Richmond City Council

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OFFICE OF THE CITY AUDITOR

REPORT # 2010-07
AUDIT
oF the

Department of Public Works
Urban Forestry Division

January 2010

OFFICIAL GOVERNMENT REPORT

Richmond City Council
OFFICE OF THE CITY AUDITOR
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Committed to increasing government efficiency, effectiveness, and accountability on behalf of the Citizens of Richmond.

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January 27, 2010

The Honorable Members of Richmond City Council
The Richmond City Audit Committee
Mr. Byron C. Marshall, CAO

Subject: Community Development – Permits & Inspections Audit

The City Auditor's Office has completed an audit of the Urban Forestry Division of the Department of Public Works. The audit covers Urban Forestry activities for the fiscal year ended June 30, 2008. This audit was conducted in accordance with Generally Accepted Government Auditing Standards issued by the Comptroller General of the United States. The purpose of this audit was to assess the effectiveness and efficiency of the DPW-Urban Forestry Division operations.

The Division is responsible for planting, maintaining and removing trees on sidewalks, parks and other City facilities. In FY 2008, the City spent over $2.2 million on these activities.

The following are the salient findings of this audit:

- ***Management***

  Management of this function needs improvement. Auditors observed that:

- The Division could not account for approximately 15,800 (52%) out of 30,600 available productive hours. Without accountability, it is not possible to determine if the staff's productivity is adequate.
- The Arborists spent approximately five hours per day performing administrative tasks. This means that only three hours per day are being spent performing core activities including supervising work crews. Without adequate supervision by the Arborists, the field crews may not get proper direction and be adequately productive.
- The Urban Forestry Division does not have a comprehensive listing of trees in their inventory. Without this information, it may not be possible to plan for the maintenance of these trees.
- The Division does not have a master plan for managing the City's urban forest. Effective management of this function may not be possible without proper short-term and long-term planning. It is an important tool that establishes a clear set of priorities and objectives that could assist the Division and the community in developing management plans to:
  - decrease the risk and the cost associated with tree branch failures;
  - maintain a healthier urban forest; and
  - help beautify the City and create a community identity.
- According to the City's tree purchasing/planting contract, the vendor warrants life sustainability for the first year after the tree is planted and is required to replace a tree failure that occurs during that period. The audit tests identified that 10 (18%) of 55 trees inspected were dead. The Division personnel did not perform follow up visitations to the newly planted tree locations, as required.
- According to financial data provided by management, audit analysis revealed that the Division expends most of its resources in tree removal. A small fraction of the total budget is expended on tree planting and tree trimming. It appears that the Division is primarily focusing their efforts on tree removal rather than maintenance and new tree planting. In FY 2008, the City removed 2.95 trees for every tree

planted. Consistently removing more trees than new plantings would deplete the tree inventory further.

- Apparently, the Division did not expend sufficient funds required for:
  - Watering
  - Fertilization
  - Insect and Disease Control
  - Cabling and Bracing
  - Other Tree Care

- ***Hazardous Trees***
  - A tree becomes hazardous when its structure is compromised with defects that can cause failure of all or part of the tree. Recognizing hazardous trees and taking proper corrective actions minimizes personal injury and property damages. Many City trees become hazardous because of inadequate maintenance over the tree's life span. Auditors were provided a hazardous tree listing dated December 16, 2007 that had an inventory of 353 hazardous trees. The listing did not rank the hazardous trees based on the severity of the hazard. Without assigning proper rank, the Division may not be able to prioritize addressing the most hazardous situations.
  - Auditors observed conditions that could impact the safety of the citizens. Auditors witnessed trees directly touching power lines that put constant stress on live wires. The possibility of causing power outages, specifically during storms, is significant. Broken live wires could create a significant safety hazard. Recent efforts have identified that 28% of the City's street trees have a conflict or potential conflict with overhead utility lines.
  - The auditors observed a tree root system disrupting the sidewalk surfaces by elevating them causing a tripping hazard. The survey determined that 24.6% of the City's sidewalks have from ¾" to more than 3" heave conflicts due to trees disturbing sidewalk surfaces.

- ***Required Investment***
  - Planting trees in currently empty locations on the City streets could require about $7.7 million over 10 years, computed using current costs plus a historic inflation factor. The Division needs to seek policy guidance and funding to accomplish this task. It should be noted that this amount does not include the investment required for replacing trees in parks and other facilities.
- ***Internal Controls***
  - Based on the results and findings of the audit, auditors concluded that internal controls in the Division's procedures need improvement. One of the standard internal control procedures includes having a formal written policies and procedures manual. Written policies and procedures provide guidance to employees to perform their duties. Also, they can be used as an effective employee training tool. While Urban Forestry has numerous policies and procedures documents, a formal comprehensive manual has not been devised and distributed to the staff for their reference. Under these circumstances, established policies may not be followed consistently.

The City Auditor's Office appreciates the cooperation of the City staff during this audit. A written response to the report with an action plan and target dates for implementation has been received and is included with this report. Please contact the City Auditor's Office if you have any questions or comments.

Umesh Dalal, CPA, CIA, CIG
City Auditor

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2	***Once an inventory is established, perform future cyclic inventories of the City's street trees and park trees.***	**8**
3	***Schedule a follow-up of the performed sample inventory.***	**8**
4	***Seek funding to attain a desired stocking level for the City's streets and sidewalk locations.***	**8**
5	***Perform an aerial photography of the entire City to assess the state of the urban forest.***	**8**
6	***Establish standard recordkeeping practices for all urban forestry activities.***	**9**
7	***Enforce the tree planting program policy to ensure either survivability or replacement of newly planted trees.***	**9**
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22	***Develop a strategy to address elevated sidewalks due to the trees' root systems.***	**25**
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Introduction and Scope

Introduction and Scope

The City Auditor's Office has completed an operational audit of the Department of Public Works-Urban Forestry Division. This audit covers Urban Forestry activities for the fiscal year ended June 30, 2008.

This audit was conducted in accordance with Generally Accepted Government Auditing Standards issued by the Comptroller General of the United States. Those standards provide a reasonable basis for the auditor's conclusions regarding the internal control structure of the Urban Forestry Division and the recommendations presented. The scope of work included the review and analysis of the Division's plans, policies and procedures, budget and resource allocations, inventory systems and procedures, inspection and maintenance plans, and the adequacy of monitoring and controlling urban forestry activities.

Audit Objective

The purpose of this audit was to assess the effectiveness and efficiency of the DPW-Urban Forestry Division operations.

Methodology

To accomplish the objective, the auditor performed the following procedures:

- Interviewed Division personnel;
- Reviewed and evaluated relevant policies and procedures;
- Reviewed and analyzed the relevance of data maintained; and
- Performed other audit procedures as deemed necessary.

