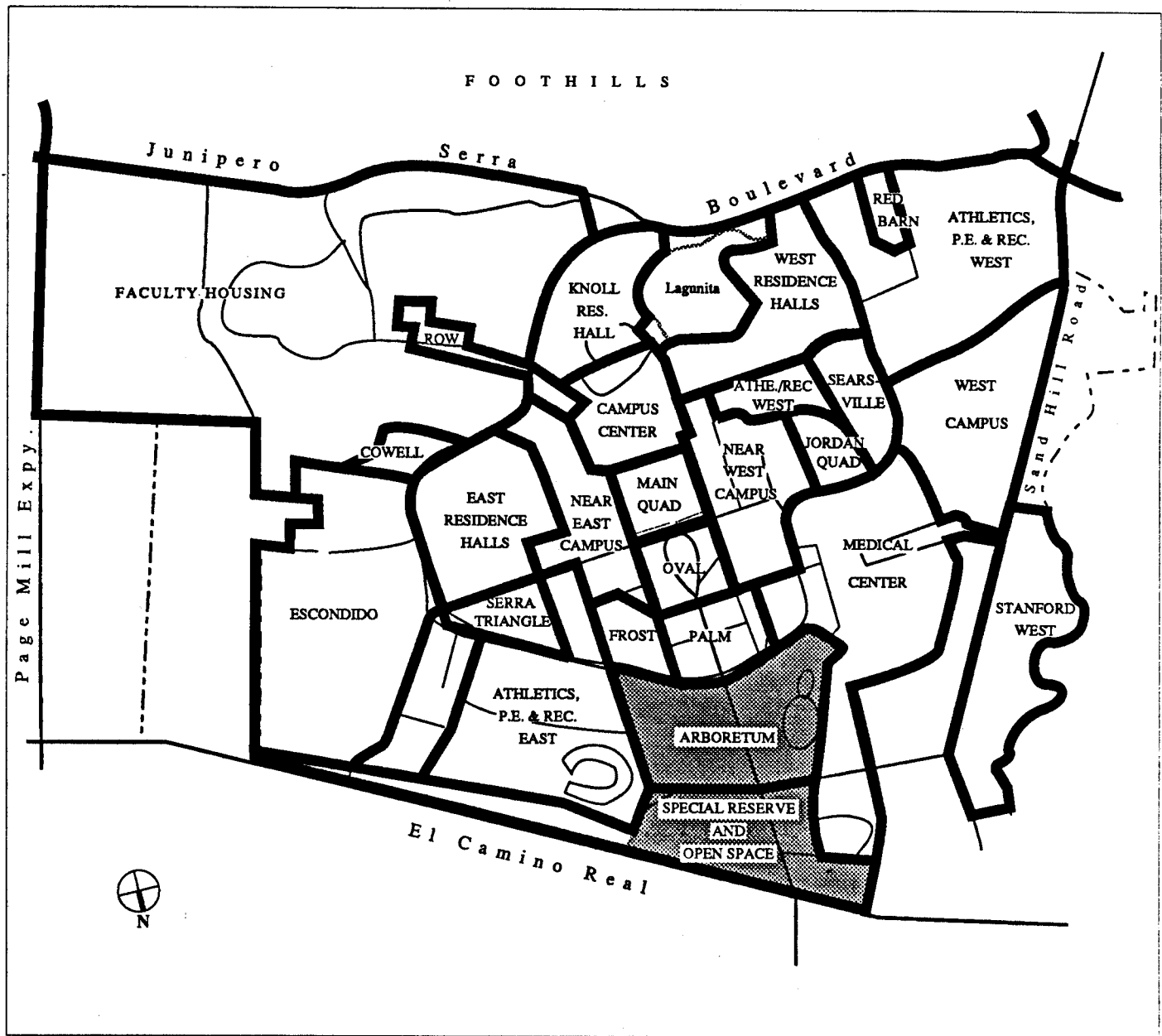


ARBORETUM REGION PLAN

STANFORD UNIVERSITY



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ARBORETUM REGION PLAN

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Arboretum Region Plan Synopsis

An arboretum at Stanford University was envisioned from the beginning by Senator Stanford. Apparently planned in its present location since 1888, the majority of the trees were planted between that time and the death of Senator Stanford in 1893. After that time, despite several attempts to reinvigorate the original intention, financial exigencies were responsible for the neglect and gradual decline of the original plantings.

The land on which the present Arboretum is located has very few natural constraints to either continued horticultural/agricultural use or for development and construction. The land slopes minimally and drains poorly; this, combined with the various roads acting as dams causes the region to experience regular flooding during heavy winter rains. The vegetation is a mix of some California native plants with a predominance of exotic species, most notably the Tasmanian blue gum, *Eucalyptus globulus*. The shrubs and non-woody plants are dominated by drought tolerant usually exotic weedy species. Virtually all of the trees are almost 100 years old and approaching senescence. Further, the combined stresses of prolonged drought, freeze, and the advent of the Eucalyptus long-horned borer have taken a severe toll of the mature eucalypts, creating a management and revegetation problem of enormous proportions.

The Arboretum faces the City of Palo Alto across El Camino Real, and is in its sphere of influence. On the west it is flanked by the Medical Center region; on the east, by the Athletics region. It is the most highly visible side of central campus, and Palm Drive, which bisects the region, forms the most ceremonial entry to campus. Although limited development could be absorbed by the region, the 1990 Draft Land Use Plan and the recently completed Second Century Plan confirm that no building development shall occur in the region.

