Building Neighborhoods that Build Social and Economic Prosperity:
Manual for a Complete Neighborhood

Kigali, Rwanda

"A house is not a home unless it is a village."
Peter Rich, South African Architect

Challenge

Rapid urban growth due to the substantial scale of repatriation in Rwanda has created an untenable housing demand within Kigali. While shortages in adequate housing facilities and modern services are generally experienced among all income levels, housing is particularly absent for low-income families. The poor provide their own housing through illegal slums and squatter houses that exist outside of the formal economy and land tenure, known as informal settlements. The realization that government cannot be a complete housing provider prompts alternative provider solutions based on cooperative partnerships known as Sites-and-Services schemes. In sites-and-services arrangements, governments provide serviced land and essential building infrastructure while low-income beneficiaries are responsible for completing the construction of their individual dwelling units.

This manual illustrates a stepped process for achieving a Complete Neighborhood that harnesses best practices from both formal and informal development processes. A complete neighborhood provides the full spectrum of land uses within its borders to meet the daily needs of its residents. Formal development processes underscore the necessity of basic services and planning upon which to build prosperity. Informal processes demonstrate the power of local social and economic self-organization to build livelihoods in low-resource environments. The envisioned outcome is a neighborhood in which low-income households can find dignified shelter as well as the prospects to develop deep social ties and work opportunities.

Neighborhoods can be building blocks towards achieving prosperity. The proposal reflects the green development philosophy outlined in *The Rwanda National Strategy on Climate Change and Low Carbon Development*, a strategic development vision completed last year. While government constructs core site and building services necessary for the minimum stage of habitation, the proposal's generative principles promote increasing complexity among local social, ecological and economic systems. Generative principles emphasize sustainability, resiliency, flexibility, and net energy production in the evolution of 21st century living environments—all addressing new notions of prosperity and security in a lower-energy future. The six tactics towards a complete neighborhood outlined below provide a low-cost, high-concept placemaking template of which any income group would be proud.

Tactics

Step 1: Assess Topography and Define Hillside Planning Module

Step 2: Create a Settlement Network with Multiple Centers and Service Corridors

Step 3: Envision the Cross-section of Social Life from Ridge to Valley

Step 4: Define Unit Module and Building Frame; Couple and Stack Utility Cores

Step 5: Combine Units into Building Typologies

Step 6: Sustainability? Embed Resiliency into Neighborhood Systems

Analysis of Existing Settlement Patterns





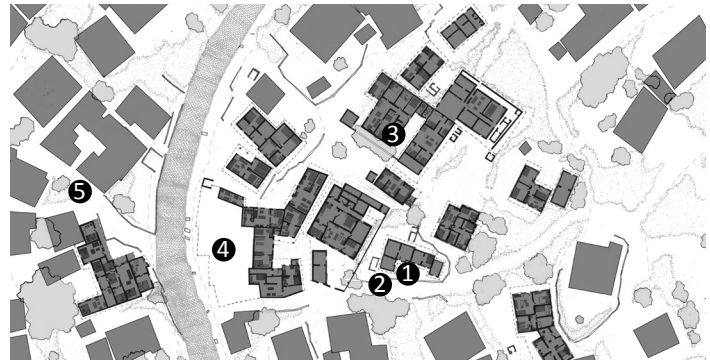


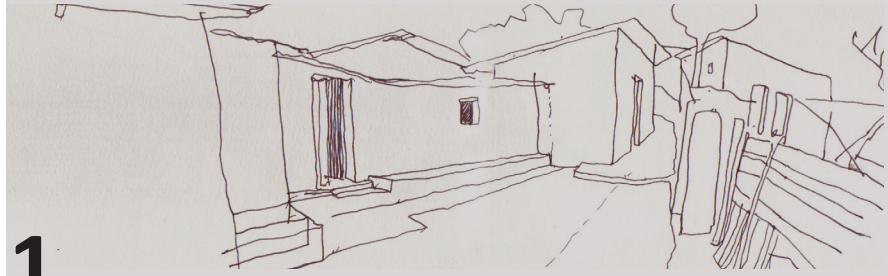



The president of Rwanda has decreed that all roofs are to be red

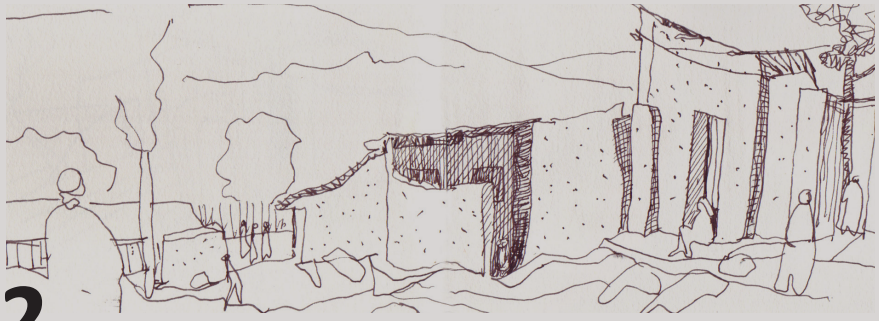
Urban Study

UA / KIST / PRA 2011 Views of Igikari (courtyards), edge conditions in an informal settlement in Kigali, Rwanda.





1 *Igikari* (courtyard) defensible private forecourt space



2 Public walkway, storm water drain and defensible edge

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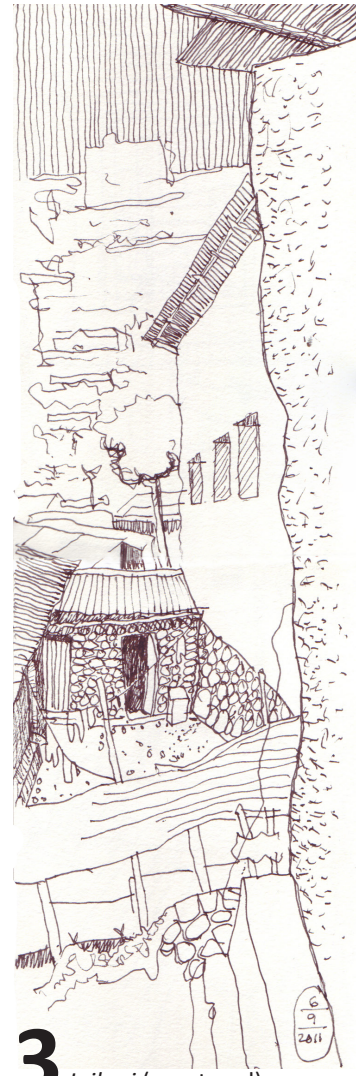
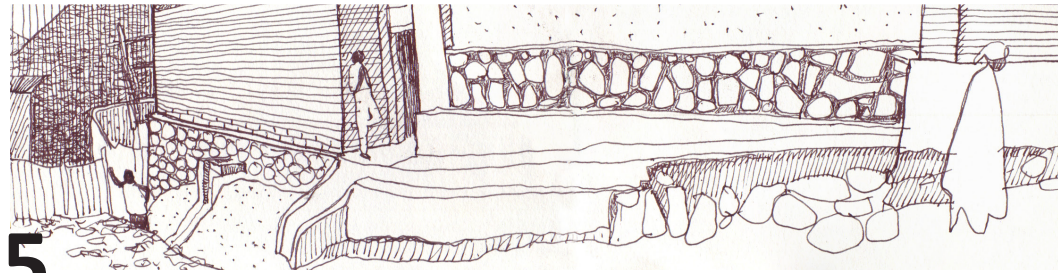


3 *Igikari* (courtyard) defensible backyard space

4 *Ibaraza* (veranda) - interactive commercial street edge



5 Horizontal platform, defensible edge + stormwater control

Urban Study

UA / KIST 2011 Field work study of a portion of an informal settlement in Kigali, Rwanda.

