Ms. Nhujah Maharjan ***is a passionate architecture student currently in her 5th year, 9th semester at Acme Engineering College, Kathmandu. She is interested in design and research activities. She has been recognized through the prestigious Mansa Memorial Award. Beyond her academic achievements, Ms. Maharjan was an active member of the SQC, where she honed her collaborative and leadership skills. She aspires to contribute to society and her country through her work in architecture, aiming to create designs that are both innovative and socially impactful.***

Ms. Lisa Shrestha ***is interested in reading books, writing poems, and conducting research. By participating in the Turkish Olympia, she demonstrated her dedication to cultural and academic pursuits, showcasing her talents on an international stage. Her writings and research often delve into important societal issues, helping to raise awareness and inspire others.***

Ms. Upasana Dhakal ***is a Bachelor's in Architecture student of Acme Engineering College, Kathmandu, Nepal. She is passionate about the intersection of design, technology, and sustainability. She has been actively engaged on various activities: Acme architectural student association, society of Nepalese architect's seminar and exhibition and writing articles. She explores innovative solutions to contemporary issues like climate change and resource scarcity. She aims to integrate sustainable and innovative design principles into her architectural practice to enhance the quality of life for individuals and communities.***

Muskan Khanal ***is architecture undergraduate student at Acme Engineering College, Kathmandu. With a keen interest in blending creativity with environmental responsibility, Muskan strives to explore innovative solutions that harmonize with nature while meeting the needs of modern society. Embracing the principles of sustainable architecture, she aims to contribute meaningfully to the built environment, advocating for designs that prioritize both aesthetic appeal and ecological integrity. She has been actively engaged in various exhibitions and conferences, besides serving to Acme Architecture student association.***

Ms. Hashi Gurung ***is a Bachelor's in Architecture student of Acme Engineering College, Kathmandu, Nepal. Her field of interest includes ecofriendly design and vernacular architecture. Her contribution includes publishing a journal article on the Lo Manthang Conservation Challenges and report on earth sheltered architecture. She also volunteered at the SONA Seminar.***

ISSN: 2582-8304

Alternate planning of Ichangu Narayan land pooled area

Nhujah Maharjan, Lisa Shrestha, Upasana Dhakal, Muskan Khanal, Hashi Gurung

B. Arch, 5th Year students

Department of Architecture, Acme Engineering College, Kathmandu, Nepal

6.1 Study background

Land pooling is an approach that can contribute to making cities more inclusive, safe, resilient, and sustainable. It was first adopted to build a road in Pokhara in 1976 A.D. After this experience, land pooling was implemented in Kathmandu to develop a residential area in the then urban periphery. It is regarded as one of the best land development techniques for planned provision of infrastructure and supply of land without external investment. Compared to site and services and guided land development, land pooling technique has been accepted by general public as the land owners do not need to be displace. Moreover, even the area of the returned but serviced land area is small compare to the original one, the cost of the plot is many times higher than before the land development. However, land pooling projects in the Kathmandu valley have been implemented in the absence of mater plan and without a valley wide holistic vision.

This study aims to propose an alternate planning for the Ichangu Narayan land pooled site. The project implemented by Kathmandu

valley development authority (KVDA) took 8 years for completion (2006 – 2014). The main objectives of this paper are threefold. First, it studies the land pooling techniques from urban design perspective. Second, it critically carries out the Ichangu Narayan land pooled site and the KVDA implemented master layout plan. Third and last, it proposes an alternate layout plan for the same site.

6.2 Urban design framework for land pooling

Land-Pooling also known as land readjustment, land reform, town planning scheme, is an urban land development technique that involves acquiring fragmented plots belonging to many different landholders, consolidating the various plots into one area, subdividing this area in an orderly and planned manner, providing infrastructure, and redistributing serviced plots back to the original owners. A portion of the land is typically set aside for hard infrastructure but can also be allocated for social infrastructure (schools, government buildings, etc.) and public amenities such as parks and other open spaces.

