

Mature Tree Retention – Risk or Benefit to the Community ?

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Certified Tree Risk Assessor

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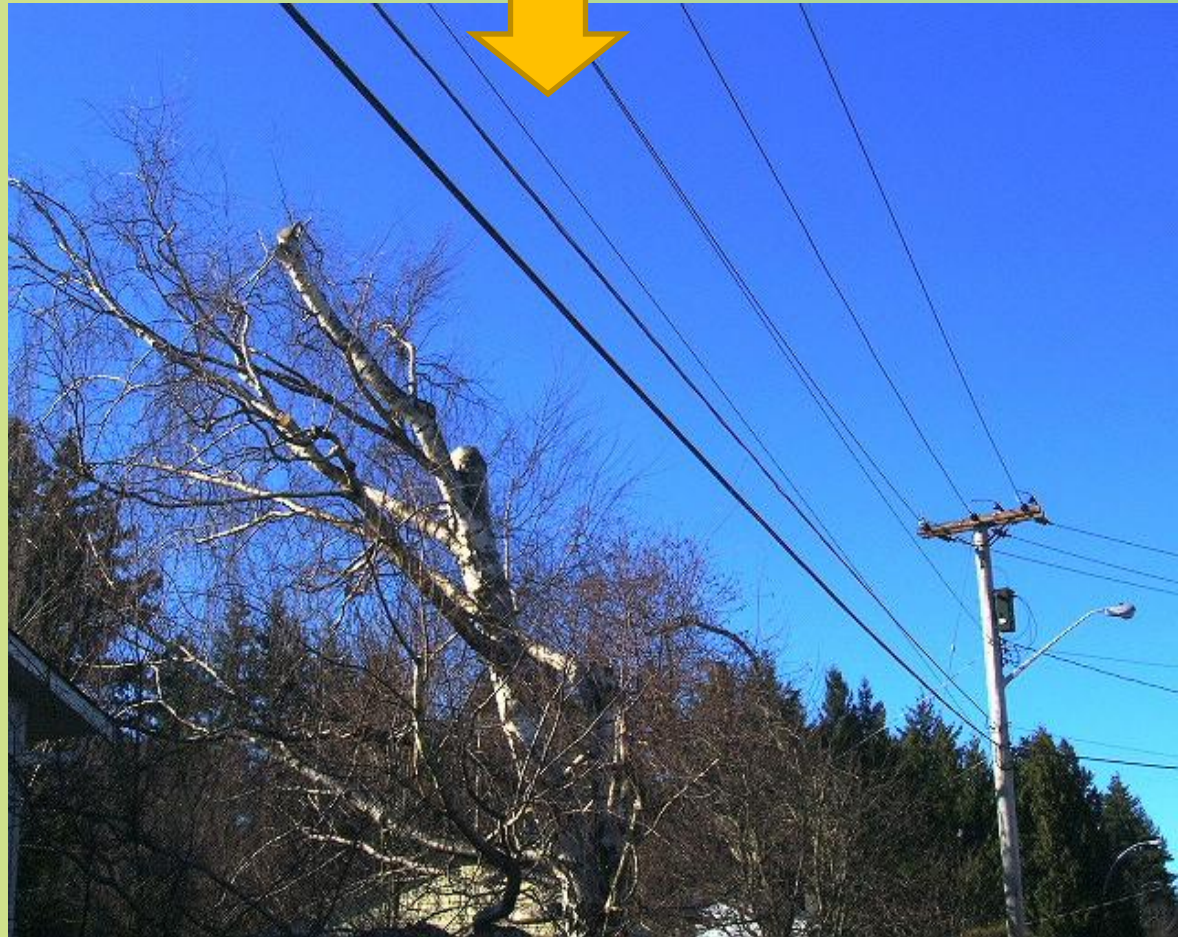
Mumby's Arboriculture Consulting

www.treelady.ca





Planting under power lines



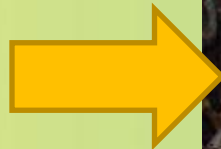
Wrong tree for location.



Decayed
structural roots



Irrigation
system



Mature Trees

“Save
Every
Possible
Tree –
Even Just
One.”

Page 57
Sustainable
Landscape
Construction
2nd edition



Garry oak at Victoria Airport

80 year old Douglas fir trees in Courtenay.



2nd growth trees retained on private property.





100 year- old
Douglas fir with
eagle nest.

Grove retention between residences near the ocean.



Grove of trees retained on new residence building site.



Duty of Care

- n. a requirement that a person act toward others and the public with watchfulness, attention, caution and prudence that a reasonable person in the circumstances would. If a person's actions do not meet this standard of care, then the acts are considered negligent, and any damages resulting may be claimed in a lawsuit for negligence. (See: [negligence](#), [standard of care](#))
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Duty of Care

- For owners of trees the Duty of Care means as an owner they have a legal responsibility to ensure that their trees are reasonably safe
- - that means the owner must have all reasonable efforts to identify anything that can foreseeably cause harm to people or property.

Tree Risk Assessment in Urban Areas & the Urban /Rural Interface PNWISA publication, page 62.

Standard of Care

-that degree of care which a reasonably prudent person should exercise in same or similar circumstances. If a person's conduct falls below such standard, he may be liable in damages for injuries or damages resulting from his conduct. Black 1990

The Standard of Care
determines how the Duty of
Care is measured.

Dunster & Murray 1997

Kaslo, B.C. population 1,029



In December 2009, a total of 295 publically owned trees were tagged and inventoried. Of the 295 trees, 21 are recommended for removal, 32 require a risk assessment and 100 trees require pruning over the next 3-5 years.



Managing Risk in the Urban Forest Matheny & Clark

Arborist News April 2007

Standard of Care Statement

The following is an example of a standard of care statement for a tree risk management program as recommended by Duntemann.

