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Town of Fairfax
142 Bolinas Road
Fairfax, CA 94930

URBAN FORESTRY ASSOCIATES, INC.
8 Willow Street San Rafael, CA 94901
(415) 454-4212 info@urbanforestryassociates.com

URBAN FORESTRY MANAGEMENT PLAN
for
trees in the parking lot between Broadway Blvd. and Sir Francis Drake Blvd. in downtown Fairfax

PURPOSE

The purpose of this study is the development of a modified Urban Forest Management Plan (UFMP) for the Town of Fairfax. A UFMP involves the assessment of site environmental and landscaping conditions, existing tree resources, the identification of tree related issues and the recommendations to address those issues. In this case we focused on trees around the perimeter of the parking lot, bound by Broadway Boulevard, Sir Francis Drake Boulevard, Claus Dr., and Pacheco Ave. We confined our assessment to species selection, tree maintenance, infrastructure conflicts, and tree hazard issues. The trees were assessed by Ray Moritz and Ben Anderson of Urban Forestry Associates, Inc. (UFA) on September 17, 2013.

Work Description

1. Label each assessed tree with round metal pre-numbered tags for identification purposes. Our assessment began with T-1 and concluded with T-30. All the redwoods were assessed and numbered as a single grove.
2. On-site evaluation of tree conditions (species, size, location, health, structural condition, suitability for preservation, identify any existing or potential infrastructure impacts, conclusions, and recommendations).
3. Locations where trees are inappropriate were identified.
4. Identify urban forestry management issues and economically appropriate solutions.

LIMITATIONS

All determinations reflected in this report are objective to the best of our abilities. All observations and conclusions regarding tree, shrubs, and site conditions in this report were made by UFA, independently, based on our education, experience, and inspection of the trees and site.

The health and hazard assessments in this report are limited by the visual nature of the assessment. No trees were climbed to obtain an up-close examination of the exact nature of branch or trunk leader attachments. Aerial defects may be obscured by aerial foliage, branches multiple trunks or other trees. None of the subject trees were examined using invasive techniques such as ground penetrating radar, ultrasound devices, or a Resistograph®. Aerial inspections and

ATTACHMENT B

the use of invasive techniques would be prohibitively expensive. The probability of tree failure is dependent on a number of factors including: topography, geology, edaphics (soils), wind patterns, species characteristics, visually evident structural defects, visually concealed defects, and the macro and micro characteristics of a specific storm. Structurally sound, healthy trees have been known to be wind thrown during severe storm events. Consequently, a conclusion that a tree does not require corrective surgery or removal is not a guarantee of no risk or hazard or of sound health.

METHODOLOGY

Trees were inspected visually for their health, vigor, structural stability, infrastructure impacts, and suitability for preservation. The recommendations were prioritized using a color code on a green to red spectrum with red being the most urgent. Diameters were measured at DBH (diameter at breast height, which is 4.5 feet above grade) with a forester's diameter tape. One tree is recommended for a Resistograph® study.

Resistograph

The Resistograph is a probe with a long, thin specialized ⅛" steel bit. As the tiny cutting head cuts the wood tissue, variation in torque resistance is translated into graphical output that depicts the internal conditions encountered by the probe. It is used to detect internal decay, cavities, fractures and other defects in tree trunks, branches and exposed roots.

It extends 400 millimeters into the tree. As the probe passes through the wood, it encounters variable amounts of resistance, which reflects:

- the structural condition of the cell walls
- the variations between early and late wood in the annual growth rings
- the species of wood and its typical cell layout (for example diffuse, or ring porous)
- The presence of reaction wood
- the manner in which the tree has developed in response to environmental conditions

SITE DESCRIPTION

The subject area is a parking lot bordered by two busy streets that are heavily trafficked by automobiles, bicycles and pedestrians. Little or no unpaved space was left adjacent to the trees along the north and south sides of the parking lot. The majority of the trees are sweetgum (*Liquidambar styraciflua*) and London plane (*Platanus* x *hispanica*). There is also a redwood grove (*Sequoia sempervirens*) at the east end and a single mimosa (*Albizia julibrissin*) in the middle. All of the liquidambar are doing damage to the infrastructure. A detailed inventory of the trees including recommendation for future care is included in Appendix A.

