Onondaga
Botanical Garden & Arboretum
The Master Plan · Summer 2004

City of Syracuse Department
of Parks Recreation and Youth
Programs

State University of New York
College of Environmental
Science & Forestry
Faculty of Landscape Architecture

Carl Jahn & Associates,
Landscape Architects
Table of Contents

2  Section One
   Project Overview

25  Section Two
   The Collections

67  Appendix A
   Historical Evolution of Botanical Gardens and Arboreta

76  Appendix B
   Profiles of North American Facilities

Master Plan Project Team

SUNY College of Environmental Science & Forestry
Faculty of Landscape Architecture
Professor Emanuel Carter
Dr. Maria Ignatieva
Lori Ball MLA Candidate
Ryan Kovac MLA Candidate
Heather Carrington MLA Candidate

Carl Jahn & Associates, Landscape Architects
David Harding, RLA

Project Oversight Team

Syracuse Department of Parks, Recreation & Youth Programs
Patrick Driscoll, Commissioner
Glen Lewis, Planning & Development
Alix Krueger, Planning & Development

Syracuse Department of Community Development
Fernando Ortiz, Commissioner

Onondaga Park Association / Botanical Garden Committee
Paul Pflanz, Chair
Linda Pflanz
Fran Lawlor
Paul Aviles
Monica Sundej

SUNY College of Environmental Science & Forestry
Dr. Donald Leopold, Faculty of Environmental & Forest Biology
Dr. Theodore Endreny,
  Faculty of Environmental Resources & Forest Engineering and
  Forest & Natural Resources Management

USDA Forest Service Cooperative Research Station at SUNY-ESF
Dr. David Nowak, Director

Cornell Cooperative Extension of Onondaga County
Paul O'Connor, Community Forestry Educator

Marshall Tyler Rausch, Landscape Architects
Geoff Rausch, RLA
Section One: Project Overview

Onondaga Botanical Garden & Arboretum

BACKGROUND

The Onondaga Botanical Garden & Arboretum is an idea that originated (as a botanical garden) with the Onondaga Park Association in 1999. In that same year the idea was included in the Southwest Urban Design Study done by faculty and graduate students in the Faculty of Landscape Architecture at the SUNY College of Environmental Science and Forestry. That study expanded the idea to include an arboretum and the re-naturalization of part of the Onondaga Creek.

Over the ensuing four years, the Onondaga Park Association, the Syracuse Department of Parks, Recreation & Youth Programs, the SUNY College of Environmental Science & Forestry and other partners held many meetings to develop a concept for a botanical garden and arboretum that would stretch in a great circle from Upper Onondaga Park to Newell Street to Elmwood Park and back to Upper Onondaga Park, capture the spirit of the original botanical garden that once existed in Lower Onondaga Park and expand to become a landscape of education, beauty and animation that could serve as a catalyst for the revitalization of the southwest quadrant of the City of Syracuse.

Some important steps have already been taken. The City of Syracuse hired the landscape architecture firm Carl John & Associates to prepare and oversee the implementation of a rehabilitation plan for Upper and Lower Onondaga Park. That project was completed in 2002. With funds from Congressman James Walsh, the City has initiated the rehabilitation of the historic fire house in Upper Onondaga Park (for use as a community building and a teaching facility) and supported scientific studies looking at the feasibility of re-naturalizing the portion of Onondaga Creek along the west end of Kirk Park.

The purpose of this master plan is to establish a framework for the further pursuit of this project and to enlist more vigorous participation by the current project partners and by those yet to be inspired by the concept and its goals.

DESCRIPTION

The Onondaga Botanical Garden & Arboretum is a 228 acre facility that encompasses Onondaga Park, the west end of Kirk Park and the Onondaga Creek Corridor from W. Colvin Street to W. Newell Street and Elmwood Park in the Southwest Community of the City of Syracuse. It is a unique urban educational landscape designed to serve the following four goals:

- To serve as a major regional educational facility that offers active and passive recreation opportunities, exhibition space, classroom space, and interpretive plant collection exhibits that reflect research, education and community participation in the realms of forestry, horticulture and ecology.
- To offer opportunities for formal and informal teaching and learning, vocational and avocational growth, community interaction and the general broadening of horizons for local citizens and visitors from other locations.
- To serve as a catalytic landscape that combines a National Register historic landscape, a restored stream ecosystem and plant exhibits to re-knit, re-interpret and re-define the urban fabric of Syracuse’s Southwest Community through community participation and visitor participation in education, ecological enhancement, aesthetic improvement and economic development.
- To help restore a local and regional sense of hope and community well-being by investing in a new community aesthetic, new community cooperative networks and new opportunities for urban place-making that address neighborhood, city-wide and regional issues and opportunities.

The Onondaga Botanical Garden & Arboretum is intended to begin as a non-traditional facility in that it will not be enclosed and available solely via paid admission. Instead, it will be a connected series of community parks open to neighbors and to visitors from a distance, shaped by a combination of community, municipal and institutional actions, and gradually augmented by new structures (visitor center, conservatory, greenhouses, educational/exhibit facilities, etc) that will complement the outdoor exhibits.

The evolution of this botanical garden & arboretum as a unique urban educational landscape will be dependent upon generous and meticulous care and feeding from participating partners, friends groups and donors and patrons.

With that in mind, the aforementioned goals will be achieved in large measure by grounding the programs, activities, and physical development of the arboretum & botanical garden in the long-term missions of such institutions as the SUNY College of Environmental Science & Forestry, Cornell Cooperative Extension of Onondaga County, the United States Forest Service Cooperative Research Station (at SUNY-ESF), the Syracuse City School District as well as community-based organizations such as the Onondaga Park Association, CANOPY, the Syracuse Garden Club, the Southwest Community Center, etc. It is expected that the initial audience for this facility will be local but complex. That audience will include: (1) the students and teachers in the Syracuse City School District and other local districts; (2) local citizens – those who live nearby and seek recreation and learning opportunities, those who are active in the Onondaga Park Association, CANOPY and likely friends groups; (3) faculty, staff, students and professionals associated with local institutions involved in teaching, research and public service; and (4) the Centers for Nature Education which already uses Syracuse’s parks for youth-oriented education programs. It is this audience that will establish the viability of the botanical garden & arboretum concept and champion its role in opening new horizons for the local population.
Section One: Project Overview

offering opportunities for a growing body of scientific research, improving the local neighborhood quality of life and encouraging reinvestment in the greater Southwest Community.

The hope is that the experiences of the initial audience will generate a broader, regional audience, not only of school children, etc., but of scientists, scholars, and general lovers of horticulture, forestry and agriculture. Ideally, the broader audience will help offer the botanical garden & arboretum a broader (and very good) reputation that will beget the interest of individuals and foundations eager to support the facility’s mission. In this way the Onondaga Botanical Garden & Arboretum will develop, not like the Arnold Arboretum, the Morris Arboretum or Longwood Gardens, but like the Centers for Nature Education at Baltimore Woods (Marcellus) or the Beaver Lake Nature Center (Lysander).

While it is understood that the City of Syracuse will continue to own the land on which the facility is located, it is expected that the Onondaga Botanical Garden & Arboretum will be managed by a not-for-profit entity that will represent the interests of the public and the participating partners. Those partners will gradually begin to assist the City of Syracuse and the not-for-profit entity in developing and maintaining the facility and in managing its programming.

The not-for-profit will have to attract friends groups to help in exhibit maintenance and to assist in revenue-generating festivals, special exhibitions and performances at the botanical garden & arboretum. It will also have to offer paid memberships and have special events that are available via paid admission with a discount for members. Other revenue might be generated by renting spaces for weddings, receptions, banquets, corporate picnics, scholastic socials and small conferences. Like the Centers for Nature Education, the Onondaga Botanical Garden & Arboretum might also raise revenue by running summer botany/nature camps or, like Cornell Plantations or Morris Arboretum, offer a year-round slate of adult and children’s classes in botany, nature drawing, gardening, ecology, etc. A high-quality lecture series accessible to the non-scientist might be another source of revenue and reputation.

As the educational and scientific exhibits and programs of the facility expand and build a reputation, it is likely that there will be a call for indoor exhibition and program space in the form of a visitor center, additional greenhouses, a conservatory, etc. The funding for such facilities may be a long time in coming but, as the Centers for Nature Education discovered, quality programs diligently and passionately delivered beget the interests of those with money and other kinds of support!
THemes

These are the proposed themes around which the exhibits would be designed. Each theme is grounded in the long-term mission of one or more participating organizations.

- Exhibition and interpretation of Central New York native plants, plant communities and diversity of flora and fauna (SUNY-ESF, US Forest Service, Cornell Cooperative Extension)
- Exhibition and interpretation of a re-naturalized Onondaga Creek and riparian ecosystem (SUNY-ESF, US Forest Service, Cornell Cooperative Extension)
- Exhibition and interpretation of endangered plants and related plant pathology research (SUNY-ESF, US Forest Service, Cornell Cooperative Extension)
- Exhibition and interpretation of experimental plant materials for bio-remediation, new sources of energy, etc. (SUNY-ESF, US Forest Service, Cornell Cooperative Ext.)
- Exhibition and interpretation of decorative horticultural gardens (Onondaga Park Association, CANOPY, Syracuse Garden Club, etc.)
- Permanent and rotating indoor interpretive exhibitions (photography, panels, etc.) regarding botany, horticulture, forestry, ecology, ethno-botany, the fine arts, design, etc. (Syracuse Department of Parks, Recreation and Youth Programs, SUNY-ESF, Syracuse City School District, Syracuse University, Onondaga Community College)
- Community agricultural cooperatives (Cornell Cooperative Extension, SUNY-ESF)
- National Register historic landscape (NYS Parks, Recreation and Historic Preservation)
- Active and passive community recreation (Syracuse Department of Parks, Recreation and Youth Programs)
- Education and employment training (Cornell Cooperative Extension, SUNY-ESF, Syracuse Department of Parks Recreation and Youth Programs, Syracuse City School District)
Section One: Project Overview

COMPONENTS

The Onondaga Botanical Garden & Arboretum will include four contiguous precincts with connections to two others. The contiguous precincts will be connected by the Onondaga Promenade, a pedestrian corridor that will link every exhibit area. The precincts are as follows:

Upper Onondaga Park: This will be the realm of the woodland drumlin collections, the horticultural garden collections, the endangered species plant pathologies exhibits, the cold-hardiness exhibits. These will be supported by the renovated fire house that will serve as a community meeting place, a classroom building and an exhibit hall, and by a refurbished grotto, Hiawatha Lake, a revitalized lagoon, picnic facilities, and The Summit, a vantage point from which there are spectacular views of the City.

The Meadow Slope: This precinct will stretch from The Summit (Round Top) to Onondaga Avenue and include the Lilac Walk and the meadow collections.

Lower Onondaga Park: This will be the civic center of this educational landscape and the most intensely developed part of the facility. It will include the Greenhouse Complex with a café and exhibition spaces, formal decorative gardens, ethno-botany gardens, the community agricultural cooperative, a family activity area centered around a fountain/pool facility to be used for water play in the summer and for ice skating in the winter, plant propagation facilities (Grow Out Station), a visitor center, parking for cars and busses, and the facility’s main entrance (on South Avenue).

Onondaga Creek Floodplain (South Avenue to Newell Street): The floodplain corridor will be devoted, in part, to the re-naturalization of Onondaga Creek and the resulting exhibit that will interpret the revitalized stream and its habitats, the riparian vegetation and the adjacent forest community and do so in such a way as to compare it with 19th and early 20th century approaches to addressing urban streams.

Connector Streets: South Avenue, Valley Drive and Strathmore Road will serve as connector streets linking the above contiguous elements to Elmwood Park. The connector streets will have plant collections that reflect on-going research about cold-hardiness and salt tolerance in urban lake-effect conditions.

Elmwood Park: A forest park along Furnace Brook, Elmwood Park will serve as an interpretive exhibit of the rich diversity that is possible in an urban forest. The park will also offer a soon to be revitalized historic mill building that will serve as a community building and an environmental study center.
Section One: Project Overview

ANCHOR ELEMENTS
The initial development of the Onondaga Botanical Garden & Arboretum will be rooted in the missions of the several partnering organizations.

The Experimental Trees Exhibit
This exhibit will be based on the New York State American Chestnut Research and Restoration Project at the SUNY College of Environmental Science and Forestry. The exhibit will present: (1) the history of the American chestnut; (2) the development of the chestnut blight and its impacts; (3) research to develop blight-resistant chestnuts; and (4) the display of new tissue culture derived chestnuts as part the establishment of large restoration plantations around New York State.

The Willow Biomass Exhibit
This exhibit will address the SUNY-ESF Willow Biomass Project and will interpret efforts to exploit willow biomass as an inexpensive and renewable source of energy in an era of much concern about global warming and air pollution, the need to reduce dependency on imported energy fuels and to reconsider the uses for rural farmland. The exhibit will present: (1) the history of fuel resources use in American culture; (2) the story of global warming and air pollution; (3) the promise of willow biomass; (4) how and where willow is grown, harvested and used; and; (5) the role of willow in our energy future.

Onondaga Creek Restoration Exhibit
Although this exhibit will be small at first (from South Avenue to the pedestrian bridge at Kirk Park) it has the potential to eventually stretch farther south to W. Newell Street. Reflecting feasibility studies by SUNY-ESF, this exhibit will show the aquatic, botanical and zoological behaviors and impacts of a restored natural urban waterway. The exhibit will be interpreted in terms of: (1) local and regional hydrology; (2) aquatic, riparian and upland plants and plant communities; (3) aquatic, riparian and upland wildlife, and; (4) a discussion of channelization versus naturalization through traditional interpretive panels and the juxtaposition of exquisite remnant stone walls and the newly restored, naturalized stream corridor.

Long-term Ecological Research Exhibit
This exhibit will be sponsored by the USDA Forest Service Cooperative Research Station located at SUNY-ESF. It will present how long-term ecological research (LTER) works in terms of: (1) the nature of the urban forest; (2) issues and imperatives; (3) methods, processes and analysis; (4) studies taking place in Syracuse, and; (5) implications for community design and planning. The exhibit may include an on-site LTER monitoring tower.

Grow-out Station
The purpose of a grow-out station is to manage the growth of seedlings and containerized trees that are initially too small for urban street or park planting. Grow-out stations are both nursery and educational facilities that use trained youth to manage the plant materials. Youth learn the science and techniques required to grow tree seedlings into sapling size specimens ready for municipal planting. This plan calls for a grow-out station along South Avenue between Cortland Avenue and the entrance to the arboretum & botanical garden. The expectation is that the Syracuse Department of Parks, Recreation and Youth Programs, Cornell Cooperative Extension, SUNY-ESF and the Syracuse City School District will cooperate in developing the appropriate educational and nursery programs that will augment the City’s ability to train youth and prepare municipal plantings.

Upper Onondaga Park Fire House / Community Building:
The former fire house, located at the S. Summit Street entrance to the botanical garden & arboretum, will be refurbished and reopened as a building for: (1) community meetings and events; (2) lectures and classes, and; (3) rotating and/or permanent exhibits, especially of plants and plant communities that cannot be grown outdoors in the Central New York climate. This revitalized and adaptively reused facility will be one of the signature structures in the arboretum & botanical garden and one of the likely locations for indoor educational activities sponsored by the Syracuse Department of Parks, Recreation and Youth Programs, the Syracuse City School District, local institutions of higher learning, and other community-based participating partners.

The Lower Onondaga Park Greenhouse
The Syracuse Department of Parks, Recreation and Youth Programs currently uses the greenhouse to propagate plants for about 150 locations throughout the City. It is expected that that activity will continue and funding is currently being sought for upgrades to the roof and the integral drainage system. As part of the arboretum & botanical garden, the plant propagation process will be made visible and augmented with interpretive panels. As educational opportunities increase through cooperation with ONY Works (job skills training) and the Syracuse City School District, there will be an eventual need to augment the greenhouse with space for classrooms, public gathering and indoor plant exhibits.

The Elmwood Park Bio-diversity Exhibit
The Syracuse Department of Parks, Recreation and Youth programs will oversee the development of an interpretive system that illuminates the 661 species of flora and fauna discovered in the May, 2003 bio-blitz conducted by students and faculty from the SUNY College of Environmental Science and Forestry. The interpretive system will highlight the attributes of a unique historic urban park that is part of a rich regional ecosystem.
Section One: Project Overview

**The Unified Landscape**

Informal interviews by the design team reveal that there are many people in Syracuse who view the component landscapes that will host the botanical garden & arboretum as separate entities called Upper Onondaga Park, Lower Onondaga Park, Kirk Park, the Onondaga Creek Parkway, and Elmwood Park. This plan envisions these components as being brought together to create a dynamic educational landscape that cascades from the drumlin uplands to the creek valley and back up again offering kaledioscopic splashes of color, form, pattern and animated purpose that gives new value to the surrounding neighborhoods and to the City and to the Central New York Region. Reading as separate parks and public spaces, the host landscape is fragmented into territories that, depending on where one lives, reads as the locations of “them” and “us” or “here” and “there.” Through the development of the exhibits, the connecting promenade, and the unified interpretive, directional and identity signage, the Onondaga Botanical Garden and Arboretum will appear, and behave, as one place. This will be important because this “One Place” will connect two neighborhoods that have experienced very different economic, social and demographic trajectories over the last six decades and will require the people of those neighborhoods to work together to keep the facility dynamic, relevant and functional. The hope and expectation is that the facility’s neighbors will consider the “One Place” to be “Their Place.”

**The Historic Landscape**

Upper and Lower Onondaga Park together constitute a National Register historic landscape that reflects early 20th Century urban park development in the United States. The former reservoir that has come to be Hiawatha Lake, the (now dry) lagoon, the broad lawns and meadows, the greenhouse, the crafted stone work and fountains and the WPA stone work that channels Onondaga Creek are all features that contribute to the National Register status of the park. Part of the role of the Onondaga Botanical Garden and Arboretum will be to highlight the form and role of Onondaga Park as an historic landscape and the ability of such a landscape to evolve into new roles while remaining a viable historic narrative.

