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# Digital Community Hub in Serpong, Tangerang Selatan (An Eco-Technology Architecture)

***Nandini Anindita Kristi[1]*, Adryanto Ibnu Wibisono[2]***

*[1,2]Universitas Pancasila, Indonesia*
***Corresponding Author:** *nandinikristi@gmail.com*

**Abstract:** Serpong District in South Tangerang, Banten Province, Indonesia, is an area that has the greatest potential for creative economic development but does not yet have facilities capable of accommodating this activity. Therefore, a digital community hub is needed that can fulfill the facilities and needs for the development of the creative economy in the fields of information and technology. It is necessary to plan and design the digital community hub that pays attention to and responds to climate and environmental conditions by applying eco-technological architectural concepts, to obtain a building design that is responsive and in harmony with the surrounding environment. Methodologically, the application of the concept of eco-technology architecture includes the application of design strategies for energy efficiency and adding value to the quality of buildings for the environment, utilization of renewable energy, selection of materials and openings in buildings. Its design is divided into four zonings, namely, rental office zoning, digital capability development zoning, culinary zoning and service zoning. In its operation and maintenance, this building utilizes energy efficiency in the use of water and lighting. The green roof which is used as a communal space adds aesthetic value while supporting the eco-technological architectural concept implemented.

**Keywords:** digital community hub, eco-technology architecture, energy efficiency, green buildings

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## Introduction

In recent years South Tangerang City in Banten Province, Indonesia has experienced rapid development in almost every sector, especially in the economic sector which is supported by the residential, commercial, service and trade sectors. This was followed by the aggressive attitude of the South Tangerang City Government in implementing accelerated infrastructure development to support the development of existing sectors, including the development of the creative economy. This is proven by the highest economic growth rate in Banten province which is held by South Tangerang City with an achievement of 7.43% (Kontadakis et al., 2018). Apart from that, survey data and statistical results also show that the GDP of the creative economy grew by 4.38% in 2015 (Wibowo, 2017).

Seeing the potential and goals, as well as the pace of economic activity, the South Tangerang City government is actively paying attention to and developing the creative economic sector. This area of the creative economy sector is considered promising, especially in the national economy and will become a new

force for economic activity in the future. The creative economic potential of South Tangerang City is quite large, one of which is proven by the number of start-up companies that have been formed in the South Tangerang area. Apart from that, as a city that is proclaiming a smart city, South Tangerang City also has the potential to develop technology to access information and accommodate the growth of a network-based (online) creative economy. One way to fulfill and develop this potential is that facilities are needed that can become a forum for creative economy actors to carry out activities and develop the creative economy in the information and communication sector.

Apart from contributing to advancing human life, technological and industrial developments also have an impact that causes increased energy consumption and damage to the environment. With the environmental issues that occur, it is necessary to apply environmental friendliness to building design so that it can adapt to environmental changes that occur and facilitate design to provide a feeling of comfort and safety. One design approach that can be applied is eco-technology architecture, which is an approach to design that studies the relationship between design and the regional environment using environmentally sound technology. Eco-technology architecture itself has already been analyzed and discussed by some schollars such as Abd Raub et al. (2015), Attiya et al. (2023), Lukita & Miranda (2018), Putra et al. (2024), and Saputri & Ashari (2023).

Based on the issues that have occurred, a facility is needed that can be a forum for bringing together various activities and developing the potential to accommodate the growth of the creative economy in the technology sector in one location. The facilities provided must have flexible criteria and be easily accessible to potential users. Apart from that, environmental issues require the creation of facilities that have an environmentally friendly approach that is able to guarantee the safety, comfort and health of potential users. Therefore, a digital community hub design concept is needed in Serpong, South Tangerang with an eco-technological architectural concept approach that can respond to environmental issues that occur in the Serpong area.

Digital Community Hub can be broken down into two main points of discussion, namely community centers and digital community centers. Community centers, which can also be called community hubs, are formed as a response to the issue of the need for service provision, increased efficiency and improved facilities. In general, a community center can be interpreted as a community facility for socializing or carrying out activities with the services and facilities that have been provided. A community center can be defined as a business area in a community that has an impact on a wide scale, grows and is locally responsible. Community centers can be differentiated by ownership, i.e. owned and managed by the public sector, provider organization or community organisation. The existence of a community center provides benefits to users, namely, being a place for users to socialize, carry out creative economic activities, a place to discuss and share ideas and a place to rest, recreate and entertain themselves with shopping or culinary tourism.

Digital hub is a development of a community center, which can be interpreted as a physical space that becomes a forum for a community with easy,

fast internet access facilities and offers services. Digital hubs provide services to connect within the network, support the development of digital skills and encourage the use of technology within the network. Digital hubs aim to improve environmental quality in local networks and are easily accessible to the public, businesses or local authorities. The digital hub is a means that provides change in the socio-economic sector and has a long-term impact on the wider community (BPPD Tangerang Selatan, Profil Kota Tanggerang Selatan, 2020).

Apart from that, digital hubs are considered to be able to build collaborative communities that encourage social connectivity and economic change, become facilities for exchanging knowledge, cultivating local technology-based entrepreneurial culture, creativity facilities and a combination of physical space and networked space. This is intended to increase the ability of individuals or entrepreneurs to develop technology in various types of expertise. According to Ashmore (2019), digital hubs are the primary interaction space in this digital era. Specifically, the presence of a digital hub is aimed at presenting an inclusive digital community, which has the existence value of balancing primary interaction needs with the digital needs that grow within it. Digital hubs become relevant along with the development of society whose needs are constantly changing.

The occurrence of climate change and the decline in environmental quality caused by the growth and acceleration of industrialism has resulted in environmental conditions changing drastically and the supply of natural resources being depleted. This raises awareness of the importance of architectural design that is responsive to local climate conditions. Ken Yeang, in an interview with CNN, said that architecture and the environment must work in harmony and support each other. Therefore, a concept is needed that is able to respond to climate and environmental problems in building design, one of which is by utilizing environmentally friendly technology.

Eco-technology is a science that studies the reciprocal relationship between living things and their environment and is the transformation of ecology into technology as tools and designs based on the natural environment (Utama & Prianto, 2022). Eco-technological architecture can be characterized based on:

- Expression of structures and constructions that are connected and become one with the environment
- Use of materials that are sustainable with the natural environment and are long-lasting
- Natural ventilation system as the main circulation source by utilizing building design and outside air processing to be used as artificial ventilation in the building
- The natural lighting system is utilized as well as possible as a source of building lighting

The study of eco-technology architecture can also be seen from several concepts as follows.

