

Quality of an urban community: a framework for understanding the relationship between quality and physical form

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Abstract

Community quality is an extremely complex concept which involves the physical environment providing opportunities for humans to meet their needs and desires. Both researchers and designers must concern themselves with raising the standard of the designed environment from the present level, to one which successfully meets the complex levels of human needs. To reach this goal, it is necessary to bridge the gap between research and design and to link the two into a comprehensive framework. This research project is an investigation of the physical elements that contribute to the quality of a community. A quality community is one which meets the needs and desires of its visitors and inhabitants. The methods involve descriptive research, matrix development and case study applications. Six categories and 28 sub-categories of community quality and needs criteria were developed through the research of community quality, and human social and psychological needs theories. The six main categories of the quality principles are livability, character, connection, mobility, personal freedom, and diversity. Approximately, two hundred community physical form criteria were developed through the summary of professional community design literature and guidelines. The physical form criteria were categorized under community, urban block, buildings, streets, pedestrian ways, open space, vegetation, and feature areas. A matrix relating social needs with physical form, illustrates how community quality can be better understood through physical design. Case study applications of three communities in Toronto, the Beaches, High Park, and Parkdale, illustrate how the matrices can be used to analyze a community. The result is a framework for understanding the relationship between the quality of an urban environment and physical form. Matrix analysis showed that connection and character scored the highest with respect to physical form, and the top physical form criteria are, a walkable community, outdoor amenities, lots of seating, barrier free, and open space areas in residential areas. © 1997 Published by Elsevier Science Ltd.

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1. Introduction

The purpose of this study was to develop a framework to facilitate the understanding of the relationship between the quality of an urban community and physical form. More specifically, the purpose was to

develop an understanding of the social, psychological, and physical elements that contribute to the quality of a community, to develop a list of physical form criteria that will contribute to the essential qualities of a community, to develop a framework to link quality research to physical form, and to illustrate the practical use of the framework by applying it to three distinct urban communities in Toronto.

Community quality is a multidimensional concept

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that is a product of a number of interrelated concepts. It is dynamic, unique for each community and the perceived quality of a community differs from one individual to the next. Quality refers to distinguishing properties that promote a degree of excellence or high rank. The term community refers to 'a people within a limited territory possessing shared values, common interests, and norms of conduct, engaging in social interaction and mutual aid, and having their own groups, associations, and institutions to help meet their basic needs' (Hallman, 1984, p. 34). Included in this definition are such spaces as parks, sidewalks, schoolyards, parking lots, streets, gardens, and outdoor cafes.

A greater understanding of the physical properties that contribute to the quality of a community is needed for design professionals to play a more influential role in the preservation, enhancement and development of successful community environments. In particular, a method or framework is needed to build a greater understanding of community quality and the relationship to physical form.

2. Methods

The design of this research project involves descriptive research, matrix development and case study applications. The approach taken is to combine professional design and social theories to create a general transactional framework to facilitate a greater understanding of quality and physical form. It was developed through a literature review on relevant findings from various fields of thought (community psychology, environmental psychology, urban design, sense of place theories, design professional publications, human behavioral research studies) and through the development of a matrix which links quality to physical form.

The purpose of the descriptive research is to learn from experts in the field and to benefit from their experiences by taking a transactional approach combining information from social and psychological researchers and from design professionals. It is also to collect, analyze and synthesize detailed information on the essential characteristics that contribute to community quality. And finally, to summarize physical design strategies for urban communities that contribute to community quality.

A matrix was developed to organize the information derived from the literature into a comprehensive framework. The matrix is a device to link quality theories with physical form. Quality principles are listed horizontally along the top of the matrix, and physical form criteria are listed vertically down the left side of the matrix. Each quality principle is analyzed according to their relationship to each physical form criteria. They either have a relationship to each other, a partial relationship to each other or no relationship at all. The matrix graphically illustrates which design criteria and quality principles have strong and weak relationships. This may help to identify any problems, and justify current conditions and practises.

The community quality matrix can be used to understand the relationship between the quality of a community with respect to its form. The purpose is to analyze a community according to the quality principles, through on-site observational analysis. This will illustrate areas of the community that contribute to its quality, and areas that need improvement. The second step is to use the matrix to determine which physical form criteria can be used to improve the quality of the community. Three communities in Toronto are used for application, the Beaches, High Park, and Parkdale. Two popular communities, the Beaches, and High Park were chosen according to their reputation, real estate values, and successful commercial districts. Parkdale, a less desirable community due to high rates of crime, was used as a comparison test against the more successful communities.