The master plan calls for the re-naturalization of the portion of Onondaga Creek from South Avenue to the Kirk Park Footbridge. Although this area is not in the National Register landscape of Onondaga Park, it is National Register eligible. As such it offers an opportunity rather than a constraint. In re-naturalizing this portion of the creek, the WPA stone work will remain intact on the west side of the channel and will be part of the interpretive exhibit that indicates the differences between 19th century / 20th century and 21st century ideas about how to handle urban streams in an ecologically sound manner.

**The Connective Landscape**

The master plan calls for the main body of the Onondaga Botanical Garden & Arboretum to be linked to Elmwood Park via “Connector Streets” that will also serve as interpreted exhibit space. These streets will include Newell Street, Valley Drive/Glenwood Drive, South Avenue and Strathmore Drive/W. Colvin Street. These streets will be used to study how neighborhood street trees respond to the stresses of lake-effect climate in urban neighborhoods. The new and existing trees, the potential poles, banners, lighting and new paving, and the interpretive, directional and identity signage will reflect the extension of the arboretum & botanical garden to include the Strathmore and Southwest communities in one urban design concept.

**Gateways**

The botanical garden & arboretum will have four gateways. The “Main Gateway” reflecting the facility’s address will be at the intersection where Centennial Drive and the Onondaga Creek Parkway meet South Avenue. This intersection will eventually be the location of the “Visitor Center.” Until that time, it will be the location of identity and directional signage, poles, banners, lighting, new paving patterns, and plantings that proclaim entry to a significant facility. The language of entry will be extended north/south along South Avenue from the intersection with Cortland Avenue to the intersection with Onondaga Avenue and the current Rent-A-Center Plaza (where shared parking will be available). This gateway design language will not only identify the location of the botanical garden and arboretum. It will also anchor the facility’s connection to South Avenue and serve as part of an aesthetic renewal of that corridor.

The plan calls for the other gateways to the botanical garden & arboretum to be located at the intersection of W. Newell Street and the Onondaga Creek Parkway, at Beverly Road / Summit Avenue, at Strathmore Drive, at the Glenwood Avenue and Corcoran High School entrances to Elmwood Park. To maintain neighborhood integrity, these entrances will not be available to bus traffic or used to accommodate more than neighborhood parking. These gateways will use the design languages of the Main Gateway but at a smaller scale and with less intensity.

In addition to the gateways, there will be identity signage at every location where a street enters or abuts the botanical garden & arboretum.

**The Collections**

From the vantage points provided by nearby streets it will be possible to see parts of the botanical garden & arboretum. The views into the facility will reward local citizens with access to a wide range of flowers, flowering shrubs, trees, etc. in exciting patterns of color and form. From South Avenue especially it will be possible to view WPA stone work, fountains, Onondaga Creek, botanical gardens in Lower Onondaga Park and the east slope of Upper Onondaga Park. Eventually, the visible collections will be augmented by a visitor center, and other related architectural elements.
Section One: Project Overview

**Urban Design**

**Animation**

The plan calls for 24 exhibit areas, many of which must be maintained by friends groups. With local and regional visitors throughout each day and local citizens working days, evenings and weekends, the botanical garden & arboretum will become an animated landscape, one that is as much about the interaction of people as it is about botany, horticulture, forestry and agriculture. The animation will be therapeutic to urban residents who may have questioned the viability of neighborhood and city.

The unique nature of the facility will encourage interesting encounters such as visitors from beyond Syracuse learning from exhibits where local citizens are actually working or local citizens going for a stroll among scientists examining the status of Chestnut trees or water quality or students and teachers learning plant names and characteristics among teenagers managing nursery specimens at a grow-out station. The botanical garden & arboretum will be the most vibrant landscape in the southwest quadrant of the City.

If this animation is successful, it will have implications for the rest of the area. The first implication will be that the botanical garden & arboretum is a safe landscape where all are welcome. It will be local, city-wide and regional COMMON GROUND! The logical extension of this safe and beautiful landscape will be that the adjacent neighborhoods are desirable places to be, to visit, to raise a family. The logical extension of that will be that neighborhood and city are viable constructs and the logical extension of that is that neighborhood and city need our sense of pride and need our caring to be expressed through generous acts of citizenship.
Section One. Project Overview

PROJECT PHASING

The master plan calls for the Onondaga Botanical Garden & Arboretum to be developed in four phases: (1) an administrative phase; (2) the initial / anchor projects; (3) extended exhibits; (4) connector streets exhibits, and; (5) new architectural elements.

Phase One (Year One):

Administrative Development

With completion of this plan it is imperative that the participating partners work quickly to establish a not-for-profit entity to offer administrative leadership and to solicit and disperse funds on behalf of the Onondaga Botanical Garden & Arboretum. The not-for-profit entity should have a board of directors and an operating staff.

The board of directors should include representatives of each of the founding participating organizations and from local and regional corporate, political and not-for-profit realms. The board should include a combination of membership development, public safety, and personnel. Volunteer and friends groups coordination, membership development, public safety, and personnel.

Initially, the operating staff might be existing or new staff at the Syracuse Department of Parks, Recreation and Youth Programs which might develop a Botanical Garden & Arboretum Unit. This would make sense if the City of Syracuse continues to own the land for the facility. The director would report to the board of directors and to the parks commissioner who would be an ex-officio member of the board.

Eventually the operating staff should include the following:

Director:

to manage staff and all of the day-to-day operations of the Onondaga Botanical Garden & Arboretum on behalf of the City of Syracuse and the not-for-profit Board of Directors; also responsible for leadership in fundraising, grantmanship, endowment management, membership development, coordination of volunteers, inter-agency coordination, publicity, etc.

Botanical Curator:
to take the lead in and oversee, in cooperation with the participating partners, the development, evolution and maintenance of all indoor and outdoor, permanent and temporary plant collections, exhibits and interpretive systems; participate in educational programming, fund-raising and grantmanship; maintain the balance between botanical garden and arboretum, among scientific work, educational exhibits and recreation opportunities and between an evolving park system and the National Register historic landscape.

Education Program Coordinator:
to coordinate education programming with school districts and other education organizations in the region; to develop in-house educational programs, assist the botanical curator in the development and management of all botanical and non-botanical indoor and outdoor exhibits; assist in membership development, fund-raising and grantmanship.

Land Manager:
to oversee the day-to-day maintenance of all indoor and outdoor components of the facility, from plant maintenance to snow removal to trash pick-up; to supervise staff of gardeners and maintenance crews.

Administrative Aide:
the institutional continuity; a person with the appropriate administrative and communication skills to help the above personnel get their work done.

Gardeners:
skilled horticulturists / arborists to deal with all aspects of plant propagation, planting, relocation, removal, pruning, watering, etc.

Maintenance Crew Members:
to deal with all aspects of non-botanical maintenance including repairs, clean-up, trash and garbage collection, snow removal, etc.; some must be capable of electrical and plumbing repairs.

The botanical garden & arboretum staff should be augmented by two sets of volunteers: docents and friends groups. Public safety personnel should be present at all times.

Docents: volunteers who can lead tours of the facility, take tickets at special events and answer questions; led by a coordinator of volunteers.

Friends Groups: which can offer their expertise, passion and time to assist in the maintenance of various collections under the supervision of the land manager and / or the botanical curator. There should be at least one friends group for each collection exhibit.

Public Safety:
should be City of Syracuse police officers (for whom the botanical garden & arboretum is their primary beat), preferably bicycle patrol with access to immediate back-up by officers in cruisers. As more of the exhibits reflect the on-going work of SUNY-ESF, perhaps the public safety effort might be augmented by State University Police.

The director of the Onondaga Botanical Garden & Arboretum and the administrative aide should be paid by the City of Syracuse and be administrative staff personnel in the Department of Parks, Recreation and Youth Programs. Other staff should be brought in as grants (initially) and the endowment (eventually) allow. Interim staff might be available through partnering institutions. The initial goals of fund-raising by the not-for-profit entity will be to fund staff, assist in the implementation of the initial anchor exhibits and develop an endowment.
Section One. Project Overview

PROJECT PHASING

Phase One (Year One):
Administrative Development (cont.)
An important aspect of the initial administrative phase is for the Commissioner of Parks, Recreation and Youth Programs and the members of the not-for-profit Board of Directors to work with the Mayor, Common Council, other municipal department heads and the citizenry to garner unequivocal, long-term commitment to managing the evolution of a botanical garden & arboretum on this site. These projects will most likely be funded by the participants and their financial resources. The first projects should include:
- Creation of long-term strategies for financial development, facility implementation and facility maintenance
- Complete renovation of fire house in Upper Onondaga Park
- Development of educational and visitor programming for the refurbished fire house in Upper Onondaga Park
- Continuation of park restoration work as per Carl Jahn & Associates’ November 1999 report
- Detailed planning and design for the botanical collections; initiation of botanical garden exhibits
- Design and construction of the Onondaga Promenade that connects all exhibit areas
- Creation and implementation of an interpretive system that will offer a consistent format and language for the facility
- Initiation of the American Chestnut Exhibit
- Initiation of the Willow Biomass Exhibit
- Initiation of the Grow-Out Station Exhibit
- Planning, design and construction of the bio-diversity interpretive system in Elmwood Park
- Construction of Long-Term Ecological Research tower and initiation of LTER exhibit
- Planning and design for renovation and extension of greenhouse complex
- Planning and design for re-naturalization of parts of Onondaga Creek
- Planning and design for community gardens; initiation of community gardens complex
- Planning and design for reuse of tourist camp structure (stone building) along Onondaga Creek Parkway
- Relocation of baseball diamond and basketball courts to Kirk Park
- Establishment of agreement for shared parking with Rent-A-Center mall on South Avenue
- Solicitation and organization of teams of citizens and experts to begin the research, planning and design for the establishment of historic ethno-botany exhibits.
- Determination of what public improvements need to be made in terms of lighting, banners, seating, receptacles, pedestrian paths, location and directional signage, etc.
- Establishment of a land acquisition strategy for parking, a conservatory and additional exhibit space
- Development of a plan for a system of public art.
- Planning and design for the connector streets exhibits
- Planning and design for traffic calming on South Avenue
- Initiation of rotating indoor exhibits and annual lecture series
- Implementation of historic ethno-botany exhibits

Phase Two (Years Two and Three):
Initial / Anchor Projects
The initial / anchor projects will be those provided by the participating partners. These will be the projects that indicate to all that there will be a real botanical garden & arboretum on this site. These projects will most likely be funded by the participants and their financial resources. The first projects should include:
- Creation of long-term strategies for financial development, facility implementation and facility maintenance
- Complete renovation of fire house in Upper Onondaga Park
- Development of educational and visitor programming for the refurbished fire house in Upper Onondaga Park
- Continuation of park restoration work as per Carl Jahn & Associates’ November 1999 report
- Detailed planning and design for the botanical collections; initiation of botanical garden exhibits
- Design and construction of the Onondaga Promenade that connects all exhibit areas
- Creation and implementation of an interpretive system that will offer a consistent format and language for the facility
- Initiation of the American Chestnut Exhibit
- Initiation of the Willow Biomass Exhibit
- Initiation of the Grow-Out Station Exhibit
- Planning, design and construction of the bio-diversity interpretive system in Elmwood Park
- Construction of Long-Term Ecological Research tower and initiation of LTER exhibit
- Planning and design for renovation and extension of greenhouse complex
- Planning and design for re-naturalization of parts of Onondaga Creek
- Planning and design for community gardens; initiation of community gardens complex
- Planning and design for reuse of tourist camp structure (stone building) along Onondaga Creek Parkway
- Relocation of baseball diamond and basketball courts to Kirk Park
- Establishment of agreement for shared parking with Rent-A-Center mall on South Avenue
- Solicitation and organization of teams of citizens and experts to begin the research, planning and design for the establishment of historic ethno-botany exhibits.
- Determination of what public improvements need to be made in terms of lighting, banners, seating, receptacles, pedestrian paths, location and directional signage, etc.
- Establishment of a land acquisition strategy for parking, a conservatory and additional exhibit space
- Development of a plan for a system of public art.
- Planning and design for the connector streets exhibits
- Planning and design for traffic calming on South Avenue
- Initiation of rotating indoor exhibits and annual lecture series
- Implementation of historic ethno-botany exhibits

Phase Three (Years Four through Six):
Extended Exhibits & Extended Planning
This phase should see the completion of projects begun in Phase Two and the initiation of new projects. Funding is likely to come from the participating partners and their sources of support and from foundations, corporations, individual donors and various levels of government. New projects should include:
- Closing of park roads to thru traffic
- Expansion of educational and visitor programming
- Implementation of public improvements along South Avenue, at the entrances to the facility and within the facility
- Initiation of the connector streets exhibits
- Implementation of historic ethno-botany exhibits
- Determination of what public improvements need to be made in terms of lighting, banners, seating, receptacles, pedestrian paths, location and directional signage, etc.
- Establishment of a land acquisition strategy for parking, a conservatory and additional exhibit space
- Development of a plan for a system of public art.
- Planning and design for the connector streets exhibits
- Planning and design for traffic calming on South Avenue
- Initiation of rotating indoor exhibits and annual lecture series
- Implementation of historic ethno-botany exhibits
Section One: Project Overview
Onondaga Botanical Garden and Arboretum Master Plan

ELMWOOD PARK

Elmwood park is a forest park along Furnace Brook. The park will serve as an exhibit of the rich diversity that is possible in an urban forest. The park will also offer a venue to be revitalized into a wildlife building that will serve as an environmental education and community meeting center.

ANCHOR ELEMENTS

- **The Elmwood Park Sacred Diversity Exhibit**
  The Syracuse Department of Parks, Recreation and Youth programs will oversee the development of an interpretive system that illustrates the 664 species of flora and fauna discovered in the May 2003 field trip conducted by students and faculty from the SUNY College of Environmental Science and Forestry. The interpretive system will highlight the attributes of a unique historic urban park that is part of a rich regional ecosystem.

Onondaga Botanical Garden and Arboretum Master Plan

ONONDAGA CREEK FLOODPLAIN

The floodplain corridor will be devoted to the revitalization of Onondaga Creek. The exhibit will interpret the revitalized stream habitat, including riparian vegetation and the adjacent upland forest community. The interpretive program will compare the revitalization with historic treatment of the urban stream corridor.

ANCHOR ELEMENTS

- **Onondaga Promenade**
  The promenade is a trail, linear education pathway linking the various collections and deficit features throughout the park.
- **Onondaga Creek Restoration Exhibit**
  Although the re-makings will be small in scale, extending from South Avenue to the present preservation Park, it will allow for potential to expand the length of the park to Nysa Street.
- **The Willow Promenade exhibit**
  This area will address the SUNY ESF Willow Biomass Project and will interpret other discipline studies and study willow biomass as an innovative and sustainable source of energy.
**Section One: Project Overview**

**PROJECT PHASING**

**Phase Three (Years Four thru Six): Extended Exhibits & Extended Planning (cont.)**
- Renovation and construction of addition(s) to the greenhouse complex
- Construction of the visitor center at the South Avenue entrance
- Implementation of public art system
- Acquisition of land for parking, a conservatory and additional exhibit space
- Planning and design for a conservatory and additional parking and exhibit space
- Re-naturalization of relevant parts of the Onondaga Creek corridor

**Phase Four (Years Six thru Ten): Final Development**
This phase should see the completion of projects from Phase Three and the initiation of the final large signature elements in the facility. These will be funded by the participating partners and their sources of support and by foundations, corporations, individual donors and various levels of government.
- Construction of conservatory, new parking and new exhibit space
- Completion and/or expansion of all other exhibits

**Phase Five: Long Term Operations**
This is the long-term management and evolution of the Onondaga Botanical Garden & Arboretum and its growth into a regional educational and recreational facility.

**Project Phasing**

**Phase Three (Years Four thru Six): Extended Exhibits & Extended Planning (cont.)**
- Renovation and construction of addition(s) to the greenhouse complex
- Construction of the visitor center at the South Avenue entrance
- Implementation of public art system
- Acquisition of land for parking, a conservatory and additional exhibit space
- Planning and design for a conservatory and additional parking and exhibit space
- Re-naturalization of relevant parts of the Onondaga Creek corridor

**Phase Four (Years Six thru Ten): Final Development**
This phase should see the completion of projects from Phase Three and the initiation of the final large signature elements in the facility. These will be funded by the participating partners and their sources of support and by foundations, corporations, individual donors and various levels of government.
- Construction of conservatory, new parking and new exhibit space
- Completion and/or expansion of all other exhibits

**Phase Five: Long Term Operations**
This is the long-term management and evolution of the Onondaga Botanical Garden & Arboretum and its growth into a regional educational and recreational facility.

**Phase Four (Years Six thru Ten): Final Development**
This phase should see the completion of projects from Phase Three and the initiation of the final large signature elements in the facility. These will be funded by the participating partners and their sources of support and by foundations, corporations, individual donors and various levels of government.
- Construction of conservatory, new parking and new exhibit space
- Completion and/or expansion of all other exhibits

**Phase Five: Long Term Operations**
This is the long-term management and evolution of the Onondaga Botanical Garden & Arboretum and its growth into a regional educational and recreational facility.

**Section Two: The Collections and Seasonal Walks**

**The Collections**

**Design Considerations**

The master plan calls for the design and location of collections to reflect:
- (1) on-site precedents regarding form, color and plant materials;
- (2) the establishment of a stimulating mixture of interpretive exhibits;
- (3) respect for land form and the presence of water;
- (4) the conscious interweaving of elements of botanical garden, arboretum and historic landscape;
- (5) thematic linkages;
- (6) the arrangement of color, form and pattern to make the most of views and vistas, and;
- (7) the enhancement of the contextual cityscape.

The master plan calls for 24 collections. This section uses a combination of local, regional, national and global examples and precedents to illustrate the several ways in which the recommended collections might be expressed at the Onondaga Botanical Garden & Arboretum. The examples and precedents stand as the doorway to the exhibit design process that will be addressed pursuant to this plan.