- Making connection: focuses on creating a relationship between the design and the surrounding environment which is applied to the building through an analogy process

• Civic symbolism: designing with different ideas and shapes so that the building can become a public symbol for the surrounding environment

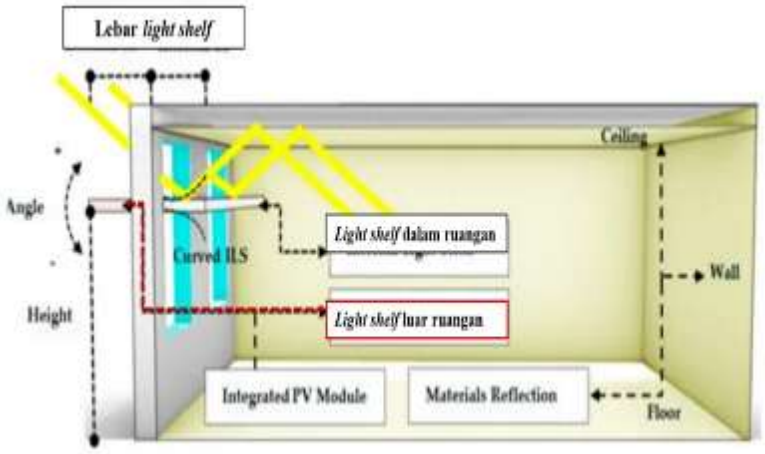
• Urban responses: looking for problems related to the city environment and responding to them in design

• Energy matter: implementing energy efficiency in buildings to maximize energy utilization with existing technology

• Sculpting with light: focuses on natural lighting systems as lighting in the interior of the building and the operations and atmosphere of the building can be supported by this lighting

• Structural expression: prioritizing building forms with more modern and updated structures and applications that can be integrated with nature.

Solar lighting in buildings in tropical climates must pay attention to heat gain due to solar radiation. Effective natural lighting in a room includes distribution of light, projection of natural shadows and avoiding glare that can interfere with activities. The method of utilizing solar energy is considered to be able to create physical comfort for buildings in terms of lighting without using additional energy (Handoko & Ikaputra, 2019). Effective energy use takes into account environmental conditions without requiring additional construction costs and has a small impact on the environment, thereby saving more energy in the course of building operations.

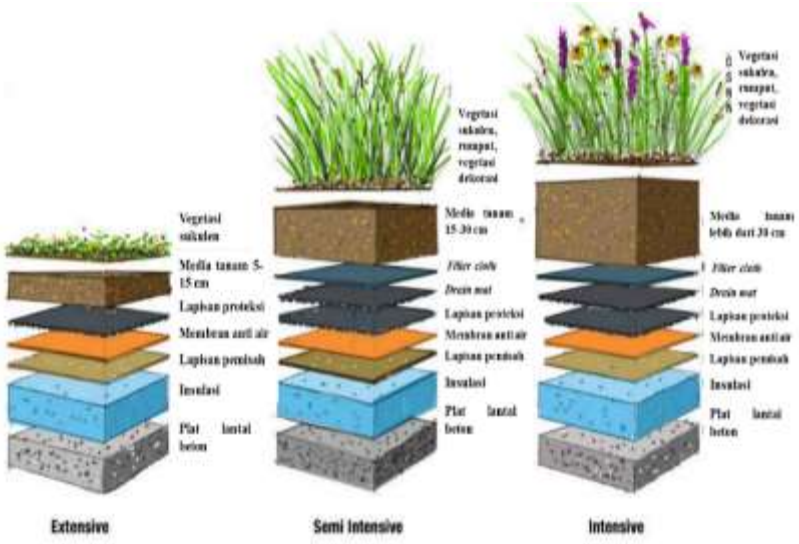



[Source: Mesloub & Ghosh, 2020]
Figure 1. Overview of the working principle of a light shelf

One way that can be done to maximize the distribution of sunlight into the room is to apply sun shading facades and use light shelves in buildings (Ministry of Communication and Information, Republic of Indonesia, 2017). The use of sun shading and light shelves is considered the right solution for controlling natural lighting in a room. This system is easy to modify, provides many options for design solutions and can regulate most of the incoming light flux to the ceiling of the room, so that the room gets the same intensity of natural lighting in each part, especially if installed on a facade oriented towards the south (Nadhif & Sutanto, 2019). The materials used can be made of wood, glass, plastic, metal

panels, plaster, acoustic panels and other materials that can help reflect sunlight into the building (Rizki, 2022).

One application of the urban responses concept that suits the problems of the design site is the application of a green roof (roof garden). Green roofs can absorb rainwater, help reduce air and noise pollution, and reduce the effects of climate change, especially global warming. Green roofs can add value to aesthetics, because the impression created looks at one with nature (Darmiant, 2018).




[Source: rainscapingiowa.org, 2015]
Figure 2. Green roof layer

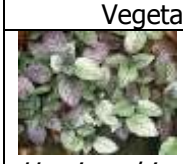
Green roofs are classified based on the thickness of the planting medium, maintenance intensity and level of role, namely:

- Extensive green roof: a type of green roof with a planting media thickness of less than 15 cm and uses semi-fertile soil because it is not used as a communal or public area.
- Semi-intensive green roof: has a planting medium thickness of 15 to 30 cm, uses fertile soil so that more varied and decorative vegetation can be planted.
- Intensive green roof: has a planting medium thickness of more than 30 cm and can be planted with various types of vegetation. In its application, it requires a large and strong building structure to accommodate the heavy load of the green roof layer and the load of vegetation. The water system on this type of green roof must be very careful so that the vegetation can survive.
- Brown roof: a type of green roof that is intended to grow wild vegetation to form an ecosystem.

The green roof construction layer consists of a concrete floor plate, waterproof membrane, drain mat, filter cloth, planting media and vegetation (Rahayu, 2020). The concrete floor plate is at the bottom layer and will function as a roof structure, which will be covered with a waterproof membrane. Then, a drain mat will be installed to assist the irrigation system in moving water flow. Between the drain mat and the planting medium there is a filter cloth, which

separates the drain mat layer from the planting medium. Once everything is installed, the planting medium can be sprinkled before being planted with vegetation. Vegetation that can be planted on a green roof is plants with fibrous roots, whose growth tends to spread rather than continuing into the ground. Vegetation with tap roots can damage the roof structure, which can cause leaks and endanger building users. Suitable vegetation to be planted on a green roof can be seen in Table 1.

Table 1. Green Roof Vegetation

| Vegetation | Function | Information |
|---|---|---|
|  *Hemigraphis colorata* | Planting media cover, grows in media to a depth of 100 mm | Suitable for planting in shady areas until it gets full sun. Its spread is relatively fast. |
|  *Cordyline fruticose* | An aesthetic enhancer, grows in media to a depth of 200 mm | Suitable for planting in areas that receive light shade |
|  *Alternanthera sessilis red* | Planting media cover and divider, can grow in media with a depth of 100 mm | Can grow in areas that receive full sunlight and requires planting media that tends to be dry |
|  *Zoysia japonica* | Planting media cover, grows in media to a depth of 100 mm | Can grow in areas that receive full sunlight |
|  *Alysicarpus vaginalis* | Planting media cover and erosion control | Grows well in semi-shade and full sun. Can grow in various planting media from sand to clay. |
|  *Portulaca grandiflora* | Enhances aesthetics and can grow in media with a depth of 100 mm | Can grow well in sunlight and does not grow well in wet soil. |
|  *Spathoglottis unguiculata* | Planting media cover and aesthetic enhancer, can grow in media with a depth of 100 mm | This plant grows well in full sun to partial shade although it tends to flower more abundantly in brighter conditions |