Exceeds

Written

Training

Inspection

Document

Guidelines

Standards

Pre-climbing

Reporting

Goals &
Objectives

→ The City of Treeland will meet or exceed all arboricultural industry standards in its tree risk management program through the following actions:

- • Have a written policy regarding tree hazard management.
- • Provide specialized training for all tree inspectors on identifying and evaluating structural defects in trees, developing risk ratings, and inspecting and evaluating tree–infrastructure conflicts. In addition, all inspectors will maintain Certified Arborist, Certified Tree Worker, Certified Municipal Arborist, Certified Utility Arborist, and/or Board-Certified Master Arborist status through the International Society of Arboriculture.
- • Undertake systematic inspections of city trees on a schedule as described in the Tree Risk Management Plan. Inspections are to be visual, from a ground survey, walking 360 degrees around the tree.
- • Document the inspections and communicate them to the appropriate person as defined in the Tree Risk Management Plan.
- • Undertake/recommend appropriate risk management action according to guidelines in the Tree Risk Management Plan.
- • Adhere to industry standards for general tree care activities, including the American National Standard Institute's standards for safety in arboricultural operations (Z133.1) and pruning (A300) and the International Society of Arboriculture's *Best Management Practices: Tree Pruning*.
- • Perform a pre-climbing inspection prior to entry into the tree.
- • Ensure that each climber will either report or abate any defects encountered while working in a tree that were not observed from a ground survey.
- • Include goals and objectives for reducing tree failures in overall management programs, based on the high-risk features of a population.

Educating the Public

The Whyte Avenue elms were planted in the 1940's and are part of the registered landscape (City recognized historical value)...

Urban landscape settings along roadways can be harsh environments for trees due to limited soil volumes and compaction, associated road conditions, and various construction project impacts. Trees growing in these conditions typically have a shorter lifespan than similar trees grown in natural environments.

Since 1995, Forestry staff have been directing additional resources in the form of pruning, fertilization, aeration and watering to improve the growing conditions of the Whyte Avenue trees.

Although 70 trees were marked for removal earlier this spring, following a second inspection, it has been confirmed that 20 will actually be removed. The remaining trees will be pruned to remove the dead wood. While being pruned, the trees will be assessed again for health and potential safety hazards.

A plan is presently being developed for the improvement of the soil conditions and the replacement of the trees for the centre median on Whyte Avenue. The plan will be developed collaboratively with Parks and Transportation to provide the best growing opportunity for the new trees....

Please also be advised that the City performs a tree health assessment on all publicly owned trees...Trees that are dead or have no hope for survival are marked with a pink dot. Prior to these trees being removed they are re-assessed to ensure the accuracy of the decision.

- Written
- Inspection
- Document
- Guidelines
- Standards
- Reporting
- Goals & Objectives



ASSET MANAGEMENT
AND PUBLIC WORKS



A heritage group lists mature street trees among the city's most endangered heritage sites.

“If you look at the great cities around the world,” said Donald Luxton, president of Heritage Vancouver, “one of the things that helps define them are boulevards and canopies — and we’re losing ours.”

JEFF HODSON

METRO VANCOUVER

Published: April 26, 2010



Tree Risk Assessment courses define the Standard of Care. The risk manager can reasonably expect the assessor to provide the best possible advice.



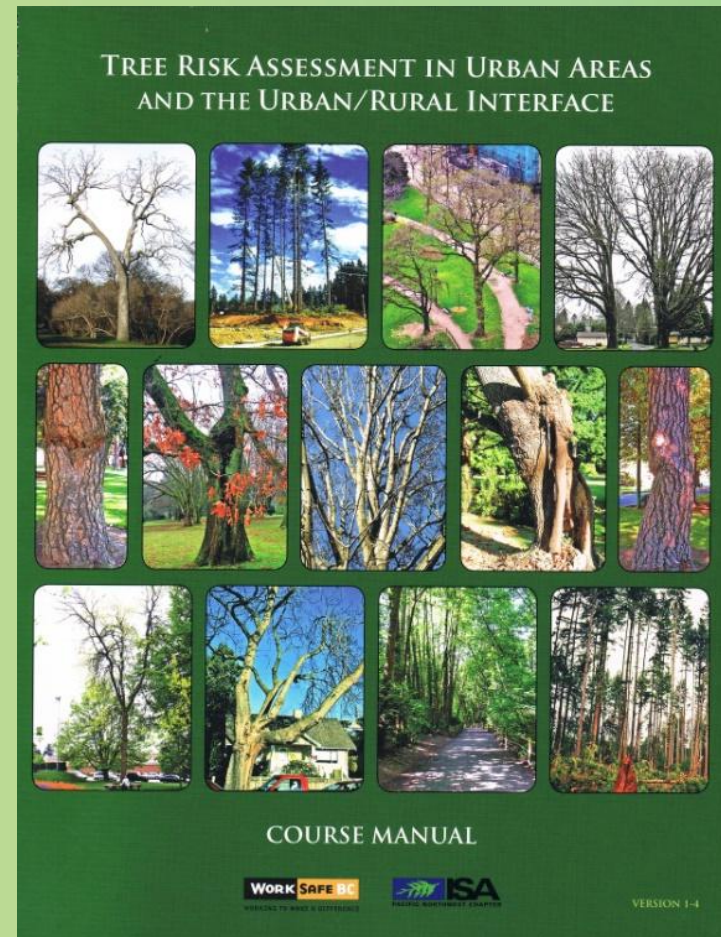
BCTS WINDTHROW MANUAL:

*A Compendium of Information and Tools for
Understanding, Predicting and Managing Windthrow
on the BC Coast*



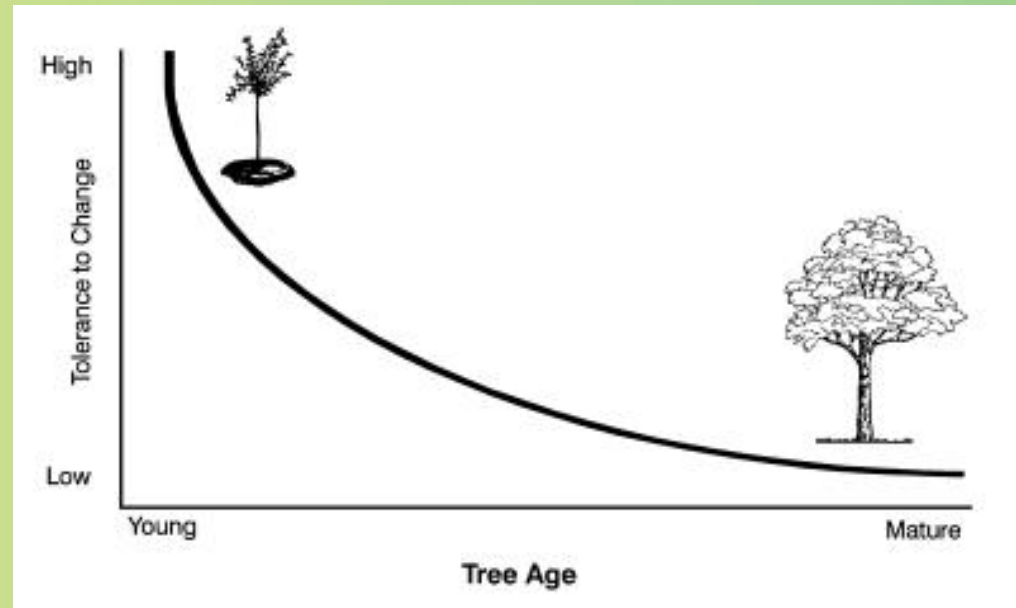
Wildlife Danger Tree Certification

Parks & Recreation Module



Assessing your mature trees:

- All wounded trees do not become infected
- All infected trees do not become decayed
- All decayed trees do not fail.



