

TREE ASSESSMENT & MITIGATION REPORT

for the Las Positas Multi-Use Path Project, City of Santa Barbara

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Prepared for:

Amec Foster Wheeler

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SUMMARY

The City of Santa Barbara (City) is proposing to build the *Las Positas Multi-Use Path Project* along Modoc and Las Positas Roads. There are many native and specimen trees along this corridor. I was contracted by Amec Wheeler Foster to inventory the trees, assess their condition, and prepare a report identifying potential impacts to the trees within specific limits of the project and recommended mitigation. I performed field work on 1/21/16 and 11/2/16 focused primarily along Las Positas Road. Additional field work and review occurred on 11/14/16 to identify potential impacts to trees along Modoc Road. Most of the trees identified on Modoc Road are nonnative, and many of the nonnative trees have been topped due to overhead electrical lines.

The professional grade survey available for this assessment was incomplete at the time of my fieldwork. As a result, most of the existing tree locations were identified based on aerial imagery. In addition, limits of construction for the project were preliminary and conceptual and did not include excavation and grading details, which would be required for in depth assessment of impacts. The level of information provided permits assessment of generalized impacts to trees, but not the fine-grained level of information needed to fully determine if impacted trees could potentially be saved by remedial measures. In implementation of the project, the City will strive to reduce the number of trees that are impacted or removed during construction, but to ensure a conservative assessment, this report employs a reasonable worst case analysis of potential impacts to trees.

Out of the 105 trees that were assessed primarily along Las Positas Road, I determined that 26 California Live Oaks will be removed and 22 will be significantly impacted. In addition 3 Monterey Cypress, approximately 20 Weeping Red Gum eucalyptus, 2 Blue Gum eucalyptus, and 24 Mexican fan palms will be removed. Out of the 19 trees that were assessed on Modoc Road, 1 Oleander, 1 Silk Oak, 2 Ash, 2 eucalyptus, 1 Rosewood, and 5 Queen Palms will be removed. Based on City policy for mitigation for

impacts to oaks, a total of 240-#5 gallon oak saplings will need to be planted (required 5:1 replacement ratio). Based on area of canopy cover of non-native trees, 122-#15 gallon oaks will need to be planted for a total of 362 replacement trees. The mitigation for this project would increase the area of the existing canopy cover by up to six times over a ten year period.

The Table of Contents on the next page provides the organization of this report. Refer to the attached figure of the site that shows tree locations.

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BACKGROUND/ASSIGNMENT

The City of Santa Barbara (City) is proposing to develop a non-vehicular multi-use path along Modoc and Las Positas Roads. There are many trees along this route that may be impacted from construction. I was contracted by Amec Foster Wheeler as part of the project team to assess a selection of trees along the route, and prepare a report with my findings, recommendations, and mitigation measures. I was on the site in January 21, 2016 with a representative of Amec Foster Wheeler, to perform the field work. I returned on November 2, 2016 to observe and document additional trees. On November 14, 2016, I reviewed and confirmed field work and observations completed by Brian Hannegan of RRM Design who surveyed additional segments of Modoc Road for tree impacts that were not originally included within my assigned survey area primarily along Las Positas Road.

Limits of the Assignment and Report

- The areas of study includes locations identified by the City during their professional tree survey, including the disturbed area west of the Las Positas Road-Modoc Road intersection and the west side of Las Positas road from Modoc to Cliff Drive. Additional areas of disturbance were considered along the southern side of Modoc Road.
- During the time of my field work, a complete professional grade survey and detailed plans with limits of excavation and grading were not yet available.
- A permanent disturbance area for the path was defined as having a 12- to 14-foot wide disturbance corridor dependent upon location. Temporary disturbance areas were defined as 2' to the east and west of the permanent path. The total area of disturbance was determined to be 16'-18' from the southern edge of Modoc Road and 16'-18' from the western edge of Las Positas Road.
- The tree inventory includes oaks that are 4" in diameter and greater, cypress trees that are 6" in diameter and greater, and Mexican Fan palms within the limits stated above. There is also a cluster of eucalyptus adjacent to the south west corner of Las Positas and Modoc Roads. Other mature trees were observed and documented to the extent feasible within the study area.