SPECIES CHARACTERISTICS

Liquidambar

The American sweetgum tree (*Liquidambar styraciflua*) is valued for its form, foliage, brilliant fall color and easy cultivation. It is a deciduous tree employed as a lawn or garden accent, border or water edge tree. It native range in the United States is in the southeastern tier of states. Therefore, while it is drought hardy, it is adapted to summer precipitation environments. In California it is frequently used along roads and sidewalks for landscape aesthetics, shade, color and screening, but its aggressive shallow roots do a great deal of damage to other landscape features and hardscape infrastructure.

It is a conical shaped tree when young, but develops a a spreading crown in age or through directional pruning. Its rapid growth in combination with weak wood, upright branching habit and frequently weak acute angle branch attachments results in a relatively high branch failure rate. Its branches also tend to become over-extended for its wood strength.

This tree can grow to a height of 75' with a crown spread of approximately 40'. The seed capsule is a tough, woody, round (1" to 1.5") fruit that is considered a litter nuisance and tripping hazard along sidewalks, roads and other paved areas. It should not be planted in high use areas or near infrastructure.

Rate of Growth:	Moderate to fast; moderate life span
Climate:	Tolerates both heat and cold. Drought and wind tolerant. USDA hardiness zones 5-10. Sunset Western Garden Book climate zones 3 - 9 and 14 - 24.
Exposure:	Sun or partial shade.
Care:	Prune when young for a strong and pleasing form and site requirements (winter prune). Feeding is not required but spring fertilization will accelerate growth.
Pests and Disease	Relatively resistant and free from pests and diseases.
Size:	Height = 75 feet, Width = 40 feet
Fruit:	Round; 1"; dry; brown; causes significant litter and tripping hazards.
Habit:	pyramidal to rounded; moderated density; symmetrical; coarse texture.
Light Requirements:	Partial shade to full sun
Soil Tolerances:	All texture (clay to sand); slightly alkaline to acidic; wet - moderate dry
Pest Problems:	Severe decay susceptibility problems
Pruning:	Needs extensive, regular pruning to develop strong trunk and branch structure.
Structure:	Severe breakage problems
Nuisance:	Very shallow, aggressive roots damage infrastructure (curbs, sidewalks, paths, driveways, patios, retaining walls, gas lines, grey water lines and irrigation lines), lawns and planting beds, seed capsule tripping hazard

London Plane

The London plane is (*Platanus* x *hispanica*) is one of the most common urban tree species. It is a type of sycamore, and is thought to be a hybrid of American sycamore and oriental plane. It is very similar in appearance to our native California sycamore and is deciduous.

Rate of Growth:	Moderate to fast.
Climate:	Tolerates both moderate heat and cold. USDA hardiness zones 5-8. Sunset Western Garden Book climate zones 2-24.
Exposure:	Full sun to partial shade.
Care:	Prune when young for form and site requirements (winter prune). Feeding is not required but spring fertilization will accelerate growth. Relatively resistant and free from pests and diseases.
Height:	65 feet
Width:	35 feet
Fruit:	Round; 1"; dry; brown; causes significant litter and tripping hazards.
Habit:	Erect and spreading
Soil Tolerances:	Best in rich, deep, moist, well-drained soil but tolerates many soil types.
Pest Problems:	Susceptible to anthracnose and powdery mildew.
Pruning:	Tolerates aggressive pruning (including Pollarding) of both branches and roots.
Limb Breakage:	Branch strength is rated as medium.

Coast Redwood

Coast Redwood (*Sequoia sempervirens*) is an extremely adaptive species. Its native range in the fog zone of the Pacific coastal strand subjects it to a wide variety of punishing environmental conditions including: fierce storm sea-blast, flooding, erosion, landslide, river scouring and sedimentation of its root system, drought and wildland fire. With adequate water it can do well on inland sites.

Growth Rate:	Rapid growth rate; long lived
Climate:	Coastal fog belt of northern California. USDA hardiness zones 8-10, and Western Garden Book climate zones 15, 16 and 17 where sheltered from sea blast and salt air
Exposure:	Dense shade to full sun, damaged by sea blast but very wind stable
Height:	70 to 90 feet at 25 years (*Sunset Western Garden Book*)
Width:	25 to 30 feet
Habit:	Columnar; pyramidal; moderate density; symmetrical; fine texture
Soil Tolerances:	All textures (clay to sandy), deep moist loam is best; slightly alkaline to acidic.
Pest Problems:	Resistant. Decay often invades second growth "fairy ring" stems from the decaying "mother stumps", resulting in increased failure rates.

