CHANGING VALUES
CHANGING COMMUNITIES

A GUIDE TO THE DEVELOPMENT OF HEALTHY, SUSTAINABLE COMMUNITIES

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Preface

Since the nineteenth century, a succession of planning concepts have been put forward as alternatives to the standard residential development forms of the time. This Guide examines four alternative planning approaches which have emerged in response to concerns about the livability and sustainability of our communities; they are neo-traditional planning, the pedestrian pocket, cohousing and the eco-village concept.

This Guide is intended to aid readers in evaluating these approaches, and others, in terms of how they contribute to the development of healthy, sustainable communities. It provides an evaluative framework which defines the essential attributes of a healthy, sustainable community, identifies related planning goals and objectives, and identifies some of the "tools" which communities may use to meet their goals.

The Guide also presents several case studies which exemplify the four approaches, and reviews them to illustrate how the evaluative framework may be applied. The case studies range from a new community for 27,000 people to a housing project with 17 units. Although the focus of the Guide is on planning approaches for new greenfields development, much of the information is applicable to redevelopment and renewal projects.

The Guide is organized in five chapters. Chapter I provides an overview of the whole document, including a summary of the findings from the case study evaluations and a discussion of the four planning approaches. Chapter I will be of interest to the general reader. Readers interested in a particular topic can pursue it further by turning to one of the remaining chapters which provide more detailed information.

Chapter II presents the complete Evaluative Framework; it will be of special interest to those wishing to use the framework as a planning tool.

Chapter III presents a discussion of alternative planning approaches and infrastructure costs.

Chapter IV documents the case study examples and will appeal to those interested in how the four planning approaches are being implemented in actual developments.

Chapter V is a listing of resources, specifically organizations and publications concerned with alternative planning approaches.

Chapter 1: Overview

1.1 Why Plan Differently?

Continuous population growth in the past four decades, combined with economic and demographic change and rapidly rising car ownership, has spread Canadian cities and towns across large areas of previously rural land. In the five-year period from 1981 to 1986 alone, over 55,000 hectares of land were converted from rural to urban use. By way of comparison, the City of Montreal is 19,200 hectares and the City of Vancouver is 11,392 hectares. Much of this land consumption is the result of the predominance of a housing type, i.e., the detached house on its own lot, which requires a relatively large amount of land to accommodate a given population.

The suburban model evolved during the post-war period when the population was growing rapidly and new families were forming. The majority of households had two adults, and only one adult worked outside the home. With a growing tax base and support from higher levels of government, municipalities could afford investments in new infrastructure. In search of cheaper land and affordable housing, development moved further and further away from the town or city centre. Growth was limited only by the availability of serviced land. The resulting low-density pattern of urban growth, often termed 'urban sprawl', has created a variety of problems, including high servicing costs, unnecessary loss of good farmland and natural features, severe environmental costs due to heavy dependence on the private car for transportation, a degree of social isolation, and lack of a sense of community.

Over time, provincial and municipal governments have recognized the need to plan for urban growth. This resulted initially from the need to provide infrastructure for new development. The cost of water supply and sewerage systems was significantly higher where such development was scattered or built at very low density, whereas economies could be achieved by directing development into areas where the infrastructure was already in place or could readily be extended. Municipalities could thus control servicing costs by ensuring that development took place in a planned, orderly manner.

Circumstances today are much different for the householder, for the municipality and for society at large than they were in the post-war period. Many additional concerns have since been added to the original objective of orderly development. Municipalities are now expected to shape the livability, economic vitality, health, social resilience, safety and other aspects of communities through the planning process.

In response, the suburban model has been adapted to include more medium density residential development, to mitigate some

environmental impacts and to address other concerns. Despite these incremental changes, however, there is a growing recognition that present planning and development models are not adequate to meet today's needs.

From the householder's point of view

Demographics in Canada have changed considerably since the planned subdivision and the apartment tower made their first appearance. The population is aging; there is a much smaller proportion of school age children and a higher proportion of older adults and senior citizens. Household composition has also changed; there are more households with fewer members per household. As well, the economic context affecting household size and formation has changed. It is common now for both parents in a two parent household to work outside the home. Restructuring of the economy has caused more households to move in search of work, and an increasing number of people work from home. At the same time, there is a renewed concern about health and health related issues such as air and water quality as well as other quality of life issues such as affordability and accessibility.

Housing and community development need to respond to these changes. To reflect new demographics and household composition, many communities are providing greater variety in housing choice in the form of street townhousing, block/cluster townhousing, walk-up apartments, and double duplexes. To be implemented however, these alternatives often require zoning flexibility and changes to development standards, such as right-of-way widths, lot sizes and parking requirements.

At the same time, it is widely acknowledged that the cost of housing is out of reach for many people, that more housing that average people can afford is needed, and that housing should be adaptable over time to suit changing needs. There is a recognition that the auto-dependent suburban model does not provide accessible services and amenities for large segments of the population, particularly the elderly, the young, the disabled and the poor, and that community forms which support public transit are desirable. And there is a desire for local plans to support the maintenance or improvement of public amenities such as beaches suitable for swimming, pure potable water and clean air.

From the municipality's point of view

Initially, municipalities had to provide for orderly development in the context of growth in both population and tax base. Today, they must maintain levels of service and satisfy rising expectations for quality of life in the face of shrinking revenues. Economic restructuring has placed a direct burden on some municipalities as they struggle to meet the responsibilities of growing social needs and welfare rolls. At the same time, fiscal restraint in higher levels

of government has resulted in decreased revenue and grants for the municipality and 'downloading' of some social responsibilities to the municipal level. In the face of these immediate needs, municipalities must plan to maintain and expand basic infrastructure despite shrinking resources. Existing municipal infrastructure is aging and a large proportion of it is reaching the end of its service life. New infrastructure is costly and some municipalities are constrained from approving new development because the necessary infrastructure is not in place. Health and environmental concerns combine to demand higher performance standards for infrastructure such as water and sewage treatment.

All of these concerns point to the need for housing and community forms which are fundamentally different from our current models. Communities are needed which will promote wellbeing, help to meet social needs, and ensure a high quality of life, rather than creating conditions which foster ill health, stress and poor quality of life. It is now understood that elements such as diversity of uses, continuous streets, and variety in housing type and tenure will help to create a more socially resilient and self-sufficient community than the homogeneous subdivision or anonymous apartment block. Compact forms of development which optimize infrastructure requirements are more economical for the municipality to develop and maintain than sprawling subdivisions. As well, the location and design of new development can have major effects on the degree of environmental impact, the resulting effect on amenities such as water quality, and the infrastructure costs required to mitigate those effects.

From society's point of view

Circumstances and concerns are changing in the broader society as well. There is now a widespread understanding that the planet's resource base and ability to absorb pollutants is finite. Limits to growth are now being felt in very real terms by communities faced with conditions such as shortage of water supplies or contamination of ground water by septic systems. With this new awareness, a concern has arisen to conserve precious resources for future generations and the focus has shifted from exploitation to stewardship. In the words of the National Task Force on Environment and Economy, "[O]ur economic systems should be managed to maintain or improve our resource and environmental base so that the generations that follow will be able to live equally well or better." In addition to concerns for the future, issues such as ozone depletion and accumulation of carbon dioxide (CO_2) in the atmosphere have dramatically illustrated how the planet functions as one large ecosystem, in turn prompting a greater sense of global responsibility related to local actions.

In the local sphere there is a need to build housing and communities for the population while practicing environmental stewardship and global responsibility. For Canadian communities, this translates to a need for planning approaches which allow for

preservation of scarce agricultural land, respect for sensitive areas and ecosystems, and efficiency in use of resources. Community forms are needed which use less land and materials, are more integrated with natural systems and consume less energy and resources during construction and operation.

Along with the growing concern for the environmental sustainability of our communities, there is a growing concern for their social sustainability and stability. Quality of life is threatened not only by environmental crises but also by violence, social fragmentation, ineffective human services and unemployment. This dual concern — with the social as well as the environmental — underlies the "healthy communities" movement. This fast growing world-wide movement has its roots in Canada. The healthy community process emphasizes a multi-sectoral approach to improving health, wellbeing and quality of life through local community involvement, and local government action. It looks to the action of local coalitions that bring together the social, environmental and economic sectors, and suggests that good urban planning results in improved health, wellbeing and quality of life by addressing both the physical and the social environments of cities.

Summary

Planning models which have dominated new development since the post war period are straining to accommodate pressing new concerns posed by changing circumstances and societal values. Changing households require more variety in housing forms, better accessibility and public amenities. Municipalities need to reduce the capital and operating costs of infrastructure while meeting higher environmental standards. As well, there are societal concerns about environmental responsibility and social stability.

There is a growing sense that different models are needed which can address these divergent concerns in new ways. While a vision of healthful, sustainable communities is emerging, it is not yet clearly defined.

1.2: What Makes a Healthy, Sustainable Community?

Defining a new vision of healthy, sustainable communities is now the subject of widespread discussion and debate. All agree that the vision must address environmental, economic and social issues, but how? This Guide presents a framework which can be used to define a healthy, sustainable community – particularly those aspects relating to the physical plan – to review plans for new development and to identify tools which communities may use to achieve their objectives.

The framework begins by defining the aspects of healthy and sustainable communities under seven key headings. Their interrelationships are shown in the accompanying figure.

Aspects of Healthy, Sustainable Communities

resource conservation
- land
- materials
- water
- energy

environmental impact
- greenhouse gases
- ozone impact
- air, water and soil quality

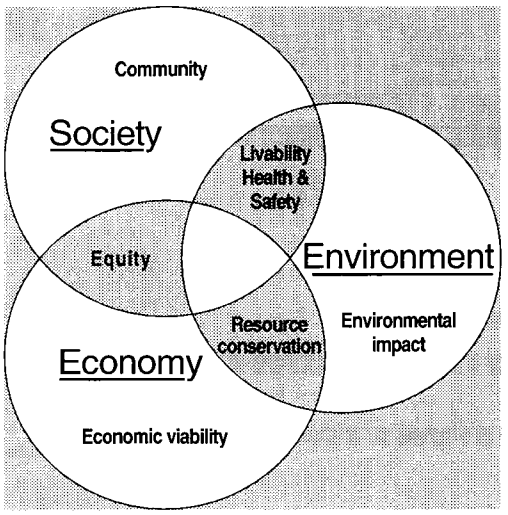
economic viability
- infrastructure
- marketability
- stability

equity
- access and opportunity
- fulfillment of basic needs
- services and amenities

livability
- services and facilities
- public open space
- convenience of movement
- private open space
- climate and weather
- delight

community
- inclusiveness
- participation
- heritage
- identity
- gathering places

health & safety
- health protection
- health promotion
- health care and safety



Each aspect has an associated goal. These are listed in the complete evaluative framework which is presented in detail in Chapter II of the Guide. It defines more specific, often measurable objectives for each goal and identifies tools which may be used to achieve the objectives. The tools are presented under six major headings which cover most aspects of public endeavour;

- land use planning,
- building form and technology,
- infrastructure / utilities,
- transportation / communications,
- economic development, and
- social development.

The framework is different from other, similar efforts in several ways:

1. It is comprehensive; many recent checklists are concerned about environmental sustainability and so concentrate on issues relating to resource conservation, for example, without considering other attributes such as livability or equity.

2. While the framework was developed with a focus on land use planning, it recognizes that planning for sustainability crosses over into several other areas of public sector responsibility.

3. It concentrates on identifying attributes, goals and objectives rather than prescribing which tools should be used to achieve them. Many checklists define success by the presence or absence of particular planning features. Canadian communities are diverse in every circumstance - climate, demographics, size and economy. The framework is designed to show that many tools are available but that the choice of tools used to achieve objectives should reflect that diversity.

4. The framework is not definitive, but rather illustrative. Its purpose is to show the breadth of attributes which make up a healthy, sustainable community and how the various attributes affect each other at the practical level of community plans and operations.

An important feature of the framework is the emphasis on a holistic approach; no aspect can be left out. A community's priorities and emphasis on various aspects and goals may change from time to time, reflecting circumstances and where effort should be directed over the short term. But a balance must be found between the sometimes competing demands of economic, environmental and social issues. In the long run, a healthy and sustainable community will be one which has managed to achieve a level of excellence in all the areas.

1.3: Four Alternative Approaches

This section presents a brief description of four alternative planning approaches; neo-traditional planning, the pedestrian pocket approach, cohousing and the eco-village concept.

They were chosen for study for several reasons. All are recent attempts to address emerging concerns. All four approaches go beyond incremental changes to existing planning models. Neo-traditional planning and the pedestrian pocket approach, (referred together as new urbanism) are widely known and have been applied in a number of developments throughout Canada and the U.S. The eco-village concept and cohousing are less well known in North America, but represent leading edge European attempts to address environmental and social concerns .

It should be noted that while the four approaches are discussed separately they are not mutually exclusive categories. The approaches are complementary and could easily co-exist in a single development. For example, a community could be based on neo-traditional and pedestrian pocket design concepts, be built to eco-village performance standards and include cohousing. Indeed, as will be discussed later, a combination of these different approaches, adapted to the local setting, may represent the best option.

Neo-traditional

Neo-traditional is the term given to a planning approach which is modeled on 19th century urban and small town form. The neo-traditional approach originated in the eastern United States in response to a growing dissatisfaction with the standard form of suburban development. In particular, neo-traditional planners were seeking to provide an improved sense of place in new developments, to restore a pedestrian orientation and to avoid the social, economic and environmental impacts of suburban sprawl.

The neo-traditional approach covers a fairly wide range of specific plans and forms which share a few common features. Neo-traditional developments are compactly developed, usually on a modified grid plan with relatively narrow distances between house fronts. While they often emphasize detached dwellings, many projects are built to higher than average densities and rear lanes are a characteristic feature. Local shops and similar services are located within the development, with some plans calling for basic services to be accessible within a short walk from any residence. Larger developments are centred around a "Town Square", a higher density mixed use area including retail services, apartments and commercial uses. Neo-traditional developments are often distinguished by strong design controls which may govern house façades, fencing, street furniture and other aspects of urban design.

The Florida partnership of Andres Duany and Elizabeth Playter-Zyberk are well known as the originators of the neo-traditional approach. Their firm was responsible for some of the original developments in this style, including Seaside in Florida and Kentlands in Maryland. Although it originated in the U.S., neo-traditional type developments are now being planned in Canada.

Pedestrian Pocket

The pedestrian pocket approach originated in California in response to many of the same issues addressed by the neo-traditional approach, i.e., suburban sprawl, traffic congestion and lack of a sense of place. As described in *The Pedestrian Pocket Book,* this approach is characterized by "a simple cluster of housing, retail space and offices within a quarter-mile walking radius of a transit system." It is intended to encourage walking within the area and use of public transportation to other destinations.

As originally developed in the U.S., the pedestrian pocket used existing rail lines to create new development on a town model with the new town forming a "node" on the transit network.

The pedestrian pocket approach has since evolved into the broader concept of transit oriented development (TOD). Practitioners of transit oriented development are now applying this approach on projects of various sizes from the creation of new neighbourhoods and the redevelopment of industrial areas in the urban core to the creation of new towns and the preparation of regional plans for large metropolitan areas. Recently the proponents of TOD and neo-traditional planning have joined forces under the common banner of "new urbanism".

Peter Calthorpe, an urban designer and author of *The Next American Metropolis*, is one of the foremost proponents of the pedestrian pocket and related concepts. Laguna West, a new neighbourhood in Sacramento, California was the first test of this concept and perhaps the best known example. In some Canadian cities, redevelopments around transit nodes predate the pedestrian pocket concept but share many of its characteristics.

Cohousing

Cohousing is an alternative approach to financing, designing and managing individual housing projects, rather than to neighbourhood or town planning. Cohousing is basically a social, rather than a physical, design concept but it is included in this review because its unique characteristics have implications for urban infrastructure and for urban form.

Cohousing originated in northern Europe in response to the desire for a housing form which was more affordable and which allowed for alternative patterns of living and a greater sense of community.

Cohousing projects may vary in form from single family detached projects, to row housing, low rise and even high-rise apartment buildings. Whatever the housing type, cohousing projects share some common characteristics. While individuals own their own private dwelling, part of the project is owned and managed communally, usually more than in a condominium development. Also, when joining a cohousing project residents subscribe to a more 'participatory' lifestyle than in a typical condominium. Unlike co-operatives, which generally are rental, cohousing members own their own unit.

The communally owned portion of the project may include large amounts of land in a rural setting or a smaller open space in an urban development. Cohousing projects typically include a common meeting space and most include a dining facility where meals may be offered on special occasions or on a regular basis. Common facilities may also include workshops, laundry, gardens and other features. In most cohousing projects, the greater emphasis on common facilities is supported by a slight reduction in the size of the individual suites or units. Municipalities often accommodate cohousing projects on the basis of individual site plan approval.

With their emphasis on participation and strong group ties, members of cohousing projects tend to be more interdependent. Projects emphasize strong neighbourly social interaction and support networks, giving members considerably more potential to be self-sufficient; or, in other words, less reliant on public- and privately-run services, such as day care, community patrols, and so on.

Like the pedestrian pocket, cohousing is a relatively new name for an alternative approach which has existed in North America for some time. Early examples of what would now be called cohousing have been developed on a limited scale in the U.S. and Canada since the early 1950s. Following on the developments in Europe, cohousing is enjoying a strong resurgence of interest in the U.S. and Canada. Numerous projects have been built in the U.S. and cohousing groups in several provinces are now trying to get projects underway.

Eco-village

The term eco-village has been coined to describe a planning approach whose primary aim is to reduce the environmental impact and resource consumption of urban development to a minimum. Its intellectual roots can be traced to the "Garden Cities" movement of the late 19th century. Originating in Europe, the eco-

village concept is often presented in North America under the term of "environmentally sustainable communities". This approach addresses the demands which urban development puts on the environment, both as a source of materials and resources and as a "sink" for pollution and waste. In some projects the goal of environmental sustainability has been combined with the goal of providing housing for people with environmental sensitivities.

Urban areas draw their resources such as building materials, energy, water and food from the surrounding countryside, other regions, and even from other continents. In order to reduce this impact, (sometimes called a population's ecological footprint), the eco-village approach sets self-imposed performance criteria. Eco-village standards for energy consumption in buildings and transportation, waste management and water consumption are generally much more rigorous than the norm.

Eco-village projects most often involve a high degree of participation in the design and subsequent management of the community through future residents and local community groups. In most projects, the community aims for a greater degree of self-sufficiency. This objective leads to a greater emphasis on local employment (especially in "green" industries), and to emerging infrastructure technologies such as renewable energy, recycling and composting, and alternative water and sewage treatment methods.

In keeping with the aim of reducing energy use in transportation, the eco-village is usually compact in form and aims to minimize auto use in favour of transit, bicycles and walking. With this common feature as a basis, the neo-traditional or pedestrian pocket development could evolve into a full fledged eco-village project by adding on performance criteria and addressing other issues such as waste management in a rigorous manner.

In Europe, where the eco-village concept originated, most of the early projects were initiated by small groups of house seekers. Municipalities now play a more supportive role and in some cases are initiating projects a well. A European organization of eco-villages now has over 100 members. Ecolonia in the Netherlands is a well known European example of the eco-village concept. The Bamberton project in British Columbia is the best known Canadian example of this approach. The Affordable Sustainable Community project of the University of Calgary is another example of a Canadian eco-village which is on the drawing board.

1.4: What Do They Offer?

The key question for consideration is, do the alternative planning approaches move us closer to creating healthy, sustainable communities? Using the evaluative framework as a checklist, the four approaches were reviewed to discover their potential in addressing environmental, economic and social issues.

Neo-traditional

environmental issues

To the extent that the neo-traditional approach emphasizes more compact development in principle, it results in less land used per dwelling unit. In practice, however, neo-traditional developments are not always built to higher than average densities. Some continue to emphasize detached dwellings and consequently do not take full advantage of the land use conservation potential in the compact form.

The neo-traditional approach also reduces auto dependence within the development, in turn reducing energy use and environmental impacts. The mixed use design allows for local stores and services to serve local needs within walking distance. Depending on the densities in the development and its context, use of the automobile for trips outside the neighbourhood may also be reduced.

Neo-traditional developments, however, generally do not take advantage of all the potential environmental benefits of compact form. For example, greater energy savings could be obtained if plans incorporated district heating and cogeneration technology, and if design controls included energy performance standards for buildings.

economic issues

The cost of infrastructure is generally greater for neo-traditional developments when compared to conventional subdivision plans. The extra costs are largely due to the rear lanes included in most neo-traditional designs. In some cases, extra costs also stem from wider pavements (for on-street parking), single loaded streets, boulevarded streets, and more street area resulting from a tight grid pattern.

Most of the neo-traditional case studies that were considered compensated for the extra costs of infrastructure by greatly increasing the densities of development. Compact form was found to bring the costs of infrastructure on a per-unit basis close to the costs per unit for conventional plans, albeit the neo-traditional lots are generally smaller. Increased densities can also promote more efficient public transit and viable employment and retail opportunities.

social issues

The neo-traditional design, is in part a response to a desire to return to the idealized sense of community that is perceived to have been characteristic of 19th century small towns. The attempt to create an active pedestrian street life and social centre for these communities serves to meet that need. On the other hand, the predominance of detached dwellings, the general lack of plans for community involvement in planning and design, and the social homogeneity apparent in some designs, may limit the extent to which social objectives can be met.

Pedestrian Pocket

environmental issues

The pedestrian pocket and transit oriented development offer similar environmental benefits to the neo-traditional approach. For example, the compact form and mixed use necessary to support transit also results in less land required for development. Because of the generally higher densities, the pedestrian pocket approach offers greater savings in this area. The transit orientation saves energy and reduces air pollution by reducing auto dependence. Emphasis on local employment further reduces auto use by reducing the need to travel outside the immediate area for work.

Like the neo-traditional approach, the pedestrian pocket has not reaped all the potential environmental benefits offered by the compact form and transit orientation.

economic issues

With the pedestrian pocket approach, there is a greater emphasis on matching the amount of employment to the population of the area. This provides more of a balance for the community's economy and moves it out of the category of a bedroom suburb with associated retail and services.

In pedestrian pocket development, compact form provides savings in the cost of municipal infrastructure, provided that significant extra pavement widths and rear lanes are not imposed. As the densities increase, the cost of infrastructure on a per-unit basis decreases. Increased densities also promote more efficient public transit and viable employment and retail opportunities. There can be additional economic benefits from using existing rail lines to link pocket communities to each other and to nearby urban areas.

social issues

The higher density and the emphasis on live-work proximity, combined with local commercial and mixed use development appears to give the pedestrian pocket a good likelihood of creating a reasonably strong sense of community. Moreover, the broad range of housing types makes it more likely that the community will have a diverse mix of ages and incomes.

Cohousing

environmental issues

Cohousing represents a mini form of compact development and so may result in proportionate reductions in the requirements for linear infrastructure. The emphasis on shared facilities such as workshops and laundry may result in more efficient use of materials for the facility and equipment. The lifestyle emphasis of cohousing also predisposes residents to demand management innovations in the project design, such as water conserving devices and to activities such as waste reduction and recycling.

economic issues

Cohousing, by its nature, offers many opportunities for reduced building costs, although the extent to which these are adopted depends on the members. Ideally, costs could be saved by sharing kitchen and eating facilities, laundry facilities, meeting and recreational areas, heating systems, etc. In practice, a level of independence is often accommodated, thereby offsetting some potential cost savings. On the other hand, the interdependence of the members may result in less demand on 'soft' infrastructure such as social services.

social issues

The sense of community and the desire to participate in the co-design and co-management of the development is the hallmark of cohousing. People who choose this option are making a deliberate decision to live in a community which requires a higher than usual participation in the life of the community and a closer relationship with one's fellow residents than is the norm today.

Eco-Village

environmental issues

Of all the approaches discussed here, the eco-village contrasts most sharply with 'conventional' development in environmental terms. Eco-village developments may share features such as compact form and pedestrian orientation with communities designed along the principles of new urbanism. They are distinguished from these projects in their approach to environmental issues. Reducing the environmental impact of development is an overriding aim and eco-village projects take a rigorous and comprehensive approach to achieving this objective.

While most urban development now attempts to minimize environmental impact, some eco-villages will limit the size of the development according to a defined aspect of the carrying capacity of the immediate environment, such as water supply. As well, eco-villages often establish strict goals regarding environmental impact, for example, sewage treatment which will have zero impact on receiving water bodies. Most eco-villages also establish rigorous community goals for resource efficiency. These typically

aim at a level of consumption for energy and water which are one half or less the consumption of a conventional community.

To achieve these ambitious objectives, eco-village developments generally set high standards of building performance in the areas of energy and water efficiency. They also develop innovative systems for energy supply, stormwater management, water supply, sewage treatment and waste management, with an emphasis on on-site systems.

Eco-village developments see a connection with the natural environment as a positive and necessary amenity. They generally incorporate features such as allotment gardens and natural areas into the plan, and they often dedicate large areas of the site as natural preserves. Where applicable, remediation and enhancement of the site's ecosystem and natural features will also be included in the plan.

economic issues

The eco-village approach also provides the greatest potential for infrastructure savings. In addition to savings on linear infrastructure resulting from a more compact urban form, eco-villages reduce the capital and operating costs relating to the supply of services through built-in demand management features which lower the per capita requirements for energy, water and waste disposal.

Some eco-villages also strive for complete self-reliance, which could have far reaching implications for the future of municipal services. By reducing energy loads, water consumption, solid waste production, and so on, eco-villages are making alternative, community-based infrastructure systems more economically feasible. Small-scale cogeneration and renewable energy technoloogies, systems for collecting potable water and treating wastewater on site, and systems for returning compostable solid waste to the nutrient cycle, all have the potential to reduce, or eliminate the need for expensive, centralized public infrastructure. By incorporating the cost of autonomous infrastructure systems into dwelling unit prices, eco-villages internalize, to varying degrees, the initial cost and ongoing responsibility for environmental protection within the community.

social issues

Because eco-villages are usually an attempt to address holistically the environmental, social and economic dimensions of the community, they often (but not inevitably) place a high value on creating a strong sense of community and participation in community decision-making. The combination of the "village" design, local employment, pedestrian orientation, a diverse mix of housing options and, usually, a shared commitment to environmentally responsible design and behaviour, can be expected to create a strong sense of community.

1.5: Lessons Learned

Use of the evaluative framework to review the alternative planning approaches and the case study examples has led to several observations.

1. While the four planning approaches are discussed separately, they are complementary in many respects.
2. The use of a predetermined physical form or model may not be the best approach to planning a healthy, sustainable community.
3. The cost of municipal infrastructure depends on several factors, not just physical form.
4. Individual community plans are constrained by the community's context or setting.
5. The physical plan is only one factor in achieving a healthy, sustainable community.

This section presents these observations in greater detail and suggests that an alternative planning *process* is required in which the Physical Plan is part of a broader Strategic Plan for the community.

Observations

1. The Alternative Approaches are complementary

The study was originally directed at four distinct concepts of urban form, each reflecting a particular basic goal. Setting aside cohousing, a concept which is not fundamentally about physical form at all, "advanced" Canadian urban development tends not to embody any one of these concepts in its "pure" form, but is in fact much more eclectic. All the cases (including, to the extent permitted by their small scale, the cohousing projects) have attempted to varying degrees to create a more compact, pedestrian-friendly environment than the conventional suburban subdivision; to include a well-defined focal point; to provide a mix of uses and housing types; to restrain automobile use and favour public transportation; generally to create a livable community rather than merely an amorphous car-oriented maze of more or less uniform houses; and to protect natural features and respect environmental sustainability.

At the same time, it should be recognized that the "eco-village", as represented by Bamberton and Cerro Gordo, tends to go much further than the others in the direction of sustainability, in setting high conservation performance standards and eliminating or reducing dependence on conventional municipal services.

