

OPEN SPACE POLICY AND THE ENVIRONMENT

Boston includes approximately 5,000 acres of open space, more open space than the City of Cambridge has land area. Almost 2,350 acres are city parks and playgrounds. The remaining acres are owned and operated by the Metropolitan District Commission, the Commonwealth, and the federal government. A major portion of this open space is in the Emerald Necklace, a string of parks and parkways designed by Frederick Law Olmsted, which surrounds Bostonians with one of the loveliest urban landscapes in America. In designing one of his parks, Olmsted stated, "and all of this magnificent pleasure ground is entirely, unreserved, and for ever, the people's own".¹ Through the Emerald Necklace, he established the foundation of our open space system and a legacy for the people of Boston. It is our responsibility, as custodians of the city for future generations, to preserve and enhance this system.

Open space performs critical functions in our daily lives. It provides a quiet peaceful place as a respite from crowded urban life. It provides places for our children to run and play, and for communities to meet in common areas. Just as it is important to the spirit of the urban dweller, open space also serves the critical functions of providing a healthy environment and reducing pollution. Open space is a major part of what makes Boston a great place to live and work. It plays a vital role in helping us attract new jobs and housing opportunities, and supports our important tourist industry.

But Boston faces a chronic problem in that the city cannot afford to adequately maintain and enhance existing open space. At the same time, the need for additional open space is growing.



Recognizing the critical importance of open space and our commitment to the goals and vision of Olmsted's plan, Boston is setting a new policy for the maintenance, preservation and expansion of open space in Boston. This policy includes six central elements:

- o Open Space Zoning
- o Open Space Trust Fund
- o Expansion of the Emerald Necklace
 - eleven new parks
 - Harborpark, Dudley and other neighborhood initiatives
 - improvement of vacant lots
- o Reforestation of Boston
 - tree planting program
 - tree nurseries on vacant lots
- o Open space standards
 - accessibility
 - character
 - maintenance
- o Microclimate Standards for Development
 - pedestrian level wind
 - sunlight and daylight
 - air quality and circulation

OPEN SPACE ZONING *

All open space in Boston is currently zoned residential, commercial or industrial. An ordinance establishing a public open space zone to protect existing open space from private development is needed. This ordinance would allow the city to zone as open space public land which is used for recreational or conservation uses.

Public open space is already protected against development in that a three-quarter vote of the state legislature as well as city council approval are required to remove land from park use. This new zoning district, if adopted,

would add additional protection in that a public hearing by the zoning commission would be required before the land could be rezoned to permit development. Thus, not even the government itself could dispose of open space land or change its use without full public involvement.

OPEN SPACE TRUST FUND

Proposition 2 $\frac{1}{2}$ has had a severe impact on the City's ability to maintain, let alone expand, its open space system. Moreover, the state does not fund open space maintenance or operation costs. A look at the City Parks and Recreation Department budget highlights the City's predicament. The annual budget of \$6.8 million has not increased since 1973. San Francisco, which has approximately the same municipal open space acreage as Boston, has an annual Recreation Department budget of \$40.6 million. Boston's annual per capita expenditure for open space is \$12, compared to the average amount of \$28 per person spent by eleven major cities in the country including Boston.

In downtown Boston where development pressures and activities are strong, the contribution from this development to funding open space can also be significant. The city is therefore proposing an Open Space Trust Fund to provide for maintenance, improvement and capital planning for open space. A percentage of the sale price or long-term lease revenues on all public property will enter this fund.

EXPANSION OF THE EMERALD NECKLACE

Expansion of the Emerald Necklace can achieve a weaving together of Boston's neighborhoods with ribbons of green space connecting the Back Bay to Dudley, Massachusetts Avenue to the Harbor and Dorchester to the

Charlestown. Expansion of open space throughout the city can fill in this network and help to provide an equitable distribution of quality open space for all residents.

Eleven new parks: Eleven new parks for the city are already in the final stages of planning and will be added to the open space system in the near future.