Pruning:	Needs little or no pruning to develop strong structure but naturally deciduous of twigs and lower branches. Tends to develop multiple leaders and false leaders (branches that assume upright growth habit of the leader). Subordinate, less well attached leaders and false leaders should be removed before they get too large and constitute a failure threat.
Other requirements:	Outside the fog zone it may need deep watering every 20 to 30 days during the dry season. Occasional feeding may be required when trees are growing on poor soils. However, most trees require no fertilization.
Structure:	Naturally deciduous of lower branches, particularly in dense stands. Poorly attached or subordinate multiple leaders tend to fail.
Nuisance Habits:	Redwood is a magnificent, beautiful tree, but is not recommended for most residential properties. Its extremely rapid growth, great height and girth, and its voracious invasive roots have caused it to be classified as an "undesirable tree" in most tree ordinances. Its wide spreading (60+ feet) and massive root systems can be a major problem in developed areas, threatening all manor of infrastructure (paved roads, curbs, gutters, sidewalks, driveways, paths, patios, pools, retaining walls, foundations, water, gas and soil lines, lawns and planting beds). It is naturally deciduous of lower branches in dense stands and produces an abundance of twig, cone and leaf litter. This species is a very poor choice for walkways, parking strips and roadside locations. It is notorious for creating tripping hazards.

Mimosa

Mimosa (*Albizia julibrissin)* is a short-lived (10-20 years) deciduous tree that is native to Iran and central China. It is very popular in Southern, Central and inland valley California as a landscape and patio tree due to its rapid growth to a wide-spreading canopy and umbrella of showy flowers. This tree commonly has low branching that is wide spreading. The tree requires full sun and tolerates all textures of soil and those ranging from slightly alkaline to acidic. The tree requires pruning to develop good structure. Note: The species is subject to limb breakage due to susceptibility of breakage at crotch attachments due to poor collar formation.

The species is a copious producer of seed pods after bloom in the spring/summer which often become a nuisance. In addition to the litter, the tree seeds can lead to an abundance of volunteer trees.

Growth Rate:	Rapid growth rate to 40 feet with ample water
Climate:	Enjoys high summer heat. USDA hardiness zones 6-8, Sunset Western Garden Book climate zones 4 - 23.
Exposure:	Full sun or partial shade
Size:	Height: 30 feet, Width: 40 - 60 feet
Habit:	Wide-spreading and open-grown
Soil Tolerances:	All textures (clay to sandy soils) ranging from slightly acidic to alkaline.

Pest Problems:	This tree is sensitive to pest and disease (*Fusarium*, cottony cushion scale, mites, mimosa webworm, etc.)
Pruning:	Pruning must be done early in the life of the tree to develop good structure and head clearance. Rub off buds as they develop on young trunks. Late pruning deforms the structure of the tree.
Limb Breakage:	Branch strength rated as medium weak.

