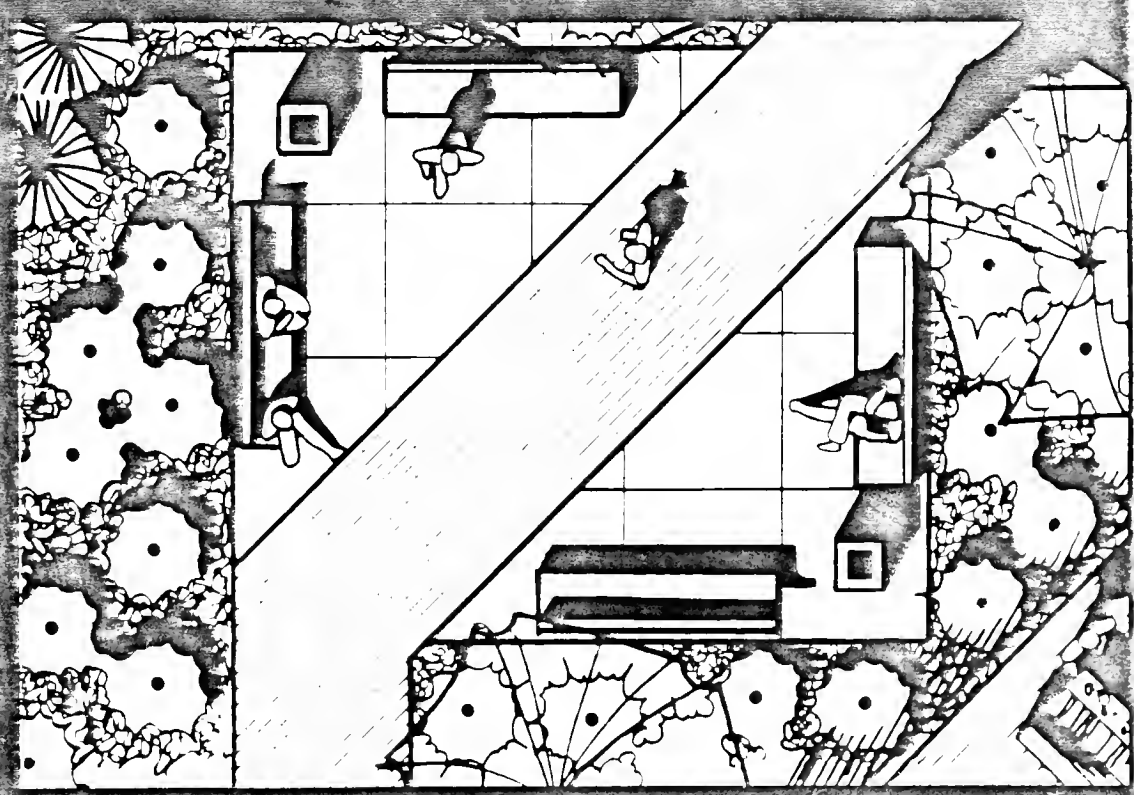
ATTACHMENT 2



MASCO

Longwood Medical Area

table of contents

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preface

Over the past several months MASCO has been meeting with institutional representatives and their architects and designers to develop an awareness and shared sense of the value of the Longwood Medical Area's open space. In the course of these meetings, ideas, plans, and possibilities for improving the appearance and operation of the Longwood Medical Area have been presented and discussed. This report presents a framework for open space improvement and describes current and future programs within that framework. Some programs will be implemented by MASCO; some by area institutions; and some as joint efforts.

The goal of the Framework is to re-establish the value of public and private open spaces in the Longwood Medical Area. It outlines the programs and a local philosophy of open space planning as it applies to urban design, the setting of old and new buildings, safe and convenient pedestrian areas, and places for social interaction.

introduction

Improving the appearance of the Longwood Medical Area (LMA) has long been recognized as a vital component to the growth of the LMA as a world-class medical and educational center. With its diversity of architectural styles, the area is a collection of buildings in search of a common identity. From the Beaux Arts beauty of the Harvard Medical School Quadrangle to the obscured Italianate lines of the Longwood Pharmacy, the area's buildings exhibit their own particular characteristics.

However, first-time visitors or new patients are understandably overwhelmed when face-to-face with these varying visual images. There is nothing inherently wrong with this eclectic blend of styles. In fact, it says alot about the individuality of each institution.

But an opportunity exists to showcase these institutions, much as you would a picture in a frame. In this case, the frame, or framework is the open space—the green lawns, planting beds, unpaved areas, sidewalks, even parking lots—that surround these buildings. This open space framework to develop, improve, and preserve open spaces will enhance the LMA's visual environment.

There are additional reasons to provide for open space. For thousands of years man has understood the important medicinal benefits of open space. In Epidaurus, Greece (1500 B.C.) and in Milan (1480 A.D.) open space played an important role in the healing process by helping rest and renewal to occur. In the late 19th century, Frederick Law Olmsted, the founder of landscape architecture in America, wrote "...the charm of natural scenery is an influence of the highest curative value." The Prouty Garden of Children's Hospital is an excellent modern-day example of the restorative value of open space on patients.

As building development in the LMA continues at a rapid pace, we must allocate space for open areas as well as for buildings. Most visitors get their first image of the LMA from the streets and sidewalks as they arrive here, not from the hospital's and school's interiors. Without an open space philosophy, or framework, the LMA will continue along a development path leading to concrete environments of extremely high densities with little consideration for amenities on a smaller, human scale.

The goals of this Open Space Framework are to:

- Improve the visual and physical environment of the LMA;
- Focus on the well-planned use of the LMA's open space, rather than it being leftover areas between buildings;
- Provide restful and restorative outdoor spaces for patients, visitors, staff, and students;
- Make pedestrian areas more attractive, useful, clean, and safe;
- Contribute to a sense of common identity and place by standardizing certain built elements;
- Provide a framework for better planning and development;
- Encourage incorporation of open space into future projects.

A series of programs within that open space framework will achieve the goals described above. Some of these programs are underway already; others are envisioned. Some will be continual, such as street tree planting and maintenance programs.

pedestrian amenities system

Very little open land of significant size is available in the LMA for open space uses. Sitting areas are particularly scarce. There are a few scattered sites, but these are extremely inadequate considering the number of people in the area. Furthermore, proposed building activities could greatly reduce the amount of available pedestrian amenities.

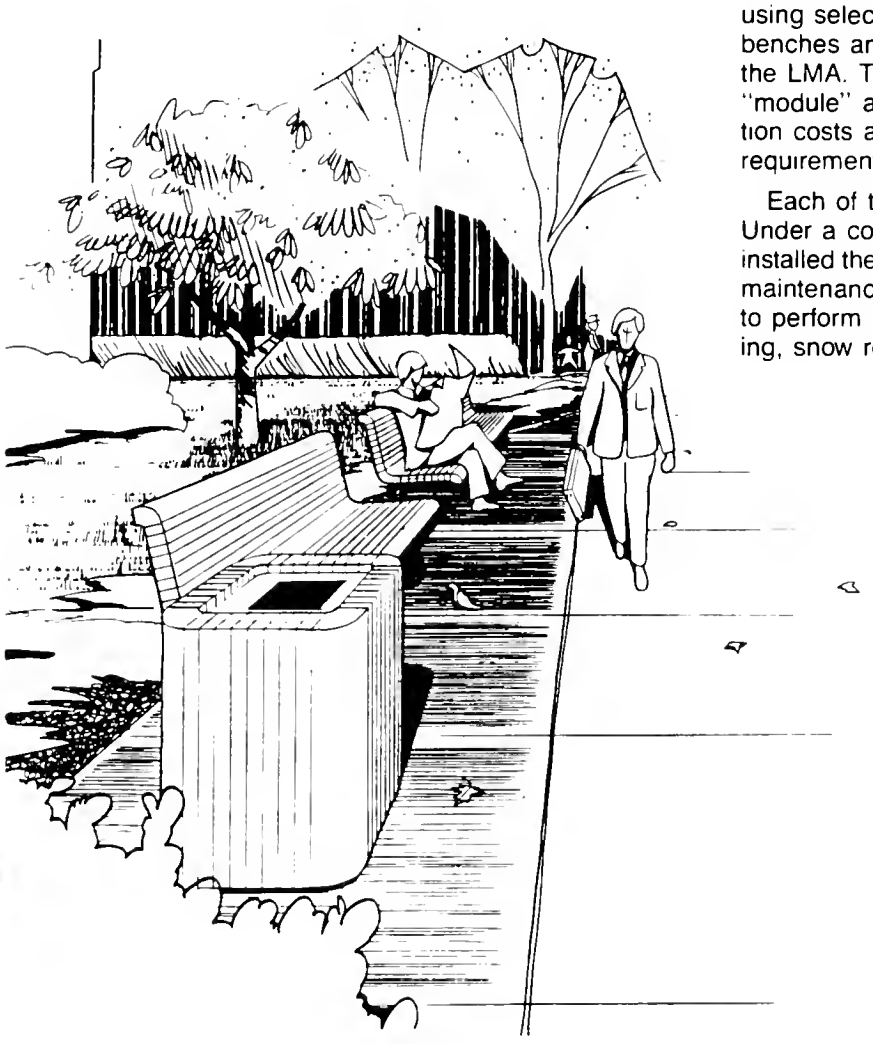
Many "leftover" or underutilized parcels have resulted from past development. These parcels could create opportunities for specialized open space improvement. To address these conditions, the Pedestrian Amenities System has been developed.

An approach has been developed to inventory and analyze potential sites emphasizing existing underutilized space. With the assistance of landscape architecture consultants, over 50 potential sites were identified, and an evaluation was conducted to determine which sites were appropriate for sitting areas. The criteria included:

- Location and use potential
- Relationship to surroundings
- Site availability
- Ease of construction
- Space adequacy
- Adaptability to standardized system

Using these criteria, 13 sites have been developed thus far. Just as the LMA Sign Program has begun to create a sense of identity for the LMA, the Pedestrian Amenities System has reinforced this identity and continuity by using selected street furnishings (mahogany contour benches and trash receptacles) and plantings throughout the LMA. The furniture and plantings are installed in a "module" approach that minimizes design and construction costs as well as reduces maintenance and repair requirements.

Each of the 13 modules was installed on private land. Under a cooperative agreement, MASCO furnished and installed the pedestrian module and is responsible for major maintenance and repair efforts. Each institution agreed to perform routine maintenance; i.e., grass cutting, watering, snow removal and emptying of trash receptacles.



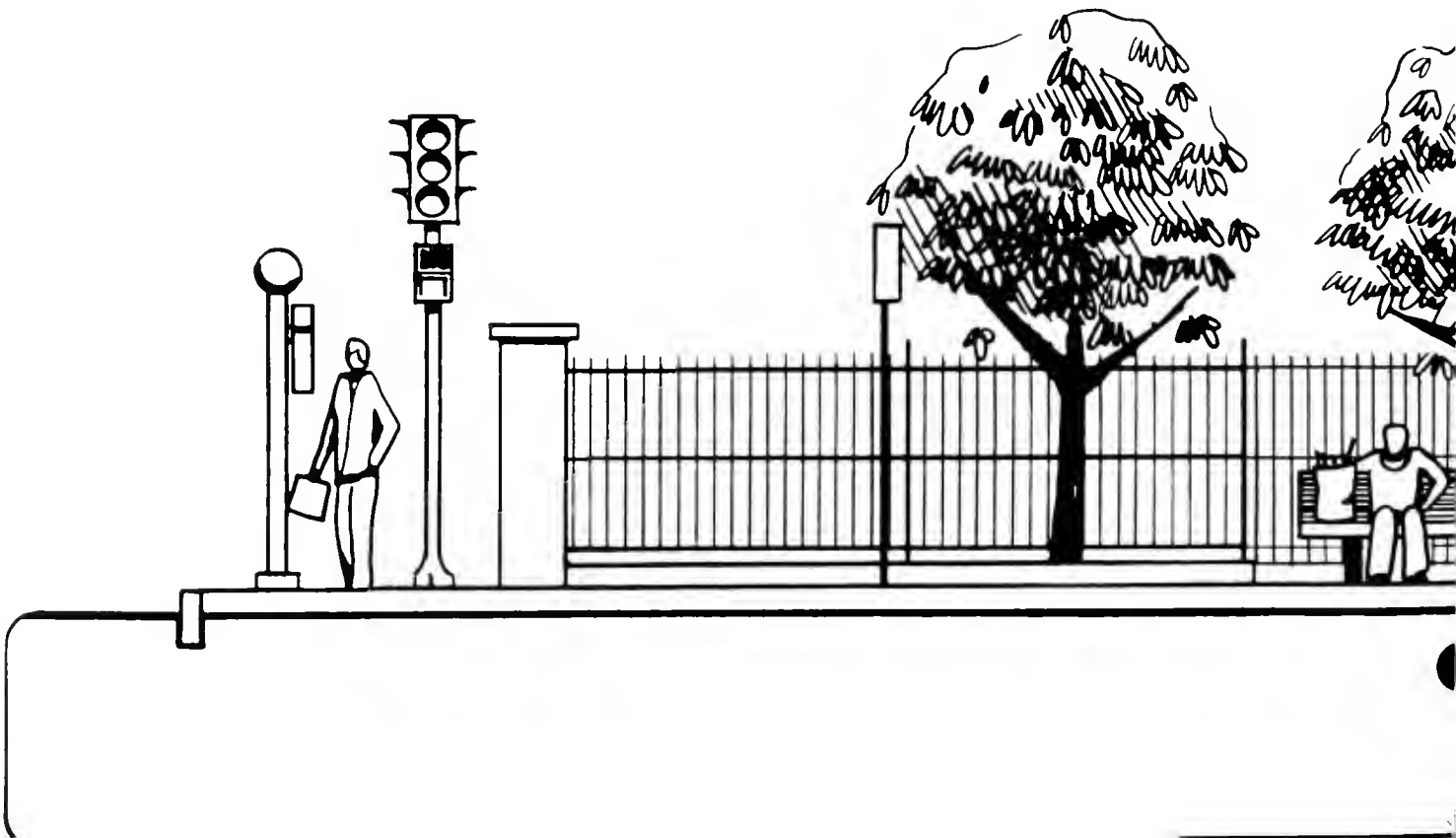
bus shelter and bus stop improvements

Three bus routes with 15 bus stops serve MBTA bus commuters in the LMA. Although the MBTA has provided a few shelters for its riders, those shelters are rarely used unless a driving rain forces people inside. These old aluminum shelters are uninviting, poorly maintained, and in some cases, poorly situated. They clearly do little to encourage MBTA ridership.

From a design perspective, the old shelters have no relationship to their surroundings. They are simply bolted to the sidewalk regardless of adjacent buildings or pedestrian circulation.

The new LMA bus shelters are permanent steel structures designed from the ground up and intended to integrate with their surroundings. The shelter's bench is the standard bench of the Pedestrian Amenities System. The shelter's color and graphics complement the LMA Sign System. The setting and uses adjacent to shelters were primary considerations during the design process. They are incorporated into the existing and potential land uses, along with supplemental plantings.

Across from Beth Israel Hospital, at the intersection of Brookline Avenue and Short Street, a shelter has been located behind the sidewalk on land owned by Simmons College. The new fencing and landscaping which blends into the streetscape allows pedestrians to easily walk in front of the shelter. Additional benches were added to accommodate the heavy use of this site.



Other shelters are planned for high-use bus stops along Brookline and Longwood Avenues. At these locations, proper siting and landscaping will be utilized to ensure that the shelters are not intrusive elements.

Beth Israel has installed another bus shelter near its main entrance. Although a different architect and contractor were used, they closely cooperated with MASCO to coordinate the design and graphics. As a result, all shelters will have a common identity and continuity, achieved without losing individual design tastes.

Maintaining the bus shelters, as with all street furniture, is critical. Beth Israel not only maintains its own shelter, but also the shelter at Brookline Avenue and Short Street. Plans are now underway to design, build, and form cooperative maintenance agreements for additional bus shelters in the LMA. Potential locations for these new shelters include the stop at Brookline Avenue and Longwood Avenue by the Winsor School, the stop adjacent to Children's Hospital emergency room, the stop at Brookline and Francis Street at the power plant, and various stops along shuttle-bus routes.

At several locations, the conditions or the relatively small number of waiting commuters do not justify providing bus shelters. At these locations, bus stop sitting areas have been installed using the modular approach of the Pedestrian Amenities System. Three have been constructed and others are under consideration.

riverway–fenway program

A greenbelt of parkland known as the Riverway and the Fens surrounds much of the LMA. These two links of the "Emerald Necklace" were designed by Frederick Law Olmsted and completed in the late 1880s. Olmsted transformed the Riverway from a brackish swamp into a scenic waterway by narrowing the Muddy River and planting trees and shrubs along raised banks. A system of footpaths and bridletrails was introduced throughout parkways with pedestrian traffic separated from vehicular traffic. In the Back Bay Fens, or Fenway, Olmsted designed a system of intercepting sewers and storage basins to convert a tidal swamp into a natural saltmarsh. The bordering floodplain became parkland.

