

4. Planning Alternative Future

Two previously surveyed model districts within housing complexes in Cirebon and Bandung Cities were selected. Cirebon is a coastal city with low and flat land and a hot climate. Bandung is an inland city with high and sloping land conditions (altitude is 700-800m above average sea level) and cooler climate.

(1) “Gunung” District in Cirebon City

a. Existing Condition of the District

The target area is selected from Gunung Complex, a subdivided part of Harjamukti Complex developed by the National Housing Corporation. The area includes two communities coded RW-08 and RW-09. This site is located on the inland side of the inner part of Cirebon City. The 18m wide main street runs north-south in the eastern side of the district. A market, local government office, and schools are located along this street. The western part of this district is a housing complex surrounded by an 11m wide access road served by public buses.

The National Housing Corporation invited a Dutch architect to plan this area where houses were constructed in 1979.

Existing conditions in the district are described in Table 29. The two communities occupy a total of 5.47 ha, and the target area (for model planning) is 4.1 ha with 1,090 inhabitants and 273 houses.

Table 25: Existing Condition of the District including the Target Area for Model Planning

RW	RT	Population	Households	Houses		
				Total	Occupied	Empty
08	4	529	128	221	209	12
09	7	808	221	202	191	11

The results of analysis of ALOS stereo satellite images show that the altitude of this district is between 8-16m above average sea level, higher in south-west part, and lower in north-east part. When people walk in this district, they obviously do not sense this slope (less than 2%).

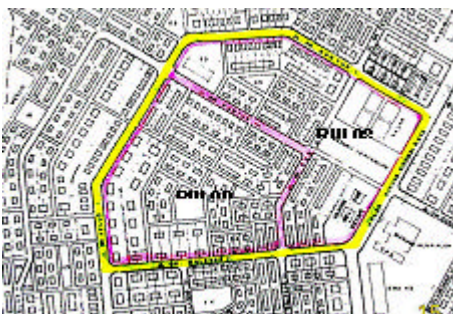


Fig 15: Site Plan of Existing Area

b. Alternative Planning for the Future

Four alternative plans were prepared as 3D data, to be used to give a presentation from the viewpoint of social-cultural aspects at the workshop attended by non-engineer discussants and resource persons.

The four alternative plans for the study area in Cirebon are summarized as follows:

Table 26: Concept of Planning Each Alternative for Gunung District in Cirebon City

Designer	Concept	Site Plan	House Unit
1. Arief	High Rise + Low Rise + Open Space	Renewal to High Rise in Center and Low Rise in Fringe	Maisonette
2. HK	High Rise Artificial Land	Preserve Housing Area Renewal Business Area along Street	High Rise Complex Flat House & Business
3. Aswin	One Tree for Each House	Preserve Existing Lot	Two storied, with center court
4. Sigit	One Tree for Each House	Renewal to Grid Plan	Two storied, with center court

Alternative 1: Existing house lots are rearranged, plotting core type apartment houses in the center and maisonette-units in the fringe. Apartments can create open space on the ground. Maisonettes also achieve more intensive land use than exiting single storied houses by increasing open space. The open space this creates will be covered with greenery. This plan does not involve changing the existing business areas along the street.