The Planning Office explored a number of scenarios for the management and revegetation of the Arboretum in consultation with members of the Biology Department, the Center for Conservation Biology, Facilities Grounds, Athletics, Friends of the Arboretum, and the California Department of Forestry. We decided the best course was to emphasize California native plants (which are native to our part of the peninsula) while managing the diversity of existing exotic species where appropriate. The option of restoring the Arboretum to full status as an arboretum or botanical garden was considered and rejected, primarily because of lack of academic relationship for such an endeavor. The narrower

focus on California native plants was confirmed because of the tremendous diversity of exotics elsewhere on campus, with very little opportunity for most people to experience the richness and diversity of the native flora.

Over time the chosen scenario will result in the disappearance of the eucalyptus trees from most of the Arboretum; they will be retained and managed, however, in the two existing dense stands. In the central portions of the Arboretum the eucalypts will be replaced by trees native to the area, primarily Valley oaks, while the areas adjacent to the roads will be planted primarily with Coast live oaks. The existing diversity and richness of the region will be retained in such elements as the Cactus Garden and the plantings around the Mausoleum, the Deodar cedar allee leading to the Mausoleum, and in the numerous specimens scattered throughout the region. Aside from the eucalypts, only weedy or invasive exotics will be targeted for total replacement with other species.

An historic and precious element of our lands, the Arboretum forms a significant part of the first impressions and lasting memories of all who come to Stanford, whether to study, to work, or just to visit. It is imperative that the Arboretum Region be preserved as Special Reserve and Open Space, and that the vegetation be managed so that what we preserve, and change, leaves a legacy for the next hundred years and beyond.

ARBORETUM REGION CONTEXT

The Arboretum consists of approximately 144 acres of open wooded land between Galvez Street, Campus Drive, El Camino Real, and Quarry Road. The west edge of the region is more accurately a line angling northeast from the intersection of Quarry Road with the east service drive to the Medical Center, to the Hoover Pavilion site, then returning to Quarry Road. This line marks the eastern edge of the Medical Center Region. (Formerly the northern boundary of the region had been defined by Arboretum Road, with the area north of Arboretum Road designated Special Reserve and Open Space. In the draft 1990 Land Use Plan, the entire region, as well as the Palm and Oval regions, were designated Special Reserve.)

HISTORY

The Historic Values Index Working Group has identified several elements of the region as of significant historic value to the University. The open space on either side of Palm Drive, extending the width of the Quad and the length of Palm Drive, has been identified as "Untouchable," that is, as having the highest historic significance. So has the Mausoleum (within the region), and the Museum (technically in Palm region, but visually fronting on and contributing to the character of the open space of which the region is a part). The Arboretum itself, and the Cactus Garden, a small landscape element in the region, have been identified as of significant historic value as well.

As early as 1880, Senator Stanford had drawn up a plan for a new residence on the Stock Farm that was to have been on the site of the present Mausoleum. On that plan there was indicated a "Proposed Lake" to the southeast of the house, amidst a large "Arboretum." A later plan, dated 1883, shows the proposed house location in an oval with an adjacent oval to be laid out as a small garden with formal parterres (the present Cactus Garden), the only part of the scheme to be built. According to Paul Turner in The Founders and the Architects, "[i]t is not known exactly when this cactus garden was laid out, but a photograph of it exists in the Stanford Archives, dated January, 1886. This photograph calls it the 'Arizona Garden'."

In a letter to Senator Stanford dated April 12, 1888, Frederick Law Olmsted indicated that the plans for the University being prepared at that time would show "considerable variation from the original general plan and an extension of it to include on one side an Arboretum and several hundred acres of forest plantations on the foothills, and on the other an avenue

to a proposed railway station." From this it is clear that a very ambitious scheme for an arboretum had been contemplated from early on (Stanford himself had publicly stated that an arboretum was to be an important part of his university), although it appears that the original location for the majority of the plantings was to have been in the foothills to the south of the University buildings, not in the present location. The formal avenue from the railway station seems to have been Senator Stanford's idea, but according to a plan dated February 11, 1887, Olmsted apparently originally planned for it to proceed up to the Quad through a "Park."

From a memorandum relating to the Arboretum, dated December 4, 1888, Olmsted communicated his desire "that there shall be exhibited to advantage all the trees and woody plant (*sic*) of the world that may be expected to grow to mature natural forms under the climatic and other conditions of the locality." Further, from the "Notes Explanatory of the Leading Motives of the Plan" (text accompanying the General Plan for the University, dated 1888), Olmsted indicated that "all land within the limits of the Plan not to be presently occupied [...] are, as soon as practicable, to be closely planted. The plantations are to be afterwards thinned, before they become crowded, and clearings to be made among them, as, from time to time, space is wanted for buildings. [...] the landscape and the architectural design have in view ideals that pertain rather to the South than to the North of Europe or to the Atlantic States."

Although we have no records of how the original plantings were set out, it seems that the Eucalyptus trees were intended as a nurse crop, to provide shade and wind protection for the choicer and slower growing specimens. There are lists of plants and seeds that were planted out on campus, and the species diversity is much richer than what remains today. The death of Senator Stanford in 1893 and the ensuing financial austerities are probably responsible for the neglect of those early plantings. We do not know about the level of maintenance these plantings received, but it would appear that nature was allowed to take its course, and what remains today is an arboreal survival of the fittest.