- o Sargent's Wharf
- o Roxbury Heritage Park
- o Columbia Point
- o Copley Square
- o Creek Square at the Blackstone Block
- o The Fan Pier at Fort Point Channel
- o Post Office Square Park and Garage
- o Rose Kennedy Park at Waterfront Park
- o East Boston Heritage Park
- o Charlestown Navy Yard Parcel 7
- o Shipyard Park Phase III at the Charlestown Navy Yard

These parks represent the beginning of expansion of the open space system. Copley Square and Post Office Square Parks are excellent examples of private investment in public open space.

Harborpark: The Harborpark Plan incorporates a commitment to providing a continuous walkway along the waterfront from South Dorchester to the end of the Charlestown waterfront. This Harborwalk concept is already becoming a reality with developments such as the Schraffts Center, Rowes Wharf and the Fan Piers committed to this public access.

Dudley and Other Neighborhood Open Space Initiatives: A major objective for the Dudley neighborhood initiative is to provide quality open space to meet the needs of the community. This effort is viewed as a role model for other neighborhoods which through development or other pressures are in danger of losing needed open space. Currently, the open space in Dudley is poorly maintained, perceived as unsafe and is underutilized. Open space that



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is well planned and designed with the community and that links this neighborhood to surrounding communities will provide major impetus to revitalization of this and other areas.

Vacant Lots Improvement: The City of Boston owns over 1,200 vacant lots and sliver parcels. Large tracts of vacant land also are owned by other state authorities. A few of these parcels are already being used as urban gardens. However, the majority are used as dumping areas and construction equipment sites or as open storage of materials. These lots are primarily in neighborhoods that have experienced dramatic socio-economic changes over the past two decades and where disinvestment has occurred. They erode the quality of a neighborhood. However, the lots also are a major resource and opportunity to provide community open space, improve neighborhood confidence in an area, and promote community involvement in establishing and maintaining open space. A vacant lot improvement plan will be adopted by the city. Key to the success of such a program will be the emphasis on neighborhood involvement. Specific parcels for improvement will be targeted by neighborhood groups committed to maintaining them as open space.

The city will develop a demonstration vacant lot improvement program, and will select, through community input, a few parcels for use in this program.

REFORESTATION OF BOSTON

Cultivating and nurturing trees in the urban environment has been a common practice recorded throughout history. Trees play a multi-faceted role in providing aesthetic pleasure, buffers from wind and weather, and biological sinks for air pollution. It is the city's goal to establish an aggressive reforestation program for Boston. This effort is already underway in that trees

are programmed into new developments through the development review and approval process. Additional initiatives are also planned or underway to promote reforestation.

Tree Planting Program: A neighborhood tree planting and replacement program also has been targeted for areas of the following communities for the Fall. Sites have been selected in:

- o Roxbury: Cedar Square, Hyde Park and Kittredge Square area, Orchard Parking Housing, Linwood Park, M.L. King Boulevard at Washington Street
- o Waterfront Park
- o Dorchester Avenue
- o Charlestown Navy yard
- o Allston-Brighton along Commonwealth Avenue
- o South Boston

This effort is the beginning of an overall program to improve the city's stock of trees and raise community awareness of the value of trees in their neighborhoods.

Tree Planting Guide: Trees are living organisms with four basic necessities: air, light, soil and water. While many species of trees can thrive successfully in the urban environment and even reduce air pollution in that process, there are optimal conditions for planting and tending trees. Anne Whiston Spirn notes, "Given this ancient practice of building urban parks and the venerable professions of horticulture and forestry, it is astonishing that modern methods of horticulture and management of urban vegetation are so crude".³ Selection of species, size, soil base, access to light, and a maintenance plan are all factors that need to be considered in planting trees in order to ensure that this effort will be productive. To promote successful

tree planting, the city will publish a Tree Planting Guide to be used by the resident planting a single tree in his front yard as well as by the city or the urban forester cultivating vacant lots.