Use of Report

It is intended that this report:

- Offer guidance to the project team as to the locations of native and specimen trees and their critical root zones.
- Identify potential impacts to specimen trees, including direct removal and/or substantial damage to roots, trunk or crown.
- Define the importance of a completed professional grade survey and details of excavation and grading in order to minimize impact to trees.
- Provide general tree protection measures.
- Provide mitigation guidelines.

Scope of Project

The elements below were required to fulfill my assignment:

- Inventory the trees and compare the site aerial photos.

- Inspect and assess the condition of the trees.
- Define critical root zones and discuss potential impacts.
- Work with Amec Foster Wheeler to create a site map applicable to my report.
- Create mitigation, habitat maintenance, monitoring, and tree protection recommendations
- Prepare a report with my findings and recommendations.
- Revisit site, review, revise.

OBSERVATIONS

1. The survey along Las Positas Road includes 105 trees. Note that tree ID #1 represents 20 trees, tree ID #9 represents 8 trees, and tree ID #55 represents 24 trees.
2. All trees are either California Live Oak (*Quercus agrifolia*), Monterey Cypress (*Cupressus macrophylla*), Weeping Red Gum Eucalyptus (*Eucalyptus camaldulensis*), Blue Gum Eucalyptus (*Eucalyptus globulus*), or Mexican Fan Palm (*Washingtonia robusta*) along the Las Positas Road extent of the study area.
3. The supplemental survey of the Modoc Road extent of the study area on 11/14/16 includes 19 trees. Many of these trees have been topped due to overhead electrical lines. 12 of these trees will be removed, consisting of 1 Oleander, 1 Silk Oak, 2 Ash, 2 eucalyptus, 1 Rosewood, and 5 Queen Palms. 6 trees would remain in place with no impact, and 1 California Live Oak would remain in place, but would be slightly impacted by the pruning of one limb that is leaning into the right of way (ROW). The pruning would not constitute a significant impact, however, since the oak is located downslope of the proposed pathway and the critical root zone would be undisturbed.
4. With the exception of the eucalyptus trees, which are insect infested with Lerp psyllid, all trees are in good biological condition. However, due to natural and unattended growth, most trees have structural defects, many of which can be improved with pruning.
5. Some of the trees along Las Positas Road have been hit by vehicles, thus some have injuries on the lower northern and eastern side of the trunks.
6. Some of the trees are matured stump sprouts that had grown since the parent tree had died or was damaged.
7. The project area includes a permanent path that is generally 12 to 14 feet wide, 8-10 feet of paved surface with 2 foot shoulders, and with 2' on either side to be used as a temporary impact and work area. Although this 2' width on either side is not permanent, activities will likely impact roots.
8. Due to the sloping soil and existing pavement (on Las Positas and Modoc Roads), portions of the critical root zones are already covered with asphalt reducing the existing undisturbed critical root zones.
9. In many of the areas of the proposed path, adjustments could be made to minimize impacts to many trees.

TREE INVENTORY

Tree ID # was assigned by myself to identify trees on the spreadsheet and site plan.

Tree Location Surveyed is an original # on the preliminary professional grade survey that was provided to me by Amec Foster Wheeler.

Tree Location Estimated is the hand digitized location provided by myself and Amec Foster Wheeler based on the aerial photo location. These locations are approximated

and based on the preliminary survey and project plans, which may not fully capture the relationship of tree trunk locations to proposed project improvements.

Type is an oak, cypress, or eucalyptus.

DBH in inches is the diameter at breast height at 54" above ground. With some trees, the measurement was taken slightly higher or lower where a limb may have interfered.

With multi-trunk trees, both trunk diameters were measured and represented on the spreadsheet with a "/" between each trunk diameter.

CRZ radius in feet -is the critical root zone: 1' radius per 1" DBH. Multi-stem trees were calculated by taking the square root of the sum of the squares of each stem.

