DESIGN GUIDELINES

The Design Guidelines are organized first according to urban design scale, and second according to one of the six overarching principles.

The guidelines focus primarily on aspects of site and community design and, to a lesser degree, on engineering and implementation. They are grounded in sound research and/or emerging policy for more sustainable building, site and community design. Where appropriate, specific targets, thresholds and performance criteria are used to support the guideline; in other cases, links to further research and/or related policy are referenced. As illustrated below, each page is presented in a common format.

Design Guideline ID

Scale
This identifies the urban design scale at which the guiding principle applies.

Guideline Objective
This identifies one way to conform with the overarching principle.

Quote
This is just for fun.

Overarching Principle
This lists which of the six overarching principles for creating or maintaining a sustainable community .

Sustainability Category
The green shaded squares identify which sustainable design category the guideline addresses.

green infrastructure   movement
social infrastructure   cost

Related Strategies/ Guidelines
This provides a cross-reference to related charrette strategies and design guidelines.

Description
This explains how the design objective fulfills the intentions of the principle.

Sidebar
This provides further information on how to achieve

Diagram
This illustrates how to achieve the design objective.

Further Research
This indicates where to find more detailed information on the topics addressed.

Guideline
This describes a way to achieve the design objective.

1
District
capitalize on the site

1 Build on developed land first.
"There are cities built upon cities, one, two, a hundred times over, each of them leaving their detritus of memory, tragedy, experience." Eduardo Rauch, Parabola, Winter 1993.

By building and rebuilding within developed areas, we can retain the history of our communities and capitalize on our past creative and economic investments. Building on already developed land also means undeveloped agricultural and habitat areas may remain untouched.

Related Charrette Strategies
A4; B1; B4; C1; H3; J4; L4; P4

Related Guidelines
2; 3; 8; 22.1; 24; 29.4; 38; 41

1.1 Infill
Vacant or under-used areas adjacent to developed areas are often ideal locations for adding density within existing communities. Within any district there are areas that are less efficiently developed than they could be. By capitalizing on under-utilized land, we can reduce the pressure to sprawl.

1.2 Retrofit
Land use changes over time can leave holes in the community fabric where once industrial or commercial development existed.

CONTAINING URBAN GROWTH
Local governments can encourage development in already built-up areas through: the establishment of an urban containment boundary (as in the case of the Greater Vancouver Regional District's Green Zone and the Nanaimo Regional District's urban growth boundary); policies that promote town centre, village, or "nodal" development (as in municipalities such as Kelowna, Nanaimo, Surrey, North Vancouver, and Burnaby); and integrated transportation and land use planning.

URBAN REDEVELOPMENT
Recommended best practice for locating redevelopment is to use urban sites that are located within an existing minimum development density of 5600m2 (65,000 sq. ft.) per acre, or two storey development (LEED™ BC, 2001, p.10).

FURTHER RESEARCH/POLICY
Cole, Hassan and Theaker, Draft LEED™ BC Applications Guide.

Nowlan, Rolfe, and Grant, The Smart Growth Guide to Local Government Law and Advocacy.

Burchell, et al., The Costs of Sprawl – Revisited.

Peih and Condon, "The Effects of Developer Cost Changes on Sustainable Growth."

As population grows, the demand for more housing and services can first be met by infilling in underdeveloped places. As development divides large lots, a tighter network of streets and buildings will provide a more efficient urban fabric. Often the existing infrastructure can accommodate increased use at little or no additional cost. In cases where existing infrastructure is unsustainable, the new investment brought by infill development can often provide the only practical means of making grey infrastructure green.

As demand for housing and services builds, these holes provide space for new uses. Retrofitting for new uses provides an opportunity to mitigate any environmental damage caused by previous uses, and it also enables us to reveal such buried green infrastructure as historic streams.

District 1 - 14

Capitalize on the Site

1   Build on developed land first

2   Include existing residents

3   Fit development to the land

Connect the Flows

4   Design streets and streams as one system

5   Create a connected ecological network

6   Connect the district to the region

Layer the Systems

7   Layer functions in open space

Create a Centre

8   Create a region of centres

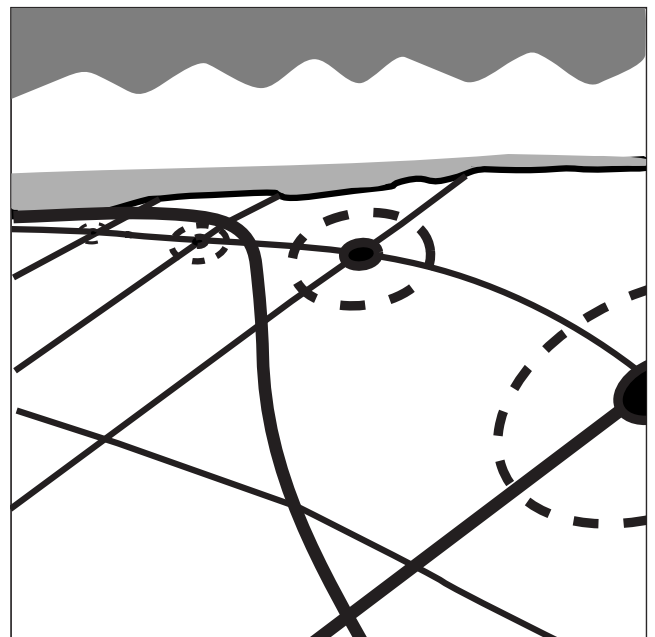9   Let the centre define the community

10   Centre every neighbourhood around social space

An Economy of Means

11   Put jobs near people

12   Share public facilities

13   Employ natural features to increase value

Make it Home

14   Derive community identity from the landscape

Districts are the geographic and social units that combine to form our urban regions. They are the places where we live, work, play and exchange. They often represent the most local level of government (as in electoral wards for example). How districts are shaped and function can affect the entire region. Districts that concentrate services, housing, jobs and transit and other activities of daily life within a walkable distance of residences benefit the region by reducing auto use and by distributing services and employment evenly.

capitalize on the site

1 Build on developed land first

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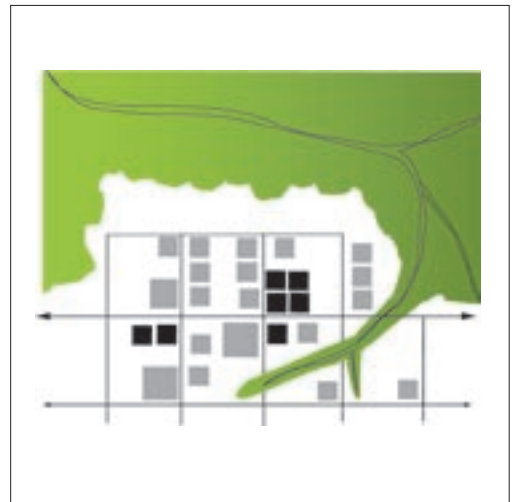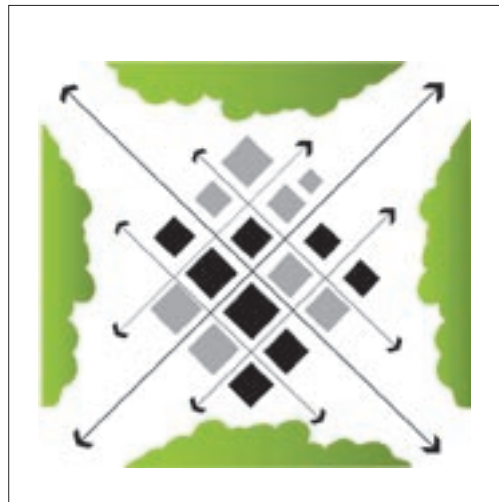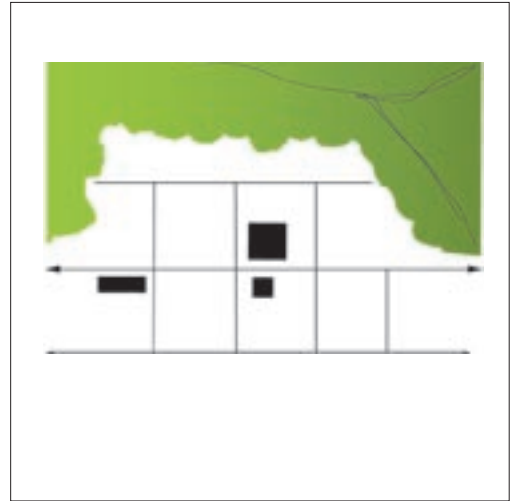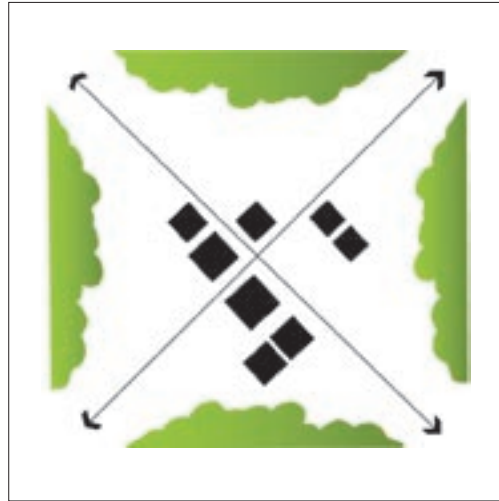
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As demand for housing and services builds, these holes