NATURAL FACTORS

Soils

The Arboretum region comprises two closely related soil types, Pleasanton Loam and Pleasanton Gravelly Loam, with slopes between 0-2%. Both of these soils overlay a gravelly clay loam subsoil, with moderately slow subsoil permeability. Both have only

moderate water intake when wetted, with moderate to high runoff potential. They typically are found on old, nearly level alluvial fans, in areas with mean annual rainfall of 16 to 20 inches, supporting a vegetative cover comprised chiefly of annual grasses and forbs with scattered oak trees.

There are only slight to moderate limitations for most uses on these soils; the exceptions are for septic tank filter fields (severe limitation because of poor permeability) and various intensive recreation or agricultural uses of the more gravelly of the two soils because of the gravel content in the surface layer. Aside from these few constraints, the soils are well suited for construction sites, dry-farmed grassland and pasture, and some irrigated crops, especially orchards. There is also only moderate limitation for water retention structures.

Earthquake Hazard

The region lies in USGS Earthquake Zone C - very strong intensity. This is the same for virtually all of Central Campus. Given contemporary building technologies, there are no physical constraints to construction in the region, whether from soils or earthquake.

Hydrology

As mentioned above, the slopes in the region are minimal, from 0 to 2% (with 2% being the minimum for positive drainage). Also, the soils are only moderately permeable, especially when wet, and the subsoil is even less so. The land falls gradually in a northeasterly direction, and the existing drainage outlet for storm water is located at the northeast corner of the Arboretum at the intersection of Galvez and El Camino Real.

There are no streams in the region, although there is a network of drainage ditches and swales. In the Palm Region, just to the south of the Arboretum across Campus Drive, several drainage ditches and swales feed into an artificial pond, Mem Marsh, the outfall channel of which flows through the Arboretum. The ditches exist primarily to carry winter storm water runoff toward the outfall at Galvez and El Camino. However, despite several drought years, the channels were observed to stay wet enough during the summer of 1989 to require weed abatement. Mem Marsh, created in the summer of 1988, was installed to retain winter storm water. It was thought that the pond would dry up during the summer months, but it remained virtually full. We have been unable to determine the source of this water. The weir was lowered in the early fall of 1989 and the area monitored for its effects on storm water runoff and flooding.

In the winter of 1990-91 an additional drainage project was implemented in the Arboretum, the Vernal Pool project. It was installed to the north of Mem Marsh, between Arboretum Road and El Camino Real, just east of Palm Drive. Undertaken as the first phase of an ultimate reconstruction of Palm Drive, a primary purpose of which is to address drainage and flooding problems discussed above, the Vernal Pool project created a new drop inlet and culvert from Palm Drive, under the remains of old Lasuen Street, to the retention basin. The design and construction of the basin was coordinated with the Center for Conservation Biology, to best promote the future development of vernal pool habitat.

Flood Potential

The potential in the region for inundation by dam failure was identified in the 1980 Land Use Plan. The entire region falls within the area at risk from failure of the dam at Searsville Lake. In addition, the southeast segment of the region, from Quarry Road at Campus Drive across the intersection of Palm Drive with Arboretum Road out to El Camino, is susceptible to inundation by dam failure at Lake Lagunita. (This is obviously only a risk in non-drought years, when there is actually water in Lake Lag.)

Apart from possibility of inundation by dam failure, there is the reality of intermittent flooding from winter rains. The relatively poor permeability of the soils, the minimal slopes, and the various roads which act as dams together cause regular flooding in the winter. This situation is especially serious for Palm Drive because of the inconvenience to traffic (floods close at least one lane in each direction), and because of gradual undermining of the roadbase by the action of the water.

Wildlife

Because of the fragmented character of the potential habitats within Central Campus, there is very little in the way of significant wildlife. As large as the Arboretum is, it is isolated from other areas of similar habitat value. It therefore has little in the way of species diversity, and the species that are found there are primarily those which are common to the suburbs: various birds, ground squirrels, an occasional raccoon or skunk. There are no rare or endangered species in the region.

Vegetation

The existing vegetation in the region is almost exclusively exotic. The dominant woody species is *Eucalyptus globulus*, the Tasmanian blue gum, with an understory of non-native annual grasses, predominantly *Avena fatua*, Wild oats. There is a great diversity of trees in the Arboretum, including many Eucalyptus species other than *globulus*, a great many Coast live oaks, *Quercus agrifolia*, and a dramatic allee of Deodar cedars, *Cedrus deodara*. A casual evaluation of recent aerial photographs of the region show a tree cover density of approximately 50%. Most of the trees stand singly or in small clusters, casting dappled shade in an open, grassy woodland or savannah type association.

There are also many shrubs and shrubby trees, predominantly *Heteromeles arbutifolia*, Toyon, *Pyracantha* spp., Firethorns (exhibiting all the diversity of seedling variability), and *Prunus ilicifolia*, Hollyleaf cherry. These plants all thrive without supplemental irrigation. The understory in the region, as noted above, is dominated by Wild oats, but is richly populated with annual and perennial forbs. This herbaceous carpet is so characteristic of the undeveloped landscape in coastal California that many people read it as native, even though it is composed almost exclusively of naturalized exotic and often weedy species.