Vacant Lot Tree Nurseries: As part of the vacant lot improvement program, the city is evaluating the feasibility of an extensive program cultivating tree seedlings on vacant lots for transplanting to areas throughout the city. This effort would have two major benefits beyond producing trees for the city. It would be an integral part of neighborhood involvement in open space, and it would be a direct improvement of the vacant lots. A central focus of this effort⁺ should be the involvement and support of neighborhood youths and education and job training for young adults, ~~in agriculture and horticulture~~ ^{agricultural and horticultural}. Successful nurseries could actually provide employment and develop into commercial ventures to fund reforestation programs.

The nursery program should build cooperatively on ongoing programs such as, Boston Urban Gardeners, involved in urban agriculture. The city also will seek the participation of area institutions involved in agriculture and horticulture in order to evaluate and develop such a program.

Adopt-A-Block Program: There are several programs in the city which link business and commercial establishments with the cleaning up of the sidewalk and street areas adjacent to their buildings. Because funding for planting and maintaining street trees is extremely scarce, there is a need to expand this private/public connection and mutual benefit to incorporate street trees. The city is therefore considering an Adopt-A-Block program to complement these ongoing efforts. The program would encourage businesses and building owners not only to maintain and clean adjacent sidewalks and streets, but also to provide for the planting and maintenance of street trees along their block.

OPEN SPACE STANDARDS

The buildings and open spaces within a complex city such as Boston are part of a system. This system is tied together as an organized whole through the interaction of its various pieces; entryways, major streets, parks, city squares, and landmark buildings. This public space network influences the quality of experience in the city. The overall network enables people to perceive the city as a whole interrelated parts.

The formation of these two key elements, public open space and an easily understood pedestrian network are basic to the design development of the city. The objective of the open space standards is twofold: to preserve and enhance existing public space and to create new and lively public spaces in future development proposals. To meet this objective, priority is to be given to:

- o The improved design and adaptation of existing and potential networks both within the downtown core and surrounding the city. Special attention will be given to the development of major parks and greenways, tree-lined boulevards and sidewalks, pedestrian streets and passageways.
- o The development of the open spaces which form the settings for activity in the city: plazas, urban squares, parks and interior winter gardens.

The development of Rowes/Foster Wharf, an important link in the Harbor Master Plan, illustrates both the concept of an open space network and the diversity of open space planning which can occur in one proposal. The public open space benefits at Rowes/Foster Wharf include complete access to the water's edge. Sixty-five percent of the site will be built as public open space with landscape materials and other amenities.

Merely establishing the framework for a network of spaces does not ensure the design of an improved public realm. The quality of those spaces must be ensured and their active use by all must be encouraged. To provide quality settings and succeed at creating a viable open space system the following standards must be met.

→ Accessibility/Availability: Public open space must be accessible to the public at all reasonable times. To ensure safety ^{it is} standards ^d require that open space be well lit and visually accessible. Entries, through-block passage and other public-oriented building elements must be articulated through appropriate signage and orientation devices and provide barrier-free access.

The open space standards also require, as part of all new development, clear attention to pedestrian access, preferably at grade or no more than one to two feet above/below grade level.

The overall form of the new design for Copley Square serves as an example of an accessible site. A calm but flexible central space is contained within active edges where the major uses in the square occur. Visibility is maintained from each edge of the site and the ground plane is simple and flat, accessible to all.

Character: Features should be incorporated in the design of open space that meet the needs of the neighborhood in which they are located. The development of such features should be comprehensive in scope, including site amenities such as appropriate seating for the elderly, play equipment, lighting, artwork and landscaping. The individual character of each setting should be established, creating a unique sense of place.

It is the goal of the open space standards to encourage detailed and clearly identifiable site specific strategies for the design of all elements for individual projects. It is also necessary to preserve and enhance the unique quality of the already understood "special" places in the city and to incorporate that understanding in the development of new design.

