



PORTLAND PARKS & RECREATION

Healthy Parks, Healthy Portland



# Learning Landscapes Tree Planting Typology and Best Practices

Portland Parks & Recreation  
Urban Forestry

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# PORTLAND PARKS & RECREATION LEARNING LANDSCAPES PROGRAM

## The Learning Landscapes Program

A Learning Landscape is a neighborhood arboretum planted on campus by school children and their teachers, parks volunteers, local parent and neighborhood groups, PTA members, and Neighborhood Tree Stewards. This collection of trees is identified and mapped so students and neighbors can learn about them as they grow. Developing a school arboretum gives students and the community a hands-on, life-long learning opportunity. In addition to the environmental and aesthetic benefits of trees, students have opportunities to learn about tree biology, tree identification, environmental writing, native trees, watershed ecology, and more.

Students connect to their school by improving their campus grounds. They are able to participate in ongoing projects such as watering and pruning, designing maps and signs for their arboretum and presenting neighborhood learning sessions with teachers and Parks staff to enhance their study of the natural world. You can find more information at the Learning Landscapes web page at [www.portlandparks.org](http://www.portlandparks.org).

Funds for planting and maintaining school trees comes entirely from mitigation fees paid when trees are removed during construction and development projects in local neighborhoods.

## Portland Parks / Urban Forestry Management Commitment

- Select and plant a mix of trees that meets each Learning Landscape's particular requirements.
- Support and manage 100% of the labor and scheduling to install the Learning Landscape.
- Maintain the Learning Landscape for a minimum ten-year period.
- Supply fundamental materials and lesson plans for ongoing student engagement with the Learning Landscape.

## Using Trees for Education

At a time when field trips are limited by budgets and available instructional time, having a living laboratory of trees steps away from a classroom can be a great way for students to access the educational benefits of the natural world. Learning Landscapes can be used in lesson planning for every discipline, from science to math to art.

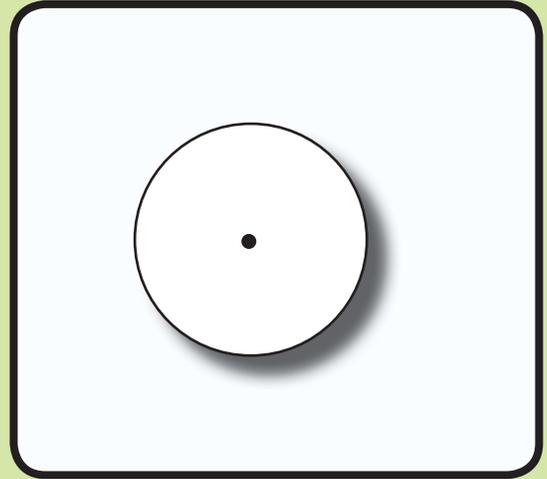
## How To Use A Learning Landscape

Portland Parks / Urban Forestry provides specific information about each tree's characteristics as well as details on the economic, scientific, historical and social importance. Urban Forestry also provides lesson plans linked to core curriculum. Since trees lend themselves to creative lesson planning, lessons need not be limited to science or math. All teachers are free to incorporate a Learning Landscape into creative teaching modes. For example, teachers have used Learning Landscape trees to teach sketching, writing, poetry and the social sciences. Trees can also serve as research objects, allowing students to take scientific field measurements and create graphs showing changes in data. Students can even become citizen scientists tracking the effects of global climate change through the trees at their very own school. It's easy to spark a student's imagination when they can reach out and touch examples of the world's tallest, most massive, and oldest living tree species.



# SPECIMEN TREE

A tree that can stand on its own, chosen for specific characteristics. This is a more typical tree planting that is most likely surrounded by lawn and a small mulch ring.



## Characteristics

- A SPECIMEN TREE can stand on its own or be part of a line of trees.
- Plant a line of SPECIMEN TREES along a TRAIL to enhance the connection.
- Use single trees for shade play areas, seating areas, large pavement expanses or adjacent buildings.