Many of the trees in the Arboretum are approaching maturity or senescence, and planning for their management is critical if we expect to retain the character of the region. Further, the Blue gums, which give such a distinctive character and aroma to the region, are being attacked by a pest, the Eucalyptus longhorned borer (ELHB). We are currently working closely with the California Department of Forestry to monitor the problem, and we have begun the first phase of a program of harvest and disposal of infested trees that are 50% or more dead. It is at this point in planning for the future of these trees that reconsidering the character of the region is most appropriate. Our recommendation for the future character of the region is presented below.

SOCIAL FACTORS

Land Use

As identified in the 1990 Draft Land Use Plan, the future land use for the Arboretum region is "Special Reserve and Open Space." This designation refers to "[g]reenbelts and malls which surround and interlace the developed portions of the campus. Lands held open under special agreements which place restrictions on use." This constitutes a change from

the 1980 Land Use Plan, in which the southerly portion of the Arboretum was identified as "Academic Reserve and Open Space," and a considerable part of the Palm region (as well as the "lobes" of the Oval) were designated "Instruction and Research - Medium to High Density," to indicate their future availability for academic development. This was expressly to provide an alternative to expansion in the Foothills, should further demand arise. The recent change came about in response to the feeling of the Stanford community, as evidenced in the controversy over the siting of Littlefield Center, that this entire area is an important part of our Olmsted Plan heritage, and should remain as open space.

This portion of campus lands is within Santa Clara County and under its jurisdiction. Stanford's land use designation has been adopted by the County, under the designation "University Lands/Academic Reserve and Open Space," and carries legal weight. The combined Arboretum and Palm regions, along with the Oval, fall within Special Condition Areas A and D, as defined in the 1989 General Use Permit granted to Stanford by Santa Clara County. According to the procedural conditions section of the General Use Permit, any uses within either of these special condition areas which result in any building construction will require a separate use permit. Although this does not preclude development in the region, it does make it somewhat problematic, and indicates that such development would need to have exceptional justification to be approved. The Arboretum also abuts the city of Palo Alto along El Camino Real, and is within its sphere of influence. In the Palo Alto Comprehensive Plan the Arboretum is designated "Open Space ... Controlled Development," which is defined as "land having all the characteristics of open space but upon which some development can be allowed, providing that the open space amenities are retained." This is manifestly in agreement with Stanford's stated intentions for this land.

One consideration for the region that is currently being discussed in the preparation of the revised Land Use Plan is the reconfiguration of the Academic Reserve and Open Space and the Special Reserve and Open Space areas. In keeping with the "untouchable" area identified by the Historic Values Index, that portion of the Arboretum the width of Main Quad flanking Palm Drive all the way out to El Camino would be designated Special Reserve and Open Space, as well as the Mausoleum and Cactus Garden. The segment of the Arboretum between this swath of land and Galvez Street (adjacent to the stadium and Angell Field) would retain its designation of Academic Reserve and Open Space. This would permit development within the region should demand warrant it, yet retain much of the character that it has today. However, in 1991 the University adopted the Second

Century Plan, which confirms that no building development shall occur in the region within the foreseeable future.

Adjacent land uses include Instruction and Research/P.E., Athletics, Recreation, and Support Services/Academic & Residential on the east, with Instruction and Research/Medium to High Density and Support Services/Academic & Residential on the west. In the 1980 Land Use Plan the "Rectangle" parcel, between Hoover Pavilion and Arboretum Road, was identified as University Support/Income Property. The 1990 (Draft) Plan has designated it as Instruction and Research/Medium to High Density.

The region presently serves as a visual buffer between campus and downtown Palo Alto; passive recreation for walkers, joggers, bicyclists, dog walkers, bird watchers, etc.; limited parking for University faculty and staff; and major overflow parking for athletic events--the Arboretum is one of the favored spots for tail-gating. There are no strong, direct academic affinities within the region, although the Center for Conservation Biology has begun to observe Mem Marsh and it is hoped that the Vernal Pool habitat experiment will also become an academic resource for the Biology Department. In addition to cooperating with the Biology Department, the Friends of the Arboretum (a volunteer organization of primarily Stanford staff) has been planting and caring for a wide variety of trees in the region for several years. Finally, the Planning Office has begun implementing the Botanical Parkway (a linear system of planting on Campus Drive that uses plants from each of the five mediterranean climate zones of the planet); one of the native California reaches of the Parkway forms the southerly edge of the Arboretum.

Circulation

As mentioned above, the region is bounded and subdivided by roads. Although the region is well served by roads, it is also chopped up by them, and somewhat isolated from the rest of Central Campus. The heaviest traffic volumes, in descending order, occur on Palm Drive from El Camino to Arboretum Road, on Galvez from El Camino to Arboretum Road, and on Quarry Road from Arboretum Road to Welch Road. All of the roads in the region (with the exception of the old segment of Lasuen Street that runs between Campus Drive and Arboretum Road) carry close to or over 10,000 vehicles per 24 hours. From this pattern, it is apparent that the region is the most important entrance to campus.

Neighboring Uses

The Arboretum region is bounded on the east by Athletics, P.E. & Recreation East, on the south by Frost and Palm regions, on the west by the Medical Center, and on the north by El Camino Real. Presently Athletics is the only program that formally uses the Arboretum. The Athletics Plan of 1987 assumes the continuing "ability to share event overflow parking in the Frost and Arboretum regions." (p. 30) There is no indication in that plan that there is any anticipated need for additional space for their programs which would have any impact on the Arboretum. Similarly, the 1990 plan for the Near East, Frost and Serra regions do not forecast any academic development which could not be accommodated within the boundaries of the Frost region. The Medical Center region plan of 1990 also does not indicate significant growth in the area adjacent to the Arboretum. This boundary is perhaps the most sensitive, as it is immediately adjacent to the "untouchable" historical features of the Mausoleum and the Cactus Garden.