Maintenance: All public open spaces must be carefully maintained and operated. In all future development proposals, a program for the maintenance

of every public open space must be included. Efforts will be made to build a program with public/private cooperation to ensure better maintenance for all existing public open space.

The award winning Post Office Square serves as an ideal model for the type of program which best serves both the city's private and public sectors. When the money was granted for the renovation of the square it was done under an agreement which tied the maintenance of the park to four corporate abutters. This partnership enabled the square to be developed and ensured that the square would be carefully maintained and cared for. Today Post Office Square is one of Boston's most popular squares. It is hoped that the example of Post Office Square will encourage other public/private partnerships within the city.

MICROCLIMATE STANDARDS FOR DEVELOPMENT

Three hundred and fifty-five years ago, it was the natural setting of the peninsula that contributed to the settlement and expansion of the City of Boston. Anne Whiston Spirn in the Granite Garden: Urban Nature and Human Design² writes, "The colonists of the Massachusetts Bay Colony sailed into Boston Harbor in 1630 and found a propitious site for the future city: a readily defensible peninsula connected to the mainland by a narrow neck... a broad protected harbor; and an abundant supply of fresh spring water... Boston's original situation, open to sea breezes and with little predisposition to inversions, protected it from the air pollution experienced by colonial cities in less fortunate locations".

The geometry of Boston has been dramatically altered since colonial times, but there is still an urban ecology that is critical to the health and well being of the city's inhabitants. It is the public's right and interest to

protect this ecosystem now and for future generations. Unplanned development in the city can strain or destroy the balance of natural elements. In 1974 the Boston Redevelopment Authority adopted environmental review procedures primarily to comply with state and federal requirements for review of publicly funded projects. However, the environmental process has emphasized "review" for too many years and new standards and procedures needed to actively guide growth. Past development has taught us a great deal about the adverse individual and cumulative effects of our actions on the environment. But Boston remains one of the most livable cities in the world. It is certainly not too late to enhance our natural environmental planning and standards to move us into the 21st century. To afford this protection the city is adopting new environmental procedures and standards. These will incorporate the microclimate standards for development including: pedestrian level wind, sunlight and daylight, and air quality and circulation, as well as guidelines for water quality and groundwater protection. The microclimate standards are near completion and new environmental procedures should be proposed by the end of 1985.