While the categories of neo-traditional, pedestrian pocket and eco-village may be *conceptually* useful as expressions of certain ideas or sets of ideas about desirable urban form, their *analytical* and

descriptive value is limited because in practice, new development which seeks to break out of the conventional mould borrows from all of them.

2. Reliance on Models May not be Advisable

It may be a mistaken approach to planning to take *any* predetermined notion of physical form as its starting-point, rather than its final product. This study strongly suggests that a more appropriate approach is to define the community goals and to apply these in light of the opportunities and constraints imposed by the site.

The kind of evaluative framework presented in this Guide is a more useful planning tool than a rigidly defined model. Working from well defined goals, the framework makes it possible to focus on desirable attributes and features and to combine these in the way most appropriate to the community and its conditions rather than relying on conceptual forms which combine physical attributes in a somewhat arbitrary fashion.

As illustrated in the later discussion of an alternative physical planning process, the framework can also be used by the planner as a comprehensive, practical guide to the factors which he or she needs to take into account in developing a concept of physical form *appropriate to the particular situation* for which it is being planned.

3. Infrastructure Costs Depend on Several Factors

Apart from public education and demand-side-management programmes that can reduce infrastructure costs both on- and off-site, there are three major factors affecting the cost of on-site linear infrastructure for new developments.

- Street configuration: The number, type and layout of streets in the development has a direct effect on the cost of roadways and linear infrastructure in the development.

- Density and urban form: The density of residential development is expressed in the number of units per hectare. Infrastructure costs decrease (on a per-unit basis) as density increases. Higher densities can be achieved in different ways; compact development can achieve relatively high densities with building heights generally under four storeys.

- Engineering and development standards: Standards affect the costs of infrastructure since they determine the widths of streets and rights of ways, associated features of street design such as curbs and sidewalks, and the placement of linear infrastructure.

These three factors are interrelated and cannot be taken in isolation. For example, in order to achieve a "livable" design, cost savings achieved in one area may be counter-balanced by higher costs in another area. Ultimately, the cost of infrastructure for any given community will depend on the community's planning goals and the particular "mix" of factors – street configuration, density and engineering standards – which was chosen to meet them. No one factor alone will necessarily result in lower infrastructure costs.

By way of illustration, a comparison of the costs of infrastructure for neo-traditional versus conventional plans is included in Chapter III. The conclusion is that, for a neo-traditional development with a grid road pattern, boulevarded streets and rear lanes, the cost of infrastructure will be 30% to 35% higher than for a similar conventional development having the same density. The cost of the rear lanes alone accounts for about two-thirds of the increased cost.

While the characteristic patterns of a neo-traditional plan were found to significantly increase the cost of infrastructure, an increase in the density of the built form was found to decrease the infrastructure costs (on a per-unit basis). When density was considered alone (without a change in the street layout), the cost of infrastructure per unit could be lowered by 25% to 30% by doubling the density. So, when the two factors are combined — neo-traditional plan at double the conventional density — the result is that much of the extra cost of the neo-traditional plan is offset by the increased density.

This is generally true for any physical form of development; neo-traditional or otherwise. Higher densities and a more compact form means a greater number of units per metre of road, with only marginally higher costs for increased sewer sizes and more lateral connections to the units. Thus, increased density will decrease costs on a per-unit basis while the addition of infrastructure such as wider roads, boulevards, laneways, etc. will increase costs on a per-unit basis.

Similarly, the choice of engineering standards for a particular community can substantially affect the initial costs of development and also have significant implications for the cost of maintaining and replacing infrastructure over the long term. "Gold-plated" standards raise the cost of infrastructure; on the other hand, infrastructure costs can be greatly reduced, regardless of planned densities, through the appropriate use of new engineering standards and / or technologically improved products.

4. Context is Important

An aspect of new development not fully captured by the evaluative framework is the "fit" of the project's goals, planning and design to its context or setting. This was not considered because it would entail a broad-scale examination of the area in which each project

is located, including the planning context, and the result would still tend to be a rather subjective judgment. Nevertheless, it is a consideration which should not be neglected in planning. Here are some illustrations from among the case studies that were examined.

One is intended to be a self-sufficient community rather than a city satellite; but with good transportation connections to a nearby city, it may be destined in practice to be little more than an outlying bedroom suburb or retirement community. Another has been given a transit-oriented plan despite being located on the edge of an existing small town with limited transit service. Two other cases, regardless of their intrinsic merits, seem somewhat out of place. Both are attempts to realize a preconceived urban design concept in an environment for which it may really be inappropriate, or out of keeping with the local vernacular.

It is important for the planner to recognize that the completed project, among its other features, ought to be related both functionally and aesthetically, one might say culturally, to its site, location and surrounding, recognizing the practical constraints (and perhaps opportunities) imposed thereby, and should be visually complementary to its neighbours rather than appearing as a sort of alien intrusion, even if this entails some sacrifice of other aims.

5. The Physical Plan is Only One Aspect

Important as it may be to follow the right physical planning process, it is probably even more important to recognize that this will not be the only factor, or even the key factor, in attaining many of the development goals, and may indeed be almost irrelevant to some of them. Water conservation is a good example (though notably neglected in the developments examined in this study). Regional and site hydrology will obviously be important considerations in a water conservation plan, as will the nature and design of the infrastructure built to serve the development. But so will the construction and equipment of the buildings themselves, regardless of their layout.

The creation of a healthy, sustainable community in fact goes much beyond the design of the built environment. It requires plans and programs, not just for putting the physical elements into place over time, but for the long-term management of transportation, water supply, and the various other components of the community's infrastructure. At least equally important are continuing, matching plans and programs for social and economic development and for environmental protection and resource conservation. All of these must recognize the requirements and constraints imposed by the legal, regulatory and — not least — fiscal regimes which apply. And they must be integrated in the context of a genuinely comprehensive or strategic community plan which provides an overall direction for the community's future.

An Alternative Planning Process

a.) The Strategic Plan

Building a healthy, sustainable community requires a strategic plan embracing every area of public sector responsibility, directed towards a set of linked goals for social, economic and physical development. These goals in turn should be based on a comprehensive "vision" of the community's future, created by its residents collectively. Within the context of the strategic plan there will be more specific plans for particular areas of responsibility, including a physical plan, but the physical plan should be only a part of a much broader picture.

Essentially, a strategic plan concerns the qualities of the community which is to be created. It identifies its broad social, environmental and other key goals, and outlines the courses of action needed to attain them. It also addresses the question of fiscal resources and constraints. Because choices will inevitably have to be made regarding the allocation of resources and regarding objectives and programs that are not fully compatible, it is concerned with priorities.

A desirable first step in preparing a strategic plan is a "visioning" process in which participants are encouraged to depict their ideal future community verbally, pictorially, or both. This provides a basis for the development of *broad goals,* the conditions of which the plan is intended to achieve. "Housing to meet the full range of individual and household needs" is an example of a possible goal; "maximum economic self-sufficiency' is another. *Principles* might also be decided on: the basic ground rules governing, mainly, how things are to be done in the planning and development process. It might, for example, be a principle that development will be carried out without any form of public subsidy, or that in no circumstances will an Area of Natural or Scientific Interest (ANSI) be disturbed.

Goals and principles should be developed through a combination of interdisciplinary discussion within a broad-based planning team collectively capable of addressing all the issues which must be considered, and participation by the public through such devices as focus groups acting as surrogates for prospective residents and other users of the future development.

Once the community's goals have been established, they have to be translated into specific *objectives* related to a timetable. To use the previous examples, the goal of a full range of housing means identifying the particular types of accommodation to be made available at various stages as development proceeds; the goal of maximum economic self-sufficiency calls for a practical program for local economic development. The strategic plan, in other words, has to be translated into a closely integrated set of more specific, more concrete plans for action in particular sectors, notably social development, economic development, environmental protection and conservation, "hard" services such as water supply

and waste management, and transportation. The physical plan falls into place as one of these. Like the others, it must reconcile incompatibilities and accommodate trade-offs, — for example, between the provision of housing and the preservation of environmental values — according to the principle of sustainable development and the priorities established by the strategic plan.

b.) The Physical Plan

The goals of the physical plan should be determined through the strategic planning process. If it has to be prepared outside such a context, its goals should nevertheless be developed much as they would be in that process. The evaluative framework in this report will be very useful, not so much in deciding what the goals should be, but in ensuring that no field in which physical planning goals might be established is overlooked.

Parallel to goal-setting is the identification of the opportunities and constraints created by the *location* and the *site* of the development. The evaluative framework can be used also to help to ensure that no significant location or site factor is overlooked.

The physical plan should emerge from the application of the goals of the strategic plan and the objectives and programs of the sectoral plans to the opportunities and constraints imposed by location and site. Again, the process demands an interdisciplinary approach coupled with continuing public involvement, to ensure that every relevant consideration is properly taken into account.

The approach to physical planning, which is suggested as an alternative to the use of a predetermined concept, involves several discrete steps. It is important to appreciate that these steps will not be tidily sequential, and that the whole process is iterative, the results of each step being continually "revisited" and, if necessary, rethought at later stages.

The ultimate physical form should respond to the land rather than being imposed upon it. While it may well incorporate features characteristic of, for example, neo-traditional or transit oriented development, that outcome should be determined by the planning process, not an assumption built into it from the start for reasons of planning or design ideology or fashion.

The built environment provides the physical "stage" on which the goals of community health and sustainability can be pursued. If properly devised, the physical plan can contribute in important ways to the attainment of many of these goals, but it alone cannot achieve them.

Chapter II: An Evaluative Framework

2.1 Introduction

As discussed in Chapter I, "Building a healthy community requires a strategic plan embracing every area of public sector responsibility, directed towards a set of linked goals for social, economic and physical development." The evaluative framework presented here can be used to define a healthy, sustainable community — particularly those aspects relating to the physical plan — to review plans for new development and to identify tools which communities may use to achieve their objectives.

The framework is organized from the general to the particular. The aspects of a healthy and sustainable community are identified under seven key headings;

- resource conservation,
- environmental impact,
- economic viability,
- equity,
- livability,
- community, and
- health and safety.

Each of these main topics is discussed in a two page format; a chart on the left hand page and discussion on the right. The first column of the chart gives further definition to the aspects of a healthy and sustainable community; for example, conservation of land, materials, water, and energy are all aspects of resource conservation. The second column defines a goal or goals related to each aspect and the third column defines more specific, often measurable objectives relating to each goal. The fourth column indicates some tools which may be used to achieve the goals.

Tools are discussed under the headings of
- land use plan,
- building form and technology,
- infrastructure and utilities,
- transportation and communication,
- economic development, and
- social development.

These cover all aspects of the community, the built environment, the infrastructure and systems which enable the community to operate, and the economic structure and social systems which define community life. The list of tools on the chart is *not* keyed to specific goals or objectives. It is not intended to be exhaustive, but rather to illustrate the wide range of options available to communities wishing to enhance their sustainability. A facing page opposite the chart provides more information on how specific tools may be used to achieve community objectives.

The framework is intended as a guide to help the user identify all the elements that need to be taken into account in planning a healthy, sustainable community. It is essentially a checklist and can be used in several ways.

- Readers may wish to use it as a template, changing, defining or adding goals and objectives which are more suitable to the vision which they have for their community.
- It can be used as a tool to evaluate new greenfields development against community goals.
- In planning for existing communities, the framework can help to integrate efforts of the land use plan with other plans such as transportation, or social development. Economies may be achieved if this is done early in the planning process.
- Fortunately, many initiatives are complementary. Using the framework can reveal opportunities to improve the quality of the plan and improve cost-effectiveness by harmonizing complementary elements.
- Of course, the challenge of planning is to balance competing concerns. The framework helps to clarify where tradeoffs must be made, and to indicate where a change in one aspect of the community may affect others.

2.2 Resource Conservation

Aspect	Goal	Objectives	Tools
Land	Land is valued and conserved.	◊ Ensure efficiency in the use of developable land. ◊ Preserve and enhance agricultural land. ◊ Protect and conserve natural features and sensitive areas. ◊ Minimize land development.	***land use*** ◊ Master, secondary and site plans, development agreements, zoning. ◊ conservation plan ◊ solar orientation
			building form and technology ◊ design guidelines ◊ equipment and building performance standards
Materials	Optimum efficiency and conservation in use of materials.	◊ Minimize use of non-renewable materials. ◊ Maximize use of renewables on a sustainable basis. ◊ Favour the use of local renewable resources.	
			infrastructure and utilities ◊ Integrated resource plans* for energy, water and waste ◊ Use of living systems
Water	Water is used within the carrying capacity of local natural systems.	◊ Maintain demand within limits of local natural systems. ◊ Allow maximum return to groundwater and surface water systems. ◊ Make optimum use of existing infrastructure.	***transportation and communication*** ◊ Integrated resource plan for transportation ◊ municipal operations
Energy	Net self-sufficiency in energy.	◊ Minimize energy demand of buildings. ◊ Minimize energy demand for transportation. ◊ Maximize reliance on local renewable sources. ◊ Where non-renewable energy is used, use local sources where possible.	***economic development*** ◊ economic strategy ◊ resource management plan ◊ public support for green technology ◊ public education ***social development*** ◊ public education ◊ consultation ◊ technology transfer

* In the utility sector, an Integrated Resource Plan is one which takes demand side options as well as supply side options into account.

Tools for Resource Conservation

land use plan

Planning densities and land use by-laws can be used to encourage developments which;
- conserve land by minimizing the land required per dwelling unit,
- minimize the materials required for roads and linear infrastructure,
- provide sufficient densities to support public transit, and efficient technologies such as district heating and co-generation,
- maintain the population within the capacity of the local water system.

Land use plans, site plans and alternative development standards can be used to
- minimize paved areas to allow for groundwater recharge,
- reduce building energy needs by allowing for solar access and summer shading, and
- preserve significant features and environmentally sensitive areas.

Conservation and forestry management plans can provide for stewardship of resources and preservation of natural features.

building form and technology

Significant savings may be achieved through use of design guidelines, and performance standards for buildings and equipment. Efficient building form can optimize use of materials and energy and provide solar access for heating and daylighting. Building techniques are now being practiced which optimize use of materials, and produce less construction waste. Building technologies are readily available which can reduce household indoor water consumption by 50% and energy consumption by 75% compared to conventional construction.

infrastructure / utilities

Integrated resource plans examine both supply side and demand management options to arrive at a plan which makes the most efficient use of resources. Aggressive waste reduction programs can reduce solid waste by 80% thereby reducing the need for landfill sites. Water conservation can maintain demand within the capacity of local sources. The energy management plan can incorporate efficient supply technologies such as district heating, cogeneration and renewable energy into the community plan together with demand management strategies.

Living systems such as hedgerows, naturalized ponds, solar aquatics, wetlands and urban forestry can reinforce the conservation of natural eco-systems while providing utility functions such as storm water treatment and summer cooling.

transportation / communications

An integrated resource plan can be used to determine the most effective means of meeting needs whether through various forms of supply (e.g., auto, transit, or cycle), or by reducing the demand for travel (rezoning to facilitate mixed use, intensification etc.). Municipalities can show stewardship of resources through day to day management of municipal fleets and transit systems, e.g., fuel switching, use of energy efficient vehicles etc.

economic development

An economic strategy can identify key resources and develop plans for sustainable use. Implementation may include public / private partnerships to support "green" industry and development of new technology. Public education can convey the benefits to the local economy which result from resource conservation such as waste reduction and conservation of water and energy as well as from "green" industry.

social development

Public education and consultation with stakeholders are the keys to achieving participation in demand management programs. Technology transfer programs can assist industry and trades in improving their resource efficiency.

2.3 Environmental Impact

Aspect	Goal	Objectives	Tools
Carbon dioxide (CO_2) and green-house gas emissions	Meet or better the highest existing standard on CO_2 reduction.	◊ By 2005, reduce CO_2 production to 20% of 1988 levels from buildings, and ◊ ... from transportation. ◊ Meet highest applicable standards governing industrial CO_2 emissions. ◊ Improve CO_2 absorption.	***land use*** ◊ resource conservation tools ◊ transit oriented development ◊ energy efficiency guidelines ◊ development agreements ***building form and technology*** ◊ energy performance standards ◊ design guidelines ◊ equipment performance standards ***infrastructure and utilities*** ◊ State of Environment reporting ◊ performance targets ◊ municipal programs ◊ regulations ◊ user-pay systems ***transportation and communication*** ◊ Integrated resource plan for transportation ◊ municipal operations ◊ municipal hazardous waste program ***economic development*** ◊ assistance to business and industry in meeting environmental standards ◊ marketing the benefits ◊ promotion of green industry ◊ monitoring of new development ***social development*** ◊ public education ◊ training ◊ participation in decision-making
Ozone depleting substances	Meet or better the highest existing standards on reduction and elimination of CFCs and similar substances.	◊ Eliminate use of CFCs and other ozone depleting substances in buildings, and ◊ ... in transportation, and ◊ ... in business and industry.	
Air Quality	Meet or better the highest existing standard for local air quality without exporting air quality problems.	◊ Minimize emissions from building heating and cooling systems, ◊ ...from electricity production, ◊ ... from transportation, and ◊ ... from industrial processes.	
Water Quality	Meet or better the highest standard for potable water and return withdrawn water to the receiving body at the same level of quality or better.	◊ Provide high quality potable water. ◊ Avoid returning contaminated stormwater to natural systems. ◊ Return waste water to the natural system at the same level of quality, or better, than taken. ◊ Zero tolerance for discharge of persistent toxins.	
Soil Quality	Maintain and improve soil quality.	◊ Avoid discharging pollutants to the soil. ◊ Remediate and enhance soil quality.	

Tools for Reducing Environmental Impact

land use

Land use instruments which are used to reduce energy consumption and automobile use will reduce CO_2 and other greenhouse gas emissions and improve local air quality, (see Resource Conservation section). As well, land use plans and development agreements may be used to provide for CO_2 "sinks" such as community forests, urban forestry etc. The same land use mechanisms which are used to conserve water also reduce the environmental impact of development on the natural water system. Development agreements may be used to preserve top soil and remediate damaged sites.

building form and technology

Building performance standards can be used to reduce energy use, and hence CO_2, and other greenhouse gases. Design guidelines for building materials and equipment can minimize dependence on ozone depleting substances, reduce combustion emissions, reduce hazardous waste from the construction process, and reduce indoor air pollution, either through voluntary guidelines or mandatory standards. Equipment performance standards can be used to minimize emissions from building heating and cooling systems and maintain local air quality.

infrastructure / utilities

Monitoring of key indicators such as air quality, water quality and soil quality can provide essential feedback to householders, public agencies and industry. Regular State of the Environment reporting can provide an information base for the setting of community targets and programs and raise public awareness. Setting measurable targets in areas such as solid waste reduction, greenhouse gas emissions, air quality, water quality and waste water quality is essential to focus utility and community efforts. Programs dealing with issues such as Household Hazardous Waste or water conservation can facilitate necessary community participation. Regulations and user-pay systems can reinforce behaviour once alternative programs are in place.

transportation and communications

An integrated resource planning process can identify measures such as reducing the need for vehicular travel and emphasizing public transit. When implemented these will reduce CO_2 and other emissions relating to transportation. Municipalities can show leadership in reducing environmental impact through their operations, e.g. clean running fleet vehicles will result in better air quality and minimizing use of road salt will improve stormwater quality. An aggressive hazardous waste program can eliminate discharge of used motor oil and related products to water systems or the soil.

economic development

The municipality can provide guidance / assistance for business and industry in meeting the high performance standards of the community. In marketing, the community can emphasize the advantages which clean air, water and soil offer to potential business and residential development. The economic development plan can stress assistance to local businesses which develop new "green" technologies to meet local needs or to local industries based on recycling. By staging and carefully monitoring new development, damage to natural features and systems may be prevented.

social development

Public education and consultation with stakeholders are the keys to achieving participation. Technology transfer programs can assist industry and trades in improving their environmental performance.

2.4 Economic Viability

Aspect	Goal	Objectives	Tools
Infra-structure	Obtain optimum long-term economic and social value from infrastructure.	◊ Optimize choices, accessibility and efficiency for all modes of transportation. ◊ Optimize functionality, adaptability and operating efficiencies for all public utilities. ◊ Allow for optimum use of public service buildings and sites.	***land use*** ◊ compact, mixed use development ◊ employment density requirements ◊ resource management plan ***building form and technology*** ◊ building performance requirements ◊ performance requirements / guidelines for durability, adaptability, variety, repairability
Marketability	A diversity of choices in housing and commercial facilities to meet market demand.	◊ Offer a wide range of housing choices in terms of type, price, tenure and location. ◊ Provide for a diversity of commercial opportunities.	***infrastructure and utilities*** ◊ Integrated Resource Plans, emphasis on self sufficiency and low-cost local solutions ***transportation and communication*** ◊ Integrated Resource planning allows for full cost accounting ◊ transportation systems can be designed to facilitate economic goals ***economic development*** ◊ strategic plan for economic development ◊ staged development ◊ provision of "incubator" ◊ technology development
Stability	A local economy in harmony with regional and global economies such that it can adapt and sustain itself.	◊ Make optimal use of local resources and skills. ◊ Enable the community to be self-sufficient in meeting some of its needs.	***social development*** ◊ training and adult education ◊ human services ◊ social development plan

Tools for Economic Viability

land use

Zoning for compact, mixed use development can provide economies by allowing optimum use of infrastructure. The land use plan can also provide for an appropriate balance and mix of uses, housing choices and community amenities which will make the community attractive to potential residents and businesses and enable the community to adapt with resilience to changing circumstances. Through a resource management plan the community can practise effective stewardship of resources such as aquifers, groundwater recharge areas, urban and non - urban forests, agricultural areas, natural features etc., ensuring that they are used on a sustainable basis.

building form and technology

Building performance standards can reduce building operating costs for energy and water - making the community more attractive to business tenants, providing more household disposable income and allowing more dollars to stay in the community. Design guidelines affecting building form, design and choice of materials can encourage durability and adaptability in buildings, allowing the community to meet changing needs in an economical manner. Guidelines emphasizing use of local materials and products will strengthen the local economy.

infrastructure / utilities

An integrated resource plan approach to local utility planning and development will make the most of opportunities for economies through operational efficiency, demand management programs and shared use of facilities. Lower capital and operating costs for infrastructure will allow businesses to be more competitive and provide more disposable income in the community.

transportation / communications

Integrated Resource planning allows for full cost accounting of options, including externality factors. This enables the community to more accurately predict the true societal costs of various transportation systems and to make more informed choices. The transportation system can be designed to facilitate the community's economic goals. For example, amenities such as an effective transit system and pedestrian oriented development will make the community attractive to potential residents. Demand management programs can act like import replacement, allowing more dollars to stay in the community.

economic development

An economic plan which recognizes and builds on the changing national economic environment, builds on local resources to meet local needs, and promotes community-based economic development, enhances the community's stability and resilience. Regular monitoring using locally agreed on indicators of economic health will provide valuable feedback to all sectors of the community. Pacing residential development to the growth in jobs and economic base improves marketability and self-sufficiency. Close coordination of economic development objectives with land use and transportation planning can create areas which have business "incubator" characteristics. Public / private partnerships may be used to further technology development.

social development

Opportunities for training and adult education will help the community to adapt to changing needs. A well designed community with attention paid to the social infrastructure, to prevention and community-based services should reduce overall costs. Also, multi-use facilities will reduce overall cost of the infrastructure. Providing a comprehensive range of services and facilities will make the community attractive to prospective residents and businesses.

2.5 Equity

Aspect	Goal	Objectives	Tools
Equal Access and Opportunity	Residents can participate in all aspects of community life: housing, employment, decision-making, cultural and recreational activities.	◊ Enable equal access through full employment. ◊ Enable full involvement of residents in community planning and management. ◊ Provide means to enable people with special needs to participate fully in the life of the community.	***land use*** ◊ site plans and zoning to provide diversity in housing form and tenure ◊ high quality public spaces ***building form and technology*** ◊ building performance standards ◊ guidelines for accessibility and adaptability ***infrastructure and utilities*** ◊ standards of service ◊ rate structures and user-pay systems ***transportation and communication*** ◊ transportation plan ◊ transit operation ***economic development*** ◊ strategic plan ◊ support for very small businesses ◊ allowance for alternative forms of tenure and capital formation ***social development*** ◊ access to education and social services, ESL etc. ◊ opportunities for participation ◊ strong social networks
Fulfillment of basic needs	Availability to all of food, water, clothing and shelter, adequate in quality and quantity as defined by generally accepted Canadian standards and practice.	◊ Provide a full range of services and facilities suitable for different income levels within the community.	
Community services and amenities	A common, high standard of community services and amenities such that no residents are at a disadvantage in the use of public services.	◊ Provide a safe, palatable, public potable water supply. ◊ Ensure good quality ambient air throughout the community. ◊ Provide equal access to high quality public spaces. ◊ Provide equal access to public services of high quality.	

Tools for Equity

land use

Site plans and zoning which provide for mixed use, conservation of existing housing stock, inclusion of affordable housing, and alternative forms of tenure provide a variety of housing options for people of different needs, integrated into the community fabric. Mixed use and diversity also encourage job creation. The land use plan can ensure that the community has high quality public spaces which are available to all; e.g., parks, squares, garden allotments, recreation facilities, natural areas.

building form and technology

Building performance standards which lead to reduced operating costs allow for more household disposable income while conserving resources. Guidelines for building and site design can ensure that people with special needs are accommodated. Design guidelines which encourage adaptable building forms allow for residential conversion to meet changing needs - e.g., from single family to apartments - incorporating space for a disabled person etc. at less cost than building new facilities.

infrastructure and utilities

High quality public services which are available to all, e.g., good quality potable water, promote equity. Strategies which meet conservation goals and reduce environmental impact will also facilitate good quality basic amenities such as clean air and water. Utility rate structures and user pay systems can be designed to allow for an equitable basic level of service while rewarding conservation.

transportation / communications

A transportation plan which emphasizes transit, and pedestrian modes makes the community more accessible to a wider range of residents. It also reduces emissions from transportation, resulting in improved air quality for all, and makes the expense of car ownership less mandatory. By providing for people with special needs the transit system can make it easier for people with disabilities to participate in the community.

economic development

A strategic plan which encourages local enterprises, provides more local opportunities and a better balance of employment and housing promotes equity. Programs which support formation of even very small businesses using innovative financing techniques promote diversity in economic activity. Self-help programs such as sweat equity and innovative forms of tenure such as co-ops and cohousing make home ownership accessible to a wider range of the population.

social development

Equity is supported by a community planning and management process which provides opportunities for houseseekers and residents to become involved.

Human services of high quality, e.g., education, social services, health and recreation which are accessible to all promote equity. Informal social services and the development of strong social networks also support equity by allowing everyone the opportunity to take part in the informal and the formal economy of the community.

