CHAPTER 4

THE ROW HOUSE AND OTHER LOW-RISE HOUSING

From the courtyard houses of ancient Ostia and Athens to contemporary planned communities, townhouses are a basic building block of city life. (The terms townhouse, terrace housing, and row house are used interchangeably throughout this book.) Characterized by relatively narrow and deep proportions, with windows front and back and often fireproof party walls on each side (or small gaps between houses as in San Francisco, for example), townhouses are usually built in rows with similar floor plans and some exterior visual relationship to each other. Ranging from one to five stories in height, townhouses may house one or several families. They allow for private entries to individual dwelling units within a narrow width of street frontage, thus minimizing the length of utility runs and providing for low-rise dwellings with a high density — generally 25–40 units per acre in a townhouse neighborhood.

▼ *A townhouse neighborhood in Richmond, Virginia. Photo by Jean Lawrence.*

Townhouses are an efficient, flexible, and livable solution for families and may also be attractive to singles and empty nesters who do not want to be burdened with the greater upkeep of a free-standing house. Townhouses can successfully transition from less to more dense housing types in mixed-type housing communities and are adaptable to urban, suburban, and rural areas (rural townhouses are less common but not unusual in resort or other clustered developments). Built tightly together, townhouses make efficient use of land, allowing higher densities and preserving outdoor space. The shared party wall construction conserves materials and energy for heating and cooling. In addition, some of the most walkable and attractive city streetscapes in the United States and abroad are townhouse neighborhoods in London; San Francisco; Amsterdam, Netherlands; Boston; and Richmond, Virginia.

BACKGROUND

The American row house is most directly related to English prototypes and has evolved over the past 200–350 years. By the time of the growth of cities in the American Colonies, townhouses were commonly developed in groups with similar layouts. Guiding builders were pattern-books of designs such as Asher Benjamin's *American Builder's Companion* (1806).

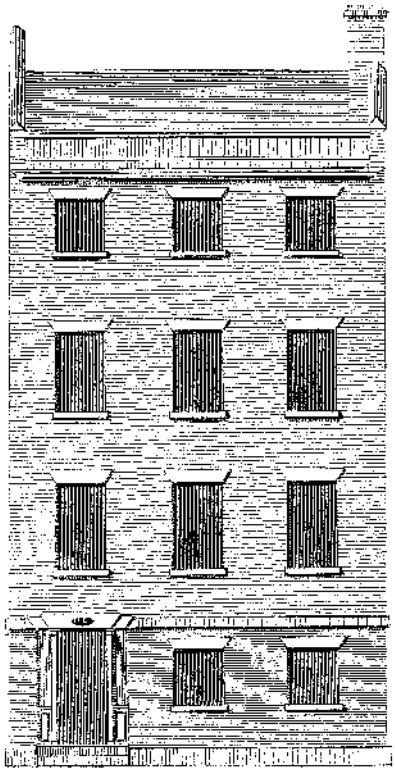
Regional variations came about as a result of differences in climate, local culture, building code requirements, and topography. Over time, requirements for fire-resistant construction were enacted in many cities—often in the wake of catastrophic fires. Initially, the open space behind row houses was needed for privies and stables, but developments in building systems now allow this space to serve as gardens or parking.

One impetus to townhouse construction in this century has been the movement toward denser cluster developments to preserve open space. Another is the acknowledgement that row housing may be a more promising prototype for urban family life than high-rise buildings, especially for lower-income families. An emphasis on planned new communities in Germany in the 1920s spurred investigation and experimentation with housing types by Bauhaus architects and others, and this has continued through the century in Germany and elsewhere.

Note that current building codes in the United States are often more stringent than older codes or those of other countries; older or foreign building prototypes may require substantial variations to meet today's requirements for new buildings, although buildings erected prior to the codes may be able to continue in use under some code provisions.

THE BASIC BUILDING TYPE

Because windows are limited to the front and back of the building and it is efficient to keep the units relatively narrow to increase density with less street frontage, the interior unit designs of townhouses are fairly limited and consistent. Units are generally at least 15–16 ft wide and can be from 30–90 ft in depth. Wider houses (over about 18 ft) efficiently allow space for two bedrooms side by side on both exterior walls, to create a four-bedroom unit on two levels. Deeper row houses yield relatively large areas in the middle without light; light wells, skylights, or courtyards can sometimes provide natural light for these areas



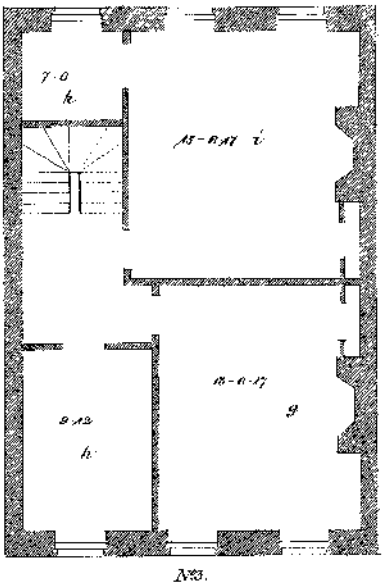
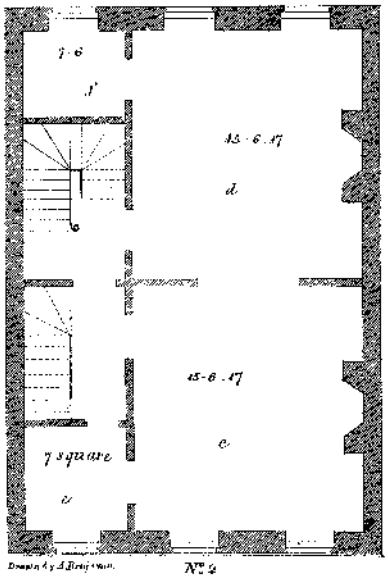
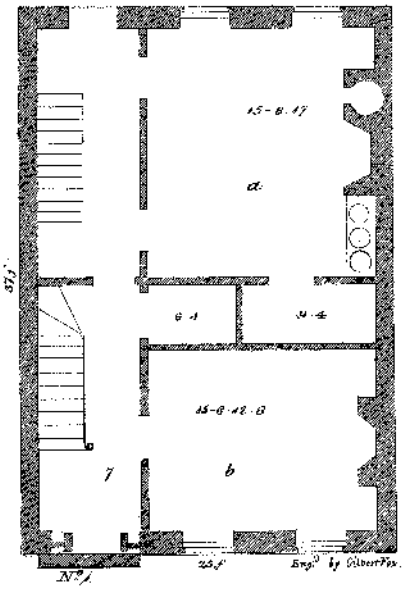
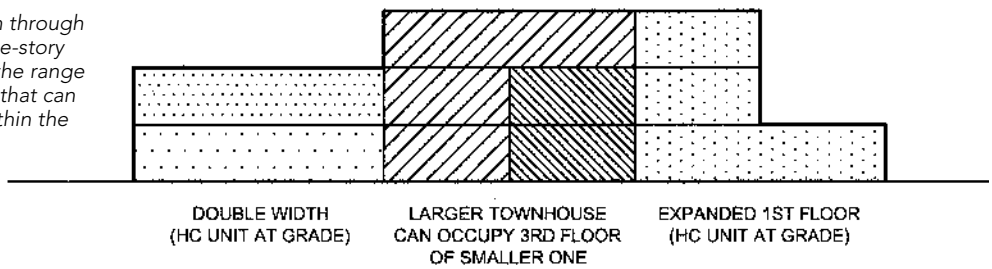


Illustration of a townhouse from Asher Benjamin's American Builder's Companion *(1806). The layout of townhouses has changed little since. Reprinted from Dover Publications.*





Modernist low-rise housing in Munich incorporates childcare and office space in its lower floors. It also establishes a flexible framework for building additional floors at the top and for personalizing the basic structure. Steidle +Partner. Photo: Michael Joyce.