## Educational Connections

- Use your specimen tree to demonstrate solar energy and its use in photosynthesis - Refer to SCI.03.13
- Use your specimen tree to discuss the importance of trees in Portland's future - Refer to Language Arts 3.SL.1.a

## Maintenance

- See the TREE PLANTING BEST PRACTICES section of this document.
- Specimen trees do take regular care as outlined below, but they can be one of the most simple tree plantings to install and maintain.
- Planting a carefully chosen specimen tree or two is a good first step for schools that are more hesitant about tree planting.

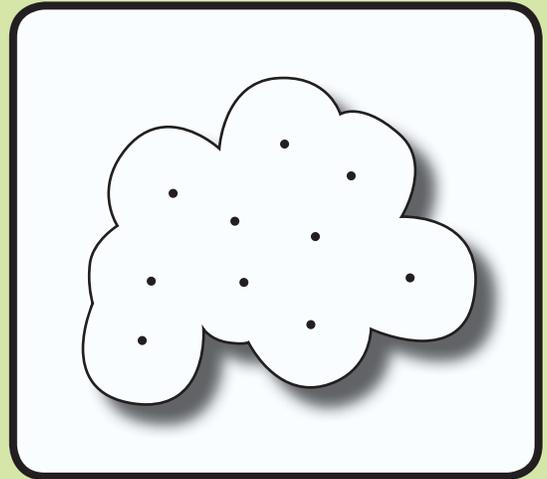
## Kenton School Case Study

In 2002 three specimen Oregon white oaks were planted in the Southeast corner of Kenton school at the intersection of North Lombard and Interstate Avenue. The Oregon White oaks will offer visual interest, shade and environmental benefits. Many schools have existing specimen trees on the school grounds. Specimen trees include any larger growing trees such as; an elm at Duniway, Oak at Lincoln HS or the Doug fir at Kenton.



# GROVE

A tightly planted group of trees functioning as a single group or unit. These plantings most likely don't have lawn between them because of tight trunk spaces and mowing limitations.



## Characteristics

- Showcases a single or a few tree species clustered together, creating a unique sense of place.
- Combine a GROVE along a TRAIL, with a LOG CLUSTER, or part of a RESTORATION to enhance the space. See those typology pages for examples and more information.

## Educational Connections

- Plant a native tree grove and connect it to how different cultures have viewed and used Northwest trees - Refer to Language Arts 5.RI.9
- Use the tree grove to teach about respiration as a basic need - Refer to SCI.03.01

## Maintenance

- See the TREE PLANTING BEST PRACTICES section of this document.
- The intent of a grove is that the trees are planted very closely together in mulch, crushed rock, or groundcover to eliminate the need for mowing.
- A grove planting will create a unique sense of place.
- Trees will have to be pruned carefully to maintain visual access and to facilitate continued growth of each tree.

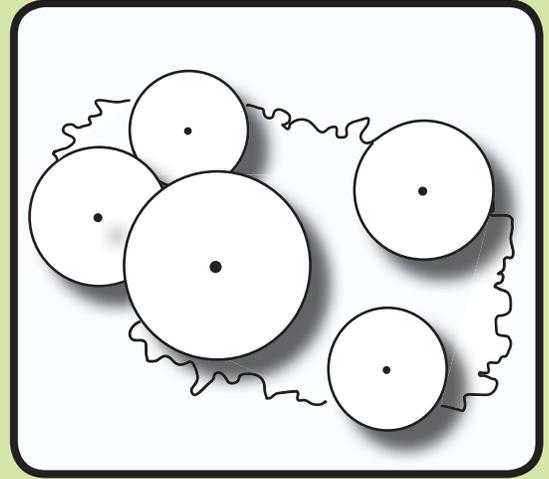
## da Vinci School Case Study

Inspired by a grove at the Olympic Sculpture garden in Seattle da Vinci Arts Schools science teacher Jason Hieggelke worked to plant a formal grove that could teach about carbon sequestration and create a reflective space. 25 trees were planted in a 5x5 grid 20 feet apart to create the da Vinci grove. The grove creates a format space where lines of site are maintained and the area between the trees can be used for educational and reflective activities



# RESTORATION AREA

A group of native trees and understory planted to restore habitat and environmental function to an area.