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Nowlan, Rolfe, and Grant, *The Smart Growth Guide to Local Government Law and Advocacy.*

Burchell, et al., *The Costs of Sprawl – Revisited.*

Proft and Condon, "The Effects of Developer Cost Charges on Sustainable Growth."

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provide space for new uses. Retrofitting for new uses provides an opportunity to mitigate any environmental damage caused by previous uses, and it also enables us to reveal such buried green infrastructure as historic streams.

2 Include existing residents.

"When change occurs too suddenly and arbitrarily it's destructive. And when things don't change at all, that's destructive too." Jane Jacobs, Parabola, Winter 1993.

The inhabitants of every site of development have a history. It is important to take their needs and desires into consideration when planning to expand their community. It is often difficult for a new community to attract jobs and services; finding ways to include existing businesses and services would be of economic benefit to a developing community. Capitalize on existing residents and services in order to provide a foundation for community development and growth.

Related Charrette Strategies
A3; A4; B3; I4; J4; P3

Related Guidelines
9; 32; 37; 41; 42

2.1 Fit the Old Into the New
Development that treats the site as a "clean slate" will necessarily displace existing businesses and residents. Develop plans that include space for existing users.
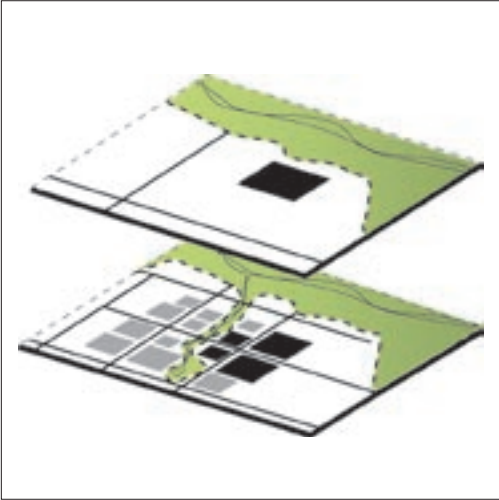
INCREMENTAL CHANGE

Opposition to change can be mitigated by ensuring that the broad objectives of the community are reflected in local planning and development processes and that community stakeholders have a voice in the planning processes.

Methods for facilitating involvement and achieving community buy-in include:

- *Citizen involvement in OCP review processes;*
- *Identifying and monitoring performance indicators;*
- *Community-based mapping and environmental inventories; and*
- *Design charrettes (see Part One of this manual).*

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2.2 Grow Incrementally
Change works best when it occurs one step at a time. Incremental development is the best way to allow new uses to grow around existing ones, keeping jobs and services within the expanding community. Look for ways to add new homes to existing structures, new structures to existing lots, and new lots to existing communities. Resident opposition to change is often a function of the extent of that change. Existing residents can more easily embrace incremental, respectful, and organic growth.

2.3 Link with Common Ground
New development can disrupt and degrade adjacent communities. Providing a common meeting ground that physically and socially unites adjacent areas can successfully weave new development into old. Creating a park, public square, or new community building are just three ways of establishing a shared centre for a changing community.
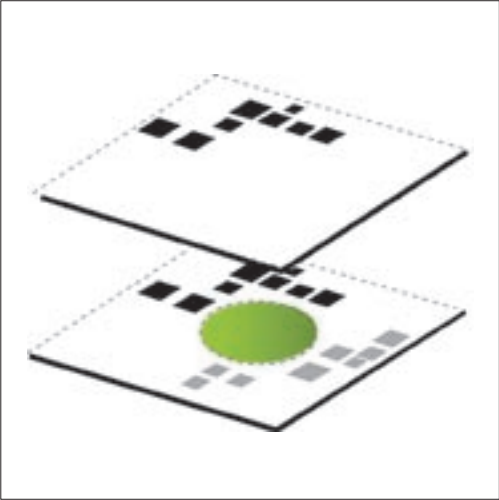
FURTHER RESEARCH

La Rochelle, ed., "Citizen Involvment Tools" in The Smart Growth Tool Kit.

Sanoff, Community Participation Methods in Design and Planning.

Crofton, Sustainable community planning and development: Participation tools and practices.

Part Three – Design Guidelines for District

capitalize on the site

Related Charrette Strategies
B1; C1; D4; F2; J1; K2; L1; O1

Related Guidelines
1; 7.3; 9.1; 15; 17; 27; 33

ECOSYSTEM PLANNING

Ecosystem planning is a means by which local governments can identify, map, prioritize and protect key environmentally sensitive features, such as watersheds, water-courses, flood-plains, riparian zones, wetlands, areas of biological diversity, steep slopes, habitat corridors, etc. in order to ensure that resource protection objectives are met as development proceeds.

Ecosystem Planning tools include:
- *Environmentally Sensitive Area (ESA) maps and inventories*
- *Watershed-based zoning*
- *Streamside Protection and Enhancement Areas*
- *Stewardship bylaws*

STREAMSIDE PROTECTION AND ENHANCEMENT AREAS

The Streamside Protection Regulation (Fish Protection Act, 1997, c. 21, ss. 12, 13 (1) and 37 (2)) identifies streamside protection and enhancement areas as those areas adjacent to a stream that link aquatic to terrestrial ecosystems. This includes both the riparian area vegetation and the adjacent upland vegetation influencing the stream.

The regulation establishes protection and setback requirements for both permanent (perennial) and non-permanent (intermittent) streams. Setbacks are to be determined according to the presence or absence of and/or condition of riparian habitat along a stream bank.

3 Fit development to the land

"...Thor stepped forward and with one blow of his hammer smashed the rock giant to bits." Tom White, Parabola, Winter 1993.

Building new communities means reshaping the landscape. Building "from the ground up" — respecting site hydrology, soil structure, topography, and natural features — can minimize the cost and consequences of development. Each district has a variety of landscape conditions that can help to direct the location and form of development. Understanding topography, soil, and hydrology is a necessary first step in the planning and development process.

3.1 Embrace Natural Features
Every district is home to important natural features. The careful use of natural features for recreation and green infrastructure adds value to the community, increases economic stability and resident satisfaction, and reveals how the world works. Integrate and protect natural features in order to capitalize on them for the mutual benefit of both human and non-human communities.

3.2 Use High Points Carefully
High points are very visible and desirable locations. When development leaves them unbuilt, environmental impacts are reduced while access to these points can be available to all. Capitalize on the district's high points in a district by preserving them for the whole community.

