

# FINANCING SAN FRANCISCO'S URBAN FOREST



## THE BENEFITS + COSTS OF A COMPREHENSIVE MUNICIPAL STREET TREE PROGRAM

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PREPARED FOR:



**SAN FRANCISCO  
PLANNING DEPARTMENT**

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# EXECUTIVE SUMMARY

San Francisco's urban forest is comprised of approximately 670,000 trees on both public and private property.<sup>1</sup> These trees provide valuable ecological and economic services ranging from improved air and water quality to energy savings and neighborhood greening. Trees increase San Francisco's desirability as a place to live, work and visit. As part of its long-term sustainability goals, the City and County of San Francisco (City) seeks to maintain and expand its urban forest for generations to come. Street trees are a component of the larger urban forest, and San Francisco is home to approximately 105,000 trees located in the public right-of-way. This study explores various options for expanding resources to better maintain, augment and care for the city's street trees.

## STUDY OBJECTIVES

The primary objective of this study is to evaluate the costs and benefits of a comprehensive, municipally-operated street tree program in San Francisco, in which the Department of Public Works (DPW) would be responsible for the planting and maintenance of all trees within the public right-of-way. Specifically, this study seeks to:

- **Determine the current costs to private property owners** of street trees under their care and quantify the additional cost or benefit of a comprehensive municipal program to property owners.
- **Explore the costs and benefits of a municipal street tree program** if DPW were to assume responsibility for all street trees in the public right-of-way (approximately 105,000) and expand the urban forest by 55,000 additional street trees over the next 20 years.
- **Assess potential financing strategies to generate revenue for the implementation** of a municipally-operated street tree program in San Francisco.

## KEY FINDINGS

- **A comprehensive municipal program would provide net benefits to San Francisco residents.** Property owners would save \$10-\$65 per tree annually compared to current costs (estimated at \$160-\$175 per year) incurred for maintenance, sidewalk repair, and claims associated with sidewalk falls. The program has the added benefit of growing the urban forest by 50 percent over 20 years, while the status quo is expected to result in a continuing decline of the street tree population.
- **Routine maintenance is more efficient and cost effective,** potentially reducing DPW's per-tree maintenance costs by as much as 50 percent by leveraging economies of scale from block pruning instead of the current approach of emergency and service request response. Routine maintenance would further reduce costs by releasing the City from a portion of claims payments, as the City could effectively argue that it took all necessary precautions to assess and maintain trees. Presumably the incidence of injuries and damage would also decline with routine maintenance.
- **Augmenting DPW staff with contractors could increase capacity while minimizing costs.** Other cities with comprehensive urban forestry programs often rely on contractors to handle a range of activities, such as increased pruning, post-storm maintenance and intense bursts of tree planting. Augmenting City staff with contractors—both private and non-profit (e.g., Friends of the Urban Forest)—could reduce program costs (e.g., staff, equipment purchase and maintenance) by 45

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<sup>1</sup> According to information provided by the United States Forest Service in its 2007 report, *Assessing Urban Forest Effects and Values: San Francisco's Urban Forest*, and input from DPW urban forestry personnel.

percent compared to sizing DPW staff to meet these demands. Even so, the core municipal staff (DPW) would grow under the creation of a comprehensive municipal urban forestry program.

## RECOMMENDATIONS

- **Pursue a program of moderate expansion**, planting 2,900 new street trees per year and replacement trees to keep pace with an estimated four percent annual mortality, thereby increasing the number of trees in San Francisco's right-of-way from about 105,000 to 162,000 over 20 years. Average annual costs would total between \$25M and \$33.5M.
- **Fund capital costs with outside sources**, such as General Obligation bonds, state grants, capital improvement program funds and in kind contributions. Under the scenario described above, the costs of planting and establishment (early tree care and watering) would average \$8.9M-\$11.5M per year over 20 years.
- **Levy a parcel tax, based on street frontage, to fund operations and maintenance (O&M)**. A stepped parcel tax would charge a lower fee to properties with very small frontages (under seven linear feet), and a higher fee to properties with very large frontages (over 500 linear feet). For the average San Francisco lot (25 linear feet), the annual fee for street tree O&M under the scenario described above, with the use of contractors, would be \$39-\$52. This is substantially less than if planting and establishment were included. Limiting the funding required from property owners or residents would increase the likelihood of approval.
- **Reduce the use of truck drivers** by requiring that they accompany maintenance crews only when the additional manpower is required (i.e., for emergencies or large tree removals), rather than for all maintenance. This would decrease DPW's per-tree maintenance costs by more than 20 percent.
- **Complete the City's street tree inventory**. DPW is currently conducting a pilot inventory of street trees in three neighborhoods to inform the broader planning effort underway for San Francisco's urban forest. Expanding inventory efforts to include the City's entire street tree population would ensure that DPW obtains accurate data for all trees in the public right-of-way. Accurate data yields considerable efficiencies, facilitating block pruning and tracking of maintenance history, ultimately helping to manage costs.
- **Develop a Street Tree Management Plan** that clearly outlines DPW's planting and maintenance plans over the long term. This would leverage economies of scale and reduce costs by implementing block pruning, while also clearly demonstrating the need for capital and O&M funding to the community and municipal leaders.
- **Undertake a comprehensive public outreach campaign** to elevate awareness of the importance of San Francisco's urban forest, and the consequences of the City's current street tree policies and practices. This is a crucial step before launching any campaign to levy additional funds from residents, as it will not only communicate the funding required from the public but also illustrate the benefits to all residents.

## BENEFITS OF A HEALTHY URBAN FOREST

A healthy urban forest provides numerous environmental, social and economic benefits (Figure 1). Trees help purify water, absorb air pollution, sequester atmospheric carbon and provide wildlife habitat, among other environmental benefits. San Francisco’s urban forest removes more than 287 tons of atmospheric pollutants and 5,100 tons of carbon each year.<sup>2</sup> Trees provide important social benefits, helping to create places to recreate and improving public health. The economic benefits of urban trees include increased property values, reduced heating and cooling costs and greater economic activity in commercial areas. San Francisco’s trees provide over \$7.5M in combined benefits each year, according to research conducted by the United States Forest Service’s Center for Urban Forest Research.<sup>3</sup> Trees are one of the few assets in a city that *increase* in value over time. Investing in a healthy urban forest can provide greater returns on investment for the City and all San Francisco residents.

Figure 1. Benefits of Street Trees

Environmental	Economic	Social
<ul style="list-style-type: none"> <li>• Produce oxygen</li> <li>• Filter air pollution</li> <li>• Reduce stormwater runoff</li> <li>• Sequester carbon (CO<sub>2</sub>)</li> <li>• Create habitat</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce demand on infrastructure (sewer, energy)</li> <li>• Boost economic activity in commercial areas</li> <li>• Reduce building heating/cooling costs</li> <li>• Increase property values</li> </ul>	<ul style="list-style-type: none"> <li>• Create green spaces for recreation and improved aesthetics of streetscapes</li> <li>• Improve public health (physical, mental)</li> <li>• Calm traffic and promote pedestrian/bicyclist safety</li> <li>• Muffle noise from freeways and other sources</li> <li>• Help reduce crime rates</li> </ul>

## CHALLENGES FACING STREET TREES

While street trees are the most visible component of the urban forest, they face serious maintenance and funding challenges in San Francisco. The main street tree-related challenges include fragmented maintenance, inadequate funding and inefficient and inconsistent care. Fiscal constraints resulting from local, state and national economic conditions have required the City to cut funding for non-essential services to maintain essential services such as health and safety programs. As long as San Francisco’s urban forestry program is a discretionary expenditure, its funding will remain unstable and continue to fluctuate.

### A Fragmented Maintenance Structure

Some street trees in San Francisco are the responsibility of private property owners, while DPW cares for others. Although DPW has the ultimate authority over all trees within the public right-of-way, the agency is responsible for maintaining only about 40 percent of these trees. Responsibility for the remaining 60 percent falls to adjacent private property owners. As a result, achieving a standard and coordinated level of care is challenging. DPW has historically maintained trees planted by the City and those along major commercial streets or thoroughfares. However, DPW has also inherited maintenance of certain street trees planted by the San Francisco Redevelopment Agency, or through special state or federal funds.

<sup>2</sup> United States Forest Service, Northern Research Station. 2007. *Assessing Urban Forest Effects and Values: San Francisco’s Urban Forest*. Resource Bulletin NRS-8. Newton Square, PA: USDA Forest Service.

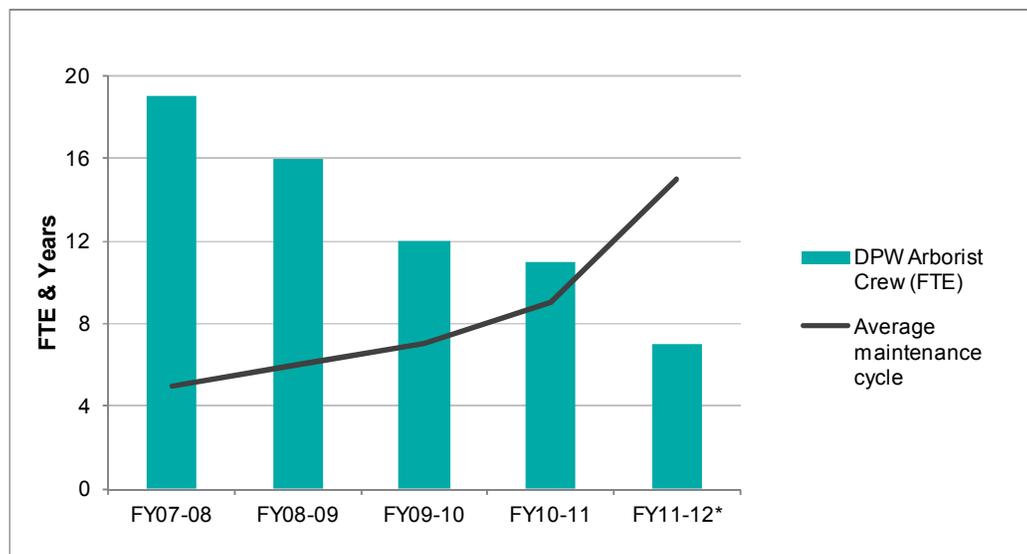
<sup>3</sup> Geiger, Jim (ed.). 2004. *San Francisco Trees Poised to Provide Big Benefits*. *Western Arborist*. 30.2: 30-31.

This has created an uneven patchwork where DPW maintains some trees but not others, making it difficult for property owners to know when maintenance responsibilities fall to them or to the City. It also creates a divided system whereby some property owners pay to maintain their street trees while DPW assumes the cost and responsibility for others, and still others do no maintenance because they are unaware that it is their responsibility or unwilling to pay for it.

### Declining Funding

Successive years of budget cuts and decreases to DPW’s urban forestry program have restricted its ability to sustain staffing and desired maintenance levels. The agency’s street tree maintenance budget has decreased for the last five consecutive years. Declining resources have further exacerbated the agency’s ability to care for street trees. As of FY11-12, San Francisco street trees are anticipated to be on a 15-year pruning cycle (Figure 2). Professional standards recommend that trees be pruned an average of every three-to-five years, depending on the age and species of the tree.

Figure 2. DPW Resources for Street Tree Care



\*Projected

Source: DPW 2012

### Maintenance Deficiencies

Both DPW and property owners (through permits) have the authority to plant street trees. The responsible party (DPW or the property owner) is also required to maintain the tree and to repair sidewalk damage resulting from a street tree. This division of maintenance responsibility means that no single maintenance approach applies citywide, resulting in inefficient and substandard care. While some property owners hire professionals, many more try to maintain the trees themselves or hire untrained individuals. Nearly 20 percent of property owners in a recent survey reported never pruning street trees for which they are responsible.<sup>4</sup> Substandard maintenance increases the risks to safety and property (e.g., from sidewalk damage and tree or limb failure). Trees that have been severely over-pruned may result in unsightliness, a weak branch structure that can fail and risk public safety, and death of the tree. The consequence is not only risk of damage or injury but also costly removal and replacement, as well as a loss or reduction in

<sup>4</sup> Urban forest property owner survey performed in February and March 2012. Approximately 5,440 surveys were administered online and through direct mail with a response rate of 11 percent.

the environmental benefits provided by a mature tree. Moreover, the decline in available budget to maintain the City's urban forest has led to deferred maintenance and a street tree program that is reactive. This approach ultimately increases the costs of street tree care, as trees in poor condition require greater care and contribute to emergencies and claims for personal injury and property damage.

### **Tree Maintenance Transfer Plan**

In response to recurring budget cuts that have left DPW with inadequate resources to sustain maintenance operations, the agency announced its seven-year Tree Maintenance Transfer Plan in 2011. Under this plan, DPW intends to transfer the responsibility for approximately 24,000 street trees currently under its care to adjacent private property owners. The program is costly, as DPW must first assess the health of each tree to be transferred, and it has raised concerns among San Francisco residents regarding the additional burden on property owners and the ultimate health of the urban forest. Research conducted on other cities as part of this study has indicated that publicly managed and maintained street trees are more likely to receive regular maintenance than street trees generally left in the domain of private property holders. This not only compromises tree health and stability, risking public safety, but also diminishes the social and environmental benefits that street trees provide.

### **A COMPREHENSIVE MUNICIPAL STREET TREE PROGRAM**

Both DPW and Friends of the Urban Forest (FUF), a San Francisco-based non-profit organization whose mission is to promote a healthy urban forest, report reluctance among property owners to plant new trees. The main reasons are the ongoing maintenance responsibilities and potential costs associated with liabilities such as sidewalk repair. FUF currently plants approximately 1,100 trees per year, a decline from its peak of over 2,900 trees in 1999. Given the benefits of a healthy urban forest and the risks associated with poor maintenance, DPW is exploring the potential of a long-term sustainable funding stream to support an expanded, comprehensive, municipally-operated program for the care of San Francisco's street trees.

Preliminary research conducted as part of San Francisco's Urban Forest Plan, currently under development, revealed that cities recognized as leaders in urban forestry (e.g., Santa Monica, Sacramento, Minneapolis, New York) have responsibility for all street trees. These cities recognize both the benefits that street trees provide, as well as those associated with a comprehensive program for their care. A strategy that increases urban forestry funding in San Francisco would allow DPW to not only reverse the transfer of maintenance of those trees that it has historically maintained, but also to take on the maintenance of all street trees.

In this study, a comprehensive municipal street tree program is defined by the following components:

- DPW would assume responsibility for the care and maintenance of all of San Francisco's street trees.
- All street trees, under DPW's care, would receive regular maintenance (with an average five-year pruning cycle) to ensure a high standard of care.
- Property owners would no longer be required to maintain street trees fronting their property.
- Property owners would no longer be required to repair sidewalks damaged as a result of a street tree.
- The City would assume the liability associated with tree-related sidewalk falls, relieving property owners of this risk.
- The program would expand San Francisco's urban forest by 50 percent over the next 20 years, with a substantial increase in the planting of new trees.

## STUDY FINDINGS

**A municipal street tree program results in net benefits for San Francisco residents.** Under a comprehensive municipal street tree program, property owners who currently care for street trees would no longer be required to maintain trees or repair sidewalks damaged as a result of a street tree. In addition, the City would cover the liability associated with tree-related sidewalk falls, which have averaged just over \$23,000 per claim over the past eight years. A municipal program would save property owners between \$10 and \$65 per tree annually compared to current costs (estimated at between \$160 and \$175 annually) incurred for maintenance, sidewalk repair and claims associated with sidewalk falls.<sup>5</sup> All street trees would receive regular assessment and maintenance (under a five-year pruning cycle on average) from qualified arborists to ensure a high standard of care. Property owners and the City would benefit from economies of scale, as efficiencies associated with caring for all street trees would drive costs down. A comprehensive street tree program would entail not just maintenance, but would expand San Francisco's urban forest, by 50 percent, benefitting residents citywide.

**Routine maintenance is more efficient and cost effective.** The majority of DPW's current street tree work involves responding to service calls and emergencies, with routine pruning comprising only about 20 percent of maintenance activities. By assuming responsibility for all trees in the public right-of-way, DPW could implement block pruning and double the number of trees routinely pruned each year without any increase in its labor force. Routine maintenance could cut DPW's per tree maintenance costs by as much as 50 percent with block pruning rather than the current approach of responding to emergencies and service requests which provides only spot maintenance. Preventive maintenance also translates into fewer emergencies, which are more labor intensive and therefore more costly than routine pruning. Routine maintenance would further reduce costs by releasing the City from a portion of claims payments because it can effectively argue that it took all necessary precautions to assess and maintain trees.<sup>6</sup> The City's risk would further decline with sufficient funding to perform routine inspections and keep sidewalks in good repair.