3. Literature review

The two main categories of literature researched for this project are quality principles derived from social and psychological theories and physical form criteria summarized from professional publications. The social and psychological research is comprised of community quality theories, home environment studies, human social, psychological and physical needs, community psychology, and environmental psychology literature. The physical form criteria are derived from current leading edge design guidelines, and books authored by professionals in the various design fields.

Jarvis (1993) stated that the measure of success for any residential neighbourhood is how well community, and site plans can be implemented to achieve a balance between a list of opposing qualities of desirable places to live. The conflicting qualities are: convenience, separation; relatedness, identity; affordability, luxury; tradition, innovation; unity, variety; safety, excitement.

Johnson developed a framework for describing quality of place at a regional, community, and project level. The seven qualities cited were identity, stability, security, choice, interest, convenience, and relatedness.¹ Lang (1994) used Maslow (1943) 'hierarchy of needs' as an organizing principle for human needs. The needs are physiological needs, safety and security needs, affiliation needs, esteem needs, and self-actualization needs (including cognitive and aesthetic needs).

Lennard (1987) summarized principles involved in designing urban spaces that promote social life, and a sense of well-being, derived from traditional urban space design theory. A list of 10 basic design principles were comprised: safe and comfortable pedestrian networks; a central neighbourhood square; human scale urban spaces; visual enclosure fostering a sense of belonging; natural elements to increase sensual enjoyment; intricacy and variety to stimulate curiosity and encourage exploration; intimate and personal territories beside significant structures to contribute to meaningful experiences; spatial definitions; appropriately designed seating locations and arrangements.

Appleyard (1981) researched the quality of life in residential environments, and the impacts of traffic, and transportation on them. From the study, five important characteristics of a street were developed: safe from crime; clean, uncluttered appearance; convenient; free of traffic congestion; good for children; lined with affordable housing.

Lynch (1960) distinguished five elements which facilitate the linkages of a community to a city being, paths (channels where people move), edges (linear elements such as railway lines), districts (sections of the city having some identifiable characteristics),

nodes (strategic spots where people can enter), and landmarks (points of reference such as a monumental building). Lynch (1981) distinguished five categories or theories of 'good city form'. These categories are: vitality (a healthy environment), sense (sense of place or identity), fit (a setting's adaptability), access (to people, activities, resources, places, and information), and control (responsible control of the environment).

In order to provide an international perspective, books which use American, and European case studies were used in combination with urban design guidelines of developments in Canada. Listed below are the design guidelines, and the books that contributed to the physical form criteria used in this research project.

Milus Bollenberghe Topps Watchorn (1995) provided guidelines for a comprehensively planned and integrated community that reflects traditional Ontario heritage, achieved by providing architecture, and landscape architectural guidelines which reflect the qualities, images, and streetscapes of traditional urban neighbourhoods. The design guidelines cover detailed information for all residential, mixed use, and commercial development.

Berridge Lewinberg Greenberg (1991) developed a comprehensive approach aimed at integrating environmental, economic, social, and built form issues in reurbanization. The areas of interest in the report were, employment areas, centers, corridors, mixed use, mix of housing types, density, urban design, the public realm, the pedestrian environment, parking, fit, transition, and special features.

City of Toronto (1996a,b) design guidelines for the King-Parliament and King-Spadina areas presented a new approach to planning which focuses on built form emphasizing a fit into the established pattern, scale, height, and mass of existing buildings, access to sunlight and setback conditions, and maximum flexibility, and diversity of uses. The major planning objectives are: promoting flexibility of uses; emphasizing built form; retaining physical and heritage character; re-using existing buildings; protecting and reinforcing public spaces; retaining and creating businesses; creating good quality living and working environments; and simplifying the planning framework. The built form focuses on defining street edges, sunlight on streets and parks, and general

¹ Johnson, B., 1988. A Descriptive Estimate of Quality of Place. Unpublished.

height limits. The space between buildings is also addressed through: light, view and privacy; building depth restrictions; removal of density as a planning control; areas of special identity; and special streets.