2.6 Livability

Aspect	Goal	Objectives	Tools
Services and facilities.	A full range of facilities and services conveniently accessible to all residents.	◊ Provide local level services which are accessible without dependence on the auto. ◊ Ensure that regional level services are accessible within 1 hr by transit or automobile.	***land use*** ◊ zoning, site plans and development agreements to provide: access to services, diversity and amenities
Public open space and outdoor recreation	A comprehensive, linked open space system.	◊ Provide a range of parks and outdoor recreation facilities. ◊ Preserve outstanding natural features for public enjoyment. ◊ Provide dedicated non-vehicular routes.	***building form and technology*** ◊ design guidelines ◊ height and bulk controls
Convenience of movement	Convenient, safe movement of people and goods within the community and between the community and other areas.	◊ Provide for convenient, safe movement of people within the community without dependence on the auto. ◊ Ensure adequate access to all premises for emergency, service, and freight vehicles. ◊ Provide frequent transit service to regional level services. ◊ Provide efficient vehicular connection between the site and regional services.	***infrastructure and utilities*** ◊ see section on environmental impact ***transportation and communication*** ◊ transportation plan ◊ transit services ***economic development*** ◊ economic development plan to promote diversity in housing and job opportunities
Private open space	Availability to all residents of some open space for private use and enjoyment.	◊ Provide directly accessible, usable open-air space for private use of each household. ◊ Provide access to garden space for each household (if desired) .	***social development*** ◊ social development plan which promotes diversity of opportunity for social interaction ◊ provision of diverse gathering and meeting places
Climate and weather	Maximize benefits and minimize adverse effects of weather and climate.	◊ Allow for maximum solar access to buildings and outdoor recreation areas. ◊ Reduce local wind velocities. ◊ Provide shelter in areas of heavy pedestrian usage.	
Delight	A built environment which is pleasing to the senses and the spirit.	◊ Use "human scale" in the built environment. ◊ Use harmonious diversity. ◊ Provide a visually attractive environment.	

Tools for Livability

land use

By providing suitable sites for housing, the land use plan can help to ensure that education, health, social and cultural services as well as retail and commercial facilities are easily accessible to all residents. Zoning can allow for diversity of use and tenure. The land use plan and development agreements can provide for public amenities such as parks, recreation facilities, facilities for the arts, protection of natural features for public enjoyment and a linked open space system through the community. Land use and site plan requirements can also improve the livability of private spaces by providing for access to private outdoor space for each household, ensuring that buildings and outdoor spaces have adequate solar access and providing moderated micro climates in pedestrian areas.

building form and technology

Building design and construction guidelines can encourage maximum daylighting and indoor environments which are quiet, comfortable and have good air quality. Height and bulk controls on buildings can ensure that neighbourhoods are built to a human scale.

infrastructure / utilities

Utility and infrastructure measures to reduce environmental impact will have a direct affect on the livability of the community in the form of amenities such as improved air quality, high quality potable water, groundwater bodies clean enough for recreational use etc.

transportation / communications

The transportation plan is a key factor in determining convenience of movement within the community and between the community and surrounding area. Measures such as transit supportive guidelines, e.g., short blocks, direct routes; intersection design, traffic calming, access to premises for emergency, service and freight vehicles and dedicated routes for pedestrians and cyclists can enhance the livability of the community. In the operation of the transit service itself factors such as frequency of service and convenience of shelters and stops can be used to enhance the livability of the community.

economic development

A strategic plan which promotes diversity in housing and opportunities for local employment make it more possible to live and work in the same community and to find employment which is suited to family situation and lifestyle.

social development

Availability of basic level human services within the community and a diversity of social, cultural, recreational and religious institutions contribute to the community's livability. Opportunities for a variety of forms of social interaction — business, personal, social, civic, recreational, cultural make it possible to form strong informal networks and provide for many of the community's needs through effective volunteer efforts. A wide variety of indoor and outdoor spaces which allow for casual interaction as well as formal gatherings contributes to the community's livability.

2.7 Community

Aspect	Goal	Objectives	Tools
Inclusiveness	A wide range of social and economic groups included in the community.	◊ Provide housing facilities and services to meet diverse needs.	***land use*** ◊ zoning for diversity and mixed use ◊ site plans and development agreements to preserve heritage features and provide formal and informal meeting places ◊ urban design guidelines
Participation	A sense of "ownership" by residents.	◊ Allow for participation in community planning, development and management.	***building form and technology*** ◊ design guidelines re: preservation of architectural features, alternate housing forms and adaptability.
Heritage	Cultural and natural heritage is valued and protected as an important community resource.	◊ Preserve significant features; architectural, archaeological, historical, cultural and ecological.	***infrastructure and utilities*** ◊ advisory committees and other forms of participation in planning and management ◊ State of the Environment reporting
Identity	The community has a sense of local identity.	◊ Nurture a sense of local identity through use of distinguishing characteristics and symbols.	***transportation and communications*** ◊ transportation plan ◊ transit operations ***economic development*** ◊ participation by major stakeholder groups in strategic planning process ◊ see Equity
Gathering places.	Residents may gather in large or small groups, indoors or outdoors.	◊ Provide a variety of spaces for public use.	***social development*** ◊ opportunities to participate in decision making ◊ public education and leadership training ◊ operation of institutions and agencies ◊ governance and boundaries

land use

Zoning for diversity of housing type and tenure and employment choices enables the community to be inclusive and allows for people to stay in their own neighbourhood as they move through different life stages. Site plans and development agreements may be used to identify and preserve archaeological, historical, cultural, scenic, and ecologically significant features, thereby fostering a sense of place and identity. Site plans may incorporate design guidelines requiring continuation of local architectural vernacular and other means of creating / preserving distinctive character of the community. Streetscape plans and site plans can provide open spaces and public / semi-public buildings where people may assemble in large groups for formal and informal events.

building form and technology

Design guidelines can encourage flexible, adaptable housing, enabling people to "age in place". Guidelines can be developed to facilitate alternate housing forms such as cohousing which seek to encourage a sense of community. Building technology is available which makes it possible to preserve historic buildings and upgrade their performance without sacrificing authenticity. High performance features (e.g., solar panels), can be emphasized, particularly on public buildings, thereby contributing to visible community identity.

infrastructure / utilities

Participation is essential to the success of Demand Management programs. This is best achieved through involvement of citizens on advisory committees which help to guide the development of plans and programs. Regular sharing of information through vehicles such as State of the Environment reports allows all sectors of the community to understand how well the municipality is meeting its goals and provides necessary feedback on progress.

transportation / communications

The transportation plan can support community identity by reinforcing internal boundaries and avoiding splitting the neighbourhoods in two with heavily used transportation routes. Good transit services can be used by everyone in the community, enhancing opportunities for social interaction and community identity.

economic development

Forums such as local round tables provide opportunities for all stakeholders to take part in developing the community's economic development plan thus promoting a sense of ownership and strengthening community ties.

social development

An effective participation process for planning and managing all aspects of the community can lead to a sense of civic "ownership". Design, planning and management of the community, its facilities and services should be via a process of locally accountable democracy and community ownership. Public education programs can be used to support an enhanced role for citizens / stakeholders in decision making. Schools can emphasize voluntary service and citizenship skills. Forms of governance both for the municipality and for service institutions should respect natural community boundaries. Visible markers and features can be used to enhance a sense of community identity.

2.8 Health and Safety

Aspect	Goal	Objectives	Tools
Health Protection	Personal health is protected from environmental hazards.	◊ Provide a high quality supply of potable water. ◊ Provide a high level of air quality, indoors and outdoors. ◊ Provide water bodies and water courses which are safe for recreational use. ◊ Avoid hazards caused by radiation, such as power lines and generating stations.	***land use*** ◊ environmental impact tools ◊ site location and zoning ◊ safety audits of neighbourhood design ***building form and technology*** ◊ building standards ◊ safety audits of building design e.g., parking garages ***infrastructure and utilities*** ◊ State of Environment reporting ◊ standards for air and water quality ◊ zero tolerance for discharge of persistent toxins ***transportation and communication*** ◊ transportation plan ◊ street and system design ***economic development*** ◊ see Environmental Impact ◊ programs to encourage businesses to exceed basic standards ***social development*** ◊ public education ◊ training ◊ monitoring and reporting
Health promotion	Health promoting activities are available in the community.	◊ Provide facilities and services related to health promotion, such as fitness facilities and day care.	
Health care	A full range of health care services and facilities is available to all.	◊ Provide primary medical facilities within 15 min. of all dwellings.. ◊ Provide specialized health care facilities within 1 hour by public transit.	
Safety	Minimize hazards to the safety of persons and property.	◊ Reduce exposure to hazards from - off-site facilities - site characteristics - fire - crime - traffic - accidents	

Tools for Health and Safety

land use

Tools which reduce environmental impact also result in public health prerequisites such as safe drinking water, high level of air quality and safe recreational water. Site location and zoning can ensure that health care facilities are within easy access of all community residents and that space is allocated for active recreation. Safety audits of potential sites can be used to identify and avoid major off site and on site hazards such as waste disposal sites, storage sites for flammables, major radiation sources, unstable slopes, contaminated soil, areas subject to flooding etc.

building form and technology

Building standards typically provide for occupant health and safety through minimum requirements for natural lighting, space, ventilation, fire separations, egress etc. Design guidelines can enhance performance by specifying materials and equipment which contribute to improved indoor air quality. Safety audits of building designs can encourage greater occupant safety, particularly in problem areas such as parking garages.

infrastructure / utilities

State of the Environment reporting allows for monitoring of critical factors which affect public health such as air and quality and raising of public awareness. Measurable targets for standards in these areas can help to focus community endeavours. straightforward standards in critical areas, e.g., zero tolerance for toxic discharges to waterways, combined with programs which help all sectors to comply can change community behaviour.

transportation / communications

The transportation plan can assist public health goals through measures which improve local air quality. The design of roads, streets and intersections is a key factor in pedestrian, passenger and cyclist safety.

economic development

See Environmental Impact section.

An economic development plan which emphasizes environmentally friendly industry can help to minimize air, water and soil pollution and hazardous waste production. Public programs can be developed which reward local companies which are leaders in protecting the health of the environment, the community and their workers and creating healthy workplaces that are productive.

social development

An integrated health protection, promotion and health care strategy can keep health at the forefront of the community agenda while also helping to restrain health care costs. A strong social network can help to support comprehensive home services, including recreational and cultural services. Public education, including health and safety awareness programs is an essential aspect of health promotion.

Monitoring and reporting of environmental and other factors affecting health and of health indicators, e.g., incidence of childhood asthma, heart disease, etc. is essential to raise public awareness and to provide information needed for community planning.

Chapter III: Alternative Planning Approaches And Infrastructure Costs

3.1 Introduction

The effect of alternative planning approaches on the cost of municipal infrastructure was given special attention in this study. This was because in tough economic times, housing affordability is a key issue, and the current wave of neo-traditional planning has promoted a belief that compact communities with rear lanes and narrow road allowances will be less costly to develop than "conventional" suburban designs.

In the debate over costs, some critics of the neo-traditional approach have pointed to the obvious extra costs associated with rear lanes, and have argued that these increase the total infrastructure costs of development. Supporters of neo-traditionalism respond that the efficiencies and higher densities generally associated with these designs will more than offset the extra costs of the rear lanes.

The difficulty in assessing the merits of either case is that there are no direct comparisons between similar developments with similar densities. Numerous comparisons have been made between neo-traditional and conventional designs, but such comparisons are frequently clouded by substantially different road patterns, densities and even engineering standards. In addition, it is misleading to compare the costs of individual features of neo-traditional plans such as Cornell and MacKenzie Towne with conventional suburban plans. (These and other projects are discussed in detail in chapter IV: Case Studies.) Instead, it is necessary to identify all the cost-sensitive factors and assess their total impact in both conventional and neo-traditional designs.

The intent of this section is to examine some actual cost comparisons in order to draw conclusions regarding the relative costs of the two planning approaches.

(Although the analysis in this section focuses entirely on comparative infrastructure costs, it is not intended to suggest that financial considerations are more important than environmental and social considerations in planning communities.)

There are three major factors affecting the cost of infrastructure for new development ;

- Street configuration: the number, type and layout of streets in the development has a direct effect on the cost of roadways and all linear infrastructure in the development.
- Density and urban form: the density of residential development is expressed in terms of the number of units per hectare. Per-unit infrastructure costs decrease as density increases. Higher densities can be achieved in different ways; compact

development can achieve relatively high densities with building heights generally under four storeys.

- Engineering and development standards: affect the costs of infrastructure by determining the widths of streets and rights of ways, associated features of street design such as curbs and sidewalks, and the placement of linear infrastructure.

Street configuration, density and engineering standards are interrelated and cannot be considered in isolation. No single factor will necessarily result in lower overall infrastfucture costs. For example, in order to achieve a livable design, cost savings achieved in one area may be counter-balanced by higher costs in another area. Infrastructure costs of a development will ultimately depend on the mix of factors which the development features.

Moreover, it is necessary to take into account the trade-off between initial infrastructure installation costs and ongoing operation and replacement costs. For a life cycle cost analysis, operation, maintenance and replacement have to be considered. In this study, each of these factors was examined independently.

The principal sources of information for the analysis that follows are two infrastructure cost comparisons conducted for two major developers. One of the comparisons was documented in Cornell Project; Municipal Infrastructure Cost Analysis by Marshall Macklin Monaghan Limited for the Ontario Ministry of Housing (June 1994). The other was done by IMC Consulting Group Inc. on the Mackenzie Towne development for Carma Developments, but not formally documented.

Two other documents were also referenced; a draft document entitled, Making Choices; Alternative Development Standards; Guideline by Marshall Macklin Monaghan Limited, Berridge Lewinberg Greenberg Ltd. and REIC Ltd. for the Ontario Ministries of Housing and Municipal Affairs (May 1994), and a document entitled Alternative Development Standards; Proposals to Reduce Housing Costs by the Ottawa-Carleton Regional Working Committee on Alternative Urban Development Standards (September 1991).

3.2 Street Configuration

An analysis was conducted to determine whether the street configuration in a neo-traditional plan comprised greater lengths of road (and hence greater lengths of linear infrastructure). It was expected that the cost of the rear lanes incorporated in many neo-traditional plans would also increase infrastructure costs. However, a simple comparison of infrastructure costs divided by the number of units would not provide an accurate accounting because the net density of neo-traditional plans is frequently significantly higher than conventional plans. For a comparison based on similar densities, it was necessary to create a hypothetical low-density neo-

traditional subdivision for which the infrastructure costs could be calculated. These costs could then be compared to the infrastructure costs for conventional low density subdivisions, and thus provide some indication of the extra costs attributable to street configuration. (In the next section, the savings attributable to higher densities are calculated.)

Marshall Macklin Monaghan's Municipal Infrastructure Cost Analysis was used to provide the base data for comparative subdivision plans. They conducted a very comprehensive comparison between the planned Cornell community and two existing conventional subdivisions in the Markham area. Care was taken in their selection of comparative subdivisions to ensure that the geographic locations of the conventional subdivisions were relevant, and that the proportion of lands dedicated to parklands and school sites were similar (on a percentage of gross acreage basis) to the Cornell plan. One of the conventional subdivisions (Mintleaf) comprised a high proportion of 15m lots, while the other one (Armadale) had a slightly higher density with lot frontages generally

Table 3.1
Comparative Data for Cornell, Armadale and Mintleaf Communities

ITEM	CORNELL	ARMADALE		MINTLEAF	
Number of Units *	890 & 1070	890	1070	890	1070
Gross Area (ha)	42.0	63.0	79.0	76.0	90.0
School, Park Area (ha)	5.3	10.5	12.9	9.2	9.2
Net Area (ha)	36.7	52.5	66.1	66.8	80.8
Gross Density (upha)	21.2 & 25.5	14.1	13.5	11.7	11.9
Net Density (upha)	24.3 & 29.2	17.0	16.2	13.3	13.2
Road Length (m)	6040	7055	8765	8350	9950
Lane Length (m)	3680	0	0	0	0
Road Length per ha.(m) (not including lanes)	144	112	111	110	111
Road per unit (m) (not including lanes)	6.8 & 5.6	7.9	8.2	9.4	9.3
Full Infrastructure Cost (including roads, lanes and other linear services)	$10,226,100 and $10,432,500	$9,757,070	$12,097,770	$12,176,980	$14,615,130
Full Infrastructure Cost per Unit	$11,490 and $9,750	$10,963	$11,411	$13,682	$13,659
Full Infrastructure Cost per Metre of Road	$1,693 & $1,727	$1,383	$1,393	$1,458	$1,469

(The Cornell designers based the comparisons on 2 alternative concepts; one with 890 units, and the other with 1070 units.)*

in the 9m to 15m range. The physical areas of each subdivision used for the cost analysis were determined by balancing the same number of units that are in the subject Cornell neighbourhood, and hence the comparison was based on the number of units produced rather than the physical area developed. The calculated infrastructure costs represent the costs of municipal servicing that is normally required in the development of a new plan of subdivision. They do not include land costs, consulting fees, levies and similar development costs. All development is assumed to be freehold; no allowance has been made for the costs of infrastructure within developed lots.

A summary of the data for each comparison is shown in Table 3.1. It shows that the infrastructure costs for the Cornell Community are, on a per-metre of road basis, 22% to 24% more expensive than Armadale, and 16% to 18% more expensive than Mintleaf. The higher cost is attributable to the cost of the rear lanes (which are part of the infrastructure) and the cost of wider pavements for some streets.

The cost difference on a per-unit basis does not follow the same pattern. The cost per unit for Cornell (which has a density of about 24-29 upha) is lower than Mintleaf, but about the same cost per unit as Armadale (which has a density of about 17 upha).

The data show that the net densities for the Cornell Community are 43% to 120% higher than those in the other two communities. In order to determine how much of the extra costs of infrastructure in a New Urban community are related to the street configuration alone, a hypothetical situation was created in which the densities in Cornell were assumed to be the same as the densities in Armadale and Mintleaf. (It is not suggested that a low density neo-traditional plan is a viable development scheme. This hypothetical situation has been created for cost comparison only.) Using the Armadale net density of 17.0 upha, the hypothetical Cornell community would accommodate 624 units, and using the Mintleaf net density of 13.2 upha, the hypothetical Cornell community would accommodate 484 units.

The estimated costs of the infrastructure for these two low density cases were then calculated by deducting the unit-based costs (such as the cost of lateral connections and driveways to each dwelling) and the costs of oversized roads and services that would not otherwise be needed for the lower populations. For instance, the hypothetical lower density subdivision would have fewer homes, so trunk sewers would be smaller, major roads may fall into a lower classification and fewer sidewalks may be required. The incremental cost of these "oversized" services was deducted to determine the "adjusted" cost for the hypothetical lower density neo-traditional plan. The adjusted data are reflected in Table 3.2.

Table 3.2
Data for Hypothetical Lower Density Cornell Community

ITEM	COMPARED TO ARMADALE	COMPARED TO MINTLEAF
Assumed Net Density (upha)	17.0	13.2
Adjusted Number of Units	624	484
Adjusted Development Cost	$9,167,000	$8,994,100
Dev't Cost per Unit	$14,691	$18,583

By comparing the hypothetical cost of infrastructure on a per-unit basis (in Table 3.2) for a lower density Cornell Community with the related costs in the Armadale and Mintleaf communities shown in Table 3.1, it was concluded that the Cornell costs would be $3,728 per unit (34%) higher than Armadale and $4,901 per unit (36%) higher than Mintleaf. Put another way, the 624 unit Cornell community would cost $2,326,300 more than the same sized Armadale development, and the 484 unit Cornell community would cost $2,372,100 more than the same sized Mintleaf development. These amounts were determined to be the "extra" costs attributable to the neo-traditional street configuration.

To determine where the "extra" costs were incurred, Marshall Macklin Monaghan's summary of development costs was consulted. (Marshall Macklin Monaghan calculated the average costs per metre of road for sanitary sewers, watermains, curbs, etc., thus facilitating additions and deletions for estimating purposes). It was concluded that, after making the adjustment for unit-based costs such as lateral connections, and density-based costs such as larger trunk sewers (costs such as earth moving being similar), the extra costs for a neo-traditional street configuration were attributable to two features of the design: (i) the greater length of road used in the tighter grid pattern, and (ii) the addition of rear lanes. In the Cornell case, the length of road per gross ha. of development is 144 m/ha, as compared to 110 to 112 m/ha for the two conventional developments. This is a 30% increase in road length over the length of roads found in the two conventional subdivisions. In addition, the Cornell community has 3,680m of rear lanes which are not found in the two conventional subdivisions.

Marshall Macklin Monaghan's figures were used to determine that the incremental costs of infrastructure per metre of road is at least $968/m, and the cost of residential lanes is about $450 per metre of lane. These figures were used to reconcile the breakdown of the "extra" costs attributed to the neo-traditional street configuration. The "extra" road length for Cornell as compared to Armadale was multiplied by $968 to determine the extra road costs, and the length of lane was multiplied by $450. Similar calculations were made for the comparison between Cornell and Mintleaf. In each of the hypothetical low-density neo-traditional cases, the extra length of

road accounted for about 36% of the extra costs of infrastructure, and the rear lanes accounted for about 64%. The extra costs are summarized in Table 3.3.

Table 3.3
Summary of Extra Costs in Hypothetical Low Density Cornell Community

ITEM	COMPARED TO ARMADALE		COMPARED TO MINTLEAF	
Greater length of road	$822,200	35.6%	$883,100	37.2%
Rear lanes	$1,490,400	64.4%	$1,490,400	62.8%
Total Extra Costs	$2,312,600	100.0%	$2,373,500	100.0%

Based on these hypothetical comparisons of the street configurations, it was concluded that the addition of rear lanes and the effects of greater lengths of street would increase the cost of infrastructure by about 35% relative to conventional subdivisions. (The comparisons assume that densities are maintained at 13 to 17 units per net hectare.) Of the extra costs, about 60% to 65% is estimated to be attributable to the cost of the rear lanes.

3.3 Density

The above analysis was done to examine the effects of neo-traditional street configurations when applied at conventional suburban densities. It was not surprising that the grid-like street pattern and the addition of rear lanes increased the development costs on a per-unit basis if both the neo-traditional and the conventional subdivision plans have similarly low densities. In most cases, however, neo-traditional designs incorporate higher densities than conventional plans, and it is generally accepted that infrastructure costs decrease (on a per-unit basis) as density increases.

Accordingly, a second hypothetical comparison was made between Cornell and the two comparative suburban neighbourhoods to estimate the effect on infrastructure costs in the case where higher densities were applied without altering street patterns. This hypothetical case presumed that the higher densities would be achieved with compact housing forms that could be accommodated within conventional lot depths, such as street townhouses, narrow detached and semi-detached units, stacked units, and apartments located over retail buildings. (As with our first hypothetical scheme, it is not suggested that high densities on conventional suburban streets would produce a suitable development plan.) The more conventional forms of higher density housing such as high-rise

apartments and condominium townhouse complexes on large residential blocks were not considered because they would require a change to the street layout.

For this comparison, hypothetical higher density versions of the Armadale and Mintleaf communities were created. The same densities being considered in Cornell were used; 24.3 upha and 29.2 upha., including the same ratios of low, medium and high density housing. At these densities, Armadale would have 1531 units and Mintleaf would have 1847 units when compared to the 890 unit Cornell; and when compared to the 1070 unit option for Cornell, Armadale and Mintleaf would have 1840 and 2219 units respectively. The development costs for these hypothetical communities were then calculated by adjusting Marshall Macklin Monaghan's costs to account for the increased densities, in much the same manner that the costs for Cornell were adjusted for lower densities. For instance, the cost of lateral connections was added to account for the greater number of units, and an allowance was made for oversizing trunk services. The resultant costs are reflected in Table 3.4

Table 3.4
Data for Hypothetical
Higher Density Armadale and Mintleaf Communities

ITEM	HIGHER DENSITY ARMADALE		HIGHER DENSITY MINTLEAF	
Assumed Density (Net upha)	24.3	29.2	24.3	29.2
Number of Units	1531	1840	1847	2219
Adjusted Development Cost	$12,507,700	$13,502,100	$15,790,400	$16,985,300
Adjusted Cost per Unit	$8,170	$7,338	$8,549	$7,654
Cost Reduction per Unit	$2,793	$3,625	$5,133	$6,028
Cost Reduction per Unit (%)	25.5%	33.1%	37.5%	44.1%

Table 3.4 shows that if the Armadale and Mintleaf communities were developed at a density of 24.3 upha, the costs of infrastructure would be in the range of $8,100 to $8,500 per unit, and if the density was increased to 29.2 upha, the costs would be between $7,300 and $7,600 per unit. This compares with costs of $11,000 per unit for Armadale at its conventional density of 17.0 upha, and $13,700 per unit for Mintleaf at its conventional density of 13.3 upha (see Table 3.1).

Although these costs illustrated in Table 3.4 are about 25% lower than the costs for the neo-traditional Cornell community for the same densities, a direct comparison may be unfair. A conventional suburban street layout, with its curved crescents and cul-de-sacs, is

not suited for uniform high densities. Suburban designs generally concentrate higher densities near arterial roads. Nonetheless, a relationship between density and infrastructure costs can clearly be shown. In the case of conventional suburban subdivisions such as Armadale and Mintleaf, a 50% increase in density from 14 upha to 21 upha could reduce the cost per unit by 25%, while doubling the density from 14 upha to 28 upha could reduce the cost per unit by 35%.

When both street configuration and density are considered together, the extra costs incurred in a neo-traditional design (as a result of rear lanes and greater lengths of street) are largely off set by the benefits of higher densities. In the comparisons between the conventional Armadale and Mintleaf subdivisions and the neo-traditional Cornell Community, the neo-traditional street configuration was estimated to have added 35% to the cost of infrastructure on a per-unit basis, but the higher densities associated with the compact form was found to have reduced the cost by 25% to 30%. The net result, as confirmed by the Marshall Macklin Monaghan study, is that cost savings can be realized in a neo-traditional compact form community when compared to a low density plan such as the Mintleaf subdivision, but similar savings will not be realized when compared to a slightly higher density conventional neighbourhood such as Armadale.

3.4 Engineering Standards

The above comparisons assumed that the engineering standards remained constant for each case. It is frequently argued, however, that significant savings in the cost of infrastructure can be realized by applying a "Performance Based Approach" to development standards. Developers and engineers argue that some municipalities enforce "gold-plated" engineering standards, presumably because the capital cost of infrastructure is paid by the developer, while the long-term maintenance and replacement costs are paid by the taxpayer. Performance based engineering recognizes that there are diminishing returns; as the standards are increased, the increased benefits do not match the extra costs. Moreover, there is a recognition that the home-buyer is the one who ultimately pays both the capital cost and the long term cost of municipal infrastructure.

The performance based approach takes into consideration the "life-cycle cost" when considering an appropriate level of performance for infrastructure. For instance, where replacement and/or maintenance costs are low, the design standard can be relaxed because the consequences of having to replace or repair the service are minimal. Likewise, the standard could be relaxed where the consequences of interrupted or reduced service are merely a matter of convenience. Examples of relaxed standards may include a lower level of service for snow clearing, less frequent garbage pick-up and slightly more surface flow during rainfalls. Note that in all cases, public safety remains a primary consideration, and should not be compromised.

The draft document Making Choices: Alternative Development Standards examined the potential for a reduction of engineering standards based on life-cycle costs and performance based design. The Ottawa-Carleton study, Alternative Development Standards: Proposals to Reduce Housing Costs made specific recommendations to reduce costs, and compared the cost savings in two hypothetical designs. We have not attempted to estimate the cost savings that might be realized in the Cornell, Armadale or Mintleaf communities, but the magnitude of savings in the Ottawa-Carleton examples are noted. A summary of some of the infrastructure works for which reduced standards can be considered are briefly described below:

Right-of-Way Widths

The designers of most of the neo-traditional and eco-village case studies in this Guide considered traffic function during the preliminary design stages. The standard 20m ROW and 8.5m pavement have, depending on the municipality, given way to a host of alternative streets that reflect the intended level of traffic and parking. Examples range from mews to minor streets, conventional streets, major streets, main streets and grand boulevards. ROW widths range from as little as 12.5m to 30m. Narrower rights-of-way have a direct impact on density. The Ottawa-Carleton study found that a 4 metre reduction in the ROW allowed for a very significant increase in density.

Pavement Widths

Some of the case studies had reduced rights-of-way, but maintained the pavement widths at 8.5m to allow for on-street parking. Other developments had pavement widths ranging from 6.0m to twin 7.25m roadways. The Ottawa-Carleton study recommended a reduction of the pavement width on local streets from 9.0m to 8.0m, for a saving of $30 per metre of road.