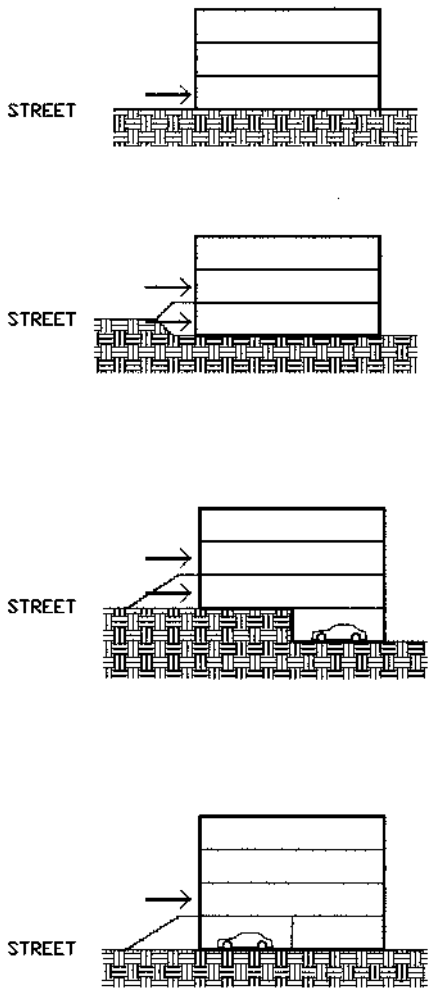


Longitudinal section through a row of two- and three-story townhouses showing the range of dwelling unit types that can be accommodated within the module.

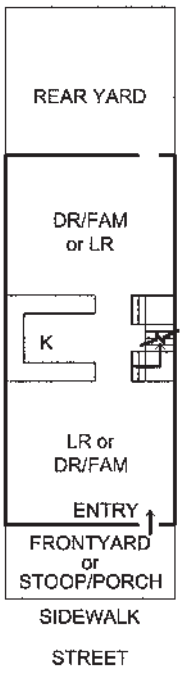
(these devices are feasible in either one-story row houses or wider, multistory buildings). Generally, however, the habitable rooms occupy the window walls at the front and back of the building, with utility spaces (stairs, bathrooms, kitchens, mechanical space, and closets) in the middle.

To create variety in dwelling-unit size within the same width of module in houses along a row, some units can step up and down or forward and back with minor modifications to the typical design. Although the basic townhouse concept does not lend itself well to handicapped access, accessible units may be created within a row of multistory townhouses by forming a double-wide unit at grade in the width of two townhouse modules or expanding an end unit outward to accommodate more space at grade level. Rowhouses may be entered at-grade, a half-level above or below, or a full story above grade, with equal variety possible at the back of the unit. Depending on natural slopes and unit designs, this can provide for many variations in design and use.

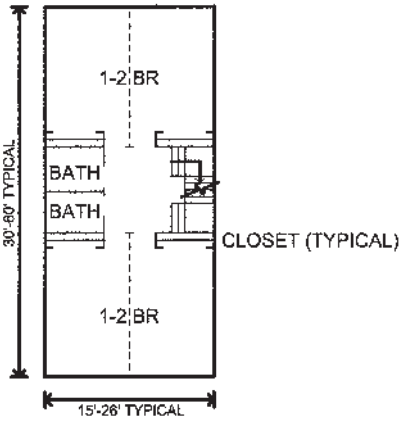
Cultural and individual differences combine to determine a family's prefer-



Cross-sections illustrating different ways a row house can relate to grade level in front and back.



FIRST FLOOR



SECOND FLOOR
(OPTIONAL THIRD FLOOR SIMILAR)

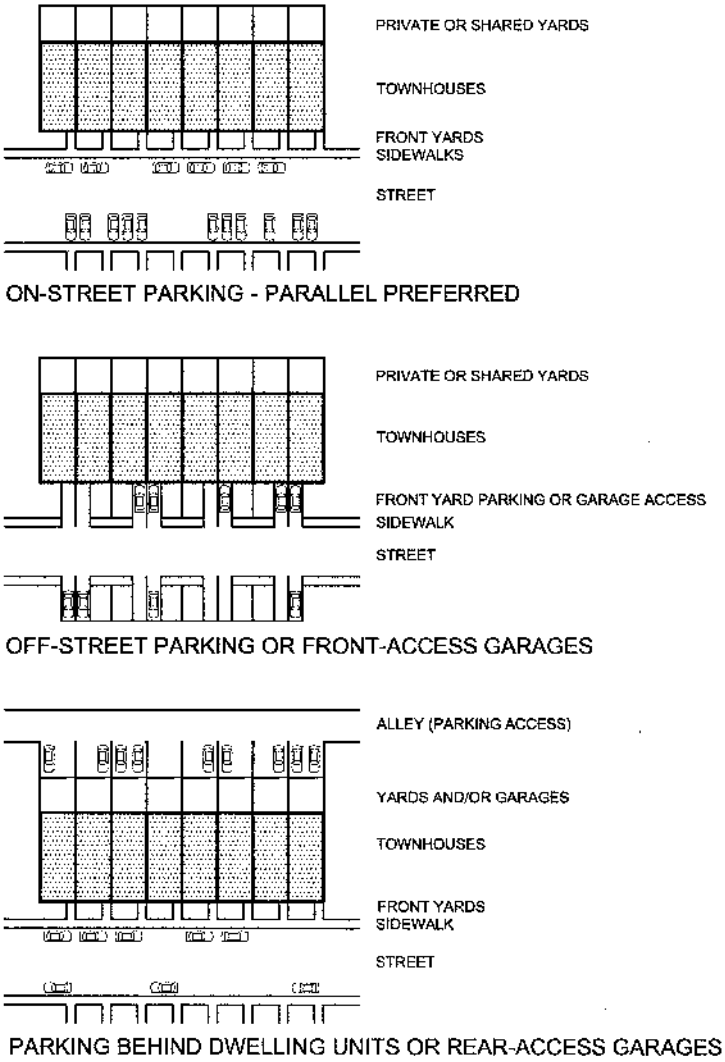
A typical townhouse plan. Although dimensions and details may vary, the basic layout provides a practical arrangement of rooms in a limited-width building.

ence about public/private and formal/informal uses of space. It may be possible (and desirable) to provide individual flexibility, even within a standard unit layout. For example, at Harbor Point, Boston, the townhouses are designed so that the front and rear first-floor rooms can be used interchangeably as a dining and family room or living room. Each family chooses which room they want to face the backyard and which to face the street. When combined with variations in relation to grade, virtually endless options may be achieved by the creative use of interior space. These include such possibilities as incorporating an apartment or work space on the ground level or flipping living areas to the top of the building to take advantage of views, light, or higher ceilings.

SITE DESIGN AND PARKING

Townhouses are generally set quite close to the street, often with a small front garden and a stoop or front porch that creates a comfortable semiprivate zone between street and dwelling. The density in row house communities has the advan-

Alternative parking arrangements in a townhouse neighborhood.



tage of providing enough foot traffic to create pedestrian activity and safety along the street as well as opportunities for meeting neighbors.