Residential (family unit + allied rental) 100 units per Hectare

Igikari Courtyard as defensible space

Igikari Implied Courtyard without enclosure

Commercial

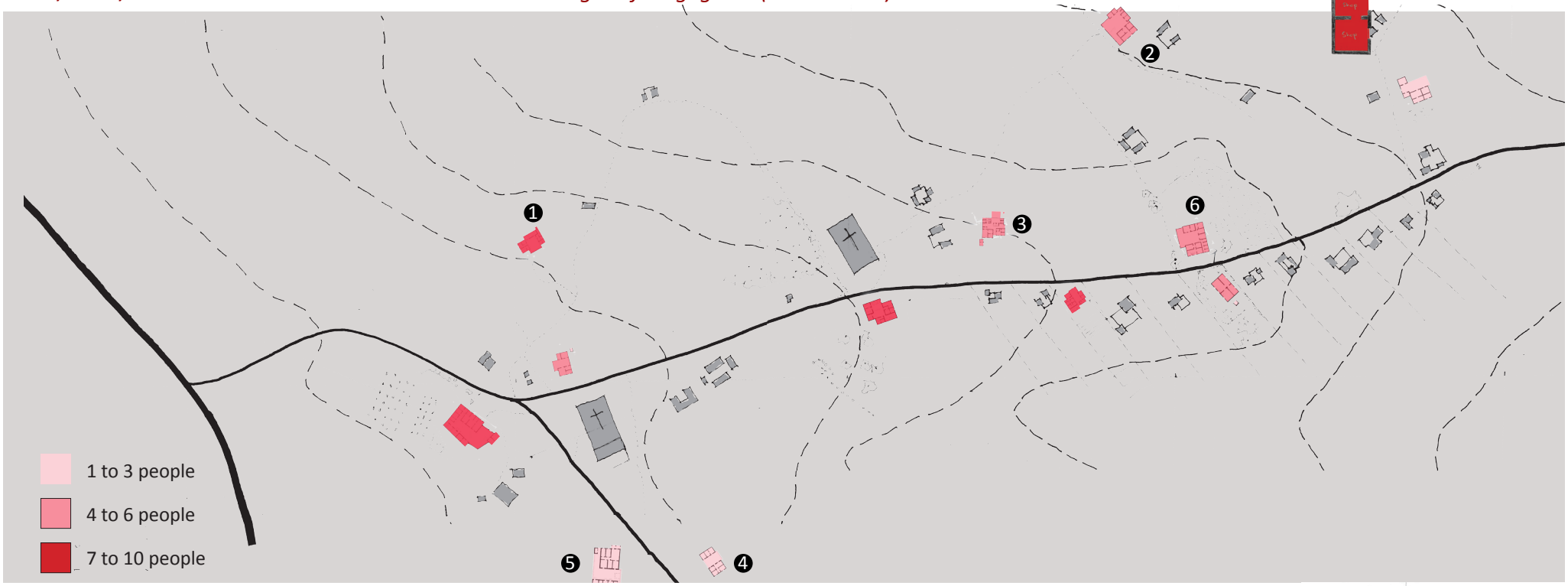
Interactive with street *Ibaraza* (veranda)

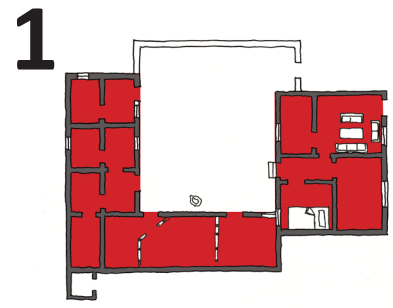
Main public walkway and stormwater drainage

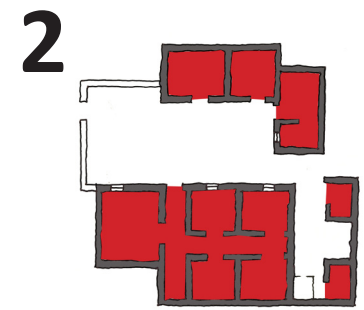
Negotiated internal public circulation

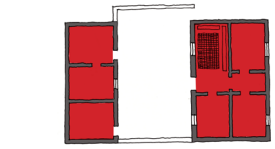
Rural Study

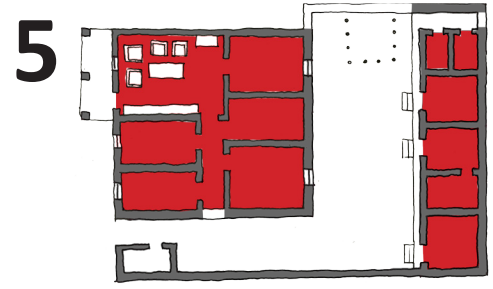
UA / KIST / PRA 2011 Rural household densities - buildings defining Igikari (inner courts).

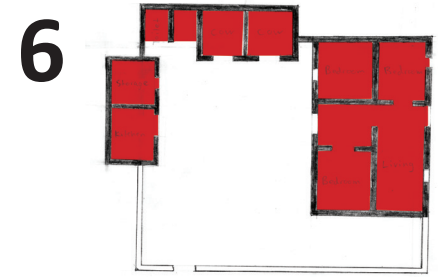












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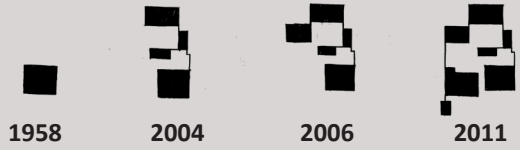
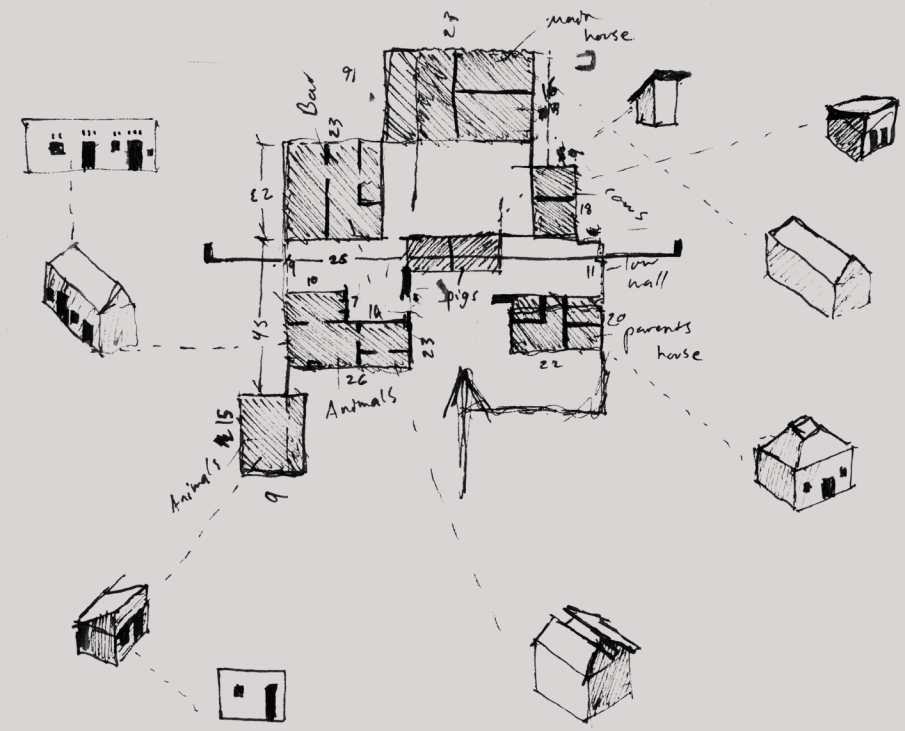
Rural Study

UA / KIST / PRA 2011 Farming settlements structured down a hill along an access spine.

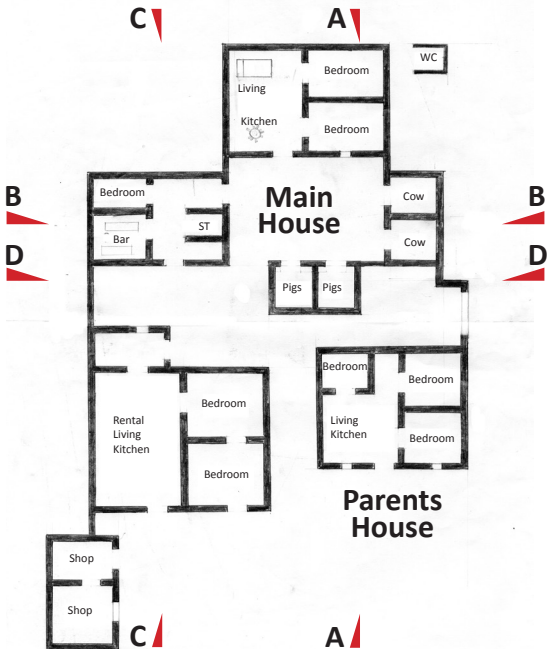


Incremental growth of the house and
the forming of the *igikari* (courtyard)

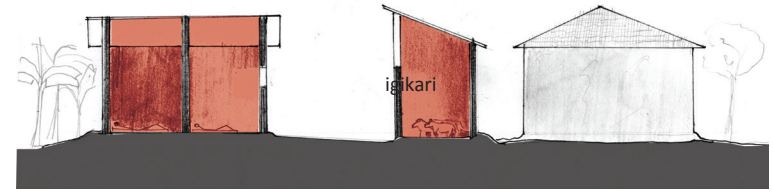


Rural Study

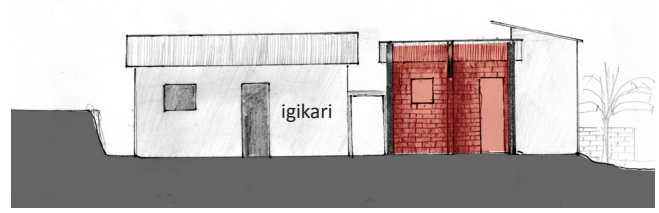
UA / KIST / PRA 2011 Farm house room usage - sections - incremental growth over time forming igikari.