An urban design approach carries with it fundamental principles and responses to human behaviors, provides a process and conceptual framework for implementing those principles, and allows more expansive use of the tools that urban design brings to a physical planning challenge. For places to be well used and well-loved, they must be safe, comfortable, varied and attractive. They also need to be distinctive, and offer variety, choice and fun. Vibrant places offer opportunities for meeting people, playing in the street and watching the world go by. New development should enrich the qualities of existing urban places. This means encouraging a distinctive response that arises from and complements its setting. This applies at every

scale the region, the city, the town, the neighborhood, and the street. Places need to be easy to get to and be integrated physically and visually with their surroundings. This requires attention to how to get around by foot, bicycle, public transport and the car and in that order. Places that strike a balance between the natural and man-made environment and utilize each site's intrinsic resources the climate, landform, landscape and ecology to maximize energy conservation and amenity. Stimulating, enjoyable and convenient places meet a variety of demands from the widest possible range of users, amenities and social groups. They also weave together different building forms, uses, tenures and densities. New development needs to be flexible enough to respond to future changes in use, lifestyle and demography. This means designing for energy and resource efficiency; creating flexibility in the use of property, public spaces and the service infrastructure and introducing new approaches to transportation, traffic management and parking.

6.3 Ichangu Narayan site analysis and layout prepared by KVDA

The Ichangu Narayan land pooling site is located at ward 1 of Nagarjun municipality. The site is in close proximity to Ghong river and Nagarjun forest. However, it is poorly connected with the Ring Road. The site is nearby to naturally conserved and protected Nagarjun forest and there are many hiking routes around it. It covers around 30.94 ha of land with total number of 956 plots. Implemented by Kathmandu valley town development committee (now KVDA) the road network covers around 20.03% with open space allocation of 2.93% only with additional 6.07% of sales plots (Table 6.1).

Table 6.1 Project detailing of Ichangu Narayan land pooling

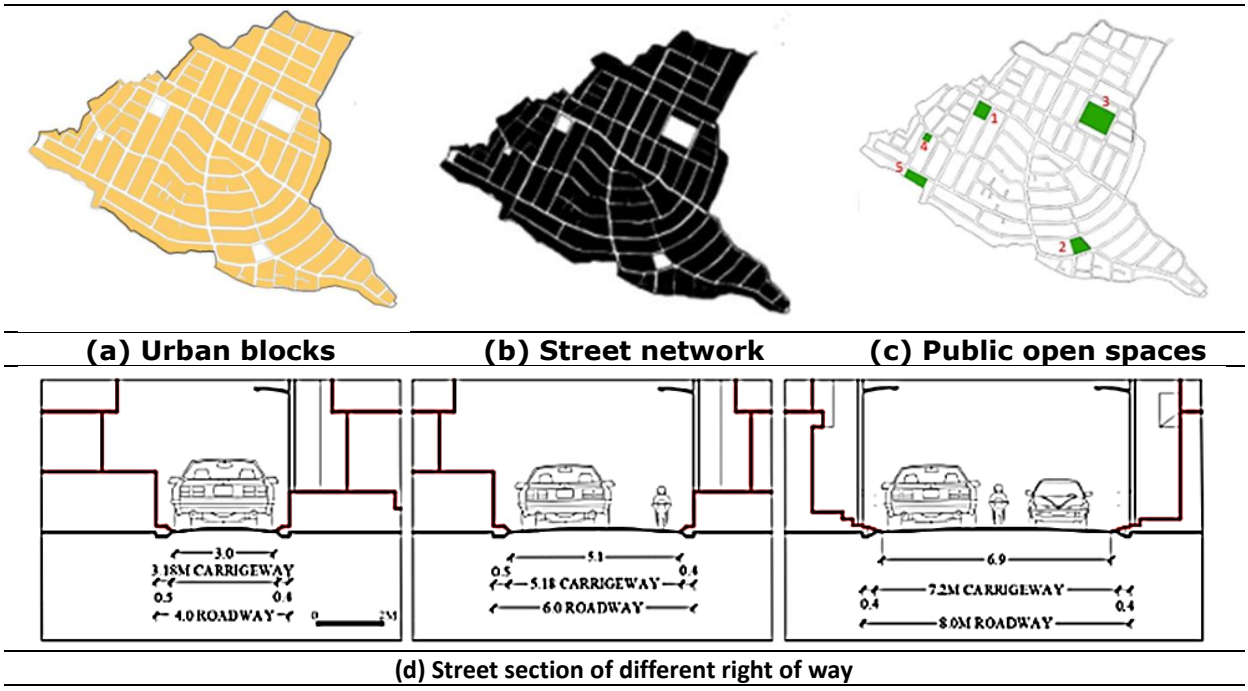
Project area	**30.94 ha**	**Estimated project cost**	**NRs472,000,000**
Starting time	**2003**	**Actual project cost**	
Status	**?**	**Developed plots**	**70.97%**
Total no of plots	**956**	**Road**	**20.03%**
Land owners/ tenants	**956**	**Open space**	**2.93%**
Implementing agency	**KVDA and Nagarjun municipality**	**Sales plot**	**6.07%**
Minimum size of plot	**80 sqm**		

