b. Alternative Planning for the Future

Four alternative plans were prepared in the form of 3D datato be used for presentations from social-cultural perspectives at a workshop attended by non-engineer discussants and resource persons.

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

Table 28: Basic Concepts of Each Alternative Plan for Sarijadi District in Bandung City

	Concept	Site Plan	House Unit
1. Arvi	Enhance Open Space for Greenery	Renewal to Cul-de-sac pattern	Maisonette
2. HK	Wood town	Preserving existing house lot Individual Renewal following three dimensional regulation of shape	Fire-proof timber houses, with enough natural ventilation and sunlight
3. Doni	Land re-adjustment for creating open space	Rearrangement to Cul-de-sac pattern	Two storied, partially apartment
4. Kukuh	Greenery on building	Rearrangement for apartment complex	Apartment

Alternative 1: Site plan is re-arranged in a Cul-de-sac pattern, and more intensive land use is achieved through maisonette type dwelling units, enhancing the open space with greenery.

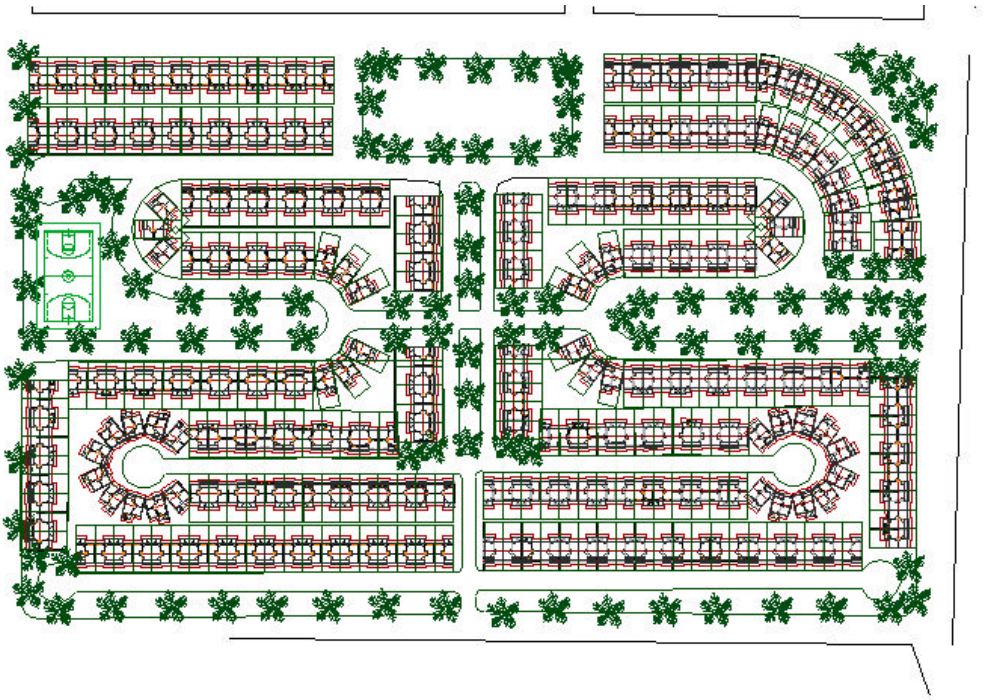

Fig.31: Site Plan

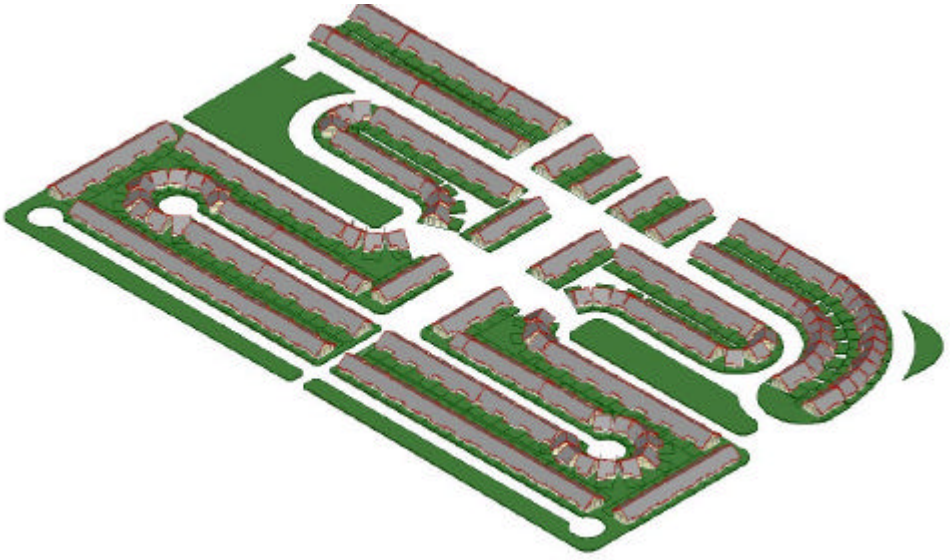

Fig.32: Birds Eye View

Fig.33: Dwelling Unit that was Originally Planned for Existing Complex

Fig.34: Maisonette Type Dwelling Unit proposed

Alternative 2: The altitude of Bandung city is 700-800m above sea level, and its temperature is cool (4.5 degrees (daytime) and 6 degrees (nighttime) cooler than Jakarta). These conditions improve the use of organic materials (by prolonging their lifetimes) and simplify the provision of comfortable indoor environments without artificial air conditioning. This plan is not intended to change the existing lot-subdivision pattern, because it introduces three-dimensional regulations to maintain good ventilation and natural lighting in the whole area. Houses will be re-constructed individually in line with this three dimensional regulation, utilizing timber material supplied by sustainable forestry that will be established in the nearby mountains and, hopefully, combined with the urban housing area maintenance . C.a. 18 m^3 of timber is needed to construct one house. Planting trees on c.a. 500m^2 of empty land in the mountains can provide enough timber material to reconstruct this house every 40 years. Fire-proof materials will be applied to walls of the timber houses.

