Detailed Area Planning

Old South End and Peninsula Centre
Background Report:
Public Gardens District Study

City of Halifax
Planning Department
Division
1979

INTRODUCTION

The Public Gardens District, as defined for the Old South End and Peninsula Centre Detailed Area Plan, is located in the area generally bounded by Robie Street on the west, Bell Road and Sackville Street on the north, South Park Street and Summer Street on the east, and University Avenue on the south (see Map 1).

In the Detailed Area Planning process concern has been expressed with regard to the impact of large new developments on the Public Gardens. These concerns are primarily related to three factors:

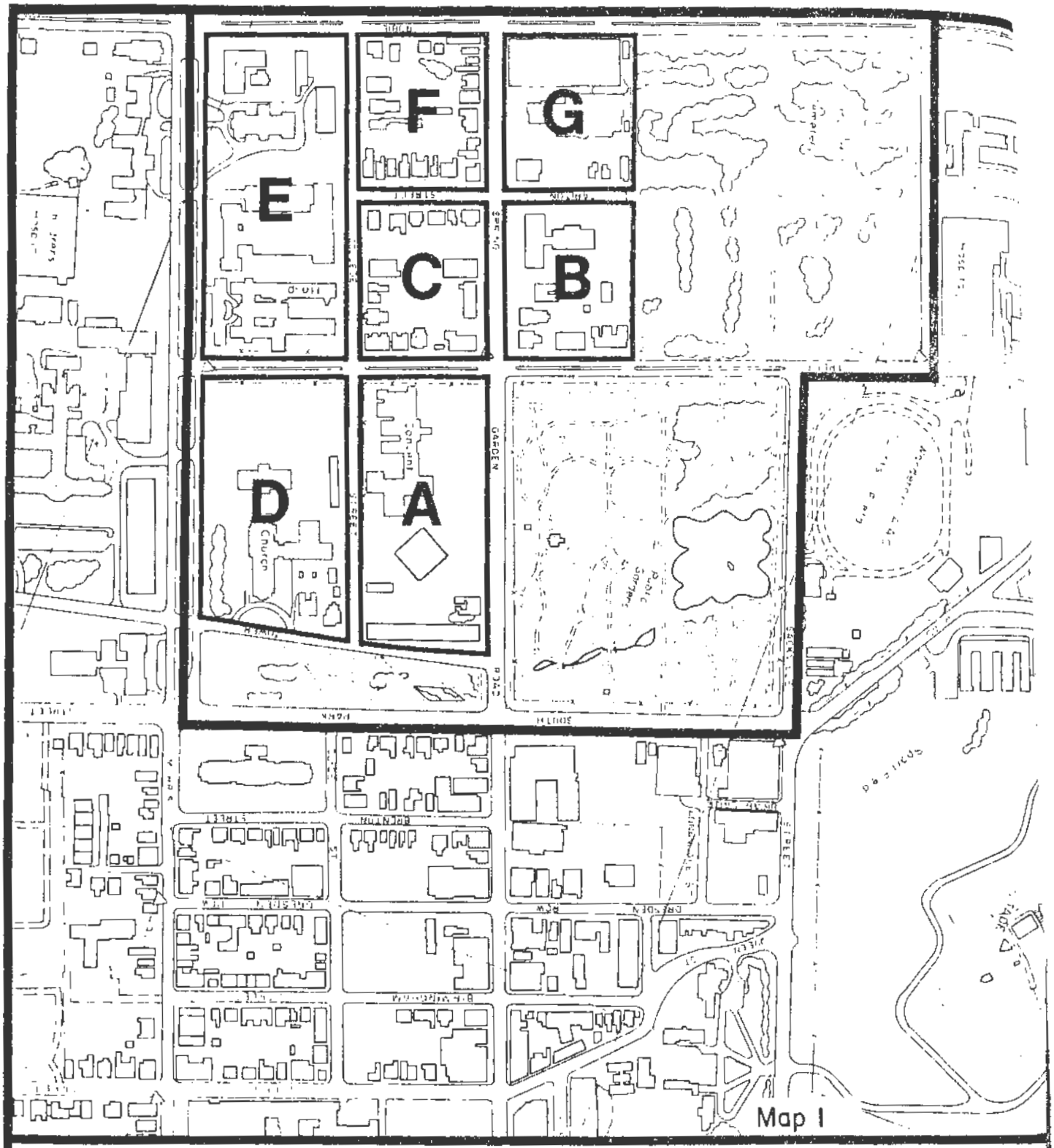
(A) the policy mandate of the Municipal Development Plan;

(B) the historical significance of the Public Gardens; and

(C) the major investment of the City of Halifax in the maintenance of the Public Gardens.

(A) The City of Halifax Municipal Development Plan mandates the preparation of Detailed Area Plans for the soft areas of the City. With respect to the Public Gardens District, the primary policy guidance is found in Part II, Section II, Policies 5.1, 5.2 and 7.4:

> *Policy 5.1* *The City shall continue to seek the preservation, rehabilitation, and/or restoration of those areas, sites, streetscapes, structures and/or conditions which impart to Halifax a sense of its heritage, particularly those which are relevant to important occasions, eras, or personages in the histories of the City, the Province or the nation, or which are deemed to be architecturally significant . . .*



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Boundary of Study Area

Feet
0 250 500

Policy 5.2 *The City shall continue to make every effort to preserve or restore those conditions resulting from the physical and economic development pattern of Halifax which impart to Halifax a sense of its history . . .*

Policy 7.4 *The City shall identify areas of natural significance and natural areas which are environmentally sensitive. The City will protect these areas from environmental degradation insofar as possible through such means as zoning, development standards, and public education.*

(B) In 1971 the Public Gardens were designated a landmark by City Council. They are also recommended for designation as a heritage site in the official City report entitled An Evaluation and Protection System for Heritage Resources in Halifax.

The history of the Public Gardens dates back to an area of land bequeathed by Jonathan Belcher, Esq., Lieutenant-Governor and Commander-in-Chief over His Majesty's Province of Nova Scotia, "to and for the use of inhabitants of the Town of Halifax as a commons forever . . ." on June 23, 1763. A total of 235 acres was bequeathed to the City in the area now bounded by Cunard, South Park, South and Robie Streets.

Possibly the most unique portion of the Halifax Commons today is the Public Gardens. Unlike other parts of the Commons, the Gardens have suffered no encroachment, and because so much time, public effort and money have been invested, it is unlikely that encroachment within their presently defined boundaries would be permitted. Established in 1841 when the City was incorporated, the original Gardens were significantly smaller than they are now, and were the responsibility of the Horticultural Society "for the betterment of the City and Province, financially, socially and morally". Their purpose was "to improve the culture of the best kinds of fruit, the most useful vegetables, shrubs, trees and choice flowers".

In 1867 and again in 1873-4, the Gardens were expanded. In 1874 the area was purchased by the City of Halifax and in the same year, a private donation brought the entire square as it now exists into the one public ownership. Since that time, the Gardens have been developed into a valuable and unique public place containing about 100 varieties of trees, 80 varieties of shrubs and a changing variety of flowers.

Recent history, however, has seen the transformation of the nature of the Public Gardens District as an open space area. Because of the area's attractiveness, it is a prime location for apartment buildings, shops, hotels and office buildings. While from a land use perspective this type of use may be appropriate, the scale of recent construction casts shadows on the Public Gardens. It has also affected users of the Gardens as there is no longer a relatively secluded open space environment due to the visual penetration of large buildings into the sightlines emanating from the Public Gardens. Figure 1 shows the view within the Public Gardens looking south toward the bandstand and canteen.

FIGURE 1

View From the Public Gardens

(C) In addition to the issues of shadow-casting and views, there is also the matter of the substantial investment by the City of Halifax in the maintenance of the Public Gardens. Since 1965 this City has allocated approximately $2 million in its operating budget for the Public Gardens.

TABLE 1

Operating Costs of Public Gardens 1965-78

Year	Actual Amount	% Increase	Cumulative Total
1965	$ 71,276		
1966	$ 76,193	+ 6.899%	$ 147,469
1967	$ 89,429	+17.37%	$ 236,898
1968	$100,459	+12.33%	$ 337,357
1969	$ 95,269	- 5.17%	$ 432,626
1970	$104,206	+ 9.38%	$ 536,832
1971	$147,963	+41.99%	$ 684,795
1972	$151,718	+ 2.54%	$ 836,513
1973	$177,879	+17.24%	$1,014,392
1974	$135,462	-23.85%	$1,149,854
1975	$124,646	- 7.99%	$1,274,500
1976	$157,313	+26.21%	$1,431,813
1977	$176,449	+12.16%	$1,608,262
1978	$181,480	+ 2.85%	$1,789,742
1979	$209,930	+15.67%	$1,999,672

Source: City of Halifax Operating Budgets

Part I of this report documents the manner in which recent construction casts shadows on the Public Gardens. It clearly displays the need for height controls adjacent to the Public Gardens to ensure the preservation of its character.

Part II explains the methodology utilized in preparing solar guidelines for the Public Gardens, and recommends the establishment of strict height precincts within the Public Gardens District to ensure that the penetration of shadows into the Gardens is maintained at its present level. These recommendations will subsequently be incorporated into the Detailed Area Planning process for the Old South End and Peninsula Centre through their inclusion in the new set of zoning regulations being prepared for these exercises.

PART I

SHADOWS FROM HIGH-RISE BUILDINGS

The Public Gardens District provides a number of attractions for Haligonians. Within a fairly compact area there is, in addition to the Public Gardens, substantial open space areas, the Spring Garden Road commercial area, the hospital and university complexes, and easy access to the amenities of the Central Business District. The impact of recent development in this area, however, may have negative impacts on the local environment and may erode the special flavour and character of the district.