Severing one major root can cause the loss of 5 to 20 % of the root system.



The roots of a tree extend far from the trunk and are found mostly in the upper 6 to 12 inches of soil.

Stanley Park, Vancouver 2006

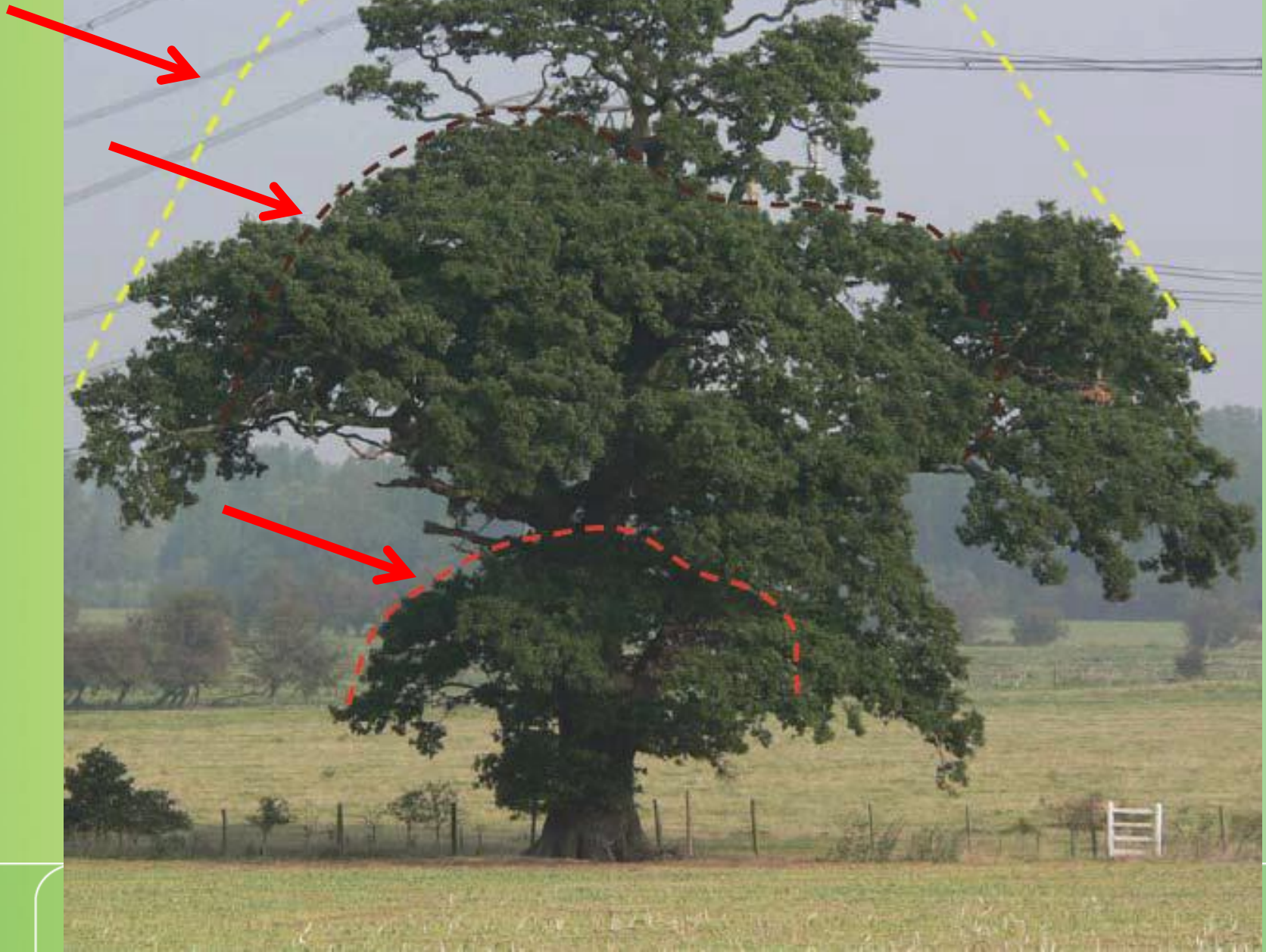


Bill Stephen Photo

Crown condition indicates health not structural stability.



Quercus showing early crown transition - II



NW Poplar Medicine Hat, Alberta



TERMS

- Risk: The potential for injury or damage due to tree failure.
- Hazard: The presence of a condition that is likely to cause injury. The tree is hazardous when the potential exceeds a threshold defined by the tree owner or managing agency.
- Risk Assessment: The process of evaluating the likelihood that a tree or tree part will fail and cause injury or damage.

Arborist News Managing Risk in the Urban Forest Part 2. June 2007

Mature Tree Retention on Private land



Data should be clear and concise

TABLE 1 tree report

Mumby's Arboriculture Consulting www.treesdy.ca

BIG LEAF MAPLE *Acer macrophyllum* (BLM)

Tag #	DBH (cm)	Height (m)	Tree Health	Tree Defects	Hazard Rating	RST cm	AST cm	Hazard Abatement	Re-assess	Remarks on pg. #
651	44/32	18	Average	Trunk	7	11	35	Fill cavity at base of tree	3 years	4
310	56/49/39	34	Average	Root/Crown	8	9	12	Pocket of decay to monitor	2-3 yrs	4
659	105/48	33	Fair-Poor	Root/Crown	9	22	22	Open cavity to fill, prune, decay column to monitor	2 yrs	4

Douglas Fir *Pseudotsuga menziesii* (DgF)