Curbs and Sidewalks

The need for sidewalks on both sides (or either side) of minor streets and mews may be questioned. Sidewalk widths and alignment can be considered, as well as the need for concrete sidewalks in parks and open spaces. Curb standards, especially the expensive two-stage curb and gutter, are being re-examined, and in some cases, curbs may be eliminated if a rural section is used to improve storm-water quality. The Ottawa-Carleton study recommended elimination of sidewalks on local streets, and argued that stormwater design criteria should be revised to eliminate curbs to save costs and the environment. The cost savings for these two items would be $135 per metre of road.

Geometric Road Standards

Most municipalities have adopted geometric standards for roads and curbs that are based on the movements of garbage trucks, fire trucks and snow plows. Without compromising public safety, many of these standards can be relaxed in individual situations. This could increase densities and lower capital costs.

Watermain Standards

Technological improvements in watermain materials and appurtenances have allowed for smaller pipe diameters, greater valve spacing and the confidence to locate mains under the pavement. Additional savings can be achieved by installing valve boxes rather

than expensive chambers. A more radical approach would be to re-examine fire hydrant spacing in the context of modern fire fighting methods. Increased hydrant spacing may eliminate conventional sized mains on some streets, leaving fire-fighting mains on say, every second street.

Sewer Standards

Technological improvements in sewer materials and cleaning methods have allowed smaller manholes, greater manhole spacing and lower drops through manholes. Strong, light weight, smooth-walled pipes allow for cheaper, smaller sewers. Similar savings can be achieved in lateral connections to houses, and dual connections to serve two houses can significantly reduce costs and repairs by halving the number of connections.

Storm Design Standards

Major cost savings and reduced environmental damage can result from employing a lower design standard for storm drainage works. The lower standard can convey the more frequent, low intensity storms conveniently, but larger storms will be "detained" or routed over land. Storm detention lowers the scouring impact on receiving streams, and smaller sewers can be installed more economically. There is no need to install expensive sewers for infrequent storm events, provided that the overall storm drainage system is designed to accommodate the major storm events.

Storm Conveyance Systems

Some of the features in contemporary storm systems that have evolved for convenience and low maintenance are not only costly to install and maintain, they also increase the severe impact to receiving streams. Cost savings can be achieved by spilling roof water drains into sodded swales (or rain barrels), reducing the number of catchbasins in the street, eliminating many double catchbasins, and in some situations, eliminating curbs and storm sewers in favour of roadside ditches.

Foundation Drains

Storm design standards cannot be reduced if foundation drains are connected to the storm sewers because basement flooding and structural damage can occur when the sewer surcharges. This is one reason that sewers have become larger and deeper. Cost effective alternatives for foundation drain connections to storm sewers include sump pumps (to a sodded swale, dry well or storm sewer), or a separate foundation drain collection system. The cost of these services is more than off set by the savings of a smaller and much shallower storm sewer.

3.5 Infrastructure Maintenance Costs

When considering life-cycle costs, the long-term cost of maintenance and replacement need to be factored into the equation. This is not often done when planning for new developments because a municipality's objectives for low-cost maintenance is often in conflict with the developer's objective of lowest capital cost. This conflict is not likely to be resolved quickly. Most municipalities are reluctant to risk increased maintenance costs by compromising

engineering standards that were derived from long-term experience, especially if the compromise appears to increase the developer's profits.

The Marshall Macklin Monaghan comparison of the Cornell, Armadale and Mintleaf communities considered both maintenance and replacement costs. Overall, it was found that the costs for the neo-traditional plan ranged from 12% greater to 11% less than the conventional plans, depending on the densities. As was the case with capital costs, it was found that compact development decreases the cost of maintenance. However, most maintenance costs are directly related to the amount of road, so an increase in the length of road and the addition of rear lanes, will each increase the cost of maintenance. Marshall Macklin Monaghan estimated that, when calculated on a per metre of road basis, the cost of maintaining the Cornell development would be 39% greater than Armadale and 43% greater than Mintleaf.

The maintenance works that are directly related to the amount of road include pavement, sidewalk and curb repairs, street lighting and snow plowing. Sewer works were considered to be marginally affected, although some increase in the cost of watermain maintenance may result from repairs under pavement rather than boulevards. Maintenance and snow clearing of the rear lanes was the most significant item where additional costs would be incurred, and the magnitude of these costs can vary widely depending on the level of service. Based on a moderate level of service, the cost of snow clearing in Cornell's rear lanes alone is estimated by Marshall Macklin Monaghan to be $4.81/m annually (or roughly $10 to $17 per unit).

One service that Marshall Macklin Monaghan assumed would be less expensive (by 15%) in Cornell is garbage collection. Their assumption is based on the fact that the higher densities of the compact development would allow for more efficient pick-up.

3.6 Infrastructure Replacement Costs

Marshall Macklin Monaghan evaluated the replacement costs based on the life expectancy of each element of the infrastructure. As was the case with capital and maintenance costs, an increase in the length of roads and lanes tended to increase replacement costs, whereas compact development tended to reduce the costs when considered on a per-unit basis. The Cornell development also included some engineering standards that were slightly different than those in the conventional subdivisions. The most notable one from a replacement cost point of view is the placement of all secondary hydro cable in PVC ducts in the laneways. Replacement of these cables through the ducts will be far less expensive than re-installing direct-bury cable in a mature street boulevard.

This represented a significant cost saving in the Cornell case, but is more indicative of the potential savings that can be achieved with alternative engineering standards, rather than through the implementation of neo-traditional plans. Another example is the elimination of curbs. The Ottawa-Carleton study reported that a Nepean experience demonstrated lower maintenance costs and minimal replacement costs for the gravel shoulder.

3.7 Putting It All Together

This analysis verified that street configuration, density and engineering standards are all factors that affect the costs of municipal infrastructure in a new community.

The relationship between the length of road and the cost of infrastructure for a community is highly significant; an increase in the length of road and the addition of rear lanes will directly increase the capital cost, maintenance cost and replacement cost for the development. In the neo-traditional approach, where lanes are frequently employed, the costs for the lanes alone can add 20% to 25% to the cost of infrastructure, and where there are more cross streets and grand boulevards than a conventional subdivision, the total extra cost for community infrastructure (including the lanes) can be in the order of 30% to 35%.

The increased costs resulting from the street configuration of neo-traditional designs can be substantially or entirely off set by the increase in densities resulting from a compact form of housing. In the Cornell example, depending on the final density, the cost savings realized by higher densities associated with the compact form of development were estimated to be 25% to 30%. At the highest density considered, Cornell was able to bring its costs (on a per-unit basis) below the costs for the conventional subdivisions. It is, however, important to recognize that this is a by-product of compact form, and not of street configurations typical of neo-traditional plans. There are many forms of compact development that could be more economically developed, especially if they are planned without the use of rear lanes.

The third cost-sensitive factor, engineering standards, also holds great potential to reduce the cost of infrastructure in any type of development, regardless of planned densities. The application of new engineering standards and/or technologically improved products is, by no means limited to neo-traditional schemes. In fact, some of the greatest cost savings may be more easily accommodated in a more environmentally sensitive design such as Bamberton or Cerro Gordo, where roadside ditches are used more frequently than storm sewers, and conservation programs reduce the costs of water and hydro supply.

The developers of Mackenzie Towne altered the standard for rear lanes as a compromise to off set the extra cost of having the lanes.

Because the densities in Mackenzie Towne are not as high as Cornell, the developer was faced with higher costs per unit than for competitive developments. Their solution was to accept a lower standard for the lanes (gravel surface with no curbs or storm sewers). Given the low traffic volumes and comparatively low snow accumulation, the compromise will not affect public safety or the level of service.

In summary, the cost of municipal infrastructure for housing is dependent on several interrelated factors. Both initial costs and life-cycle costs are influenced by street configuration, densities and engineering standards. Infrastructure costs can be lowered by adopting a balance of efficient street design, moderately high densities using compact forms of housing, and cost-effective engineering standards. All of these principles can be applied to any planning concept, and it would be misleading to suggest that any of the alternative planning approaches discussed in this Guide are, by their nature, more cost efficient than others.

Chapter IV: Case Studies

This section presents brief case studies of eight new development plans, ranging from a 17 unit cohousing development to a new town for 27,000 people. The case studies represent some of the most innovative developments being planned today. They are included to illustrate how the alternative planning approaches are being applied in practice, and to demonstrate how the evaluative framework may be used.

Name	Location	Area	Population	Type	Status
Bamberton	Mill Bay, B.C.	600 ha	12,000	eco-village	awaiting approvals
Cardiff Place	Victoria, B.C.	0.22 ha	17 units	cohousing	construction
Cerro Gordo	Dorena Lake, Oregon	474 ha	2,500	eco-village	construction
Cornell	Markham, Ontario	625 ha	27,000	new urban	awaiting approvals
Heart of Springdale	Brampton, Ontario	40 ha	2,055 units	new urban	withdrawn
McKenzie Towne	Calgary, Alberta	970 ha	28,000	new urban	awaiting approvals
Montgomery Village	Orangeville, Ontario	100 ha	750 units	new urban	awaiting approvals
WindSong	Langley, B.C.	2.3 ha	30 units	cohousing	awaiting approvals

The case study examples were chosen with several considerations in mind. Firstly, the intent was to illustrate each of the four planning approaches; the neo-traditional and pedestrian pocket approaches (now referred to as the new urbanism), cohousing and eco-village. Bamberton and Cerro Gordo represent the eco-village concept. Cardiff Place and WindSong are cohousing projects. Montgomery Village, Cornell, McKenzie Towne and Heart of Springdale are examples of new urbanism. Secondly, it was agreed that the case studies should focus on how the approaches are being applied in Canada. All but one of the developments, (Cerro Gordo), are planned for Canadian communities. Thirdly, projects should be beyond initial concept and well into the approvals stage. Cornell, McKenzie Towne, Bamberton and WindSong are in the approvals stage. One project, Heart of Springdale was withdrawn at the approvals stage. Cardiff Place, Montgomery Village and Cerro Gordo are all under construction.

Each case study begins with a "thumbnail" description of the development and a plan view and perspective illustration. This is followed by a general discussion of the project. This section is not intended as a critique but as a demonstration of how the evaluative framework may be used.

Based on the information available from the case study examples, each project was reviewed using the framework as a checklist. In the discussion of each case study, the review comments are summarized under the major headings from the framework as follows:

- resource conservation and environmental impact,
- economic viability,
- equity,
- livability and community, and
- health and safety.

As well, the discussion section notes the difficulties and obstacles encountered by these innovative projects.

Bamberton

Location: Mill Bay, British Columbia.
Area: 600 ha. (1,583 acres) total planning area.
Population: Approximately 12,000.
Status: under provincial review.

Designer: Waisman, Dewar, Grout and Carter, Andres Duany and Elizabeth Playter-Zyberk, Campbell Moore Group Architects, Chip Kaufman and J.D. Tait and Associates
Owned by: Bamberton Investments Ltd.(4 pension funds)
Development Manager: South Island Development Corporation;
Contact: Darlene Tait (604) 389-1888.

Context: a proposed new town on a site previously used for a cement plant and quarry. The site is 2km from the closest town, and 32km north of the city of Victoria.

Objectives: to create a community based on ecologically sustainable development and provide a showcase for new environmental solutions. Face-to-face interaction, services within walking distance and a sense of community, are other values.

Built Form

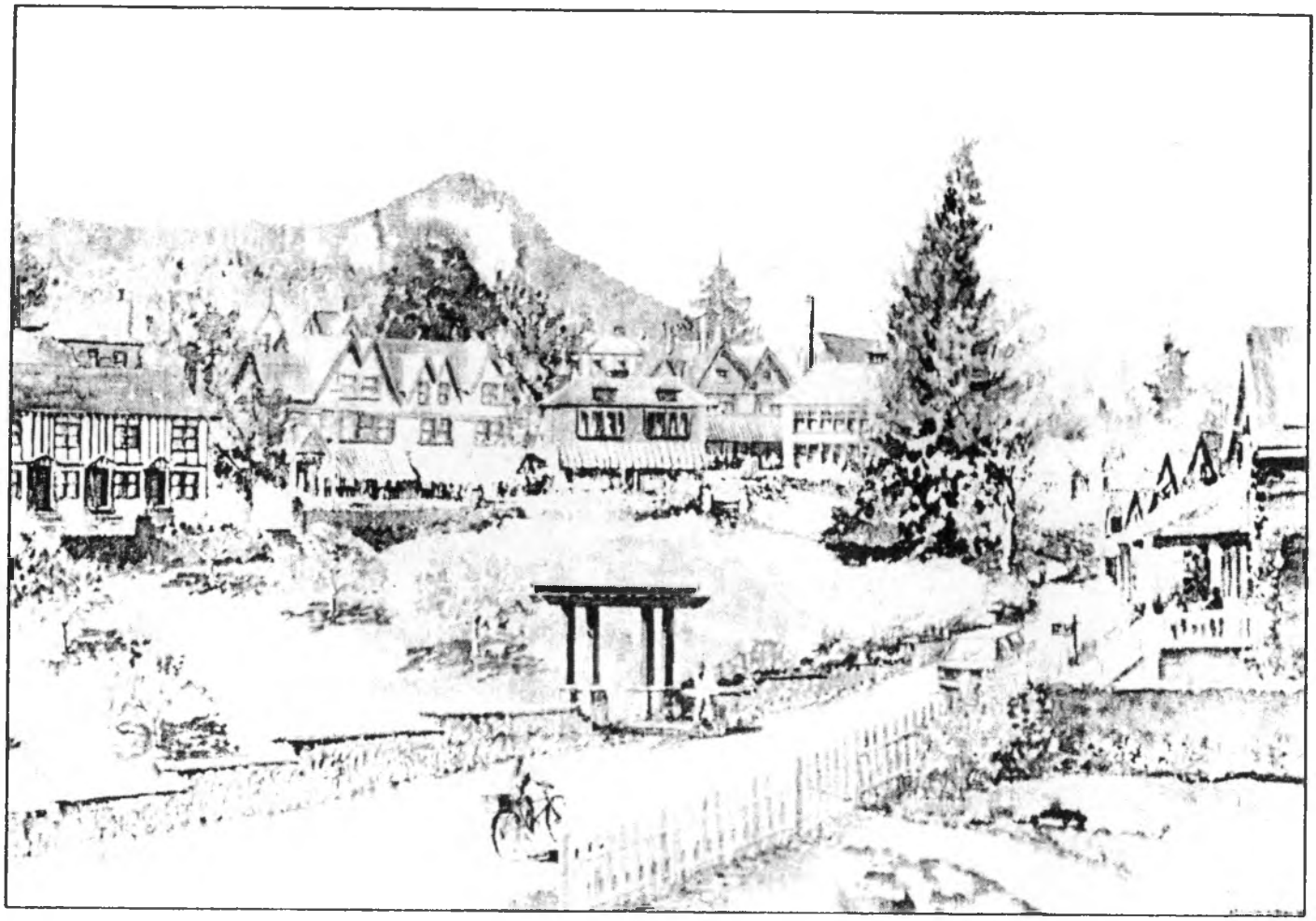
Building technology: minimum R-2000 performance. Higher efficiencies are encouraged.
Housing: 4900 homes: 2964 detached, 1293 townhouse units, 643 units apartment residential.
Land use: Half the area is parkland, open space or native habitat garden area. The plan includes a town centre, with townhall, retail, offices, condominiums and spaces for cottage industries.
Site plan: The plan calls for creative re-use of the abandoned industrial buildings on the site.
Transportation plan: an internal minibus, community carpool plan, and transit friendly site plan..
Infrastructure: emphasis on narrower road widths. All roads are concrete; asphalt is prohibited. All sewer and water services are funded by the development.

Environmental Systems

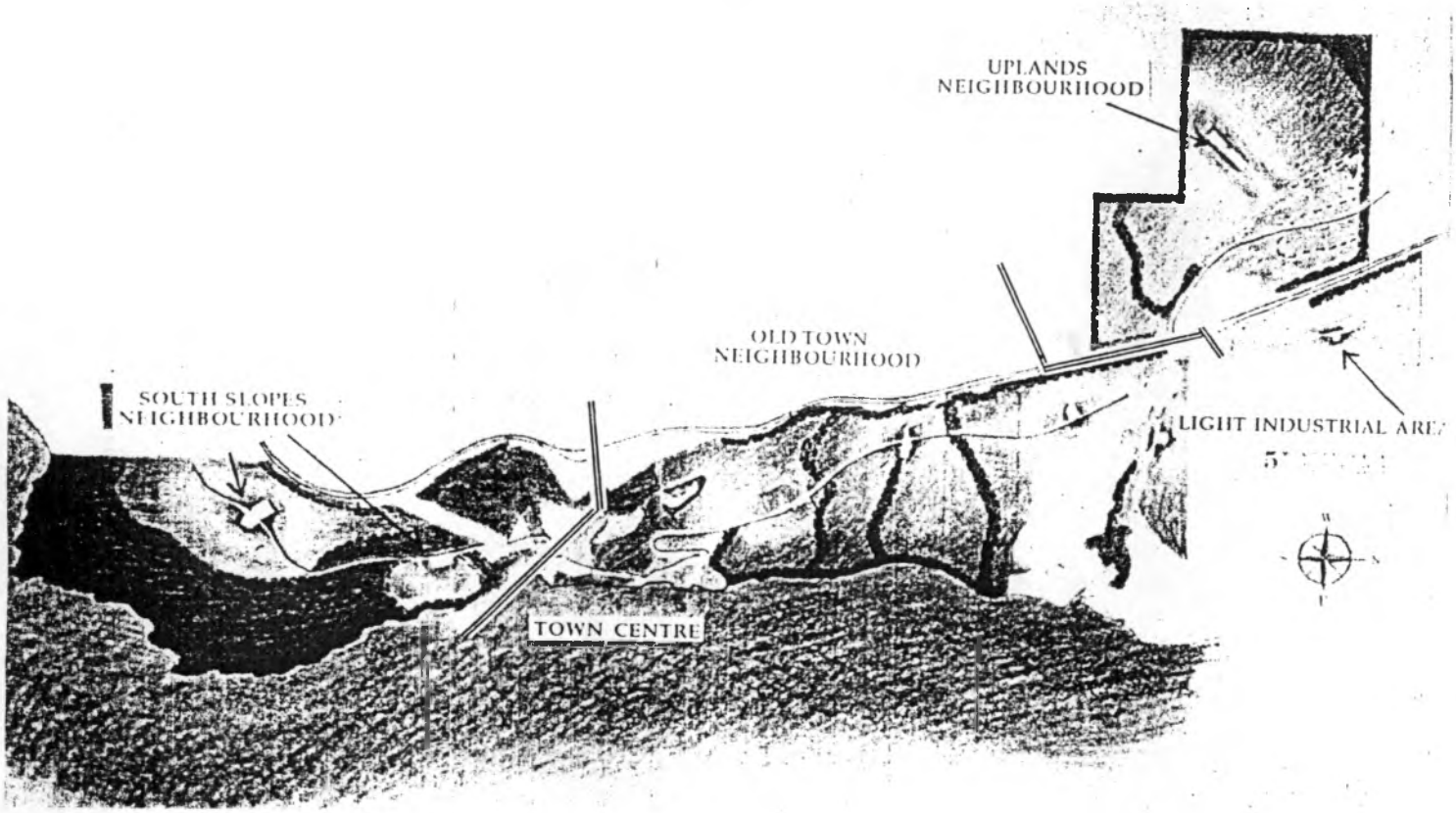
Energy: serviced by community electrical utility. Designated a "PowerSmart" community by BC Hydro, per home demand is expected to be 65% less than BC average. Bamberton aims at an 80 per cent reduction in CO_2 through building and transportation initiatives. Cogeneration and a town centre ground source heat recovery system may be implemented.
Water: Supply is from local surface water sources owned by the development. Recycled water will be used to irrigate golf courses and landscaping. Six litre toilets and other water efficiency measures will reduce consumption by approximately 50%.
Sewage: An advanced tertiary biological nutrient removal system will result in effluent which can be re-used for on-site irrigation and compost, instead of being discharged to a water body.
Waste: An on-site recovery facility supports an extensive community recycling program. Waste disposal requirements are reduced by 90% compared to similar-sized communities.

Socio-economic Systems

Community services: tot lots, churches, day care, community centres, etc.
Employment type and density: a commitment to the creation of one job per household, including home-based businesses, telecommuting, and a range of community service and tourism positions.
Tenure and ownership: mixed
Intended market or occupancy type: Ten per cent of multi-family units are designated "affordable". Ten per cent of single family units are designated for "Innovative Approaches to Affordability".
Planning process: Involvement of local special interest groups started in 1990, and is planned to continue through the construction phase. Public opinion has been sought through a poll, meetings with community organizations, seminars, a planning centre open to the public and a newsletter.



Village Green – M. Kluckner 1992



Resource Conservation and Environmental Impact

The developers of Bamberton have made an aggressive and comprehensive commitment to environmental protection and resource conservation. They have established a series of development principles to ensure that all the players in the Bamberton development process adhere to a code of sustainable community development practices.

The plan proposes to leave 50% of the site as green space while requiring that 25% of each private lot be planted with native species. Trees over 20 cm in diameter breast height are protected and habitat protection policies are established for building sites, neighbourhoods and public lands. The plan stipulates the importance of designing with the topography in mind, prohibiting excessive excavation and filling.

To protect the land/soil resource, the Bamberton forest will be protected under a management plan, identifying no-cut zones to enhance regeneration, slope stability, erosion control and esthetic views. In keeping with this philosophy of preserving native species, turf grass lawns will be limited in area and the stripping or contamination of topsoil during site preparation will be prohibited. To help enrich the soil resource, the plan will promote the application of compost created by combining treated sewage and community compostables.

To protect watercourses in the Bamberton area, a 10 metre no-build zone has been established on either side of all watercourses. In addition, the plan stipulates that no toxic materials can be stored within 40 metres of a watercourse. To protect surface and groundwater resources, the plan incorporates a tertiary level advanced biological treatment facility and the plan commits to ensuring that no untreated sewage is allowed into Saanich Inlet. The intent is to ensure zero impact on aquatic life in water bodies receiving the effluent.

Current water supply in the area is provided by wells. The plan proposes to use surface water sources owned by the development as the basis for a regional water supply serving Bamberton and surrounding areas. Gravity sources will minimize the need for water pumping. The plan incorporates water efficiency measures (including a native species landscaping policy, metering and high efficiency fixtures) are designed to reduce water consumption by 50 per cent. Treated waste water will be used to irrigate golf courses and other public spaces.

The Bamberton plan has established an ambitious target of a zero increase in runoff due to development. A benchmark of background runoff volumes will be established before development begins. By reducing road widths and stipulating permeable hard cover for development, the plan envisages that runoff can be reduced to the point where it can be handled by natural drainage swales and retention ponds. On individual lots, the plan calls for draining roof runoff into rock pits to facilitate natural ground water recharge.

This is one of only a few development proposals which looks seriously at the environmental implications of construction materials. It intends to preserve as many existing buildings on the site as possible or, where this is not feasible, to recycle the materials in the buildings. For new development, the plan stipulates that only high quality construction materials will be allowed, with a focus on durable buildings of high workmanship. The plan also sets an aggressive target of reducing solid waste by at least 50% through reduction, recycling and composting programs.

The plan is making all the right provisions to enable an energy efficient built form. It will encourage energy efficient building designs by offering an energy efficient model for builders and developers which will meet the R-2000 standard as a minimum. It may also incorporate more advanced energy, embodied energy and resource efficiency standards such as those in the Austin, Texas, Green Builder Program.

Economic Viability

The principles expressed in Bamberton are sincerely devoted to sustainable development and have been comprehensively implemented. An independent Bamberton Business Network, consisting of future residents and business people, now has 300 members who have expressed an interest in relocating to and/or starting new businesses in Bamberton. The community will be wired with fibre-optics to facilitate teleworking and satellite operations. Flexible zoning for home-based businesses and a 28.3ha (70 acre) Environmental Technologies Park for enterprises less appropriate in residential areas will offer suitable sites for a range of commercial activity.

However, despite the listed potential industries, the economic reasons for locating a business in Bamberton are not overwhelming. Consequently, there is a danger that Bamberton may simply become a bedroom community to Victoria, or a retirement community. This affects the whole issue of transportation. Substantial efforts have been made to accommodate non-vehicular means of transportation, but if cars are needed to commute to Victoria for employment, entertainment and services, then it will be very difficult to support local public transit and hence local businesses.

In regard to infrastructure, the developer has made sound economic decisions. For instance, they have reduced pavement widths as well as rights-of-way (other case study projects have reduced rights-of-way but retained conventional pavement widths), and they have planned for the recycling of solid and liquid waste and are cooperating with neighbouring municipalities for the construction and operation of major infrastructure. They are also planning for combined uses of community buildings such as schools, and the eventual recommissioning of buildings for new uses when their initial uses have diminished.

The residential mix is very broad, and even considers cohousing, which most developers overlook. However, the remote location of the site will likely reduce the demand for higher density, lower priced homes unless there is considerable employment in the area.

The initial start-up costs of a new community are typically quite substantial. Sewage treatment, domestic water treatment and road construction, and site remediation costs will place a heavy burden on the developer, yet the rate of development may be too slow to offset the huge up-front cost of the major infrastructure, thereby threatening the economic viability of the whole project. The development is fortunately owned by four pension funds which can take a long-term view of their investment, but this does not diminish the need for economic viability within conventional limits of risk.

Equity

The proposal calls for a range of housing types for people of all ages, types and incomes, so that the people who work in Bamberton can afford to live there. Particular reference is made to the need for working people to be potential buyers. In addition, housing options will include rental, cohousing and co-ops. "Smaller lots, smaller houses and smaller profits can help make integrated housing available to all." Other measures proposed include setting aside 10% of single-family lots for innovative approaches to affordability such as growhomes, cluster developments and self-build co-op housing, with a further 10% considered for land lease arrangements such as a Community Land Trust.

Another element of affordability in Bamberton is that an affordable community is "one which allows reduced car ownership, offers well paying local jobs, strong social services, and good public infrastructure such as transit."

The community "must accommodate wheelchair-bound persons and those with impaired hearing, vision and movement". To this end, paths and roads in the town centre will be graded for wheelchair use and 5% of the houses will be specifically designed, (with lower cupboards, special bathroom fixtures, etc.) for wheelchair occupants.

Livability and Community

Everything about the design of Bamberton suggests that it will be an extremely livable community. There is a strong commitment to creating one job for every household and to making it possible for people to live, work and play and have a range of amenities and services within walking distance.

The plan for Bamberton places a lot of emphasis on the sense of community and the small town feel of the place. This will be enhanced by the creation of neighbourhoods with their own village centres and greens containing neighbourhood meeting places such as schools, restaurants, pubs, clubs and public buildings. Face-to-face interaction, which has been shown to improve the quality of life and reduce crime, will be encouraged through a number of design features such as pedestrian and seating areas, houses that provide 'eyes on the street' and providing community meeting places.

Bamberton is seen as a community in which there will be a great deal of public participation in the design and ongoing management of the community, including the possibility of becoming a municipality. A sense of belonging will be encouraged through the formation of neighbourhood associations, promoting a degree of neighbourhood self-management, encouraging participation in local government, and considering establishing a non-profit community development corporation.

Health and Safety

Health and safety are considered in a variety of ways in the plans for Bamberton, from slowing traffic and providing pedestrian-friendly environments to avoiding the use of pesticides, using environmentally friendly materials and cleaning up the site. (An inventory of industrial contamination and a remediation plan have been prepared.) Police, fire and health service needs are discussed.