Bio represents the health condition and is rated in Good, Fair, or Poor (G,F,P).

Struc represents the structural condition and is rated in Good, Fair, or Poor (G,F,P).

% of encroachment into CRZ is the estimated % of encroachment into the tree's critical root zone (CRZ).

PPI = Potential Project Impact reflects the percent of encroachment into the critical root zone. Trees with 100% encroachment will be removed (R). Trees with greater than 20% encroachment are considered to be significantly impacted (SI).

Removed Tree Canopy Size = Impacted tree size or the average canopy spread rated as XL, L, M, S, based on CRZ.

Tree ID #	Tree Location surveyed	Tree Location estimated	Type	DBH"	CRZ-radius'	Bio	Struc	% of encroachment into CRZ	PPI	Removed tree canopy Size
1		x	Euc cluster (20)			F	F	100%	R	M
2		x	Oak	10	10	G	F	100%	R	M
3		x	Oak	7	7	G	F	50%	SI	S
4		x	Oak	8	8	G	F	100%	R	S
5		x	Oak.	4	4	G	F	100%	R	S
6		x	Oak	12	12	F	F	100%	R	M
7		x	Oak	18/14	23	G	F	100%	R	L
8		x	Cyp	30	30	G	F	50%	SI	XL
9		x	8 Oaks	4"-14"	4'-14'	G	F	0	none	M
10	232		Cyp	13/10 /8/8	20	G	F	50%	SI	L
11		x	Cyp	6	6	G	F	50%	SI	S
12	233		Oak	20/8/4	22	G	F	50%	SI	L
13	236, 237, 238		Oak	6/9/8	13	G	F	50%	SI	M
14	239, 240		Oak	14/10	17	G	F	50%	SI	M
15		x	Oak	6	6	G	F	100%	R	S

Tree ID #	Tree Location surveyed	Tree Location estimated	Type	DBH"	CRZ-radius'	Bio	Struc	% of encroachment into CRZ	PPI	Removed tree canopy Size
16		x	Oak	12	12	G	F	100%	R	M
17		x	Oak	6	6	G	F	100%	R	S
18		x	Oak	4	4	G	F	100%	R	S
19	255		Oak	16	16	G	F	50%	SI	M
20	260		Oak	11/12	16	G	F	50%	SI	M
21	261		Oak	12	12	G	F	50%	SI	M
22	262		Oak	7	7	G	F	50%	SI	S
23	263		Oak	15/10 /7	19	G	F	50%	SI	L
24	267		Oak	16	16	G	F	50%	SI	M
25	268		Oak	4/4/4 /4/4/ 4	10	G	F	50%	SI	M
26	269		Oak	9	9	G	F	50%	SI	M
27		x	Oak	6/4/4	8	G	F	50%	SI	S
28	270		Oak	7/6/5 /4/4/ 4	13	G	F	50%	SI	M
29	271	x	Oak	22	22	G	F	50%	SI	L
30	272		Oak	5/ 7	9	G	F	100%	R	M
31		x	Oak	7	7	G	F	100%	R	S
32		x	Oak	4/4/4	7	G	F	100%	R	S
33	290		Oak	4	4	G	F	50%	SI	S
34	292		Oak	21	21	G	F	50%	SI	L
35	294		Oak	17	17	G	F	100%	R	M
36		x	Oak	5	5	G	F	100%	R	S
37		x	Oak	4	4	G	F	100%	R	S
38		x	Oak	5/3/3	7	G	F	100%	R	S
39	295		Oak	16	16	G	F	50%	SI	M
40	296		Oak	10	10	G	F	50%	SI	M
41	298		Oak	11	11	G	F	50%	SI	M
42	299		Oak	22	22	G	F	50%	SI	L
43	300		Oak	18	18	G	F	50%	SI	L
44		x	Blue gum Euc	9	7	F	F	100%	R	S
45		x	Blue gum Euc	48	36	F	F	100%	R	XL
46		x	oak	9	9	G	F	100%	R	M