Tag #	DBH (cm)	Height (m)	Tree Health	Tree Defects	Hazard Rating	RST cm	AST cm	Hazard Abatement	Re-assess	Remarks on Pg. #
336	105	18	Average	Trunk	9	15	18	Prune to reduce load & re-assess	2 yrs	5
338	94	16	Average	Crown	8	13	17	Radial crack in stem, prune for load	3-5 yrs	5
340	99	18	Average	Root/Crown	11			Extensive butt rot, removal		5
343	108	20	Average		5	n/a		Prune upper 1/3 @ old topping cuts	3-5 yrs	5
654	69	36	Average		5	n/a			3-5 yrs.	5
658	92	33	Average	Root/Crown	10	13	20	Prune & re-assess or wildlife tree	2 yrs.	5
663	104	42	Average		7	n/a		Prune upper 1/3 to reduce load	2-3 yrs.	6
664	53	27	Average		7	n/a		Prune to reduce load	2-3 yrs.	6

Arbutus *Arbutus menziesii* (A)

Tag #	Tree Type	DBH (cm)	Height (m)	Tree Health	Tree Defects	Hazard Rating	Hazard Abatement	Re-assess	Remarks on pg. #
339	A	44/33	11	Fair-Poor	Trunk	8	Advanced decay in upper stem. Few targets, allow to decline naturally.		6

Overall Risk Rating and Action Threshold

<i>Risk Rating</i>	<i>Risk category</i>	<i>Interpretation and Implications</i>
3	Low 1	Insignificant – no concern at all.
4	Low 2	Insignificant – very minor issues.
5	Low 3	Insignificant – minor issues not of concern for many years yet.
6	Moderate 1	Some issues but nothing that is likely to cause any problems for another 10 years or more.
7	Moderate 2	Well defined issues – retain and monitor. Not expected to be a problem for at least another 5-10 years.
8	Moderate 3	Well defined issues – retain and monitor. Not expected to be a problem for at least another 1-5 years.
9	High 1	The assessed issues have now become very clear. The tree can still reasonably be retained as it is not likely to fall apart right away, but it must now be monitored annually. At this stage it may be reasonable for the risk manager / owner to hold public education sessions to inform people of the issues and prepare them for the reality that part or the entire tree has to be removed.
10	High 2	The assessed issues have now become very clear. The probability of failure is now getting serious, or the target rating and /or site context have changed such that mitigation measures should now be on a schedule with a clearly defined timeline for action. There may still be time to inform the public of the work being planned, but there is not enough time for protracted discussion about whether or not there are alternative options available.
11	High 3	The tree, or part of it has reached a stage where it could fail at any time. Action to mitigate the risk is required within weeks rather than months. By this stage there is not enough time to hold public meetings to discuss the issue. Risk reduction is a clearly defined issue and although the owner may wish to inform the public of the planned work, he/she should get on with it to avoid clearly foreseeable liabilities.
12	Extreme	The tree, or part of it, is in the process of failing. Immediate action is required. All other, less significant tree work should be suspended, and roads or work areas should be closed off, until the risk issues have been mitigated. This might be as simple as removing the critical part, drastically reducing overall tree height, or taking the tree down and cordoning off the area until final clean up, or complete removal can be accomplished. The immediate action required is to ensure that the clearly identified risk of harm is eliminated. For trees hit by severe storms, where many extreme risk trees can occur, drastic pruning and/or partial tree removals, followed by barriers to contain traffic, would be an acceptable first stage of risk reduction. There is no time to inform people or worry about public concern. Clearly defined safety issues preclude further discussion.

1980



Mature Tree
Retention on
Private land

1987





2008

Over the past 5 years, 3 cables and 3 bolts had been installed.



2009

2009



Risk Rating	Risk category	Interpretation and Implications
3	Low 1	Insignificant – no concern at all.
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9	High 1	The assessed issues have now become very clear. The tree can still reasonably be retained as it is not likely to fall apart right away, but it must now be monitored annually. At this stage it may be reasonable for the risk manager / owner to hold public education sessions to inform people of the issues and prepare them for the reality that part or the entire tree has to be removed.
10	High 2	The assessed issues have now become very clear. The probability of failure is now getting serious, or the target rating and /or site context have changed such that mitigation measures should now be on a schedule with a clearly defined timeline for action. There may still be time to inform the public of the work being planned, but there is not enough time for protracted discussion about whether or not there are alternative options available.
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Assignment

Assess a brittle willow (*Salix fragilis*) at 2053 Beach Road, Comox, to determine its health and structural stability. Recommend mitigating measures.

Observations

On August 11, 2010 I assessed the willow using the International Society of Arboriculture (ISA) Tree Hazard Evaluation Form. This form gathers information about the tree characteristics, health, defects, site conditions and potential targets. The risk rating is calculated by determining the failure potential of the tree (present health and structural stability), the size of the part of the tree that may fail and if there is a target. The form calculates a risk rating of Low, Moderate, High or Extreme. The risk ratings are explained on page 5.

The tree has 2 large stems (see Picture 1). Stem 1 is 64 centimetres in diameter. Stem 2 is 50 cm and at the base of the tree is 114 cm. Stem 1 over hangs the house. Stem 2 over hangs the ocean. Tree height is 20 metres and the canopy spread is 18 metres. It is in good condition. It has been pruned, cabled and bolted. All hardware in the tree is intact.



Picture 1

Past pruning techniques to parts of the tree have caused excessive water sprouts (see Picture 2) and reduction of wound wood development around the cuts.



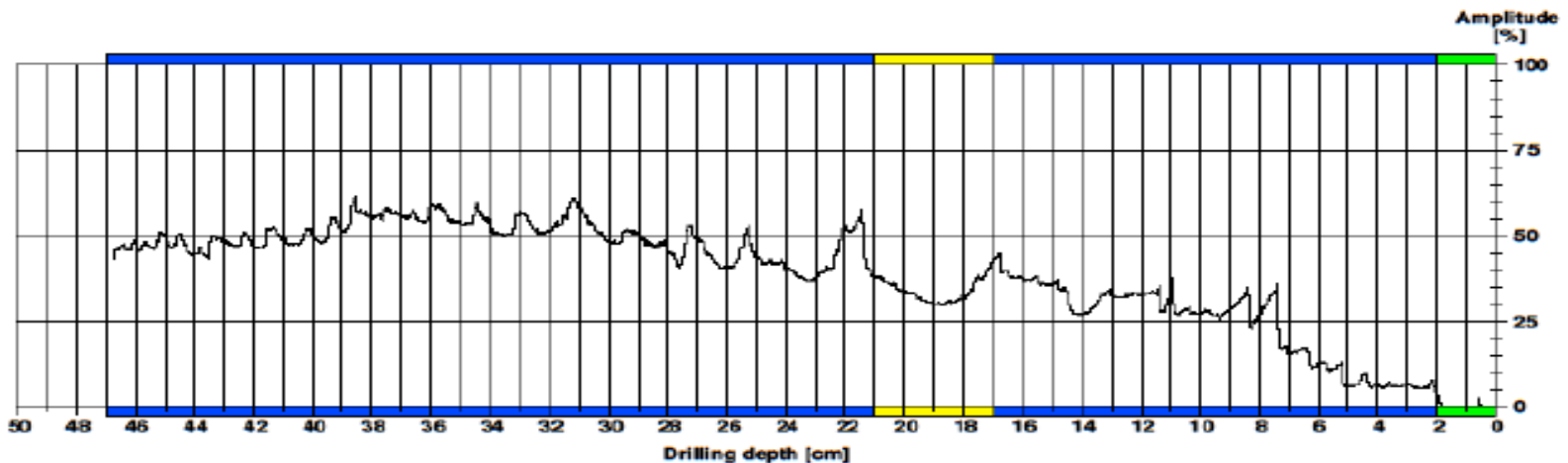
Poor pruning cut causing water sprouts.