(Source: Yok; Sia, 2008 in Nasrulloh, *et al*. 2022)

## Methodology

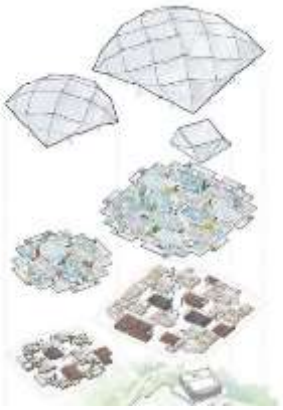
The design method that will be applied in this final assignment is descriptive qualitative research by collecting and comparing literature data and field surveys as done by some other architectural scholars such as Anwar & Ardhiati (2023), Gunawan & Ardhiati (2022), Herlambang & Ardhiati (2023), Kholis (2023), and Subagyo & Adi (2023). The qualitative descriptive method is used to research the condition of natural objects where the researcher as the key tool uses combined data collection techniques, inductive/qualitative data analysis, and the results of qualitative research emphasize meaning rather than generalization. The data obtained will be used as the basis for the design. Location data will be obtained by surveying the design location directly and searching for literature data related to regulations and site conditions. The design method will be carried out by searching for ideas, collecting data, analyzing and obtaining a synthesis.

The search for ideas for a digital community hub was based on concerns about the lack of space that could facilitate and support activities related to the development of the creative economy in the fields of information and technology. In addition, the acceleration of industrialism has resulted in climate change which is quite a concern in this design. The approach that will be applied is eco-technological architecture which is a solution to the current climate change problem. After searching for ideas, a data collection stage will be carried out by directly observing the condition of the design site and studying documentation and notes related to the design. Data can be collected by collecting alternative locations and conducting surveys directly. A location survey is carried out to observe the potential of the surrounding environment, problems on the site and potential on the site. Apart from that, it will search for literature data such as journals, articles, books, books and digital books related to objects. At this stage, data will be collected on regional regulations, infrastructure development regulations and other regulations. A precedent study will be conducted to collect and compare literature data regarding digital community hubs and eco-technology architectural design approaches.

The data that has been collected will be analyzed and processed to make it easier to understand. The analysis process is a point of view that needs to consider many aspects related to site location planning. The analysis discussion can be divided into site analysis, function, users and activities, space, form, structure and utility. After the analysis process is carried out and problems related to design are found, a synthesis process will be carried out to find solutions to these problems. The synthesis process produces space programs, space relationship diagrams, building forms, structures and others. The synthesis results will be collected into one to form a design concept.

Followings are the potential concept of the current design of community hub in Serpong, Tangerang.

## *Google Bay View, United States*



[Source: Architectural Record, 2022]
Figure 3. Google Bay View

Google's multi-mass building is a manifestation of Google's ambition to create sustainable, human-centered innovation for the future. The building is divided into two floors, with work spaces and team meeting rooms on the upper level and facilities space below. There is a series of indoor terraces throughout the building connecting the two levels, providing easy access to the café, kitchenette, conference room and function room. This area promotes the physiological benefits of physical movement when circulating between different levels and modes of work, and doubles as a wayfinding tool.

The superstructure uses a large-span canopy with average orthogonal column spans that allows the entire second level workspace to be opened and connected under one roof. This workspace prioritizes access to natural light and views, with glare reduction through carefully designed clerestory windows that accentuate the canopy. All three buildings were constructed as lightweight canopy structures optimized for interior lighting, views, collaboration, experiences and activities.

## *Machinery Tower, Malaysia*

[Source: T.R. Hamzah & Yeang Snd. Bhd.]

Figure 4. Sun shading diagram of the Mechanical Engineering Tower

The Mesiniaga Tower is a tall building that embodies Ken Yeang's bioclimatic design principles. Yeang's interest in environmentally responsible and adaptive design led him to apply it to the design of this high-rise building. The bioclimatic approach is applied by uniting the building with vegetation on the facade through vertical landscaping to create natural ventilation, improve the microclimate, reduce heat and the intensity of sunlight entering the building. Vegetation is arranged on the balconies in a circular manner up to the end of the tower. Vertical landscaping creates natural ventilation, improves the microclimate, reduces heat and the intensity of sunlight entering the building. Buildings also naturally utilize outside air as natural ventilation by reducing outside air pressure and solar heat. On the building facade, large skycourts are also designed that encircle the building from bottom to top.

To respond to sunlight, the building orientation is designed perpendicular to the movement of sunlight and uses sun shading to reduce solar heat. The theory is based on the ecosystem concept, seen from the shape of the building in the form of a tube with a crown at the top and surrounded by vegetation. The existence of a vertical landscape provides living facilities for other habitats. Apart from that, vertical landscapes can form photosynthesis processes from sunlight and produce oxygen needed by living things.

## *Nanyang Technology University, Singapore*

Nanyang Technology University, located in Singapore, carries an Eco-Technology theme which can be seen in the building which is shaped like a hill to be in harmony with the surrounding environment. The roof that is shaped like a hill is a green roof that can be passed by pedestrians and can be used as a communal area.

[Source: YouTube, 2013]
Figure 5. Nanyang Technology University

## *Springvale Community Hub, Australia*

Springvale Community Hub is a public place that combines a public library, public space and government offices that stand in a public park. The building serves as a reflection of the Springvale community, which is one of the most

culturally diverse communities in Australia, and the unique identity of its residents. The building embodies the importance of representation and connection and is intended to foster a sense of shared ownership, weaving the cultural narrative of the region into the fabric of the building. This results in a mix of diverse public spaces and encourages interaction and connection between communities.

## Results and discussion

The design location is on Jalan Pahlawan Seribu, Bumi Serpong Damai, South Tangerang with a land area of 2.56 hectares. The area in this area is designated as a development area for the economic sector, industry, private offices and space for informal sector activities.

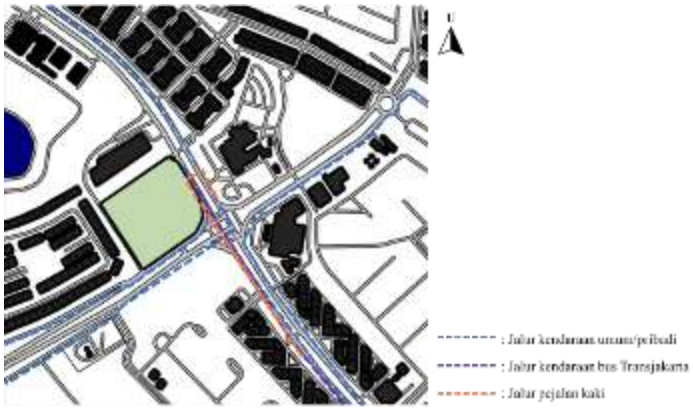
[Source: Google Earth, 2022]
Figure 6. Location of Digital Community Hub design

The design location has a zoning designation for trade and service areas with general provisions on the intensity of space utilization which include:

- Maximum KDB 60%
- Maximum KLB 9.6
- Maximum KDH 60%
- Maximum KTB 65%
- GSB is a maximum of 6 meters from the outer edge of the site.