Tree ID #	Tree Location surveyed	Tree Location estimated	Type	DBH"	CRZ-radius'	Bio	Struc	% of encroachment into CRZ	PPI	Removed tree canopy Size
47		x	oak	8	8	G	F	100%	R	S
48		x	oak	12	12	G	F	100%	R	M
49		x	oak	10	10	G	F	100%	R	M
50		x	oak	17	17	G	F	100%	R	M
51		x	oak	12	12	G	F	100%	R	M
52		x	oak	15	15	G	F	100%	R	M
53		x	oak	18/21	28	G	F	100%	R	XL
54		x	oak	22	22	G	F	100%	R	L
55		x	24-Mex fan palms	8	8	G	G	100%	R	M
56		x	oak	18	18	G	Fair	100%	R	L
Total			105 trees						97 trees R or SI	

Note: Trees observed and recorded along Modoc Road are not included in this table, as the 11/14/16 survey provided total impacted tree count, but not specifications (i.e., radius, canopy, etc.).

MITIGATION PLANTING, MAINTENANCE, AND MONITORING

BACKGROUND

Planting trees to mitigate removal and significant impacts to oak trees is a common requirement in California. The ratio of replacement oak trees and the source of those trees has been a continuing point of discussion. There is consensus among biologists and botanists that mitigation oak trees should be grown from acorns collected within the local watershed. One benefit of growing trees from acorns is the quality of the root system and the adaptability to local environment. Smaller/younger trees can develop healthier and structurally better root systems than larger trees limited by containers.

Despite the back and forth ideas around oak mitigation, the City has a policy, Municipal Code Chapter 22, that requires planting 5 oaks for each impacted oak (5:1 replacement ratio). The saplings are to be transplanted from #5 (5 gallon containers). Non-native tree mitigation is often at a 1:1 ratio with a #15 (15 gallon tree), but has been increased in certain situations.

MITIGATION STRATEGY

On this project, 48 of the 56 oak trees that will be significantly impacted and/or removed are in locations that have been graded at some point in time thus negatively affecting soil structure (compaction). There is also a lack of organic material beneath the canopies, which is atypical of natural oak woodland but more typical of urban soil.

The goal of mitigation is to replace oaks in clusters that could create or improve habitat and eco-systems with apportion of the oaks planted along the project ROW to benefit the aesthetics of the project. The drainage alongside the proposed multi-use path alignment is a corridor with wooded areas along Modoc Road to the ocean. Buffering this corridor with trees can help to partially achieve the objectives of mitigation planting. Additional mitigation sites may include adjacent City-owned property along Las Positas Road, Veronica Meadows across Arroyo Burro Creek west of the project corridor, Eling's Park east of Las Positas Road, and a City-owned foothill property in Barger Canyon.

Planting with mixed sizes can create clusters of trees that easily adapt, add cover and habitat value, and also provide aesthetic benefits. Small #1 (one gallon) size trees are great for adaptability, although they often get lost among the weeds or get damaged during maintenance. #5 (five gallon) trees are larger and are also relatively adaptable. These trees first appear to be small shrubs. They are visible and can outgrow the weeds. #15 (fifteen gallon) trees are still larger and actually look like a tree. Larger box trees could be included by planting in strategic locations, such as the corners of Las Positas and Veronica Springs Roads or adjacent to the Las Positas condominiums.

In summary, I have defined the following mitigation goals:

- Replace canopy area with equal or better cover over a reasonable amount of time (10 years).
- Replace removed native trees with trees from the same genetic pool or watershed.
- Enhance environmentally sensitive habitat and providing habitat for wildlife.
- Create a buffer between developed and non-developed areas.
- Assure that communities will have a healthy urban forest to provide benefits.
- Assure at least 85% success of replacement trees.

MITIGATION CALCULATIONS

City Required Oak Mitigation

Based on the anticipated significant impact and/or removal of 48 oak trees, a total of **240-#5 oak trees must be planted**. The objectives, placement, and management of these mitigation trees are discussed in the previous section and in future sections.