In keeping with tradition, Upper Onondaga Park (collections included: environmental education center; horticultural gardens; native New York State plant communities; the picnic pavilion area; the conifer collection; the alpine rock garden; the central lawn; the summit area; the experimental trees area; the winter garden; the summit gateway; and the lilac walk and meadow) will remain a combination of woodland, lake, meadow and decorative gardens while serving as the crowning element of color, form and pattern and offering spectacular views of the immediate neighborhood, the City of Syracuse and the northern end of the Onondaga Valley.

Lower Onondaga Park (collections included: the family activity area; the greenhouse complex; the formal garden; the South Avenue entrance, and; the adjacent grow-out station) will be dominated by the presence of the greenhouse and be the most horticulturally prolific part of the overall facility. The strong horticultural aspect and the attendant stone work, fountains and public art will be balanced by the reforestation of the Rock Garden at South Avenue, the new access to the edges of Onondaga Creek and by the new architecture that will represent the visitor center and education facility.

The area comprised of Kirk Park and the Onondaga Creek Parkway (collections included: succession garden; heritage gardens; aquatic, riparian and upland plant communities; the willow bio-mass exhibit, and; the Newell Street entrance) will reflect the condition of the Onondaga Creek floodplain, the saga of its historic degradation...
Some exhibits will be celebratory. The Summit Avenue entrance; the South Avenue entrance; the aquatic, riparian and upland communities along Onondaga Creek; the Newell Street entrance, and; the connector streets exhibit will celebrate community design and a visible sense of neighborhood rebirth connected to the intense interweaving of new plantings, new architecture, new landscapes and a newly visible historic landscape.

Finally, there will be recreational landscapes – those that invite active engagement that might be separate from a learning process. The picnic pavilion area; the heritage gardens; and the system of paths and sitting areas will be ideal for those who just want to stroll, contemplate, or meet friends and neighbors.

The Tour

The following is a look at each of the proposed 24 collections in terms of existing conditions at the project site and examples of precedents and typologies from which exhibit design might be derived.
The Collections

1. Onondaga Promenade

The Onondaga Promenade will be a unified circulation system, which will consist of distinctive pavement, borders of perennials and annuals (related to adjacent exhibits), seating, lighting and signage elements.

Top Left: Botanic Garden of the Royal Veterinary and Agricultural University.

Bottom Left: Tulips in one of the USA Botanic Gardens.


2. Environmental Education Center

Renovated Firehouse:
Will serve as an education center and a community building.

Wildlife Garden Next to the Education Center:
Collection of decorative plants (native and exotic): Dicentra eximia, Silene virginica, Solomon’s Seal-Polygonatum biflorum, Hosta species.
Section Two: The Collections

3. Horticultural Gardens

Series of collections with the main emphasis on demonstration of horticultural varieties of decorative plants.

Lily Pond: Species and cultivars of daylily—Hemerocallis will be used.

Around the pond: Rodgersia spp., Iris spp., Lobelia cardinalis

In the Pond: Nymphaea spp.

Above Left and Bottom Left: View of Rustic Bridge at Lily Pond in 1944; Lily Pond in one of the Botanic Gardens.

Above Right: View of the Lily Pond in May 2003.

Right: Potential collection plant: Lobelia cardinalis.

Right: Nuphar species in New York State.

Far Right: Water Lily by Lynn Gertenbach


Far Right: View of the Lagoon (c.1915, postcard).

Left and Above Left: Daylily collections.
Section Two: The Collections

Decorative plants (annuals and perennials):

Far Left: Southeast View from West Lake Shore (c.1915, postcard).
Left: Same view, November 2003.

Far Left: Flowerbeds in Botanic Garden of the Royal Veterinary Agricultural University.
Above: Annual flowerbed in Christchurch New Zealand.

Right: Forsythia blooming in the Central Park (New York City).

Far Left: View of Gazebo Bandstand (c.1915, postcard).

Left: Blooming Bougainvillea slope. Hawaii Island.

“Blooming Walk” around Hiawatha Lake:
Forsythia x intermedia, Laburnum anagyroides, Caragana arborescens, Cornus mas, Chaenomeles japonica, Cytisus spp., Philadelphus spp., Pieris japonica.
Section Two: The Collections

4. Native New York State Plant Communities Interpretive Area

Native New York State Plant Communities: Collection of forest hardwood plant communities which to be located on the existing hardwood drumlin forested area: maple-beech forest (Fagus grandifolia, Acer saccharum, Acer rubrum, Quercus rubra, Prunus serotina, Tilia americana, Fraxinus americana, Cornus alternifolia, Acer spicatum, Hamamelis virginiana, Trillium grandiflorum, Erythronium americanum, Hepatica nobilis, Aster divaricatus, collection of native ferns).


Clockwise from Top:
View of drumlin forested area in 2003.
Aerial View from Southeast (c. 1923).
Trillium grandiflorum, Rand Tract, Syracuse.
Drumlin forested area in October 2003.

Above: Interpretive sculpture in Kew Botanic Gardens (forested area).
Far Left: Woodland fern collection.
Left: Collection of native plants.
Section Two: The Collections

5. Picnic Pavilion

6. Conifer Collection

This area will include the collection of conifer species and the shaded Conifer Rock Garden.

**Conifer Collection:** Picea spp., Thuja spp., Tsuga spp., Pseudotsuga, Metasequoia glyptostroboides and dwarf conifers: Juniperus-Juniperus spp., Thuja spp., Taxus spp.
Section Two: The Collections

Shaded Conifer Rock Garden Collection

Far Left: Upper Onondaga Park. The Rock Garden and waterfall (c.1915, postcard).

Left: Hepatica nobilis for the rock shade garden
Above: Rock Garden in Brooklyn Botanic Garden.

Clockwise from Above:
Upper Onondaga Park. Location of future Alpine Rock Garden.
Rock Garden in one of the USA Botanic Gardens.
Rock Garden in Kew Botanic Gardens.
Classical Rock Garden in one of the USA Botanic Garden.

8. Alpine Rock Garden
Collection of native and exotic alpine plants:
Section Two: The Collections

9. Central Lawn

Collection of native and exotic trees and shrub species in combination with perennials on the lawn.


Clockwise from Top Left:
Upper Onondaga Park, Central Lawn Area in November 2003.
Arrangement of collections in the form of decorative groups in Kew Botanic Gardens.
Arrangement of collections in the form of decorative groups in Kew Botanic Gardens.
Decorative groups (trees, shrubs and perennials) in St. James’s Park, London.

10. The Summit

Formerly called “round top.” This area will be a belvedere (lookout) to the City of Syracuse with decorative plants that will enhance the viewing experience.
Section Two: The Collections

11. Experimental Trees Exhibit

Display area for new cultivars of tree species based on on-going SUNY ESF research and community education outreach. This area will include three major collections:

1. Cold Tolerant Trees Collection:
Collection of woody cold tolerant plants native to New York State and Eastern US:
- Hydrangea quercifolia, oakleaf hydrangea
- Ilex opaca, American holly
- Kalmia latifolia, mountain laurel
- Liquidambar styraciflua, sweetgum
- Magnolia virginiana, sweetbay magnolia
- Quercus phellos, willow oak
- Zenobia pulverulenta, dusty zerbria

2. Chestnut Collection:
Species of chestnut—Castanea spp.

3. Tree Pathology Garden:
New and experimental cultivars of elm (Ulmus—Dutch disease), chestnut—Castanea, beech (Fagus)

Clockwise from Right:
- Kalmia latifolia, mountain laurel
- American Chestnut (Castanea dentata)
- Ilex opaca—American Holly
- Hydrangea quercifolia, oakleaf hydrangea.
- American Chestnut (Castanea dentata)

Upper Onondaga Park. Existing site condition, November 2003

According to Drs. Maynard and Powell (SUNY ESF), this site provides ideal conditions for growing chestnuts.
Section Two: The Collections

12. Winter Garden

Rest area and hill side decorative collection of plants with emphasis on winter seasonal interest.

Far Left: Winter Garden showing colored stems of Cornus at Cambridge University Botanic Garden (UK).

Left: Tabletop Scotch elm (Ulmus glabra) at Morris Arboretum (USA).


Clockwise from Above:
Winter Garden at Hillier Arboretum.
Winter Garden at Hillier Arboretum. Betula papyrifera, Syracuse, NY.
Winter Garden at Hillier Arboretum.
13. The Summit Gateway

This is the primarily entrance from Strathmore neighborhood with major emphasis on spring blooming trees and shrubs. The area around the Gateway will also include English trees and shrubs Collection, and English Cottage Garden Collection that reflects neighborhood design textures.

Blooming Arboretum Gateway:
Magnolia spp., Cornus florida, Prunus spp., Malus spp.

Clockwise from Right:
Neighborhood residence next to the Summit Entrance in October 2002.
Cottage Garden. Ashburton, New Zealand.
Cottage Garden.

English deciduous trees and shrubs collection:
Tilia europaea, Quercus robur, Acer platanoides, Acer pseudoplatanus, Ulmus laevis, Corylus avellana.

Far Left: Area next to the Summit Entrance in 2003.
Left: English deciduous trees collection at Kew Botanic Gardens

English Cottage Garden: Lavandula spp., Alsea rosea, Antiminthum majus, Calendula officinalis, Cosmos spp., Dianthus barbatus, Digitalis purpurea, Hemerocallis spp., Papaver spp., Rosa spp., Viola tricolor, Cornus kousa, Syringa vulgaris

http://www.bbg.org/exp/stroll/index.html
http://www.maigold.co.uk/garden.htm
http://www3.baylor.edu/~Charles_Kemp/cottage_garden.htm

http://www المستخدمة.co.uk/garden.htm
http://www.Olayko.edu/~Charles_Kemp/cottage_garden.htm
14. The Lilac Walk and the Meadow

This collection will be based on an historical lilac collection (Syringa species). This collection will highlight the sloping meadow that connects Upper and Lower Onondaga Parks. The meadow is based primarily on native New York State species and decorative bulb species.
Section Two: The Collections

15. Family Activity Area
In Lower Onondaga Park: a Children’s Garden and play area in combination with a passive recreation area for adults.

16. The Greenhouse Complex
Indoor settings for exhibitions, plant propagation and education.

Greenhouse Botanical Collections could include collection of world’s biomes: tropical, subtropical, arid, savanna etc.

Victorian Favorite Plants: *Cyathea* spp. woody ferns, *Victoria regia*.
Section Two: The Collections

17. The Formal Garden

Collections based on historical precedent. It will be the central formal garden with different decorative and taxonomical displays of plants:

- Rosa spp., Buxus sempervirens, Taxus baccata, Thuja occidentalis (emphasis trees), Petunia, Salvia, Begonia spp., Viola spp., Primula spp., Iris spp., Verbena spp., Sempervirum spp., Alternanthera spp,
Potted plants collection:
*Pelargonium* spp., *Lobelia erinus*, *Yucca* spp., *Petunia hybrida* and *Citrus* species

---

### Section Two: The Collections

---

#### 18. The South Avenue Entrance

The main entrance to the botanical garden and arboretum and the primary access from the southwest neighborhood and from Onondaga Hill. This area will be a combination of design elements and collections that emphasize arrival and orientation to the facility.
Section Two: The Collections

19. Grow Out Station

Plant propagation and nursery activities area for the education of high school students and for the preparation of plant materials for parks, streetscapes and the botanical garden and arboretum.

Clockwise from Top Left:
Villandry Garden, France.
Examples of vegetable gardens and nursery activities.
Villandry Garden, France.
Examples of vegetable gardens and nursery activities.

20. Succession Garden

Collections of native New York edge plants, floodplain vines, and meadow-like plant communities.

Meadow slope: Native meadows
Native new York State Edge Plants: Cornus racemosa, Rhus typhina
Floodplain Vines: Vitis spp., Parthenocissus spp.
21. Heritage Gardens

Ethno-botanical gardens representing multiple cultural uses of plants for food, medicine and rituals.


Far Left and Left:
Lower Onondaga Park,

Above:
Heritage Garden in
Morris Arboretum.

Right:
Heritage Garden in
Montreal Botanic Garden.

Top Left and Top Right:
Onondaga Creek Parkway,
Proposed site,
November 2003.

Right:
Upland forest: Acer saccharum,
Acer rubrum, Populus tremuloides, New York State

22. Acquatic, Riparian and Upland Plant Communities

Collection of New York State upland and riparian plant communities associated with woodland streams. Proposed location: Onondaga Creek and Onondaga Creek Parkway.

\[ \text{Platanus occidentalis, Populus deltoides, Salix spp., Acer negundo, Cornus spp., elms, oaks, maples etc.} \]
Section Two: The Collections

Acquatic, Riparian and Upland Plant Communities continued

Top Left and Top Right:
Proposed site, November 2003;
Hemlock forest. New York State.

Center Top and Center Right:
Proposed site, November 2003;
Forested swamp: skunk cabbage and
red maple.

Bottom Left and Bottom Right:
Proposed site, November, 2003; Iris
versicolor and Onoclea sensibilis.
Freshwater marsh, New York State.

Left:
Caltha palustris

Below (top to bottom):
Onondaga Creek, October 2003;
Green ash and riparian species,
New York State.
Section Two: The Collections

23. Willow Biomass Exhibit
Collection of species: Salix spp., Populus spp. that are used for bio-remediation and as an alternative energy source. Based on ongoing research at SUNY ESF.

Clockwise from Top Left:
- Proposed site. Existing conditions, November 2003.
- Willow biomass
- Willow biomass experiments
- Weldan Garden, the Netherlands.

24. Newell Street Entrance
This is the southern entrance to the facility, enhanced by a small visitor center and garden exhibits (Pergola Plant Collection: Wisteria sinensis, Actinidia kolomikta, Clematis spp., Parthenocissus spp.)
Section Two: The Collections

25. Connector Street Collections
Plant collections that reflect on-going research at SUNY ESF about cold-hardiness and salt tolerance in urban lake-effect conditions.

Street Trees Collection:
- Acer nigrum, black maple
- Carpinus caroliniana, American hornbeam
- Cotinus obovatus, American smoketree
- Halesia tetraphylla, Carolina silverbell
- Nyssa sylvatica, blackgum
- Potentilla trifoliata, hoptree
- Quercus shumardii, Shumard oak

Above: Tilia cordata (European Linden) in one of the street plantings in St. Petersburg, Russia.

26. Elmwood Park Biodiversity Exhibit
Interpretive exhibits that reflect the 661 species of life (discovered and cataloged by SUNY-ESF faculty and students in a May, 2003 bioblitz) in this unique 68 acres of urban forest along Furnace Brook.

Seasonal Walks

SPRING: MARCH TO MAY
Native New York State Plant Communities: Erythronium americanum, Dicentra cucularia, Dicentra canadensis, Trillium grandiflorum, Trillium erectum, Smilacina racemosa, Sanguinaria canadensis, Tiarella cordifolia
Victorian annuals: Viola, Primula
*Blooming Walk*: Forsythia x intermedia, Viburnum spp., Rhododendron spp., Veigela spp.
Alpine Rock Garden: Primula spp.
Lilac Walk: Syringa spp.
Dry Alpine Garden: Euphorbia spp., Draba spp.
The Summit Gateway: Magnolia spp., Prunus spp., Cornus florida
English Cottage Garden: Scilla, Crocus, Tulipa, Narcissus
Rose/Parterre Garden: Viola spp., Primula spp.
Heritage Garden: Viburnum spp.
Grow out Station: Malus spp., Prunus spp.
Pergola Plants Collection: Clematis spp., Wisteria spp.
Spring bulbs and other spring plant along Onondaga Promenade

SUMMER: JUNE TO EARLY SEPTEMBER
Native New York State Plant Communities: Native ferns, Aquilegia, Anemone canadensis, Geranium robertianum, Solidago spp. (forest species), Thalictrum dioicum
Shady Rock Garden: ferns
Daylily Collection: Hemerocallis spp.
Wetland New York State Protected Plants: Lilium spp.
Victorian Annuals: Tagetes, Geranium, Pelargonium, Salvia, Zinnia, Bellis perennis
*Blooming Walk*: Hydrangea spp., Cornus cousa, Philadelphus spp.
Water lily Garden: Nymphaea spp., Nuphar spp.
Shrub Collection with Perennials: Cornus, Viburnum, Hibiscus syriaca, Delphinium, Rudbeckia, Solidago
Alpine Rock Garden: Campanula, Thymus spp., Salvia spp., Elytrigia, Veronica, Knautia
Seasonal Walks

SUMMER: JUNE TO EARLY SEPTEMBER CONTINUED

Heritage Garden: Thymus, Mentha, Origanum

AUTUMN: SEPTEMBER AND OCTOBER

Native New York Plant Communities: Acer, Quercus, Fraxinus, Liriodendron, Coryllus
Victorian Annuals: (similar to summer)
*Blooming Walk*: Euonymus alata
Shrub Collection: Cornus racemosa
Native Meadow: Solidago, Aster
English Cottage Garden: Chisanthemum spp.
Formal Garden: (similar to summer)
Upland and Riparian Plant Communities: Autumn foliage
Native Edge Garden: Rhus typhina, Cornus racemosa
Flood Plain Vines: Vitis spp., Parthenocissus spp.
Grow out Station: Harvest
Pergola Plants Collection: Vitis spp.