Over the years this open space was neglected. Maintenance was deferred or nonexistent; additions to the roadway network obliterated much of the scenic design; and engineering changes to the original design contributed to the decline and decreased use of the Riverway and Fenway parklands.

The City of Boston, through a grant from the Massachusetts Department of Environmental Management, is rehabilitating the Emerald Necklace. This includes cutting back overgrown areas, restoring footpaths and bridges, and other capital improvements.

Abutting LMA and Fenway institutions have indicated a desire to share in maintaining these areas once they have been rehabilitated. The Deaconess Hospital has recently signed an agreement with the City to maintain a significant portion of the area. Simmons and Emmanuel Colleges have shown interest in area maintenance. The size and quality of these open spaces represent an important asset which could be used by employees, students, visitors and residents.

As building density increases, these greenbelt areas become more and more analagous to Central Park in Manhattan. The Riverway and Fenway when rehabilitated will represent an opportunity for patients, visitors, staff and students to enjoy a walk in a country setting as a temporary escape from day-to-day problems, just as Olmsted envisioned it. These areas can expand available open space on adjacent campuses for active and passive recreation. Many people already use the jogging trails or bike trails, and this should be further encouraged. Several programs within the medical institutions already use these open areas for the therapeutic benefit of their patients. Wheelock College classes use the Riverway for field work. It's possible that other academic classes could also make use of the area as well.

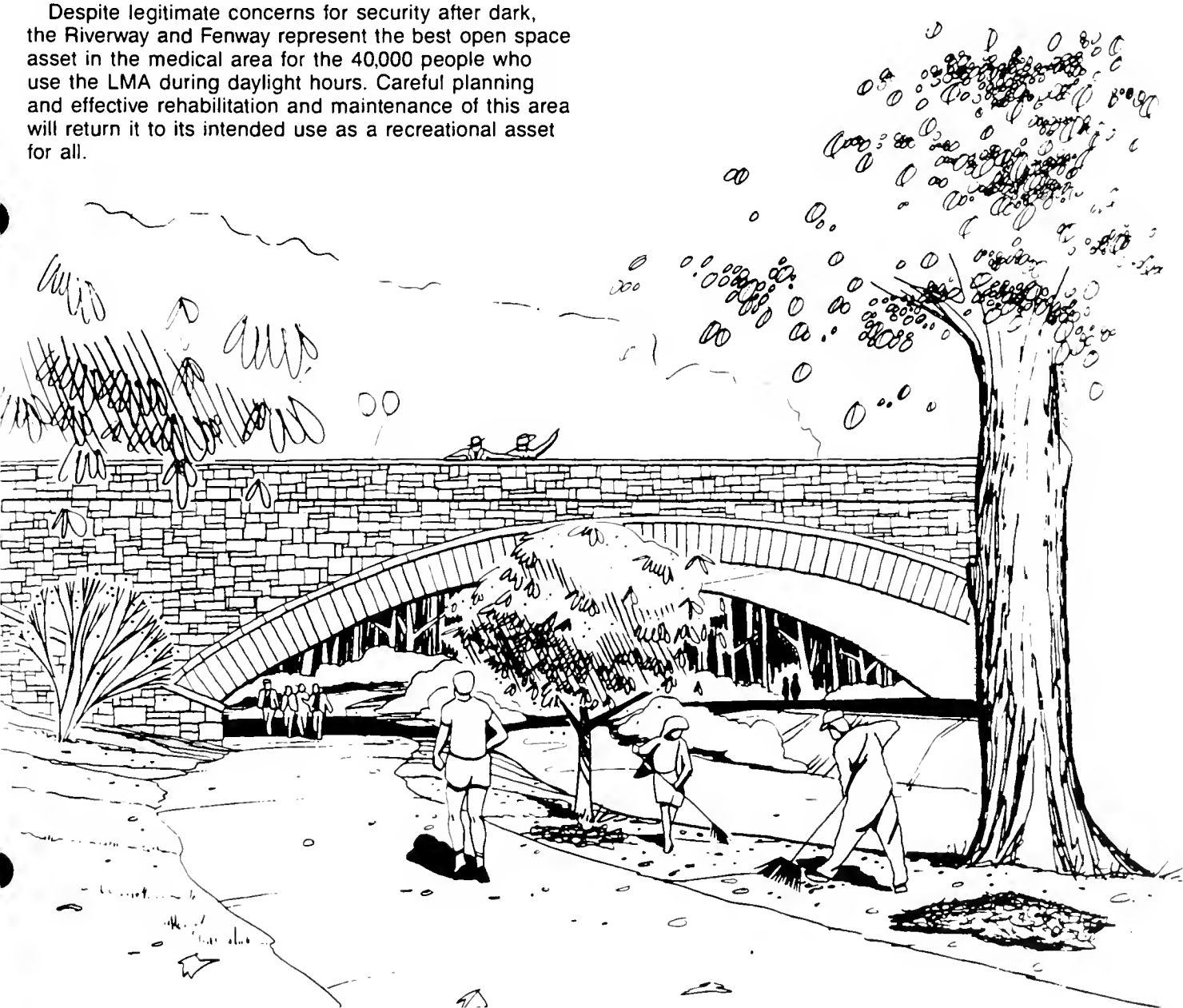
Finally, the Riverway and Fenway are important links in the open space framework created through street planting programs and other open space improvements. Gateway areas between the LMA and the Riverway/Fenway should be marked more clearly by pedestrian crosswalks, better paths, and small scale signing.

Once rehabilitation has been completed and maintenance arrangements begun, the remaining important issue will be security. While the Brookline side of the Riverway is regularly patrolled by town police, no regular police presence exists in the Boston area, although the Boston Urban Park Rangers patrol the area during the summer from 11 a.m. to 7 p.m.

Clearing away overgrown vegetation and unnecessary understory growth will have a beneficial impact on visibility and subsequently help to deter crime, but some type of regular volunteer or contract service patrol should be established as part of the area's overall maintenance plan.

Lighting is not advocated for interior portions of the Riverway and the Fenway. Even in Olmsted's day, crime was a fact of life, and his parks were designed so that portions could be closed at night.

Despite legitimate concerns for security after dark, the Riverway and Fenway represent the best open space asset in the medical area for the 40,000 people who use the LMA during daylight hours. Careful planning and effective rehabilitation and maintenance of this area will return it to its intended use as a recreational asset for all.



street tree planting and maintenance program

The LMA is not as green as it once was, but we have the opportunity to make it greener through a street tree planting program. The LMA's urban environment is harsh on trees; many have been susceptible to disease and damage brought on by such outside forces as street and sidewalk repair, salt damage, snow removal, and vandalism. Wear and tear over the years is hard on trees in this area. For example, urban soil tends to be compacted by the constant pedestrian and vehicular traffic; root development is stunted; water and nutrients are not as easily absorbed into the soil; and winter road salting has an extremely harmful effect. Airborne pollution from vehicles and industry also takes its toll. Despite these problems, there are many reasons for having trees and working to maintain them.

The most obvious reasons are that they bring form, color, diversity and movement to the inanimate cityscape. They can draw the eye to desirable views and screen other less desirable views. Consider how important the lindens are along Avenue Louis Pasteur. They bring a sense of unity and order to the street. The abutting institutions have recognized this and have jointly paid for pruning and fertilizing these trees. In an area as densely built as the LMA, trees can soften the hard edges of buildings and provide contrasts in color and form in response to seasonal changes.

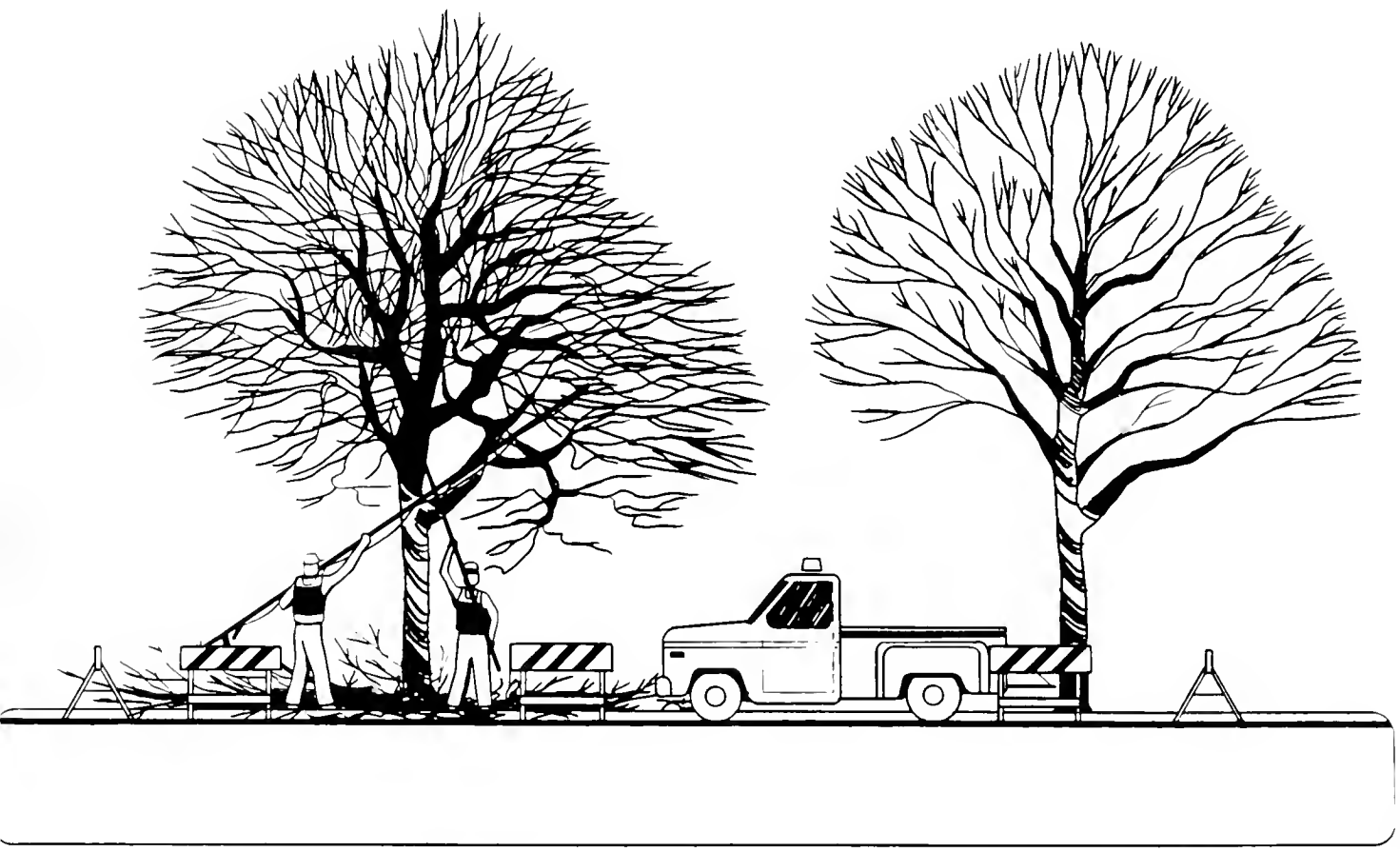
Trees provide important shade for pedestrians during hot summers and shade portions of buildings as well. Ongoing studies also show how trees moderate the microclimate by serving as windbreaks, by removing airborne pollutants, and by adding oxygen to the atmosphere. On hot summer days, trees absorb heat and release it at night. Trees also can diffuse noise by scattering sound waves. Finally, trees and related landscaping can increase property values.

Since we know that city streets are stressful areas for trees, it's important to have several criteria in mind before planting. The species selected should be native or adaptable to the New England climate and city conditions. Soil conditions should be suitable for the trees' growth and sustenance. There should also be adequate space for growth below and above the surface. The purpose of the tree should determine the species of the tree chosen. Is it intended to screen a dumpster? Is it a flowering type intended to improve the appearance of a drab location? The proper species should provide the desired benefits for a long time—up to 50 years—but pruning, spraying, fertilizing, and watering are part of the bargain.

MASCO is planning to undertake a major tree planting program in the next few years. Individual city blocks will be targeted for this program with the goal of gradually bringing back to the area many of the street trees that once flourished here.

Rather than spread newly planted trees too thin, massive plantings will be concentrated in specific blocks. When one block is done, subsequent phases of the program will move on to the next block.

It is important to have a diverse population of tree species to avoid having our tree population destroyed by disease or insect infestation such as Dutch Elm Disease. The list below includes some of the street and flowering trees which should be considered for this area. Others would also thrive in the local environment. (For more information on the selection and care of street trees, see the Fall 1984 issue of Arnoldia, the magazine of the Arnold Arboretum).



Suggested Shade Trees

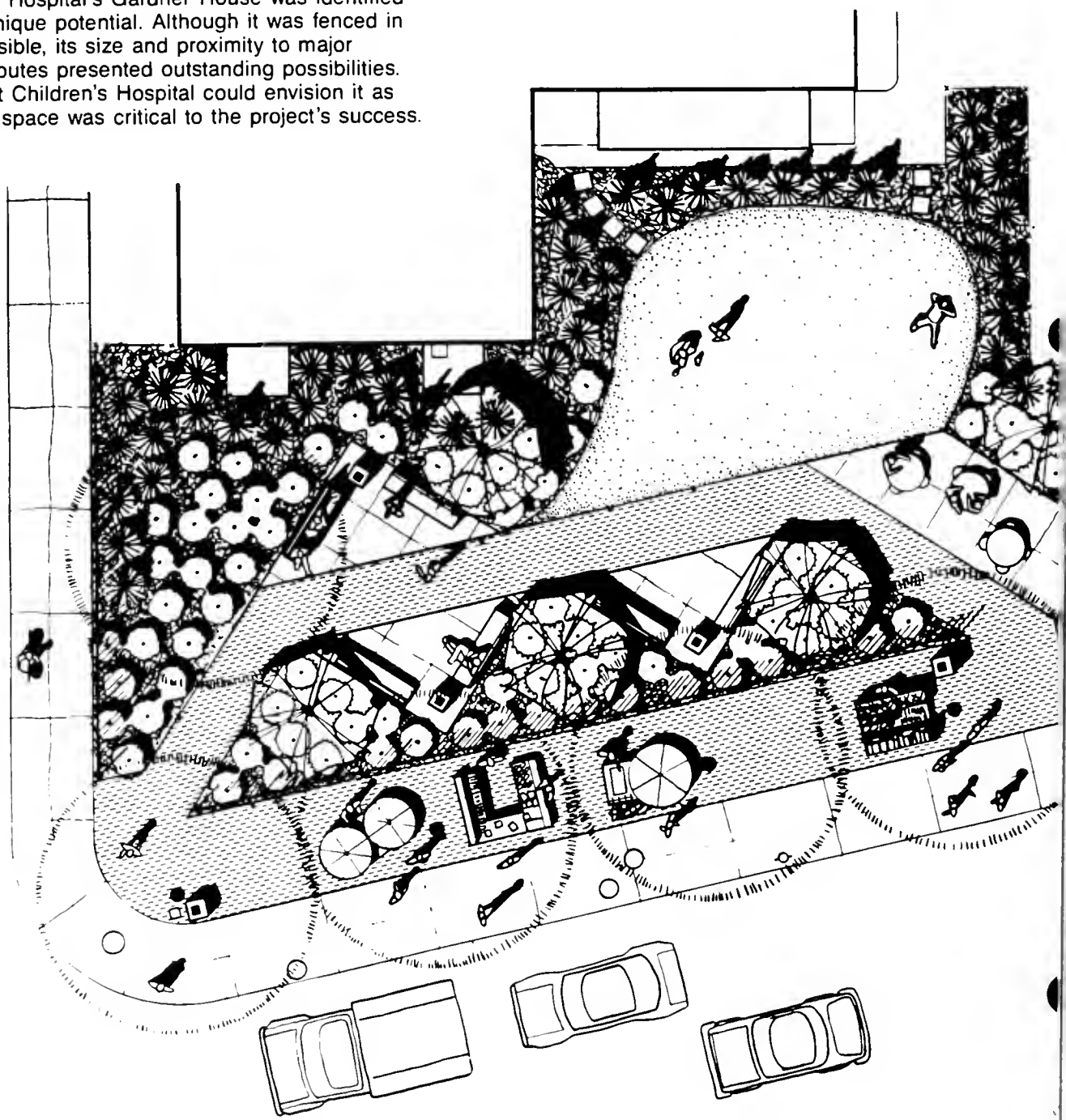
Acer platanoides—Norway Maple
Acer pseudoplatanus—Sycamore Maple
Acer rubrum—Red Maple
Acer saccharum—Suger Maple
Carpinus betulus—European Hornbeam
Cladrastis lutea—Yellowwood
Fraxinus pennsylvanica lanceolata "Marshall's Seedless"—Marshall's Seedless Green Ash
Ginko biloba (Male)—Ginko
Gleditsia triacanthos "inermis"—Thornless Honeylocust
Liquidambar styraciflua—Sweetgum
Nyssa sylvatica—Blackgum
Platanus acerifolia—London Planetree
Quercus borealis—Northern Red Oak
Quercus rubra—Red Oak
Quercus palustris—Pin Oak
Quercus robur—English Oak
Tilia cordata—Littleleaf Linden
Zelkova serrata "Village Green"—Zelkova