**Augmenting DPW staff with contractors could increase capacity while minimizing costs.** Other cities with comprehensive urban forestry programs often rely on contractors to handle a range of activities, such as increased pruning, post-storm maintenance and intense bursts of tree planting. Supplementing City staff with contractors—both private and non-profit (e.g., FUF)—could reduce program costs (e.g., staff, equipment purchase and maintenance) by over 45 percent compared to sizing DPW staff to meet these demands. The use of contractors would enable the City to save on both staff costs and the purchase and maintenance of equipment. Even so, the core municipal staff (DPW) would likely grow under the creation of a comprehensive municipal urban forestry program.

## ECONOMIC ANALYSIS

### Comprehensive Program Costs

This study initially evaluated two scenarios based on San Francisco's goal of increasing its urban forest: Accelerated Planting and Moderate Planting. Prior analysis determined that the Accelerated Planting scenario, which increase the number of street trees to 205,000 over 20 years (5,000 trees per year in addition to replacement trees) per San Francisco's Street Tree Action Plan (Urban Forest Council 2004), would be too costly. Therefore, this report focuses on the Moderate Planting scenario, which meets San Francisco's urban forest goals within 35 years, with a more modest approach to planting, for a total of

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<sup>5</sup> The full technical report discusses the current costs of street tree maintenance to San Francisco property owners in greater detail.

<sup>6</sup> Warriner, Walt. Community Forest & Public Landscape Superintendent. City of Santa Monica, Public Landscape Division. Personal communication, June 21, 2012.

162,000 trees by 2032. This would require planting approximately 2,900 trees per year, in addition to replacement trees.

Costs were estimated for major activities associated with San Francisco’s street trees: Planting, Establishment (early tree care and watering), Maintenance and Sidewalk Repair. This study explored the use of private contractors for all street tree activities to determine the effect on costs. Costs were estimated for two options: one where private contractors would conduct half of the routine pruning and provide additional capacity for DPW in the areas of Planting, Establishment and Sidewalk Repair, and one where DPW would conduct all work under a municipal program. For both options, this study evaluated two different levels of efficiency to present a range of costs for street tree activities. Table 1 presents average annual costs for the Moderate Planting scenario, both with and without the use of private contractors.

*Table 1. Average Annual Street Tree Costs*

ACTIVITY	DPW AND CONTRACTORS	DPW ONLY
<b>Capital Costs</b>		
Planting	\$3.3M-\$3.4M	\$4.1M-\$4.7M
Establishment	\$5.6M-\$8M	\$11.5M-\$14.2M
<b>Operations &amp; Maintenance Costs</b>		
Maintenance	\$9.1M-\$14M	\$10.5M-\$17.5M
Sidewalk Repair	\$5.3M-\$6.3M	\$9M-\$10M
Non-Sewer Claims	\$1.8M	\$1.8M
<b>TOTAL COSTS</b>	<b>\$25M-\$33.5M</b>	<b>\$36.9M-\$48.2M</b>

Source: AECOM 2012

NOTE: May not sum to totals due to rounding

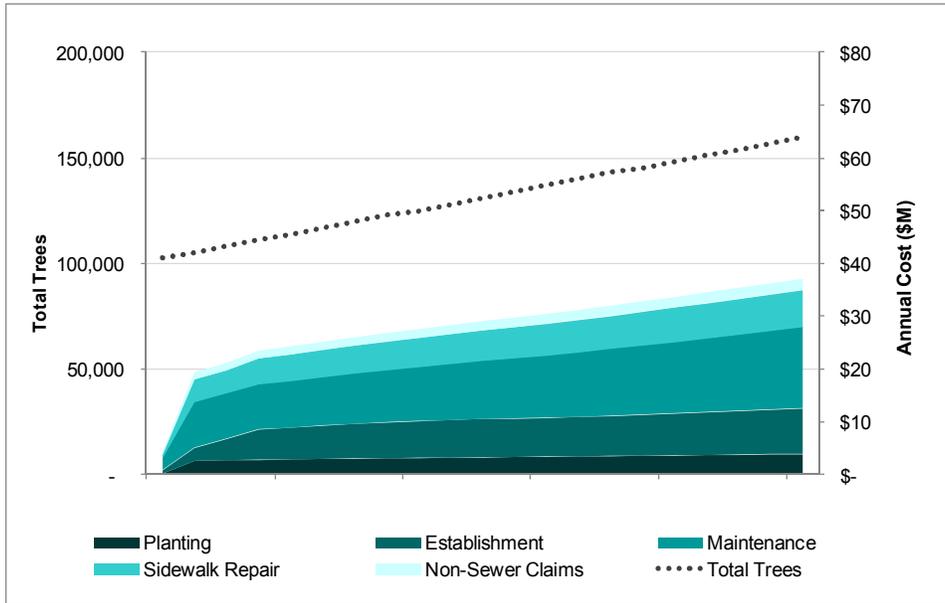
### **DPW and Contractors**

The average annual cost for the Moderate Planting scenario with private contractors is approximately \$25M-\$33.5M over 20 years. Maintenance is the most costly activity, averaging \$9.1M-\$14M per year, followed by establishment at an average cost of \$5.6M-\$8M per year. Annual Planting costs average \$3.3M-\$3.4M, and Sidewalk Repair costs average \$5.3M-\$6M. Non-Sewer Claims costs average \$1.8M per year. Figure 4 illustrates average costs over 20 years.

### **DPW Only**

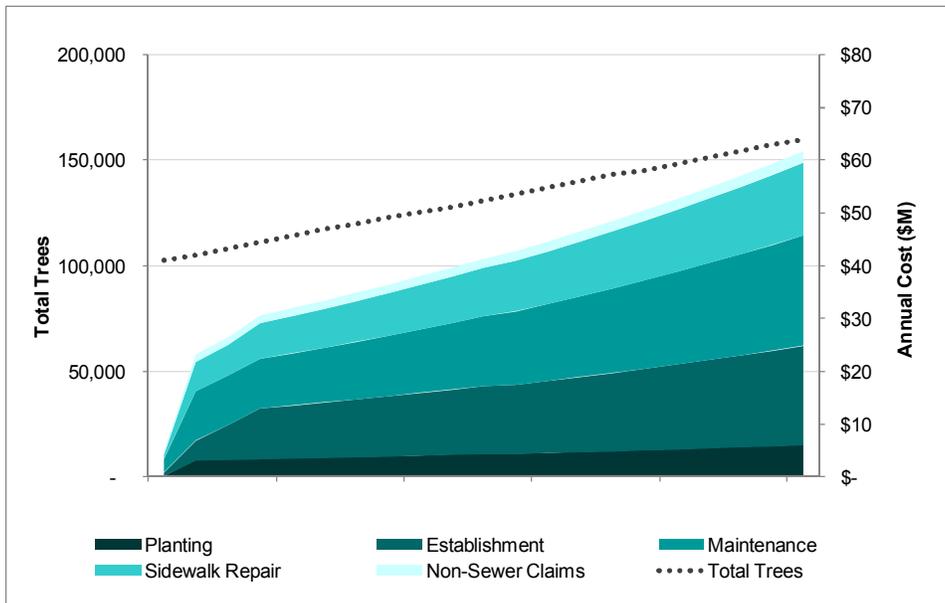
Without private contractors, the average annual cost of the Moderate Planting scenario is approximately \$36.9-\$48.2M. This represents a 45 percent increase in costs compared to the option where contractors conduct a portion of the work. Maintenance remains the most costly activity, increasing by 22 percent to \$10.5M-\$17.5M per year, followed by Establishment—which experiences the greatest increase (90 percent)—at \$11.5M-\$12.9M per year. Annual planting costs increase by 31 percent to approximately \$4.1M-\$4.7M, and Sidewalk Repair costs increase by 64 percent, at an average of \$9M-\$10M per year. Non-Sewer claims costs are unchanged, at approximately \$1.8M per year.

Figure 3. Average Costs for the Moderate Planting Scenario with Contractors, FY12-FY32



Source: AECOM 2013

Figure 4. Average Costs for the Moderate Planting Scenario without Contractors, FY12-FY32



Source: AECOM 2013

### Benefit to Property Owners

Under a municipal program, property owners would no longer be responsible for pruning and sidewalk repair. All street trees would receive regular maintenance (under a five-year pruning cycle) from certified

arborists to ensure a high standard of care. In addition, property owners would not be liable for sidewalk falls resulting from street trees, which have averaged just over \$23,000 per claim over the past eight years. A municipal program would cost between \$110 and \$150 per tree per year for Maintenance, Sidewalk Repair and Non-Sewer Claims with contractors. Compared to current costs incurred by property owners for the same activities (\$160-\$175 per tree per year), this results in an annual savings of \$10-\$65 per tree, depending on the level of efficiency achieved. If DPW conducts all work in-house, the program would cost between \$145 and \$205 per tree annually, and the effect on property owners would range from an additional cost of \$45 to a savings of \$30 per tree per year.

A comprehensive street tree program would entail not just maintenance, but would expand San Francisco's urban forest by 50 percent, benefitting residents citywide. A municipal program would add thousands of new trees each year, compared to several hundred under current conditions, a situation that is causing the urban forest to shrink, as new tree plantings do not currently keep pace with mortality. Overall, a comprehensive municipal program would produce a larger, healthier urban forest, benefitting not just property owners but all San Francisco residents (and visitors).

## FINANCING A COMPREHENSIVE PROGRAM

This study evaluated a wide range of potential financing options for a municipal street tree program and determined the three most feasible: special assessment, parcel tax and general obligation (GO) bonds.

### Operations and Maintenance

A **Parcel Tax** is a special tax levied for the provision of special benefits. Revenues from special taxes must be used for the specific purpose for which they are intended, so a parcel tax would create a dedicated funding stream for street trees. Similar to a special assessment, a parcel tax cannot be based on the value of property; however, the amount levied on each parcel need not be directly related to the benefits provided. A parcel tax requires strong public support, as it must be approved by two-thirds of all voters, rather than just the majority of property owners, as with a special assessment. Parcel taxes are designed to encompass entire cities and, therefore, are good candidates for a citywide street tree program, as opposed to the district-level approach that often occurs under special assessments (discussed below).

A **Landscape and Lighting Assessment District (LLAD)** is likely the most appropriate form of special assessment. LLADs are widely used throughout California to fund a range of public realm improvements and services related to street trees, streetscape improvements, street and traffic lights, and recreational facilities, among others. As a special assessment, LLADs are subject to the provisions of Proposition 218, which requires the assessment levied to be directly related to the benefit provided, as well as approval from the majority of property owners (50 percent plus one) within the LLAD. LLADs are typically designated at geographies smaller than the entire city, and therefore not as good candidates for a citywide street tree program. The interaction between multiple assessment district fees in San Francisco also presents a legal and administrative challenge, absent in the parcel tax approach.

### Tree Planting and Establishment

**General Obligation Bonds** are a common resource for local governments to fund the construction and improvement of projects involving real property (e.g., buildings, infrastructure and parks). GO bonds typically carry low interest rates, making them attractive for capital projects. GO bonds could be a suitable tool to fund costs of tree planting and establishment (capital costs) identified in the scenarios. Ongoing maintenance is ineligible for GO bond funding pursuant to federal tax law. California cities pay debt service from GO bonds through ad valorem property taxes, where assessments are based on property value. As a result, the issuance of GO bonds requires two-thirds voter approval. San Francisco voters

have approved two GO bonds for streets and road repair in recent years that include funding for street tree planting. In addition to GO bonds, an assortment of other resources is currently available to the City for tree planting, including plantings by FUF and Proposition K funds, state grants, capital improvement program funds and in kind contributions.

## RECOMMENDATIONS

**Pursue a program of moderate street tree expansion**, increasing the number of trees in San Francisco's right-of-way by 55 percent. The addition of nearly 2,900 trees per year (plus replacement trees) under the Moderate Planting scenario is the most feasible approach, given the costs associated with a more ambitious planting scenario. Average annual costs for all program elements (Planting, Establishment, Maintenance, Sidewalk Repair and Non-Sewer Claims), with the use of contractors, would total between \$25.1M and \$33.6M over 20 years. At its most efficient, this scenario would save property owners \$65 per tree each year compared to the current cost to maintain street trees privately, with the added benefit of growing the urban forest and covering sidewalk claims.

**Fund capital costs with outside sources**, specifically for street tree Planting and Establishment. Funding capital costs with outside sources would complement either a special assessment or parcel tax focused exclusively on O&M, as described below. Under the Moderate Planting scenario, with the use of contractors, capital costs would average \$8.9M-\$11.5M per year over 20 years. Although GO bonds that include monies to improve the City's streets and streetscapes are an option, they will still result in a cost to the City. Alternatively, capital costs could be funded through grants or in kind contributions from public and private sources. While properly financing ongoing O&M activity can be difficult, capital sources have historically been more accessible, either through private grants or through state and federal dollars. An assortment of resources is currently available to the City for tree planting, including plantings by FUF and Proposition K funds, state grants and capital improvement program funds.

**Levy a parcel tax based on street frontages to fund ongoing maintenance of San Francisco's street trees**, specifically Maintenance and Sidewalk Repair activities (Non-Sewer Claims are paid out of a separate litigation fund). This would fund the O&M of all existing street trees, as well as O&M of new trees planted with separate, capital funds. O&M activities average \$14.4M-\$20.3M per year over 20 years with the use of contractors. This translates into a parcel tax of \$1.55-\$2.18 per linear foot of frontage. Street frontage is directly related to the number of street trees abutting a property, and therefore represents a good approximation of an individual property's relation to street tree maintenance. This study recommends creating frontage brackets, with corresponding tiered fees based on the per-linear-foot cost, as shown in Table 2. These figures are substantially less than if Planting and Establishment were included. Limiting the funding required from property owners or residents would increase the likelihood of approval. The range in fees reflects the range in estimated costs for a municipal street tree program. The lower fees represent the lower bound of estimated municipal street tree program costs, while the high fees represent the upper bound of estimated municipal street tree program costs, based on a range of programmatic efficiency gains and cost savings.

Table 2: Tiered Fees Per Frontage Bracket

PROPERTY TYPE (typically)	PERCENT OF ALL PROPERTIES	FRONTAGE BRACKET (linear feet)	ANNUAL FEE
Apartment / Condominium	13%	0 – 7	\$15-\$25
Average Residential Lot	57%	7 – 30	\$39-\$52
Large Residential Lot / Corner Lot / Neighborhood Commercial Building	26%	30 – 150	\$102-\$147
Large Non-Residential Lot	3%	150 – 500	\$350-\$492
Ultra-Large Commercial Lot	1%	Greater than 500	\$1,585-\$2,234

Source: AECOM 2013

**Reduce the use of truck drivers** to realize additional cost savings. Current union agreements require that a truck driver accompany DPW crews on all maintenance jobs, even though all City arborists hold commercial drivers licenses, allowing them to operate large trucks. Requiring a truck driver to accompany maintenance crews only when the additional manpower is required (i.e., for emergencies or large tree removals), rather than for all maintenance, would decrease DPW’s per tree maintenance costs by more than 20 percent. This reduction would further decrease the funds levied on San Francisco residents.

**Complete the City’s street tree inventory** for street trees transferred from private to public responsibility. DPW is in the process of conducting a pilot inventory for all street trees in three neighborhoods to gain information about tree species, condition and maintenance needs, in order to inform the broader planning effort underway for San Francisco’s urban forest. However, the agency has limited information about the two-thirds of street trees currently in the private domain. A comprehensive street tree inventory would ensure that DPW obtains accurate data for all trees in the public right-of-way. Accurate data yields considerable efficiencies, facilitating block pruning and tracking of maintenance history, ultimately helping to manage costs.

**Develop a Street Tree Management Plan** to clearly outline DPW’s planting and maintenance plans over the long term. A management plan would enable DPW to plan for the succession of trees, create planting plans and identify capital funding needs. A management plan would also help to leverage economies of scale and reduce costs by implementing block pruning. Other urban forestry leaders note the importance of a long-range management plan as a tool to help facilitate regular maintenance and demonstrate this need to the community and municipal leaders, thereby garnering support and regular funding for street trees.