As with most housing, accommodating cars can be a defining challenge in site design; a number of different approaches are possible. Parallel parking in front accommodates, at most, one car per townhouse width and is the least intrusive way to park. It allows for the space behind the townhouses to be used as private or shared yards. Ninety-degree parking along one or both sides of the street increases the number of cars but widens the street and may detract from its character. Parking can also be aggregated in small lots near the housing. With more and larger cars becoming a fact of contemporary life and townhouses

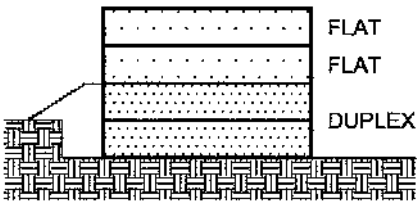
▲ *Section showing structured parking below row houses at Langham Court, Boston, Massachusetts. Goody Clancy and Associates*

becoming an increasingly popular suburban housing prototype in the United States, space for one car per townhouse is often not enough, and off-street parking for each dwelling may be required by either zoning or the market.

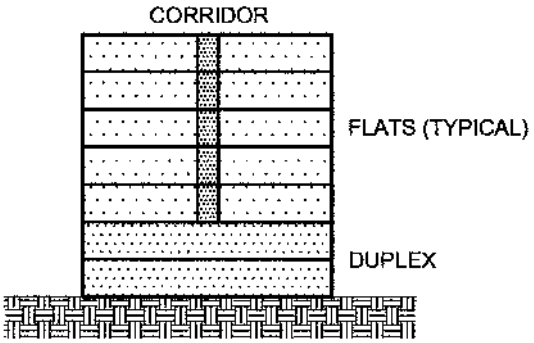
A parking garage that occupies the front of the house at grade level or somewhat below grade, leaving space for an entry to one side, is one way to provide off-street parking. This configuration has the disadvantage of breaking up the sidewalk frequently with driveways and creates a less direct relationship between the house and the street. Alternatively, parking can be located behind row houses, with an alley for access. This has the advantage of providing service access to the houses (for trash pick-up, etc.) but decreases private outdoor space and security in back of the houses; it may also decrease activity (and the safety it may bring) in the front of the houses. Another approach is viable only when land values justify the cost of structured parking: townhouses and their patios can be built over below-grade parking garages, effectively hiding the parking while freeing the grade-level site for other uses.

VARIATIONS

The row house's long history and its flexibility have led to many variations: the same basic unit type has yielded everything from modest two-story workers' townhouses to urban palaces on a grand scale. As cities have grown and land values have risen, increasing housing density has been a goal that has made the ideal dwelling unit narrow and tall. The need for greater housing density has led to the conversion of many of the grand townhouses originally intended for single families into multiple dwelling units.



◀ *Townhouse units can be combined with flats in taller buildings.*



▲ *Row houses in Hastings, United Kingdom, show the great variety that can be achieved in two- and three-story row houses of a consistent width. Photo: Ian Britton/Freefoto.*

A number of variations are possible for combining townhouse-style units with other unit types. Stacking townhouses vertically is another way to accommodate more dwellings while retaining some of the character of a single-family house and the convenience and pleasure of direct access to the outside. A key design requirement under most modern building codes is the provision of two separate egress stairs from any unit that lacks direct access to grade. The upper townhouse may be located anywhere from one-and-a-half to three levels above grade (still in the walk-up range); by grouping four units around two egress stairs, the need for two independent means of egress can be met economically (see the floor plans for Langham Court on page 87). Townhouses may also occupy the base of any taller building (these are called "maisonettes") with flats above. This arrangement mixes housing and family types in one building, and the multiple entrances and privately-maintained yards may enliven the ground level.

Creating new townhouse units in the many deteriorating and obsolete three-story buildings of flats built as public housing in the mid-twentieth century has also given new life to communities. This kind of conversion reduces the number and size of families who share a common entry, increasing security, and assigns the use and maintenance of adjacent exterior space to each row-house unit.

EXTERIOR DESIGN

The facade of a townhouse row should maintain a balance between consistency and individuality, simplicity and visual interest, in the selection of materials, detail, and window placement. The facades may be sheathed in wood, brick, stucco, metal, stone, concrete, or a combination of materials. Although austere identical elevations can be beautiful, variation of detail from one house to the next may give houses individuality within a related vocabulary. Variation in height or minor shifts forward or back can create a livelier rhythm in a long row of houses, as can

smaller-scaled elements such as entryways, balconies, or bay windows. Roof forms can run the gamut of pitched to mansard to flat.

Attempts to copy exactly nonlocal or historic architectural styles generally look out of place and artificial. Although historic recall may be a very successful design tool, it must be exercised with skill, subtlety, and restraint to be successful. Contemporary design uses new building materials and techniques to achieve a high-tech aesthetic; this aesthetic is more common for housing developments in Europe than in the United States.

OTHER LOW-RISE HOUSING

The definition of low-rise buildings in this country used to be based on the number of stories occupants are willing to climb, above which an elevator is needed. However, current building code requirements in this country generally change for buildings over three stories, and the Americans with Disabilities Act (ADA) requires elevators in all new multifamily buildings over one story or not accessible by wheelchair. In this book we consider buildings up through four stories to be low-rise (with or without an elevator).

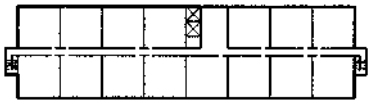
Multifamily low-rise buildings (as opposed to the townhouse-style buildings discussed earlier in this chapter) are typically built today as flats, with apartment sizes ranging from studios to two-bedroom units.

Garden apartment buildings cluster four or more dwelling unit entries on each floor around a circulation core,

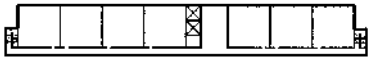
A row of contemporary townhouses detailed in steel and glass, Wohnbebauung Jugerhalde, Germany, shows a successful high-tech vocabulary. Project and photo: Schaudt Architekten.

Greenwich at Garfield Place, a multifamily rental apartment building, also incorporates retail uses. This 148-unit building was the first of six phases planned for a new residential neighborhood in downtown Cincinnati, Ohio. Project and Photo: Gruzen Samton LLP, Architects Planners & Interior Designers.

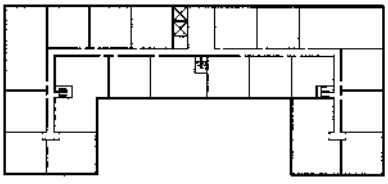
GARDEN APARTMENTS



DOUBLE-LOADED CORRIDOR



SINGLE-LOADED CORRIDOR



COURTYARD BUILDING

Variations in building layouts for low-rise residential buildings.

minimizing corridors. This building type is characterized by a single street entry serving a small number of dwelling units; it is often a free-standing building (with open space on four sides). Older-style garden apartment buildings, with one means of egress and no elevator, cannot be built today in most localities; few new garden apartments are likely to be built in the United States because of the high cost of providing an elevator for so few units.

More typically, low-rise multifamily buildings have a single central entry with interior corridors that can extend as long as building codes and market preferences allow, with egress stairs located to provide two independent means of egress from every unit. The unit types and building configurations possible are similar to mid-rise buildings described in the next chapter. Two or more elevators are generally centrally located.

CASE STUDIES

Borneo Sporenburg

Amsterdam, Netherlands

Confined to two connected peninsulas in the Eastern Harbor Docklands of Amsterdam, Netherlands, the plan for Borneo Sporenburg confronted the planning challenges of a dense urban environment. The planners had to achieve a balance of public and private zones within a small area, and the surrounding water represented both an opportunity and a limitation—a public realm for the community but also a boundary. The plan for Borneo Sporenburg set a density of 100 units per hectare (41 units per acre) as a requirement, and ultimately 2,500 units were built. The plan incorporates a number of building types; but the reliance on townhouses both provides the required density and creates a vital and cohesive community.