MANAGEMENT SCENARIOS

In the course of the Planning Office's recent effort to create an integrated campus plan (the Second Century Plan), we identified the critical need for managing the Arboretum for long-term sustainability, similar to the Foothills revegetation program.

As a first step toward crafting a revegetation program for this area, we explored alternatives for **Priorities, Phases and Alternative Scenarios**. Four priorities were identified and confirmed; four phases were developed from those priorities. The Alternative Scenarios show the variety of possible approaches that were considered, and from which the recommendations were selected.

Priorities

The highest priority for managing the Arboretum is to protect the health and safety of the people who use it; all other considerations of use and aesthetics follow on this overarching goal. The massive maintenance effort being staged at the time of this writing, and the commitment to yearly inspection and ongoing maintenance, are evidence of our intention to do whatever we can to ensure the health and safety of the users.

The second priority is to preserve and enhance the view from the road. Most people who arrive at Stanford along any of the routes that traverse the Arboretum experience the region

from their cars. Therefore, the predominant perception of the region is that which can be gotten from the road, and that is the experience of primary importance. With limited planting along the edges of the Arboretum that are defined by roads, the perception of the region will be improved. This will permit the process of transition in the interior of the region to proceed with relatively little impact on most of the people who comprise our public.

The next critical priority is to maintain the eastmost portions for tailgating. The single most intensive use of the Arboretum is that of tailgating and parking at football games. This is a traditional use of the space, and one that provides a great deal of fun to a lot of people. It is a use that we determined was completely appropriate and desirable for the region; the issue became how best to accommodate that use and still begin to revegetate the area. The critical question was to determine if/how vehicle control should happen in these areas. It was clear that if new, young trees were to be planted, vehicle control had to happen, and a variety of methods were confirmed, from placing tree trunks around groups to placing lodge poles around individual trees. Further, the ditches that were implemented to control vehicular access into the Arboretum during the Centennial celebration were left in place for the remainder of the football season and were very successful in controlling traffic. This technique was discussed and confirmed as an option to be implemented in other sectors of the region.

Another priority confirmed was that of maintaining MemMarsh and the Vernal Pool for drainage. These retention ponds have become significant contributors to the storm water runoff management in the area, as well as popular places to visit and watch the passing show of the seasons and the wildlife of the area. This dove-tails with the goal articulated in the Landscape Design Guideline of keeping water on the surface, that is, of permitting water to percolate back into the soil and replenish the groundwater wherever possible, thereby reducing the reliance on costly subsurface, engineered storm sewers. Although the possibility was discussed of expanding involvement by the Center for Conservation Biology and the Biology Department, it was determined that both groups are already taking as much advantage of the region as they can.

The last priority established was that of replanting the central areas to maintain and enhance visual amenity and ecological stability in the Arboretum. Although in some senses this was the least tangible or practical priority, there was complete agreement that it was desirable as well as consensus on how to go about achieving it. The means of implementation are discussed below.

Phases

The immediate effort, which began this summer and was confirmed as of critical importance, is that we continue to monitor, harvest and dispose of infested, diseased and dying trees. Not only are these trees an increasing nuisance, with dying eucalyptus trees dropping branches unpredictably, it is an ethical responsibility to the community. We have the largest stand of infested trees in the area and are serving as a concentrated source of infestation for eucalyptus trees throughout our sector of the peninsula.

The second phase involves replanting perimeter areas to provide visual screening, addressing the first priority above, screening the view from the road. There are a number of areas that have already been treated in this way, most notably the segment of the Arboretum that was affected by the widening of El Camino Real in the 60s. The tree most commonly (and most effectively) used for this is the evergreen Coast live oak, *Quercus agrifolia*. Because of the importance of the screening to be obtained from these trees, they will be planted from container grown stock, most probably 15 gallon size trees.

The third priority is that of replanting high use and/or damaged areas. Since tailgating is the most intense use of the region, and areas of shade or spaces immediately under trees were observed to be most popular for this sort of parking, it was confirmed that this would be an appropriate phase of our efforts in the revegetation plan for the Arboretum. Because of the unknowns with respect to the mortality among the eucalyptus as a result of the activity of the Eucalyptus long-horned borer (ELHB), it is impossible to draw up a long-range replanting plan. To some extent this activity will occur in an ad hoc fashion, planting new trees in the areas that are most in need as a result of mortality of mature trees, and as funds become available. In areas where large numbers of trees are needed near the stadium, it was confirmed that the trees would be planted at random spacings but more or less in rows, to best accommodate the parking patterns during games. These trees would then be protected by tree trunks laid parallel to the drive aisles, secured in place with galvanized pipe or rebar, and with a thick layer of mulch placed between the logs to suppress weed growth.

Ultimately, after the most intensively used areas are addressed, it was confirmed that we would begin replanting the remaining central areas of the region. In part because of the financial constraints involved in planting and maintaining the new trees, and in part because of the desirability of moving away from having an even aged stand of trees, it was agreed

that the replanting should occur incrementally, ideally over a period of two to three decades.