**Undertake a comprehensive public outreach campaign** to elevate awareness of the importance of San Francisco’s urban forest and of the consequences associated with the status quo. A municipally-operated street tree program represents a dramatic shift from the current approach, in which property owners have responsibility for maintaining two-thirds of the City’s street trees. An educational campaign that explains the municipal program, its benefits to property owners, and the challenges associated with the current approach can help build support for San Francisco’s urban forest. Property owners who currently care for street trees would be relieved of their responsibilities and see their costs decline, and many others would receive street trees in front of their homes. Other cities that have successfully increased funding for their urban forestry programs, including funding from property owners, have relied upon public outreach as an essential tool for success. This is a crucial step before launching any campaign to levy additional funds from San Francisco residents, as it will not only communicate the funding required from the public but also illustrate the benefits to all residents.

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# 1. PROPERTY OWNER COSTS

This chapter presents estimated costs of street tree maintenance for San Francisco private property owners who currently have street tree maintenance responsibilities.

## METHODOLOGY

This study estimated the costs to San Francisco property owners of maintaining street trees in the following categories:<sup>7</sup>

- Routine pruning
- Liability (sewer repair, sidewalk/curb repair and sidewalk falls)
- Removal permits
- Fines

The analysis relied on a survey administered to property owners regarding their maintenance of street trees, extensive interviews with City staff, private contractors and other cities regarding the costs and financing strategies associated with street trees. All costs are estimated on an annual and a per tree basis.

### Tree Maintenance Survey

The Planning Department and FUF surveyed property owners within the City to gather information on the frequency and costs of routine pruning and sewer and sidewalk/curb repairs. Two surveys (online and mailer) with identical questions were administered to property owners identified in FUF's database of addresses with privately maintained street trees. The online survey was sent to a total of 5,105 email addresses, organized into three different groups according to tree age (less than 10 years, 10-20 years and 20-30 years), based on FUF's records. Because FUF specifically works with property owners to plant trees, many of the individuals in its database—and who therefore, received the online survey—are responsible for young trees (e.g., less than 10 years old). To address this bias, the mailer specifically targeted owners of older trees. The mailer was sent to 338 addresses, evenly distributed among San Francisco zip codes; 167 surveys were sent to property owners with trees 10-20 years of age, and 171 were surveys were sent to those with 20-30 year-old trees.

### Private Contractor Interviews

Interviews with certified arborists in San Francisco that provide tree care as private contractors provided additional insights on the frequency and costs of maintaining street trees. This was particularly salient given the share of young trees captured by the survey of property owners. The costs associated with young tree care are considerably less than for larger, more mature trees.

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<sup>7</sup> Because property owners were assumed to water their own trees, the survey did not evaluate the cost of this activity.

## City Attorney’s Office Claims Records

Individuals who file sidewalk fall claims typically name both the City and property owners as defendants. Therefore, this study used data from the San Francisco City Attorney’s Office on annual claims and total payments for sidewalk falls between Fiscal Year 2003-2004 (FY03-04) and FY10-11 to estimate the costs to property owners.

## Additional Costs

DPW provided information on the average number of tree removal permits and fines issued per year, and the associated costs to property owners.

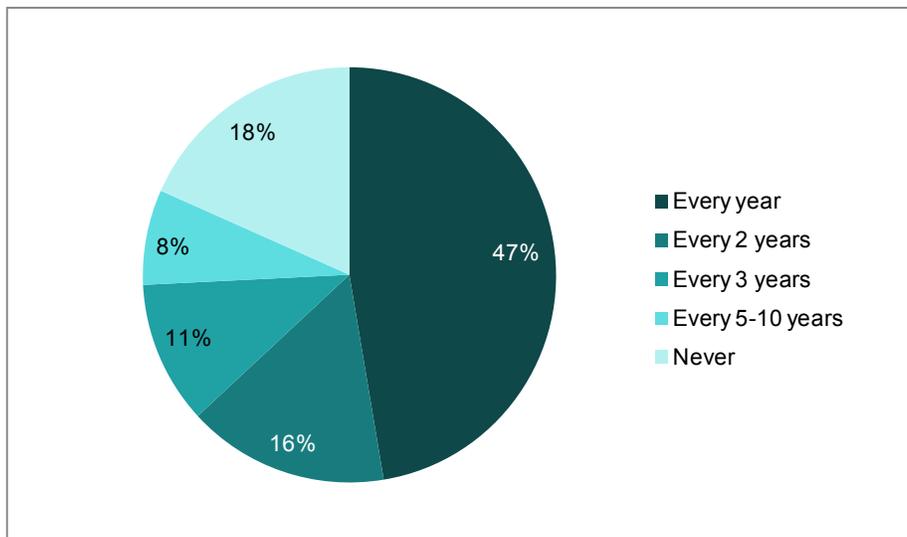
## SURVEY ANALYSIS

The online and mailer survey of property owners received a combined total of 581 responses. The overall response rate was 11 percent: nine percent (n=484) for the online survey and 29 percent (n=97) for the mailer. The majority of respondents (82 percent) reported caring for trees less than 10 years old, and so responses likely reflect maintenance practices and costs associated with young street trees, which are typically lower than for mature trees.

## Pruning Costs

Four hundred fifty-eight survey respondents provided information on the frequency of pruning their street trees. Forty-seven percent reported pruning their trees every year, and another 16 percent prune every two years. Eighteen percent of respondents reported never pruning their trees (Figure 5). DPW’s ideal pruning cycle, to ensure the health of San Francisco’s street trees, is an average of between three and five years. Based on this survey, private property owners appear to prune their trees more frequently. Interviews with private contractors confirm this finding – the majority of customers prune their trees every one to two years. Because this survey was administered to property owners who specifically requested the planting of new trees through FUF, it likely reflects a high level of awareness about tree maintenance responsibilities. Therefore, the rate of pruning may be lower among the general population.

Figure 5. Frequency of Pruning Privately Maintained Street Trees



Source: AECOM 2012, FUF/Planning Survey 2012

Of respondents who do prune their trees, 356 provided information on both the party responsible for pruning and the frequency of pruning. Forty-two percent reported pruning street trees themselves, followed by 36 percent who hire private contractors, and 23 percent who use FUF. Of the 127 respondents who reported hiring private contractors for pruning, 103 provided information on both costs and tree height. The average cost of hiring a contractor for pruning is \$195 per tree across the three height categories, based on a weighted average; costs range from \$15 to \$1,000 per tree, with a median cost of approximately \$160 (Table 3). The results do not indicate a correlation between pruning costs and tree height.

When pruning frequency is examined, costs are similar to those reported by tree height, above. For property owners who reported pruning their trees every one to five years, the average cost reported is approximately \$195 per tree (n=76)<sup>8</sup>. On an annual basis, the average cost of pruning across all frequencies is approximately \$115 per tree, with a range of \$50 to \$170 per tree (Table 4). As with tree height, no trends are apparent across pruning costs and frequency.

*Table 3. Average Pruning Costs by Tree Height*

TREE HEIGHT	AVERAGE COST PER TREE	NUMBER OF RESPONDENTS
10 feet or less	\$205	21
10 to 20 feet	\$155	56
Over 20 feet	\$175	26
<b>ALL HEIGHTS</b>	<b>\$195</b>	<b>103</b>

Source: AECOM 2012, FUF/Planning Survey 2012

Pruning costs reported in the survey are considerably lower than those provided by private contractors, who estimate charging \$800 to \$900 to prune an average-size tree and \$75 to \$250 for a small tree. The lower costs reported in the survey likely reflect the predominance of young trees in the sample surveyed; however, they may also indicate the use of contractors who provide lower cost and possibly, substandard care compared to the certified arborists contacted as part of this study.

*Table 4. Average Pruning Costs by Pruning Frequency*

PRUNING FREQUENCY	AVERAGE COST PER TREE	AVERAGE ANNUAL COST PER TREE	NUMBER OF RESPONDENTS
1 year	\$170	\$170	35
2 years	\$125	\$63	17
3 years	\$275	\$91	13
5 years	\$250	\$50	11
<b>ALL FREQUENCIES</b>	<b>\$195</b>	<b>\$115</b>	<b>76</b>

Source: AECOM 2012, FUF/Planning Survey 2012

<sup>8</sup> This analysis does not include respondents who prune their trees every ten years or more, because of the small sample size (n=12).

## Repairs Costs

For all survey respondents who reported having to make tree-related repairs, the average cost over five years is \$1,591 (median of \$1,000) for sidewalk/curb damage, \$2,667 for sewer damage (median of \$2,000), and \$1,754 for other expenses, such as private property damage and tree replacement (median of \$354).<sup>9</sup> Assuming that damage-related expenses are likely the result of a single tree, these figures represent per-tree repair costs. Sidewalk/curb damage is the most common of all tree-related damages, with approximately 10 percent of respondents (n=59) incurring expenses for repairs over five years. Approximately three percent of respondents (n=18) report paying for repairs resulting from sewer damage. Damage to private property is the least common cause for tree-related repair expenses, as reported by approximately two percent of respondents (n=9). When accounting for the incidence of occurrence for each of these expenses, the expected value of the average annual cost for all repairs is between approximately \$50 and \$60 per tree.<sup>10</sup>

## OTHER COSTS

Property owners may incur additional costs for street tree removals. DPW requires a permit for the removal of street trees. The vast majority (98 percent) of permits are issued for the removal of three or fewer street trees, at a flat fee of \$300. This study assumed that property owners incur removal costs for individual trees, so that the permit fee is for one tree. DPW issued between 580 and 755 removal permits between FY06 and FY11.<sup>11</sup> With an average incidence of approximately one percent among all privately-maintained street trees, this results in an annual removal cost of \$3 per tree.

DPW issues citations for illegal removal and maintenance practices that damage street trees. In FY10-11, DPW issued 51 citations totaling approximately \$165,000, averaging about \$3,200 per fine.<sup>12</sup> When accounting for the incidence (approximately one percent of all street trees), the annual cost associated with fines is \$3 per tree. DPW would issue considerably more citations for illegal practices; however, the agency does not have the resources to do so. Therefore, the incidence and average annual cost per tree used in this study are conservative, as they underestimate the true cost of street-tree related fines—and the severity of the problem—to San Francisco property owners.

Property owners may also be liable for sidewalk falls associated with privately maintained street trees. DPW paid an average of 11 sidewalk claims per year, totaling approximately \$275,000 annually, between FY03 and FY11.<sup>13</sup> Because both property owners and the City of San Francisco are typically named in claims regarding sidewalk falls, DPW's data reflects the likely cost to private property owners. With the average claim payment of just over \$23,000 and an incidence of less than one percent, the annual cost of liability associated with street trees and sidewalk falls is between \$8 and \$10 per tree.<sup>14</sup>

## TOTAL COSTS

The combined costs of pruning, repairs, and other costs associated with private street trees is between approximately \$175 and \$190 per property owner each year (Table 5). It is important to note that these costs represent only the partial costs associated with San Francisco's street trees, as they exclude planting and establishment of new trees.

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<sup>9</sup> Sewer repairs from trees are predominantly a result of tree roots exploiting existing cracks in sewer laterals and exacerbating the existing failure.

<sup>10</sup> Calculated by multiplying the incidence (percentage) by the average annual 5-year cost and applying a 10 percent variance to account for variation.

<sup>11</sup> Data was not available for FY09-FY10.

<sup>12</sup> DPW typically receives payment for only a small portion of the citations issued, but this study considers the entire amount to account for the full costs to property owners.

<sup>13</sup> Data was not available for FY05-FY06.

<sup>14</sup> Study assumes a 10 percent variance to account for variation in claims payments.

*Table 5. Average Annual Street Tree Costs to Property Owners*

MAINTENANCE ACTIVITY	AVERAGE ANNUAL COST (PER TREE)
Pruning	\$115
Repairs	\$50-\$60
Removals	\$3
Citations	\$3
Sidewalk Falls	\$8-\$10
<b>TOTAL COSTS</b>	<b>\$175-\$190</b>

Source: AECOM 2012, FUF/Planning Survey 2012, DPW 2012, San Francisco City Attorney 2012

NOTE: May not sum to total due to rounding.

NOTE: Repairs include Sewer Repairs, which are estimated to be an average of \$15 per year. Because the estimated costs of a municipal program do not include sewer repairs, when comparing private costs to municipal costs, sewer repairs are excluded, bringing the resultant cost of street tree care to property owners to between \$160 and \$175 per tree per year. Refer to Chapter 2, under the Comparison to Private Costs section.

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# 2. MUNICIPAL PROGRAM COSTS

This chapter presents cost projections for a comprehensive municipally-operated street tree program in San Francisco, if DPW were to assume responsibility for all street trees in the public right-of-way. These projected costs are then compared to the estimated current costs of street trees to property owners, as determined in the previous chapter. This chapter begins with a discussion of insights from interviews with other cities regarding their urban forestry programs, which informed the assumptions used in this study.

## CASE STUDY INSIGHTS

As part of this study, employees at the cities of Davis, Portland, Redwood City, Sacramento, San Jose and Santa Monica were interviewed regarding their experiences with their respective urban forestry programs. In particular, the interviews focused on strategies for managing costs. This study focused primarily on cities in California because of the specific limitations on the abilities of local governments to raise revenue. While the characteristics of each city's urban forest (e.g., tree species, age condition), planting and maintenance programs, and funding mechanisms vary widely, a number of themes emerged. These lessons learned are discussed below.

### Block Pruning

Block pruning results in considerable cost savings to cities and is the preferred approach for a number of cities. For example, in Davis, the cost per tree increases nearly 75 percent if the City's private contractor prunes a single tree rather than implementing block pruning (Cain, pers. comm., 2012). Both Redwood City and Sacramento have recently completed street tree inventories and note that this has improved their respective abilities to plan maintenance activities and realize efficiencies, such as those from block pruning (Benassini, pers. comm., 2012, Gibbons, pers. comm., 2012). Sacramento reported that the street tree inventory presented a clear picture of its street tree maintenance needs, allowing the department to successfully argue its case for using private contractors, whereas previously it had used only in-house staff. (Benassini, pers. comm., 2012). A street tree inventory is currently underway in San Jose.

### Preventive Maintenance

A number of the cities interviewed noted the cost savings associated with routine, preventive maintenance. Santa Monica currently prunes most of its trees on a three-to-five year cycle, and in some cases more frequently, according to the specific needs of the trees. The City began increasing its maintenance activities in 2003; after six or seven years, it noticed a sharp decline in calls for emergency service. Prior to the implementation of routine maintenance, Santa Monica typically received between 30 and 40 calls per night during a major storm. During a series of large storms in November 2011, the City experienced only 17 limb failures, presumed to be due to the improved health of its urban forest. Santa Monica also has an aggressive sidewalk repair program that requires the presence of a consulting staff arborist at repairs, resulting in fewer tree failures from poor root pruning (Warriner, pers. comm., 2012). Sacramento reports a similar experience, having recently completed its first full maintenance cycle over a five-year period. The City states that its recent increase in proactive pruning has reduced its emergency maintenance activities, and it is targeting a three-to-five year cycle in the future (Benassini, pers. comm., 2012).

Davis, San Jose and Portland report that their current approaches to street tree maintenance are reactive because of funding shortages. San Jose requires permits for pruning and receives applications for less than one percent each year, although additional pruning likely occurs by property owners who do not obtain permits. Ideally, the City would be on a five-year cycle that would allow for cost-effective block pruning and the identification of small problems, rather than its current inefficient and expensive approach of responding to service calls (Mize, pers. comm., 2012).

Regular maintenance also appears to reduce the liability associated with street trees. Sacramento has an aggressive sidewalk repair program developed in response to a lawsuit several years ago, and is highly vigilant about repairing the displacement of pavement in order to minimize claims involving sidewalk falls (Benassini, pers. comm., 2012). In Santa Monica, palm trees are the most common type of tree involved in claims. The City has increased its maintenance for palms, currently on a two-to-three year cycle, and claims have declined. Whereas previously claims would average one per month, they now experience one-to-two claims following less frequent high-wind events. Furthermore, regular maintenance releases the City from claims payments, because it can effectively argue that it took all necessary precautions, thus resulting in many accidents being considered acts of God. Santa Monica's experience with a hazardous tree resulting in a \$1M claim payment raised the awareness of the benefits of proactive maintenance among the public and the City Council, ultimately garnering support for increased funding (Warriner, pers. comm., 2012).

### **Private Contractors**

Five of the six cities contacted employ private contractors to manage costs and increase their capacity for planting, routine maintenance and other activities, such as emergency removal. Portland is the exception, requiring property owners to maintain street trees and using in-house staff to respond to emergencies (Cairo, pers. comm., 2012). San Jose also places street tree maintenance responsibilities with property owners, but the City uses private contractors to respond to service requests and emergencies (Mize, pers. comm., 2012). Santa Monica contracts out a comprehensive urban forestry management program that includes site investigations, data collection and analysis, and community outreach, in addition to street tree planting and maintenance (Warriner, pers. comm., 2012). In addition to maintenance and emergency removals, Davis also contracts out sidewalk repair (Cain, pers. comm., 2012).