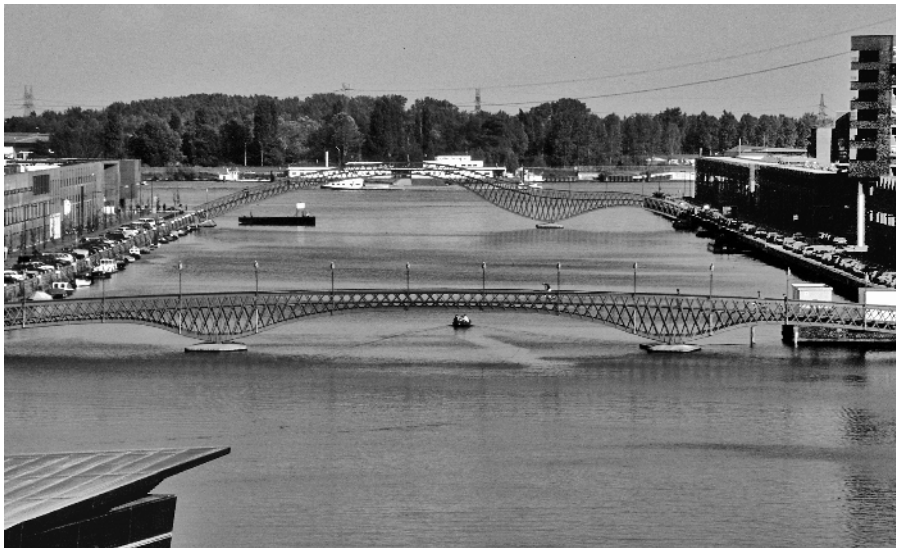
Planning/site design

Borneo and Sporenburg are two peninsulas on the eastern end of the Amsterdam docks that are tied together by twin bridges that cross a wide basin. The bridges accommodate cyclists and pedestrians, connect neighborhoods to one another, and focus attention on the basin itself, the backdrop of the development. The public domain of Borneo Sporenburg is the water, a unique characteristic of canal communities.

A variant of the traditional Dutch canal house, the housing at Borneo Sporenburg forms a "Scheepstimmermanstraat," a broad avenue of row houses lining the canal.

The overall site design emphasizes the interplay of built architecture and void. A diagonal green strip and two squares form a wide, open path that relates to the water. Street and quay design elements at Borneo Sporenburg are kept simple and consistent. Dutch brick paving and oversized concrete curb stones are used for the straight and narrow streets.

Public sidewalks line the water's edge; but most other exterior space, including patios and open spaces within the town-



Two sister bridges connect Borneo and Sporenburg. The higher pedestrian bridge offers a glimpse into the secluded world of the patios. Photo: Jeroen Mulsch.

▲ *The variety in houses and boats enlivens the scenery at Borneo Sporenburg. Photo: Jeroen Mulsch.*

house units, are the residents' private domain. The patios create sunlit voids within the densely built rows of townhouses. The residential patios are visible from the streets and the canals, establishing an interplay of public and private views.

The existing quay structures were fully renovated. A floating museum ship called the Armada of Amsterdam will contribute to the revitalization of the nineteenth-century docks. Such harborside activity reinforces the concept that "green is replaced by blue"—water is the dominant public space.

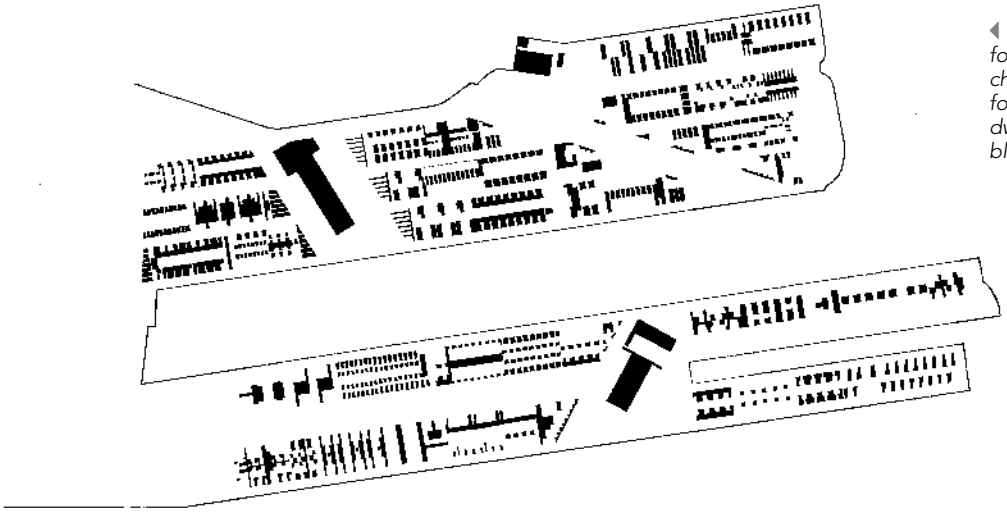
Building design

The Borneo Sporenburg dwelling was created as a prototype: a home with an attached garage and 30–50 percent interior void. Five basic building types and a wide spectrum of floor plans were developed by different architects based on this prototype. While maintaining a consistent scale, diverse architectural detail lends individuality to the facades of the row houses.

The patios at Borneo Sporenburg give residents the opportunity for individual expression and provide privacy in this dense urban community. Most of the pa-

▶ *An aerial view of the Eastern Docklands shows the development of the Borneo Sporenburg site. Photo: Jeroen Mulsch.*

Patios within typical row houses at Borneo Sporenburg become private gardens. Photo: Jeroen Mulsch.



Courtyards and patios form holes, akin to a swiss-cheese pattern, between footprints of low-rise dwellings and sculptural blocks. West 8.

tios, with their glass facades, are visible from the street and the quays. Their small scale and individuality provide a welcome contrast to the open harbor landscape.

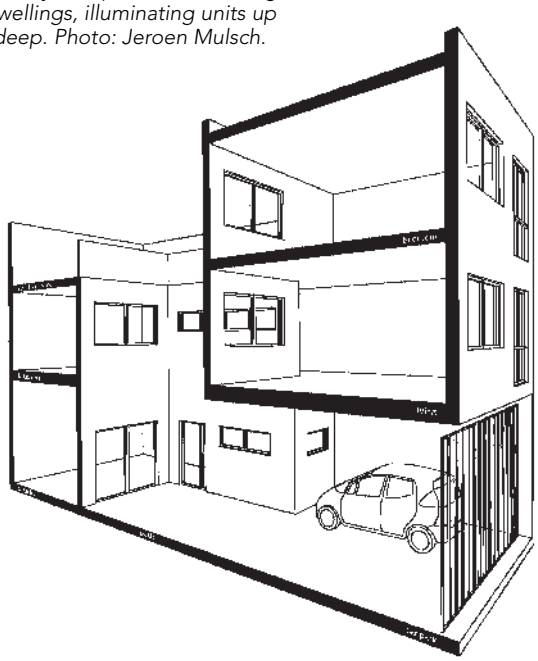
The townhouses are the contemporary equivalent of the traditional canal house, with higher living rooms facing the water. Greater living room heights are not only a desirable feature for the living units but also provide long-term flexibility, allowing future conversion of ground floor units into retail, restaurant, and office space.

Development process

The planning of Borneo Sporenburg was experimental and was followed with great interest by urban planning professionals and national planning authorities. The planning process was intensive and participatory, with workshops in which over one hundred architects contributed to both the urban plan and the development of the housing prototype.