Section B-B



Section A-A



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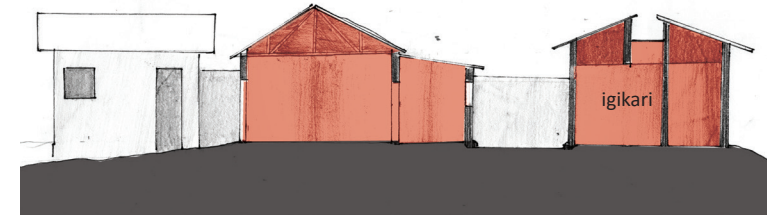
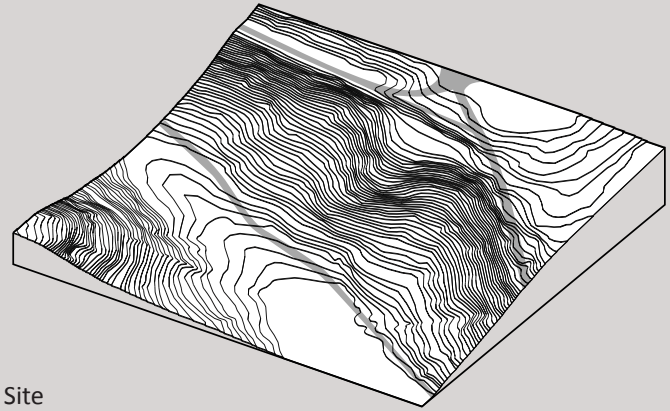


Section C-C

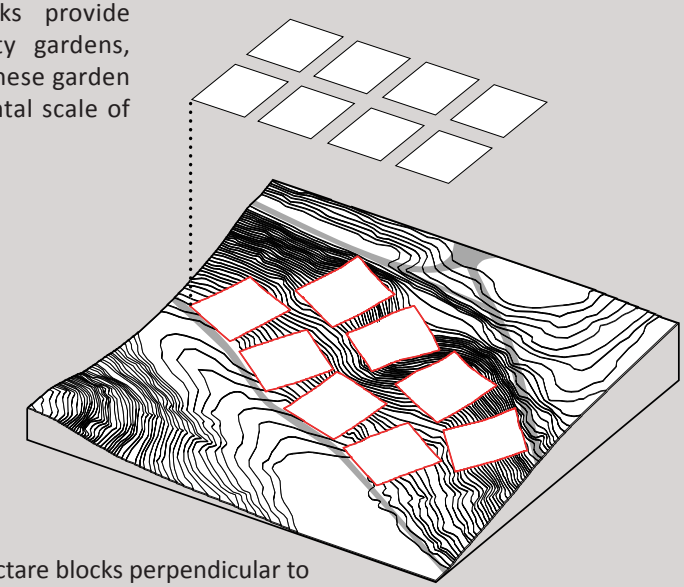
Step 1: Assess Topography and Define Hillside Planning Module

Everything in Rwanda happens on a hill. Urban settlement patterns must be responsive to changing hillside slope ratios, entailing solutions that optimize connectivity between dense development on steep ridges above and agricultural fields in valleys below.

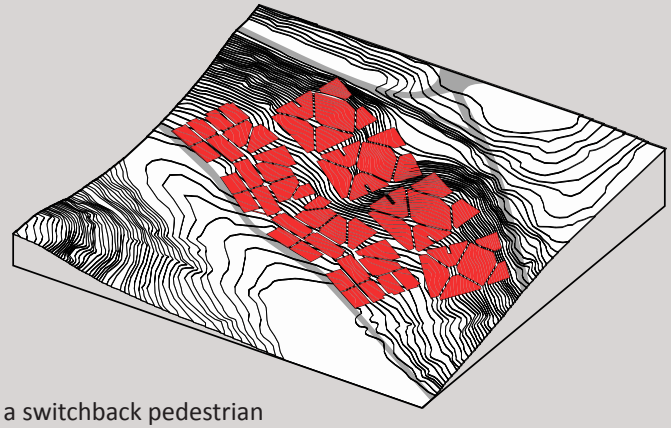
Place one-hectare blocks perpendicular to hillside contours constituting identifiable neighborhood increments with distinct edges, centers, and nodes. This rationalization optimizes views and orientation—at no additional cost—and provides a shared neighborhood template employed among other income groups. Blocks are versatile planning units since they accommodate a wide spectrum of housing types and neighborhood land uses within their increment. Blocks also facilitate pedestrian connectivity and accessibility to essential services for daily needs without reliance on the automobile. Each block is connected by public spaces that deliver ecological and urban services. Slope or embankment landscapes between blocks provide important ecological services through community gardens, stormwater management, and slope stabilization. These garden blocks reproduce holistic qualities at the fundamental scale of neighborhood building.



