Innovative Land Development Standards:

A Post-Occupancy Evaluation of RPL Zoning in Edmonton

Using Parametric and Multiple Regression Analyses

By

Robert D. Brassard

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MASTER OF CITY PLANNING

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INNOVATIVE LAND DEVELOPMENT STANDARDS: A POST-OCCUPANCY EVALUATION OF RPL ZONING IN EDMONTON USING PARAMETRIC AND MULTIPLE REGRESSION ANALYSES

BY

ROBERT D. BRASSARD

A Thesis submitted to the Faculty of Graduate Studies of the University of Manitoba in partial fulfillment of the requirements for the degree of

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Dedicated to my Mother

ABSTRACT

The purpose of this study was to determine if innovative (reduced) land development standards lowered neighborhood satisfaction. Residential satisfaction theory suggested that smaller lots for several reasons would result in lower satisfaction levels.

Four hypothesis were formed regarding satisfaction and land development standards, and tested using two Edmonton subdivisions -- Kiniski Gardens and Pollard Meadows. Kiniski Gardens was zoned Planned Lot Residential (RPL), a zoning ordinance that allowed single family detached housing to be developed with innovative planning standards (i.e. reduced lots, setbacks and frontages). Pollard Meadows was a nearby subdivision developed with conventional standards (zoning ordinance RF1).

Questionnaires were used to examine and contrast satisfaction levels between the two study areas. Questions focused on a variety of residential satisfaction variables such as: residents' expectations before moving into the area, their contentness with privacy, safety, lot sizes, lot shapes and setbacks. The total sample size was 60 -- for Kiniski Gardens and Pollard Meadows.

Data showed that residents of the RPL subdivision were generally satisfied with their neighborhood -- although mean satisfaction scores were slightly lower than those of the RF1 sample. However, there were no significant differences between the two forms of housing with respect to residential satisfaction. Only 3.33% of those surveyed in the Kiniski Gardens area were either dissatisfied, or very dissatisfied, with living there. In fact, over 60% stated that they "would recommend this type of neighborhood to friends if they were looking to buy single family housing." However, there were some statistically significant differences between the two study groups such as satisfaction with lot size, lot shape, and density. The results also suggested that smaller lot sizes did not enhance the sense of community in the area. The five predictors of satisfaction were found to be privacy, neighbor homogeneity, neighborhood friendliness, lot shape and expectations.

CHAPTER 1: INTRODUCTION

This chapter discusses demographic, environmental and economic changes associated with the introduction of innovative urban land development standards. It states the purpose and importance of undertaking this study. Also included in this chapter is a description of the study's research strategy, and statements of delimitations and assumptions.

Background

There has been a considerable amount of social and demographic change in Canada during the last two of decades. Environmental issues are now of importance in civic discussions and have caused, for example, concern over the sprawl of development into the countryside. These concerns have caused planners and policy makers to re-evaluate policies guiding urban growth. This is of particular interest when examining land development standards for single family detached housing -- a major contributor to urban sprawl. However, in attempts to conserve land and achieve a more compact form of development some authorities contend that neighborhood livability has been compromised. There is little information on the substantive aspects of reduced standards to substantiate this type of claim. This study aims to add to knowledge on residential livability. It investigates levels of satisfaction of residents living in a neighborhood built with innovative land development standards. The remainder of this section briefly discusses some of the changes in the Canadian demographic and economic environments and their impact on urban land development regulations and housing affordability.

Canadian demographics have changed considerably since conventional land development regulations were framed. Moreover, housing policy based entirely on the traditional nuclear family is no longer valid. In 1961 Canada census the average number of

persons per private household was 3.9 (Statistics Canada 1986, 93-104). Today this average is about 2.7 persons per household (Statistics Canada 1986, 93-104). Not only are per household averages different from past decades but so is the composition of Canadian households. Today, non-family one-person households comprise almost 25% of the total number of households in Canada (Statistics Canada 1986, 93-105).

These changes have caused peoples' needs and desires to change with the times. This fact has serious repercussions on federal, provincial and municipal housing policies. This is pointed out in the "MODEL CODE for Residential Development" published by the Australian Task Force For More Affordable Housing that echoes the Canadian experience

> Households are getting smaller and more varied, and lifestyles are changing with more time spent in leisure outside the home. Not everyone wants a big garden or to pay for a large lot, and it is realistic and appropriate for residential development regulations to help improve the opportunity for people to have wider choices in housing, as can be achieved by the provision of small lots. (JVMAH 1989, 18).

In addition to social and demographic transformations are economic changes. Canada's economic environment is changing and causing market uncertainty. Affordable single family detached housing is now a critical issue. It is of concern despite low interest rates (the Bank of Canada's prime lending rate as of November 1, 1992 is 7 1/2 percent). For instance, the average price of a starter house according to the CMHC (1991) is still $175,590 in Toronto, $133,180 in Hamilton, Ontario and $93,950 in Edmonton, Alberta. Notably, a significant component of starter home prices is land and development (site servicing) costs.

The affordability problem is exacerbated by the fact that "the prospect of owning and living in a freestanding house on its own land is an enduring element in American [and Canadian] aspirations" (APA 1986, 1). Michelson (1969, 191) notes that "no-one wants to live in a multi-family walkup apartment". Moreover, research has shown that owning a

single family detached house is the preferred choice among urban dwellers (Stokols and Altman 1987 and Commonwealth Department of Health, Australia, 1991). Furthermore, "forecasts by the [City of Edmonton's] Planning and Development Department indicate that from 1987 to 1992, suburban single family housing is expected to account for over 95% of new housing construction in Edmonton" (Edmonton Planning and Development Department 1991, 8/53).

The significant changes in social attitudes, demographics and the Canadian economic environment have substantially impacted housing policy. Consequently, a number of alternatives have been explored to cope with these changes and make new houses more affordable, more environmentally sensitive and to meet the changing needs and desires of the Canadian population. One alternative advocated by planners, developers, designers and policy makers is to re-evaluate conventional land development standards as they pertain to single family detached housing. The overall intent of development standards as stated by the Canadian Housing and Mortgage Corporation (CMHC) in an Affordability and Choice Today (ACT) publication states that

> The purpose of land development standards is to provide for the orderly development of land within the province, region and municipality and to ensure that communities are adequately serviced. (CMHC 1989, 3).

However, some argue (Wentling 1990; Regional Working Committee on Innovative Urban Development Standards 1991; Kingsley 1989; Burchell et al. 1976; Carliner 1989; Hershey et al. 1983; Lozano, JAPA 38; Mingilton 1979; Sanders 1982) that today, conventional land development standards are outdated, being designed in many cases more than 20 years ago, and are excessively costly. Kingsley (1989, 1) argues that "the heart of the problem as it is typically described is that the standards in these regulations require unreasonably costly materials, technologies, and land use patterns -- so much so that legally approved housing is unaffordable [sic] to most new urban households".

The Province of Ontario, a major participant since 1973 in the call for regulatory reform, has completed a significant amount of research into "land use planning practices which can create the opportunity to provide an adequate supply of affordable housing types rather than impede it" (Regional Working Committee on innovative Urban Development Standards - hereinafter to be called 'RWCOAUDS' 1991, 1). The basic objectives of many federal, provincial and municipal efforts regarding regulatory reform are stated by CMHC (1991)

> There are two objectives in reforming regulations related to land development standards. One objective is to ensue land development standards result in housing types, forms and tenure that meet the needs of the community . . . A second objective is to ensure that the cost of land development standards do not outweigh their benefits. (CMHC 1991, 3).

It has been argued (Sanders 1976; US General Accounting Office 1978 and others) that one way to relieve the pressure of these development components (i.e. land acquisition cost and servicing) is with "increased densities, less restrictive engineering standards such as reduced right-of-way width and flexible planning standards, for lot and housing size[which] would help make housing more affordable" (RWCOAUDS 1991, 2).

Many government sponsored studies have been produced relating to innovative land development reform (Paul Theil Associates 1979; British Columbia Ministry of Municipal Affairs 1980; Associated Engineering Services 1983; Ontario Ministry of Housing 1991; De Leuw Cather 1977; Cohos Evany and Partners 1975; Willis, Cunliffe, Tait and Company Ltd. 1977). These government studies infer that not only would revised land development standards reduce the price of the average house by an estimated $8504 per unit (RWCOAUDS 1991, APPENDIX 1), but they would reduce the consumption of valuable rural land required for urban use. Notably, the estimated cost savings of up to

$8,504 per dwelling is a conservative estimate compared to that of $9,437 calculated by the Ontario Ministry of Housing (1990).

Land development regulations are, essentially, comprised of two different types of standards -- engineering standards and planning standards. Engineering standards govern several subdivision development elements (Del Can, De Leuw Cather Western Ltd. 1984) such as: waterworks specifications (i.e. pipe systems, hydrant spacing, line valves and water-house service connections), sanitary sewer specifications (i.e. pipe sizing, pipe gradients, manholes, and sanitary-house service connections), storm drainage specifications (i.e. pipe systems and catch basins), and roadway specifications (i.e. right-of-way widths and paved surface width).

Planning standards, both zoning ordinances and subdivision site regulations also govern land development. Specifically, the planning standards that regulate suburban development are: housing mix specifications, side yard requirements, density, lot area, coverage, lot shape, and setback requirements.

Together, engineering and planning standards control the layout, use, composition and development intensity of a parcel of land. Examining these types of standards are important since "previous research has demonstrated that the nature of such rules and regulations and the ways they are implemented by [civic] officials have an influence on the degree of satisfaction of the tenants with their housing [and neighborhood] units" (Onibokun 1974, 190; also see Lempert and Ikeda 1958).

Problem Statement

There is little evidence to support the statement that innovative land development standards per se "encourage more humane neighbourhoods" (Ontario Ministry of Housing 1991, 1). Only cost calculations have been used to examine the benefits of these new standards. No empirical or formal research using compositional and contextual variables has been conducted into the sociological or the socio-psychological effects of developing single family detached housing with lower development specifications. Currently, the success or otherwise of regulations such as Planned Lot Residential (RPL) zoning in Edmonton is therefore problematic while the information on the topic is limited.

It has been argued that "if policy can be defined as 'guides to action and rules of choice that apply priorities to specific decisions' (Meehan 1974, 4), then it is appropriate that research on the topic focus on the need to inform policy makers" (Francescato et al. 1987, 43). Yet even though it is recognized that *information* is a critical element in the planning process, a post-occupancy evaluation has never been performed on any of Edmonton's RPL zoned communities. Moreover, research in general into the effects of reduced land development standards on residential satisfaction is negligible. Consequently, neither planners, designers nor developers fully understand the implications of designing communities with reduced land development standards. A post-occupancy evaluation, such as the one undertaken in this study, would be the next logical step in the planning process, after the design and implementation stages. The research proposed is intended to be used both to improve the local neighborhood environment and to influence the vast, complex system of designers, planners, builders, and regulators who plan and build residential neighborhoods.

The Present Study

There has been a significant amount of research into the cost savings associated with innovative land development standards (specifically as they pertain to single family detached housing), but there has been no research into the consequences of using such standards. Although more compact single family detached developments are desirable from cost and many environmental points of view, no study in Canada has researched the levels of satisfactions of occupants living in single family detached neighbourhoods using more economical layouts and standards (i.e. smaller lots, smaller right-of-way widths, narrower lots, smaller frontages). There has been limited indirect work done on the topic in the United States by Lansing and Hendricks (1967), Michelson (1969) Onibokun (1974) and Lansings and Marans (1969), all of whom conclude that people living on small lots in compact neighborhoods experience lower levels of satisfaction than people living on larger lots. Conversely, a recent study by the Model Task Force of the Joint Venture For More Affordable Housing (1989), in Australia, concluded that residents on smaller lots do not have satisfaction levels significantly different from families on larger type lots. Notably, the results from this Australian study have not been replicated here in Canada. Thus, at best the empirical evidence on the topic is contradictory.

This study will inquire into the levels of residential satisfaction of residents living in a neighborhood built using reduced land development standards. It will examines satisfaction levels, using questionnaires, of residents in the Kiniski Gardens district of the Burnewood neighborhood (BWN) located in Edmonton, Alberta, Canada. Kiniski Gardens neighborhood is zoned Planned Lot Residential (RPL), that is a zoning ordinance that allows land to be developed with reduced planning and engineering standards. The questionnaires administered to the residents will be designed, largely, on a (close-ended) five-point Likert scale (see Likert 1932). Questions will focus on a variety of residential

satisfaction variables such as: expectations before moving to the area, satisfaction with privacy (including acoustical privacy and visual intrusion) lot size, lot shape, and safety (including traffic and crime). Also included will be an overall neighborhood satisfaction index. The proposed sample size used for the RPL community is thirty households.

The responses from the Kiniski Gardens residents will be contrasted and compared with results obtained from residents of Pollard Meadows (an adjacent neighborhood). The Pollard Meadows neighborhood is designed with conventional land development standards (zoning ordinance type RF1 in the City of Edmonton Land Use Bylaw #5996). The size of the RF1 neighborhood is also thirty households.

Both neighborhoods were initially developed in the early 1980's and are currently part of a comprehensive area structure plan (Bylaw #6055). They are located in the south-east portion of Edmonton and have a combined estimated population of 3,269.

The RPL zone is vividly different from the typical RF1 zone. For instance, the average lot size in Kiniski Gardens (zoned RPL) is $343m^2$ compared to $465m^2$ in a typical RF1 zone. There are other significant differences such as density and frontage requirements. The average density of a RPL zone is 28.32 units/hectare compared with RF1 averages about 15.44 units/hectare with a average lot width of 8.84 meters that is on average 50% - 60% narrower than the Edmonton norm (Edmonton Planning and Development Department 1991, 9/53).

By using neighborhoods from the same geographical area with approximately the same level of municipal services (i.e. fire protection, police protection, ect.) and approximately the same level of access to regional facilities (i.e. schools, shopping facilities, and the City's central business district), any differences in satisfaction levels may be associated with differing land development standards. "This [design] framework explicitly recognizes the physical environment by indicating the *objective attributes* of the particular environment [which] have an influence upon a person's *satisfaction* through the

person's *perceptions and assessments* of those environmental attributes (Weidemann et al. 1985, 157).

The Importance of This Study

Examining residents' satisfaction is important. Rent and Rent (1978, 481), for example, illustrated that "general life satisfaction was significantly related to both housing and neighborhood satisfaction" (also see Angrist 1974; Fried 1963; James and Brogan 1974; Shelly and Adelberg 1969). Campbell, Converse and Rodgers (1976, 48) showed "that objective characteristics of neighborhoods have important influence on residential satisfaction" (also see Rossi 1972). It has also been argued that "although we are far from having an integrated theory of the effects of the physical environment on psychological functioning or social behavior, the evidence for the importance of spatial variables for residential and non-residential experiences is substantial" (Fried 1982, 108). Furthermore, "it follows that the residents' attitudes and behavior are important domains of study, which can be ignored only at substantial peril not only for the research community, but also - and more important - for the well-being of the social, political, and economic structures of a nation" (Francescato et al. 1987, 45). For the above reasons it is important to examine and evaluate the effects of developing neighborhoods with reduced land development standards.

Even though several municipalities in Alberta (i.e. Red Deer, St. Albert, Calgary and Hinton), as well as many in Eastern Canada, have authorized the construction of communities using reduced standards, so far none have performed post-occupancy evaluations into the livability of such communities. In other words, in Canada, no research on innovative development standards and residential satisfaction has been previously undertaken. This research will also provide planners, developers, builders and designers

with needed feedback on design concerns, problems and perceptions of more compactly designed communities. A mail survey will be used to collect needed information since past research shows that "attitude surveys can be effective indirect means of involving citizens in the planning process . . . [and it] in effect enables the planner to go directly to all the people to determine differences as well as concerns in values and objectives" (Lansing and Marans 1969, 199). Hence, it is expected that the results from this study will help government officials and the private market achieve a pattern of development that is consistent with citizens' values, aspirations and expectations.

Research Strategy

Literature relating to residential satisfaction predictors, as well as development standards, will be reviewed in chapters 2 and 3 of the study. Based on the literature review, hypotheses will be formed, in chapter 2 about satisfaction levels of residents living in the RPL and RF1 districts.

Chapter 4 will describe the two site areas and state the selection criteria used to choose them. Moreover, it will explain the survey methodology. Photographs and land-use maps will also included in this chapter to show physical differences between the control group and the conventionally-designed neighborhood. In addition, the study's method of data analysis will also be elaborated upon. The questions will specifically inquire into satisfaction levels with the physical, social and socio-psychological environments in the respective neighborhoods. Special attention will be given to zoning characteristics (i.e. lot size, lot shape, set backs and side yards). In addition, intervening variables such as privacy, safety and crowding will also be measured and related to development standards.

Chapter 5 will consist of descriptive and inferential analyses of the parametric data. Specifically, this chapter will perform multiple regression, correlation analyses and t-tests

on the data sets. From these tests, mean satisfaction scores can be contrasted and compared as well as satisfaction correlates. In addition, predictors of satisfaction for residents living in RPL zoned neighborhoods will be determined in order to delineate the importance of different variables on satisfaction levels (i.e. safety, privacy).

Finally, chapter 6, will conclude with a summary of the findings and discuss any differences between the two study groups and the formed hypotheses. Thus, empirical evidence will be advanced that can be used to argue the suitability of compact residential urban development.

Delimitations

As stated previously this study is primarily concerned with the impact of land development standards upon residential satisfaction. Although many factors affect residential satisfaction (i.e. municipal services, property taxes, and the regional political environment; see Tiebout, 1956), this study concentrates on land development standards and is limited to RPL-style development regulations. It does not include a discussion of site specific zoning such as DC5 zoning in Edmonton, nor does it address modified street specifications associated with community owned right-of-way widths such as the development at 36 Street and Kirkness Road in Edmonton.

Also, no attempt is made to determine the subjective valuations that the participants used to evaluate their own satisfaction levels. In other words, it does not attempt to determine or explain individual judgment criteria used in evaluating the various features of the physical and social environment. The study is therefore limited to attempts at isolating and comparing land development factors that relate to residential satisfaction and housing affordability.

This study should not be interpreted as a treatise on satisfaction and development standards, but rather as the first step in the understanding of how residents, residing in neighborhoods designed with innovative land development standards, feel about their immediate living environment.

Assumptions

It must be assumed that attitudes, perceptions and satisfaction levels of Kiniski Garden residents are typical and representative of similar RPL zoned communities in general. Compared with other RPL zoned neighborhoods in Edmonton (i.e. Dovercourt, Ottewell, Millbourne, Blue Quill and Willowdale), Kiniski Gardens is typical. Having an average parcel size of $343m^2$ ($13m^2$ below the aggregate average), 28.3 dwellings per net hectare (1 unit above the aggregate average), and an average of 2.87 persons per dwelling unit (0.13 less than the aggregate average), it is assumed that Kiniski Gardens is representative of the RPL zoned population (for more information on selected property and demographic characteristics of dissimilar RPL areas see City of Edmonton 1986, 12). Therefore, the results from this study may cautiously be generalized to include other similar communities within the province of Alberta and may be applicable to similar settlements across the country (for a discussion on the problems of over generalization see Rappoport 1980).

It is assumed that the RF1 zoned neighborhood of Pollard Meadows, that met the selection requirements, is typical of RF1 zoned communities at large (i.e. its age, housing style, demographics and amenities).

CHAPTER 2: LITERATURE REVIEW

This chapter states the sources of information that were used in gathering information related to residential satisfaction and development standards. It provides a detailed discussion of residential satisfaction constructs and correlates. It abstracts satisfaction variables from the literature reviewed and forms four hypotheses about innovative land development standards and residential satisfaction.

Sources of Information

The information used in this study was gathered from various government and academic sources as well as information obtained from a National Standards Conference held in Ottawa, Ontario in February 1992. Information related to theoretical constructs of residential satisfaction was amassed from academic journal articles such as Environment and Behavior, the Journal of the American Institute of Planners and the Sociological Quarterly. Empirical field research on residential satisfaction was collected from the Environment Design Research Association (EDRA) conferences, journal articles, books and research reports from universities and government agencies such as: Weidemann et al., University of Illinois 1987; the Joint Venture For More Affordable Housing in Australia 1989; and Anderson et al., University of Illinois 1981. Furthermore, Hytelnet, an international computer network connecting over 1200 libraries world-wide, was used in the search for related literature on urban development standards and residential satisfaction.

Information related to cost savings and innovative land development standards was collected from government sponsored engineering studies (i.e. Associated Engineering 1983 and DeL Can, DeLeuw Cather 1984), in-house government publications and research sponsored by the Canadian Housing and Mortgage Corporation (CMHC).

Information related to survey methods and questionnaire design was gathered from Earl Babbie (1973) and Dillman (1978). Finally, statistical methodologies, distribution assumptions, multiple regression analysis and model specifications were abstracted from two primary sources -- Gujarati (1988) and McClave et al. (1988).

Definition of Terms

Residential Satisfaction

The experience of contentment with one's housing. It is housing that acts to fulfill one's psychological, physical or social needs and desires -- and results in mitigating pain, discomfort or anxiety. Moreover, residential satisfaction is individual oriented and results from the fulfillment of social, psychological and physical inadequacies related to the dwelling unit and neighborhood. It is important to note that identical housing situations can result in differing satisfaction levels from individual to individual.

Standards

"The term 'standard' applies to any definite requirement established by authority -- but this fact does not necessarily mean that the standard is fair, reasonable, or equitable, or is based on sound scientific knowledge" (Mood 1969, 21).

Overview of Literature

The literature reviewed, in this chapter, on residential satisfaction was shown to be influenced by individual needs, desires, expectations and aspirations. It was found to be an aggregate of different levels of housing -- community, neighborhood, and the dwelling unit. It was also found to be based on one's perceptions and beliefs (that are culturally and individually dependent), about a particular environment. These perceptions and beliefs

together with past housing experience formed the heuristical criteria by which environments were judged.

Residential satisfaction was found to be multi-dimensional and determined by a series of variables. It was strongly influenced by the physical environment that included such features as: dwelling quality, lot size, neighborhood density, open space, landscaping and maintenance. Social features were also a determinant of residential satisfaction and included such aspects as: neighbor relationships and resident homogeneity. Non-spatial features such as privacy and safety were correlates of residential satisfaction. Hence, the research showed that people preferred environments that were safe, friendly, and allowed for personal solitude, when so desired. The remainder of this section discusses the constructs of residential satisfaction, its criticisms, past analytical techniques and offers detailed examination of relevant and significant dimensions of residential satisfaction.

Constructs of Satisfaction

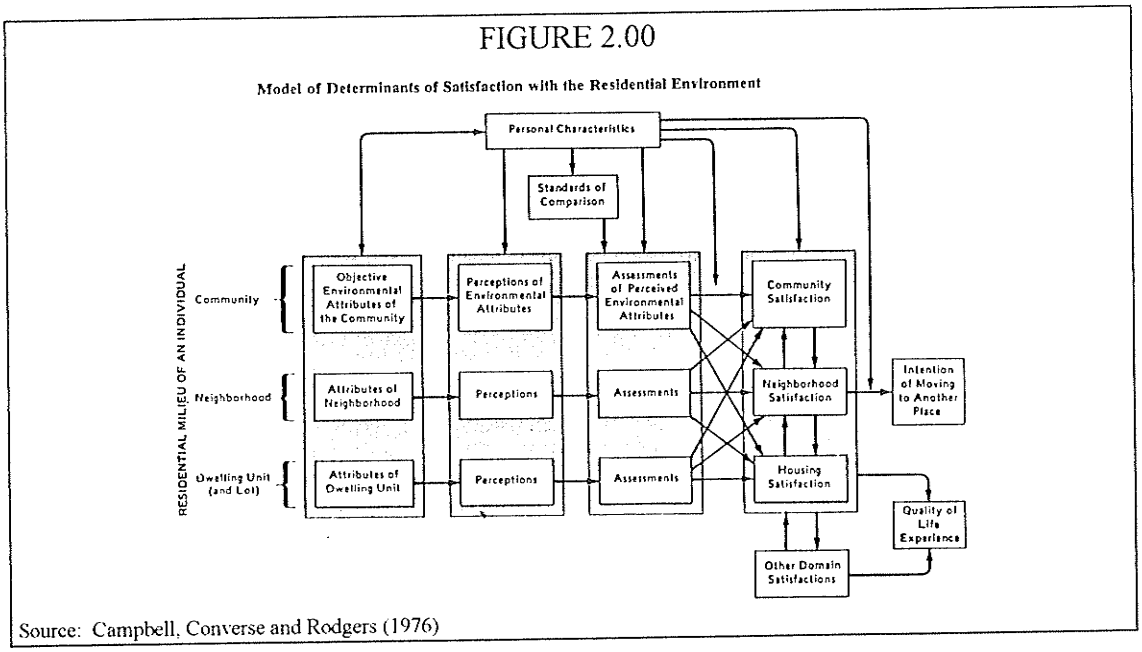
Models of residential satisfaction have evolved in complexity and sophistication, particularly over the last three decades, having evolved from including strictly emotional responses to encompassing affective, cognitive and behavioral responses. Ajzen and Fishbein (1981) argued that these three general categories encompass the types of ways people respond to social situations. Affective responses were emotion laden (and therefore culturally dependent); cognitive responses were perceptual and belief based; and behavioral responses were derived from conduct. These three broad categories made up a response trilogy that was used in whole, or in part, by satisfaction researchers. Weidemann and Anderson (1985) believed that

> these three categories also describe the potential ways in which an individual can respond to all physical and social-physical objects. Thus, these are the ways that people respond to their home, and these are the

dimensions available for understanding the evaluation of house as home. (Weidemann and Anderson 1985, 155).

However, two latent intervening variables in affective and cognitive evaluations were an individual's aspirations and expectations. Campbell, Converse and Rodgers (1976) examined the components of individual judgment criteria. Their proposed model explained that satisfaction (a trilogy) depended on "comparisons between the situation as experienced in its diverse detail and the individuals standards [derived from past experience and observations] most notably of these standards in a proximal sense being aspirations and expectations"(Campbell, Converse and Rodgers 1976, 219). They asserted that evaluation of the physical environment included one's perception of it, relating it to pervious contextual experiences, one's expectations and one's individual character. Their model contained all elements of the response trilogy. It related objective conditions, subjective experiences and personal characteristics to residential satisfaction. Their deterministic model is illustrated in figure 2.00. Marans (1976) noted that the concept of comparative standards was complex.

FIGURE 2.00

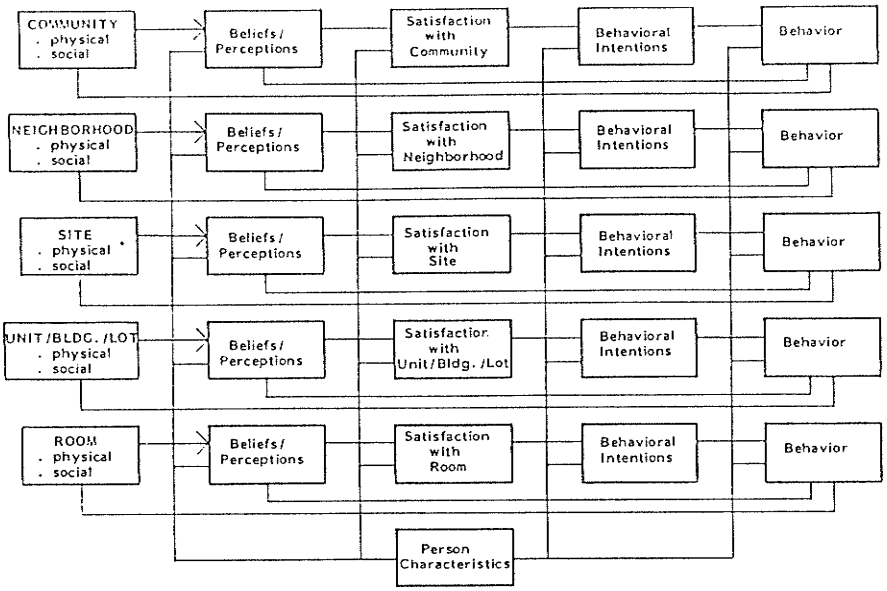


Source: Campbell, Converse and Rodgers (1976)

The inclusion of "personal characteristics" and "standards of comparisons" allowed for individual eccentricities (i.e. social class biases, one's stage in life, personal values). The model also differentiated between three scales or levels of analysis -- the community, the neighborhood, and the dwelling unit. The units were structurally separate, but intimately interacted with other domains in a causal way on residential satisfaction (see Wirth 1947 and Michelson 1976). This model was similar to other theoretical models hypothesized by other authors such as : Spreckelmeyer and Marans (1981), Speare (1974) and Marans and Rodgers (1975).

Weidemann and Anderson (1985) accepted the conjecture that there was a causal relationship between affective, cognitive and behavioral responses. However, they noted that the relationship may not necessarily be unilateral. They modified the Campbell, Converse and Rodgers (1976) model to allow for indirect causal linkages. This modification recognized "that these relationships may indeed be more complex and reciprocal than it was previously thought" (Weidemann and Anderson 1985, 159). Notably, this model included the intervening variable of behavioral intentions (also see Fishbein and Ajzen 1975). The modified model also explicitly recognized social factors in an environment. This adjustment considered previous empirical evidence (Fried and Gleicher 1961 and Speare 1974) showing that social ties and relationships were important variables in evaluating residential environments. The Weidemann and Anderson (1985) model was, arguably, the most rigorous theoretical model to date and was used as the base model in this study. Figure 2.01 illustrates their multi-lateral, multi-level model.

FIGURE 2.01



Conceptual model of satisfaction: Extended to include levels of scale, and social components of the residential environment.

Source: Weidemann and Anderson (1985)

Criticisms of Satisfaction Constructs

Some academics have questioned the validity of residential satisfaction as an effective tool for evaluating and improving residential environments. Francescato et al. (1987) identified the most common conceptual criticisms of residential satisfaction, and are as follows: (1) the distribution of reported satisfaction levels are skewed, likely by falsified responses, and therefore biased; (2) subjective variables (i.e. contextual quality and compositional characteristics) are not correlated with physical objective variables and are therefore irrelevant; (3) residential satisfaction is subjective and therefore too obscure to be a valid evaluation measure; (4) satisfaction is based on one's past housing

experiences, but responses are limited, as those with little housing experience cannot critically compare types -- thus the measure of satisfaction is limited.

The first criticism of skewed response (i.e. the chi-square distribution) was reputed by Campbell, Converse and Rodgers (1976) who "examined the issue at length and concluded that there is no evidence that high levels of satisfaction do not, in fact, accurately reflect the respondents perceptions" (Francescato et al. 1987, 48). The proposition that participants falsify responses, especially in mail surveys, lacks rigorous empirical evidence. Moreover, it would not seem unusual for people to be more satisfied than dissatisfied with their dwellings and neighborhoods since, generally, most of the basic shelter needs are readily met (i.e. water and sewer services, garbage collection services, police and fire protection services, protection from climatic elements and privacy).

The second criticism of satisfaction constructs was that subjective data measures lack correlation with objective measures (i.e. behavior). This claim is sterile. If one examines consumer market trends it is immediately apparent that satisfaction and behavior are intimately related. This criticism, forwarded by Olander (1976), was also refuted by Marans and Rodgers (1975) who state that

> Subjective indicators are needed to supplement objective indicators for the obvious, but often overlooked, reason that an individual's satisfaction with an set of circumstances is dependent, not only on those circumstances as viewed objectively, but on a whole set of values, attitudes, and expectations that he brings into the situation. As an example, satisfaction with a meal depends not only on such objective characteristics of the food's nutritive value and its temperature, but also on how hungry the individual is, his attitude towards the particular foods, and his expectations, given the prices of the items on the menu. (Marans and Rodgers 1975, 302).

The third criticism of the model was that satisfaction is subjective and likewise changes over time, therefore it is too capricious to be of significant value. However, knowing that the ultimate goal of planning and public policy making is to instigate and

stimulate people's happiness, it would seem only fitting that policies change to meet new technologies, needs and desires. Thus, satisfaction as an index of human sentiment that changes with cultural development and values would seem to be a superior method of policy adjustment then studying objective ones alone.

The fourth criticism argued that satisfaction indices were based on judgment criteria from one's past, thus inexperience with a variety of environments will yield ignorant responses. Francescato et al. (1987) respond to this assertion stating that

> It [satisfaction] is certainly not intended to provide anything other than respondents' perceptions - conditioned as they may be not only by unawareness of innovative options, but also by other intervening constrains that my or may not exist were circumstances different. Hence the desirability of integrating findings from satisfaction research with other models of inquiry . . . . (Francescato et al 1987, 50).

The criticisms of satisfaction as an effective tool for residential evaluation do not undermine satisfaction research. At best these criticisms illustrate some limitations of the model when it is used alone. It is therefore argued that satisfaction indices continue to be a useful and fruitful method of evaluation residential housing.

Early Models of Residential Satisfaction

Formal empirical research into residential satisfaction as an indicator of housing quality began in the 1960's with work initiated by Fried and Gleicher (1961), Michelson (1966), and Lansing and Marans (1969). This work on understanding and measuring residential satisfaction began from a belief that traditional methods of focusing exclusively on features of the physical environment was incomplete. "Even before complete execution of many long-term programs came the realization that the underlying assumption of a relationship between the social and physical environment was not as strong as first

suspected, if it existed at all" (Rent and Rent 1978, 460). Fried and Gleicher (1961), arguably the pioneers of residential satisfaction research, showed that kinship ties and neighbor relationships were positively related to residents' feelings about their neighborhood. Thus, after studying Boston's West End, it was also concluded that "the residential area is the region in which a vast and interlocking set of social networks are localized. And, . . . the physical area has considerable meaning as an extension of home, in which various parts are delineated and structured on the basis of a sense of belonging" (Rent and Rent 1978, 315). Fried and Gleicher (1961), inferred that in addition to physical elements, the sense of community belonging (spatial identity), interpersonal ties and kinship ties were important in neighborhood evaluation and residential satisfaction.

These results indicated that positive feelings about one's neighborhood were caused by more than purely physical elements. Thus, the idea that problems related to slum areas could be overcome solely by replacing or modifying the physical environment was discredited.