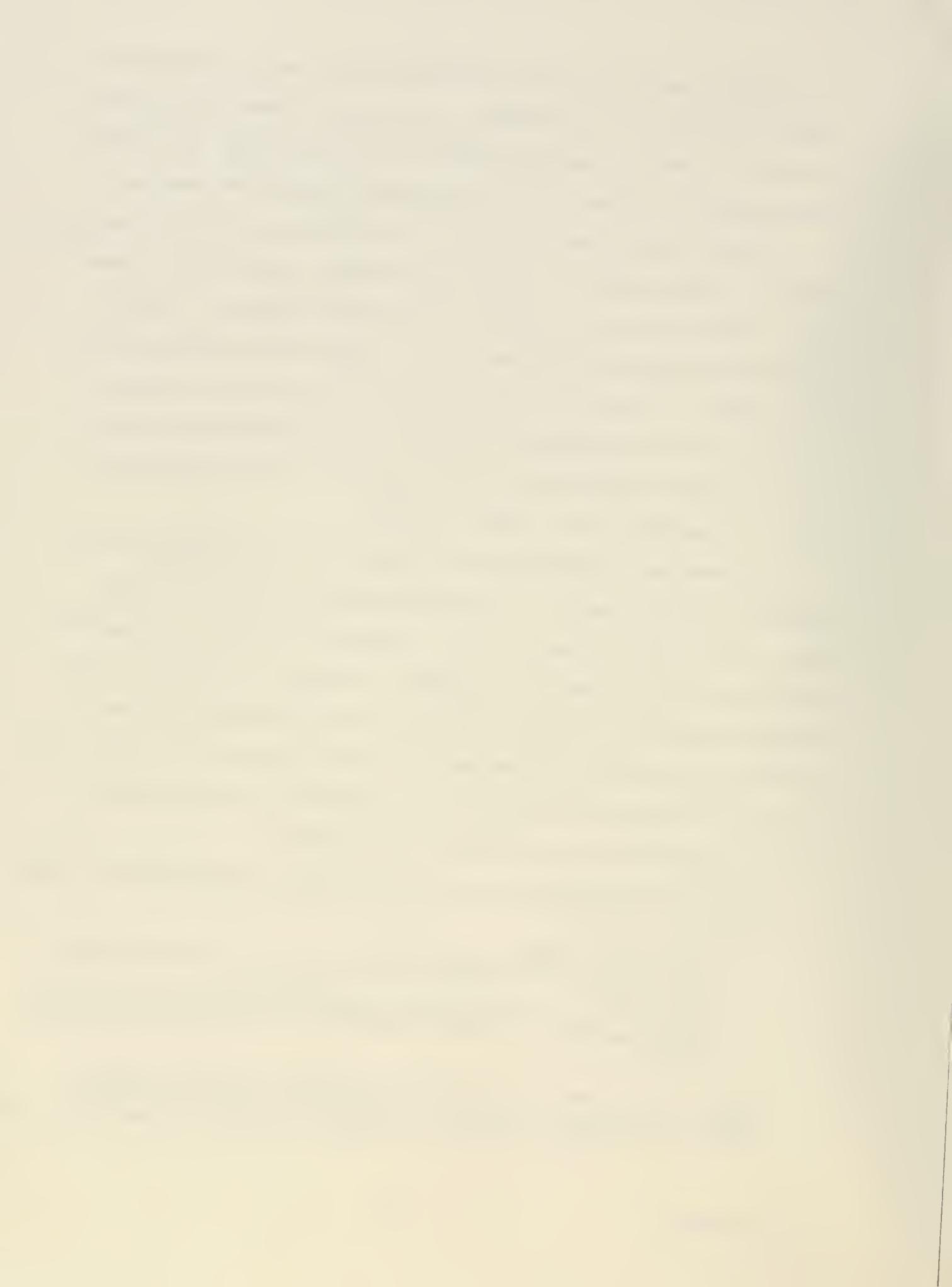
Pedestrian Level Wind: Boston is naturally a windy city with an annual average of 13.3 mph. Tall rectangular buildings inappropriately massed can exacerbate wind velocities and distort wind causing high velocity gusts and downdrafts that are not only uncomfortable, but also dangerous to the pedestrian. The interaction of wind with the built environment is complex. Wind velocity is naturally greater at higher elevations. With the introduction of a tall building the, velocities of the top of the building are deflected downward along the facade causing high velocities at the ground level. These velocities are further accelerated as they flow around corners. If the deflected wind

hits the ground between two walls of building mass strong vortices can form much to the distress of the pedestrian. The degree of impact at the pedestrian level can best be predicted through wind tunnel testing. Wind tunnel testing identifies problem areas where mitigation measures are necessary.

The most effective way to reduce or avoid pedestrian level wind problems from a tall building design the tower with set-backs rather than as a sheer wall. In the set-backs in the style of the Art Deco buildings. Allow the high velocity winds to hit the lower steps and deflect upward before they hit the pedestrian. The old John Hancock Building has no built in series of set-backs and the new Hancock Tower built as a tall rectilinear structure with a flat facade demonstrates this point quite well. The site of the new tower is a notoriously windy location in Boston.

It is important to emphasize that the impacts of a tall building can be mitigated through setbacks. The absolute height is not the only ruling factor. Other measures such as add on architectural features or dense tree plantings can provide some wind mitigation. However, for significant wind problems these are not necessarily effective. Add on features may be constrained by other design considerations. Boston's new wind standards should ensure that pedestrian level winds are not significantly and procedures are the most comprehensive and stringent in the country.