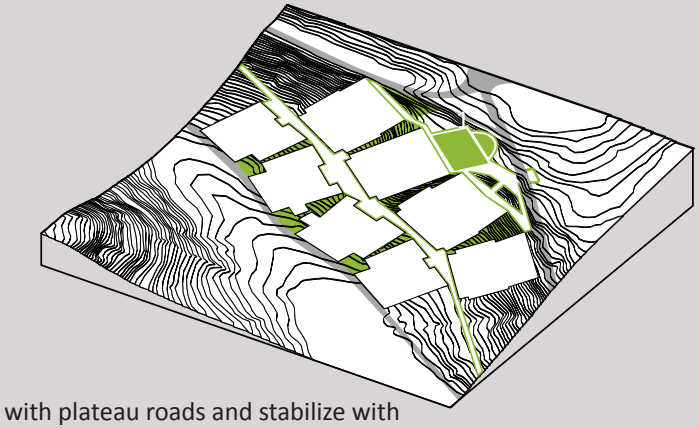
1 Hillside Site



2 Place one-hectare blocks perpendicular to topography



3 Overlay a switchback pedestrian network to maintain a 10 percent incline

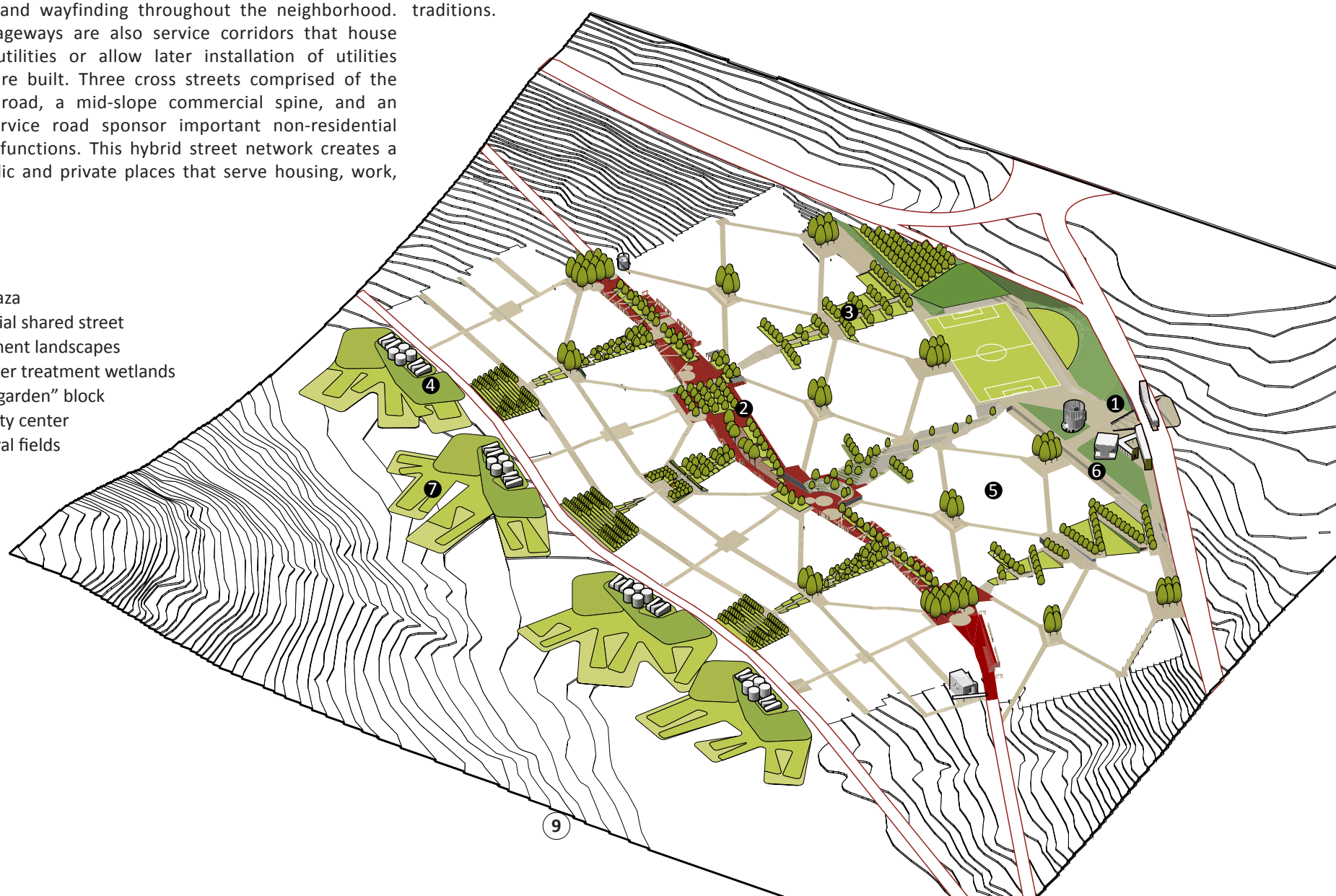


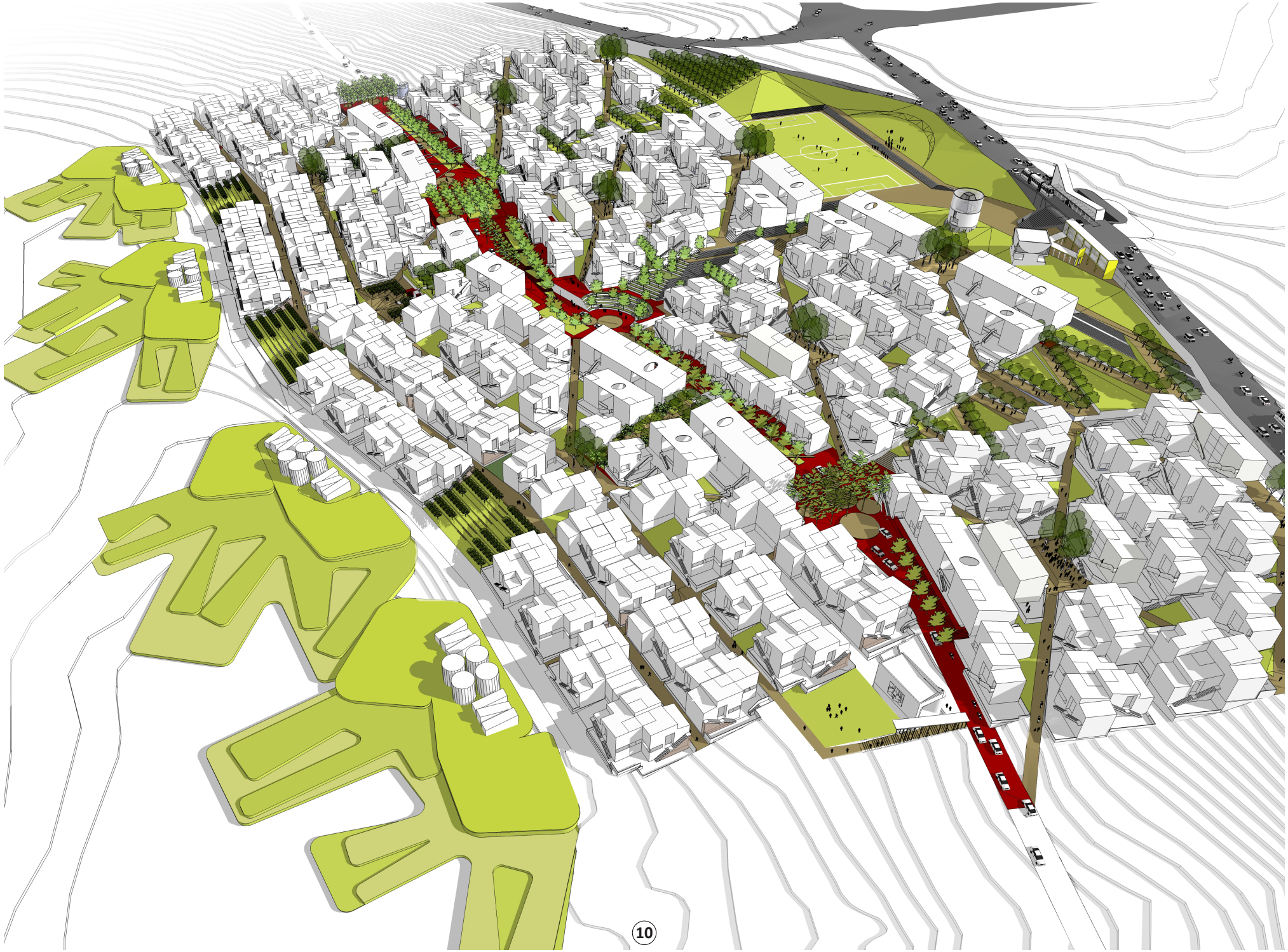
4 Link hillside with plateau roads and stabilize with embankment landscapes

Step 2: Create a Settlement Network with Multiple Centers and Service Corridors

While every block reproduces wholeness at its scale, street networks create identifiable centers and places leading to a larger communal field of centers throughout the neighborhood and city.

Apply diagonal geometries to maintain a manageable ten percent incline across steep and moderate slopes. Diagonal frequency is modulated according to the slope ratio within each block, creating terraces, plateaus, and switchbacks for ease of walkability and wayfinding throughout the neighborhood. Diagonal passageways are also service corridors that house underground utilities or allow later installation of utilities after houses are built. Three cross streets comprised of the arterial ridge road, a mid-slope commercial spine, and an agricultural service road sponsor important non-residential neighborhood functions. This hybrid street network creates a mosaic of public and private places that serve housing, work, and commercial functions within a dense setting. The benefit of this network algorithm is its provision of full modern services within a building fabric that approximates local norms of privacy, entrepreneurialism, and space underlying local housing traditions.



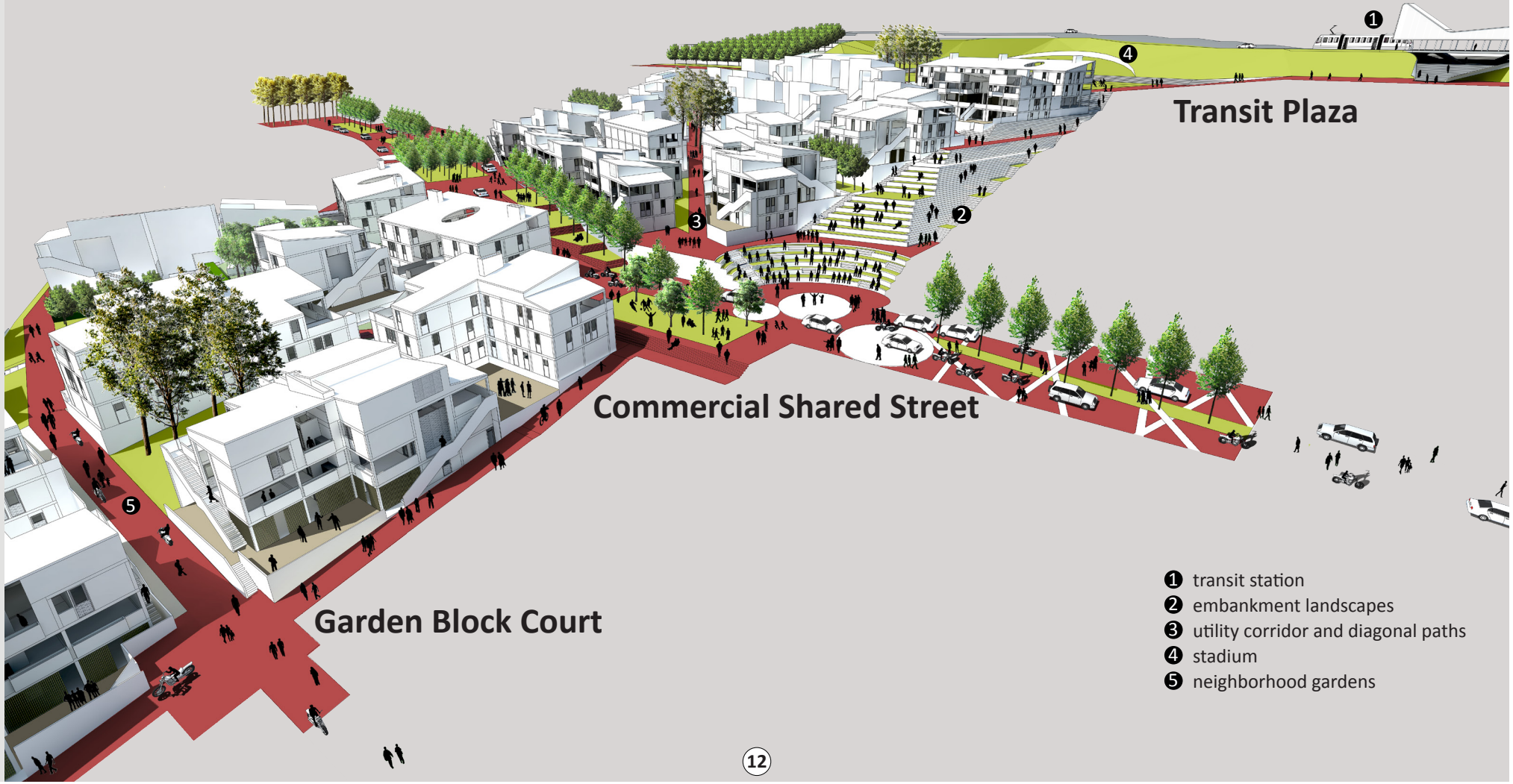


1. transit plaza
2. commercial shared street
3. embankment landscapes
4. wastewater treatment wetlands
5. hectare “garden” block
6. community center
7. agricultural fields

Step 3: Envision the Cross-section of Social Life from Ridge to Valley

Without a vision, incremental growth yields only incremental growth. The vision for the project imagines the character and content of places that support social life throughout the neighborhood. Connectivity and accessibility are core drivers of neighborhood-building solutions.