Traditionally, in the Netherlands, large tracts of land have been sold to developers who build housing and then offer it

▲ *Not only do the patios create a private space for Borneo Sporenburg residents, they also provide interior light for the dwellings, illuminating units up to 15 m deep. Photo: Jeroen Mulsch.*



▲ *The prototype dwelling at Borneo Sporenburg is defined by a 30–50 percent void with a private parking area. West 8.*

▶ *Patios and open voids allow water and sky to meet, as expressed in this house by architect Koen van Velzen. Photo: Jeroen Mulsch.*

▲ *View inside a Mastenbroek and van Gameren house. A glass-enclosed patio offers the sensation of flying above the water. Photo: Jeroen Mulsch.*

to individuals for resale. At Borneo Sporenburg, sixty parcels of undeveloped land were offered for individual ownership through a municipal lottery (called "free parcels"). This allowed the individual owners to exert a greater influence over the design of their house and the development of the community. Workshops were held to guide owners and their architects in designing the row houses.

This individual ownership of land and design/construction by the owner has become a prototype in Dutch urban planning: free parcels are now integrated into most new planned neighborhoods in the Netherlands.

BORNEO SPORENBURG *Amsterdam, Netherlands*

Owner/developer: New Deal

Master planner: Integral urban design by West 8/ Adriaan Geuze

Architects: Over 100 different architects for the free parcels, including: de Architectengroep, Koen van Velsen, and Inbo Architecten

Sculptural blocks by:
de Architecten Cie: "The Whale"
Koen van Velsen: "PacMan"
Steven Holl (original design) and Kees Christaanse (construction drawings and construction management): "The Fountainhead"

Key consultant: Ingenieursbureau Amsterdam

Project description: Integral, low-rise, high-density urban design, incorporating mid-rise structural blocks and low-rise row houses.

Completion date: 1996–1997

Number of units/type/size:
Total: 2,500 dwellings, sizes vary up to 400 sq m (4,305.6 sq ft)
"The Fountainhead": 150 dwellings and business spaces
"PacMan": 204 dwellings and business spaces
"The Whale": 214 apartments and business spaces
Approximately 1,950 individual low-rise dwellings

Site size: Borneo: 13.1 hectare (32.4 acres)
Sporenburg: 10.3 hectare (25.4 acres)

Density: 100 dwellings per hectare (41 per acre)

Parking: One parking space per house; parking types include the individual carpark, the inner parallel street (inside the block), and the half-sunken parking garage

▲ *The courtyard. Open on the south side, the courtyard allows sun into the dwelling units and provides shared open space and private patios. Photo: Steve Rosenthal.*

Langham Court

Boston, Massachusetts

Langham Court is an urban residential complex with 84 units of housing in the heart of Boston's South End historic district. The development provides mixed-income housing in a variety of unit types, ranging from studios to three-bedroom duplexes, in buildings that fit the neighborhood. The design makes no distinction among its residents (one-third low income, one-third moderate-income, and one-third market-rate)—all units are distributed throughout the complex. Although the development also includes a five-story mid-rise building housing flats, this case study will focus on the four-story townhouses.

Site plan

The project occupies most of a city block, with the buildings wrapping around the perimeter on three sides and addressing the streets with narrow planted buffers and front stoops. Wide, two-story vaulted entranceways welcome the neighborhood into the south-facing, landscaped courtyard in the middle of the block. The open side of the courtyard faces an existing elderly housing complex across an alley, completing the quadrangle of buildings.

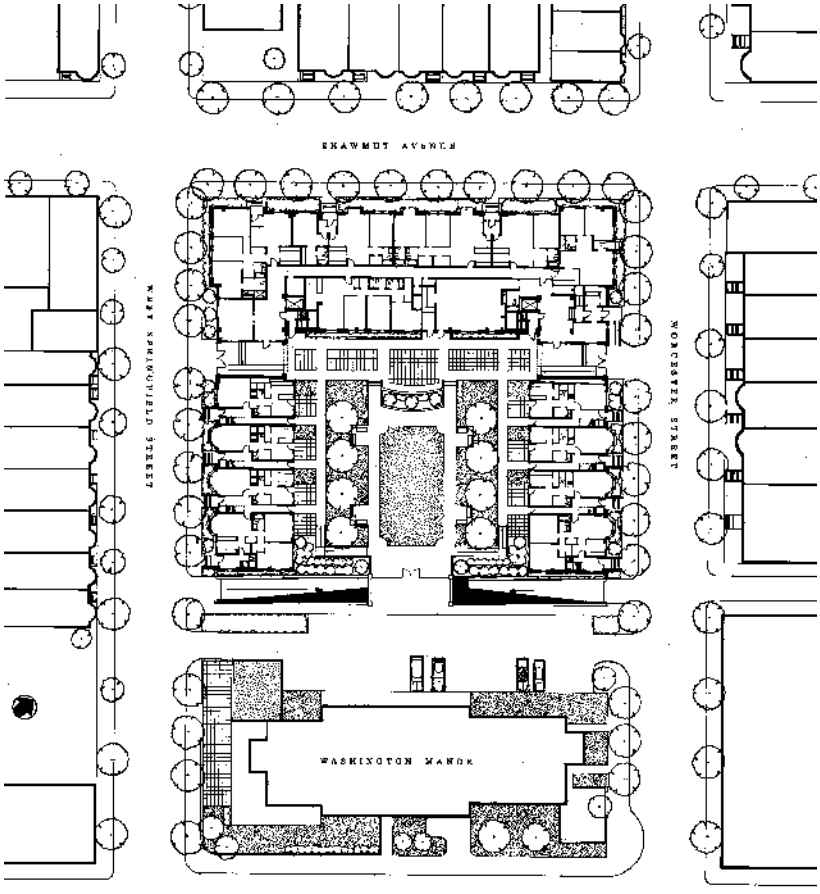
The garden court provides both semi-private rear patios for the first floor units and larger public terraces, seating areas, and lawns. The housing is constructed over a below-grade parking structure, which is concealed from the street and courtyard. Parking ramps enter and exit the garage from the alley.

Building design

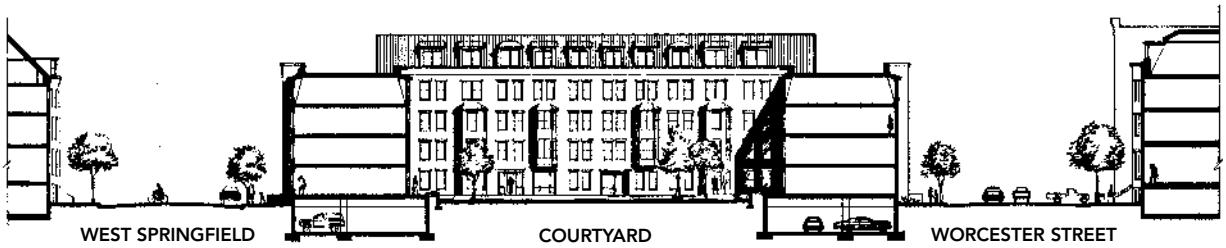
The townhouses are located on the side streets and reflect the Victorian character and smaller scale of the surrounding neighborhood. The design of Langham Court reinterprets some of the best features of the nearby historic buildings:

