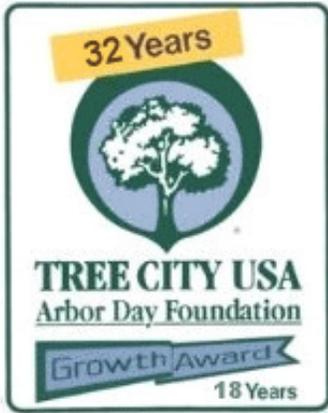


**2008 ANNUAL REPORT**

**SYNOPSIS OF LINCOLN'S PUBLIC TREE INFRASTRUCTURE AND  
COMMUNITY FORESTRY PROGRAM**

SUBMITTED BY  
COMMUNITY FORESTRY ADVISORY BOARD  
AND STEVE SCHWAB, CITY FORESTER



LINCOLN STREET TREE VOUCHER PROGRAM

**2008 SYNOPSIS of LINCOLN'S PUBLIC TREE INFRASTRUCTURE & COMMUNITY FORESTRY PROGRAM**

**CITY OF LINCOLN  
EXISTING NUMBER OF TREES ON CITY PROPERTY  
AS OF OCTOBER 2008**

	Trees < 10" diameter	Trees > 10" diameter	Total	%
Street trees	58,518	27,097	85,615	69%
Park trees & other	17,629	20,010	37,689	31%
<b>TOTAL</b>	<b>76,147 (62%)</b>	<b>47,107 (38%)</b>	<b>123,304**</b>	<b>100%</b>

**\*\*Number of city trees has increased 9½% from 112,651 to 123,304 since initial count was taken in March 2004.**

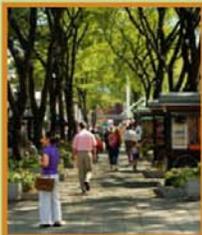
**2007 area trims done and count taken indicated that 27% of total number was ash trees.**

**NOTE:**  Trees 10" diameter or less can be pruned without using an aerial bucket truck.  
 Trees greater than 10" diameter require aerial bucket truck in order to do pruning.

**Current Size of Lincoln:** 89.12 square miles  
**Current Population (2007 est.)** 248,744  
**Linear miles of streets** 2,510 miles  
**Average # street trees per mile** 34 trees per mile  
**FY07-08 Forestry Expended Budget** \$1,093,790  
**Other Expenditures- Capital Outlay(Equip)** \$296,931  
**2008 Expenditure for Municipal Tree Car** \$5.59 per capita

**For every \$1 a city invests in trees, it receives benefits of up to \$3.74. Here's how:**

**T**rade and the Economy



- ◆ Sales at businesses on tree-lined streets are up to 12% higher; shoppers are willing to pay more for parking and will pay up to 11% more for goods and services
- ◆ Residential property values can increase 5–20% if trees are in the landscape
- ◆ Workers with views of green from their desk report 23% less instances of illness

**R**esidents



- ◆ Crime rates decrease in areas with more greenery
- ◆ Access to green areas helps reduce stress and aggression in urban environments
- ◆ Inner city common spaces with greenery are used more by residents, providing more opportunity for neighbors to know one another

**E**ducation



- ◆ Children who have a view of greenery perform better in school
- ◆ Increased exposure to nature enhances the ability of children to follow directions
- ◆ Access to green spaces relieves the symptoms of ADD, resulting in better concentration

**E**nvironmental Health



- ◆ Each year, an acre of trees absorbs the amount of carbon produced by driving a car 26,000 miles
- ◆ Trees remove dust and soot from the air, which can damage our lungs and increase asthma in children
- ◆ Trees cool city heat islands by 10-20 degrees, reducing ozone levels and helping cities meet air quality standards for federal highway dollars

**S**avings



- ◆ Streets with little or no shade need to be re-paved twice as often as those with 30% tree cover
- ◆ Just 3 trees strategically placed around a home can decrease utility bills by 50%
- ◆ Trees reduce the amount of water runoff from rain and clean the water that does run off, saving billions of dollars otherwise needed for storm water control and water treatment facilities

**Current Estimated Average Annual Environmental, Economic & Social Net Benefits of Lincoln's Public Tree Infrastructure\***

**Annual Monetary Benefit**

\$3 to \$15 for a small tree (\$9 average)  
 \$4 to \$34 for medium trees (\$19 average)  
 \$58 to \$76 for large trees (\$67 average)

Trees Planted 2004 to 2008 10,854 trees X \$4/tree = \$43,416  
 Trees < 10" dia. 58,518 small trees X average \$9/tree= \$526,662  
 Trees > 10" dia. 37,689(18,844 medium trees & 18,845 large trees)  
 18,844 medium trees X average \$19/ tree= \$358,036  
 18,845 large trees X average \$67/ tree= \$1,262,615

Total Estimated Annual Net Benefits \$2,190,729 ÷ \$1,390,721 Costs =

→ \$1.58 Return in Benefits for every \$1.00 Expended in FY2007-08 ←

\*Calculated using research data from the US Forest Service 2006 publication entitled Midwest Community Tree Guide –Executive Summary