Suggested Small and Flowering Trees

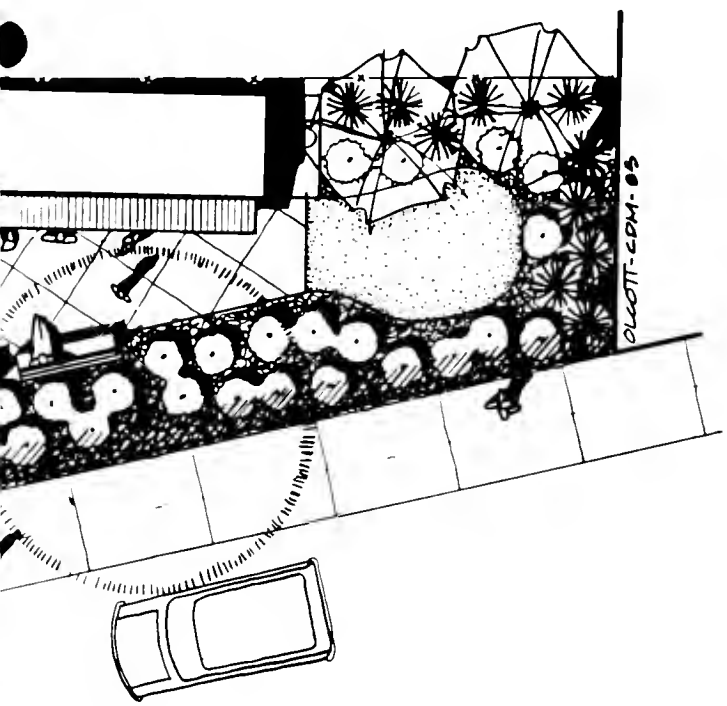
Abies concolor—White Fir
Acer buergeranum—Trident Maple
Acer ginnala—Amur Maple
Acer griseum—Paperbark Maple
Betula nigra—River Birch
Cercis canadensis "Alba"—White Eastern Red Bud
Cornus kousa—Chinese Dogwood
Crataegus phaenopyrum—Washington Hawthorn
Elaeagnus angustifolia—Russian Olive
Malus (Species)—Selected Crabapples
Oxydendrum aboreum—Sourwood
Phellodendron amurense—Amur Corktree
Picea pungens—Colorado Spruce
Prunus serrulata "Kwanzan"—Kwanzan Cherry
Syringa reticulata—Japanese Tree Lilac
Pinus thunbergi—Japanese Black Pine
Pyrus calleryana "Bradford"—Bradford Flowering Pear

children's park

There have been few opportunities to create significant sitting areas or parks in the LMA. The Pedestrian Amenities System intends to locate and develop the small, underutilized parcels of land in the LMA. During the initial site survey, a 7,500 square-foot area adjacent to Children's Hospital's Gardner House was identified as having unique potential. Although it was fenced in and inaccessible, its size and proximity to major pedestrian routes presented outstanding possibilities. The fact that Children's Hospital could envision it as public open space was critical to the project's success.



The park was designed to provide a space for passive recreation and to provide space for many of the street push-cart vendors in the Longwood Avenue area. The park design features a modified version of the standard pedestrian module with the same style mahogany contour benches and waste containers. At the hopsital's suggestion, the sidewalk was widened by pulling back a wrought-iron fence. A new 10 ft-wide brick sidewalk combined with an existing sidewalk resulted in an 18 ft-wide sidewalk to accommodate both pedestrians and small push-cart vendors. Brick is also used in a new walkway surrounding the modules and connecting the sitting areas to two new park entrances from the public sidewalk. Finally, over 150 trees and shrubs were planted to supplement the existing mature shade trees and to provide seasonal color and interest.



At the hospital's request the east end of the park was designed to allow space for a popular neighborhood food stand. This food vendor paid for his own relocation and for planting and improvements designed by MASCO's landscape architect. In addition to satisfying neighborhood appetites for Middle Eastern food, the vendor's 24-hours-a-day presence in the LMA offers convenience and security for the area— factors that particularly interest the Children's Hospital. Routine park maintenance is shared by Children's Hospital and the food vendor.

The presence of vendors and outdoor eating places is an important aspect of the open space framework for the LMA. Street vendors and outdoor eating areas represent a kind of "social greening" and ambience that does not exist at present. Additional construction in the area will eventually offset this deficiency by providing eating and retail outlets. As development occurs, plans for outdoor spaces should incorporate a variety and mix of space, seating areas, and plantings that will contribute to the public's enjoyment of the LMA open spaces.

shattuck street mall

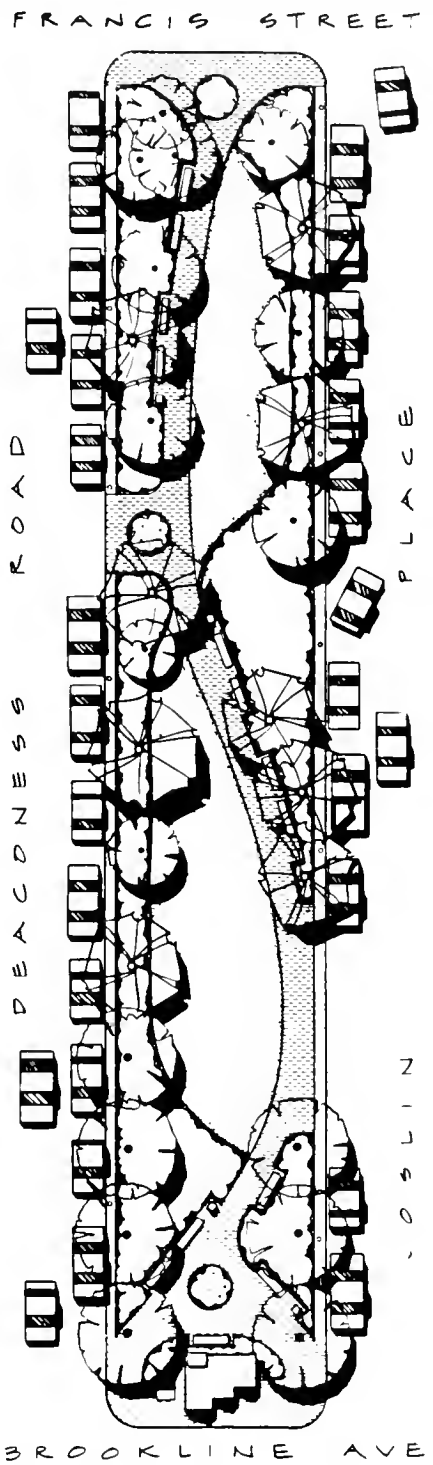
Shattuck Street is a privately owned roadway currently used by several institutions as a service and loading area, pedestrian thoroughfare, and main entrance. It could potentially be one of the best pedestrian areas in the LMA. The street borders four major institutions—Children's Hospital, Dana-Farber Cancer Institute, Harvard Medical School and Brigham and Women's Hospital. It has a strong sense of enclosure and considerable architectural interest due to the mix of old and new buildings. Unfortunately, other aspects make it less successful as an open space or mall. These are: parking areas which produce pedestrian/vehicular conflicts, an ambulance parking/drop-off area, truck service areas, and a construction process that is likely to continue for several years. Brigham and Women's is upgrading outdated buildings on Shattuck's south side and Childrens' Hospital is constructing its new buildings on the north side.

The neighboring institutions are now working with MASCO to resolve some of these issues, to make the daily pedestrian experience of Shattuck Street safer and pleasant. The solutions under discussion for this area include:

- Organize and restrict parking and traffic along the street;
- Separate pedestrian walkways from street and parking areas by utilizing special sidewalk treatment;
- Strengthen the transition from street to building entrances by clearly defining the connecting alleys and by improving public entrances to buildings;
- Open up the area by removing barriers such as chainlink fences;
- Add pedestrian seating areas and other street furniture to the walkway area on the north side of the street;
- Plant trees and shrubs in areas with sunny exposures and adequate sidewalk width and link these planting areas with "green" areas along Binney Street;
- Improve the facades;
- Evaluate and coordinate development plans to preserve openness (and sunlight) on Shattuck Street;
- Explore the possibility of locating street vendor retail activity here, with emphasis on meals and snacks for area employees.

Although considered a service area, Shattuck Street is also heavily used by pedestrians. It appears strictly as a pathway from one place to another and people are not encouraged to use the area as an open space. Nevertheless, the area directly connects four institutions and one major open space, the Harvard Medical School Quadrangle, is linked to Shattuck Street. Connections to other open spaces can make Shattuck Street part of an inviting and dynamic pedestrian network.

joslin park



Joslin Park is a City-owned park that has been landscaped and maintained for many years by the New England Deaconess Hospital and Joslin Diabetes Center. Most of the plantings were installed by Deaconess Hospital several years ago when a utility tunnel was constructed under the park. The park is a critical element in the LMA open space network because of its proximity to the main entrances of both Deaconess and Joslin and to the heavy pedestrian use. It is the largest public open space in the LMA and provides green area in the most urbanized part of the LMA.

It's important to recognize that the existing Joslin Park, also known as Longwood Park, has served residents, employees, and visitors of this area for well over 100 years. The park's use has increased since its original design. Because of the area's potential capacity and aesthetic quality, it's clear that a new open space plan should be formulated for the park.

The potential bus shelter construction at the foot of Joslin Park has created a new opportunity to analyze the park and how it is used. MASCO and the park's neighbors met to develop a new master plan for Joslin Park. Even though the current park is a success, the new master plan design is intended to further fulfill the park's potential. Pedestrian circulation and sitting areas will be improved by eliminating the preponderance of crosscutting diagonal paths. A more circuitous path will be introduced which will actually reduce the paved areas and provide more room for grassy sitting areas, more and larger benches, and additional trash receptacles. The proposed main path from Brookline Avenue to Pilgrim Road will also decrease the severe slope between these streets and thus be more accessible to the handicapped. The existing stone dust pathway will be replaced by a brick walk to reduce maintenance costs and allow better wheelchair access.

The new landscape design affords the park visitor more privacy since each bench faces away from other benches and parked cars. Small nodes or alcoves are then created at several locations along the main path and at the entrances into the park from surrounding streets. At Joslin, at Brookline Avenue, and at the Deaconess these entrances each become a focal point for the park while the remainder of the green space takes on a more natural meandering style. Each of these focal points or alcoves will include an item of sculpture or ornamental planting to distinguish its location. The entrance to the Joslin Diabetes Center is poorly defined, but the addition of a brick crosswalk between the park and the center will connect the two. In effect, the park would become a front lawn to Joslin and Deaconness.

Finally, the selected shrubs and trees will provide a low screen for park users, shielding them from the traffic and parked cars on Joslin Place and Deaconess Road. Existing trees have been incorporated into the plan and supplemented with further tree plantings to provide shade and enclosure.

signing

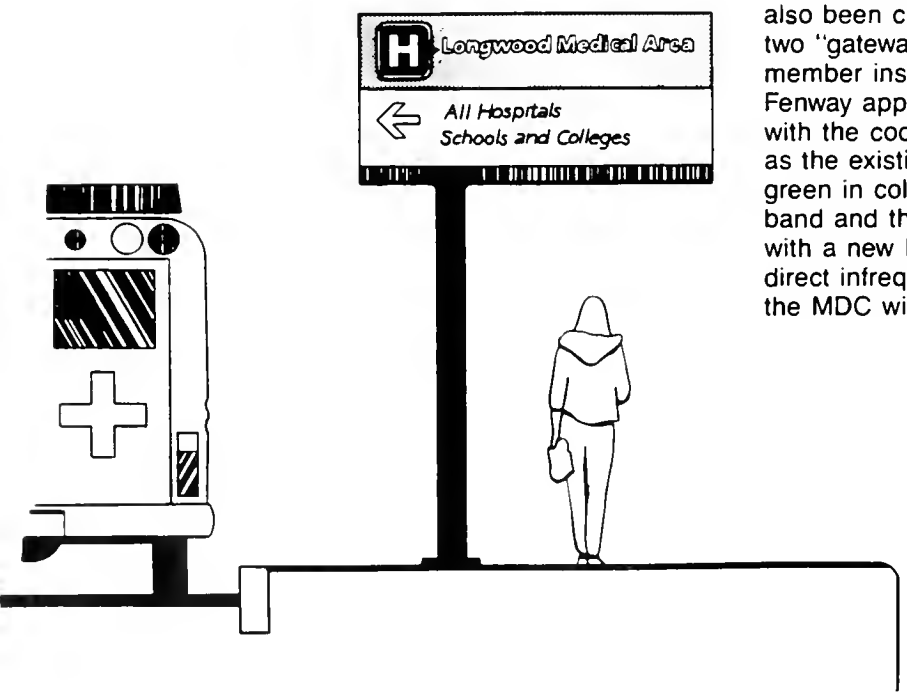
As a world renowned center for research, patient care, and education, the LMA's overlapping campuses combined with poor street and private signing made it difficult to locate main or secondary entrances and parking garages. Existing signs were often bunched together in a clutter of unrelated information.

A comprehensive exterior sign program was developed. Its goals: to provide new visitors easier access to institutions, to improve traffic flow, and to establish a cohesive identity for the LMA. The graphic design concept was based on the traditional white "H" on a blue background and the legend "Longwood Medical Area." Four sign types were created and each sign displayed its legend in distinctive typeface on white reflective sheeting.

- Major directional signs were installed at 27 locations within the LMA. These large 8 ft × 5 ft signs were mounted on steel poles and included institutional names and directional arrows;
- Advance street name signs were installed at 11 locations. These signs were placed 200 ft before intersections to inform oncoming motorists of the next crossing street;
- Street name signs were installed at 82 locations. Twice as large as the existing street name signs they replaced, the new signs are installed in such a way that the motorists not only know what street they're crossing, but what street they're on; very unusual for Boston!
- More trailblazer signs were installed in Boston and Brookline on approaches to the Longwood Medical Area. The traditional "H" sign for hospitals was modified to complement other LMA graphics and the legend "Longwood Medical Area" and a directional arrow are shown on the signs.

Finally, a distinctive blue band appeared on each sign face. The signs have helped identify the LMA as a distinct neighborhood. (The easily identifiable color scheme and typeface have also been extended to other media such as bus shelter graphics, hand-held maps, garage maps and bus exteriors.) The signs have helped create a cohesiveness and "sense of place," while maintaining the institutions' individual identities.

The second phase of the LMA Sign Program has also been completed. Seven major directional signs and two "gateway" signs have been installed on behalf of member institutions by MASCO along the Riverway and Fenway approaches to the LMA. These signs, placed with the cooperation of the MDC, have the same format as the existing blue/black/white signs, but are MDC green in color. Each sign carries a distinctive white band and the legend "MetroParkways" in compliance with a new MDC graphic identity. The signs not only direct infrequent visitors to the LMA, they also provide the MDC with a new sign program.



sidewalks and pedestrian pathways

Sidewalks and pathways connect institutions to one another and to transportation systems. The pedestrian circulation system in the LMA is extremely important since all who visit the area must use it. However, it has received little emphasis or treatment. For the most part, pedestrians use the leftover areas between buildings and streets, and the undefined pathways through parking lots.