Several of the cities interviewed report significant cost savings as a result of contracting out street tree services. Sacramento has cut overall street tree costs by more than half while increasing its level of service. The City reports finding a good balance of contracted and in-house labor, in which private contractors conduct routine pruning while public employees handle special requests (Benassini, pers. comm., 2012). Santa Monica states that private contractors have maintained five times the number of trees per year as departmental staff for the same budget. Santa Monica also notes that contracting services out avoids lost productivity when in-house employees take sick or injured leave (Warriner, pers. comm., 2012).

Although the use of private contractors can significantly reduce costs, Redwood City and Davis report that funding constraints still limit their respective abilities to conduct optimal levels of maintenance.

Sacramento has switched from a competitive bid process to the issuance of Requests for Proposals (RFPs) in order to weigh both experience and price, noting that costs may increase if they do not select a contractor solely on the basis of price. San Jose notes that contractor rates can fluctuate greatly and is currently negotiating prevailing wage rates to avoid large cost increases when it renews contracts in the summer of 2012 (Mize, pers. comm., 2012).

## Claims

While San Francisco has historically expended considerable resources paying out claims for sewer repairs and sidewalk falls, few of the cities contacted for this study report a similar experience. Santa Monica, San Jose, Davis and Portland specifically do not pay sewer claims, per the rationale that lateral sewer lines are the responsibility of property owners. San Jose states that the City's decision to turn street tree maintenance over to property owners (in 1951) dramatically reduced the number of claims paid out not only for sewer damage, but also for property damage to cars and residences due to falling limbs and other tree-related problems (Mize, pers. comm., 2012). Both Portland and Sacramento report that sewer damage from street trees is a minor issue. Sacramento specifically notes a low incidence of sewer claims because of new pipes that are not as susceptible to cracking. Sidewalk repair is also the responsibility of Portland property owners, and the City does not pay for damage resulting from street trees. However, Sacramento does pay claims for sidewalk falls and limb failures, which are more common because of the large size of its street trees (Cairo, pers. comm., 2012, Benassini, pers. comm., 2012).

## Public Street Tree Care

Of the cities interviewed, two currently delegate the responsibility for street trees to private property owners, and both expressed an interest in shifting it to the public domain. San Jose property owners have been responsible for street tree care since 1951; however, most trees receive only periodic pruning because few property owners actually perform appropriate maintenance. Until 2008, the City provided sporadic supplemental pruning, depending on the available budget, and was on a 10-15-year pruning cycle at best. Whereas San Jose previously responded to service calls and emergencies at no cost to property owners, the City currently charges a fee for such services, which are contracted out. San Jose reports concerns with quality assurance once street tree maintenance is the responsibility of property owners, as many owners do not use qualified arborists or know enough to conduct proper maintenance, thereby harming the trees. The City is currently considering the best approach to generate funding for a municipally-operated street tree program, discussed in greater detail in the Financing Options chapter (Mize, pers. comm., 2012). Portland also requires property owners to maintain street trees and several years ago, explored the option of shifting this responsibility to the City to ensure adequate maintenance of its urban forest. Ultimately, the estimated costs of implementing a municipally-operated program proved to be too high in light of considerable funding constraints (Cairo, pers. comm., 2012).

## METHODOLOGY

This study estimated the costs of a municipally-operated street tree program over 20 years (FY12-FY13 represents Year-1, and FY31-FY32 represents Year-20). Costs were estimated by categories that represent DPW's current approach to street tree care: Planting, Establishment (early tree care and watering), Maintenance and Sidewalk Repair. Although not a programmatic cost, this study also estimated the costs associated with claims paid by the City for street-tree related sidewalk falls, to account for the full costs historically associated with the care of street trees in San Francisco. Baseline data from FY10-FY11 and FY11-12 provided insights into likely future costs; where applicable, projections within some categories relied on data from prior years as well. Extensive interviews with City staff from DPW, the Planning Department and the City Attorney's Office, as well as FUF, informed data inputs and assumptions. In addition, interviews with other cities provided insights into future costs and potential cost savings.

## Moderate Planting Scenario

This study initially created two scenarios to evaluate the costs of increasing the size San Francisco's urban forest over 20 years: Accelerated Planting and Moderate Planting. Prior analysis determined that the Accelerated Planting scenario, which would plant 5,000 new trees annually (in addition to

replacement trees) per the San Francisco’s Street Tree Action Plan (Urban Forest Council 2004), to be too costly. Therefore, this report focuses on the Moderate Planting scenario, which would increase the urban forest to 205,000 trees over 35 years (the Accelerated Planting scenario had the same increase but in 20 years, by planting more trees annually). The Moderate Planting scenario DPW would plant approximately 2,900 new trees per year, bringing the total number of street trees to about 162,000 by Year 20. These newly planted trees would be in addition to the replacement trees planted to cover the four percent annual mortality rate: 4,100 trees in Year 1, increasing to 6,300 trees in Year 20. The Moderate Planting scenario represents about 72 percent of full stocking and would reach 90 percent of full stock by year 35. Table 6 illustrates the level of Planting, Establishment, Maintenance, and Sidewalk Repair that would accompany the Moderate Planting scenario.

*Table 6. Street Tree Activities under the Moderate Planting Scenario*

ACTIVITY	YEAR 1	YEAR 20
Trees Planted	7,100	9,200
Trees Established	7,700	24,300
Trees Maintained	20,500	28,700
Sidewalk Locations Repaired	2,100	3,500

Source: AECOM 2012

NOTE: Trees Maintained includes pruning and removals.

Under this scenario, DPW would be responsible for all trees within the City’s public right-of-way—this includes both existing and newly planted street trees. All street trees would be on a five-year pruning cycle (on average), on the conservative end of DPW’s target maintenance cycle (three-to-five years).

This scenario represents a significant increase in street tree activities compared to current conditions. In FY11-12, DPW and FUF together planted just over 1,500 street trees and established 4,600 (trees planted by FUF included early tree care but not watering). DPW maintained 4,700 street trees (the majority of which were service calls rather than routine pruning) and repaired 329 sidewalk locations. More information on the level of activity associated with the Progressive Planting and Moderate Planting scenario is provided below under “Street Tree Maintenance Cost Assumptions”.

### **Efficiency Gains**

This study explored the effects of a municipally-operated street tree program on efficiency and consequently, program costs. For example, management of all street trees would allow DPW to implement block pruning, rather than visit individual trees across the City in response to service calls, and significantly increase the number of trees pruned within the same period of time by cutting down on the time needed for travel and traffic detailing. A range of efficiency gains were evaluated. To represent the lower end of the range, this study used DPW’s existing costs as the basis for Planting and Establishment annual costs, with a modest reduction in Maintenance costs as a result of block pruning. This represents the maximum cost of a municipally operated program. To represent maximum efficiency, this study assumed that changes to internal operations would achieve cost savings in the categories of Planting and Establishment, and even greater efficiencies in Maintenance from block pruning. The sections below provide more detailed assumptions associated with the assumed efficiency gains.

## Assumptions

This section provides more detail on the assumptions associated with the level of effort and costs of Planting, Establishment, Maintenance, Sidewalk Repair and Claims under Moderate Planting scenario. All costs described below are fully burdened, accounting for overhead, fringe and equipment. An annual escalation rate of two percent was applied to all DPW costs to account for cost of living adjustments (COLAs) granted to public employees.

This study explored the use of private contractors for all street tree activities to determine the effect on costs. Costs were estimated for two options: one where private contractors would conduct half of the routine pruning and provide additional capacity for DPW in the areas of Planting, Establishment and Sidewalk Repair, and one where DPW would conduct all work under a municipal program.

This study estimated private contractor costs using Redwood City's current hourly rates for contractors. Given Redwood City's location in the Bay Area, these rates were considered a reasonable analogue for San Francisco. However, actual rates will depend on negotiations between San Francisco and private contractors and will be subject to prevailing wage and local business enterprise requirements. For Maintenance, labor was assumed to comprise 80 percent of contractor costs, with equipment accounting for the remaining 20 percent, based on input from Santa Monica, which operates a model municipal urban forestry program (this information was not available from Redwood City). A contingency of 10 percent was also added to all private contractor costs, so that estimates are conservative. This study therefore presents reasonable estimates of costs for private contractors in the categories of Planting, Establishment Maintenance and Sidewalk Repair.

This study also assumed that FUF would conduct tree planting, as the organization currently plants street trees under the responsibility of property owners throughout San Francisco. While it is reasonable to assume that FUF would continue tree planting within the City, and this study assumes that DPW would fund the organization's planting activities in totality, it makes no guarantee that funding shall be provided.

The sections below provide more detail on the assumptions applied to determine capacity (e.g., trees planted) and unit costs (e.g., cost per tree planted) in the categories of Planting, Establishment, Maintenance, Sidewalk Repair and Claims. All costs were estimated on a per-tree basis, consistent with the estimation of costs to private property owners in the previous chapter. Similarly, the comparison of public and private costs is on a per-tree basis. Costs are presented in current year terms (2012) and include both labor and materials. Table 7 presents the range of costs per tree used to estimate costs for a comprehensive municipally-operated street tree program.

*Table 7. Annual Street Tree Costs by Provider, Per Tree*

	DPW	FUF	CONTRACTORS
Planting	\$490 - \$525	\$335	\$400 - \$420
Establishment	\$455 - \$505	\$30	\$295 - \$335
Maintenance – Routine Pruning	295 - \$495	N/A	\$220 - \$425
Maintenance – Service / Emergency Calls	\$555 - \$570	N/A	N/A
Maintenance – Removal	\$1,200 - \$1,250	N/A	\$1,060
Sidewalk Repair	\$2,200	N/A	\$1,300 - \$1,700

Source: AECOM 2012, DPW 2012, FUF 2012

NOTE: DPW and Contractors Establishment includes watering and young tree care; FUF Establishment includes young tree care only. DPW Maintenance includes additional costs for inspections, supervision and contractor management not represented above.

## ***Planting***

In FY10-11, DPW planted 350 trees, while FUF planted 1,160, totaling just over 1,500 trees. Under the Moderate Planting scenario, DPW would ramp up to 1,440 plantings per year by Year-5 and continue this level of planting through Year-20.<sup>15</sup> FUF would increase its planting activity to 2,500 for the first 10 years, followed by an additional increase to 3,000 for the remaining 10 years, based on historic planting activity and input from FUF staff. Private contractors would plant the remaining trees. DPW's planting costs would range from \$525 per tree without any efficiency gains to \$490 per tree with the use of a gardener's apprentice in place of a laborer and the use of a cement mason's apprentice in addition to a cement mason. These costs account for inspections and other small tasks associated with DPW tree planting. This study assumes that DPW would fund 100 percent of FUF's planting activities, at a cost of \$335 per tree, which includes the first year of early tree care.<sup>16</sup> Contractor planting costs, assuming the same number of labor hours and material costs as for DPW, are estimated to be a high of \$420 and a low of \$400 per tree with the use of less costly personnel (Table 7).

## ***Establishment***

DPW currently provides three years of establishment, which includes regular watering and young tree care, for every new street tree that it plants. This study assumes that DPW would continue to provide three years of establishment for all of the trees that agency personnel plant. Street trees planted by private contractors would follow the same model, receiving three years of watering and early tree care. FUF currently provides three years of early tree care to all trees that it plants but requires a property owner to water the tree for this duration. The low end of costs for FUF-planted trees assumes a continuation of this approach; the high end of costs would rely on private contractors to water street trees planted by FUF, so that homeowners are no longer required to provide watering.

In FY10-11, DPW provided establishment for approximately 5,100 newly planted trees. Under a municipal program, DPW would provide establishment to approximately 1,200 trees in Year 1, which would steadily increase and stabilize at 4,320 trees per year in Year-7, based on planting activity.

Establishment currently costs DPW \$505 per tree per year, which represents the high end of the cost range; this cost would decline to a low of \$455 per tree with the use of a gardener's apprentice. It currently costs FUF approximately \$30 per year to provide early care to a street tree in years two and three, as the first year of care is incorporated into the cost of tree planting. Based on DPW's labor hours and material costs, annual Establishment costs for private contractors are estimated to be between \$295 and \$335, including contingency (Table 7).

## ***Maintenance***

In FY10-11, DPW maintained approximately 4,500 street trees. However, a minority of these trees—around 20 percent—received routine pruning, primarily because of the high numbers of service calls. As a result, the current maintenance cycle involves pruning individual trees every 10 to 12 years, on average. This study assumed that routine pruning would involve a five-year pruning cycle,<sup>17</sup> a standard best practice. This would presumably substantially lower the number of service calls and emergencies, so that routine pruning would then comprise the bulk of DPW's street tree maintenance activities. This study assumed that service calls and emergencies together would make up seven percent of all maintenance work, representing a decline in emergencies from 10 to five percent, and a marginal number of service calls.

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<sup>15</sup> Based on three months of planting, with four crew planting six trees per day each.

<sup>16</sup> DPW plants 24-inch box trees, which are slightly larger than the 15-gallon trees that FUF plants. Larger, sturdier trees are best in areas prone to high traffic and vandalism. However, 15-gallon trees acclimate to their planting sites, and within catch up in size five years there is no apparent difference in the two different-sized trees.

<sup>17</sup> This represents an average, as pruning needs vary by tree species, age and condition.

Implementation of a five-year pruning cycle would substantially increase the number of street trees that receive routine maintenance. Twenty percent of all mature trees would be pruned each year, increasing from approximately 20,200 street trees in Year 1 to 28,100 trees in Year 20 under the Moderate Planting scenario. This study assumes that DPW staff could routinely prune between six and 10 trees per day with the implementation of block pruning, based on input from DPW staff. Agency staff would require five years to realize efficiency gains, after which point the number of trees that DPW routinely prunes each year would stabilize. Once stabilized, DPW would routinely prune between 5,500 and 9,300 street trees per year, depending on the efficiency gains realized. Private contractors would prune the remainder of street trees requiring routine maintenance each year: approximately 15,600 trees in Year 1, increasing to between 18,900 and 22,600 trees in Year 20, depending on DPW's efficiency gains.

Maintenance currently costs DPW approximately \$570 per tree each year, which represents an average cost for service requests, emergencies and a small share (20 percent) of routine pruning. This cost does not currently realize efficiencies from block pruning and represents the high end of costs for service calls and emergencies under a comprehensive municipal program. The use of a laborer in place of one arborist would lower this cost to \$555 per tree. DPW's maintenance costs could decrease to between \$295 and \$495 per tree with block pruning, which reduces the average time required to prune each tree. In addition, more frequent pruning under a five-year pruning cycle would reduce the time required to prune each tree by largely eliminating deferred maintenance. DPW could achieve additional savings by reducing its use of truck drivers during routine maintenance, as all of DPW's arborists are licensed to operate trucks. Due to union-negotiated agreements, each maintenance crew includes one truck driver, which comprises over 20 percent of current Maintenance labor costs. The use of truck drivers during 15 percent of maintenance work—as opposed to 100 percent, as is currently the case—would reduce per-tree maintenance costs to between approximately \$230 and \$415 per tree.<sup>18</sup>

Private contractors were assumed to conduct the same level of routine pruning as DPW staff (i.e., between six and 10 trees per day per crew), resulting in approximate costs of between \$220 and \$425 per tree. This study assumed that DPW's management of private contractors would require one additional full-time equivalent (FTE) staff person at an annual fully-burdened cost of approximately \$250,000.

In addition to routine pruning, service calls and emergencies, Maintenance also includes tree removals. In FY10-11, DPW staff removed approximately 150 trees, an incidence of less than one percent of publicly maintained street trees. This incidence was applied to all street trees to estimate likely removals over 20 years, for 385 removals in Year 1, which would increase to approximately 585 under the Moderate Planting scenario. At the low end of efficiency gains, DPW was assumed to conduct all removals at a cost of approximately \$1,250 per tree, on average, based on hourly rates for a crew of three arborists. This cost would decrease slightly to approximately \$1,200 per tree with the use of a laborer in place of one arborist. Maximum efficiencies would result from the use of private contractors to conduct all removals, at an approximate cost of \$1,060 per tree, based on Redwood City's rates for two arborists and one laborer and including equipment costs.