**Analysis Report**  
 for  
**Lincoln**



**Stormwater**

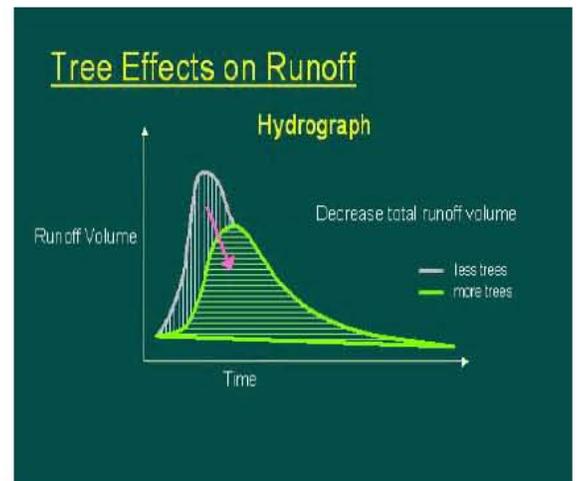
Trees decrease total stormwater volume helping cities to manage their stormwater and decrease detention costs. CITYgreen assesses how land cover, soil type, and precipitation affect stormwater runoff volume. It calculates the volume of runoff in a 2-year 24-hour storm event that would need to be contained by stormwater facilities if the trees were removed. This volume multiplied by local construction costs calculate the dollars saved by the tree canopy. CITYgreen uses the TR-55 model developed by the Natural Resource Conservation Service (NRCS) which is very effective in evaluating the effects of land cover/land use changes and conservation practices on stormwater runoff. The TR-55 calculations are based on curve number which is an index developed by the NRCS, to represent the potential for storm water runoff within a drainage area. Curve numbers range from 30 to 100. The higher the curve number the more runoff will occur. CITYgreen determines a curve number for the existing landcover conditions and generates a curve number for the conditions if the trees are removed and replaced with the user-defined replacement landcover specified in the CITYgreen Preferences. The change in curve number reflects the increase in the volume of stormwater runoff.

**Water Quantity (Runoff)**

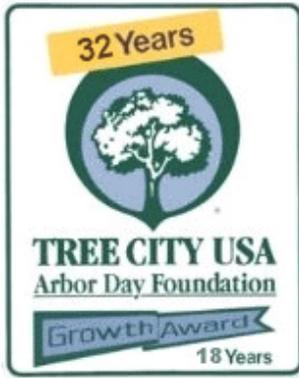
2-yr, 24-hr Rainfall:	2.75 in.
Curve Number reflecting existing conditions:	81
Curve Number using default replacement landcover:	82
Additional stormwater storage volume needed:	12,110,736 cu. ft.
Construction cost per cu. ft.:	\$2.00