Lansing and Marans (1969), too, examined components and measurements of residential quality and habitability, and by focusing on the Detroit region of Michigan, U.S.A., began to expand on the components used in neighborhood evaluations. They believed that neighborhood quality and satisfaction correlates were multi-dimensional. It was also surmised to be multi-level -- the housing unit, the neighborhood unit, and the community unit (also see Schorr 1963 and Wirth 1947). Lansing and Marans (1969) used an attitude survey to evaluate neighborhood quality. According to them a high quality environment "may be defined as one that conveys a sense of well-being and satisfaction to its population through characteristics that may be physical (housing style and condition, landscaping, available facilities), social (friendliness of neighbors, ethnic, racial or economic composition), or symbolic (sense of identity, prestige of values)" (Lansing and Marans 1969, 195). Equally important, they showed there were considerable differences in

the way planners and less-educated residents evaluated a neighborhood (also see Kaiser et al. 1970 and Danahy 1984). Moreover, results showed that "the best neighborhood seems to be one populated by friendly people, not too close together" (Rent and Rent 1978, 149).

Residential Satisfaction: The Systems Approach

Succeeding research focused on describing and predicting the sources of residential satisfaction. It showed that residential satisfaction was dependent upon a number of highly inter-correlated factors. Researchers focused, primarily, on "contextual" (i.e. physical and ecological characteristics of a neighborhood) and "compositional" factors (i.e. individual household characteristics such as income, age, sex, length of tenure and stage in life cycle). It has been argued that "the overall degree of residential satisfaction is ultimately influenced by objective 'contextual' characteristics of the neighborhood and dwelling, and objective 'compositional' characteristics of the individual respondent" (Galster 1981, 739).

In addition to relating contextual and compositional factors to satisfaction, there was evidence suggesting social and psychological variables were related to residential satisfaction (see Onibokun 1974; Michelson 1970; Phillips 1967; Gans 1962; Jacobs 1961). Consequently, it was suggested that in order to understand and evaluate a neighborhood accurately one must include various tangible and intangible variables. When studying residential satisfaction, Churchman (1968) urged researchers to include various components of housing such as: physical structures, local social relationships, local politics, cultural variables and economic factors. He advocated a "systems" approach that was a compilation of the previous interacting elements described above. Thus, a "systems" approach introduces the need to think about "the total system objectives and, more

specifically, the performance measures of the whole system" (Churchman 1968, 2). It synthesized interrelating elements that influence satisfaction. The objective of the approach was to include all influencing variables in order to evaluate environments and ultimately estimate and predict satisfaction.

Analytical Techniques

The statistical and analytical techniques used in residential satisfaction research have evolved from descriptive analyses of the 60's, to sophisticated statistical inferrencing of today. However, one element that was common in the research was the theoretical structure. The majority of the research postulated and supported a causal relationship between satisfaction (the dependent variable) and various independent factors.

The results of this causal link were first analyzed by Fried and Gleicher (1961) using personal interviews and descriptive statistics (i.e. distribution tables). Similar techniques were used by Gans (1967) and Michelson (1969). Later researchers also studied the relationship, still using personal interviews, but with more rigor. Van de Geer (1973) employed partial correlations, chi-square, canonical correlations and discriminant analyses to further explain the variations between respondents, and delineate the causal relationship between satisfaction and contextual, compositional and social factors.

However, to increase sample sizes and thus decrease the probability of Type I and Type II statistical errors, mail surveys were employed (i.e. Herting and Guest 1985; Cook 1988; Weidemann et al. 1982). For example, Weidemann, Anderson et al. (1981) used mail surveys in their Longview Place study to ensure that their sample was representative of the population. Like many other researchers, they used frequency distributions, t-tests, principle component analysis (using Kaiser-Meyer-Olkin measures with Varimax rotations)

and multiple regression analysis (mathematical modeling) to describe satisfaction levels and reveal its predictors. It has been argued that these types of statistical analyses were superior to simple descriptive techniques because they allow the researcher to study non-parametric attributes (i.e. preferential ranking) as well as correlate and predict satisfaction. Equally important, they allowed the study of covariations in satisfaction levels and compare sample means.

Empirical Findings Using The Systems Approach

This section discusses the results of previous empirical residential research and examines the salient factors that significantly relate to neighborhood satisfaction (excluding municipal services). It provides an in-depth discussion of specific physical, social and psychological features that have been shown to be associated with residential satisfaction.

Physical Environment

Many residential satisfaction researchers have used a systems approach to delineate satisfaction correlates. For example Onibokun (1974) evaluated consumers satisfaction with housing using a systems approach. "Instead of the old approaches which consider in fragmented ways the characteristics of the dwelling, or the neighborhood, or the social environment, the author proposes a systems approach which various interdependent factors are studied" (Onibokun 1974, 189). He studied four housing sub-systems (tenants, environment, dwelling and management) using descriptive and analysis of variance. By combining selected attributes from these four sub-systems Onibokun derived

a composite satisfaction index. The study, based in Ontario, Canada, included such attributes as: quality of interior walls, adequacy of storage space, quality of local schools, parking facilities, management quality and personal characteristics.

Weidemann et al. (1982) also showed that the physical environment was an important part of residential satisfaction. For instance, they showed that perceived atmosphere (i.e. attractiveness and the policing of the block) and apartment characteristics (i.e. amount of comfort, space and economic value of the dwelling) were the two strongest predictors. The importance of physical characteristics was reported in other studies such as Weidemann (1988), Francescato and Weidemann et al. (1979) and Weidemann (1987). In addition, social interaction was also shown to explain some of the model's variance.

Marans and Rodgers (1975), employing a cross-national survey (n=2153), also discovered that the condition and upkeep of neighbouring houses (maintenance), as well as, safety and convenience to regional facilities, were important predictors of satisfaction at the macro-neighborhood level. However, having good neighbors was the most important factor in predicting satisfaction. The importance of maintenance was confirmed by Weidemann et al. (1982), using mail questionnaires and multi-variate analysis, who found that it, too, was an important predictor of satisfaction, although not the strongest.

Zehner (1972) also found, as did many others (i.e. Marans and Rodgers, 1975), that maintenance level and friendliness were the two strongest predictors of satisfaction. Equally important Zehner (1972, 181) found that "high levels of neighborhood maintenance are not enough, in themselves, to produce high levels of neighborhood satisfaction, the multivatiate analyses which included responses from all communities did show that the *neighborhood's* maintenance level was clearly the most important single predictor of neighborhood satisfaction in both low- and high-density areas."

Social Environment

Rent and Rent (1978) broadened their "systems approach" model. The independent factors, in addition to physical ones, included in measuring residential satisfaction were previous housing experience (used to understand the respondents' subjective "standards" measure), social integration and participation, housing aspirations and the occupants' social psychological perspectives towards society at large. The Rent and Rent (1978) study concluded that previous housing experience was a determinant of satisfaction due to causal evidence shown in the Schorr (1963) study. "Housing aspirations" were included because of the causal relationship between them and residential satisfaction, as shown in the Merton (1968) study. A socio-psychological component was also included since feelings towards society at large, either positive or negative, were thought to influence housing satisfaction (Gans 1967).

Rent and Rent (1978) used descriptive analysis to interpret their results. The authors concluded that previous housing experiences were related to one's satisfaction. They also found a positive relationship between friendly social interaction together with general life satisfaction and residential satisfaction (also see Herting and Guest 1983). Conversely, Rent and Rent (1978) found a negative relationship between length of housing tenure and residential satisfaction. Moreover, they found that housing satisfaction was statistically unrelated to one's perception of crowding.

Thus, Rent and Rent (1978) elaborated on existing system-based models, that resulted in a multi-level and multi-dimensional deterministic model. The authors noted that "the most important implication of the above findings is that residential satisfaction, whether it is related to the neighborhood or the housing unit, is related to social factors" (Ibid., 486), and must be included in residential satisfaction research.

Personal Characteristics

Henry Sanoff (1972) implicitly accepted Rent and Rent's notion that residential satisfaction was related to factors, such as friendly neighbors. However, he stated that

> Social relationships are influenced and explained by people's homogeneity with respect to a variety of characteristics. Studies of social life have shown that people tend to choose friends on the basis of similarities in backgrounds such as age and socio-economic level and values . . . (Sanoff 1972, 13-8-1).

Thus, Sanoff (1972) argued that homogeneity too was related to residential social relationships, and therefore satisfaction (also see Moriary 1974; Weidemann 1982; and Rodger and Marans (1975).

Other studies confirmed these results. For example, Galster and Hesser found that age, sex, social class and stage in life (factors that they called "compositional"), were predictors of residential satisfaction. They stated that "overall, our findings have supported the hypothesis that both objective compositional characteristics of individuals and objective contextual characteristics of the individual's dwellings are dimensions of residential satisfaction" (Galster and Hesser 1981, 751).

Other sources and predictors of residential satisfaction for "planned" and "less planned suburbs" were examined by Zehner (1972). After collecting and analyzing secondary data he found, as did Sanoff (1972) that similarity with respect to other residents was important to residents. This affirmed "Lansing and Hendricks (1967) and several other researchers [who] suggested that social compatability in a residential environment may be of central importance for satisfaction with that environment" (Zehner 1972, 178). Equally important, Zehner (1972) provided evidence that unit density was related to satisfaction, establishing that residents of planned communities, with lower densities, on average, experienced higher levels of satisfaction than those living in "less planned," more densely developed communities.

Density

Density has been thought to be related to residential satisfaction as shown by studies such as Zehner (1972). Classical theoretical sociology suggested adverse affects of urban crowding (see Simmel 1905; Park 1915; and Wirth 1938). It has been suggested that "with a lessened ability to control events in the dense area, the neighborhood becomes more unpredictable, more stressful and ultimately more dissatisfying to residents" (Baldassre 1982, 96). Some contemporary theory supports this. For example, Bonnes et al. (1991) investigated the relationship between density (crowding) and residential satisfaction, using both personal interviews and questionnaires, discovering that "the perception of crowding of a neighborhood was found to be of primary significance to overall residential satisfaction and to occupy a central position of the main dimension of satisfaction identified with reference to the variety of other environmental aspects investigated" (Bonnes et al. 1991, 539). Bonnes et al. (1991) argued that the predictors of satisfaction and spatio-social density were: age, socio-economic measures and length of tenure. Notably, these results were supported by Baldassre (1982), who adds that childless adults were the most dissatisfied in high density neighborhoods. It is not clear, however, whether the dissatisfaction of this latter group, was or can associated with, density alone, or by the presence of active children in the immediate environment.

Onibokun (1974) also concluded that major sources of dissatisfaction include items such as: noise in an area, a lack of privacy and unusable common areas. Moreover, he found that a "high concentration of large-sized households on a small piece of property inevitability generates high levels of noise, lack of external privacy and high probability of interference from neighbors" (Ibid., 197). His methodology was comprehensive, however the attention paid to social factors in relation to residential satisfaction, arguably, was insufficient.

However, other researchers have contended that high density neighborhoods offer greater opportunities for social relationships and reduced travel costs -- due to decreased time spent commuting (see Fisher 1976; Hawley 1972; Jacobs 1961 or Michelson 1976 with regard to the effects of density). Michelson (1976, 163) stated with respect to residential satisfaction that "in general past findings have been suggestive, but far from conclusive, about direct relationships of environment and clear cut pathologies".

Privacy

Closely related to density and the perception of crowding was privacy. Privacy was related to selective control (see Altman 1975) and has been shown to be related to residential satisfaction. It was believed that intrusion into one's privacy is a source of dissatisfaction. Its importance has been discussed in several studies such as: Craun 1969; Sanoff and Sawhney 1972; Kaplan 1974; Harman and Betak 1974; and Francescato et al. 1979). For example, Herting and Guest (1985), using personal surveys in Seattle, U.S.A., found that privacy (both visual and acoustical) was an important predictor of residential satisfaction. Moreover, it was the single most important predictor of satisfaction for non-childbearing people.

One way privacy can be obtained is by provision of an adequate amount of private open space. This conjecture was supported by empirical research. For example, Michelson (1969) noted that open space was an important source of residential satisfaction. However, this type of space was dichotomous -- providing privacy but also acting as a social facilitator. Michelson (1969) claimed that this space allowed distance from neighbors when privacy was desired but also acted as a catalyst to bring neighbors together since "people do not need an excuse to remain outdoors in their own turf; causal contacts made there are not hurriedly terminated through a lack of a socially acceptable excuse to stay put" (Michelson 1969, 189).

Safety

Weidemann et al. (1982), found in their study that resident safety was the fifth strongest predictor of overall residential satisfaction (also see Lee 1981; Lagory et al. 1985; Cook 1988; Dockett et al. 1983; Weidemann et al. 1988). Concern regarding child safety, strangers and noise were the leading predictors of safety, followed by social relationships and resident homogeneity. Notably, the noise variable was included "because residents may perceive noise as being related to crime [sic] activities , particularly those involving fighting and other abusive behavior" (Weidemann et al. 1982, 717).

Counter Findings

Not all research into satisfaction supported the general findings regarding the importance of social and socio-economic variables and satisfaction levels. For instance, Fried (1982), using personal interviews with 2622 respondents from 42 communities across the United States, found that the objective quality of the residential environment was the strongest predictor of satisfaction while social factors were minimal. Fried (1982) also found specific items of the objective environment explained the regression model's variance, such as: ease of access to nature (10%); housing quality (9%); neighborhood quality (5%); safety (5.7%); municipal services (2.9%); and household density (1.7%). Moreover, he found that social measures of satisfaction were relatively unimportant. He stated that "more people (24.4 %) indicated a preference for privacy and social distance than those who desired or even indirectly implied wishes for social interaction (21.1%)" (Fried: 1982: 115). Thus, the findings were in direct conflict with those of Gleicher (1961), Campbells, Converse and Rodgers (1975), and many others. Fried (1982) concluded the study by stating that

> The analysis presented here indicate that residential satisfaction and neighborhood attachment are based largely on features of the physical

> environment. While the study, like any single data set, is not to be regarded as the final word on those questions, it provides provocative considerations and hypotheses for future studies. (Fried 1982, 118).

Supporting Fried (1982), an Australian study, sponsored by the Joint Venture For More Affordable Housing Task Force (1989), refuted some past findings regarding patterns of residential satisfaction. The Australian study specifically examined differences in satisfaction levels between small lot sizes (less than 450 m^2) and large lot sizes (more than 600 m^2) lot dwellers. Also studied were other key elements related to innovative land development standards such as: less open space, reduced setbacks and smaller right-of-way widths. Using questionnaires, the Task Force surveyed 309 households from innovatively-designed communities and 112 households from conventionally-designed communities. The Task Force, studied both macro and micro neighborhood levels and found that regardless of size, residents were generally satisfied with their lot sizes. Other results relating to the macro-neighborhood level from the Australian study are summarized as follows:

- "Estates with high design input resulted in a higher proportion of 'attractively designed' or 'very satisfied with housing style' responses" (Joint Venture For More Affordable Housing Task Force 1989, 69).
- Residents in neighborhoods with reduced standards were not significantly less satisfied overall (67 percent were either very highly satisfied or well satisfied) than those living in conventionally designed neighborhood (73 percent were either very highly satisfied or well satisfied.
- Residential satisfaction was not related to sex.
- Residential satisfaction was directly related to age.
- Residents with children tended to be more satisfied.
- Privacy was important but not a major problem in either type of neighborhood.

- First time home buyers tended to be less satisfied.
- Residents of housing designed with innovative standards tended to attach a greater value to the sense of community and neighbor relations than did those in conventionally designed communities.
- Intensive landscaping is directly related to satisfaction
- Housing density was not a major predictor of satisfaction with lot size.
- Road width was a strong predictor of residential satisfaction.
- Satisfaction levels, generally, moderately rise as the width of the carriageway increases over 7 meters -- although differences did not reach statistically significant levels.

Consequently, the study concluded that at the macro-neighborhood level careful attention must be paid to design elements, such as lot and unit orientation as well as the placement of windows. The findings of the micro-neighborhood are summarized as follows:

- "The level of dwelling satisfaction was not proportionally related to the size of the lot and the greatest levels of dissatisfaction were the smaller "standard" residential lot areas of $350m^2$ to $450m^2$" (Ibid., 86).
- "Respondents with front setbacks of less than 5 meters were more likely to be bothered by traffic noise and displayed the greatest level of dissatisfaction with 'distance from the edge of the road', while 5 meters to 7.5 meters reflected greatest satisfaction" (Ibid., 86).
- "Side distances to adjacent dwellings between 0.5 and 3.0 meters were least satisfactory, due to problems with auditory privacy and inability to make use of the land between the dwelling and the boundary" (Ibid., 86).

The study concluded that at the micro-neighborhood level special attention must be considerate of building orientation and site design (i.e. lot angles, lot shapes). It noted that "compromises can be made on setbacks, lot size, private open areas and so on, provided they are done in the context of an overall design philosophy" (Ibid., 86).

Summary of Independent Variables Used in The Study

The research reviewed in Chapter 2 has used various explanatory models to uncover a series of highly correlated independent predictors of residential satisfaction. This section abstracts and summarizes those sets of variables that are most frequently supported, empirically, as being significant predictors of residential satisfaction. Moreover, it provides a brief description of each set of variables used in the study, and also notes the supporting documentation.

Background Experience

Previous housing experience was an important predictor of present dwelling and neighborhood satisfaction. It was also one of the sources of subjective judgment criteria used in evaluation. Thus, current satisfaction was correlated with past dwelling and neighborhood experiences. Previous housing experience also effected housing aspirations and expectations (see Campbells, Converse and Rodgers 1975; Weidemann and Anderson et al. 1985; Fishbein and Ajzen 1975 and Marans 1976).

Physical Environment

The physical environment was a major contributor to neighborhood satisfaction. Its importance was reflected at the unit, neighborhood and community levels. Specific components of the neighborhood environment that have been shown to be of importance

included: density, maintenance, neighborhood attractiveness, housing quality, access to nature, road width, lot size, lighting, sidewalks, open space landscaping, setbacks, side yards and parking (see JVMAH 1989; Fried 1982; Marans and Rodgers 1975; Miller et al. 1980; and Weidemann 1981; Weidemann 1982; Weidemann et al. 1987). In this study, special attention was given to those environmental factors controlled by planning and engineering standards.

Social Environment

Research has shown that neighbor relations, kinship ties and friendliness were positively correlated with residential satisfaction and were therefore deemed important (see Fried and Gleicher 1961; Schorr 1968; Lansing and Marans 1969; Rent and Rent 1978; Galster 1981; Weidemann 1982; Herting and Guest 1985). Residential satisfaction levels and gregariousness were also correlated with homogeneity in life styles, race, values and culture -- that all impact on neighborhood friendliness (also see Michelson 1976; Sanoff 1972 and Moriary 1974). The variables used to measure the importance and strength of social factors in this study related to the degree, desirability, and importance of neighborhood social interaction, as well as resident homogeneity.

Personal Characteristics

Individual attributes were a relatively strong determinant of neighborhood satisfaction. It was showed that socio-economic status, age (stage in life), life style, marital status, length of tenure and personality were correlated with residential satisfaction. Personal characteristics reflect different needs, values and aspirations of a particular environment. Galster and Hesser (1981); Onibokun (1976); JVMAH (1989); and Sanoff (1972) all provided supporting empirical evidence of a multi-lateral interrelationship between dwelling unit and neighborhood evaluation and individual traits. Notably, age,

socio-economic factors, length of tenure and martial status variables were included in the study to delineate satisfaction correlates.

Density, Privacy and Safety

After reviewing the literature, these three items were shown to be highly related to residential satisfaction. Safety and privacy were influenced by both the physical and social environment. Weidemann et al. (1982) found that safety was the fifth strongest correlate to residential satisfaction. Likewise, Rice and Lewis (1984) found it was an important determinant of satisfaction -- being the strongest correlate (also see Francescato 1979; Lee 1981; Lagory et al. 1985; Weidemann et al 1987). Privacy and density, too, were important components of residential satisfaction. Herting and Guest (1985) found privacy to be the most important predictor of satisfaction (for non-childbearing adults). Thus, previous research inferred that people prefer environments that allow them the choice and means of achieving personal solitude and security.

Hypotheses

This chapter illustrated that several environmental and social features were correlated with residential satisfaction. Moreover, certain features have been shown to be consistently satisfying or dissatisfying. Generally, past research in North America showed that higher density areas, for a variety of reasons, were less satisfying. Although the Australian study refuted some of these facts, the majority of research support dissatisfaction with higher densities -- that were reflected in the stated hypotheses. This section abstracted from residential satisfaction theory and formulates conjectures concerning satisfaction by residents of Kiniski Gardens and Pollard Meadows. Thus, based on the literature review in this chapter, the following hypotheses were formed:

Hypothesis 1.

Residents living in the RPL zoned neighborhood, Kiniski Gardens, will experience satisfaction levels significantly lower than residents living in the conventionally designed community, Pollard Meadows, zoned RF1.

Hypothesis 2.

Residents of the RPL zoned neighborhood will experience lower satisfaction levels primarily due to dissatisfaction associated with the following features: visual privacy, lot size, lot shape, density, setbacks, noise and unfulfilled expectations.

Hypothesis 3.

The smaller RPL zoned lots will contribute to a stronger sense of community and increase the frequency of neighbor interaction.

Hypothesis 4.

Privacy, neighbor homogeneity, sociability, safety, lot size, maintenance, and density will be the strongest predictors of residential satisfaction.

CHAPTER 3: REVIEW OF LAND DEVELOPMENT STANDARDS

This chapter discusses the significant differences between innovative (RPL-style) and conventional land development standards. It offers a brief history of the RPL land use district in Edmonton and its stated purpose. It also examines, contrasts and illustrates specific site servicing (engineering) and planning standards that have been shown to be cost saving methods. Although RPL and RF1 engineering standards are the same in Edmonton, they are a source of cost savings; therefore they are considered an integral part of the discussion. Finally, this chapter derives a cost estimate of savings accrued from employing innovative land development standards and delineates their source.

Purpose and History of Planned Lot Residential (RPL) Zoning

The oil boom, commencing in 1972, caused significant development pressures in Alberta and particularly in Edmonton the province's leading industrial center. The City of Edmonton during this time experienced an influx of migrants from eastern Canada, low residential vacancy rates with increasing housing costs and high interest rates. Consequently, housing became increasingly less affordable causing builders, developers and civic officials to look at ways to reduce housing costs, one of which was through innovative layouts. Land and site servicing costs were quickly identified as among the most significant components in the cost of new suburban housing. It was argued that the rapid urban growth and changing economy required innovation from developers and home builders as well as compromise from civic officials. Consequently, the housing industry soon advocated more compact development and more efficient use of land and servicing resources to abate the rising cost of new housing. It was thought that the use of innovative land development standards, such as reduced right-of-way widths, reduced lot

sizes and setbacks, curb elimination and reduced carriageways could lower housing costs by reducing the amount of land required per dwelling unit and by distributing the servicing costs among a greater number of land owners.

The City of Edmonton responded to the housing pressures by initiating a comprehensive review of its Land Use Bylaw in 1978. Notably, the existing bylaw (#2135), at the time, did not allow for innovatively designed housing without a ministerial order. This was changed during the 1978 review process.

The 1979 Land Use Bylaw draft introduced the Small Lot Residential District (RSL) -- the antecedent to the present Planned Lot Residential District (RPL). The newly formed RSL District allowed the use of innovative (reduced) land development standards. Between 1979 and early 1980 the RSL District was revised to become even more flexible changing from that of a small lot area concept to that of comprehensively planning new communities (hence the name Planned Lot Residential District) such as Burnewood. These changes resulted in the RSL District being renamed RPL District in the spring of 1980. One of the more noticeable changes to the bylaw was the RPL District became more flexible, allowing semi-detached, as well as, quadraplexes as discretionary uses and a density up to 42 units per hectare.

The RPL District was adopted by City Council on July, 3, 1980 and is still presently included in Section 130 of the City's Land Use Bylaw (#5996). Since its inception, the RPL District has been amended four times (November 10, 1981; September 16, 1983; September 27, 1983; and September 12, 1989). Notably, these amendments have only served to clarified the bylaw and have neither altered its mandate, nor founding principles. Its general purpose as stated in Section 130 of the City's Land Use Bylaw is to

> Provide a District for small lot Single Detached Housing that provides the opportunity for the more efficient utilization of suburban areas, while maintaining the privacy and independence afforded by Single Detached

> Housing forms; and also, a District that provides greater flexibility for infill development. (City of Edmonton 1990, e 9).

The RPL District was a popular means of residential development during 1981 and 1982 (see TABLE 3.00 for selected RPL comparative statistics). During this time 1,411 housing units were developed. In fact, in 1982 RPL zoned housing accounted for 31% of all single and semi-detached housing starts in the City (City of Edmonton Planning Department 1984). In all, 13 RPL zoned neighborhoods were developed from 1976 to 1986 (including the neighborhoods of Ottewell and Millbourne that were approved in 1976 with a ministerial order and only later came under RPL jurisdiction). Map 3.00 illustrates, spatially, where the RPL Districts are located in Edmonton.

TABLE 3.00

SELECTED PROPERTY AND DEMOGRAPHIC CHARACTERISTICS OF RPL DEVELOPMENT AREAS

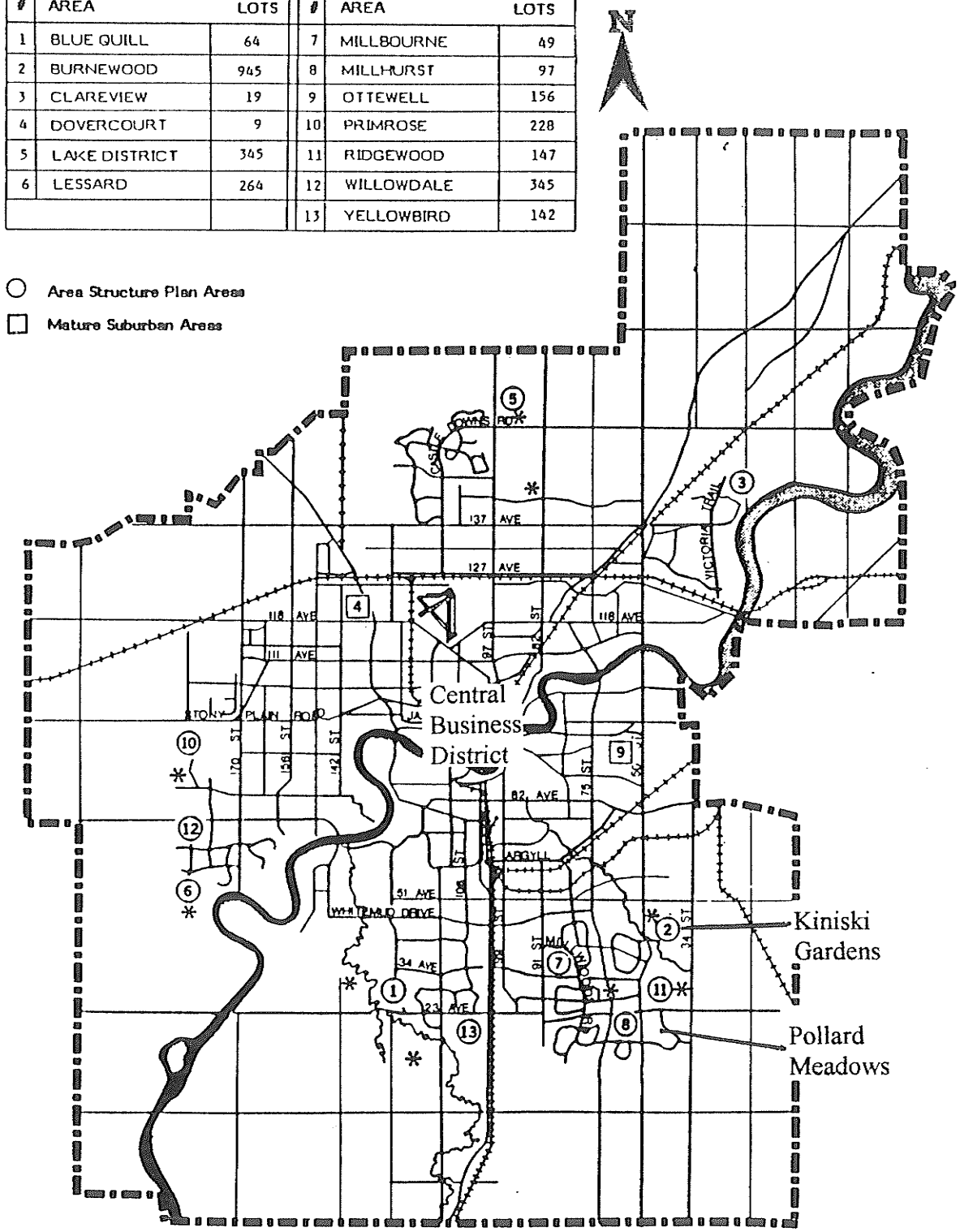
Selected Characteristics		Dovercourt	Ottewell	Millbourne	Blue Quill	Burnewood	Willowdale	All RPL Parcels
Number of Tax Parcels	#	9	156	49	64	945	345	2,810
Land Area of Tax Parcels	ha	0.3	5.2	1.4	2.6	55.3	12.7	102.9
Land Use:								
Single Detached	#	9	156	49	44	719	240	1,698
	ha	0.3	5.2	1.4	1.9	24.6	8.8	67.6
Semi-Detached	#	-	-	-	20	2	-	26
	ha	-	-	-	0.7	*	-	0.8
Undeveloped Land	#	-	-	-	-	224	105	886
	ha	-	-	-	-	8.7	3.9	34.3
City-Owned Tax Parcels	#	-	-	-	-	-	14	43
	ha	-	-	-	-	-	0.6	1.8
Average Tax Parcel Size								
Single Detached	m^2	308	336	277	432	343	366	356
Semi-Detached	m^2	-	-	-	355	235	-	345
Undeveloped Land	m^2	-	-	-	-	387	375	389
Proportion of Tax Parcels Greater than $360m^2$	%	11.1	31.4	14.2	51.6	29.5	40.8	38.3
Number of Dwellings per Net Hectare[1]	#	32.5	29.8	36.1	24.5	28.3	27.1	27.3
Subdivision Activity								
Start Year		1981	1977	1976	1978	1980	1977	1976
Peak Year		1981	1977	1976	1978	1981	1982	1981
Construction Activity								
Start Year		1982	1976	1976	1979	1981	1977	1976
Peak Year		1982	1977	1976	1979	1981	1982	1981
Average Sales Price Single Detached[2]	$	75,700	72,000	63,050	111,950	73,850	77,450	74,450
Number of Occupied Dwellings	#	9	154	46	50	565	205	1,586
Number of Unoccupied Dwellings	#	-	2	3	14	157	35	338
Proportion of Rental Households	%	11.1	9.1	23.9	12.0	2.7	2.9	4.0
Dwelling Size								
One Bedroom	%	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Two Bedroom	%	22.2	11.0	0.0	0.0	31.0	19.0	23.8
Three Bedroom	%	77.8	83.8	89.1	82.0	67.4	74.1	72.4
Four Bedroom	%	0.0	5.2	10.9	18.0	1.6	6.9	3.5
Number of Persons	#	17	415	151	153	1,624	636	4,763
Proportion of Persons Aged 14 or Less	%	0.0	22.2	27.2	19.0	26.5	29.4	27.6
Proportion of Persons Aged 55 or More	%	0.0	6.0	4.0	7.8	1.6	3.1	3.0
Proportion of Households with Children	%	0.0	46.1	65.2	44.0	49.0	60.0	54.9
Average Number of Persons per Dwelling Unit[3]		1.90	2.69	3.28	3.06	2.87	3.10	3.00

Note : RPL districted and registered tax parcels excluding utility lots and unsubdivided holdings (1983 05).
: * value less than 0.1
: 1 Potential dwellings calculated by the land area of residential lots divided by the number of lots.
: 2 Only "arms length" land and structure sales are reported (1140 cases).
: 3 includes both single and semi-detached dwellings.

Source: City of Edmonton, Planning and Development Department, 1984.

MAP 3.00
Location of RPL Development Areas

#	AREA	LOTS	#	AREA	LOTS
1	BLUE QUILL	64	7	MILLBOURNE	49
2	BURNEWOOD	945	8	MILLHURST	97
3	CLAREVIEW	19	9	OTTEWELL	156
4	DOVERCOURT	9	10	PRIMROSE	228
5	LAKE DISTRICT	345	11	RIDGEWOOD	147
6	LESSARD	264	12	WILLOWDALE	345
			13	YELLOWBIRD	142



Source: City of Edmonton, Planning and Development Department, 1984.

Engineering Standards: Differences Between Innovative and Conventional

This section provides an overview of selected innovative and conventional engineering standards. It examines and illustrates selected site servicing standards that have been shown in previous studies (i.e. Ontario Ministry of Housing 1990; DeLCan, De Leuw, Cather 1984; British Columbia Ministry of Municipal Affairs 1980 and Associated Engineering Services 1983) to be the most significant areas for cost savings in RPL-style developments. Although the examination is not exhaustive, it offers a thorough discussion of major innovative cost saving design practices. It does not, however, address site-specific zoning practices (i.e. DC5 zoning in Edmonton), nor does it address modified street designs associated with community owned roadways. The specific engineering standards addressed in this section can be grouped in four broad development categories -- waterwork standards, sanitary sewer standards, storm water drainage standards, and utility and roadway standards (including curbs and sidewalks). All of the innovative standards seek to reduce conventional ones, intensify development and use resources more efficiently, thereby reducing unit cost. "Although these innovative techniques are not yet all commonly accepted as construction practice, they represent a new generation of construction innovations, and are an indication of the resourcefulness of the development industry, consulting engineers, contractors and suppliers who are constantly seeking a better and more cost-effective way of doing things" (Ontario Ministry of Housing 1990, 5-1).