### *Analysis*

Through the data it is known that reaching the site is quite easy because the site is easily accessible by public transportation and private vehicles. Circulation analysis includes vehicle and pedestrian movement patterns around the site and traffic movements around the site. Jalan Pahlawan Seribu which is right in front of the site has a traffic lane width of 15 meters, with 6 roads and 2-way lanes. Traffic conditions around the site are busy and smooth with quite high vehicle intensity because it is the main road that connects the areas. High vehicle intensity occurs in the morning from 06.00 to 08.00 West Indonesia time and in the afternoon from 16.00 to 19.00 West Indonesia time.



[Source: Kristi, 2022]
Figure 7. Site circulation analysis

Pedestrian circulation around the site is not very busy, because pedestrians or Transjakarta users only stop at bus stops. There are no pedestrian paths, making it difficult for pedestrians to access the site. Pedestrians have to pass through areas that are overgrown with weeds and are quite disturbing to pedestrian comfort. However, on the east side of the site there is a guardrail and vegetation separating the road and the site. Apart from public transportation and pedestrians, the traffic lane around the site is also a route and access to public transportation services such as buses, garbage trucks and fire engines.

Based on data on traffic conditions around the site, there are several alternative site accesses that function as entrances and exits to the site. Alternatives one (1) and two (2) are entry and exit access intended for pedestrians close to bus stops and red lights which are directly connected to pedestrian paths, thereby facilitating pedestrian access to the site.

[Source: Kristi, 2022]
Figure 8. Site access and circulation analysis

Furthermore, there are two alternative pairs of vehicle entry and exit access, namely on the East side (3) which can be accessed directly from Jalan Pahlawan Seribu and on the North side (4) which can be accessed from Jalan Golf Artery. The disadvantage of alternative (3) is that it can cause congestion on traffic lanes when vehicle intensity is high. Alternative (4) can prevent the possibility of traffic jams occurring due to the intensity of vehicles on Jalan The Golf Artery is not as

high as the vehicle intensity on Jalan Hero of a Thousand. Alternative (4) can be used as access for service vehicles such as transport trucks, so that it does not interfere with activities in the front area of the site. Users with motorized vehicles can access the site and then drop off passengers at the drop-off area (9) or go directly to the parking area in the form of a parking lot or enter the basement area (5).

Alternatives for exiting the site are on the West side, namely alternatives (6) and (7). The exit on the West side facilitates vehicle circulation within the site and the paths around the site. Apart from that, the access door on the West side reduces congestion because it is directly connected to Jalan Pahlawan Taruna is quite rarely traveled by vehicles and tends to be quiet because it is close to a residential area. Exit access (6) can function as circulation for service vehicles that want to leave the site or exit the basement area (8), while access (7) can function as exit access for visitors or vehicles that only accompany building users.

In the building design, two accesses to the building will be created, namely through the lobby drop-off area and the parking area, so that the mass of the building can be placed in the middle of the site to make it easier for visitors to access and reach the building.

[Source: Kristi, 2022]
Figure 9. Overview of existing vegetation on the site

Vegetation on the site is found on the outer side surrounding the site and on the inside of the site. There are trembesi trees, squirrel tail palms and bushes on the outer side of the site along Jalan Hero of a Thousand. Vegetation on the path around the site can function as a guide for site circulation, forming air circulation and as protection against dust. Several trees on the inside and outside of the site will be maintained as shading, cooling and decorative elements for the open spaces of the building.

## *Noise Analysis*

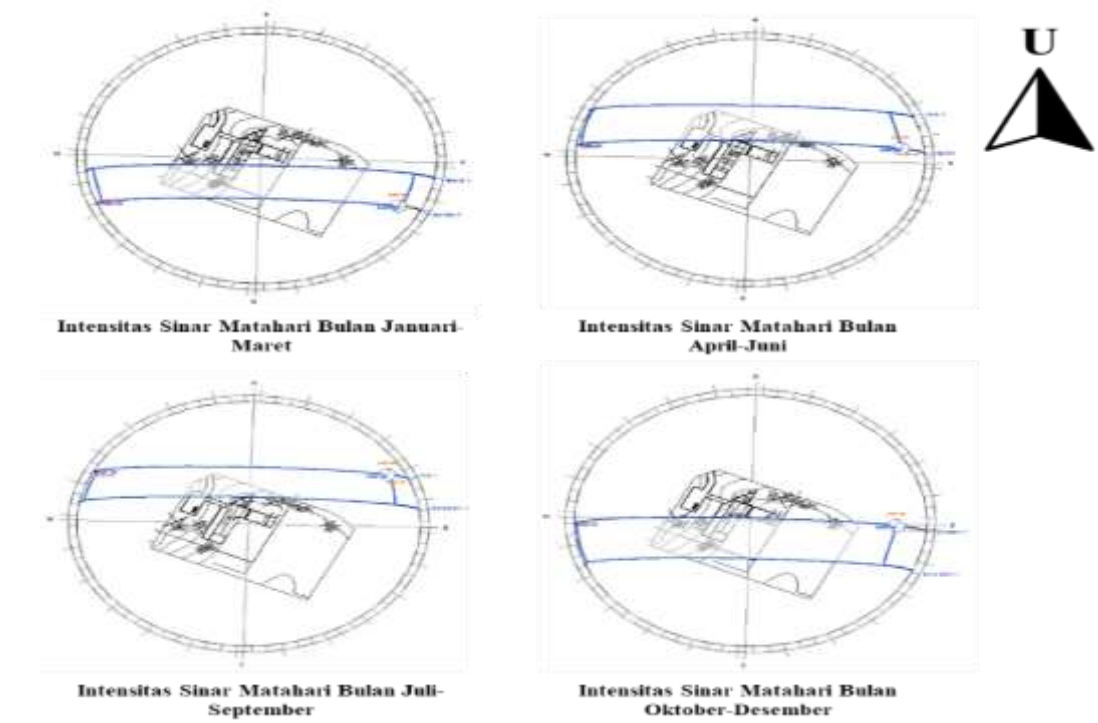

[Source: Kristi, 2022]
Figure 10. Noise analysis on site

Noise analysis on the site uses the Decibel Scale application to determine the noise level on the site. The biggest noise source comes from the East side of the site with a noise level of 85-90 dB, which comes from the main road and road intersections which are often passed by large vehicles. The lowest noise source comes from the West side which is close to residential areas with a noise level of 20-40 dB because vehicles rarely pass by. On the East side area, noise dampening vegetation will be added to reduce noise entering the site. Activities in rental office zoning and capacity development centers require places that tend to be quiet, not directly connected to or close to sources of noise. Meanwhile, for activities at digital-based community centers, there is no need to pay attention to noise, because it functions as a public area which is a facility for gathering, socializing and discussing.


[Source: Kristi, 2022]
Figure 11. Site view analysis

The location of the design site is quite strategic because it is located at a major road intersection which is the main road in the BSD City area so that the location of the site is easy to see and find. The view from inside the site to the outside is quite good because it faces directly onto the main road and commercial buildings are blocked by large vegetation, so it is quite easy to create an atmosphere within the site. The view from the outside into the site is also considered quite good because the site is very clearly visible, so the building will be designed to stand out to support and add to the aesthetic value of the area so as to attract potential users. Landscaping elements on the site will help provide a sensory view of the site. Parks and pedestrian paths, vehicle paths and bicycle paths will be designed on the site. Apart from that, real and artificial rocks will be added as decorative elements, and garden lights to complement and add to the aesthetic value of the site.