Define a framework of transitions between neighborhood areas, or ecotones, where public life will be the most vital, and ensure equal distribution across the neighborhood. In this vertical urbanism, plateaus, terraces, and stairs function as important refuges that promote social interaction as they become natural gathering spots for play, commerce, and work. Courtyard nodes anchor garden block interiors, and connect housing to open public spaces at block edges. Neighborhood infrastructure with robust public amenities provides multiple services and makes a full range of economic exchange and shared purpose possible. The shared street at mid-slope exemplifies this notion of multi-tasking infrastructure. The project's "living transect" differs from the superficial order in housing subdivision schemes, which simply distributes parcels and buildings.




Transit Plaza

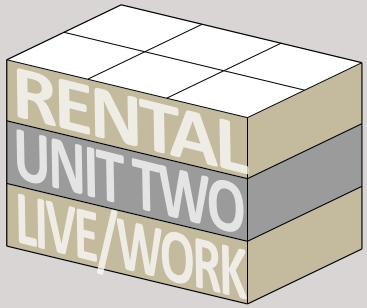

Commercial Shared Street

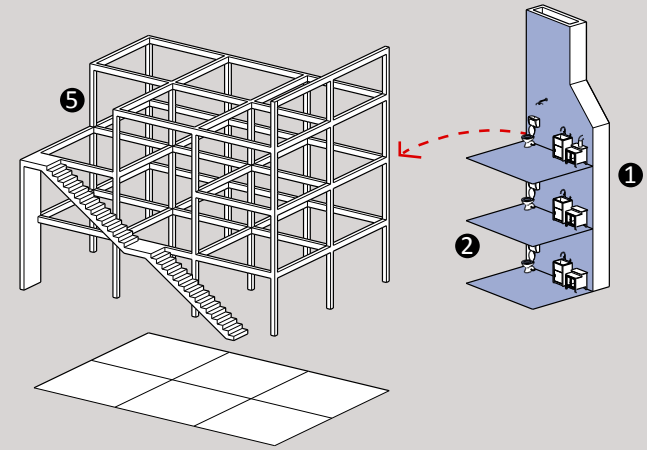

Garden Block Court

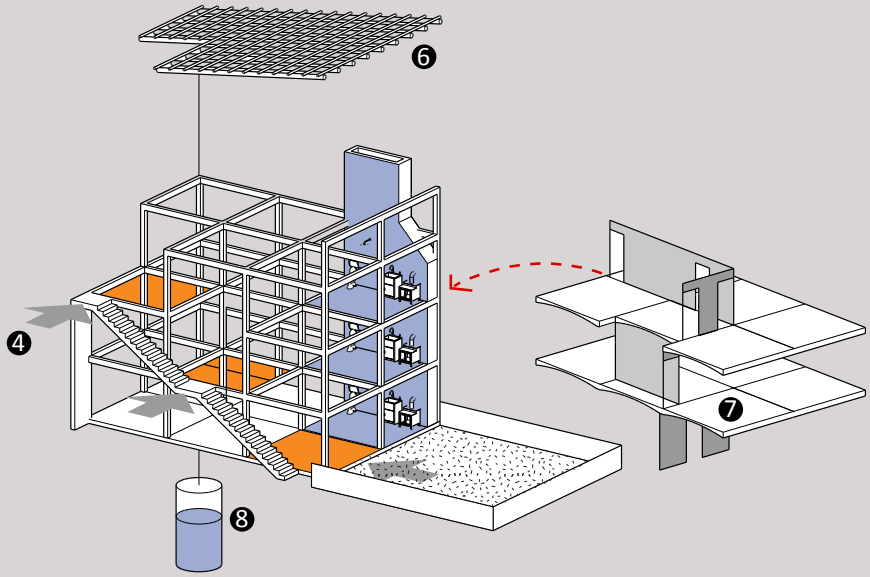
Step 4: Define Unit Module and Building Frame; Couple and Stack Utility Cores

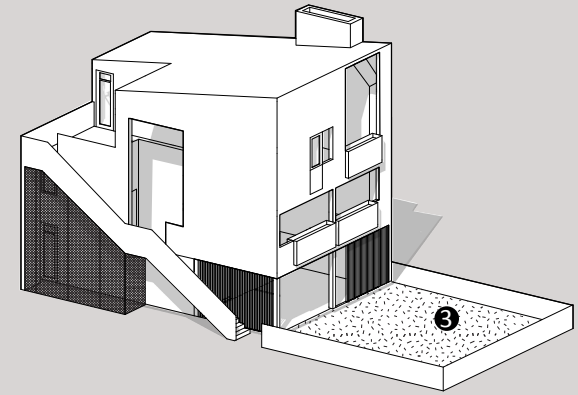
To achieve an economy of scale and land-use efficiencies, all dwelling units share a four-meter planning module open to flexible living arrangements. Unit wet cores consisting of plumbing, venting, and solar chimneys for cooling, are coupled and stacked achieving an average density of 200 units per hectare block.

Develop a square module for dwelling unit configurations with corner utility cores to support variety in unit stacking and combining. In this Sites-and-Services scheme, the government is less a housing provider and more a housing enabler: providing the concrete building frame and pads, site terracing, and infrastructure. Through sweat equity partnerships, residents enclose and finish their own dwelling units. Despite the standardized module for unit design, plan variation is achieved through unit aggregation strategies, stacking, and site orientation. All units have outdoor terraces, offering flexibility and further opportunity for individualization of lifestyle. Tradeoffs include substitution of higher densities for more familiar low-density, rural-based, or informal housing to realize greater quality in the construction, planning, and neighborhood completeness.







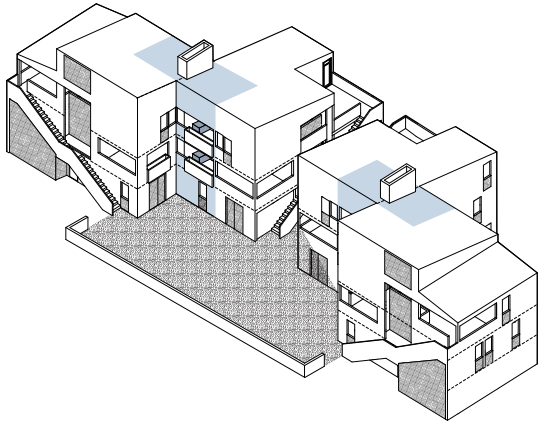


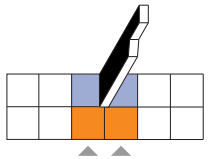
1. solar chimney
2. wet core
3. outdoor court
4. entry
5. concrete frame
6. timber roof
7. catalan vaulting
8. rainwater cistern

Step 5: Combine Units into Building Typologies

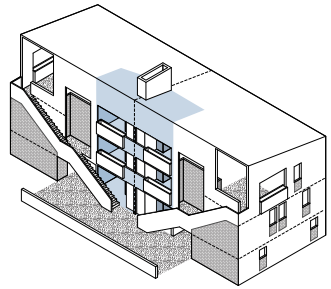
The key to good multi-family housing design lies with the quality of the building's connective tissue—shared entry courts, circulation, stairs and decks, building porches, and galleries. This is where people gather and where "social capital"—the sum of benefits derived from cooperation, trust, reciprocity, and shared learning—is formed.

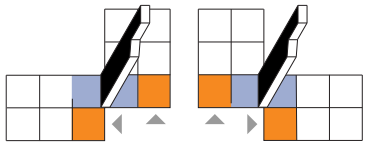
Combine units into building typologies that define neighborhood spaces, courts, patios, passages, and streets. Duplex, triplex, gateway, court, and gallery building typologies fulfill niche roles in the development of various neighborhood open space systems. Duplex, triplex and gateway building types constitute most of the patio-based neighborhood fabric, while court and gallery types are employed along streets, block centers, and at other important neighborhood thresholds. The triplex, for instance, offers two-way public space frontage, ideal for corner conditions and connections between open spaces of varying orientations. Each building typology structures specific micro-communities within the garden block.