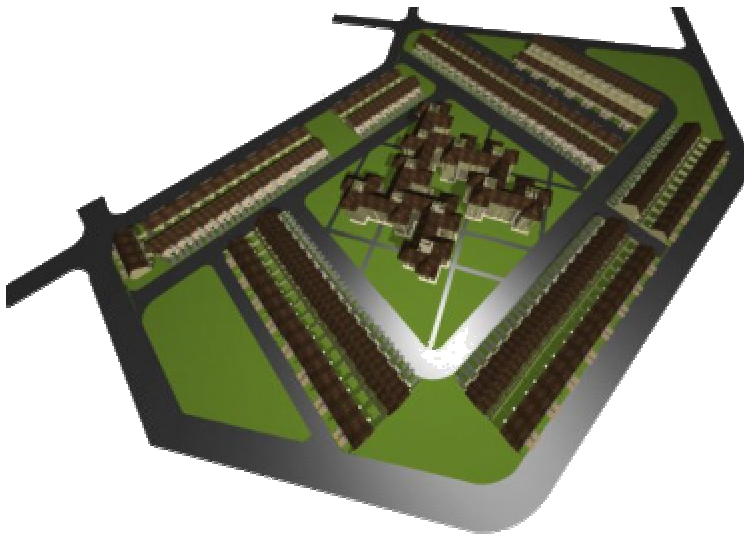


Fig.16: Site Plan

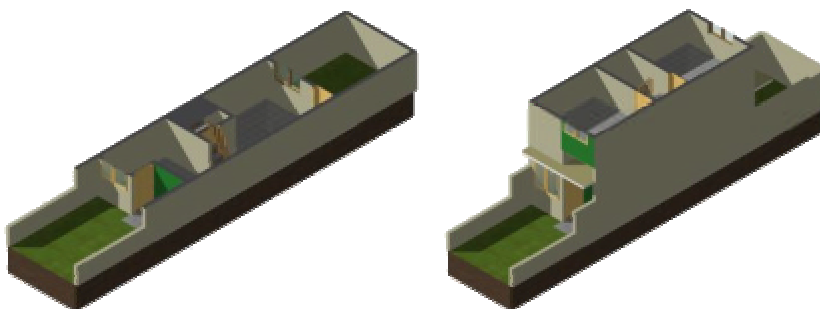


Fig. 17, 18: Dwelling Unit of Maisonette



Fig.19: Apartments in the Center

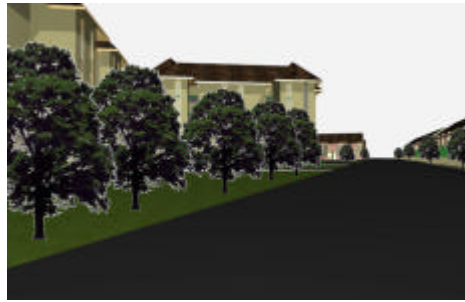


Fig.20: Landscape from the Ground

Alternative 2: Considering the future decrease of land in the coastal zone caused by the rising sea level, this plan provides high-rise artificial land for both housing and business purposes through the redevelopment of existing business areas along the street while preserving the low rise housing area. The new artificial land also provides greenery on its top. The steel superstructure will last a very long time (ideally forever), while in-fill substructures (for housing and business use) can be altered to adapt to changing social needs. After all the main streets are redeveloped, the new landscape will resemble low-rise housing areas surrounded by green hills. This intense and mixed land use will prevent an increase of trips that will result from the horizontal expansion of cities that is now occurring.