## Characteristics

- A mixture of overstory trees, understory trees and understory shrubs.
- Add a TRAIL through a RESTORATION AREA, or include a LOG CLUSTER to enhance the space. See those typology pages for examples and more information.

## Educational Connections

- Plant an Oregon white Oak restoration to describe the relationships between living things and their environments (e.g. food webs, interdependence). - Refer to SCI.04.02
- Use the restoration planting to teach about respiration as a basic need - Refer to SCI.03.01

## Maintenance

- See the TREE PLANTING BEST PRACTICES section of this document.
- Consider what type of habitat you are trying to create and how it will look and be maintained in 5 and 10 years. Wild landscapes and very natural plantings can tend to look overgrown, exclude access, and create long-term safety and visibility issues at schools.
- Understory plantings have very specific considerations in both the type of plants chosen, size, number of plants and how they are maintained. See the NATIVE UNDERSTORY page for more information.

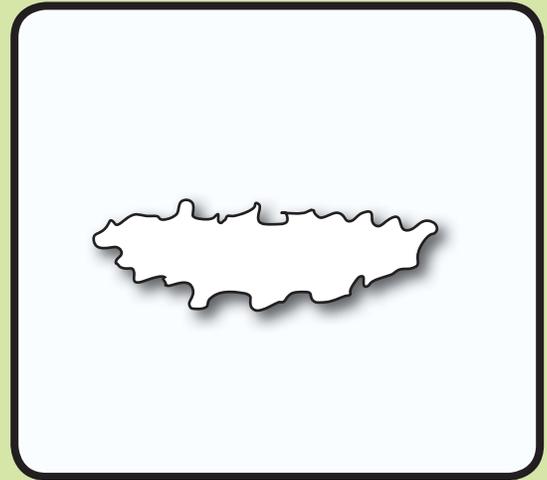
## da Vinci Rain Garden Case Study

To reduce impermeable surface and to teach interdisciplinary explorations into water and indigenous landscapes the da Vinci rain garden was built. The da Vinci rain garden includes paths, benches and native trees and shrubs. Planted in 2001 the restoration area is now nearing maturity with 30 foot tall trees and shrubs that can be pruned to maximize visibility. The da Vinci rain garden key feature is a 15x10 foot pond that attracts wildlife and can be used as a laboratory to test water quality.



# NATIVE UNDERSTORY

A planting of native understory shrubs and groundcovers. Often used in places with existing trees or tight spaces where trees won't fit.



## Characteristics

- Understory plantings create visual interest, educational opportunities and wildlife habitat. They can be a single species or multiple species of native understory plants.
- Combine along a TRAIL, under a GROVE or with a LOG CLUSTER to enhance the space. See those typology pages for examples and more information.
- In PP&R Learning Landscapes understory species are most often selected for their educational value and ability to survive rather than to recreate a natural habitat.

## Educational Connections

- Explain how people can care for the environment. - Refer to Geography SS.K.10
- Identify trees and shrubs native to coastal, Willamette Valley and the Cascades - Refer to SS.06.14
- Planting shrubs for coppicing that create materials for weaving.