**Total Stormwater Savings: \$24,221,471**

**Annual costs based on payments over 20 years at 6% Interest: \$2,111,738 per year**



**TREE CITY USA**



**Lincoln's "Green Infrastructure" -  
CITY TREES & TREE CITY USA**

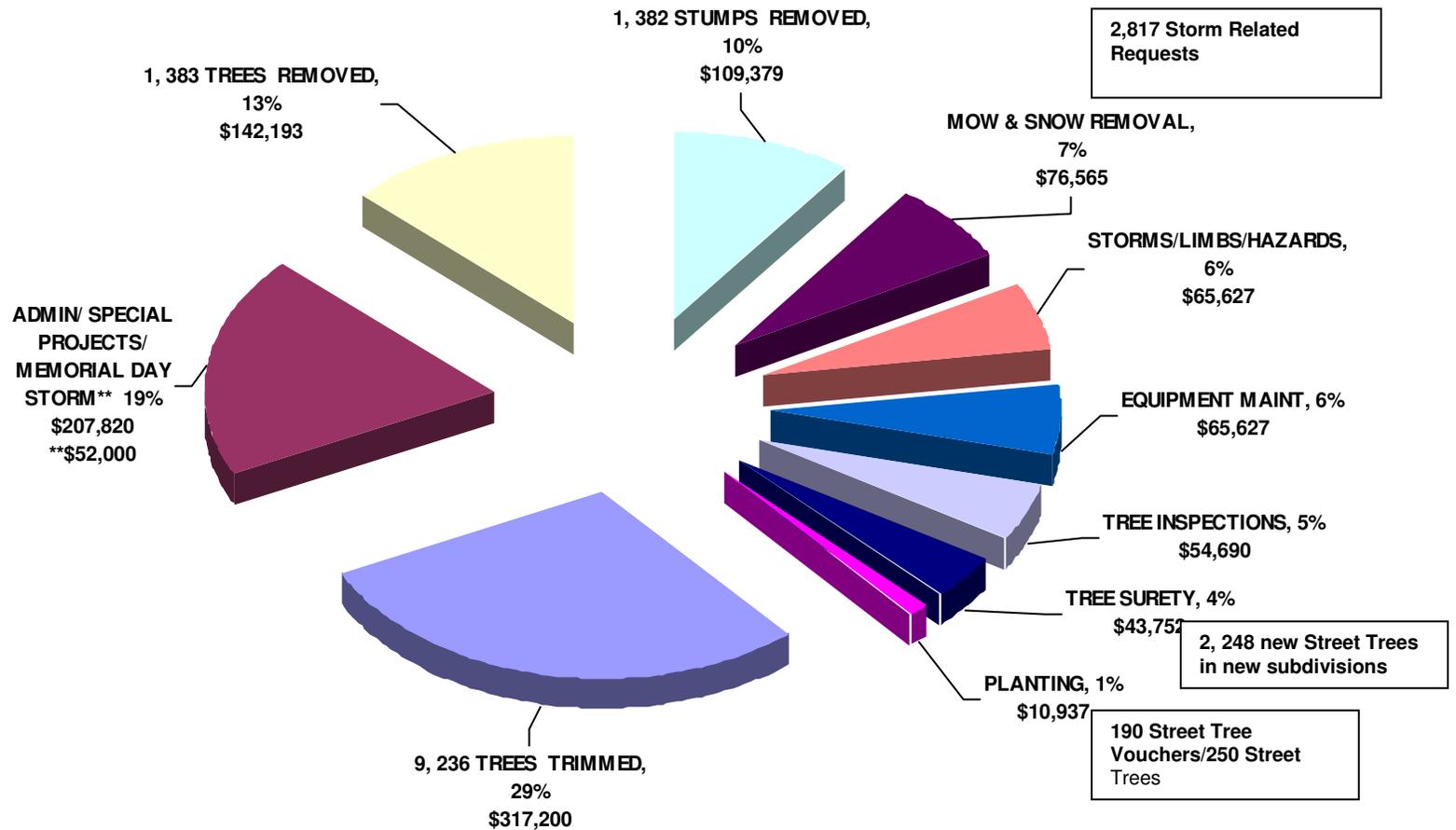


- ✿ **NATIONWIDE - 3,306 Tree City USA communities - 534 Tree City USA Growth Award communities - 186 Sterling Tree City USA communities - 138 Tree Line USA Utilities - 106 communities both a Tree City USA & Tree Line USA Utility -**
- ✿ **LINCOLN - Tree City USA 32 years ; Tree City USA Growth Award recipient 18 consecutive years ; Sterling Tree City USA since 2000 ; Tree Line USA Utility (LES) and Tree City USA since 2005 and Tree Campus USA University Nebraska Lincoln since 2008 - *currently the only community nationwide to concurrently have all such designations***
- ✿ **Forestry Section of the Lincoln Parks & Recreation Department responsible for maintaining over 123,000 city-owned trees valued at over \$64 million**

TREE CITY USA DESIGNATION	NUMBER NATIONALLY	CITY of LINCOLN
Tree City USA	3,306 Communities	32 Years
Tree Growth Award	534 Recipients	18 years
Sterling Tree City USA	186 Communities	Since 2000
Tree Line USA Utility	138 Utilities	Lincoln Electric System (LES)
Tree Campus USA	10 Universities	UNL since 2008
All of the above	1- Lincoln, NE	Lincoln since 2008