Waterworks Servicing Standards

There are four different types of specification standards that regulate residential waterwork development -- pipe line sizes, hydrant spacing, waterline valve spacing and service connections. Hydrant spacing and service connections have been shown to be the

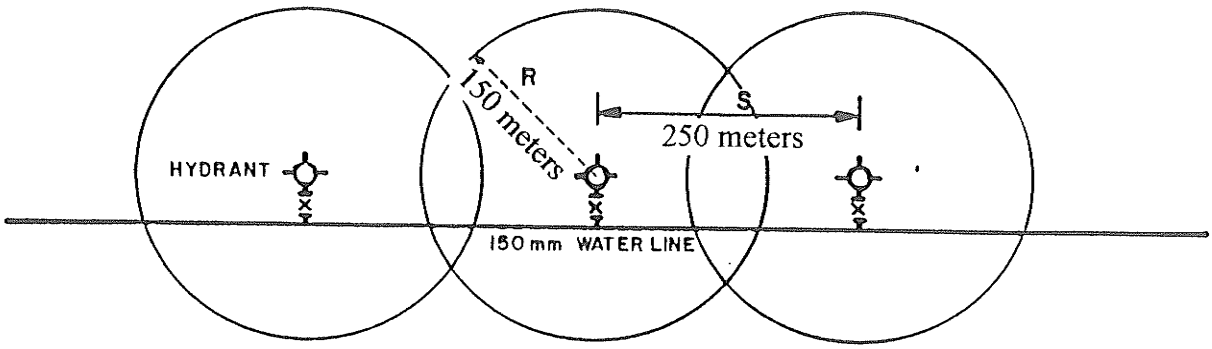
most significant areas for cost reduction, while pipe size and valve spacing have less prominent cost affects. Consequently, only hydrant spacing and unit service connections will be elaborated upon in this section.

Hydrants provide water for fire fighting vehicles. It has been argued in many studies that the spacing required between hydrants can safely be increased to reduce capital costs. The DeLCan, De Leuw, Cather study (1984) noted that conventional hydrant spacing standards range from 100 to 120 meters between hydrants. However, innovative development standards allow for hydrant spacing upward of 150 meters from the furthest dwelling unit and up to a distance of 250 meters between dwellings. FIGURE 3.00 illustrates innovative hydrant spacing and distance practices.

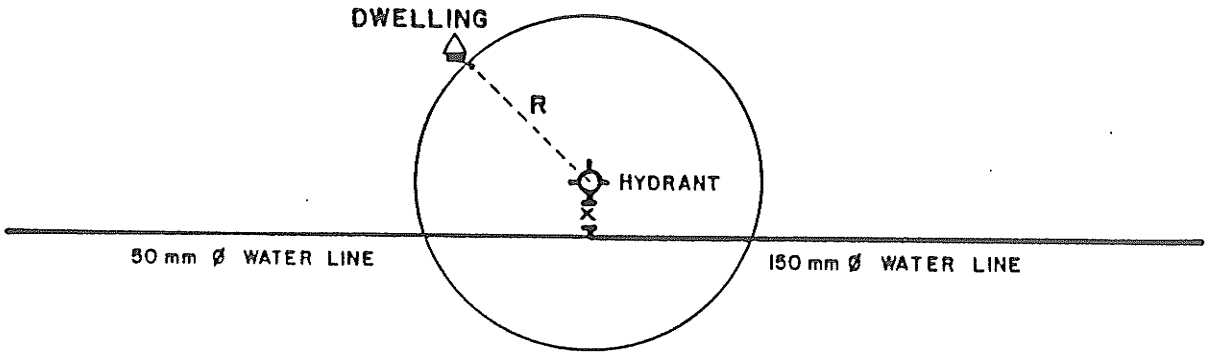
Water service connection practices also differ amongst innovative and conventional engineering standards. Water service connections refer to the method whereby dwelling units are linked to the trunk water service line located in the right-of-way width. Conventional design standards require a single connection be provided to every dwelling unit adjacent to the right-of-way width. This is frequently done to allow water utility companies better control water servicing delinquent accounts.

However, innovative standards reduce capital expenditures by reducing the amount of pipe required to service each dwelling unit. Instead of laying a single water line to each unit, a shared water service connection (also known as Y trenching) is used to reduce development costs . FIGURE 3.01 illustrates the innovative design concept. The Ontario Ministry of Housing (1990) reports that shared service connections can reduce capital expenditures in this area by up to 29%.

FIGURE 3.00



HYDRANTS: On-Line Spacing



LAST HYDRANT: Distance to Furthest Dwelling

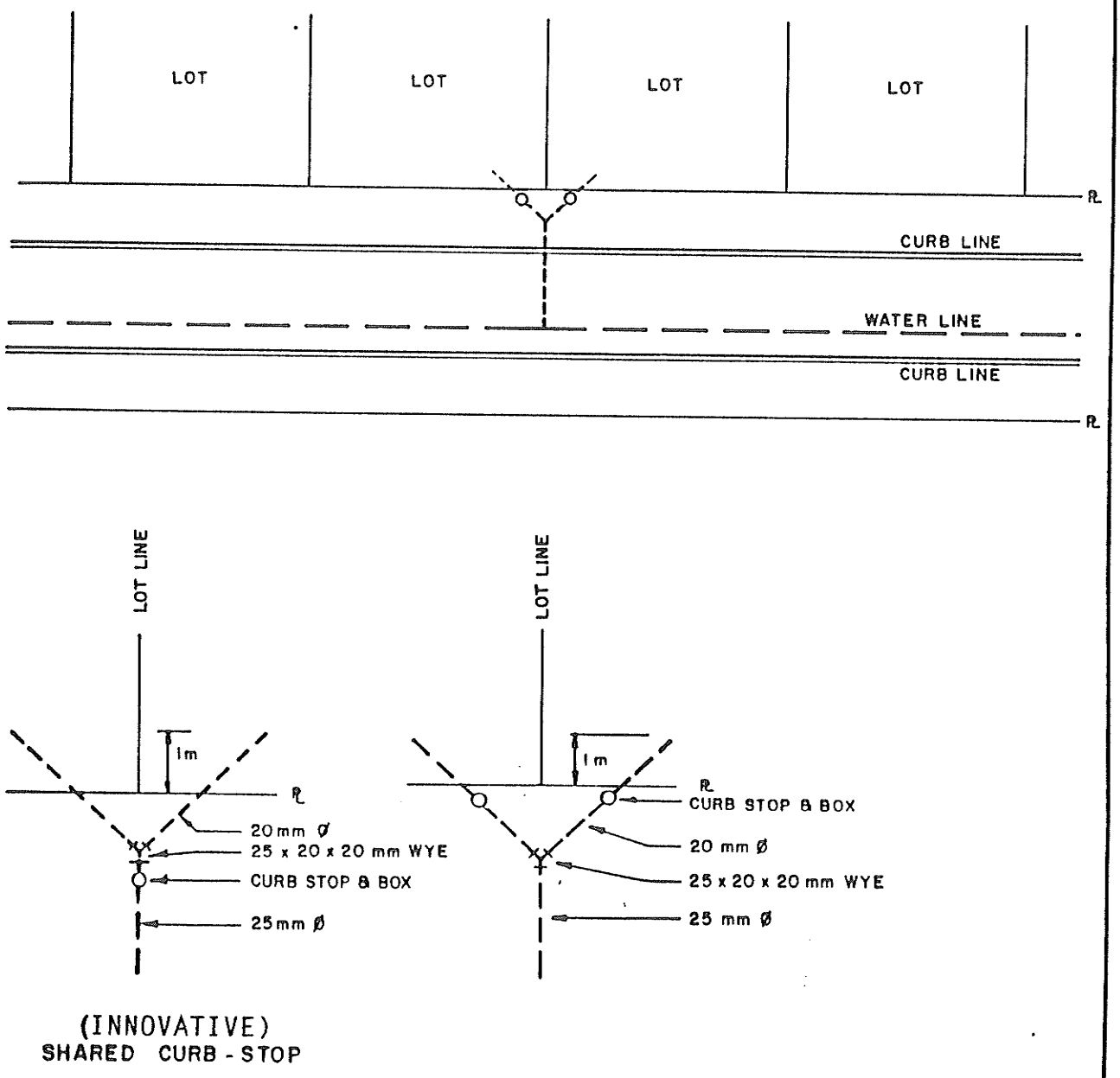
R = RADIUS OF INFLUENCE-TO REFLECT CURRENT FIRE-FIGHTING EQUIPMENT

S = ON-LINE SPACING (2 X R) LESS SOME NOMINAL OVERLAP

HYDRANT SPACING & DISTANCE

Source: DeLCan, De Leuw, Cather, Western Ltd., 1984.

FIGURE 3.01



(INNOVATIVE)
SHARED CURB - STOP

SHARED WATER LINE HOUSE CONNECTIONS

Source: DeLCan, De Leuw, Cather, Western Ltd., 1984.

Sanitary Sewer Standards

Innovative and conventional standards also differ with respect to their treatment of sanitary sewer design specifications. Sanitary sewers convey domestic waste water to a central water management or disposal point. There are four general areas regarding sewer standards that have been shown to reduce development costs and differentiate innovative standards from conventional ones -- pipe size, pipe gradients, manhole spacing and shared sewer connections. The most significant cost savings areas, and design differences, occur from increased manhole spacing and common sewer connections. These two design areas will be elaborated upon below. Although reduced pipe sizes and gradients do differ between innovative and conventional standards, the variations in design methods are not significantly important to be focused upon in this section.

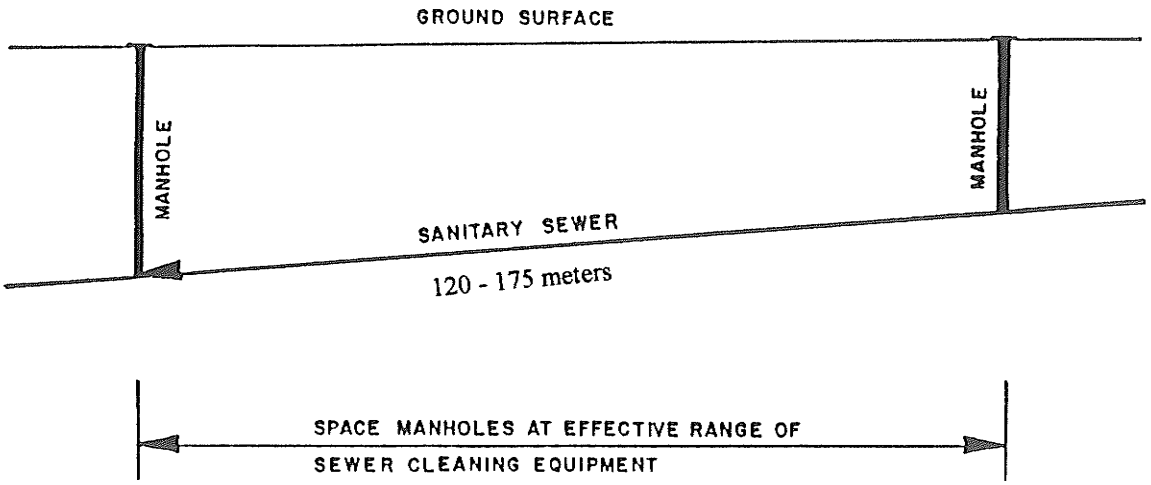
Another major design difference between innovative and conventional sewer practices is with respect to their treatment of manhole spacing. Manholes allow access to sewer pipe systems. They allow the system to be cleaned and serviced in the event of blockage. Conventional design specifications require manholes to be spaced, typically, every 100 meters.

Innovative design standards increase the required distance between manhole spacing and therefore reduce capital expenditures. Innovative designs are based on the premise that manholes along straight lengths require less maintenance and encounter infrequent blockage. Thus, manholes on straight lines can be increased to distances from 120 - 175 meters, depending on a municipality's sewer cleaning equipment. This increased manhole spacing is significantly different from conventional 100 meter spacing. The range presently being used by other innovatively-designed neighborhoods in Alberta is between 120 and 175 meters (Associated Engineering 1982). FIGURE 3.02 illustrates the concept.

Innovative and conventional standards also differ with respect to their treatment of sewer connections. Conventional standards require a single sewer line to every dwelling unit. Once again, the conventional design method is capital intensive.

Innovative standards permit shared sewer lines commencing from the curb. "There has been considerable discussion in the literature on the cost benefits of shared sewer house connections. Certainly, by halving the number of house connections that cross the street, some savings are achieved" (DeL Can, De Leuw, Cather 1984, 48). Thus, innovative sewer development standards reduce the materials used in subdivision development and offer a means of reducing housing costs. However, some conventional design advocates believe that this reduction in sewer capital increases the chance of line blockage and increases required long term maintenance costs. FIGURE 3.03 shows the concept of shared sewer lines.

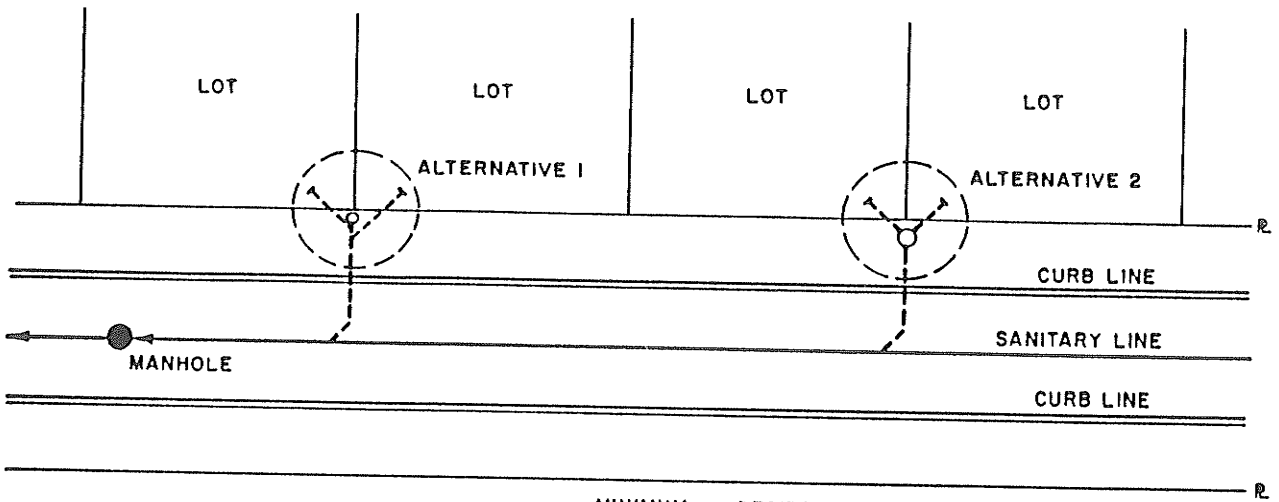
FIGURE 3.02



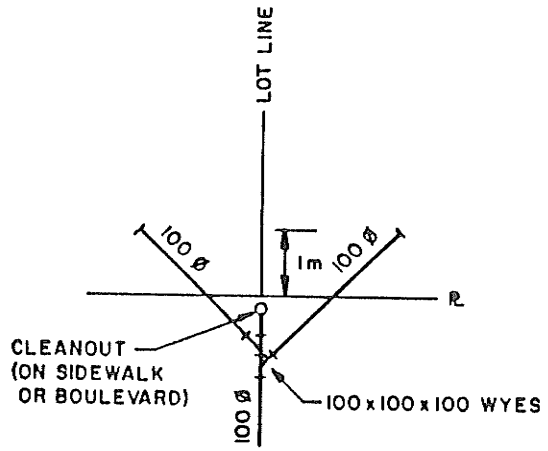
MAXIMUM ALLOWABLE MANHOLE SPACING

Source: DeLCan, De Leuw, Cather, Western Ltd., 1984.

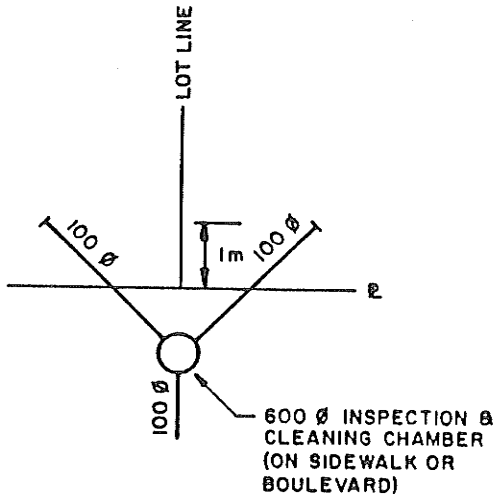
FIGURE 3.03



	MINIMUM GRADIENT	DESIRABLE GRADIENT
100 mm ø	1.5 %	2.0 %
150 mm ø	0.8 %	1.0 %



ALTERNATIVE 1



ALTERNATIVE 2

SHARED SANITARY SEWER HOUSE CONNECTIONS

Source: DeLCan, De Leuw, Cather, Western Ltd., 1984.

Storm Water Drainage Systems

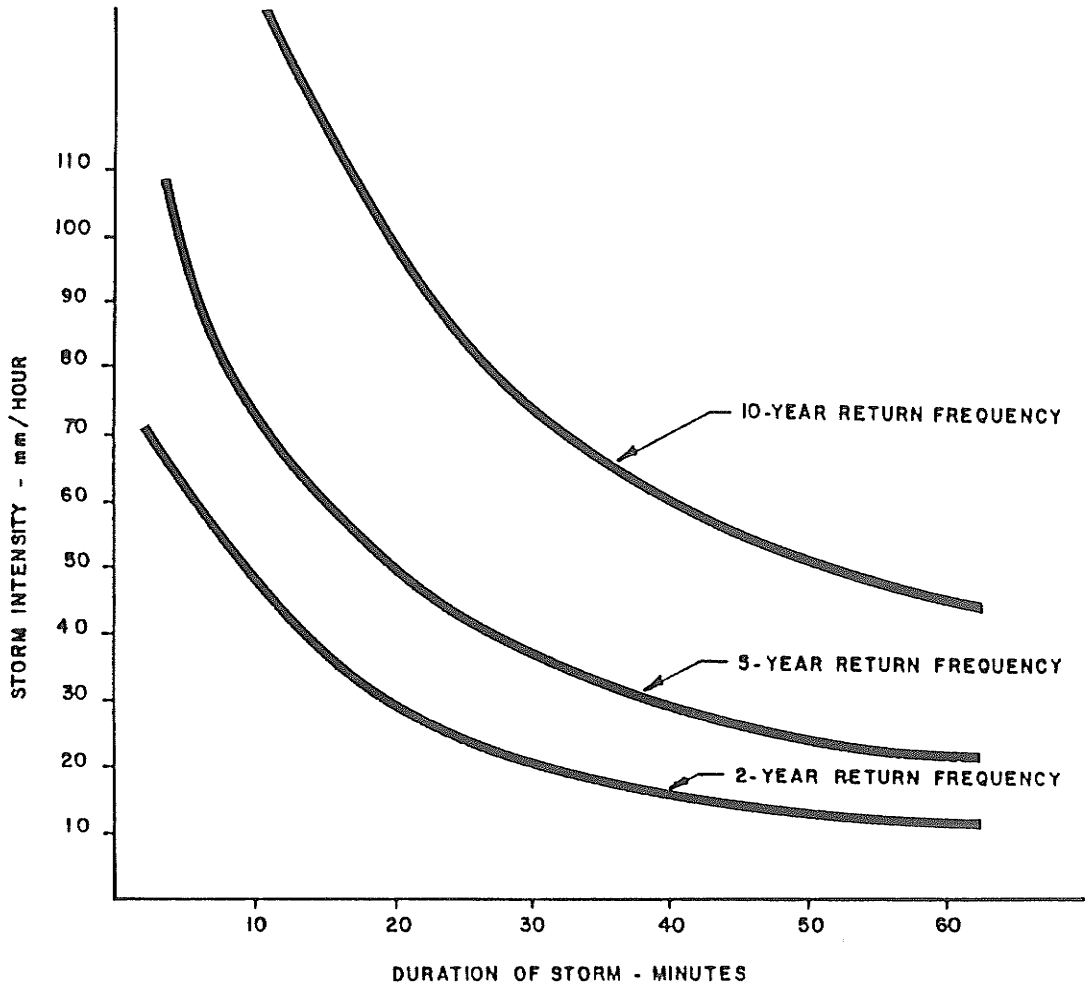
There are four main areas where conventional and innovative standards storm water practices differ (excluding pipe gradients) -- frequency of storm occurrences, maximum allowable manhole spacing, catch basin spacing and site water management. These four categories of development standards, as well as the reduction rationale are discussed below.

The primary function of storm water drainage systems is to carry excess rainwater away from roadways and private sites. Conventional standards require these pipe systems to be designed so as to facilitate "minor" storms occurring every five years. The longer the storm interval, the greater the probability of excess rainfall and the greater is the cost of facilitating runoff capacity.

Innovative design standards reduce the frequency of "minor" storm occurrences from 5 years to 2 years and accommodate "major" storm (that occur every 50 to 100 years) runoff with ditches and natural drainage channels. DeL Can, De Leuw, Cather (1984, 52) note that "if it is judged by the municipality that the general attitude of the community will accept infrequent flows on street and short-term ponding at some catch basins, then a two year return frequency storm can be considered adequate". FIGURE 3.04 illustrates storm drainage time curves for conventional (5-10 year periods) and innovative (2 year period) design standards.

Innovative and conventional water management standards also differ with respect to the maximum allowable manhole spacing. Notably, innovative standards allow distances of up to 120 meters, while conventional ones, typically, require distances of only 90 meters. The limitations of using increased storm water manholes are similar to those discussed regarding increased sewer hole distances.

FIGURE 3.04



TYPICAL STORM INTENSITY - DURATION CURVES

Source: DeLCan, De Leuw, Cather, Western Ltd., 1984.

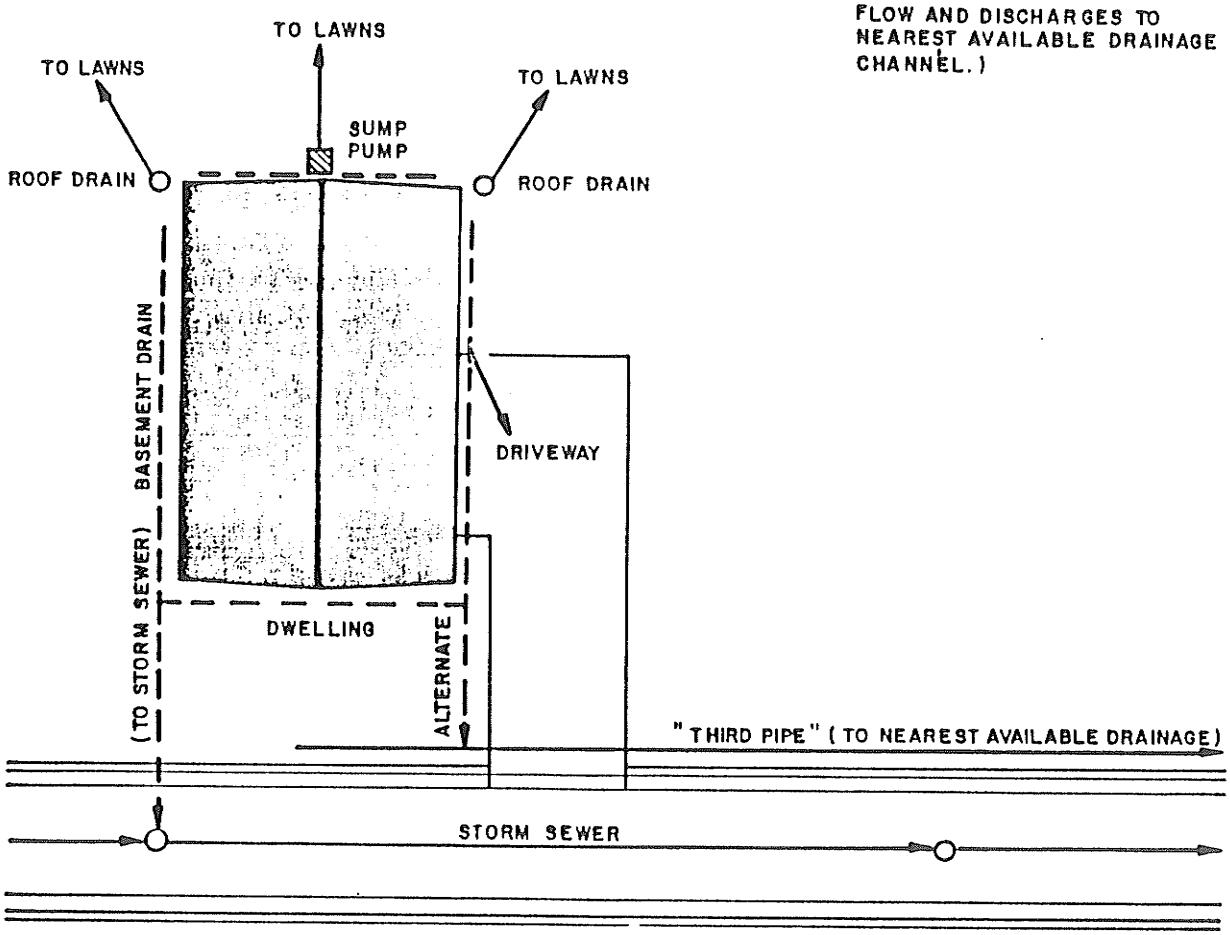
Likewise, greater distances between catch basins decrease residential capital costs -- since fewer are required. Catch basins retain and direct rain water to main pipe channels and discharge points (i.e. rivers, lakes, etc.). Notably, design standards in this area vary extensively. Associated Engineering (1982) in their comparative study of communities designed with innovative land development standards reported a variation in maximum allowable manhole spacing, ranging from 120 meters, in Edmonton and St. Albert, to 365 meters in Sherwood Park, Alberta. These specifications are considerably different from conventional catch basin standards that, typically, require distances of less than 100 meters. Increased basin distances do cause more overland water flow and increased drainage times; however most authorities contend that the negative effects resulting from these modifications are minimal.

The final significant difference between conventional and innovative water management standards is their treatment of on-site runoff. Conventional standards require roof discharge to be directed to street storm sewer systems. This method of management requires roof drains from each dwelling unit to connect with the sub-surface storm water sewer line. This trunk line is usually located in the right-of-way-width. However, it has been strongly argued in previous studies that this specification is excessive.

Innovative methods permit on-site water management. "The overwhelming conclusion is that roof drains need not be connected to street storm sewers unless the lot has no surface drainage to the street or lane" (DeLCan, De Leuw, Cather 1984, 59). This method reduces capital costs and fosters natural water management techniques. FIGURE 3.05 illustrates innovative water management techniques.

FIGURE 3.05

1. ROOF DRAINS TO LAWNS OR DRIVEWAY.
2. WEEPING TILE BASEMENT DRAINS (IF REQUIRED IN HIGH WATER TABLE AREAS), OPTIONS:
   - I) TO STORM SEWER IF DEPTH ADEQUATE.
   - II) TO SUMP AND PUMP TO LAWN.
   - III) TO "THIRD PIPE" - F.D.C. (A SEPARATE CONDUIT WHICH COLLECTS ONLY WEEPING TILE FLOW AND DISCHARGES TO NEAREST AVAILABLE DRAINAGE CHANNEL.)



STORM SEWER - HOUSE CONNECTION OPTIONS

Source: DeLCan, De Leuw, Cather, Western Ltd., 1984.

Right-of-Way Width

Innovative and conventional standards differ vividly with respect to their treatment of right-of-way (ROW) widths. Conventional standards require a 20 meter ROW while innovative engineering standards, often, require only 16 meters or less. The rationale of conventional and innovative ROW widths is explained and illustrated below.

A considerable percentage of land within residential subdivisions is occupied by local roadways. Included in this area are the carriageway and the boulevard. The boulevard accommodates sub-surface utilities (i.e. hydro, cable, telephone), as well as, acts as a storage area for snow. The boulevard (that also includes the curb and sidewalk) together with the carriageway combine to form the (ROW) width typically 20 meters from front lot line to front lot line. FIGURE 3.06 illustrates the dimensions of a conventional 20 meter ROW width. This area has been the focus of many civic studies. The primary rationales for the conventional specifications are as follows (DeL Can, De Leuw, Cather 1984, 61):

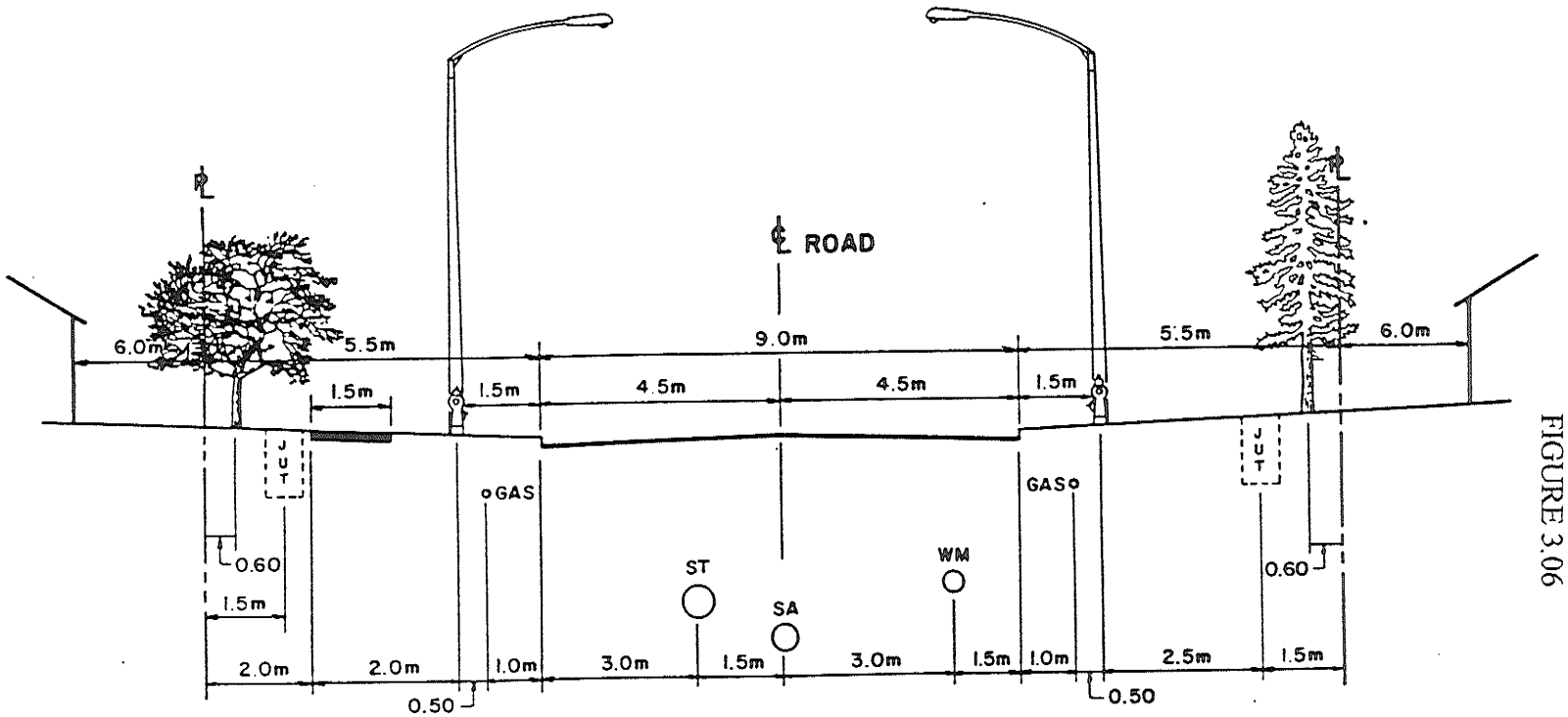
- Watermains should be at least 3 meters apart from sanitary sewers to minimize danger of cross connection and contamination of water.
- Utility corporations such as gas, telephone, have a stated preference to keep such utilities outside the paved area for maintenance considerations
- On streets which are plowed by the municipality, adequate boulevards must be included for storage of snow.

However, it has been shown that adequate clearance for services including adequate access for emergency vehicles and utilities can be accommodated within a reduced ROW width of 16 meters for local roads. FIGURE 3.07 illustrates a reduced ROW width that meets the safety and performance criterion of a 20 ROW width. The Ontario Ministry of

Housing (1990) estimated that a 16 meter ROW width would results in cost savings of about $426 per meter of road length.

One can note from FIGURE 3.07 that the reduced ROW width is achieved by the elimination of sidewalks and curbs -- at an estimated cost savings of $130.00 per linear meter. Regulatory reformers argue that eliminating curbs and sidewalks, "also has an added advantage to provide an environmentally sensitive approach to new development. It allows runoff to percolate through grass thereby reducing the amount of storm runoff that can contaminate disposal areas (i.e. rivers, lakes etc.) with effluents" (RWCOAUDS 1991, 8). It is also argued that a reduced ROW width "could enhance the sense of community in a residential neighborhood and provide more opportunity for neighborly contact" (Ibid., 9; see FIGURE 3.08).

Municipal experience with curb and sidewalk elimination has shown few traffic or pedestrian safety concerns resulting from their removal. One example of this type of capital-cost deduction is in the City of Winnipeg, where, several neighborhoods have been built without curbs or sidewalks and have, reported pedestrian accidents involving automobiles as being rare in occurance. For example, some residents in the Victoria Park area of the city prefer sidewalk and curb elimination stating that it promotes a more pastoral and relaxed residential setting.



EXAMPLE OF 20 METRE R.O.W.