Picture 2

The Resistograph is just one tool in your toolbox.

Measuring / object data

Measurement no. :	2	Time :	11:38:38	Location :	Comox
Drilling depth :	46.72 cm	Avg. curve :	off	Name :	Halliday
Wood species :	Soft (1)	Diameter :	64.0 cm		
ID number :	willow	Level :	170.0 cm		
Advance :	81.6 cm/min	Direction :	south to north		
Date :	11.08.2010	Object species :	Salix fragilis		



Assessment

From	0.0 cm	to	2.0 cm	:	bark
From	2.0 cm	to	17.0 cm	:	sound wood
From	17.0 cm	to	21.0 cm	:	incipient decay
From	21.0 cm	to	47.0 cm	:	sound wood
From	0.0 cm	to	0.0 cm	:	
From	0.0 cm	to	0.0 cm	:	

Comment

Tree Retention on Development Sites

The tree was successfully kept and protected and it is now a boulevard tree on Great Elm Place. During the construction period utilities were tunneled under the tree. The tree was root injected several times with a preventative fungicide so that it would not get Dutch elm disease. In 1986 the elm was 75 cm (30 in.) in diameter at breast height (dbh) and 17 m (56 ft) high. In 2008 the tree had grown to the following dimensions: 80 cm (31.5 in) dbh, and 19 m (62 ft) high).



Richardson American Elm, Robin Blvd. Winnipeg, MB

- principles of tree preservation
- tree biology
- development process
- plans & construction practise
- evaluation process
- designing for tree preservation
- impact to trees
- minimizing the impacts
- preparing specifications
- the construction phase
- post-construction management
- reports & plans

Trees and Development

A Technical Guide to Preservation of Trees During Land Development



Nelda Matheny and James R. Clark

TABLE 3.3 Tree preservation process (HortScience, Inc. Adapted from a figure prepared by James Dean, Lee Newman & Associates, Westlake Village, California 1981).

Action taken by	Prior to application for approval	Time of application	Project review	Project approval	Construction period	Maintenance phase	Postconstruction maintenance
<i>Applicant</i>	Seeks information regarding tree preservation policies. Develops preliminary site plans.	Provides required information; may include tree report, EIR, or stand delineation.	Responds to requests for changes to plans.	Prepares final tract map (PUD only). Submits for final approval. Prepares construction drawings.	Obtains permits and begins site work, implementing conditions as approved.	Completes construction; requests final inspection and clearance	Requests and receives bond exoneration.
<i>Agency (may include city, county, state, and federal agencies, as appropriate)</i>	Provides tree preservation policy, including ordinances and requirements for submittals. Identifies other involved agencies.	Reviews submittals; requests appropriate changes.	City may require review and approval by a design review committee, planning commission, and city council. Each may request changes to plans.	Reviews final submission. Sets bond for mitigation of impacts to trees. Prepares conditions of approval.	Monitors progress of project.	Agency inspects; notes deficiencies. Issues clearance upon adequate inspection.	Bond exonerated.
<i>Consulting arborist</i>	Performs tree survey or stand delineation. Provides background on tree preservation issues. Identifies trees suitable for preservation. Provides design guidelines for tree preservation.	Prepares tree preservation plan. Reviews site plans. Identifies tree protection zone.	Responds to questions regarding tree preservation issues.	Prepares fencing plan. Prepares final tree preservation plan, including recommendations and specifications for tree protection.	Provides preconstruction treatments to trees. Monitors activity around trees.	Evaluates trees following construction. Provides needed remedial treatments.	Prepares and implements tree management plan.
Additional steps/actions	Prior to application for approval	Time of application	Project review	Project approval	Construction period	Maintenance phase	Postconstruction maintenance
<i>Agency enforcements and incentives to the developer</i>	Land exchanges and purchase options.	Fast-track for project approval.	Flexibility on design and density rules.	Acceptance of tree preservation plan. Assessment of bond for trees to be preserved.	Stop-work notices.	Postpone occupancy permit, pending completion of required mitigation treatments.	Delay final acceptance and/or release of bond.
<i>Requirements for successful tree preservation</i>	Clearly stated tree preservation policies. Understanding of tree-related issues.	Cooperation between applicant and community or agency. Accurate site and tree information.	Clearly defined conditions of approval.	Commitment among project members.	Sensitivity to field conditions. Commitment of construction superintendent. Respect for tree preservation zone.	Accurate base information for use as a comparison.	Commitment of new owners to long-term tree care.