Based on the analysis results, the East and Southeast sides have quite high sunlight intensity, while the North side of the site only receives afternoon sunlight. Shading vegetation will be planted on the site, such as Kiara Payung trees and Trembesi trees. Apart from that, a sun louvre roof with grilles will be applied to the site which can block sunlight and provide air conditioning for pedestrian circulation paths. Apart from that, the orientation of the site will be towards the East side facing the main road and can receive a fairly large air flow into the site. To prevent strong winds, wind breaking vegetation will be planted on the East and West sides.




[Source: Kristi, 2022]
Figure 12. Analysis of the sun's movement in a year on the site

Climatic factors influence building layout based on sunlight intensity. The orientation of the building will face southeast because apart from being in line with the point of view from the main road, this side can receive morning sunlight. In addition, sun shading facades will be applied on this side, to regulate the amount of light entering the building.

The building orientation will be towards the East side. Through this position, the building will not turn its back on the main road and will take advantage of the view from inside and outside the site. Views from the east and south are the main road and site supporting facilities, which are quite dominated by large vegetation.

Space program

The function and activity analysis will explain in detail the functions and activities contained in the Digital Community Hub building, so that you can then determine the space requirements and building area required.

Table 2. Analysis of functions and activities

| Function | | User | Activity analysis |
|---|---|---|---|
| Primary Function | Digital Based Training and Personal Development Center | Training/workshop/course<br>Seminar/counseling<br>Work/be creative<br>Organizing events/exhibitions<br>Work | Training/workshop/course |
| | | | Seminar/counselling |
| | | | Work/be creative |
| | | | Organizing events/exhibitions |
| | Digital Based Rental Office | Inter-team meeting<br>Discussion<br>Gathering and discussions between communities | Work |
| | | | Inter-team meeting |
| | | | Discussion |
| | | | Gathering and discussions between communities |
| | Digital Based Community Activity Center | Learn/develop yourself<br>Doing a hobby<br>Play<br>Increase knowledge/reading | Learn/develop yourself |
| | | | Doing a hobby |
| | | | Play |
| | | | Increase knowledge/reading |
| Secondary Functions | Commercial | Trade<br>Promotion<br>Rest, eat, drink | Trade |
| | | | Promotion |
| | | | Rest, eat, drink |
| | Customer service | Discuss<br>Work<br>Listen to customer complaints and aspirations | Discuss |
| | | | Work |
| | | | Listen to customer complaints and aspirations |
| | Daycare | Childcare<br>Study<br>Play | Childcare |
| | | | Study |
| | | | Play |
| | Management and Administration | Work<br>Meeting<br>Financial management | Work |
| | | | Meeting |
| | | | Financial management |
| | | | Security management |
| | | | Marketing management |
| | | | Public relations management |
| Supporting Functions | General service | Visitors, management staff | BAB, BAK |
| | | | Clean yourself |

| | | | | |
|---|---|---|---|---|
| | | | | Rest |
| | | | | Worship |
| | Building services | Management (technicians) | staff | Panel management |
| | | | | AHU Management |
| | | | | Generator management |
| | | | | Loading and storing goods |
| | | | | Vehicle parking |
| | Security | Management (security guard) | staff | BAB, BAK |
| | | | | Clean yourself |
| | | | | Rest |
| | | | | Worship |
| | | | | Patrol |

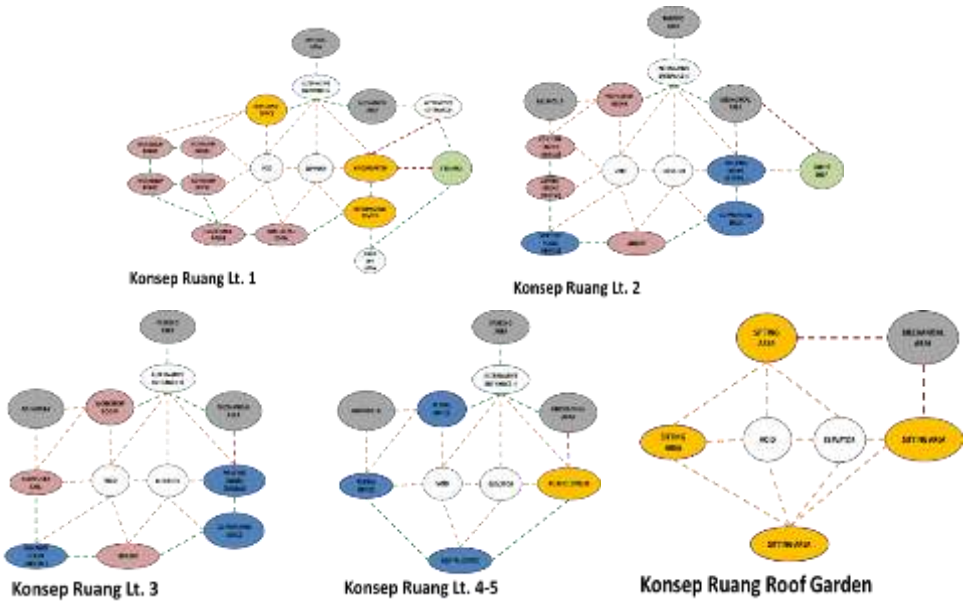
[Source: Kristi, 2022]

Based on the calculation assumptions made, the targeted number of visitors is 2,400 people per day. The space requirements are obtained as follows.

Table 3. Space size

| No. | Zone Group | Besaran Luas |
|---|---|---|
| 1. | Parking area | 6.900 $m^2$ |
| 2. | Digital-Based Self-Development Zoning | 2.220 $m^2$ |
| 3. | Rental Office Zoning | 2.600 $m^2$ |
| 4. | Culinary Zoning | 500 $m^2$ |
| 5. | Service Area | 2.200 $m^2$ |
| | Total area | 14.400 $m^2$ |

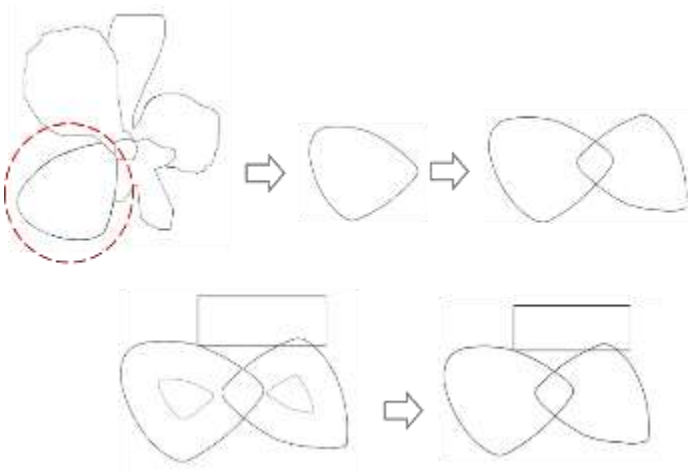
[Source: Kristi, 2023]




[Source: Kristi, 2022]
Figure 13. Community Hub Digital space diagram

## *Concept*

Based on the Kompas page, there are more than 20 groups of orchid cultivation farmers spread across seven sub-districts in South Tangerang, namely in Ciputat, Pamulang, Serpong and Setu sub-districts. The Vanda Douglas orchid was also one of the inspirations for the creation of the typical South Tangerang dance, namely Nong Anggrek. In accordance with the concept of making connection, the basic shape of the Vanda Douglas orchid flower is taken, which is a plant commodity that is widely developed in South Tangerang.