DPW currently conducts additional work beyond the pruning and removal of street trees, such as inspections and planning and supervision of workflow. Based on input from Santa Monica, one inspector is needed for every 35,000 street trees under a city's care. A municipal program would require 3.0 FTE in Year 1, which would increase to 4.5 FTE by Year 20, at an annual cost of \$142,000 per FTE, based on the fully-burdened rate for DPW's arborist inspectors.

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<sup>18</sup> Costs with reduced truck driver use are illustrative only and were not used as inputs for the cost projections.

### ***Sidewalk Repair***

In FY11-12, DPW repaired 329 sidewalk locations damaged by publicly-maintained street trees. This level of repair does not keep pace with needs, as publicly-maintained street trees currently generate approximately 950 new locations requiring repair each year, an incidence of about two percent. As a result, DPW has a large backlog of open sidewalk requests—approximately 6,000 as of June 2012—based on service calls received from residents and DPW’s inspections. Ninety-five percent of these requests were assumed to result from street trees, based on input from DPW. This study assumed that a municipally-operated street tree program would include repair of all new sidewalk damage resulting from street trees, as well as the existing backlog.

The current incidence of sidewalk damage—two percent—was applied to all street trees to determine the new locations requiring repair: 2,100 in Year 1, increasing to 3,500 under the Moderate Planting scenario. The existing backlog was distributed evenly over the 20-year time frame, with repairs beginning in FY14-15, as the City’s Sidewalk Inspection and Repair Program (SIRP) program has currently allocated funding for sidewalk repairs through FY13-14. This results in 287 sidewalk repair locations per year from the existing backlog. This study assumed that DPW would repair 700 sidewalk locations per year, with contractors repairing the remainder. This increases from approximately 1,500 in Year 1 to 2,800 by Year 20. DPW’s incidence of sidewalk damage was applied to determine the sidewalk backlog associated with privately maintained trees, which DPW would assume responsibility for under a comprehensive municipal program. The total backlog of just over 9,300 private sidewalks needing repair was distributed evenly over the 20-year time frame (466 repairs per year), with repairs beginning in Year 1. The average cost per location repaired by DPW is currently approximately \$2,200, based on an average of 144 square feet per location at a cost of \$15 per square foot. Contractor costs were assumed to be a low of approximately \$1,300 per location with a cost of \$9 per square foot and a high of \$1,700 per location at a cost of \$12 per square foot, based on input from DPW staff. These costs were applied to all sidewalk repairs (associated with street trees currently maintained by DPW and private property owners).

### ***Claims***

San Francisco has historically paid claims related to publicly-maintained street trees under the categories of tree problems and sidewalk falls. At the time of this study, the City was considering a policy change involving the transfer of responsibility for sewer repairs to property owners, which has recently been implemented. Although prior analysis estimated the costs of a municipally-operated street tree program both with Sewer Claims, this study focuses on claims for sidewalk falls and other tree problems under the category of Non-Sewer Claims, with the assumption that street trees are directly responsible for such problems.

Tree problems comprise the majority of San Francisco’s claims involving street trees. Ninety-five percent of claims in this category are for sewer damage; the remainder is for hazardous tree falls and other problems that cause property damage and personal injury. The number of claims for tree problems has generally increased in recent years, whereas claims for sidewalk falls have not exhibited any clear trend. Similarly, average claims payments for tree problems have exhibited an increasing trend, while for sidewalks payments have varied considerably, with a large increase in the last two fiscal years. Between FY03-04 and FY10-11, the average claims payment was approximately \$8,200 for tree problems and \$23,400 for sidewalk falls (Table 8).

This study applied a range of claims payments, based on a 10 percent variance around the average payment amount, to account for variation in claims payments. The “Low Claims” category included approximately \$7,400 for each tree problem claim and \$21,100 for each sidewalk fall claim. The “High Claims” category included approximately \$9,000 for each tree problem claim and \$26,000 for each sidewalk fall claim. Between FY03-04 and FY10-11, the average incidence of claims involving tree problems was approximately one percent of all publicly maintained street trees; for claims related to

sidewalk falls, the incidence was less than one half percent. The incidence of each type of claim was then applied to determine the total claims costs for all street trees over the study's 20-year time frame.

DPW incurs additional costs for time spent on investigations and depositions for a small number of claims. Annual processing costs involving the City Attorney's Office average approximately \$215 per individual claim. DPW personnel also conduct investigations for the City Attorney's Office and participate in depositions, resulting in additional costs. According to DPW staff, four percent of all claims require staff time for investigations, at a cost of approximately \$295 per claim. Approximately two percent of all claims involve DPW staff in depositions, at a cost of \$1,050 per claim. As with claims payments, this study applied these unit costs and incidence rates to all street trees to determine the total costs over the 20-year time period for both the Low Claims and High Claims categories.

Table 8. Claims Related to Street Trees, FY03-FY11

FISCAL YEAR	SIDEWALK FALLS			TREE PROBLEMS		
	TOTAL PAYMENT	CLAIMS	PAYMENT PER CLAIM	TOTAL PAYMENT	CLAIMS	PAYMENT PER CLAIM
FY03-04	\$243,155	18	\$13,509	\$1,501,374	206	\$7,288
FY04-05	\$442,884	13	\$32,530	\$1,749,660	240	\$7,290
FY05-06	N/A	N/A	N/A	\$1,808,230	232	\$7,794
FY06-07	\$60,779	9	\$6,753	\$2,598,907	286	\$9,087
FY07-08	\$34,494	10	\$3,449	\$2,435,050	290	\$8,397
FY08-09	\$82,621	6	\$13,770	\$2,949,332	366	\$8,058
FY09-10	\$503,703	11	\$45,791	\$4,495,574	502	\$8,955
FY10-11	\$576,534	12	\$48,045	\$3,085,545	358	\$8,619
<b>AVERAGE</b>	<b>\$274,900</b>	<b>11</b>	<b>\$23,400</b>	<b>\$2,577,900</b>	<b>310</b>	<b>\$8,200</b>

Source: San Francisco City Attorney's Office

NOTE: Total Payment and Payment/Claim figures adjusted to 2012 dollars.

NOTE: Tree Problems include sewer claims (95% of all claims) and other problems, such as hazardous trees (5% of all claims).

The cost projections described in this report do not make assumptions regarding any reduced incidence of claims that may occur under a comprehensive municipal program, as data is not available to support such assumptions. Therefore, cost estimates associated with claims are conservative and may decline over time should San Francisco take a more aggressive approach towards preventive tree maintenance.

## PROJECTED COSTS

This section discusses the projected costs of a municipally-operated street tree program in San Francisco, based on the assumptions detailed above. Estimated costs are presented for the Moderate planting scenario, both with and without contractors. As mentioned previously, costs are presented for Planting, Maintenance, Establishment and Sidewalk Repair associated with San Francisco's street trees, as well as Non-Sewer Claims associated with tree problems and sidewalk falls. Table 9 presents the average annual costs for the Moderate planting scenario. The sections below discuss the specific costs in greater detail.

Table 9. Average Annual Street Tree Costs, Moderate Scenario

ACTIVITY	DPW AND CONTRACTORS	DPW ONLY
<b>Capital Costs</b>		
Planting	\$3.3M-\$3.4M	\$4.1M-\$4.7M
Establishment	\$5.6M-\$8M	\$11.5M-\$14.2M
<b>Operations &amp; Maintenance Costs</b>		
Maintenance	\$9.1M-\$14M	\$10.5M-\$17.5M
Sidewalk Repair	\$5.3M-\$6.3M	\$9M-\$10M
Non-Sewer Claims	\$1.8M	\$1.8M
<b>TOTAL COSTS</b>	<b>\$25M-\$33.5M</b>	<b>\$36.9M-\$48.2M</b>

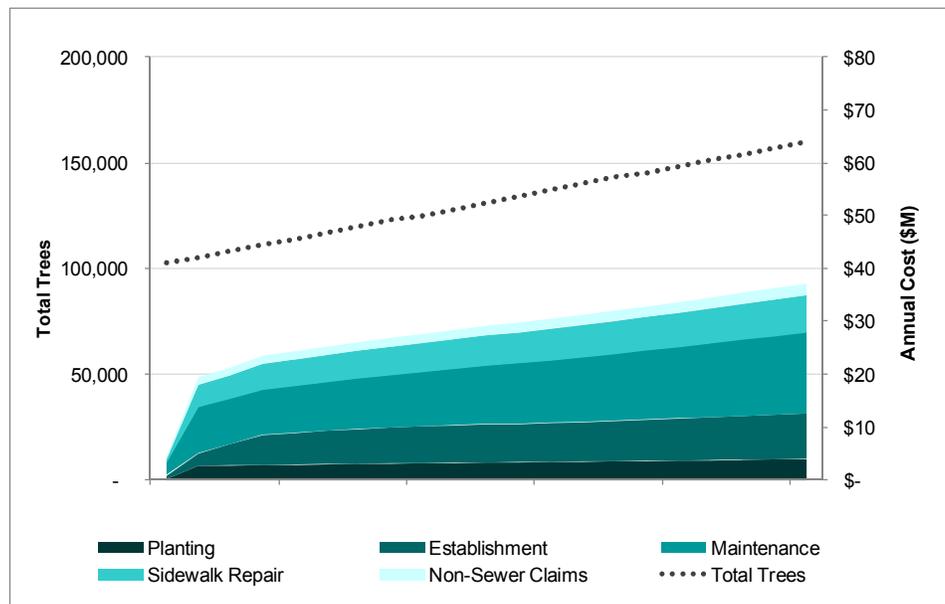
Source: AECOM 2013

NOTE: May not sum to totals due to rounding

### DPW and Contractors

The average annual cost of the Moderate Planting scenario with the use of private contractors is approximately \$29.3M (range of \$25M-\$33.5M). The average cost in Year 1 is about \$19.5M (range of \$16.7M-\$22.3M), increasing to approximately \$37.2M (range of \$31.8M-\$42.5M) in Year 20, reflecting the 55 percent increase in the number of street trees. Figure 6 illustrates average annual costs over 20 years. Maintenance is the most costly activity, averaging about \$11.5M per year (range of \$9.1M-\$14M), followed by Establishment at \$6.8M per year (range of \$5.6M-\$8M). Annual planting costs average approximately \$3.4M (range of \$3.3M-\$3.4M), and the costs for Sidewalk Repair average about \$5.8M per year (range of \$5.3M-\$6.3M). Non-Sewer claims average approximately \$1.8M per year.

Figure 6. Average Costs for the Moderate Planting Scenario with Contractors, FY12-FY32

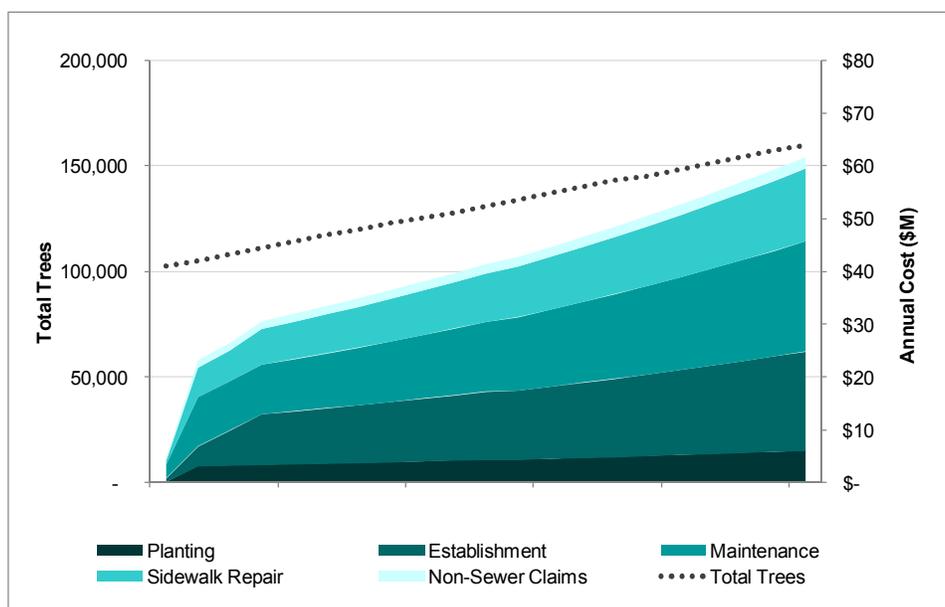


Source: AECOM 2013

## DPW Only

Without private contractors, the average annual cost of the Moderate Planting scenario is approximately \$42.6M (range of \$36.9M-\$48.2M). This represents a 45 percent increase in costs compared to the option discussed above, where contractors conduct a portion of the work. The average cost in Year 1 is about \$23M (range of \$20.9M-\$25.3M), increasing to approximately \$61.6M (range of \$51.4M-\$72.1M) in Year 20. Figure 7 illustrates average annual costs over 20 years. Maintenance remains the most costly activity, averaging about \$14M per year (range of \$10.5M-\$17.5M), although it experiences the smallest increase—22 percent higher than with the use of contractors. Establishment, which remains the second most costly activity without contractors, experiences the greatest increase—nearly 90 percent—averaging \$12.9M per year (range of \$11.5M-\$12.9M). Annual Planting costs increase by 31 percent, averaging approximately \$4.4M (range of \$4.1M-\$4.7M), and Sidewalk Repair costs increase by 64 percent, at an average of about \$9.5M per year (range of \$9M-\$10M). Non-Sewer claims costs are unchanged, averaging approximately \$1.8M per year.

Figure 7. Average Costs for the Moderate Planting Scenario without Contractors, FY12-FY32



Source: AECOM 2013

## COMPARISON TO PRIVATE COSTS

This study estimated the effect of a comprehensive municipally-operated street tree program on private property owners by comparing the cost projections above to the costs estimated in the Private Street Tree Maintenance Costs chapter. Costs for Maintenance, Sidewalk Repair and Non-Sewer Claims for each scenario were averaged over the 20-year study period to determine the average annual cost per street tree associated with a municipal program. Planting and Establishment costs were not included, as the estimated costs to property owners did not include these activities. The total annual cost of street tree maintenance activities to property owners was found to be between \$175 and \$190 per tree. As noted in the previous chapter, this accounts for the costs of repairs, including to sewers (estimated to be an average of \$15 per year). Because the estimated costs of a municipal program do not include sewer repairs, the costs to property owners were revised to exclude this component. The resultant cost of street tree care to property owners is between \$160 and \$175 per tree per year, not including the costs of sewer repairs.

Both scenarios result in cost savings for property owners compared to the private maintenance costs estimated as part of this study. The estimated annual cost of the Moderate Planting scenario that includes private contractors is between \$110 and \$150 per tree for Maintenance, Sidewalk Repair and Non-Sewer Claims. When compared to the estimated cost to maintain trees privately (\$160-\$175 per tree per year), the result is in an annual benefit to property owners of between \$10 and \$65 per tree. Without private contractors, annual costs of Maintenance, Sidewalk Repair and Non-Sewer Claims are between \$145 and \$205 per tree; the result to property owners of between ranges from an annual cost of \$45 to a savings of \$30 per tree.

The estimated Maintenance costs with a municipal program are presumed to include a higher standard of care than reflected in the estimate of private street tree costs, as not all property owners perform regular maintenance or hire certified arborists. As a result, the private costs presented in this study underestimate the true costs associated with street trees. Consequently, the comparison of public and private costs overestimates the costs (or underestimates the benefits) to property owners of implementing a comprehensive municipally-operated street tree program in San Francisco.

# 3. FINANCING OPTIONS

Funding for planting and maintenance of San Francisco’s street trees has traditionally come from four primary sources: Gasoline taxes, Proposition K (sales tax revenue), General Fund expenditures (Capital Improvement Program) and the State Transportation Development Act (TDA). Each of these sources funds different types and levels of activities—for example, gasoline tax revenues fund maintenance, while TDA money is only for sidewalk repair. The current funding streams do not generate the revenue required for DPW to meet its planting goals, establish newly planted trees, and conduct routine maintenance and sidewalk repairs. This chapter discusses constraints on the ability of California local governments to generate revenue and financing options that may provide the City with the revenue required to fund a municipally-operated street tree program.

## FINANCING CONSTRAINTS

Local governments in California face considerable constraints when it comes to raising revenue from property owners. Proposition 13, approved by California voters in 1978, limited the ability of local public entities to increase property taxes, the main tool typically used to generate municipal revenue. Proposition 13 also required that two-thirds of voters approve any new property tax levied to fund specific services. Cities, counties and other local entities responded by shifting their focus to assessments, fees and other taxes (e.g., hotel occupancy taxes, business license fees) as mechanisms for generating revenue.