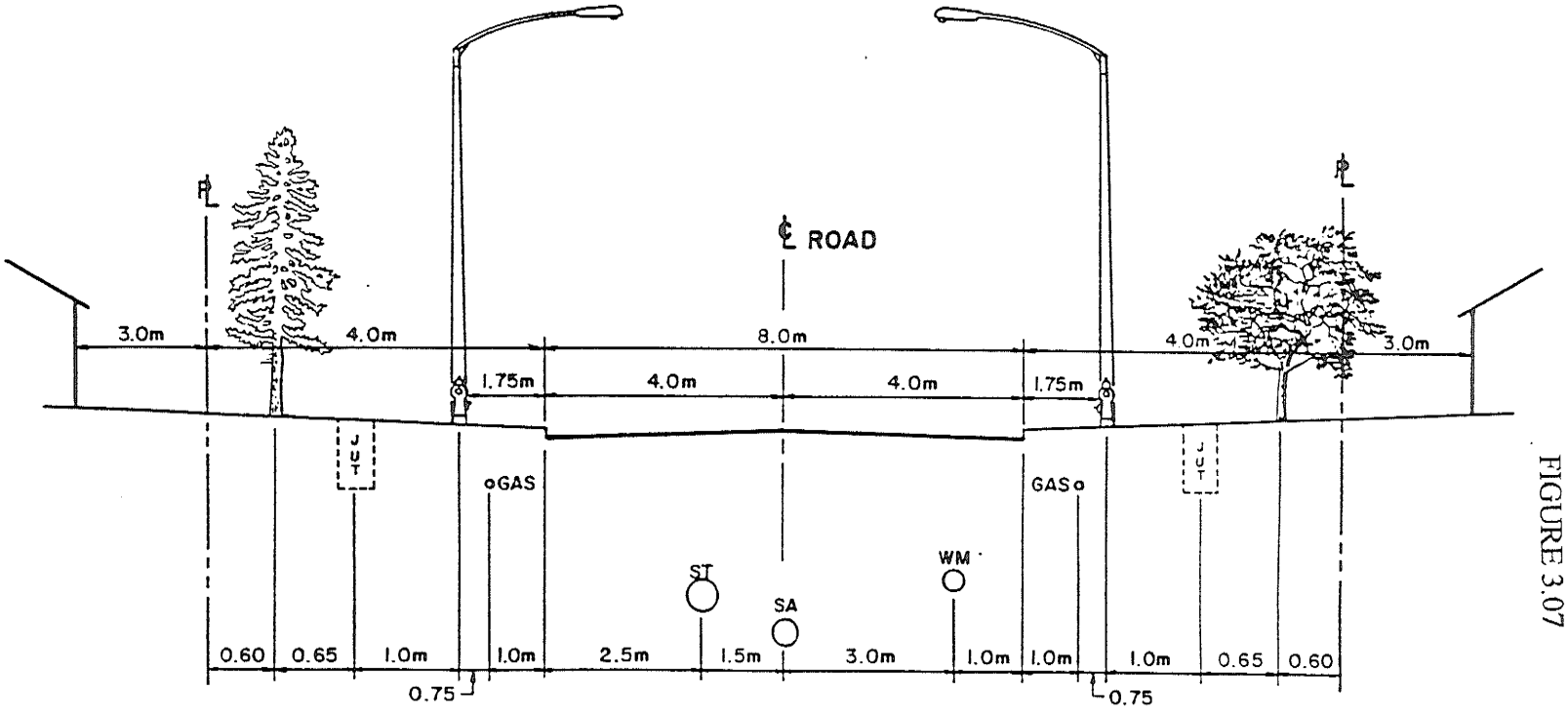
32 METRE HOUSE FRONT TO HOUSE FRONT SEPARATION

Source: Regional Working Committee on Alternative Urban Development Standards, 1991.

LEGEND

ST - Storm Sewer
SA - Sanitary Sewer
WM - Water Main
JUT - Joint Utility Trench

FIGURE 3.06



PROPOSED 16 METRE R.O.W.

22 METRE HOUSE FRONT TO HOUSE FRONT SEPARATION

Source: Regional Working Committee on Alternative Urban Development Standards, 1991.

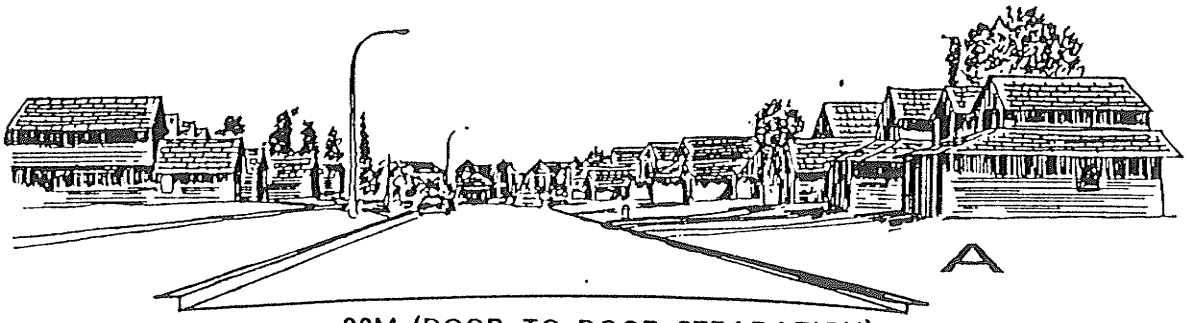
LEGEND

ST - Storm Sewer
SA - Sanitary Sewer
WM - Water Main
JUT - Joint Utility Trench

FIGURE 3.07

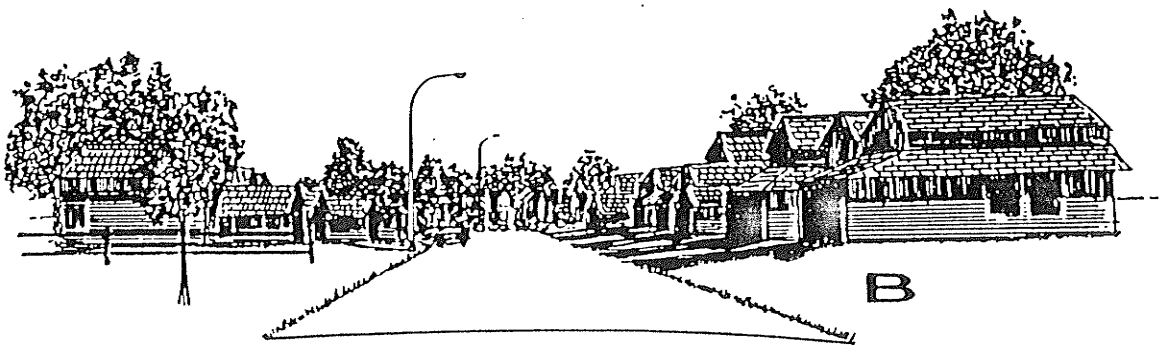
FIGURE 3.08

A COMPARISON OF CONVENTIONAL STANDARDS (A) AND MODIFIED STANDARDS (B)



32M (DOOR TO DOOR SEPARATION)

20M R.O.W.



22M (DOOR TO DOOR SEPARATION)
16M R.O.W.

Source: Regional Working Committee on Alternative Urban Development Standards, 1991.

Planning Standards: Differences Between RPL-Style and Conventional

Although reduced engineering standards offer a means for cost reduction, they account for only about 15-25% of the total development savings (Ontario Ministry of Housing 1990). Reduced planning standards account for most of the other cost savings. Conventional planning standards are land intensive, while innovative ones require much less. It is estimated that innovative standards result in savings of about $6,700 per dwelling unit (see Ontario Ministry of Housing 1990 for the estimate assumptions). This section provides an overview and comparison of innovative (RPL-style) and conventional planning standards that regulate new suburban residential development. The specific planning standards reviewed in this section are as follows: density, lot size, lot shape, side yards, coverage and setbacks (see APPENDIX 5 for RPL and RF1 planning regulations). Innovative planning standards, that reduce lot area, frontage and setbacks, intensify development, reduce both land and capital costs, and in a normal market result in more affordable housing.

Density

In conventional layouts density standards are relatively low, generally, having development densities below 30 units per net development hectare, and rarely even this density is achieved. For example, Edmonton allows a maximum of 27 units per net hectare. However, typically, conventionally designed developments in Edmonton achieve a density of about 15 units per net hectare. It is felt that this density ensures privacy and ample open space at site and overall neighborhood level.

Innovative density standards allow for greater urban intensification. For instance, Edmonton's RPL District allows building densities up to 42 units per net development hectare. This higher density allowance is more efficient since it intensifies development and reduces the cost of supplying municipal services. Servicing higher density

development is cost efficient since there are fewer streets, utility lines and water mains to upgrade, replace and maintain.

Lot Size

Conventional standards, generally, require lot sizes to be in excess of 360 m^2 (3,875 sq. ft.) in area. However, the average lot size in conventionally designed suburban areas is generally substantially larger than this minimum statutory requirement. For instance, average conventionally designed lots in Edmonton are about 465 m^2 in size. This size is believed to provide ample outdoor private space and adequate household privacy.

Innovative standards, such as RPL zoning in Edmonton, reduce the lot size requirement. For example, the minimum lot size in a RPL District is 270 m^2 (2,906 sq. ft.). This is 90 m^2 smaller than the statutory requirement under RF1 zoning, and is 195 m^2 smaller that the conventional layout average. Reduced lot size is the greatest single land development cost reducing factor. "Reduced lot sizes account for 60% to 80% of total development savings." (Ontario Ministry of Housing 1990, 1-1). It is thought that these smaller lots can accommodate a significant share of people in the housing market who require less space and more affordable housing (i.e. seniors, singles and single parents).

Lot Shape

The shape of a lot has a significant bearing on capital and servicing costs. Wider lots, with more street frontage, require more infrastructure per dwelling unit and therefore greater capital expenditures. Conventional standards often require minimum frontages to be in excess of 12m (40 ft.). The rationale for this is that the lot cross-section must be wide enough to support adequate sideyards, the dwelling unit and a car port or garage. Consequently, these lots are relatively wide and shallow. It is estimated that every meter of lot frontage requires $1,233 in infrastructure costs (Ontario Ministry of Housing 1990, 7.9).

Innovative standards reduce lot frontage. For example the RPL District in Edmonton requires a minimum 9 meter (29.5 ft.) frontage. This reduced frontage requirement effectively elongates the lot and reduces roadway and other capital expenditures. "The primary aim is to reduce the amount of street ROW required to support each dwelling . . . lot shape also has an effect on the lot to road ratio and ultimately the density achieved. From an efficiency point of view it is better to increase lot depth rather than width to obtain the same lot area" (DeLCan, De Leuw, Cather 1984, 79).

Side Yards

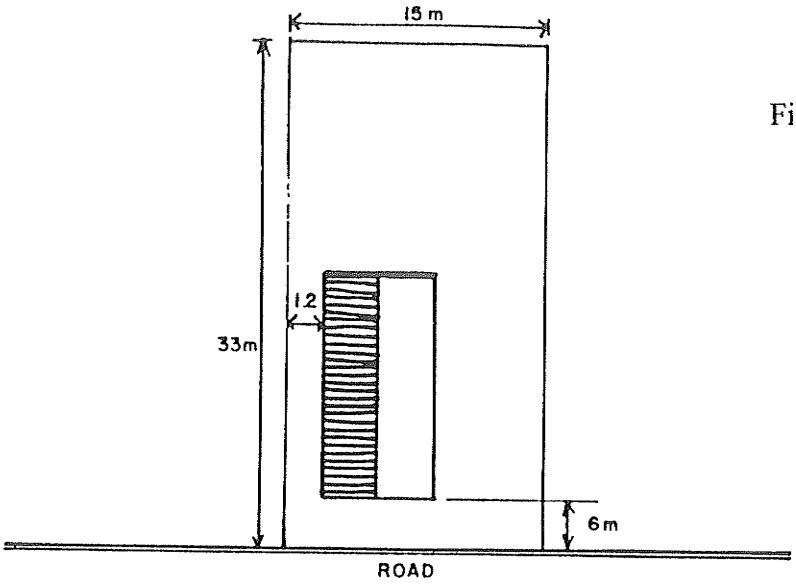
Conventional standards require the dwelling to be setback from its side property lines. This is done to provide an adequate distance between adjacent dwellings. For instance, RF1 zoning in Edmonton, requires a minimum side yard distance of 1.2 meters (3.94 ft.) for dwellings under 7.5 meters in height.

Innovative standards often allow lots with reduced frontages to build the dwelling completely offset to one side of the lot. This practice is known as the zero lot line concept. It provides better utilization of the outdoor living space and is argued that it increases privacy. Some zero lot line developments have been built in Edmonton, such as Ottewell and Millbourne. FIGURE 3.09 illustrates the concept.

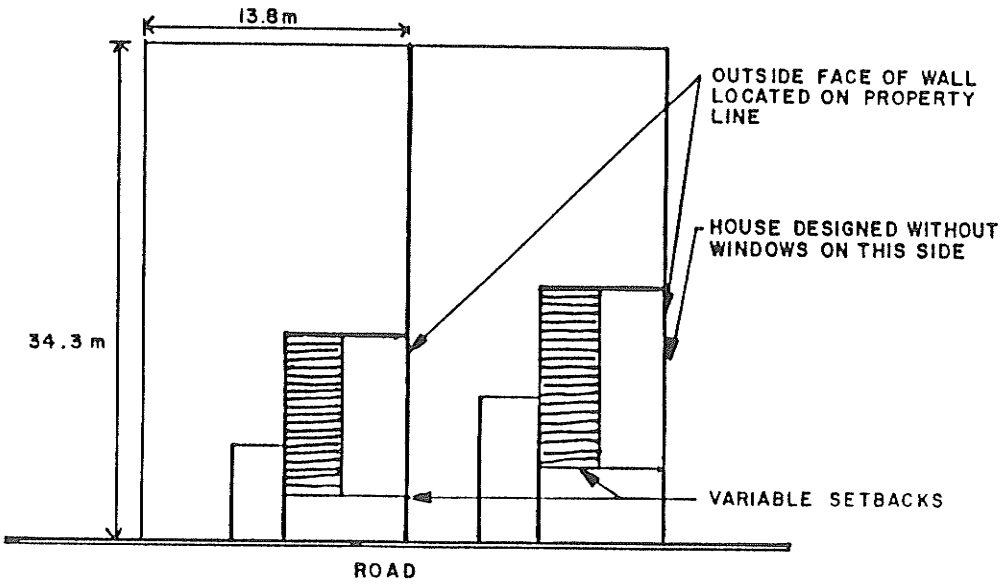
Site Coverage

Typically, conventional standards require site coverage to be under 40%. This figure is specified to prevent an area from becoming seemingly over-developed and thereby reducing the residents' quality of life.

Figure 3.09



CONVENTIONAL 'A'



ZERO LOT-LINE 'B'

ZERO LOT-LINE

Source: DeLCan, De Leuw, Cather, Western Ltd., 1984.

Innovative standards, often allow dwellings (i.e. house and garage) to cover 45% or more of the site area. For example, RPL zoning in Edmonton permits site coverage up to 45% with a maximum of 35% for the principle building. This standard accommodates dwelling units built in excess of 1,300 sq. ft. in area.

Setbacks

Building setbacks provide separation space between the ROW width and the dwelling unit. Conventional standards, generally, require a minimum setback of 6 meters as they do for example in Edmonton.

Innovative design standards reduce the required setback. For instance, RPL zoning in Edmonton permits a minimum front yard setback of 4.5 meters. It is argued that "narrower setbacks are quite acceptable and can enhance the feeling of human scale in the development" (DeLCan, De Leuw, Cather 1984, 81).

Inventory of Cost Savings Associated With Innovative Development Standards

When aggregated, the specific modified engineering and planning standards reduce new suburban housing costs by as much as 10 percent. This section provides an inventory of accepted cost saving techniques associated with modified land development standards. It summarizes construction servicing costs of two subdivision plans developed for the same site -- one designed with conventional standards and the other with innovative development requirements. The detailed cost estimate is abstracted from the Ontario Ministry of Housing report, Urban Development Standards: Update 1990. The cost estimate derived by the Ministry would be similar to cost savings associated with the innovative standards discussed in this chapter. TABLE 3.01 illustrates the total estimated cost savings of using modified engineering standards, as well as, identifies their source (also see FIGURE 3.10).

TABLE 3.02 summarized the cost savings per unit attributed to both modified planning and engineering standards (also see FIGURE 3.11). For a discussion of all the development assumptions see the Ontario Ministry of Housing (1990) study.

TABLE 3.01

SUMMARY OF CONSTRUCTION SERVICING COSTS

FOR A SUBURBAN RESIDENTIAL SUBDIVISION

($1990)

	CONVENTIONAL STANDARDS	INNOVATIVE STANDARDS	SAVING (INCREASE)	PERCENTAGE
Watermains	$382,900	$328,200	$54,700	14%
Sanitary Sewers	$326,000	$268,500	$57,500	18%
Storm Sewers	$647,400	$563,000	$84,400	13%
Service Connections	$473,400	$336,800	$136,600	29%
Roadways	$1,119,300	$1,072,600	$46,700	4%
Sidewalks	$249,400	$247,300	$2,100	1%
Street Lighting and Underground Hydro	$394,600	$604,600	($210,000)	-53%
Grading (1)	$11,300	$71,000	($59,700)	-528%
Miscellaneous (1)	$161,300	$125,700	$35,600	22%
Sub-total	$3,765,600	$3,617,700	$147,900	4%
Engineering (7%)	$263,592	$253,239	$10,353	4%
TOTAL SERVICING COST	$4,029,192	$3,870,939	$158,253	4%
No. of Units	263	414		
Servicing Cost Per Unit	$15,320	$9,350	$5,970	39%
No. of Metres of Road	2990	3140		
Servicing Cost Per Metre	$1,348	$1,233	$115	9%
TOTAL LAND COST (2)	$2,500,000	$2,500,000		
TOTAL COST	$6,529,192	$6,370,939	$158,253	2%
Total Cost Per Unit	$24,826	$15,389	$9,437	38%

NOTES: (1) Costs identified in original study.
(2) Assume $125,000/ha ($50,000/acre)

Source: Ontario Ministry of Housing 1990

TABLE 3.02

SUMMARY OF 1990 SAVINGS
SUBURBAN RESIDENTIAL SUBDIVISION

	Conventional Cost	Innovative Cost	Savings
SERVICING COSTS			
Total Servicing Cost	$4,029,192	$3,870,939	$158,253
Total Servicing Cost Per Metre of Road	$1,348	$1,233	$115
Total Servicing Cost Per Unit	$15,320	$9,350	$5,970
Saving per Unit Attributed to Engineering Standards			$1,307
Saving per unit attributed to ROW Width	---	---	N/A
Savings per unit attributed to Planning Standards	---	---	$4,663
TOTAL COST			
Total Land Cost	$2,500,000	$2,500,000	---
Total Cost (Servicing and Land)	$6,529,192	$6,370,939	$158,253
Total Cost Per Unit	$24,826	$15,389	$9,437
Total Cost Per Metre of Road	$2,184	$2,029	$155
Savings per Unit attributed to Engineering Standards	---	---	$1,307
Savings per Unit attributed to ROW Width (say average 3 m saving)	---	---	$426
Saving per Unit attributed to Planning Standards	---	---	$7,704

Note: Land costs assumed to be $125,000/ha ($50,000/acre)

Source: Ontario Ministry of Housing 1990

FIGURE 3.10

Comparison of Construction Costs (1990)

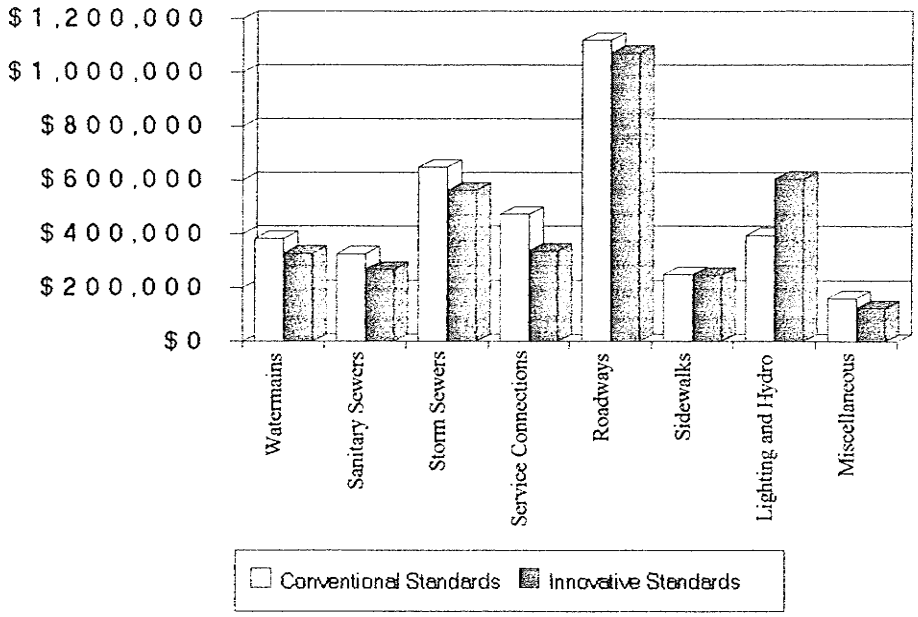
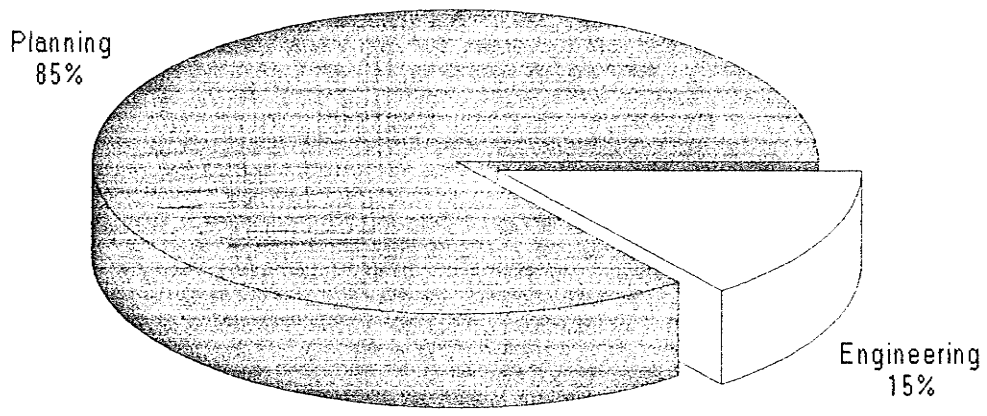


FIGURE 3.11

Composition of Cost Savings (1990)



CHAPTER 4: SITE DESCRIPTION AND SURVEY METHODOLOGY

This chapter focuses on the two selected site areas used in this study and on the methods and processes employed in designing and implementing the mail questionnaire. It discusses how the data were collected as well as how the selected samples were chosen. Also included are field survey photographs. This chapter also discusses, in detail, the questionnaire format and survey methodology. Last and equally important, it elaborates on the relationship between questionnaire items and the four formulated hypotheses.

Selection and Description of The Two Samples

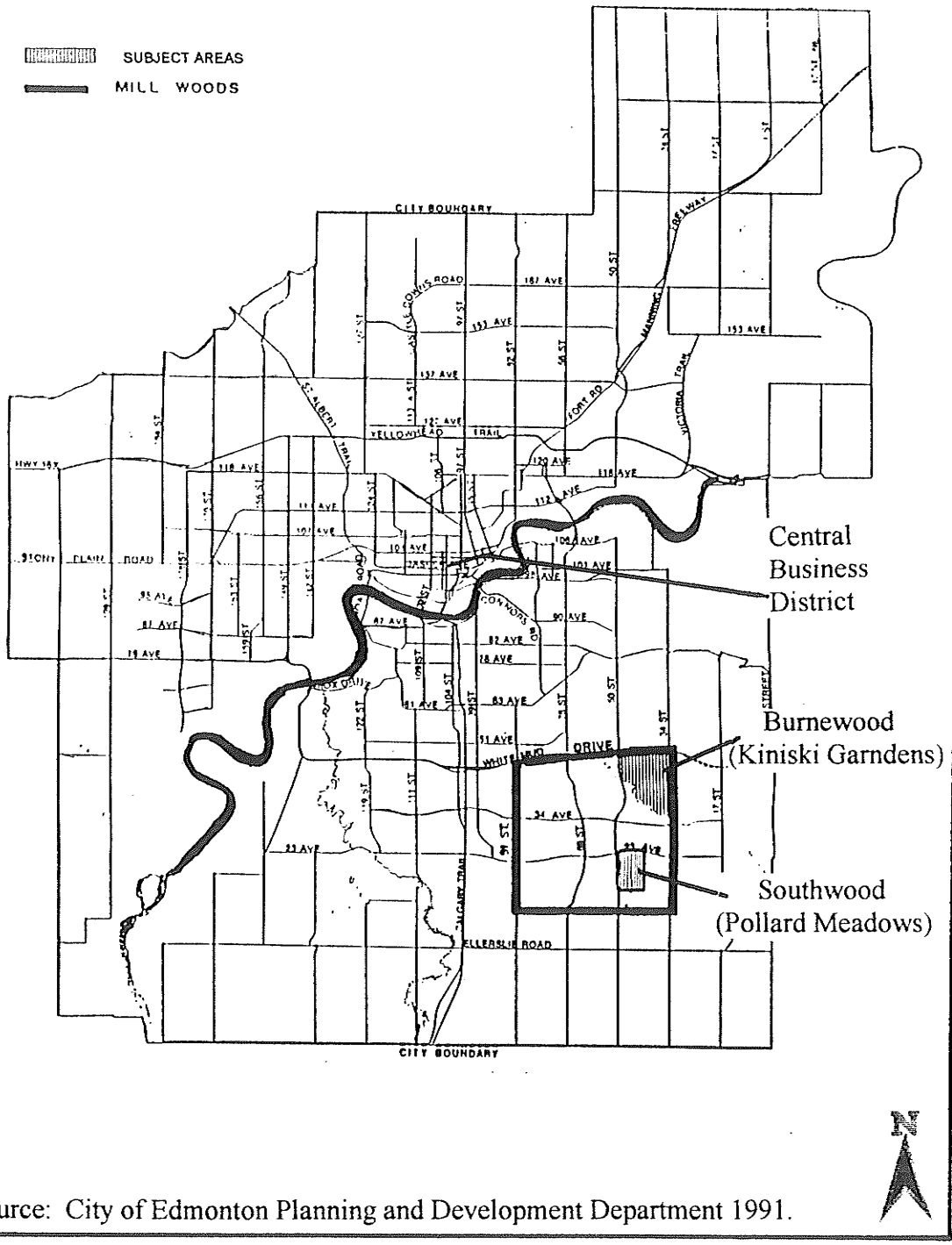
Two neighborhoods were chosen to test the conjectures formed in chapter two -- Kiniski Gardens in the Burnewood community and Pollard Meadows in the Southwood community. Both of these sites were located in the eastern region of Mill Woods, Edmonton. MAP 4.00 illustrates their contextual location in the City.

Selection criteria were used to choose the two study sites in Mill Woods, but it is important to note that these criteria are subjectively based and reflect the authors own judgments and heuristics. The two neighborhoods were chosen because each satisfied the author's neighborhood selection criteria:

1. The dwelling units selected were part of a mature community. Specifically, they were at least ten years in age. Age was specified because of the continued development (i.e. grass and tree planting, garage construction) often associated with newer suburbs. Hence, it was specified to negate the possible effects associated with this sort of activity.

2. The demographics of the site were close to other similarly-zoned developments, and comparable to city averages.

MAP 4.00



Source: City of Edmonton Planning and Development Department 1991.

3. The physical environment (i.e. lot size, dwelling size) was typical and representative of other similarly-zoned neighborhoods in the City.

4. The development density of the site were comparable to other similarly zoned areas in the City.

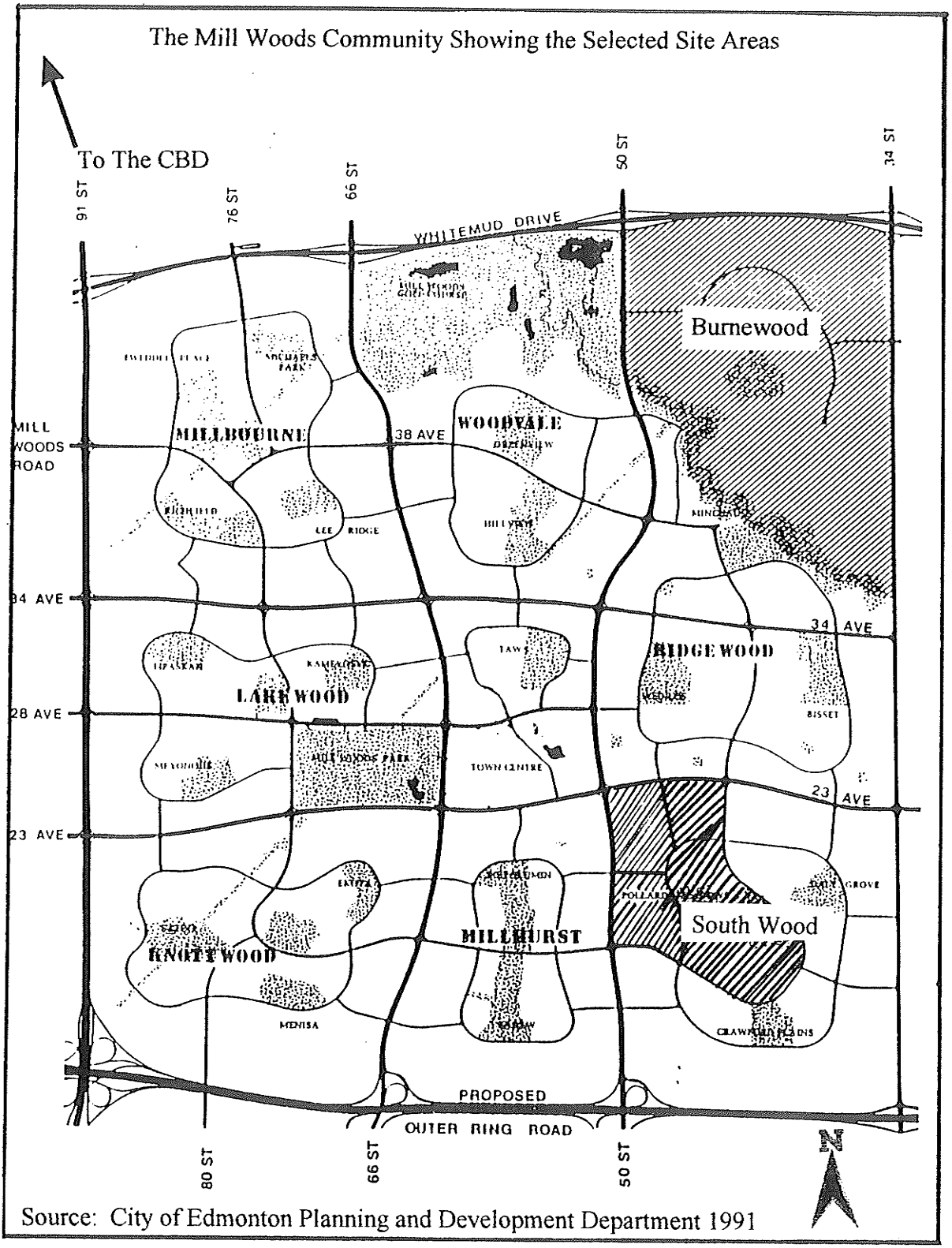
5. The two site areas, RPL and RF1, were located in the same geographical region -- in order to control locational factors (i.e. proximity to the downtown, shopping centers, schools and other regional facilities).

The Kiniski Gardens Area

Kiniski Gardens, part of the Burnewood neighborhood, is located in the northeast quadrant of the Mill Woods community. It was named in honor of former City alderman Julia Kiniski and was chosen to represent a typical RPL subdivision in Edmonton. Kiniski Gardens is one of three subdivisions that make up the Burnewood neighborhood. As of May 1990, Burnewood had a population of 3,269, (over 930 households), and covered 755.21 acres of land (City of Edmonton 1991, 7/53). The area was once part of a land bank "assembled in 1970 by the government of Alberta because of concern over the rising cost of serviced residential land in the Edmonton area. Mill Woods was named for the Mill Creek which crossed it and the groves of trees that once stood there" (City of Edmonton 1987, 1). MAP 4.01 depicts Mill Woods and illustrates the relative locations of the two study areas. Furthermore, MAP 4.02 illustrates the subdivision design of Kiniski Gardens and the existing land uses permitted there as of 1987.