WINTER: NOVEMBER TO FEBRUARY

Greenhouse Collections
Conifer Collection
English Deciduous Trees and Shrubs (forms and bark)
Upland and Riparian Plant Communities (forms and bark)
Succession Garden (outline of groups)
Winter Garden (form, habit, color and silhouette)
Willow Biomass Exhibit (habit, color)

Appendix A:
Historical Evolution of Botanical Gardens and Arboreta

BOTANICAL GARDENS AND ARBORETA:

Botanical Gardens:
Plants as exhibits
*"At first sight, a Botanic Garden strikes the casual visitor as being quite unlike any other garden. There are flowers, but it is not a flower garden. There are vegetables, but it is not a kitchen garden. There is fruit, but it is not an orchard. There are trees, but it is not a park. There are even some ‘weeds’ cultivated and treasured like other plants. What, then, is it? (John Prest, 1981)"

The great age of the Botanical Garden followed the discovery of New World Europe:

- 16th century: Padua, Leyden, and Montpellier Botanic Gardens
- 17th century: Oxford, Jardin du Roi in Paris and Uppsala (Sweden)

Layouts of early gardens:

Europe:
1. A square divided into four quarters (representation of four quarters of the Earth (Europe, Africa, Asia and America). Oxford
2. Geometrical design (the parterres in the quarter) Padua, Paris

Before European discoveries:

Mexican Aztec’s “gardens of plants”

Academic origin of a Botanical Garden: It was an encyclopedia; a book with pages, but the plants were real.

First Botanical gardens: Each plant was awaited with expectation and enthusiasm, identified and named.

Contemporary interpretation: the foundation of this encyclopedic garden was in the context of the re-creation of the earthly Paradise, or Garden of Eden: throughout the middle ages the Garden of Eden was believed, somehow, to have survived the Flood.

In the great age of geographical discoveries in 15th century, navigators had hopes of finding it. Finally they did not find it and decided to bring the scattered pieces of creation together into a Botanical Garden, or new Garden of Eden.
Appendix A: 
Historical Evolution of Botanical Gardens and Arboreta

Botanical gardens were and are centers of plant introduction.

There are 10 main periods of exotic plant introduction in European botanical gardens (Gololvkin, 1981):

- Asia Minor period
  1560-1620: Tulipa, Scilla, Iris, Fritillaria, Narcissus

- Early American period
  16th-17th centuries: Trapaeolum majus, Tagetes erecta, Tagetes patula, Actaea spp., Lilium canadense, Rudbeckia laciniata, Monarda fistulosa, Asclepias syriaca, Aster novae-angliae

- Cape (South Africa) period
  17th century: Pelargonium, Lobelia erinus, Erica spp.

- North American trees and shrubs period
  17th century

- Kew Botanical Garden (London) period
  18th century to beginning of 19th century

- Second period of North American plants introduction
  First part of 19th century: Western part of the US, Missouri region: Oenothera missouriensis, Lupinus spp., Sequoia sempervirens

- Introduction of Central and South American tropical plants
  17th, 18th, and 19th centuries: Heliotropium peruvianum, Cosmos bipinnatus, Zinnia elegans, Begonia semperflorens

- Introduction of Australian and New Zealand plants
  End of 18th century to 19th century

- Introduction of Chinese and Japanese plants
  Second part of 19th century to early 20th century: Callistephus chinensis, Anemone japonica

- Selection in botanical gardens
  19th & 20th centuries to present time

Victorian Botanical Gardens in England were among the most influential around the world:

- Importance of greenhouses
- Emphasis on plant display
- Importance of design elements
- Fashion of including Chinese and Japanese gardens within the botanical gardens

MODERN BOTANICAL GARDENS AND ARBORETA

Definitions

1. Arboretum is a place where trees or shrubs are cultivated for their scientific or educational interest. (Etymology of the word: 19th Century: from Latin, from arbor tree) (The Collins English Dictionary, 2000).

2. Botanical Garden is an institution holding documented collections of living plants for the purposes of scientific research, conservation, display and education. (Botanic Gardens Conservation International (BGCI), Wyse Jackson, 1999)

There are over 2,000 botanic gardens and arboreta in 150 countries worldwide and they maintain more than 4 million living plant accesses. Amongst their collections are representatives of more than 80,000 species, almost one third of the known vascular plant species of the world. In addition, botanic gardens have a wealth of other collections such as herbaria (preserved specimens) and seed banks. There are 297 Botanic gardens in North America and 621 in Europe.

Now botanical gardens are being established throughout the world, primarily to become botanical resource centers supporting native plant conservation.

The Botanic Gardens Conservation Secretariat was created in 1985 and the Botanic Gardens Conservation Strategy was published in 1989.
Types of Botanical Gardens

1. ‘Classic’ multi-purpose gardens are often institutions with a broad range of activities in horticulture and horticultural training: research, particularly in taxonomy with associated herbaria and laboratories and public education and amenity. They are generally state supported.

2. Ornamental gardens are often very beautiful establishments with diverse plant collections that are documented; they may or may not currently have research, education or conservation roles. Some ornamental gardens are privately owned.

3. Historical gardens include the earliest gardens developed for teaching or medicine; some were established for religious purposes.

4. Conservation gardens have recently been developed in response to local needs for plant conservation. Some contain, or have associated areas of, natural vegetation in addition to their cultivated collections. Included in this category are native plant gardens, that contain only cultivated plants from their surrounding region or national flora.

5. University gardens many universities maintain botanic gardens for teaching and research. Many are open to the public.

6. Agro-botanical and germplasm gardens function as an ex situ collection of plants of economic value or potential for conservation, research, plant breeding and agriculture. Several are experimental stations associated with agricultural and forestry institutions.

7. Alpine or mountain gardens in mountainous regions of Europe or tropical countries. They are specifically designed for the cultivation of mountain and alpine flora.

8. Natural or wild gardens contain an area of natural or semi-natural vegetation that is protected or managed.

9. Horticultural gardens maintained by horticultural societies and open to the public—these specialize in growing a limited range of related or morphologically similar plants or plant growth forms to illustrate particular themes generally in support of education, science, conservation and public display.

10. Community gardens small gardens with limited resources, developed for, and by, a local community to fulfill its particular needs, such as recreation, education, conservation, horticultural training, and the growth of medicinal and other economic plants.

Functions of Modern Botanical Gardens

- Multifunctionalism ("Source of aesthetic and intellectual delight")
- Scientific institutions (in most cases: research in botany and horticulture)
- Plant conservation
- Public recreation
- Public education

Appendix A:
Historical Evolution of Botanical Gardens and Arboreta

Above: Distribution of Botanical Gardens in the USA
International Agenda for Botanic Gardens in Conservation, May 2003

Top to Bottom:
Kew Botanic Gardens: Classic example of multipurpose botanic gardens.
Longwood Gardens, Philadelphia.
Botanical Garden of the Botanical Institute named after V. Komarov in St. Petersburg, Russia. It was established in 1700s as a medical botanical garden.

Top to Bottom:
Maria Ignatieva, 2003
Rachel May, 2003

Above: Distribution of Botanical Gardens in the USA
International Agenda for Botanic Gardens in Conservation, May 2003
Appendix A: Historical Evolution of Botanical Gardens and Arboreta

**Elements of Botanical Gardens**

**Plant Displays**

**Themes:**
- Taxonomical collections (families, genera, species)
- Ecological communities (flood plain vegetation, tropical vegetation of Australia, Asia etc., prairie of Mid-West USA etc.)
- Geographical collections (plants of Japan, North America, and Europe etc.)
- Native plants
- Medicinal plants
- Economic botany (economically valuable plants)
- Weedy plants
- Horticultural (decorative plants [ornamental plants])
- Rare plants

**Different decorative gardens within the botanic gardens**

Japanese and Chinese gardens, rock gardens, water gardens

**New Trends in Modern Botanical Gardens**

Ecological design: wildflower borders, "free lawns," display of "spontaneous" weedy succession gardens

**Architectural Elements in Botanical Gardens**

- Greenhouses
- Herbaria
- Museums
- Libraries
- Pavilions and kiosks
- Bridges
- Sculpture
- Trellises
- Pergolas
- Visitor Centers
- Laboratories
- Education Centers

**Below:** Taxonomic collection at Kew Botanic Gardens

**Below Left:** "Free Lawn" at Kew Botanic Gardens.

**Below Center:** Weedy Succession Garden. Sheffield Botanic Garden, UK.

**Below:** Visitor center and café at Dunedin Botanic Garden, New Zealand.
Appendix A:
Historical Evolution of Botanical Gardens and Arboreta

World Famous Botanic Gardens

<table>
<thead>
<tr>
<th>EUROPE</th>
<th>JAPAN</th>
<th>REFERENCES</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>ASIA</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore Botanic Garden</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcutta Botanic Garden</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NEW ZEALAND</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Christchurch Botanic Garden</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AUSTRALIA</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Melbourne Botanic Garden</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SOUTH AMERICA</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Buenos Aires Botanic Garden</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IMPORTANT COLLECTIONS IN NEW YORK STATE</th>
<th>IMPLICATION FOR ONONDAGA ARBORETUM/BOTANIC GARDEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cornell Plantations</td>
<td>Based on critical analysis of the history of world botanical gardens and arboreta and the modern vision of botanical garden organizations, the vision of Onondaga Botanical Garden &amp; Arboretum as a combination of botanical collections (Botanical Garden), arboretum and natural plant communities was crystallized.</td>
</tr>
<tr>
<td>2. Brooklyn Botanic Garden</td>
<td>Historical analysis of the Upper and Lower Onondaga Parks and critical evaluation of existing modern tendencies in botanical gardens and arboreta influenced our choice of the main principles of organization of Onondaga Arboretum/Botanical Garden:</td>
</tr>
<tr>
<td>3. The New York Botanical Garden</td>
<td>· Recognition of historic precedents (use of exotic trees, shrubs and herbaceous)</td>
</tr>
<tr>
<td>4. Buffalo and Erie County Botanical Gardens</td>
<td>· Understanding of native ecosystems</td>
</tr>
<tr>
<td>5. Highland Botanical Park and Lamberton Conservatory</td>
<td>· Public Botanical Garden</td>
</tr>
<tr>
<td></td>
<td>· Use of some of the principles of the late 19th –mid 20th centuries of botanical garden structure and organization (for example display of individual specimens on the lawn) and modern principles</td>
</tr>
<tr>
<td></td>
<td>· Scientific research collections</td>
</tr>
<tr>
<td></td>
<td>· Community and institutional use</td>
</tr>
<tr>
<td></td>
<td>· Seasonal use</td>
</tr>
</tbody>
</table>

Appendix A: Historical Evolution of Botanical Gardens and Arboreta
Appendix B: Profiles of Relevant North American Facilities

PRECEDENTS

The following document is a compilation of information about selected existing arboreta and botanical gardens and public parks. The information contained in this report is intended to be a compendium of pre-existing information, to be used as a reference for decision-making regarding the Onondaga Botanical Garden & Arboretum proposed for Syracuse, New York.

The data presented in this document has been gathered primarily from the web pages for each institution represented, unless otherwise noted. The visual images used herein are taken from some website passages have been used and are indicated by quotation marks around the citations. Some discrepancies exist in categories of information presented for various sites. This is due to the relative availability of information about the institutions. An attempt was made to compile information regarding financial health of the examined sites, but was unfortunately not readily available to the public.

Size: 92 acres
Location: Philadelphia, Pennsylvania
Mission: “The Morris Arboretum of the University of Pennsylvania is a historic public garden and educational institution. It promotes an understanding of the relationship between plants and people through programs that integrate science, art and the humanities. The Arboretum conducts four major activities: education, research, outreach, and horticultural display. As the official Arboretum of the Commonwealth of Pennsylvania, the Morris Arboretum of the University of Pennsylvania provides research and outreach services to state agencies, community institutions and to citizens of Pennsylvania and beyond.”

Vision for the Future: “The Morris Arboretum of the University of Pennsylvania is a historic public garden and an education institution. It is an important resource for extending an appreciation of the world’s ecology, and an understanding of the importance of plants to people, in a biological, cultural, historical and aesthetic context.”

History: The Morris Arboretum began as “Compton”, the summer home of John and Lydia Morris. The brother and sister came by their wealth through the family business, the I.P. Morris Company, which was an iron-manufacturing company founded by their father. The siblings transformed the once barren site on Chestnut Hill into a rich landscape filled with plants, collected by John and Lydia in their travel throughout America, Europe, and Asia. John was a respected plantman, and both he and Lydia shared a love for history and art. They developed Compton’s grounds to be a repository for beauty and knowledge. They sought to be deemed “worthy stewards.”

Through the Morris family, plans were laid for the grounds of Compton to become a school and laboratory devoted to horticulture and botany. The property became the Morris Arboretum of the University of Pennsylvania in 1932. The Morris Arboretum is now designated a National Historic Site, and is the official arboretum of Pennsylvania. The education and stewardship so important to the Morris siblings continues through research, teaching, and outreach activities sponsored by the Morris Arboretum today.

Education and Research Activities: Morris Arboretum provides educational opportunities for a broad segment of the population through classes, tours, seminars, internships, plant clinics, organized travel with plant experts, urban forestry programs, and volunteer positions. In addition, the arboretum provides access to horticultural information through its website which includes an extensive “Pennsylvania Flora Database” and the “Plant Clinic”, identifying various pests and suggesting remedies.

Recent research by arboretum botanists is compiled in the 1,040 page guide to Pennsylvania flora, The Plants of Pennsylvania, written by Dr. Ann Rhoads and Dr. Tim Block and published by University of Pennsylvania Press. This text is the result of four years of research cataloguing both native and introduced species in Pennsylvania. Arboretum staff also regularly participate in botanical collecting expeditions around the world, with an emphasis on Asia and the United States.
Appendix B: Profiles of North American Facilities

Morris Arboretum
of the University of Pennsylvania

Continued

Morris Arboretum

The Morris Arboretum is under the oversight of the “Advisory Board of Managers”, which advises the Director of the arboretum. Having formally conferred the title of “Associate Trustees” on all board members in 1977, the trustees have designated a similar status on the Advisory Board as that of any Board of Overseers falling under the canopy of the University of Pennsylvania. Although not nominally the same, the structure of the organization is now based upon that of the standard Board of Overseers at the University. This structure was a change from the original pattern of the Advisory Board, which had been chaired since its inception by the President of the University. Upon making these organizational changes to bring the board more in line with University oversight practices, the President gave up the Chair position to be replaced by a member of the Board itself.

Collections Management:
"More than 13,000 labeled plants of over 2,500 types are growing in the Arboretum’s living collection. These include representatives of the temperate floras of North America, Asia, and Europe. This historic collection traces its foundation to John Morris’s interest in plants from around the world, and includes plants collected in China by E.H. Wilson at the turn of the century. Many of the Delaware Valley’s “trees-of-record” (the largest of their kind) are found in the Arboretum. Most notable are the katsura, Engler Beech, Bender oak, and trident maple.

More recently, staff members have regularly engaged in plant collecting expeditions in Asia and the United States, increasing the diversity of plants available for today’s urban and community landscapes. Currently plants from 27 countries are represented in the collection with a primary focus on Asian temperate species. Significant plant groups in the Arboretum’s collection include maples, magnolia species, native azaleas, members of the witch hazel family, roses, hollies, and conifers."

Location:
Jamaica Plain area, Boston, Massachusetts

Size:
265 acres

Mission:
“The historical mission of the Arnold Arboretum is to increase knowledge of woody plants through research and to disseminate this knowledge through education. Today this mission is carried out by:

1) The development, curation, and maintenance of a well-documented collection of living woody plants from around the world that are hardy in the Boston area; and the execution of these responsibilities within the landscape of the Arboretum designed by Frederick Law Olmsted

2) The development and curation of an herbarium, library, and related information systems to support research on woody plants, their associations in nature and their future conservation

3) The development of related programs for instruction, publication, and public information

These priorities derive from the Indenture of Trust of 1872, which created the Arnold Arboretum as a trust held by Harvard University. The basic premises of this instrument govern administration of the Arboretum and permit its staff to provide instruction at Harvard University. As part of the City of Boston’s park system, the Arboretum’s historic landscape serves as an outdoor museum that is open to the public."

History:
“The Arnold Arboretum was established in 1872 when the trustees of the will of James Arnold (1781-1868), a whaling merchant of New Bedford, Massachusetts, transferred a portion of Arnold’s estate to the President and Fellows of Harvard College. Income from the legacy was to be used for establishing, developing, and maintaining an arboretum to be known as the Arnold Arboretum; its director would carry the title of Arnold Professor of Dendrology at Harvard College. The bequest specified that the Arnold Arboretum “shall contain, as far as practicable, all the trees [and] shrubs … either indigenous or exotic, which can be raised in the open air.”

Charles Sprague Sargent (1841-1927) was appointed the Arboretum’s first director in 1873 and spent the following 54 years shaping the policies and programs of the Arnold Arboretum. Since its inception, it has served as a model and benchmark for similar institutions, both in North America and elsewhere.

The successes of Sargent’s directorship were due in part to his ability to raise the funds required to implement his plans and in part to a creative lease agreement that was forged between the City of Boston and Harvard in 1882. According to the terms of the thousand-year lease, the Harvard-owned land on which the Arnold Arboretum was established became part of the city park system, but control of the collections continued to reside with the Arboretum staff. The city was to maintain the perimeter walls, gates, and roadway system and provide police surveillance, while the Arboretum agreed to keep the grounds open to the general public, free of charge, from sunrise to sunset every day of the year.

As a result of this unique arrangement the Arboretum became part of the famous “Emerald Necklace,” the 7-mile-long network of parks and parkways that Frederick Law Olmsted laid out for the Boston Parks Department between 1878 and 1892.

The design of the Arboretum grew out of Sargent’s close collaboration with Olmsted, who laid out the path and roadway system and designated areas within the Arboretum for specific groups of plants. Early on, Sargent decided to arrange the plant collections by family and genus, following the then generally accepted classifica-
As Sargent envisioned it, “a visitor to the Arboretum as a leading scientific garden, able to obtain a general idea of the temperate zone without even leaving his carriage. It is hoped that such an arrangement, while avoiding the stiff and formal lines of the conventional botanic garden, will facilitate the comprehensive study of the collections, both in their scientific and picturesque aspects.”

Sargent also devoted much effort to realizing the institution’s research potential. As the era’s most distinguished dendrologist, he authored The Silva of North America, published between 1890 and 1902 in 14 volumes, and The Manual of the Trees of North America (1st ed., 1905; 2nd ed., 1929), both standard references even today. By developing a comprehensive library devoted to botany, horticulture, and dendrology, an equally notable herbarium to serve as the repository of specimens of woody plants from throughout the world, and a publication program that included both scholarly and semi-popular works, Sargent established the Arnold Arboretum as a leading scientific institution. In addition, the Arboretum’s involvement in botanical and horticultural exploration around the world, especially in eastern Asia, has brought many new plants into cultivation and greatly expanded our knowledge of their evolution and systematics.