Calthorpe (1993) developed the concept of Transit Oriented Developments, or 'T.O.D.s', defined as "a mixed-use community within an average two thousand foot walking distance from a transit stop and core commercial area" (Calthorpe, 1993, p. 56). The guiding principles of 'T.O.D.s' are they must be mixed-use, transit-oriented, walkable, and diverse. The guiding principles: relationship to transit, and circulation; mix of uses; residential mix; recognizable and interconnected street and circulation system; general design criteria; site boundary definition; coordinated planning; distribution of 'T.O.D.s'; redevelopment and infill sites; new growth areas; regional form; criteria for new towns.

Alexander (1977) described detailed 'patterns' for towns, neighbourhoods, houses, gardens, and rooms. It is a collection of over 250 patterns divided into the following categories: preserving community character; the formation of local centers; housing forms; work communities; road and path networks; public open land; smaller common land; social institutions; work groups; local shops, and gathering places; arrangement of groups of buildings; position of individual buildings on the site; relationship of indoor and outdoor space; and details on building design.

Gehl (1987) described outdoor activities and a number of physical conditions that influenced them. He described in detail, good places for walking, standing, sitting, seeing, hearing, and talking. Whyte (1988) analyzed from direct observation, the social life of the street and described: street people, who they are and what they do; the physical street, its sensory environment, and the design and management of spaces; carrying capacity; steps and entrances; and sun and shadows.

Katz (1994) comprised essays from professionals which described the new urbanism movement, which borrows from traditional city planning in the early 1900s. The principles include diversity, pedestrian scale, public space, bounded neighbourhoods with discernible edges, and diverse environments with a hierarchical structure.

Brown (1985) focused on the relationship between architectural form and energy use to help

architectural designers understand the energy consequences of their most basic design decisions. The basic principles include sensitivity to: the sun, wind, and light; comfort; program and use; form and envelope; combining climate, program and form; design strategies for the design of building groups; and designing for comfortable open spaces.

Hester (1975) analyzed the social suitability of neighbourhood space, and created a user needs checklists for use in neighbourhood design. The major components of the checklist are: desired activities; appropriate activity settings; relatedness through interaction with the natural environment; safety; aesthetic appeal; convenience; psychological comfort; physical comfort; symbolic ownership; and cost.

4. Results

A list of quality and needs principles, and a list of physical form criteria have been developed from the literature. The 'theory of good city form' by Lynch (1981) was used as an organizing principle for the quality literature of community environments. Table 1 summarizes the quality and needs principles, followed by a written description of each term.

4.1. Quality criteria

4.1.1. Livability

Livability represents the basic qualities that must exist for a community to be successful, consisting of survival, personal health and development, environmental health, comfort, and safety and security. *Survival* is the most basic indicator of livability involving the adequacy of oxygen, food, water, shelter and clothing, and the ability to move around a territory to obtain the basic necessities of life. Quality environments support *personal health* (a basic need enabling us to lead active lives), and provide opportunities for various levels of physiological and psychological *development*. Community development must ensure ecological preservation and conservation, and respond to the *health of the environment* in a sensitive manner to ensure the present, and future stability of the ecological community. A comfortable place is one which provides physiological *comfort* (which can be achieved by proximity to an active commu-

Table 1
Summary of quality and needs principles

Livability	Character	Connection	Mobility	Personal freedom	Diversity
Survival	Sense of place	Fit	Accessibility	Control	Variety
Personal	Warmth	Continuity	Convenience	Expression	Choice
Health	Sense of time	Unity	Activity	Privacy	Interest
Environment	Stability	Symbolism	Legibility	Affordability	Awareness
Health	Aesthetics	Interaction			
Comfort		Belonging			
Safety and security					

nity core where a variety of services are readily available), and psychological comfort (which can be achieved through sensitive design providing a comfortable microclimate and protection from rain, and wind) to support the desired activities of an individual or a group. The layout of the environment must provide *safe* (free from danger), and *secure* (providing a sense of assurance) settings in which people can lead active lives, safe from physical harm where they have control over their environment.