Difficulties and Obstacles

Public opposition and a cumbersome and politically-charged development approval process have been serious challenges to the project. Opposition is grounded in a widespread fear that Bamberton will be a continuation of the kind of development which has been prevalent in Southern Vancouver Island. The developer believes that this perception stems from misinformation, and has offered site visits, a newsletter, press releases, and a debate on community TV.

The development company attempted to have the development approved under planning legislation designed more specifically for large scale projects, but Bamberton has been forced to follow the standard Municipal Act approval process. This is designed for small and conventional developments, and has been very slow and cumbersome for Bamberton.

Lastly, B.C.'s NDP government does not wish to be seen as favouring a union-backed project. The special consideration which may be due to Bamberton, because of its sustainability and planning principles, may be interpreted as mere political favouritism.

Summary

If Bamberton is built as planned, it will meet almost all the criteria for a healthy, sustainable, livable, economically viable, equitable and safe community that have been discussed in this Guide. The Bamberton Code, developed as the project got underway, established the values that underlie the whole project. An extensive community consultation has led to the development of some 300 design principles organized in 90 issues in 11 categories: community planning, character and culture, social planning, the economy, the environment, transportation and travel, town site, housing, utilities and amenities, visual impact, and leisure and tourism. Taken together, these values and principles direct the planning of everything from governance to pest control. To the outside observer, the big question is: will Bamberton be able to

meet the expectations and aspirations of its developers and financiers over the long haul?

Cardiff Place Cohousing

Location: Victoria, B.C.
Area: 0.22 ha (0.55 acre).
Population: 17 units.

Status: 6 units built; remainder by June 1994.
Developer: Victoria CoHousing Development Society.
Contact: Brad Jarvis, (604) 480-5152.

Context: re-use of an existing building and construction of a new 11 unit building, within walking distance of downtown Victoria.

Objectives: a community of privately-owned units offering extensive common areas designed to facilitate social interaction; a community diverse in age, household type, size income and lifestyle.

Built Form

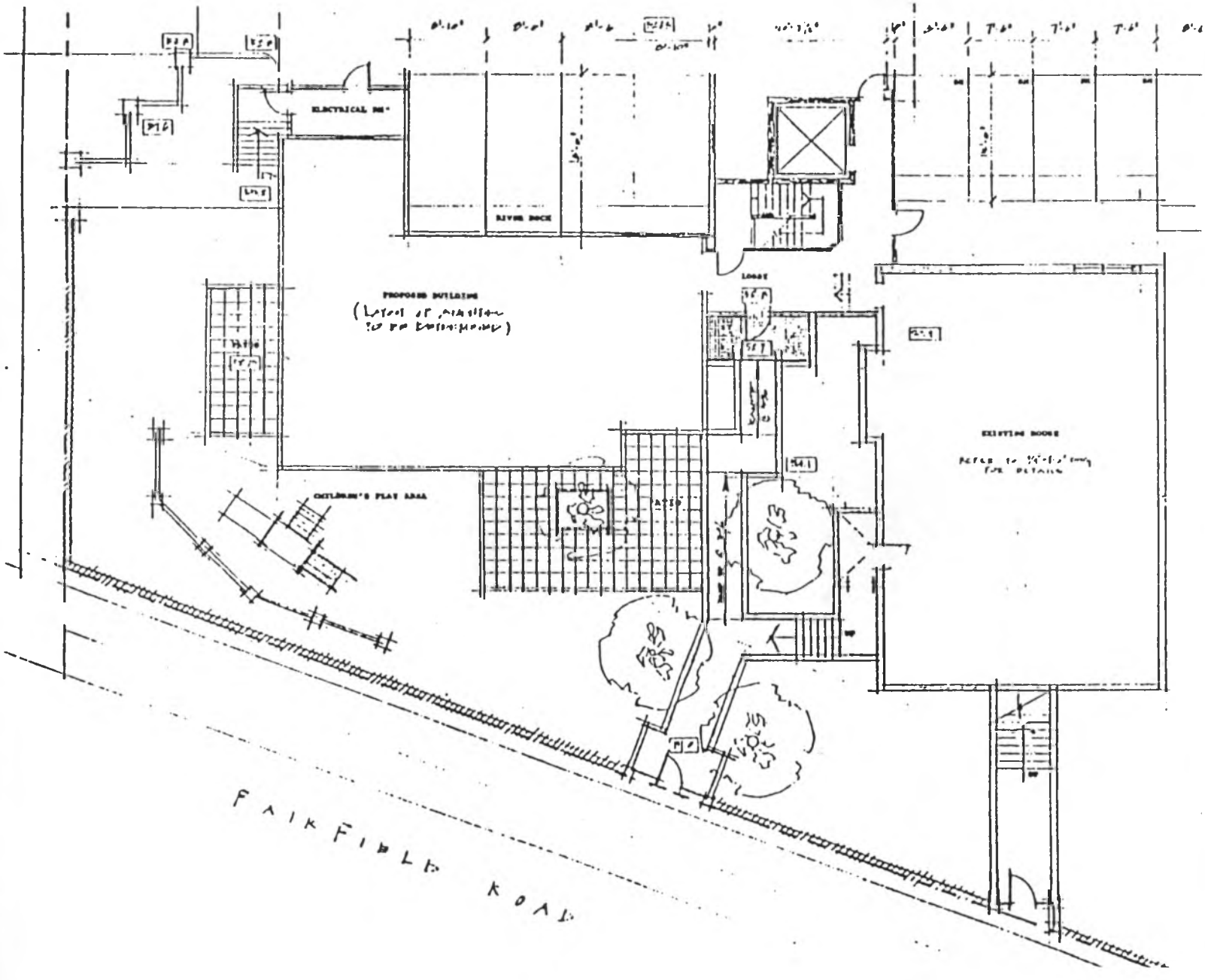
Building technology: building envelope includes higher levels of insulation and high performance windows.
Housing: a range of types from single units to three bedroom suites. Units are offered from 56.5 to 120 m^2 and prices range from $97,324 to $251,000.
Land use: two multi-unit buildings, common gardens, parking and a children's play area.
Site Plan: The common areas link the existing and new building.
Transportation plan: Parking spaces will be limited to minimum requirements; site is within walking distance of downtown.
Infrastructure: Municipal requirements resulted in more parking spaces than desired by the proponents.

Environmental Systems

Energy: Step-up water heaters in kitchens will reduce line losses and allow lower central water tank temperatures.
Water: Ultra low-flow toilets installed throughout the project.
Sewage: municipal.
Waste: An existing building is being adapted and substantially renovated. Another has been removed from its foundations and relocated rather than demolishing the units and building new ones.

Socio-economic Systems

Community services: almost 270 m^2 of common facilities.
Employment type and density: not applicable.
Tenure and ownership: 5 rental units and 12 owned.
Intended market or occupancy type: a range from family to single unit.
Planning process: Future residents were involved in planning and directing the project.


ELECTRICAL RM.
LIVING ROOM
LOBBY
PROPOSED BUILDING
EXISTING HOUSE
CHILDREN'S PLAY AREA
PATIO
FAIRFIELD ROAD

Resource Conservation and Environmental Impact

It is important to recognize that this project of only 17 units, like most cohousing developments, is a quite small in scale. Thus some of the criteria for evaluating sustainability that have been developed with larger developments in mind will not apply to these cohousing developments. Also, the project's limited approach to environmental issues stems partly from the fact that the project was purchased from the original developer just before the building permit stage. The development was in an advanced state of design when the decision was made to switch to cohousing. As a result the members' requests for environmental features which go beyond current code requirements were not easy to introduce into the project.

Due to the small size of this development there may not have been many opportunities to explore some of the broader resource conservation and environmental impact issues. However, at a density of nearly 88 units/hectare, it is obvious that the development optimizes the use of the land resource. Its proximity to public transit maximizes opportunities to reduce car use, although, ironically, the city required 23 parking spaces in the development.

From the perspective of materials use, the brief notes that many of the functions or activities conventionally done in each private unit in non-cohousing developments are done in the common area of cohousing projects, thus lessening the need for building materials, heating, lighting and in some cases, direct energy use. Members explored materials options which would impact indoor air quality (e.g., choice of low formaldehyde materials). However, it was not possible to incorporate alternative materials into the project because of their high incremental cost.

The group was able to make some changes to the plan affecting water and energy use. Ultra-low flow toilets were specified for all units, insulation levels were upgraded beyond code requirements and high performance windows were included in the project.

However, the heating system is nothing out of the ordinary. A natural gas-fired fireplace heats the main, open (common) rooms (e.g., living, dining and kitchen), while electric baseboard heaters are used in bedrooms and washrooms. To the extent that the B.C. electricity grid is based almost exclusively on renewable, hydroelectric sources, it could be argued that baseboard heaters are acceptable. However, better attention to an efficient building envelope, plus better integration of the HVAC components, with a focus on renewables, could have eliminated the baseboard demands, thus freeing up the electricity for more appropriate uses in industry or transportation.

The plan does not directly address environmental issues relating to CO_2, ozone depletion, air quality, water quality and soil quality . However, the nature of this cohousing development, with its higher density form of development and proximity to downtown, implies that the per capita contributions to these problems will be lessened, compared to an equal number of people housed in detached dwellings.

Economic Viability

This is an infill project that intensifies the built form by making use of and adding to an existing structure. While the design is principally based on lifestyle criteria, there is a concerted effort to reduce costs and increase the efficient use of space and facilities. In this case, the group was partially successful, but not entirely.

The location for the project was intended to be near Victoria's downtown to reduce car dependency, but 1.35 parking spaces per unit are required by the City nevertheless. The convenient location also comes at a price, and this cost has been reflected in the price of the units. Overall, the units are priced from $97,000 to $251,000. Unless the price is at least 20% below comparable condominium suites, then the economic viability of the project would be in question. Although some people perceive substantial social benefits in cohousing, there is likely a limited number of

people willing and able to pay as much for shared facilities as for a private suite. The Cardiff Place project incorporates common eating, meeting and recreational spaces, but cost savings have not necessarily been realized because kitchens and eating areas have also been kept in the suites. Opportunities are also missed to reduce operating costs through energy conservation.

Equity

This is the first cohousing project in North America to have rental housing as part of the project (due to the fact that the project was purchased from a developer who already had a commitment with the city to include rental housing). The inclusion of rental housing has often been an objective of cohousing communities but has frequently been problematic because of financing problems. Although "cohousing is not - of its very nature - affordable housing ... some cohousing communities - ours included - tend to be more open to creative solutions to housing affordability, including: shared equity ... loan guarantee ... (and) co-signing a loan".

Social benefits cited by the community include "...extensive social contact with a comparatively diverse community, in age, household type and size, lifestyle and, as far as possible, in income." There is a clear commitment to participation in all aspects of community life and while small cohousing projects do not address broader community services and amenities, this cohousing community has a high level of amenities and services in the shape of its shared spaces and resources, including common dining facilities, laundry, workshop, garden, play area and recreational space.

Livability and Community

These same characteristics contribute to the livability of the community. Moreover, the residents have deliberately chosen to establish their community in a neighbourhood which is within walking distance of downtown Victoria and that has a wide range of services and open space within easy access, including good public transport. The project respects the site, renovating an existing building and adding a new building that complements the style of that existing building. The only obvious drawback to the livability of the site is the mandated provision of 23 parking places - "more than the residents want". This consumes a large amount of space that could otherwise be used as a garden, and that would appear to be unnecessary, given the residents' commitment to alternatives to car use: "...there is some interest among our members in going even further in this direction: car-pooling (ride-sharing) and vehicle-sharing (shared ownership or time-share)". Concern has also been raised about "the noise and pollution on Fairfield Road", the main road onto which the property faces.

Those who choose to live in cohousing are clearly committed to a sense of community; as the brochure for Cardiff Place puts it, "a place where everyone knows your name". One reason for their choice of neighbourhood location is that it is "...an unusually strong community in both the informal sense of being a friendly place where neighbours tend to come to know one another ... and the formal sense of having a strong, comparatively well-regarded and active neighbourhood association ... the residents of our condo-style cohousing project have no intentions of seeking isolation from the immediate community".

The design of the project, with its shared spaces and gathering places, supports the sense of community, as will the common ownership of some possessions and the sharing of some personal possessions; this will be made easier by the "bonds of trust" that exist in such a community.

Health and Safety

While there is no specific reference to health and safety in the material that was reviewed, the commitment to community is likely to be beneficial to health. Concern was raised about the noise and pollution from traffic in the area; another area of concern may be the parking area, which is a potential hazard for young children, although the play area is well separated from it. Since the project is being built in a long established neighbourhood, it

is assumed that it meets all the usual municipal requirements for safe and healthy housing and that basic safety and protective services are available.

Difficulties and Obstacles

Cardiff Place encountered few difficulties because the cohousing group was able to purchase a project which was already well under way and which met their requirements; thus regulatory hurdles, financing, etc., had already been dealt with. The main problem has been to recruit enough households to fill all 17 units: only three were ready to move at the time the project was acquired.

"Generic" problems for cohousing include:

- lack of knowledge, experience and time to undertake and manage a project;
- lack of familiarity with the planning and regulatory regime; and
- wariness on the part of lending institutions unfamiliar with the concept.

Summary

As cohousing is fundamentally a social rather than a physical planning concept, Cardiff Place is not directly comparable with most of the other projects evaluated, and some of the evaluation criteria do not fully apply. As might be expected, Cardiff Place has a high rating on community criteria, and also on environmental and livability criteria to the extent that they apply to a very small project. On conservation and economic considerations its achievements are somewhat less than they might have been, but economics were affected by both municipal requirements and members' preferences.

Cerro Gordo

Location: Dorena Lake, Oregon.
Area: 474.27 ha (1,172 acres).
Population: approximately 750 units or 2500 population.

Status: 14 units built.
Developer: Cerro Gordo Community Development Company.
Contact: Christopher Canfield, Cerro Gordo Town Forum, (503) 942-7720.

Context : a forested valley surrounded on three sides by State Forest and a lake. The site is 10 km from the town of Cottage Grove and 30 km from the city of Eugene-Springfield, Oregon.

Objectives: a prototype resident-designed community that clusters development, provides local employment, reduces auto–dependence, conserves energy, minimizes impact on the natural ecosystem, and permanently preserves over 90% of the site in its natural state.

Built Form

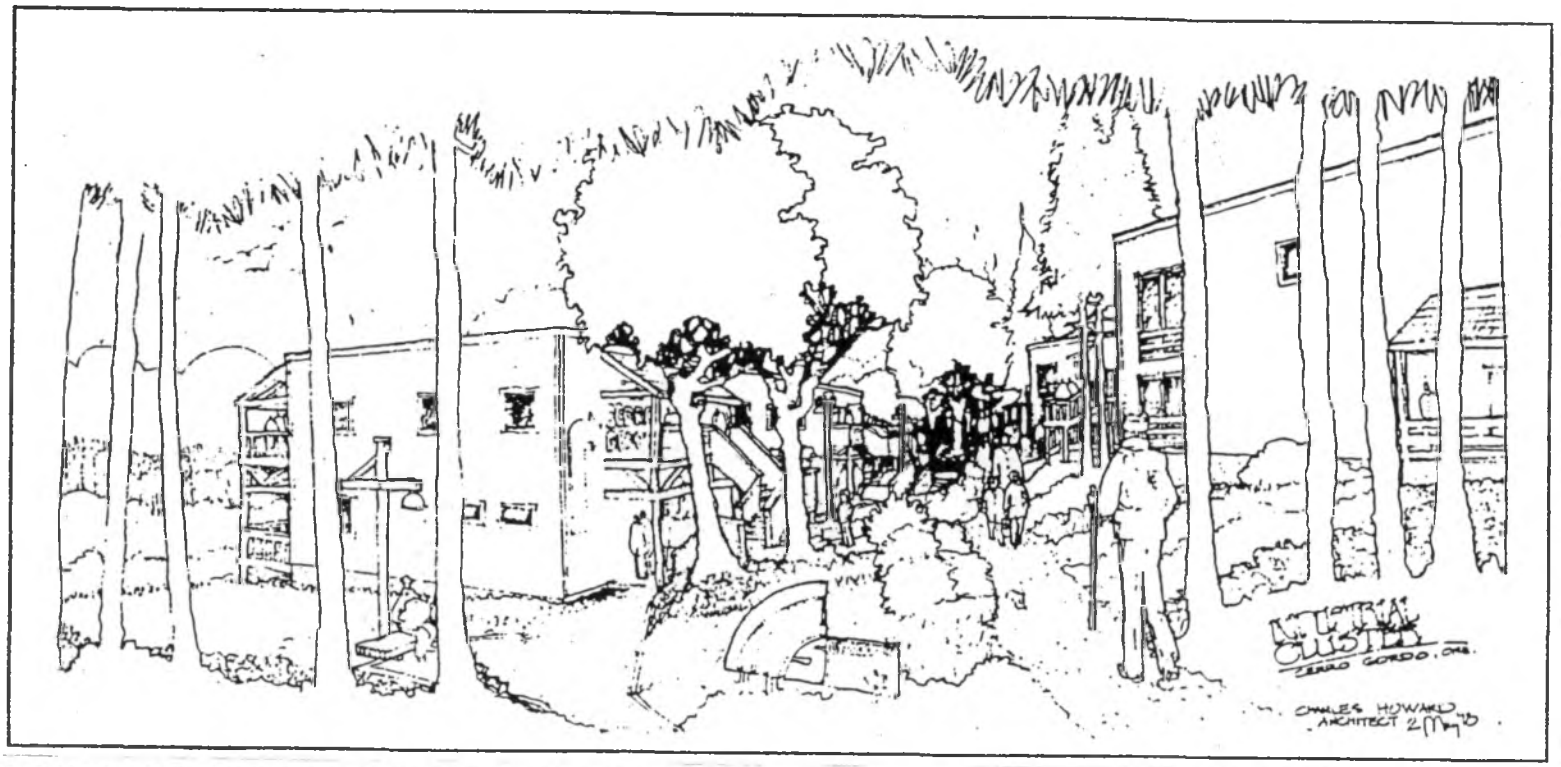
Building technology: Houses are energy efficient and qualify under the state Super Good Cents program; some include solar features; all include water conserving fixtures.
Building form: clustered to reduce environmental and economic impacts.
Housing: apartments, townhouses and single detached. Buildings are sited to allow two orientations (village and nature).
Land use: a mixed development including forestry, agriculture (orchards, greenhouses, market gardens), housing, commercial and light industrial uses.
Site Plan: 90% preserved natural space. Most commercial and community buildings are within the mixed use village centre. Residential areas are clustered — all within 500m of the village center.
Transportation plan: To generate a no-car community, paths link all residential clusters to the village center. Vehicular access to buildings is limited to services only.
Infrastructure: There is no private automobile use within the townsite. A system of minimal roads is provided for service vehicles only with narrower paths for pedestrians and cyclists.

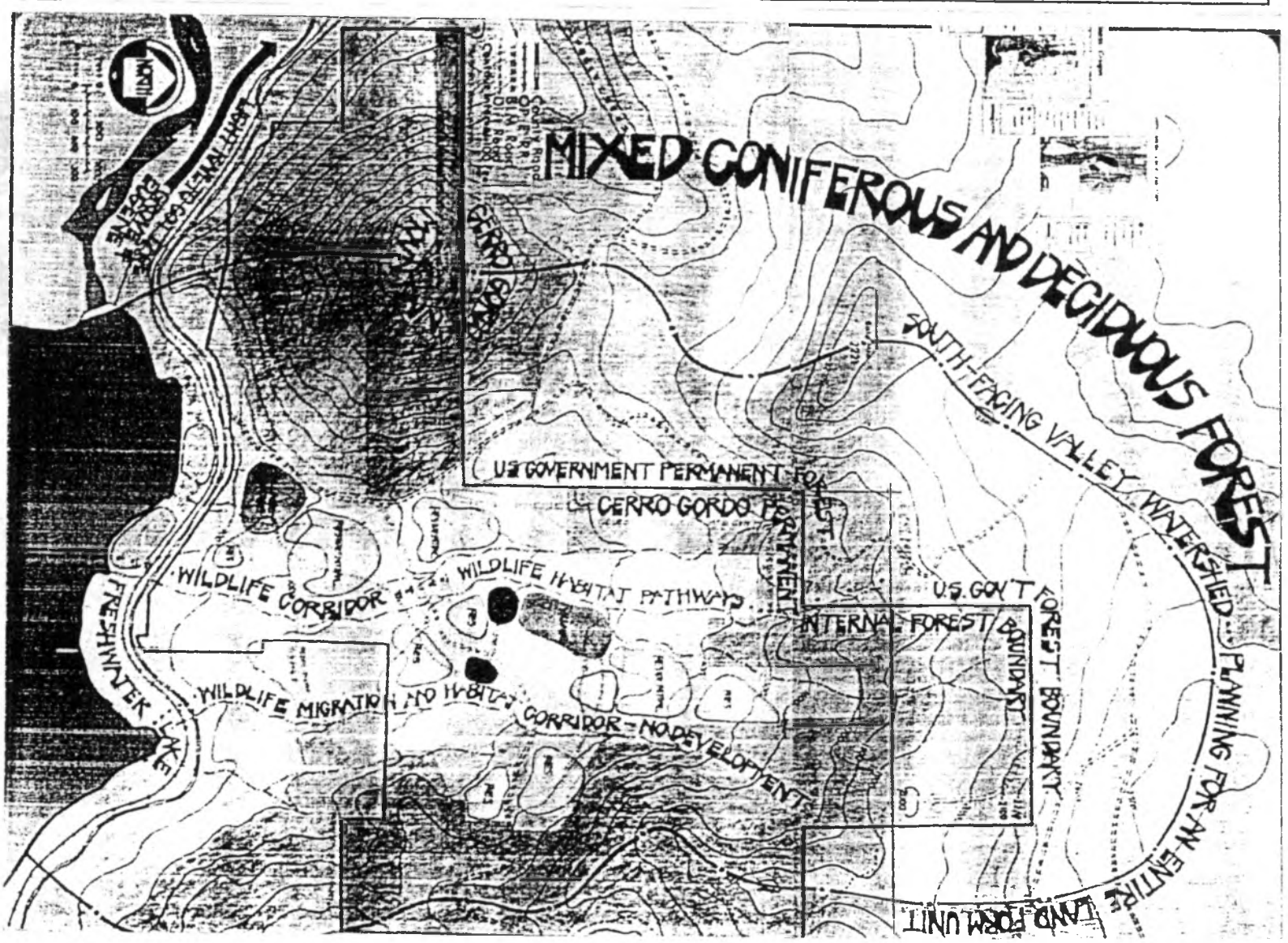
Environmental Systems

Energy: serviced by electricity with some use of renewable sources.
Water: communal wells initially, moving to a groundwater reservoir as water source.
Sewage: initially by sand-filtration septic systems. Communal treatment facilities will be developed that allow wastewater to be used for agricultural and forestry irrigation .
Stormwater: managed on site.
Waste: communal recycling and composting facilities.

Socio-economic Systems

Community services: a community development organization is directing planning, community and commercial facilities and future enterprises.
Employment type and density: A range of employment is planned including forestry and small industries, home occupations, small publishing and computer networking operations and retail. A bed and breakfast, a research and publishing house, a bicycle trailer manufacturer and a computer retailer are already operating on site.
Tenure and ownership: private tenure, with community financing. The land is owned cooperatively and a community development organization directs planning, infrastructure and economic development.
Intended market or occupancy type: ranges from small rental units to large single family homes.
Planning process: intensively participatory, including future residents and supporters. Ongoing input is sought in all planning processes, from visioning and site selection to community development.


CHARLES HOWARD
ARCHITECT


MIXED CONIFEROUS AND DECIDUOUS FOREST
SOUTH-FACING VALLEY WATERSHED
PLANNING FOR AN ENTIRE LAND FORM UNIT
U.S. GOVERNMENT PERMANENT FOREST
CERRO GORDO PERMANENT FOREST
U.S. GOV'T FOREST BOUNDARY
INTERNAL FOREST BOUNDARY
WILDLIFE CORRIDOR
WILDLIFE HABITAT PATHWAY
WILDLIFE MIGRATION AND HABITAT CORRIDOR - NO DEVELOPMENT
FRESHWATER LAKE
NORTH

Resource Conservation and Environmental Impact

With energy, water and land conservation principles front and centre, the Cerro Gordo project is the culmination of nearly two decades of ecologically-based planning. Preservation of land in its natural state is central to the plan. The development is efficient and compact. Housing clusters located within a quarter mile radius of the village centre and joined by walking and bicycling paths will accommodate 2500 people on approximately 1/12th of the site.

Over 90 per cent of the lands will be preserved as community-owned forest, meadow and agricultural land. Forest management will include natural preserves, a perpetual-yield forestry program and individual tree selection management. A wildlife management plan will protect habitat and populations through extensive corridors where construction will be prohibited.

All toilets, showerheads and water using fixtures will be water efficient. Seasonal storage of water collected during summer will augment water drawn from communal wells. It is proposed that an on-site groundwater reservoir will eventually replace the wells. Sewage will be treated initially by advanced individual sand-filtration systems, and eventually by a communal system designed expressly for wastewater reclamation for re-use and groundwater recharge.

Stormwater will be managed on-site, using techniques to maximize infiltration and to detain and purify runoff. An impervious cover study, which examined the percolation rates of the site's soils, directs impermeable surfacing materials to areas of low recharge capability. A series of detention ponds will provide acquifer recharge and water for re-use in agriculture and forest management.

Energy efficiency measures include the stipulation that all homes must meet the Super Good Cents energy conservation standards. As well, houses built to date include a variety of passive solar features. Homes will be built using native wood, stone and clay, to minimize embodied energy during construction. Site layout, the relegation of cars to a designated parking area, and a transportation co-op with emphasis on shared commuting and co-ownership of vehicles should reduce energy required for travel, as well.

Waste management plans include an area for communal composting, source separation of recyclables, site planning that emphasizes gardens, edible landscaping, orchards, and a co-op village general store offering goods in bulk format and in reusable containers.

Economic Viability

The symbiotic principles of resource efficiency and conservation will make important contributions to the economic viability of Cerro Gordo. Basic services such as water, sanitary waste treatment, stormwater treatment and roads have all been designed in a cost-effective manner that allows for staged expansion of services as the community grows. The sensitivity to environmental integrity and overall livability has also played a role in ensuring that services have not been over-designed or "gold-plated", and the compact nature of the villages will keep costs lower. These factors are important in maintaining the economic viability of a project in the initial stages when front-end costs are normally very high (as in the case of Bamberton). However, despite these considerations, there are extra costs that will be associated with the relative isolation of the project, and the large gaps between the villages.

Cerro Gordo is planned for an attractive mix of housing types and supporting businesses. If the planned diversity can be realized, then the project would be marketable. There may be some concern that this small "eco-community" will appeal to only a small market of environmental purists, but the natural setting combined with a variety of conventional freehold housing forms and the proximity to Eugene-Springfield should give it a broader appeal. The planners have set a goal for 100% employment on site. While this goal is admirable, there is no indication that sufficient industrial and service enterprises will be attracted to this little

community to employ its inhabitants. Moreover, it is even more unlikely that the community would be large enough to support its own economy. It is expected that Cerro Gordo, over time, will develop a variety of retail and service industries, light manufacturing and home-based businesses, but a dependence on Eugene-Springfield for a higher order of retail services and employment will likely evolve.

Probably the best indication of the economic viability of Cerro Gordo is its present status. Although the land has been held for 20 years and the community has been in the planning stages for a long time, there are only 14 homes built with another 35 under way. Only 90 more are expected to be built before the year 2000. This extremely slow rate of development perhaps indicates the negative economic forces that affect the pure application of an environmentally and socially sustainable community. Some compromises that would favour more economic principles may be in order.