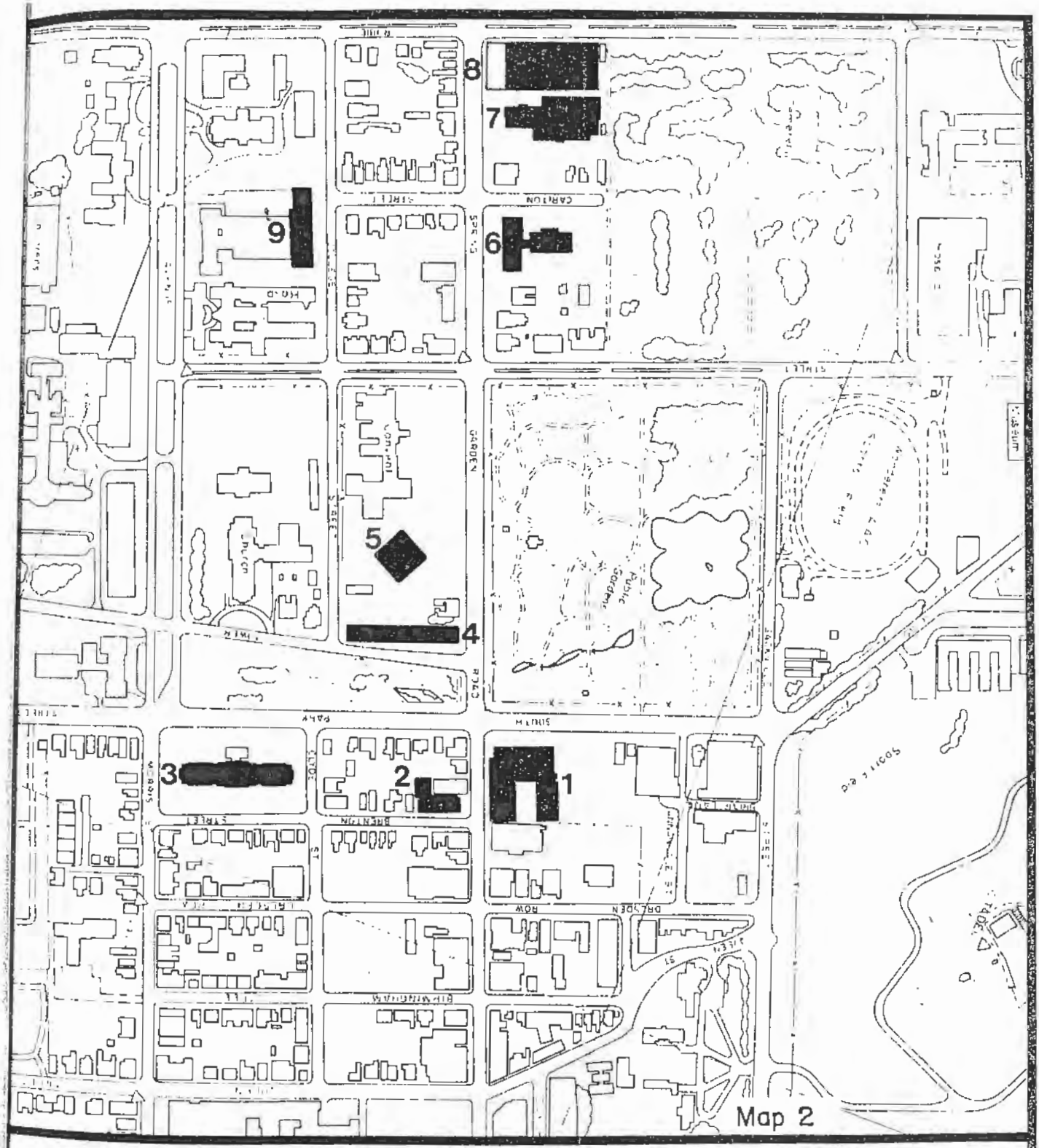
Although development will most certainly not take place within the confines of the Public Gardens, the scale and amount of recent development activity adjacent to the Gardens are significant. Table 2 lists the major developments which have been constructed in the last fifteen years in the immediate vicinity of the Gardens and Map 2 shows their location.

TABLE 2

Recent Developments Adjacent to the Public Gardens

Building	Approximate Height	Number of Floors
1. Lord Nelson	100.0'	10
2. Halifax Insurance	125.0'	10
3. Park Victoria	222.0'	22
4. Garden Park Apartments	86.0'	9
5. 5770 Spring Garden	185.0'	19
6. Spring Garden Terrace	115.0	11
7. Embassy Towers	144.6'	16
8. Professional Centre	79.0'	11
9. Tupper Medical	196.0'	15

Source: Planning Department Block Files



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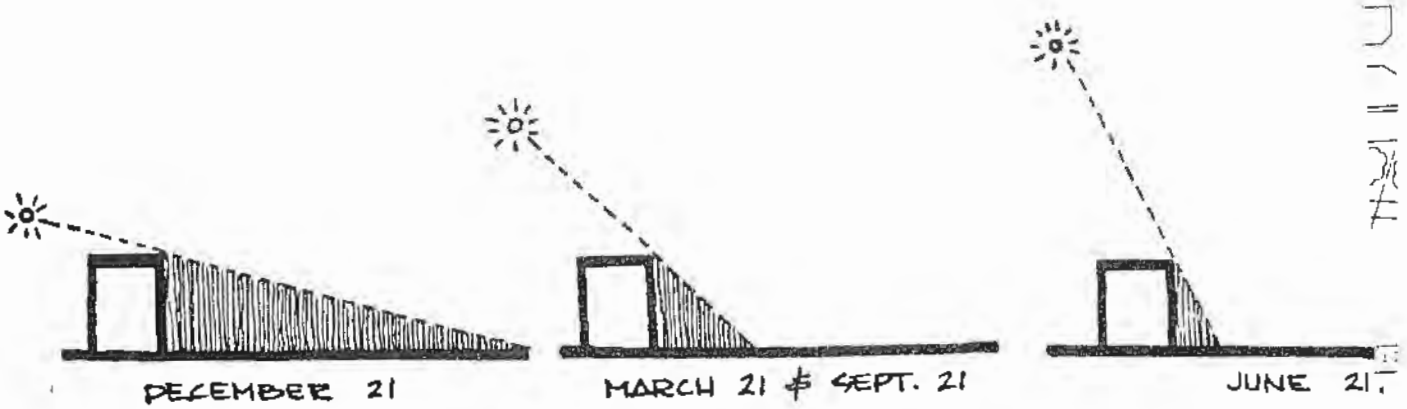
Location of High-Rise Buildings

Feet
0 250 500

The nine existing high-rise buildings in the Public Gardens District cast shadows on the Gardens, Victoria Park and Camp Hill Cemetery. The degree of shadow cast is dependent on the time of day and the time of year studies. For example, shadows cast in the winter have the greatest coverage and thereby portray the "worst" shadow conditions possible for open space and pedestrian areas.

FIGURE 2

Schematic Building Elevations and Shadows



To provide a representative perspective of the impact recent developments have had on the Public Gardens District, shadow calculations were completed for the winter solstice (December 21), the summer solstice (June 21) and the vernal and autumnal equinox (March 21 and September 21).[1] In each instance calculations were prepared for early morning, mid-day and afternoon sun conditions. Maps 3 to 11 display the direction and length of shadows using the variable times and seasons noted above.

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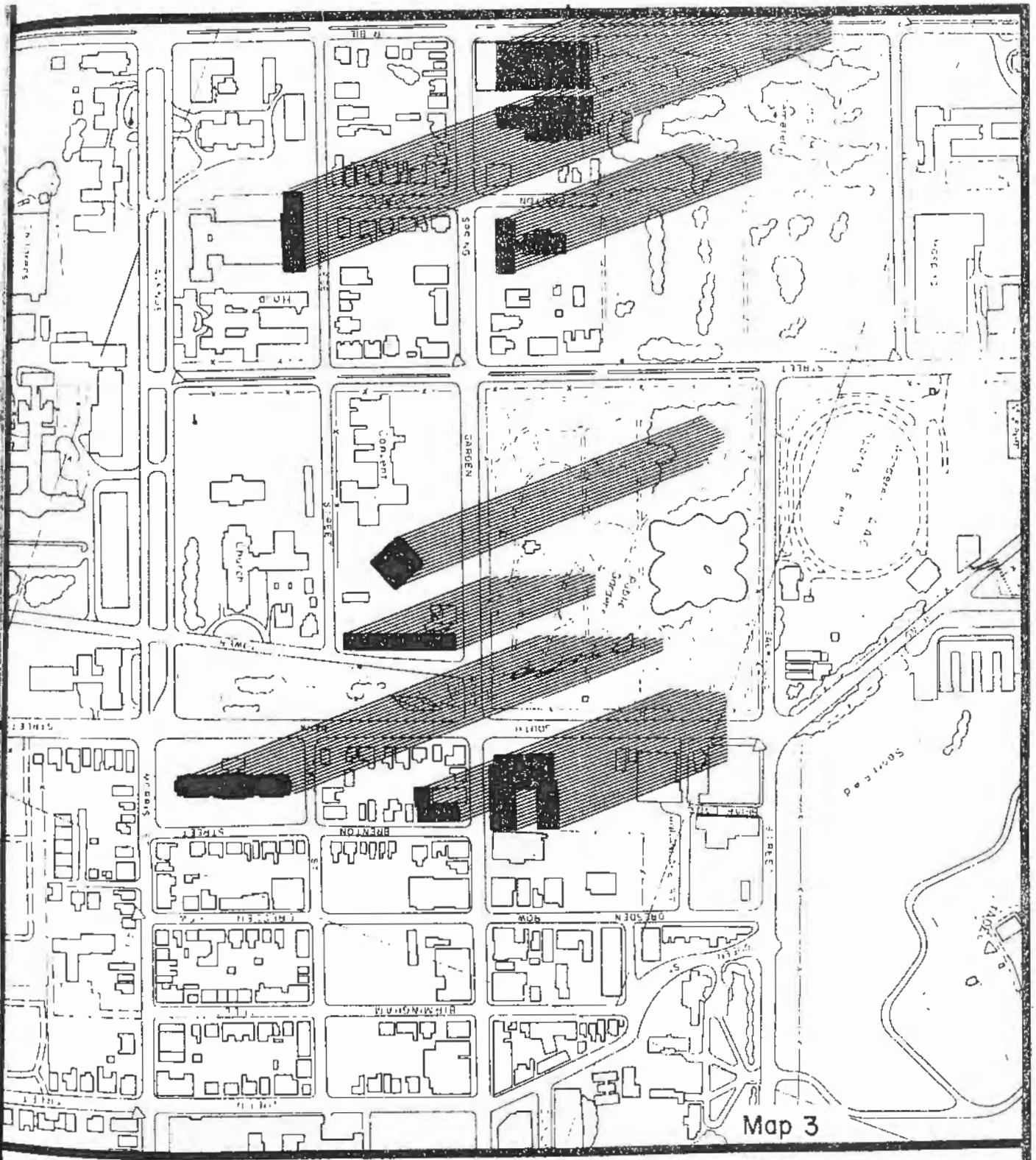
1. The reader may wish to consult Appendix "A" (Definitions) at this point for an explanation of the terms used in this report pertaining to shadow calculations and solar guidelines.