Background

The mission of the Urban Forestry Division demonstrates a commitment to the care, conservation and growth of Richmond's street trees and urban

forest. Trees were long considered simple aesthetic amenities; however, research demonstrates that trees perform as "green infrastructure" to mitigate many of the problems plaguing growing urban areas. Among other benefits, trees help:

There are several benefits of maintaining an urban forest

- Improve air quality;
- Improve water quality by reducing storm water runoff;
- Save energy;
- Extend the life of paved surfaces (shade protection); and
- Increase traffic safety (lowers driver speed and protects pedestrians).

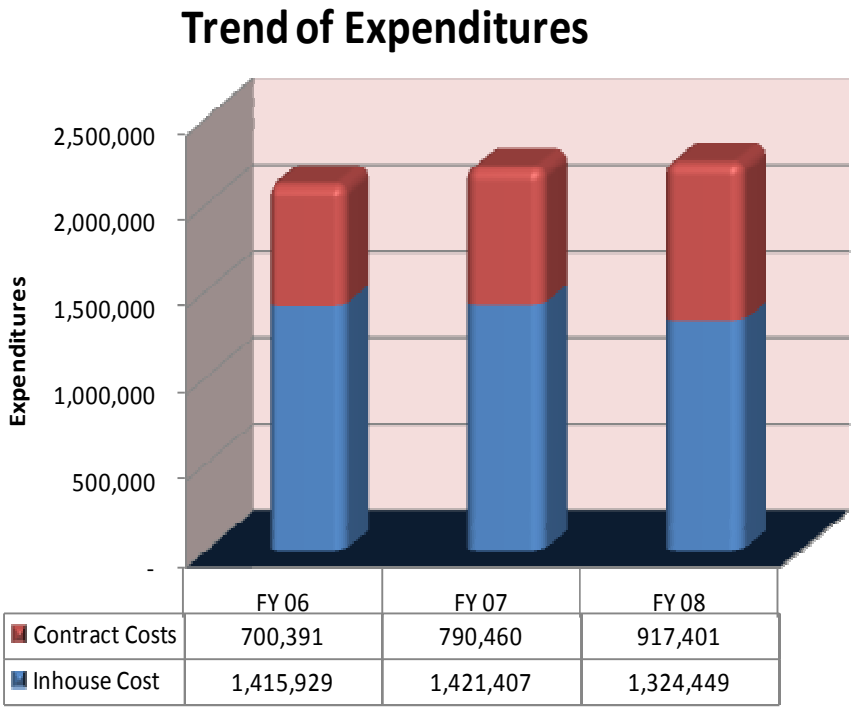
The Division maintained an anecdotal count of more than 150,000 City-owned trees that consisted of more than 100 species in the City's neighborhoods, streets, and parks in accordance with a 1992 City ordinance. The Division's roles and responsibilities include:

- Citywide tree maintenance support;
- Citywide storm response;
- Removal of dead trees and pruning of limbs;
- Managing the Adopt-A-Tree program;
- Planning, technical and logistics support for tree planting projects;
- Assisting with community education; and
- Support for Arbor Day, Earth Day, Project W.A.R.M and other programs.

Trend of Expenditures

In FY 2008, the Urban Forestry Division operations had expenditures of approximately $2.2 million and an authorized staffing of 19 employees.

The City invests over $2 million annually to maintain its urban forest



	FY 06	FY 07	FY 08
Contract Costs	700,391	790,460	917,401
Inhouse Cost	1,415,929	1,421,407	1,324,449

Source: DPW

Between FY2007 and FY2008, expenditures for contract services increased by 16%. These changes were a direct result of staff reductions and an authorization to increase contract services to augment operational activities.

Observations and Recommendations

Management of the Function

For any organization to succeed, its operations must be properly planned, its workload and resources must be properly accounted for, and its employees' performance must be properly monitored and measured. This report examines the efficiency and effectiveness of the Urban Forestry Division in managing its operation and service delivery. For this purpose, the auditors evaluated:

- Recordkeeping;
- Planning;
- Workload and performance measurements; and
- Internal controls.

Recordkeeping

Recordkeeping is critical for managing any function. Proper recordkeeping consists of gathering information related to:

- Resources being managed;
- Workload;
- Cost effectiveness of activities performed;
- Assurances of proper service delivery; and
- Checks and balances in the Division's procedures.

Tree Inventory

The Division does not have proper records of tree inventory, workload or labor hours

The Urban Forestry Division is responsible for verifying and compiling records of the City's trees. However, they currently do not have up-to-date inventory records. These records have not been updated since the last inventory in 1994. The Division personnel are not aware of the total number of trees within their responsibility to manage and maintain. Without this information, it may not be possible to plan for the maintenance of these trees.

The Division contracted with a vendor for the performance of a partial 4% inventory throughout various City sections at a cost of $20,400. This inventory was completed and presented to the Urban Forestry Division in October 2009. The following information was provided by the sample inventory:

- The City presently has 47,333 street trees in comparison to the anecdotal 65,668 street trees indicated in the 1994 inventory.
- There are 36,743 unplanted street tree sites with 30,971 plantable sites, indicating the tree inventory presently populates 60% of available planting locations on City streets.
- The canopy cover as a percentage of total streets and sidewalks totals 6.60%.
- Eighty (80) different species were inventoried in the sample.
- Total citywide replacement costs of trees were determined to be $211,514,286.

The Division recently hired a vendor to perform a partial inventory of trees in the City's urban forest

It should be noted that the inventory performed by the vendor addresses trees on City streets. It does not take into account the trees planted on private or public properties including City parks. This occurrence prevents the City from determining total tree canopy coverage. The City of Richmond Urban Forestry Division was not aware of the coverage provided by all of the City's existing trees. While this sample inventory is a step in the right direction, the City cannot grow or maintain its urban forest without the proper knowledge base that a comprehensive inventory provides.

The vendor extrapolated sampled inventory (4% of tree population) results to depict the canopy coverage status of the City's total streets and sidewalks locations.

The vendor reported that the City's streets and sidewalks have 47,333 sites with trees planted in them. An additional 36,743 unplanted sites with only 30,971 plantable locations were also identified.