4.1.2. Character

The character, genius loci or spirit of place is unique to all communities, and to those who perceive them. Character is described by sense of place, warmth, sense of time, stability, and aesthetics. *Sense of place* is the distinguishing quality that differentiates one place from another, made from a collective representation of a community identity, where residents have a sense of belonging, and can identify with. The term *warmth* is a psychological concept relating to an atmosphere of friendliness in the physical environment contributing to the sense of a place. *Sense of time* is an understanding of how the present is linked to the past, and the future, realized through the preservation of old buildings, the construction of modern structures, through vegetational change, and sun-shade patterns. *Stability* of a community refers to the continuity of the community structure, the stability of a community image, and the physical, socioeconomic, and historical stability of a community, providing a community with a sense of balance and permanence. *Aesthetics* in a general sense refers to beauty on a sensory and intellectual level, and can be achieved through the use of patterns, sequences, and symbolism.

4.1.3. Connection

It is necessary to provide opportunities for connections to others through social interaction, and people watching, as it is an important form of social life in public. Connection includes fit, continuity, unity, cultural symbolism, social interaction, and sense of belonging. *Fit* of a settlement, the relationship of its pieces, can be measured by observing how people act in a place, by analyzing place and actual behavior. *Continuity* refers to a place where one feels a sense of belonging to, where one can return to, which engenders feelings of continuity, stability, and permanence. *Unity* can be referred to as an arrangement marked by the even distribution of ele-

Table 2
General physical form categories

Community	General structure and pattern
Urban block	General structure and pattern
Buildings	General
	Civic, Community, Institutional
	Commercial, Industrial
	Residential
Streets	General
	Parking: general
	Byways
	Main streets
	Residential streets
	Laneways
Pedestrian ways	General
	Sidewalks
	Formal trails
Open space	General
	Primary areas
	Secondary and tertiary areas
	Semi-public and private areas
Vegetation	General
Feature areas	Natural resources
	Views

Table 3

Community: general structure and pattern

1. Variety of accessible community resources
2. Clear entrance and exit
3. Defined edge
4. Defined community center
5. Distinct visual character
6. Community size
7. Variety of behavior settings
8. Coordinated land use mixing
9. Maximum building-street definition
10. Orient for microclimate
11. Identifiable hierarchical circulation patterns
12. Balanced design emphasis
13. Balanced mix of activities
14. Barrier free
15. Contextualism
16. Opportunities for activities day and night
17. Accommodates various modes of transportation
18. Corridors connecting to center
19. Employing opportunities
20. Centers in nodal form
21. Well maintained
22. Human scale

Urban block

23. Pedestrian routes through large blocks
24. Building depth restrictions
25. Building setbacks to street edge
26. Short blocks
27. Mixed use development
28. Small surface parking lots
29. Walkable community
30. Smaller lots
31. Expressive aesthetics
32. Road layout determined by surrounding context
33. Opportunities for natural surveillance
34. Lots of seating
35. Grid pattern streets
36. Hierarchy of well-defined areas

Buildings: general

37. Structurally sound building materials
38. Flexible building design
39. Buildings of different eras
40. Building edge
41. Architectural variety
42. Innovative building forms
43. Massing variety
44. Comfortable grade
45. Outdoor amenities
46. Individuality in detail, size and colour
47. Similarity in detail, size and colour
48. Energy efficient
49. Street related main entrances
50. Appropriate building frontage
51. Quiet, sound resilient structures
52. General height limits

Table 3 (continued)

Community: general structure and pattern

Buildings: general

53. Building envelope restrictions
54. Range of compatible uses
55. Special design consideration at key intersections
56. Transition in scale and densities
57. Tallest buildings in center

Buildings: civic

58. Centrally located Civic Square
59. Corner lot location
60. Grade related uses
61. Continuous pedestrian connectivity
62. Special attention to civic architecture
63. Open and welcoming design
64. Community centers
65. Buildings located on the worst part of the site
66. Educational institutions

Buildings: commercial

67. Diversity of entertainment options
68. Variety of market driven retail
69. Specialization of district
70. Shopping center
71. Street related retail
72. Consistency in design
73. Non-toxic industrial use

Buildings: residential

74. Smooth transition between densities
75. Traditional materials
76. Consistency of construction materials
77. Consistency of ornamental features
78. Similar pitch of roofs
79. Design vernacular
80. Intermixing of housing types
81. Diverse mix of housing alternatives
82. Variety of affordable choices
83. Mix of ownership options
84. Street friendly frontage
85. Non-garage dominated
86. Circulation system between homes
87. Residences are accessible to main streets
88. Small scale house form