15m - 60m
buffer

+15%
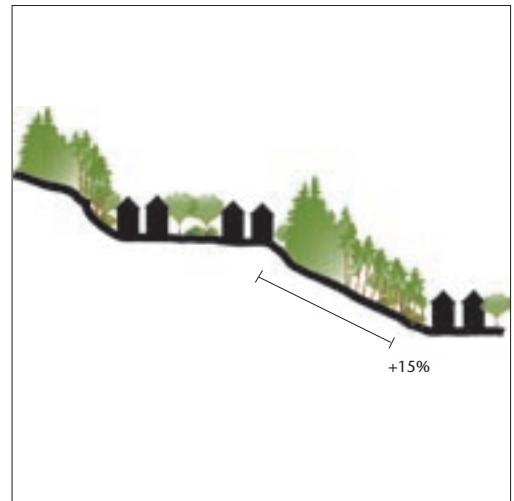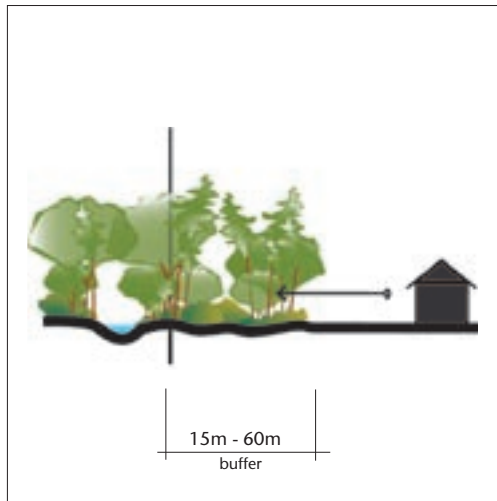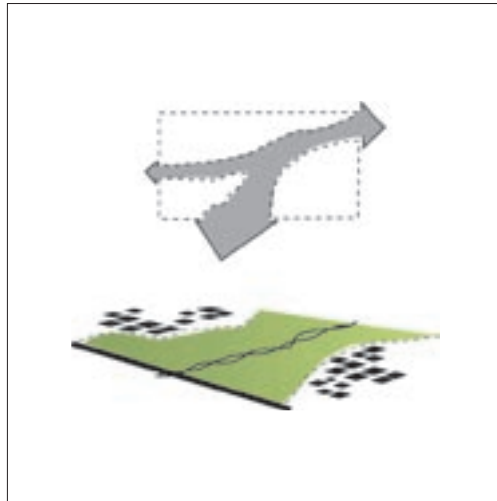
3.3 Buffer
Most people greatly value having nature close to home. Green systems should be protected for their social, economic, and ecological value. Streams require wide forested buffers in order to maintain water temperature and to ensure a food supply for fish. Human use in these areas must be carefully controlled, and in some cases, prohibited to preserve natural function and to maintain the qualities that give these areas their value.

3.4 Place More Density on Gradual Slopes
It is easier to build on gradual slopes (1% to 15%) than it is to build on steep ones. Steer intense development to gradual slopes as "table-flat" lands are often either best suited to agriculture or are environmentally sensitive. Reduce requirements for flat land in each lot to maximize land efficiency and to minimize earthworks. Connect developed terraces with streets that either follow the contours or that climb steeply over short distances.

connect the flows

4 Design streets and streams as one system

"In Esmerelda, city of water, a network of canals and a network of streets span and intersect each other." Italo Calvino, Invisible Cities, 1972.
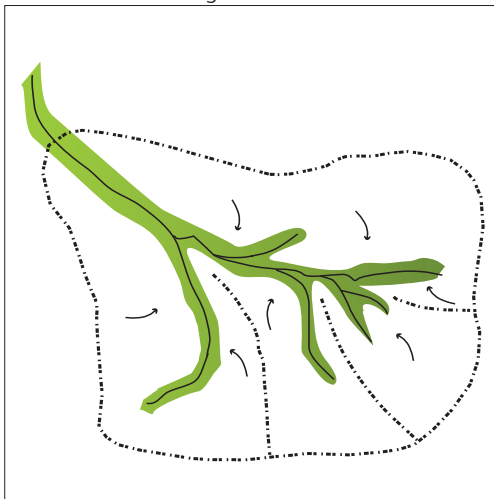
Conventional stormwater systems move all rainwater via underground pipes. Small pipes connect to bigger pipes until they disgorge dirty water into sensitive streams. Street systems must mimic stream and watershed systems to save them. Interconnected streets can hold, move, and absorb stormwater within the surface of each right-of-way. They must absorb stormwater just as do forests, holding almost all of the water that falls on the site in the soil so that it can gradually filter below ground to streams or to deep aquifers. Designing streets like forests and their streams means that, once the new community is built, the fish will notice no change.

4.1 Understand the Watershed
Watersheds come in all shapes and sizes, from the scale of a river basin to that of an individual parcel and yard. What happens at each scale, from the district to the individual parcel affects the hydrological performance of the larger watershed.
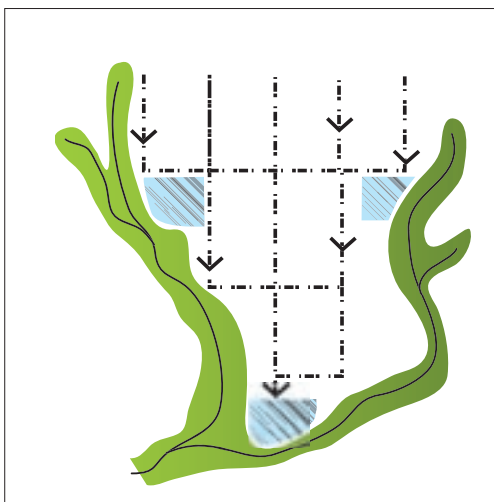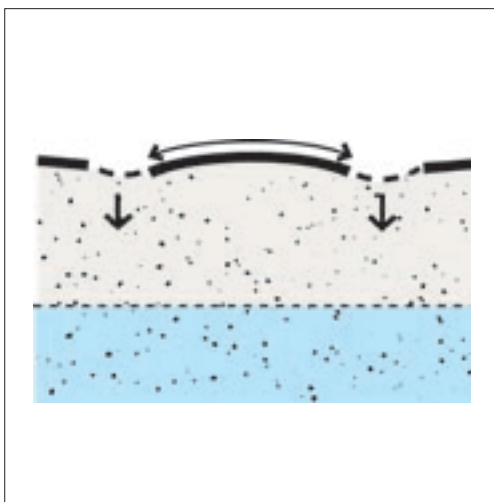
4.2 Direct the Flow
Streets provide an ideal vehicle for integrating local watersheds to the larger hydrological system. The street network should work with, not against, the natural drainage patterns of a site. Small storms should all be absorbed by streetside and yard soils. Large storms, those that occur just a few times a year, are a different matter. Within the connected ecological network, large natural areas such as schools and parks are ideal places for diverting runoff from very large storms and for integrating biological treatment/wetland areas into the district. School and park sites also offer the best opportunity for increasing the biotic diversity of the site and for managing the headwaters of receiving streams.

4.3 Absorb and Clean Water
Research suggests that the health of watersheds is compromised when the effective impervious area (comprised mostly of streets and rooftops) exceeds 10% of an entire watershed. Reducing the width of streets will reduce the amount of impervious surface area, while using the roadside area to clean and absorb rainwater will minimize the impact of remaining impervious surfaces. It is possible to reduce a total impervious area of 50% to an effective impervious area of 10% or less through this means.

Related Charrette Strategies
A1; D4; F1; F2; G1; H2; J1; K1; L1; N1

Related Guidelines
3; 4; 5; 7.3; 15; 16; 17; 19; 27; 36

WATERSHED BASED ZONING

Watershed-based zoning establishes criteria for watershed health based on current physical, chemical, and biological health of streams, and their future desired condition. Based on these criteria, policies can be developed that address stream protection and buffer widths, development density, and limits on effective impervious areas (i.e., streets and roofs). This allows land use decisions to be based on whether a development meets established performance criteria for watershed health.

Under the Local Government Act, local governments can establish the maximum percentage of an area of land that can be covered by impermeable material. These maximum thresholds can then be applied at the scale of the watershed (S. 907 (3)).

FURTHER RESEARCH/POLICY

Chilibeck and Sterling, *Urban Stormwater Guidelines and Best Management Practices for Protection of Fish and Fish Habitat.*

Centre for Watershed Protection, *The Practice of Watershed Protection: Techniques for Protecting and Restoring Urban Watersheds.* (www.cwp.org)

Province of British Columbia, *Local Government Act.* S. 907.

Richman & Associates, Dress & McKee, and Ferguson, *Start at the Source: Residential Site Planning & Design Guidance Manual for Stormwater Quality Protection.*

connect the flows

5 Create a connected ecological network

"...beside a sacred fount the Tree is placed." The Epic of Gilgamesh, 4,000 B.C.

Virtually every part of a sustainable community has a function within the ecological system of the district. This is true of public as well as of private open space. Recognize the role of public and private open space in creating a district-wide green network. The green network of streets, yards, and parks serves both ecological and social purposes by supporting the surface drainage system, contributing to the urban forest, providing sufficient bird and fish habitat, maintaining base flows in streams, and providing areas for both passive and active recreation.