Planning phase of the development project

Primer on the Development Process 33

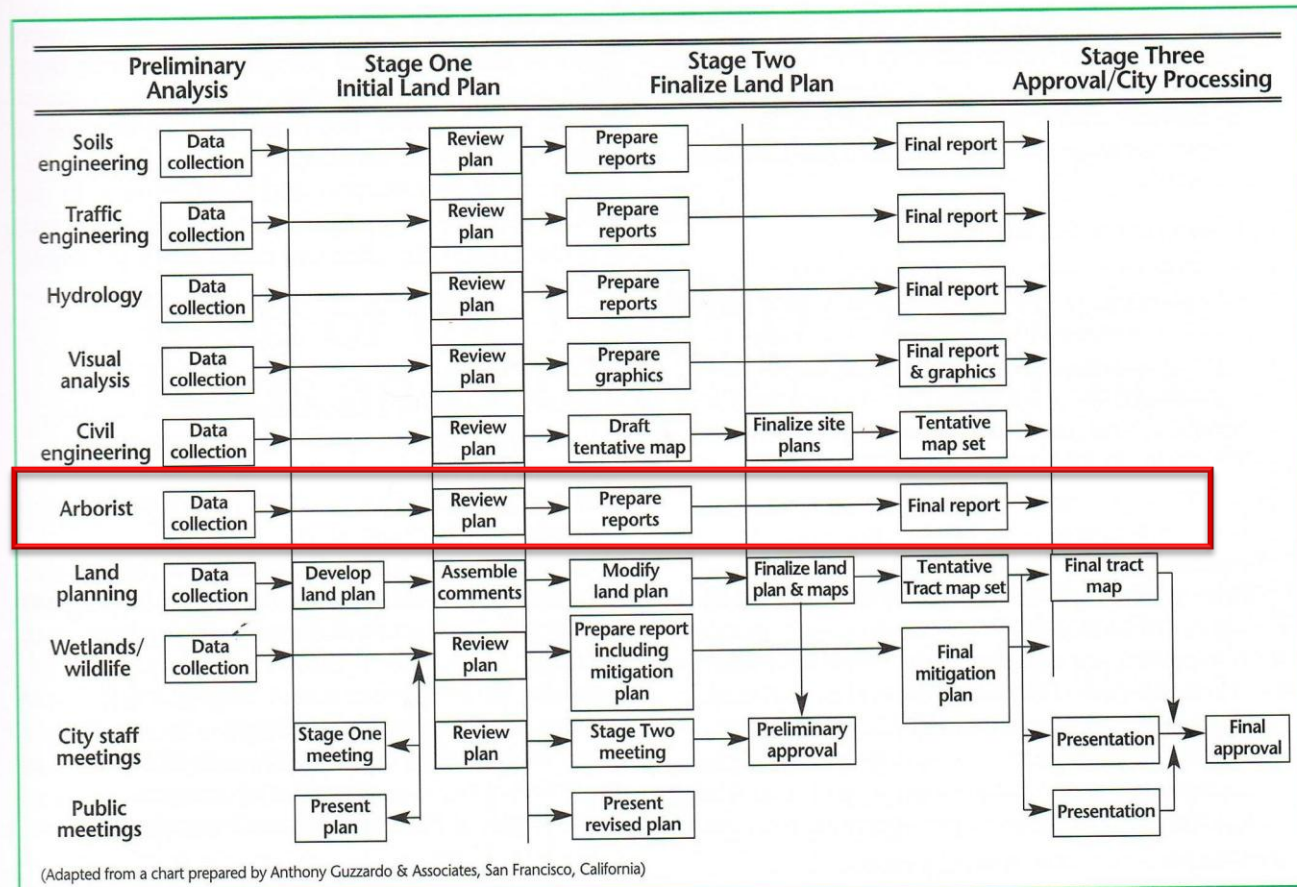
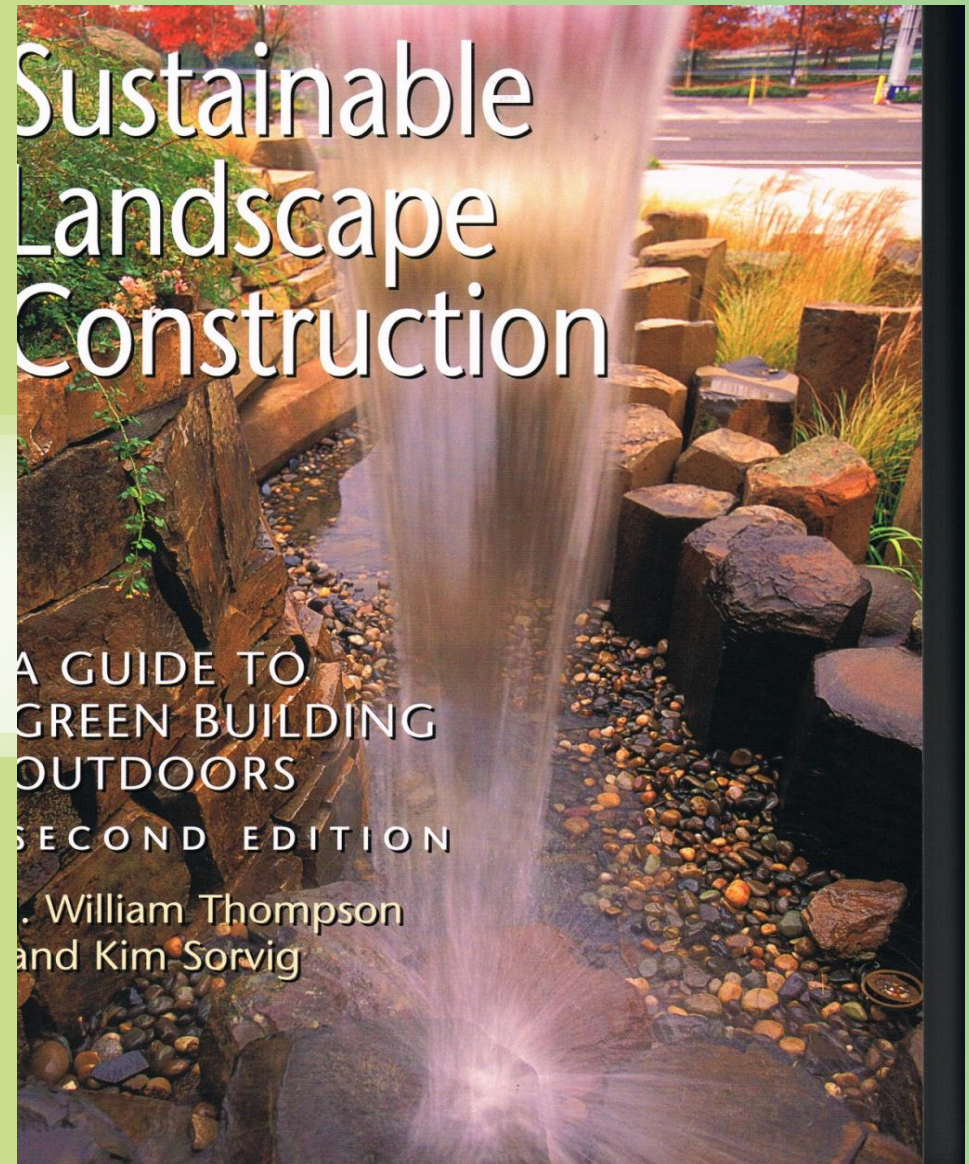


FIGURE 3.1 The planning phase of a development project involves using information from a variety of sources to formulate a comprehensive plan, including opportunities for review and comment by the public agencies involved.