## FORESTRY SECTION BUDGET EXPENDITURE

### FY 2007- 08 Forestry Section Expenditures by Work Categories (Total Forestry Budget Expenditure was \$1,093,790)

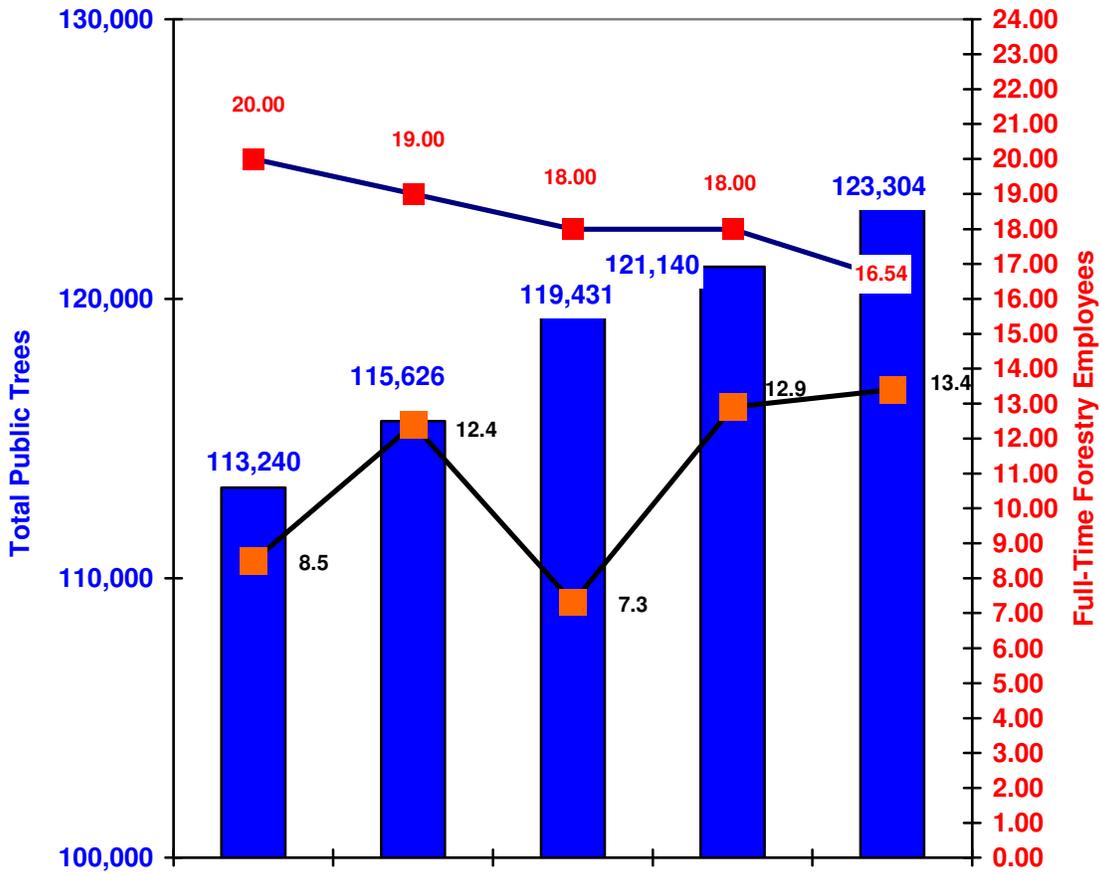


### COSTS

- Tree Removal  $\$142,193 \div 1,383 \text{ trees} = \$103/\text{tree}$
- Stump Removal  $\$109,379 \div 1,382 \text{ stumps} = \$79/\text{stump}$
- Trim  $\$317,200 \div 9,236 \text{ trims} = \$34/\text{trim}$
- Limb Request  $\$65,627 \div 2,817 \text{ requests} = \$23/\text{request}$
- Street Tree Vouchers 190 Vouchers issued for 250 street trees for total amount of \$13,705 = \$54.82 per tree (Voucher recipients on average contribute \$75/street tree planted, a 135% match for each \$50 street tree voucher issued)

# TREE PRUNING CYCLE

## CITYWIDE PUBLIC TREE INFRASTRUCTURE PRUNING CYCLE IN YEARS

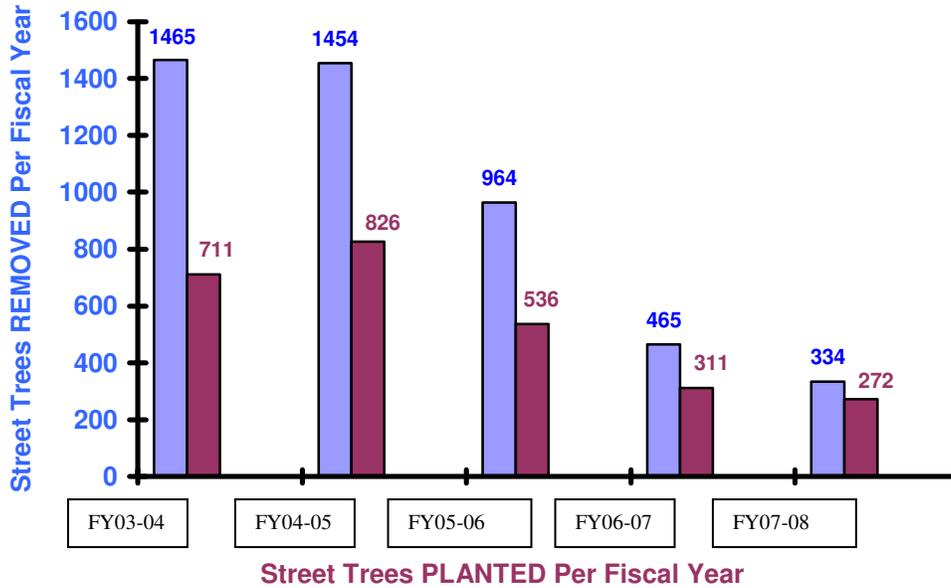


Fiscal Year	FY2003-04	FY2004-05	FY2005-06	FY2006-07	FY2007-08
Total Public Trees	114,540	117,066	119,856	121,140	123,304
Forestry FTE	20.00	19.00	18.00	18.00	16.54
Public Trees Trimmed	13,491	9,320	16,308	9,385	9,236
Trimming Cycle	8.5 Years	12.6 Years	7.3 Years	12.9 Years	13.4 Years

**NOTE:** The length of the trimming cycle has significant effect on the value, benefits and health/condition of trees. Longer pruning cycles result in reduced values and benefits and trees can become liabilities instead of assets. Research has shown that loss in value occurs over time once the trimming cycle is typically extended beyond 10 years.

**STREET TREES REMOVED & PLANTED**

**City of Lincoln - Number of Street Trees Removed and Planted Per Fiscal Year**



Fiscal Year	2003-04	2004-05	2005-06	2006-07	2007-08
# Street Trees Removed	1465	1454	964	465	334
# Street Trees Planted	711	826	536	311	272
Ratio Street Trees Removed to Street Trees Planted	206 Removed to 100 Planted	176 Removed to 100 Planted	180 Removed to 100 Planted	150 Removed to 100 Planted	123 Removed to 100 Planted
Street Tree Vouchers Issued/# Street Trees					190 Vouchers 250 Street Trees

**NOTE:** Estimated number of existing street trees is 85, 615. Current linear miles of streets is 2,510. Average number of street trees per mile is 34, or a 32 % stocking level. If all planting spaces are filled with trees of the largest size possible for the available growing space (termed "full stocking"), **a typical U.S. city will have about 105 ROW street trees per mile.** This benchmark is equivalent to one street tree every 50 feet, but takes into account visibility triangles at corners and lost planting spaces due to intersections, driveways, and other public infrastructure.