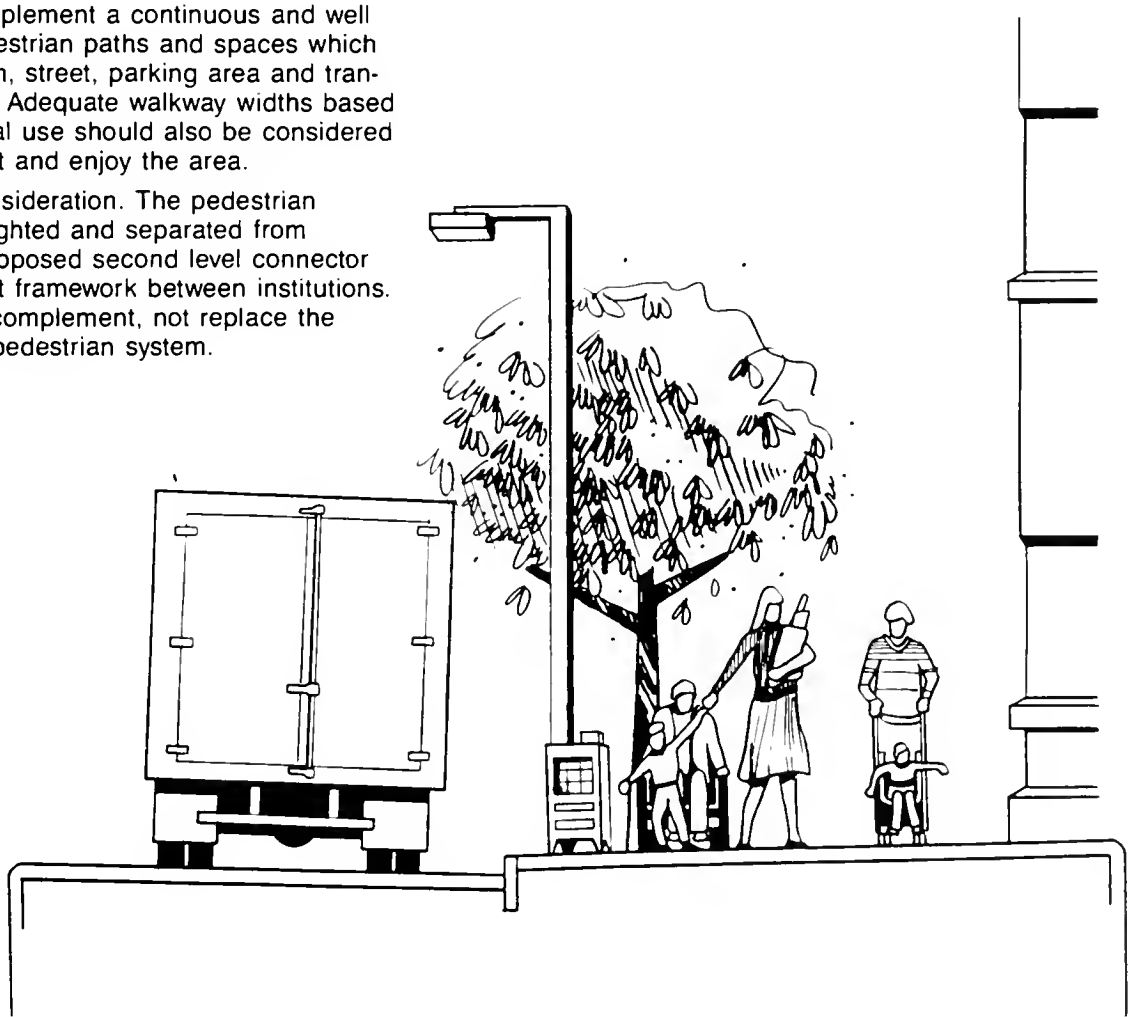
The area's circulation system should encourage use and make people feel comfortable in this environment. The public's awareness of an open space network dedicated to the pedestrian should be increased. The park-like character of the northern LMA should be maintained and connected to the more dense urban areas to the south. Visual and physical connections also should be made to the Riverway/Fenway open spaces at such locations as Short Street, Palace Road, and Netherlands Road.

The first step is to implement a continuous and well marked network of pedestrian paths and spaces which connect every institution, street, parking area and transit location in the LMA. Adequate walkway widths based on existing and potential use should also be considered to invite the user to rest and enjoy the area.

Safety is a prime consideration. The pedestrian network must be well lighted and separated from vehicular traffic. The proposed second level connector will provide an excellent framework between institutions. The connector should complement, not replace the need for the on-grade pedestrian system.

Many of the institutions will be expanding or changing their facilities in the near future. The pedestrian network will be restructured as a result. Sidewalks should be widened where possible to accommodate plantings and/or benches, as well as anticipated pedestrian traffic. Walkways should be a minimum of 10-12 ft. wide. Improved institutional entrances will also be important in orienting the visitor. Parking areas should be redefined to provide sidewalks and pedestrian pathways. Areas of pedestrian/automobile conflicts should be identified and resolved to include better crosswalk definition and clear separation of vehicles and pedestrians.

Some busy sidewalk areas that clearly need improvement include: the eastern side of Binney Street, the west side of Brookline Avenue (along the Winsor fence), the heavily travelled route from Children's to Beth Israel that goes behind the Children's Hospital garage, and the entire length of Longwood Avenue.

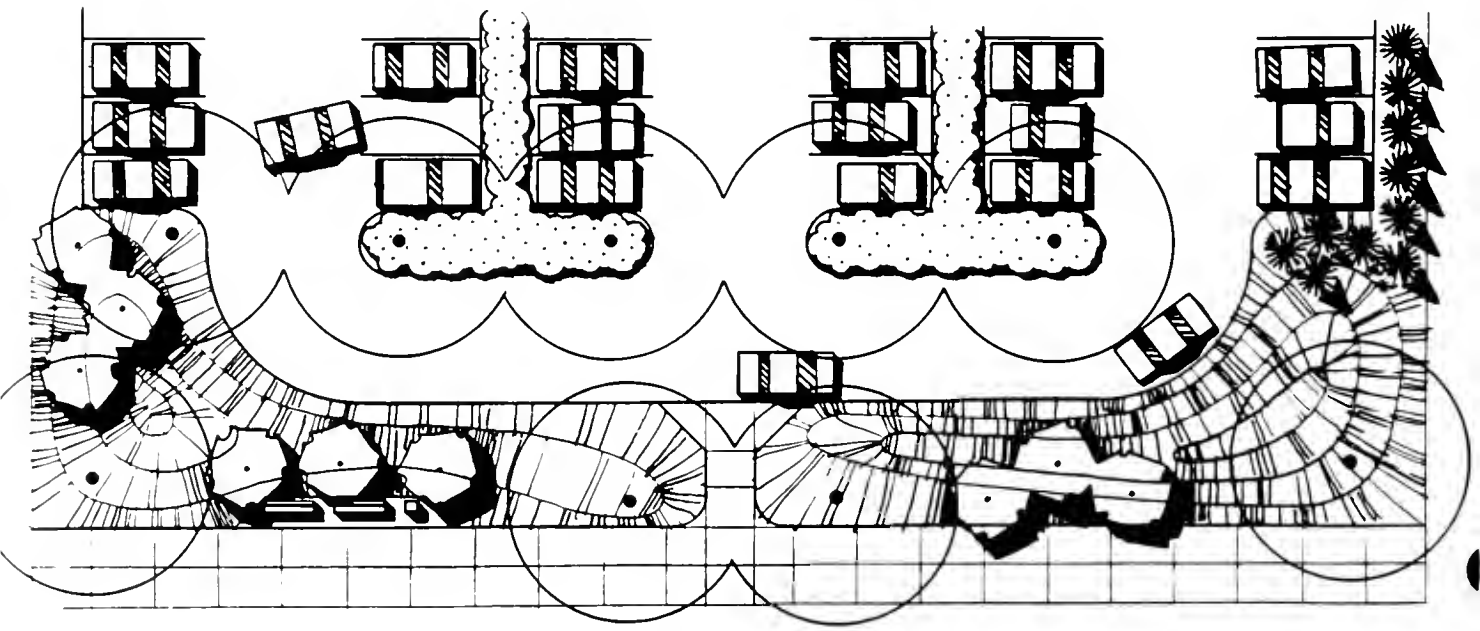


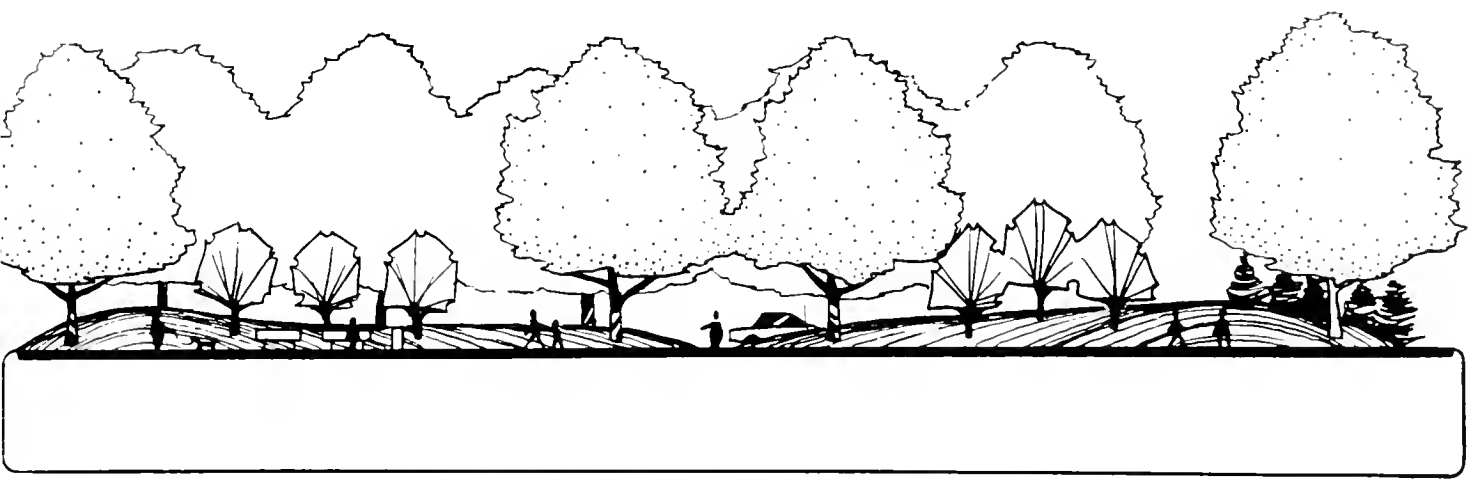
parking and loading areas

Buildings and roadways, parking and loading areas are the largest land use within the LMA. Parking areas make up much of the open areas between buildings and institutions and reduce the visual density of the urban area. Many of the parking areas also serve as pedestrian corridors and pathways between institutions. Parking spaces are extremely valuable as demonstrated by the cost of parking. As the need and cost for parking increases, so wil the potential for construction of parking garages and, subsequently, the loss of actual and perceived open space.

Existing surface parking lots appear poorly organized, with minimal planting and pedestrian definition. Many of the lots do not have adequate maneuvering areas for cars and even less for larger vehicles such as sanitation, fire, and delivery trucks.

Existing and future parking lots should contain adequate aisle widths to accommodate vehicles (20 ft. is considered a minimum). In addition, when parking areas are designed, existing pedestrian circulation patterns should be analyzed. Sidewalks and pathways should be provided for clear separation of pedestrians and vehicles. The present visual sea of asphalt should be broken up with plantings. Street trees and shrub masses would not only break up the bleak visual expanse of the parking lot, but also would shade and offer visual definition of parking and circulation areas. Evergreen plantings can be utilized to screen parking and loading areas from adjacent non-compatible land uses.





Adequate space should be provided for institutional service areas. Large tractor-trailer trucks, which usually measure 50 ft. in length, require a minimum outside turning radius of 60 ft. and a vertical clearance of 14 ft. Curb radii at corners must be 40-45 ft. Loading docks/areas are not usually attractive, and therefore should be placed in low traffic areas well screened from adjacent uses. Dumpsters which are compatible with loading areas should be incorporated into these areas where possible. Interior storage of dumpsters is desirable but not always feasible. Service drives to loading docks which are infrequently used can also serve as pedestrian mall areas. The proposed Shattuck Street improvements exemplify this potential use.

The importance of parking areas to the viability of the LMA cannot be understated. Their potential to significantly improve the visual environment through proper organization and landscaping is significant and obtainable. These improvements will not only provide a better place to work and visit, but also a more efficient use of space.

street vendors

The street vendor phrase refers to the single entrepreneur who may be selling flowers, balloons, pretzels, cookies, etc., from a pushcart. There is a niche for these vendors in the LMA because they provide for some colorful streetlife activity and they serve a useful retail function in an area where such opportunities are limited. They offer an opportunity for a quick lunch or snack, or a small trinket for a child, so there is some convenience to their services as well.

In recent years, the presence of these vendors has rapidly increased in the LMA. One of the unfortunate side effects has been that some vendors tend to congregate in areas where they should not be, i.e.: on already narrow sidewalks, in the street taking up space reserved for vehicle turn lanes, or bus stops. One vendor usually attracts another and congestion can occur as lines form or as vehicles are unable to squeeze by.

One solution that has worked successfully is to locate the street vendors on private land through agreements with institutional landowners. A variation of this has been accomplished at Children's Park at the corner of Longwood and Blackfan. An existing sidewalk has been widened onto private property to create spaces for vendors in back of the public sidewalk. Normal pedestrian traffic flows are unimpeded and those who desire to make a purchase can do so without obstructing other pedestrians. Furthermore, vehicular traffic can flow without being obstructed by pushcarts in the street.

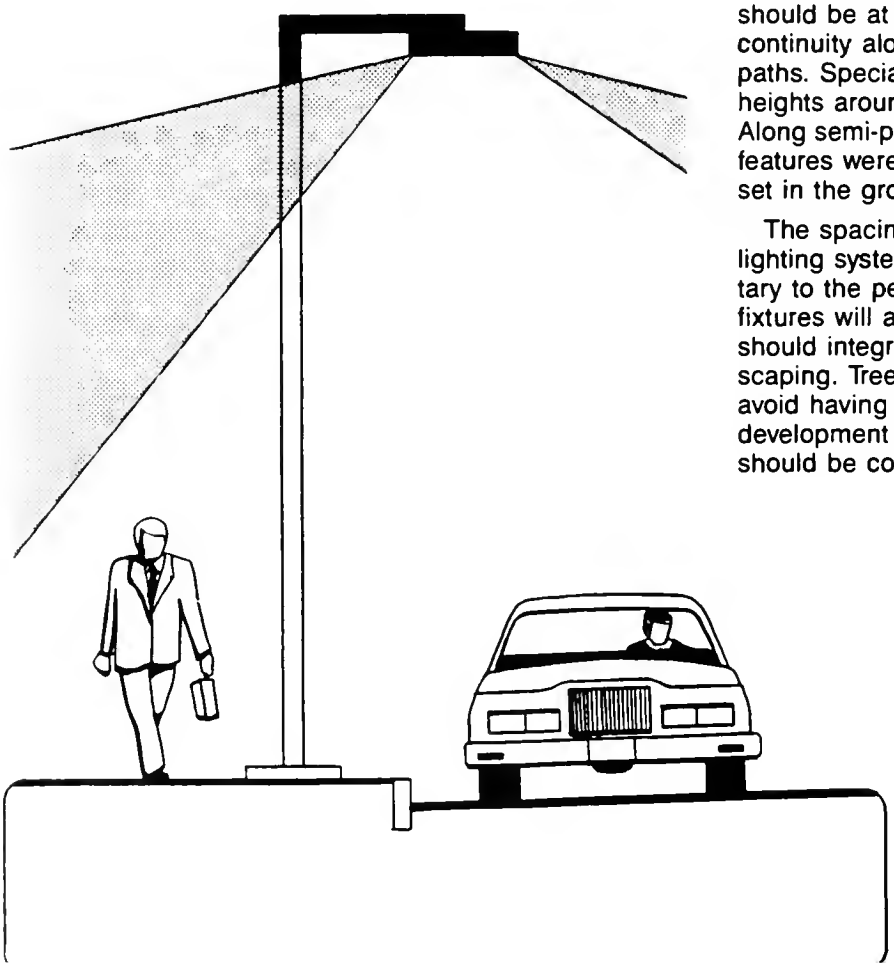
Locating vendors on private land gives landowning institutions some control over the type and variety of merchandise sold as well as in regulating the appearance of vendor's pushcarts. Children's Medical Center, for example, reviewed the design for a foodstand located inside Children's Park. Furthermore, vendors located on institutional property represent a small but consistent income source for their landlords.

Possible future areas for street vendor locations are difficult to predict since these entrepreneurs want to locate where pedestrian traffic is high. There are, however, several locations that may have potential once open space improvements are made. They are: the east side of Oscar Tugo Circle (intersection of Longwood and Avenue Louis Pasteur), the front yard of the Massachusetts College of Art on Brookline Avenue, Shattuck Street, the sunken plaza next to Countway Library, and the Servicenter Park at the intersection of Francis Street and Binney Street.


FRANKFURTERS
AND COLD
DRINKS

exterior lighting

Exterior lighting is designed primarily to illuminate pedestrian areas, streets, or building facades. Given the diversity of institutions in the LMA, lighting approaches vary from one area to another. The following should be considered a general guide to exterior lighting applicable to all LMA institutions.