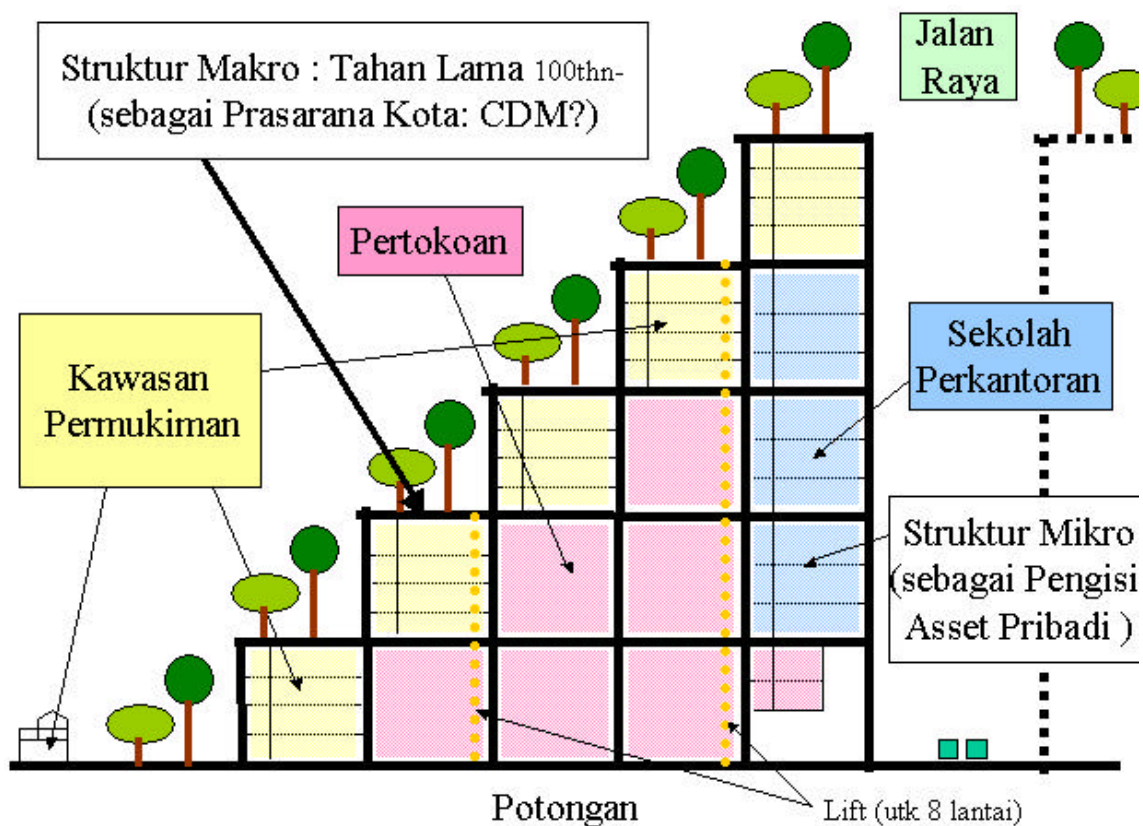


Fig.21: Cross Section showing the Concept

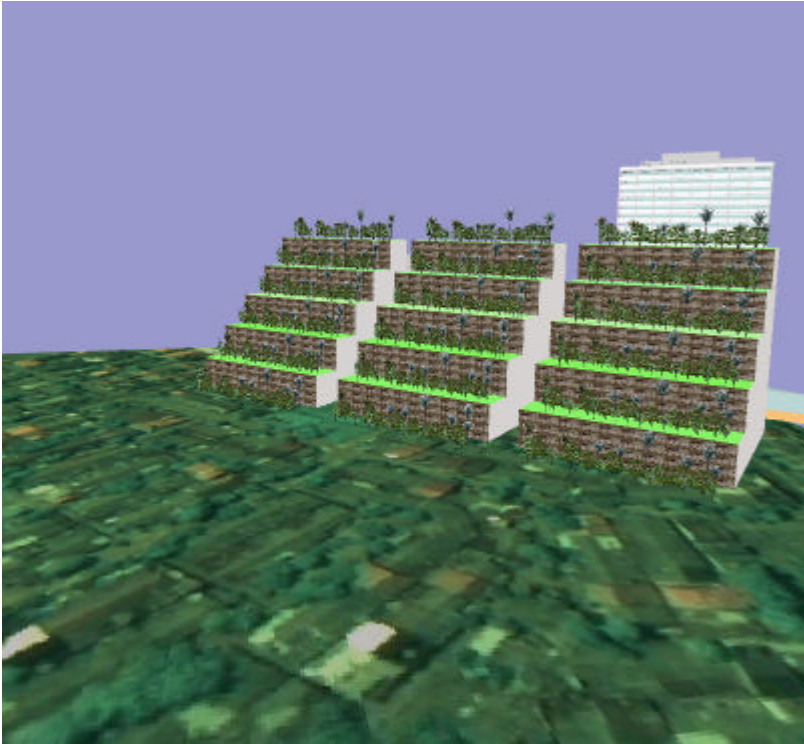


Fig.22: Birds Eye View



Fig.23: Landscape from Street, showing the Greenery on the Top

Alternative 3: A two-storied courthouse is proposed in this plan. It promotes a very simple and clear concept of planting a family tree in the central court. It will also promote a public movement to plant trees in entire urban areas.