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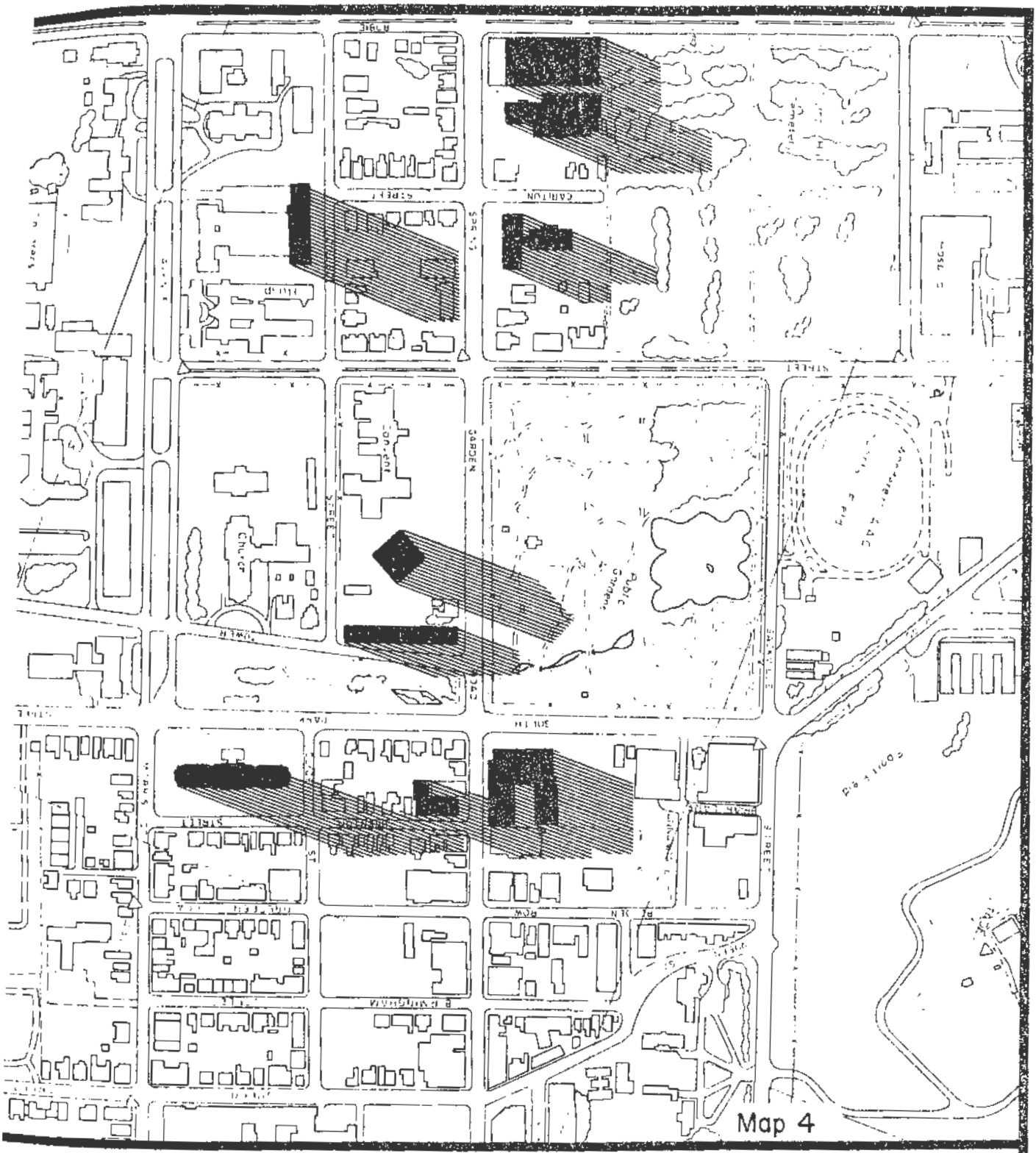
Shadow Patterns
9:00 a.m., December 21

Feet
0 250 500



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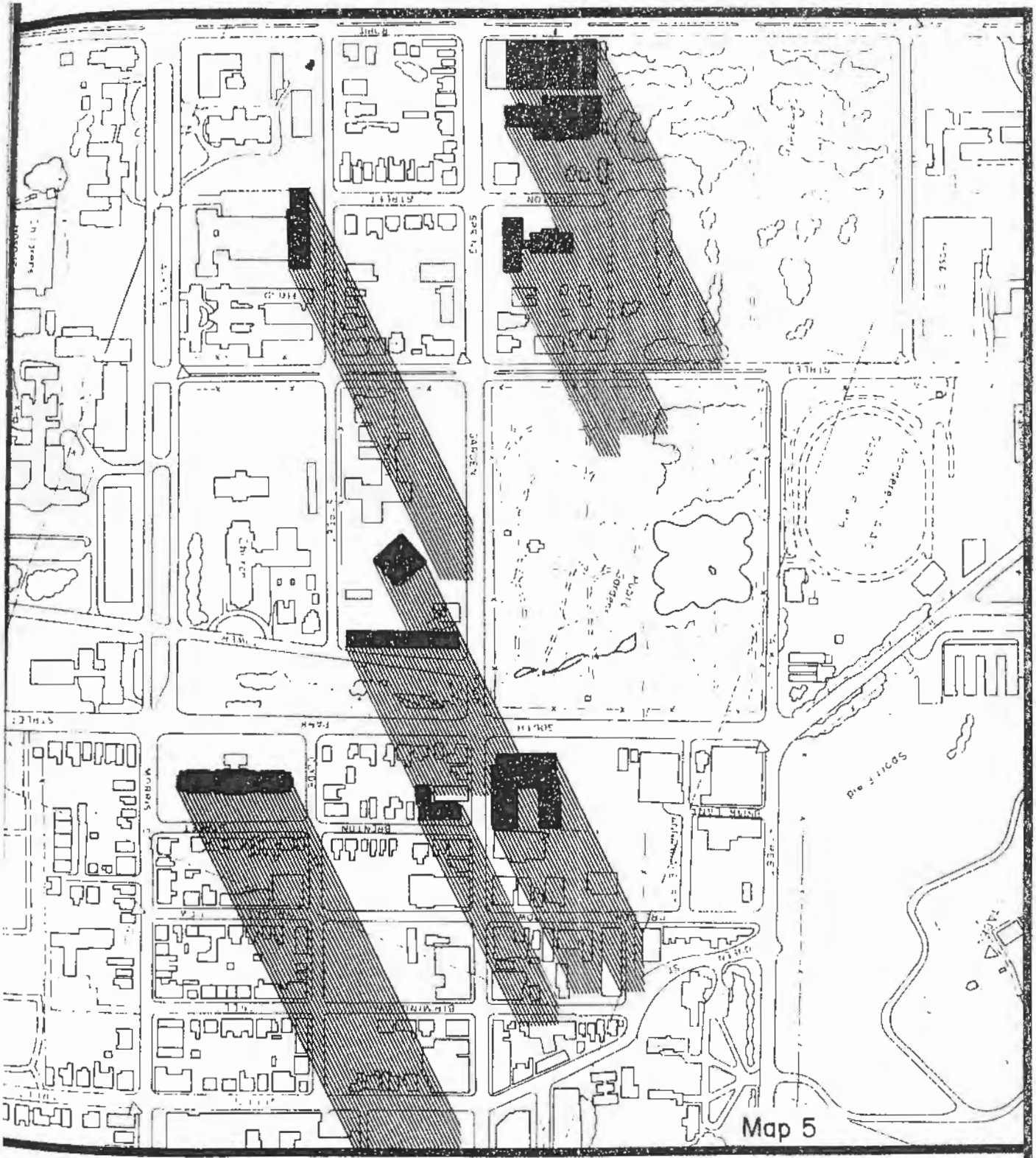
Shadow Patterns
Noon, December 21