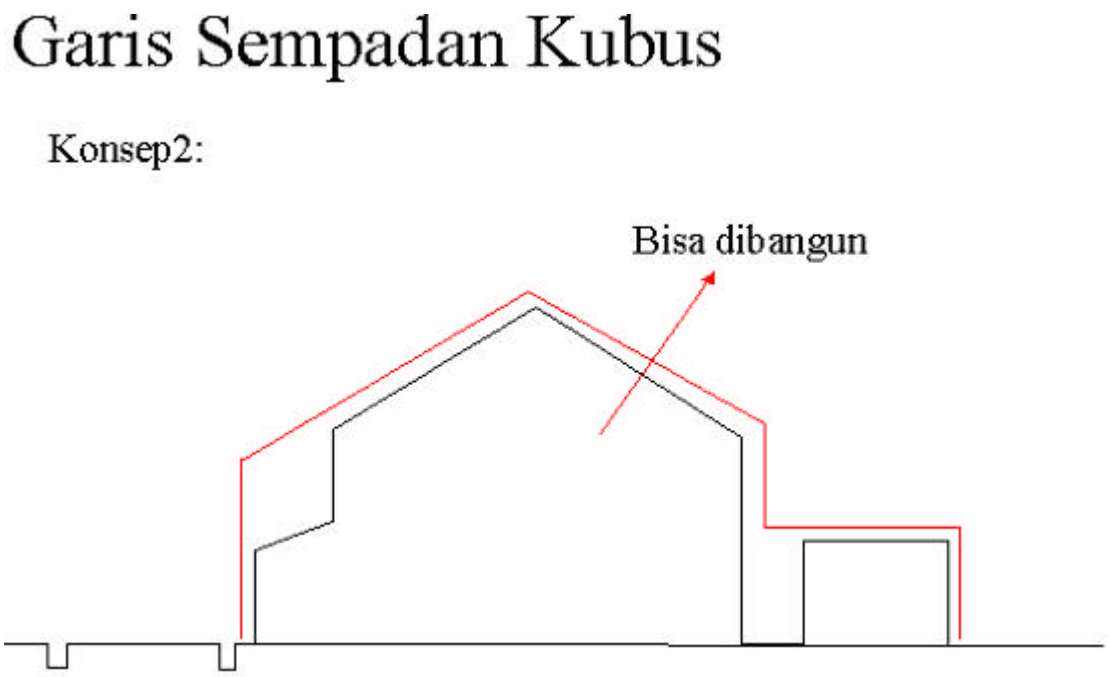

Fig.35: Three Dimensional Regulation of Land Use

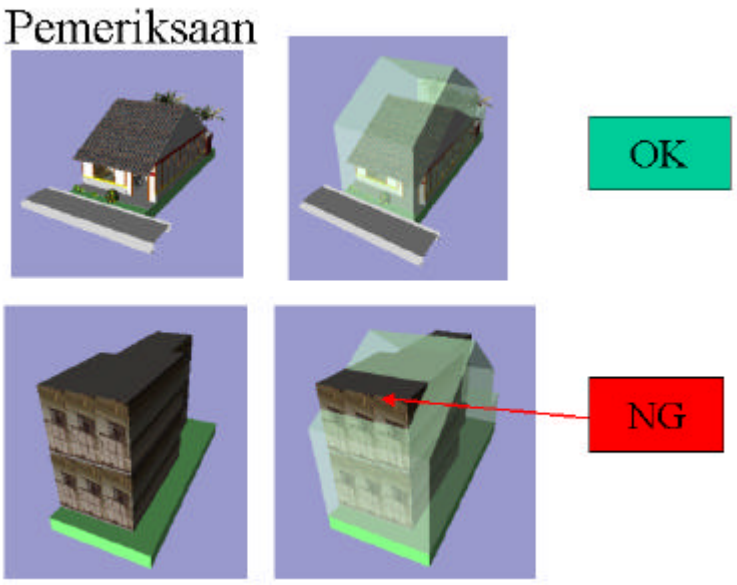

Fig.36: Shape of Houses Under the Regulation (Envelope)