Alternative Scenarios

Species mix

Because of the problems that are occurring as a result of having a near monoculture of an exotic tree, the issue of species mix was considered at some length. One alternative discussed was to move toward an association of all natives, predominantly Coast live oak (*Quercus agrifolia*), Valley oak (*Q. lobata*), Blue oak (*Q. douglasii*), California bay (*Umbellularia*), Big-leaf maple (*Acer macrophyllum*), California buckeye (*Aesculus californica*), etc. With this scenario, gradually all exotics, including the eucalyptus, would be removed and/or replaced. The second alternative presented was to have the above-listed natives dominate, eliminating all eucalyptus, but maintaining other exotics where appropriate. The third alternative explored, and the one that was confirmed, was that of having natives dominate yet maintaining a significant proportion of eucalyptus and other exotics where appropriate (Mausoleum, Cactus Garden, tailgating areas, etc.).

Planting protocols

Another group of alternatives examined dealt with issues of planting protocols. One issue treated was that of the size/age of plant to be planted. The alternatives included planting exclusively from seeds or deep-root liners; using some 1, 5 and 15 gal. container stock trees; and possibly planting in "islands," surrounding focal, large specimen trees (24" box or larger). It was agreed that in part because of expense and in part because of increased success and vigor of the resulting trees, seeds (acorns) would be used in most cases for planting native oaks. Exotic species could be planted from container grown stock.

Protection of the young trees was also discussed. The options discussed were: to provide root protection from rodent predation only; above-ground cages; lodge-poles (with wire?) for larger trees; bollards for boxed specimens; and possibly fences for larger sub-areas of one or more acres. As mentioned above, it was concluded that the most effective protocols would provide logs anchored in place for clusters of several trees, lodge-poles only for individual trees.

The last group of alternatives dealt with the issue of irrigation. Because we are in a climate region where, even in non-drought years, there is little or no summer rainfall, the survival

of seedling trees is greatly enhanced by supplemental irrigation in the first year or two of their lives. The methods available to us that we discussed addressed irrigation (water truck only, temporary irrigation system (especially along perimeter), or permanent irrigation), and labor (volunteers only, O&M Grounds staff, or a combination). In large part because the species being considered for the revegetation effort will all thrive with no supplemental irrigation once established, it was concluded that no irrigation system would be installed for this effort, temporary or permanent, thereby confirming the water truck only alternative. The group also agreed that it would be best to rely on O&M Grounds labor for the maintenance rather than on volunteers, because of the uncertainty of volunteer labor and the difficulty of coordinating such a labor pool. If any of the work is contracted out to a group (such as Magic, Inc., the non-profit that has been managing the Foothills Vegetation Management Plan), such a group might use volunteers, but the group confirmed that we would not rely on volunteers for maintenance.

RECOMMENDATIONS AND IMPLEMENTATION

The highest priority for managing the Arboretum is health and safety, with all other considerations following. The primary aspect of a management program for the region will entail the monitoring, harvest and disposal of diseased and dying eucalyptus trees. This will proceed on an as needed basis, and is being managed by O&M Grounds in cooperation with the California Department of Forestry, to control the Eucalyptus long-horned borer problem.

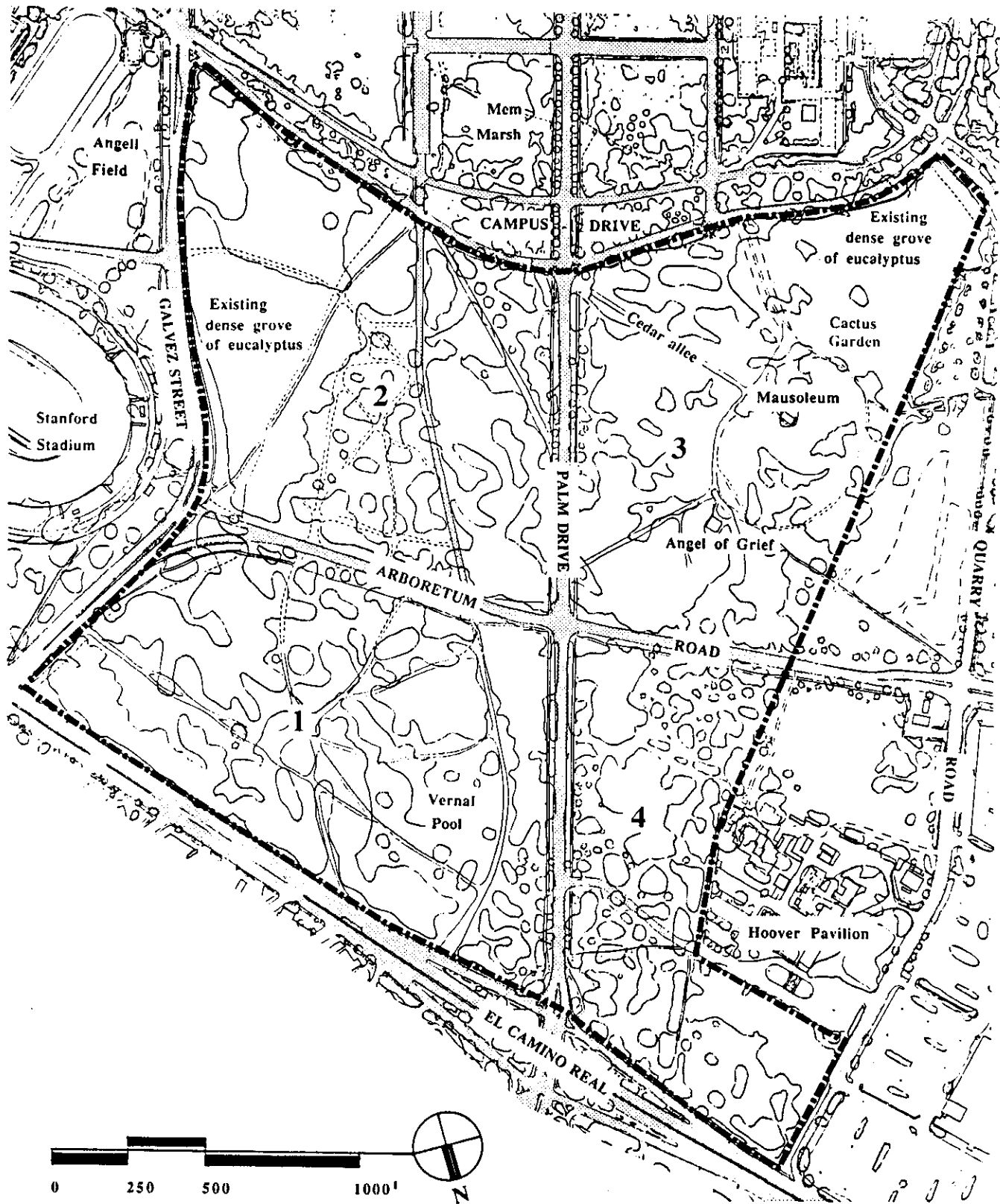
As these efforts proceed, the appearance of the Arboretum will continue to decline. The perimeter will be planted in areas that currently permit the greatest unobstructed views into the center areas of the four main quadrants of the region. Central areas will be planted in a sequence responding to the degree of openness, in an effort to achieve an open oak-grassland savannah association with approximately 50 trees per acre. The first central area targeted for replanting is the southeast sector, across Galvez Street from Angell Field. This area is largely devoid of trees and is heavily used for tailgating. The species selected for revegetation are primarily California native plants that occur naturally in this part of the San Francisco Bay area. The perimeter tree will be primarily Coast live oak, *Quercus agrifolia*, because it is evergreen and usually holds its branches low to the ground, providing excellent visual screening. The species selected for the interior plantings will be primarily Valley oak, *Quercus lobata*. It is deciduous, casts a more dappled shade while in leaf, and often holds its branches higher, lending itself well to being parked under. Other