Ray Moritz, Urban Forester SAF Cert #241
ISA Certified Tree Risk Assessor

Benjamin Anderson, Urban Forester
ISA Certified Arborist

Appendix A - Tree inventory

Trees make an important aesthetic, microclimate and engineering contribution

Tree #	Species	Total DBH	# of Stems	Health	Str. Condition	Suit.	Conclusions/Comments	Recommendations	Priority
1	Liquidambar	19	1	3	1	1	Prior failure from north side with a cavity extending into crotch. Canopy balance to south. Large wound at failure. Wound in north base. Heavily crown reduced. Roots lifting curb pavement. Blacktop up the base	Cut back blacktop and monitor structure.	4
2	Liquidambar	13.3	1	2	2	3	Poorly pruned. Stub cutting. Decay in pruning stubs.	Restorative pruning by qualified arborist.	4
3	London plane	12.3	1	3	3	3	Poorly pruned.	Use qualified arborists in the future	4
4	London plane	11.2	1	3	3	3	Surface rooted. All London planes need better irrigation.	Use qualified arborists in the future and improve irrigation.	4
5	London plane	8.3	1	3	3	3	Light post in canopy. There is a species conflict in irrigation. The surrounding manzanita requires dry conditions and sycamore requires wet conditions.	Replace either manzanita or London plane.	2
6	London plane	7.7	1	2	2	3	Dead branch and developing poor balance.	Remove deadwood and corrective pruning for better form.	3
7	London plane	7.3	1	2	2	3		Prune for better structure.	4
8	Liquidambar	15	1	3	1	3	Common attachment and overextended limbs.	Prune deadwood. Reduce hazard limb to southwest. Crown reduce for stability.	1
9	London plane	11	1	3	3	3		Prune for road clearance of sfd	3
10	London plane	7	1	2	2	1	Suppressed	Remove to favor other trees	4
11	London plane	7.8	1	2	2	2	Suppressed	Prune for improved structure	4
12	Liquidambar	17.2	1	4	2	3	Common attachment of three main leaders. Poor past pruning practices. Roots are damaging infrastructure.	Restorative and structure pruning.	2
13	Liquidambar	18	1	3	2	2	Past topping and reform top. Large sprout growth over road. Common attachment with tight crotch. Damaging pavement.	Restorative pruning.	3
14	Liquidambar	19.2	1	4	2	3	Poor prior pruning practices. Slight damage to pavement. Former branch failure.	Restorative and structural pruning.	2

Tree #	Species	Total DBH	# of Stems	Health	Str. Condition	Suit.	Conclusions/Comments	Recommendations	Priority
15	Liquidambar	18.5	1	4	1	2	Poor prior pruning practices. Hung-up branch. Damaging pavement.	Restorative and structural pruning and removal of hanging limb.	1
16	Liquidambar	19	1	3	1	2	Poor prior pruning practices. Common attachment with an acute angle crotch. Extensive damage to infrastructure from roots.	Restorative pruning.	3
17	Liquidambar	24.6	2	4	1	2	Co-dominant stems with acute angle crotch. Extensive damage to infrastructure. Extensive sprout growth in canopy.	Restorative pruning especially over the crosswalk.	1
18	Liquidambar	15	1	4	1	2		Structural pruning.	3
19	Liquidambar	33.5	4	3	1	2	Wound at base. Common attachment with included bark. Slight damage to infrastructure.	Structural crown reduction.	3
20	Liquidambar	16.2	1	3	2	3	Co-dominant stems with an acute angle crotch. Slight damage to infrastructure. Poor prior pruning practices. .	Restorative pruning.	3
21	Redwood grove		9	4	3	3	Several are developing co-dominant leaders.	Arboricultural development of new primary leaders.	4
22	Liquidambar	13.2	1	2	2	1	Former co-dominant stem removed. Suppressed by redwood.	Remove to favor redwood.	4
23	Liquidambar	14	1	3	1	2	Severe damage to infrastructure by stairway. Acute angle crotch with embedded bark.	Continue crown reduction and monitor for tripping hazard.	2
24	Liquidambar	12	1	3	3	3	Damage to pavement.	Restorative pruning.	3
25	Liquidambar	9.4	1	3	2	3	Scaffold below DBH. Cavity near attachment of branch towards center street. Tree moving at base in the wind	Monitor cavity. Continue aggressive crown reduction.	1
26	Liquidambar	17.4	1	3	2	3	Poor prior pruning practices. Some crossing branches. Extensive damage to pavement and infrastructure. Former branch failures and stub cuts..	Continue crown reductions with no heading cuts.	3
27	Liquidambar	9.4	1	3	1	1	Extensive decay in main stem. Lean over stairway.	Removal and replacement.	1
28	Liquidambar	8	1	3	3	3		Continue crown reduction to achieve better taper.	4

Tree #	Species	Total DBH	# of Stems	Health	Str. Condition	Suit.	Conclusions/Comments	Recommendations	Priority
29	Liquidambar	23.5	3	3	1		Decay cavity at base and the tree sounds hollow. Adjacent to wheelchair access.	Crown reduce.	1
30	Mimosa	19.5	1	3	3	3	Poor prior pruning practices. Root damage. Many cuts around main stem from pocket knives.	Prune deadwood. Monitor dieback.	3