The Arnold Arboretum occupies 265 acres (107 hectares) of land in the Jamaica Plain section of Boston. It is administered as an allied institution within the central administration of Harvard University. As of January 2000, the living collections consisted of some 7,082 accessioned plants representing 4,544 botanical and horticultural taxa, with particular emphasis on the woody species of North America and eastern Asia and an especially comprehensive representation of Fagus (beech), Lonicera (honeysuckle), Magnolia, Malus (crabapple), Quercus (oak), Rhododendron, and Syringa (lilac). Collections of historical interest include the plants introduced from eastern Asia by C. S. Sargent, Ernest Henry Wilson, William Purdom, and Joseph Rock. In addition to its living collections the Arboretum holds a herbarium collection in excess of 5 million specimens and library holdings in excess of 40,000 volumes, some of which are located in Jamaica Plain and some in Cambridge at the Harvard University Herbaria. The Arboretum also maintains an extensive photographic archive in Jamaica Plain, along with archival collections relating to its own history and to the history of botany and horticulture in North America.

The Arboretum continues to maintain its living collections in the naturalistic style originally established by Sargent and Olmsted; for the most part—diseases and insects notwithstanding—the collections are still arranged according to the Bentham and Hooker classification system. The tradition of plant exploration also continues, with seven major collecting trips to eastern Asia sponsored by the Arboretum since 1977.

Collections Management:
The collections are curated by a staff of two, the plant records manager and one assistant, with the addition of two horticultural interns during the summer. The staff maintains plant records on a computerized database, BG-BASE 5.0, which was developed at the arboretum. All accessioned plants are recorded on scale maps and labeled with accession number, botanical name, source information, common name, and map location.

The arrangement of the collection is based on the Bentham and Hooker planting sequence, which was agreed upon by Charles Sargent and Frederick Law Olmsted at the inception of the arboretum in the late 1870’s. This planting sequence was a common and widely accepted method at the time, which grouped plants into “cohorts” based on similar characteristics. These “cohorts” approximate today’s classification of plant families.

Propagation and distribution is handled by the staff of the Dana Greenhouses. These facilities include four service greenhouses, cold rooms, a shade house, a cold storage facility, and three irrigated, in-ground nurseries. The greenhouses are staffed by a manager of greenhouses and nurseries, a plant propagator, a greenhouse gardener, a part-time assistant, and two horticultural interns over the summer. Plants are grown from seed, cuttings, or grafts until they reach the appropriate size for inclusion in the main collections.

Arboretum Management:
Arnold Arboretum staff is divided into several main categories. These are: Administration (10 employees), Living Collections (23 employees), Public and Professional Programs (20 employees), and Research (22 employees). The administration of the arboretum as a whole falls under the responsibilities of the Director. The 1872 Indenture of Trust which created the Arboretum, constructed it as a trust of Harvard University. Therefore, the Arboretum Director is ultimately responsible to the administration of Harvard University as an allied institution.

Education:
Educational programs fall under several broad categories: Landscape Institute, Adult Education, Field Studies for Children, Internships, Apprenticeships, and Volunteerism.

- Landscape Institute – This is a professional program for students interested in a career in landscape design or history.
- Adult Education – continuing education courses in horticulture, botany, and landscape.
- Field Studies for Children – Using the arboretum as an outdoor classroom, these programs are aimed at grades 3-6 and encourage hands-on learning about science through contact with nature.
- Internships – 14 paid summer positions are available for students, providing hands-on training and required course work.
- Apprenticeships – Available to graduates from horticultural programs, the paid year long apprenticeship includes work in the greenhouses, curation, and grounds maintenance.
- Volunteerism – Possible volunteer positions include: field studies guides, or arboretum docents, both of which encourage learning and service.

Research:
According to the 2002 Annual Report, “Over the past century, the Arboretum has achieved an international reputation for research on Asian woody plants; its collections are the most important resource for Asian botanical science in the Western Hemisphere.” The Arboretum reports on the website that, “the living collections are being used for research on a diverse range of subjects that include molecular systematics, plant physiology and morphology, vegetative propagation of woody plants, and evaluation and selection of new cultivars of woody plants with ornamental merit.” Ongoing research on plant pathology and integrated pest management for maintenance of the living collections continues. Herbarium-based research focuses on the systematics and biodiversity of both temperate and tropical Asian forests, as well as the ecology and potential for sustainable use of their resources.

In addition, many of Arnold Arboretum’s staff members have extensive lists of published research on a broad range of topics. (For a complete list, see the Arnold Arboretum website, www.arboretum.harvard.edu/programs/publications/ by_staff.html)
Location: Montreal, Quebec, Canada
Size: 75 Hectares
Mission: Since its foundation in 1931 by Brother Marie-Victorin, the mission statement of the Montréal Botanical Garden is to:
· conserve, develop and present to the public living plant collections,
· pursue research activities,
· and educate Montréal citizens and all visitors in botany and horticulture.
To reach its objectives, the Montréal Botanical Garden has pursued four vocations:
· cultural institution
· educational institution
· social institution
· scientific institution
History: The idea of creating the Montreal Botanical Garden was first dreamed up by Brother Marie-Victorin, who founded the Botanical Institute of the University of Montreal in 1920. Five years later, in 1925, he unveiled his plan for the Montreal Botanical Garden, a botanical collection for all Montreal residents, and a resource for the Botanical Institute. The Garden was actually founded six years after the original plan was made public. Because so many residents were out of work at this time, the Mayor of Montreal, Camilien Houde, established the Garden as a means of creating public works to employ Montrealers. Once the decision had been made to implement the idea, Henry Teuscher, a well-known horticulturalist and botanist, was brought in to assist. Teuscher drew up the first plans for the Garden, and eventually went on to be appointed Superintendent and Chief Horticulturalist of the Garden. The Montreal Botanical Garden has incrementally grown since its founding in 1931. The most recent garden addition, the First-Nations Garden, was completed in 2001.
Outstanding Plants and Collections:
Aroids
Bonsai & Penjing
Bromeliads
Begonias
Cacti & Crabapples
Succulents
Cycads
Ferns
Lilacs
Lotus
Orchids
Gesneriads
Collections Management: The Montreal Botanical Garden’s plant collections are comprised of approximately 21,000 species and cultivars, and fall under the management of the Scientific Research and Development Division. The method of inventory used at the Garden is similar to that of other arboretas. All the specimens are indexed in a computerized system, and are classified according to the system developed by the Russian botanist Armen Takhtajan in 1969 for flowering plant families. Acquisitions are made to meet scientific, educational, and cultural objectives as defined by the mission.
Education: Educational activities provided by the Montreal Botanical Garden fall into several categories: General Public, School Groups, and Summer Activities for Youth. For the general public, the Garden offers guided tours for groups of 15 or more, horticultural workshops, and a horticultural information service, and thematic exhibitions. School groups have access to educational tools and complementary activities and coordinating thematic garden visits in the Botanophile teacher’s guide. During the summer, there are activities for young people such as youth gardens, day camps, and adventures at Angrignon Farm.
Research:
All research done at the Montreal Botanical Garden is overseen by the Scientific Research and Development Division. This body is responsible for directing research activities. The primary research performed through the botanical garden is either botanically based, such as study of plant families such as begonias, aroids, and orchids, or it is research regarding ecology and environmental issues. Some of the ecological and environmental issues are: re-naturalizing degraded spaces, reforestation, and ecologically responsible development.

Montréal Botanical Garden

Continued

Size:
50 acres of botanical collections, 150-acre arboretum

Location:
Cornell University, Ithaca, New York

Vision Statement:
"In order to attract and inspire visitors, and provide them with the opportunity to learn about plants, the natural sciences, and preservation of natural resources, Plantations staff, volunteers and advisory groups, working as a team, will develop, manage, and interpret the arboretum, botanical garden and natural areas, and will develop and maintain facilities and infrastructure in support of these goals."

Mission:
· To hold, manage, protect and enhance the living botanical collections and the natural areas and gardens of Cornell for the benefit and use of the university community and the public.
· To be a vital center for the plant and natural sciences on campus, presenting and interpreting these sciences through its botanical collections, natural areas, display gardens, and educational programs, and providing resources and opportunities for research, education, and cultural growth for the Cornell community.

Cornell Plantations

Website: www.plantations.cornell.edu/visitor.vision.cfm

Oak Collection – This collection is primarily centrally located on the Schnee Oak Slope, although some mature trees can be found in Jackson Grove. 50 different oak taxa are present. The collection will ultimately be used in a hybridization program introducing traits from pollen parents originating from zones 6-8 to oaks hardy in zone 5.

Urban Tree Collection – This collection highlights trees hardy to urban areas, and is located throughout the arboretum. Species include Red Maple, Callery Pear, Serviceberries, Hawthornes, Red Oaks, Hackberries, and London Plane Trees to name a few.

Wanut Collection – One of the longer established collections at Cornell Plantations, the Walnut collection includes large mature trees representing 20 cultivars.

Size:
50 acres of botanical collections, 150-acre arboretum

Location:
Cornell University, Ithaca, New York

Vision Statement:
"To represent Cornell among major botanical gardens and arboretas, and to serve as a resource for the people of New York State in fulfillment of Cornell’s land grant college mandate.

Arboretum Collections:
Chesnut – This is a new collection, recently installed. It currently features five cultivars. Upon completion, 25 cultivars will be represented. Due to the relatively new status of the collection, specimens are small and a high rate of mortality is expected.

Conifer – Located at various sites throughout Cornell Plantations, the conifer collection encompasses 21 types of fir, 39 pines, and 25 spruces. These are dispersed throughout the arboretum, on the Conifer-Maple slope, in the Winter Garden, along Comstock Knoll, and in the Hillside Garden.

Flowering Crabapples – This new collection is made up of fairly small trees to date, and is intended to serve a didactic function for gardeners. The collection includes 83 cultivars.

Maple Collection – Representing both native and non-native species, the Maple Collection is spread throughout the Plantations. Cultivars which are hardy to the native habitat of the Ithaca area, such as Red Maple, Sugar Maple, Silver Maple, and Striped Maple, are emphasized.
Botanical Collections:
- **Dean’s Garden**
  - Commemorative function
  - Woody and herbaceous displays
  - Teaching garden
- **Decorative Arts Flower Garden**
  - Planting flower display
  - Featuring sunflower, carnation, rose, poppy, peony, iris, lily, chrysanthemum, daisy, and tulip.
- **Flowering Shrub and Ornamental Grass Garden**
  - Features flowering shrubs and ornamental grasses
- **Groundcover Garden**
  - Small-scale oriented
- **Heritage Vegetable Garden**
  - Interpretive function, exploring historic use of vegetables in American diet, as a response to changing cultural values and technological advances.
  - International Crop and Weed Garden
  - This garden allows the visitor to reflect on plants economically important to farmers and the weeds that chronically compete with these plants.
- **American Peony Society Garden**
  - 90 varieties of peonies
  - Poisonous Plant Garden
  - Aimed at veterinary students, featuring plants poisonous to livestock.
- **Rhododendron and Woodland Perennial Garden**
  - Named for Clement Gray Bowers, a horticultural scientist who graduated from Cornell.
- **Rock Garden**
  - Drive through garden
  - Features alpine plants
  - Attracts bee activity
- **Wildflower Garden**
  - Wildflowers in both formal and natural settings in a variety of habitats, from stream to flood plain to meadow.
- **Winter Garden**
  - Planted for winter interest, this garden features plants chosen for unusual and interesting forms, colors, and textures which persist throughout the winter months.
- **Woodland Streamside Garden**
  - Features ferns, iris, and Japanese primrose, in a bog environment under the shade of hemlock trees.

History:
Ezra Cornell, the founder of Cornell University, selected Ithaca for the site of the University based on its natural beauty. Having been appreciated as a spectacular and rich natural area from the beginning, there is a history of treasuring, amplying and protecting the landscape around Cornell. In 1868, the well-respected naturalist Louis Agassiz opined that Cornell’s surroundings were unsurpassed in potential for the study of natural history. With this in mind, the University included an arboretum and botany conservatory in the plan for the construction of Sage College housing for women in 1878. The fundamental recognition of the value in the landscape surrounding Cornell led to alumni pressure for gorge preservation as early as 1909, and inspired the faculty, students, and alumni to create and support Cornell Plantations.

Cornell Plantations (Continued)
Central Park was originally envisioned as the mid-19th century call for open green space within the urban fabric of Manhattan. Political leaders endorsed the idea of developing a public central park, and city commissioners responded from 1853 to 1856 by investing more than $500,000 cubic feet of topsoil had to be hauled into the park. In addition, the huge boulders present had to be blasted out and hauled away from the site. Four man-made water bodies and thirty-six bridges and archways were constructed. Ten million cartloads of material had been hauled through the park by the year 1873.

The political process involved in constructing the park was perhaps an even more formidable feat than the required physical alterations. Due to the public nature of the project, construction and management were both highly politicized matters. During park construction, Olmsted and Vaux resigned repeatedly over a variety of political battles. Although Vaux remained involved with the project until his death, Olmsted finally resigned permanently in 1877. In the early decades of the 20th century, Central Park was already in a state of disrepair and neglect. Efforts to care for the park were intermittent at best. Dead trees and shrubs were not removed, lawns uncared for, and littering and vandalism became prevalent unsolved problems. The election of Fiorello LaGuardia in 1934, ushered in a new era for the park. LaGuardia appointed Robert Moses commissioner of the newly unified New York Parks Department, and Moses cleaned up Central Park within the year. Under Moses, the Croton Reservoir was filled in to create the Great Lawn, and the park gained 19 playgrounds, 12 ballfields, the Chess and Checkers House, handball courts, and the Wollman Rink. Renovations were completed on the Central Park Zoo and the Tavern on the Green. However, when Moses left the commissioner position in 1960, the park once again sank into a state of neglect.

The 1960′s and 1970′s witnessed the further deterioration of Central Park. New Year’s Eve celebrations, peace rallies, and protests took their toll on the park. Fixtures were broken, the lawn disheveled, and graffiti was rampant. Although the park was named a National Historic Landmark in 1964, and a New York City Landmark in 1974, neither designation brought any funds for park restoration or maintenance. Finally, in 1975, several advocacy groups pooled resources to take action to remedy the park’s deteriorated state. The Central Park Task Force and Central Park Community Fund approached Mayor Koch and Parks Commissioner Gordon Davis in an effort to gain direct care of the park. This resulted in the birth of the Central Park Conservancy in 1980. This Public/Private partnership has proved to be a turning point for the management and health of Central Park, and continues to function to restore, manage, and maintain the park today.

Features/Areas:
- Bethesda Terrace
- Bow Bridge
- Bowling & Croquet Greens
- Cedar Hill
- Cherry Hill
- Conservatory Garden
- Conservatory Water
- Cop Cot
- The Dene
- Dramatic Rock Outcrops
- East Green
- East Meadow
- Fort Clinton Site
- Fort Fish Site
- The Gill
- Great Hill
- Great Lawn
- Harlem Meer
- Hecksher Playground
- Huddleston Bridge
- Iphigenia’s Walk
- The Lake
- Lilac Walk
- Lily Pond
- The Loch
- The Mall
- McGowan’s Pass
- Nature Sanctuary
- North Meadow
- Nutter’s Battery Site
- The Pond
- The Pool
- The Ramble
- The Ravine
- Rhododendron Mile
- Ross Pineum
- Rumssey Playfield
- Shakespeare Garden
- Sheep Meadow
- Strawberry Fields
- Summit Rock
- Turtle Pond
- Umpire Rock
- Vista Rock
- Wisteria Pergola

Park Management and Operations:
Central Park’s management and funding is based on a public-private partnership. The Central Park Conservancy, founded in 1980, is a truly cooperative enterprise between municipal government and the private sector. The original board chairman, William S. Beinecke, was one of three mayoral appointees to the board. Additional board members were selected from two prior park assistance organizations; the Central Park Community Fund, and the Central Park Task Force. The Parks Commissioner and the Central Park Administrator were involved in approving board appointments. The Central Park Administrator is pivotal to the public-private interdependency and cooperation in management of the park. The Administrator is appointed by the Mayor and reports to the Commissioner, but is paid by the Conservancy. This arrangement guarantees that the public and the private sectors work in concert.

The Central Park Conservancy was awarded a management contract by the City of New York in 1998, with an annual fee for services determined by the annual expenditure made by the Conservancy. This furthers the interdependency between public and private organizations, by making Conservancy funding from the city dependent upon their success in soliciting and utilizing private funds.

Vegetation Management:
Unlike the previously discussed arboretal and botanical gardens, Central Park is not collections based. Therefore, rather than discussing collections and curation, it is more appropriate in this context to discuss vegetation management. According to the Central Park Conservancy publication, Rebuilding Central Park, the overriding goal regarding park vegetation is to create a healthy and diverse plant community. There is several guiding recommendations for meeting this goal throughout the park. Plant diversity is to be increased to provide “greater botanical interest and ecological richness”. Tree density is to be decreased, but overall plant density increased, with emphasis on shrubs, grasses, vines, and herbaceous plants. Open space is to be

Central Park Conservancy

Location:
Manhattan, New York

Size:
843 acres

Mission:
Central Park was originally envisioned as a democratic experiment. It is a purely public park, intended from its conception as a place of retreat and recreation for the people.

History:
Central Park is the result of a mid-19th century call for open green space. Political leaders endorsed the idea of developing a public central park, and city commissioners responded from 1853 to 1856 by investing more than $500,000 cubic feet of topsoil had to be hauled into the park. In addition, the huge boulders present had to be blasted out and hauled away from the site. Four man-made water bodies and thirty-six bridges and archways were constructed. Ten million cartloads of material had been hauled through the park by the year 1873.