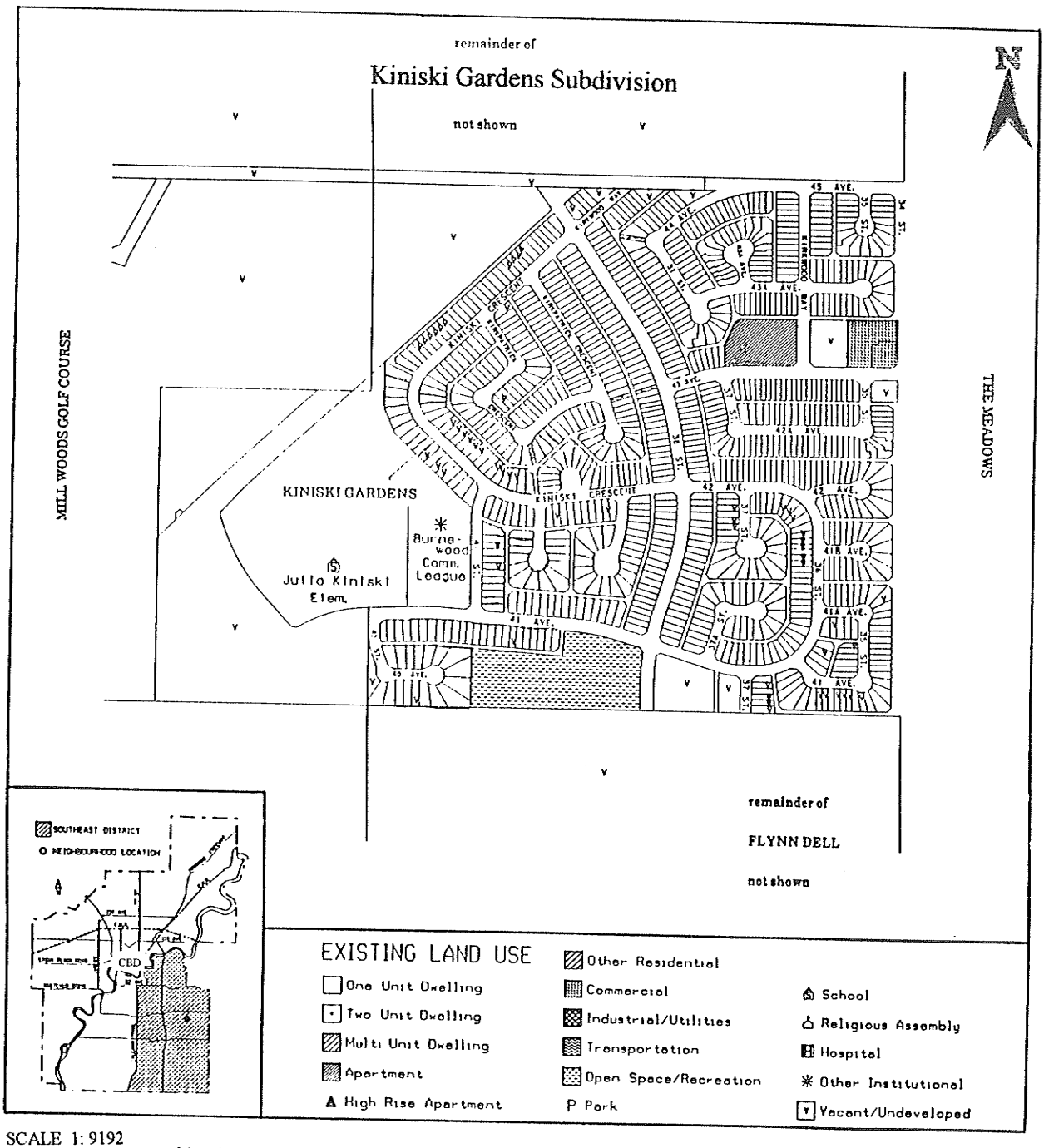
MAP 4.01

The Mill Woods Community Showing the Selected Site Areas



Source: City of Edmonton Planning and Development Department 1991

MAP 4.02



SCALE 1: 9192

May, 1987
Source:
Land Use Mapping System

THE CITY OF Edmonton PLANNING AND DEVELOPMENT

The Pollard Meadows Area

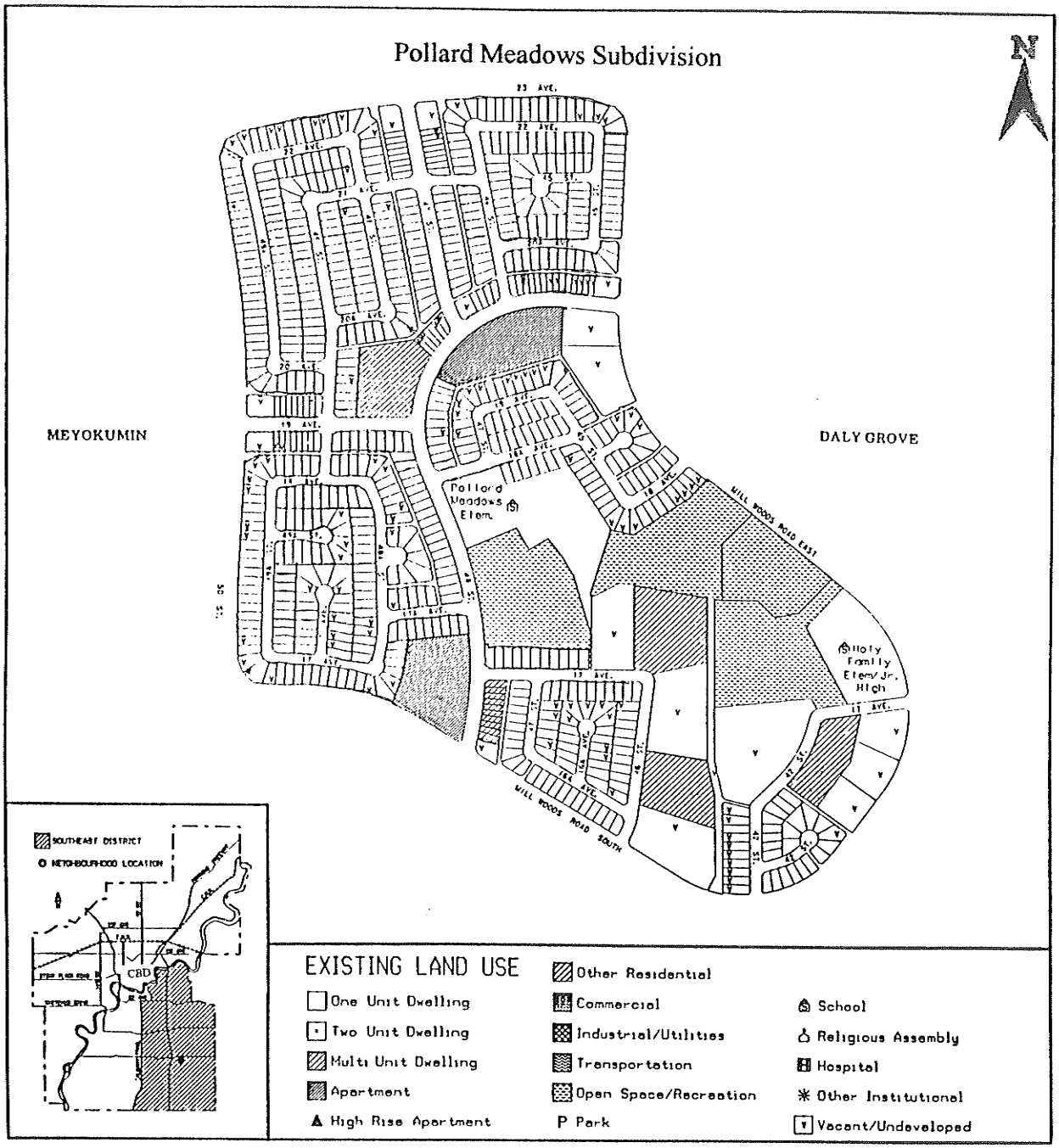
The second selected site was also one of the 27 neighborhoods comprising Mill Woods. The Pollard Meadows subdivision, chosen to represent a typical RF1 district in Edmonton, had common bungalow style housing, normal street patterns and average site specifications (i.e. 12 meter or 40 ft. frontages and 6 meter or 20 ft. setbacks). It also met the five selection criteria. Its age, location, development density, demographic profile and physical characteristics made it the "best" RF1 site choice. It was 105.2 hectares in size, with 1,202 households, and had population of 3,757 in 1987. MAP 4.03 shows Pollard Meadow's subdivision design and the existing land uses permitted in the area.

Field Survey Photographs

Although the differences between RPL and RF1 zoned housing have been discussed and diagrammatic illustrations provided, the true sense of their differences may still be elusive. Thus, photographs were taken during field surveys of the areas in December 1992. The following photos clearly illustrate the physical differences between the two types of zoning standards.

FIGURES 4.00 and 4.01 depict typical characteristics of single detached RPL housing in Edmonton; note the reduced frontage and setback requirements. FIGURE 4.00 was taken in Kirkpatrick Crescent and FIGURE 4.01 taken on 38 street and 42 A Avenue. FIGURE 4.02 shows the rear view of a typical RPL yard; it too was shot in Kirkpatrick Crescent area. FIGURES 4.03, 4.04 and 4.05 illustrate typical RF1 zoned housing in Edmonton. These photographs were taken in the Pollard Meadows area along 47 street and 20 A avenue. Note that the lots are wider and larger in size. Moreover, larger setbacks and lower development density standards are apparent in comparison to the RPL housing.

MAP 4.03

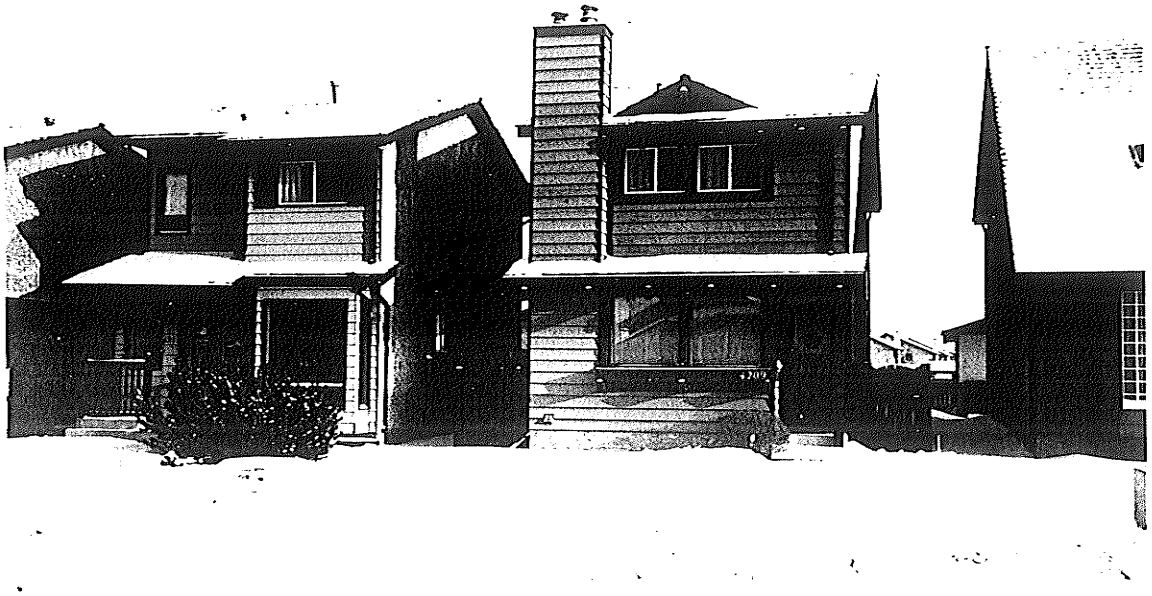


SCALE 1: 10,248

May, 1987
Source:
Land Use Mapping System

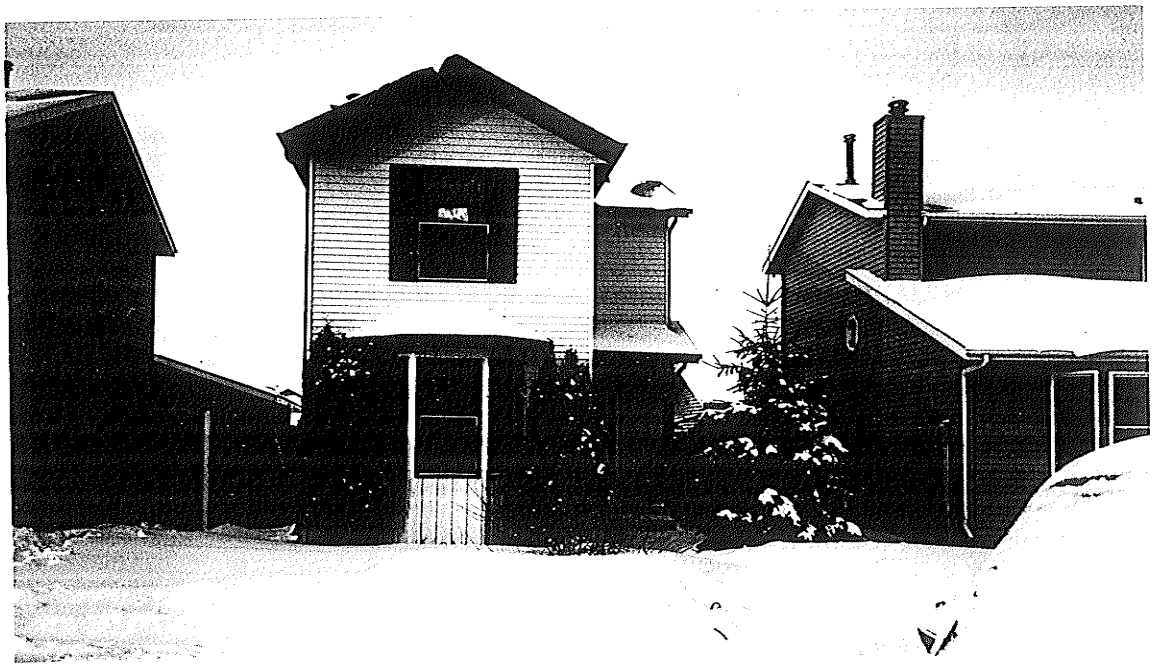
THE CITY OF Edmonton PLANNING AND DEVELOPMENT

FIGURE 4.00



RPL Housing on Kirkpatrick Crescent

FIGURE 4.01

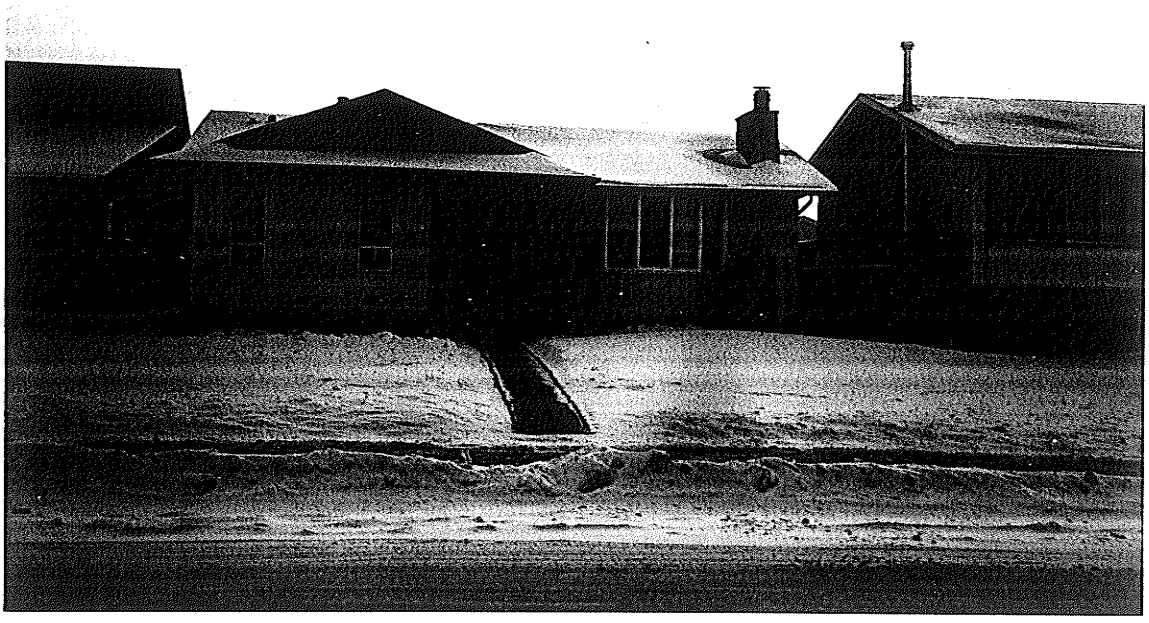


A RPL House on 38th Street and 42 A Avenue

FIGURE 4.02

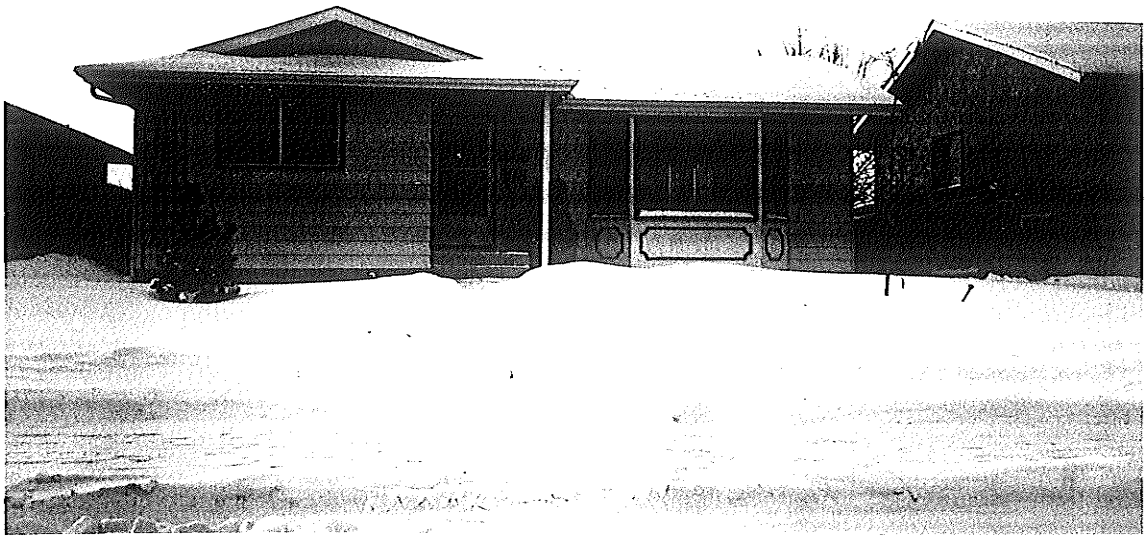
Rear View of an RPL House on Kirkpatrick Crescent

FIGURE 4.03



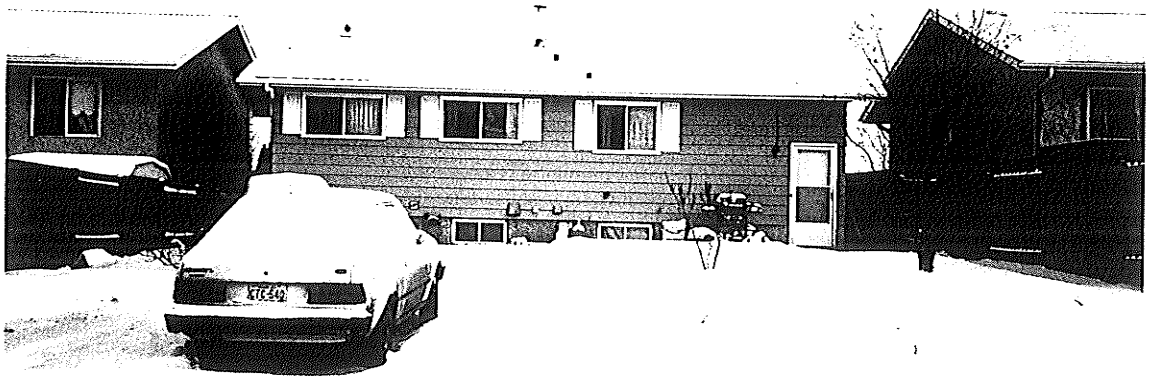
A RF1 on 47 Street and 20 A Avenue

FIGURE 4.04



A RF1 House on 49 Street and 19 Avenue

FIGURE 4.05



Rear View of A RF1 House on 47 Street and 20 A Avenue

Data Collection Method

Data relating to residential satisfaction were collected in January, 1993, using mail questionnaires. Caution was given on how the sample was chosen. "Not all methods of sampling are equally suitable for choosing samples that are representative of the population" (Ebdon 1985, 36). Moreover, McClave and Benson (1988, 184) noted that "how a sample is selected from a population is of vital importance in statistical inference because the probability of an observed sample will be used to infer the characteristics of the sample population". A random sampling technique was employed to collect responses from two different neighborhoods. "A random sampling method is one in which the choice of individuals for inclusion in the sample is left entirely to chance" (Ebdon 1985, 36). This sampling method satisfied two critical data selection criteria: (1) every individual had an equal chance to be selected; (2) the selection of one individual did not affect the chance of selection for another individual.

This random sampling method would ensure a representative sample and would help control any unseen exogenous variables with locational associations that could distort responses; thus, it was preferred to cluster sampling. In other words, the study took reasonable steps (i.e. using a random sampling technique and typical neighborhoods) to ensure adequate representation of the respective populations and attempted to address factors that were obvious in the study areas (i.e. amount of leisure space in an area, the amount of landscaping, street design, traffic, industrial noise and pollution externalities).

Determining Sample Size

"Selection of an appropriate sample size is one of the most important aspects of any experimental design problem" (Montgomery 1984, 26). The minimum sample size in this study was calculated with the aid of an Operating Characteristic (O.C.) curve (see Ferris et al. 1946 for a complete review and derivation of O.C. curves). Montgomery (1984, 28) also noted that "operating characteristic curves are often helpful in selecting a sample size to use in an experiment". Employing an O.C curve also required the use of the following formula:

$$d = \frac{|u_1 - u_2|}{2\sigma}$$

Where:
d = Difference between sample means
u_1 = Mean of sample group A
u_2 = Mean of sample group B
σ = unknown but (assumed) equal variance

Using a tolerable mean difference of 1 and an assumed variance of 1 with a level of significance of 0.05 and a power of 0.7, the minimal statistically valid sample size was found to be 30 for each sample (total n=60). Unfortunately, d involved the unknown parameter of σ. However, after reviewing previous studies it was felt that a variance of 1 was an acceptable population norm.

Generating the Random Sample

A systematic method was used to generate the random sample. The random sample was derived by numbering each household in the respective site areas on a local area map. Next, a random number list was generated using the computer program Excel 4.0®. One hundred and ninety four random numbers were generated and matched with the households numbered on the local maps. Consequently, of the 936 households eligible in the Kiniski Gardens area, 97 households were selected to participate in the mail survey (assuming a return rate of between 30% - 40%; the 97 household sample was surmised to be sufficient enough to meet the minimum required sample size of 30 households per subdivision). And, of the 480 households in the Pollard meadows area, 97 were selected to participate (again this assumed a response rate of 30% - 40% satisfying the minimum sample requirement explained on the previous page).

It is important to note that the random numbers were selected without replacement. It was felt that replacement selection would be impractical and difficult to execute. Referring to replacement sampling Ebdon (1985, 39) noted that "in practice this [method] is seldom done, and bias introduced into the study by not doing so is very unlikely to be of any importance".

Design and Format of The Questionnaire

The mail questionnaire was intended to be specific, simple and require little time to complete(see APPENDIX 1). Its format followed Don Dillman's (1978) "Total Design Method" (TDM). "This term is a result of the premise on which it is based, namely, to maximize both the quality and quantity of responses, attention must be given to every detail that might affect response behavior" (Dillman 1978, vii). The questionnaire was largely close-ended with ordered response choices. The design followed Likert's (1932) format of a ordered number scale -- a five point continuum ranging from "strongly

disagree" to "strongly agree". The questionnaire contained 37 separate response items, of which three were open-ended in design. It was five pages in length and required about ten minutes to complete. This length seemed optimal since previous TDM questionnaires of this length, have been reported to obtain, on average, response rates on average of 76%. The questionnaire elicited four basic types of responses, -- attitudinal, cognitive, behavioral and personal, that reflect the Weidemann and Anderson (1985) model, that was used in this study, and detailed in Chapter Two.

Dillman (1978) pointed out that proper questionnaire format and question wording are crucial to stimulate a meaningful response rate. He noted that "size, shape, weight, color, paper quality, cover design, question order, and layout are among the numerous features, offering clues to the worth of the questionnaire" (Ibid., 120). All these visually observable characteristics of the questionnaire have been shown to affect the recipient's decision to respond.

Following Dillman's principles, the following questionnaire format was derived. It was printed as a booklet on 8 1/2" x 14" paper, folded along the middle seam that resulted in a booklet 8 1/2" x 7" in size. This booklet size was produced by photographically reducing 8 1/2" x 11" paper by 79 percent. It was reproduced on gray paper, printed on both sides, along with a formal cover page. The cover page was titled "Evaluating Your Neighborhood: What Do You Think about it ?" (see APPENDIX 1). It had a graphical illustration of a house (obtained from the computer program CorelDRAW® version 3.0) that was manipulated to resemble housing units in the two study areas. Thus, two different types of illustrations were used the purpose bein to match housing in the area and to distinguish between the two sample groups -- Kiniski Gardens and Pollard Meadows.

The questions were ordered from those perceived to be the easiest to the most difficult. Questions prompting respondents' personal characteristics were placed on the last page. Equally important in the ordering procedure was the grouping of similar

questions and establishing a "vertical flow" (Dillman 1978). This was accomplished by designing the questionnaire in four separate sections and eight sub-sections. Each section was linked with transitional sectional headings, as suggested by Dillman (1978). The four major sections included questions related to factors relating to residential satisfaction, such as: the physical environment, the social environment, safety and privacy. To assist in clarity and reading ease, sectional headings were printed in upper case bold arial lettering while the questions were printed in lower case. Vertical dual columns, one for questions and the other for responses, were added to increase the questionnaire's reading ease, and to conserve space.

Special attention was also given to the cover letter, as it served to introduce the study's topic and invoke interest (see APPENDIX 1). Dillman (1978, 165) noted that "the cover letter is virtually the only opportunity the researcher has for anticipating and countering respondents' questions". Thus, the first paragraph of the cover letter explained the study's purpose and importance, the second paragraph indicated that their participation was crucial and the results would be confidential, the third offered a "token" reward (a copy of the study's results) for participating and a telephone number to call if they had any questions. As suggested by Sue Weidemann all letters were personally signed by the author in blue ink and dated . Directly beneath the author's name was a formal title (Project Coordinator), as advised by Dillman (1978).

Field Testing the Questionnaire

An archetypal model was tested in the North Kildonan district of Winnipeg, Manitoba during the period of January 22 - January 24, 1993. This district was chosen as the test site because it exhibited some similar RPL characteristics. For example the chosen neighborhood, located at Dunits Road and Dunits Avenue, was designed with smaller lots,

reduced frontages, no side-walks and reduced right-of-way widths. It was felt that for best test results the field area should resemble one of the Edmonton sample areas as much as possible.

The purpose of the test was to investigate question clarity and questionnaire format and potential completion time. Consequently, testing found that the dependent variable of "overall satisfaction" (question 10) needed to repositioned in the questionnaire. Originally, it was placed as question 1 in the survey; however, some participants felt its placement was awkward and prompted premature judgment. The test also revealed one grammatical mistake and a completion time of about seven minutes. In addition, two questions needed to be clarified; requiring slight rewording. These four changes resulted in the fifth and final edition of the survey questionnaire. Following these changes the final version was sent to the Faculty of Architecture Ethics Review Committee for approval. The questionnaire was found suitable, and approved by the Committee.

Mailout Procedure

A reduced version of Dillman's TDM was employed for implementing the questionnaire package. Careful attention was given to this stage since "virtually any stage in the process of sending and retrieving questionnaires may produce a refusal [and] constitutes the frame of reference from which the procedure for implementation the Total Design Method mail surveys . . ." (Dillman 1978, 161). The Dillman method was reduced from a four stage to a three stage procedure. A three stage procedure was thought to have the advantages of the full TDM, yet reduce resources required for implementation. The first stage consisted of the complete questionnaire package and the later two stages consisted of reminder cards. In order to minimize the refusal rate the questionnaire package relied heavily on personalization throughout the implementations process.

One hundred and ninety four mailout packages that included the questionnaire, the cover letter and the return envelope, were hand delivered. The selected random households were indicated on the local area maps and shipped to a distribution team assembled in Edmonton. On February 1, 1993 the two person team hand delivered the questionnaires with pre-paid return envelopes.

The mailout package was followed up, one week later, by delivering reminder cards to all the recipients of the first mailing. This task was once again perform by the Edmonton distribution team These cards were written to thank those who had already returned their questionnaires and served to remind those who had not. Exactly three weeks after the original mailout, a second set of reminder cards were sent out to those who had not yet responded. This type of follow up process has been shown to double return rates (Dillman 1978). Consequently, the follow up cards were viewed as imperative.

Computational Methods and Model Elaboration

This section bridges the gap between theory and practice. It operationalizes the conjectures formed in Chapter Two and relates them directly to questionnaire items. Moreover, it briefly discusses the methods by which the various hypotheses will be empirically tested. All the necessary statistical computations were performed on a Macintosh computer using the statistical software program StatView SE + Graphics® by Abacus Inc. (1991).

Hypothesis 1

This conjecture predicted that mean satisfaction scores would differ significantly between RPL and RF1 residents. This was be tested by comparing and contrasting mean

scores related to question 10 of the questionnaire (see APPENDIX 1 for question details). Testing required the use of Student's t-test -- a parametric mean comparison test statistic.

Hypothesis 2

This hypothesis surmised that RPL residents would have lower satisfaction scores, when compared to RF1 residents, primarily due to dissatisfaction with the following features: privacy, lot size, lot shape, density, setbacks and mislead expectations. Mean scores were to be contrasted between RPL and RF1 residents and again, Student's t-test was used. The following questions operationalized the hypothesis: question 1 (lot size), question 6 (lot shape), question 7 (setbacks), question 8 (safety), question 19 (density), question 3 (privacy) and question 22 (expectations).

Hypothesis 3

This hypothesis stated that the small lots in the RPL district would cause increased social interaction as well as an increased sense of community. Questions 11 and 15 test this hypothesis and required the use of Student's t-test.

Hypothesis 4

This hypothesis predicted that privacy, lot size, safety, neighbor homogeneity, social interaction, maintenance (i.e. yard and house) and density would be the strongest predictors of residential satisfaction. The dependent variable was overall satisfaction (question 10). The independent variables were question 1 (lot size), question 8 (safety), question 3 (privacy), question 9 (social interaction), question 16 (homogeneity), question 4 (noise), question 2 (price), question 7 (setbacks), question 6 (lot shape), question 19 (density), question 9 (friendliness), question 28 (sex), question 29 (tenure), question 31 (age), question 32 (marital status), question 36 (income) and question 5 (Maintenance). This

conjecture required the use of multiple regression via the ordinary least squares method. The regression equation was built using forward stepwise regression procedures.

Response Rate

A total of 194 questionnaires were delivered to the two sites and of these 65 (33.5%) were returned. Of those returned, 33 questionnaires (34.0%) were from the Kiniski Gardens subdivision and 32 (32.9%) were from the Pollard Meadows subdivision. The lower than average response rates caused slight concern. The author recognized the limitations of this response rate and advises that the results be viewed bearing this in mind.

CHAPTER 5: ANALYSIS OF RESULTS

This chapter analyzes the data obtained from the mail questionnaires using descriptive and inferential statistics. It discusses demographic profiles of the study areas and elaborates on the types and purposes of the various statistical tools used in this chapter. Furthermore, it performs various statistical analyses on the data to test the hypotheses formed in Chapter Two. Specifically, it performs two different statistical operations in order to test the first three hypotheses -- Students t-test to compare sample means, and the Pearson's Product-Moment Correlation (r) to delineate linear relationships. The fourth hypothesis is tested using multiple regression analysis. Notably, the multiple regression model's assumptions are clearly stated and violation tests performed, such as random error plots to determine if the stochastic disturbances are heteroscedastic and normally distributed.

Socioeconomic and Demographic Statistics of The Study Groups

Information from Statistics Canada was of little assistance in determining the representativeness of the results, obtained from the questionnaire, since only 1986 census data were available. Not only was the data somewhat dated but the census tracts were problematic. For example, census tracts 090.14 and 090.12 encompassing Kiniski Gardens and Pollard Meadows, respectively, were much larger than the two selected sites. Hence, these larger census tracts included various other forms of housing (i.e. apartments and new high-end housing) that served to distort the characteristics of the study areas (for information on the census tracts see Statistics Canada 1988, Edmonton Profile - Part II).

However, residents' characteristics were derived from the questionnaire. These characteristics were analyzed, using Student's t-test, to determine if the samples were statistically different. None of the characteristics such as age, sex or income were found to be significantly difference at alpha=0.01. However, at an alpha=0.05 (t = -2.479), household size did become significantly different. Below is a summary of residents' characteristics.

Sex

The ratio of males to females in the sample was nearly equal. In fact, in the RPL sample the percentage of males to females was exact (see APPENDIX 2 for all distribution details). This distribution was optimal, providing a balanced pool of data.

Tenure and Previous Dwelling Type

Residents of the RF1 sample tended to have lived in their present dwelling longer compared to residents of the RPL district. Fifty percent of the RF1 sample lived in their present dwelling 6 years or longer compared to only 40% of residents surveyed in the RPL sample.

The previous type of dwelling sited by RF1 residents tended to be single family housing (40%). This contrasted with residents of the RPL subdivision whose previous housing tended to be townhouses (36.66%) and apartments (33.33%).

Respondents' Age and Marital Status

Residents of the RF1 sample were on average older than residents of the RPL study group. Thirty percent of the former were older than 40 years compared to only 20% of the latter.

On average, residents of the RF1 sample consisted of more married couples (70%) compared to those of the RPL sample (60%). Moreover, the RPL sample consisted of more (never married) singles (10%) than did the RF1 sample (3.33%).

Composition of Households

Residents of the RF1 zoned housing tended to have more children than did those of the RPL sample. In fact, 70% of the RPL residents surveyed had 1 or fewer children. Consequently the average household size was larger in the RF1 sample.

Education and Income

Residents of the RF1 sample tended to be slightly more educated with moderately higher incomes than did those from the RPL. For example, 69.99% of those in the RF1 sample earned $41,000 or more yearly while only 46.66% in the RPL sample matched this income level.

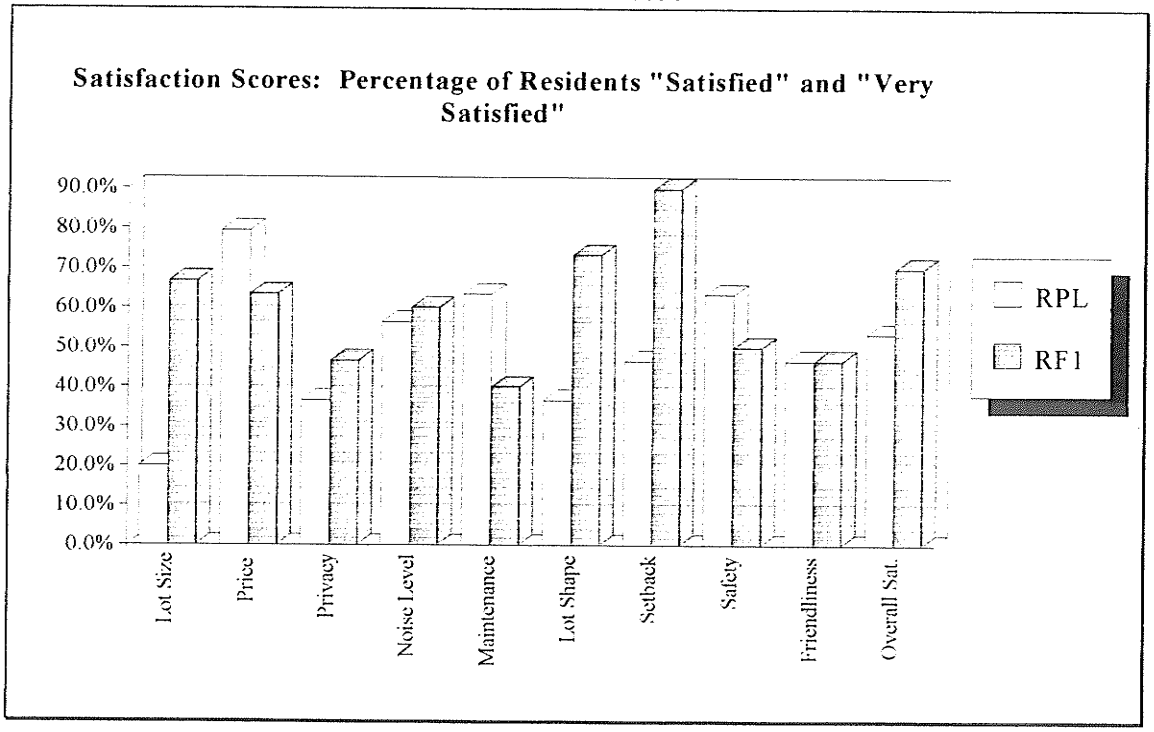
Overview of Results

As previously stated, the questionnaire was divided into four major sections and eight subsections. Below is a brief summary of the responses to the questions in each of the first three sections of the questionnaire pertaining to residential satisfaction and physical and social attributes of the respective areas (the forth section of the questionnaire related to personal characteristics discussed earlier in this chapter).