Streets: general

89. Adequate drainage
90. Appropriate lighting
91. Accommodate emergency vehicle
92. Appropriate surface
93. Interconnected system
94. T-junction
95. Right angle intersections
96. Visibility at pedestrian crossings
97. Coordinated streetscapes
98. Attractive pedestrian environments
99. Use of warm colors, materials

Table 3 (continued)

Community: general structure and pattern

Parking: general

- 100. Parking behind buildings
- 101. Attractive usable parking areas
- 102. On street parking
- 103. Mixed use areas share parking facilities
- 104. No parking on curve of street
- 105. Hidden parking lots

Streets: byways

- 106. Well-illuminated
- 107. Shielded
- 108. Through traffic

Streets: main streets

- 109. Principle access points
- 110. Enhanced ground plane
- 111. Street parking on both sides of the street
- 112. Articulation of built form
- 113. Vehicular access restrictions
- 114. Crossroad turning circles
- 115. Walkways to entrances
- 116. Boulevards through main streets
- 117. Street widths

Streets: residential streets

- 118. Low density traffic flow
- 119. Part of open space
- 120. Quiet tree lined streets
- 121. Narrow street
- 122. Parking on one side of street

Streets: laneways

- 123. Laneways behind homes
- 124. Servicing from a system of public lanes
- 125. Widening of existing lanes

Pedestrian ways: general

- 126. Wide and raised pedestrian ways
- 127. Avoid obstructions
- 128. Pedestrian nodes
- 129. Minimum crossing of pedestrian and bikes
- 130. Interconnected collector system
- 131. Access to different land uses
- 132. Avoid dead ends
- 133. Bicycle parking
- 134. Pedestrian zone crossings
- 135. Provision of weather protection

Pedestrian ways: sidewalks

- 136. Expanded sidewalk on Main streets
- 137. Parallel to streets
- 138. Provision of adequate sidewalks
- 139. No routes through parking

Pedestrian ways: formal trails

- 140. Promenades
- 141. Routes not through activity areas

Table 3 (continued)

Community: general structure and pattern

Pedestrian ways: formal trails

- 142. Dedicated bicycle paths
- 143. Links to public open spaces

Open space: general

- 144. Ecologically connected
- 145. Integration into local community fabric
- 146. Hierarchy of well defined spaces
- 147. Diversity of recreational activities
- 148. Distinct character of spaces
- 149. Clear hierarchy of areas within space

Open space: primary areas

- 150. Central 'town square or green'
- 151. Recreational corridors
- 152. Predominant pedestrian connection
- 153. Visual terminus
- 154. Park entrance visible from a significant public street
- 155. Located in center of community
- 156. Active sports facilities and playgrounds
- 157. Grave yards

Open space: secondary and tertiary areas

- 158. Variety of secondary open spaces
- 159. Located in residential areas
- 160. Variety of tertiary open spaces
- 161. Rotaries
- 162. Small and frequent spaces

Open space: semi-public and private areas

- 163. Minimize size of front lawns
- 164. Transition zone
- 165. Porch setback
- 166. Private exterior space for each home
- 167. Opportunities to personalize

Vegetation

- 168. Tree lined streetscapes and pedestrian ways
- 169. Live walls
- 170. Tree planting and background planting
- 171. Variety of species
- 172. Landscaping for scale and screening
- 173. Hierarchy of naturalistic areas
- 174. Landscaping elements
- 175. To improve sensory environment
- 176. Use of native species
- 177. Deciduous trees and shrubs
- 178. Coniferous trees and shrubs
- 179. High crowned deciduous trees on Main Streets and boulevards
- 180. Landscaped boulevards
- 181. Regularly spaced trees and simultaneously planted trees of a common species on Main Streets
- 182. Street trees in grates with guards
- 183. Coordinated landscaping

Table 3 (continued)

Community: general structure and pattern

Vegetation

- 184. Half-hidden garden
- 185. Parking lot landscaping

Feature areas: natural resources

- 186. Preserve natural and cultural features of the site
- 187. Maximize connections to feature areas
- 188. Integration of existing natural features into residential fabric
- 189. High areas
- 190. Maintain health of resources
- 191. Special edge treatment

Feature areas: views

- 192. Alignment of main streets to views
- 193. Views out of but not into private outdoor space
- 194. Visual access
- 195. Variety of vistas
- 196. Coordinated architecture to define significant vistas
- 197. Coordinated landscape elements to define significant vistas

ments, or as a unified whole which gives order and is harmonious in direction, form, size, texture, and colour. *Cultural symbolism* involves an inherited pattern of thought, attitudes or customs handed down from one generation to the next, expressed through the use of symbols. The type and quality of *social interaction* and relationships, and knowing that we are a member of a group are significant aspects of home, and community environments. The need for a *sense of belonging* is fulfilled by having supportive relationships, and an identity as a participating member of a place, a group or set of groups, which helps to build memories of relationships, and connections.