Canopy Cover Replacement Mitigation

The objective of this strategy is to plant an adequate number of trees to replace the removed canopy cover. Calculating canopy size and new canopy growth was determined through the following steps.

1. Convert the DBH (diameter at breast height measured at 54" above ground) to the CRZ (critical root zone radius). For many trees this is a one-foot radius per inch of DBH. The CRZ is adjusted for multi-trunk trees (see description of CRZ in Inventory headings). The CRZ is really a close reflection of the dripline or canopy cover. The CRZ is a better a representation of the radius of the canopy cover due to the symmetry of a CRZ as opposed to the asymmetry of a tree canopy.

- Classify the CRZ/canopy cover as small, medium, large, or extra-large to simplify the process. I used my experience in working with trees to categorize canopy size. Size of the removed tree is the last column on the inventory spreadsheet.

Removed Tree Size (native or non-native)	DBH Range	Average DBH	Approx. Radius of Canopy Cover	Approx. Canopy cover area
Small	4"-8"	6"	6'	113 sq'
Medium	9"-17"	13"	13'	531 sq'
Large	18"-24"	21"	21'	1,385 sq'
Extra large	25" and greater	30"	30'	2,826 sq'

- Calculate the areas of the four sizes of canopy cover. The table below shows this calculation.
- Calculate the rate of growth of a tree over a ten year period based on average shoot growth of 2' per year (radius of canopy spread). This average growth rate is actually a 4' increase in diameter. This growth rate was determined through discussion and observations (on other projects) and in communication with other professionals. Note that 2' per year is an average. Weather, site conditions, and management will affect shoot length, which may result in more or less growth per year. A larger boxed tree will require one or two additional years to adapt until average growth resumes. The table below illustrates the projection of growth over ten years (without adaptation period).

Ten Year Projection of Canopy Cover Area Growth - Allow one to two years of additional time for adaptation after planting larger boxed trees										
Year	1	2	3	4	5	6	7	8	9	10
Container size	5gal	15 gal	24" box	36" box	48" box	60" box				
Canopy radius	1	3	5	7	9	11	13	15	17	19
Canopy diameter	2	6	10	14	18	22	26	30	34	38
Canopy area	3.14	28.26	78.5	153.86	254.34	379.94	530.66	706.5	907.46	1133.54
Canopy area (Rounded)	3 sq'	28 sq'	79 sq'	154 sq'	254 sq'	380 sq'	531 sq'	707 sq.'	907 sq'	1134 sq'

- Compare the canopy cover of the removed tree (small, medium, large, extra-large) and determine the number of trees to be planted and the number of years desired for canopy replacement. Note that these replacement periods are based on good

environmental and cultural conditions and 100% success rate. With oaks, 85% success rate is reasonable.

Biomass Replacement Period						
Tree Size	Current Canopy	@1:1 mitigation w/#5 tree (3 sq')	@2:1 mitigation w/#5 tree (3 sq')	@1:1 mitigation w/#15 tree (28 sq')	@2:1 mitigation w/#15 tree (28 sq')	@3:1 mitigation w/#15 tree (28 sq')
Small	113 sq'	4 years	2 years	3 years	1.5 years	1 year
Med	531 sq'	7 years	3.5 years	6 years	3 years	2 years
Large	1385 sq'	11 years	5.5 years	10 years	5 years	3.33 years
X-large	2826 sq'	16 years	8 years	15 years	7.5 years	5 years

These calculations support mitigation of non-native trees at a 2:1 ratio when using #15 size containerized trees to replace canopy cover of the removed trees within an approximate 2-8 year period (rounded). A lower ratio will result in a longer period for replacement of canopy cover.

This table also shows that the 5:1 ratio of oak mitigation with #5 trees, will replace removed oak canopy within one to six years. (See column with 1:1 mitigation and divide the total years of replacement by five trees).