The political process involved in constructing the park was perhaps an even more formidable feat than the required physical alterations. Due to the public nature of the project, construction and management were both highly politicized matters. During park construction, Olmsted and Vaux resigned repeatedly over a variety of political battles. Although Vaux remained involved with the project until his death, Olmsted finally resigned permanently in 1877. In the early decades of the 20th century, Central Park was already in a state of disrepair and neglect. Efforts to care for the park were intermittent at best. Dead trees and shrubs were not removed, lawns uncared for, and littering and vandalism became prevalent unsolved problems. The election of Fiorello LaGuardia in 1934, ushered in a new era for the park. LaGuardia appointed Robert Moses commissioner of the newly unified New York Parks Department, and Moses cleaned up Central Park within the year. Under Moses, the Croton Reservoir was filled in to create the Great Lawn, and the park gained 19 playgrounds, 12 ballfields, the Chess and Checkers House, handball courts, and the Wollman Rink. Renovations were completed on the Central Park Zoo and the Tavern on the Green. However, when Moses left the commissioner position in 1960, the park once again sank into a state of neglect.

The 1960′s and 1970′s witnessed the further deterioration of Central Park. New Year’s Eve celebrations, peace rallies, and protests took their toll on the park. Fixtures were broken, the lawn disheveled, and graffiti was rampant. Although the park was named a National Historic Landmark in 1964, and a New York City Landmark in 1974, neither designation brought any funds for park restoration or maintenance. Finally, in 1975, several advocacy groups pooled resources to take action to remedy the park’s deteriorated state. The Central Park Task Force and Central Park Community Fund approached Mayor Koch and Parks Commissioner Gordon Davis in an effort to gain direct care of the park. This resulted in the birth of the Central Park Conservancy in 1980. This Public/Private partnership has proved to be a turning point for the management and health of Central Park, and continues to function to restore, manage, and maintain the park today.

Features/Areas:
- Bethesda Terrace
- Bow Bridge
- Bowling & Croquet Greens
- Cedar Hill
- Cherry Hill
- Conservatory Garden
- Conservatory Water
- Cop Cot
- The Dene
- Dramatic Rock Outcrops
- East Green
- East Meadow
- Fort Clinton Site
- Fort Fish Site
- The Gill
- Great Hill
- Great Lawn
- Harlem Meer
- Hecksher Playground
- Huddleston Bridge
- Iphigenia’s Walk
- The Lake
- Lilac Walk
- Lily Pond
- The Loch
- The Mall
- McGowan’s Pass
- Nature Sanctuary
- North Meadow
- Nutter’s Battery Site
- The Pond
- The Pool
- The Ramble
- The Ravine
- Rhododendron Mile
- Ross Pineum
- Rumssey Playfield
- Shakespeare Garden
- Sheep Meadow
- Strawberry Fields
- Summit Rock
- Turtle Pond
- Umpire Rock
- Vista Rock
- Wisteria Pergola

Park Management and Operations:
Central Park’s management and funding is based on a public-private partnership. The Central Park Conservancy, founded in 1980, is a truly cooperative enterprise between municipal government and the private sector. The original board chairman, William S. Beinecke, was one of three mayoral appointees to the board. Additional board members were selected from two prior park assistance organizations; the Central Park Community Fund, and the Central Park Task Force. The Parks Commissioner and the Central Park Administrator were involved in approving board appointments. The Central Park Administrator is pivotal to the public-private interdependency and cooperation in management of the park. The Administrator is appointed by the Mayor and reports to the Commissioner, but is paid by the Conservancy. This arrangement guarantees that the public and the private sectors work in concert. The Central Park Conservancy was awarded a management contract by the City of New York in 1998, with an annual fee for services determined by the annual expenditure made by the Conservancy. This furthers the interdependency between public and private organizations, by making Conservancy funding from the city dependent upon their success in soliciting and utilizing private funds.

Vegetation Management:
Unlike the previously discussed arboretal and botanical gardens, Central Park is not collections based. Therefore, rather than discussing collections and curation, it is more appropriate in this context to discuss vegetation management. According to the Central Park Conservancy publication, Rebuilding Central Park, the overriding goal regarding park vegetation is to create a healthy and diverse plant community. There is several guiding recommendations for meeting this goal throughout the park. Plant diversity is to be increased to provide “greater botanical interest and ecological richness”. Tree density is to be decreased, but overall plant density increased, with emphasis on shrubs, grasses, vines, and herbaceous plants. Open space is to be
Appendix B: Profiles of North American Facilities

Central Park Conservancy

Continued

expanded and enhanced. New trees are only to be planted according to the following criteria: a) augmentation of an important or underrepresented species; b) introduction of new species; c) replacement of an appropriately placed dead or dying tree; d) restoration of a historic effect.” Evergreen reintroduction throughout the park is also a priority. While these are several guiding principles for overall vegetation management, the emphasis is on maintaining the three primary landscape types included in the original design by Olmsted and Vaux. These are: meadow, parkland, and woodland. The Central Park Conservancy has issued specific recommendations for each landscape type within the park.

The first type discussed is the meadow. Meadows are defined here as “open grassy or turf areas of any size or configuration.” The Sheep Meadow and the North Meadow are two examples of this type found within the park.

The Central Park Conservancy seeks to re-establish the illusion of limitless space and openness using the methods employed in the original park design. One primary method is making meadow edges irregular by extending the space into the tree-line at irregular intervals. Further recommendations for meadow areas involve turf management using “tough turf,” and double drainage systems for sports fields.

The second landscape type discussed is parkland. Parkland is defined as “open lawns with scattered trees.” The Conservancy recommendations consist of turf management practices and tree thinning and pruning. Turf management practices for parkland includes: “soil reconstitution and lawn reconstruction; proper drainage and irrigation; application of different seed mixtures to correspond with environmental conditions (sun, shade, slope) and intensity of use; and periodic liming, fertilization, aeration, and overseeding.” Tree thinning and pruning are suggested “where necessary to prevent unhealthy competition and shading out of lawns.” The goal here is to maintain a continuous greensward as originally designed.

The final specific landscape recommendations pertain to woodland within the park. Woodland is defined here as “for the most part, imitations of a natural forest environment.” However, Central Park’s woodland areas are not simply that. They are “stylized Victorian versions of woodlands”, representing the romantic 19th century picturesque vision of the forest. The Conservancy suggests: “overstory tree planting should be based on priority for native food-producing species; understory trees and shrubs should be increased in number and variety; small openings such as glades and lawns should be re-established; picturesque details should be reintroduced; dead trees typical of old growth should to some extent be left in place because they are part of the woodland ecology hospitable to wildlife.”

Programs and Activities:

Central Park is the location for a broad variety of activities ranging from education, youth leadership, and family programs, to walking tours, theatrical and musical events, and professional team-building programs for adults. Most of these programs are sponsored by the Central Park Conservancy, who provide staff and funding for the diverse experiences available in the park.

- Walking Tours
  Offered year round, tours are hosted by Central Park Conservancy volunteers and focus on the design, history, and ecology of Central Park.

- Family Programs and Events
  The Conservancy sponsors free events for families, often lending out supply kits for the day, such as bird-watching accoutrements or sports equipment.

- Just for Kids
  Central Park offers children a choice of playgrounds, an ice-skating rink, playful sculptures, a carousel, puppet shows, and more.

- Music in the Park
  During the months between May and Labor Day, Central Park hosts a wealth of cultural events featuring performances by the New York Philharmonic, the Metropolitan Opera, and the Summer Stage Series.

- Recreation Programs
  Some of the many offerings include: Adventure programs, fitness classes, summer day camps, and professional development retreats.

- Education Programs
  Central Park serves as an outdoor classroom setting for students of all ages. There are programs for school groups, continuing education classes in horticulture and history, community service opportunities, and virtual field trips.

- Youth Leadership Programs
  Teens can get involved in community service programs such as ROOTS (Restoration of the Outdoors Organized by Teen Students) through which teen get hands on experience in horticulture and woodland management, the Media Outreach Crew which allows teens to organize teen events and programs for environmental participation, or the Teen Docent Program.

- Weddings
Although the new owner intended to admission for sightseers. However, on the property. He called his new of public parks. The land on which was captivated by the grounds, so much so that Pratt began charging the money to be made by selling the property, an economic decline caused the value of the site to drop rapidly and the wharves were never built. The property reverted to the Bank of the United States in 1840, until it was purchased by the city of Philadelphia in 1843. The city’s interest in Lemon Hill derived from its location just above the intakes of the municipal Water Works at Fairmount. City Council member Thomas Cope believed that by acquiring the land, the city could stave off industrial contamination of the river. The Pennsylvania Horticultural Society suggested that the land be converted to a public garden, but instead, the property was rented to a variety of tenants over the next decade. Finally, in 1855, a petition by the city’s property holders urged the dedication of Lemon Hill as a public park to be known as “Fairmount Park”, and the City Council conceded. Citizens played a crucial role in the expansion and development of the park over the next ten years. Initially, they raised $60,000 in contributions to aid in the purchase of a stretch of property between the new park and the Spring Garden Water Works. Again in 1867, citizens united to support the expansion of the park. They bought 140 acres of the Lansdowne Estate and sold it back to the City for the same amount they had paid. The landslide of public support for the project provided the momentum for the establishment of the Commissioners of Fairmount Park later the same year.

Fairmount Park continued to expand incrementally. In 1868, an unexpected gift of 83 acres from Jesse George was accepted and came to be known as George’s Hill. Roads and bridges were expanded, improved, or replaced. The Fairmount Park Art Association was born in 1872 in an effort to bring public art to the landscape. The “City Beautiful” movement inspired the Benjamin Franklin Parkway, which was completed by the 1920’s, giving a grand entrance to the park. Although the Fairmount Park did not ultimately protect the water quality from industrialization, the citizens of Philadelphia benefitted by having access to a public space filled with nature, art, and activity. Fairmount Park certainly fulfills the ordinance that gave it life, to provide a park “for the health and enjoyment of the people forever.”

Management:
“The Fairmount Park Commission was established by an Act of Assembly of 26 March 1867 which provided that the Board of Commissioners be composed of the Mayor, Presidents of Select and Common Councils, and two city engineers ex-officio, and of ten unpaid court-appointed citizens. The Act authorized the City to purchase land for Fairmount Park in order to preserve the purity of the City’s water supply and provide a place of public enjoyment for the people of Philadelphia. The Commission was given charge of and responsibility for all park lands vested in the City which Councils would consign to its care. The first of these, and specified by the Act, was the Lemon Hill estate dedicated as Fairmount Park by an ordinance of 28 September 1855. An Act of 14 April 1868 enlarged and defined the specific powers of the Fairmount Park Commission, including the authority to establish a Fairmount Park Guard. The earliest chief extensions of the Commission’s jurisdiction included the acquisition of authority over the Wissahickon Valley by ordinance of 4 March 1868, over Hunting Park (dedicated as a City park by an ordinance of 10 July 1856) by virtue of an Act of 15 May 1871. The Commission’s organization passed virtually unchanged through the era of the Bullitt Bill and the City charters of 1919 and 1951. In April 1951, the Fairmount Park Commission was incorporated as a part of the Philadelphia City government with the adoption of the Philadelphia Home Rule Charter and designated a departmental commission of the Department of Recreation.

The Fairmount Park Commission has 16 members, of whom 10 are citizens appointed for five-year terms by the Board of Judges of the Court of Common Pleas of Philadelphia. The remaining 6 are ex-officio members and include the Mayor, the President of City Council, the Commissioner of Public Property, the Recreation Commissioner, the Water Commissioner and the Chief Engineer and Surveyor of the Department of Streets.”

Collections Management:
Fairmount Park is not a collections-based institution like some of the previously discussed arboreta and botanical gardens. Therefore, similar to other public parks, the approach to management is significantly different. Currently the Fairmount Park Commission is working with The Academy of Natural Sciences to complete a Natural Lands Restoration and Environmental Education Plan. The emphasis is on restoring, renewing and protecting the park.

The restoration effort will be focused on portions of the natural landscape in the following watershed parks in the Fairmount Park system: Wissahickon, Cobbs Creek, East and West Park, FDR Park, Pennypack, Porquessing, and Tacony. After an initial inventory, the Academy will identify focus areas for restoration to include: “trail rebuilding, tree planting and forest management, streambank stabilization and stormwater management.”

The Academy will also be evaluating methods for dealing with the two primary invasive species found in the park system: Japanese knotweed, and Norway Maple. Because these two species can frequently outcompete native species, they pose a threat to the continued survival of native vegetation within the parks and thus the natural habitat of the wildlife within the park. Expected outcomes include:
Appendix B: Relevant North American Facilities

Fairmount Park

Continued

“(1) identification of the most successful management techniques (of those assessed) for controlling Norway maple and Japanese knotweed in the park system, (2) partial control of these invasive plants in significant areas of the park system, (3) communication of outcomes to park managers and the scientific community, and (4) transfer of successful methods to park personnel for application throughout the park system.

Finally, the Fairmount Park Commission has held permits for several controlled deer hunts within the confines of the park system. This has been a controversial approach to dealing with vegetation destruction and an unhealthy overpopulation of deer in the park. This overpopulation has led to a high number of vehicular accidents involving deer and to concerns about lyme disease. While controversial among animal rights activists, the limited hunts have restored a healthy balance between wildlife and vegetation and reduced the overgrazing had been damaging the park grounds.

Education:
Fairmount Park’s Division of Environmental Education’s mission is:

“To promote understanding, appreciation, and stewardship of Fairmount Park and our total environment. From neighborhood to region to world, our actions impact our environment and our environment impacts our quality of life.”

Some of the programs offered through the Division of Environmental Education include:

- Large public festivals including Sheep Shearing, Maple Sugaring, Apple Fest and Family Farm Day.
- Intimate public programs such as birding workshops, meadow walks, full moon hikes and winter tree identification.
- On-site field experiences which investigate natural cycles, forest ecology, environmental issues, animal adaptations, watersheds and more.
- Outreach programs to schools and youth groups on topics such as trash, careers in science, natural lands restoration and watersheds.
- After-School Programs which combine environmental content and hands-on activities with field work and restoration projects.
- Volunteer, restoration and service-learning opportunities.
- Summer camp adventures for groups and individuals.
- Additional services such as teacher training, birding resources and curriculum consultation.
- Informational materials such as trail maps, public program calendars, tee shirts and bird seed.”
Site Rehabilitation

While Upper Onondaga Park contributes to the social and recreational opportunities of the surrounding communities and the City of Syracuse as a whole, the area is lacking the ecological integrity a large urban park can contribute to the city’s residents and visitors. The evolution of the park’s landscapes, initiated by the Onondaga Botanical Garden and Arboretum Master Plan, will build on the foundation of existing uses and activities to expand opportunities within the park to encompass not only social and recreational activities but also new educational, ecological and aesthetic opportunities as well.

While it is possible for some to travel to areas outside the City of Syracuse to learn about, view and experience "natural" environments, many urban residents do not have the time or means to do so. Through this project there is the potential to provide a landscape, which is not a typical urban park, in which city residents and visitors can socialize, relax, and learn.

The basis for this site’s transformation will be through a vegetative rehabilitation program of natural and managed succession techniques. Through rehabilitation the hillside will become an unvegeted stand of trees with a multi-layered understory. The evolving succession stages, assisted with plantings, will create the now non-existent understory growth. The development of an anastorey will fill in gaps in the present canopy, will provide new growth as the old-growth trees on-site continue to decline, and will provide diverse layers of trees, shrubs, and perennials.

Through these stages new plant communities will change the aesthetics and ecological functions of the site. Throughout the progression of the site a series of phrased exhibits will highlight and complement the natural processes taking place, providing an experiential environment for education and enjoyment. Rehabilitation of this site can create a compelling landscape that contributes to the social, ecological, economic, and aesthetic condition of the City of Syracuse. A landscape that, like the overall dynamic urban setting, it is a part of, allows for a range of choices, interactions and experiences.

Project Summary

This design project is intended to contribute to the exhibit, landscape and garden designs pursuant to the Onondaga Botanical Garden and Arboretum Master Plan, released in the summer of 2004. The area of focus for this project is the hillside surrounding the fire barn located on Summit Avenue in Upper Onondaga Park, Syracuse, New York. As detailed in the Master Plan this area is to exhibit a native New York State beach-maple forest ecosystem. The site’s area is approximately 7.4 acres or 3 hectares.

Through research and design the importance of urban forests has become increasingly more apparent over the past few decades. However, many urban centers have not fully embraced their current urban vegetation or capitalized on projects that could have extended the beneficial qualities of their urban forests. This project is intended to demonstrate the inherent necessity, complexities, functions and aesthetics of the urban forest through a process of vegetative rehabilitation that promotes the natural processes of succession.

The project site lies within the National Register Historic Landscape of Onondaga Park, which is not a landscape that must be frozen in time. Part of the role of the Onondaga Botanical Garden and Arboretum, and therefore of this project, will be to highlight the historic landscape while at the same time demonstrating its ability to evolve. The park’s capacity to offer a compelling narrative will be broadened by the addition of new elements used to highlight and juxtapose, both historic and contemporary, forms, functions and aesthetics.

The goal for this project is:

To add to the ecological and landscape diversity of the area through urban forest rehabilitation, while at the same time providing an experiential landscape of natural processes, exhibit and beauty.
Site Topography

With the aid of a survey provided by the Syracuse Department of Parks, Recreation and Youth Services a base map was created (through interpolation) of the sites contours at one foot intervals. This base map provides the necessary topography data for the site. One of the main objectives of this project was the site’s topography to be impacted as little as possible due to the site’s historic designation. In order to preserve the inherent hillside characteristics of the site a slope analysis was performed. The slope analysis divided the percent of slopes into four categories: 0-5%, 5-10%, 10-20%, and greater than 20%. Equal accessibility to the site’s main features for the handicapped was another main objective of the project. The slope analysis allowed for the site to be divided further into accessible and non-accessible slopes per the A.D.A. guidelines. In the smaller accessible slopes graphic areas shaded in grey are slopes that are greater than 8.33% and therefore non-accessible without regard to the topography. The areas left in white are slopes that are 8.33% or lower and are accessible with no further grading needed. Compiling this information allows for the sites interior paths to be planned with little disruption to the sites existing topography, while also creating accessible pathways for all park patrons.