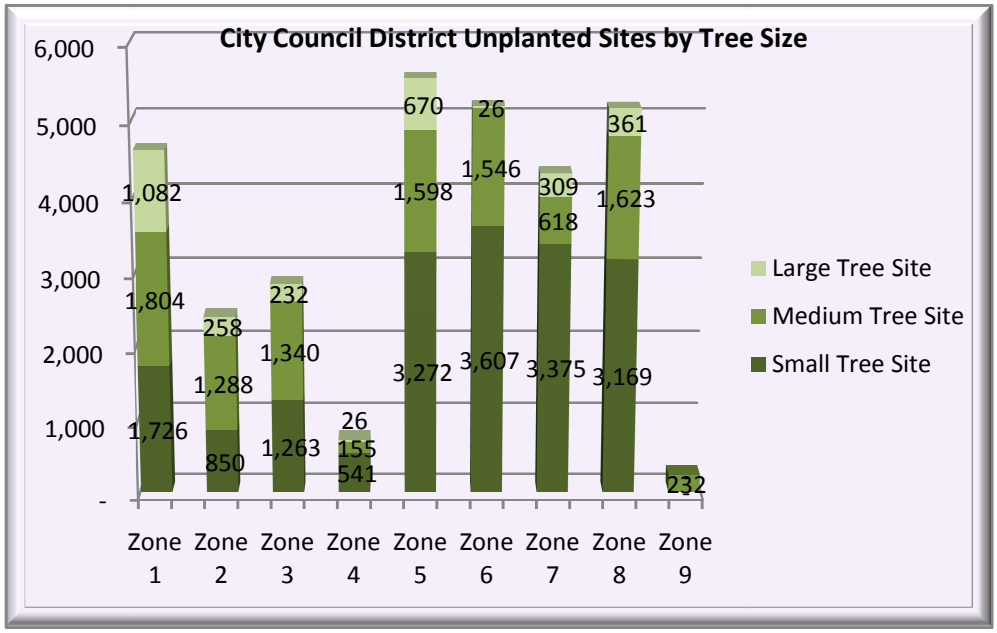
The auditors used the above information to compute funding needed to plant trees in the empty locations on City streets. This funding spread over a 10 year period using historical inflation rate and recent cost of tree ($215/tree) would result in the following annual requirements:

It will cost the City approximately $7.7 million over 10 years to plant trees on currently empty locations on the City streets

Period	Total $ Cost
Year 1	$665,855
Year 2	$687,828
Year 3	$710,527
Year 4	$733,974
Year 5	$758,195
Year 6	$783,215
Year 7	$809,062
Year 8	$835,761
Year 9	$863,341
Year 10	$892,119
TOTAL	$7,739,876

The sample inventory indicated the Council Districts where plantable sites were available and the tree sizes that those sites could accommodate as depicted in the following graph:

City Council Districts 1,5,6,7 and 8 have more than 4,000 empty locations on sidewalks where new trees can be planted



The American Forests organization suggests the minimum tree cover for USA east coast cities should be at 40% overall coverage in residential and business zones. The cities of Chesapeake, Norfolk and Virginia Beach have tree coverage of 36%, 33% and 38%, respectively.

The City cannot move forward to attain the overall 40% canopy coverage suggested by the American Forest organization until an urban and community tree canopy assessment can be made. This means that all residential, suburban, urban, and business district trees need to be identified. This identification process can be obtained through various means, such as satellite data imagery and/or field data collection.

Recommendations:

1. ***Conduct a complete tree inventory and identify relevant information, such as:***
    a. ***Tree species distribution***

b. Health and maintenance needs of the trees

c. Tree location

2. ***Once an inventory is established, perform future cyclic inventories of the City's street trees and park trees.***

3. ***Schedule a follow-up of the performed sample inventory.***

4. ***Seek funding to attain a desired stocking level for the City's streets and sidewalk locations.***

5. ***Perform an aerial photography of the entire City to assess the state of the urban forest.***

Planting of New Trees

Tree species diversity is a major objective of urban forestry management. A diverse tree population reduces vulnerability of the urban forest to be impacted by a species-specific pest or disease. Tree selection should consider factors such as drought resistance, shade density, seasonal flowering and leaf color variation, and hardiness to cold temperatures. The Urban Forestry Division Arborists create a listing each fiscal year for tree species and genera approved for planting.

The Division personnel did not perform inspections of newly planted trees as required by their policy

During FY 2008, the City planted 440 trees. The citizens participating in the Adopt-A-Tree Program were requested to water the trees during the first two years of the tree's life. The Urban Forestry Division was responsible for performing several inspections during the first year after trees were planted to ensure sustainability. According to the City's tree purchasing/planting contract, the vendor warrants life sustainability for the first year after the tree is planted and is required to replace a tree failure that occurs during that period.

The Division's established policy for new trees requires that inspections be performed no sooner than nine months after the installation date, but no later

than 11 months after the installation date. This allows sufficient time to give the planting contractor a list of trees that did not survive and need to be replaced.

The auditors visited fifty-five newly planted tree locations and found:

- Ten (18%) of those trees were dead.
- One additional tree was damaged by an automobile accident.

The Division did not have either present or future maintenance schedules noted for newly planted trees. The auditors noted that Urban Forestry management did not perform follow up visitations to the newly planted tree locations, as required. As a result, the Division did not request replacements for the dead trees indicated above. The Division does not have documented data to evidence their due diligence during the first year of a tree's life. Accordingly, the Division does not appear to be following the established policies. This causes loss of resources related to trees that died during the first 12 months of planting. The loss was the result of not notifying the vendor in a timely manner.

Recommendations:

6. ***Establish standard recordkeeping practices for all urban forestry activities.***

7. ***Enforce the tree planting program policy to ensure either survivability or replacement of newly planted trees.***

8. ***Implement a maintenance schedule for newly planted trees.***

Planning

The Division does not know the complete scope of their workload as they do not have information about the number of trees they are responsible for

maintaining. Therefore, the Division does not have adequate information to plan its operations and service delivery.

Without proper records the Division has been unable to formulate any maintenance and inspection schedules for monitoring, gauging and maintaining tree health. Currently, the Division personnel have not identified the risks associated with the City's urban forest.

Master Plan

There is no master plan to clearly set priorities for the Division

A master plan is an important tool that establishes a clear set of priorities and objectives that could assist the Division and the community in developing management plans:

- To decrease the risk and the cost associated with tree branch failures;
- To maintain a healthier urban forest; and
- To help beautify the City and create a community identity.

A master plan could help manage the risk of branch failures, maintain a healthier urban forest and beautify the City

The City does not have an urban forestry master plan. Effective management of this function may not be possible without proper short-term and long-term planning. Auditors were informed that the limited inventory data gathered by the Division will be used to develop an updated management plan and establish performance standards. Further, the partial inventory results will be used in an attempt to secure funding for a complete tree inventory. Some of the basic concepts of preparing a master plan are included in *Appendix A* to this report.