- o The wind standards require wind tunnel testing in the preliminary stages of schematic design for:
 - Any building higher than 150 feet;
 - Any building 100 feet high and two times higher than the adjacent buildings;
 - Other buildings which fall below these thresholds, but because of the context and particular circumstances, could require wind tunnel testing.
- o Stage I wind tunnel testing must be conducted to determine problem areas and appropriate placement of sensors for Stage II of testing. These initial studies, referred to as erosion analyses, use the wind tunnel



to determine locations on the scale model where surface particles are eroded away and pile up. These locations then indicate where the wind is relatively stronger and where wind is trapped in vortices. Erosion studies will also be used for air quality analyses.

- o Results of wind tunnel testing will be measured against established comfort criteria for different levels of pedestrian activities. Exceedence of these standards will require mitigation.

Melbourne's Criteria for Hourly Average, Effective Gust, and Peak Gust Velocities

<u>Category</u>	<u>Velocity (mph)</u>		
	<u>Hourly Average</u>	<u>Effective Gust</u>	<u>Peak Gust</u>
1. Unacceptable-Dangerous	27 ≤ Uav	39 ≤ Uep	55 ≤ Upk
2. Uncomfortable for Walking	19 ≤ Uav 27	27 ≤ Uep 39	37 ≤ Upk 55
3. Acceptable for Walking	15 ≤ Uav 19	21 ≤ Uep 27	30 ≤ Upk 37
4. Stationary Short Exposure	12 ≤ Uav 15	16 ≤ Uep 21	23 ≤ Upk 30
5. Stationary Long Exposure	Uav 12	Uep 16	Upk 23

Sunlight: Sunlight is key to the enjoyment of open space and public areas and to the general well-being of city inhabitants. Shadows generated by development can, however, be minimized through building design, siting and massing. To guide appropriate siting and design shadow impact analyses are required in the preliminary stages of schematic design.

- o No new shadows shadow impacts from development will be permitted on major open space areas.
- o Shadows on all pedestrian areas must be minimized.

Daylight: Daylight, or the amount of sky view afforded to the pedestrian, is the key to maintaining a hospitable environment in the city. Daylight has been significantly diminished on several streets and open space areas by tall building facades built to property lines. But this adverse effect can be avoided through sensitive building massing. Set back of high rise elements can retain light at the street. As with pedestrian level winds, buildings such as the United Shoe Manufacturing Building and old John Hancock Building produce the least impact on daylight. A methodology for

quantifying daylight as the percentage of obstructed sky-dome has been developed under a National Endowment for the Arts Grant to the city for microclimate studies.

- o Existing levels of daylight are being measured and mapped throughout central Boston and limits on obstruction of daylight are being established on a block by block basis.
- o Daylight standards will be used as a guide to determine building set backs on a development site necessary to preserve daylight at the pedestrian level.
- o Daylight analyses are required in the preliminary stages of schematic design for build and no-build conditions.

Air Quality/Circulation: Air quality is dramatically affected in the urban environment by the pollution from the thousands of cars that move into the city daily. When radical changes in the building geometry of an area result in high dense walls along narrow streets - street canyons, this pollution becomes trapped and cannot be dispersed. Boston is blessed with daily sea breezes that can disperse pollutants. But insensitive development can block this influence if buildings are constructed in a wall along the Harbor.

- o Stage I erosion wind tunnel analyses conducted to determine pedestrian level winds will also be used to analyze air flow and building and street geometry that can block or trap air pollutants and inhibit pollution dispersion.
- o Reduction of air pollution is addressed primarily through traffic and congestion controls, and promotion of green space as sinks for air pollutants. For new developments consideration will be given to the interaction of the proposed massing with existing building and street geometry as they relate to air flow.

Water Quality: Boston Inner Harbor is a unique and valuable asset to the urban environment. It has served throughout Boston's history as an attraction to manufacturing and commercial activities, the fishing industry, recreational and boating activities, tourism and residential development. However, with the growth of the metropolitan area, the water quality in the Harbor has progressively deteriorated during the past several decades due to

the effects of combined sewer overflows (CSO's), stormwater runoff, industrial effluents, debris, construction residue, oils, and sludge deposits from Deer and Nut Islands sewerage treatment plants.