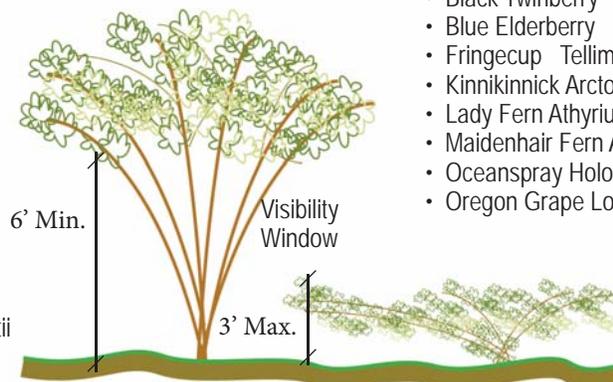
## Maintenance

- See the TREE PLANTING BEST PRACTICES section of this document.
- Plants are chosen that are long lived and persist well with low care.
- Often this type of planting is well suited for a courtyard garden or school planter.

Native plants are used that are under 3' or over 6' to create a visibility 'window'. Shrubs greater than six feet should be thoroughly pruned so stems are clear of foliage up to 5 feet. Shrubs lower than 3 feet are to be pruned to promote dense ground cover. Shrubs that respond well to this type of pruning are listed below.

### Tall Shrubs - Pruned to over 6'

- Osoberry/Indian Plum *Oemleria cerasiformis*
- Oxalis *Oxalis oregana*
- Pacific Ninebark *Physocarpus capitatus*
- Red Elderberry *Sambucus racemosa*
- Red Flowering Currant *Ribes sanguineum*
- Red Osier Dogwood *Cornus sericea*
- Sword Fern *Polystichum munitum*
- Vine Maple *Acer circinatum*
- Silk Tassel Bushes *Garrya elliptica* or *Fremontii*



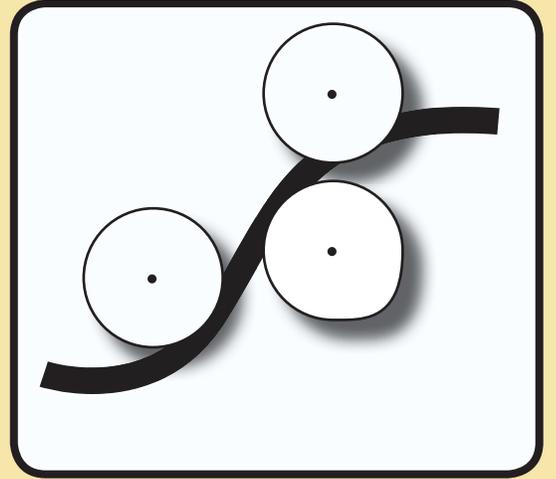
### Low Understory - less than 3 feet high

- Black Twinberry *Lonicera involucrata*
- Blue Elderberry *Sambucus nigra* ssp. *cerulea*
- Fringecup *Tellima grandiflora*
- Kinnikinnick *Arctostaphylos uva-ursi*
- Lady Fern *Athyrium filix-femina*
- Maidenhair Fern *Adiantum pedatum*
- Oceanspray *Holodiscus discolor*
- Oregon Grape Low *Mahonia aquifolium*



# TRAIL

A permanent surface that provides a linear link for tree planting, easy maintenance, and an access way for year round educational outings.



## Characteristics

- Connect two destinations or create a loop trail on the school site.
- Plant a line of trees along the length or combine with a GROVE, LOG CLUSTER, or RESTORATION to enhance the space. See those typology pages for examples and more information.
- Compacted crushed rock construction 4'-6' wide will provide a stable and accessible surface.

## Educational Connections

- Give examples of local natural resources and describe how people use them. - Refer to SS.01.12
- Describe a habitat and the organisms that live there. - Refer to SCI.03.04
- Link with the school's physical education goals by providing a full body, tactile learning experience.

## Maintenance

- See the TREE PLANTING BEST PRACTICES section of this document.
- Carefully consider what type of surfacing to use. Bark mulch may be cheaper to install, but will require more maintenance and resurfacing long term.
- Consider if the surface will be universally accessible.
- Compact surfacing to keep it from moving.
- Consider adding an edger to help define path edges for long term maintenance.