Feet
0 250 500



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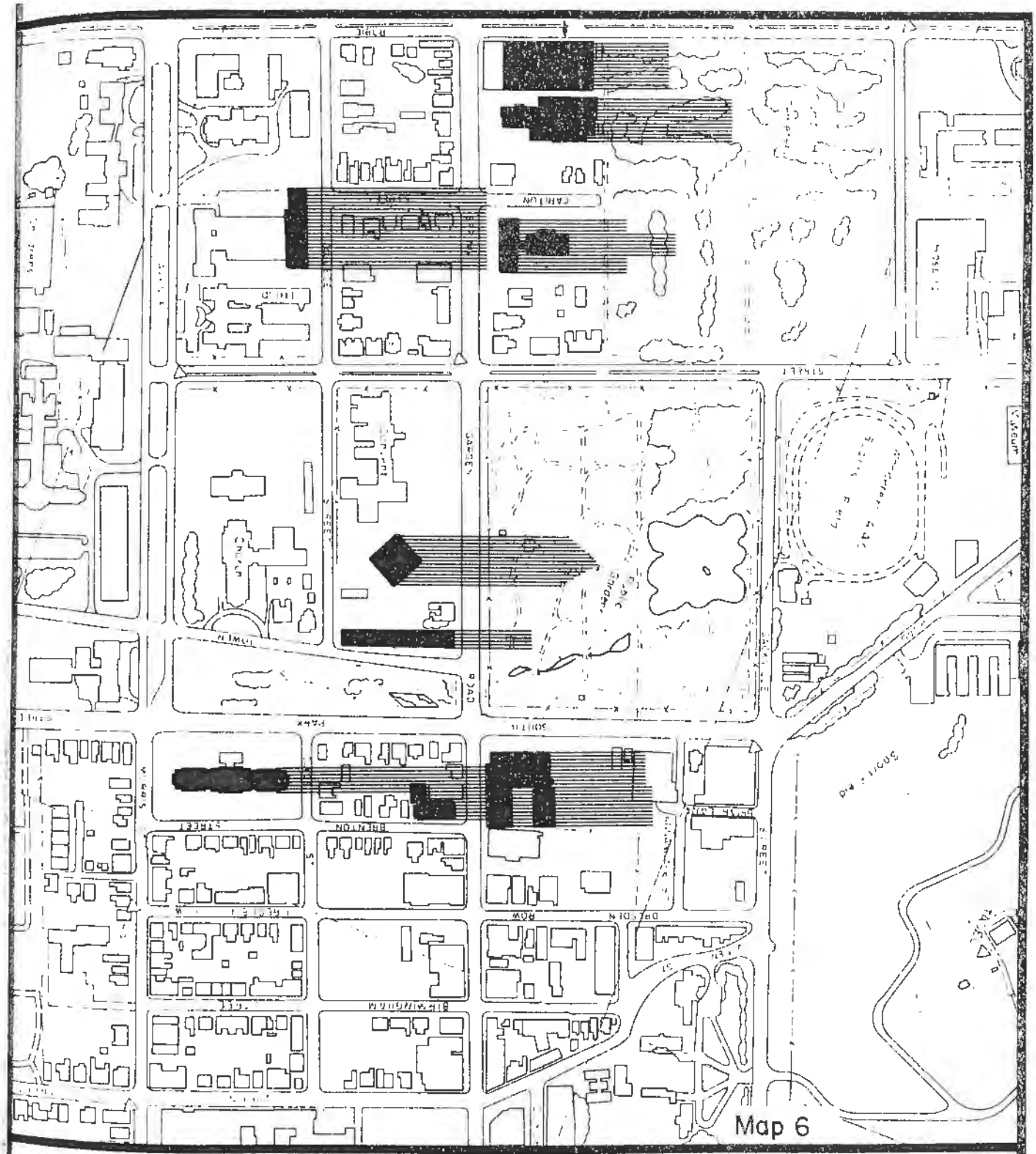
Shadow Patterns
3:00 p.m., December 21

Feet
0 250 500



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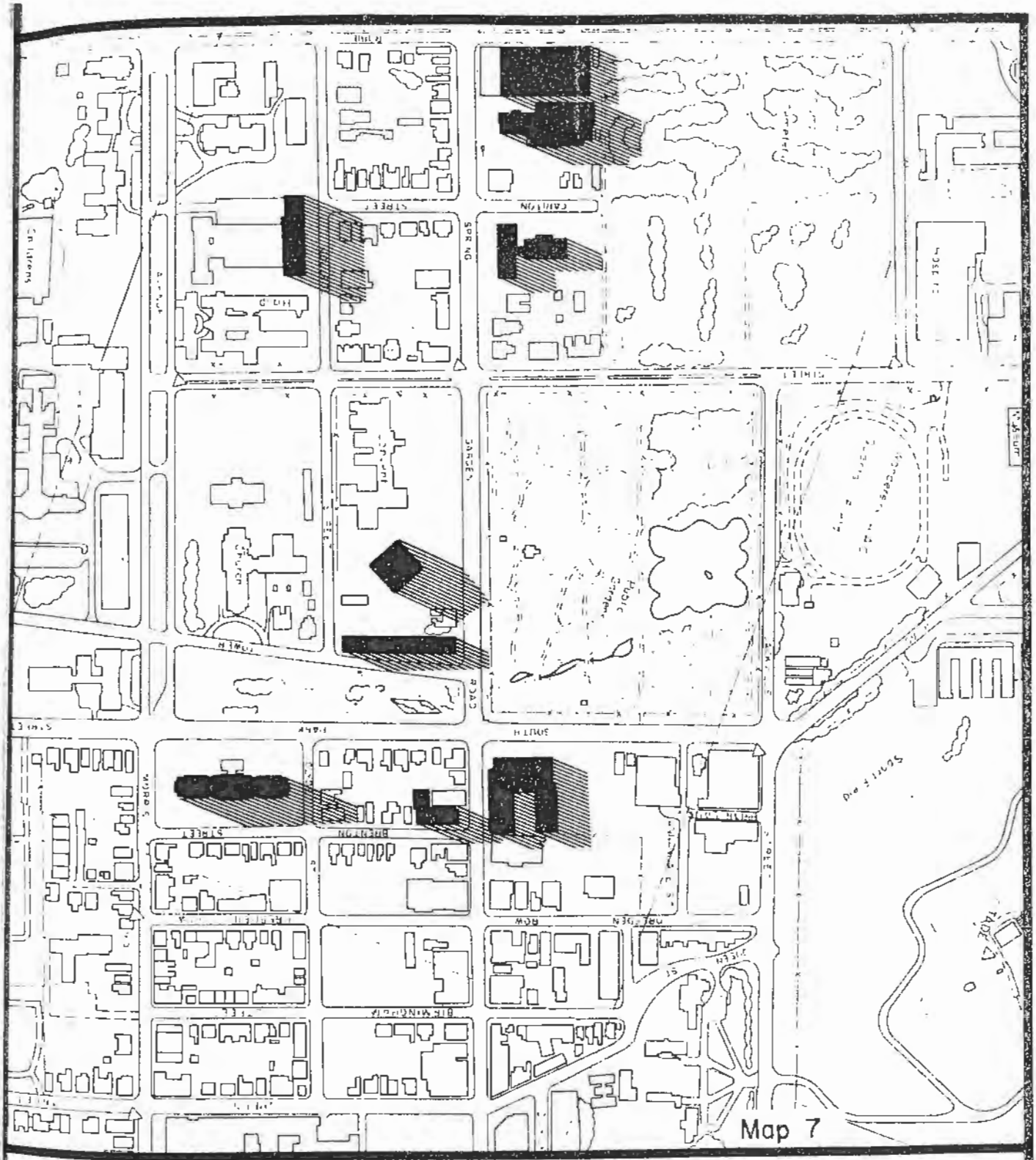
Shadow Patterns