Fig.24: Description of the Concept

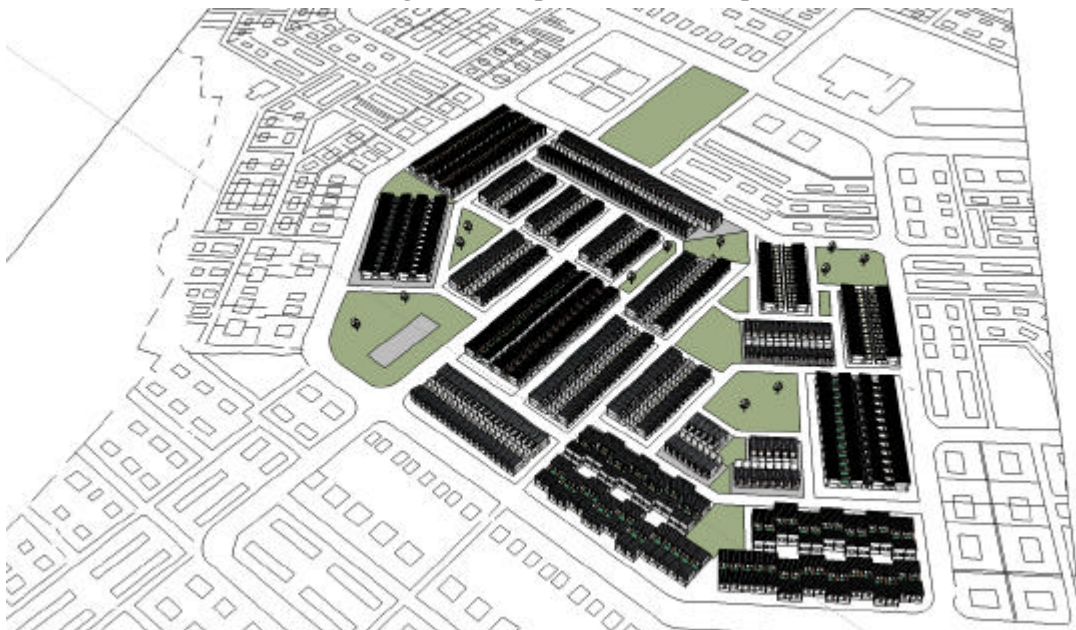


Fig.25: Birds Eye View

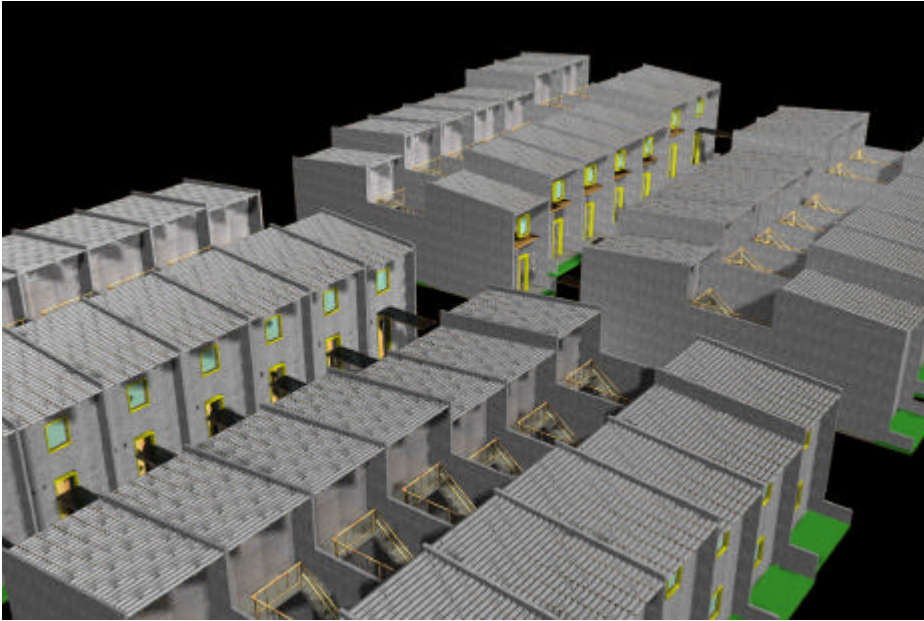


Fig. 26: 3D Images of the Environment



Fig. 27: Landscape

Alternative 4: This plan, which is a further development from (b-3), rearranges the spatial order from the existing order to strict grid planning. The grid planning will more efficiently use natural wind for ventilation, and shorten the average trip distance from each house to destinations.