Section I: Satisfaction With Various Aspects of Housing

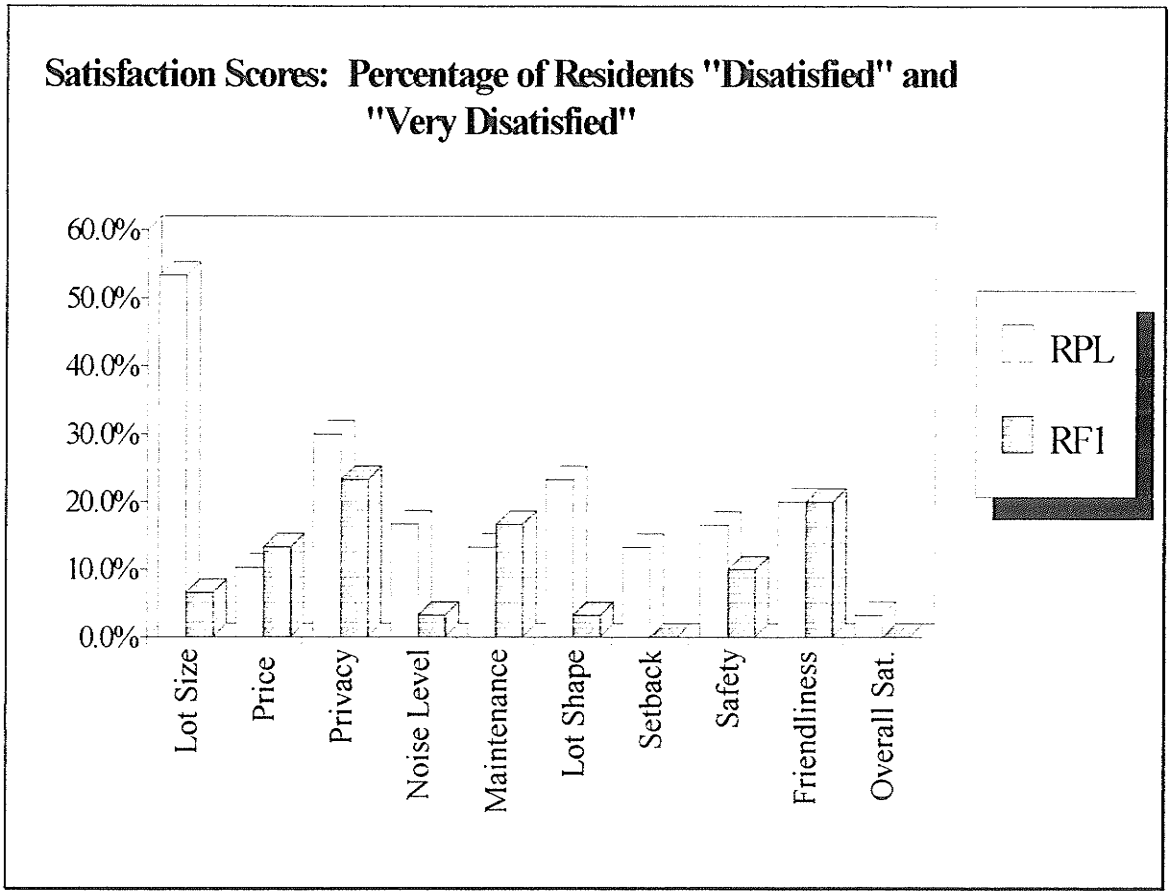
Generally, the residents of Kiniski Gardens and Pollard Meadows were satisfied with their home and neighborhood. When satisfaction scores for "Very Satisfied" and "Satisfied" were aggregated the total satisfaction percentages for the nine independent variables were as follows for Kiniski Gardens and Pollard Meadows (see FIGURE 5.00).

FIGURE 5.00



When satisfaction scores for "Very Disatisfied" and "Disatisfied" were aggregated the total satisfaction percentages for the nine independent variables were as follows for Kiniski Gardens and Pollard Meadows (see FIGURE 5.01).

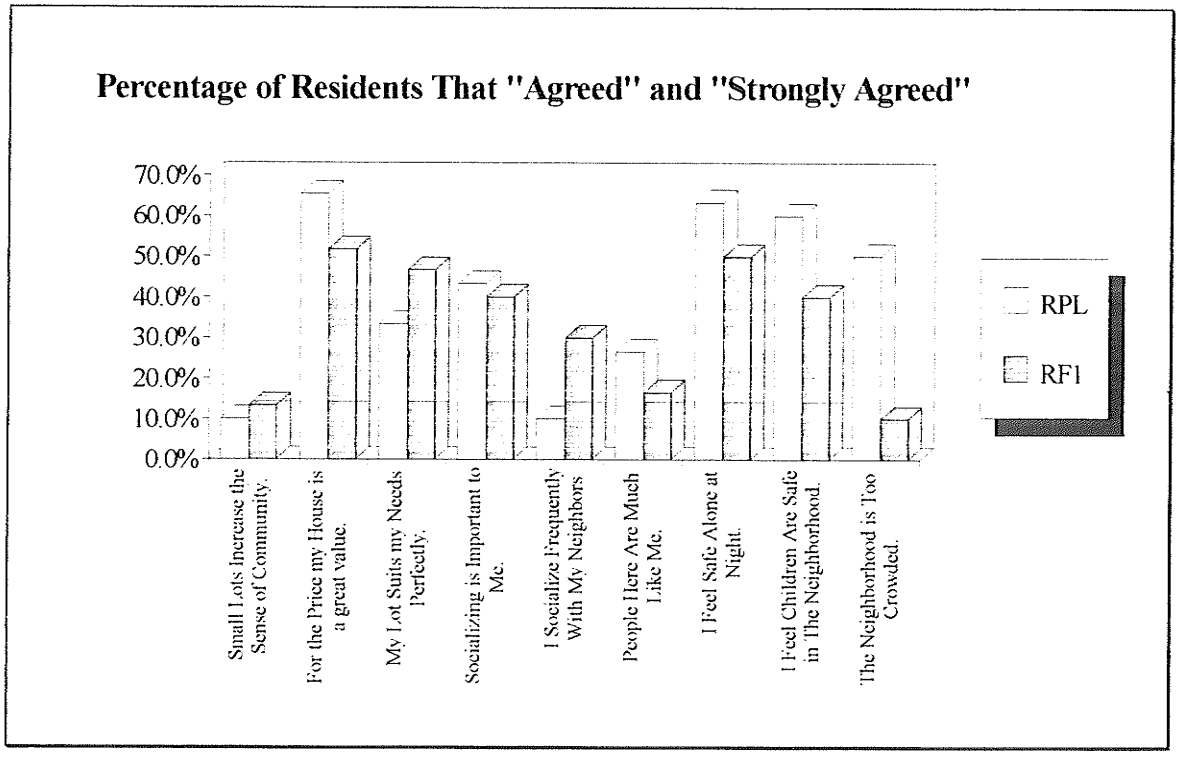
FIGURE 5.01



Section II: Physical and Social Environment

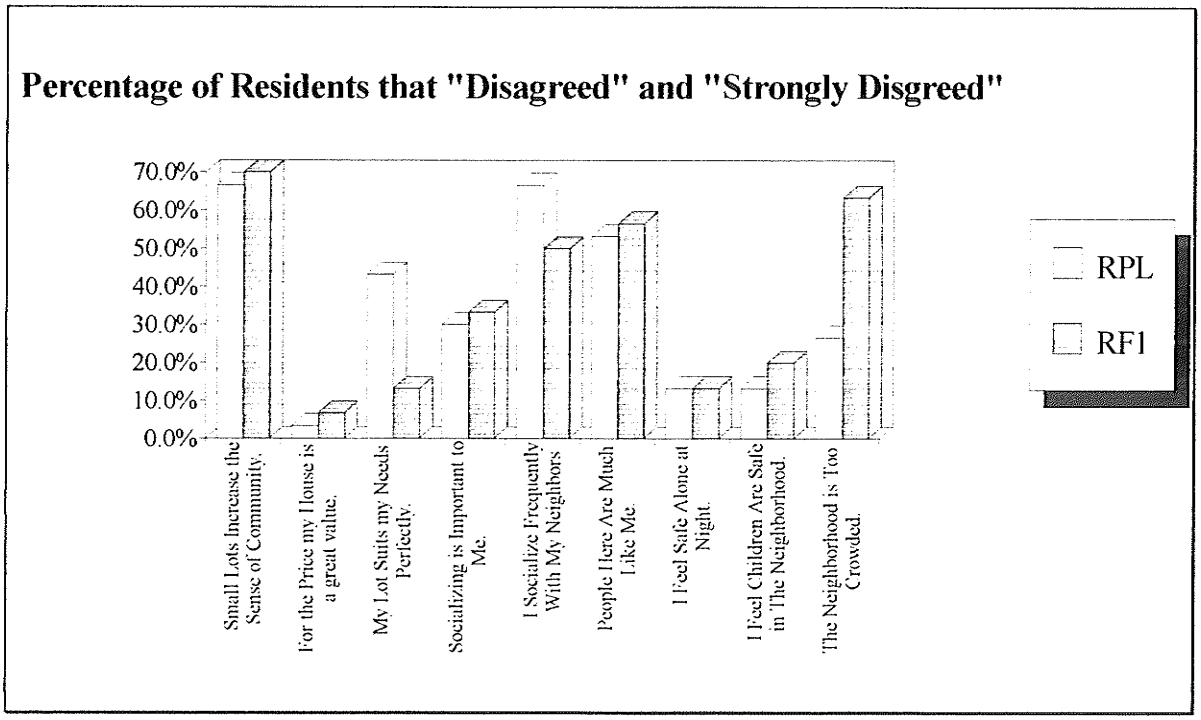
Section II of the questionnaire investigated several physical and social variables associated with residential satisfaction such as lot size, socializing and safety. In this section, unlike the previous, residents responded to written question statements. They were asked to indicate how much they agreed or disagreed with the question statements using a 5-point scale. When the categories "Strongly Agree" and "Agree" were combined the percentages to the statements were as follows for Kiniski Gardens and Pollard Meadows (see FIGURE 5.02 below and APPENDIX 2 for full distribution details).

FIGURE 5.02



When the categories "Strongly Disagree" and "Disagree" were combined the percentages to the statements were as follows for Kiniski Gardens and Pollard Meadows (see FIGURE 5.03).

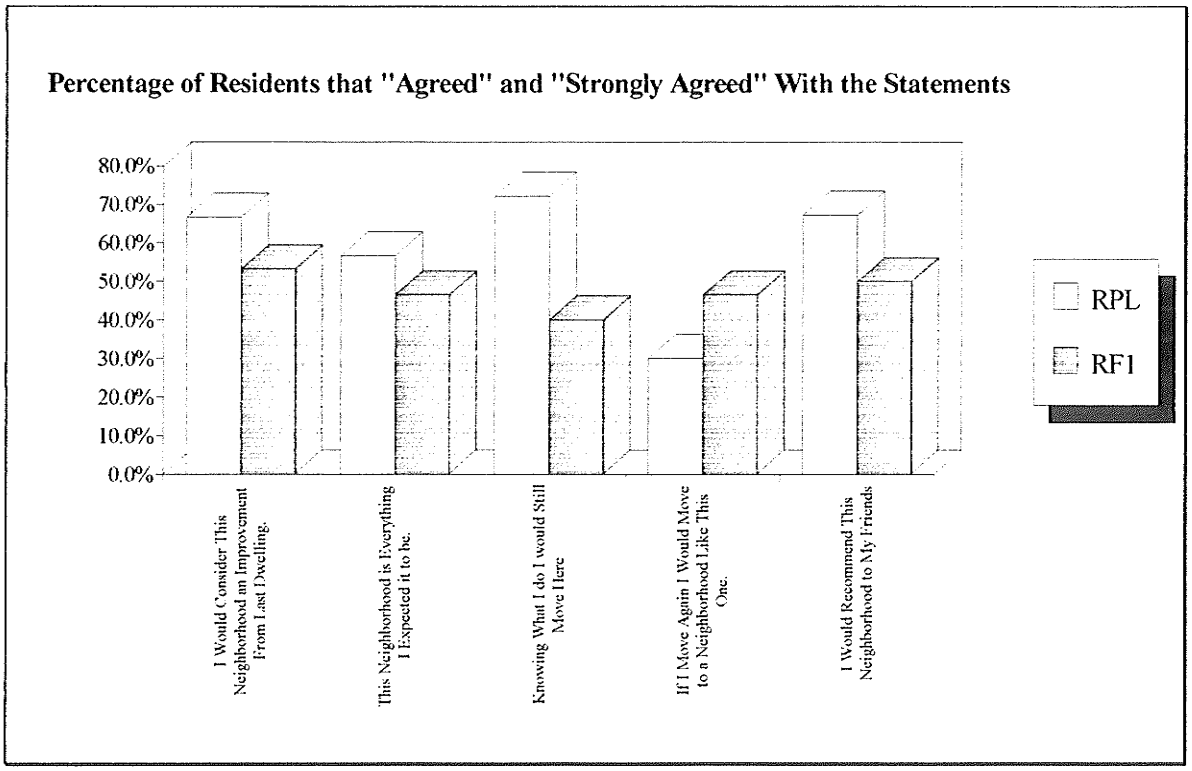
FIGURE 5.03



Section III: Value and Enjoyment

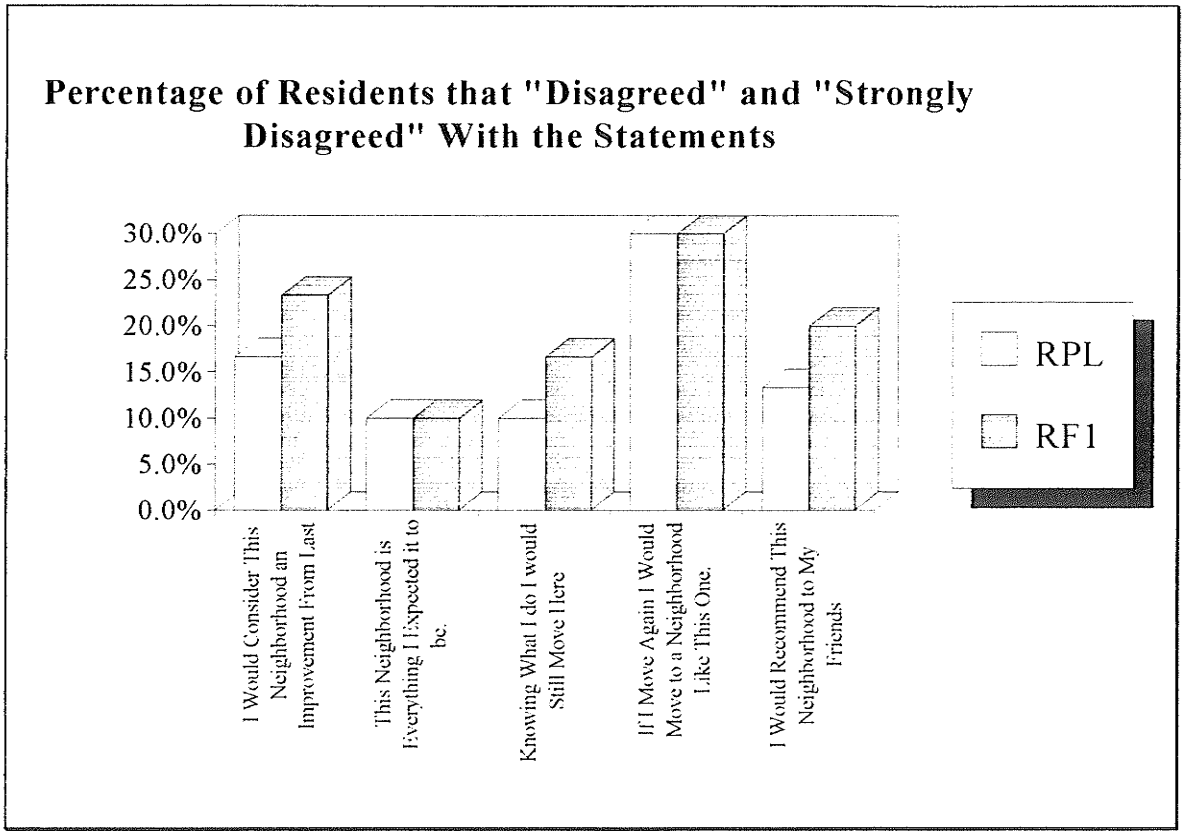
This section of the questionnaire asked if residents agreed or disagreed with questions regarding their previous accommodations, their expectations and the reality of living in their neighborhoods. When the categories "Strongly Agree" and "Agree" were combined the percentages to the statements in Section III of the questionnaire were as follows for Kiniski Gardens and Pollard Meadows (see FIGURE 5.04).

FIGURE 5.04



When the categories "Strongly Disagree" and "Disagree" were combined the percentages to the statements in Section III of the questionnaire were as follows for Kiniski Gardens and Pollard Meadows (see FIGURE 5.05).

FIGURE 5.05



Population Assumptions and Specification of Statistical Tests

The interval data used in this study was treated as parametric, as in other residential satisfaction studies such as Weidemann, Anderson et al. (1987) and Weidemann, Francescato et al (1979). "Interval data is another step up the hierarchy of measurement scales in the sense that it enables us to say how much further along a scale [i.e. Likert] one individual is than another" (Ebdon 1985, 3). And "by the word 'parametric' we imply some quality, characteristic or value of the *population data*, not the sample data" (Gregory 1963, 132). Ebdon (1985, 15) noted that "it is generally argued that a parametric test, used in a situation where its assumptions are justified, is more powerful than an equivalent nonparametric method such as the Wilcoxon Rank Sum Test or the Mann - Whitney U Statistic". It was felt that the population in this study met the following assumptions:

(1) that the population data were normally distributed;

(2) that the observations were independent of each other

(3) that the populations being compared had the same variance

(4) that the variables were available on an interval scale

The parametric statistic used to test hypotheses 1, 2, and 3 was Student's t test. All three hypotheses assumed that the two sets of data were random samples from different normally distributed populations with statistical or significant difference between the population means. Statistical or significant difference meaning that it was extremely improbable that such a difference could have occurred by chance alone.

A low t value suggests little difference between the samples, while a score greater than the critical value results in the hypothesis be rejected. The critical value used in this study was a two-tailed 0.05 significance level -- 99% confidence level.

Also used in the analysis of the sample data was the Pearson's Product-Moment Correlation. This parametric measuring device calculated the degree of linear association between two desired variables.

Multiple regression analysis was used to examine the relationship between the dependent variable, residential satisfaction, and the numerous independent ones (i.e. privacy, safety, density, etc.). Gujarati (1988, 15) noted that "regression analysis is concerned with the study of the dependence of one variable, the dependent variable, on one or more other variables, the explanatory variables, with a view of estimating or predicting the (population) mean or average value of the former in terms of the known or fixed values of the latter.". Mathematically this resulted in a probabilistic equation, with a random error term that followed the general multiple regression equation as follows:

$$y = \beta_0 + \beta_1 x + \varepsilon$$

Whereby:
y = Dependent variable
x = Independent variable
β_0 = y intercept
β_1 = Slope of the x line
ε = Stochastic disturbances

The regression analysis took five steps: (1) deterministic components of the probabilistic model were hypothesized, (2)sample data were collected to estimate the unknown parameters, (3) model assumptions were clearly stated, (4) the regression model was tested for assumption violations, (5) dependent variables were derived. The regression analysis performed on the questionnaire data followed the five procedures described above and used the Ordinary Least Square (OLS) method of predicting residential satisfaction. The OLS method minimized the model's sum of square errors which provided the most accurate method of predicting satisfaction correlates.

Testing Differences Between Sample Means

Hypothesis 1

Residents living in the RPL zoned neighborhood will experience satisfaction levels significantly lower than residents living in the conventionally designed neighborhood.

Residents living in the RF1 zoned subdivision had mean satisfaction levels (u = 3.867) slightly higher than did those of the RPL area (u = 3.60). Seventy percent of the RF1 sample fell in the range of "satisfied" to "very satisfied" compared with only 53% of those in the RPL group. Moreover, a greater percentage (46%) of those in the RPL sample responded in the range of neutral to very dissatisfied compared to only 30% in the RF1 sample (see APPENDIX 2 for sample distribution details).

These apparent satisfaction differences were tested for significance. Performing a two-tailed unpaired t-test (alpha = 0.005, or 99% certainty; critical t = 2.042) revealed that the results were not significantly different. Hence, the statistic supported the alternative hypothesis (see APPENDIX 4 for t-test results).

Next , satisfaction levels were correlated with personal characteristics in order to measure the presence of linear associations. However, tests showed that satisfaction was uncorrelated with sex, age and tenure. Household gross income, however, was shown to be negatively correlated with residential satisfaction (r= - 0.349).

Hypothesis 2

Residents of the RPL zoned neighborhood will experience lower satisfaction levels due to dissatisfaction with: privacy, lot size, lot shape, setbacks, crowding and unfulfilled expectations.

Privacy

Residents of the RPL sample tended to score privacy satisfaction lower (30% dissatisfied or very dissatisfied) than did those in the RF1 sample (24%). In the upper end of the satisfaction scale slight differences were also apparent. Forty seven percent of those in the RF1 sample responded either satisfied or very satisfied with privacy compared to 36% in the RPL sample.

Arithmetic mean responses regarding privacy were essentially the same between the RF1 (u = 3.33) and RPL (u = 3.20) residents. Hence, the data were found not to be statistically different at alpha = 0.01. Thus, the above hypothesis was not supported.

Lot Size

There were considerable differences between the two samples regarding lot size and satisfaction. Fifty three percent of those in the RPL sample were either dissatisfied or very dissatisfied with their lot sizes, compared with only 6% in the RF1 sample.

Mean responses for lot size satisfaction were 2.633 and 3.90 for residents of Kiniski Garden and Pollard Meadows, respectively. Mean analysis using t-test showed that the data were significantly different (t = -4.92) at alpha = 0.01; thus the data supported the above hypothesis. See APPENDIX 4 for the test results.

Lot Shape

Lot shape satisfaction levels were considerably different between the two samples. Seventy three percent of those from the RF1 sample were either satisfied or very satisfied with the shape of their lots compared with only 36% in the RPL sample (see APPENDIX 2 for distribution details). Mean scores for Kiniski Gardens and Pollard Meadows were 3.133 and 4.00, respectively. These mean differences were found to be statistically different at alpha = 0.01 -- supporting the above hypothesis (see APPENDIX 4 for t-test statistics).

Setbacks

Residents of the RF1 sample were, generally, more satisfied (90%) with there setbacks than those in the RPL sample (70%). Furthermore, residents of the RPL sample (20%) were more apt to respond "neutral" to the statement than those of the RF1 sample (10%). Means tests revealed that the data between the samples were not statistically different; thus the hypothesis was not supported.

Crowding Perceptions

Significant differences existed between the two samples regarding crowding perceptions. Sixty three percent of RF1 residents in the sample either disagreed or strongly disagreed with the contention that their neighborhood was "too crowded," while only 26% of those in the RPL responded in that manner or less than half. Moreover, 30% of those in

the RPL sample strongly agreed with the statement that their neighborhood was "too crowded." These differences proved to be statistically different at an alpha = 0.01. The unpaired t-value of 3.173 provided statistical evidence supporting the hypothesis.

Expectations

There seemed to be only moderate differences between the two groups when asked if their neighborhoods were "everything they expected them to be". Those in the RF1 sample (46%) either agreed or strongly agreed with the question statement compared to 56% in the RPL sample. This suggested that the residents in the RPL sample were more accurate in their beliefs prior to moving into the area. Mean analysis revealed a low t-value (t = 0.518). This caused the hypothesis to be rejected in favor for the alternative (see APPENDIX 4 for detailed analysis).

Hypothesis 3

The smaller RPL lots will contribute to a stronger sense of community.

The majority of residents of the RF1 sample either disagreed or strongly disagreed (70%) with this statement that smaller lots fostered a stronger sense of community. Likewise, residents of the RPL sample responded negatively to the question statement (67%). Combined only 11.67% of the two samples supported the above contention. Thus, the hypothesis was rejected as the samples means were both near the value of 2.00 on the satisfaction scale.

Analysis of the sample means showed that there were no significant differences in responses between the study groups (see APPENDIX 2 for distribution details). The data were also analyzed for the presence of linear associations with personal characteristics, however, no relationships were detected (see APPENDIX 4).

Regression analysis

Hypothesis 4

Privacy, neighbor homogeneity, friendliness, safety, lot size and density will be the strongest predictors of residential satisfaction.

Hypothesize The Deterministic Components of The Model

The literature reviewed in Chapter 2 illustrated that several factors contribute to residential satisfaction. Moreover, Chapter 4 operationalized hypothesis 4 by relating the conjecture with several satisfaction correlates abstracted from previous empirical studies. On these foundations the following deterministic model was formed:

$$Satisfaction = \beta_0 + x_1\beta_1 + x_2\beta_2 + x_3\beta_3 + x_4\beta_4 + x_5\beta_5 + x_6\beta_6$$

Where:

β_0 = Constant
β_1 = Neighbor Homogeneity
β_2 = Friendliness
β_3 = Safety
β_4 = LotSize
β_5 = Privacy
β_6 = Density

Statement of Model Assumptions Using the OLS Method

The statistical theory of linear models is based on strict classical assumptions. In order to test Hypothesis 4, using OLS regression analysis, certain assumptions had to be

made because of the general regression equation ($y = \beta_0 + \beta_1 x + \varepsilon$). "It shows that "y" depends on both "x" and "ε". Therefore unless we are specific about how "x" and "ε" are created or generated, there is no way one can make any statistical inference about the "y". Thus, the assumptions on the "x" variable and the error term are critical to the valid interpretation of the regression estimates" (Gujarati 1988, 52). Consequently, four assumptions were made regarding the stochastic disturbances and one about the specified regression model. The five assumptions are as follows:

1. The mean of the probability disturbance ε is zero. In other words "the factors not explicitly included in the model, and therefore subsumed in ε, do not systematically affect the mean value of y" (Gujarati: 1988: 52).

2. The variance of the probability distribution of ε is non-stochastic for all of the independent variables. That is, homoscedacity is assumed for the error terms.

3. The probability distribution of the error term ε is normal.

4. The disturbances are unrelated. This assumes no serial or autocorrelation. In other words, the disturbances do not follow systematic patterns.

5. The (OLS), multiple regression model is correctly specified. It is assumed that there is no specification bias.

The latter sections of this chapter test the regression model and accompanying variables to make certain that they meet these classical regression assumptions. If these assumption are satisfied, then the Gauss-Markov theorem is applicable, which states

> Given the assumptions of the classical linear regression model, the least squares estimators, in the class of unbiased linear estimators, have minimum variances, or are BLUE [best linear unbiased estimators]. (Gujarati 1988, 63).

Thus, the independent estimators (i.e. $\beta_{Privacy}, \beta_{Safety}, \beta_{LotSize}$) used in the regression equation were best linear unbiased estimators (BLUE) with minimum variances.

Computed Stepwise Regression Model

Forward stepwise regression was used to derive a 6-variable model (including the intercept constant). Twenty one variables were regressed and 5 were found to contribute to the model at $F > 4.00$. These 5 regressors (variables) were: privacy, lot shape, friendliness, density and expectations (see TABLES 5.00 - 5.03 for regressor details). All of the variables were positively associated with satisfaction, except for resident homogeneity. The formulated multiple regression model can be written as follows:

$$Satisfaction = 1.17 + 0.235\beta_1 + 0.182\beta_2 + 0.214\beta_3 - 0.107\beta_4 + 0.183\beta_5$$

Where:

$\beta_1 = \text{Privacy}$

$\beta_2 = \text{Lot Shape}$

$\beta_3 = \text{Friendliness}$

$\beta_4 = \text{Resident Homogeneity}$

$\beta_5 = \text{Expectations}$

TABLE 5.00

Stepwise Regression Y 1 :***QUESTION 10*** 21 X variables

F to Enter	4
F to Remove	3.996
Number of Steps	5
Variables Entered	5
Variables Forced	0...0

TABLE 5.01

STEP NO. 5 Stepwise Regression Y 1 :***QUESTION 10*** 21 X variables

Variables in Equation

Variable:	Coefficient:	Std. Err.:	Std. Coeff.:	F to Remove:
INTERCEPT	1.169			
QUESTION 3	.234	.051	.387	20.928
QUESTION 6	.183	.074	.248	6.075
QUESTION 9	.213	.061	.346	12.221
QUESTION 21	.184	.067	.256	7.553
QUESTION 16	-.106	.053	-.179	4.004

Variables Not in Equation

Variable:	Par. Corr:	F to Enter:
QUESTION 1	.104	.567

TABLE 5.02

STEP NO. 5 Stepwise Regression Y ¡ :***QUESTION 10*** 21 X variables

Variables Not in Equation

Variable:	Par. Corr:	F to Enter:
QUESTION 2	.114	.684
QUESTION 4	.117	.726
QUESTION 5	.023	.028
QUESTION 7	-.06	.191
QUESTION 8	.185	1.847
QUESTION 19	.053	.149
QUESTION 28	.031	.049

Variable:	Par. Corr:	F to Enter:
QUESTION 29	.029	.042
QUESTION 30	-.081	.344
QUESTION 31	-.013	.008
QUESTION 32	-.048	.12
QUESTION 33	-.204	2.254
QUESTION 34	-.121	.771
QUESTION 35	.141	1.06

Variable:	Par. Corr:	F to Enter:
QUESTION 36	-.207	2.319

TABLE 5.03

Multiple Regression Y ¡ :***QUESTION 10*** 5 X variables

Count:	R:	R-squared:	Adj. R-squared:	RMS Residual:
60	.807	.651	.618	.439

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	5	19.347	3.869	20.119
RESIDUAL	54	10.386	.192	p = .0001
TOTAL	59	29.733		

Beta Coefficient Table

Variable:	Coefficient:	Std. Err.:	Std. Coeff.:	t-Value:	Probability:
INTERCEPT	1.173				
QUESTION 3	.235	.05	.389	4.669	.0001
QUESTION 6	.182	.073	.247	2.5	.0155
QUESTION 9	.214	.059	.348	3.602	.0007
QUESTION 16	-.107	.051	-.183	2.093	.041
QUESTION 21	.183	.066	.256	2.774	.0076

Test Classical Model Assumptions

The stocastic disturbances (ε) were plotted using Data Desk © statistical software. The charts plotted showed that the disturbances were homoscedastic and normally distributed. Furthermore, the model seemed to be correctly specified with a coefficient of determination of 0.651. The presence of 5 regressors with significant t ratios and large F ratios was also strong supporting evidence for correct model specification.

CHAPTER 6: DISCUSSION, FURTHER RESEARCH AND CONCLUSIONS

This final chapter discusses the results from Chapter 5 and relates them to the four hypotheses formed at the beginning of the study as well as to past residential satisfaction research discussed in Chapter 2. In addition, this chapter also provides a sample of residents' comments derived from the questionnaire. The last section of the chapter summarizes and concludes the study suggesting areas and directions for further research on the topic of innovative land development standards.

Major Findings

Hypothesis 1

Residents living in the RPL zoned neighborhood will experience satisfaction levels significantly lower than residents living in the conventionally designed neighborhood.

The data did not support the above hypothesis at alpha = 0.01 (99% confidence level). Consequently, the above hypothesis was rejected -- there were no significant differences with respect to residential satisfaction between the two differently zoned subdivisions.

Moreover, residents of the RPL subdivision were generally satisfied with their neighborhood. Only 3.33% of those surveyed from Kiniski Gardens area were dissatisfied or very dissatisfied. Over 65% supported the statement that they "would recommend this type of neighborhood to friends if they were looking to buy single family housing," while 72.2% supported the statement that "knowing what I do now about this neighborhood, I would still be very willing to move here."

Hence, the results from this study support the argument that residents on smaller residential single family lots do not have satisfaction levels statistically different from

those living on conventional (larger) lots. This finding supports the Australian study performed by the Task Force For More Affordable Housing (1990), which found no satisfaction differences between small and large lot dwellers. Conversely, these findings do refute several past studies such as Zehner (1972), Onibokun (1974) and Bonnes et al. (1991).

Hypothesis 2

Residents of the RPL zoned neighborhood will experience lower satisfaction levels due to dissatisfaction with: (1) privacy, (2) lot size, (3) lot shape, (4) setbacks, (5) crowding and (6) unfulfilled expectations.

Privacy

Data regarding satisfaction with respect to privacy did not support the hypothesis. No statistical differences were found between the two samples, however, there were distribution differences. For example, respondents in the RPL sample tended to be more dissatisfied (30%) with privacy, than those in the RF1 sample (24%).

This result conflicts with some previous residential satisfaction research, but it did support the Australian study (1990). One possible explanation for the absence of privacy differences between the two samples may be due to climatic conditions. The survey was conducted in January, 1993 -- typically a month with temperatures well below -15 C.. Hence, problems associated with visual and acoustical privacy may have been mitigated by reduced outdoor activity and sealed windows and doors. Differences may be more pronounced in spring and summer when both adults and children occupy outdoor space more frequently and windows and doors are left open for ventilation.

Lot Size

The data regarding satisfaction with lot size supported the stated hypothesis. The results on lot size satisfaction strongly support classical residential satisfaction research. They confirmed studies such as Zehner 1972 and Onibokun 1974 -- that inferred smaller lot sizes reduced neighborhood satisfaction.

Lot Shape

The data with respect to lot shape satisfaction supported the above hypothesis. Only 36.6% of the respondents in the RPL sample were satisfied, or very satisfied, with their lot shape compared with over 73% in the RF1 sample. The average difference of 3 meters in lot width between the RPL and RF1 samples clearly had an impact on lot shape satisfaction. The data supported the conjecture that reduced frontages and consequently elongated lots resulted in reduced lot satisfaction, -- possibly because of less privacy (perceived or real) and reduced usability due to smaller side-yards.