[Source: Kristi, 2022]
Figure 14. Community Hub Digital mass composition study

The basic shape is taken from pieces of orchid flower petals put together to form an infinity symbol, which can depict the concept of infinity and infinity which represents the purpose of the Digital Community Hub building to support the unlimited development of digital creativity. An additional rectangular shape will be provided which will function as a parking building for cars. After that, elevation differences will be given that separate the two zones according to their function.

The design concept for the site produces four area zones, namely, the parking area, the public area consisting of a mini plaza, the main area, namely the digital community hub building, and the service area, namely the TPS area at the back of the site. There is circulation for pedestrians and vehicles which is arranged so that they do not cross. Apart from that, the car and motorbike parking areas will be separated so that they do not cross each other. Apart from that, entry access for two-wheeled and four-wheeled vehicles will be separated. The circulation pattern will be created around the site.

On the site, noise-dampening vegetation will be planted, vegetation will act as a guide and utilize existing vegetation such as palm trees. On the site, bus stops will be designed as drop point areas for online vehicles and places for bus passengers to get on and off.

[Source: Kristi, 2023]
Figure 15. Site planning concept

[Source: Kristi, 2023]
Figure 16. Concept of mass composition

The Digital Community Hub building mass that will be designed is a single mass that combines four zonings, namely rental office zoning, digital capability development zoning, culinary zoning and service zoning. The building layout will use a radial type.

Floors one to three will be used as an area for developing digital and culinary skills consisting of a conference room, workshop room, rental meeting room, library and reading room, co-working space area, computer laboratory, food and beverage area and coffee shop. Meanwhile, the fourth and fifth floors will be used as rental office areas, each floor providing three rental office units and one public lounge. Each floor provides service facilities such as toilets and prayer rooms. The roof floor will be used as a communal area by providing a seating area. This communal area can be used as a work or relaxing area. The back of the building will be used as a parking area for four-wheeled vehicles and also a loading dock.

The structural concept used is based on the results of structural analysis which will be adjusted to the building site conditions.

Table 4. Structural design concept

| Structure | Building section | Material |
|---|---|---|
| Upper Structure | Green Roof | • Reinforced concrete |
| | Rooftop | • Separator layer |
| Middle Structure | Column | • Waterproof membrane |
| | Beam | • Drain mat |
| | Wall | • Filter cloths |
| | Soundproof walls | • 30 cm thick soil planting medium |
| | Facade | • Vegetation |
| | Floor | • Cast concrete |
| | Ceiling | • Waterproof coating |
| Bottom Structure | Foundation | • Reinforced concrete diameter 70 cm |

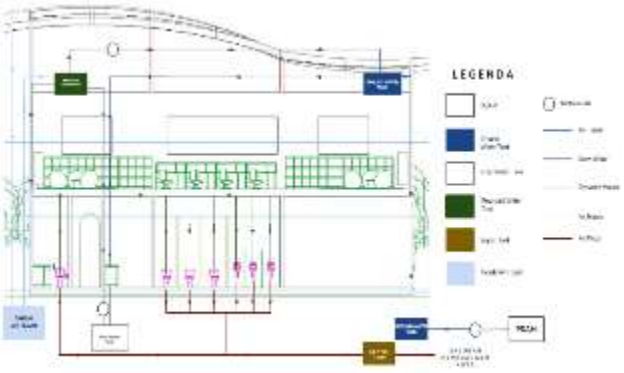
[Source: Kristi, 2022]

The source of clean water supply uses a water tank system sourced from PDAM and groundwater sources which will flow to the pump and then be stored in the ground tank. After that, a filtering process will be carried out and then it will flow to the roof tank. After that, the water will be channeled to each shaft point on each floor of the building.

- Sewer

Dirty water channels will be classified into three, namely liquid waste, which comes from sinks, kitchens, floor drains, rainwater, solid waste from toilets or urinals and liquid waste which can be recycled for reuse. The dirty water channel will use a two-pipe system installation. Liquid waste originating from the kitchen goes to the fat tank (BL) to the catch basin (CB) and flows to the control tank (BK), then ends up in the waste infiltration. The solid waste channel originating from the toilet flows into the control tank then goes to the septic tank (STP) then flows into the control tank again before heading to waste absorption.

• Recycling Water Line




[Source: Assignments in the Green Building MBKM Lecture, 2021]
Figure 17. Water recycling diagram

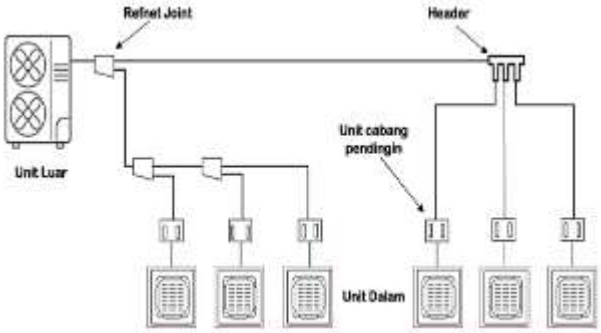
The Digital Community Hub building will use a water treatment plant (WTP) as a recycling water channel. WTP is a system that functions to treat water from

contaminated raw water quality to obtain the desired water quality treatment. WTP construction consists of five processes, namely coagulation, flocculation, sedimentation, filtration and disinfection. This recycled water can be used for flushing toilets and watering plants on buildings and sites.

• Electrical System

Electrical channels come from two sources, namely; (1) PLN as the main electricity distribution source; and (2) Generator as a backup electricity source. The electrical voltage in the building is Medium Voltage (TM) which originates from the electricity substation (PLN) to the building's HVDP which reduces the voltage from Medium Voltage to Low Voltage (TR). After that, it will flow to the MDP (Main Distribution Panel) which will then flow to the SDP (Sub Distribution Panel) located on each floor. Next, electricity will be distributed from the SDP to other rooms on each floor.

• Air conditioning system




[Source: Rachman, et al, 2022]
Figure 18. Cooling diagram with VRV technology

The ventilation system will utilize natural and artificial air conditioning systems (VRV). Using a VRV AC system can be a more efficient and effective choice in maintaining multi-storey buildings. This system consists of a heating unit consisting of a boiler, a ventilation unit consisting of a fan and a cooling unit consisting of a chiller. VRV systems minimize duct usage which reduces pressure drops which are often estimated at 10-20% of the total air flow in a duct system. VRV systems are more efficient than cold water systems. Even though installation costs are higher, the VRV system is considered capable of reducing energy consumption by 30-40% in a year. Air control in each room unit uses an air controller/thermostat, which allows efficient use of AC. Setting the temperature with a thermostat can save energy and make AC maintenance easier.