8:00 a.m., March 21 and September 21

Feet
0 250 500



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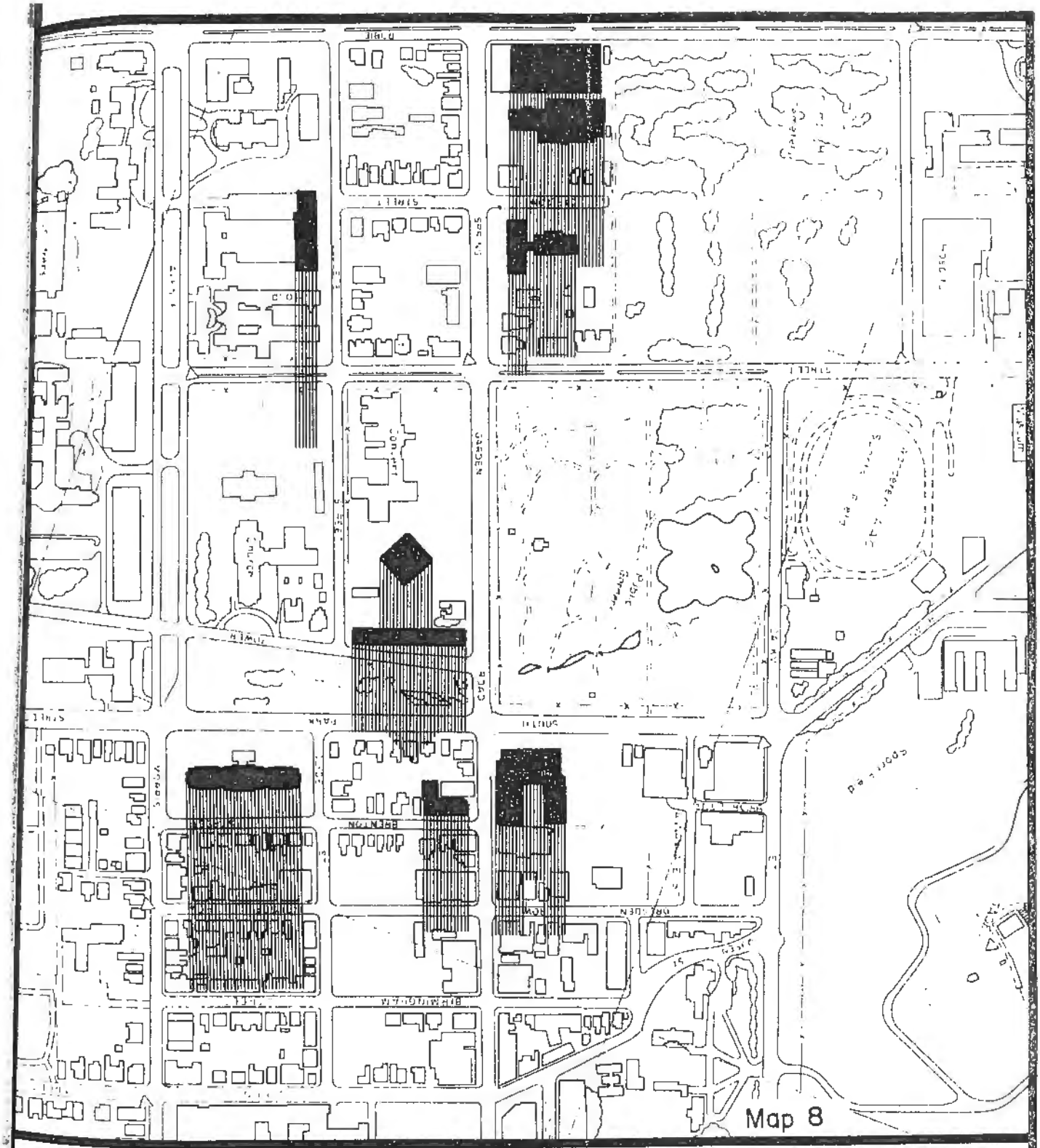
Shadow Patterns

Noon, March 21 and September 21

Feet
0 250 500



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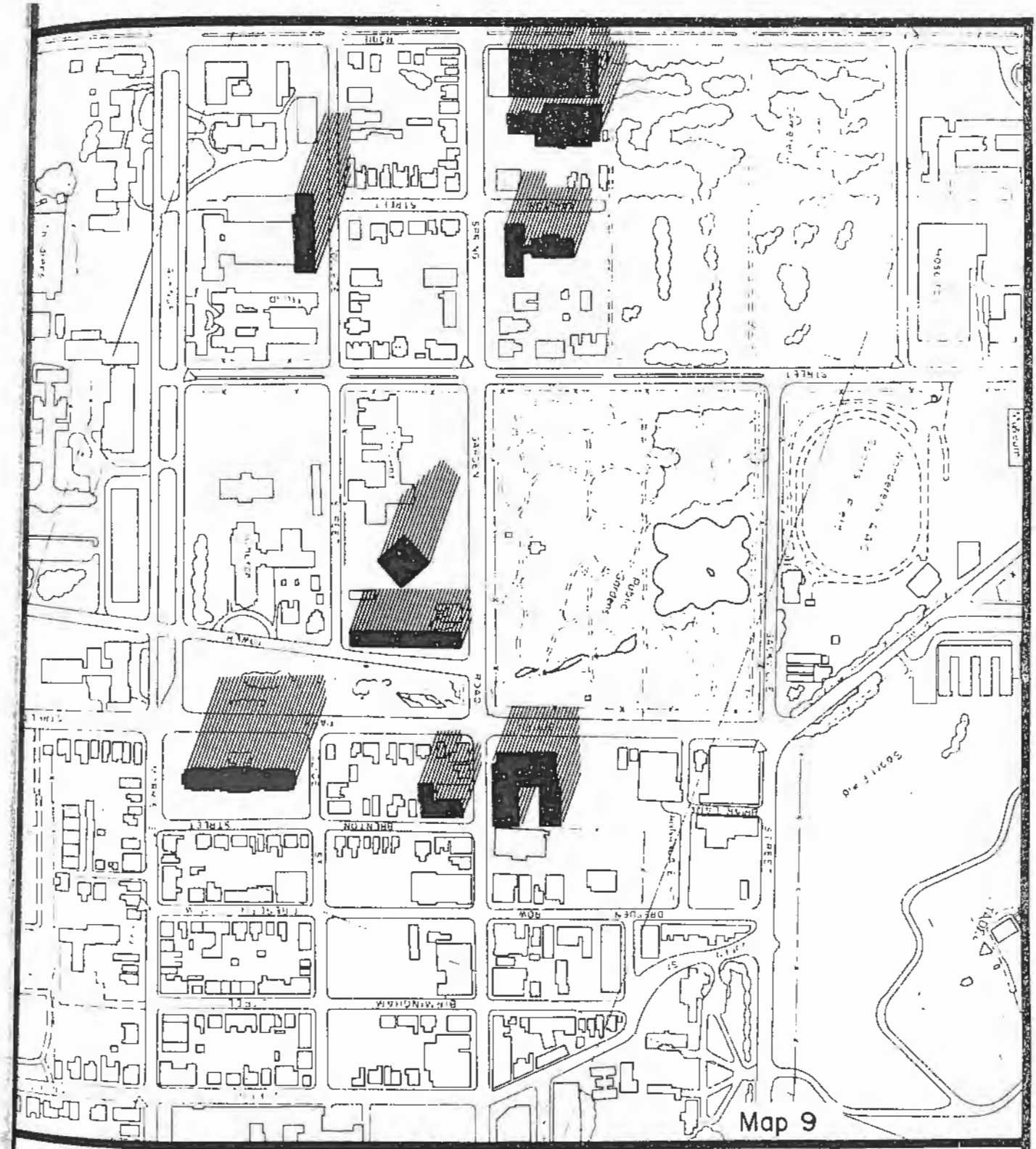
July 1979

Shadow Patterns

4:00 p.m., March 21 and September 21

Feet
0 250 500



Old South End and Peninsula Centre Detailed Area Plans
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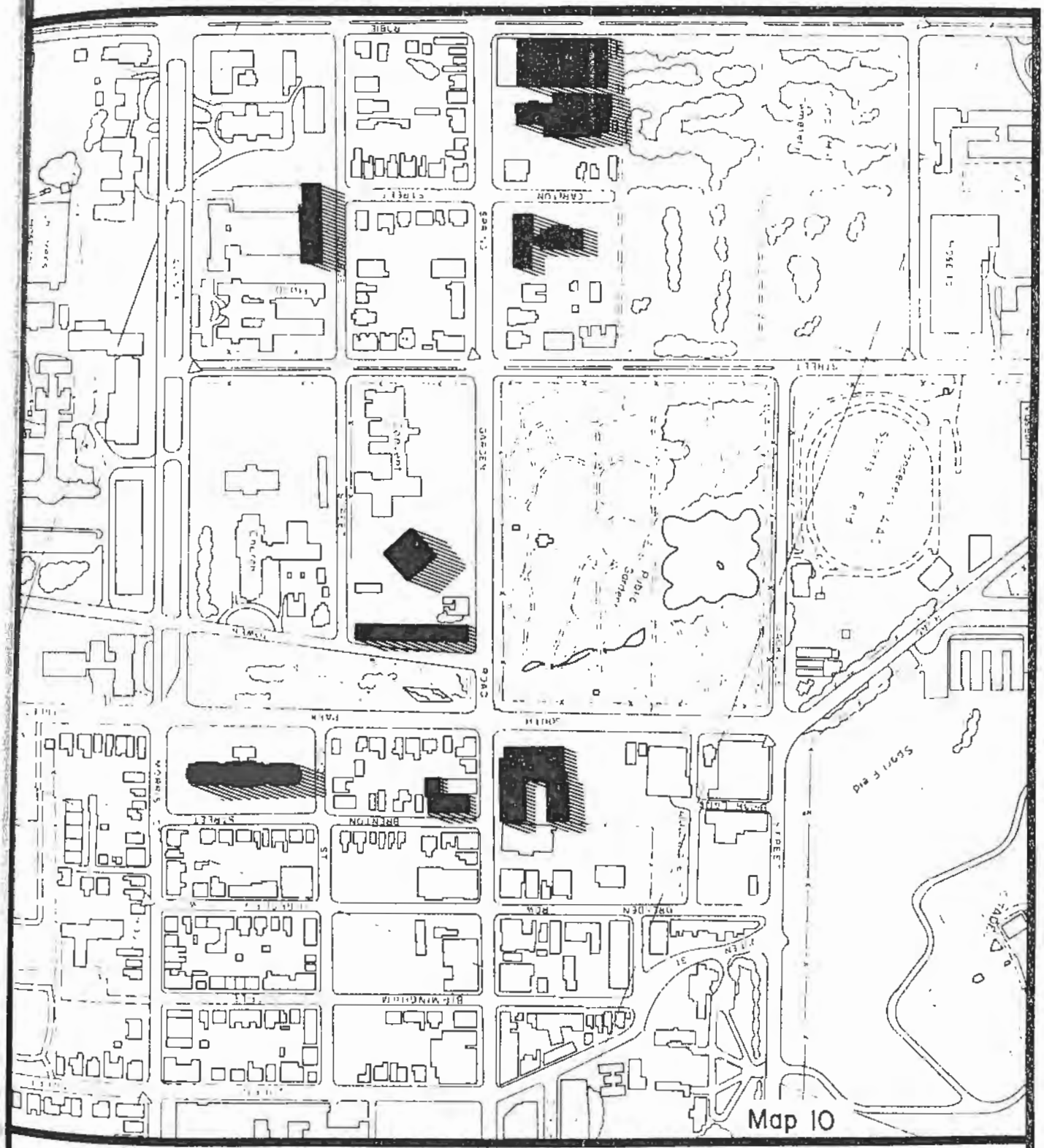
Shadow Patterns
8:00 a.m., June 21