Thought the project was commenced in 2003, it was delayed two years due to court cases, as some of the land owners were against the project implementation. Out of 956 plots, 494 plots belong to residential use and 195 plots have mixed use buildings (Fig. 6.1). Similarly, 22 plots have industry related building and 7 plots have commercial buildings. There are 17 temporary structures made up of CGI sheets. There are three schools including one Montessori, one Hindu temple and one Jamacho gumba is under construction (Fig. 6.2). Still 201 plots are vacant without any construction. In addition to these, two multistory apartments were also built with one community building within the site. The Department of Urban Development and Building Construction (DUDBC) purchased reserve land from the Users Committee at 20% above the market rate (NRs110 million) for construction of multilevel apartment buildings for the nearly 1,000 slum dwellers who had been evicted in 2012 from a settlement along the Bagmati River.

Fig. 6.1 The layout plan for Ichangu Narayan land pooling project

Fig. 6.2 Existing buildings and templs in the land pooled area

There are 85 number of urban blocks and those urban blocks are oriented in various directions (Fig.6.3). Three different types of street are planned. The right of ways are 8m, 6m and 4m. Due to small urban blocks, there are 38 cross junction with 62 T junction. There are five public open spaces scattered around the area. Out of them there are being partially occupied with community building, overhad water tank and temple. One of them is at present used as micro bus stand. Due to poor management, the childrenpark is also closed whereas entry fee is required to enter into one of the big park (Fig. 6.4).



(a) Urban blocks (b) Street network (c) Public open spaces

(d) Street section of different right of way

Fig. 6.3 Various features of the Ichangu Narayan land pooling project

Fig. 6.4 Public open space in the Ichangu Narayan land pooling project

Two apartment block earlier planned for resettlement of squatters remained empty for many years even after completion of the building simply because the beneficiaries did not want to relocate there (Fig. 6.5). The reasons cited for that were far location and lack of job opportunities around them. Moreover, the local land owners of Ichangu Narayan land pooling projects also protested squatter resettlement in their neighbourhood. As a result, those two buildings are now used by public agncy and one social organization.

Fig. 6.5 Apartment built as a squatter resettlement project

As there are not separate design guidelines for the planned area, different types of buildings are coming up at Ichangu Narayan land

pooled area, guided by prevailing building bye-laws of Nagarjun municipality (Fig. 6.6).

Fig. 6.6 Building types in the land pooled area

6.4 Proposed alternative master layout plan for the same site

The master plan is designed for a land pooling project, aiming to optimize land use, improve infrastructure, and create a balanced community environment. The design includes various zones such as residential, commercial, mixed-use, and institutional areas, integrated with public facilities and open spaces (Fig. 6.7).

The plan features a central circular hub, likely serving as a major focal point for the area, possibly hosting key public amenities or a major park. The residential zones are distributed around the central hub and along the main roads, providing easy access to amenities

and minimizing travel distance. The strategic placement of public facilities like health posts, police stations, and community buildings ensures that they are within a reasonable distance for all residents, enhancing the community's overall functionality. The use of different road widths helps in managing traffic flow efficiently, catering to different types of vehicles and pedestrian movement.

This master plan demonstrates a well-thought-out approach to urban planning, focusing on creating a balanced, functional, and sustainable community. The careful distribution of residential zones, integration of public facilities, and efficient traffic management are key elements that contribute to the overall effectiveness of the plan. This master plan showcases a well-balanced approach to urban development. It emphasizes accessibility, diversity, and sustainability by integrating various land uses and public amenities. The thoughtful layout promotes a high quality of life, economic vitality, and environmental health, making it a comprehensive and effective urban planning solution.