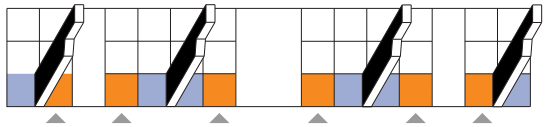


Duplex Type

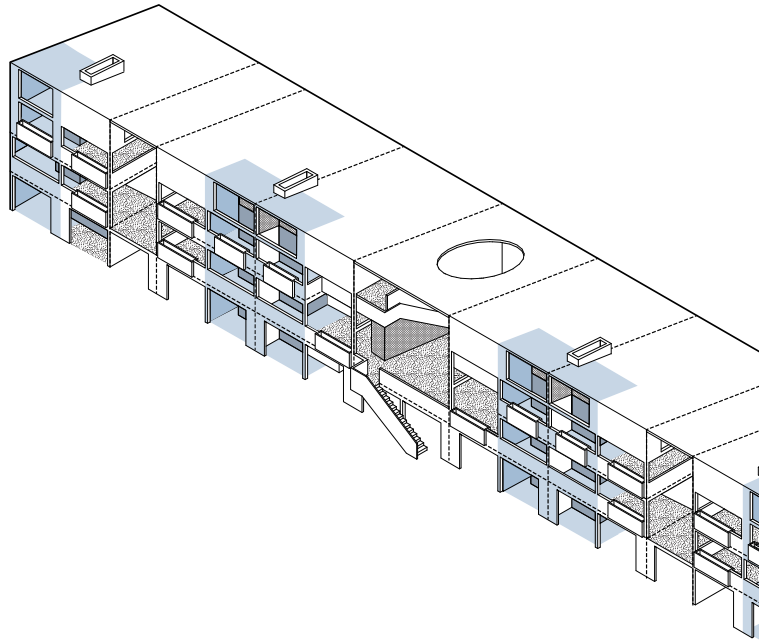


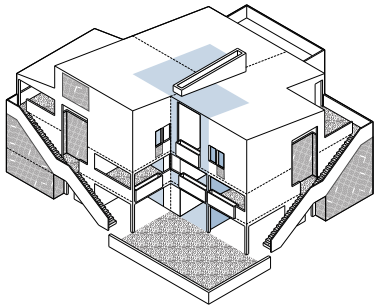


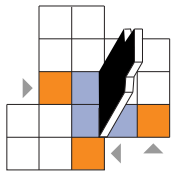
Court Type



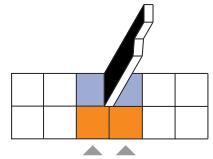
Gallery/Gateway Type



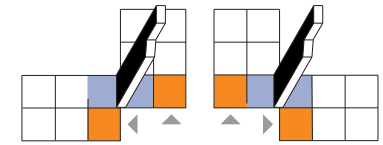




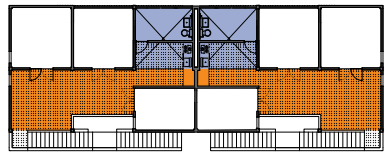
Triplex Type



Duplex Type

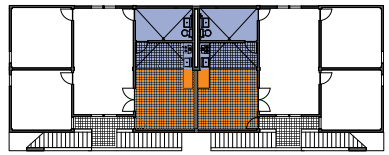


Court Type

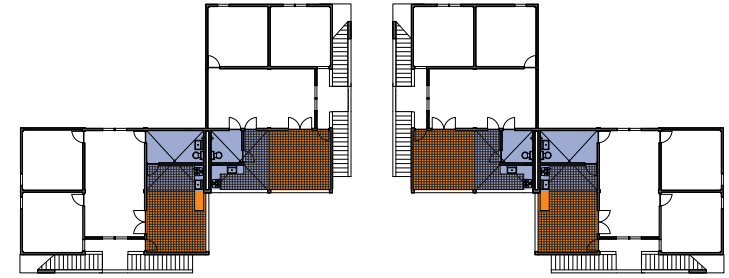


Third Floor Plan

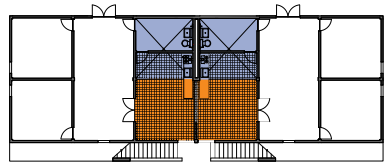
Third Floor Plan



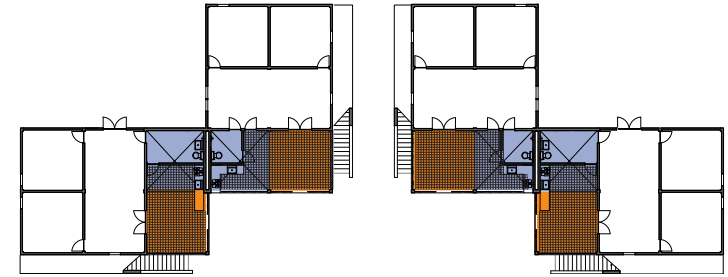
Second Floor Plan



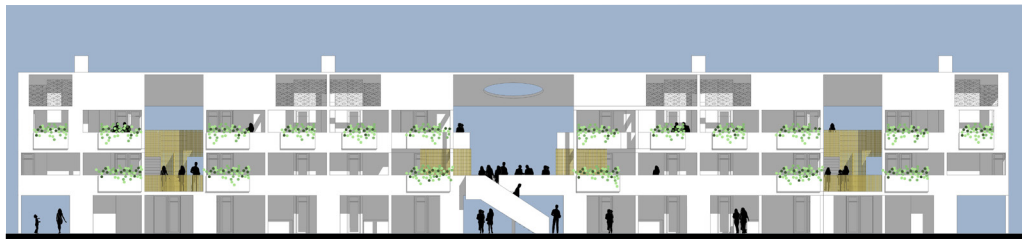
Second Floor Plan

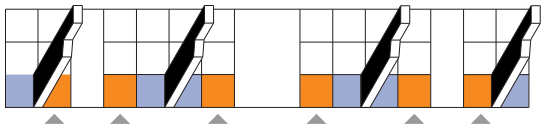


Ground Floor Plan

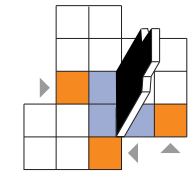


Ground Floor Plan

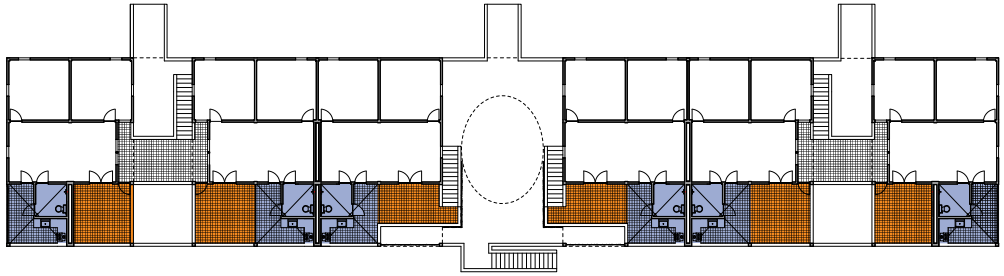




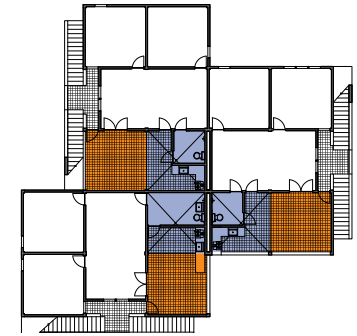
Gallery Type



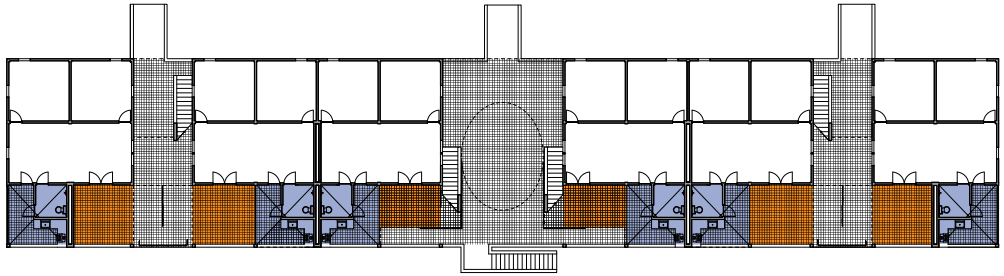
Triplex Type



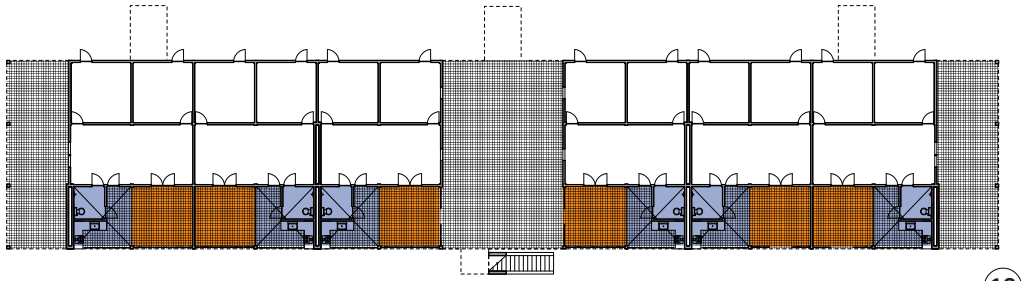
Third Floor Plan



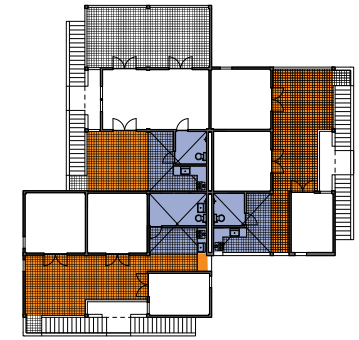
Third Floor Plan



Second Floor Plan



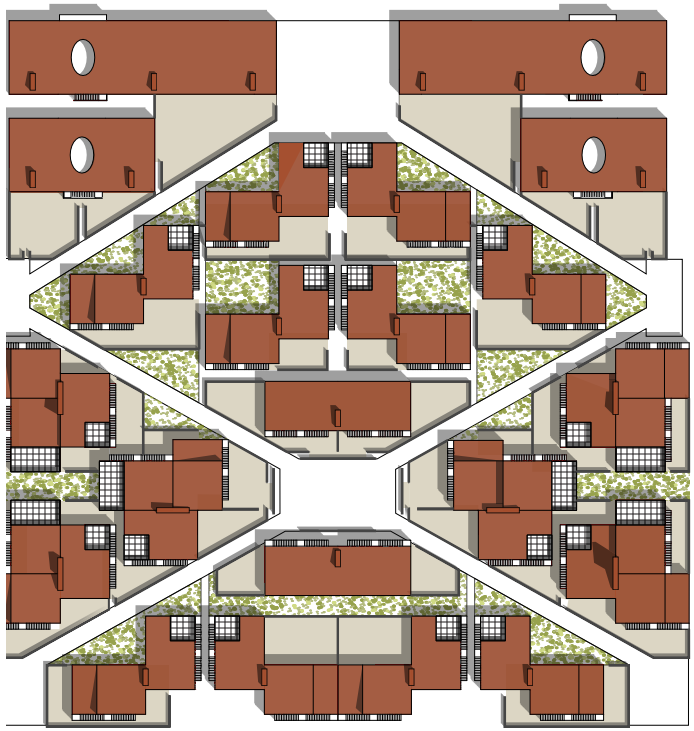
Ground Floor Plan



Ground and Second Floor Plan

Garden Block Hectare

1. switchback doubles to maintain ten percent slope
2. terrace
3. foyer
4. court
5. shared street
6. defensible space
7. neighborhood gardens



Umuryango—Family and Door: The Cultural and Architectural Language of Kinyarwanda

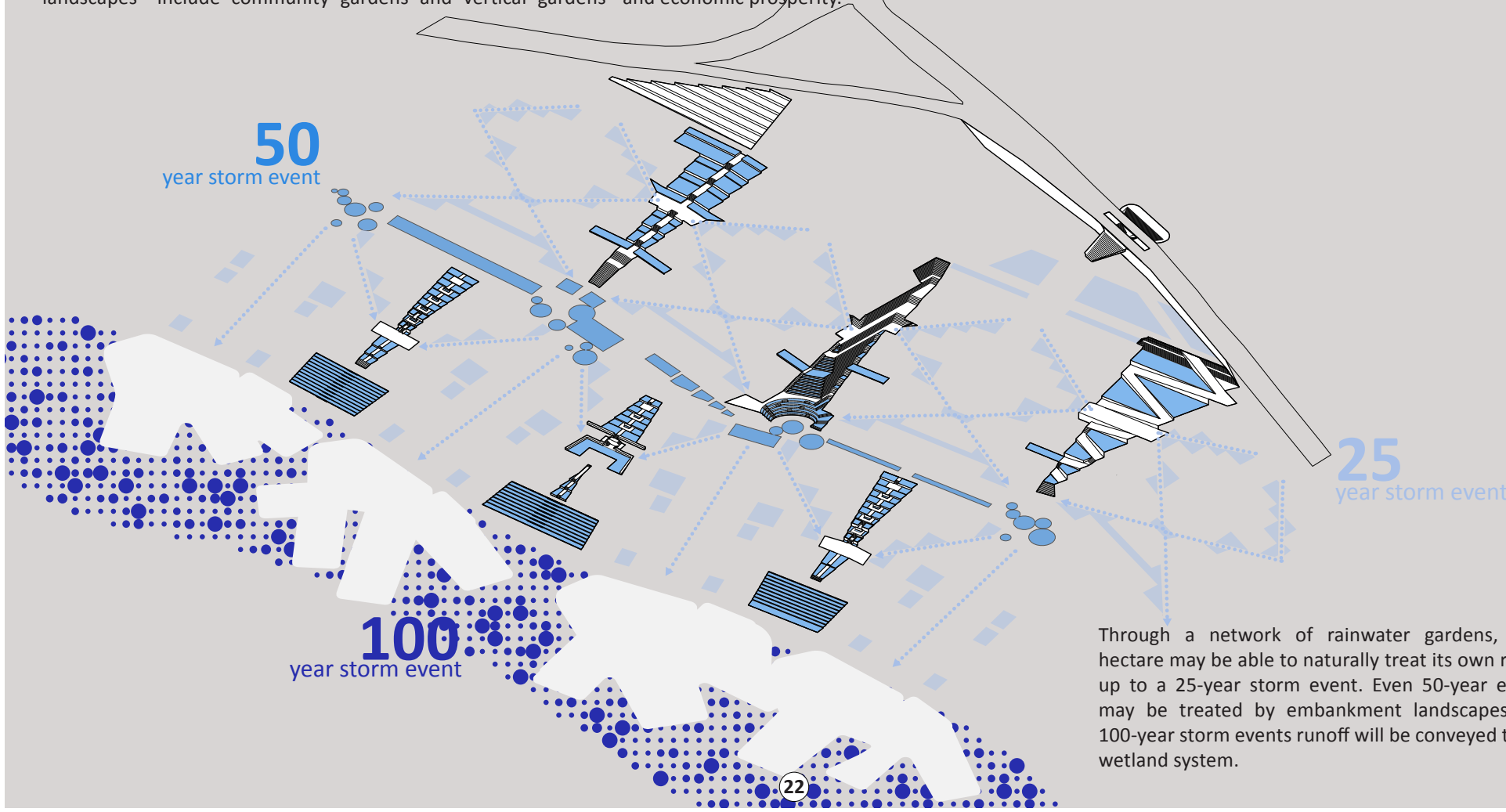
"A culture's spoken or written language often holds clues about the experiences and artefacts of daily life. Kinyarwanda, the national language of Rwanda, is exemplary in this regard. In Kinyarwanda, the term for family is *umuryango*. Dependent upon the pronunciation, however, umuryango can also mean 'doorway', often referring to the main entry to the home. Umuryango is both a social construct—family—and an architectural concept—doorway—a linguistic bridge between abstract notions and concrete things. The door is the family; the family is the door. Family is a concept expressed not through the notion of house or home but via the door, the mediating device between one's neighbours, *abaturanyi*, and the individual members of