Recommendations:

9. ***Devise a management plan to protect the City's urban forest.***
10. ***Develop a master plan to set standards and priorities for maintaining and growing the urban forest.***

Workload and Performance Measurements

Mandated Tasks

The Division is required to provide the following standard services in accordance with the tree ordinance:

The City's Tree Ordinance requires a variety of maintenance activities

- **Tree Maintenance**
  - The inspection, trimming and removal of all City trees.
  - Newly planted trees require special treatment for the first two years.
- **Watering:**
  - Ample soil moisture to be maintained following planting; thorough watering each five to ten days, depending on soil type and drainage provisions, is usually adequate during the growing season.
- **Fertilization:**
  - Adequate essential nutrients to be made available in second year of growth.
- **Insect and Disease Control:**
  - Measures to be taken to control insects and diseases as determined from frequent and thorough inspections.
- **Pruning:**
  - Practices during the first few years following planting shall consist of removing dead, broken, or injured branches, the removal of girdling and damaged roots, uneven growth, and usually the removal of sucker growth.
- **Cabling and Bracing:**
  - To be placed approximately 2/3 of the distance between the crotch and top branch ends.
- **Cavities:**
  - Extensive cavity work to be performed on trees only if they are sufficiently high in value to justify the cost.
- **Tree Replacement**

- Replenishing of the City's tree population through a tree planting program.

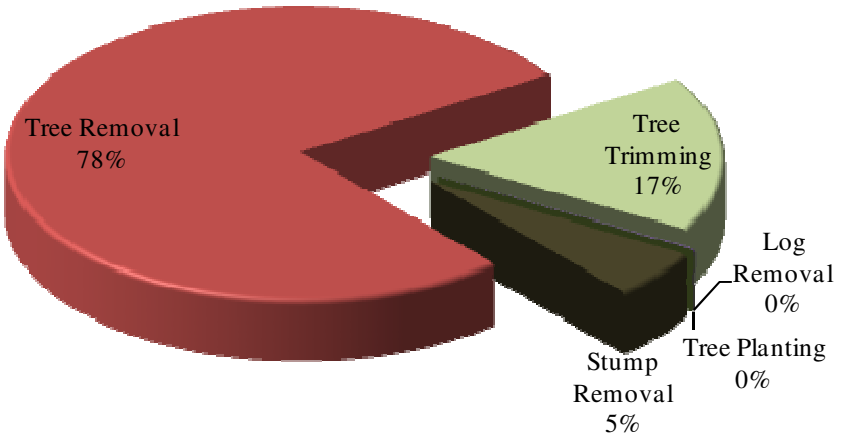
- **Emergency Care**
  - Perform healthy tree removals that refer to property improvements.
  - Perform hazardous tree removals for unsound trees that pose a threat to occupied dwellings or pedestrian or vehicular traffic.

Spending on Actual Work:

According to the financial data provided by management, audit analysis revealed that the Division expends most of its resources on tree removal. A small fraction of the total budget is expended on tree planting and tree trimming. The Division's expenditures are depicted in the following chart:

The Division mainly focuses on tree removal

Actual Work Performed by City Staff



Apparently, the City did not expend funds on:

- Watering
- Fertilization
- Insect and Disease Control

- Cabling and Bracing
- Other Tree Care

Based on the above analysis, it appears that the Division is primarily focusing their efforts on tree removal rather than maintenance and new tree planting. In FY 2008, the City removed 2.95 trees for every tree planted. Consistently removing more trees than new planting would deplete the tree inventory further.

In FY 2008, the City removed 2.95 trees for every tree planted. Consistently removing more trees than new planting would deplete the tree inventory further

According to the Urban Forestry sample inventory, there are 30,971 spaces on City streets that need to be planted. However, the Division has not developed a strategic plan to address this need.

It is not clear if the necessity of tree removal resulted from lack of proper maintenance. Dead trees would need to be replaced to maintain urban forest coverage. This results in the additional investment of public resources. Even trees planted under the Adopt-A-Tree program result in a loss when removed. Citizens are required to make a small contribution to this program for each tree planted. The City pays for the remaining cost of the tree.

Recommendation:

11. Revisit work plans prescribed by the City's Tree Ordinance and mandated work priorities.

Workload

The Operations Manager informed the auditor that only the work on citizen requests are documented on work orders. For FY 2008, 3,252 citizen requests were received. Of these only 1,261 were addressed and

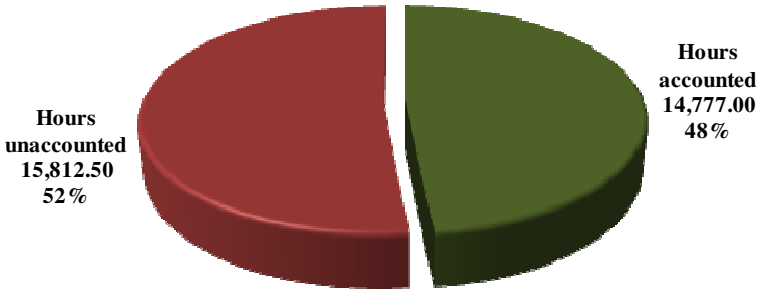
documentation was kept on formal work orders. The auditors do not have any evidence of any work done on the remaining requests.

Auditors were informed that the Arborists perform tree inspections based on citizen requests received. The inspection results are then used to determine whether tree trimming, pruning and/or removal activity needs to occur. The Arborists did not keep complete data related to their inspections. The Division does not have maintenance records for each tree it is responsible for maintaining. Without usable records, it may be difficult to deal with issues related to the appropriateness of maintenance provided. These records could help the Operations Manager to prevent and manage the loss of trees due to inadequate maintenance.

In FY 2008, the City Works system accounted for only about 23% or 7,161 hours out of about 30,590 possible productive hours for an operational staff of 17 employees. The Division's production log accounts for only 14,777 or about 48% of the possible productive hours.

There is no accountability over the Division's labor hours

Majority of Work Hours Not Accounted For



Based on the above information, it is not possible to evaluate the efficiency of this operation. In addition, due to the lack of operational data, the effectiveness of this function cannot be evaluated. Under these

circumstances, the Operations Manager is unable to determine if his crews have adequate productivity. Proper management of labor costs cannot be accomplished without complete information.

The Operations Manager is unable to determine if his crews have adequate productivity

According to the Operations Manager, performance measures had not been established to guide and measure employee performance. Lack of records and performance measurements may prevent proper management of this function. Under these circumstances, the function may not be able to contribute value to the City and its residents.