**City gets 're-tree' grant**

By the Lincoln Journal Star  
Monday, Oct 27, 2008 - 04:07:17 pm CDT

Lincoln has received a \$7,500 grant from the "Trees for Nebraska Towns" program. The grant, which will be matched by the city, will be used to fund Lincoln's ReTree Nebraska Street Tree Voucher Program for planting shade trees in City rights of way.

The TNT program is funded by the Nebraska Environmental Trust and coordinated by the Nebraska Statewide Arboretum. The program recently awarded more than \$300,000 in landscape beautification funds to 23 Nebraska communities.

Property owners who are interested in planting street trees on city rights of way should contact the Lincoln Parks and Recreation Forestry Division at 441-7035.



(LJS File)

**✖ CLOSE** ReTree Nebraska is a 10-year cooperative initiative to raise public awareness of the value of trees, reverse the decline of Nebraska's tree and forest resources and improve the health and sustainability of trees and forests across the state for future generations.

The program partners with Nebraskans to foster the proper planting and maintenance of one million new trees by 2017.

More information on the city's forestry division is available on the city's Web site at [lincoln.ne.gov](http://lincoln.ne.gov) (keyword: trees).

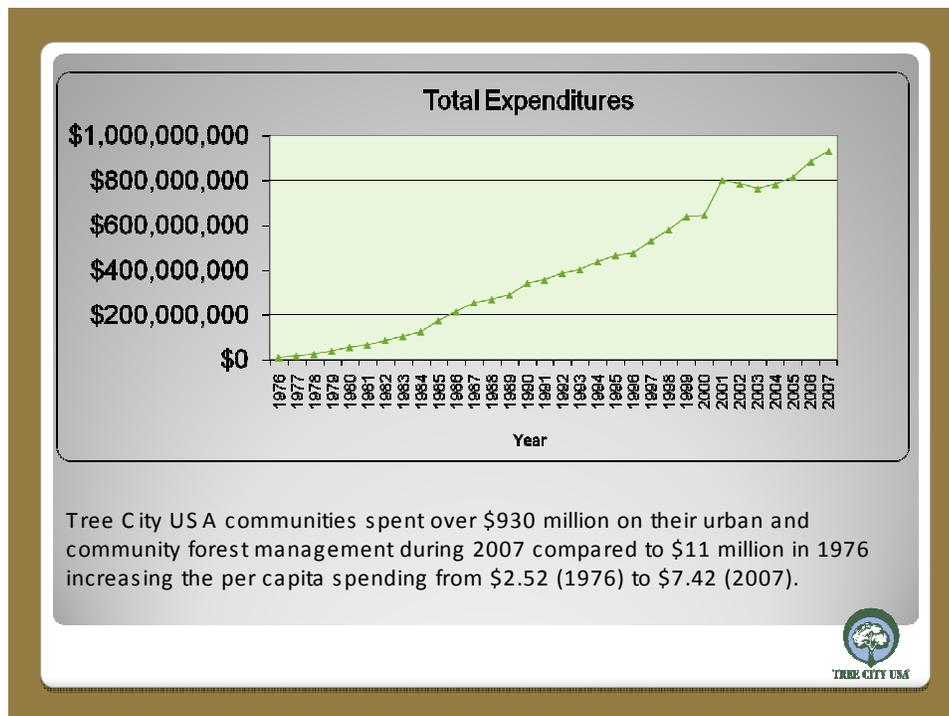
## **AMOUNT SPENT PER CAPITA FOR PUBLIC TREE INFRASTRUCTURE MAINTENANCE**

- Forestry Section FY2007-08 Budget Expenditure - \$1,093,790
- Horticulture & Park Districts/Parks Operation Budget Expenditure - \$66,426
- CIP Master Street Tree Program (Street Tree Voucher Program)- \$13,705
- Fleet Equipment- Capital Outlay- \$216,800

Total \$1,390,721 ÷ 248,744\* = **\$5.59 per capita** expended for personal services, materials, operations, equipment replacement and Street Tree Vouchers in FY2007-08 for management and maintenance of Lincoln's public tree infrastructure.