Fig.37: Townscape that will be created by the Regulation

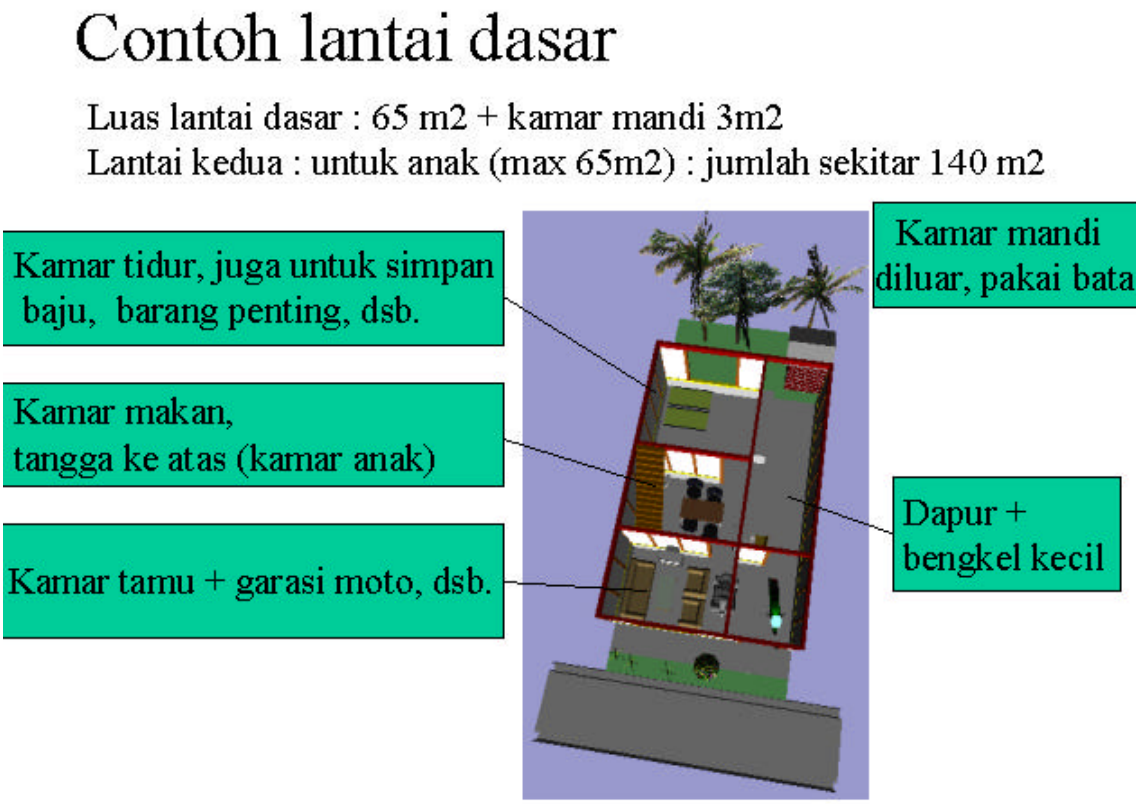

Fig.38: Example of dwelling unit

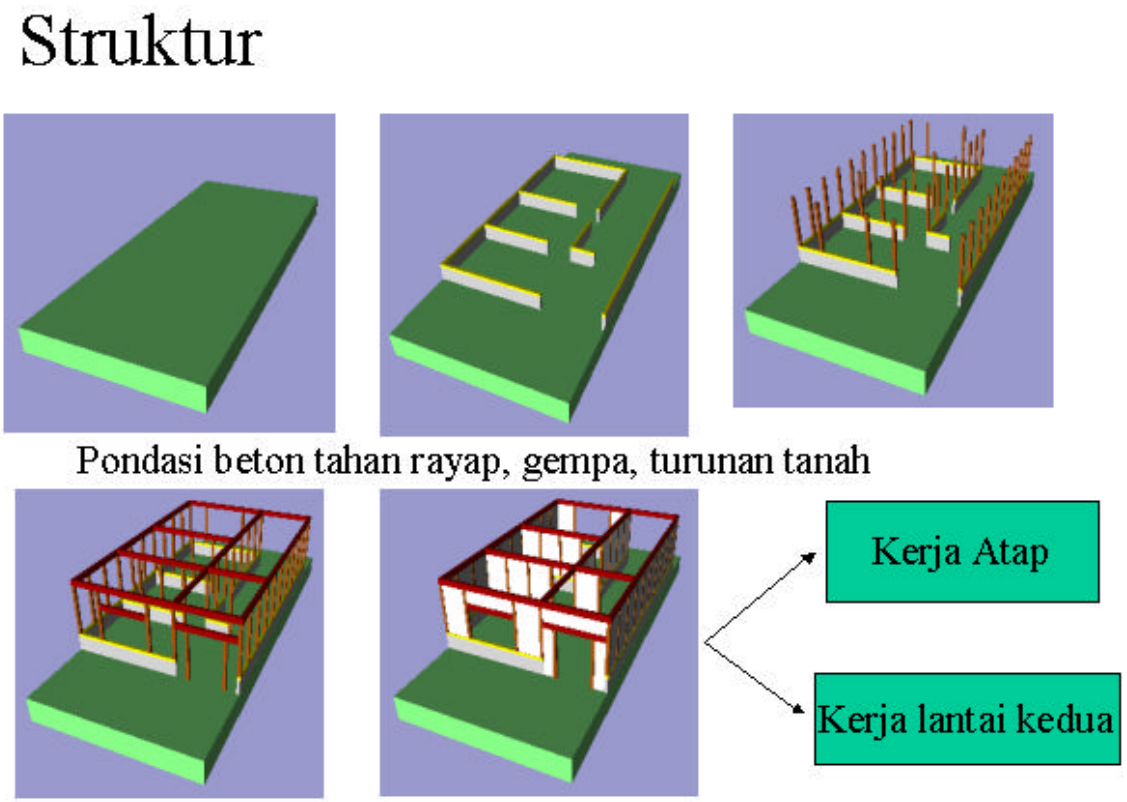

Fig.39: Timber Structure

Alternative 3: Existing crowded environment will be re-arranged through land-readjustment, creating open space.