indigenous species will be used where site specific conditions warrant, e.g.: Big-leaf maple and California bay in low-lying or moist areas.

We are also in the process of exploring wildflower and native bunch grass plantings in low-use, low-maintenance areas. The techniques and species mixes we are using will serve as a laboratory for future implementation of similar plantings in the Arboretum, especially on the highly visible perimeter areas.

The existing system of drainage swales and ponds will be maintained to preserve and enhance their utility as drainage elements as well as their ecological and aesthetic benefits. This involves an ongoing commitment to maintaining the ponds and channels free of vegetation that would impede flow, as well as to planting trees and shrubs that will shade the swales (reducing regrowth of obstructing vegetation) and enhance the habitat value of these areas.

The sequence of revegetation efforts, as they can be foreseen today, are shown on the key plan.



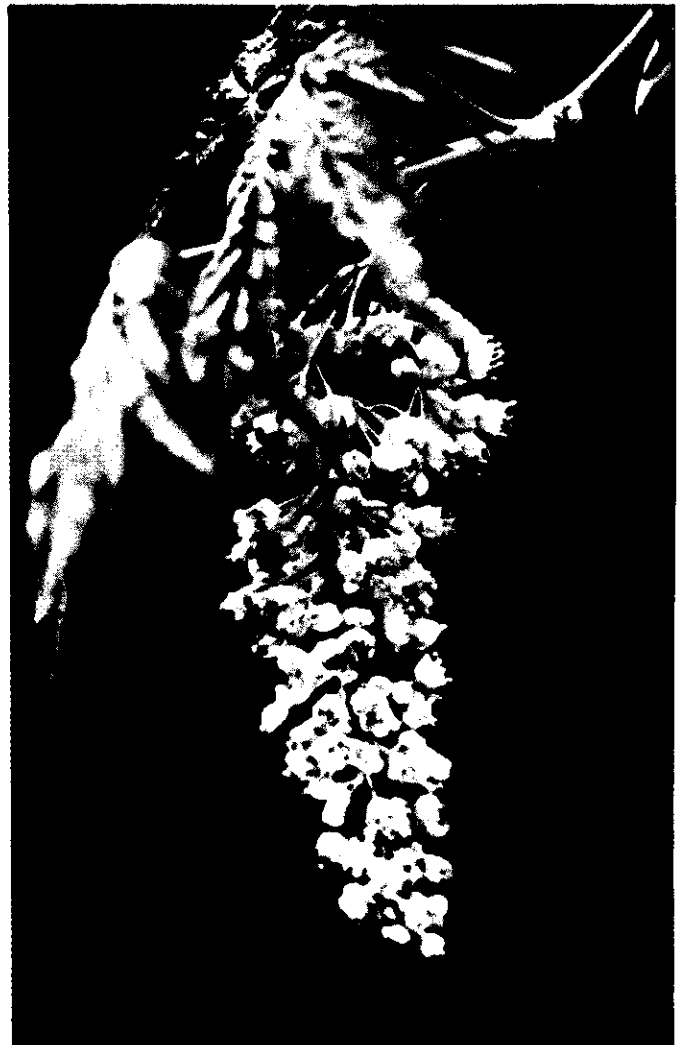
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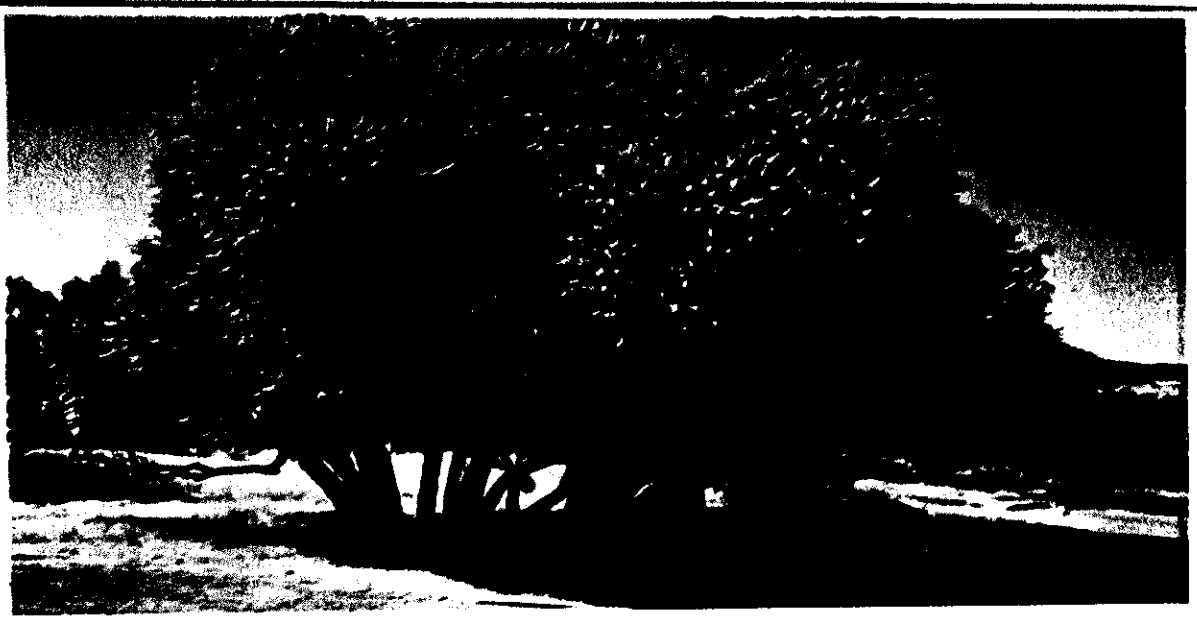


ACER MACROPHYLLUM

Bigleaf Maple

A round-topped tree with a handsome silvery-gray trunk, often reaching sixty feet or more. Large dark green leaves with red petioles turn a rich golden color in autumn. In spring pendulous racemes of scented yellow flowers appear with new wine-red leaves that turn pale pink before becoming green. The fruits are twin wings that persist for a long time providing the tree with another decorative feature. *Q* Given partial shade and water, bigleaf maple is a fast growing tree, a natural choice for a creekside.





AESCULUS CALIFORNICA

California Buckeye

A small single or multitrunked tree sometimes reaching forty feet but usually half that height. In winter its silver-gray bark makes an interesting living sculpture.

Large emerald green leaves begin unfolding in January and by April huge clusters of fragrant flowers stand up above the foliage. Lustrous brown fruits sometimes called horse chestnuts develop slowly. They are poisonous to humans and livestock. In inland habitats buckeyes drop their leaves early in summer; however, in irrigated settings leaves will be retained longer.