Case Studies: Langham Court

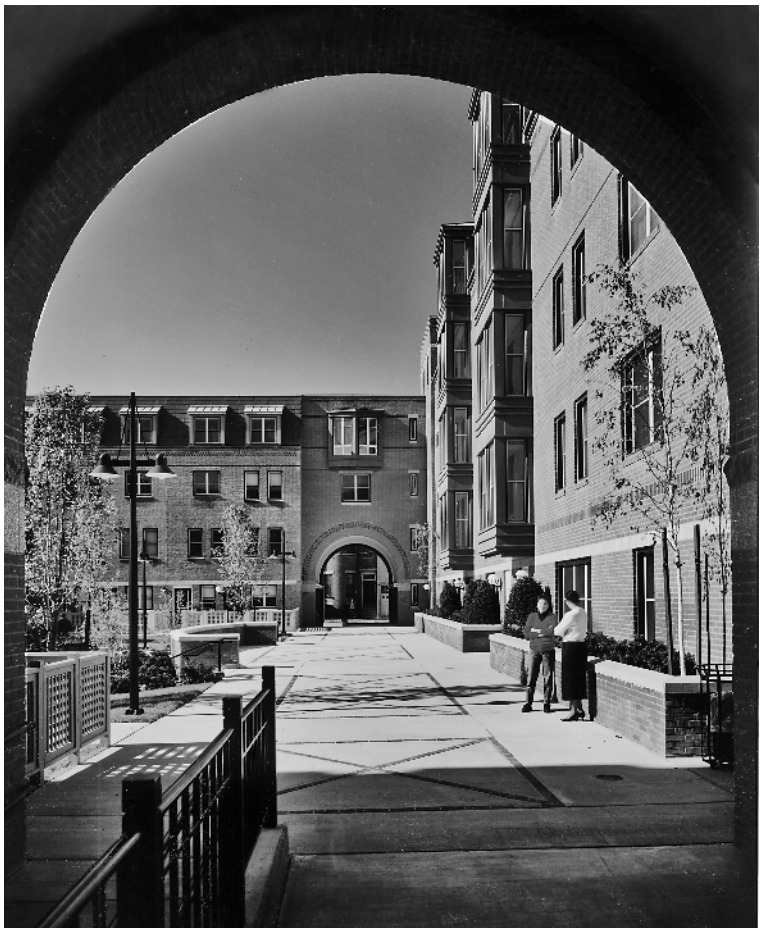
Townhouses along the side streets have front stoops and bay windows. At the far corner, a tower element of the five-story mid-rise is visible. Photo: Steve Rosenthal.



Site plan of Langham Court. Townhouses and mid-rise housing surround the open courtyard (middle), with private patios for townhouse units on either side. The new housing matches the scale and relationships to the street of the existing neighborhood, with a mid-rise building on the major street (top) and townhouses on the side streets. Existing elderly housing is shown at the bottom of the drawing. Goody Clancy and Associates.



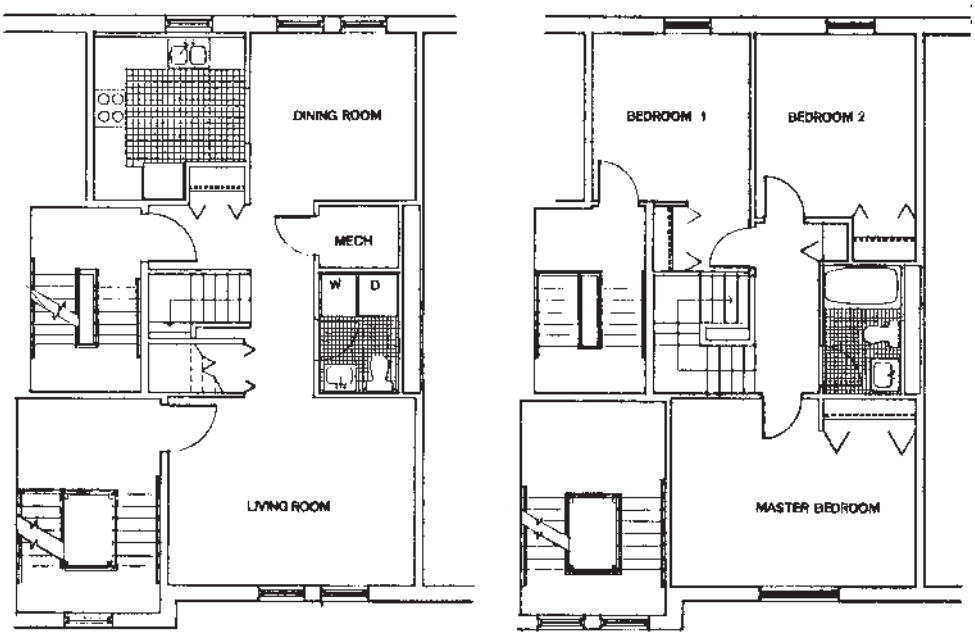
▲ *Section through townhouses and courtyard showing underground parking. Goody Clancy and Associates.*



▶ *View through the archway into the courtyard. Townhouses are visible in the background and mid-rise units are located on the right. Photo: Steve Rosenthal.*

dormers, bay windows, arched entryways, stringer courses, and varying roof forms (pitched, mansard, and flat). Materials include two colors of brick, granite, precast concrete, enameled aluminum, wood, and glazed ceramic tile. This vocabulary is integrated with restraint, contributing richness and detail to the simple building masses.

By stacking duplex-over-duplex, the townhouse design increases density while housing families in dwelling units that



▲ *Plan of stacked three-bedroom duplex unit (typical upper unit shown). The two stairs between units provide the required two separate means of egress from each unit. Goody Clancy and Associates.*

retain the intimacy, scale, and convenience of the traditional townhouse neighborhood.

Four townhouse units share two egress stairs located between them; each townhouse unit also has an internal stair. Because the first floors are a half story above grade, the occupants of the upper units have only one-and-a-half flights of stairs to reach their private entrances. Raised stoops serve multiple purposes: they recall neighboring buildings, create a friendly urban gesture, and obscure the parking below.

Construction system

The structural system is a fireproofed, steel frame clad in veneer brick. Although other structural systems might have been more economical if the entire project were townhouses, the steel system was selected as a contractor's recommendation to simplify the construction process by using one structural system for the townhouses, mid-rise buildings, and parking structure.

Financing and development

Langham Court was developed by the Four Corners Development Corporation, a nonprofit community development group. Comprised of housing activists from the South End of Boston, the Four Corners Development Corporation (aided by the Boston Redevelopment Authority) launched the project. Their goal was to make it aesthetically suited to its historic neighborhood and to house residents of mixed income levels. Langham Court was financed by city money, state loans, and private investment, much of which was spurred by federal tax incentives.

▲ *Detail of arch. Careful detailing gives the buildings a texture and complexity similar to the surrounding Victorian buildings but in a modern vocabulary. Photo: Steve Rosenthal.*

LANGHAM COURT *Boston, Massachusetts*

Owner/developer: Four Corners Development Corporation

Planner/architect: Goody Clancy and Associates, Inc.

Contractor: Dimeo Construction Co.

Key consultants:
Structural: Lim Consultants; ***Landscape:*** The Halverson Co.