4.1.4. Mobility

Mobility facilitates frequent, and regular movement of residents to all parts of the community. It includes accessibility, convenience, opportunities for activity, and legibility. All people, especially the elderly, children, and the physically challenged, need to have safe and easy *access* to all places in the community, to other people, a variety of activities, resources, places, and information. *Convenience* is something that increases physical comfort by being nearby through the proximity to shops, schools, work, recreation, and transit routes. By facilitating *opportunities* for a diverse range of *activities*, a commu-

nity can meet the active needs of a wide population of people. *Legibility* is the ease with which the environment is to read, or understand.

4.1.5. Personal freedom

A community environment should allow the capacity for choice, and freedom where people can meet their esteem, and self actualization needs. Personal freedom includes control, personal expression, privacy and territoriality, and affordability. *Control* or the perceived degree of personal control, that an individual or group has over a setting contributes to the fulfillment of self-actualization needs leading to feelings of satisfaction, and pride. *Personal expression* can be expressed through nonverbal communication, and environmental meaning, through the interchange of ideas, messages or information among people. An optimal environment is one where an individual has the choice of *privacy*, and of achieving optimum levels of social interaction, in a *territory* with a well-defined physical, social or psychological boundary in which an individual or group of individuals belong to. Economic *affordability* is to have the financial means and the capability for providing.

4.1.6. Diversity

A community with a rich, and diverse physical, and social character is one with variety, choice, interest, leading to greater awareness in such a quality environment. *Variety* is the quality of being made of many different elements, forms, kinds, or individuals. The freedom of *choice* from a set of things gives individuals the flexibility for a diversity of alternative lifestyles through multiple uses of outdoor spaces. *Interest* in an environment through a rich make up of various elements of different forms, textures, colours, lines, values, shapes, and sizes, can evoke strong feelings of fascination, curiosity, and exploration. Awareness occurs through intellectual and spiritual enlightenment, through learning through observation and participation.

4.2. Physical form criteria

A list of 197 physical form criteria have been developed from the literature. The physical form criteria have been divided into specific pieces which together makeup the community design puzzle. Listed first are the physical form criteria that apply to the

general structure and pattern of the community as a whole. Then the criteria focuses on a more micro level, and describes the general structure and pattern of an urban block. The rest of the form criteria is described on a more specific level starting with the architectural environment and gradually to a more natural landscape. Table 2 lists the general categories that the physical form criteria is organized under and Table 3 lists the 197 specific physical form criteria.

A community quality matrix was developed by placing the quality principles and physical form criteria on both axes of the matrix. Each cross-section on the matrix represents the relationship between the items on the two axes. The sections that are shaded the darkest have an effect on each other, light shading represents a partial effect on each other, and no shading has only an insignificant relationship or effect on each other.

Community Qualities	Beaches	Comments
LIVABILITY		
Survival		Meets the basic requirements.
Personal Health and Dev.		Promotes physical and psychological health.
Environmental Health		Nearby sewage plant and polluted lake.
Comfort		Proximity to an active core with services.
Safety and Security		Near lower income areas and crime.
CHARACTER		
Sense of Place		Full of character and has a strong identity.
Warmth		Mature trees in a human scale environ.
Sense of Time		Use of deciduous trees & historic buildings.
Stability		Older community actively being restored.
Aesthetics		Eclectic with some areas nicer than others.
CONNECTION		
Fit		Outdoor activities, active com. centre.
Continuity		Flexible bldg. design enables people to stay.
Unity		Even distribution of parks & views to lake.
Cultural Symbolism		Traditional architecture, churches, events.
Social Interaction		Boardwalk, parks, porches, outdoor cafes.
Sense of Belonging		Identifiable community, intimate scale.
MOBILITY		
Accessibility		Walkable to community core & lake.
Convenience		Some inconvenience driving to & parking.
Legibility		Strong southern, weak northern boundary.
Activity		Opportunities to walk, bike, play & interact.
PERSONAL FREEDOM		
Control		Community groups, local paper.
Expression		Landscaping, outdoor areas, promenades.
Privacy and Territoriality		Small lots, traffic and people decrease privacy.
Affordability		Increasing prices, some affordable options.
DIVERSITY		
Variety		Variety of activities, architecture, stores.
Choice		Choice of things to do and ways to get there.
Interest		Interesting mix of people and built form.
Awareness		Lots of schools and places for interaction.