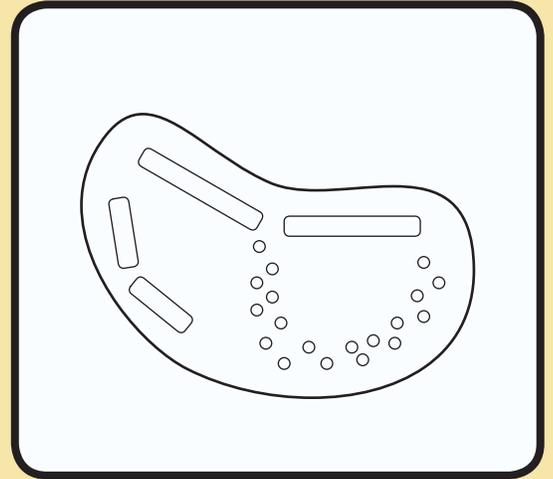
## Rigler Trail Case Study

Between the Rigler community garden and a soccer field a 150 foot tree trail installed as part of a tree planting at Rigler Elementary school. The trail is a tool that directs students and community members to explore the trees, get exercise and engage with the landscape. Trails can contain benches and other landscape feature that tie the trees together in one cohesive landscape feature.



# LOG CLUSTER

A gathering of large log and wood pieces for seating and gathering.



## Characteristics

- A group of long log segments, log rounds or other log benches. Can be used as a transition or edge for a space.
- Can be combined with a GROVE, set along a TRAIL or as part of a RESTORATION to enhance the space. See those typology pages for examples and more information.
- Large logs should be partially buried or otherwise connected to the ground for added stability and safety.

## Educational Connections

- Can be used as an outdoor classroom or small group activity space. Use as seating for recess or afterschool.
- Can be linked with physical activity and play if it is designed to accommodate safe use and provide appropriate impact attenuation for falls.
- Use a larger log's tree rings to mark historical dates and teach about tree growth.
- Compare how people lived in the community in the past with the way they live in the present. - Refer to SS.01.02
- Recognize the characteristics that are similar or different between organisms, deciduous versus evergreen. - Refer to SCI.03.02

## Maintenance

- Make sure log remain in a stable position to ensure they won't roll or fall.
- Log Rounds will degrade over time. Remove bark and treat with a non toxic preservative to extend their life.
- Regularly review logs for deterioration and remove the logs when necessary.

**Type A:** 18"-30" x12' log rounds set out for seating.



**West Powelhurst School**

**Type B:** custom cut log benches.

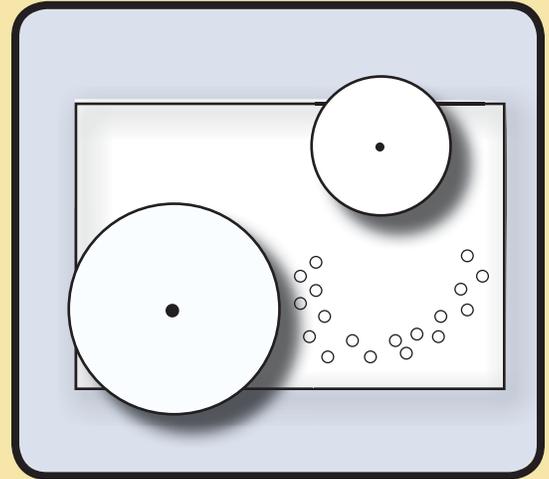


**Type C:** Stumps loose or buried



# COURTYARD

An outdoor space surrounded by the school building on at least 3 sides. Used for education, recreation by students, or as a calm and safe retreat.



## Characteristics

- Because of its protected and enclosed nature, a courtyard is a good place for student recreation and education including gardening, plant study, group work, and reading.
- Consider adding EDUCATION DETAILS in courtyards because of their increased visibility by students, ease of maintenance and reduced vandalism in this protected area.
- Combine with a SPECIMEN TREE, LOG CLUSTER, or small NATIVE UNDERSTORY to enhance the space. See those typology pages for examples and more information.