Equity

It is not clear that Cerro Gordo would provide a solution for a low-income urban family seeking both accommodation and employment (in general it appears likely to attract people in the middle-income range), or that it would provide fully for people with special needs, but with these qualifications it rates very highly on equity. "Commons", utilities and community facilities will be owned by a "Community Co-op", and full participation of all members of the community in planning, decision-making, development and local government is stressed. Cerro Gordo will provide a wide range of housing types, with cost savings from water and energy conservation measures. Economic development will be promoted by a limited-dividend Community Development Company. Cerro Gordo aims at 100% employment on-site in a diversified economy including sustainable forestry (through a Forestry Co-op), agriculture, and low-environmental-impact industry, as well as diverse small-scale agriculture. It is intended to have as wide a range of local services as an eventual population of 2,500 can support. All residents will have the benefits of clean air, clean water and ample access to the natural environment, with the forest and meadows of the site owned by the Community Trust.

Livability and Community

In terms of livability, Cerro Gordo will have the inherent advantages and disadvantages of any small town. It will appeal very strongly to "environmentalists" and to those seeking an attractive, quiet, small-scale living environment in a rural setting (which is likely to limit demographic diversity and restrict the range of experience to which growing children will be exposed). Cerro Gordo will provide ample opportunities for varied outdoor recreation. It will offer an attractive, carefully-designed, human scale built environment within which movement is easy and safe, with an emphasis on walking and other alternatives to private cars. (On the other hand, the attraction of these alternatives may be substantially reduced by rather heavy precipitation: it is not clear how much allowance has been made for climatic factors in planning and design.) The nature and range of local services and facilities will necessarily be limited by the size of the community; however, Cerro Gordo is within easy reach of Eugene-Springfield, a university town of 150,000 people.

Cerro Gordo is likely to attract people who already share a sense of community in terms of common values and ideals, and this will be reinforced by the very high level of sharing in planning and governance and the commitment to specific community goals, particularly in terms of nature conservation, environmental protection and ecological sustainability. Generally, a very strong sense of community can almost be taken for granted. The physical development plan will further reinforce this through "a pedestrian, human-scaled village center...in which community facilities, residences and most everyday shops and services are clustered to create a holistic village lifestyle". The other side of this coin is that the community, whether intentionally or otherwise, may tend to exclude those who do not fully share Cerro Gordo's goals and values, and thus limit the

range of people and ideas which ought to be one of the strengths of a community.

Health and Safety

Cerro Gordo will provide a health-promoting environment with ample opportunity for outdoor activities and high levels of safety with regard to traffic and air and water quality, as well as a supportive social environment. A small, relatively isolated community can expect low crime levels. One of Cerro Gordo's planning principles is "Minimize fire, health and security hazards, and provide on-site emergency systems to supplement regional services"; others are "Provide community health facilities and programs that emphasize preventive medicine and whole person health care and education" and "Create a way of living that values and supports personal growth, self-discovery and spiritual understanding according to each person's chosen path". In short, physical and mental "wellness" is a primary objective for the Cerro Gordo community. Local services, facilities and programs will be backed up by the availability of specialized health care in Eugene.

Difficulties and Obstacles

Oregon has one of the most restrictive planning approvals mechanisms in the United States. Each county must submit a Rural Comprehensive Plan detailing 19 parameters for land use planning and zoning. After more than 16 years in this evaluation process, Cerro Gordo was one of first properties approved in Lane County's Plan.

The clustered form of development was initially inconsistent with future residents' desire for detached homes on acreage homesites. However, after extensive community participation in the planning process, over two-thirds said that they wanted to live in attached homes in or near the village centre.

Summary

In terms of environmental quality, Cerro Gordo promises to be a model community. In its aspirations at least, it will be a model community in social terms too. Its ability to attain its economic goals seems rather more questionable. Its economic and social limitations are mainly those of any somewhat isolated small community. It is impossible to predict whether in the long term Cerro Gordo will be able to maintain its rather idyllic character despite these limitations. Nevertheless, in the meantime, for many people — though not for everyone — Cerro Gordo would offer the ideal living environment.

Cornell

Location: Markham, Ontario.
Area: 625 Hectares (1544 acres).
Population: approx. 27,000 or 10,360 units.

Status: Secondary Plan approval stage.
Designer: Weinstein Leeming Hinde + Associates Limited and Macaulay Shiomi Howson **Developer:** The Province of Ontario, Cornell Development Group.
Contact: Evan Wood-Brunet, (905) 472-4523.

Context : The site is an expansion area, on the eastern border of residential development in the Town of Markham. Eighty per cent of the lands are owned by the Province of Ontario, with the balance in private ownership.

Objectives: To create a model community in the Town of Markham, based on the principles of New Urbanism and the Town's policies for future development, through the following principles:
diversity of land uses, a well defined public realm, integration of new development with existing, adjacent development, preservation and enhancement of the natural environment and built heritage, transit supportive and pedestrian-oriented, a full range of commercial, cultural and community facilities, and a range of housing types.

Built Form

Building technology - to code.
Housing: a full range of housing types including at least 25% affordable housing in accordance with provincial policy.
Land use: neighbourhoods with a mix of uses, including residential, commercial, green space, and employment, within easy walking distance of each household.
Site plan: The plan is based on 3 fundamental elements. Neighbourhoods are primarily residential with employment/service uses at the neighbourhood centre. Districts are mixed use but each has a dominant activity. Corridors, consisting mainly of roads and open space, connect neighbourhoods and districts.
Transportation: The plan provides a street and lane network, on a pedestrian-friendly scale, with alternative vehicular and pedestrian routes to most destinations.
Infrastructure: a hierarchy of streets from a 36 metre wide parkway to 15.5 metre minor streets.

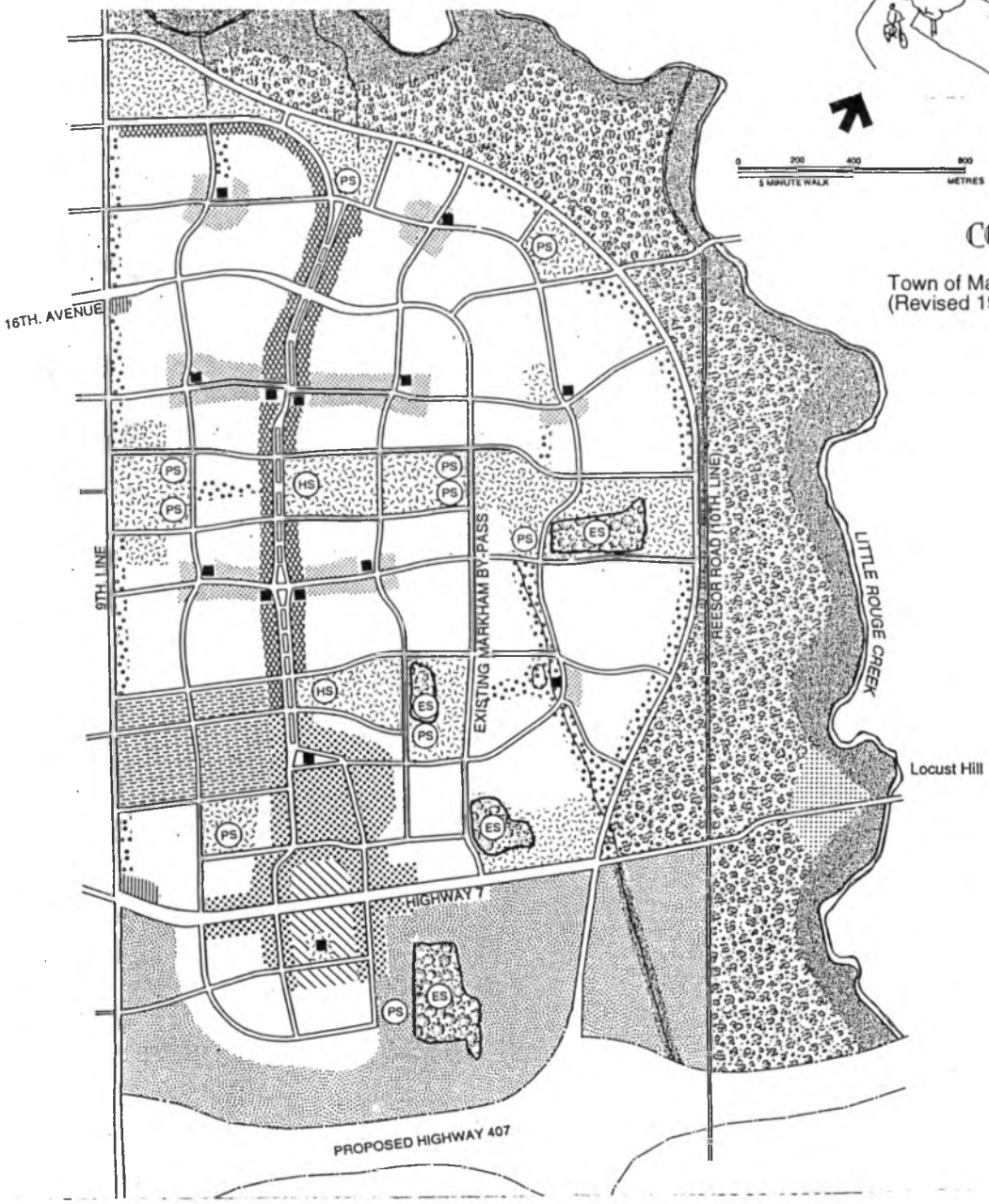
Environmental Systems

Energy: Development applications will be evaluated in terms of solar orientation of streets and buildings, increased densities, and energy conserving materials.
Water: conventional servicing.
Sewage: serviced through the regional system. Zoning permits solar aquatic treatment facilities.
Stormwater: The management system is integrated with the open space system, and mitigates impacts on the natural environment.
Waste: municipal system.

Socio-economic Systems

Community services: a full range of socio-cultural, commercial and community facilities and a well-defined public realm.
Employment type and density: a general target of one job per household.
Tenure and ownership: a mix of freehold, rental cooperative, non-profit and rent assisted.
Intended market or occupancy type: a wide spectrum of household incomes, lifestyles, ages and family structures, designed to permit lifecycle housing within neighbourhoods.
Planning process: a concerted public information process. Presented twice in public forums, the plan's design principles have gained a high degree of acceptance with the existing community.

Neighbourhood Centre



CORNELL SECONDARY PLAN

Town of Markham Official Plan (Revised 1987)Amendment No.

Schedule "AA" Land Use Plan

- Neighbourhood General
- Neighbourhood Centre
- Central Corridor
- Central Core
- Automotive Service
- Hospital District
- Open Space
- Open Space-Commercial Recreation Area
- Community Park/ Institutional
- Greenway Link/Buffer
- Civic and Public Sites
- Employment
- (HS)(PS) HS-High School PS-Public School
- (ES) Environmentally Sensitive Area
- Hazard Lands
- Hamlet

Resource Conservation and Environmental Impact

In this 625 ha development there is considerable potential to improve on past practices. The plan devotes specific sections to such aspects as stormwater management, environmentally sensitive areas, tree planting and landscaping and energy conservation. It also points out that several technical studies involving transportation, servicing, natural environment and open space will have a bearing on the way development proceeds. Successful realization of these goals and principles at the subdivision scale of development, at the scale of the neighbourhood, and in the actual design and construction of dwellings will depend on mechanisms now being developed.

The Implementation section of the Secondary Plan identifies the need for Urban Design & Amenity Guidelines and provision of a Control Architect function to govern development.

With regard to stormwater management, the plan focuses on watercourses and states that treatment "shall be consistent with the Subwatershed Study completed for the area, and in accordance with a Master Servicing Plan to be prepared for the area." A related stormwater management plan has established runoff control strategies to meet both quality and quantity control concerns. This will guide individual developers at the subdivision design stage with the objective of retaining as much runoff within the development site as possible. The secondary plan also considers application of Best Management Principles regarding stormwater management, which were developed by the Ontario Ministry of Environment and Energy.

The East Markham Secondary Plan makes a strong commitment to the preservation of the natural environment in the plan area. Major woodlots, other wooded areas, hedgerows and water courses are protected within the Open Space designation.

Conservation of potable water is not identified as an issue in the East Markham Secondary Plan, and demand management is not identified as a means of checking the continued deterioration of surface and subsurface water resources. Water efficiency could be a consideration in the subdivision approval process, by the addition of a development principle in the secondary plan which explicitly identifies the environmental benefits of water efficient developments.

With regard to the broader environmental implications of the East Markham Secondary Plan, issues relating to CO_2, ozone depletion, and air quality are not mentioned. Goals and standards could be incorporated in the secondary plan as development principles requiring support at the appropriate scale of plan implementation.

Economic Viability

The size of this project allows for a hierarchy of streets and corridors, including a transit-only corridor linked to the regional transit system. The densities and population will make the transit system viable, although the costly dedicated corridor may be under-used.

The road network will be more costly than a conventional subdivision system due to single-loaded streets, streets with centre boulevards, shorter blocks (more cross-streets), wider streets to accommodate on-street parking, and the provision of rear lanes.

Chapter III of this Guide gives a comparison of the costs of infrastructure for neo-traditional and conventional neighbourhoods. The comparison identifies the additional costs in the neo-traditional design to be in the range 30% - 35%, most of it attributable to the cost of the rear lanes.

The Cornell designers have off set much of the additional infrastructure costs by significantly increasing the development densities. The comparative study discussed in Chapter III showed that the higher densities brought the infrastructure costs down on a per-unit basis, although the neo-traditional design still tends to be more expensive, especially where rear lanes are part of the plan. In addition to the capital costs, there are

also marginally higher costs for maintenance and repair. In particular, the cost of snow removal in the rear lanes needs to be recognized.

The residential mix is highly diversified and allows for both traditional forms of housing and housing for special groups. This diversification of sizes and tenure will increase the marketability of units. Affordable housing is an objective of the plan, and this is expected to be met by building small units at high and medium densities. The small size of the lots will make them intrinsically affordable, although some of the affordability has been compromised as a result of the premiums paid for neo-traditional infrastructure.

Commercial and employment opportunities have been planned, particularly in the central core. Cornell will also build in high capacity fibre optics to accommodate high tech commercial and home-based businesses. The proximity to major arteries, public transit, higher density housing and the hospital will make many retail and business services viable, although a regional mall located external to the project will compete for the local market. Employment areas adjacent to a provincial highway and the regional hospital have been planned, but other than the conventional expectation that businesses will be attracted to the highway location, there does not appear to be any particular strategy to draw specific types of business to Cornell. The unique opportunity to leverage the influence of the regional hospital to promote research and health care business has not been fully addressed.

Equity

The goal statement in the Secondary Plan directly addresses the equity issue: "To create a model community . . . which will meet the economic, social and cultural needs of its residents, through: . . . . . transit supportive and pedestrian oriented development patterns . . . provision of a full range of commercial, socio-cultural and community facilities; and . . . provision of a range of housing types for the full range of households."

Provision of a diversity of housing, including affordable housing, garden suites and accessory apartments, is a prominent aspect of the Cornell plan, and "The affordable housing component shall include units designed to meet the needs of special groups such as seniors and the physically and mentally challenged ..." Inclusion of features for people with special needs will be articulated in the Urban Design & Amenity Guidelines.

Also particularly noteworthy in relation to equity are: extensive public participation in the planning process and provisions for community input on governance issues outside the planning process; a uniform high standard of services; the possibility of varied employment opportunities within and near the site; ready access, on foot or by bicycle, to neighbourhood centres and local parks; and a strong emphasis on transit, accessible within a 5-minute walk (400m) of every household. As well, the Community Park/Institutional secondary plan designation explicitly provides for day care facilities.

Livability and Community

The aim of creating an extremely livable community is expressed in such features as the provision for a wide range of readily accessible local services and facilities (with higher-order services readily accessible from the site) and for a diversity of accessible, linked open space; the emphasis on encouraging movement on foot and by bicycle and transit, with "comfortable waiting places" at transit stops; and the concern for creating a varied, attractive, human-scale, pedestrian-friendly built environment. However, no mention is made of ensuring the availability of privately usable open space to all residents. Building orientation and design in relation to sun and wind will be detailed in Cornell's Urban Design and Amenity Guidelines.

The plan is intended to create "a sense of place and community". It provides for community parks, "designed as settings for informal social activity and recreation", for local sites for civic and public buildings

(including places of worship), and for seven neighbourhood centres each within a five minute walk (400m) of most dwellings in the neighbourhood. The plan also calls for "a definable core with a civic building and regional focus as well as the centre for the community as a whole". The core area will also accommodate higher-density housing. Shared use of institutional lands and buildings is to be encouraged. Preservation and enhancement of natural features, including woodlots, is emphasized, and neighbourhood plans encourage incorporation of heritage buildings into the urban fabric. The successful realization of these principles, however, will depend on the effectiveness with which they are applied in detailed planning and development.

Health and Safety

Cornell can be expected to meet high standards of water and air quality, and fire protection. There is a hospital within its boundary, and the normal range of health care services can be expected to be provided in the Central Core and neighbourhood centres. There will be ample opportunity for outdoor recreational activities. Safety is identified as an objective of the planning of roads and cycle and pedestrian ways. "Noise impact" will be a factor in detailed planning. There is no reference to crime prevention, to the management of solid and hazardous waste, to the use of toxic chemicals, or to safety in homes, playgrounds, etc. Despite these omissions, the general level of health and safety should be high, with reservations concerning three design features. (These comments apply in the case of all developments which incorporate these features.)

(a) As is quite common practice, cycle and pedestrian paths are combined, although fast-moving cyclists and roller-blade users can be a hazard to walkers (and themselves);

(b) Lanes could provide concealment for undesirable activities, though it is claimed that lighting and design features address this possibility, and the risks may be offset by improved access for police and emergency vehicles;

(c) On-street parking is favoured as discouraging fast traffic, apparently ignoring the risk to small children who may run into the street from between parked cars; it is not clear why the objective could not have been achieved by street design.

Difficulties and Obstacles

The obstacles facing Cornell are those typically faced by other innovative developments. Firstly, review agencies tend to seek improvements in their own particular area of concern (sometimes with unrealistic expectations) without considering the implications for other areas which affect the overall quality and performance of the project. Secondly, innovative plans challenge standard development guidelines and practices in areas affecting issues such as rights of way and road allowances.

According to Cornell's management team, the approach to overcoming these obstacles is basically good planning practice. The planner's role is to maintain the overall vision for the community and to encourage other players and stakeholders to look at the urban fabric as a whole. Coordination and conflict resolution are major aspects of the planner's work, helping participants to understand how one element affects other aspects of the community design.

Summary

The designers of Cornell have opted to apply the principles of "New Urbanism", which provide many benefits in terms of streetscape, pedestrian scale and compact form, but this comes at the expense of higher infrastructure costs, particularly for rear lanes. Some opportunities with regard to resource conservation and environmental issues have been missed and certain aspects of safety can be queried. Otherwise, provided that its goals and principles continue to be successfully embodied in detailed planning and design, Cornell can be expected to provide a living environment of very high quality, marketable, and respectful of the biophysical environment.

Heart of Springdale

Location: Brampton, Ontario.
Area: 40 Hectares (100 acres).
Population: 2055 Residential Units.

Status: cancelled.
Designer: du Toit, Allsopp, Hillier.
Developer: The Daniels Group Inc., Toronto.
Contact: Mark Guslits, (416) 598-2129.

Context: part of a 1600 hectare new development on the north side of the City of Brampton, 50 km northwest of Toronto.

Objectives: a healthy village/ neo-traditional pilot project, with mixed use (including home occupations and workshops) a range of prices and affordability, and reduced auto dependence.

Built Form

Building technology: to code.
Housing: 2055 units: 976 low-rise, 508 high-rise apartments, 266 townhouses, 103 row bungalows, 90 semis, 77 quattroplexes, 35 single detached.
Land use: Approximately one half the site is residential with a retail / commercial "main street" and mixed use buildings around the Village Square.
Site plan: an "urban village" based on the model of older downtown sections of Ontario towns.
Transportation plan: a permeable grid street system. Bus routes would have placed the majority of the community within 250m of a transit stop.
Infrastructure: a hierarchy of streets with rights of way ranging from 27 metres to 16 metres. The plan included rear lanes.

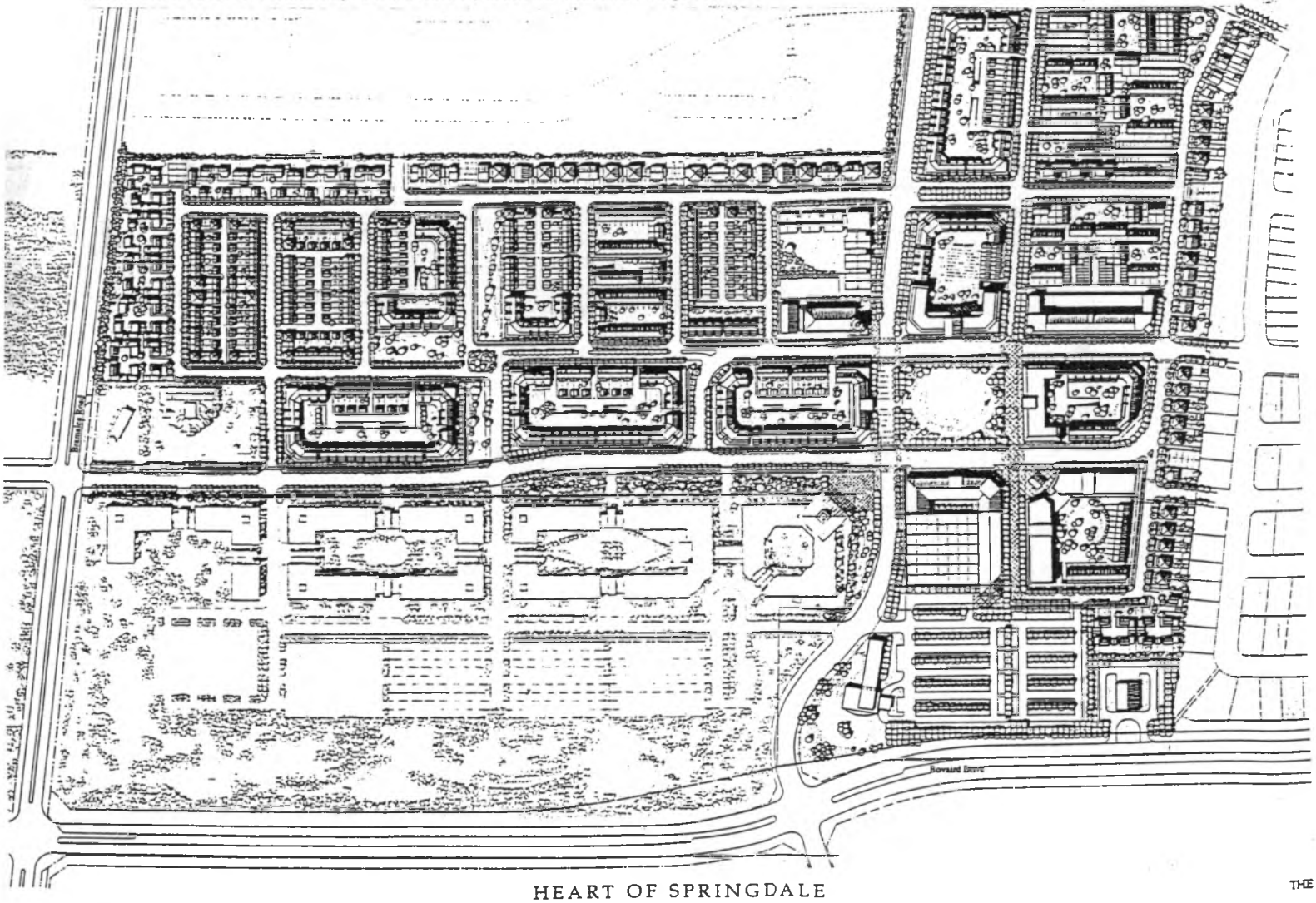
Environmental Systems

Energy: All buildings would have been designed for energy efficiency in heating and lighting. District heating/cogeneration would have been evaluated.
Water: Conservation, grey-water re-use and cisterns would have been examined.
Sewage: municipal system.
Stormwater: innovative servicing design freed boulevard areas for stormwater infiltration.
Waste: Housing included storage facilities for recycleables, 3-chute system for larger buildings, and developer-subsidized composters and recycling equipment.

Socio-economic Systems

Community services: opportunity for a public library in the Village Square, together with local retail and medical services.
Employment type and density: office and light commercial/industrial, clustered around a central Village Square. The plan encouraged mixed uses and home occupations.
Tenure and ownership: market and non-profit.
Intended market or occupancy type: a wide range, from first-time buyers to seniors.
Planning process: conventional.

The Market Square, Community Centre, and Apartments with retail at grade



HEART OF SPRINGDALE

Brampton, Ontario

THE

DU TOIT, ALLSOPP, HILLIER • Read Engineering Corporation • DS-Lea Associates Ltd. • Weinstein, Leeming & Associates • Hough, Standebury, Woodland Ltd.

Resource Conservation and Environmental Impact

The application for Heart of Springdale was withdrawn after the project had been in the development and approvals process for two years. Heart of Springdale made a commendable effort to address environmental and resource conservation in a tangible way. It articulated a compact development form or "healthy village", combining a mix of residential, commercial/retail and employment uses, in a "neo-traditional" development, serviced by back laneways. It was described in one planning journal as "a refreshing alternative to the usual suburban high rise, bungalow and shopping plaza character of development . . ."

The plan identified a series of environmental principles focusing on the preservation of the natural landscape and the management of stormwater. For example, the plan incorporated a development pattern which preserves significant vegetation including hedgerows, recognizing their importance from both esthetic and wildlife habitat perspectives.

Stormwater management techniques took advantage of a servicing design which located underground services and utilities in such a way that street boulevards remained unencumbered, allowing them to play an active role in re-absorbing stormwater into the soil.

The plan made explicit reference to the need for waste management and energy and water conservation strategies to be incorporated into the built form of the community. It identified four elements: 1) recycling, 2) leaf composting, 3) energy efficient building design, and 4) water conservation. Recycling was to be accommodated by designing each residence in the community with appropriate facilities to encourage the use of blue box and other recycling programs. The plan even required that elevatored buildings have a 3-chute system for garbage disposal to encourage residents to separate their recyclable materials from the general waste stream. Garbage rooms in these developments were to be sized to accommodate the storage of recyclable materials.

With regard to composting, the developer proposed to augment an existing municipal program by providing additional subsidies for the purchase of backyard composters and other recycling hardware. Recognizing the importance of community involvement in these programs, the plan identified the role that homeowner associations, co-ops and condominium associations can play as vehicles for such participation. In addition, the developer proposed to donate a leaf composter yard to the city, adjacent to the Heart of Springdale.

Regarding energy efficiency, the plan committed to ensuring that "all residential units and commercial buildings will incorporate energy efficient design features as well as the latest technology in heating systems", although the specific nature of the design features were not identified, nor were the heating options. The plan also committed to an investigation of the feasibility of incorporating district heating and cogeneration into the development.

Water conservation was also identified as a development principle, with homes designed to minimize water demands and an education program for residents. Cisterns and grey water reuse were also identified as candidate techniques for further examination.

With regard to broader environmental impacts, CO_2 emissions, ozone depletion, air quality and soil were not explicitly mentioned. However, in view of the plan's strong commitment to energy efficient building designs and pedestrian-friendly streets, as well as densities which will encourage transit usage, it can be inferred that this development would have had less impact on the environment than "conventional" suburban developments housing the same number of people.

Economic Viability

Like other neo-traditional plans, The Heart of Springdale placed an emphasis on the

accommodation of modes of transportation other than the automobile. The high densities in this plan would probably have supported convenient transit, although in the context of the surrounding low density neighbourhoods, the overall demand for connecting routes might not have been adequate. A direct link to regional transit was not evident, but could have been accommodated.