5.1 The Ecological Network
All public and private open space should combine to create a network of green infrastructure. This allows us to dramatically decrease the negative consequences of development while capitalizing on nature's generous recreational and aesthetic qualities.

5.2 Private Yards and Gardens
Because private open space is individually owned, we sometimes forget that each parcel is a part of a greater whole. Yards and gardens provide private outdoor space for residents, while well designed yards and gardens collect, clean, and infiltrate water. Vegetation can be layered to provide bird habitat — habitat that is sometimes more attractive to some bird species than are mature forests. Ideally, each private outdoor space should make a positive contribution to the ecology of the district.

URBAN HABITAT

The East Clatyon Neighbourhood Concept Plan recommends at least 40% of school/ park sites be covered by tree canopy and that at least 50% of the sites' total area have habitat value.

FURTHER RESEARCH

Campbell and Pincott, *Naturescape British Columbia: Caring for Wildlife Habitat at Home. The Provincial Guide.*
http://www.hctf.ca/nature.htm

Collyer and Holmes, *All Hands in the Dirt: A Guide to Designing and Creating Natural School Grounds.* Vancouver, BC: Evergreen Foundation.
http://www.evergreen.ca/

Moffat, *City Green: A Guide to Green Infrastructure for Canadian Municipalities.*

City of Surrey Department of Planning and Development et al, *East Clayton Neighbourhood Concept Plan.*

5.3 Schools
Combined school and park sites can act as the green heart of a community and can be designed to enrich habitat and maximize the health of receiving streams. Areas of forest cover and naturalized wetlands or retention ponds can provide stream protection and bird habitat. The discharge of clean water and necessary nutrients into stream waters can be managed within this new form of public green infrastructure.

5.4 Utility Rights-of-Way
Many communities have utility rights-of-way (ROWs), which are publicly accessible under certain conditions; however, maintenance requirements generally discourage naturalization. These areas also often require yearly clearing. Nonetheless, ROWs can provide useful links for birds and other wildlife, pedestrians, equestrians, and bikes, thus contributing to movement through the district.

connect the flows

5.5 Riparian Areas

Riparian areas, which are usually associated with natural streams, are locations that have been left undisturbed by development. These locations preserve precious habitat for significant numbers of bird, aquatic, and animal species. They also provide community residents with fully mature natural areas. Preserved riparian areas within a 10 minute walk can greatly increase the sale and resale value of new homes. When carefully integrated into the neighbourhood and preserved as public nature parks, riparian areas can be a very powerful capital asset to any community. This, of course, is in addition to their obvious value for protecting endangered ecological communities. Preserved riparian areas can, and should, also provide for bike and pedestrian trails. While these trails must be located so as to minimize impact to sensitive streams, opportunities for contact with nature should be taken advantage of.

5.6 Parks and Linear Open Space

Neighbourhood parks are irreplaceable aspects of the social functioning of a community and are well suited to stormwater infiltration. Linear open space — such as bike routes, greenways, and public parkways — connect the movement of people, water, and wildlife throughout the community. They both connect the individual components of the ecological network and provide valuable habitat/stormwater management services. Strive for a diverse urban forest comprised primarily of native trees (to provide native insects for fish and wildlife). For park sites, provide tree canopy over at least 50% of the site. This urban forest will help compensate for the loss of the original forest, replacing some habitat and substantially replicating lost hydrological function.

FURTHER RESEARCH

Hamilton and Quayle. *Impact of Riparian Suburban Greenways on Property Values.*

Netusil and Bolitzer, "The Impact of Open Spaces on Property Values in Portland, Oregon"

Netusil et al, "Can Open Spaces Be Self Financing: Results from Portland, Oregon"

Related Charrette Strategies
A1; C1; C3; D2; D4; E1; F1; F2; G1; G3; H1; H2

Related Guidelines
4; 5; 8.2; 14.3; 15; 16; 18; 25; 28

6 Connect the district to the region

"What is more beautiful than a road? It is the symbol and the image of an active, varied life." George Sand, Consuelo, Vol. II.

Corridors are the arteries of a region. They connect the flows of materials, goods, residents, and wildlife within and between communities. A coherent system of interconnected streets can disperse traffic while creating important places at key intersections. Different types of corridors are appropriate for different types of movement. Street networks should respond to neighborhoods rather than vice versa. Connect the flows by making a district-wide network of different corridors.

TRAVEL BEHAVIOUR

Changes in land use and the built environment can have a significant effect on travel demand (i.e., automobile trip duration and frequency, and modal choice).

Together with mixed-uses and high employment and housing densities, integrated street networks and pedestrian-oriented design measures can reduce vehicle kilometres travelled by 45% or more.

6.1 High Capacity Road Network
An efficient system of arterials can provide smooth-flowing connections between regional employment and shopping hubs and are often magnets for commercial activity. Calm arterials and make them compatible with pedestrian use. Provide designated commuter bike lanes along arterials when there is no other alternative. Let roads serve pedestrians, cyclists, and drivers.
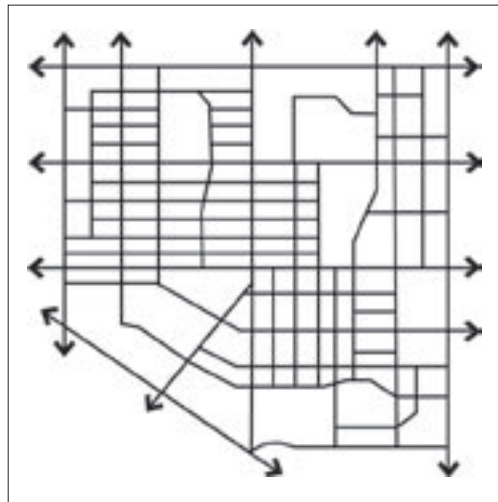
6.2 Local and Collector Street Network
A sustainable street system is not hierarchical; rather, it is an integrated whole within which all roads contribute. Many of our older, and most liveable, cities include only local streets and "trolley-car" arterials in an interconnected street system. The interconnected street system is also an inclusive system, as it provides direct and safe routes for multiple users, including cyclists. This is in opposition to the hierarchical, disintegrated, disconnected system of cul-de-sac, residential, residential collector, collector, and suburban arterial street system strategy — a strategy that has generated unbearable levels of congestion on major streets.

FURTHER RESEARCH

Litman, "Land Use Impact Costs of Transportation."

Cervaro, "Travel Choices in Pedestrian Versus Automobile Oriented Neighbourhoods."

Criterion Engineers and Planners, *Benefits of Neotraditional Development*.

6.3 Greenways and Bikeways
Greenways are linear recreational, travel, and habitat corridors that link pedestrians and cyclists to the surrounding community and regional open space system. Greenways can also perform important green infrastructure and ecological functions, such as habitat connectivity, surface stormwater conveyance, and biofiltration. The interlaced system of stream and greenway corridors provides a network of bike, pedestrian, and wildlife routes that connect important destinations within the district.

7 Layer functions in open space

"...it has nothing that makes it seem a city, except the water pipes that rise vertically where the houses should be and spread out horizontally where the floors should be." Italo Calvino, Invisible Cities, 1972.

When people see the way things work, they begin to understand them. We love what we understand and we take care of what we love. Layer servicing, ecological, and social functions throughout private and public open space. Do this in an integrated way and make sure that it is visible. Schools, natural areas and private yards and gardens can all fulfill multiple functions.

Related Charrette Strategies
A1; C4; D4; I1; J1; J3; K1; K2; L1; L3

Related Guidelines
5; 12; 27; 30; 31

community gardens

7.1 Social Functions

The school and schoolyard of a sustainable community can be a perfect example of integration. The school serves the educational needs of the community and can also provide a cultural and social resource. For example, portions of the schoolyard can serve as a site for community gardens.
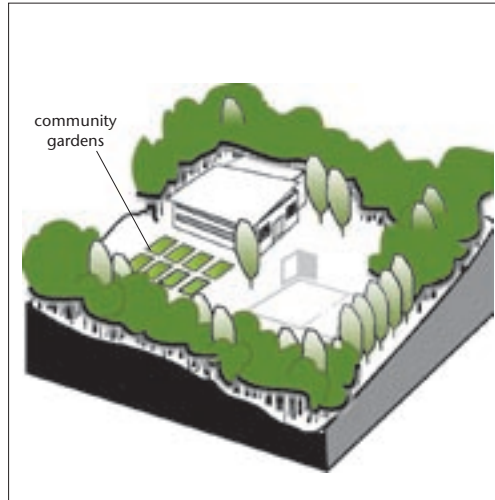
WETLAND DESIGN

The design of retention/wetlands should achieve an optimum ratio between water depth and maintaining the appropriate aquatic and terrestrial habitat to support a rich and diverse ecosystem. On shared school/park sites, measures to ensure safety and provide access to a variety of users should be addressed through the appropriate use of vegetation, buffers and landform.