the family. Concepts such as this were essential to the housing proposals seen in this pamphlet. While higher-density housing is new to Rwanda, the work herein is built upon cultural and spatial concepts of Rwanda, especially in establishing territories of public, semi-public, and private space: *urubuga*, public plaza or square; *urugo*, house, enclosure, or compound; *irembo*, gate or gateway; *ibaraza*, stoop, small porch, or veranda; *imbuga*, semi-public courtyard or forecourt; and *mu gikari*, within the private courtyard. These terms, taken together—*umuryango wo mu gikari*, the doorway to the private courtyard, or *umuryango wo mu kuruganiriro*, the doorway to the main living space—provide both a cultural and an architectural language for future urban housing in Kigali."

Korydon Smith

Step 6: Sustainability? Embed Resiliency into Neighborhood Systems

Resiliency is the capacity of any system to sustain disturbances and distresses that could otherwise impair normal functioning. Neighborhood resiliency incorporates passive and low impact technologies to solve for problems in water management, erosion control, water supply, waste removal, food security, as well as social divisiveness.

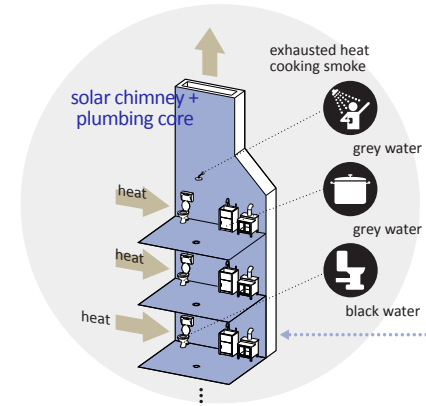
Create distributed, redundant, and intelligent infrastructure that delivers multiple ecological and urban services. Total reliance on centralized systems concentrate risk in one place, and their failure to consistently function produces chains of negative effects. Distributed systems include low impact stormwater runoff management, which uses the biological processes in plants to treat runoff and prevent erosion. Other forms of "productive landscapes" include community gardens and vertical gardens for food production. Rainwater harvested from roofs provides alternative water supply. Biogas plants provide on-site waste water treatment, converting waste to energy. Solar chimneys in units promote interior natural cooling and evacuate polluted indoor air from cooking through natural convective ventilation. Neighborhood planning promotes a full spectrum of opportunities for forging the cooperative structures leading to greater social and economic prosperity.