Fig. 6.7 Proposed alternate master layout plan with different uses

Residential (Purple): The extensive use of purple suggests a significant portion of the land is allocated for residential purposes. These areas are dedicated to housing, potentially including a variety of housing types such as single-family homes, apartments, and possibly some townhouses. A large residential area suggests a focus on creating a comfortable living environment. The layout should ensure access to essential services such as schools, parks, and shops.

Commercial (Pink): These areas are intended for businesses, shops, and services. They are distributed throughout the map, indicating multiple commercial hubs. These zones are intended for retail shops, offices, restaurants, and other businesses. Placing commercial zones strategically helps reduce travel distances for residents, potentially decreasing traffic congestion. These areas can serve as employment centers, boosting the local economy.

Mixed Use (Red): These zones allow for a combination of residential, commercial, and possibly other uses. They are strategically placed to ensure accessibility to both residential and commercial areas. Allows for a blend of residential, commercial, and possibly even light industrial uses. Mixed-use areas encourage walkability and can create vibrant, dynamic neighborhoods where people live, work, and socialize. This can lead to more sustainable urban growth by reducing the need for extensive commuting.

Open Space (Green Dotted): These are areas set aside for parks, recreational areas, and possibly green belts. They are spread out to ensure residents have access to open space for recreation and leisure. Parks, recreational areas, green belts, and other open spaces. Open spaces are crucial for environmental sustainability, providing areas

for recreation, reducing urban heat islands, and improving air quality. They also enhance the aesthetic appeal of the city.

Low Income (Yellow): These areas are designated for affordable housing. Placing them in different parts of the city ensures socioeconomic diversity and inclusivity. Affordable housing for low-income residents. Integrating low income housing into various parts of the city helps prevent economic segregation and ensures that all residents have access to urban amenities and services. This promotes social equity and diversity.

Community Building (Blue): These are designated for community centers or other public buildings. Community centers, libraries, and other public buildings. Community buildings are important for fostering social cohesion. They provide spaces for community events, learning, and social services, contributing to a sense of community.

School (Brown): Schools are marked and strategically placed to be accessible to various residential areas. Educational institutions ranging from primary schools to possibly higher education. Schools are essential for attracting families to the area and ensuring that children have access to education. Their strategic placement reduces travel time for students and can create safe, walkable neighborhoods.

Bus Station (Dark Red): These areas are designated for public transport hubs, ensuring connectivity. Public transport hubs. Effective public transport reduces traffic congestion and pollution. Well-placed bus stations enhance connectivity and make it easier for residents to access different parts of the city.

Health Post (Light Blue): Health facilities are distributed to ensure accessibility for residents. Clinics, hospitals, and other healthcare facilities. Accessible healthcare facilities are critical for the well-being of residents. They ensure that medical services are available to everyone, reducing health disparities.

Police Station (Dark Blue): Indicates the location of law enforcement facilities for maintaining public order and safety. Law enforcement facilities. The presence of police stations enhances public safety and security. Their distribution throughout the city helps ensure quick response times and fosters a sense of safety among residents.

This zoning plan showcases a balanced approach to urban planning, emphasizing connectivity, mixed-use development, and the provision of public amenities. It aims to create a vibrant, inclusive, and accessible urban environment. This zoning plan reflects a comprehensive approach to urban planning, focusing on creating a balanced, inclusive, and functional urban environment. By strategically placing residential, commercial, mixed-use, and public amenity zones, the plan aims to enhance livability, promote economic growth, and ensure sustainable development. The thoughtful integration of road networks and open spaces further supports these goals, fostering a connected and vibrant community.

The layout of urban blocks ensures a well-connected road network, facilitating easy movement within the urban area. Both north-south and east-west orientations are well-represented, promoting balanced traffic flow. The presence of circular blocks with central open spaces highlights the emphasis on creating communal areas. These spaces can serve as social hubs, recreational areas, and green lungs for the

city. The distribution of blocks suggests efficient land use, balancing residential, commercial, and public spaces. The mixed block orientations provide flexibility in land use planning, accommodating diverse building types and functions. The careful consideration of block orientations can contribute to environmental sustainability. Optimizing sunlight and wind flow reduces reliance on artificial lighting and mechanical ventilation, lowering energy consumption. The angular and circular blocks add variety to the urban landscape, preventing monotony and fostering a unique aesthetic and cultural identity for the area.