[240-#5 oaks @ 1,134 sq'/tree after ten years = 272,160 sq' x 85% success = 231,336 sq']

Recommended Mitigation

A total of 362 replacement oaks would need to be planted to mitigate the removal or significant impacts to trees, as follows:

- Based on the anticipated significant impact and/or removal of 48 oak trees, a total of 240-#5 size oak trees must be planted (City generated policy 5:1).
- Non-native trees should be mitigated by planting 122-#15 size oaks (canopy cover calculation) for a less than ten year canopy replacement.

This final table shows the approximate area of canopy cover along Las Positas Road of removed oaks and non-native trees and the approximate replacement canopy within a ten year period based on the calculations above. Trees observed and recorded along

Summary of Mitigation/Canopy Cover Calculation														
Removed Trees	Small	Approx Canopy Area (x113 sq')	Med	Approx Canopy Area (x531 sq')	Large	Approx Canopy Area (x1,385 sq')	XL	Approx Canopy Area (x2,826 sq')	Total Removed Canopy area	Total Trees Removed	Replacement oak size	Quantity Planted	Approx Canopy Area When Planted	Approx Canopy Area - 10 year projection
Oaks	15	1,695 sq'	23	12,213 sq'	9	12,465 sq'	1	2826 sq'	29,199 sq'	48	#5 (5:1)	240	240 x 3sq' = 720 sq'	272,160 sq'
Non-natives	2	226 sq'	44	23,364 sq'	1	1,385 sq'	2	5,652 sq'	30,627 sq'	49	#15 (2:1)	98	98 x 28 sq' = 2,744 sq'	111,132 sq'
Totals	17		67		10		3		59,826 sq'	97		338		383,292 sq'

Modoc Road are not included in this table, as the 11/14/16 survey provided total impacted tree count, but not specifications (i.e., radius, canopy, etc.).

The table above indicates that oak mitigation based on the City generated policy and non-native tree mitigation based on canopy cover will result in a replacement of canopy cover area by approximately six times over a ten year period provided there is 100% success. A 50% success rate would replace the canopy cover by three times over ten year period.

These figures suggest that fewer trees can be planted as a reasonable mitigation or much larger trees may be substituted for some of the smaller trees and planted in select locations to provide a more mature landscape during the early years of the project.

Alternate Biomass Mitigation Calculation

As an alternate approach for comparison, if the biomass provided by the trees that would be removed or significantly impacted from the project, a total of 195 replacement oaks would mitigate for loss of biomass, as described below. However, this approach does not account for changes to canopy cover, as addressed above, and therefore is not recommended as an appropriate mitigation approach for the project.

- According to the ratio calculations in conjunction with the tree inventory and size analysis, to mitigate the loss of biomass from 48 oak trees, 126-#5 size oaks would need to be planted.
- To mitigate the biomass removal of 3 cypress (one extra-large, one large, and one small cypress), based on size ratios, 16-#15 size oaks would need to be planted.
- To mitigate the biomass removal of 24 eucalyptus and 29 palm trees, 53-#15 size oaks would need to be planted.

GUIDELINES FOR MITIGATION PLANTING

1. Mitigation trees should be grown and managed for a period of five years by a professional woodland restoration service. Management includes planting, protection, irrigation, weeding, monitoring, and structural pruning to develop good form for long term development.
2. Collect acorns during the fall after commencement of the project. Acorns should be tested for viability, and then germinated in deep containers for a brief period until initial establishment of a juvenile root system. As trees grow and develop a large tap root, the containerized tree needs to be moved into a larger, deep container. This can be done by a contract grower or an oak woodland restoration service.
3. Planting sites should be chosen where there is space for cluster and where they can grow to provide canopy cover for habitat. The area where eucalyptus are being removed is an excellent location to plant a large number of oaks. Also, the area between the new bike path and water channel along Las Positas Road may be lined with oaks in an effort to provide a wildlife corridor to the ocean and buffer the homes to the west from noise and view. Note that this may not be feasible due to space restraints and City policies regarding ROW infringement.
4. The replacement trees shall be planted in a planting hole that is at least two times the diameter and the same depth as it was when in the container.
5. Protect trees with wire mesh above and below ground to discourage animals from eating leaves, roots, and stems. Use $\frac{1}{2}$ - $\frac{3}{4}$ inch wire mesh fencing that is 5' tall. The