Set backs

Setbacks in the RPL subdivision were reduced on average 1.5 meters, compared to those in the RF1 area. Reduced setbacks, however, did not result in significant satisfaction differences between the two samples; hence the above hypothesis was not supported. Even though the samples were not statistically different there were again slight distribution differences between them with 90% percent of the respondents in the RF1 sample being either satisfied, or very satisfied, compared to 66.6% of those in the RF1 sample.

Crowding

It was hypothesized that residents of the RPL subdivision would have lower satisfaction scores due to perceptions of crowding. The density of the RPL development

was, as previously mentioned, approximately 28 units per gross development hectare while the RF1 study area was about 14 units per gross development hectare. The data supported the above conjecture (i.e. significant differences existed between the two samples with a t-value of 3.173). Nearly 50% of the respondents in the RPL sample either agreed, or strongly agreed, with the statement that their neighborhood "was too crowded," compared to only about 10% of those in the RF1 sample.

The data supported several previous residential satisfaction research studies such as Bonnes et al (1991), Herting and Guest (1985), and Harman and Betak (1974). Generally, the data suggested that "with a lessened ability to control events in the dense area, the neighborhood becomes more unpredictable, more stressful and ultimately more dissatisfying to residents" (Baldassre 1982, 96).

Unfulfilled Expectations

It was thought that many of the RPL residents would have perceived the RPL neighborhood as a conventional-type development at a lower price but with no livability tradeoffs. It was surmised that only after living there would some of the possible limitations (i.e. reduced privacy and increased noise levels) become apparent. The data did not support this hypothesis. When asked "is this neighborhood everything you expected it to be as far as comfort is concerned ?," 10% in both samples answered in the negative. However, the majority (56.6%)of respondents in the RPL area answered that living in Kiniski Gardens met their expectations.

Hypothesis 3

The smaller RPL lots will contribute to a stronger sense of community.

It was thought that the smaller RPL lots would foster a stronger sense of community. However, the data strongly refuted this contention. Seventy percent of those in the RF1 sample either disagreed, or strongly disagreed, with the question statement, compared with 67% in the RPL sample. Only 9% of those in the RPL sample supported the hypothesis.

Not only did smaller lots not add to the sense of community, but on the contrary, smaller lots were seen as a source of dissatisfaction. The more compact RPL lots caused 50% of those in the sample to either agree, or strongly agree, with the statement that "their neighborhood was too crowded," compared with only 9% in the RF1 sample.

These results conflicted with contemporary theoreticians such as Jacobs (1961), Fisher (1975) and Hawley (1972). The data was, however, supportive of studies by Fried (1982) and Herting and Guest (1985) regarding the relationship between privacy, social distance and social interaction. More recently, the data also negated such claims as

> The use of alternative standards does not imply a reduction in the standard of living or the sacrificing of good planning principles. On the contrary, it provides an opportunity to create neighborhoods which are attractive with a *strong sense of community (italic mine)*. RWCOAUDS 1991, 20.

Hypothesis 4

(1) *Privacy, (2)neighbor homogeneity, (3) friendliness, (4) safety, (5) lot size and (6) density will be the strongest predictors of residential satisfaction.*

Three of the six hypothesized predictors were proven to be significant at $F > 4.00$ (i.e. privacy, neighbor homogeneity and friendliness). Two other non-hypothesized factors

were also shown to predict residential satisfaction -- lot shape and prior expectations. Hence, the hypothesis was partially supported. Overall, the predictive power of the regression equation was good with an adjusted coefficient of determination of 0.618.

None of the studies reviewed in Chapter 2 tested lot shape as a possible satisfaction predictor; therefore it was not included in hypothesis 4. However, with a t-value of 2.50 it was a significant predicting variable. Although satisfaction with lot shape was never regressed in previous research, it seemed to be a logical predictor of residential satisfaction. The positive value of its t-coefficient suggested that as housing frontage was reduced, residential satisfaction was lessened as a consequence. This direct relationship seemed reasonable since when lot frontage is reduced, (especially under 12m) use of side yards and rear yards, including the element of privacy, is decreased.

Prior expectations before moving into the area were shown to be a predictor of residential satisfaction. This finding supported several previous residential satisfaction studies (i.e. Campbells, Converse and Rodgers 1976; also see FIGURE 2.00). Moreover, the above finding was consistent with the Weidemann and Anderson (1985) model used in the study (see FIGURE 2.01).

Other Findings

The questionnaire also obtained data not specific to the four hypotheses, but useful in understanding land development standards and residential satisfaction. For example, question 12 stated "for the price, my house and lot are a great value"; sixty five percent of the RPL respondents either agreed or strongly agreed with the statement, compared to 52% of those in the RF1 sample. Notably, although there were slight distribution differences, the two samples were not statistically different.

Another interesting result was regarding resident safety. Residents of the RPL sample had a tendency to feel safer when alone at night in their neighborhood than those of the RF1 sample. It was believed that this may be due to the higher density of the RPL subdivision (28 units/hectare) and thus "more eyes on the street" (see Jacob 1964). Moreover, residents of the RPL sample felt that their children were relatively safe from harm when playing in the neighborhood. This result was statistically different from the RF1 sample at a confidence level of 90%. Again it was surmised that this may be due to higher development density in the RPL area and hence greater street surveillance.

Moreover, study data found that 67% of the RPL respondents considered Kiniski Gardens a considerable improvement from their last dwelling. Notably, most of the residents (77%) moved to the area from apartments, townhouses and mobile homes (trailers), while the remainder migrated from other single detached housing.

The smaller RPL lots (on average in excess of 1500 sq. ft. smaller than RF1 lots) caused respondents of that sample to be more satisfied (79%) with the lot price than those in the RF1 sample (66%). This illustrated a trade-off or inverse relationship between price satisfaction and lot size.

Lastly, parametric correlations showed that neither sex, length of tenure nor age were related to residential satisfaction and is supported the Fried (1982) study. However, income was found to be inversely related to residential satisfaction ($r = -0.349$). Although the relationship was relatively weak, it illustrated that as income increased, residential satisfaction decreased. This relationship might be anticipated, particularly in an area with starter homes, if an individual believes that the image and style of the neighborhood is no longer compatible with his or her growing income, changing life-style, expectations and aspirations (see Rodgers and Marans 1976).

Residents' Comments

At the end of the questionnaire respondents were asked if they had "any other comments regarding their neighborhoods?" Many of them wrote short notes. A small sample of relevant comments written by RPL residents' is offered below. These personal comments went beyond the statistical parameters of the 5-point Likert (1932) scale and perhaps allow for a better understanding of the issues and feelings voiced by the residents. Sample comments derived from the questionnaire were as follows:

> I would gladly sacrifice rear land for a wider, shorter lot.

> With the new mall in the last few years we actually see people (adults) walking on the streets! Still it is horrible driving on a oriented [organic] street system -- maybe it is unavoidable considering that we are 10 km from Strathcona and 15 km from downtown. The community league system is great -- but outside of that system. At the individual level of interaction, the Mill Woods model somehow mitigates against socialization -- your question 15 reflects the cold Canadian view that 1 - 2 times per week of interaction is "frequent"!!

> This neighborhood was designed to make it less accessible to unwanted traffic and it works. Less noise, safer streets for children, slower traffic are the result even though finding our address seems difficult for those unfamiliar with the neighborhood. I really do not like having an alley and don't like garages always being at the front of the house.

> I would like to see wider streets -- also this neighborhood is 11 years old and very few people have built garages or planted trees in their backyards. The City should consider a shopping centre per "x" amount of people.

> I chose this area for the easy access to schools and shopping centres etc. I also wanted a place which would allow me easy maintenance with minimal time. I spend little time at home due to the type of work I do, but it [the neighborhood] is perfect for me!

Smaller houses are an excellent idea. They are efficient and comfortable. The lot sizes however are getting ridiculous. They are much too small, we are practically on top of each other.

It is a nice place to live. However, the houses are packed together and I feel that there area too many people living is such a small area. Overall, I am happy to be living in this are despite some of the drawbacks.

Our lot is a corner lot and is fine for us, however, I would not like other lots here as they are long and narrow!!

Conclusions and Further Research

The purpose of this study was to determine differences in residential satisfaction due to differing land development standards. It could also be viewed as a starting point for further RPL research since other issues emerged that might be fruitful areas for further study. Residential satisfaction research suggested that smaller lots for several reasons would, indeed, lower residential satisfaction significantly.

Data showed that residents of the RPL subdivision were generally satisfied, overall, with their neighborhood -- although mean satisfaction scores were slightly lower than those of the RF1 sample. Equally important data showed that residential satisfaction was not reduced as a consequence of reduced land development standards. This result supported the recent work on residential satisfaction and alternative land development standards in Australia (JVMAH 1989).

As stated earlier 3.33% of those surveyed in the Kiniski Gardens area were either dissatisfied, or very dissatisfied, with living there. Over 65% stated that they "would recommend this type of neighborhood to friends if they were looking to buy single family housing." However, there were some statistically significant differences between the two

study groups such as satisfaction with lot size, lot shape, and density. The results also suggested that smaller lot sizes did not enhance the area's sense of community. The five predictors of satisfaction were found to be privacy, neighbor homogeneity, neighborhood friendliness, lot shape and prior expectations.

This study examined residential satisfaction differences between *typical* RPL and RF1 zoned housing. However, other patterns and layouts of RPL housing were not analyzed. For example, satisfaction differences between zero-lot-line and side yard housing were not explored. This could easily be researched by comparing either of Edmonton's two zero-lot-line developments (Millbourne and Ottewell) with typical RPL zoned housing (i.e. Willowdale, Primrose or Lake District).

Satisfaction levels associated with street layouts were not investigated in this study. For example, RPL zoned housing located on cul-de-sacs could be contrasted with those on grid-iron streets. It could argue that housing on RPL cul-de-sacs (either bulbs or hammer-heads) would have lower satisfaction because of increased density. On the other hand, the absence of through traffic and unique design could foster a stronger sense of community and increase residential satisfaction.

Several residents in the Kiniski Gardens subdivision noted that they would have preferred no rear lanes. This is another design aspect that could be explored -- satisfaction with respect to rear lanes (back-alleys). This could be examined by contrasting Millbourne or Ottewell (built without rear lanes) with other RPL developments such as Willowdale or Lessard (built without rear lanes).

In addition, satisfaction levels regarding reduced R.O.W. widths were not examined. Reduced R.O.W. widths could might impact residential satisfaction since houses are closer together with increased densities. This issue could be examined by studying a RPL area

with a typical 17 - 20 meter R.O.W. and a similar area with narrower R.O.W. specifications (i.e. the housing development at 36 St. and Kirkness Road).

Lastly, further research should attempt to increase sample sizes (i.e. beyond the required minimum). Although in this study a sample size of 60 was statistically significant, larger samples might be pursued in order to lower sample variances.

Once research is completed in these aforementioned areas planners, engineers, developers and politicians can truly begin to speak with some authority on the role, and appropriateness, of reduced land development standards in the urban environment. Moreover, once this information is gathered, housing authorities and policy makers will , for the first time, have some **hard empirical facts** on which to base there decisions with respect to innovative land standards.

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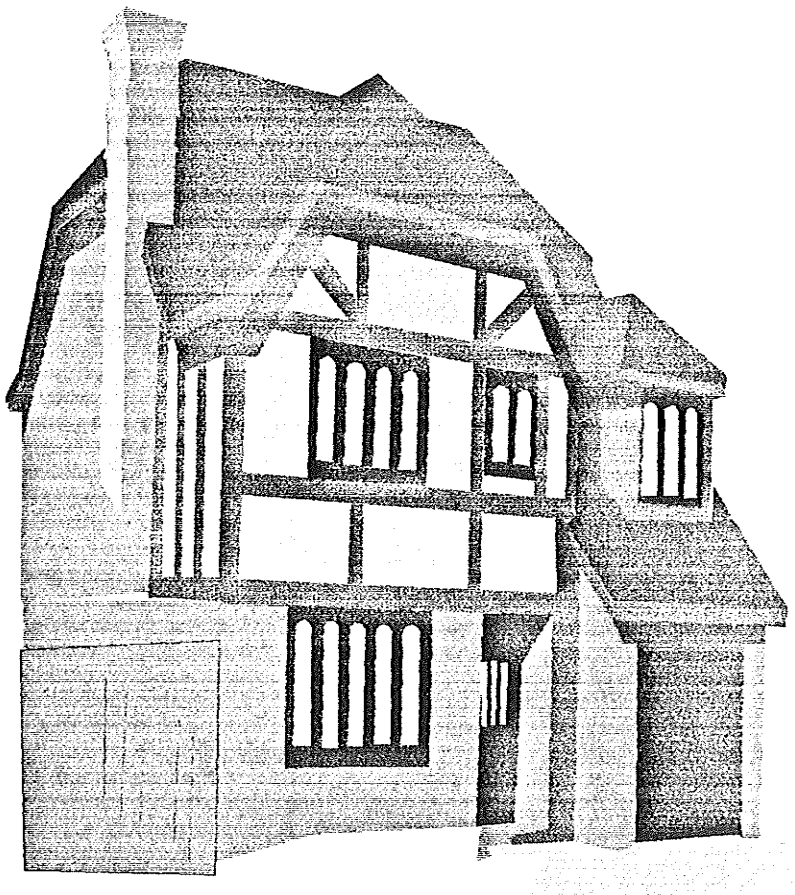
Appendix 1
(Questionnaire)

Evaluating Your Neighborhood:

What Do You Think About it?



By The University of Manitoba

January 22, 1993

Dear Resident:

Your neighborhood has been selected to participate in a survey that asks people various questions about the places in which they live. Its purpose is to examine satisfaction levels associated with different types of housing in Edmonton. Your views and ideas are a valuable source for planners, designers, developers who all are part of the neighborhood development process. It is hoped that this information will aid in addressing design and development concerns that you, the resident, may have.

I am writing from Winnipeg, and am a Master's student in City Planning at the University of Manitoba. However, I was born and raised in Edmonton. This survey is part of my Master's thesis research, that examines different types of residential zoning in Edmonton. Your participation is crucial if this research is to be successful; although it is completely voluntary. The questionnaire is 5 pages in length and will take about 10 minutes to complete. You can be assured complete confidentiality. No one other than myself will read the returned questionnaires.

When you have completed the questionnaire, place it in the pre-paid envelope provided and drop it in the mail. You may receive a summary of the results by writing "summary of results please" on the back of the return envelope - be sure to include a mailing address. If you have any questions, please feel free to call me, here at the University of Manitoba, at (204) 261-5398. Thank you for your participation.

Sincerely,

Robert Brassard
(Project Coordinator)

SECTION I: NEIGHBORHOOD SATISFACTION

The following questions ask how satisfied you are with your present house and neighborhood. For the questions below circle 1 if you are very dissatisfied or 5 if you are very satisfied. If you are neither you place yourself somewhere between 2 and 4.

SATISFACTION ITEM	Very Dissatisfied				Very Satisfied
1. How satisfied are you with the size of your lot?	1	2	3	4	5
2. How satisfied are you with the amount that you paid for your house?	1	2	3	4	5
3. How satisfied are you with the amount of privacy you have from your neighbors?	1	2	3	4	5
4. How satisfied are you with the noise level in your neighborhood?	1	2	3	4	5
5. How satisfied are you with the amount of maintenance required to upkeep your house and yard?	1	2	3	4	5
6. How satisfied are you with the shape of your lot (for example long & narrow or square shaped)?	1	2	3	4	5
7. How satisfied are you with the distance your house is setback from the street and public sidewalk?	1	2	3	4	5
8. How satisfied are you with the level of security and safety in your neighborhood?	1	2	3	4	5
9. How satisfied are you with the friendliness of neighbors?	1	2	3	4	5

10. Overall how satisfied are you with your home and neighbourhood:

Very Unsatisfied **Very Satisfied**

1 2 3 4 5

University of Manitoba, Faculty of Architecture, Department of City Planning

SECTION II: THE PHYSICAL & SOCIAL ENVIRONMENT

In this section I would like to ask you some questions regarding how you feel about the physical and social surroundings of your neighbourhood. Please indicate how much you agree or disagree with each of the following statements below.

LOT SIZE and SHAPE	Strongly Disagree				Strongly Agree
11. Smaller, more compact lot sizes in neighbourhoods strengthen the feeling of community:	1	2	3	4	5
12. For the price, my house and lot are a great value:	1	2	3	4	5
13 I find that my lot size suits my needs perfectly:	1	2	3	4	5
NEIGHBOURS	**Strongly Disagree**				**Strongly Agree**
14. Socializing with people in my neighbourhood is important to me:	1	2	3	4	5
15. I interact with the people in my neighbourhood frequently (1or 2 times per week or more):	1	2	3	4	5
16. The people in my neighbourhood are like me with regard to their income, age, race and lifestyle:	1	2	3	4	5
SAFETY	**Strongly Disagree**				**Strongly Agree**
17. I feel safe walking alone at night in my neighbourhood:	1	2	3	4	5
18. I feel that children playing in this neighbourhood are relatively safe from harm:	1	2	3	4	5
CROWDING	**Strongly Disagree**				**Strongly Agree**
19. I would say that my neighbourhood is too crowded:	1	2	3	4	5

SECTION III: VALUE/ENJOYMENT

In this section I would like to ask you some questions regarding how you feel about living in your neighbourhood. I would also like to ask if you consider buying a home in this neighbourhood a good purchase or value.

PREVIOUS ACCOMMODATIONS	Strongly Disagree				Strongly Agree
20. I would consider this neighbourhood a considerable improvement from my previous dwelling:	1	2	3	4	5
YOUR EXPECTATIONS	**Strongly Disagree**				**Strongly Agree**
21. Living in this neighbourhood is everything I expected it to be as far as comfort is concerned:	1	2	3	4	5
22. Knowing what I do now about my neighbourhood, I would still be very willing to move here:	1	2	3	4	5
23. If I move again, I would like to live in another place like this one:	1	2	3	4	5
THE REALITY	**Strongly Disagree**				**Strongly Agree**
24. This neighbourhood suits my needs, desires and expectations perfectly:	1	2	3	4	5
25. I would recommend this type of neighbourhood to my friends if they were looking for single family housing:	1	2	3	4	5

26. What are the 3 best features (if any) about living in your neighbourhood:

_____

_____

_____.

27. What are the 3 worst features (if any) about your neighbourhood:

_____

_____

_____.

SECTION IV: RESIDENT'S CHARACTERISTICS

In this section I would like to ask you some questions regarding your background.

28. Your Sex?
    1. Male_____.
    2. Female_____.

29. How long have you lived in this neighbourhood_____.

30. What was the type of dwelling you lived in before coming to this neighbourhood:
    1. A house_____.
    2. An apartment_____.
    3. A Townhouse_____.
    4. Other_____.

31. Your age?
    1. Under 20_____.
    2. 20-30_____.
    3. 31-40_____.
    4. 41-50_____.
    5. 51- 60_____.
    6. 61 +_____.

32. Your Marital Status?
    1. Never Married_____.
    2. Presently Married_____.
    3. Living as Married_____.
    4. Separated or Divorced_____.

33. How many children do you have (if any)_____.

34. How many people live in your house (including yourself)_____.

35. Education level completed?
    1. Grade School_____.
    2. High School_____.
    3. Community College/Trade School_____.
    4. University_____.

36. Combined annual family income before taxes?
    1. Less than $10,999_____.
    2. $11,000 - $20,999_____.
    3. $21,000 - $30,999_____.
    4. $31,000 - $40,999_____.
    5. $41,000 - $50,999_____.
    6. $51,000 - $60,999_____.
    7. More Than $61,000_____.

37. Are there any other comments you would like to add regarding your neighbourhood?_____

_____

_____

_____

_____

_____.

Thank-You for Your Participation
This Information Will Make a Difference

University of Manitoba, Faculty of Architecture, Department of City Planning

Appendix 2

(Survey Results: Distributions)

X_1: RF1: QUESTION 1

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	0	0%	
2	1	2	2	6.667%	
3	2	3	8	26.667%	
4	3	4	11	36.667%	←Mode
5	4	5	9	30%	

X_1: RPL: QUESTION 1

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	3	10%	
2	1	2	13	43.333%	←Mode
3	2	3	8	26.667%	
4	3	4	4	13.333%	
5	4	5	2	6.667%	

X_2: RF1: QUESTION 2

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	0	0%	
2	1	2	4	13.333%	
3	2	3	7	23.333%	
4	3	4	10	33.333%	←Mode
5	4	5	9	30%	

X_2: RPL: QUESTION 2

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	0	0%	
2	1	2	3	10.345%	
3	2	3	3	10.345%	
4	3	4	13	44.828%	←Mode
5	4	5	10	34.483%	

X3: RF1: QUESTION 3

Bar:	From: (>)	To: (≤)	Count:	Percent:
1	0	1	2	6.667%
2	1	2	5	16.667%
3	2	3	9	30%
4	3	4	9	30%
5	4	5	5	16.667%

X3: RPL: QUESTION 3

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	2	6.667%	
2	1	2	7	23.333%	
3	2	3	10	33.333%	-Mode
4	3	4	5	16.667%	
5	4	5	6	20%	

X4: RF1: QUESTION 4

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	0	0%	
2	1	2	1	3.333%	
3	2	3	11	36.667%	
4	3	4	14	46.667%	-Mode
5	4	5	4	13.333%	

X4: RPL: QUESTION 4

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	2	6.667%	
2	1	2	3	10%	
3	2	3	8	26.667%	
4	3	4	7	23.333%	
5	4	5	10	33.333%	-Mode

X_5: RF1: QUESTION 5

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	0	0%	
2	1	2	5	16.667%	
3	2	3	13	43.333%	←Mode
4	3	4	9	30%	
5	4	5	3	10%	

X_5: RPL: QUESTION 5

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	0	0%	
2	1	2	4	13.333%	
3	2	3	7	23.333%	
4	3	4	13	43.333%	←Mode
5	4	5	6	20%	

X_6: RF1: QUESTION 6

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	0	0%	
2	1	2	1	3.333%	
3	2	3	7	23.333%	
4	3	4	13	43.333%	←Mode
5	4	5	9	30%	

X_6: RPL: QUESTION 6

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	1	3.333%	
2	1	2	6	20%	
3	2	3	12	40%	←Mode
4	3	4	10	33.333%	
5	4	5	1	3.333%	

X7: RF1: QUESTION 7

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	0	0%	
2	1	2	0	0%	
3	2	3	3	10%	
4	3	4	19	63.333%	-Mode
5	4	5	8	26.667%	

X7: RPL: QUESTION 7

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	0	0%	
2	1	2	4	13.333%	
3	2	3	6	20%	
4	3	4	13	43.333%	-Mode
5	4	5	7	23.333%	

X8: RF1: QUESTION 8

Bar:	From: (>)	To: (≤)	Count:	Percent:
1	0	1	0	0%
2	1	2	3	10%
3	2	3	12	40%
4	3	4	12	40%
5	4	5	3	10%

X8: RPL: QUESTION 8

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	4	13.333%	
2	1	2	1	3.333%	
3	2	3	6	20%	
4	3	4	15	50%	-Mode
5	4	5	4	13.333%	

X_9: RF1: QUESTION 9

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	1	3.333%	
2	1	2	7	23.333%	
3	2	3	8	26.667%	
4	3	4	5	16.667%	
5	4	5	9	30%	-Mode

X_9: RPL: QUESTION 9

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	1	3.333%	
2	1	2	5	16.667%	
3	2	3	10	33.333%	-Mode
4	3	4	9	30%	
5	4	5	5	16.667%	

X_{10}: RF1: **QUESTION 10***

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	0	0%	
2	1	2	0	0%	
3	2	3	9	30%	
4	3	4	16	53.333%	-Mode
5	4	5	5	16.667%	

X_{10}: RPL: **QUESTION 10***

Bar:	From: (>)	To: (≤)	Count:	Percent:
1	0	1	0	0%
2	1	2	1	3.333%
3	2	3	13	43.333%
4	3	4	13	43.333%
5	4	5	3	10%

X_{11}: RF1: QUESTION 11

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	10	33.333%	
2	1	2	11	36.667%	←Mode
3	2	3	5	16.667%	
4	3	4	4	13.333%	
5	4	5	0	0%	

X_{11}: RPL: QUESTION 11

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	8	26.667%	
2	1	2	12	40%	←Mode
3	2	3	7	23.333%	
4	3	4	1	3.333%	
5	4	5	2	6.667%	

X_{12}: RF1: QUESTION 12

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	0	0%	
2	1	2	2	6.897%	
3	2	3	12	41.379%	
4	3	4	13	44.828%	←Mode
5	4	5	2	6.897%	

X_{12}: RPL: QUESTION 12

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	0	0%	
2	1	2	1	3.448%	
3	2	3	9	31.034%	
4	3	4	16	55.172%	←Mode
5	4	5	3	10.345%	

X13: RF1: QUESTION 13

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	2	6.667%	
2	1	2	2	6.667%	
3	2	3	9	30%	
4	3	4	14	46.667%	←Mode
5	4	5	3	10%	

X13: RPL: QUESTION 13

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	2	6.667%	
2	1	2	11	36.667%	←Mode
3	2	3	7	23.333%	
4	3	4	8	26.667%	
5	4	5	2	6.667%	

X14: RF1: QUESTION 14

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	3	10%	
2	1	2	7	23.333%	
3	2	3	8	26.667%	
4	3	4	10	33.333%	←Mode
5	4	5	2	6.667%	

X14: RPL: QUESTION 14

Bar:	From: (>)	To: (≤)	Count:	Percent:
1	0	1	2	6.667%
2	1	2	7	23.333%
3	2	3	8	26.667%
4	3	4	8	26.667%
5	4	5	5	16.667%

X_{15}: RF1: QUESTION 15

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	8	26.667%	
2	1	2	7	23.333%	
3	2	3	6	20%	
4	3	4	9	30%	←Mode
5	4	5	0	0%	

X_{15}: RPL: QUESTION 15

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	9	30%	
2	1	2	11	36.667%	←Mode
3	2	3	7	23.333%	
4	3	4	2	6.667%	
5	4	5	1	3.333%	

X_{16}: RF1: QUESTION 16

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	8	26.667%	
2	1	2	9	30%	←Mode
3	2	3	8	26.667%	
4	3	4	4	13.333%	
5	4	5	1	3.333%	

X_{16}: RPL: QUESTION16

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	11	36.667%	←Mode
2	1	2	5	16.667%	
3	2	3	6	20%	
4	3	4	7	23.333%	
5	4	5	1	3.333%	

X_{17}: RF1: QUESTION 17

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	0	0%	
2	1	2	4	13.333%	
3	2	3	11	36.667%	←Mode
4	3	4	7	23.333%	
5	4	5	8	26.667%	

X_{17}: RPL: QUESTION 17

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	2	6.667%	
2	1	2	2	6.667%	
3	2	3	7	23.333%	
4	3	4	11	36.667%	←Mode
5	4	5	8	26.667%	

X_{18}: RF1: QUESTION 18

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	2	6.667%	
2	1	2	4	13.333%	
3	2	3	12	40%	←Mode
4	3	4	9	30%	
5	4	5	3	10%	

X_{18}: RPL: QUESTION 18

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	2	6.667%	
2	1	2	2	6.667%	
3	2	3	8	26.667%	
4	3	4	13	43.333%	←Mode
5	4	5	5	16.667%	

X_{19}: RF1: QUESTION 19

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	4	13.333%	
2	1	2	15	50%	-Mode
3	2	3	8	26.667%	
4	3	4	1	3.333%	
5	4	5	2	6.667%	

X_{19}: RPL: QUESTION 19

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	4	13.333%	
2	1	2	4	13.333%	
3	2	3	7	23.333%	
4	3	4	6	20%	
5	4	5	9	30%	-Mode

X_{20}: RF1: QUESTION 20

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	3	10%	
2	1	2	4	13.333%	
3	2	3	7	23.333%	
4	3	4	11	36.667%	-Mode
5	4	5	5	16.667%	

X_{20}: RPL: QUESTION 20

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	1	3.333%	
2	1	2	4	13.333%	
3	2	3	5	16.667%	
4	3	4	7	23.333%	
5	4	5	13	43.333%	-Mode

X_{21}: RF1: QUESTION 21

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	1	3.333%	
2	1	2	2	6.667%	
3	2	3	13	43.333%	←Mode
4	3	4	7	23.333%	
5	4	5	7	23.333%	

X_{21}: RPL: QUESTION 21

Bar:	From: (>)	To: (≤)	Count:	Percent:
1	0	1	0	0%
2	1	2	3	10%
3	2	3	10	33.333%
4	3	4	10	33.333%
5	4	5	7	23.333%

X_{22}: RF1: QUESTION 22

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	0	0%	
2	1	2	5	16.667%	
3	2	3	13	43.333%	←Mode
4	3	4	6	20%	
5	4	5	6	20%	

X_{22}: RPL: QUESTION 22

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	1	3.333%	
2	1	2	2	6.667%	
3	2	3	5	16.667%	
4	3	4	14	46.667%	←Mode
5	4	5	8	26.667%	

X_{23}: RF1: QUESTION 23

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	1	3.333%	
2	1	2	8	26.667%	
3	2	3	7	23.333%	
4	3	4	9	30%	←Mode
5	4	5	5	16.667%	

X_{23}: RPL: QUESTION 23

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	4	13.333%	
2	1	2	5	16.667%	
3	2	3	12	40%	←Mode
4	3	4	7	23.333%	
5	4	5	2	6.667%	

X_{24}: RF1: QUESTION 24

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	2	6.667%	
2	1	2	8	26.667%	
3	2	3	7	23.333%	
4	3	4	9	30%	←Mode
5	4	5	4	13.333%	

X_{24}: RPL: QUESTION 24

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	2	6.897%	
2	1	2	6	20.69%	
3	2	3	10	34.483%	
4	3	4	11	37.931%	←Mode
5	4	5	0	0%	

X_{25}: RF1: QUESTION 25

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	0	0%	
2	1	2	6	20%	
3	2	3	9	30%	-Mode
4	3	4	8	26.667%	
5	4	5	7	23.333%	

X_{25}: RPL: QUESTION 25

Bar:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	1	3.333%	
2	1	2	3	10%	
3	2	3	7	23.333%	
4	3	4	14	46.667%	-Mode
5	4	5	5	16.667%	

X_1 : RF1:SEX OF RESPONDENT

Bar:	From: (>)	To: (≤)	Count:	Percent:	
Male	0	1	17	56.667%	-Mode
Female	1	2	13	43.333%	

X_1 : RPL:SEX OF RESPONDENT

Bar:	From: (>)	To: (≤)	Count:	Percent:
Male	0	1	15	50%
Female	1	2	15	50%

X_1: RF1: TENURE OF RESPONDENT

Years	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	2	6.667%	
2	1	2	4	13.333%	
3	2	3	6	20%	←Mode
4	3	4	0	0%	
5	4	5	3	10%	
6	5	6	2	6.667%	
7	6	7	2	6.667%	
8	7	8	2	6.667%	
9	8	9	1	3.333%	
10	9	10	2	6.667%	
11	10	11	1	3.333%	
12	11	12	2	6.667%	
13	12	13	2	6.667%	
14	13	14	1	3.333%	
15	14	15	0	0%	

X_1: RPL TENURE OF RESPONDENT

Years	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	7	23.333%	←Mode
2	1	2	4	13.333%	
3	2	3	2	6.667%	
4	3	4	4	13.333%	
5	4	5	1	3.333%	
6	5	6	3	10%	
7	6	7	3	10%	
8	7	8	2	6.667%	
9	8	9	1	3.333%	
10	9	10	1	3.333%	
11	10	11	2	6.667%	
12	11	12	0	0%	
13	12	13	0	0%	

X_{28}: RF1: PREVIOUS DWELLING TYPE

	Bar:	From: (>)	To: (≤)	Count:	Percent:	
House	1	0	1	12	40%	-Mode
Apartment	2	1	2	11	36.667%	
Townhouse	3	2	3	6	20%	
Other	4	3	4	1	3.333%	
	5	4	5	0	0%	

X_1: RPL: PREVIOUS DWELLING TYPE

	Bar:	From: (>)	To: (≤)	Count:	Percent:	
House	1	0	1	7	23.333%	
Apartment	2	1	2	10	33.333%	
Townhouse	3	2	3	11	36.667%	-Mode
Other	4	3	4	2	6.667%	
	5	4	5	0	0%	

X_{29}: RF1: RESPONDENT'S AGE

	Years	From: (>)	To: (≤)	Count:	Percent:	
Under 20	1	0	1	0	0%	
20-30	2	1	2	6	20%	
31-40	3	2	3	15	50%	-Mode
41-50	4	3	4	7	23.333%	
51+	5	4	5	2	6.667%	

X_1: RPL: RESPONDENT'S AGE

	Years	From: (>)	To: (≤)	Count:	Percent:	
Under 20	1	0	1	0	0%	
20-30	2	1	2	9	30%	
31-40	3	2	3	16	53.333%	-Mode
41-50	4	3	4	4	13.333%	
51+	5	4	5	1	3.333%	

X_{30}: RF1:MARITAL STATUS

	Bar:	From: (>)	To: (≤)	Count:	Percent:	
Never Married	1	0	1	1	3.333%	
Married	2	1	2	21	70%	-Mode
Living as Married	3	2	3	4	13.333%	
Divorced or Sep	4	3	4	4	13.333%	
	5	4	5	0	0%	

X_1: RPL:MARITAL STATUS

	Bar:	From: (>)	To: (≤)	Count:	Percent:	
Never Married	1	0	1	3	10%	
Married	2	1	2	18	60%	-Mode
Living as Married	3	2	3	4	13.333%	
Divorced or Sep	4	3	4	5	16.667%	
	5	4	5	0	0%	

X_1: RF1:NUMBER OF CHILDREN

NO.	From: (≥)	To: (<)	Count:	Percent:	
1	0	1	4	13.333%	
2	1	2	8	26.667%	
3	2	3	9	30%	-Mode
4	3	4	4	13.333%	
5	4	5	5	16.667%	
6	5	6	0	0%	

X_1: RPL:NUMBER OF CHILDREN

NO.	From: (≥)	To: (<)	Count:	Percent:	
1	0	1	12	40%	-Mode
2	1	2	9	30%	
3	2	3	4	13.333%	
4	3	4	2	6.667%	
5	4	5	2	6.667%	
6	5	6	0	0%	

X_1: RF1:NUMBER OF PEOPLE IN THE HOUSEHOLD

NO.	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	0	0%	
2	1	2	3	10%	
3	2	3	11	36.667%	←Mode
4	3	4	7	23.333%	
5	4	5	4	13.333%	
6	5	6	5	16.667%	
7	6	7	0	0%	

X_1: RPL NUMBER OF PEOPLE IN THE HOUSEHOLD

NO:	From: (>)	To: (≤)	Count:	Percent:	
1	0	1	3	10%	
2	1	2	11	36.667%	←Mode
3	2	3	8	26.667%	
4	3	4	3	10%	
5	4	5	2	6.667%	
6	5	6	2	6.667%	
7	6	7	1	3.333%	

X33: RF1: EDUCATION LEVEL COMPLETED

	Bar:	From: (>)	To: (≤)	Count:	Percent:	
Grade School	1	0	1	0	0%	
High School	2	1	2	9	30%	
College/Trade	3	2	3	6	20%	
University	4	3	4	15	50%	←Mode
	5	4	5	0	0%	

X33: RPL:EDUCATION LEVEL COMPLETED

	Bar:	From: (>)	To: (≤)	Count:	Percent:	
Grade School	1	0	1	2	6.667%	
High School	2	1	2	8	26.667%	
College/Trade	3	2	3	13	43.333%	←Mode
University	4	3	4	7	23.333%	
	5	4	5	0	0%	

X_1 : RF1 ANNUAL FAMILY INCOME

	Bar:	From: (>)	To: (≤)	Count:	Percent:	
< $10,999	1	0	1	0	0%	
$11,000-$20,999	2	1	2	2	6.667%	
$21,000-$30,999	3	2	3	3	10%	
$31,000-$40,999	4	3	4	4	13.333%	
$41,000-$50,999	5	4	5	11	36.667%	-Mode
$51,000-$60,999	6	5	6	6	20%	
> $61,000	7	6	7	4	13.333%	

X_1 : RPL ANNUAL FAMILY INCOME

	Bar:	From: (>)	To: (≤)	Count:	Percent:	
< $10,999	1	0	1	0	0%	
$11,000-$20,999	2	1	2	1	3.333%	
$21,000-$30,999	3	2	3	2	6.667%	
$31,000-$40,999	4	3	4	13	43.333%	-Mode
$41,000-$50,999	5	4	5	8	26.667%	
$51,000-$60,999	6	5	6	2	6.667%	
> $61,000	7	6	7	4	13.333%	

Appendix 3
(Raw Empirical Data)

	NEIGHBORHOOD	QUESTION 1	QUESTION 2	QUESTION 3	QUESTION 4
1	RPL	3	3	4	3
2	RPL	4	5	5	5
3	RPL	2	4	3	2
4	RPL	1	4	2	4
5	RPL	3	4	2	3
6	RPL	2	5	4	2
7	RPL	2	4	2	4
8	RPL	2	5	5	5
9	RPL	4	5	5	5
10	RPL	3	2	1	1
11	RPL	2	5	2	3
12	RPL	2	4	2	5
13	RPL	3	.	4	4
14	RPL	3	3	3	3
15	RPL	4	4	4	5
16	RPL	3	2	3	5
17	RPL	2	4	3	5
18	RPL	5	5	5	5
19	RPL	1	3	3	2
20	RPL	5	4	5	3
21	RPL	2	5	3	3
22	RPL	2	4	4	4
23	RPL	2	5	3	4
24	RPL	3	2	1	1
25	RPL	1	5	3	4
26	RPL	2	4	3	3
27	RPL	3	4	2	3
28	RPL	2	4	2	5
29	RPL	4	4	3	4
30	RPL	2	5	5	5
31	RPL	.	.	.	.
32	RPL	.	.	.	.
33	RF1	5	2	3	4
34	RF1	4	5	3	4
35	RF1	3	4	4	3
36	RF1	5	3	1	4
37	RF1	5	3	2	5
38	RF1	4	3	3	4
39	RF1	4	5	2	5
40	RF1	3	4	4	5

	NEIGHBORHOOD	QUESTION 1	QUESTION 2	QUESTION 3	QUESTION 4
41	RF1	4	5	5	4
42	RF1	5	5	3	3
43	RF1	3	4	4	3
44	RF1	4	4	2	2
45	RF1	4	5	5	5
46	RF1	5	5	4	4
47	RF1	4	5	4	4
48	RF1	2	2	1	3
49	RF1	4	4	3	4
50	RF1	5	4	5	4
51	RF1	3	3	2	3
52	RF1	4	3	4	3
53	RF1	3	4	4	3
54	RF1	3	4	4	3
55	RF1	5	3	2	4
56	RF1	5	5	5	4
57	RF1	3	2	3	3
58	RF1	4	5	4	4
59	RF1	2	2	3	3
60	RF1	4	4	3	4
61	RF1	3	3	3	3
62	RF1	5	4	5	4
63	RF1	.	.	.	.
64	RF1	.	.	.	.