This urban block plan represents a thoughtful approach to urban design, integrating various block orientations to enhance functionality, sustainability, and livability. The diverse orientations—north-south, east-west, angular, and circular—each offer distinct advantages and design opportunities. The inclusion of central public spaces in circular blocks underscores a commitment to community building and social interaction. Overall, the plan aims to create a balanced, vibrant, and sustainable urban environment.

This plan focuses on the organization and layout of urban blocks within a land pooling area (Fig. 6.8). The proposed urban blocks are oriented in different directions. There are 35 number of block (54%) orienting towards north-south direction whereas 32 no of blocks (49%) are oriented towards east-west direction. Similarly, two urban blocks (2%) are oriented in angular direction and the remaining 4 blocks (6%) are oriented in circular form.

Fig. 6.8 Proposed urban blocks in alternate master layout plan

North-South Blocks (Orange)

These blocks are oriented in a north-south direction. North-south orientation can optimize sunlight exposure, particularly useful in regions where natural lighting is essential for energy savings and comfort. It can also facilitate better natural ventilation, improving air quality and reducing the need for mechanical cooling systems. This orientation can help in maintaining thermal comfort within buildings by minimizing direct sun exposure on the larger facades, thus reducing heat gain.

East-West Blocks (Pink):

These blocks are oriented in an east-west direction. East-west blocks receive direct sunlight in the morning and evening. This can be beneficial in colder climates where maximizing sunlight is desired. In hotter climates, east- west orientations might lead to higher solar gain, necessitating design features like shading devices to mitigate heat. Proper architectural design, including window

placement and materials, is crucial to manage the solar impact on these blocks.

Angular Blocks (Red):

These blocks are oriented at an angle, not strictly north-south or east-west. Angular blocks offer unique opportunities for creative architectural designs and distinctive urban character. The impact of sunlight and wind can be more complex to manage in angular blocks, requiring thoughtful design to balance these factors.

Circular Blocks (Yellow):

These blocks are oriented around a circular layout, typically centered on a public space. Circular blocks often feature a central public space, such as a park or plaza, which serves as a focal point for community activities. This layout encourages social interaction and community engagement, enhancing the livability of the area. Circular design can improve accessibility, ensuring that amenities and public spaces are within easy reach for residents.

Three types of road network are proposed (Fig. 6.9): 15 m, 12.5 m and 8m.

16.5m Road (Thick Orange): These are major arterial roads designed for high traffic volumes, likely connecting different zones and facilitating major traffic flow. Major arterial roads designed to handle high traffic volumes and connect key areas of the city. These roads are crucial for efficient traffic flow and connecting different zones. They might also support public transport routes and major commercial activities.

12.5mRoad (Thick Gray): These are secondary roads that connect neighborhoods and feed into the main roads. Secondary roads that support the main arterial roads. These roads facilitate access to residential and commercial areas, helping to distribute traffic more evenly and reducing congestion on major roads.

8m Road (Thin Gray): These are smaller, local streets intended for residential access. Local streets primarily serving residential areas. Local streets provide direct access to homes and small businesses. They should be designed to ensure pedestrian safety and support local traffic.