10 principles discussed:

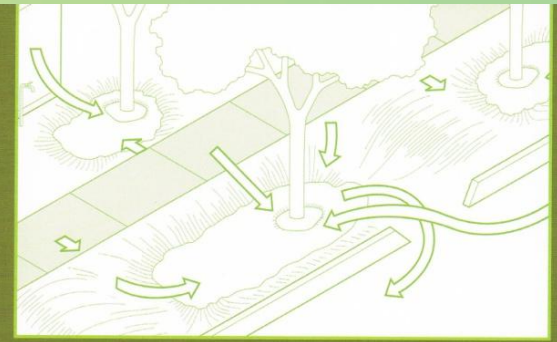
- Keep Healthy Sites Healthy
- Heal Injured Sites
- Favour Living, Flexible Materials
- Cost of Energy over Time
- Consider Origin & Fate of Materials
- Respect the Waters of Life
- Know the Cost of Energy over Time
- Pave Less
- Celebrate Light, Respect Darkness
- Maintain to Sustain



- Practise of landscape architecture
- Standards & Guidelines
- Process, Implementation and Application
- Materials

hic
DARDS

Standards & Guidelines



LANDSCAPE ARCHITECTURAL GRAPHIC STANDARDS



LEONARD J. HOPPER, RLA, FASLA

Developing With Trees in Mind: Enhancing Your Investment

This 14 minute video was developed
by Oregon Community Trees , USFS
& Oregon Dept. of Forestry

It is available for sale from Oregon
Community Trees, a non-profit organization.

www.oregoncommunitytrees.org

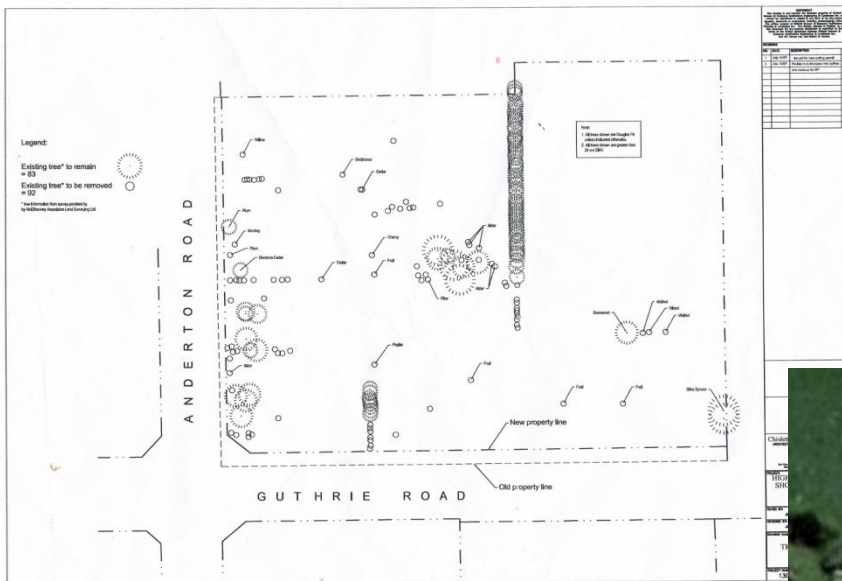
Tree Retention on development sites:



Before development: 247 trees

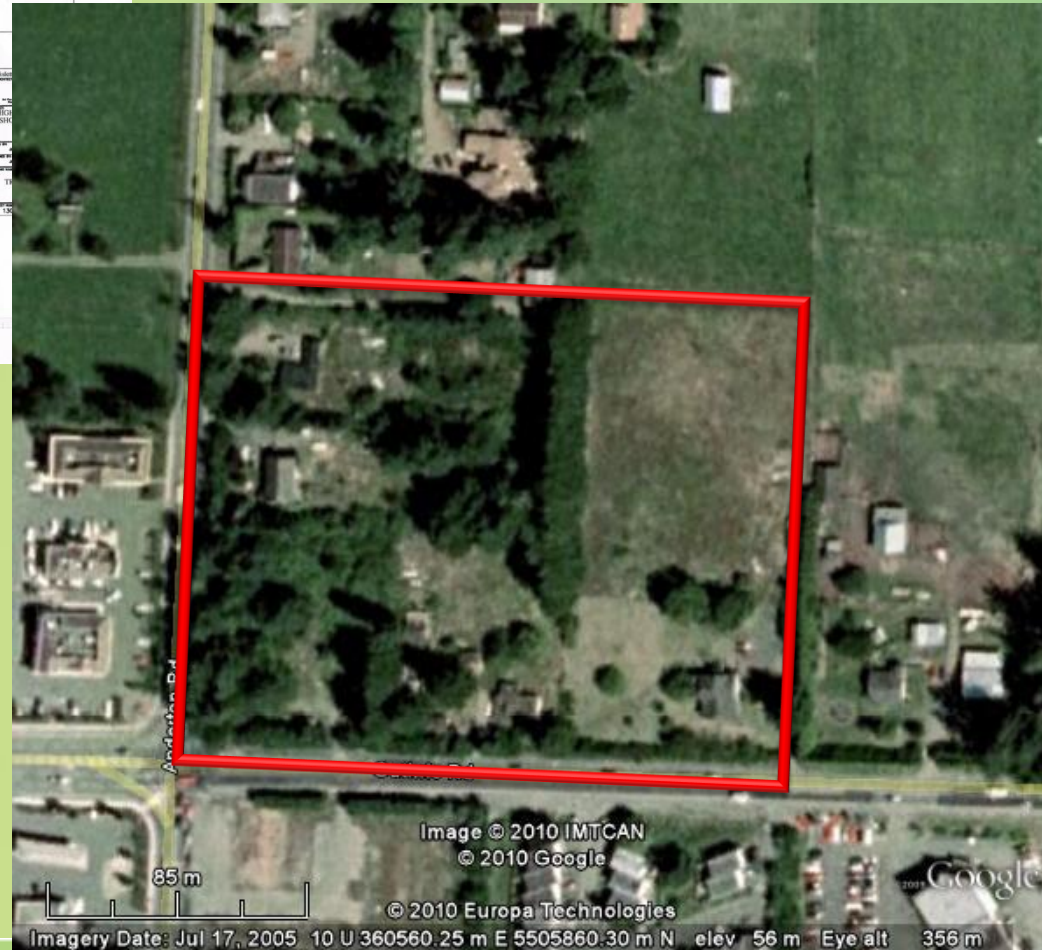


Pre-development Stage



REVISED TREE RETENTION PLAN ACCEPTED.
DECEMBER, 18, 2007
SILV - COMOX PARKS Supt.