In October 2008, the Division attempted to establish a recordkeeping methodology for meaningful labor cost management. It had devised worksheets to capture the activities that occurred during work periods. The employees were instructed to list daily attended work locations, work type performed, the tree size (DBH), and the time expended to complete the job tasks. Management indicated that similarities in the collected data would be used to develop standards to measure work performance. Unfortunately, the devised data collection process was discontinued when the Operations Manager was assigned to another DPW project leaving the Division without oversight. The Operations Manager has since returned to Urban Forestry but the data collection process has not resumed.

The workload data tracked by the Division was found to be unreliable

Auditors reviewed the available data and found it to be unreliable. For example, the Division personnel informed the auditors that the contractor removed 298 trees in FY 2008. However, a review of invoices from the vendor indicated that the contractor removed 426 trees. The information received from the division personnel on different occasions was not consistent. The information compiled from the daily activity log indicated that the division personnel removed 870 trees. However, in a summary

prepared by Urban Forestry staff it was represented that the division crew removed 1,594 trees. The records are kept electronically and can be altered without audit trail. The auditors did not observe any source documentation for the employee hours spent or workload accomplished. Therefore, the Division's records were considered unreliable. Without reliable labor and workload information it may not be possible to manage this operation.

The auditors also reviewed statistical data provided to the Land Use, Housing and Transportation Committee. The information provided to the committee was incorrect. This could lead to the City Council making policy and appropriation decisions based on erroneous data.

Supervision

During the audit, Arborists spent approximately five hours per day performing administrative tasks. This means that only three hours per day are being spent performing core activities as depicted below:

Schedule Time	Activities
7:00 a.m. – 10 am	Office administrative time and generate tickets.
10 a.m. – 2:00 p.m.	Field
2:00 p.m. – 4 p.m.	Office administrative time and generate tickets.

Field crews may not be adequately supervised

Without adequate supervision by Arborists, the field crews may not get proper direction and be adequately productive. In addition, field presence of the Arborists would identify unhealthy and hazardous trees. With the professional assessment of the Arborists, a proper maintenance plan can be designed for the overall tree inventory.

Recommendations:

12. ***Implement appropriate performance measures to track and monitor employee productivity.***

13. ***Establish proper timekeeping standards to account for employee work assignments.***

14. ***Link performance measures to employee performance evaluations.***

15. ***Perform a cost – benefit analysis to consider whether the urban forestry function should be outsourced. If found beneficial, then either outsource the function or consolidate with other City divisions such as Grounds Maintenance.***

Automation

The Division used computer software purchased from a family-owned business, in which a former Arborist had a financial interest, until April 2009. Upon the Arborist's termination of his employment with the City and after the bankruptcy of the software company, the Division was forced to discontinue using the software. In 2008, the Division purchased handheld electronic devices that would upload recorded data to this computer software. The Arborists used the handheld devices to record tree inventory data while working in the field. It appears that the City's investment of $10,400 in this handheld equipment lacks value until the Division finds a use for them.

To further expedite work performance, the Division acquired and implemented the use of Panasonic "Tough Books" laptop computers for the Arborist to record maintenance activities while working in the field.

Using the above software, the Division did not keep complete records of all service requests it received from the citizens. Relying on such a system to keep critical data for the function in which the City invests $2 million annually does not appear to be a good idea. The Division is currently left with

fragmented and incomplete data that may not be useful for administering this function.

A tree management system must:

- Keep a complete record of tree inventory.
- Enable logging of service requests.
- Allow divisional personnel to organize field work and keep record of maintenance activity.
- Help in developing long-range project plans.
- Allow analysis of tree populations.
- Generate appropriate management reports.

Since the end of Urban Forestry management's access and use of Canopy Tree, the Arborists no longer record the results of their tree inventorying process. The inventory database is now defunct and the Division is not recording any data related to any of its ongoing inventory efforts. The Division is currently working with the City's Information Technology Department (DIT) to provide a remedy for its system issues.

Recommendations:

16. ***Maintain a manual recordkeeping process while a computerized system is not available for such functions.***

17. ***Continue to work with DIT to implement a tree management system.***

Internal Controls

Management Responsibility

The Administration for the City of Richmond is responsible for maintaining the City's financial records. It is also responsible for establishing and maintaining a system of internal accounting controls. In fulfilling this responsibility, the Administration is required to assess the expected benefits and related costs of control procedures.

According to Government Auditing Standards, internal control, in the broadest sense, encompasses the agency's plan, policies, procedures, methods, and processes adopted by management to meet its mission, goals, and objectives. Internal control includes the processes for planning, organizing, directing, and controlling program operations. It also includes systems for measuring, reporting, and monitoring program performance.

Based on the results and findings of the audit, auditors concluded that internal controls in the Division's procedures need improvement. The internal control deficiencies are discussed throughout this report.

Policies and Procedures

The Urban Forestry Division does not have a formal written policies and procedures manual

One of the standard internal control procedures includes having a formal written policies and procedures manual. Written policies and procedures provide guidance to employees to perform their duties. Also, they can be used as an effective employee training tool. While Urban Forestry has numerous policies and procedures documents, a formal comprehensive manual has not been devised and distributed to the staff for their reference. Under these circumstances, established policies may not be followed consistently.

Audit research identified practices recommended for the Ontario Municipality that appeared to be prudent and may be applicable to

Richmond. The City may want to consider the following practices when developing its policies and procedures for the Urban Forestry management.

Ontario Practices	City of Richmond Practices	Improvement Potential
Tree inspections and maximum inspection cycles.	Reactive. The citizen's request drives tree inspections. No inspection cycles established.	Tree life will be sustained with timely inspection and care action.
State employee qualifications.	Position descriptions adequately state qualifications.	Proper tree care is enhanced through employee training updates.
Maintain tree records.	Records maintained were not accurate and complete.	Demonstrate that trees are being inspected for health and safety on a regular basis.
Tree ownership defined and conveyed to the public.	The City's Tree Ordinance so states.	Establish clear delineation of ownership and responsibility for tree care.
Account for tree inventory utilizing a computerized system.	A computerized or a manual record system is not used.	Provide for developing and maintaining City trees.
Maintain tree work order histories.	Not performed.	Document work activities related to tree care, as well as labor and equipment costs.
Quantify and report work order system data	Partial summaries of work activities were documented.	Summarize workload and provide accountability for use of resources.
Standard computer system processing procedures.	No standard data entry process.	Accurate and complete records related to tree care.
Generate system inventory reports for management use.	Not performed.	Provide reports and summaries that serve as management tools.
Perform site evaluations.	Site evaluations were included in the Adopt-A-Tree Program.	Plant the right tree in the right place to sustain tree life and to prevent future conflicts with utilities and streetscape amenities.
Establish spacing distance between trees for different plant site locations.	Proactive. Spacing distance and location is properly established.	Plant the largest tree (at maturity) that the site will accommodate to make the greatest environmental contribution.
Select high quality nursery grown trees.	ANSI standards are followed.	Initial investment in sound, healthy and well formed trees reduces long term maintenance needs and problems.
Develop planting specifications.	Proactive. Specifications and standards noted in the City's Tree Ordinance.	Cater to the needs of the community. Locate underground utilities prior to planting to provide adequate space for tree health and growth.
Planting aftercare procedures.	Established but not monitored.	Proper aftercare contributes to overall tree health.