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7.2 Recreational Functions

The schoolyard's playfields help to serve the community's recreational needs. Students use them during the day while on weekends and holidays they are used by residents and sports groups.
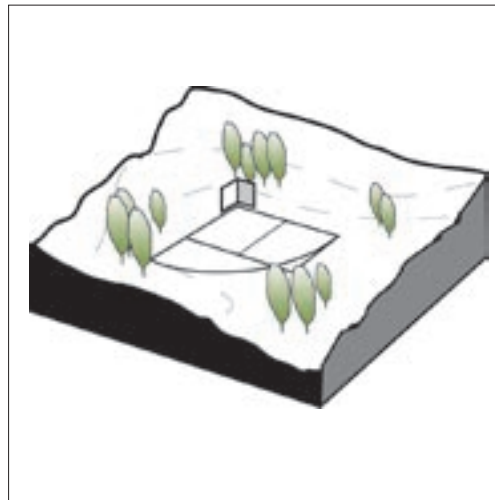
7.3 Ecological Functions

Integrated school/park sites can show students how their environment works. The large, flat, and open nature of school playfields also makes them an ideal location for stormwater storage. During the 5 to 100-year storm events (e.g., 7.5 to 12.5 centimetres of rain in 24 hours in the Lower Mainland), not all stormwater can be infiltrated where it falls. In such cases, excess stormwater can be conveyed (either on street verges or underground) to district playfields where it can be stored and slowly infiltrated into the soil and/or re-leased clean, at controlled rates, into receiving streams. Forested and reforested areas on the site provide habitat and contribute to site hydrology.
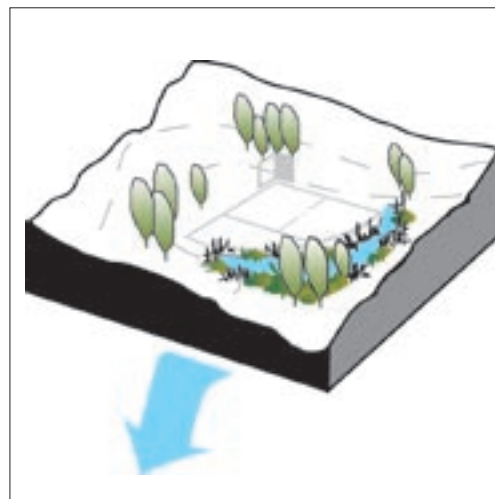
FURTHER RESEARCH

Furguson, *Introduction to Stormwater: Concept, Purpose, Design.*

Model Schools Program, Evergreen Foundation.
http://www.evergreen.ca/en/lg/lg.html

Richman and Associates, *Start at the Source.*

create a centre

8 Create a region of centres

"...just as there is a best size for every animal, so the same is true for every human institution." J.B.S. Haldane, The World of Mathematics, 1956.

A region of concentrated centres provides jobs and services close to home, saves money on infrastructure, and makes a regional transit system viable. Centres work at multiple scales: neighbourhood centres combine to form a district, and district centres combine to form a region. Development based on centres means that each community can preserve valuable greenspace and farmland. The ecological and economic value of undeveloped land will remain well into the future.

8.1 A Green Legacy
Drawing a line around natural assets such as stream corridors, wetlands, and low-lying agricultural areas identifies a green "backbone" around which a neighbourhood, district, or regional community may be structured. Locating growth around this framework means that areas with high ecological, social, and agricultural value will maintain their productivity and health.

8.2 Concentrate and Condense
Concentrated centres enhance social and economic function. Viewed as a district of neighbourhoods, each circle depicts a residential mix organized around a 5 minute walk to a small commercial and transit node: Viewed as a region of districts, each circle depicts a regional transit node surrounded by more intensive residential and commercial uses. These provide the density needed to support frequent service. Density may decrease with distance from the centre.

CENTRES

An average neighbourhood density of 25 units per hectare (10 units per acre) is considered the minimum to support a viable transit system.

Given an average walking pace, neighbourhoods based on an average 5 minute walk would range in size from between 16 hectares (40 acres) up to approximately 30 hectares (75 acres).
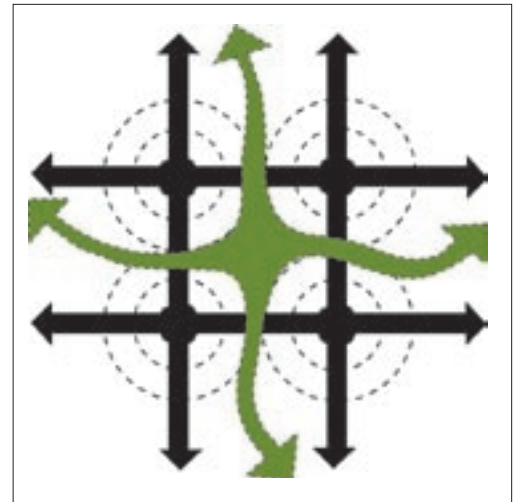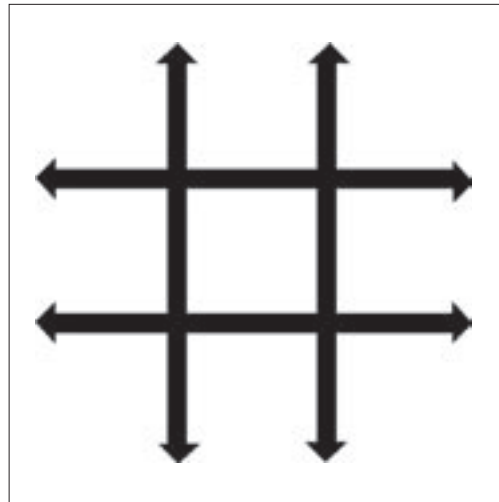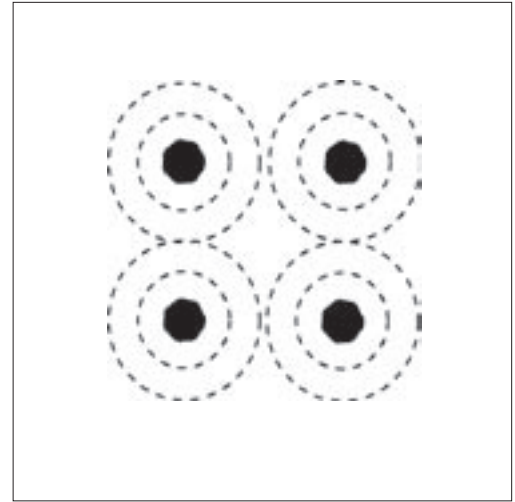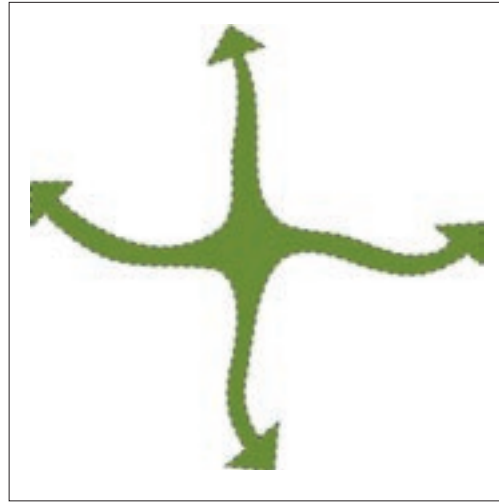
FURTHER RESEARCH

Parsons Brinckerhoff Quade and Douglas, Inc., Cambridge Systematics,Inc. and Calthorpe Associates,"Making the Land Use Transportation Air Quality Connection – the Pedestrian Environment."