In 1996, California voters approved Proposition 218, which placed similar limits on the use of these alternative tools to raise revenue for local governments. Proposition 218 requires voter approval for all taxes and the majority of fees and special assessments levied on property owners. In addition, all property-based assessments must fund “special benefits”, defined as services that are above and beyond the general benefits that local governments typically provide (e.g., police, fire, transportation) (LAO 1996). Special benefits encompass a wide range of services related to economic development, neighborhood improvements, and infrastructure development, such as a higher level of street tree care than that currently provided. However, in order to levy an assessment, local governments must calculate the benefit, or nexus, to each property owner and set the assessment amount accordingly, before requiring majority approval from voters (LAO 1996). Proposition 218 also requires voter approval for any increase in special assessments, unless initially approved upon creation of the assessment.

## FINANCING OPTIONS

Despite these constraints, a number of options are available to DPW to finance the costs of a municipal street tree program. This section provides greater detail on the attributes, processes, opportunities, challenges and precedents associated with each of the following:

- Parcel taxes
- Special assessment districts
- Mello-Roos Community Facilities Districts
- Service fees
- General Fund expenditures
- General Obligation bonds
- Partnerships

- Cap-and-Trade
- Urban Forestry Joint Powers Authority

Based on this analysis, this study determined the most feasible options for financing a comprehensive municipally-operated street tree program and the amount of revenue that would be required under each option. Where applicable, the discussion of financing options incorporates input from cities interviewed regarding their respective street tree programs (Davis, Portland OR, Redwood City, Sacramento, San Jose and Santa Monica). Table 12 presents a summary of each of the options evaluated.

## **MOST FEASIBLE FINANCING OPTIONS**

Prior analysis found that a parcel tax or special assessment designed to fund the full costs of a street tree program would likely be too high to be politically feasible. As a result, this study examined a parcel tax or special assessment that would be levied for O&M only (Maintenance and Sidewalk Repair), which is typically more difficult to secure funding for than capital activities (Planting and Establishment). For example, General Obligation (GO) bonds and partnerships are common sources of capital funding. The City currently pays all claims related to street trees out of a litigation fund, rather than DPW's operating budget; therefore, Non-Sewer Claims were not included in the parcel taxes and special assessments considered for a comprehensive municipal street tree program.

This study recommends a parcel tax be levied for O&M costs, over a special assessment. A parcel tax is typically administered citywide, while special assessments are typically developed for smaller areas such as neighborhoods or districts. Secondly, a special assessment requires the preparation of an Engineer's report, while a parcel tax does not. Finally, where special assessment districts pre-exist in San Francisco, a citywide special assessment for street tree maintenance would have to be carefully demarcated and evaluated to avoid overlapping landscape charges. The administrative and legal challenges of establishing a citywide special assessment fee for street tree maintenance, accounting for the patchwork of pre-existing special assessment districts across San Francisco and their fee allocations, would result in a complicated and unwieldy fee schedule. A parcel tax, conversely, can be charged uniformly citywide.

### **Parcel Tax**

A parcel tax is a special tax levied for the provision of special benefits. Revenues from special taxes must be used for the specific purpose for which they are intended, so a parcel tax would create a dedicated funding stream for street trees. Similar to a special assessment, a parcel tax cannot be based on the value of property; however, the amount levied on each parcel need not be directly related to the benefits provided (ILG 2008). Cities have the flexibility to levy parcel taxes as they see fit, but they are typically based on lot square footage or levied as a flat tax, with the same amount per parcel (CTD 2012a). Parcel taxes are designed to encompass entire cities and therefore, are good candidates for a citywide street tree program, as opposed to the district-level approach that often occurs under special assessments.

Parcel taxes typically fund more than just street trees. For example, the City of Davis levies an annual Parks Maintenance Tax of \$49 per parcel for the maintenance of parks and open space and improvements to recreation facilities, about 15 percent of which funds street tree planting and maintenance (Davis 2012, Cain, pers. comm., 2012). A parcel tax requires strong public support, as it must be approved by two-thirds of all voters. Because a parcel tax must be voted on in a general election, rather than via mail-in ballot, it is likely to receive heightened political attention. However, general elections capture the votes of renters, who may be more apt to approve a tax borne by property owners.

### **Requirements for a Comprehensive Street Tree Program**

A parcel tax may be levied as a flat tax, or it may be based on lot size (square footage) or frontage (linear footage). This study evaluated the parcel tax amount that would be required to finance a municipally-operated street tree program via frontage. Street frontage is directly related to the number of street trees abutting a property, and therefore represents a good approximation of an individual property's relation to street tree maintenance. Since larger frontages accommodate more street trees (or the potential for more new street tree plantings) than smaller frontages, a frontage-driven parcel tax provides an appropriate basis for fee determination. San Francisco currently has approximately 190,000 taxable parcels, with approximately 9.3 million linear feet of (taxable) frontage citywide (Office of the Assessor 2012; San Francisco Planning Department; AECOM).<sup>19</sup> The City would need to levy between \$1.55 and \$2.18 per linear foot, per year, to cover O&M costs under the Moderate Planting scenario, with contractors. Without contractors, the per-linear-foot annual cost to cover O&M work would be between \$2.10 and \$2.96. The range in per-linear-foot costs reflects the range in program costs. The range of costs represents the upper and lower bound of costs, assuming various programmatic efficiency gains and cost savings, as described in Chapter 2, under the Methodology section (Efficiency Gains subsection). Given the margin of error of the frontage data<sup>20</sup>, this study recommends bracketing frontage ranges, and charging tiered parcel taxes. The frontage brackets are intended to represent typical San Francisco property categories:

- **0-7 linear feet of frontage** represents a dwelling unit's 'share' of building frontage. This frontage bracket is a proxy for an apartment or condominium.
- **7-30 linear feet of frontage** represents the typical San Francisco lot (the average San Francisco lot has 25 linear feet of frontage).
- **30-150 linear feet of frontage** represents a typical corner lot (the average San Francisco corner lot has 125 linear feet of frontage) or neighborhood commercial lot.
- **150-500 linear feet of frontage** is a large lot, or combination of lots, representing a non-residential property
- **Great than 500 linear feet of frontage** represents an ultra-large, commercial parcel.

The fee amounts vary per frontage bracket, with small frontage parcels (apartments) paying the least, and ultra-large commercial parcels paying the most. Fees per bracket are roughly proportional to the per-linear-foot cost (\$1.55-\$2.18 with contractors; \$2.10-\$2.96 without contractors) for the *average* linear frontage within each bracket.<sup>21</sup> The tiered parcel fees are shown in Table 10.

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<sup>19</sup> This figure includes only taxable parcels – i.e. excludes governmental parcels, religious parcels, public parcels (libraries, museums, universities and colleges), and other exemptions (hospitals). This study considers all linear feet (frontage) within the City of San Francisco to represent the cost of a municipal street tree program to all property owners.

<sup>20</sup> Frontage data is not rigorously collected by the Assessor's Office. Frontage data for this study was determined through GIS by the San Francisco Planning Department. The nature of GIS takeoffs includes a certain amount of error. As well, some error exists where multi-unit buildings assume an even division of frontage among all units.

<sup>21</sup> Note that proportionality is modified slightly to ensure cost coverage for annual program costs.

Table 10: Fee Tiers for Parcel Tax Based on Frontages (Moderate Planting Scenario)

FEE BRACKET (linear feet of frontage)	PERCENT OF ALL PROPERTIES	DPW AND CONTRACTORS	DPW ONLY
0-7	13%	\$15-\$25	\$16-\$20
7-30	57%	\$39-\$50	\$48-\$70
30-150	26%	\$102-\$147	\$140-\$198
150-500	3%	\$350-\$492	\$475-\$670
Greater than 500 <sup>22</sup>	1%	\$1,585-\$2,234	\$2,154-\$3,025

Source: AECOM 2013

Note that the fees represent the net present value of the annual fee over twenty years, given 3 percent inflation. That is, the fee amounts represent Year 1 fees, and every year these fees should be inflated by 3 percent. Aside from inflation adjustment, parcel tax revenue over time will be flat, while program costs will increase, as the size of the street tree canopy increases. In later years of the program, a reserve amount is necessary to supplement the parcel tax revenue. In other words, the fee amounts (Table 10) collect revenue in initial years to fund the program as well as build a reserve for future years. To administer this parcel tax, a portion of annual fee revenue must be set aside for the following year.

Determining proportional fees for each frontage bracket is subject to significant numerical sensitivity. While the numbers in Table 10 above are the roughly proportional fees for the *average* linear frontage within each frontage bracket, rough proportionality can be calculated based on *median* linear frontage, *minimum* linear frontage, or *maximum* linear frontage for each bracket. Table 11 shows parcel fees per frontage bracket that also cover the costs of a sustainable municipal street tree program, but are proportional not to the average frontage, but to the maximum frontage for small parcels (where fees are very low), to the average frontage for medium-sized parcels (where fees are larger), and to the minimum frontage for the largest parcel bracket (where fees are very high).

Table 11: Alternative Fee Tiers for Parcel Tax Based on Frontages (Moderate Planting Scenario)

FEE BRACKET (linear feet of frontage)	PERCENT OF PROPERTIES	DPW AND CONTRACTORS	DPW ONLY
0-7	13%	\$26-\$32	\$20-\$30
7-30	57%	\$52-\$571	\$64-\$95
30-150	26%	\$98-\$145	\$145-\$200
150-500	3%	\$345-\$490	\$475-\$675
Greater than 500	1%	\$762-\$1,100	\$1,050-\$1,500

Source: AECOM 2013

<sup>22</sup> Note that, within this frontage bracket, frontages vary considerably, from 500 to over 2,200 linear feet. Implementation of a parcel tax may consider charging differential parcel tax amounts within this frontage bracket, based on different frontages.

Note, as above, the fee amounts represent Year 1 fees, and every year these fees should be inflated by 3 percent. Note also that these fees over-collect revenue in initial years, and a portion of annual fee revenue must be set aside for the following year.

### **Landscape and Lighting Assessment Districts**

Although this study recommends a parcel tax approach as a better candidate for a citywide fee program, Landscape and Lighting Assessment Districts (LLADs) represent another possible funding option for street tree maintenance.

LLADs are a form of special assessment that finance improvements to landscaping, lighting and open space, along with open space acquisition. The Landscape and Lighting Act of 1972 authorizes municipal agencies in California to initiate and administer LLADs. The creation of a LLAD, as with any special assessment, requires the preparation of an Engineer's Report that demonstrates the nexus between fees assessed and benefits provided, followed by majority (50 percent plus one) approval via a special ballot, pursuant to Proposition 218. LLADs are widely used throughout California to fund a range of public realm improvements and services related to street trees, streetscape improvements, street and traffic lights, and recreational facilities, among others. As with parcel taxes, LLADs typically fund more than just street tree planting, establishment and maintenance. While a LLAD could be designed for street trees alone, the process may attract other agencies in need of additional revenue and interested in expanding the scope to services such as park and recreation maintenance. One caution would be to avoid setting the assessment so high as to generate voter backlash. Local municipalities have often convened focus groups to determine the appropriate assessment level.

Although they are typically designed to only include smaller areas, such as neighborhoods, LLADs may encompass entire cities, as in the cases of Oakland, Sacramento and previously, Davis. A citywide LLAD would require approval from the majority of all property owners within the City. For example, San Jose is considering the creation of a citywide "property-based user fee" specific to street trees, that would follow the requirements of a special assessment. The City's goal is to keep the annual assessment under \$100 per tree, with the details of how to levy the assessment (e.g., per parcel, linear foot) currently under development (Mize, pers. comm., 2012). A similar approach may be feasible in San Francisco, although it would require approval from the majority of all property owners within the City. Alternatively, focusing on areas with higher concentrations of street trees or maintenance needs, such as business districts, may capture property owners who are more willing to pay for tree care. This approach may be more politically palatable and could potentially lead to a citywide LLAD. For example, in 1996, the City of Hayward consolidated its six LLADs into a single, citywide district with six different benefit zones, each with its own budget. In 2005, Hayward further expanded its citywide LLAD by adding four more benefit zones (Hayward 2005).

A drawback of a citywide LLAD for street tree maintenance is the implications where existing special assessment districts collect fees for landscaping improvements. A citywide LLAD would need to carefully examine and modify fees in all areas where an existing special assessment fee is charged, to avoid legal vulnerability. This differential assessment would create an administrative burden and a complicated, unwieldy fee structure.

### ***Requirements for a Comprehensive Street Tree Program***

Special assessments are usually calculated per linear foot, based on the idea that benefits to property owners are directly related to street frontage. In some cases, special assessments include additional metrics—for example, building and/or lot square footage to account for the added benefit associated with larger buildings that have more occupants. However, this study evaluated street frontage alone, as the best approximation of an individual parcel's relation to street tree maintenance. The amount levied for a

special assessment based on linear feet would be the same as a parcel tax based on frontage. As discussed above, this would be between \$1.55 and \$2.18 per linear foot annually if DPW employed contractors and between \$2.10 and \$2.96 per linear foot, without contractors.

### **General Obligation Bonds**

Local governments commonly use General Obligation (GO) bonds to fund the construction and improvement of projects involving real property (e.g., buildings, infrastructure and parks). GO bonds typically carry low interest rates, making them attractive for capital projects, which may include tree planting. However, funding is available for discrete projects, often over a limited time rather than an extended period. In addition, ongoing maintenance is ineligible for GO bond funding pursuant to federal tax law. California cities pay debt service from GO bonds through ad valorem property taxes, where assessments are based on property value. As a result, the issuance of GO bonds requires two-thirds voter approval (State Treasurer 2008).

GO bonds may be a tool for financing the planting of street trees in San Francisco as part of a larger package of capital improvements, as bonds are typically issued for large amounts. For example, in 2011, San Francisco voters approved a \$248M Road Repair and Street Safety Bond, with \$50M for streetscape and street safety improvements that included street tree planting. Two years prior, voters approved a Safe Streets and Road Repair Bond for \$368M. Both of these GO bonds included tree planting among streetscape improvements through the Great Streets Program. Both of these bonds allocated funding for street tree planting to the Great Streets Program, rather than DPW's urban forestry program; however, opportunities exist for additional money for street tree planting through future bonds. A bond specifically focused on a major street tree planting effort may be appropriate.

### ***Requirements for a Comprehensive Street Tree Program***

Because GO bonds can only fund capital costs, they could only be used to finance Planting and Establishment activities under a comprehensive municipally-operated street tree program. Average annual capital costs range from approximately \$8.9M to \$11.5M under the Moderate Planting scenario with contractors and \$15.6M to \$18.9M for DPW only.

## **ADDITIONAL FINANCING OPTIONS**

### **Maintenance Assessment Districts**

The Landscape and Lighting Act of 1972 authorizes Maintenance Assessment Districts (MADs), which are closely related to LLADs. The key difference is that charter cities, including San Francisco, can create MADs for the provision of services not specifically authorized under state law, thereby broadening their use (Griffin, pers. comm., 2012). MADs may be used to finance street tree care, but as with a LLAD, a MAD intended for street trees alone could also attract the attention of other agencies interested in funding the provision of additional non-related services.

MADs are often created for sub-areas within a city with specific landscaping and/or open space maintenance needs, although the law does not preclude establishment of a citywide MAD. For example, the City of San Jose has 13 MADs (i.e., for landscaping on individual streets), while the City of San Diego has 56 MADs that cover larger areas based loosely around neighborhoods (San Jose 2012, San Diego 2012). In 2010, the City of Sacramento initiated a feasibility study of a citywide MAD for the maintenance of parks and recreation facilities. The City considered creation of a MAD more cost-effective and simpler than amending the City's existing LLAD, which includes other services beyond park and recreation maintenance (Sacramento 2010). However, Sacramento later suspended the study because of concerns

about conflicts with Proposition 218 and the need for more public outreach on the issue, given the need for property owner approval (Sacramento 2011).

### **Community Benefit Districts**

Community Benefit Districts (CBDs) are used to finance neighborhood revitalization, commonly in commercial areas. Special benefits typically include public safety, economic development, beautification, and streetscape improvements. Formation of a CBD requires property owners to petition the appropriate local agency and demonstrate an interest in paying for additional services. A non-profit Board of Directors typically comprised of property owners, businesses, and government representatives administers a CBD. While CBDs may include street tree planting and maintenance, this is rarely the focus.