Recommendation:

18. Develop and distribute a formal policies and procedures manual to the staff.

Cash Receipts

The City Auditor's review of Urban Forestry policies and procedures revealed that the Division's check handling policy was not in compliance with the City's policy.

The Division was not in compliance with the City's cash receipts policy however the situation was rectified during the audit

The Division's check handling policy and previously practiced procedure allowed for the holding of all check items received until month's end prior to constructive receipt and deposit of those items. This practice, however, was not compliant with the City's deposit procedures.

The City's Fiscal and Administrative Policies and Procedures are the overarching principles that all departments and its divisions must follow. Specifically, the City of Richmond – Department of Finance's policy states:

Chapter 10 Collections 10-004 Cash Collections – Deposit's Policy

"All organizational units in the City that accept cash payments shall deposit cash receipts of $500 or more within 24 hours. All cash receipts, regardless of amount, are deposited by 4:30 p.m. on Friday. Cash receipts not yet deposited are secured in a safe, locked box, locked drawer, or cash register until they can be deposited. The person responsible for the receipt of cash and his or her supervisor are the only ones who have access to the cash. The receipt of cash and the depositing of cash are handled by separate persons in each department to ensure proper segregation of duties."

The Division immediately took action to correct the non-compliance described above when pointed out by the auditor.

Recommendation:

19. Ensure that the Division continues to follow the City's cash collection policy.

Risk Management

Hazardous Tree Identification and Removal

A tree becomes hazardous when its structure is compromised with defects that can cause failure of all or part of the tree. Recognizing hazardous trees and taking proper corrective actions minimizes personal injury and property damages. Many City trees become hazardous because of inadequate maintenance over the tree's life span.

The Division personnel are required to perform on-site visual inspections of suspected tree hazards to evaluate the tree's health. The identification of hazardous trees is initiated by:

- Citizen request
- Arborists driving by their assigned area of responsibility

The list of hazardous trees was not based on the severity of the hazard

Auditors were provided a hazardous tree listing dated December 16, 2007 that had an inventory of 353 hazardous trees. The Division's policy states that for a tree to be designated as a hazard there must be a combination of a structural defect which predisposes it to failure and a target such as a structure, road, walkway, or other area where there is a possibility of injury to people or damage to their properties. The listing did not rank the hazardous trees based on the severity of the hazard. Without assigning proper rank, the Division may not be able to prioritize addressing the most hazardous situations.

The Urban Forestry Division does not maintain statistical data related to its tree removals. Without maintenance and evaluation of tree removal

statistics, management cannot make informed, sound decisions to prevent future tree purchases/plantings of species prone to fail. Recent inventory identified that sugar maples make up the largest percentage (12.36%) of the City's street tree population. More than one third of identified hazardous trees were sugar maples. Of the total number of sugar maples, 41.4% have been evaluated as being dead or dying or in poor condition. Therefore, accumulating proper data would help in analyzing the appropriateness of the City's investment in trees.

Recommendation:

20. Maintain statistics related to tree removals in order to make informed new tree purchase/planting decisions.

Risk Exposure

28% of the City's street trees have a conflict or potential conflict with overhead utility lines

Auditors observed conditions that could impact the safety of the citizens. Auditors witnessed trees directly touching power lines that put constant stress on live wires. The possibility of causing power outages specifically during storms is significant. Broken live wires could create a significant safety hazard. In addition, there may be a possibility of fire due to burned branches that touch the power line. Recent efforts have identified that 28% of the City's street trees have a conflict or potential conflict with overhead utility lines. The following picture depicts the situation:

The auditors observed a tree root system disrupting the sidewalk surfaces by elevating them causing a tripping hazard. The survey determined that 24.6% of the City's sidewalks have from ¾" to more than 3" heave conflicts due to trees disturbing sidewalk surfaces.

24.6% of the City's sidewalks have from ¾" to more than 3" heave conflicts due to trees disturbing sidewalk surfaces

Although, the tree related claims payments in recent years have been minimal, in 2002 the City paid over $1 million for these claims. This indicates that the safety hazard related to the trees is real and can cause the City financial harm.

Auditor's inquiries revealed that Division personnel do not have a process for preparatory planning efforts regarding the impact that selected tree species would have on the surrounding environment. This could create hazards as described. Additional resources will have to be expended to address such hazardous situations.

It should be noted that the above situations have resulted from the decisions made several years ago. However, the current leadership must address this situation and have a process in place to prevent the situation from recurring. The current Operations Manager was aware of the existing risks; however, until recently, no strategy had been developed to address them.

Recently, the Division has begun incorporating a more defined analysis of site condition and location space that may impact planting plans. These analyses are undertaken with City tree planting efforts under the Adopt-A-Tree Program.

Recommendations:

21. Develop a strategy to address conflicts between trees and power lines. The strategy should include the maximum tree growth height when in close proximity to power lines.

22. Develop a strategy to address elevated sidewalks due to the trees' root systems.

Opportunity to Supplement Staff

The urban forest is a unique public asset that can motivate citizen participation. Well maintained healthy trees have aesthetic appeal and contribute substantially to the citizens' perception of quality of life. It is for this reason some citizens would volunteer for maintaining and/or notifying the City of a tree's need for additional efforts to increase its life.

The auditors benchmarked with other surrounding localities and found that three of four surveyed localities utilized volunteers in their forestry operations. The Urban Forest Division interacts with citizens through the Adopt-A-Tree Program and the Tree Stewards Program. However, they have elected not to use volunteers in the tree inspection/notification process. The Urban Forestry employees assert that due to the lack of training and skills, the volunteers' contributions may not help.