Calthorpe, *The Next American Metropolis.*

Holtzclaw, *Using Residential Patterns and Transit to Decrease Auto Dependence and Costs.*

8.3 Connect the Centres
Efficient connections make a more liveable community. Within a neighbourhood or district, interconnected streets and an effective transit system help people meet their daily needs without a car. Regionally, high-capacity transit and major thoroughfares connect major activity centres. Regional connections catalyze sustainable economic and urban development and will reduce overall dependence on the automobile.

8.4 A Region of Centres
Neighbourhood centres combine to form a district, and district centres combine to form a region, while natural features provide the overall structure for development. Building communities around a green framework ensures that high-value ecological, social, and agricultural areas will be kept close to the people who benefit from them. At every scale, interconnected transportation corridors connect the centres.

create a centre

9 Let the centre define the community

"Ah and around this centre: the rose of onlooking blooms and unblossoms." Rainer Maria Rilke, "The Fifth Elegy", in The Selected Poetry of Rainer Maria Rilke, 1982.

A neighbourhood centre gives a community its identity and its anchor. A neighbourhood centre may provide a place for informal social interactions or daily shopping. A district centre offers access to other districts, provides civic services, and satisfies weekly shopping needs. A region built of numerous centres equitably and economically fulfills the economic, transportation, and social needs of its citizens.

Related Charrette Strategies
A3; B2; E4; F3; H3; H4; M2; N3

Related Guidelines
1; 8; 10 ; 18; 22; 24; 39

9.1 Something at the Centre
A centre is not just a geographic location, it is also the point where all the radii of a circle meet. Within a community, it is the place where residents meet. Make a centre that means something to community residents: do this by including civic, economic, transportation, and social functions. Use civic buildings, public parks and squares, people-friendly streets, and a broad mix of activities including shopping, working, living, walking, sitting, playing, and watching.
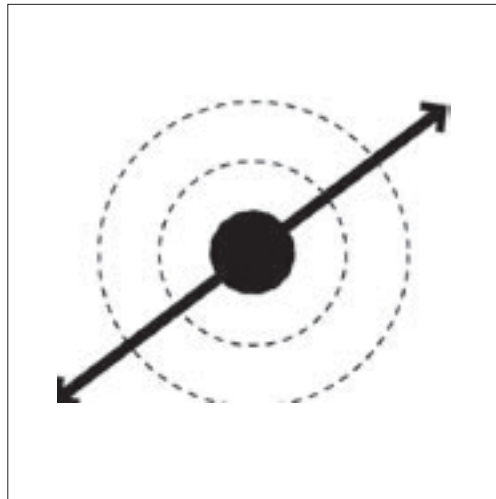
LAND USE MIX

Employment densities and jobs/housing balance are two important factors affecting changes in travel behaviour.

The mix of uses in each district and neighbourhood centre will vary depending upon context and location; however the following are suggested ranges:
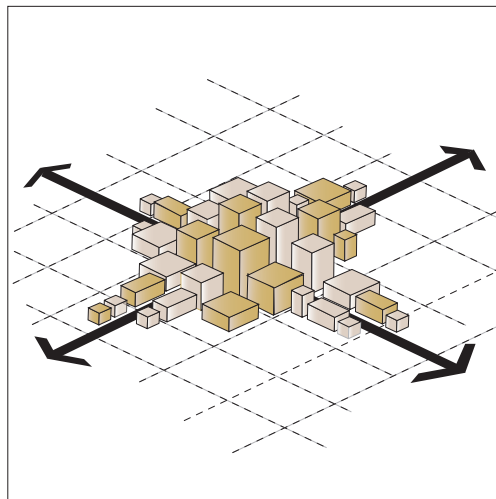
For neighbourhood centres

- *Public uses: 10% - 15%*
- *Employment: 10% - 20%*
- *Housing: 60% - 90%*

For district centres

- *Public uses: 10% - 15%*
- *Employment: 30% - 70%*
- *Housing: 30% - 70%*

97
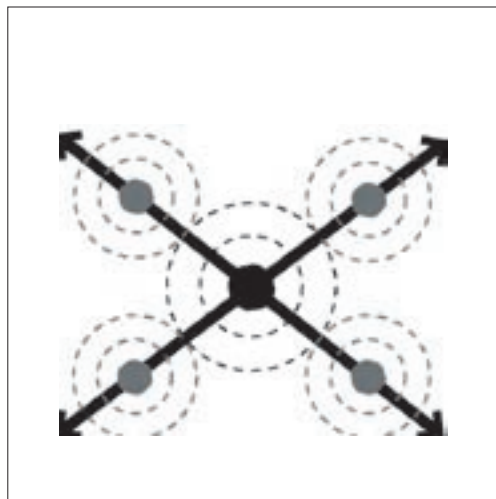
Part Three – Design Guidelines for District

9.2 Denser at the Centre
Density is relative to urban context. This means development density will generally increase as one moves from a rural community to a suburban community to a city centre. Within each community there will also be a range of densities. Regardless of urban context, make each district denser at the centre. Include a variety of land uses and residential types to maximize diversity, activity and synergy between uses. This will ensure that more people are located close to their daily needs and that there will be a large enough population within the centre of the district for animated social exchange.

FURTHER RESEARCH

Calthorpe, *The Next American Metropolis.*

Cervero and Radisch, "Travel Choices in Pedestrian Versus Automobile Oriented Neighborhoods."

Holtzclaw, "How Compact Neighborhoods Affect Modal Choice – Two Examples."
http://www.sierraclub.org/sprawl/ articles/modal.asp.

Institute of Transportation Engineers, *Traditional Neighbourhood Development Guidelines.*

9.3 Districts of Smaller Centres
The neighbourhoods that make up a district are also organized around a centre. Structuring each neighbourhood according to a five-minute walk to commercial services and transit (a 400-metre-radius circle for relatively flat sites) adds convenience and reduces auto dependance.

create a centre

### 10 Centre every neighbourhood around social space

"In Mexico, in any small town plaza every Thursday and Sunday night with the band playing and the weather mild, the boys walk this way, the girls walk that, around and around, and the mothers and fathers sit on iron-scrolled benches and watch." Ray Bradbury, "The Boys Walk This Way, The Girls Walk That," in West, 1970.

Ideally, each block has some kind of gathering place. Some are small — a bench on the boulevard — while others can take up to a whole block. Ensure that each home is located within a 3 minute walk of social space. This social space need not be a garden or park but also may take the form of a public square or coffee shop with an outside seating area.

Related Charrette Strategies
A3; B3; D3; D4; E2; F3; I1; J3; L3

Related Guidelines
2; 5.6; 7; 9; 13.2; 29; 31; 35.2; 42.4
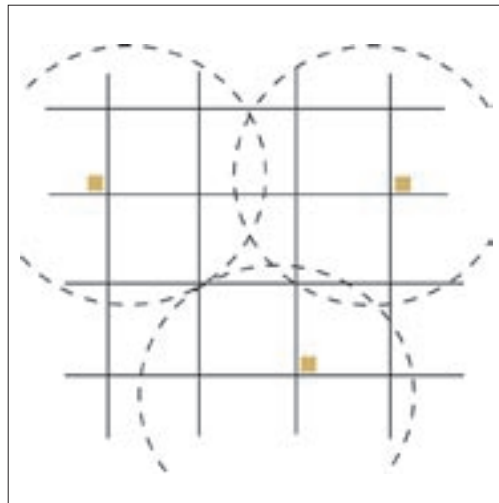
10.1 The Neighbourhood Store

Each family should be no further than a 5 minute walk from a neighbourhood store. This store may have a suite above it or may be located within an outbuilding of a family home. The neighbourhood store provides an opportunity for families to live and work in the same area, and, because it is small, the street can accommodate its parking needs. Situate the building close to the street in order to ensure a strong pedestrian orientation (i.e., build it to the property line or at a maximum setback of 2 metres). Because the store is in a residential area, its maximum lot coverage should be lower than that typical of commercial areas (i.e., it should be no more than 60%). The neighbourhood store serves a social function in that it is an identifiable landmark within the neighbourhood and a destination for children: "I'll race you to the store" is a cry that enriches any neighbourhood.
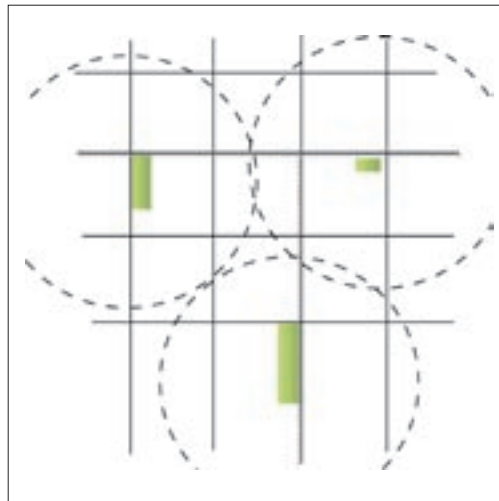
10.2 The Neighbourhood Park

The neighbourhood park is full of social opportunities: a place to run the dog, play tennis, or establish a community garden. A small park can provide a meeting place, while larger parks provide active recreation fields for residents and local sports clubs. Tailor each park to the needs of the community it serves. Locate a small park within a 3 minute walk (250 meters) of all homes and a large park within a 7 minute walk (700 meters) of all homes.

an economy of means

11 Put jobs near people

"In a city or a village which we have known well since our childhood we move in a tamed space, our occupations finding everywhere expected landmarks that favor routine." Czeslaw Milosz, Parabola, Summer 1993.