• Lighting System

In the building two lighting systems will be used, namely a natural lighting system and an artificial lighting system. Natural lighting comes from sunlight which will be reflected into the building by using sun shading and skylights on the roof and facade of the building, thereby maximizing the intensity of light

entering the building. Artificial lighting comes from electric lights which will be used for building operations at night, when the weather is dark or cloudy so that no sunlight enters the building and in rooms that are not accessible by natural lighting.

• Waste Disposal System

The waste disposal system uses a waste chute system in the form of a square box, which is provided in the service area on each floor, as a waste disposal channel. The waste elevator is divided into three parts, namely organic waste, inorganic waste and B3 waste (Hazardous and Toxic Materials) which leads to the garbage chute and down to the bottom floor of the building, to the waste room, through the tower recycling system. Each type of waste will be collected according to the type of waste, placed in a TPS at the back of the site and then transported by a rubbish truck to be taken to the nearest TPA.

• Disaster Prevention and Management System

Disaster prevention and management is very important to pay attention to, especially because buildings are public areas so they need access and materials that can prevent possible disasters from occurring. Applications that can be applied to buildings are heat detectors, sprinklers and emergency stairs.

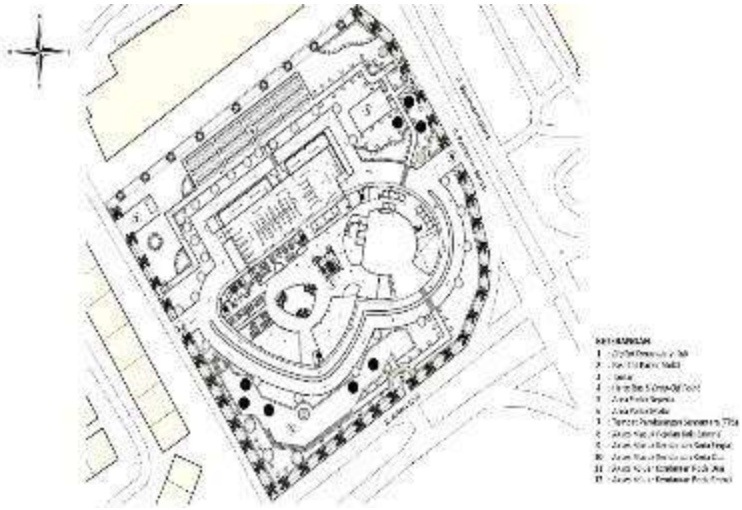
• Building Transportation Systems

The transportation system in the building will use ramps and elevators as vertical transportation, while for horizontal transportation, lobbies and corridors will be designed.

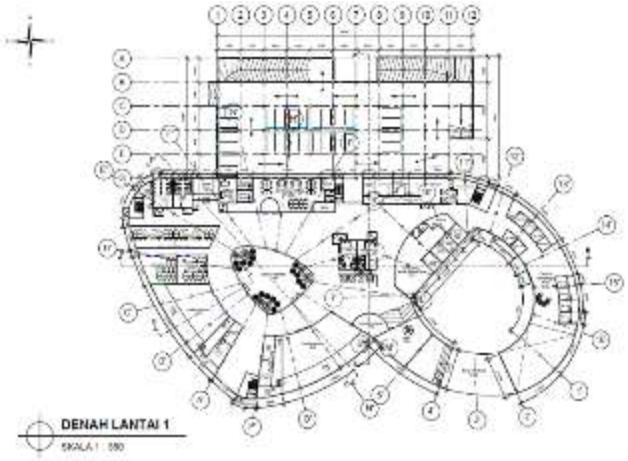
## *Design Drawings*

Through the planning and design process, several image products are produced as follows.

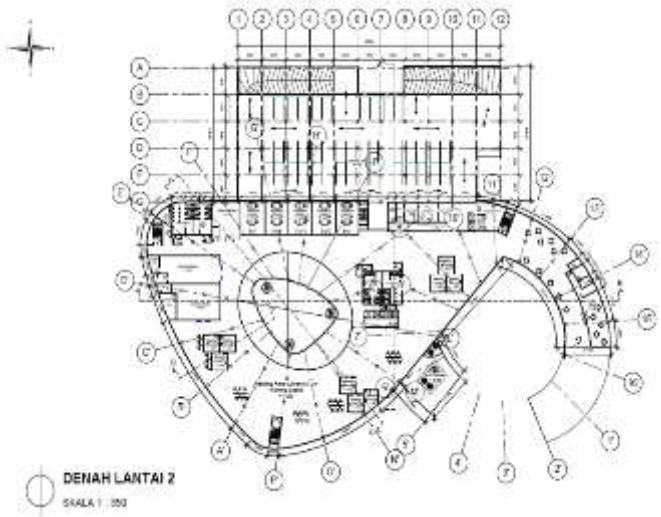
[Source: Kristi, 2023]
Figure 19. Block plan



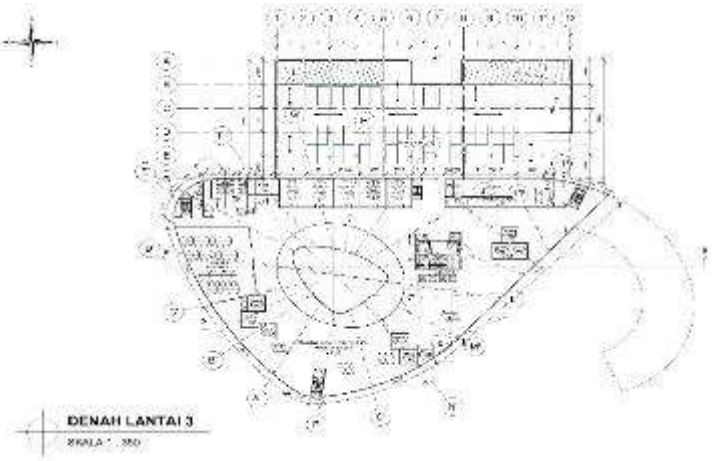
[Source: Kristi, 2023]
Figure 20. Site plan