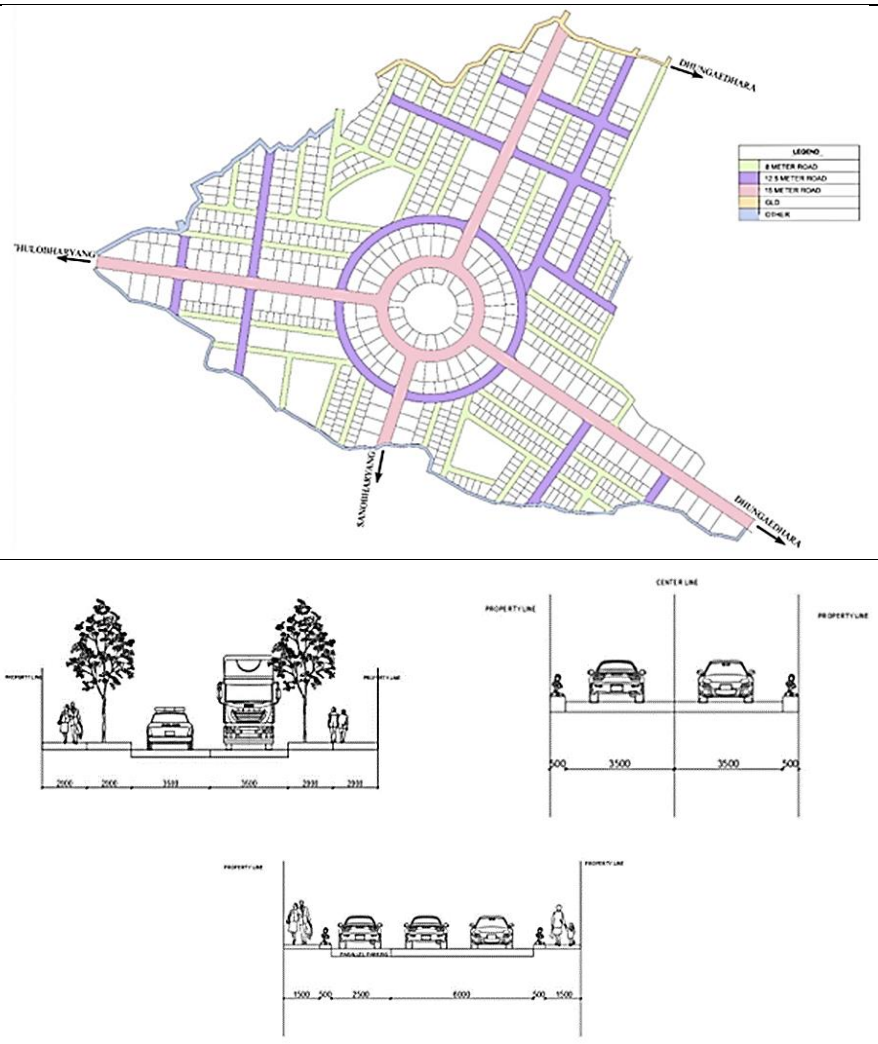


Fig. 6.9 Proposed road network with cross sections

Different types of public open spaces are proposed catering different age groups (Fig. 6.10). They include community park, children park and so on. Open spaces in residential areas are integral to fostering a healthy, active, and vibrant community. They serve as hubs for social interaction, physical activity, and relaxation. Incorporating features such as inclusive walking tracks and playgrounds for children, surrounded by green environments, colorful mandalas, and vibrant colors, can significantly enhance the appeal and functionality of these spaces.

Fig. 6.10 Proposed diverse type of public open spaces

Inclusive Walking Tracks: Walking tracks in residential areas should be designed to cater to all age groups and fitness levels. These tracks provide a safe and accessible path for walking, jogging, and running, encouraging residents to engage in regular physical activity. Features

such as smooth surfaces, adequate width, gentle slopes, and resting areas with benches ensure that everyone, from young children to the elderly, can use the tracks comfortably. Additionally, shaded sections and proper lighting make the tracks usable throughout the day and evening, promoting consistent use.

Playgrounds for Children: Playgrounds are crucial for the physical, social, and cognitive development of children. They provide a space where children can play, explore, and interact with their peers, fostering essential skills such as cooperation, problem-solving, and creativity. Modern playgrounds are designed with safety in mind, incorporating soft surfaces, age-appropriate equipment, and clear visibility for caregivers.

Green Surroundings: Green surroundings in residential open spaces contribute to a serene and refreshing environment. Trees, shrubs, and grass areas not only enhance aesthetic appeal but also improve air quality, reduce urban heat, and provide habitats for wildlife. Green spaces are known to have positive effects on mental health, reducing stress and promoting a sense of well-being among residents.

Colorful Mandalas and Vibrant Colors: The inclusion of colorful mandalas and vibrant colors in playgrounds and parks can have a profound impact on the overall atmosphere and the psychology of children. Mandalas, with their intricate and symmetrical designs, are not only visually appealing but also known to have calming effects. They can help in focusing the mind and reducing anxiety, making the playground a more relaxing and enjoyable place for children. Vibrant colors, especially oranges, play a significant role in child psychology. Orange is associated with enthusiasm, creativity, and warmth. It stimulates mental activity and encourages social interaction. Using

orange and other bright colors in playgrounds can create an inviting and stimulating environment that promotes playfulness and creativity. These colors can also enhance mood and energy levels, making children feel happier and more engaged.