1. *Pedestrian Areas:* The relationship between good exterior illumination and decreased crime rates has been proven in many studies, and its importance in the LMA should not be underestimated. In pedestrian areas such as sidewalks, plazas, and building entrances, it is recommended that the light's brightness approximate that of natural light. This means that a high level of visibility should be established with a minimum of glare. Vertical surfaces, such as doors, windows, and trees should be visible. In general, lighting should be sufficient for one to notice a potential hazard or problem in enough time to evaluate an alternative route or solution to the problem.

A good standard for pedestrian areas is that lighting should not measure less than one footcandle in areas of coverage. (In layperson's terms, one footcandle is the minimum light necessary to read a newspaper.) Downtown streets commonly have about two foot-candles of light intensity. The LMA should be close to that.

For general pedestrian traffic, pole-mounted lighting should be at the 8 ft. level. This would provide lighting continuity along the more heavily-travelled pedestrian paths. Special low-level lighting could be installed at 3 ft. heights around building entrances or parking entrances. Along semi-private footpaths or in areas where landscape features were to be highlighted, small spotlights may be set in the ground to "uplight" areas bordering paths.

The spacing, positioning, and height of the pedestrian lighting system should be contiguous and complementary to the pedestrian open space network. Since the fixtures will also be seen during the day, placement should integrate with other street furniture and landscaping. Trees near light fixtures should be pruned to avoid having branches block light sources and in new development tree placement and light fixture placement should be coordinated.

2. *Streetlights:* There are four major kinds of streetlights: incandescent, sodium vapor, mercury vapor, and metal halide. Incandescent is the lighting system that best approximates natural lighting. It is the oldest system and, unfortunately, the most expensive because of its high energy draw and the large number of fixtures needed to illuminate a given area. According to industry analysts, the best lighting available is the high-pressure sodium vapor light which is less expensive to maintain and whose color is close to natural daylight. Mercury vapor and metal halide are also available, but neither is recommended due to their high expense and limited brightness.

Lighting fixtures designed for roadway illumination should be at least 18 ft. high along most streets. At special locations, such as the Brookline/Longwood intersection, light fixtures should be taller to highlight their importance as gateway areas and to provide better lighting for heavier vehicular and pedestrian traffic.

As is the case with pedestrian lighting, streetlight poles should be installed with their daylight appearance in mind. Currently, there is a mixture of streetlight styles in the LMA. The City is phasing in new streetlights that have black square light boxes atop smooth aggregate poles. These newer lights may be seen along Deaconess Road, Shattuck Street and Binney Street. This style is an attractive standard for the LMA and its further use should be encouraged.

3. *Lighting of Building Facades:* Ground level floodlights pointed at building exteriors highlight a building's distinctive design features and assist nightime visitors in recognizing their surroundings. They also provide a deterrent to crime. Floodlights on top of buildings and garages also provide additional security for large expanses of open space.

The primary recommendation for exterior lighting is that it be even throughout the LMA. Evenness is more important than the absolute level of brightness, since every area can thus achieve a minimum acceptable light level and there are no pockets of darkness.

Types of lighting can contribute to the special quality of any space. The height of light fixtures and the characteristics of that quality can mark transition areas; i.e., from public to private space or to show boundaries of the open space system. A hierarchy of lighting systems shows the pedestrian and/or motorist he is leaving one area for another.

The following characteristics of lighting should be standardized, first on individual campuses and then in an area-wide program.

- Common brightness;
- Placement and spacing;
- Consistent mounting heights;
- Color of light;
- Free from tree overgrowth;
- Coordination with tree planting programs.

Finally, regular surveys of lighting conditions in the LMA should be conducted. Every two years MASCO performs an overall survey to record those areas where poor lighting may contribute to security problems. Each institution and campus should conduct its own lighting audit on a more frequent basis, to review conditions and see where broken lights need replacement.

public art

Public art refers to outdoor sculptures, fountains, murals or decorative architectural elements. Public art can be used effectively only in highly selective settings when scale, medium, and content have been carefully considered.

There are many reasons to introduce public art into the outdoors: to visually reinforce a formal arrangement of buildings; to create a meaningful focal point, backdrop, a specific mood, or environment; to visually orient individuals; to introduce visual interest or stimuli into the built environment; to decorate a blank wall; or to equalize the disparity of scale between the pedestrian and the built environment. In most instances, appropriately placed public art acts as a meaningful transition between one spatial function and another—for example, between a sidewalk and a building entrance or a green space and nearby buildings. The intended purpose of the art will often determine its form. The art can make a grand statement at a large scale, or a subtle statement at a more intimate scale.

The "sculpture garden" on the front lawn of the Massachusetts College of Art, Brookline Avenue campus, is an example of public art. The garden exists to display student art. Ideally, public art should be commissioned with the space in mind.

Visitors who experience the Prouty Garden at Children's Hospital delight in the discovery of small-scale, naturalistically arranged copper or marble sculptures of animals. This is the finest example of the use of sculpture out-of-doors in the Longwood Medical Area. Small animals are placed in niches of formal sculpted plants or manicured lawns. A small pool nestled amidst a grouping of paper birches is a habitat for sculptures of playful seals. The sculptures, pool, and fine landscaping create a restful oasis for both patients and visitors within the massive architectural complex of the Hospital, and is particularly appealing because of its small, intimate scale. The selection of sculptures of animals is a wholly appropriate choice for an urban park where live animals are typically absent.

Numerous opportunities exist to create small-scale, interesting and intimate pedestrian seating areas in the LMA through the selective use of public art.

There are also opportunities to introduce larger scale public art in the LMA. Adding an obelisk in the Oscar Tugo Circle at the intersection of Longwood Avenue and Avenue Louis Pasteur would be an appropriate example of large-scale public art. An obelisk would complete the axial alignment created by the U-shaped Harvard Medical School buildings, whose focal point is the massive classical revival facade of Building A, and the terminus of Avenue Louis Pasteur at The Fenway. Just as the green interior quadrangle is flanked by formal symmetrical buildings, Oscar Tugo Circle is flanked by similarly arched wings of Vanderbilt Hall and the former Boston Lying-In Hospital. An obelisk would re-emphasize the formal grand vista intended by the layout of the Medical School and the Avenue, and strengthen the vista from both directions.

Another example of an appropriate location for a large outdoor sculpture would be in the plaza in front of the Harvard School of Public Health. Flanked by the multi-storied, cubical architecture of the Countway Library and buildings of the Medical School and School of Public Health, the pedestrian plaza is somewhat barren and overwhelmed by the scale of the adjacent buildings. A large sculpture would provide an interesting focal point for pedestrians, would reduce the highly vertical feeling created by the surrounding buildings and would bring a more human scale to the plaza. The surrounding buildings would provide an effective backdrop for a large sculpture, and alternatively, the sculpture would act as an exciting introduction to the buildings themselves. By adding seating areas, the plaza could become an inviting and vital open space in the LMA.

Finally, vast concrete retaining or building walls along service areas or parking lots may be appropriate locations for murals. The expansive concrete retaining wall adjacent to the parking lot behind the Boston English High School, for example, creates an uninviting feeling to people who park in the lot, pedestrians, and visitors to the Judge Baker Guidance Center. The ambience of this area is one of a concrete, chain-link fenced and forgotten space. A mural of the appropriate color and content would create a more habitable and interesting environment on a more human scale.

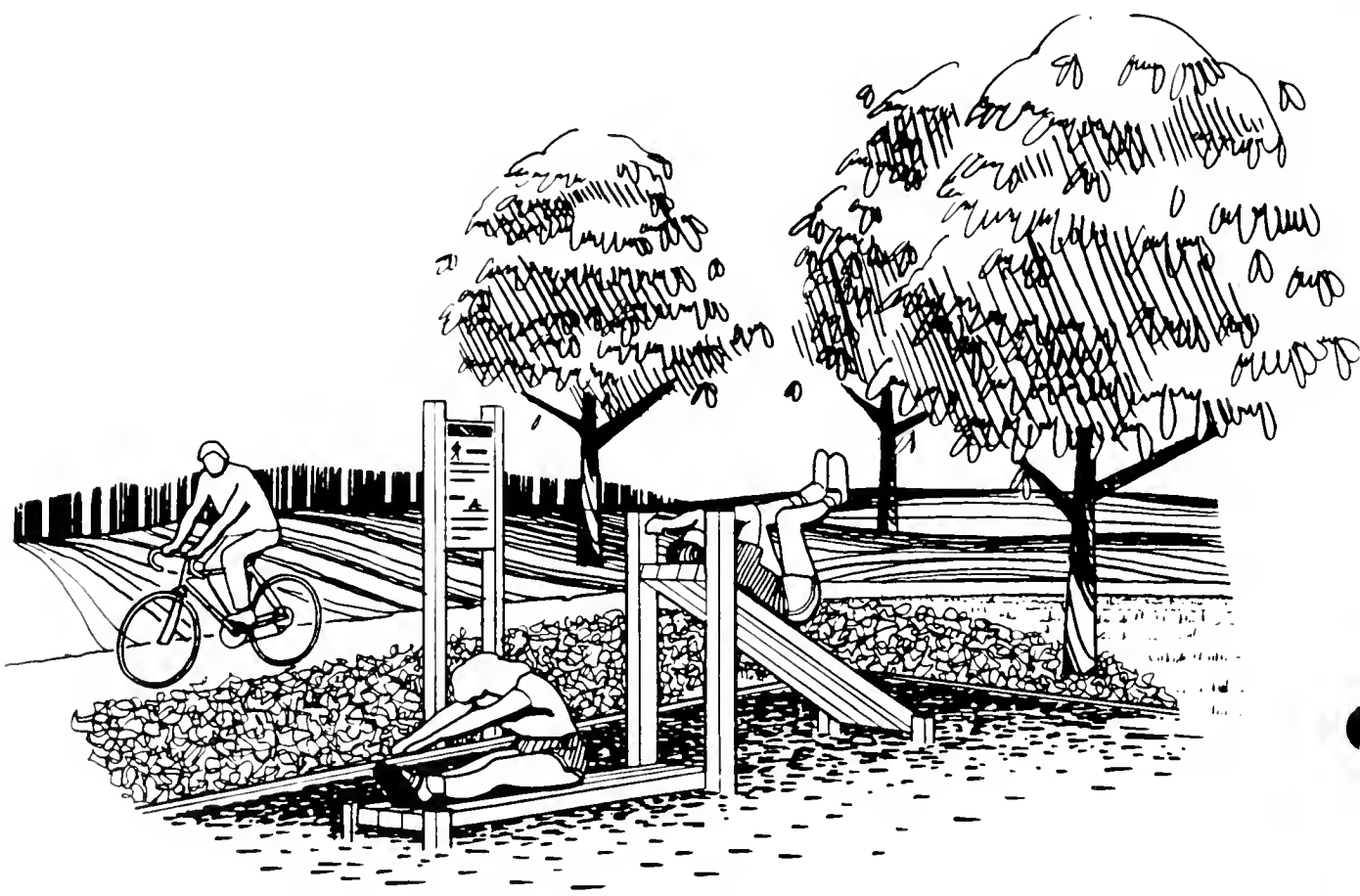
additional open space opportunities

Opportunities for improved open space exist everywhere. Some sites that are already open could easily be adapted for pedestrian amenities. A list of possible future mini-parks would include: the area on Binney Street now occupied by electric transformers; a vacant house lot on Binney Street across from the Servicecenter Garage; an open area on the Deaconess campus near Autumn Street; the front yard of the College of Art Brookline Avenue campus; and the northwest corner of Brookline and Longwood Avenues.

There are several possibilities for warm-up/cool-down areas associated with jogging trails and fitness courses (also known as par courses). They include: the open area adjacent to the Pilgrim Road garage on Longwood; an area by the 110 Francis Street garage on the Riverway; and Evans Way Park. Each of these locations would permit easy access to the jogging trails and bike paths of the Riverway and Fenway.

There is a need for more bicycle parking areas and many potential locations exist to fill this need. MASCO recently assisted Harvard in the design of a large bicycle storage area and several small module locations. This study will provide a basis for addressing the entire LMA with a coordinated bicycle storage system.

Each of these opportunities is based on land that is currently vacant. As buildings are torn down, or new buildings go up, more opportunities for planned open space improvements will arise. It's essential to plan early for such improvements and make them a part of building projects. The plan accompanying this document provides a visual illustration of some of the many open space opportunities that exist.



site design guidelines

The LMA is made up of many institutions with a variety of architectural styles. The area as a whole is difficult to identify or visualize as a cohesive place since there are very few unifying elements. The LMA Sign Program was the first step toward developing a definable area identity. Site design standards are another such opportunity to provide unity and area identity. As new buildings are built and areas redeveloped, individual institutional identity will be maintained by differing architecture and architectural elements.

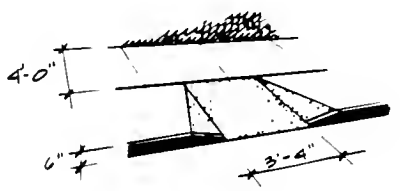
To ensure the highest possible quality of site development, site design guidelines will be developed. These guidelines will suggest material types and standards for design of the site improvements. If used by the individual institutions as site improvements are made, they will provide an open space framework with many similarities and a strong identity. These guidelines will not be mandatory or applicable to all situations. The goal is to provide designers hired by the institutions with a common direction from which to create their designs.

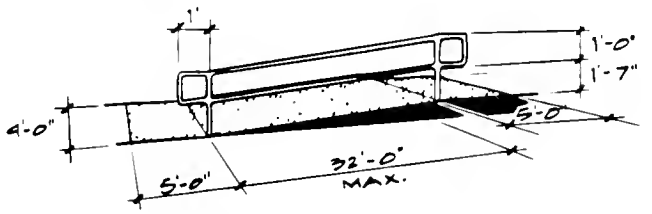
It is envisioned that fact sheets including the following design elements would be developed from this open space framework parent document:

a. Site amenities and street furniture (benches, telephones, fountains, waste containers, etc.);
b. Plantings;
c. Paving and sidewalks;
d. Lighting;
e. Signage and kiosks;
f. Traffic controls (bollards, fencing, railing, gates, curbs, etc.);
g. Bicycle parking (racks and storage);
h. Handicapped access (standards);
i. Parking area layout;
j. Vendor areas;
k. Access to sunlight;
l. Loading and service areas;
m. Public art;
n. Maintenance;
o. Building entrance treatments.

The guidelines will be general in nature providing a design philosophy with suggestions and examples of desirable approaches to the specific site element. For example, the technical fact sheet for bench guidelines will include: specifics on proper height and width of structures; several design alternatives, including manufacturer's name and address; suggestions on how to integrate the benches with surrounding street furniture; and tips on installation and maintenance requirements and intervals.

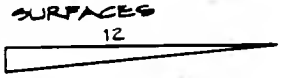
MASCO will also continue to provide technical assistance on installation and design of open space areas.