For reliable accurate data (tree #'s, species and location), surveys should be done by arborists or foresters.



Response about the 25% tree retention tree by-law.

- Architect: “This is great!”
- Landscape Architect: “I’ve never done a commercial design with mature trees.”
- General Contractor: “None of my crew will be working on this site with trees on it.”
- Engineers: “This is absolutely ridiculous.”
- Developer: “This is costing me more money. Can’t we just get rid of them & plant more?”

Caring Citizens

- Walnut / Apple / Chestnut : wood carvers
- Ornamentals (rhodos, roses, plum, money puzzle trees): local gardeners
- To ensure the safety of the public, I had to be on site during these transactions. My liability insurance covered these tasks.



Communicate



Educate

There were a few bumps on the way...

The Tree Management Plan for the shopping centre development project specified 28 trees to be removed for Phase 2. Forty four trees were removed in May, 2009. Remediation for the 16 trees removed has been determined using The **Cost of Cure** formula and the **Trunk Formula Method**. Costs ranged from \$7,200.00 to \$12,800.00. The Trunk Formula Method appraised value is \$10,320.00.



Geotechnical engineers



Geotechnical engineers

- **Geotechnical engineering** is the branch of [civil engineering](#) concerned with the engineering behavior of earth materials. Geotechnical engineering uses principles of [soil mechanics](#) and [rock mechanics](#) to investigate subsurface conditions and materials; determine the relevant physical/mechanical and chemical properties of these materials; evaluate [stability of natural slopes](#) and man-made soil deposits; assess risks posed by site conditions; design [earthworks](#) and structure [foundations](#); and monitor site conditions, earthwork and foundation construction [\[1\]](#)[\[2\]](#)

Wikipedia

Tree Retention on development sites:



Before development: 247 trees
End of Phase 1: 80 trees retained
End of Phase 2: 36 retained trees
211 removed (85%)



Tree Maintenance Program (TMP):

- Conifers are best retained in groves as their root systems intertwine improving their stability and structural strength.
- *I estimate it will take 3 years for the trees to adjust to their growing conditions. The TMP helps the trees to improve their health. It is critical the trees remain healthy. Not caring for the trees will increase the potential for them to decline rapidly and become a risk.*
- Native understory plant material in the groves must not be disturbed. This plant material helps hold the moisture in the groves and reduces foot traffic in the groves. The plant material can be pruned for a better appearance.
- All 3 groves require fertilization of a slow release tree fertilizer in 2010 and 2012. The trees are showing signs of stress commonly seen when construction is done around them. Fertilizing is done with a deep root injection system.
- The critical change for the trees is hydrology. Most of the water has been moved away from the trees by the construction. The summer of 2009 was hot and dry which has added stress to the trees. Watering in 2010 and 2011 will be needed. Watering is done with a deep root injection system.
- Professional assessment of the trees is ongoing year round to determine health and structural stability.
- No picnic tables, etc. should be place in the groves. A new landscape area already designed to be installed by the medical clinic will have a public area.

Responses about the 25% tree retention town tree by-law after Phases 1 and 2 were completed.

- Architect: “This is great! “
- Landscape Architect: “The end result design with mature trees worked out well. “
- General Contractor: “We now understand more about working around mature trees . The letter to WCB helped. “
- Engineers: “This is absolutely ridiculous. “
- Developer: “This was my idea from the start, isn't it great! “

Grove of trees retained on new residence building site.



Our love-hate affair with trees

- Since 2005 communities in London (England) have removed 40,000 street trees. Forty % because of insurance claims. 1% of the removals were justified.
- In England 147 communities surveyed their urban trees. Eleven % were between 50-100 years old and only 2% over 100 years old.
- “Insurance companies demand trees be cut down and councils cave in to their demand. Which means when trees get big, they get chopped down.”
- London Tree Officers’ Association developed Capital Asset Value for Amenity Trees (CAVAT) to assess a tree’s worth.
- The higher the tree’s value, the more proof the insurers will need to chop it down.
- www.independent.co.uk/environment/nature/green-giants

City trees and property values

Arborist News August 2007

Dr. K. Wolf

● **Yard and Street Trees**

Studies about trees and residential property values have evaluated a range of urban forest and landscape conditions on single-family homes. Although there have been a few exceptions, homes with trees are generally preferred to comparable homes without trees, with the trend across studies being a price increase of about seven percent. Here are results from a selection of studies:

Yard and Street Trees

Price Increase Condition

2% mature yard trees (greater than 9-inch dbh)

3-5% trees in front yard landscaping

6-9% good tree cover in a neighborhood

10-15% mature trees in high-income neighborhoods

Tree Retention in Development

Price Increase Condition

18% building lots with substantial mature tree cover

22% tree-covered undeveloped acreage

19-35% lots bordering suburban wooded preserves

37% open land that is two-thirds wooded

Generally, trees and forest cover in development growth areas add value to parcels.



We estimated the annual value of old growth trees in Israel using a Contingent Valuation (CV) study. We used the payment card (PC) procedure and surveyed both forest visitors as well as a representative sample of the general population. It was found out that the annual value can range between 2.35 and 19.9 million Euros depending on the assumption with respect to who are the beneficiaries of the project. This value is important since old growth trees are used less for active recreation but has an important role in the heritage of the country. As such they should be allocated funds to be preserved. This paper tries to understand the value of this commodity from an economic point of view in order to conclude if it deserves the financial effort needed to be preserved. © 2009 Elsevier B.V. All rights reserved.

The economic value of old growth trees in Israel

Nir Becker a,[?] , Shirra Freeman b

a Department of Economics and Management, Tel-Hai College, Upper Galilee, 12210, Israel

b Department of Geography, University of Haifa, Mount Carmel, Haifa, 31905, Israel





We are capable of retaining 1,100 year old trees for future generations to enjoy!



Ranley Oak in England





As an arborist ,
educate yourself
about mature
tree retention.

Educate the workers,
engineers, developers
about mature tree
retention. Everyone will
benefit from your actions.



Mature Tree Retention –Risk or Benefit to the Community ?

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