Recommendation:

23. Solicit and train volunteers to assist with urban forestry activities.

Appendix A –

Master Plan Concepts

CATEGORY	DESCRIPTION	PLAN IMPORTANCE
Species Distribution	The percentage of each species of tree (how many sugar maple, red oak, trident maple, etc.)	For species diversity, the master plan may state "do not choose plant species that occupy more than 5 to 10% of the community forest". In such cases, the master plan would place a moratorium on planting every tree species that is more than the specified percentage of the street tree population.
Size Class Distribution	Shows the proportion of trees by size. To optimize the value and benefit of trees, the urban forest should have a high percentage of large canopy trees. Large canopies mean large diameters. If tree planting activity is regularly performed, the size distribution should be relatively even, tapering off at the larger (older) sizes.	The master plan is driven by tree inventory results. If the inventory shows a few small diameter trees, the master plan may state "concentrate on planting new trees until size classes even off". However, if the inventory shows fewer large diameter trees, the master plan may indicate the need to plant more trees that mature at larger sizes.
Tree Condition	Shows the percentage of good, fair, poor and dead trees.	Once the poor and fair condition trees are identified, an arborist can assess which trees need to be removed first and provide an estimate. If the inventory shows a high percentage of poor trees, more funding will be required for removals in the first few years.
Tree Planting	Maintain a data base that identifies planting site locations.	The master plan should set priorities for choosing planting sites based on established criteria.

SOURCE: Cornell University Community Forestry Planning

MANAGEMENT RESPONSE FORM - 2010-07
DEPARTMENT OF PUBLIC WORKS - URBAN FORESTRY DIVISION

#	RECOMMENDATION	CONCUR Y-N	ACTION STEPS
1	***Conduct a complete tree inventory and identify relevant information, such as: (a) Tree species distribution, (b) Health and maintenance needs of the trees, and (c) Tree location.***	Y	Assign each arborist the responsibility to inventory an average of 17 trees per day, in their service area for 4 years. Have the arborists instruct volunteers such as Tree Stewards on how to collect the data for trees located in the parks and common areas.
	TITLE OF RESPONSIBLE PERSON		**TARGET DATE**
	Arborist		1-Jan-14
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**
	Our arborists had been collecting data for the Street Tree Inventory, but stopped collecting data once we lost the Canopy Tree Management Program, stating it was too much work to enter the information into a spreadsheet for future uploading into the program being developed by our GIS team.		
#	**RECOMMENDATION**	**CONCUR Y-N**	**ACTION STEPS**
2	***Once an inventory is established, perform future cyclic inventories of the City's street trees and park trees.***	Y	Assign each arborist the responsibility to re-assess 20% of the trees in their service area, including trees in the parks and common areas each year. This will produce a 5 year cycle.
	TITLE OF RESPONSIBLE PERSON		**TARGET DATE**
	Arborist		1-Feb-14
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**
#	**RECOMMENDATION**	**CONCUR Y-N**	**ACTION STEPS**
3	***Schedule a follow-up of the performed sample inventory.***	Y	We will be sure the items raised in the sample inventory are addressed in both our management and master plans.
	TITLE OF RESPONSIBLE PERSON		**TARGET DATE**
	Arborist		31-Dec-10
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**
#	**RECOMMENDATION**	**CONCUR Y-N**	**ACTION STEPS**
4	***Seek funding to attain a desired stocking level for the City's streets and sidewalk locations.***	Y	While we have been actively seeking additional sources of funding in order to replace trees that have died, as well as, trees to fill empty tree wells, we will now use the information gained from the 4% sample inventory and accompanying STRATUM analysis along with the findings of this audit to support our requests for grants, greater citizen participation, increased funding from the general fund and any other manner of funding we can discover.
	TITLE OF RESPONSIBLE PERSON		**TARGET DATE**
	Operations Manager		30-Jun-11
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**

#	RECOMMENDATION	CONCUR Y-N	ACTION STEPS
5	***Perform an aerial photography of the entire City to assess the state of the urban forest.***	Y	The Urban Forestry Division is taking steps to work with the Commonwealth of Virginia, Department of Forestry to acquire high-resolution satellite imagery in order to complete an assesment of the entire urban forest (private and publicly-owned trees). This assessment will help establish base-line canopy coverage and help us adopt a local goal to increase urban tree canopy cover.
	TITLE OF RESPONSIBLE PERSON		**TARGET DATE**
	Arborist		1-Jun-11
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**
6	***Establish standard recordkeeping practices for all urban forestry activities.***	Y	Operations Manager to sit down with the Acting Deputy Director of Operations, Arborist, Administrative Program Support Assistant and work crews and review the recordkeeping that was in place and determine if it can be improved to make it more user friendly.
	TITLE OF RESPONSIBLE PERSON		
	Operations Manager		1-Feb-10
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**
	Most of the recordkeeping was in place; the staff just wasn't following the procedures.		
#	**RECOMMENDATION**	**CONCUR Y-N**	**ACTION STEPS**
7	***Enforce the tree planting program policy to ensure either survivability or replacement of newly planted trees.***	Y	As part of our standard operating procedures and record of work completed, we will include measures to assure the arborists are inspecting and documenting the condition of each newly planted tree as it approaches the 1 year warranty date.
	TITLE OF RESPONSIBLE PERSON		**TARGET DATE**
	Arborist		1-Feb-10
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**
#	**RECOMMENDATION**	**CONCUR Y-N**	**ACTION STEPS**
8	***Implement a maintenance schedule for newly planted trees.***	Y	Based upon the number of trees we plant or authorize to be planted, we will dedicate a portion of our productive time toward structural pruning that trains the newly planted trees (that are established) into proper form and clearances as outlined in the ANSI A300 standards for tree pruning. We will implement a maintenance schedule for trees planted within the last 2 years, by the target date and then by May 1st of each following year for trees that were just planted during that planting cycle.
	TITLE OF RESPONSIBLE PERSON		**TARGET DATE**
	Arborist		1-Feb-10
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**
#	**RECOMMENDATION**	**CONCUR Y-N**	**ACTION STEPS**
9	***Devise a management plan to protect the City's urban forest.***	Y	Using the data gathered in the sample inventory, as well as, information from this audit report, we will develop a management plan that emphasizes and protects the City's urban forest.
	TITLE OF RESPONSIBLE PERSON		**TARGET DATE**
	Operations Manager		1-Jun-10
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**

#	RECOMMENDATION	CONCUR Y-N	ACTION STEPS
10	***Develop a master plan to set standards and priorities for maintaining and growing the urban forest.***	Y	Using the data gathered in the sample inventory, as well as, information from this audit report, we will develop a master plan that sets standards and addresses priorities for maintaining and growing the urban forest. This plan will be developed to maximize the available resources.
	TITLE OF RESPONSIBLE PERSON		**TARGET DATE**
	Operations Manager		31-Dec-10
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**

#	RECOMMENDATION	CONCUR Y-N	ACTION STEPS
11	***Revisit work plans prescribed by the City's Tree Ordinance and mandated work priorities.***	Y	We are again going to attempt to introduce the O&R to update the ordinance dealing with the City's trees.
	TITLE OF RESPONSIBLE PERSON		**TARGET DATE**
	Operations Manager		31-Mar-10
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**
	We have worked with the Department of Community Development, the Urban Design Committee and a couple of concerned citizens to re-write the Municipal Tree Policy and have the tree ordinance changed to reflect the priorities of the City's urban forest.		