## Educational Connections

- Create a garden-themed science area or a quiet reading garden off the library.
- Create a calming and safe retreat space for counseling or special needs students.
- Courtyard planting improves nature observation, bringing plants and wildlife into close range for window viewing.
- Identify how some animals gather and store food, defend themselves, and find shelter. - Refer to SCI.03.05

## Maintenance

- The more complicated the design the more maintenance will probably be involved. Start with a small project and make sure it can be maintained long term before tackling something large.
- Before construction have a plan for maintenance including; weeding, path maintenance and resurfacing, watering, storage of tools, drainage, etc.

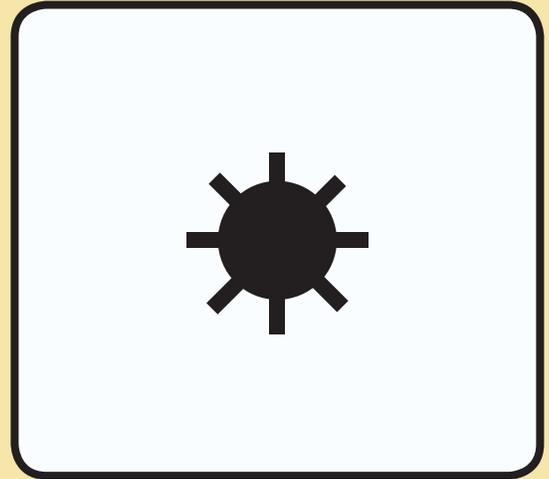
## Aster School Case Study

Many schools have court yards which have classroom that look out upon them. These court yards are an opportunity to create a visually inspiring landscape that brings scientific observation into classrooms. Trees and shrubs selected for courtyards include features for; year around visual interest, habitat, visual screening, and diversity seed types. In order to increase the opportunities to make visual observations from inside the classrooms additional features such as nurse logs, bird houses, bird feeders, insects condos, rain gauges, and thermostats give students a way to observe seasonal changes and create reports on those changes.



# EDUCATION DETAILS

Smaller design features that link lessons and stories to trees.



## Characteristics

- Can be combined with any of the other features.
- Can come in lots of shapes, sizes, and levels of complexity.

## Educational Connections

- **LOOSE PARTS:** A collection of smaller logs, wood pieces, and branches for building and creative play.
- **NURSE LOG:** A downed log with small trees and plants planted on top. Replicating this natural occurrence to help teach about natural life cycles and nutrient recycling.
- **TREE RINGS:** Use an old stump's tree rings to mark historical dates and teach about tree growth.
- **INSECT HOTEL:** Create a place for insects and pollinators to live and teach about their role in the ecosystem.
- **PHYSICAL ACTIVITY STATIONS:** Use logs and wood pieces to offer physical challenges to students. Set challenges along a path or in a cluster.
- **BIRD FEEDERS and NESTING BOXES:** Provide food and shelter to attract birds to a certain area.

## Maintenance

- The more complicated the design the more maintenance will be involved. Start with a small project and make sure it can be maintained long term before tackling something large.
- Before construction have a plan for maintenance including how to replace elements from damage by use, weather, and vandalism.

**Loose Parts Play**



**Insect Hotel**



**Activity Station**



# TREE PLANTING BEST PRACTICES

The following guidelines are recommendation by Portland Parks & Recreation Urban Forestry Division. These elements should be considered before planning your tree planting project.