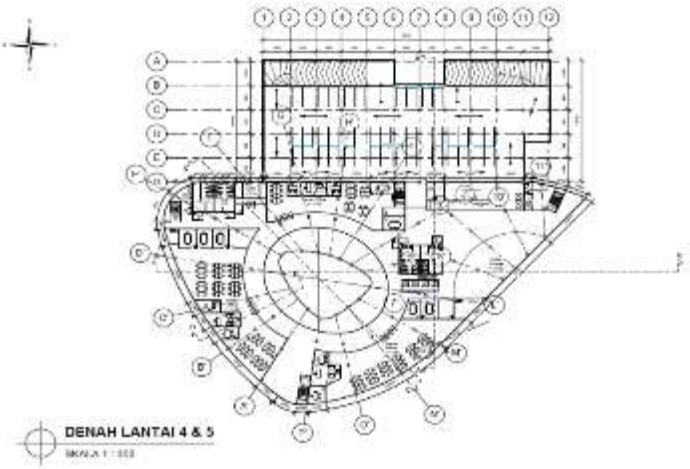

[Source: Kristi, 2023]
Figure 21. First floor plan



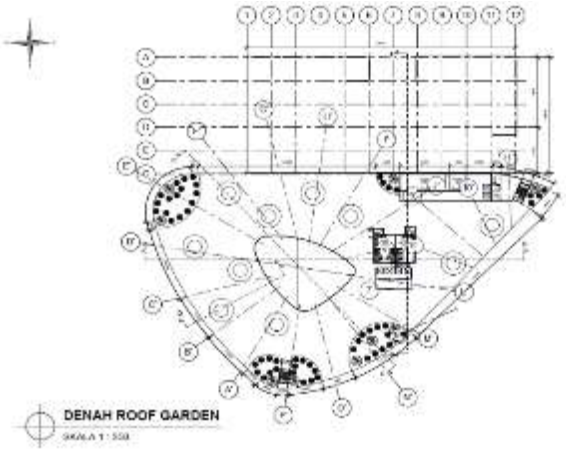

[Source: Kristi, 2023]
Figure 22. Second floor plan




[Source: Kristi, 2023]
Figure 23.Third floor plan

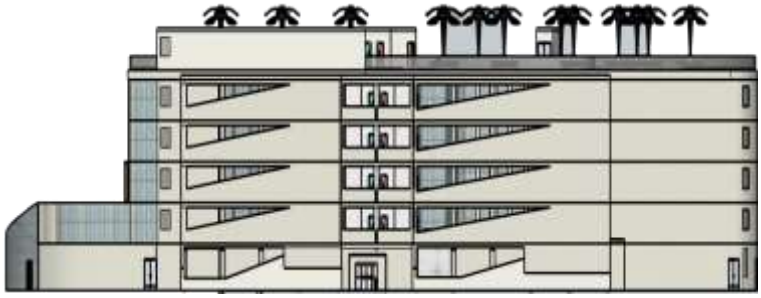



[Source: Kristi, 2023]
Figure 24. Fourth and fifth floor plans




[Source: Kristi, 2023]
Figure 25. Roof garden plan

[Source: Kristi, 2023]
Figure 26. Front view of the Digital Community Hub

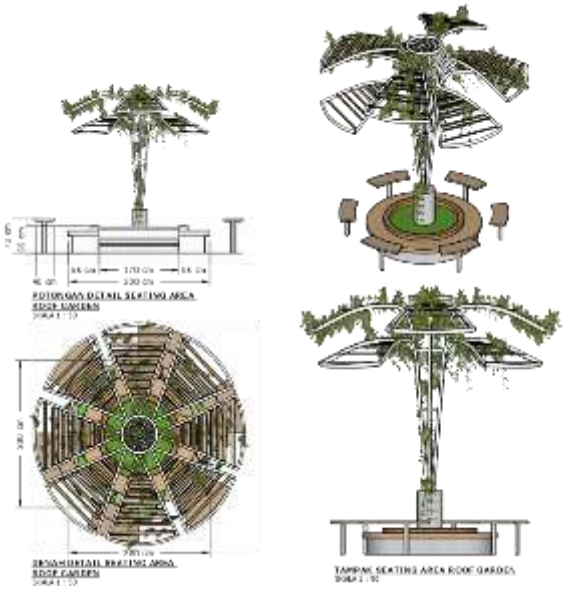


[Source: Kristi, 2023]
Figure 27. Back view of Digital Community Hub

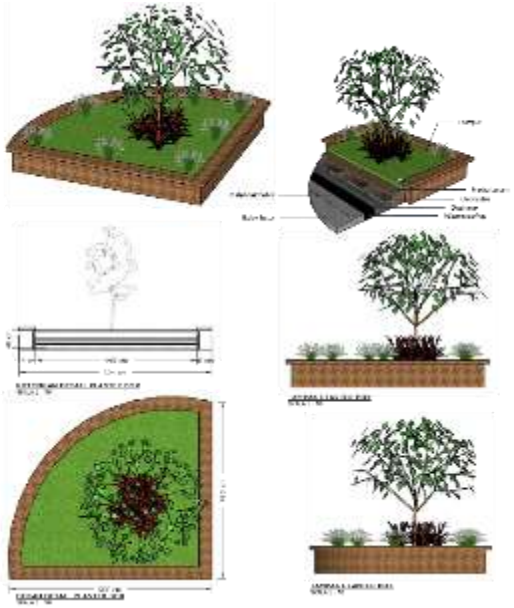
[Source: Kristi, 2023]
Figure 28. Left side view of Digital Community Hub

[Source: Kristi, 2023]
Figure 29. Right side view of Digital Community Hub

The roof garden floor will function as a communal area for working or relaxing, so there will be a seating area as a facility for sitting and carrying out activities and planter boxes as an aesthetic addition.

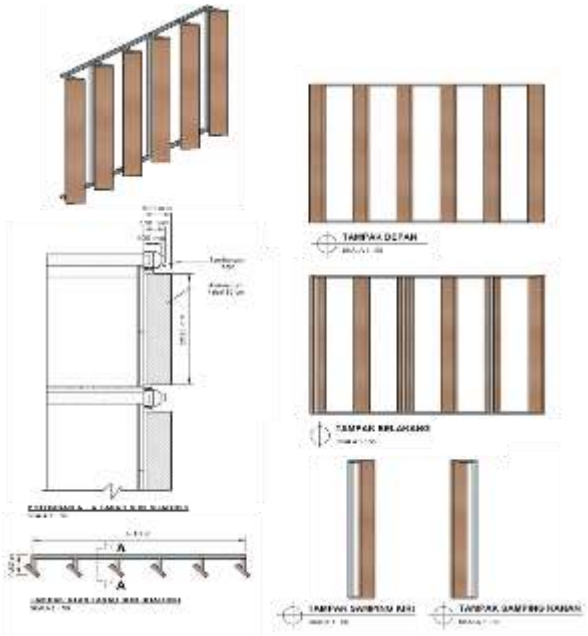


[Source: Kristi, 2023]
Figure 30. Seating area details



[Source: Kristi, 2023]
Figure 31. Planter box details

The building facade will use a combination of curtain wall and sun shading. The use of sun shading functions as a catcher for sunlight to be transmitted into the building to help with natural lighting. The sun shading material consists of 10 cm thick aluminum with a Cooper metallic color.



[Source: Kristi, 2023]
Figure 32. Sun shading facade Details

## Conclusion

The Digital Community Hub in Serpong, South Tangerang is located on Jalan Pahlawan Seribu, Bumi Serpong Damai, South Tangerang with a land area of 2.56 hectares. Its design is divided into four zonings, namely, rental office zoning, digital capability development zoning, culinary zoning and service zoning. In its operation and maintenance, this building utilizes energy efficiency in the use of water and lighting.

Apart from that, the green roof which is used as a communal space adds aesthetic value while supporting the eco-technological architectural concept implemented. The concept of eco-technology architecture is also applied to the use of sun shading facades to transmit the intensity of sunlight into the building, thereby allowing the building to receive natural lighting.

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