fencing shall be rolled to form a tube that is approximately 18 inches in diameter or larger if the tree is wider. The bottom and top of the tubes shall be left open. The tubes shall be placed around the newly installed trees and shall extend below ground approximately 18 inches. The upper 3.5' of the tube will be above ground and shall be secured to two fence posts and/or two pieces of #4 or larger diameter steel rebar that are well anchored into the ground. The project manager may prefer to use gopher baskets below ground and wire mesh above ground.

6. In order to suppress weed growth and increase the capacity for the soil to retain moisture, a 2- to 4-inch thick layer of coarse wood chips (or suitable other mulch) shall be spread out in a circular area a minimum of 3' from the base of each newly installed plant. Do not cover the base of the tree with mulch.
7. Oaks should be irrigated with drip for approximately two years until it is determined that rainfall levels support tree growth. The restoration specialist should determine method and frequency of irrigation as they will be responsible to assure that trees remain alive and healthy.

MITIGATION MAINTENANCE & MONITORING

1. The replacement trees shall be maintained (i.e., weeds shall be removed from around the base of the tree, drip irrigation system shall be checked and repaired as need, and tree protection fencing shall be repaired as needed) on a regular basis (monthly).
2. Some oaks may warrant structural pruning, during, soon after, or in the early years to develop a good framework of limbs and remove defective limbs. Preferably, trees will not require pruning when planted. The restoration specialist, under supervision of a qualified Certified Arborist, should decide when pruning is necessary. Pruning should be limited to improving structure and removing deadwood. There are multiple resources for young tree pruning on the internet including the University of California.
3. Any trees that die or are in decline during the first five years should be replaced.
4. Stakes and ties should be removed no later than two years after planting. If determined that a tree still needs support or protection from wildlife, it should be retained. To avoid damage to root growth, if may be necessary to cut wire mesh at the ground level. If gopher baskets were used, only the above ground wire mesh will need to be removed.
5. Oak tree survival shall be 85%. Should tree survival fall below 85% at any time, additional replacement trees shall be planted.
6. Mitigation trees shall be monitored twice a year (spring and fall) by a County approved biologist, and status reports documenting replacement tree survival with photographs shall be submitted to County twice a year for a minimum of five years.

CONCLUSIONS

1. Based on preliminary project parameters, of the 48 oak trees, 26 oaks will be removed and 22 oaks may be significantly impacted.
2. Of the 3 cypress, 22 eucalyptus, and 24 palms, all may be removed or significantly impacted.
3. Of the 19 nonnative trees identified on Modoc Road, 12 may be removed.
4. To mitigate the significant impact and/or removal of 48 oak trees, a total of 240-#5 gallon oak trees must be planted (City policy generated 5:1).

5. To mitigate the significant impact and/or removal of non-native trees, a total of 122-#15 gallon oaks should be planted (canopy area calculations 2:1).
6. The total replacement canopy cover over a ten year period may be up to six times the existing canopy cover if there is 10% success rate and good growing conditions.
7. Fewer mitigation trees can be planted with a longer time period of canopy cover replacement.
8. Larger trees can be substituted for some of the smaller trees in order to provide a more mature looking landscape early on after project completion.
9. A complete professional grade survey and construction details, can provide an opportunity to adjust the construction zone and reduce the number of trees removed and significantly impacted.
10. The mitigation, maintenance and monitoring recommendations in the section above should be followed to assure the success of mitigation trees.
11. Prior to approval of this project, the extent of tree loss and mitigation should be clearly explained to avoid problems with the public once the project gets underway.
12. Trees to be retained should be pruned to improve their structure.
13. Trees that overhang the project area may need pruning to improve conditions or to reduce risk to underlying targets such as people.