## Tree Selection

We consider the following aspects when selecting trees for a site. Refer to the PP&R Urban Forestry 'Tree List' for more specifics on each tree. We recommend selecting trees that are:

1. Long-lived species
2. Generally healthy and climate adapted
3. Not known to have pests and diseases that are a problem in the area
4. Able to have lower limbs pruned for ease of maintenance and access
5. Sized so that the mature canopy size fits the available site
6. Carefully selected so their roots do not interfere with maintenance approaches
7. Producing a manageable amount of organic matter onto an acceptable surface

## Selecting Trees for Educational Benefits

We consider the following when selecting trees for educational benefit. We select trees that:

1. Maximize the educational opportunities of the planting by closely considering each tree selected and what is may help demonstrate
2. Fill multiple educational objectives
3. Provide one if each type of tree deciduous conifer, deciduous broadleaf, evergreen broadleaf, and evergreen conifer
4. Consider the teaching value of the tree; botanical, ecological, economic, historical, evolutionary, and ethnobotanical
5. Match the core curriculum requirements. See the 'Learning Landscapes Curriculum Guide'

## Site Selection

We consider the following aspects while selecting a site for the trees. We select sites that:

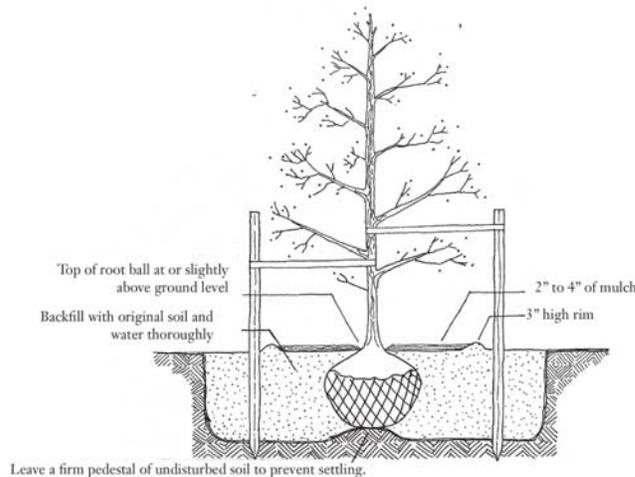
1. Fit the mature canopy size of the tree
2. Will not cause safety issues like providing access to the school roof
3. Will not cause conflicts with other uses such as limbs hanging over ballfields
4. Are not proposed area also planned for future school improvements such as a portable classrooms
5. Can provide needed shade to a play area, south / west side of a building, or large paved area
6. Minimize impacts on neighbors and views
7. Provide the trees ample spacing from one another so that they will have room to thrive



# TREE PLANTING BEST PRACTICES

## Planting, Staking, and Mulching Requirements

- Trees between ½ inch and 2 inches are recommended for planting because of their ability to be established and ease of student to plant them.
- Tree mulch is needed to retain moisture, add nutrients and create a visual buffer around the tree.
- For protection, all bare root or container trees should be staked and tied for the first 1 to 2 years. Stakes should be strong so they cannot be easily removed or broken off. Balled and burlap trees may or may not need to be staked.



## Basic Tree Planting Maintenance Requirements

Portland Parks and Recreation Urban Forestry Division commits to the following ongoing maintenance.

1-5 Years	6-10 Years	Continuing
Annual work day with community and staff to weed, mulch as necessary, and prune trees	Weeding and mulching work days	Community workdays to learn tree care, urban forestry benefits and build community
Remove and replace trees that die or are severely damaged.	Pruning for branch structure, visibility concerns and mower clearance	
Summer watering for 3 summers		

## For More Ideas and Inspiration

- For more best practices for planting trees visit [www.PortlandOregon.gov/parks/trees](http://www.PortlandOregon.gov/parks/trees)
- See how studying trees in your classroom can help meet the core curriculum requirements in the 'Learning Landscapes Curriculum Guide' [www.PortlandOregon.gov/parks/trees](http://www.PortlandOregon.gov/parks/trees)
- For inspiration on design and creation of outdoor learning spaces visit [www.learninglandscapesdesign.com](http://www.learninglandscapesdesign.com)