Project description: Urban mixed-income, mixed-type housing

Completion date: 1991

Number of units: 84 units total, 48 of which are within townhouses

Site size: 1 acre

Density: 84 units per acre (extrapolated for townhouses alone)

Parking: Underground parking for 54 cars

BedZED, A New English Garden City

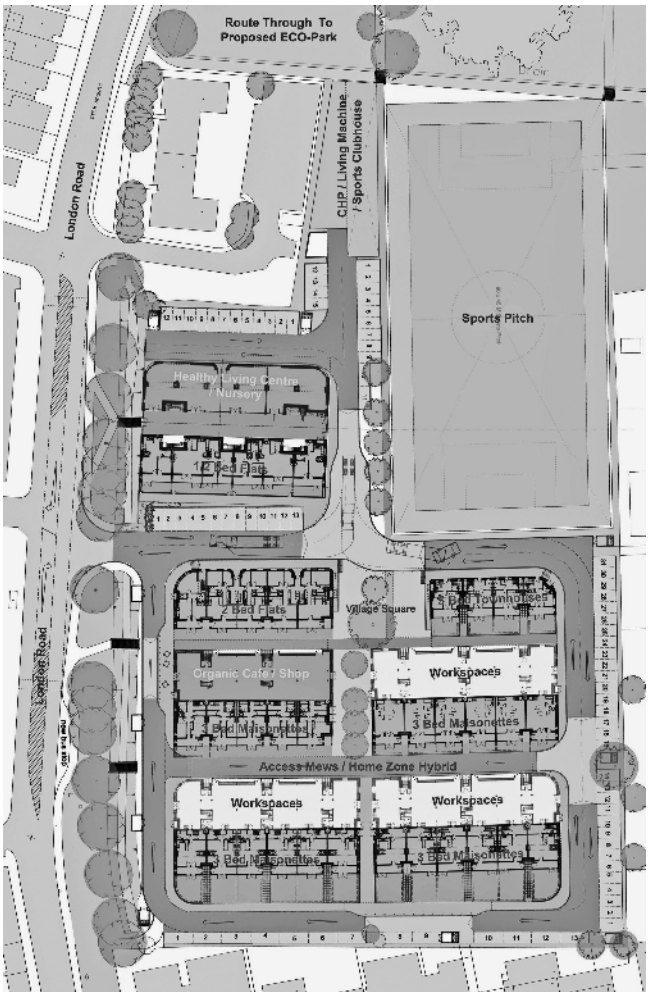
Beddington, United Kingdom

The Beddington Zero Energy Development (BedZED) demonstrates how an environmentally responsible residential community can reconcile density with amenity—minimize its impact on the natural environment and increase its residents' quality of life. Setting sustainability as a priority, BedZED was developed to reduce emissions expenditure and take advantage of natural resources within a community setting. The "green" lifestyle demonstrated at BedZED is so easy and convenient that most residents have slipped into it unconsciously.

Site design

BedZED was constructed on a site once used for waste treatment. Now it houses a dense grouping of solar-powered townhouses, most with their own roof garden and southern-facing conservatory. Located outside of Sutton, England, BedZED is an easy commute from London, yet many residents work within the community. BedZED is a mixed-use develop-

▲ *An aerial view from the southeast of the development depicts the interplay of built and open space at BedZED. Bill Dunster Architects ZEDfactory Ltd. Photo: Raf Makda/VIEW.*

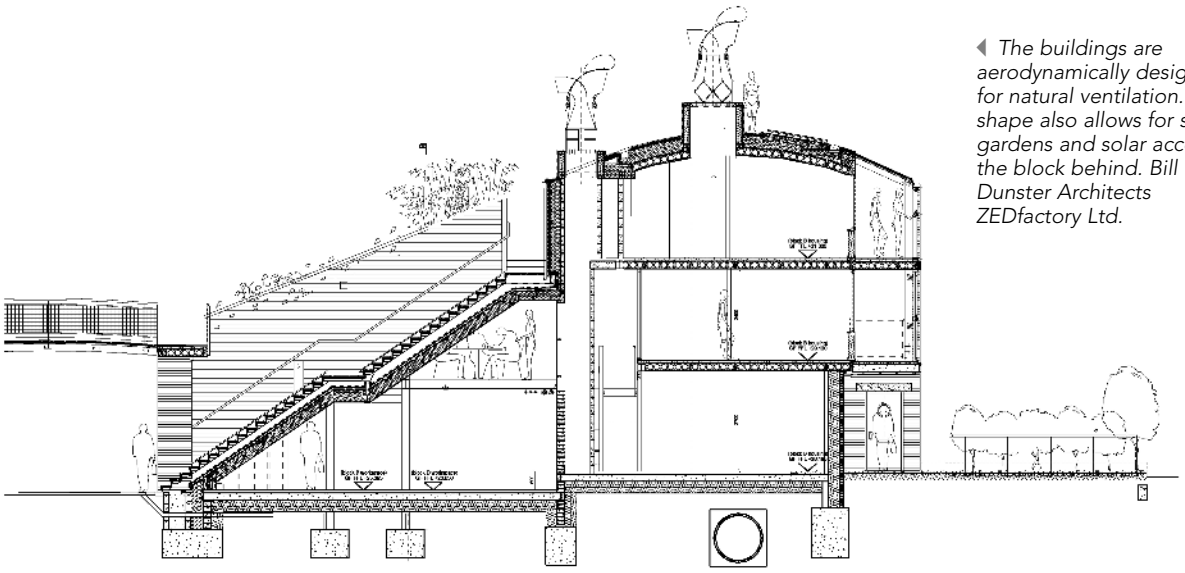


Site plan. The mixed-use development consists of dwellings, live/work units, a community center, and a nursery. By housing residents near amenities, their ecological footprint is significantly reduced. Bill Dunster Architects ZEDfactory Ltd.

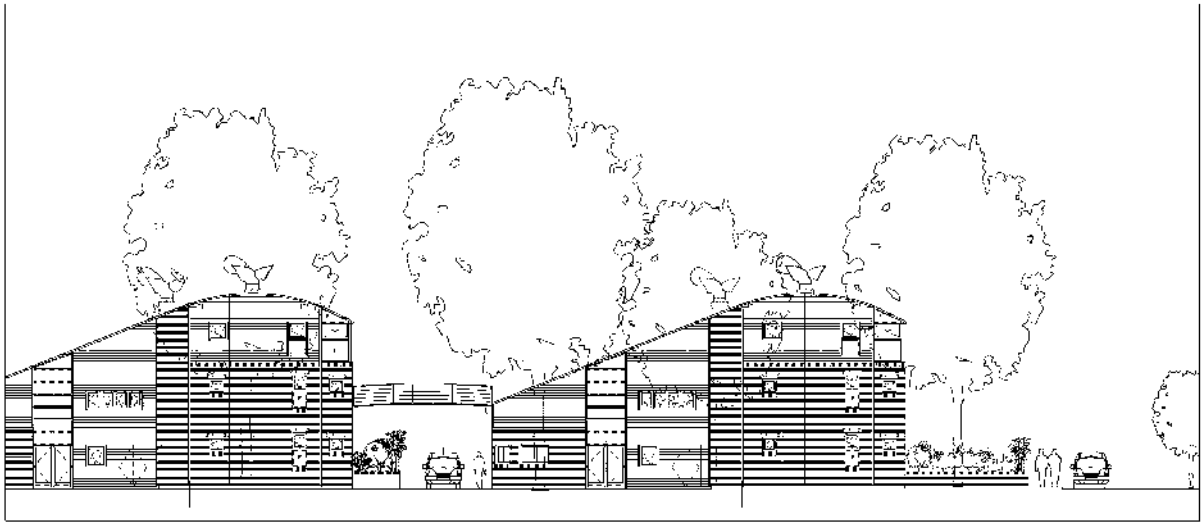
ment, offering workspace, an office park, daycare, and athletic facilities. Although densely built, it offers more amenities than most suburban communities.