Site Vegetation

Field analysis of the current plant species composition of the site is summarized in Table-1. The majority of the site is composed of large and medium sized deciduous trees. Included in this table are the total number for each species as well as the total number of trees on site. The site has twenty different tree species, the majority of which are native to New York state. The most dominant in number are Acer saccharum and Quercus rubra however the most dominant in size are Tilia americana and Liriodendron tulipifera. These trees represent the top four dominant species on the site. For more in-depth analysis and calculations please refer to the written proposal for this project.

Table-1 Tree Species Composition

<table>
<thead>
<tr>
<th>Tree Species Present</th>
<th>Number of Trees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acer saccharum</td>
<td>76</td>
</tr>
<tr>
<td>Quercus rubra</td>
<td>32</td>
</tr>
<tr>
<td>Pinus rigida</td>
<td>9</td>
</tr>
<tr>
<td>Acer platanoides</td>
<td>7</td>
</tr>
<tr>
<td>Tilia americana</td>
<td>6</td>
</tr>
<tr>
<td>Aesculus hippocastum</td>
<td>3</td>
</tr>
<tr>
<td>Fraxinus americana</td>
<td>3</td>
</tr>
<tr>
<td>Liriodendron tulipifera</td>
<td>3</td>
</tr>
<tr>
<td>Prunus serotina</td>
<td>3</td>
</tr>
<tr>
<td>Fagus grandifolia</td>
<td>2</td>
</tr>
<tr>
<td>Ostrya virginiana</td>
<td>2</td>
</tr>
<tr>
<td>Acer nigrum</td>
<td>1</td>
</tr>
<tr>
<td>Acer rubrum</td>
<td>1</td>
</tr>
<tr>
<td>Pinus sylvestris</td>
<td>1</td>
</tr>
<tr>
<td>Tanne cuspidata</td>
<td>1</td>
</tr>
</tbody>
</table>

Total # of Trees on Site: 167

Soil Analysis

The site lies on an area of Palmyra and Howard soils (PHD). This group consists of individual areas of mostly Palmyra soils, Howard soils, or both. This soil type usually is in karstic outwash areas that have short, complex slopes, on terrace fronts, and on moderately steep sides of streamway dissections. Slopes range from 15 and 25 percent. The topography of the hillside site adheres to this general description of the soil group. The fire burn site on approximately the high point of the area with only a slight rise in topography to the west. The steepest slopes lie on the north and northeast sides of the site. The south side has a more gradual downward slope in part due to the presence of Summit Avenue, a residential street.

When mapping areas with this soil type it is not uncommon to also find small inclusions of Phelps soils in deeper depressions and along streamways. Also commonly found are small inclusions of sandy Airport soils and heavier textured Children soils. "These soils can make up as much as 10 percent of some areas, but they have little effect on use or management." Generally the soil group of Palmyra and Howard soils is considered "dray" and prone to erosion due to the steep slopes. Therefore this soil group is best suited to deep-rooted plants.

(This soil information was compiled using the Soil Survey of Onondaga County, New York by Penn, Z. Hutton, Jr., and C. Francey and United States Department of Agriculture, Soil Conservation Service, in cooperation with Cornell University Agricultural Experiment Station).
Seed Bank Analysis

The seed bank is the upper portions of the soil in which viable seeds are present and able to germinate. The seed bank can hold seeds from the current seed fall as well as persistent seeds able to withstand adverse conditions for years prior to germinating. The site was divided into nine areas based on present growing conditions. Within each area, multiple samples of the upper 2.5" of soil were collected forming an aggregate sample which was then used to take one seed bank sample for analysis. All nine samples were then stored in coolers for cold stratification for three months. The samples were then placed in trays on top of a prepared soil mix and allowed to germinate within the greenhouse. Germination has been observed for approximately three months. An additional control tray of just the prepared soil mix was also in the greenhouse to make sure no germinating seeds within the seed bank trays were actually from the prepared mix. Nothing germinated from the control tray.

The majority of growth within the analysis trays were herbaceous species commonly found as turf weeds. These species included Oxytropis spinosa (common woodborer), Plantago major (broadleaf plantain), Taraxacum officinale (dandelion), and Oligochara sp. (large orchgrass). While these species are not necessarily the optimum growth they did germinate quickly and in abundance, providing a cover for any bare soil until something more desirable germinates or is planted and can shade the herbaceous species out. Unfortunately there was little woody species growth within the seed bank analysis trays. The only woody species observed was Rhus typhina (staghorn sumac), and as the other herbaceous plants continued to grow the majority of sumac seedlings were eventually crowded out.

Natural and Managed Succession Areas

These areas were selected based on current site conditions. Basically the current vegetation on the site creates areas in which planting or any major disruption of the soil will negatively impact the existing root structures of the trees. Therefore the area that is shaded, in the above graphic, was determined by outlining around the canopies of the existing trees to create the areas of natural succession. By not attempting to plant within this area the root structures will remain unaffected and seeds from the site will be able to disperse into, and germinate naturally, within these areas. This will be especially true under the large seed trees where seeds will be able to drop in close proximity to the parent tree without any disturbances. It is envisioned that the managed areas will lessen over time allowing the natural processes of succession to take hold of the site. It is believed that once the equilibrium state occurs on site that the only areas in need of management will be in areas of concentrated use such as the interpretation center and pavilion area.

Managed Rehabilitation Techniques

While natural regeneration techniques are important there are situations in which certain desirable species are not present on-site, in the seed bank, or in close enough proximity to become established on the site. Using techniques of managed regeneration allows for specific species and site selections for rehabilitation. The two managed succession techniques to be used on site will be planting species and direct seeding.

Various perennials, shrubs and trees, not able to be naturally established on the site, will be planted throughout the successional stages. These plants will range in size and type depending on the specific role they are to play. This technique allows for optimal specimen and site selection.

Direct Seeding, which also allows for species and site selection, disseminates seed by either spot or broadcast spreaders over areas of prepared soil. This method is much more cost effective than transplanting, but does not allow for the establishment of various sizes or ages of plants.

Some possible species to be planted by one or both of the above methods include: Fagus grandifolia, Pterostyrax americana, Betula alleghaniensis, Cornus alternifolia, Hamamelis virginiana, Viburnum odoratissimum, Acer spicatum, Polystichum acrostichoides, Similacum racemosum, Aralia racemosa, Sanguinaria canadensis, and Trillium grandiflorum.

Revealing and Experiencing Natural Process: Urban Forest Rehabilitation in Upper Onondaga Park

Plants and Processes

Michael T. Doherty
Major Professor: Emanuel Caster
Committee: Dr. Donald Leopold

SUNY-ESF
LSA 100 Capstone Studio
Fall 2004 / Spring 2005
Rehabilitation Initiation

As stated earlier the most difficult place to plant is within the area of the existing canopy. This is due to the existing root structures but also due to the lack of adequate sunlight for many plant species. To begin the rehabilitation of the site the grass-turf stage must be initiated. Within the natural succession areas plants of this stage will vary greatly due to the vast amounts of sunlight. Therefore the entire site will be aerated and raked to disturb the upper two inches of soil. This will allow for the addition of soil amendments and will promote aeration, nutrient cycling, and germination. In the managed areas grasses and forbs will be planted using the direct seeding method. These plants will germinate and colonize the managed areas. Germinating within the natural areas will be plant species similar to what has been observed in the seed bank analysis. These plants, similar to those in the managed areas, will provide a soil cover and begin to establish the site's vegetation along with the managed areas, the plants will be allowed to grow and succumb naturally.

Allowing both areas to become established through natural and managed techniques will demonstrate the need for proper management due to the urban context and condition of the site. Just as both areas will educe park visitors on the techniques used and the reasoning behind them.

Rehabilitation Progression

The site’s rehabilitation will be initiated through the introduction of grass and turf species. While these plants are among the best established various trees and shrubs will also be planted within the managed areas. This will allow for the establishment of plant species not currently on site, but those that can survive in the site’s current condition. Using the different areas described in the “Planting Areas and Strategies” section the managed plants will begin to thrive while at the same time species already on site will naturally be spreading seeds and germinating. This progression and establishment of the different stages of succession is shown in the three site graphics to the right.

The eventual increase in vegetative density on the site will allow for infilling of plant species such as forbs, oenotheras, and the ground covers that need dense shade. This progression will eventually establish the multi-layered forest growth desired for the site.

Due to the fact that there is already an existing mature stand of trees on the site, at any given time during the site rehabilitation there will be actually a number of successional stages present. The intention of the rehabilitation plan and schedule is to allow for each stage to have a dominant time period to positively affect the site and prepare it for the next successional stage.

For a more detailed description of the succession stages, the rehabilitation plan, and rehabilitation schedule please refer to the written report for this project.
Ecological Interpretation Center and Urban Forest Exhibit Area

Through restoration of the existing historic fire barn an educational community center will be developed to provide programs for all levels of city schools as well as to the general public. These programs will be science-based but will encompass a wide range of activities such as drawing, photography, lectures, field studies, and gardening. This site design takes into account the possible need for a future addition connecting to the fire barn. Also included in this site design is the urban forest exhibit area surrounding the renovated fire barn. This outdoor exhibit area will hold interpretive panels focused on the subject of urban forests. The design concept for this space is to allow the rehabilitated urban forest growth of the hillsides to appear as though it is enveloping the exhibit space. This was done to provide visitors with not only the interpretive panels but also their living subjects within arms reach or close view.

Urban Forest Development Exhibit

This area will hold the five exhibit panels introducing visitors to the processes of succession, different methods for developing and preserving urban vegetation and provide introductory information about the urban forest rehabilitation of the hillsides.

Urban Forest Monitoring Exhibit

This area will hold five exhibit panels introducing visitors to the UFDM method and other methods of monitoring urban forest effects.

Urban Forest Exhibit

This area will hold eight to ten exhibit panels that will introduce visitors to the definition of urban forests, their effects and value, and urban forest sustainability, diversity and connectedness.

Fire Barn and Site Exhibit

This area will hold the two exhibit panels introducing visitors to the fire barn and hillside site. Specifically these panels will highlight the history of both the fire barn and the site.
The concept for the exhibit spaces within the interior of the site and on the peripheral edge, is to demonstrate the past, present, and future succession stages and processes of the site. Depending upon what current state the site is in the exhibit graphics and informational text will allow visitors to be immersed in both the current stage of the site and also allow for "snapshots" of past stages and processes.

The exhibits are meant to act as overlays upon the site so as to not burden or intrude on the site's aesthetics and evolving processes. The exhibits will enable visitors to step out of the present condition surrounding them and into a view of past or future aesthetics, processes, and plants. The importance of this distinction of time is to allow visitors to learn about and appreciate not only the present condition of the site but also the conditions that have allowed the site to get to where it is as well as those that will sustain it later.

Using three different expressions of this concept these exhibits will act as an overlay over whatever the present condition of the site may be. Each exhibit will act as a threshold allowing visitors to enter into another timeframe other then the present. Whether it is to the past or future, the exhibits will allow for visitors to experience, learn about and appreciate processes and aesthetics not actually occurring on site. The three physical manifestations of this design concept will be "Sequence", "Panoramic", and "Room". All these exhibits allow for visitors to compare and contrast different time periods, processes, and aesthetics with the actual present condition of the site.

Sequence

The Sequence exhibit will allow succession processes to be demonstrated in a progression. In the examples to the right the progression of the grass/herb succession stage to the shrub-seeding stage is shown. These panels will be large enough to show greater detail of the plants and give an up close view of a process many park users, especially urban residents, may have never witnessed before. The dimensions of these panels will be 6' x 4' with a 1' high steel pedestal. The recommended material for these panels is phenolic resin due to its cheap cost, ability to take digital graphics and colors, fade and scratch resistance, and the lack of a need for a frame. Phenolic resin panels are becoming more and more popular and are fast replacing the common traditional fiberglass panels.

Panoramic

The Panoramic exhibit is meant to allow for the creation of a large graphic overlay accompanied by two explanatory panels. By using such a large graphic visitors can feel more immersed in the aesthetic view of past or future stages. In the example to the right the panoramic exhibit is demonstrating a future aesthetic of the young succession stage while the present condition of the site is in the early stages of the shrub-seeding stage. This exhibit is meant to be off the peripheral path on the north side of the site. Looking south at the exhibit visitors will be able to view the panoramic graphic as well as the site behind it due to the landscape sloping up towards the south. The panoramic graphic will be 40' in length and 8' in height. The recommended structure to achieve such a large exhibit is to use a tangle fabric structure with the graphic printed directly on the fabric. This fabric can then be stretched over the steel structure, allowing for the exhibit graphic to change as the site evolves.

Room

The Room exhibit is the only exhibit accessed within the interior of the site. The interior path actually passes through each of the three room exhibits. Stepping off the path visitors will be able to view and read about succession processes, and the development of the layered forest growth. The room exhibits will allow for visitors to physically step through a threshold into another time period and aesthetic. The room exhibits will encompass visitors in the exhibit with large graphics and accompanying text. The total diameter of the room will be 24'. This allows for the interior path to pass through the center and for a 8' area off the path on either side for visitors to stop and take a closer look. The exhibit will be raised off the ground 18" and will have a height of 10', the recommended material for this exhibit is again a tangle fabric structure.
Proposed Greenhouse Complex

Figure A:
Bird’s Eye View of the Greenhouse Complex: Looking South

Proposed conservatory and plaza

Existing greenhouses

Proposed compost bins and parking

Figure B:
Bird’s Eye View of the Greenhouse Complex: Looking North

Section A:
SCALE: 0' 20' 40'

Section B:
SCALE: 0' 20' 40'
The proposed greenhouse complex and formal garden design concept incorporates existing historic elements with new architecture and garden design. This composition celebrates the history of Onondaga Park, and expands its uses to meet the community’s current academic and recreational needs.

The concept calls for the original greenhouses to be used for propagation, growing and classroom space. New architecture includes a display conservatory for horticultural collections representative of plants from around the world, a cafe, library, exhibit room for local artisans and travelling art collections, and an outdoor public plaza for planned events, and general public use.

The proposed formal garden is designed within the boundaries of the original garden’s footprint and is comprised of three distinct garden rooms:

- **Therapeutic Garden:** Defined by raised stone planting beds of various heights, low evergreen hedges, and a variety of annuals, perennials, and shrubs that have medicinal, culinary or therapeutic properties. The purpose of this garden is to demonstrate the cultural diversity of plant use while providing a beautiful setting for the public. This garden will also provide fresh flowers and herbs for the cafe.

- **Mosaic Garden:** Defined by a collection of annuals, perennials, evergreen and deciduous shrubs and trees, raised planting beds, and evergreen hedges of various heights. This garden is meant to be stimulating, relying on color, texture and form to create an invigorating and welcoming space.

- **Serenity Garden:** A quiet place to sit. This garden is slightly recessed allowing a visitor to experience a subtle, physical separation from the surrounding environment without being isolated. The reflecting pool provides a calming and cooling water element. Deciduous shade trees, and woodland plantings further enhance the serene atmosphere.

The proposed garden includes a cafe, exhibit room, classrooms and a library. Paths oriented north-south follow original garden paths, and are split with small lights to honor the original garden.

City of Syracuse  
Mayor  
Matthew J. Driscoll

Syracuse Department of Parks, Recreation and Youth Programs  
Patrick Driscoll, Commissioner

Onondaga Botanical Garden and Arboretum: Greenhouse Complex and Formal Garden  
Project Team:  
Patricia Volontini  
Sue Wyndham  
Professor Emanuel Carter  
Spring, 2005

Syracuse Board of Education  
Superintendent of Schools  
Patrick Driscoll

Powerpoint  
E. C. M.  
V. M.  
L. C.  
V. C.  
C. M.  
V. M.  
V. M.  
C. M.  
V. C.  

N  
SCALE:  
0  
20  
40  
60  
80  
100

Proposed Stone Mosaic Landing  
These mark the footprint of original planting beds and are redefined as stone mosaic landings, with an open bench oriented around a center planting.

Proposed Plaza

Existing Greenhouses

Proposed Compost Bins

Proposed Conservatory: Includes a cafe, exhibit room, classrooms and a library

Proposed Mosaic Garden

Proposed Therapeutic Garden:

Proposed Serenity Garden with Reflecting Pool

Proposed Stone Mosaic Landing
The Formal Garden in Winter

Raised planters, ornamental grasses, evergreen plantings and evergreen hedges are included in the design to add color and interest to the Syracuse winter landscape. The raised planters are designed with heights ranging from 1 foot to 3 feet, providing an assortment of surface elevations for snow cover (see examples from Cornell Plantations, below). Incorporating snow into the design as an integral element of the winter garden allows visitors an opportunity to enjoy and appreciate the natural beauty of a Syracuse winter.

Serenity Garden

Therapeutic Garden

Mosaic Garden

Deciduous trees and shrubs with ornamental bark, such as the Paperbark Maple, the River Birch, and the Red and Yellow Twig Dogwood can be used for additional winter color and texture (see examples below).

Winter Scenes and Winter Plantings

Cornell Plantations
Evergreen Hedge
Winter, 2005

Hemlock
Tsuga canadensis

Paperbark Maple
Acer griseum

River Birch
Betula nigra

Cornell Plantations
Red Twig Dogwood (Cornus alba) and Yellow Dogwood (Cornus sanguinea)

Japanese Silver Grass
Miscanthus sinensis "Helmos Feather"

Cornell Plantations
Winter, 2005

Winter Scene
Ornamental grasses, Sedum /Hylotelephium /, Yucca spp.