Apparently buckeyes are tolerant of a great number of cultural situations. Evergreen liveoaks make excellent companions in spacious settings.





QUERCUS AGRIFOLIA

Coast Live Oak

To many people, the "character" tree of California. Fast growing when young, especially with ample water. Although preferring marine influence, evergreen coast live oak will do well inland on not-too-dry slopes, ultimately attaining seventy feet. In mid-spring pendulous chartreuse catkins cover the tree.

Peerless as a large specimen in parks, it can also be a magnificent year-round cover for the small garden.



QUERCUS DOUGLASII

Blue Oak

With a craggy rounded top, the deciduous blue oak is a distinctive silhouette in the winter landscape.

Dry rocky slopes and interior valleys are its natural habitats.

Maturing slowly, it seldom reaches more than twenty-five feet in height in cultivation.

Attractive shallowly lobed blue-green leaves are a special characteristic. ♀ Blue oak is drought tolerant and well-adapted for landscapes in hot and dry areas. Often found in the company of digger pines, nature's own pleasing combination might well be imitated.



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QUERCUS LOBATA

Valley Oak

Stately and long-lived, this deciduous oak reaches forty to one hundred feet at a slow pace. Found growing in rich soil, in valleys and on slopes, its twisting and weeping branches are an outstanding characteristic. Medium-green leaves are deeply and unevenly lobed. Being drought tolerant, an underplanting of *Arctostaphylos hookeri* 'Monterey Carpet' and *Ribes speciosum* make compatible companions.



UMBELLULARIA CALIFORNICA

California Bay

Of grand proportions, gradually reaching seventy-five feet in moist situations. Dry or windswept sites cause a more shrub-like appearance in height and breadth. The strongly aromatic leaves are medium-green and sometimes used for flavoring in cooking.

Some shade is advised for its early years. With pruning it may be trained to a single trunk. A good screen.



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