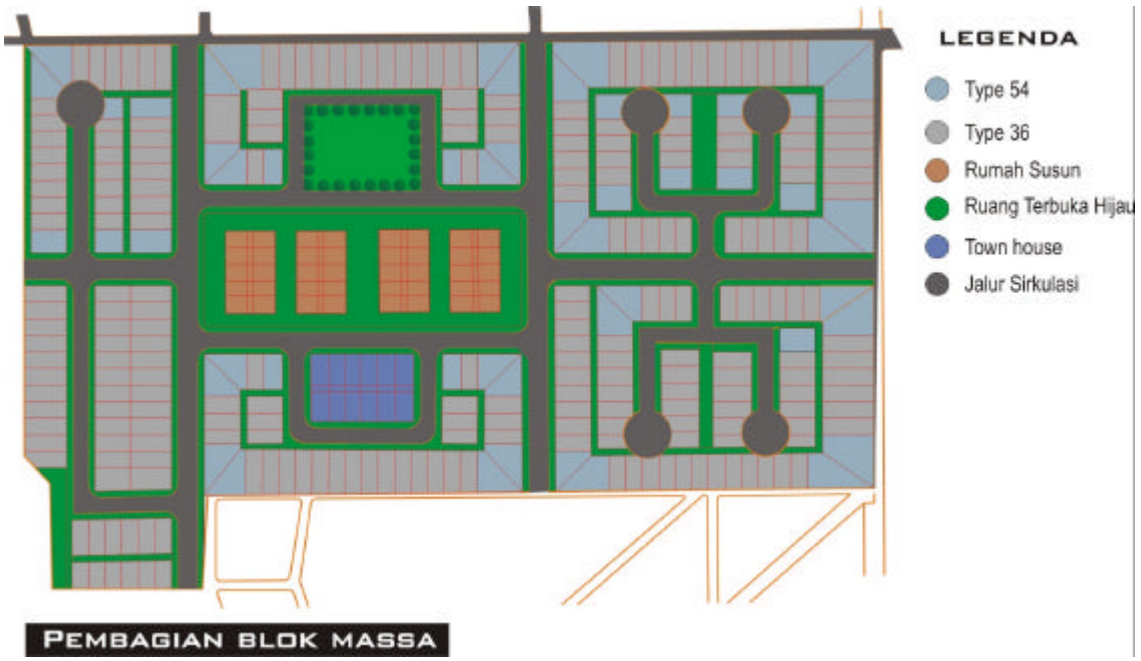

Fig.40: Site Plan

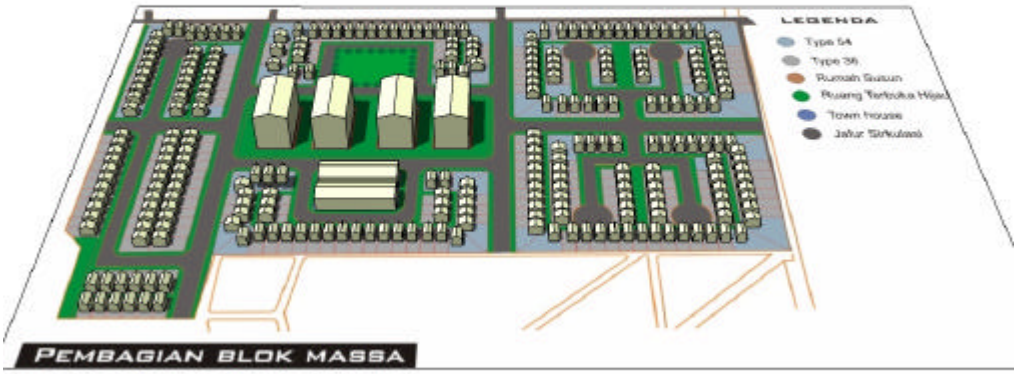

Fig.41: Birds Eye View

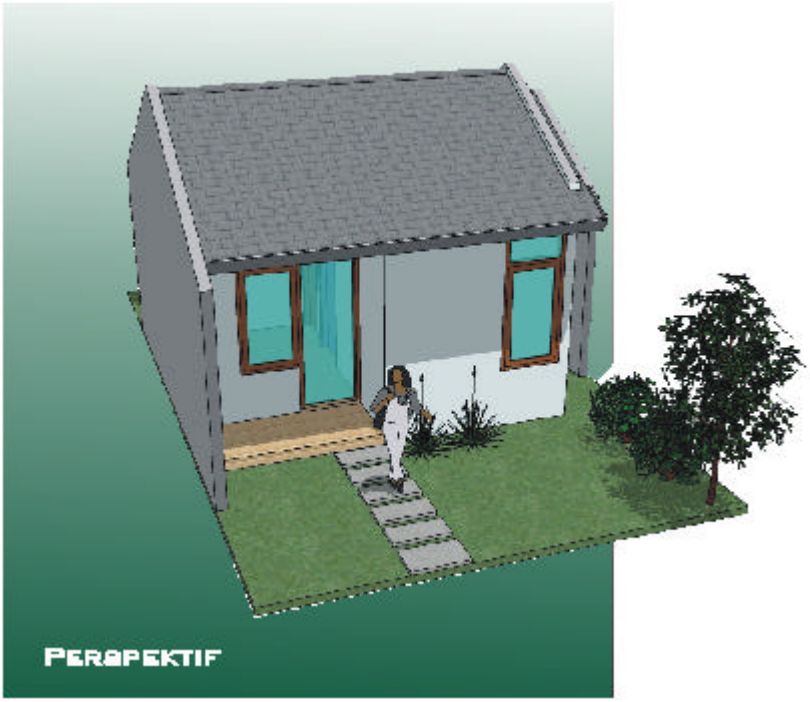

Fig.42: Dwelling Unit

Alternative 4: Urban renewal will change the existing crowded environment to apartment houses with greenery on the top and walls, in addition to the open green space created at ground level.

Fig.43: Site Plan

Fig.44: Birds Eye View

Fig.45: Image of Greenery on the Buildings

c. Estimation of CO_2 Emissions

Table 29: Estimation of CO_2 Emission for Each Alternative Plan, Sarijadi District in Bandung City

Items	Existing	Plan 1	Plan 2	Plan 3	Plan 4	Unit
Land area	52,028	52,028	52,028	52,028	52,028	㎡
Total units	343	343	343	343	343	Units
Population	1,570	1,212	1,372	1,372	1,372	Persons
Total floor area	29,400	32,870	29,400	32,870	32,870	㎡
Housing	27,400	30,870	27,400	30,870	30,870	㎡
Non-housing	2,000	2,000	2,000	2,000	2,000	㎡
CO_2 emission/year/unit	3.648	3.613	3.517	3.535	3.513	T-CO_2
Building material LCE	555	555	0	900	900	T-CO_2
B. Material LCE/unit	1.6	1.6	0	2.6	2.6	T-CO_2
Expected length of life	15	15	20	60	60	Years
LCE/Year	37	37	0	15	15	T-CO_2
LCE/Unit/Year	0.108	0.108	0	0.044	0.044	T-CO_2
LCE/ ㎡ of floor/Year	1.35	1.20	0	0.49	0.49	T-CO_2
Domestic energ/Year/Unit [1)]	2.390	2.390	2.390	2.390	2.390	T-CO_2
Transportation/Year/Unit [2)]	1.159	1.159	1.159	1.159	1.159	T-CO_2
Tree cap coverage	5,700	28,149	20,811	37,532	46,915	㎡
Absorption/Year	-3.0	-15.0	-11.1	-20.0	-25.0	T-CO_2
Absorption/Year/Unit	-0.009	-0.044	-0.032	-0.058	-0.080	T-CO_2
Barbon Stock in Building	68.6	68.6	987.8	34.3	34.3	Ton-C

[1)] Technical proposals for domestic energy consumption (solar cells, electric devices etc.) were discussed, however they were not included in the plan.

[2)] Fuel consumption did not differ significantly between the different spatial arrangements. In order to evaluate the total fuel consumption, urban scale spatial arrangement (including planning compact cities through vertical expansion) and provision of mass transportation were considered. That will be the next major topic of research. However, differential analysis by comparing an additional unit within the complex with additional development in the urban fringe could be attempted using the data on hand.

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