The road infrastructure was typical of neo-traditional design in its layout, and would have been more expensive than conventional designs to build and maintain. This is due to many single-loaded streets, streets with centre boulevards, provision for back lanes, shorter blocks (more cross-streets), and wider pavement to accommodate on-street parking on both sides. There would also have been increased maintenance costs for snow removal, cleaning and repair.

Here, however, the extra cost of roads and lanes would have been entirely offset by higher densities, creating a very compact development in comparison to the lower density neo-traditional case studies. The overall residential densities were high, and indeed, three quarters of the units were in a high density category. Even so, the units would appear to have been highly marketable because of the diversity of product and tenure. The high density units would have been predominantly low-rise or ground related, and therefore more appealing than conventional high rise. Many would have been affordable and suited to special groups including seniors. The residential component was well balanced by adequate and diverse commercial uses including retail, office and health services.

As part of the larger Springdale Community, this project would have contained most of the retail and high density designations for the area, increasing its economic viability. The developer also recognized the economic opportunity to create a synergy between the community and the adjacent health services centre, which would have supported the long term viability of both.

Equity

Responsibilities for planning, development and management of Heart of Springdale were to be divided in the conventional fashion between the developer and the City of Brampton, with no special provision for resident participation. In other respects, however, Heart of Springdale rates well in terms of equity. According to the application for an official plan amendment (OPA), it was to become "a true 'urban village', with opportunities for employment, education/daycare, shopping and recreation in addition to housing, within an environment that is friendly, safe ...". These objectives were fully reflected in the plan. Notable are the provisions for a wide range of housing, including non-profit housing, accessory apartments ("granny flats") and shared accommodation; freedom from car dependence; accessibility for people with special needs; diversity and accessibility of community and commercial services; and a variety of employment opportunities.

Livability and Community

Livability was a fundamental aim of the Heart of Springdale plan. The OPA application describes: "... a clearly defined public realm expressed through an interconnected network of streets and parks; a sense of community with its mix of home, work place and shops based on a pedestrian scale ... stable residential precincts behind ... major streets; and provision of human and pedestrian scale through a fine-grained pattern of small streets and short blocks." Other notable features included or considered include design guidelines, neighbourhood parks, meeting places, provision of cultural facilities, provision for allotments, and protection and enhancement of natural features.

No provision for traffic calming or for an independent pedestrian/cycle circulation system was evident, but this could be defended on the basis of the general attention given to avoiding car dominance. There was no continuous open space system through the site, and the ratio of park hectares-to-population was low (approximately 0.75/1,000), but these apparent deficiencies

must be seen in context. Heart of Springdale would not have been a free-standing community but the relatively small central district of an extensive residential area. There was no reference to special design or construction measures to reduce adverse climatic effects.

Heart of Springdale proposed a very clear identity in relation to its conventional suburban surroundings. Careful attention was given to the protection of natural features; while the available information makes no reference to the preservation of cultural, historic, archaeological or similar features, this may not have been a relevant consideration;

Health and Safety

There was no evidence of environmental hazards to health and safety (water quality, air quality, radiation, site characteristics, etc.). The plan provided for active outdoor and indoor recreation, though not for an extensive park or trail system (see "livability"). The location and planning of the site made ample provision for health care facilities. The circulation plan would have kept the incidence and severity of traffic accidents relatively low. Crime prevention was considered as a design factor, and the high "community" quality would in any case have tended to discourage crime. As the site is within the City of Brampton, it can be assumed that fire prevention measures would have been adequate, and that the disposal of hazardous and solid waste would have been dealt with on a city-wide basis.

Difficulties and Obstacles

The plan was called into question regarding density, road width and road configuration. A more automobile-oriented street system, without laneways or on-street parking was requested by the City of Brampton. Density was reduced from 14 to approximately 11 units per acre. Substantial concessions were made on many neo-traditional design parameters, to accommodate city standards, public demands and more "politically neutral" design specifications.

After two years of developing and modifying plans, and dozens of meetings with municipal officials, ratepayers groups and the public, the developer of The Heart of Springdale withdrew its application. Although it was most difficult even to get people to read the plan, the developer remains supportive of neo-traditional designs, noting that for a proposal such as Springdale to succeed, "everyone in a municipality has to be on board".

Summary

The notable strengths of the Heart of Springdale plan are in its concern for conservation and in the compact form designed to provide both economical land use and a congenial, urban built environment with a mixture of uses and a diversity of housing. Had it been built, it would probably have stood the test of time well. A weakness which may have contributed to its ultimate failure was the limited public involvement in the planning process. This may have cost the developer the public support which might have enabled him to overcome the municipal "salami-slicing" process which eventually caused him to abandon the proposal, and would have detracted greatly from its quality if it had been built. The most commendable element of the plan was the integration of the New Urbanism style with the principles of conservation and environmental protection; these are not fully considered in all the other case studies. This is also the rare instance where densities were raised to a level at which the additional cost of New Urban infrastructure was overcome, yet the product remained highly marketable.

McKenzie Towne

Location: Calgary, Alberta.
Area: 970 ha. (2,400 acres).
Population: 28,000 persons or 10,000 units.

Status: approval stage.
Designer: Andres Duany & Elizabeth Playter-Zyberk, IMC Consulting Group and Gibbs Gage Partnership.
Developer: Carma Developers.
Contact: David Harvie, (403) 231-8900.

Context : a new town planned for a site within Calgary.

Objectives: a set of mixed use neighbourhoods offering housing, jobs, shopping, entertainment, education and civic institutions within extremely short travel distances .

Built Form

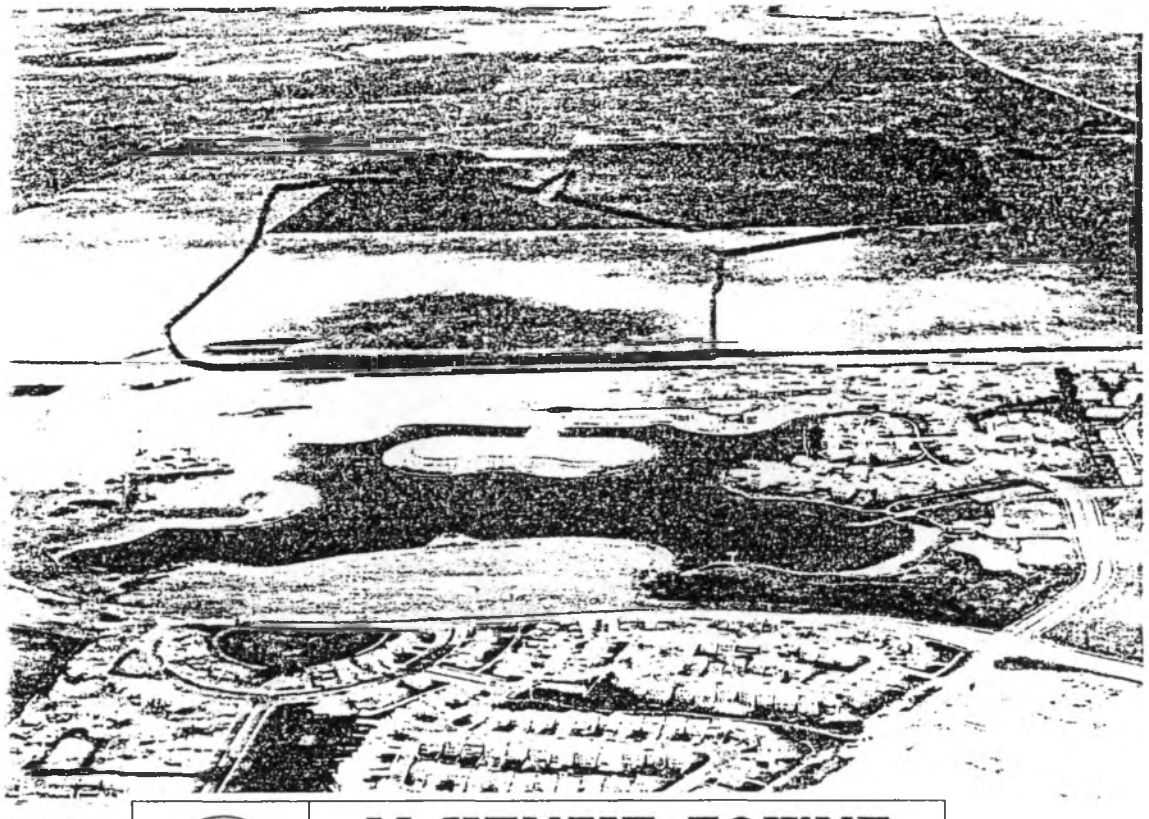
Building technology: to code.
Housing: a range of types – principally single family homes but including townhouses, apartment flats, studio suites and apartments above stores.
Land use: Neighbourhoods are defined by a 450 metre radius (e.g. walking distance) from a town square.
Site Plan: 13 neighbourhoods organized on a neo-traditional scheme, each with its own mixed used neighbourhood square. The Towne centre is a higher density, mixed use area, anchored by a light rail transit station.
Transportation plan: as pedestrian and cyclist friendly as possible. A variety of street types and lane widths will be used to accommodate vehicular and other kinds of traffic. Parking spaces will be limited, and a greenway system will link neigbourhoods.
Infrastructure: a hierarchy of streets and roadways, including rear lanes.

Environmental Systems

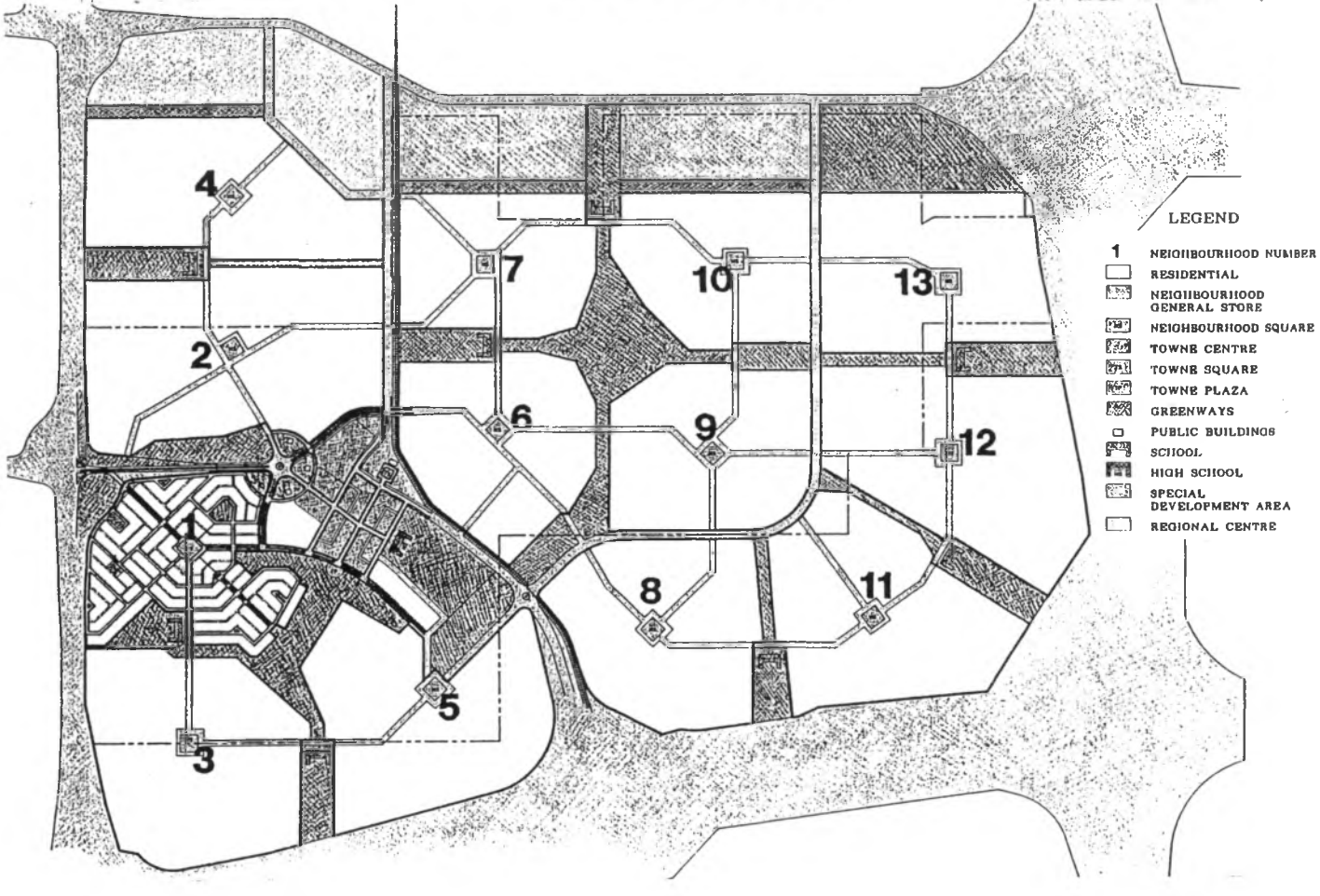
Energy: to code.
Water: municipal system.
Sewage: the site requires special pumping arrangements to convey waste water to the main trunk sewer.
Waste: municipal system.

Socio-economic Systems

Community services: Public buildings or day care centres may be provided in each neighbourhood square. Schools, sport facilities and public services will be located on designated sites throughout the plan area.
Employment type and density: Neighbourhood stores, convertible residential units as well as retail and commercial buildings are expected to generate employment for up to 8,500 persons.
Tenure and ownership: a range of forms, including various affordable housing options.
Intended market or occupancy type: mixed with emphasis on private ownership of detached houses.
Planning process: conventional approvals process.



McKENZIE TOWNE
TOWN PLAN



Resource Conservation and Environmental Impact

This development site is in a greenfield area which has been heavily disturbed and modified by approximately 100 years of agricultural activity. Accordingly, the plan makes little reference to the natural systems and processes occurring on the site. The plan does note that, due to the low elevation of the plan area relative to adjacent servicing infrastructure, it will be necessary to incorporate lift stations and forcemains to convey sanitary and storm sewerage to adjacent gravity mains.

The plan does attempt to sequester stormwater within each neighbourhood, both to allow natural "treatment", through evapo-transpiration and percolation into the water table, and to create aquatic public open space. The plan could have gone one step further to identify what percentage of stormwater could be so treated, and what percentage would need to be pumped off site.

In view of these servicing constraints the plan should identify the importance of minimizing the volumes of stormwater runoff and sewage flows. A development principle establishing the importance and legitimacy of water efficiency and the minimization of both sanitary and stormwater flows would have put all the key players in the development process on notice of the need to consider alternatives. This is particularly relevant, in light of the dependence of this development area on pumping facilities to remove sanitary and storm sewage from the site. A stipulation could also have been inserted to the effect that the developer specify high efficiency, variable speed pumps.

The development plan makes no reference to materials or energy as resource components in need of conservation. For example, the compact form of the town centre offers the potential for reviewing district heating and other alternative or renewable energy sources, yet this is not addressed. The opportunity to explore energy efficiency in the design and layout of the buildings has also been missed. Such opportunities could have been addressed through policies linking approvals to the subdivision agreement process.

As with most development plans, issues relating to CO_2, ozone depletion, air quality and soil quality are not directly addressed. However, in common with other New Urbanism schemes, McKenzie Towne does offer the potential to reduce automobile use and the attendant environmental effects.

Economic Viability

The plan emphasizes transportation modes other than the automobile. There are provisions for easy access to bus stops, and adequate greenways, walkways and short streets for pedestrian movement. Each neighbourhood square functions as that neighbourhood's bus stop, and is linked by bus to a commuter train station planned for the town centre.

The road layout is typical of neo-traditional design, and will be more expensive than conventional designs to build and maintain. This is caused by many single-loaded streets, streets with centre boulevards, provision for back lanes, shorter blocks (more cross-streets), and wider pavement to accommodate on-street parking on both sides. Besides the higher capital costs, there will also be increased maintenance costs for snow removal, cleaning and repair. While the developers of our other case study projects were able to offset the premium cost of New Urban infrastructure by significantly increasing densities, this was not the case in McKenzie Towne. The developer recognizes that consumer preferences in Calgary will be an obstacle to the successful marketing of small homes on small lots. Nevertheless, the developer is willing to pay a premium for the New Urban design because of its other benefits. As a compromise, he has sought approval for lower standards as a means of reducing the premium: for instance, it is the intention to construct narrower laneways with a gravel surface and no storm sewers.

Housing is mostly single detached. Although some thought has been given to apartments over retail and "granny flats", there is little

diversity and the overall density is similar to conventional suburban subdivisions. Retail has been planned in neighbourhood squares, which may also include churches, day care centres and other public buildings. The viability of the "general stores" may be questionable due to the small market areas and poor traffic exposure. A higher order of retail is planned at the town square, but similar concerns are raised about the viability because the focus is around a public open space, the centre is not large enough to attract major retailers, and the parking has been hidden from view. To meet the needs of larger retail, the plan also incorporates commercial and office uses, a site for a regional shopping centre and an office park with approximately 48 ha of industrial lands.

Equity

While the proposal outline is primarily concerned with the physical quality of the planned development, decisions on matters such as lot and housing types incorporate input from focus groups and at home interviews. Reference is made to a "Residents Association" in the context of the ownership of public buildings and this association is intended to address many local concerns. The plan calls for "a broad range of housing such that citizens of varied ages and incomes can be accommodated" but notes that "the single-family house will likely predominate as the preferred housing type". The developer notes that affordable single family housing can be constructed in Calgary at the same price levels as multifamily units.

Two other housing types are specifically mentioned: the apartment above the store, which is said to be suitable for people who will work in the Towne Centre and for senior citizens, and the studio suite or backyard cottage, limited to 45 square meters, which provides a more affordable housing alternative for older relatives and young adult children.

The plan also calls for other forms of affordable housing to be built in small groups - no more than a dozen units in a row - interspersed with housing of a higher economic range. This affordable housing "...will emulate the main-stream housing, only smaller. Ideally, this housing should be sufficiently desirable that *it will tend not to remain affordable upon resale.* This is the mark of success and should not be avoided" (emphasis added). Clearly then, this is designed to be, ultimately, a non-affordable development! The developer is also confident that co-op or special needs housing will be provided, as market conditions warrant, by independent contractors.

On the positive side, the provision of basic community amenities within a few minutes walk in each neighbourhood and the emphasis on public transportation are commensurate with equity.

Livability and Community

Livability is a major emphasis of this development: "The neighbourhoods, each with their own square, function as mixed-use communities ...". The squares, within 5 minutes walking of all or nearly all of the 1,500 - 2,000 residents, are the site of such amenities as a general store, public building, day care centre, post office, bank teller machines and the bus shelter and stop. Provision will be made for the surrounding residential buildings "... to be convertible into home occupations and other smaller scale commercial uses such as offices and shops...". Moreover, the neighbourhoods "are placed within a continuous matrix of greenways", designed as parks "to imitate a portion of the landscape captured within the town". These greenways will also be the location of schools and their playing fields, lakes and other large open spaces. There will be 5.35 ha of major open space / stormwater management per 1,000 population.

Convenience of movement is emphasized, with strong emphasis on walkability and the use of a bus system. Reference is made to a pedestrian and cycle network, though few details are provided: "neighbourhood streets will be designed to be as pedestrian and cycle friendly as practical" and it appears that there will be provisions for separated pedestrian and bicycle paths in areas of more intensive use. A light rail station is shown at the

Towne Centre, designed to be a part of the present Calgary rail system.

Initially, the community "will provide a limited workbase to balance the housing"; ultimately, "McKenzie Towne will provide many of its residents with the potential of having housing, jobs, shopping, entertainment, education and civic institutions within extremely short travel distances". Indeed, "theoretically, everyone living within such a community will have to leave only for higher order medical care, cultural entertainment, specialized shopping, out of town business, or tourism".

The plan makes no mention of any consideration given to cold climate design features to enhance the usability of urban spaces in conditions. Attention is paid, however, to creating a townscape that is pleasing to the eye.

It is not clear that there is an intention to include a wide range of social and economic groups in the community; indeed, the strong emphasis on home ownership and single family dwellings seems to militate against such inclusiveness. Nor is there much evidence of resident ownership and control in the planning and management of the community, although reference to a Residents' Association and the strong emphasis on a sense of neighbourhood means that such a possibility is likely over time. There is no explicit reference to natural and cultural heritage, other than the greenways. It seems that the Towne as a whole, and certainly the neighbourhoods, would foster a sense of identity and belonging, while the neighbourhood squares and the public buildings associated with them and with the Towne Centre provide opportunities for people to gather.

Health and Safety

It is presumed that the development will meet all the usual health and safety standards set by the City of Calgary and the Province of Alberta. It is not known from the material provided whether there are any environmental health hazards in the area. No reference is made to health, social and other services, except to note that people would only need to leave "for higher order medical care"; presumably this means that basic primary and ambulatory care could be provided in the Towne, perhaps with a primary care centre at each neighbourhood square. Reference is made to the safety of pedestrians and cyclists, the provision of safe play areas "within two minutes walking distance of 50% of the housing they serve", and that "streets, to be safe and effective public spaces, must be populated by pedestrians"; four rules are proposed that will make the streets "feel like outdoor rooms".

Difficulties and Obstacles

Currently, many of the principles of McKenzie Towne are contrary to City of Calgary standards, including land use bylaws, road standards, and commercial land use policies. However, an Innovative Projects committee established by Calgary's Mayor is working with the developer, both to identify concerns and suggest solutions. Engineering and Transportation Departments were less willing to compromise, but have ultimately proven accommodating.

Consumer skepticism and predispositions towards larger homes and properties have proven more resistant to change. And though it proposes smaller lots, reconfigured homes and rear garages, the developer is confident that with time, its designs will gain acceptance.

Summary

Compared to the conventional suburban development, McKenzie Towne has notable strengths: in its overall structure and distribution of land uses and amenities, in the quality of its built environment, its greenways, its emphasis on public transportation, its handling of stormwater. Compared with other case studies, more might have been achieved in the areas of conservation, environmental protection, and social and housing mix. Nevertheless, the McKenzie Towne developers are to be commended for taking bold steps in a relatively conservative environment. Time will tell whether the compromises made in

response to conventional market demands and engineering standards mean that McKenzie Towne eventually becomes just another middle-class suburb with some unusually good design features.

Montgomery Village

Location: Orangeville, Ontario.
Area: 100 Hectares (250 acres).
Population: up to 750 units.

Status: under construction.
Designer: Berridge, Lewinberg, Greenberg.
Developer: Tribunal Developments/The River Oaks Group.
Contact: Marvin Green, River Oaks Group, (416)445-6900.

Context : adjacent to existing development on the western edge of Orangeville — a town of 17,000 people, 60 km northwest of Toronto.

Objectives: a compact and varied pedestrian-oriented development, with diverse housing types at a wide range of prices; integrated employment opportunities and preservation of existing natural features.

Built Form

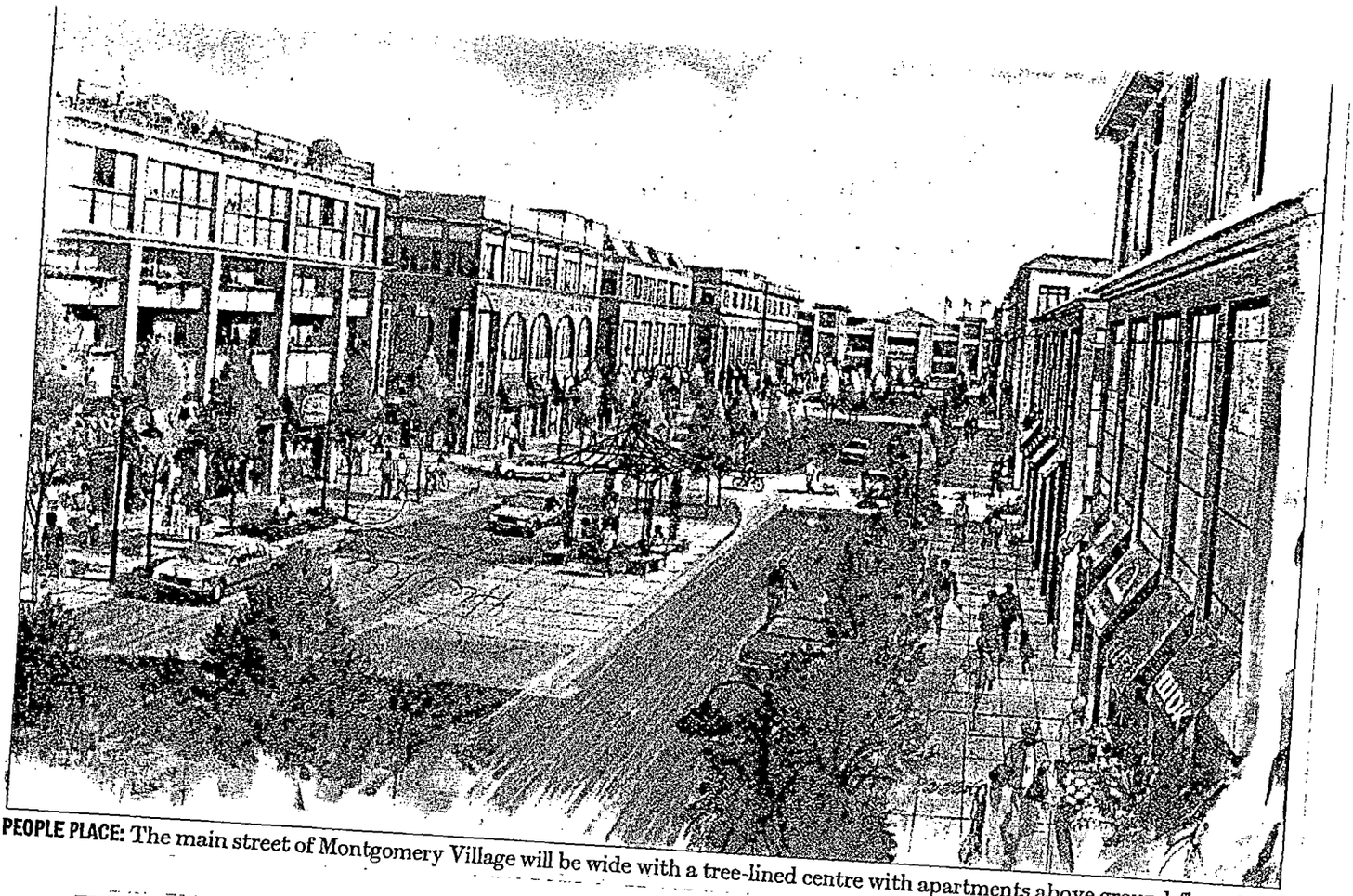
Building technology: to code.
Housing: mostly low-rise residential; detached, semi-detached and row housing. Some lots include garden flats and some units are convertible from one to two family.
Land use: residential, mixed use and employment area.
Site plan: a neo-traditional plan featuring compact, low-rise residential neighbourhoods, mixed residential and neighbourhood commercial uses along a central boulevard and larger commercial, industrial uses along a boundary road.
Transportation plan: pedestrian oriented. Local roads are one-way, with laneways and dedicated rear-yard parking spaces.
Infrastructure: compact right-of-way design with rear lane servicing.