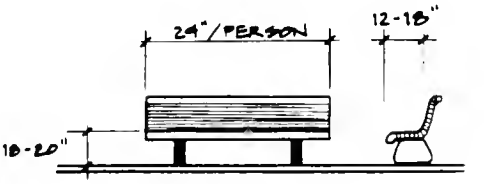


RAMPS

- MAX. RAMP GRADIENT 8% ON ALL SIDES & SURFACES



- ROUGHENED SURFACE ON RAMPS



BENCHES

- MATERIALS MUST NOT RETAIN HEAT OR COLD
- SEAT SURFACES SHOULD NOT HOLD WATER
- 8 FT. LONG BENCHES ARE DESIRABLE
- SEAT HEIGHTS SHOULD NOT VARY BEYOND 18-20 IN.
- BACK RESTS ALWAYS INCREASE COMFORT

conclusion and implementation schedule

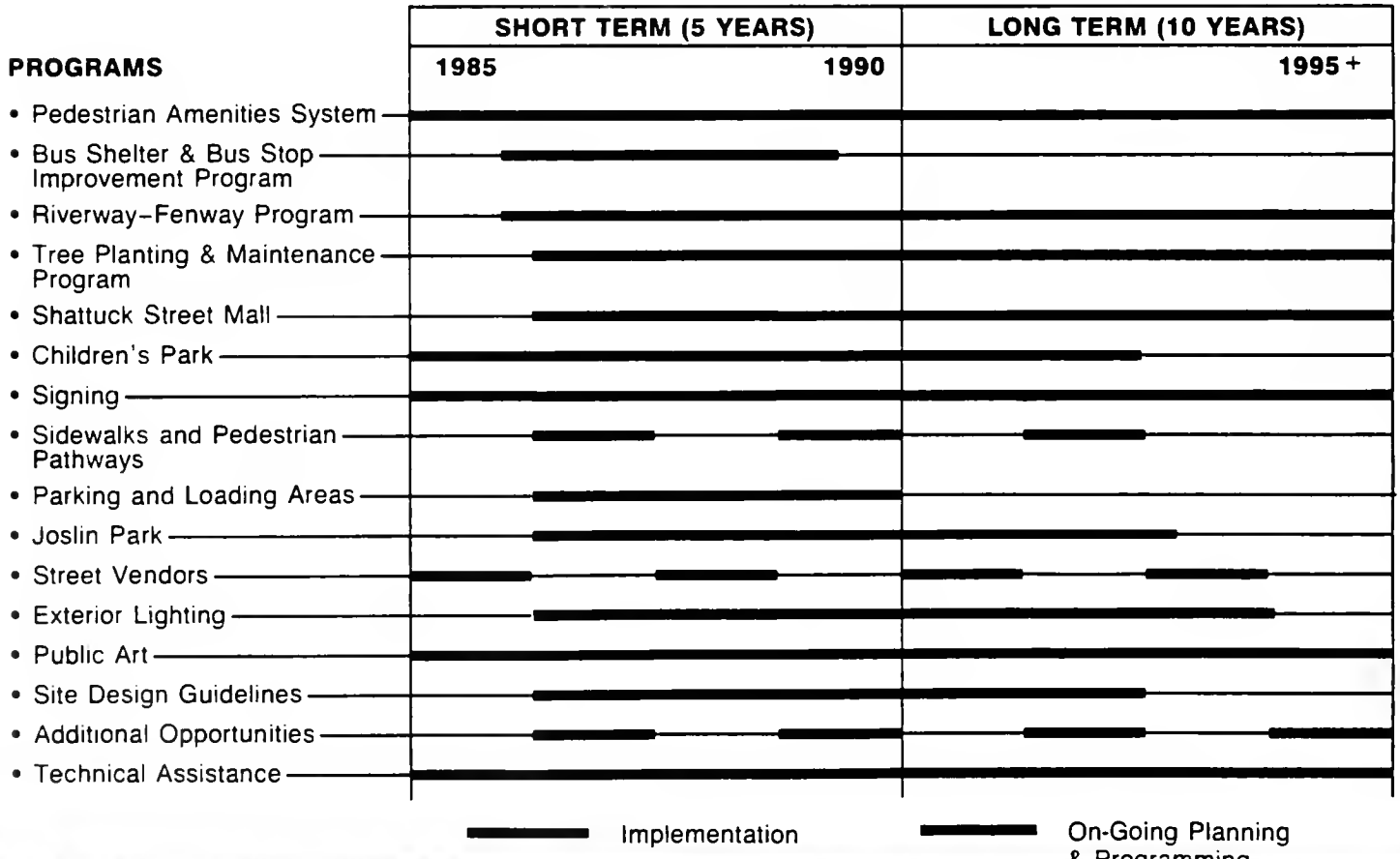
Proper maintenance is the most important aspect of all open space improvements. This means routine lawn-cutting, trash removal, etc., but it also means fertilization, tree pruning, and periodic specialized care. Projects undertaken by MASCO on behalf of our members include maintenance agreements which spell out areas of responsibility for improvements. More formalized maintenance agreements will be sought for some of the large-scale improvements planned. For example, it is clear that the Riverway/Fenway clean-up by the City of Boston will greatly enhance the LMA. The critical factor will be a workable agreement among the institutions, Boston, the MDC, and Brookline for maintaining those areas so they do not revert back to their previous overgrown state.

The programs described here exemplify open space improvements for the LMA that can be made by MASCO (acting on behalf of our members), by individual institutions, or by outside developers.

What we have established here is a framework: a context for open space planning. This framework is intended to dramatize the importance of open space as an area to be *planned* and incorporated in building development, instead of being treated as leftover space. The accompanying map and this narrative show how open space provides some human scale and diversity to the LMA; creates opportunities for social interaction; and establishes spaces where people can enjoy moments of relative solitude or reverie.

In reaching our destinations, we become pedestrians at some point, so we should seek to improve the LMA's pedestrian network. We must plan for people traffic as well as vehicular traffic. Finally, we must remember the LMA is a world renowned center for education and patient care, and that a high percentage of elderly, ill, and handicapped come to this area. Making access safer and easier for them is an important part of our collective mission.

The implementation schedule presented below indicates the short term and long term programs associated with the proposed framework. Some projects/programs are already underway while others are only in the program planning stage. The actual implementation of the framework program will be a mutual effort of MASCO and the LMA institutions.



introduction

Improving handicapped access within the Longwood Medical Area (LMA) is a goal entirely consistent with our collective mission of providing high quality, accessible health care and education. The LMA is host to some 30,000 people every day including patients, visitors, students and staff. And, with the high concentration of medical facilities in the area, a significant number of daily users are either temporarily or permanently disabled. Add to that the current trends in medical institutions toward the development of ambulatory outpatient services, and handicapped access improvements become increasingly important.

While many institutions have made handicapped access improvements in and around their physical plants, access and mobility within the entire LMA is still difficult for the handicapped. Unfortunately, the value of individual efforts is diminished if related site improvements are neglected. Consider the familiar sight of a wheelchair-bound person forced to enter street traffic when confronted with a vertical curb at the end of a pedestrian crosswalk. That same person may have just left a building that was equipped with automatic doors and handicapped ramps.

The focus of this appendix to the Open Space Framework will be to address specific handicapped access problems in the open space network of the LMA and to provide general site design guidelines for access improvements. The guidelines are not intended to represent a definitive handbook on architectural or site standards, rather, they are intended to promote a recognition of the importance of a fully accessible pedestrian network.

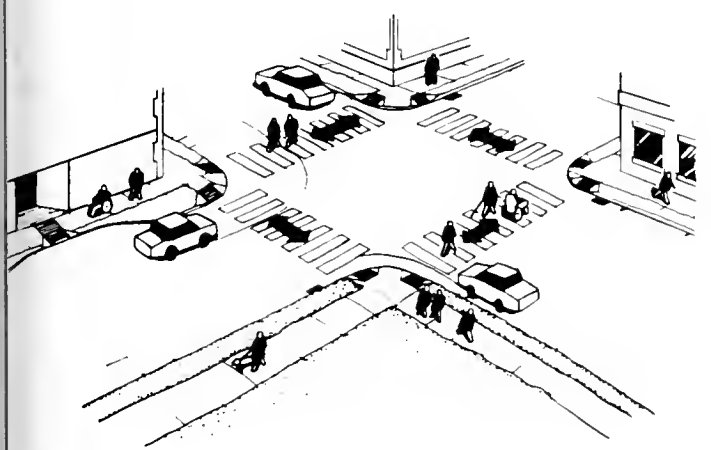
This document was prepared by the Area Planning Department of the Medical Area Service Corporation (MASCO), 221 Longwood Avenue, Boston, Massachusetts 02115, and Camp Dresser & McKee Inc. (CDM), One Center Plaza, Boston, Massachusetts 02108. Printed 1987.

traffic intersections

Traffic intersections are particularly hazardous for handicapped individuals. At intersections two access modes come into conflict: slow-moving pedestrian traffic with fast-moving vehicular traffic. While the safety of all pedestrians is a concern at intersections, the safety of the handicapped at intersections is of particular concern. The common absence of curb cuts (ramps) at intersections forces the wheelchair-bound to enter the street and travel in parking or traffic lanes, sometimes for several blocks, jeopardizing personal safety until a ramp can be found.

Curbing is one of the most neglected site elements in terms of the physical barriers it creates for the handicapped. Recently, MASCO undertook a survey of handicapped ramps at intersections in the LMA. Results indicate that of the 37 street intersections, only sixteen are adequately ramped and of these only nine have complete complements of curb cuts and crosswalk striping. Where curbing is necessary, it should be set vertically to a height of six inches, with a maximum height of seven inches. In addition, providing a contrast in color between curbing and the surrounding pavement serves as a visual warning that a grade change exists.

Curb cuts are mandated by the Commonwealth of Massachusetts' Architectural Barriers Board when sidewalks adjacent to striped pedestrian crosswalks are being constructed or reconstructed. And, when curb cuts are constructed or reconstructed on one side of the street, they are required by law to be installed on the opposite side of the street.



Because publicly funded sidewalk improvements typically occur on a rotational basis throughout the City about every 25 years, most of the sidewalk improvements made in the LMA are privately funded. However, the requirement that liability be accepted for privately funded improvements tends to act as a disincentive for such initiatives. The net result is that sidewalk reconstruction and curb cut installations are not always carried out when it would be in the public interest to do so. Ideally, over time, all LMA sidewalks can be improved through a combination of public and private efforts.

Wherever possible, curb cuts should be planned as a natural extension of the sidewalk's alignment. Between four and eight curb cuts are required by the Commonwealth's Architectural Barriers Board at four-way intersections. depending on the crosswalk striping pattern.

Generally, curb cuts should be located at each corner of the intersection, within the crosswalks or pedestrian travel paths. At many LMA intersections additional curb cuts are needed.

Traffic islands in the middle of crosswalks are another area where curb cuts are required. Curb cuts should be located on both sides of the island, provided there is a minimum level area of four feet between the curb cuts. Alternatively, the island needs to be cut to provide a continuous area at grade with the street.

When constructing handicapped ramps, the maximum allowable slope is 12:1 with a maximum drainage lip of one-half inch where ramps meet the road gutters. The minimum allowable width of a curb cut is three feet, four inches. Ramps should have a roughened texture in the direction of the ramp's slope or be painted yellow. This provides the visually impaired individual with a warning that he is about to enter a traffic area.

Finally, at the intersection of a driveway with a pedestrian walk, either curb cuts should be made or the driveway should be installed at a grade continuous with that of the adjacent sidewalks. Uncurbed walks should be painted yellow at the edge of the vehicular way, or the walk should have a tactile warning texture.

surface parking and drop-off areas

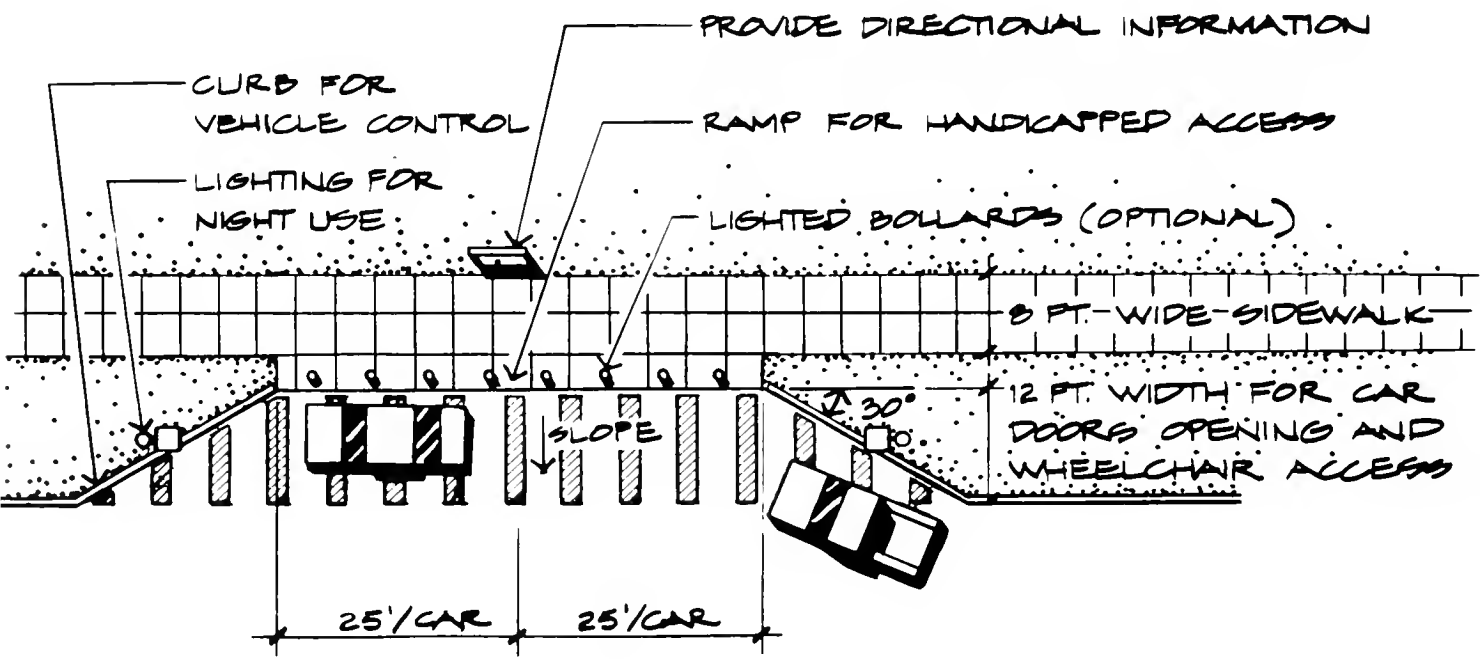
Parking and drop-off areas are also places where vehicular and pedestrian modes of transportation intersect. Getting out of a vehicle and onto a sidewalk can be an intricate maneuver for people using mechanical aids such as a wheelchair, brace or crutches.

Handicapped parking spaces or drop-off areas should be located as close as possible to main building entrances. Ideally, handicapped parking should be located within 200 feet of a building entrance, and a drop-off area within 100 feet of a building entrance. State standards require that one handicapped space be provided for a 25 car parking area. Standards for larger lots are indicated in the table on page six.

The ideal location for handicapped parking spaces is at the ends of parking rows, provided the cross-slopes are minor. Angled spaces should be nine feet wide with a four foot aisle between cars for access along the vehicle. Parallel spaces should be twelve feet wide with a four foot minimum clear aisle between cars parked end to end. In all cases, each handicapped parking space should be clearly marked.

If wheel stops are used to separate parked vehicles and a pedestrian pathway is located between the wheel stops, provision should be made for a ten foot opening between stops to allow handicapped access. Alternatively, if posts are desired, they should be centered along the front edge of the parking spaces to allow pedestrian mobility along the aisles between cars. If walks are curbed, ramps should be provided and clearly signed.

Drop-off areas need to be at least 50 feet long and 12 feet wide in order to accommodate two cars. Ideally, the adjacent sidewalks should not be curbed. If they are, one ramp per car should be provided. With an uncurbed area, bollards are useful barriers to keep vehicles out of the pedestrian walk. Unfortunately, they will also inhibit access if spaced too closely together. Bollards ought to be spaced at least six to eight feet apart to enable the passage of a wheelchair or dolly.



conclusion

Except where institutions have made privately funded sidewalk improvements, sidewalks in the LMA are generally in poor condition and additional handicapped access improvements would be beneficial. Each access improvement made along the sidewalks at street intersections and parking or drop-off areas will help create a barrier-free environment in the Longwood Medical Area. Site improvements in the open space environment can be made through collective area-wide projects, scheduled capital improvements, and planned projects. The net result will be an enjoyable open space network that can be fully utilized by everyone in the LMA.

guidelines for handicapped access

PARKING AREAS:

- ***Handicapped space distance to building entrance*** ***200' max.***
- ***Building entrance drop-off areas*** ***100' max.***
- ***Single handicapped parking stall width*** ***12'- 0" min.***
- Single handicapped parking stall length 18'- 0" min.
- ***When curb cuts are constructed or reconstructed, they shall also be installed on the opposite side of the street where pedestrians travel.***
- ***Two eight foot wide parking spaces can be separated by a four foot wide center aisle to create two handicapped access parking spaces.***
- ***Parking lots and garages should have a minimum number of handicapped accessible parking spaces. The following is a list of space provisions recommended:***

Total Parking Spaces	*Required Spaces*
25	*1 space*
26-40	*not < 2 spaces*
41-100	*not < 3 spaces*
101-200	*not < 4 spaces*
201-500	*not < 6 spaces*
501-1,000	*not < 10 spaces*

STAIRS:

● One-way stair width	3'- 0" min.
● Two-way stair width	5'- 0" min.
● Stair riser height	6-1/2" max.
● Stair tread depth	11" min.
● Two risers (r) plus one tread (t) equals	(2r + 1t = 26" to 27")
● Intermediate landings on stairways	6'- 0" max.
● ***All stairs shall be constructed without abrupt projection of tread nosings. Open risers are not permitted.***	

RAMPS:

● ***Slope of ramp***	***12:1 max.***
● ***Width of ramp between railings***	***4'- 0" min.***
● ***Length of ramp at 8.33% slope between landings***	***32'- 0" max.***
● Clear area at top and bottom of ramp and at landings	5'- 0" min.
● Curb height on ramp sides	2" min.
● Design live load for ramp	100 lbs./s.f.
● Lighting on ramps	5 footcandles min.
● ***Surfaces of ramps shall have a roughened texture in the direction of the slope or shall be painted yellow.***	

HANDRAILS:

● ***Handrail heights on ramps (two handrails, both sides)***	***2'- 10" & 1'- 7"***
● Extend handrails beyond ramp and stairs	1'- 6" min.
● Handrail height on stairs at stair nose	2'- 9" min.
● Extend handrails beyond stair	1'- 6" min.
● Outside diameter of handrails and railings	1-1/2" min. - 2" max.
● Design live load for handrail	250 lbs./s.f. min.