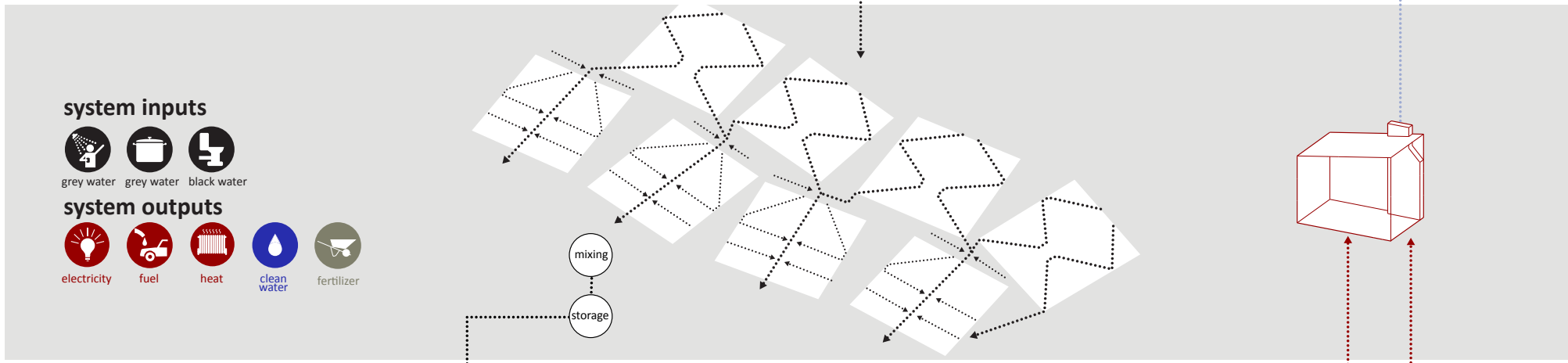


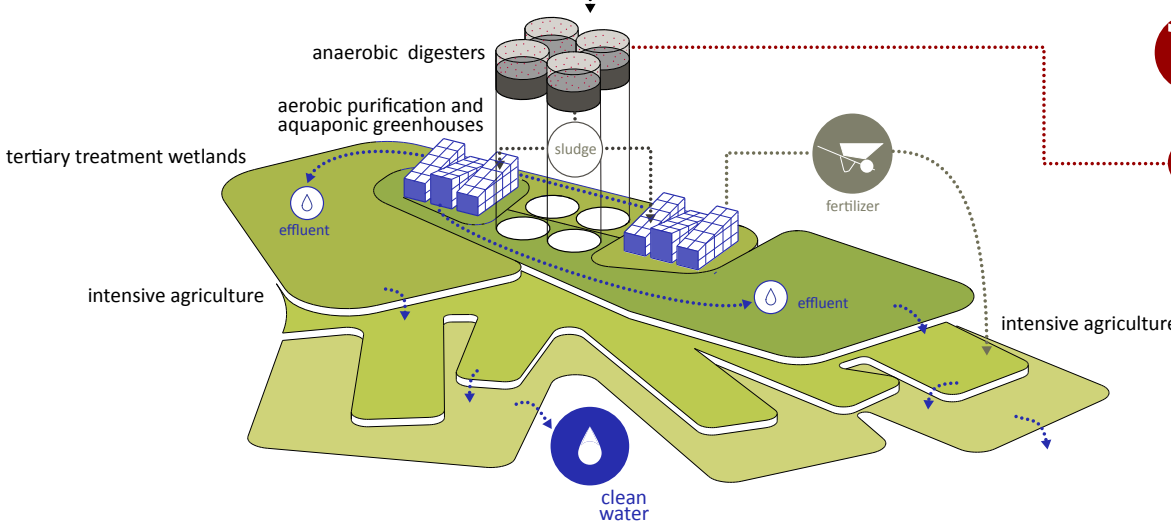
Through a network of rainwater gardens, each hectare may be able to naturally treat its own runoff up to a 25-year storm event. Even 50-year events may be treated by embankment landscapes. For 100-year storm events runoff will be conveyed to the wetland system.

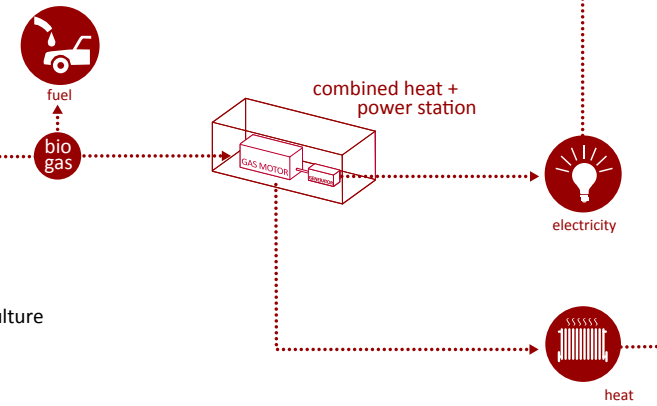
Waste to Energy: Regenerative Neighborhood Landscapes

Energy self sufficiency is achieved by recycling waste through on-site biogas facilities. Each hectare produces enough waste to fuel one thousand 100-watt lightbulbs per hour and provide gas for cooking. In this closed loop system, outputs from the biogas facility (sludge and effluent) are purified and used to irrigate and fertilize intensive agricultural fields.

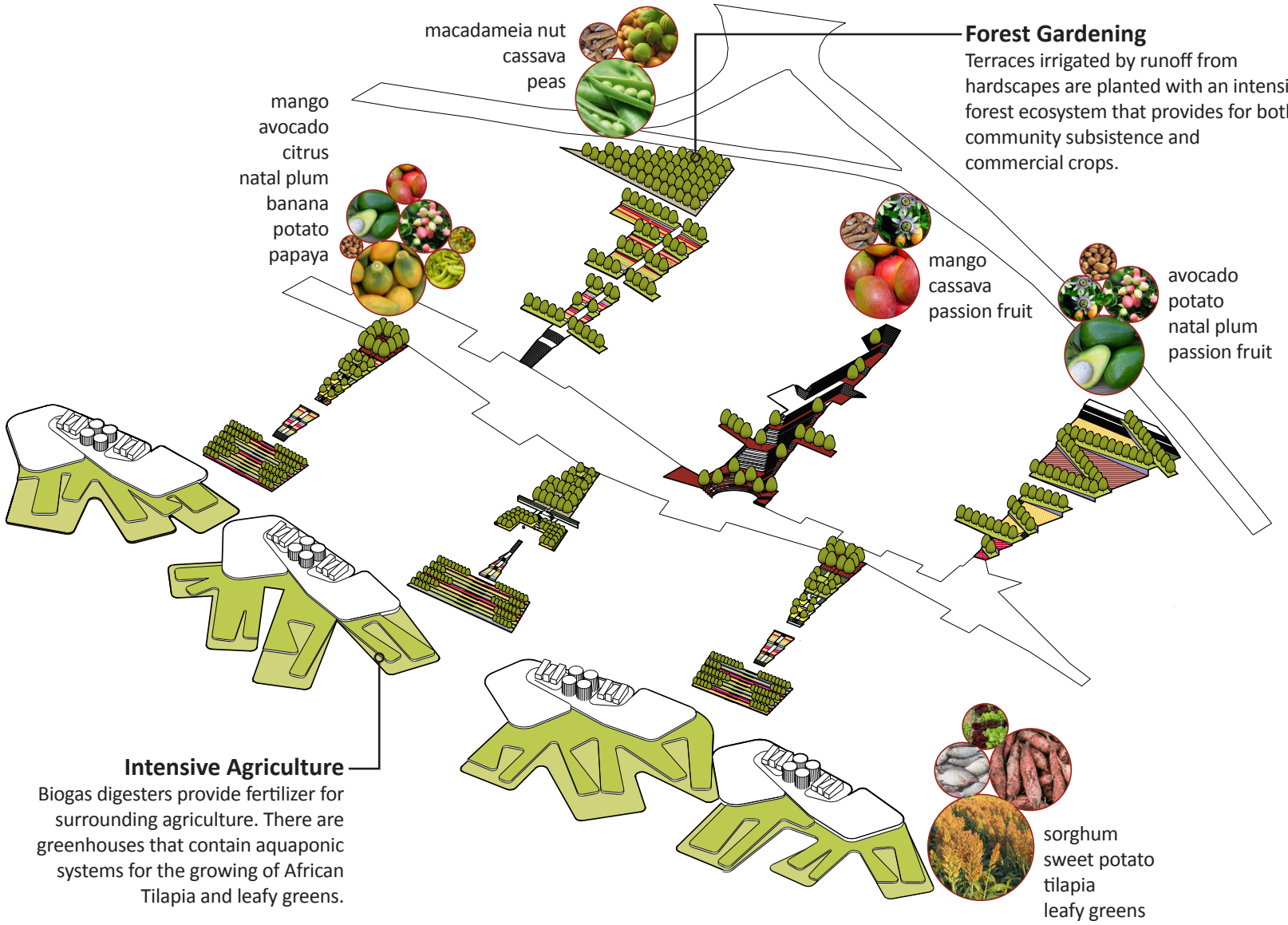








Edible Landscapes



Building Neighborhoods that Build Social and Economic Prosperity:
Manual for a Complete Neighborhood
Kigali, Rwanda

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