A comparison of existing water quality sampling data with the Massachusetts Water Quality Criteria indicates that several of the parameters violate their respective criteria. Dissolved oxygen (DO) levels, one of the most important indicators of water quality, are considerably lower than the prescribed minimum of 6.0/mg/l. ~~A low level of dissolved oxygen~~. The low DO levels are primarily a result of the 51 CSOs in the Harbor. They make the water unsuitable for many forms of aquatic life. Total coliform levels are as high as 4.6×10^6 MPN per 100 ml (most probable number per 100 milliliters) at some sample sites. The state standard to protect aquatic life and protect secondary contact recreation is a maximum of 100 MPN per 100 ml for the log mean of a set of samples.

Toxic metals including cadmium, copper chromium, lead, nickel and zinc in the bottom sediment of the Harbor are also very high.

Dramatic improvement of water quality can be achieved, however, through the upgrading of the sewerage treatment facilities serving the metropolitan area and elimination of the CSO's. These improvements are currently in the planning stages ^{under} through a major combined effort by federal, state and ^{in the short term} local agencies. The city can, however, through its growth and environmental policies reduce the volume of water entering the sewerage system. Policies to reduce the burden on Boston Harbor will be incorporated into the development and environmental guidelines. Expansion of open space can have a very positive effect on volume reduction by providing an increase in natural surfaces for storm water runoff to permeate the soil. Several developments downtown in the past five years have already included effluent holding tanks

in order to store the wastewater and release it when it will have the least impact on CSOs. The City of Denver has adopted a program for retention of stormwater in depressed open space areas and on rooftops that has been successful for over ten years.

Groundwater: Major portions of downtown Boston have been developed on land that was created by filling in low lying marsh areas and inlets of Boston Harbor. Construction on the loosely consolidated fill required the use of piles to support structures. In order to preserve wooden piles from rotting and prevent subsidence or lowering of the soils surrounding the piles, the water table must be maintained at +5 feet (Boston City Base). Excavation and construction in these fill areas has caused periodic lowering of the water table exposing many piles to the air causing them to decay and weaken foundations. This has particularly affected, over the years, buildings of historical and architectural significance. In 1929 portions of the Boston Public Library began sinking and walls began to crack due to exposed, rotting piles. The cost of foundation reconstruction was \$250,000 (1929 dollars). In the 1980's this problem has resurfaced. The Advent Church, the Union Boat House and several homes in the Beacon Hill area have experienced damage from rotting piles and incurred high costs for restructuring piles. There are now approximately 188 buildings in the significantly impacted area. Today it is estimated that it will cost \$1,000 per linear foot of wall to repair piles. This would be about \$140,000 for a typical building in this area.

A geotechnical report on groundwater problems in the Back Bay recently completed for the city sites problem areas and identifies areas in need of immediate remedial attention. Several recommendations for action include:

- o Installation of a groundwater observation and monitoring well system.
- o Legislation and/or revisions to the Massachusetts Building Code.

- o Recommendations to the Metropolitan District Commission and Boston Water and Sewer Commission for further investigations and an immediate installation of a recharge system at the foot of Pinkney, Mt. Vernon, and Chestnut Streets along Storrow Drive.

The city is now in the process of setting up a cooperative working group among state and city agencies to determine what actions different agencies need to take to address groundwater problems. An important part of this action is to seek funding at the state or federal level to support the cost of needed repairs.

NOTES

1. Bruce Kelly, Gail Travis Guillet, and Mary Ellen W. Hern, Art of the Omsted Landscape (New York: New York City Landmarks Preservation Commission and the Arts Publisher, Inc., 1981), p. 85.
2. Anne Whiston Spirn, The Granite Garden: Urban Nature and Human Design (New York: Basic Books, Inc., 1984) pp. 14-15.
3. Ibid, p. 184.