### **U.S. Census Bureau Population Estimate for City of Lincoln-**

Geographic Area		Population Estimates					
Place	State	July 1, 2007	July 1, 2006	July 1, 2005	July 1, 2004	July 1, 2003	July 1, 2002
Lincoln city	Nebraska	<b>248,744</b>	245,358	242,676	239,850	237,551	233,744



### **City of Lincoln FY2007- 08 per capita expenditure in comparison to other Tree City USA communities nationally-**

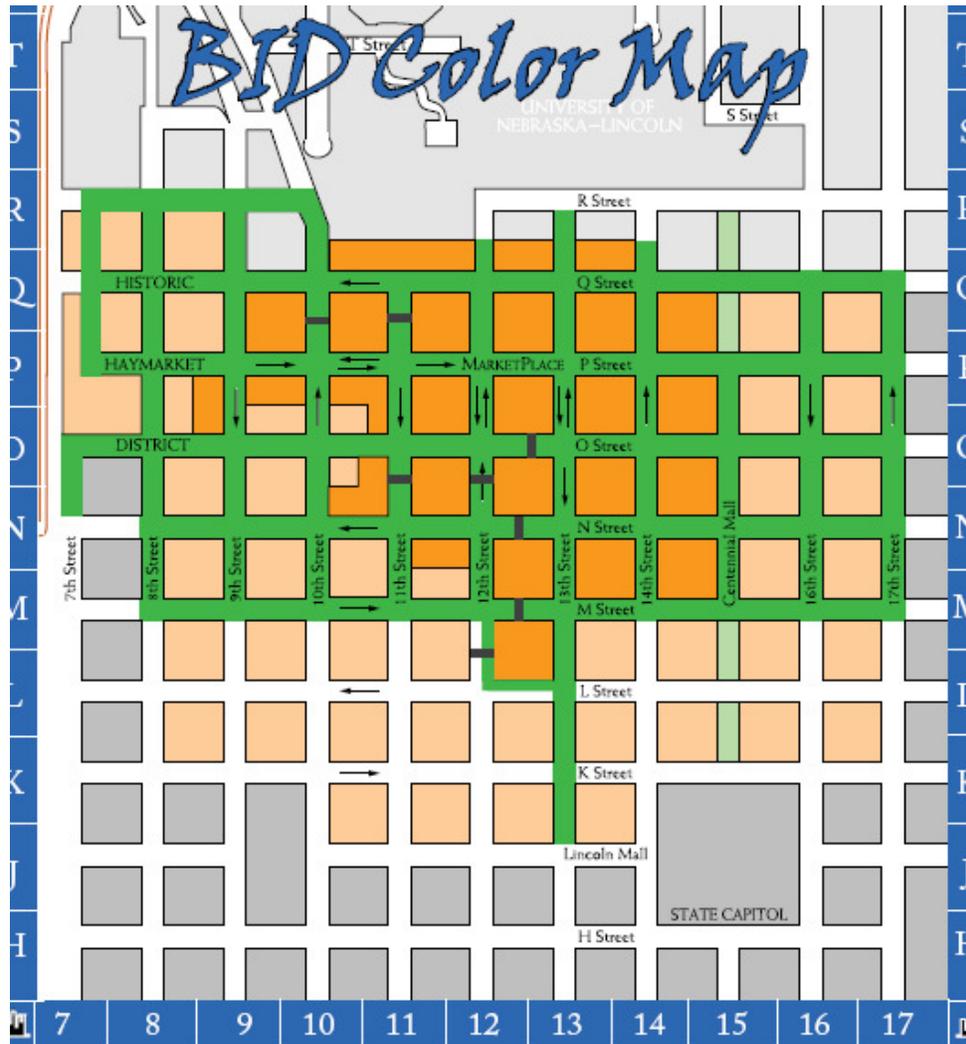
- Tree City USA 2007 national average per capita spending of \$7.42 as reported by the Arbor Day Foundation
- Lincoln spent \$5.59 per capita in FY2007-08
- Lincoln **spent 25% less per capita** for public tree infrastructure maintenance than the national average for Tree City USA communities in 2007

# DOWNTOWN STREET TREE INVENTORY

## Downtown Lincoln Tree Inventory October 1-7, 2008

NOTE: Inventory done by Downtown Lincoln Association (George Pinkerton, DLA Director of Landscape Management & DLA Staff).

There are 595 street trees growing a **66 block district** in the greater part of the City's downtown area, which equates to an 81% stocking level. There are also 205 open spaces where trees have either been removed and/or are missing (total existing number of 800 spaces for street trees).



 Downtown BID    Core BID    Maintenance BID

The downtown BID street trees were identified, condition coded, measured and inspected for damage and scheduled for maintenance. The collected data is as follows:

# of street trees	Species	# of street trees	Species
83	Honeylocust (83 ÷ 595 = 14%)	61	Norway Maple (61 ÷ 595 = 10%)
65	Green Ash (65 ÷ 595 = 11%)*	42	Red Bud (42 ÷ 595 = 7%)
34	White Ash (34 ÷ 595 = 6%)*	22	Red Oak (22 ÷ 595 = 4%)
74	Kentucky Coffeetree (74 ÷ 595 = 12%)	15	Hackberry (15 ÷ 595 = 3%)
78	Ginkgo (78 ÷ 595 = 13%)	22	Crabapple (22 ÷ 595 = 4%)
21	Japanese Lilac (21 ÷ 595 = 4%)	16	Swamp White Oak (16 ÷ 595 = 3%)
3	Pin Oak (3 ÷ 595 = .5%)	2	Bradford Pear (2 ÷ 595 = .3%)
2	Goldenraintree (2 ÷ 595 = .3%)	3	Manchurian Ash (3 ÷ 595 = .4%)*
11	Linden (11 ÷ 595 = 2%)	13	Amur Maple (13 ÷ 595 = 2%)
6	Red Maple (6 ÷ 595 = 1%)	16	Hophornbeam (16 ÷ 595 = 3%)
6	Elm (6 ÷ 595 = 1%)		