The procedure to use the matrix to analyze the quality of an urban community is as follows: observe the community through on-site analysis, maps and photographic analysis; analyze the quality of the community by completing the case study application form (see form); distinguish strong and weak qualities of the community, and use the community quality matrix to understand the relationship between the physical form of the community and its quality. For

this study, three case studies in Toronto were used for analysis, the Beaches, High Park and Parkdale.

5. Discussion

5.1. Community quality principles

The matrices systematically organize the quality principles and the form criteria into a useful frame-

work for analyzing the effect of physical form on the quality of a community. The matrices can also be used as a guide for improving the quality of a community through physical form. Conclusions are drawn about the community quality principles and their relationship to physical form. On the same

account, conclusions are drawn about the physical form criteria and their relationship to the community quality principles. The case study applications illustrate the practical use of the framework for real world community analysis.

	QUALITY PRINCIPLES	LIVABILITY					CHARACTER					CONNECTION					MOBILITY				FREEDOM				DIVERSITY				
		Survival	Personal Health	Environmental Health	Comfort	Safety & Security	Sense of Place	Warmth	Sense of Time	Stability	Aesthetics	Fit	Continuity	Unity	Cultural Symbolism	Social Interaction	Sense of Belonging	Accessibility	Convenience	Legibility	Activity	Control	Expression	Privacy	Affordability	Variety	Choice	Interest	Awareness
#	PHYSICAL FORM																												
	COMMUNITY	GENERAL STRUCTURE AND PATTERN																											
1	Available resources																												
2	Clear entrance and exit																												
3	Defined edge																												
4	Defined centre																												
5	Distinct visual character																												
6	Community size																												
7	Variety behaviour settings																												
8	Coordinated land use mix																												
9	Max. building-street definition																												
10	Orient for microclimate																												
11	Clear circulation patterns																												
12	Balanced design emphasis																												
13	Balanced mix of activities																												
14	Barrier free																												
15	Contextualism																												
16	Activities day and night																												
17	Modes of transportation																												
18	Corridors connect centre																												
19	Employment opportunities																												

The matrices illustrate that certain quality principles are met through a greater number of physical form criteria than others. The analysis was done through a simple arithmetic calculation or sum total of the columns of the matrix for the categorical and individual quality principles. This method of analysis was chosen as there are no numerical weightings placed on each relationship, it is simply illustrating a strong or weak relationship to each other. The main categories of the quality principles are listed below in order of importance, number one having the strongest relationship to the physical form criteria and number six having the weakest relationship:

1. Connection,
2. Character,

3. Diversity,
4. Mobility,
5. Livability, and
6. Personal Freedom.

The list tends to suggest that the first three are more physical qualities and the last three are more social qualities.

The specific quality principles were also analyzed in the same manner as the main categories. The top five quality principles that are most often met through physical form, starting with the strongest relationship:

1. Fit,
2. Sense of Place,
3. Awareness,

4. Interest, and
5. Warmth.

Analyzed next were the specific quality principles that had the weakest relationship to the physical form criteria. They are from the weakest relationship to physical form:

1. Affordability,
2. Survival,
3. Privacy,
4. Environmental Health, and
5. Sense of Time.

What do these conclusions mean? They suggest that the quality principles that have the strongest relationship to the physical form criteria are the most important and should remain the focus of community design projects. The quality principles that have the weakest relationship may not be important to the overall quality of a community, yet they may be important to certain specific qualities. They also suggest that the physical form criteria developed are not successful in producing these particular qualities and therefore professionals should strive to discover new physical design solutions that will promote these qualities in community environments.