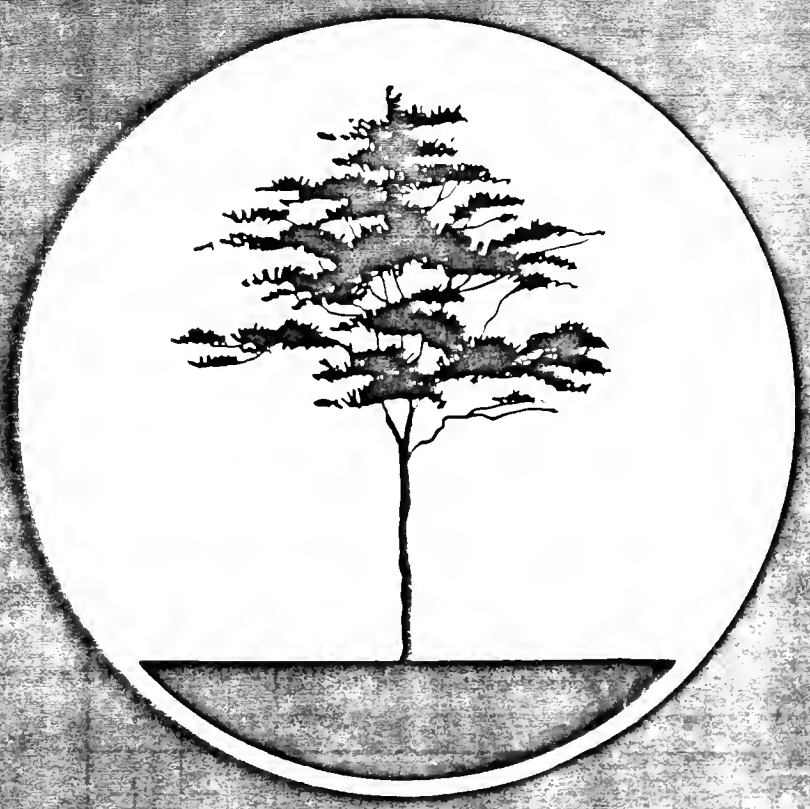
WALKWAYS AND SIDEWALKS:

● ***Walkway and sidewalk width***	***4'- 0" min.***
● ***Cross-slope of walkways***	***2% min. - 3% max.***
● ***Walkway ramp width***	***3' - 4" min.***
● ***Curb height at intersections***	***7" max.***
● Expansion/contraction joints	1/2" max.
● Setbacks from walkways to benches, trees, posts, etc.	2'- 0" min.
● Width of major pedestrian paths	7'- 6" min.

SEATING WALLS:

● Seat surface width	12" min. - 18" max.
● Seat surface height	18" min. - 22" max.

BOLD ITALICS TEXT INDICATE MASSACHUSETTS STATE STANDARD



introduction

The intent of this appendix to the Open Space Framework (1986) is to present to Longwood Medical Area (LMA) planners and facilities managers a new approach to street tree site planning. This approach focuses on removing restrictions to root growth and selecting the most appropriate trees for LMA sites, two factors which we believe to be the most important for tree survival. The current research of horticulturists and landscape architects suggests that street tree viability is just as much a function of proper advance planning as it is of adequate post-installation maintenance. Poor site preparation and species selection contribute to tree decline and failure within one to three years of installation and can lead to expensive and intensive maintenance efforts while the trees are struggling to live.

In selecting species for the LMA we need to match the distinction and eclecticism of the architecture with trees of equal stature and variety. Trees are an important investment in the quality of the pedestrian and built environments, both now and in the future. Some of the important benefits of street trees are the form, color, diversity and movement they bring to the inanimate cityscape; the shade and windbreaks they provide for pedestrians and buildings; removal of air pollutants and addition of oxygen to the atmosphere; and the scale, or humanizing elements, they bring to the built environment (for more information refer to the Open Space Framework).

The critical components to planning street trees are: site evaluation to document the existing environmental conditions that will affect species selection and design/placement; the plant performance characteristics needed to meet the design intent and offset site limitations; horticulturally-skilled installation techniques; and proper maintenance once the tree is installed.

site evaluation

Urban sidewalks are harsh environments for trees: rooting space is restricted, heat is trapped and re-radiated, and air pollution, salt damage and drought conditions are prevalent. While these factors cannot be changed, their negative impacts can be mitigated. Planners can avoid common mistakes made in species selection and planting design by thorough site evaluations during the planning stages.

Site evaluations should document potential constraints to tree growth and health. Constraints commonly found in the LMA include:

- Poorly drained soils or soils compacted by pedestrian or vehicular traffic, resulting in lack of adequate oxygen required by trees' roots.
- Sites surrounded by pavement, walls and glass which cause higher air and soil temperatures. The result is rapid water loss through leaf transpiration and greater demands on the soil to replace lost moisture.
- Narrow sidewalks which lead to the design of small, isolated tree pits that constrict or confine tree root growth, and limit roots' access to moisture and oxygen.
- Proximity of structures which restrict the normal growth habits of many species, stunt tree growth through shading or require radical pruning to keep the tree within bounds.
- Exposure to urban air pollutants, vehicular damage, salt, and vandalism.

Each constraint can be remedied if its presence is documented during site evaluation and species are selected accordingly. The table on the following page presents strategies for mitigating each condition.

This document was prepared by the Area Planning Department of the Medical Area Service Corporation (MASCO), 333 Longwood Avenue, Boston, Massachusetts 02115, Geraldine Weinstein and Associates, Ltd., 2 Greenough Ave # 7, Jamaica Plain, Massachusetts 02130, and Camp Dresser & McKee Inc. (CDM), One Center Plaza, Boston, Massachusetts 02108. Printed 1989.

mitigating typical site constraints

site constraint	impact	strategy
Poorly Drained or Compacted Soil	Absence of oxygen leads to decreased rooting capacity; paradoxically, trees are more susceptible to both drought and drowning.	When preparing pit, replace existing soil with sandy loam to the depth of the root ball; with 2-3 inch mulch layer create surface permeable to oxygen and moisture; select plant species more tolerant of both wet conditions and prolonged drought.
Air/Soil Heat Loading	Rapid root/leaf water loss.	Select species least susceptible to leaf scorch and most tolerant of drought and full sun; use closer spacing (15-20') in linear plantings or design group plantings so that massed trees provide immediate ground shading; provide plantings to shade the trees' roots. Where possible plant trees in lawn areas or planting strips behind sidewalks rather than in small pits.
Narrow Sidewalk	Restricted or confined rooting space.	Where possible, create planting strip between sidewalk and adjacent buildings; for sidewalk sites create continuous soil corridor or planting trench to provide a larger unrestricted rooting space and expand the availability of oxygen and water. Provide underplantings.
Proximity to Structures	Growth restriction; inappropriate pruning required.	Use trees with narrow or columnar forms or select species with ascending or open growth habits.
Shady Site	Inadequate light for certain species causing stunted growth and development.	Select species that are shade tolerant instead of those requiring full sun.
Air Pollution and Salt	Overall decline in health; salt intrusion and soil compaction, leading to poor growth, leaf scorch and dieback.	Select species that will tolerate exposure to pollutants and are hardy and resistant to salt damage; if possible, site beds away from cars; raise the beds to prevent tree pits from functioning as catchbasins. Encourage use of sand instead of salt as a de-icer.

species selection and site planning

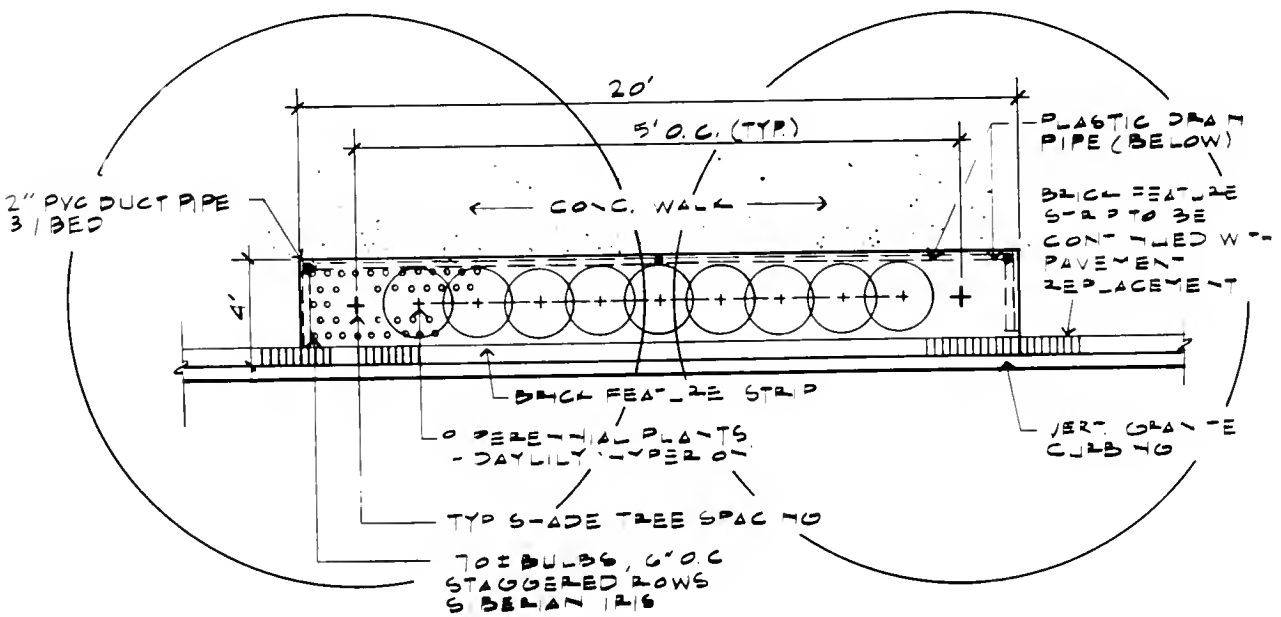
The tables on the following pages illustrate the attributes of certain species and cultivars according to selected aesthetic and site considerations. Before the final selection is made several key questions need to be addressed:

- What environmental constraints must the species overcome?
- What is the main purpose of the planting: to screen a building, to create a backdrop, to enrich pedestrian areas, to provide shade, to control glare and reflection, to enhance architectural elements?
- What are the soil conditions in which the species will have to grow?
- What level of maintenance will be provided? Will any provisions be made for long-term maintenance or will maintenance budgets be contingent on need?
- What is the preferred shape, maximum height, and crown spread given the site conditions and planting objectives?
- What seasonal qualities are desired: flowers, fruit, textured bark, fall color?
- Is the proposed planting compatible environmentally and aesthetically with existing planting in the area? Are other plantings of the same species thriving in the LMA?

As a word of caution, this is by no means an exhaustive list of the many species which may be suitable for the LMA at specific sites; new varieties continue to be developed for urban areas. Overplanting of a single species should be avoided; it provides an attractive breeding ground for insects and diseases.

Studies show that smaller trees are more vigorous and have a greater ability than large trees to become reestablished in their new environment. Larger trees suffer greater transplanting shock; more of their root systems are left behind in the nursery. For these reasons we recommend planting trees in the three-to-six inch caliper range and, ideally, the three-to-four inch caliper range.

A typical urban sidewalk tree planting usually consists of a linear arrangement of trees placed in small, isolated tree pits. Large trees are often planted to achieve the maximum immediate visual impact. Small, isolated tree pits restrict the rooting space available to the tree and reduce the availability of water and oxygen necessary for survival and growth. Unfortunately, sidewalk space is at a premium in the LMA, and large tree pits cannot always be accommodated. If small



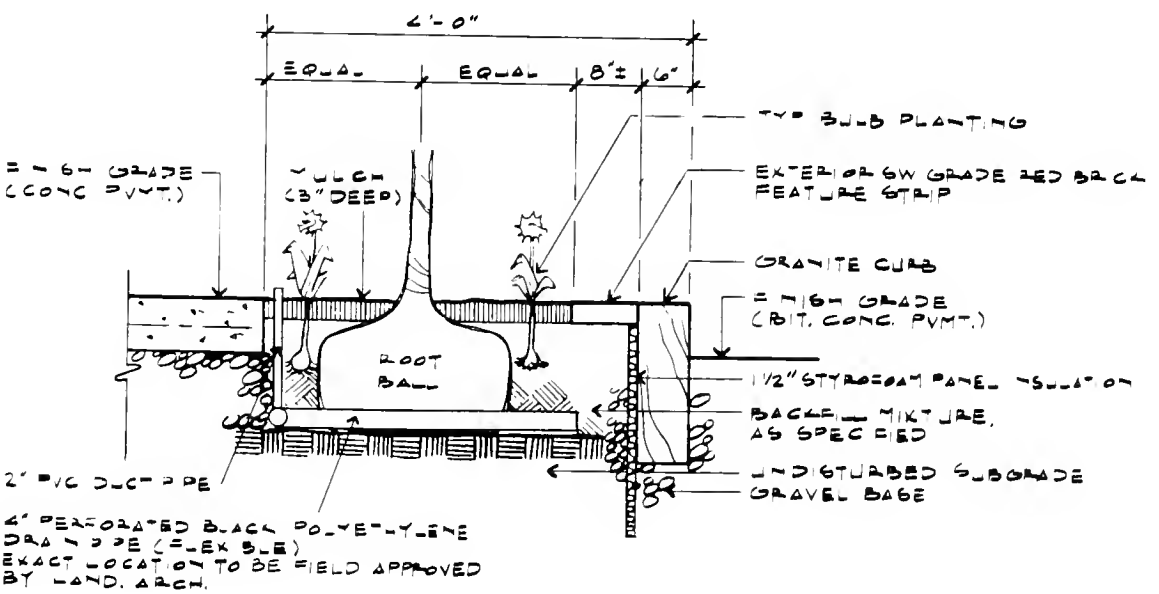
individual tree pits cannot be avoided, a species with lower oxygen and rooting space demands should be selected. Often, trees with lighter canopies and smaller leaves, such as Honeylocusts, are more tolerant of these conditions. Underplantings are even more important at LMA sites because they help to aerate the rooting environment.

The planting trench utilized by MASCO, illustrated below and on the adjacent page, provides an extended planting area. The PVC duct pipe and plastic drain pipe assembly is used in the planting trench to provide a means of deep, periodic watering, and continuous aeration of the roots. The standard trenches used by MASCO in the LMA are 4' by 20', abutting the curb and parallel to the street. In this way both a larger pit size and the need for clear sidewalk area can be accommodated. In a shared rooting space or continuous soil corridor, the trees' roots will mutually support each other through greater access to available oxygen and water.

The use of planting trenches also allows closer tree spacing and the creation of a microclimate of increased humidity. Closer tree spacing in the trench (as close as 15-to-20 feet instead of the usual 25-to-30 feet, depending upon the species) creates more shading of the soil surface, reducing evaporation and moisture loss; and creates a higher level of humidity, reducing leaf transpiration. A three-inch layer of mulch or preferably an underplanting of perennial bulbs (green mulch) maintains the porous layer required for oxygen and moisture exchange, shades the tree roots, adds additional seasonal color to the streetscape, and keeps the soil surface loose.

As an added precaution, to protect trees from mechanical or vehicular injury or soil compaction, certain tree accessories can be installed such as bollards, guards and collars. In trench plantings a brick feature strip (or any narrow band of pavement) behind the curb can also act as a landing strip for pedestrians getting out of the passenger side of cars and reduces the potential for salt intrusion.