Fig.28: Rearrangement of the Site Plan

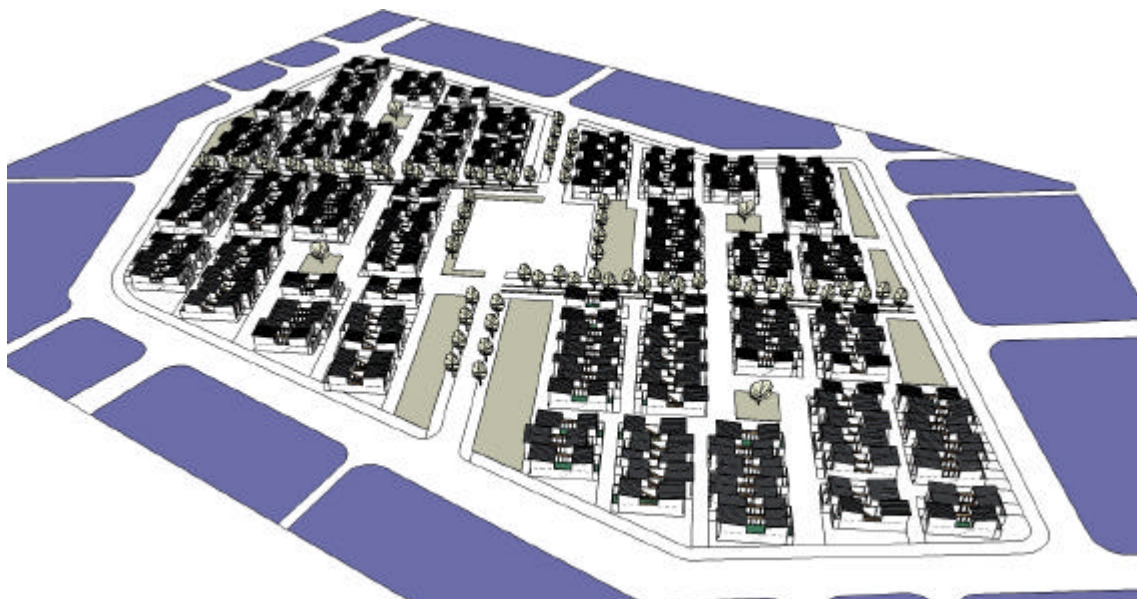


Fig.29: Birds Eye View of the Plan

c. Estimation of CO₂ Emissions

Table 27: Estimation of CO₂ Emissions for each Alternative Plan, Gunung District in Cirebon City

Items	Existing	Plan 1	Plan 2	Plan 3	Plan 4	Unit
Land area	54,700 ¹⁾	54,700	54,700	54,700	54,700	m ²
Total units	324	364	924	578	344	Units
Population	1,090	1,457	3,737	2,312	1,376	Persons
Total floor area	39,056	40,616	136,836	35,616	25,420	m ²
Housing	28,836	32,396	72,036	27,396	17,200	m ²
Non-housing	8,220	8,220	64,800	8,220	8,220	m ²
CO ₂ emission/Year/Unit	2.710	5.419	2.382	4.168	4.226	T-CO ₂
Building Material LCE	369	15,809	13,488.6	13,369	8.394	T-CO ₂
B. material LCE/unit	1.140	43.4	14.6	23.1	24.4	T-CO ₂
Expected length of life	15	15	60	15	15	Years
B. Material LCE/Year	24.624	1,054	224.8	891	560	T-CO ₂
LCE/Unit/Year	0.076	2.8	0.243	1.54	1.63	T-CO ₂
LCE/m ² of floor/Year	0.00085	0.033	0.0031	0.033	0.033	T-CO ₂
Domestic energy/Year/Unit ⁴⁾	1.891	1.891	1.891	1.891	1.891	T-CO ₂
Transportation/Year/Unit	0.751	0.751	0.263 ²⁾	0.751	0.751	T-CO ₂
Tree cap coverage	4,814	15,614	25,150	14,944	29,994	m ²
Absorption/year ³⁾	-5.1	-16.6	-26.6	-15.8	-31.8	T-CO ₂
Absorption/Year/Unit	-0.008	-0.023	-0.015	-0.014	-0.046	T-CO ₂
Carbon Stock in Building	324	364	0	0	0	Ton-C

¹⁾ Of the total area of 54,700m², street side business areas occupy 13,700m², and housing areas behind them cover 41,000m². Plan 1, 2 and 4 will rearrange the housing area, and Plan 3 will rearrange the business area.