Feet
0 250 500



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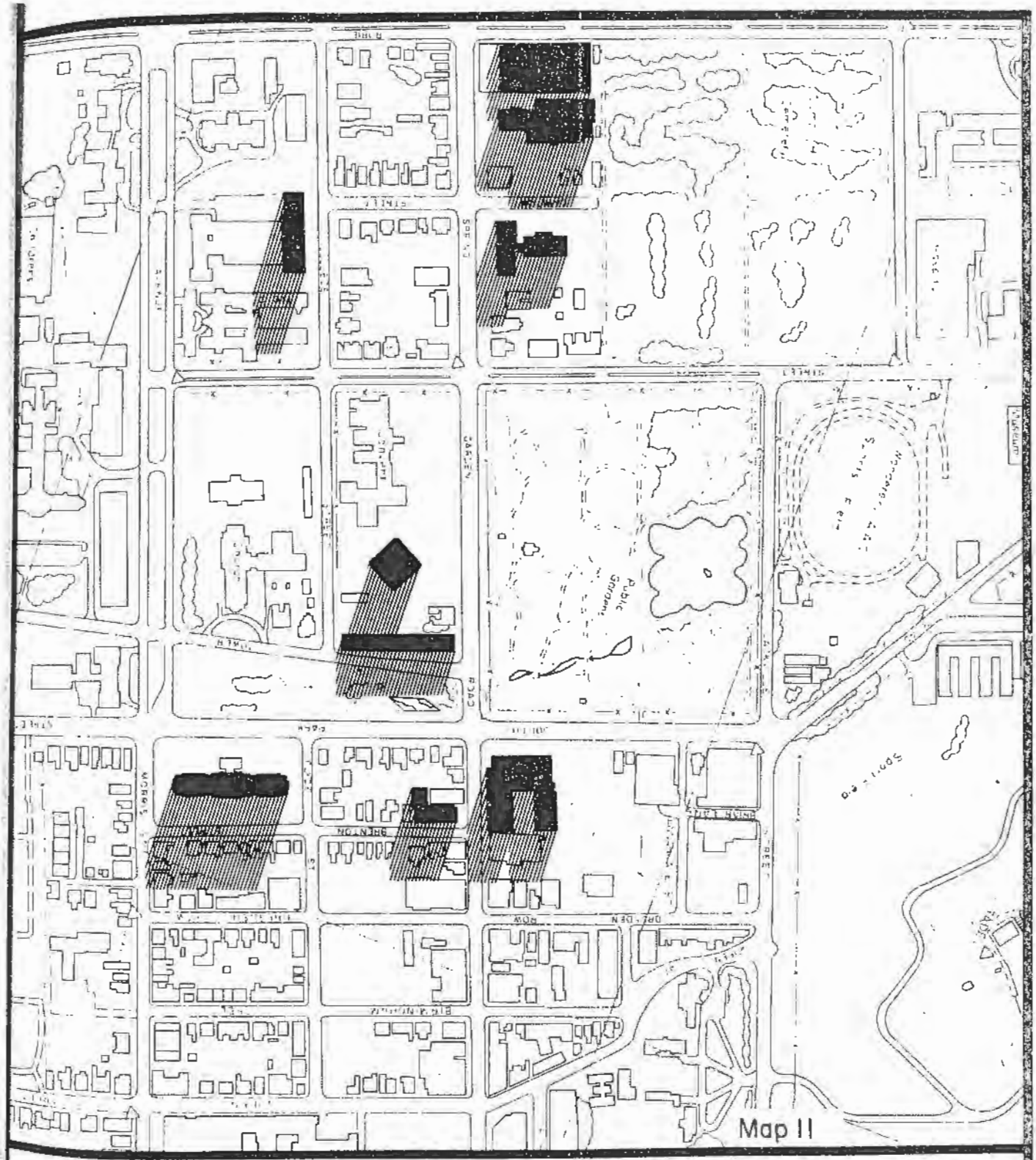
Shadow Patterns
Noon, June 21

Feet
0 250 500



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Shadow Patterns
4:00 p.m., June 21

Feet
0 250 500

To summarize the maps, it is apparent that the impact of adjacent buildings on the Gardens is greatest during the winter solstice. For all three readings the Gardens are covered by shadows to some extent. During the vernal and autumnal equinox the greatest impact on the Gardens is in the morning. The mid-day and afternoon readings show only minimal shadow penetration into the Gardens. During the summer solstice shadows are cast on the Gardens during the early morning hours only. The extreme height of the sun during the summer solstice lessens the impact of adjacent buildings on the Public Gardens.

Finally, while not the primary focus of the study, it should be noted that Victoria Park is covered by shadows, to varying degrees, at all three times of the year for which calculations were completed.

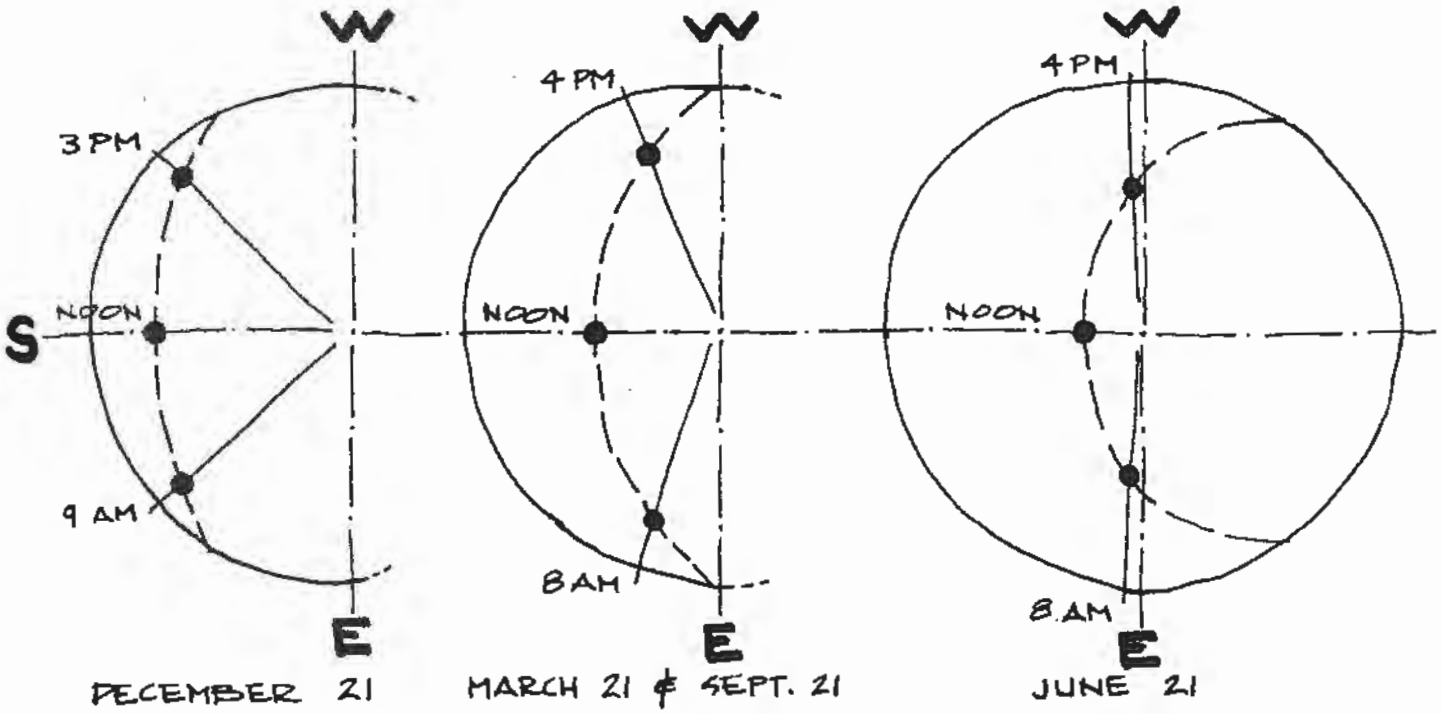
PART II

SOLAR GUIDELINES:
METHODOLOGY AND RECOMMENDATIONS

The purpose of this section is to determine certain critical positions of the sun at various times of the year in Halifax by calculating sun angles (altitudes) and sun positions (azimuths). Simplified sun path diagrams were utilized for critical times of the year - the summer solstice, the winter solstice and the spring and fall equinoxes - for Halifax's location which is 44 degrees north latitude.