5.2. *Physical form criteria*

The matrices also show that some physical form criteria have a stronger effect on community quality than others. The analysis was done through adding the individual rows of the physical form criteria of the matrices and providing totals showing strong and weak relationships. A list of 10 of the strongest and 10 of the weakest physical form criteria with respect to community quality were developed according to their proximity in scores. The top 10 design criteria that have the strongest relationship to community quality are listed below in order of importance, the first representing the strongest relationship:

1. Walkable community,
2. Outdoor amenities,
3. Lots of seating,
4. Barrier free,
5. Open space areas in residential areas,
6. Well maintained,
7. Active sports facilities,
8. Landscaping elements,
9. Preservation of natural and cultural features, and
10. Variety of behaviour settings.

The following is a list of the 10 physical form criteria that have the weakest relationship to community quality with the weakest listed first:

1. Use of warm colours,
2. Tree grates with guards,
3. Right angle intersection,
4. Widen existing lanes,
5. Views out of and not into private open space areas,
6. Formal trails do not go through activity areas,
7. Use of rotaries,
8. Minimize size of front lawns,
9. Three way *T*-intersection,
10. Through traffic on byways.

These lists act as a general guideline for determining the most and least important physical form criteria with respect to the quality of a community. As a basic rule, the top 10 list of physical form criteria should be present in successful communities and should be the focus of community development and improvement projects. Whereas, the bottom 10 physical form criteria should not be given a priority in design when projects are concerned with enhancing the quality of a community.

5.3. *Case study applications*

The purpose of analyzing the three communities in Toronto was to test the reliability of the community quality framework and to illustrate its use in community analysis. The communities were analyzed according to their relationship to the community quality criteria. The results of the categorical qualities are listed below beginning with the strongest relationship and ending with the weakest relationship:

Beaches	High park	Parkdale
(1) Connection	(1) Connection	(1) Diversity
(1) Diversity	(1) Diversity	(2) Character
(2) Character	(1) Character	(3) Personal Freedom
(3) Personal Freedom	(2) Personal Freedom	(3) Mobility
(4) Livability	(2) Livability	(4) Connection
(5) Mobility	(2) Mobility	(5) Livability

The top categories of the successful communities are connection, diversity and character. This is consistent with the top community quality principles that

were met by most of the physical form criteria. This suggests that the physical form of the Beaches and High Park meet these qualities. The analysis of Parkdale, however, shows that connection is near the bottom of the list having a weaker relationship to physical form. This suggests that the physical form of Parkdale does not successfully provide the qualities of connection. The comparison shows that differences in the specific qualities of communities may ultimately have an effect on the overall success of a community.

5.4. Limitations

There are however, some limitations of this research. The design criteria are not a set of generic solutions that can be universally applied to all communities, creative thinking is needed. The list of qualities and physical form are limited with respect to culture. The list of community quality principles and physical form criteria is not intended to be a complete and sufficient list, it is flexible and adaptable. Physical form is not the only indicator of quality; it is not an absolute and may have no effect on community quality at all. The matrices and case study applications are weak in reliability as they are vulnerable to subjective biases which may have influenced the outcome. Therefore they are subject to change, as one's own experiences and biases influence the ratings used.

5.5. Benefits

There are several benefits of this research. It will be of interest to urban designers, city planners, landscape architects, architects, developers and any other professional involved in the manipulation of the physical form of community settings. It is a tool to help designers promote and preserve existing or potential community quality thereby enhancing residents' psychological investment in their local, physical communities. It presents a link between the quality of place and physical design. It is easy to implement and is beneficial to those who want to gain a better understanding of an unfamiliar community such as first time home buyers, infill developers, real estate agents and community designers. It will enable developers and designers to evaluate the im-

pact of their community design decisions on the quality of an adjacent community. The matrices give relevance to some community quality principles and physical form criteria, and question the importance of others. It is a valid and flexible framework that can be adapted to analyze most community settings.

5.6. Implications for further research

Further research could be done to expand on several areas of community quality. To begin with, the reliability of the matrices could be tested by having a random sample of people analyze the relationship between quality and physical form. The next challenge would be to determine the similarities and differences of the analyses, and to discover why these differences exist. Further research could also be done by having residents analyze the quality of their community using the framework developed and then compare the results. Finally, it would be of interest to discover how those not trained in design define the qualities of a community and to develop another matrix using these new definitions.

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