Environmental Systems

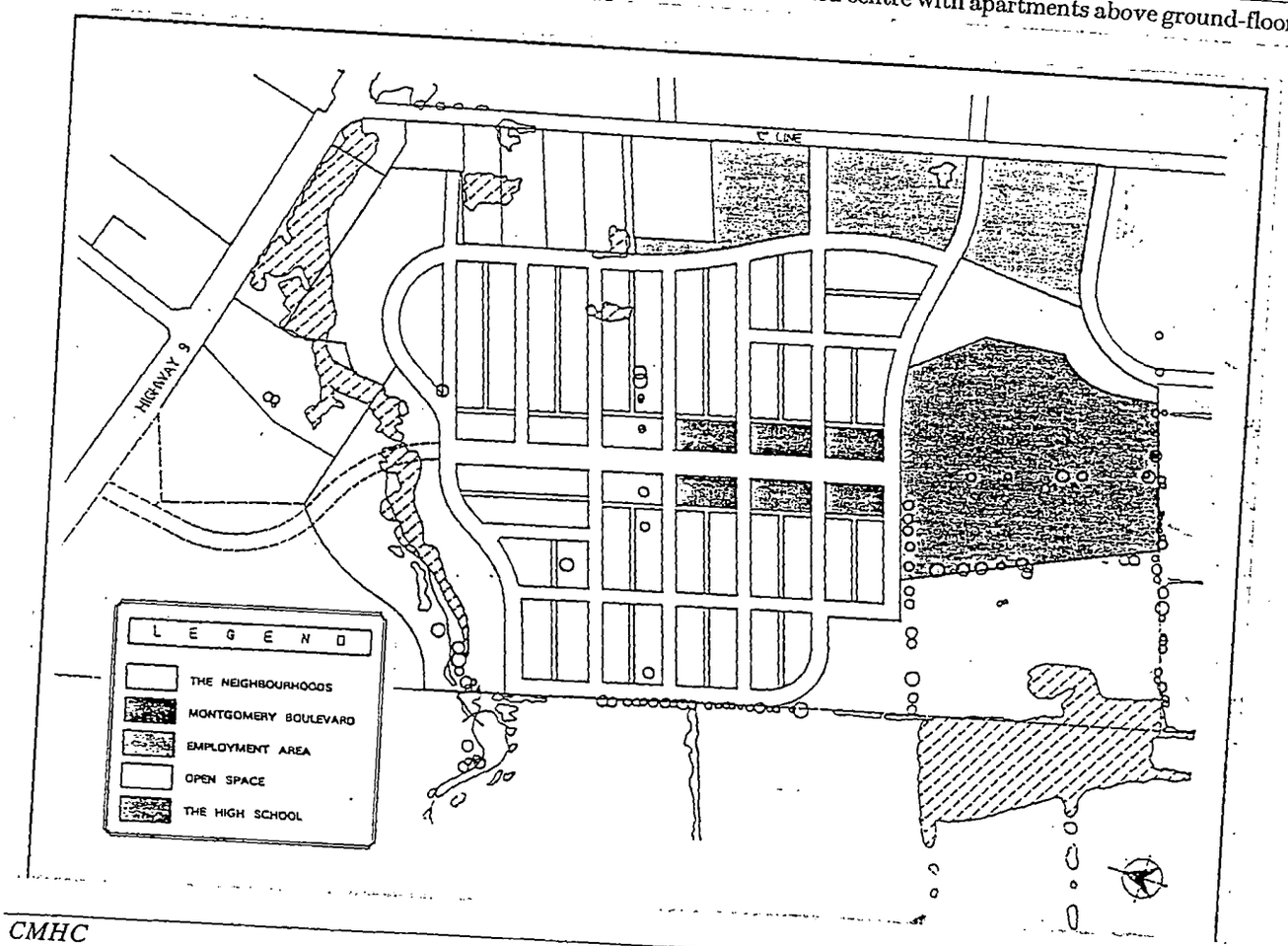
Energy: conventional gas and electricity supply.
Water: provided from well on site.
Sewage: municipal system.
Stormwater: Stormwater management is integrated with landscaping and uses overland swales where possible. Vegetation and permeable paving materials are used to encourage infiltration. Cisterns are proposed for irrigation.
Waste: municipal system.

Socio-economic Systems

Community services: A high school located adjacent to the site will serve as a public meeting place and local resource. Local retail, medical and other services will be provided along Montgomery Boulevard.
Employment type and density: A wide range of businesses will be permitted, provided they are compatible with the surrounding residential neighbourhoods. Many units are designed with home offices. The development is planned as a "telecommunity"; it will be wired with fibre optic cable and have access to a data, video and voice network.
Tenure and ownership: freehold, co-op housing and rental; also, limited equity and other affordability mechanisms.
Intended market or occupancy type: a range of incomes and life cycle stages. Many units are convertible to 2-family dwellings, or are designed to permit accessory dwellings.
Planning process: conventional.



PEOPLE PLACE: The main street of Montgomery Village will be wide with a tree-lined centre with apartments above ground-floor shops.



Resource Conservation and Environmental Impact

Montgomery Village uses a compact development form or "village concept", combining a mix of residential, commercial/retail and employment uses, in a typical "neo-traditional" development, serviced by back laneways.

Existing natural elements, including hedgerows, woodlots, water courses and the natural topography, will remain essentially "undeveloped". In addition, rather than taking the traditional approach to stormwater management (collection and removal off-site), the plan will utilize drainage swales and related over-land channels, to direct rainwater and run-off to temporary ponding areas. Relying on a combination of natural percolation into the soil (where soil conditions allow) and evapo-transpiration, the intent is to "treat" this storm water naturally before returning it to the ground water regime. These ponds will also be shaped to take advantage of shading from trees planted adjacently, so that water temperatures are amenable to a wider variety of fish species.

The plan suggests other built environment implications of run-off, as "other possible elements" of the storm water management plan. Included were permeable paving materials and cisterns on individual properties, "to collect rainwater for use in watering the garden, and possibly for non-potable household purposes." Based on concerns for long-term maintenance, the Town of Orangeville was not supportive of permeable paving. A more detailed stormwater management plan has been requested as a condition of draft approval.

With regard to potable water, the developer has proposed to develop a water supply source on site. Plumbing fixtures will voluntarily meet the 1996 Ontario Plumbing Code, but no details on how to minimize outdoor water demand, are provided. This would have been an ideal opportunity to minimize seasonal peak demands, and to reduce overall withdrawals from the ground water regime. The developer could have offered, as part of the development agreement with the Town, to reduce water withdrawals by 20 percent, through a water efficiency strategy including exterior landscaping.

As with many of the projects reviewed, Montgomery Village does not directly address the materials and energy aspects of resource conservation. There is no mention of energy efficiency in the design and layout of buildings or of resource considerations in selection of building materials. In addressing these issues the plan could have identified the implementation pathways necessary to ensure that environmental and resource conservation priorities are enacted.

Economic Viability

The Montgomery plan incorporates many of the neo-traditional principles and higher than conventional densities to create a compact development. However, this may not be sufficient to offset the inherent inefficiencies of extending the community infrastructure far from the existing settlement area and the town centre of Orangeville.

Moreover, the objective of reduced car dependency hinges on achieving the high live-work relationship proposed for the site; a challenging target of 1 - 2 jobs per household has been proposed. The developer proposes to install fibre-optic technology in the community to increase its competitive advantage. Additionally, the integration of living and working space will be promoted in the sales office. However, it must be remembered that Orangeville is itself a rural car-dependent community, and its suburbs will be hard-pressed to change that pattern. Based on the projected population, it is not certain that a transit system could be self-sustaining.

The road system adheres to the characteristic neo-traditional grid, although it tends to have longer blocks and fewer boulevards and public squares. Consequently, the efficiency of the road layout is better than with some other neo-traditional designs. This plan has made use of rear lanes, and both the capital cost and the on-going maintenance cost will be higher than the costs of conventional

subdivision layouts (see the discussion of Cornell).

The residential densities are about twice what would be expected in a suburban development, and it appears that a real trade-off has been made in favour of density versus sprawl over adjacent environmental areas. The compact form will offset some of the additional cost of infrastructure caused by the neo-traditional layout, although the average lot sizes are considerably smaller than other lots in Orangeville. A diversity of housing products will be offered, and most appear to be marketable and viable. The exception may be the mixed use and higher density blocks, since the usual urban intensity, public transit and services normally associated with a town centre will not likely be manifested in this small community. Similarly, the employment areas located on the fringe arterial road will have a hard time attracting a major employer, and are more likely to be light industrial or works yards, which will contribute little to the economic viability of the community. The area high school will provide employment and the potential for shared community facilities.

Equity

As a greenfield development largely unrelated to existing developments, Montgomery Village has been subject to the required public meetings and some additional meetings with municipal staff and politicians. No recorded special provisions have been made for resident participation in the planning, development or management of Montgomery Village. Housing types include detached, semi-detached, and row houses. Provision is made for some units to convert from one to two dwellings or vice versa, and accessory apartments ("granny flats") are considered an option. Prices are envisaged as relatively modest, and the inclusion of non-profit and co-op housing is foreseen. Thus a substantial demographic range is provided for. This is also encouraged by intended employment within walking distance of the homes in the "'C' Line Employment Area", local businesses, and home-work. Neighbourhood-type commercial and other services will be similarly accessible, and this could include services for particular groups if the demand existed. On the other hand, there is no reference in the source material to design and construction for accessibility to people with special needs. Standard utilities are provided. Local parks and playgrounds are provided, and the site includes part of a natural open space corridor which is to be maintained and enhanced.

Livability and Community

Livability features include "friendly", human-scale streets and frontages, a street system designed to encourage pedestrian use and limit heavy traffic, and some local services and facilities (including parks and playgrounds) within easy reach. There is no separate pedestrian/cycle system through the site, but the adjacent open space corridor could presumably accommodate trails. Total on-site open space relative to potential population amounts to approximately 4.6 ha/1,000. Montgomery Boulevard provides a well-defined focus of the "village Main Street" variety. The development is intended to be transit oriented, with a (30m right of way) main street designed specifically to accommodate public transit and streetscapes aimed at enhancing the enjoyability of walking, though there is no pedestrian street.

Traffic calming measures include one-way streets and reduced (16m instead of 20m) rights of way aimed at reducing traffic speed. No reference is made to planning and design to allow for weather or climatic conditions. The Village could be affected to some extent by noise and odours from nearby industrial areas, main roads and railways.

The scale and compact form of Montgomery Village, focused on a local "Main Street", is conducive to a sense of community, as is the provision for a range of ages and household types and the pedestrian-oriented streets and local open spaces. The high school adjacent to the village centre could provide a range of facilities and serve to a considerable extent as a community centre. Much stress is placed on the preservation and enhancement of natural features; no reference is made to cultural or man-made features, but these may not be relevant considerations.

Health and Safety

The developer is required to meet provincial standards for water quality from an on-site source. There is no evidence of environmental hazards, other than the existence of industrial areas and main roads in the vicinity. Health-promoting activities would presumably be available in the open space corridor and the high school. Primary health care has been suggested for premises on Montgomery Boulevard, as well as being available in Orangeville, and the Orangeville hospital is within easy reach; specialized health care services in Toronto are accessible by bus. Crime prevention was examined as a design factor; for example, the lane system incorporates lighting and laneway house numbering to allow rapid navigation for emergency services. The Village would obtain fire protection from the Town of Orangeville. The street plan would tend to limit traffic accidents, but the source material makes no reference to measures to reduce accidents in other locations such as the home, workplace or playground.

Difficulties and Obstacles

Existing codes and engineering standards were developed with conventional subdivisions in mind and do not facilitate compact development forms. For example, they often prohibit on-street parking, require wider street widths or prohibit the use of swales for drainage. For innovative projects, planners and developers must convince municipal authorities that the projects will work, and then, often, obtain exemptions from the conventional standards from a variety of municipal and provincial agencies. This is often easier to do in a smaller municipality where there is less bureaucracy and where it is easier for the staff and administration to get behind a project.

Summary

While some conservation opportunities seem to have been overlooked, with regard to water and energy in particular, in general Montgomery Village comes through the evaluation quite successfully. Notable features include the preservation of natural features, the handling of stormwater, the compact urban form, the range of housing provided (some of it "convertible"), and the provision for telecommunications. The last two features in particular should enable Montgomery Village to adapt successfully to change over time, although the targets for on-site employment seem unrealistically high. The New Urban design is compact and pedestrian-friendly, but, as shown in our comparison of New Urban with conventional layouts, comes at a premium cost, partially but not fully offset by the compact form.

WindSong

Location: Langley, B.C.
Area: 2.34 ha (5.8 acre).
Population: 30 units.

Status: submitted for municipal approval.
Designer: Davidson, Yufn, Simpson Architects.
Developer: WindSong CoHousing Cooperative Construction Association.
Contact: Howard Staples, (604) 888-1442.

Context: The site straddles a creek in a newly developed area of Langley. It is bordered by a townhouse and apartment development on one side and a subdivision of detached houses on the other.

Objectives: "to create, build and sustain a close, supportive community ... (by) providing common facilities ... (and) encouraging open communication and full participation."

Built Form

Building technology: design not finalized.
Housing: a range of units from 1 to 4 bedrooms in size.
Land use: The project occupies 13.13% of the site with the balance given over to a conservation area bordering the creek.
Site Plan: A double row of town houses is connected by an atrium which serves as a central pedestrian "street". Two wings of the project are connected by a "common house".
Transportation plan: The site is on a bus route and is within easy access of a commercial / retail area.
Infrastructure: Most of the required parking spaces are provided underground.

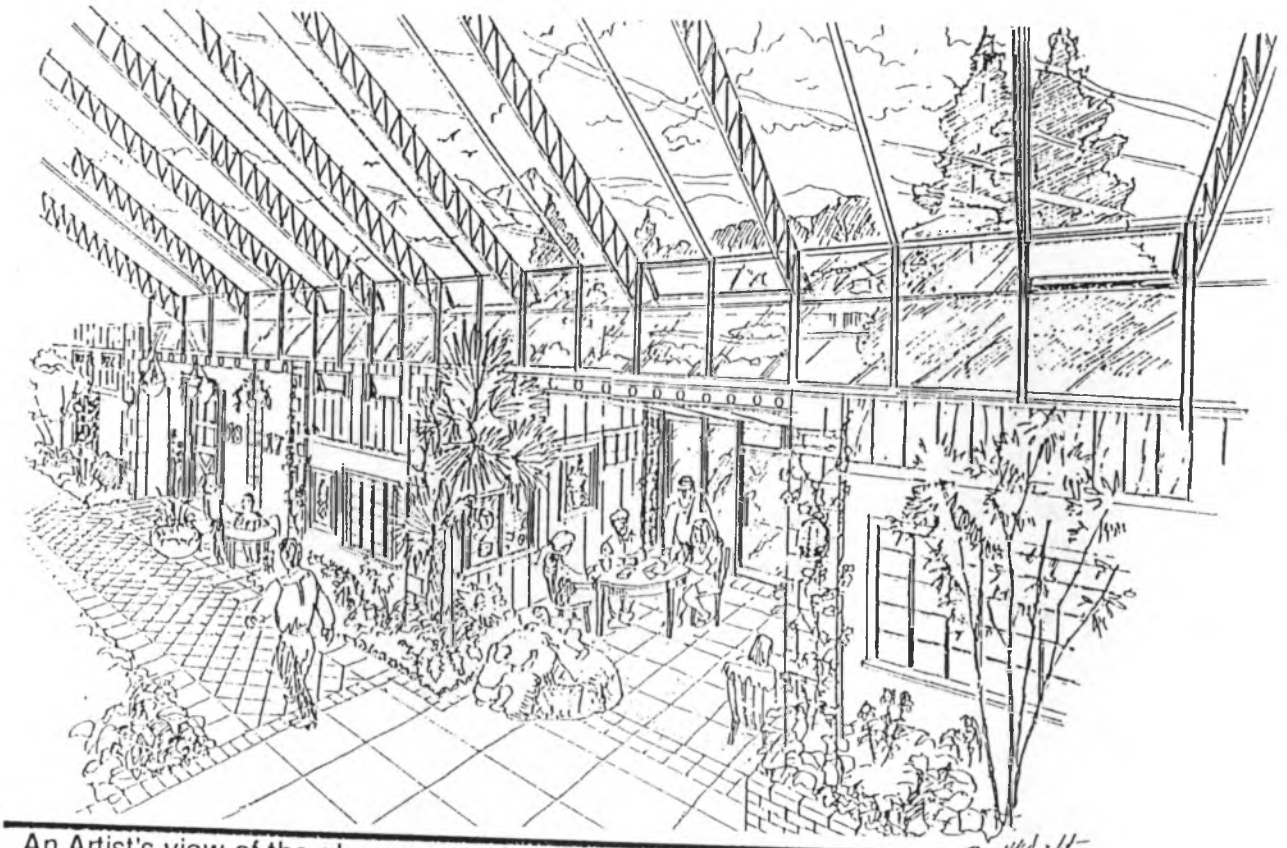
Environmental Systems

Energy: design not finalized
Water: design not finalized
Sewage: municipal system.
Waste: municipal system.

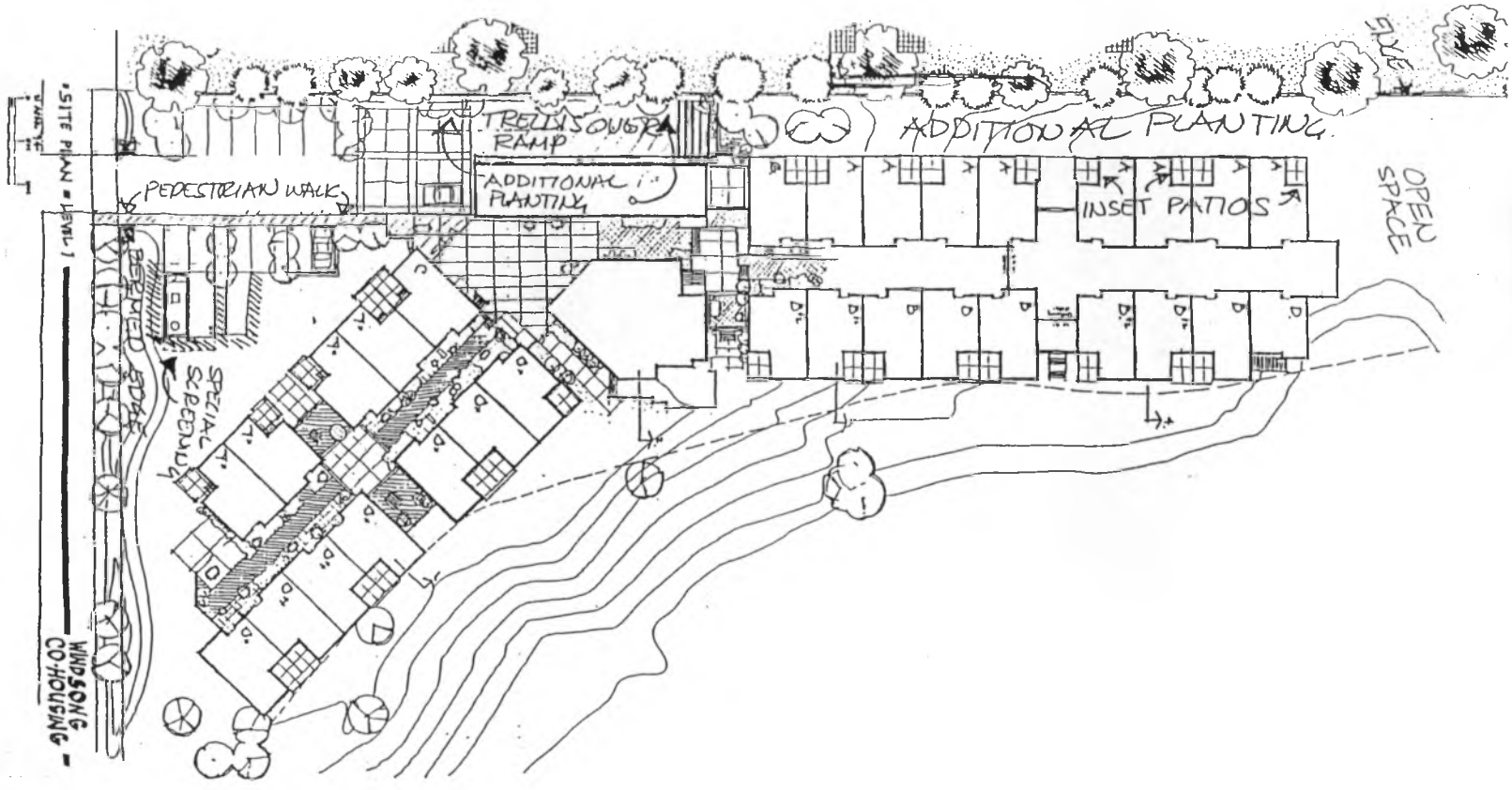
Socio-economic Systems

Community services: Common facilities include a dining area, lounge, children's play area, craft room, workshop, storage, laundry, recreation room and guest room.

Employment type and density: not applicable.
Tenure and ownership: Units will be privately owned.
Intended market or occupancy type: Units are designed to appeal to a variety of households.
Planning process: Members and future residents took an active role in the design of the project.



An Artist's view of the glass-covered street.



Resource Conservation and Environmental Impact

The developers of Windsong intend to continue the land stewardship practiced by the former owners of the site. Based on an analysis of geotechnical and environmental characteristics, development of the site will be restricted from the lowland areas and from an upland knoll. The lowland areas, originally cleared for pasture and recently inundated by flooding caused by beavers, will be devoted to open space. The banks of Yorkson Creek will be rehabilitated with native plantings, and an area including 5m from its banks will be protected by restrictive covenant. Actual coverage will be 13.13% of the site area, though 35% site coverage is permitted.

The project has incurred extraordinary costs with respect to the land stewardship measures noted above. Measures which have added to the cost include the low site coverage, site rehabilitation and provision of underground parking for most of the required parking spaces.

The project is now at the detailed design stage where efficiency measures such as low-flow toilets, insulation upgrades and advanced heating systems will be considered. However, it is uncertain as to what additional measures the project can afford to incorporate, given the heavy investment in environmental considerations related to land stewardship.

Economic Viability

The WindSong development is an infill project in an established mixed density suburban residential community. It was designed as a cohousing project from the outset, and has been able to incorporate the principles of efficiency, community and sharing. The energy conservation measures would have enhanced its long-term economics. Similarly, it would seem that opportunities were missed to eliminate or greatly reduce the size and function of individual kitchens, given that the common house is intended to be utilized for most meals, though this may have been a trade-off deliberately accepted by the members.

The project is located on a bus route, thereby facilitating the use of public transit for commutes to the city, but on-site parking is also very convenient with 2 spaces for most units (a standard that was likely imposed by the municipality). The units themselves range from one bedroom suites to five bedroom suites. Unit prices are not known, but the stated intent was not to produce "affordable" housing, but rather market housing designed to specific needs. If the project was designed by the eventual unit owners, then financial viability would not be a concern. If, however, the units were designed for sale at the same price as similar sized non-cohousing units, their marketability would be limited because of the specific type of lifestyle involved. The long-term adaptability of WindSong to changing conditions (market, social preferences, demographics) will be determined by the type and price of units in the context of a (now) unconventional manner of ownership and occupancy.

Equity

Like most cohousing developments, WindSong will be owner-occupied, although rental will be permitted, with the community retaining the power to control who the tenant is and to evict them. With respect to affordability, "though affordability is among our many goals, it is not the specific intention of [WindSong] to build homes that are priced below typical market prices." Moreover, proportionate costs for maintenance of common space etc. will be on the basis of the unit, not on income, "nor in any other way contingent upon the people living within the unit". However, there may be some cost savings due to a lower developer profit margin that has been agreed upon, the possibility of a degree of "sweat equity" and unfinished basements and due to shared facilities. On the other hand, these shared facilities and a commitment to high quality construction may increase costs.

There is a commitment to diversity in terms of age, race, family types, faith and status,

and to "universal design" for the elderly and people with disabilities. Units will range in size from 1 bedroom to 5 bedrooms.

Livability and Community

Great attention has been paid to livability in the design of WindSong. Like other cohousing projects, parking will be on the periphery and separate from homes, although vehicle access will be possible for heavy loads etc. The pedestrian streets will be safe for children and peaceful for neighbours. The numerous community activity areas will be complemented by gardens, orchards, treed areas and greenspace, including the significant natural habitat of the flood plain and valley lands on the site; the community intends to "respect and maintain perpetual stewardship of this watercourse and wildlife area".

In recognition of the rainy climate, walkways will be covered wherever possible and there will be sheltered outdoor play areas.

The design of the community will also be flexible to allow for changing needs over the life-cycle and provision will be made for home-based occupations. The units will be stacked to promote energy conservation and to shorten walking distances; noise protection and energy conservation measures will be better than required by the building code.

The site was chosen with a view to remaining "within commuting distance of much of Greater Vancouver" and within walking distance of schools, proximity to shopping and commercial areas and transit, and the availability of other recreational and community facilities.

The sense of community will be very strong; it is the underlying purpose of cohousing, as noted earlier. Windsong is based on the four characteristics of cohousing, namely: "1) residents organize and participate in the planning and design; 2) the ... design promotes a strong sense of community ...; 3) extensive common areas are provided ...; 4) residents manage the development, making decisions of common concern at community meetings." Thus the community seeks "... to create relationships in which differences are valued and respected, with a genuine effort to understand, with trust and open communication." Participative decision making using consensus is the norm, together with participation in the greater community. The many community facilities and activities that are envisaged will strengthen the sense of community.

Health and Safety

The sense of community and the livable design will contribute to health and safety (especially the pedestrian orientation), while the artistic and recreational facilities will also contribute. The only explicit reference to health and safety in the proposal is to the use of safe materials.

It is assumed that the development will meet all the usual code requirements for health and safety and that it is not sited in any known hazardous areas.

Difficulties and Obstacles

As with most cohousing projects, financing has been the major impediment. Many potential participants, although interested and willing to commit time to learn about the concept, are in the end unwilling to gamble financially on cohousing.

The intention was for the cohousing group to assume responsibility for financing, but participants were unable or unwilling to commit sufficient funding to the project. Eventually a developer, familiar with the processes of land use planning and willing to assume some risk with respect to both timing and eventual cost of obtaining approvals, secured financing for the project to go ahead.

A Provincial Ministry of the Environment determination that 1.6 ha of former farmland, now flooded by beaver activity, is "fish habitat" has rendered this entire portion of the site undevelopable. This decision seemed too severe to be taken seriously, but the MOE would not revise its position. Eventually, the development group was forced to concede and modify its design.

As with Cardiff Place, WindSong was subject to the generic obstacles facing all cohousing projects; lack of knowledge, lack of familiarity with planning and wariness on the part of lending institutions.

Summary

On the "people" criteria — community, equity; livability, health and safety to the extent that they apply — WindSong, as might be expected, gets very high marks; it does so also on protection of the biophysical environment. On the related criteria of conservation, specifically energy efficiency, and economics, it rates lower. Whether WindSong will be able to retain its high quality as a cohousing community in the long term remains to be seen.

Chapter V: Resources

Information Sources

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  Research Division
  700 Montreal Road
  Ottawa, Ontario K1A 0P7
  (613) 748-2000

- Canadian Institute of Planners
  541 Sussex Drive, 2nd Floor
  Ottawa, Ontario K1N 6Z6
  1-800-207-2138

- Canadian Urban Institute
  30 St. Patrick St., 6th Floor
  Toronto, Ontario M5T 3A3
  (416) 598-1606

- Cohousing Network/Ontario
  Ed. Russell Mawby
  182 Indian Rd. Cresc.
  Toronto, Ontario M6P 2G3
  (416) 760-8904

- B.C. Cohousing
  Ed. Fritz Radandt
  Cohousing Resources
  174 Bushby Street
  Victoria, B.C., V8V 4H9
  (604) 480-4815

- International Centre for Local Environmental Initiatives (ICLEI)
  8th Floor, East Tower
  City Hall,
  Toronto, Ontario M5H 2N2
  (416) 392-1478

- National Round Table on the Environment and the Economy
  1 Nicholas Street, Suite 520
  Ottawa, Ontario K1N 7B7

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