CBDs are typically created around a specific neighborhood rather than for an entire city. San Francisco has eight CBDs that range from five to 35 square blocks and encompass a range of special services, primarily focused on neighborhood beautification and public safety, and in some cases, business attraction (i.e., marketing and promotion of local businesses) (OEWD 2012) (Figure 8).<sup>23</sup> While many of these CBDs have the authority to plant and maintain street trees, in practice, landscaping activities typically involve the installation of planter boxes and hanging flower baskets. However, several of the CBDs outline activities specific to street trees.<sup>24</sup> The Ocean Avenue CBD sets a target of pruning between three and 30 times per year, depending on tree size and location, and watering some trees every three weeks during the dry season (OARC 2010). The Noe Valley CBD has used grant funding from the City to plant, water, and prune young street trees (NVA 2012, 2011). The creation of any new street tree assessment or fee that overlaps with these existing CBDs would need to ensure the provision of additional services (per Proposition 218) and likely coordinate with CBD Boards of Directors regarding street tree planting and maintenance responsibilities.

All of San Francisco's CBDs use multiple methods for levying assessments, including linear feet of frontage and square footage of lot size and/or building area. While frontage fees recognize that all properties benefit from improvements, square footage fees are based on the idea that lot and building size are proportional to the level of service provided. Frontage fees range from \$5.20 to \$26.28 per linear foot.<sup>25</sup> Lot size and building areas fees typically range from \$0.022 to \$0.215 per square foot, although the Civic Center CBD calculates flat fees based on commercial parcel size and building size and use (e.g., commercial, residential). In some cases (e.g., Civic Center and Noe Valley CBDs), other sources such as grants, donations, and in-kind services comprise a small amount of funding. The annual budgets for San Francisco's CBDs range from approximately \$225,000 for the 15-block Noe Valley CBD to approximately \$2.4 million for the seven-block Yerba Buena CBD (OEWD 2012).

Because CBDs typically focus on revitalization of commercial areas, they may not be the most appropriate tool to finance expanding street tree planting and maintenance. However, CBDs were a

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<sup>23</sup> San Francisco also has two Business Improvement Districts (BIDs) that assess business owners for special services, typically related to revitalization, economic development, and streetscape infrastructure improvements in commercial areas.

<sup>24</sup> The 2500 Block of Mission Street BID also targets a seven-year maintenance cycle (SFOEWD 2005).

<sup>25</sup> Frontage fees for San Francisco's BIDs, which only assess business owners, are notably higher, ranging from \$49.92 to \$70.58 per linear foot.

Figure 8. San Francisco CBDs



Source: City and County of San Francisco 2010

NOTE: Civic Center and Ocean Avenue CBDs (created in 2010) not shown; Fillmore Jazz District CBD expired 2011; 2500 Block of Mission Street and Greater Union Square are BIDs.

recommended strategy for financing San Francisco's *Better Streets Plan*, and there may be opportunities to expand street tree planting and maintenance services in any new CBDs formed (CD&A 2008). This approach would likely occur at the district scale, rather than encompass the entire city, especially because property owners must initiate the formation of a CBD.

### Parking Benefit District

Community Parking Benefit Districts (PBDs) are similar to CBDs, in that they generate revenue within a special district for improvements and services related to streets, streetscapes, and landscapes. Because revenue derives from parking meters, visitors to PBDs fund the majority of improvements. As a result, local governments may create PBDs via ordinance without requiring a vote of property owners, setting them apart from other special assessment districts. Although only commercial areas with parking meters provide revenue, improvements may be implemented beyond PBD boundaries. The ordinance that creates the PBD determines the share of revenue that must be applied to improvements within the district, known as the "local return" portion. A committee of residents, property owners, and business owners advises the local agency administering the PBD on how to expend revenue. Current City policy guarantees excess meter revenue to the San Francisco Municipal Transportation Agency (SFMTA), and would need to be changed to enable the use of this tool for a street tree program (CD&A 2008).

While activities may include street tree planting and maintenance, a PBD is likely to cover other improvements related to neighborhood beautification. A number of cities have created PBDs both within

and beyond California. For example, Pasadena established a PBD in 1993, using revenue to revitalize its historic downtown area. The PBD has created a dedicated funding stream for improvements, including street tree planting, sidewalk maintenance, and the installation of street furniture and light fixtures (MDT 2012, CD&A 2008). This may present an opportunity to finance a portion of San Francisco's street tree costs; however, this strategy requires additional analysis to determine the likely amount of revenue to be generated for street trees, along with the potential for adding parking meters in new areas of San Francisco.

### **County Service Areas**

A County Service Area (CSA) is a form of special assessment that allows counties to levy fees for the provision of a wide range of services, pursuant to California's County Service Area Law. CSAs can provide both basic services not already provided by a county (e.g., police, fire) and additional services (e.g., expanded fire protection, parks and recreation maintenance). To initiate the formation of a CSA, a county may adopt a resolution or registered voters can petition the county. A special election is only required if a majority of registered voters protest (CTD 2012b). As with other special assessment districts, tree planting and maintenance is allowed under a CSA but is not typically the focus of such areas.

Because San Francisco is both a city and a county, this study evaluated the potential for a CSA to finance a street tree program. However, CSAs are intended primarily for unincorporated areas; therefore, any further exploration of this strategy should involve the City Attorney. For example, Napa County has several CSAs, one of which provides expanded fire protection, street lighting, street sweeping, and median landscaping to residents in a portion of the county's unincorporated area. The CSA has three benefit zones, each receiving different types of services. For example, Zone 1 only receives street landscaping services. The assessments levied differ by zone because of the different services provided. Napa County has expanded the services of this CSA and updated the assessment amounts over time, as new development has increased the demand for services (Napa 2011).

### **Mello-Roos Community Facilities Districts**

The Mello-Roos Act of 1982 authorizes local governments to create Community Facilities Districts (CFDs) and levy special taxes to finance a wide range of improvements and services. While special assessment districts have limited use for capital projects, CFDs can finance the construction of major improvements (e.g., new infrastructure), with the authority to issue bonds to generate additional revenue, if needed. This flexibility makes CFDs particularly suitable for large-scale projects developed over several phases (Bort 2006). Assessments are levied on property owners within a CFD, which typically forms around a new development or existing neighborhood. CFDs require approval by two-thirds of residents or—if fewer than 12 registered voters live in the CFD (in the case of an undeveloped area)—approval by the landowner. It is this last provision that makes CFDs particularly attractive as a tool to finance greenfield developments, although urban areas can use them for infill development, especially for large redevelopment projects that require a development agreement.

San Francisco has a number of CFDs throughout the city (e.g., Rincon Hill, Mission Bay). Redevelopment of the Mission Bay area involved the creation of three CFDs, two of which issued bonds to help finance over \$400M in infrastructure improvements. A third CFD was established to levy a special tax for park and open space operations and maintenance on 35 acres of land. Because the land was formerly industrial and mostly vacant, creation of these CFDs required landowner approval only (SFRA 2009, EPS 2010). The City of Beverly Hills also created a CFD to finance \$16M in infrastructure improvements, including streetscape and landscape capital projects, on the 70-acre Golden Triangle shopping district. As with Mission Bay, the presence of fewer than 12 registered voters on the land meant that only land approval was needed (CD&A 2008). Because of its requirements for two-thirds resident approval, and common

application for large-scale developments, Mello-Roos CFDs are not likely to be an appropriate tool for financing street tree program in San Francisco.

### **Service Fee**

Several opportunities for levying service fees exist, despite the constraints of Proposition 218. The Tree Planting Act of 1931 authorizes local governments to levy fees for the planting and removal of trees. Local agencies may also levy fees for street tree maintenance; however, the law limits maintenance fees levied on any property owner to five years, which would not allow San Francisco to implement routine maintenance over the long term. No ballot approval is required for a local government to implement this type of fee, although a protest by a majority of property owners adjacent to the frontage involved terminates it (California Streets and Highways Code, Section 22080-22096). Although this approach may allow San Francisco to cover the costs of tree planting and removal, it is likely not appropriate for a comprehensive program because of its focus on individual property owners. Furthermore, Proposition 218 may limit the use of service fees, and therefore, any further exploration of this mechanism should involve the City Attorney. The City may encounter multiple protests from property owners who do not wish to have trees planted, potentially undermining efforts to increase the canopy and creating more administrative work for DPW staff.

The City of San Jose currently bills property owners for emergency response and service requests. Property owners have the option of hiring contractors or using the City's urban forestry staff for a fee. The City's street tree ordinance, which has required property owners to care for street trees in the public right of way since 1951, authorizes the City to levy fees for services that the City provides instead. San Jose may also levy maintenance fees for property owners who fail to maintain street trees, although the City rarely uses this tool. The City also has a financing plan for property owners who cannot afford to cover the costs of street tree-related emergencies (Mize, pers. comm., 2012).

### **General Fund**

San Francisco's General Fund has historically funded a share of street tree planting and establishment activities through the Capital Improvement Plan (CIP). However, appropriations have declined significantly in recent years, straining DPW's ability to care for street trees and spurring their relinquishment to property owners. In addition, CIP has typically funded planting and establishment, rather than long-term maintenance. Because it is not a dedicated funding stream, and is subject to changing economic conditions and political support, the General Fund is a volatile funding source. Non-essential services are the first target for cuts when expenditures exceed revenues, and there is no guarantee that one year's appropriations will equal the next, as the City's current reduction of funding for street trees demonstrates. Given the current status, reliance on San Francisco's General Fund is not ideal for long-term planning of a program that will require a substantial commitment of resources (e.g., new staff, funding for partners).

Adequate General Fund support is an important component of financially stable street tree programs in other cities. For example, Santa Monica, widely considered to have one of the most well-run street tree programs, depends entirely on its General Fund. Appropriations have increased substantially in recent years. In 2008, while most of the City's departments and urban forestry budgets across the state experienced cutbacks because of the economic downturn, Santa Monica's urban forestry budget grew. This continued support can be largely attributed to strong support from the City Manager, City Council and community (Warriner, pers. comm., 2012). Sacramento and Davis also rely on their respective General Funds, which they supplement with additional funding streams. Conversely, cities that do not receive General Fund appropriations for street trees, such as San Jose and Redwood City, have limited abilities to care for their street trees, and the responsibility lies with property owners. A mixed General

Fund and Special Assessment model is often considered an appropriate compromise but can lead to decreases in General Fund budget allocations over time, as the assessment bears a large share of the burden of maintenance.

### **Carbon Offsets**

In 2006, California enacted the Global Warming Solutions Act, also known as Assembly Bill (AB) 32, requiring the state to reduce its emission of greenhouse gases (GHGs) to 1990 levels by 2020. In response, the California Air Resources Board (ARB) has initiated implementation of a “cap-and-trade” program that establishes a cap on GHG emissions and auctions emissions allowances to major emitters of GHGs (e.g., power plants, industrial facilities). Regulated entities can then trade allowances, with those who emit fewer GHGs than permitted able to sell credits to those who exceed their allowances. The Compliance Offset Program allows projects that reduce GHG emissions or sequester carbon to count towards compliance with cap-and-trade requirements (ARB 2012). California’s first cap-and-trade compliance period, and hence regulated carbon market, will commence January 2013. In addition, the Climate Action Reserve currently administers North America’s voluntary carbon market. Both markets include forest and urban forest projects, and therefore, may present opportunities for financing a portion of San Francisco’s street tree program.

The sale of carbon offset credits requires registration with ARB or the Climate Action Reserve. Both entities follow a similar protocol for urban forestry, which sets forth rigorous requirements for project approval and the quantification, monitoring and reporting of carbon sequestered (ARB 2011). Eligible projects must plant at least 1,000 trees in new sites (not replacement trees), as offset projects require the sequestration of additional carbon (Warriner, pers. comm., 2012). In addition, all projects must undergo independent verification every six years to ensure protocol compliance (ARB 2011). The rigorous requirements would demand upfront investment and a strong commitment to regular maintenance to guarantee a permanent (100-year) increase in carbon sequestered. The sale of carbon credits alone would not likely cover the transaction costs of participating in an offset program, unless it involved planting a large number of trees (at least 5,000), to leverage the benefits of economies of scale. It is likely possible to undertake a multi-year planting plan that adds trees over time, subject to approval by ARB or the Climate Action Reserve (McPherson, pers. comm., 2012). While the sale of carbon credits may help subsidize the cost of a municipal street tree program in San Francisco, it would, in effect, create two types of street trees, with those qualified for offsets in need of a higher level of oversight.

Santa Monica, in partnership with the U.S. Forest Service, is the first city to test California’s carbon offset program for urban forestry and is currently awaiting approval for registration with the Climate Action Reserve. The City’s Greenhouse Gas Tree Planting Project will plant 1,000 new broadleaf street trees by the end of 2012, in areas with no or little canopy coverage. The City specifically identified new sites with little chance of future disruption, such as established residential areas, to minimize any disturbance to the trees. The plan submitted to the Climate Action Reserve proposed monitoring the trees separately for the first three years to ensure growth and survival, and then incorporating them into their city maintenance program. Tree growth and carbon sequestration will be recorded and reported every two-to-five years, depending on Climate Action Reserve direction (Warriner, pers. comm., 2012).

Initiation of Santa Monica’s program has involved a considerable investment of time and money, and the sale of carbon credits will not likely cover the costs. The 1,000 new trees will sequester 5,000 metric tons of carbon, which, at between \$10 and \$15 per ton, will provide \$50K-\$75K in revenue. The application process has been especially cumbersome, and since Santa Monica is the first city to test the urban forestry protocol, some elements have not been applied before. The City has increased staffing (through additional General Fund allocations) to plant the new street trees, although a grant from the South Coast Air Quality Management District has partially offset costs. Santa Monica residents have also voiced

considerable opposition to the program, because the planting of broadleaf trees along palm-lined boulevards would change the aesthetic. The City has engaged in considerable public outreach, and from startup to approval the program will have taken four years. Despite these hurdles, Santa Monica views the program as one that will demonstrate the value of its greater urban forest and help build public support for the ongoing care of its street trees (Warriner, pers. comm., 2012).

## **Partnerships**

A number of opportunities for partnerships exist to help implement a municipal street tree program in San Francisco and cover a portion of the costs. Continued collaboration with FUF would advance the City's planting agenda, particularly if DPW does not have the resources to conduct all of the work. Sacramento, Davis and Portland all partner with local non-profit organizations that conduct regular tree planting. Public agencies, such as the US Forest Service and regional air quality management districts, may also provide grant funding, although these are typically one-time contributions rather than a sustainable funding source.

Although a model commonly used by non-profit organizations, corporate partnerships may present an opportunity for financing a share of San Francisco's street trees planting and maintenance activities. DPW's Adopt-A-Tree Fund accepts donations for street tree activities, but a formal corporate partnership program could be a component of corporate social responsibility programs, particularly for San Francisco-based businesses. In particular, large goals like doubling the City's canopy may attract corporate partners interested in environmental stewardship and a positive public image. PG&E, headquartered in downtown San Francisco, made over \$23M in grants in 2011 through its Community Investment Program. Emphasizing the benefits of street trees, such as clean air and water, may expand the pool of funders to areas like public health. For example, in 2010, Kaiser Permanente contributed over \$89M for community programs and has partnered with the East Bay Regional Park District to promote increased access to trails for fitness purposes. Development of a corporate partnership program would likely require significant fundraising and outreach efforts on DPW's part and may place the City in competition with non-profit organizations or foundations with highly organized fundraising programs based in San Francisco, such as the Golden Gate Parks Conservancy and the California State Parks Foundation. Some funders may prefer to contribute to non-profits, and so it may make sense to partner closely with a local organization, such as FUF. Ideally, corporate contributions would be regular, so that the City could rely on a sustainable funding stream.

## **Urban Forestry Joint Powers Association**

A number of public agencies and other entities beyond DPW fund or have an interest in street tree activities in San Francisco. For example, SFMTA and PG&E trim trees to keep them clear of overhead transit and power lines, respectively. Street trees help mitigate air quality impacts of freeways and other major roadways, which can benefit Caltrans and SFCTA. Similarly, street trees retain and divert storm water runoff from the sewer system, a benefit to the San Francisco Public Utilities Commission (SFPUC). Overlapping interests in street trees may create an opportunity for a unified urban forestry program, such as a Joint Powers Authority, to coordinate on planting and maintenance and engage in cost-sharing. This option requires additional analysis of issues such as feasibility, potential cost savings, the involvement of other agencies and organizations, and fair share contributions that reflect the relative benefits enjoyed by the various parties.