GENERAL TREE PROTECTION MEASURES

1. Prior to commencement of work, a pre-construction meeting should be held with contractors, to discuss tree protection measures.
2. Establish tree protection zones (TPZs) around a portion of the oaks by installing chain link fence. Chain link should be supported by metal posts driven in the ground every six to eight feet. TPZs should be at the edge of the CRZ (critical root zone) wherever possible. Due to the amount of work around trees, the TPZs will likely be very minimal and limited to the edge of the work zone.
3. The TPZs should be void of all activities, including operation of equipment, storage of materials and dumping (including temporary spoils from excavation).
4. Demolition and excavation within the TPZs should be done under supervision of the project arborist.
5. Any roots encountered that are ½" and greater should be cleanly cut.
6. It may be determined by the project arborist that supplemental irrigation is necessary to aid trees that incur root loss and/or during hot and dry periods.
1. Any pruning that is needed to remove overhanging limbs of retained trees, should be performed or supervised by a qualified Certified Arborist. The project arborist should review the goals with workers prior to commencement of any tree pruning. Tree workers should be knowledgeable of *ISA Best Management Practices for Tree Pruning* and follow *American National Standards Institute A300 Pruning Standards*
7. The project arborist should monitor activities on the site adjacent to trees.

REFERENCES

1. Harris, Clark, Matheny, *Arboriculture: Integrated Management of Landscape Trees, Shrubs and Vines, Fourth Edition*, Prentice hall, Upper Saddle River, NJ, 2004.
2. Matheny and Clark, *Evaluation of Hazard Trees In Urban Areas, Second Edition*, International Society of Arboriculture, Savoy, Illinois, 1994.
3. Matheny and Clark, *Trees and Development; A Technical guide To Preservation of Trees During Land Development*, ISA, 1998.
4. Smiley, *Root Pruning and Stability of Young Willow Oak*, Arboriculture & Urban

Forestry, Scientific Journal of the International Society of Arboriculture, 34(2): 123-128, March 2008.

ARBORIST'S DISCLOSURE AND CERTIFICATION OF PERFORMANCE

Arborists are tree specialists who use their education, knowledge, training and experience to examine trees, recommend measures to enhance the beauty and health of trees, and attempt to reduce the risk of living near trees. Clients may choose to accept or disregard the recommendations of the arborist, or to seek additional advice.

Arborists cannot detect every condition that could possibly lead to structural failure of a tree. Trees are living organisms that fail in ways we do not fully understand. Conditions are often hidden within trees and below ground. Arborists cannot guarantee that a tree will be healthy or safe under all circumstances, or for a specified period of time. Likewise, remedial treatments, like any medicine, cannot be guaranteed.

Treatment, pruning and removal of trees may involve considerations beyond the scope of the arborist's services such as property boundaries, property ownership, site lines, disputes between neighbors, and other issues. Arborists cannot take such considerations into account unless complete and accurate information is disclosed to the arborist. An arborist should then be expected to reasonably rely upon the completeness and accuracy of the information provided.

Trees can be managed, but they cannot be controlled. To live near a tree is to accept some degree of risk. The only way to eliminate all risk associated with trees is to eliminate all trees.

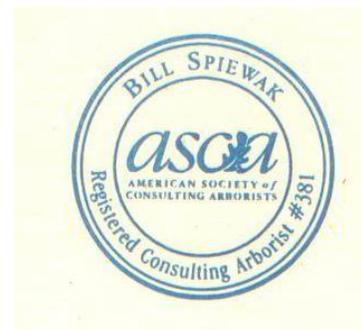
I Bill Spiewak, certify:

That I have personally inspected the trees on the property referred to in this report and have stated my findings accurately.

The analysis, opinions and conclusions stated herein are my own and are based on current scientific procedures and commonly accepted arboricultural practices.

Signed: Bill Spiewak
Bill Spiewak
Registered Consulting Arborist #381
American Society of Consulting Arborists

Board Certified Master Arborist #310B
International Society of Arboriculture



AERIAL PHOTOS OF TREE LOCATIONS