Christmas Fern
Polystichum amarissoides

Cornell Plantations
Winter, 2005

City of Syracuse
Matthew J. Driscoll
Mayor

Onondaga Botanical Garden and Arboretum:
Greenhouse Complex and Formal Garden

Syracuse Department of Parks,
Recreation and Youth Programs
Patrick Driscoll, Commissioner

Project Team:
Patricia Voltofini
Sue Wyndham
Professor Emanuel Carter
Spring, 2005
WILLOW BIOMASS EXHIBIT

Characteristics that Determine Appropriate Resource Alternatives

- Fast growing or easy to regenerate
- Capable of producing large quantities quickly
- Ease of collection and storage
- Appropriate physical and chemical composition
- Appropriate heating values, moisture content, size, shape, and chemical composition
- Possessing environmental and economic impact or benefit

Why Willow?
Willow satisfies the requirements for a renewable resource alternative

1. Willow is one of the fastest growing woody species.
2. Willow is easy to grow from unrooted cuttings with no need for agro-chemicals to control plant height and vigor.
3. The plants re-sprout forcefully after each harvest.
4. Willows offer large potential for genetic manipulation and improvement
5. In other words, different willow varieties and hybrids may provide different energy output levels.
6. Willow crops maintain an energy balance within the region.
7. Energy obtained from a willow mix can be as much as the energy required to produce the crop.
8. Willow can be used as a vegetative filter during biomediaation of wastewater & contaminated land.
9. Due to its rapid growth and harvesting cycle, willow can absorb large amounts of contaminated water from the land without being harmed, thus purifying the environment supporting the plantings.
10. Willow plants, stumps, and stumps can be used for bioengineering to stabilize streambanks & control soil erosion.
11. Willow provides windbreaks and wildlife habitats.
12. Willow production supports sustainable development by ensuring employment in rural areas and protecting farmland as a viable landscape.

Willow Cultivation for Biomass

1. Site Location & Preparation

Commercial willow crops are most successful when grown on the open fields, such as corn fields. This type of land is ideally suited to agricultural and conditions and will flourish on land. Typically, site preparation begins in the summer (mid to late July) before planting.

Prior to planting, stumps and vegetation is removed from the field, and the soil is plowed and disked to a depth of 18". The soil should maintain adequate moisture prior to planting and remain moist enough to facilitate establishment of the willows. Although willow plants may need some initial care, they do not require special treatment like many other crops.

Recommended soil types for willow include loams, sandy loams, clay loams, and silty loams of pH 5.5 to 8.5.

2. Planting

Planting the design for willow crop can offer aesthetic opportunities and landscape enhancement. There are many types of willow plants including tree and shrub varieties. Some species possess bold and land uses, creating a visually appealing willow planting scheme.

In commercial crops, however, willow plants are typically grown in long rows placed in a manner that allows for favorably higher energy yields paired at concentrations as high as thousands per acre.

3. Maintenance of Willow Crops

Ensuring that the identified willow planted crop is essential that weed control is maintained throughout the entire growing season. Willows plan to develop the type of species may vary depending on climate conditions and soil types, but there are certain basic practices to follow:

YEARS ONE, 1ST (MARCH) SEASON: Growth into the valley as expected, depending on climate conditions and soil types, but there are certain basic practices to follow:

- Willows should be cut back (coppiced) in the late fall of the first year. Cutting the stems to 1-2", which will promote sprouting and rapid canopy closure during the second year. Willows should be cut back to a height of 3-4" in early March before the new growth begins.

YEARS TWO - FOIL: After coppicing and re-growth has commenced, growers may use a variety of methods to establish the growing season. Timing of fertilization applications depends upon the role of growth but is typically applied in late June.

The process may involve withdrawing the plants from their starting point 6 months after they were planted. Any shoots that fail to establish are removed in mid-June, leaving 15-20 by the fourth season. At this point, the plants reach a height of 4'-5' tall and flower.

4. Harvesting

Willows can be harvested three times after the first coppice, or, four times after planting. Harvesting requires planning during the growing season. There is a process that involves removing 10'-15' tall, or (depending on the willow variety), reaching 15-20' by the fourth year. At this point, the plants reach a height of 4'-5' tall and flower.

Coppice harvesting involves cutting the stems to 1-2", which will promote sprouting and rapid canopy closure during the second year. Willows should be cut back to a height of 3-4" in early March before the new growth begins.

5. Drying and Storage

Willows should be dried at approximately 55% moisture and stored in a cool, well-ventilated environment. This ensures that the willows remain in good condition for future use and for preparation of green and purple plants. (It is essential that the drying process be conducted in a manner that allows for the development of a high-quality product.

Implementation
Producing willow biomass plantations is currently an agricultural endeavor being undertaken by timber growers throughout the northeastern part of the United States.

International Facilities

- 10,000 ha of land in the United Kingdom
- 10,000 ha of land in the United States
- 10,000 ha of land in China
- 10,000 ha of land in India

Local facilities

- 10,000 ha of land in the United States
- 10,000 ha of land in China
- 10,000 ha of land in India


[Image] Willow Field, Truthville, WI

[Image] Willow Stems & Bark

[Image] Willow Stems and Bark

[Image] Willow Stems and Bark

[Image] Willow Stems and Bark

[Image] Willow Stems and Bark

[Image] Willow Stems and Bark

[Image] Willow Stems and Bark

[Image] Willow Stems and Bark

[Image] Willow Stems and Bark

[Image] Willow Stems and Bark

[Image] Willow Stems and Bark

[Image] Willow Stems and Bark

What is Biomass?
1. Organic matter that can be used for fuel: vegetation, wood, fungus, animal and agricultural waste.
2. An enormous energy source.
3. A renewable resource.

Biomass Sources

1. WOOD
Logs, wood-chips, bark and sawdust account for approximately 79 percent of biomass energy. Biomass for fuel consists of woody material that is harvested from trees, shrubs, and other plants. This material can be used directly as fuel, or it can be converted into other forms of energy, such as electricity or biofuels.

2. AGRI-FUEL PRODUCTS
Agricultural waste materials such as corn stover and animal waste are a viable source of biomass.

3. LANDFILL GAS
As bacteria and fungi feed on landfill waste, a substance called methane is produced. Methane can be collected by landfills and used as an energy source for gas furnaces, gas stoves and for natural gas utility companies.

4. SOLID WASTE
Burning garbage can reduce the amount of trash in landfills by 60 to 80 percent. Fossil fuels, such as coal, are used to power the plants that burn trash to produce energy. These plants can produce as much energy as coal-fired plants, while simultaneously reducing the cost of landfill disposal.

5. ALCOHOL FUELS
Wheat, corn and other crops can produce liquid fuels including ethanol and methanol.

How Does Biomass Produce Energy?
1. Biomass absorbs sunlight, and stores it as energy.
2. During photosynthesis, energy provided by the sun enables plants to convert water, carbon dioxide and minerals into oxygen and sugars.
3. The sugars, called carbohydrates, are stored in the plants, and supply the plants (and animals that eat them) with energy.
4. Stored carbohydrates are captured and converted into bioenergy and bioproducts.

Implications and Future Trends

Currently in the United States, biomass provides only about 3-4% of primary energy fuel, but in the 21st century, energy producers will need to meet environmental targets and relieve burdened natural resources, creating a shift from fossil fuels towards renewable energy resources.

By 2050, biomass could provide 80% of the world’s primary energy needs.
Willow Fabrications

Basketry, more specifically "wicker-work," is undoubtedly the most widely recognized cultural use for willow. Weaving plant materials to form vessels for holding, storing, or carrying goods and possessions pre-dates recorded history. There are references to willow crop production dating from ancient Rome. The local availability of abundant willow in Europe made it the predominant material used for basketry in that region. However, relatively little is known about the early production of baskets. Despite the dearth of detailed information regarding basket production prior to the 1400s, when records of basket weavers' guilds appear, it is clear that willow baskets were extensively used in agriculture. Manuscripts from the 13th and 14th centuries contain illustrations of various baskets being used in an agricultural context. In addition, in England, there is historical documentation that almost every fruit or vegetable sold was associated with its own type of basket. These also served as measures. For example, a bushel of apples was based on the style and size of basket which held approximately 60 lbs. of apples. Similarly, strawberries were sold in "pounds" made of strips of willow bark, another basket weight combination.

Basket weaving techniques

Four basic weaving techniques are used to construct baskets: wicker, plaiting, twining, and coiling. Wicker, plaiting, and twining all involve weft (horizontal) elements and warp (vertical) elements, but each technique brings to basketry differentities of design, color, and form. Coiling is more like sewing. Each of the basic weaves has numerous variations, and weavers sometimes use several variations on a technique in a single basket, or combine two or more techniques.

Plaiting

In plaiting, or check-work, two elements are woven over and under each other at right angles. Twisted warp is much the same, except that the warp (horizontal) materials are woven over two, or more, wefts (vertical). Southernmost basket-makers have made well-tied plaited baskets for thousands of years, among which the willow plaiting predominates in the New Hebrides, where it is known as "kava basket." The aboriginal use of currant bend overlays to begin the "flying basket" tradition that continues among today's weavers.

Wicker

In wicker, the basketmaker uses unretted willow material over and under a solid foundation or warp of reeds or bunches of fiber. In the American Southwestern, willow is used to make serving baskets and trays. Hundreds of wicker gourds are made each year at Hopi to be used in kitchens and basket weaving and given as gifts.

Twining

Twining is a unique technique with a foundation of two elements, in this case, willow reeds and sweet-grass, white plant shoots—around which two, three, or sometimes four wafers are wound. Willow, the wafers are separated, bunched, and placed, in a stationary, one-to-one, or sometimes two-to-one, ratio, and each row is repeated again and again, building the basket. Simple and elegant patterns are made by counting the number of rows as in "branding and overlay," the number of rows, the wefts pass over, and the wafers pass under each row.

Coiling

Coiling begins at the center of a basket and grows outwards, usually pinned to or folded to the round before. Woven coiled baskets is a weaving technique as the basket maker bunches, folds, and pulls the foundation through which strands are drawn. These strands are single pieces of plant fiber. The process is made up of one turn, or sometimes two, and sometimes more slender plant shoots, twines of grass or shredded plant fibers, in a combination of drawn and looped.
Medicinal Uses of Willow

There are records of medicinal use of willow plants dating back as early as 500 BC in ancient China. Chinese medical texts recommended willow to alleviate both fever and pain. The ancient Greek use of medicinal willow was recorded around 200 BC by Hippocrates, who advised patients to chew on willow bark to reduce fever and inflammation. Worldwide, there are hundreds of willow species, and many have been used as sources of botanical medicines by a spectrum of cultures throughout history. Willows have been used for healing across diverse geographies including Asia, Europe, and North America; and by diverse peoples including the ancient Chinese, Greeks, and Romans as well as Medieval Europeans, and Native Americans, probably prior to the arrival of European settlers.

The willow plant's most important medicinal qualities are its ability to ease pain and reduce inflammation, although it has been used as a medication for everything from bloodshot eyes to hemorrhages, and from arthritis to dysentery. It has been administered in a variety of ways including: simple chewing the leaves or bark, crushing the roots to create a poultice, binding wounds with strips of the bark, or brewing leaves or bark to form tea. The key to willow’s healing properties is a compound called salicylic acid, a component of willow bark. In fact, the broad range of historical uses for willow ultimately led to the origin of aspirin, which was originally synthesized from the salicylic acid found in willow bark.

Timeline - Medicinal Willow

500 BC
Ancient Chinese medical texts recommended willow bark as a remedy for fever and pain.

200 BC
Hippocrates, a Greek physician, prescribes leaves and bark from white willow (which, like the myrtle tree, also contains salicylic acid) to relieve fever and pain, including labor pains.

150 AD
Greek surgeon Dioscorides mentions in his writings the use of willow leaves to relieve pain.

200 AD
Piny the Elder, a Roman statesman, describes the use of willow leaves in his writings, as does Garen, an armenian physician.

Middle Ages
Europeans stop using willow bark remedies, as the willow bark supply is exhausted for making wine. Use of willow for medicinal purposes banned in some places.

Before 1500
Native people of North America learn to make salicylate pain remedies from birch bark.

1763
Edward Stone, an English clergyman, reports to the Royal Society of London (world-renowned scientific group) of his successful experiments involving the use of willow bark to reduce fever in fifty of his patients. Meanwhile, on the European mainland, quinine is used to treat pain.

1828
Johann Buchner of Munich, Germany isolates pure salicin from willow bark. Salicin is the compound in willow bark that relieves pain. The name salicin was derived from salis, which is the Latin word for willow tree.

1838
Raffaele Pina converts salicin into salicylic acid. This is the first time salicylic acid was obtained from willow bark in the laboratory.

1897
On August 10, 1897, Felix Hoffmann, chemist at the Bayer chemical factory in Germany, prepares the first pure sample of acetylsalicylic acid (ASA). His laboratory journal notes the test he performed to assess the purity of his product. This is the beginning of the story of aspirin as we know it today, although the name, as of yet, has not been used.
Liverpool Willow Industry

The basket-making tradition in Europe was translated into a thriving industry by settlers in the Americas. In the mid-19th century, a basketry industry began to develop in the Central New York region. Local tradition holds that a German-born salt boiler, John Fischer, initiated basketry in the area after harvesting a local stand of willow to weave baskets in the tradition of his old country. When he sold his first basket for fifty cents, he is said to have contacted relatives still in Europe to encourage them to move to the United States. Within twenty years, Liverpool was a national center of basket production, with cultivated willow crops growing in marshes in Liverpool, Euclid, and Clay. Around the year 1800 Liverpool weavers produced 350,000 laundry baskets alone, which equaled three-quarters of all the laundry baskets sold in the United States that year. Beyond the weaving industry itself, willow provided economic opportunities in growing, harvesting, processing and marketing at a time when the local salt industry was declining.

Willow production reached its peak in about 1890, as the last salt bloks ceased operation. In 1892, some 360,000 baskets were shipped from this village whose residents then numbered somewhat less than 1300. Liverpool willow traveled to San Francisco, New York, and points beyond. Despite this volume, the industry remained a backyard, family-centered occupation. Although growing, steam and sewing willow reached industrial proportions, the weavers’ craft remained in the family shops.

Depression-era economics, cheap imports, and better transportation to more lucrative employment helped doom the Liverpool willow industry by the early 1930’s and few weavers were still at work in the 1950’s.

TRADITIONAL PROCESSING METHODS

CUTTING

A weavestand of Liverpool willow laundry baskets circa 1900.

Cutting Willow rods by size, known as drafting.

SORTING

Sorting Willow rods by size, known as drafting.

STRIPPING

Stripping bark and sawdust from the willow.

DRYING

Drying the peeled willow rods on rocks.

BLINDLING

Machine for bundling the willow.

WEAVING

A spool of completed willow baskets.

Images from the Crawford Collection, Liverpool Public Library
Introduction

Willow plants have served a variety of purposes in human societies for centuries. Willow has been used extensively across time and cultures. Historically, willow has been used primarily for one of two purposes: fabrication of products, or as a medicine for a broad spectrum of illnesses. Ancient Chinese medical texts from 500 BC recommend willow to alleviate fever and pain. The ancient Greeks used medicinal willow as early as the 3rd century BC. Willow was also used for the same purpose in Europe during the Middle Ages. North American natives used willow banks of many different species for relieving pain and reducing fever. The Cherokee used white willow bark tea to treat fever. The Blackfoot used purple willow (Salix discolor) to treat pain and fever. Remnants of willow baskets have been excavated at Iron Age archeological sites. Willow was also used in Europe in the Middle Ages to reduce fevers and pain. Throughout Canada and the United States, First Nations people traditionally used willow banks of many different species extensively for relieving pain and reducing fever. The Haudenosaunee (Iroquois) used sandbar willow stems (S. interior) as a painkiller. Eskimos use teatroot willow bark (S. plantifolia) to treat pain. Other traditional uses of willow bark include treatments for food poisoning, passive hemorrhages, chronic mucous discharges, diarrhea, worms and corns.

The second use for willow throughout history has been as a material for fabricating a broad range of products. Willow has been used to make: baskets, dyes, tanned leather, houses and boats, toys, arrows, harps, and artificial limbs. The willow plant's quick growth, ability to regenerate, flexibility, and healing properties made it an ideal material for these applications and more.
Willow Biomass Exhibit

Willow biomass is an environmentally sound, locally produced, renewable source of energy and bioproducts.

Driven by concerns about global warming, air pollution, rural development and national security, research conducted by SUNY-ESF has connected the historic willow cultivation industry to central New York. For almost two decades SUNY-ESF has teamed up with over 20 organizations to facilitate the commercialization of willow crops and other woody biomass for bioenergy and bioproducts in the Northeast and Midwest United States. The willow biomass exhibit is intended to showcase the value of willow crops as a sustainable source of fuel production (information provided by SUNY-ESF Willow Biomass Project, http://www.ces.nys.edu/ESF/occ/brochure/willow/willow.html).

Shrub willow has a rich history as an agricultural crop in central New York, where it was traditionally used for basket production. Nearly a century after the demise of the central New York basket-making industry, willow has again become a viable crop, albeit for a very different purpose. The renewed interest in willow crop production is a direct result of shrub willow’s quick growth, and ability to regenerate. It is easy to establish and when regularly harvested through coppicing, regenerates more densely, thereby creating more fuel. While this exhibit highlights willow as a biomass source, there are many other ecological uses for willow. Willow is used extensively for bio-remediation, erosion control, and bio-products as well as for biomass.

The Willow Biomass Exhibit offers visitors the opportunity to view and learn about the methods used in biomass production, as well as to enjoy willow’s natural beauty. The exhibit also reconnects the history of willow as a material for fabrication and as a medicinal plant, with emphasis on local willow tradition.

Creekwalk Entry Space

This entry to the Willow Biomass Exhibit is one of the primary points of access from the proposed Onondaga Creekwalk, as well as being the point of wheelchair accessibility. It provides a welcoming space for relaxation, as well as an introduction to the Willow Exhibit beyond. The space includes seating and bicycle racks for those who have been actively using the creekwalk and may want to pause before entering the exhibit. For those who have entered from the north entrance, it serves as the end of the exhibit, and leads directly to the historic WRK building which houses a café and gift shop.