More and more people are commuting longer distances from home to work. In the GVRD, average commuting times have increased by up to 80% on the most congested routes during morning rush hour periods. If more jobs are located throughout a community, it will be easier and more cost effective for residents to travel between work and home. A fine-grained mix of land uses within each community, and within each neighbourhood, will put many people closer to their place of work. The money saved on commuting can then be used for more productive, less polluting uses.

Related Charrette Strategies
B4; C2; E4; H4; J4; M4; P4

Related Guidelines
1; 2; 8.3; 8.4; 9; 22; 38; 41

11.1 Flexible zoning

Zoning limits what kinds of land uses are allowed within a particular area of a community. Often zoning results in the dramatic separation of uses within a community by putting single-family houses in one place, apartments and townhouses in another, and business and commercial uses in yet another. This segregation of land uses disintegrates the community fabric. More flexible zoning intermixes residential, commercial, and business uses and ensures that jobs and services are located closer to the people who need them.

11.2 Live-Work

Combining working and living space can reduce a variety of costs. Workers are now applying the artisan tradition of living and working in one unit to various situations — from artists' studios to home-based offices. This eliminates the need for rental space while also allowing parents with young children to minimize child-care costs. Live-work areas function as a transition between residential areas and higher-density mixed-use, commercial, or industrial areas. Live-work areas should have a strong residential character combined with a continuous street frontage, direct pedestrian access, and parking similar to that found on a "Main Street."
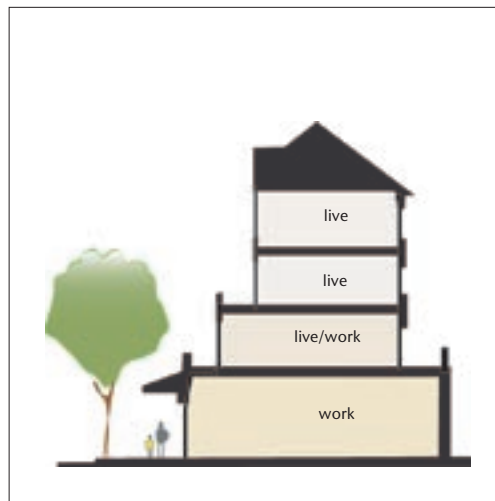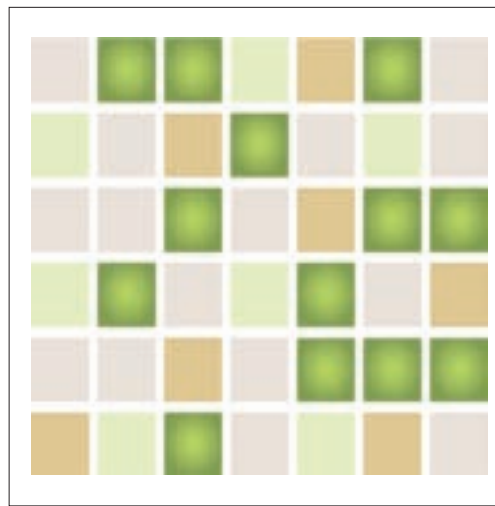
EMPLOYMENT, HOUSING AND TRAVEL

Employment density and jobs/housing balance have the strongest relationship with travel behaviour. A 1990s survey of major US and Canadian cities found that doubling urban housing and employment densities can result in a 25% to 30% reduction in vehicle kilometres travelled (VKT) (Holtzclaw, 6-8 and 21). Changes in travel behaviour result if the following thresholds are met or exceeded. For reductions in work-related trips, 50-70 employees and 9-13 persons per gross acre (about 12 dwellings per net acre) is needed. For significant reductions in non-work (i.e., shopping trips) 75 employees and 18 persons per gross acre (about 20 dwellings per net acre) is needed (Frank and Pivo).

HOME-BASED WORK

Increasing numbers of British Columbians are incorporating work spaces in their homes. The 1996 census revealed that a total of 155,455 British Columbians, or 8.2% of the work force, worked at home.

FURTHER RESEARCH/ POLICY

Contreras, Ferrara Architects Inc.,"*Home Occupation Scenario: An Investigation of the Context for Live/Work Environments and Their Regulatory Requirements.*"

City of Surrey Department of Planning and Development et al., Part 4.3 "Live/work, Work/Live Areas." *in East Clayton Neighbourhood Concept Plan.*

Gurstein, *Wired to the World Chained to the Home.*

*Live/Work and Work/Live: A Vancouver Overview.*

an economy of means

Related Charrette Strategies
C3; D4

Related Guidelines
7.1; 7.2; 7.3; 10.1; 10.2

Site Design for BC Communities

12 Share public facilities

"The bridge is not supported by one stone or another," answered Marco, "but by the line of the arch that they form." Italo Calvino, Invisible Cities, 1972.

Public facilities are often built, maintained, and managed separately, even though many of their uses are complementary. This results in underutilized spaces and facility redundancy, while the management and maintenance of separate buildings is expensive. Shared facilities decrease costs and foster interaction between different age and interest groups. Use may be segregated either physically or over time, or it may be integrated in order to enhance community interaction.
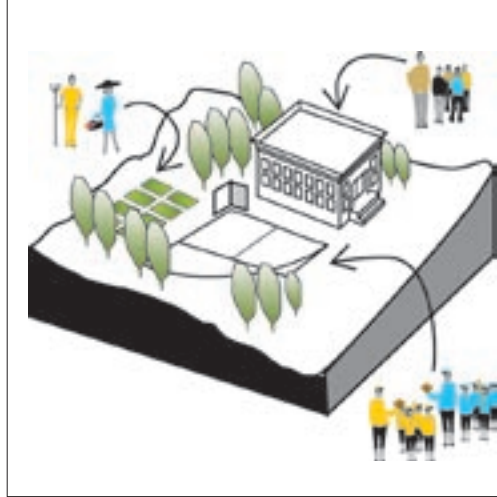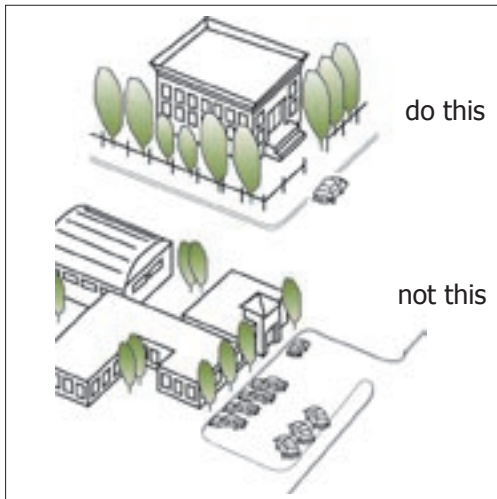

12.1 Share Space
Schools and community recreation centres have overlapping and complementary uses. Schools, libraries, and recreation facilities are often short of the funds needed to supply the full range of facilities and resources that each would like to have. Bring schools, parks, community centres, and natural areas together at the green and/or civic heart of the community.
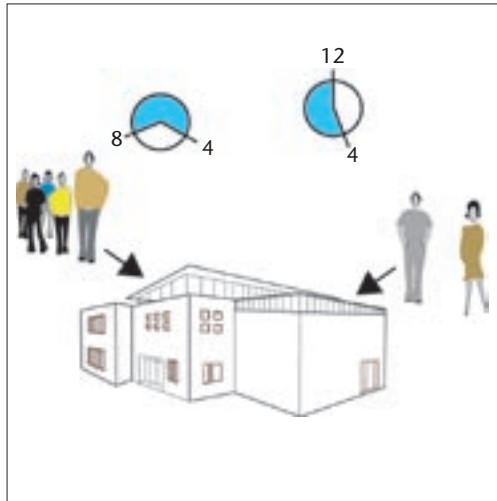
12.2 Share Time
Generally, school classrooms, gymnasia, and libraries go unused during the evening. Design and locate school facilities so that they are conducive to integrated continuing education classes. Lectures, exercise classes, gardening workshops, woodworking lessons, and community sports events are just a few of the potential nighttime uses shared facilities might host. Remember that these kinds of activities are usually enhanced if they are close to commercial sites, pubs, coffee shops, and convenience stores.