Table 12. Street Tree Financing Options

FINANCING OPTIONS	ATTRIBUTES	PROCESS	OPPORTUNITIES	CHALLENGES	PRECEDENTS
<b>Most Feasible Options</b>					
Landscape and Lighting District (LLAD)	Special assessment for landscaping, lighting, open space improvements and acquisition	City agency/property owners initiate via petition, City agency administers; based on benefits calculated in engineer's report; >50% of property owners in proposed assessment district must approve via mail ballot	Citywide LLAD possible for all street trees; individual LLADs more feasible in areas with many trees, high maintenance needs and/or political support	Typically funds more than just street trees	Sacramento citywide LLAD funds 100% of street tree program; Oakland citywide LLAD; San Jose considering \$100/tree property-based user fee for street trees
Parcel Tax	Assessment levied independent of property value, can be equal amount per parcel or dependent on lot size	2/3 of voters (not just property owners) must approve via election ballot	Tax can be directly related to program costs; maintenance taxes deductible for property owners	2/3 voter approval; potential competition from other services (e.g., schools); flat tax distributes cost inequitably	Davis Parks Maintenance Tax replaced LLAD in 1998, renewed for 3rd time in June 2012, tax too low (\$49/parcel) to be sustainable
General Obligation (GO) Bond	Low-interest loan for capital projects & improvements; repaid by levying tax revenue	2/3 voter approval required	Frequently used tool in San Francisco, with precedent for tree planting	Funding provided for set period; maintenance ineligible for funding	2011 Road Repair and Street Safety Bond; 2009 Safe Streets and Road Repair Bond
<b>Additional Options</b>					
Maintenance Assessment District (MAD)	Special assessment for maintenance of open spaces, parks, playgrounds and other public areas	City agency/property owners initiate via petition, City agency administers; based on benefits provided through engineer's report; >50% of property owners in proposed assessment district must approve via mail ballot	Citywide MAD possible for all street trees; individual MADs more feasible in areas with many trees, high maintenance needs and/or political support	Typically funds more than just street trees	San Jose - 13 small MADs for landscaping, including street trees; San Diego - 52 MADs for various services, including street trees
Community Benefit District (CBD)	Special assessment for revitalization, economic development, streetscape improvements and security	Property owners initiate via petition, non-profit board administers; based on benefits calculated in engineer's report; >50% of property owners in proposed assessment district must approve via mail ballot	Feasible in areas with high pedestrian volumes, business concentrations, maintenance needs and/or political support	11 existing CBDs, most authorized to plant and maintain street trees; citywide CBD not likely feasible; typically funds more than just street trees, commercial area focus	Greater Union Square, Tenderloin North Market, Fisherman's Wharf, Noe Valley, Castro, 2500 Block Mission, Central Market, Yerba Buena, Ocean Avenue, Civic Center, Tourism Improvement District
Parking Benefit District (PBD)	Variant of CBD, revenue stream from parking meters for range of ROW and streetscape improvements and maintenance	Enacted via local ordinance specifying boundaries, rates and use of funds; City agency administers with input from advisory committee	No ballot approval required; visitors bear burden over residents; revenue can be expended beyond district boundaries; Livable City spearheading campaign in SF	Current policy guarantees excess meter revenue to MUNI, amendment required for trees beyond transit-related streetscape; typically funds more than street trees	Pasadena, West Hollywood, Santa Monica PBDS include funding for street and streetscape improvements

FINANCING OPTIONS	ATTRIBUTES	PROCESS	OPPORTUNITIES	CHALLENGES	PRECEDENTS
County Service Area (CSA)	Special assessment for expanded services provided by counties, typically in rural areas	Registered voters initiate via petition or county adopts resolution, Board of Supervisors administers; based on benefits calculated in engineer's report; terminated if over >50% of voters or property owners protest	Covers wide variety of services; potential to focus specifically on street trees	Appears limited to unincorporated areas, likely inapplicable; terminated if over >50% of voters or property owners protest	Napa County Fire Protection and Street Maintenance Assessment District
Mello-Roos Community Facilities District (CFD)	Special tax for range of improvements and services, typically for new developments & capital projects but growing use in urban areas for streetscape maintenance	Registered voters initiate via petition or City Council adopts resolution; 2/3 of residents (not just property owners) must approve in areas with more than 12 residents	Assessment can be directly related to program costs; feasible in areas with high pedestrian volumes, business concentrations, maintenance needs and/or political support	2/3 voter approval; infeasible as a citywide tool; typically funds large capital projects for greenfield developments	Mission Bay CFD for parks & open space; Beverly Hills landscape CFD ; both had <12 residents, so only 2/3 of property owners required to approve, not residents
Service Fee	Tree Planting Act of 1931 authorizes assessment of property owners for planting, maintenance, removal of trees along city streets and City employee labor	City Council resolution required detailing planned work, demonstrate special benefit to adjacent street frontage	No ballot approval required; focuses specifically on street trees; establishes dedicated fund	Maintenance assessment limited to 5 years; terminated if over 50% of adjacent property owners protest; potential legal hurdles/ conflict with Proposition 218	San Jose bills property owners for emergency response and service requests, per street tree ordinance; authority to charge for maintenance if property owner does not provide care
General Fund	City's primary funding pool for wide range of municipal services	Annual budget appropriations via City's legislative process	History of funding for tree planting and establishment, grant funding for partners (FUF)	Volatile funding source, no guaranteed funding amounts; funds at risk if budget shortfalls	Funds a small portion of DPW street trees; 100% of Santa Monica's street tree program; significant portions in Sacramento and Davis
Partnerships	Non-profits, corporate partners and grant funding, primarily for tree planting and establishment	Various, depends on City's processes	Decrease costs, increase capacity	Union resistance, sustainable funding stream required	FUF tree planting, Kaiser Permanente funds EBRPD trails program; PG&E Community Investment Program
Urban Forestry Joint Powers Authority	Cost sharing among entities with street tree responsibilities & benefits (e.g., SFCTA, SFPUC, Caltrans, PG&E, SFMTA)	Internal collaboration among City agencies and others	Existing study (USFS) quantify economic benefits of San Francisco trees; SFPUC's SSIP program currently evaluating green infrastructure benefits	Requires negotiation and hard data to display economic share per agency/benefit; additional analysis required	

## CASE STUDY INSIGHTS

Beyond the examples provided under each of the funding options described above, interviews with select cities revealed additional insights on securing financing in general, notably related to support among residents and government leaders.

### **Long-Term Street Tree Management Plan**

The benefits of a long-term management plan for the planting and maintenance of street trees citywide was a recurrent theme among a number of the cities contacted as part of this study. Santa Monica reports that the preparation of a management plan helped demonstrate a need for a higher level of maintenance and build support among the community. The result was increased support among municipal leaders and regular funding for urban forestry activities (Warriner, pers. comm., 2012). Davis has relied on its Community Forest Management Plan to understand the overall size, health and needs of its street trees, and Sacramento hopes to prepare a long-term plan in the near future (Cain, pers. comm., 2012; Benassini, pers. comm., 2012).

### **Public Outreach**

Several cities interviewed emphasized the importance of public outreach to garner support for funding street tree maintenance. Santa Monica encountered vocal community opposition to the removal of prominent trees that were in poor health. In response, the City initiated extensive outreach in connection with the preparation of its urban forest master plan, which heightened awareness of urban forestry issues and made them a priority among the community. Resulting pressure by community activists on the City Council ultimately led to increased funding for implementation of the master plan and regular maintenance of Santa Monica's street trees. In addition, Santa Monica reports that its City Manager is a strong urban forestry advocate, and the City has repeatedly increased its funding for street tree maintenance, including diverting funds from other programs to ensure an adequate level of care (Warriner, pers. comm., 2012). San Jose intends to conduct community outreach to increase the public's understanding of the importance of street tree maintenance and build support for transferring responsibility to the City and levying the funds to do so (Mize, pers. comm., 2012). Although Portland requires property owners to care for all street trees, the City conducts extensive education and outreach regarding the importance of routine maintenance (Cain, pers. comm., 2012).

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# 4. FINDINGS + RECOMMENDATIONS

This chapter presents major findings and recommendations for San Francisco to move forward with a comprehensive municipal street tree program. Recommendations for the most feasible program, cost savings, financing options and additional actions are discussed below, based on this study's findings.

## STUDY FINDINGS

**A municipal street tree program results in net benefits for San Francisco residents.** Under a comprehensive municipal street tree program, property owners who currently care for street trees would no longer be required to maintain trees or repair sidewalks damaged as a result of a street tree. In addition, the City would cover the liability associated with tree-related sidewalk falls, which have averaged just over \$23,000 per claim over the past eight years. A municipal program would save property owners between \$10 and \$65 per tree annually compared to current costs (estimated at between \$160 and \$175 annually) incurred for maintenance, sidewalk repair and claims associated with sidewalk falls. All street trees would receive regular assessment and maintenance (under a five-year pruning cycle on average) from qualified arborists to ensure a high standard of care. Property owners and the City would benefit from economies of scale, as efficiencies associated with caring for all street trees would drive costs down. A comprehensive street tree program would entail not just maintenance, but would expand San Francisco's urban forest, by 50 percent, benefitting residents citywide.

**Routine maintenance is more efficient and cost effective.** The majority of DPW's current street tree work involves responding to service calls and emergencies, with routine pruning comprising only about 20 percent of maintenance activities. By assuming responsibility for all trees in the public right-of-way, DPW could implement block pruning and double the number of trees routinely pruned each year without any increase in its labor force. Routine maintenance could cut DPW's per tree maintenance costs by as much as 50 percent with block pruning rather than the current approach of responding to emergencies and service requests, thus providing only spot maintenance. Preventive maintenance also translates into fewer emergencies, which are more labor intensive and therefore more costly than routine pruning. Routine maintenance would further reduce costs by releasing the City from a portion of claims payments because it can effectively argue that it took all necessary precautions to assess and maintain trees (Warriner, pers. comm., 2012). The City's risk would further decline with sufficient funding it to perform routine inspections and keep sidewalks in good repair.

**Augmenting DPW staff with contractors could increase capacity while minimizing costs.** Other cities with comprehensive urban forestry programs often rely on contractors to handle a range of activities, such as increased pruning, post-storm maintenance, and intense bursts of tree planting. Supplementing City staff with contractors—both private and non-profit (e.g., Friends of the Urban Forest)—would help manage program costs (e.g., staff, equipment purchase and maintenance); costs would increase by approximately 45 percent by sizing DPW staff to meet these demands. The use of contractors would enable the City to save on both staff costs and the purchase and maintenance of equipment. Even so, the core municipal staff (DPW) would grow under the creation of a comprehensive municipal urban forestry program.

## RECOMMENDATIONS

### Program

**Pursue a program of moderate street tree expansion**, increasing the number of trees in San Francisco's right-of-way by 55 percent. The addition of nearly 2,900 trees per year (plus replacement trees) was found to be the most feasible approach, given the costs associated with a more ambitious planting scenario. Average annual costs for all program elements (Planting, Establishment, Maintenance, Sidewalk Repair and Non-Sewer Claims) under the Moderate Planting scenario would total between \$25.1M and \$33.6M over 20 years, with the use of contractors. Under a municipal program, property owners would no longer be responsible for pruning and sidewalk repair. All street trees would receive regular maintenance (under a five-year pruning cycle) from certified arborists to ensure a high standard of care. In addition, property owners would not be liable for sidewalk falls resulting from street trees, which have averaged just over \$23,000 per claim over the past eight years. At its most efficient, this scenario would save property owners \$65 per tree each year compared to the current cost to maintain street trees privately (\$160-\$175 per year), with the added benefit of substantially growing the urban forest.

### Financing

**Fund capital costs with outside sources**, specifically for street tree Planting and Establishment. Funding capital costs with outside sources would complement either a special assessment or parcel tax focused exclusively on O&M, as described below. Under the Moderate Planting scenario, capital costs would average \$8.9M-\$11.5M per year over 20 years. Although GO bonds that include monies to improve the City's streets and streetscapes are an option, they will still result in a cost to the City. Alternatively, capital costs could be funded through grants or in kind contributions from public and private sources. While properly financing ongoing O&M activities can be difficult, capital sources have historically been more accessible, either through private grants or through state and federal dollars. An assortment of resources is currently available to the City for tree planting, including plantings by FUF and Proposition K funds, state grants and capital improvement program funds.

**Levy a parcel tax based on street frontage to fund ongoing maintenance of San Francisco's street trees**, specifically Maintenance and Sidewalk Repair activities. This would fund the O&M of all existing street trees, as well as O&M of new trees planted with separate, capital funds. O&M activities average \$14.4M-\$20.3M per year over 20 years under the scenario discussed above, with the use of contractors. A tiered parcel tax, by frontage brackets, would mean annual fees of \$15-\$25 for most apartments (0-7 linear feet of frontage); \$39-\$50 for most residential lots (7-30 linear feet of frontage); \$102-\$146 for most corner lots, large residential lots, and small business lots (30-150 linear feet of frontage); \$350-\$492 for most large non-residential lots; and \$1,585-\$2,234 for most very large commercial lots. These parcel taxes are roughly proportional to \$1.55-\$2.10 per linear foot of frontage, and should be increased annually by 3 percent to account for inflation. . These figures are substantially less than if Planting and Establishment were included. Limiting the funding required from property owners or residents would increase the likelihood of approval. To balance realistic programmatic costs with political feasibility, this study recommends levying the lower ranges of the fee spectrum (for the Moderate Planting scenario, with the use of contractors): \$15 for properties with 0-7 linear feet of frontage; \$38 for properties with 7-30 linear feet of frontage; \$102 for properties with 30-150 linear feet of frontage; \$350 for properties with 150-500 linear feet of frontage; and \$1,585 for properties with over 500 linear feet of frontage. To administer this tax, partial fee revenue from initial years must be saved to create a reserve fund for the proceeding year, when programmatic costs are higher due to an increased number of street trees. [Alternatively, given different proportionality assumptions and the significant numerical sensitivity in the parcel tax determination, an alternate fee schedule would levy \$26 for properties with 0-7 linear feet of frontage; \$52 for properties with 7-30 linear feet of frontage; \$98 for properties with 30-150 linear feet of

frontage; \$345 for properties with 150-500 linear feet of frontage; and \$762 for properties with over 500 linear feet of frontage, again representing the lower range of the fee spectrum (for the Moderate Planting scenario, with the use of contractors).]

### **Cost Savings**

**Reduce the use of truck drivers** to realize additional cost savings. Current union agreements require that a truck driver accompany DPW crews on all maintenance jobs, even though all City arborists hold commercial drivers licenses, allowing them to operate large trucks. Requiring a truck driver to accompany maintenance crews only when the additional manpower is required (i.e., for emergencies or large tree removals), rather than for all maintenance, would decrease DPW's per tree maintenance costs by more than 20 percent. This reduction would further decrease the funds levied on San Francisco residents.

**Complete the City's street tree inventory** for street trees transferred from private to public responsibility. DPW is in the process of conducting a pilot inventory for all street trees in three neighborhoods to gain information about tree species, condition and maintenance needs, in order to inform the broader planning effort underway for San Francisco's urban forest. However, the agency has limited information about the two-thirds of street trees currently in the private domain. A comprehensive street tree inventory will ensure that DPW obtains accurate data for all trees in the public right-of-way. Accurate data yields considerable efficiencies, facilitating block pruning and tracking of maintenance history, ultimately helping to manage costs.

### **Additional Actions**

**Develop a Street Tree Management Plan** to clearly outline DPW's planting and maintenance plans over the long term. A management plan would enable DPW to plan for the succession of trees, create planting plans and identify capital funding needs. A management plan would also help to leverage economies of scale and reduce costs by implementing block pruning. Other urban forestry leaders note the importance of long-range master plan as a tool that can help plan for regular maintenance, and demonstrate this need to the community and municipal leaders, thereby garnering support and regular funding for street trees.

**Undertake a comprehensive public outreach campaign** to elevate awareness of the importance of San Francisco's urban forest. A municipally-operated street tree program represents a dramatic shift from the current approach, in which property owners have responsibility for maintaining two-thirds of the City's street trees. An educational campaign that explains the municipal program and its benefits to property owners, as well as the challenges of the current approach, can help build support for San Francisco's urban forest. Property owners who currently care for street trees will be relieved of their responsibilities and see their costs decline, and many others will receive street trees in front of their homes. Other cities that have successfully increased funding for their urban forestry programs, including from property owners, have relied upon public outreach as an essential tool for success. This is a crucial step before launching any campaign to levy additional funds from San Francisco residents, as it will not only communicate the funding required from the public but also illustrate the benefits to all residents.

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