Tree grates are utilized in many urban plantings to help prevent soil compaction. However, grates usually cause trees to be planted too deep; they catch trash and shoe heels, and can also restrict tree growth. If grates must be used, special considerations must be made, such as ensuring that they do not rest on soil.



recommended species

SMALL TREES	FORM		SITE		TIME		STRESS		SALT		SEASONAL				REMARKS
	wide-spreading	narrow	lawn	street	transplants readily	transplant in spring	drought tolerant	wet- soil tolerant	salt sensitive	salt tolerant	spring	summer	fall	winter	
Hedge Maple Acer campestre (30')	●		●	●	●		●	●	●			●			Dependable screen plant requiring little attention; stays green even in summer heat and drought.
Amur Maple Acer ginnala (15')	●		●		●				●				●		Very drought tolerant and cold-hardy; may not tolerate re-radiated heat; scarlet fall color; good in large containers; multi-stem form available.
Paper-bark Maple Acer griseum (25')	●		●			●			●		●	●	●	●	Papery, cinnamon-colored bark; a specimen tree.
Shadbush, Allegheny Serviceberry Amelanchier laevis (20')	●		●		●			●			●		●		White flowers in April; red berry-like fruit in summer; red to yellow fall color; multi-stem form available; shade tolerant.
Kousa Dogwood Cornus kousa (25')	●		●		●						●		●		White flower bracts in June; red raspberry-like fruits in fall; scarlet fall color; ornamental bark with age.
Cornelian Cherry Dogwood Cornus mas (25')	●		●		●						●				Very cold-hardy and durable; yellow flowers in late-March to early-April; ornamental bark with age; shade tolerant.
Washington Hawthorn Crataegus phaenopyrum (25')	●		●	●	●		●				●		●	●	White flowers in spring; red fruits in fall which persist throughout the winter; thorny and dense.
Winter King Hawthorn Crataegus viridis 'Winter King' (30')	●		●			●	●			●	●		●	●	See preceeding entry.
Rusalan Olive Elaeagnus angustifolia (15')	●		●		●		●			●	●	●	●		Silver-grey leaves; rich brown bark; brittle wood.
Carolina Silverbell Halesia carolina (35')	●		●		●		●				●				White flowers in May; wide-spreading; somewhat drought tolerant; unusual and long-lived.
Crabapple Malus sp. (20')	●		●		●						●			●	Various flower, fruit, and leaf colors; various habits; usually requires spraying and pruning.
American Hophornbeam Ostrya virginiana (35')	●		●	●	●		●			●			●		Very tolerant of winter wind and cold; yellow fall color.

( ) indicates average mature height in urban situations

recommended species

SMALL TREES	FORM		SITE		TIME		STRESS		SALT		SEASONAL				REMARKS
Callery Pear Pyrus calleryana 'Redspire', 'Aristocrat', 'Chanticleer', 'White House' (40')		●	●	●		●				●	●		●		White flowers in May; red to glossy-scarlet fall color; symmetrical form; 'Redspire' is the most narrow cultivar.
Japanese Lilac Syringa reticulata (25')	●		●		●							●		●	Dependable, long-lasting creamy-white flowers in June; shiny brown bark, sometimes requires spraying.
LARGE TREES	**FORM**		**SITE**		**TIME**		**STRESS**		**SALT**		**SEASONAL**				**REMARKS**
Norway Maple Acer platanoides 'Emerald Queen', 'Cleveland', 'Columnar', 'Crimson King' (50')	●	●	●	●	●						●		●		Profuse yellow flowers in spring; yellow fall color; 'Cleveland' has a narrow form; 'Columnar' has the narrowest form; 'Crimson King' has purple foliage; all have shallow roots which may damage sidewalks.
Sycamore Maple Acer pseudoplatanus (50')	●		●	●	●		●			●					Ornamental bark with age; similar to Norway Maple but more salt tolerant and will not damage sidewalks.
Red Maple Acer rubrum 'Autumn Flame' 'Red Sunset' (50')	●		●			●		●	●		●		●		Red twigs and flowers in spring; brilliant red fall color; brittle wood; because of its intolerance of alkaline soils and salt, it is best suited to lawn areas; prefers partial shade.
Sugar Maple Acer saccharum 'Bonfire', 'Goldspire', 'Green Mountain' (60')	●	●	●	●					●				●		Yellow to orange fall color; cultivars are more tolerant than species, but use with care as street trees (prefers moist, well-drained soils and partial shade); 'Bonfire' and 'Goldspire' are narrow in form.
Horsechestnut Aesculus hippocastanum 'Baumanii' (40')	●		●						●		●			●	White flowers in May; 'Baumanii' is a fruitless cultivar; a good urban tree.
River Birch Betula nigra (50')	●		●			●		●	●					●	Papery, exfoliating salmon-colored bark; multiple stems.
European Hornbeam Carpinus betulus (50')		●	●	●		●									Withstands shearing; tolerates shade.
Hackberry Celtis occidentalis 'Prairie Pride' (50')	●			●						●					Tough tree; very tolerant of heat and wind.
( ) indicates average mature height in urban situations	wide-spreading	narrow	lawn	street	transplants readily	transplant in spring	drought tolerant	wet- soil tolerant	salt sensitive	salt tolerant	spring	summer	fall	winter	

recommended species

LARGE TREES	FORM		SITE		TIME		STRESS		SALT		SEASONAL				REMARKS
Katsura Tree Cercidiphyllum japonicum (50')	●	●	●								●		●		Graceful foliage; yellow to scarlet fall color; best on lawns due to sensitivity to re-radiated heat.
American Yellowwood Cladrastis lutea (40')	●		●			●					●		●		Fragrant white flowers in June; tends to bloom in alternate years; ornamental bark with age; brilliant yellow fall color.
Turkish Filbert Corylus columa (45')	●			●			●								Ornamental bark with age; resistant to leaf scorch.
Hardy Rubber Tree Eucommia ulmoides (50')	●			●						●					Very durable tree; tolerant of many urban environmental impacts.
Green Ash Fraxinus pennsylvanica 'Summit', 'Marshall's Seedless', 'Newport' (55')		●		●						●					Yellow fall color; these cultivars are upright and suitable for restricted spaces.
Gingko Gingko biloba 'fastigiata' (65')	●	●		●	●		●						●		Yellow fall color; trouble-free; use only male clones; plant in stands or groves if used on lawns.
Thornless Honeylocust Gleditsia triacanthos inermis 'Halka', 'Shademaster' 'Skyline' (50')	●	●	●	●	●		●			●					Fine-leaved foliage; yellow fall color; casts a light shade; low maintenance; very tolerant of alkaline soils, shade, and salt; 'Skyline' is narrow and well-suited to restricted spaces.
Sweetgum Liquidambar styraciflua (65')	●		●			●		●					●		Interesting star-shaped foliage; excellent fall color; somewhat tolerant of poorly drained soils.
Dawn Redwood Metasequoia glyptostroboides (85')		●	●			●							●		Red fall color; difficult to transplant but tolerant of dry, poor soils once established; difficult to find large numbers of uniformly sized trees for streets.
Tupelo, Blackgum Nyssa sylvatica (40')	●		●			●		●					●		Excellent scarlet-orange fall color; insignificant flowers; blue fruits; not recommended for street planting except in wet soils.
Amur Cork Tree Phellodendron amurense (40')	●		●		●							●	●		Excellent foliage; yellow fall color; very wide spreading.
( ) indicates average mature height in urban situations	wide-spreading	narrow	lawn	street	transplants readily	transplant in spring	drought tolerant	wet- soil tolerant	salt sensitive	salt tolerant	spring	summer	fall	winter	

recommended species

LARGE TREES	FORM		SITE		TIME		STRESS		SALT		SEASONAL				REMARKS
	wide-spreading	narrow	lawn tree	street tree	transplants readily	transplant in spring	drought tolerant	wet- soil tolerant	salt sensitive	salt tolerant	spring	summer	fall	winter	
London Plane Tree Platanus acerifolia 'Bloodgood' (85')	●		●	●	●		●	●		●					Exfoliating bark; low maintenance requirements.
Pin Oak Quercus palustris (65')		●	●	●	●			●					●		Excellent late red fall color; requires acidic soils; unique branching habit; tolerates wet soils.
English Oak Quercus robur (50')	●	●	●	●		●									'Fastigiata' is narrow, good for restricted spaces; subject to foliage mildew in shade.
Red Oak Quercus rubra (65')	●		●	●		●							●		Excellent foliage; red-brown fall color; tolerates dry sites; difficult to transplant in fall.
Japanese Pagoda Tree Sophora japonica (65')	●		●	●	●		●			●		●			White flowers in late summer when little else is in bloom.
Littleleaf Linden Tilia cordata (65')		●	●	●	●							●	●		Dense, formal form; yellow fall color.
Crimean Linden Tilia euchlora 'Redmond' (50')	●		●	●	●							●	●		Dense, formal form; more tolerant of re-radiated heat (resistant to leaf scorch) than Littleleaf Linden.
Silver-leaf Linden Tilia tomentosa (60')		●	●	●	●		●			●		●	●		Excellent summer foliage; yellow fall color; most wind and salt tolerant of all linden species.
Japanese Zelkova Zelkova serrata 'Village Green' (65')	●		●	●	●								●		Vase-shaped habit; yellow to russet fall color.

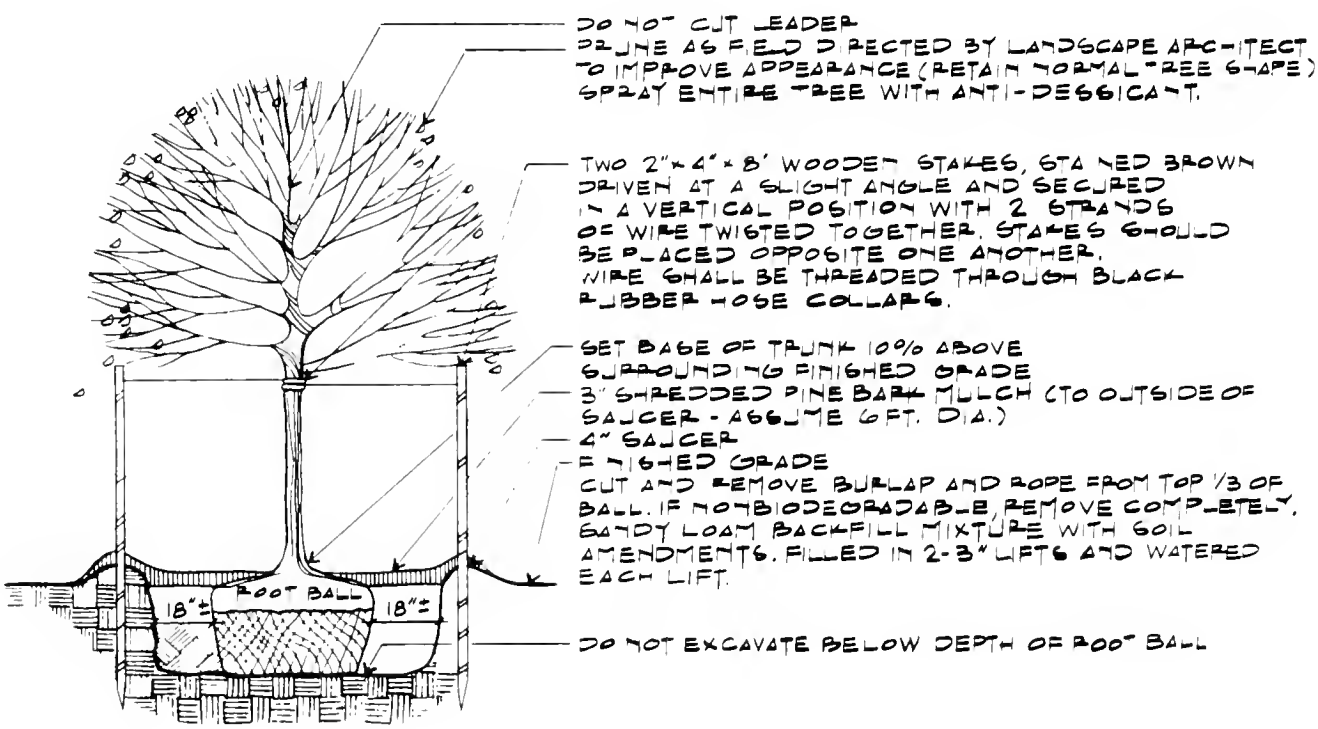
( ) indicates average mature height in urban situations

installation and maintenance

Proper installation is the third planning component for the long-term success of a tree planting. One of the most common mistakes is planting the tree too deep. When a tree is buried below the soil level at which it was originally growing, its roots are deprived of oxygen, which can lead to decline or death. Also, it is important to reduce the possibility of settlement by ensuring that the soil below the ball is undisturbed or firmed prior to planting (see detail below).

Soil content and handling is extremely important. All fill should be removed during installation and replaced with a sandy loam of uniform texture to the depth of the rootball.

Add bone meal and any special soil amendments such as watering crystals (Agrosoke) to the soil during site preparation. The soil should have a pH between 5.5 and 6.5, and organic matter must be thoroughly incorporated so that pockets of excessive moisture will not occur. Wet or frozen soils should not be handled because they tend to lose their structure and become compacted. The contractor should cover the soil in advance of planting to prevent unnecessary interruption of the planting operation.



Plastic burlap or other non-biodegradable materials around the root ball should not be accepted because they can thwart adequate root growth. Other materials such as ropes, wire baskets, and burlap should be removed from the top third of the root ball after the tree is positioned in the planting pit. It's also extremely important to ensure that the root ball and plant parts are not damaged during installation. Improper handling of the root ball can lead to root damage, automatically putting the tree into stress. The table on the back cover is a checklist to follow during tree installation. When the installation has been completed, trees should be thoroughly watered; the tree canopy should immediately be thinned to create a stronger branch structure and to reduce leaf surface demands for water from the root system. Finally, trees should be staked if planting occurs in the spring. As shown on the preceeding page, two stakes sized proportionally to the tree being planted but long enough to penetrate undisturbed subsoil should be positioned opposite one another and driven at a slight angle. The tree is then wired to the stakes using rubber hose collars to protect it. Wrapping tree trunks is recommended.

If tree siting, selection and installation have been properly executed, long-term maintenance will be relatively simple but cannot be ignored. Guy wires, stakes and wrapping should be removed after one year. After the first year, trees should be checked annually for evidence of insect pests or disease and treated if necessary. They should be fertilized after the first year, preferably in the spring or late fall. In subsequent years a fertilizing schedule of once every three years should be adequate. Fertilizers should contain at least 50 percent of the nitrogen in slow release form. Trees need to be checked annually for dead or crossing branches and lightly pruned if necessary. Perhaps the most important maintenance measures are to ensure that mulch is maintained, that planting saucers are maintained so that water is directed toward the root balls, and that the trees are adequately irrigated during periods of prolonged heat or drought.

conclusion

Since the publication of the Framework, significant tree plantings have occurred in the LMA as institutional building projects have been completed. In addition, more than 120 trees have been installed through a MASCO-initiated areawide tree planting program. These efforts have brought color, unity, and interest to the densely built LMA and have begun to create a more hospitable pedestrian environment. Additional opportunities for tree plantings exist in the next few years. MASCO is available to provide institutions with technical assistance to identify tree planting locations, potential species, planting specifications and required maintenance programs.

Additional References:

American Standard for Nursery Stock, 1986 Edition, American Association of Nurserymen, Inc.

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Trees for American Gardens, 1965. Donald Wyman, Macmillan Publishing Co.

A New Tree Biology, 1986. Alex Shigo, Shigo and Trees Associates.

Landscape Plants for Eastern North America, 1983. Harrison Flint, John Wiley and Sons, Inc.

Diseases and Pests of Ornamental Plants, 5th Edition, 1978. Pascal Pirone, John Wiley and Sons, Inc.

installation and maintenance checklist

Tree Species:

- ☐ Species or cultivar and size delivered as specified?
- ☐ Typical in form for the species?
- ☐ Leader damaged or cracked?
- ☐ Evidence of insect or disease problems?
- ☐ Trunk straight?
- ☐ Evidence of cracks or recent bark wounds?

Root Ball:

- ☐ Flattened or damaged?
- ☐ Appropriate size for tree caliper? (A good standard is nine-to-twelve inches per caliper inch.)
- ☐ Burlap and ropes removed from top third of root ball?
- ☐ Plant wrapped with non-biodegradable materials requiring special attention?

Root Zone:

- ☐ All fill removed?
- ☐ Tree placed on firm sub-grade?
- ☐ Ten percent of root ball above grade if grates have not been used?
- ☐ Bone meal and soil amendments (including watering crystals if specified) incorporated?
- ☐ Backfill placed in lifts and watered to settle?

Immediate Post-Planting Maintenance:

- ☐ Crossing, rubbing, and interfering branches removed?
- ☐ Canopy thinned?
- ☐ Trees staked and guyed as specified?
- ☐ Adequate irrigation provided immediately and for the first few weeks?
- ☐ Mulch applied at 2-3 inches or mulch and bulb combination ("green mulch") installed?
- ☐ Saucer created to direct water to root ball?
- ☐ Trees sprayed with an antitranspirant?
- ☐ Trees properly staked and wrapped?

Long-Term Maintenance:

- ☐ Stakes and guy wires removed after one year?
- ☐ Trees checked periodically during growing season for pests or diseases and treated if necessary?
- ☐ Mulch layer maintained in spring?
- ☐ Saucer maintained to direct water towards root ball?
- ☐ Dead or crossing branches removed in summer?
- ☐ Fertilizer applied during first year and every three-to-five years thereafter?
- ☐ Trees adequately watered during periods of prolonged heat and drought?