FIGURE 3

Simplified Sun Path Diagrams

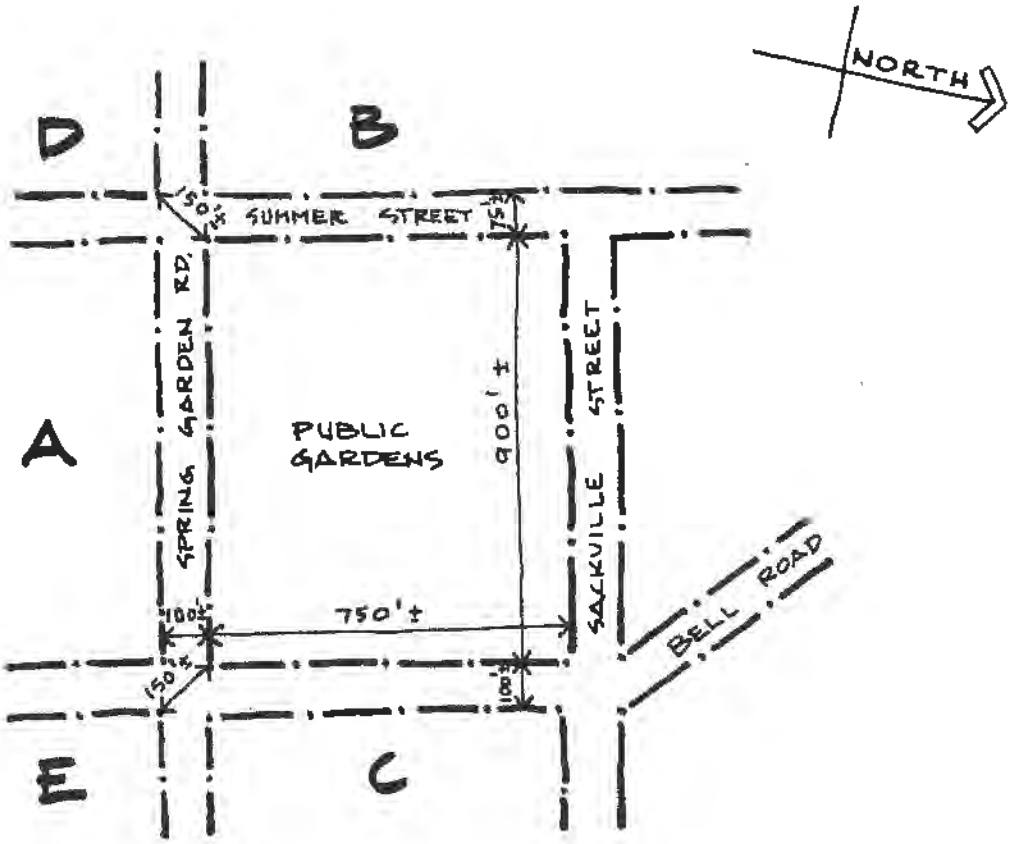


The angles and azimuths of the sun for various times of the year were obtained from solar position tables for Halifax's location of 44 degrees north latitude. These figures are now used to caludlate maximum allowable building height for future development projects in those blocks immediately south, west, east, southwest and southeast of the Public Gardens.

The angles and azimuths of the sun are used in conjunction with two other variables in trigonometric formulas to determine maximum building height. The first variable is the horizontal distance (Y) between the property lines of the Public Gardens on all four sides and the property lines across the street.

FIGURE 4

Calculation of Horizontal Distance 'Y'



The second variable involved in the calculation of building height is the setback line of the property across the street from the Gardens. The permissible building height has

been prepared for two different setbacks - one located ten feet from the property line and the other located twenty feet from the property line. These setback lines are derived from Section 47 (2)(a) of the Peninsula Zoning Bylaw, which states:

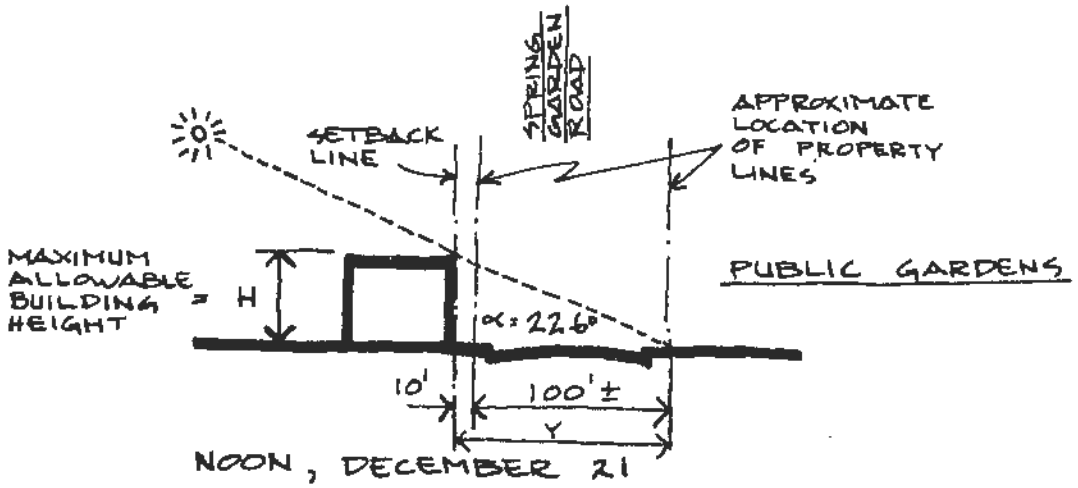
> "the distance from any part of such building and any official street line or lines abutting upon such lot shall be not less than 20 feet measured at right angles to any such official street line or lines; provided, however, that such distance may be reduced to not less than 10 feet measured at right angles to any such official street line or lines if that part of the building which is less than 20 feet from any such official street line or lines is entirely contained within the arms of an 80 degree horizontal angle as determined in subsection (3) of this Section."

These setback lines are commonly referred to as the "angle controls". The angle controls apply to new construction in the R-3 Multiple Dwelling Zone and the P & I Park and Institutional Zone. These are the dominant zoning classifications within the Public Gardens District. Figure 5 illustrates a typical sun angle/building height calculation utilizing all of the variables referred to above. The calculation illustrated is similar to those used for all blocks in the Public Gardens District, although in this instance the calculation has only been prepared once, using a ten foot setback from the street line.

It should be noted that the heights selected as the maximum allowable building heights for each block are based on rather arbitrary value judgements as to what constitutes an acceptable amount and duration of shadow casting on the Gardens. For example, the argument could be made that it is important to eliminate <u>all shadows</u> being cast into the Gardens for <u>all</u> times of the year from any buildings immediately south of the Gardens. In order to achieve this, it would be necessary to use the position of the sun at noon on December 21, that time at which the sun is at its lowest point in the sky throughout the year, and shines from a true south direction. However, another argument could be made that a certain degree of shadow casting into the Gardens is permissible by reason of the fact that the Gardens are closed to the public from October to March every year and only the vegetation would require sunlight during this period. Therefore, higher building heights would be permissible and noon on March 21/September 21, the vernal and autumnal equinoxes, could be used to calculate building heights which would result in a higher permissible figure.

FIGURE 5

Typical Sun Angle/Building Height Calculation



$$\text{TANGENT ALTITUDE} = \frac{\text{HEIGHT}}{\text{HORIZONTAL DISTANCE 'Y'}}$$

$$\text{TAN. } 22.6 = \frac{H}{110'}$$

$$*\text{TAN } 22.6 = .4142$$

$$.4142 = \frac{H}{110'}$$

$$H = .4142\,(110')$$

$$H = 45.8'$$

*OBTAINED FROM SOLAR TABLES

Furthermore, in some instances it was felt to be unnecessary to calculate maximum permissible building heights because of the nature of the existing land use pattern, or because of the nature of the land use pattern proposed for the Old South End and Peninsula Centre Detailed Area Plans. In the case of Block "E" it was felt that the block is fully developed and the maximum permissible building height should reflect the existing scale of the block. For Block "F", the proposed zoning of R-2 and R-C-2 would in themselves restrict building height to

35 feet and 45 feet respectively, which would not lead to any shadows being cast on the Public Gardens. The assumptions guiding the recommendations for permissible building height for the remainder of the blocks in the Public Gardens District are explained in the paragraphs below.

For Block "A", the block immediately south of the Gardens, the worst conditions from the point of view of shadow casting from buildings would occur around noon on December 21. In order to avoid any shadows being cast into the Public Gardens, or most of the sidewalk on the north side of Spring Garden Road, at all times of the year, the noon sun angle (22.6 degrees) is projected across Spring Garden Road from the property line of the Public Gardens to determine a maximum building height for properties across the street.

For Block "B", the block immediately west of the Gardens, similar reasoning has been applied. Four o'clock p.m. on March 21 or September 21 was assumed to be the latest time of day at which the Gardens would be used at these times of the year. Other times of the year and day at which the sun shines from a westerly direction and creates longer shadows, such as between October and February, result in allowable building heights which are excessively low and restrictive for development. Given that the Gardens are closed between October and March, it was felt that more liberal building heights should be permitted.

For Block "C", located southwest of the Gardens, noon on December 21 was felt to be the critical time at which to calculate permissible building heights since the sidewalks on Spring Garden Road should be kept relatively free of shadows throughout the year. This assumption is based on the significance of Spring Garden Road as a pedestrian link to the Central Business District and as a significant commercial area within the City of Halifax in its own right.

For Block "D", the second block from the Public Gardens to the south, four o'clock p.m. on March 21 and September 21 was used to calculate permissible building heights. The assumption here is the same as Block "C" where it was felt that shadows should not be cast on the sidewalks of Spring Garden Road.

For Block "G", the second block to the west of the Public Gardens, four o'clock p.m. on December 21 was used to calculate permissible building heights. This time of year was chosen to ensure that no shadows are cast within the boundaries of the Gardens.