Building innovations and design

BedZED generates enough heat and power from renewable resources to make it nearly carbon-neutral. Energy is provided by several means, including a combined heat and power unit fueled by woodchips from the development's own trees. Photovoltaic panels and tilted skylight units generate solar energy; wind-driven heat recovery ventilation units take the place of electric fans; and photovoltaic cells charge shared electric cars. All of these elements, along with sedum-covered roofs and grass-covered terraces (providing insulation), contribute to BedZED's playful design. These innovations and variations in design have created a community that is diverse in use, building materials, and unit type.

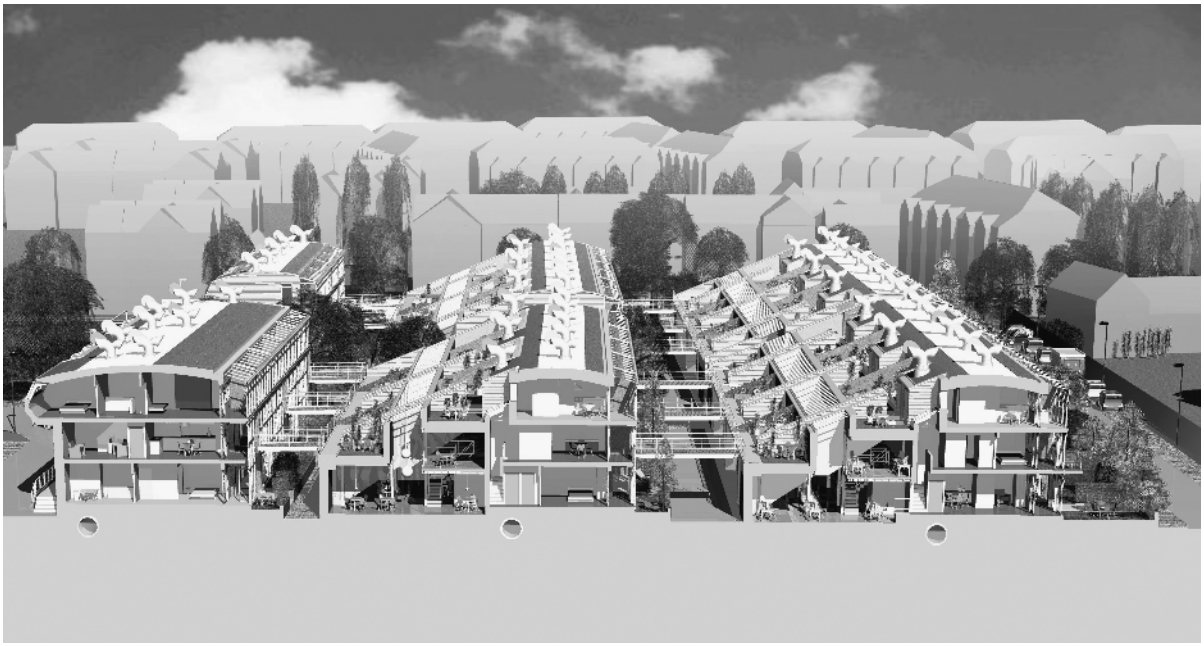


◀ *The buildings are aerodynamically designed for natural ventilation. The shape also allows for sky gardens and solar access for the block behind. Bill Dunster Architects ZEDfactory Ltd.*



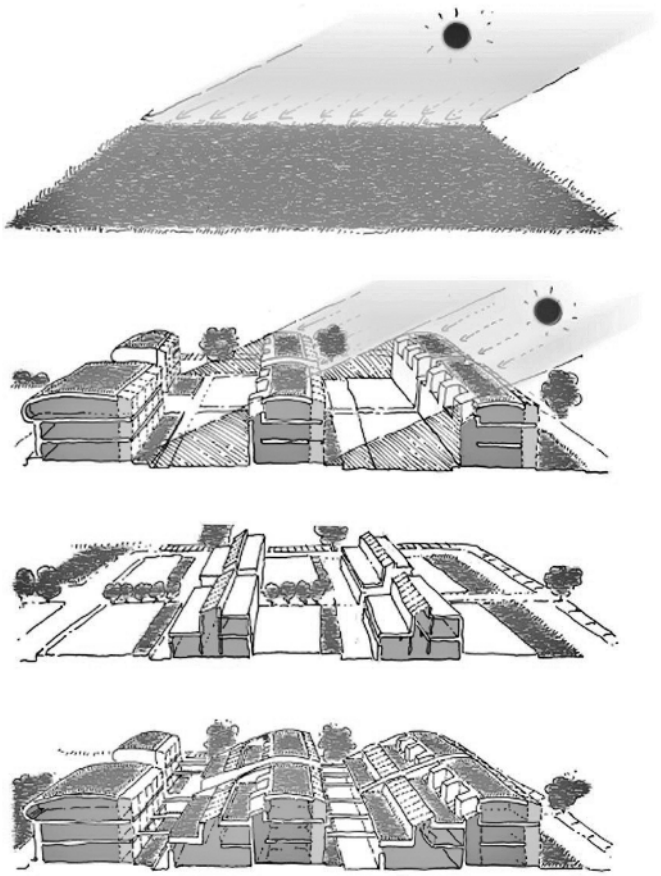
▲ *This east elevation of the development depicts the connection of one unit to another. Bill Dunster Architects ZEDfactory Ltd.*

BedZED's loftlike row houses are built primarily with local, recycled, or reclaimed materials. The 82 "maisonettes" and 18 live/work units combine brick, gypsum plasterboard, concrete aggregate, and topsoil. Exterior carpentry and bridges were built with certified hardwood, approved by the Forest Stewardship Council, and reclaimed steel has been brightly painted to add a modern touch to an otherwise traditional building type. Despite a relatively small floor plan, sunlit conservatories and gardens give the townhouses a spacious feel.



▲ *This computer-generated image shows a range of units at BedZED. Sky gardens are accessed by bridges from the dwellings opposite. ZEDfactory Ltd.*

▶ *This view of the homes on the south of the site shows photovoltaic cells in the sunspace and ground floor gardens. Bill Dunster Architects ZEDfactory Ltd. Photo: Raf Makda; © Raf Makda.*



Solar-oriented blocks are strategically placed so that they do not overshadow the block behind. Placing live/work units to the north of the blocks leaves each dwelling with a garden. Revenue from the gardens pays for the green technologies of the development. Bill Dunster Architects ZEDfactory Ltd.

Development

This ambitious approach to "green design" has been beneficial to the developer and buyers alike. Putting environmental design aside, the comfort level, affordability, and convenience of BedZED's mixed-use, live/work environment, three-level townhouses, and proximity to the local train station has made BedZED an attractive investment.

BedZED has set legal precedents as the first project to be allowed zoning advantages in exchange for lower environmental impacts. This precedent makes new carbon-neutral, mixed-use developments attractive to developers as well. Although the initial capital cost may be higher for environmentally focused developments, the expense is quickly offset by a reduction in running costs.

Live/work units contribute to the high level of daytime activity at BedZed. Bill Dunster Architects ZEDfactory Ltd. Photo: Raf Makda; © Raf Makda

BedZED, A NEW ENGLISH GARDEN CITY *Beddington, United Kingdom*

Owner/developer: Peabody Trust/Bioregional

Master planner/architect: Bill Dunster Architects ZEDfactory Ltd.

Contractor: Gardiner and Theobald CM

Key consultants:

Mechanical and electrical: ARUP

Structural: Ellis and Moore

Quantity Surveying: Gardiner and Theobald CM

Project description: Mixed-use, solar-powered urban development

Completion date: 2002

Number of units/type/size: 100 low-rise attached units

Site size: 1.7 hectares (4.2 acres)

Density/acre: 157 residents per hectare (64 residents per acre)

Parking: 82 spaces, and a car club that houses two cars shared by the development