#	RECOMMENDATION	CONCUR Y-N	ACTION STEPS
12	***Implement appropriate performance measures to track and monitor employee productivity.***	Y	We are going to start using the forms that were developed and meant to capture productivity. After we have a short history of credible data, we will establish performance measures. As the arborists are establishing performance measures for the crews, the operations manger will use already collected data to establish performance measures for the arborists.
	TITLE OF RESPONSIBLE PERSON		**TARGET DATE**
	Arborist		15-Apr-10
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**

#	RECOMMENDATION	CONCUR Y-N	ACTION STEPS
13	***Establish proper timekeeping standards to account for employee work assignments.***	Y	By using Daily Work Activity logs for the arborists and crews, we will develop checks and balances for employee hours that are recorded on the timesheets and Master UFD Production Log.
	TITLE OF RESPONSIBLE PERSON		**TARGET DATE**
	Operations Manger		15-Jan-10
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**

#	RECOMMENDATION	CONCUR Y-N	ACTION STEPS
14	***Link performance measures to employee performance evaluations.***	Y	We will further develop the performance standards in the arborist's performance evaluations, develop standards for the Administrative Program Support Assistant and have the arborist develop performance standards for the tree maintenance workers.
	TITLE OF RESPONSIBLE PERSON		**TARGET DATE**
	Arborist		1-Jul-10
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**

#	RECOMMENDATION	CONCUR Y N	ACTION STEPS
15	***Perform a cost – benefit analysis to consider whether the urban forestry function should be outsourced. If found beneficial, then either outsource the function or consolidate with other City divisions such as Grounds Maintenance.***	Y	After we are able to reliably document our production cost and the cost to provide service for each activity, we will compare those costs against our contract cost to see if it would be more efficient to outsource any or all of the activities performed by the Division.
	TITLE OF RESPONSIBLE PERSON		**TARGET DATE**
	Operations Manager		30-Jun-11
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**

#	RECOMMENDATION	CONCUR Y N	ACTION STEPS
16	***Maintain a manual recordkeeping process while a computerized system is not available for such functions.***	Y	Our GIS team has installed their version of a tree management system into each of the arborist's laptops. We are in the process of inputting inventory data and conducting beta testing. If we have difficulty or the system and/or computer are down, we will instruct our arborists to implement manual recordkeeping.
	TITLE OF RESPONSIBLE PERSON		**TARGET DATE**
	Operations Manager		30-Jun-11
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**

#	RECOMMENDATION	CONCUR Y N	ACTION STEPS
17	***Continue to work with DIT to implement a tree management system.***	Y	Our GIS team has installed their version of a tree management system into each of the arborist's laptops. We are in the process of inputting inventory data and conducting beta testing. We will continue to work with DIT/GIS to develop their system into an efficient program that will communicate with CityWorks.
	TITLE OF RESPONSIBLE PERSON		**TARGET DATE**
	Arborist		1-Jan-10
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**

18	***Develop and distribute a formal policies and procedures manual to the staff.***	Y	With the assistance of the arborists and administrative program support assistant, the operations manager will seek input from the work crews and document procedures for each work activity. The numerous policy documents that are currently in a three-way binder will be expanded, formalized and distributed to each employee.
	TITLE OF RESPONSIBLE PERSON		**TARGET DATE**
	Operations Manager		31-May-10
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**

#	RECOMMENDATION	CONCUR Y N	ACTION STEPS
19	***Ensure that the Division continues to follow the City's cash collection policy.***	Y	The only cash received is for participation in the Adopt-A-Tree program and one employee is assigned and responsible for handling any cash/checks received. An accountant with the Department of Public Works is responsible for depositing the funds to ensure proper segregation of duties. The operations manager will oversee the process to ensure the Division continues to follow the City's cash collection policy.
	TITLE OF RESPONSIBLE PERSON		**TARGET DATE**
	Arborist		4-Jan-10
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**

#	RECOMMENDATION	CONCUR Y-N	ACTION STEPS
20	***Maintain statistics related to tree removals in order to make informed new tree purchase/planting decisions.***	Y	The arborists will inventory and capture all necessary data on every tree removed or cleaned up from being "down" for whatever reason.
	TITLE OF RESPONSIBLE PERSON		**TARGET DATE**
	Arborist		4-Jan-10
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**

#	RECOMMENDATION	CONCUR Y-N	ACTION STEPS
21	***Develop a strategy to address conflicts between trees and power lines. The strategy should include the maximum tree growth height when in close proximity to power lines.***	Y	We have developed an approved tree species list for the planting of trees under power lines. We have been only approving the appropriate species of tree for this application, as well as, the appropriate species for each plant site, taking into consideration the hardscape, utilities and surrounding trees as part of our selection process. The trees that have been planted in past years have to be dealt with on a case-by-case to determine the most efficient and effective means of dealing with the conflict. We constantly meet opposition from citizens and other agencies, such as the Department of Community Development, that love the large canopy trees and aren't very receptive to discussion of the "right tree in the right place."
	TITLE OF RESPONSIBLE PERSON		**TARGET DATE**
	Arborist		4-Jan-10
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**

#	RECOMMENDATION	CONCUR Y-N	ACTION STEPS
22	***Develop a strategy to address elevated sidewalks due to the trees' root systems.***	Y	We have a policy in place to deal with existing tree/sidewalk conflicts and are again only approving the proper tree species after inspecting the site; checking among other things the size of the available planting space. With this issue we are also facing opposition from citizens and other agencies, such as the Department of Community Development, that love the large canopy trees and aren't very receptive to discussion of the "right tree in the right place."
	TITLE OF RESPONSIBLE PERSON		**TARGET DATE**
	Arborist		4-Jan-10
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**

#	RECOMMENDATION	CONCUR Y-	ACTION STEPS
23	***Solicit and train volunteers to assist with urban forestry activities.***	Y	We recognize that the urban forest belongs to the citizens and there are many citizens that want to be active in helping to manage this valuable asset. We will continue to work with the Tree Steward program which we had already reinstated. We will also train the Tree Stewards to be more active with urban forestry activities.
	TITLE OF RESPONSIBLE PERSON		**TARGET DATE**
	Arborist		2-Feb-10
	IF IN PROGRESS, EXPLAIN ANY DELAYS		**IF IMPLEMENTED, DETAILS OF IMPLEMENTATION**