Table 3 shows the information used for the calculation of maximum allowable building heights, as well as the recommended building heights with a setback of ten feet or a setback of twenty feet. The table includes the recommended building height as well as the calculations prepared for two other times of the year. The recommended building heights are also shown on Map 12.

Summary

This report has examined the issue of shadows cast by high-rise buildings in the Public Gardens District. While a number of different assumptions were used to calculate permitted building heights for the Public Gardens District, they were all based on the premise that shadows should not be permitted to penetrate the property lines of the Public Gardens between approximately eight o'clock a.m. and four o'clock p.m. during the months in which the Gardens are open.

The building heights determined through the solar calculations employed in this report will be integrated with the Old South End and Peninsula Centre Detailed Area Plans and the zoning prescriptions to implement the policies of those plans. The effect of these recommendations will be to preserve and enhance the character of the Public Gardens for the enjoyment of current and future generations of Haligonians.

TABLE 3

Calculation of Maximum Allowable Building Heights

Time	Alt.	Azum.	Tan. Alt.	(1) Allowable Height with Setback of 10'	(2) Allowable Height with Setback of 20'	Horizontal Distance 'Y'
Block 'A'						
Noon December 21	22.6°	0.0	.4163	45.8'*	49.96'*	(1) Tan. Alt. x 110'
Noon March 21/Sept. 21	46.0°	0.0	1.0355	113.9'	124.26'	(2) Tan. Alt. x 120'
Noon June 21	69.5°	0.0	2.6746	294.2'	320.95'	Y = 110' & 120'
Block 'B'						
3 PM December 21	11.0°	41.5°	.1944	16.5'	18.47'	(1) Tan. Alt. x 85'
4 PM March 21/Sept. 21	21.0°	68.2°	.3839	32.63'*	36.47'*	(2) Tan. Alt. x 95'
4 PM June 21	37.3°	87.6°	.7618	64.75'	72.37'	Y = 85' & 95'
Block 'C'						
Noon December 21	17.1°	28.6°	.2952	47.23'*	50.18'*	(1) Tan. Alt. x 160'
Noon March 21/Sept. 21	38.5°	39.8°	.7954	127.26'	135.20'	(2) Tan. Alt. x 170'
Noon June 21	57.8°	60.3°	1.5900	254.40'	270.30'	Y = 160' & 170'

* Recommended Building Height

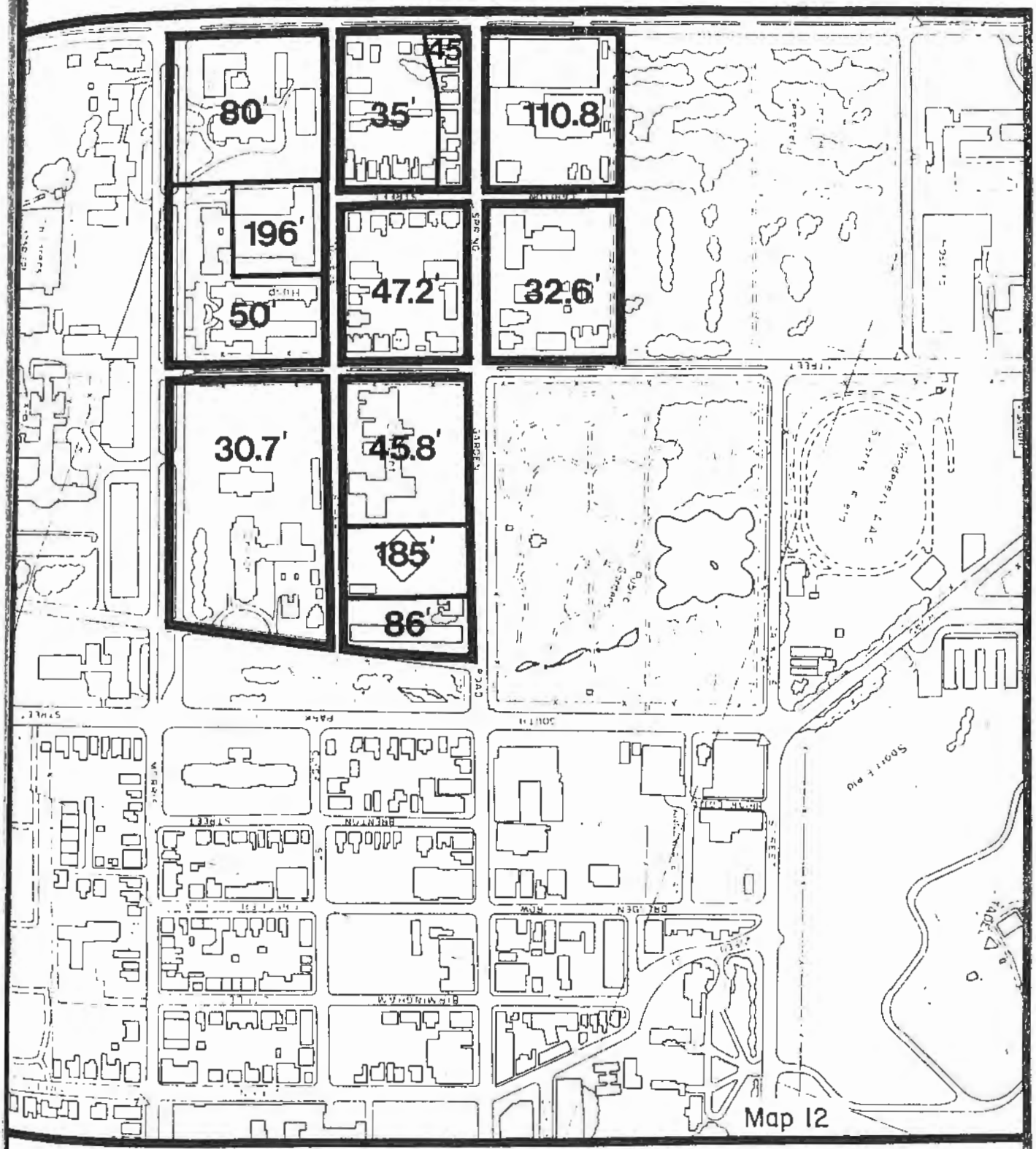
TABLE 3 (CONT'D)

TABLE 3 (CONT'D)

TABLE 3 (CONT'D)

Time	Alt.	Azum.	Tan. Alt.	(1) Allowable Height with Setback of 10'	(2) Allowable Height with Setback of 20'	Horizontal Distance 'Y'
Block 'D'						
4 PM December 21	11.0°	41.5°	.1944	15.55'	17.50'	(1) Tan. Alt. x Y
4 PM March 21/Sept. 21	21.0°	68.2°	.3839	30.71'*	34.55'*	(2) Tan. Alt. x Y
4 PM June 21	37.3°	87.6°	.7618	60.94'	68.56'	Y = 80' & 90'
Block 'G'						
4 PM December 21	11.0°	41.5°	.1944	110.81'*	112.75'*	(1) Tan. Alt. x Y
4 PM March 21/Sept. 21	21.0°	68.2°	.3839	218.82'	222.66'	(2) Tan. Alt. x Y
4 PM June 21	37.3°	87.6°	.7618	434.23'	441.84'	Y = 570' & 580'

* Recommended Building Height



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Recommended Building Heights

Feet
0 250 500

APPENDIX 'A'

DEFINITIONS

Altitude	-	the angular distance from the horizon to the sun
Azimuth		the angular distance between the true south and the point on the horizon directly below the sun
Sun Path Diagram		a circular projection of the sky vault, similar to a map, that can be used to determine solar positions and to calculate shading
Equinox		the time when the sun crosses the equator, making night and day of equal length in all parts of the earth (the vernal equinox occurs about March 21, and the autumnal equinox occurs abour September 21-22)
Summer Solstice		the time during the summer when the sun is fartherest north of the equator (June 21 or 22 in the Northern Hemisphere)
Winter Solstice		the time during the winter when the sun is fartherest south of the equator (December 21 or 22 in the Northern Hemisphere)

APPENDIX 'B'

CALCULATION OF SHADOW LINES FOR EXISTING HIGH-RISE BUILDINGS

No.	Building	Height	December 21		March 21/Sept. 21		June 21	
			Length of Shadow = (Height)/(Tan. Alt.)		Length of Shadow = (Height)/(Tan. Alt.)		Length of Shadow = (Height)/(Tan. Alt.)	
			Time = 9 AM & 3 PM	Time = Noon	Time = 8 AM & 4 PM	Time = Noon	Time = 8 AM & 4 PM	Time = Noon
			Alt. = 11.0° Azm. = 41.5°	Alt. = 22.6° Azm. = 0.0°	Alt. = 21.0° Azm. = 68.2°	Alt. = 46.0° Azm. = 0.0°	Alt. = 37.3° Azm. = 87.5°	Alt. = 69.5° Azm. = 0.0°
1.	Lord Nelson	100.0'	514'	240'	261'	97'	131'	37'
2.	Halifax Insurance	125.0'	643'	300'	326'	121'	164'	47'
3.	Park Victoria	222.0'	1,142'	533'	578'	214'	291'	83'
4.	Garden Park	86.0'	442'	207'	224'	83'	113'	32'
5.	5770 Spring Garden	185.0'	952'	444'	482'	179'	243'	69'
6.	Spring Garden Terrace	115.0'	592'	276'	300'	111'	151'	43'
7.	Embassy Towers	144.6'	744'	347'	377'	140'	190'	54'
8.	Professional Building	79.0'	406'	190'	206'	76'	104'	30'
9.	Tupper Medical Building	196.0'	1,008'	471'	511'	189'	257'	73'