NOTE: Total Percentage > 100% due to rounding off. \* Ash will no longer be planted due to threat of Emerald Ash Borer (EAB). No No more than 10% of one species is recommended. GREATER TREE SPECIE DIVERSITY IS NEEDED. Following are tough urban

- Trees that should be planted in greater numbers in downtown Lincoln-Swamp White (*Bicolor*) Oak (*Q. bicolor*);
- Chinkapin Oak (*Q. muhlenbergii*);
- Accolade Elm (*Ulmus x 'Accolade'*); Valley Forge Elm (*Ulmus x 'Valley Forge'*); Frontier Elm (*Ulmus x 'Frontier'*);
- Ironwood (*Ostrya virginiana*); State Street Maple(*Acer myiabe*); Golden Raintree (*K. paniculata*); Amur Maple (*Acer ginnala*);
- Tartarian Maple (*A. tartaricum*); Japanese Tree Lilac (*Syringa reticulata*)

**Tree Condition Code (average)**  
 (1 [excellent] -- 5[remove])      1.83 average

**Tree Height (Average)**      24.15 ft.

**Tree Diameter (Average)**      8.59 in.

Number of trees	Damage
64	Borer damage
1	Canker
41	Pruning needed*
13	Trunk damage
14	Leaning
4	Chlorotic
9	Removal*

\*Scheduled Pruning and Removals needs to be coordinated between DLA and the Forestry Section of the Lincoln Parks & Recreation Department.

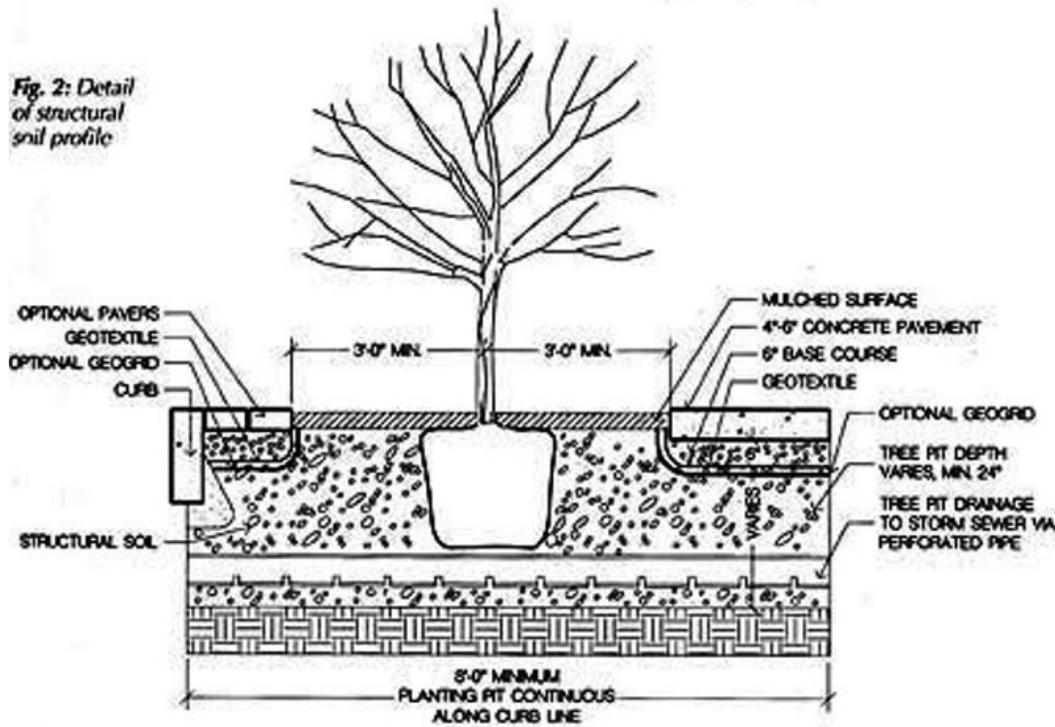
Majority of the 112 open zones where street trees are missing are 4' X 4' non-concrete cutout spaces in sidewalks. These areas need to be enlarged to accommodate/sustain the mature growth of replacement street trees.

**Create as much rooting space as possible-**

Unfortunately, planting success in a tree pit often follows what might be called the “Rule of Four”: the roots of a tree with a 4-inch trunk diameter will fill up a 4 foot X 4 foot X 4 foot pit within 4 years. This usually results in a growth slowdown or stoppage and, eventually, tree death. A planned street or sidewalk reconstruction offers a prime opportunity for street tree planting sites to be built better. A **continuous planting strip** can be built beneath the sidewalk, or existing individual tree pits can be connected with underground tunnels filled with improved soil.