	QUESTION 5	QUESTION 6	QUESTION 7	QUESTION 8	QUESTION 9
1	4	3	3	3	3
2	4	3	4	5	3
3	4	3	4	4	4
4	3	1	2	1	3
5	4	3	2	4	4
6	2	4	5	4	3
7	4	2	4	3	3
8	3	3	5	4	3
9	5	4	5	5	5
10	2	4	4	1	2
11	3	4	3	3	4
12	5	4	4	4	5
13	4	3	3	4	4
14	3	3	3	4	2
15	5	4	4	2	4
16	4	4	5	5	5
17	5	3	4	4	4
18	4	5	5	3	4
19	2	2	2	4	3
20	4	2	4	1	3
21	3	2	4	3	2
22	3	2	2	4	1
23	4	3	3	3	5
24	2	4	4	1	2
25	4	2	4	5	2
26	5	3	3	4	3
27	4	3	5	4	4
28	5	4	4	4	5
29	4	4	4	4	4
30	3	3	5	4	3
31	•	•	•	•	•
32	•	•	•	•	•
33	4	4	4	4	3
34	4	4	4	4	3
35	3	3	4	4	2
36	5	5	5	3	1
37	3	4	5	4	4
38	5	5	5	4	5
39	4	5	4	4	5
40	4	2	4	5	2

	QUESTION 5	QUESTION 6	QUESTION 7	QUESTION 8	QUESTION 9
41	2	5	4	2	5
42	3	5	4	4	3
43	4	4	4	4	5
44	4	4	3	2	3
45	4	5	5	4	5
46	2	4	4	4	5
47	2	3	5	3	2
48	3	3	4	3	3
49	3	4	4	3	4
50	2	5	5	3	3
51	3	4	4	3	2
52	3	4	4	3	4
53	3	3	4	4	2
54	3	3	4	4	2
55	5	5	5	3	5
56	4	4	4	5	5
57	2	3	3	3	3
58	3	3	4	3	2
59	3	4	4	3	3
60	3	4	4	3	4
61	3	4	3	2	5
62	4	5	5	5	4
63	•	•	•	•	•
64	•	•	•	•	•

	QUESTION 10	QUESTION 11	QUESTION 12	QUESTION 13
1	3	2	3	3
2	4	2	4	4
3	3	2	4	3
4	2	1	5	1
5	4	3	4	4
6	4	1	5	4
7	3	2	3	2
8	4	2	4	2
9	5	1	5	1
10	3	2	3	2
11	3	3	4	2
12	5	5	4	4
13	4	1	•	3
14	3	3	4	3
15	4	2	4	5
16	4	1	2	2
17	4	1	4	2
18	4	4	3	4
19	3	3	3	3
20	4	3	3	5
21	3	1	4	2
22	3	2	4	3
23	3	2	3	2
24	3	2	3	2
25	3	1	4	3
26	4	2	3	4
27	3	3	4	2
28	5	5	4	4
29	4	3	4	4
30	4	2	4	2
31	•	•	•	•
32	•	•	•	•
33	4	3	3	4
34	4	2	4	4
35	4	1	3	3
36	3	1	4	4
37	4	4	4	5
38	4	1	3	5
39	5	4	5	5
40	3	1	4	2

	QUESTION 10	QUESTION 11	QUESTION 12	QUESTION 13
41	5	1	4	4
42	4	2	4	4
43	4	1	.	3
44	4	1	4	4
45	5	4	5	4
46	4	3	4	4
47	3	2	3	1
48	3	2	2	2
49	4	2	4	4
50	4	2	3	4
51	3	4	3	3
52	4	3	3	3
53	4	1	3	3
54	4	1	3	3
55	3	2	4	4
56	5	3	4	4
57	3	2	3	3
58	3	2	3	1
59	3	2	2	3
60	4	2	4	4
61	4	3	3	3
62	5	1	4	4
63	.	.	.	.
64	.	.	.	.

	QUESTION 14	QUESTION 15	QUESTION 16	QUESTION 17
1	2	1	4	3
2	3	1	3	4
3	2	3	2	4
4	1	1	4	1
5	1	3	2	5
6	2	1	3	3
7	4	2	4	4
8	4	3	4	5
9	3	2	1	5
10	3	1	1	3
11	2	2	1	4
12	5	2	1	5
13	4	4	1	5
14	3	2	3	3
15	5	4	4	1
16	3	1	1	2
17	2	1	1	4
18	3	3	1	4
19	4	3	3	4
20	2	2	4	4
21	2	2	2	4
22	5	1	2	3
23	5	5	5	2
24	3	1	1	3
25	4	2	1	4
26	3	3	3	3
27	4	2	2	4
28	5	2	1	5
29	4	2	3	5
30	4	3	4	5
31	•	•	•	•
32	•	•	•	•
33	4	4	2	5
34	3	2	2	4
35	2	1	1	2
36	1	1	1	3
37	1	3	5	4
38	3	1	1	3
39	5	4	1	3
40	3	2	2	5

	QUESTION 14	QUESTION 15	QUESTION 16	QUESTION 17
41	4	3	3	3
42	3	4	2	5
43	4	4	2	4
44	2	1	1	2
45	3	4	4	5
46	4	4	4	4
47	3	1	1	3
48	4	4	3	4
49	2	2	3	3
50	4	2	3	5
51	4	3	3	3
52	2	2	2	4
53	2	2	2	2
54	2	1	1	2
55	1	1	2	5
56	5	4	4	5
57	3	3	3	3
58	3	1	1	3
59	4	4	3	4
60	2	2	3	3
61	4	3	4	3
62	4	3	2	5
63	•	•	•	•
64	•	•	•	•

	QUESTION 18	QUESTION 19	QUESTION 20	QUESTION 21
1	3	2	5	3
2	4	5	5	5
3	3	4	4	3
4	2	5	4	2
5	5	4	5	4
6	3	5	5	5
7	4	4	5	4
8	5	3	5	4
9	3	5	5	5
10	1	5	3	2
11	4	3	3	3
12	5	1	2	5
13	3	2	5	3
14	3	2	4	4
15	4	4	5	4
16	4	5	1	3
17	4	3	5	5
18	4	1	4	3
19	4	5	2	3
20	3	1	5	5
21	4	2	2	3
22	4	3	5	4
23	2	4	3	4
24	1	5	3	2
25	4	5	4	3
26	4	4	4	4
27	3	3	3	3
28	5	1	2	5
29	4	3	4	4
30	5	3	5	4
31	•	•	•	•
32	•	•	•	•
33	4	2	5	3
34	3	3	2	3
35	2	5	1	3
36	1	2	4	5
37	1	5	5	3
38	2	2	5	5
39	4	2	5	5
40	4	3	4	1

	QUESTION 18	QUESTION 19	QUESTION 20	QUESTION 21
41	4	2	3	5
42	4	2	5	4
43	3	2	4	4
44	3	2	4	3
45	5	1	4	5
46	4	3	3	3
47	3	1	1	2
48	3	3	4	4
49	3	2	3	3
50	4	2	3	4
51	3	3	4	4
52	3	2	3	3
53	2	4	2	3
54	2	3	1	3
55	5	2	4	5
56	5	3	3	4
57	3	1	2	3
58	3	2	2	2
59	3	3	4	4
60	3	2	3	3
61	4	1	4	3
62	4	2	4	5
63	•	•	•	•
64	•	•	•	•

	QUESTION 22	QUESTION 23	QUESTION 24	QUESTION 25
1	3	3	3	3
2	5	4	4	4
3	3	3	3	4
4	3	1	1	4
5	4	4	4	3
6	4	4	4	4
7	4	3	4	4
8	4	2	2	4
9	5	5	4	5
10	3	2	2	2
11	4	3	2	4
12	5	3	4	5
13	5	5	3	3
14	4	3	3	4
15	4	1	4	5
16	1	1	1	1
17	4	3	3	3
18	4	3	3	4
19	2	1	3	3
20	5	3	4	4
21	2	2	2	2
22	5	4	3	4
23	5	4	4	5
24	3	2	2	2
25	4	4	3	4
26	4	3	3	3
27	4	4	•	3
28	5	3	4	5
29	4	3	4	4
30	4	2	2	4
31	•	•	•	•
32	•	•	•	•
33	3	3	2	2
34	2	3	3	4
35	2	2	2	2
36	4	4	5	5
37	5	5	4	4
38	5	4	5	5
39	5	4	4	5
40	3	2	2	3

	QUESTION 22	QUESTION 23	QUESTION 24	QUESTION 25
41	5	5	5	5
42	4	4	4	4
43	4	4	2	4
44	3	2	1	3
45	5	5	4	4
46	3	3	4	4
47	2	1	1	2
48	3	2	3	3
49	3	4	3	3
50	4	4	4	4
51	3	2	3	4
52	3	3	2	3
53	3	2	2	2
54	2	2	2	2
55	4	4	5	5
56	4	5	4	5
57	3	3	3	3
58	2	2	2	2
59	3	3	3	3
60	3	4	3	3
61	3	3	4	3
62	5	5	4	5
63	•	•	•	•
64	•	•	•	•

	###QUESTION 28###	QUESTION 29	QUESTION 30	QUESTION 31
1	2	1	3	3
2	1	1	3	2
3	1	1	3	2
4	1	8	3	3
5	1	2	3	4
6	2	7	2	3
7	2	1	3	2
8	1	4	4	4
9	1	9	2	5
10	2	11	3	3
11	1	6	1	3
12	2	2	1	2
13	2	4	2	2
14	1	4	3	4
15	2	1	2	2
16	2	10	1	4
17	1	7	1	3
18	2	2	3	3
19	2	6	1	2
20	2	1	3	3
21	1	3	1	3
22	1	1	4	3
23	2	7	1	3
24	2	11	3	3
25	1	5	2	3
26	1	3	2	2
27	2	8	8	2
28	1	4	2	3
29	1	2	2	2
30	2	6	2	3
31	.	.	.	.
32	.	.	.	.
33	1	12	2	4
34	1	13	1	4
35	1	2	1	4
36	1	7	1	5
37	2	3	3	2
38	1	3	2	2
39	2	14	2	3
40	1	5	3	3

	###QUESTION 28###	QUESTION 29	QUESTION 30	QUESTION 31
41	2	10	1	5
42	1	6	2	3
43	2	3	1	2
44	2	1	1	2
45	1	3	1	4
46	2	12	2	3
47	2	3	1	3
48	2	7	3	3
49	2	13	2	3
50	1	6	1	4
51	1	2	3	3
52	1	9	1	3
53	2	1	2	3
54	1	2	1	4
55	2	8	2	4
56	1	5	3	3
57	1	2	2	2
58	1	5	1	3
59	1	8	3	3
60	2	11	2	3
61	1	3	2	2
62	2	10	4	3
63	.	.	.	.
64	.	.	.	.

	QUESTION 32	QUESTION 33	QUESTION 34	QUESTION 35
1	4	2	3	1
2	2	1	3	4
3	2	0	2	4
4	2	0	2	2
5	1	0	1	4
6	1	0	1	2
7	2	0	2	4
8	2	2	4	3
9	3	1	3	2
10	2	4	6	3
11	2	0	2	3
12	2	0	2	3
13	4	1	2	3
14	2	3	5	1
15	3	0	2	4
16	2	1	3	2
17	3	0	2	2
18	4	6	7	3
19	2	1	3	2
20	4	1	2	3
21	4	0	2	3
22	2	2	4	4
23	2	3	5	2
24	2	4	6	3
25	2	1	3	3
26	3	0	2	2
27	2	3	4	4
28	2	1	3	3
29	1	0	1	3
30	2	1	3	3
31	•	•	•	•
32	•	•	•	•
33	2	3	6	4
34	4	2	3	4
35	2	2	4	4
36	3	4	6	2
37	3	0	5	4
38	3	1	3	3
39	4	2	3	2
40	2	3	5	3

	QUESTION 32	QUESTION 33	QUESTION 34	QUESTION 35
41	2	4	3	2
42	2	1	3	2
43	2	2	4	2
44	2	0	2	4
45	3	3	5	3
46	2	2	4	4
47	2	2	4	4
48	2	2	4	4
49	2	4	6	2
50	2	2	4	3
51	4	1	2	3
52	2	1	3	4
53	2	1	3	4
54	2	2	4	4
55	2	4	6	3
56	2	1	3	4
57	4	0	2	4
58	2	1	3	4
59	2	1	3	4
60	2	4	6	2
61	1	0	3	2
62	2	3	5	2
63	.	.	.	.
64	.	.	.	.

	QUESTION 36
1	4
2	5
3	7
4	6
5	5
6	4
7	7
8	5
9	3
10	4
11	7
12	4
13	2
14	5
15	5
16	3
17	5
18	4
19	6
20	5
21	4
22	4
23	7
24	4
25	4
26	4
27	4
28	4
29	4
30	5
31	.
32	.
33	7
34	5
35	6
36	6
37	3
38	5
39	3
40	5

	QUESTION 36
41	2
42	7
43	2
44	6
45	4
46	5
47	5
48	7
49	5
50	6
51	4
52	5
53	6
54	4
55	5
56	6
57	4
58	5
59	7
60	5
61	3
62	5
63	.
64	.

Appendix 4

(t - Tests of Survey Questions)

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 1

DF:	Unpaired t Value:	Prob. (2-tail):
58	-4.92	.0001

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	2.633	1.066	.195
RF1	30	3.9	.923	.168

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 2

DF:	Unpaired t Value:	Prob. (2-tail):
57	.91	.3665

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	29	4.034	.944	.175
RF1	30	3.8	1.031	.188

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 3

DF:	Unpaired t Value:	Prob. (2-tail):
58	-.436	.6647

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	3.2	1.215	.222
RF1	30	3.333	1.155	.211

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 4

DF:	Unpaired t Value:	Prob. (2-tail):
58	-.126	.9002

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	3.667	1.241	.227
RF1	30	3.7	.75	.137

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 5

DF:	Unpaired t Value:	Prob. (2-tail):
58	1.546	.1277

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	3.7	.952	.174
RF1	30	3.333	.884	.161

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 6

DF:	Unpaired t Value:	Prob. (2-tail):
58	-3.877	.0003

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	3.133	.9	.164
RF1	30	4	.83	.152

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 7

DF:	Unpaired t Value:	Prob. (2-tail):
58	-1.926	.059

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	3.767	.971	.177
RF1	30	4.167	.592	.108

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 8

DF:	Unpaired t Value:	Prob. (2-tail):
58	-.126	.9002

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	3.467	1.196	.218
RF1	30	3.5	.82	.15

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 9

DF:	Unpaired t Value:	Prob. (2-tail):
58	-.222	.8253

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	3.4	1.07	.195
RF1	30	3.467	1.252	.229

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: ***QUESTION 10***

DF:	Unpaired t Value:	Prob. (2-tail):
58	-1.469	.1472

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	3.6	.724	.132
RF1	30	3.867	.681	.124

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 11

DF:	Unpaired t Value:	Prob. (2-tail):
58	.484	.6303

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	2.233	1.104	.202
RF1	30	2.1	1.029	.188

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 12

DF:	Unpaired t Value:	Prob. (2-tail):
56	1.094	.2786

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	29	3.724	.702	.13
RF1	29	3.517	.738	.137

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 13

DF:	Unpaired t Value:	Prob. (2-tail):
58	-2.087	.0413

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	2.9	1.094	.2
RF1	30	3.467	1.008	.184

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 14

DF:	Unpaired t Value:	Prob. (2-tail):
58	.667	.5077

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	3.233	1.194	.218
RF1	30	3.033	1.129	.206

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 15

DF:	Unpaired t Value:	Prob. (2-tail):
58	-1.26	.2126

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	2.167	1.053	.192
RF1	30	2.533	1.196	.218

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 16

DF:	Unpaired t Value:	Prob. (2-tail):
58	.106	.916

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	2.4	1.303	.238
RF1	30	2.367	1.129	.206

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 17

DF:	Unpaired t Value:	Prob. (2-tail):
58	.236	.8141

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	3.7	1.149	.21
RF1	30	3.633	1.033	.189

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 18

DF:	Unpaired t Value:	Prob. (2-tail):
58	1.222	.2266

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	3.567	1.073	.196
RF1	30	3.233	1.04	.19

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 19

DF:	Unpaired t Value:	Prob. (2-tail):
58	3.173	.0024

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	3.4	1.404	.256
RF1	30	2.4	1.003	.183

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 20

DF:	Unpaired t Value:	Prob. (2-tail):
58	1.7	.0946

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	3.9	1.213	.222
RF1	30	3.367	1.217	.222

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 21

DF:	Unpaired t Value:	Prob. (2-tail):
58	.518	.6065

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	3.7	.952	.174
RF1	30	3.567	1.04	.19

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 22

DF:	Unpaired t Value:	Prob. (2-tail):
58	1.666	.101

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	3.867	1.008	.184
RF1	30	3.433	1.006	.184

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 23

DF:	Unpaired t Value:	Prob. (2-tail):
58	-1.256	.2142

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	2.933	1.112	.203
RF1	30	3.3	1.149	.21

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 24

DF:	Unpaired t Value:	Prob. (2-tail):
58	-.487	.6279

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	3.033	.928	.169
RF1	30	3.167	1.177	.215

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 25

DF:	Unpaired t Value:	Prob. (2-tail):
58	.499	.6197

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	3.667	.994	.182
RF1	30	3.533	1.074	.196

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: ###QUESTION 28###

DF:	Unpaired t Value:	Prob. (2-tail):
58	.51	.612

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	1.5	.509	.093
RF1	30	1.433	.504	.092

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 29

DF:	Unpaired t Value:	Prob. (2-tail):
58	-1.796	.0777

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	4.6	3.223	.588
RF1	30	6.3	4.061	.741

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 30

DF:	Unpaired t Value:	Prob. (2-tail):
58	2.018	.0483

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	2.467	1.383	.252
RF1	30	1.867	.86	.157

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 31

DF:	Unpaired t Value:	Prob. (2-tail):
58	-1.442	.1546

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	2.867	.776	.142
RF1	30	3.167	.834	.152

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 32

DF:	Unpaired t Value:	Prob. (2-tail):
58	0	1

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	2.367	.89	.162
RF1	30	2.367	.765	.14

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 33

DF:	Unpaired t Value:	Prob. (2-tail):
58	-1.828	.0727

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	1.267	1.53	.279
RF1	30	1.933	1.285	.235

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 34

DF:	Unpaired t Value:	Prob. (2-tail):
58	-2.479	.0161

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	3	1.531	.28
RF1	30	3.9	1.269	.232

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 35

DF:	Unpaired t Value:	Prob. (2-tail):
58	-1.613	.1122

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	2.833	.874	.16
RF1	30	3.2	.887	.162

Unpaired t-Test X_1: NEIGHBORHOOD Y_1: QUESTION 36

DF:	Unpaired t Value:	Prob. (2-tail):
58	-.784	.436

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	4.667	1.241	.227
RF1	30	4.933	1.388	.253

Unpaired t-Test X 1 : NEIGHBORHOOD Y 1 : QUESTION 11

DF:	Unpaired t Value:	Prob. (2-tail):
58	.484	.6303

Group:	Count:	Mean:	Std. Dev.:	Std. Error:
RPL	30	2.233	1.104	.202
RF1	30	2.1	1.029	.188

Corr. Coeff. X 1 : QUESTION 11 Y 1 : QUESTION 29

Count:	Covariance:	Correlation:	R-squared:
60	-.263	-.066	.004

Corr. Coeff. X 1 : QUESTION 11 Y 1 : QUESTION 31

Count:	Covariance:	Correlation:	R-squared:
60	-.155	-.18	.032

Corr. Coeff. X 1 : QUESTION 11 Y 1 : QUESTION 36

Count:	Covariance:	Correlation:	R-squared:
60	-.068	-.049	.002

Corr. Coeff. X 1 : QUESTION 11 Y 1 : QUESTION 29

Count:	Covariance:	Correlation:	R-squared:
60	-.263	-.066	.004

Corr. Coeff. X 1 : ***QUESTION 10*** Y 1 : ***QUESTION 28***

Count:	Covariance:	Correlation:	R-squared:
60	.025	.07	.005

Corr. Coeff. X 1 : ***QUESTION 10*** Y 1 : QUESTION 31

Count:	Covariance:	Correlation:	R-squared:
60	.089	.155	.024

Corr. Coeff. X 1 : ***QUESTION 10*** Y 1 : QUESTION 36

Count:	Covariance:	Correlation:	R-squared:
60	-.325	-.349	.122

Corr. Coeff. X 1 : ***QUESTION 10*** Y 1 : QUESTION 29

Count:	Covariance:	Correlation:	R-squared:
60	.275	.104	.011

Appendix 5
(Land Use Bylaws)

Bylaw No. 6626
November 10, 1981
Bylaw No. 7322
September 16, 1983
Bylaw No. 7229
September 27, 1983
Bylaw No. 8994
September 12, 1989

130.1 General Purpose

To provide a District for small lot Single Detached Housing that provides the opportunity for the more efficient utilization of suburban areas, while maintaining the privacy and independence afforded by Single Detached Housing forms; and also, a District that provides greater flexibility for infill development.

130.2 Permitted Uses

1) Single Detached Housing

2) Limited Group Homes

130.3 Discretionary Uses

1) Homecrafts

2) Offices-in-the-Home

3) Group Homes

4) Foster Homes

5) Daytime Child Care Services

6) Residential Sales Centre

130.4 Development Regulations for Permitted and Discretionary Uses

The following regulations shall apply to Permitted and Discretionary Uses, except where altered by a Statutory Plan Overlay:

1) the minimum site area shall be 270 m^2 (2,906.4 sq. ft.) per dwelling;
2) the minimum site width shall be 9.0 m (29.5 ft.);

3) the minimum site depth shall be 30 m (98.4 ft.);

4) the maximum height shall not exceed 10 m (32.8 ft.) nor 2 1/2 storeys;

5) the following minimum yards shall be provided on each lot or potential lot:

a) the minimum front yard shall be 4.5 m (14.8 ft.);

b) the minimum required side yard shall be 1.2 m (3.94 ft.) except that a minimum side yard for buildings over 7.5 m (24.6 ft.) in height shall be 2 m (6.6 ft.); and

c) the minimum side yard abutting a public roadway other than a lane shall be 20% of the site width, but the requirement shall be not less than 2.4 m (7.9 ft.) and not more than 4.5 m (14.8 ft.) wide. Where a garage is an integral part of the building in which the Dwelling is located, and the vehicle doors of the garage face a flanking public roadway other than a lane, the distance between any portion of these vehicle doors and the flanking public roadway shall be not less than 4.5 m (14.8 ft.). The minimum side yard abutting a lane shall be 1.2 m (3.94 ft.).

6) notwithstanding Clause 130.4(5)(b) above, the Development Officer may allow the side yard to be less than 1.2 m (3.94 ft.) where:

a) the wall facing onto such side yard shall be a blank wall; and

b) a maintenance easement shall be granted by the owner of the adjacent lot which shall:

i) be registered by caveat against the title of the adjacent lot; and

ii) include any required encroachment easements to establish a minimum separation distance of 2.4 m (7.9 ft.).

7) the rear yard shall be based on a consideration of the requirements of Clauses 8), 9), 10), and 11) and in no case shall be less than 4.0 m (13.12 ft.);

8) the maximum total site coverage shall not exceed 45% with a maximum of 35% for a principal building, and a maximum site coverage of 15% for accessory buildings. Where a garage is attached to or designed as an integral part of a dwelling, the maximum site coverage for the principal building shall be 45%;

9) Separation Space shall be provided in accordance with Section 58 of this Bylaw, except that Separation Space shall not be required between Dwellings where a minimum side yard of 1.2 m (3.94 ft.) has been provided on the abutting lot;

10) a minimum private yard area of 30 m^2 (322.9 sq. ft.) per Dwelling shall be designated on the site plan for the active or passive recreation use of the occupants. This yard area shall be located immediately adjacent to, and with direct access from, the Dwelling it is intended to serve. Neither the width nor length of such a yard shall be less than 4 m (13.2 ft.). This minimum private yard may be located within a required yard, other than a front yard. This yard shall be permanently retained as open space, unencumbered by an accessory building or future additions;

11) one garage, or a site for one garage shall be clearly demarcated both on the site and on the plan, accompanying any application for a principal building, and access to one garage or garage site, per Dwelling shall be provided on the site, located in accordance with the regulations of this Bylaw;

12) all roof drainage shall be directed away from buildings and to a public roadway, including a lane, or to a drainage work. Applications for a development permit shall include a detailed drainage plan showing the proposed drainage of the site;

13) where there is no exterior access from a public roadway to a rear yard, the Dwelling shall be designed so as to provide adequate access to a rear yard for landscaping, gardening, maintenance and other activities typical of rear yard use;

14) individual Development Permit applications will be evaluated in terms of compatibility with existing structures on the block face, taking into account proposed development setbacks, Dwelling entrances and orientation, massing, roof-lines, the location of windows and other openings in walls and elevational treatment of wall openings, building facades, and finishing materials;

15) where several Development applications are received simultaneously, the Development Officer shall require the submission of site plans showing setbacks, Dwelling entrances and orientation, massing, roof-lines, the location and elevational treatment of wall openings, building facades, and finishing materials for all of the developments. The Development Officer shall require that the exteriors of the Dwellings which are the subject of the applications provide individuality and variety of building design in terms of setbacks, entrances, elevations and finishing materials;

16) new plans of subdivision for RPL development must ensure that each proposed lot is serviced by both a public roadway and a lane; and

17) general site landscaping shall be developed in accordance with Section 69.2 of this Bylaw.

130.5 **Additional Development Regulations for Discretionary Uses**

1) Offices-in-the-Home shall be developed in accordance with Section 84 of this Bylaw.

2) Homecrafts shall be developed in accordance with Section 85 of this Bylaw.

3) Group Homes shall be developed in accordance with Section 91 of this Bylaw.

4) Daytime Child Care Services shall be developed in accordance with Section 93 of this Bylaw.

5) Residential Sales Centres shall be developed in accordance with Section 95 of this Bylaw.

110.1 General Purpose

To establish a District primarily for Single Detached Housing.

110.2 Permitted Uses

1) Single Detached Housing

Bylaw No. 7229
September 27, 1983

2) Limited Group Homes

110.3 Discretionary Uses

1) Semi-detached Housing and Duplex Housing, where the side lot line abuts a lot in an Industrial, Commercial, Row Housing, or Apartment District, or is not separated from it by a public roadway more than 10 m (32.8 ft.) wide.

2) Homecrafts

3) Offices-in-the-Home

4) Group Homes

5) Foster Homes

6) Daytime Child Care Services

7) Private Education Services, where lawfully existing on a site in this District at the effective date of this Bylaw, on the same site only.

8) Religious Assembly

Bylaw No. 7322
September 16, 1983

9) Residential Sales Centre

110.4 Development Regulations for Permitted and Discretionary Uses

The following regulations shall apply to Permitted and Discretionary Uses, except where altered by a Statutory Plan Overlay:

1) the minimum site area shall be 360 m^2 (3,875.0 sq. ft.) per dwelling;

2) the minimum site width shall be 12 m (39.4 ft.);

3) the minimum site depth shall be 30 m (98.4 ft.);

4) the maximum height shall not exceed 10 m (32.8 ft.) nor 2½ storeys;

5) the maximum total site coverage shall not exceed 40%, with a maximum of 28% for a principal building and a maximum of 12% for accessory buildings. Where a garage is attached to or designed as an integral part of a dwelling, the maximum for the principal building shall be 40%;

6) the minimum front yard shall be 6 m (19.7 ft.);

7) the minimum rear yard shall be 7.5 m (24.6 ft.), except in the case of a corner site it shall be 4.5 m (14.8 ft.);

8) side yards shall be established on the following basis:

a) side yards shall total at least 20% of the site width, with a minimum side yard of 1.2 m (3.94 ft.), except that the minimum side yard for buildings over 7.5 m (24.6 ft.) in height shall be 2 m (6.6 ft.);

b) where there is no lane abutting the site, one side yard shall be at least 3 m (9.8 ft.) for vehicular access, unless there is an attached garage or a garage which is an integral part of a dwelling;

c) on a corner site where the building fronts on the front yard the minimum side yard abutting the flanking public roadway other than a lane shall be 20% of the site width, to a maximum of 4.5 m (14.8 ft.); and

d) on a corner site where the building fronts on a flanking public roadway other than a lane, the minimum side yard abutting the flanking public roadway shall be 4.5 m (14.8 ft.).

Bylaw No. 6626 November 10, 1981

9) Separation Space shall be provided between two or more Dwellings or portions thereof on the same site, in accordance with Section 58 of this Bylaw.

e2

110.5 Additional Development Regulations for Discretionary Uses

Bylaw No. 6190 September 9, 1980

1) Notwithstanding Subsection 110.4, Semi-detached and Duplex Housing in this District shall be developed in accordance with the provisions of the RF2 District.

2) Offices-in-the-Home shall be developed in accordance with Section 84 of this Bylaw.

3) Homecrafts shall be developed in accordance with Section 85 of this Bylaw.

4) Group Homes shall be developed in accordance with Section 91 of this Bylaw.

5) Notwithstanding the minimum site area and minimum site width provisions of this District, Religious Assembly Uses shall be developed in accordance with Section 81 of this Bylaw.

Bylaw No. 6626 November 10, 1981

6) Daytime Child Care Services shall be developed in accordance with Section 93 of this Bylaw.

Bylaw No. 7322 September 16, 1983

7) Residential Sales Centres shall be developed in accordance with Section 95 of this Bylaw.

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