. By tracking the cost of the materials beforehand, I had to make informed decisions about what items were essential for the completion of the project. Although, the materials that were chosen were very realistic for flexibility and accessible across Türkiye. By reflecting on this experience, I learned how important balancing requirements were with the cost and managing resources effectively even if requirements are exceeded. Another limitation was that there were not enough deep analysis and discussion of the materials and their benefits and limitations; there was not sufficient discussion regarding what would be the most suitable. Even though my model was completed successfully, a cost assessment would have shown that scaling this project up to 1:100 would be expensive. Another limitation regarding my cost investigation was that I did not ask questions about which materials would be suitable for a cost-effective seismic design. My focus was on the seismic principles, disregarding cost. Because of this, most of my research (material choices) was based on my own assumptions and online research rather than expert advice.

7. Do you think the materials used are affordable?

Yes 8
No 1
Maybe 1



More details

Materials and Cost List

Material	Cost (QAR)
Glue gun	30
Exacto knife	30
Black acrylic paint	10
2 form boards	24
Laminated paper	Free (borrowed from school)
Popsicle sticks	Free (borrowed from school)
Glue gun sticks	12
Liner	10
Wooden board	35
Screws	32
Hook screws	35
Tape	20
Pipes	45
Rubber bands	8
Ball bearings	35
Two wooden dowels	36
Total cost: 362 QAR	

The model certainly exceeded the expectations of the customer's requirements. The target users- including families, city planners, and construction companies were thoroughly considered throughout the research and construction phase. This shows how the incorporation of the seismic elements did not affect the practicality or the affordability of the model; it was more so considered how it would be possible to incorporate affordability into a seismic resistant model. The use of cost effectiveness and accessibility ensured that this would reflect a realistic construction within Türkiye. This model favorably met stakeholders' expectations. However, 80% of 10 surveyed participants agreed that this building looked affordable because material use was not discussed beforehand. (Presentation had to be delayed due to situations in Qatar).

If I were to redo this project in the future, I would focus more on the internal detailing of components and representation of components on the model (2/3 of the seismic technology was not physically visible on my model). To explore this improvement while I had the opportunity, I made an additional drawing that contained all 3 elements (appendix C). I would aim to include specific questions (such as cost-effective materials) to an expert that addresses all the subtopics of my project. It is all about asking the right questions that will get you ahead in life. Another limitation to my project was cost; I would give attention to doing more analytical research on real life materials and evaluating them to stay aligned with Türkiye's interests. The final limitation I would focus on would be asking people who have thoroughly listened to my presentation to respond to my survey; however, that was not a factor I had control of.

Appendix D

My Products Level of Achievement (using my success criteria):

	Below Expectations	Meets Expectations	Exceeds Expectations
1			
2			
3			
4			.
5			
6			