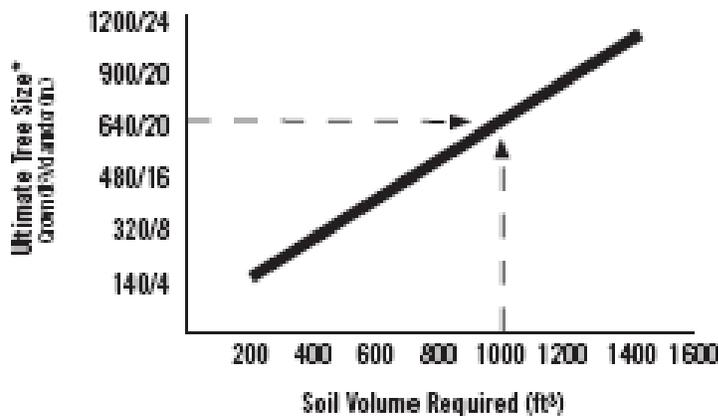
**CONTINUOUS STREET TREE PLANTING STRIP**

Fig. 2: Detail of structural soil profile



**SOIL VOLUME REQUIRED TO SUSTAIN HEALTH & MATURE GROWTH OF STREET TREE**

**Example: 1,000 cubic feet of soil needed for a 20” diameter tree**



\*The ultimate tree size is defined by the projected size of the crown and the diameter of the tree at breast height.

## UFORE INVENTORY

**UFORE** is an acronym for "Urban Forest Effects" and refers to a computer model that calculates the **structure**, environmental effects and values of urban forests. The UFORE model was developed in the late 1990s by researchers at the United States Department of Agriculture (USDA) Forest Service, [Northeastern Research Station](#) in Syracuse, NY.

The model suite consists of:

- Detailed, statistically based sampling and data collection protocols. These protocols allow for estimation of total and variation related to **urban forest structure** and population effects.
- Electronic customizable data collection programs that run on low-cost **Personal Digital Assistants (PDAs)**.
- A central computing engine that makes scientifically sound estimates of the effects of urban forests based on peer-reviewed scientific equations to predict environmental and economic benefits.

The UFORE model is currently designed to provide accurate estimates of:

- **Urban forest structure** by land use type (e.g., species composition, number of trees, **DBH** distribution, tree density, tree health, leaf area, leaf and tree **biomass**, species diversity, etc.).

Potential impact of pests such as [Gypsy moth](#), [emerald ash borer](#), or [Asian longhorned beetle](#)

Assessing Lincoln's Urban Forest – **DONE 2008** by Nebraska Forest Service

Data Needs for Sample Inventory Project

### Field data inputs:

All Projects must contain field data inputs. In addition, if sampling is conducted, the following variables are required:

Study area boundaries and size

Land use categories and sizes (required if study area is stratified)

Number of plots in each land use strata

### UFORE Plots

The plot size and number of plots needed for a UFORE project are not fixed, although UFORE plots are usually .1 acre in size (circle with 37.2 foot radius). The number of plots needed depends on the accuracy needed. **Typically 200 plots will produce about a 10% standard error for the total number of trees.** In the past, smaller cities have used 30 plots and larger cities such as New York and Baltimore have used approximately 200 plots.

A UFORE project typically begins with digital aerial photographs and land use maps of the study area, photos are not locally available, they can be obtained from the [USGS](#) for free or at low-cost. The [digital map](#) is used in selection of field plot locations; aerial photographs aid field crews in determining the location of the plots. Where available, [digital versions](#) of aerial photographs can greatly simplify and speed up the sampling process. The i-Tree [Sample Inventory Generator](#) helps to automate this process which are usually available for

### individual cities from local agencies.

After field plots are located on aerial photographs, whether electronically or manually, the plot locations are typically transferred to a street map of the area for ease of navigation for field crews. Where field plots were located on digital, geo-referenced photographs, plot locations can also be identified by their unique latitude and longitude. This allows the use of the geographic positioning system (GPS) units to locate the plots in the field.

**In 2009** – Field data collected from the 2008 Lincoln UFORE plots will be analyzed by the US Forest Service to help quantify the **structure** of Lincoln's urban forest resource (e.g., species composition, number of trees, tree sizes, tree locations) and what functions and values this resource provides (e.g., air pollution removal, carbon storage). Understanding the value of an urban forest can give managers and planners a basis with which to develop and evaluate programs for managing urban trees.

## **ARBOR DAY 2008**



### Teamwork Strengthens Community Forestry

#### Working With Volunteers

A companion bulletin is available that provides helpful information about working effectively with all kinds of individuals who volunteer to help with community forestry. It also discusses what roles are appropriate for volunteers and what jobs are best left to professionals. Please visit [arborday.org](http://arborday.org) to order *Tree City USA Bulletin No. 36, "How to Work With Volunteers Effectively."*



*Arbor Day Foundation employees with the help of city foresters and city employees plant 25 trees at a local elementary school.*

#### New Partnership Helps Qualify for Growth Award

The assistance of your city forester, tree board or municipal officials in helping to create a tree-related nonprofit will qualify for points under Category B of eligible activities leading to a Tree City USA Growth Award.



**TREE CITY USA**<sup>®</sup>

Belmont Park was the site of the 2008 Arbor Day Ceremony and tree planting. Pinnacle Bank donated \$2,000 to purchase the 25 park trees at a reduced cost from Campbell's Nurseries and the Arbor Day Foundation allowed their employees during working hours on Arbor Day to help Forestry plant the 25 trees in the park.