²⁾ Plan 2 assumes that the newly created high-rise complex will not create additional demand for trip distance, because offices, commercial areas, governmental offices and schools accessible only by foot are included.

³⁾ In order to calculate absorption by greenery, 2.9 Ton-C/Ha/Yr (namely, 5.32 Ton-CO₂/Ha/Yr) was applied as a default value as proposed by IPCC. In a tropical humid climate, the actual value, that will be far larger than this, is now being investigated by forestry research institutes. In addition to the direct absorption of CO₂, the cooling effects of greenery will reduce the outdoor temperature and therefore the load of air conditioning and related consumption of electricity.

⁴⁾ Domestic energy consumption will presumably be kept at its present level.

⁵⁾ Materials for multi-storey buildings are evaluated using Japanese data for 1990, as follows: SRC: 156 kg-C/m², RC: 133 kg-C/m², S: 85kg-C/m² and W: 59 kg-C/m² reported in literature 9).

(2) Sarijadi complex in Bandung City

a. Existing condition of the area

Sarijadi complex is located in the western part of Bandung City at an altitude near 800m above average sea level. The area is sloped and lower in its southern part. The target area for the model design is exactly equivalent to the community coded RW-07. The spatial order of this area is clear grid planning,

and the size of house lots is almost standardized at 6.5m (frontage) and 15m (depth) in satellite images. The main street runs in the eastern part of the area, and there is a row of shop houses along this street that is part of the target area. The total area of the district measured based on satellite images is 5.2 hectares, which is a little different from that in documentary records of the initial development.

Streets are not only those in front of the house lots, but include narrow footpaths connecting the backyards of houses. Their width is less than 1m, but residents can use them to escape in emergencies. Providing footpaths in backyards is a custom in planned housing areas in Bandung region, but not common in other Indonesian provinces.

The National Housing Corporation developed the area in 1980. To construct the initial houses, the RIHS (which undertook the field survey of this area in this study, and was then called LPMB) developed building materials.

Only 13 houses were constructed as complete model houses (54m²) while another 335 units were constructed as “core houses” to be expanded by inhabitants following the final design shown by the model houses. Therefore, as their families grew and children matured, occupants actively expanded their houses. Now the average total floor area is 82.16m² and almost all house lots are covered by roofs. Open space in each house lot has almost disappeared. However, trees planted in narrow open space spread their leaves over the roofs so that the area of green caps measured in satellite images (11%) is larger than the actual rate of open space at ground level.

Nowadays, many who were children at that time have already married and moved to new houses outside this complex so it has become rather a silent area where many residents have already retired from their jobs.

The land shape is sloped: higher in the east and lower in the west. Streets running from northwest to southeast are steeper in the eastern half, and rather flat in the western half.

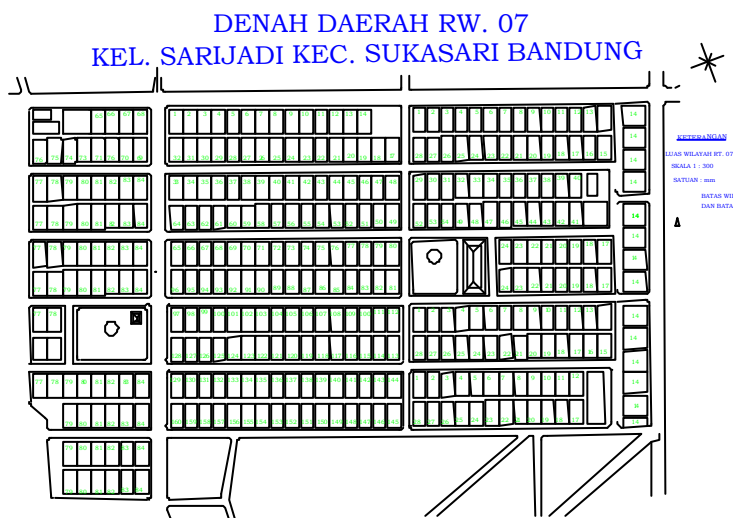


Fig.30: Site Map of the Area from Design Drawing