FURTHER RESEARCH

Public Agenda Online. "Sizing Things Up: What Parents, Teachers and Students Think About Large and Small High Schools."

Cotton, K. School Size, School Climate, and Student Performance." www.nwrel.org/scpd/sirs/10/c020.html

do this

not this

12.3 Schools Within Walking Distance
Putting schools within walking distance of virtually all residents means a larger number of smaller schools. Students in small schools get more attention from teachers, score better on tests and suffer less bullying, while their parents are more involved in student life. Also, more schools means that residents will have better access to school buildings and facilities like playgrounds. Ideally, elementary schools should be planned for no more than 400 students, and high schools should be planned for no more than 600 students.

an economy of means

13 Employ natural features to increase value

"A tree house, a free house, a secret you and me house, a high up in the leafy branches cozy as can be house." Shel Silverstein, Where the Sidewalk Ends, 1974.

The natural features of a site provide economic, and social benefits in addition to ecological benefits. Communities with an interconnected open space network are more desirable and have a higher housing value than do communities lacking such a network. Individual homes with a view, or homes fronting onto parks, also have a higher property value than do other homes.

Related Charrette Strategies
A1; C3; D4; E1; E3; I1; K1; L3; M1; N1; N3

Related Guidelines
3.1; 5; 8.1; 10.2; 20; 27; 31; 33

13.1 Open Space Network
Parks and community greenspaces contribute to the property values and economic stability of the whole community. Interconnected pedestrian systems throughout the community mean that more homes have direct access to natural and recreational amenities. Proximity to greenspace also helps homes benefit from higher resale value.

PROXIMITY TO OPEN SPACE

Homes can appreciate by between 10% and 25% as a result of being within 500 metres of natural green space.

101

The increases in property tax revenue as a result of property appreciation can benefit communities by offsetting the purchase, development and maintenance costs associated with the newly acquired community green space (Netusil et al., 1999).
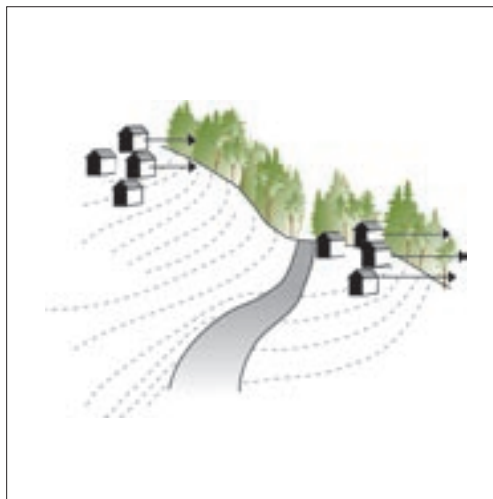

13.2 Front Onto Open Space
Higher-density housing forms, such as townhouses and low-rise apartments or condominiums, are ideally suited to fronting onto a park or open space. Proximity to the park and the view of open space has the effect of making a home seem larger than it is. Where one can gain access to units from a lane, a front street is not required (assuming the block is short enough to provide easy access from adjacent streets along a public sidewalk). Market value for units fronting onto parks is generally higher as a result. Homes overlooking parks also increase the security of park users.

FURTHER RESEARCH

Condon and Gonyea, "The Effects of Community Green Space on Property Value and Community Completeness."

Curran, and Draeseke, "Economic Benefits of Natural Greenspace Protection: The Effect on Real Estate Value."

Hamilton and Quayle, "Corridors of Green and Gold: Impact of Riparian Suburban Greenways on Property Values."

Netusil and Lutzhiser, "The Effect of Urban Open Space Type and Proximity on a Home's Sale Price: Portland, Oregon."

13.3 Orient Toward Views
People everywhere appreciate a distant prospect; even partial views can bring increased value to homes. Most BC districts have actual or potential views of distant mountains. Particularly on hillside sites, houses oriented towards a view will have a higher sale value than those lacking such views.

make it home

14 Derive community identity from the landscape

"There is a precipice between two steep mountains: the city is over the void, bound to the two crests with ropes and chains and catwalks." Italo Calvino, Invisible Cities, 1972.

Communities shaped in response to the landscape create a strong connection between themselves and their residents. Once residents identify with a place and claim it as "theirs," they begin to love and to care for it. Make a community home by shaping it to the physical and cultural landscape.
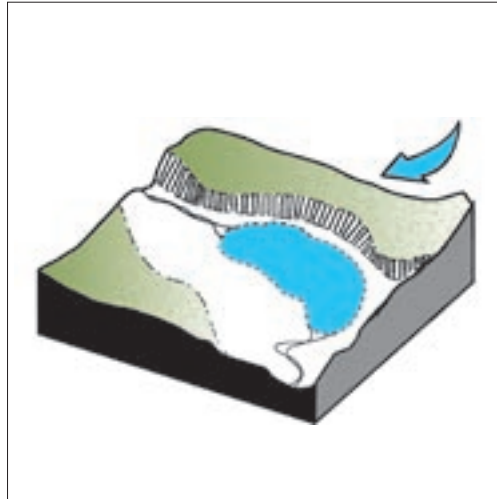

14.1 Land
The physical landscape can contribute strongly to community identity. Each site has unique features, such as landform, water bodies, vegetation, wind, and light. By emphasizing and capitalizing on these features, each community can establish its own character.
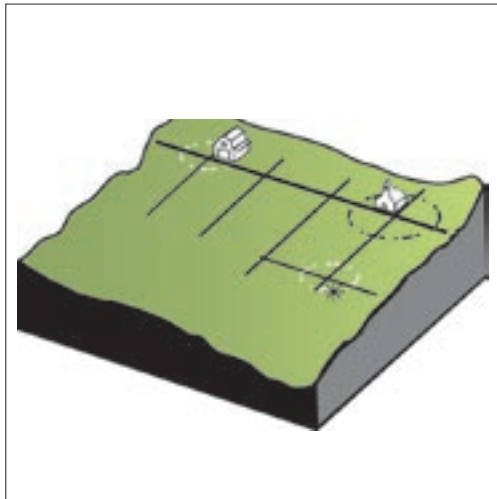
14.2 Culture
The cultural landscape marks the history of the people who have lived in a place. This history is often revealed through an existing pattern of development, a monument, or the preservation of a unique natural feature. Weaving such elements into development projects ensures that, while developing a new identity, a community does not lose its old one.
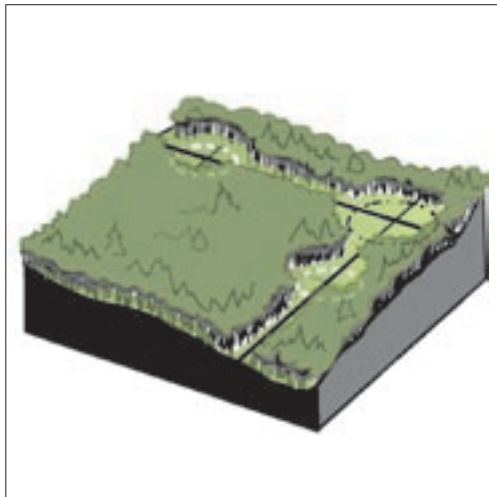
14.3 Connections
Corridors connect communities, thus it is not surprising that communities have often been founded at the intersection of the corridors. In order to strengthen community identity, reinforce development around existing corridor intersections and establish development around new ones.

FURTHER READING

Busch, *The Geography of Home.*

Hough, *Cities and Natural Process: Towards a New Urban Vernacular.*

Kaplan and Kaplan, *The Experience of Nature: A Psychological Perspective.*