

Keep Houston Beautiful



A Guide for

Creating



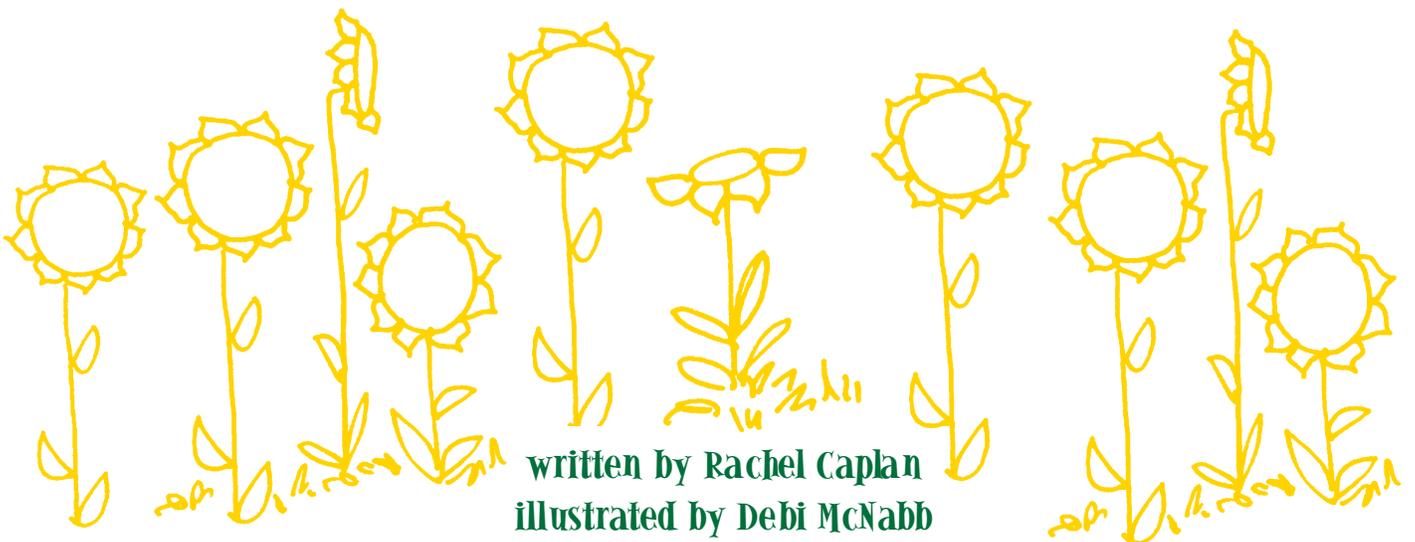
Environmental

Outdoor



Learning

Centers



written by Rachel Caplan
illustrated by Debi McNabb

A Guide for Creating Environmental Outdoor Learning Centers



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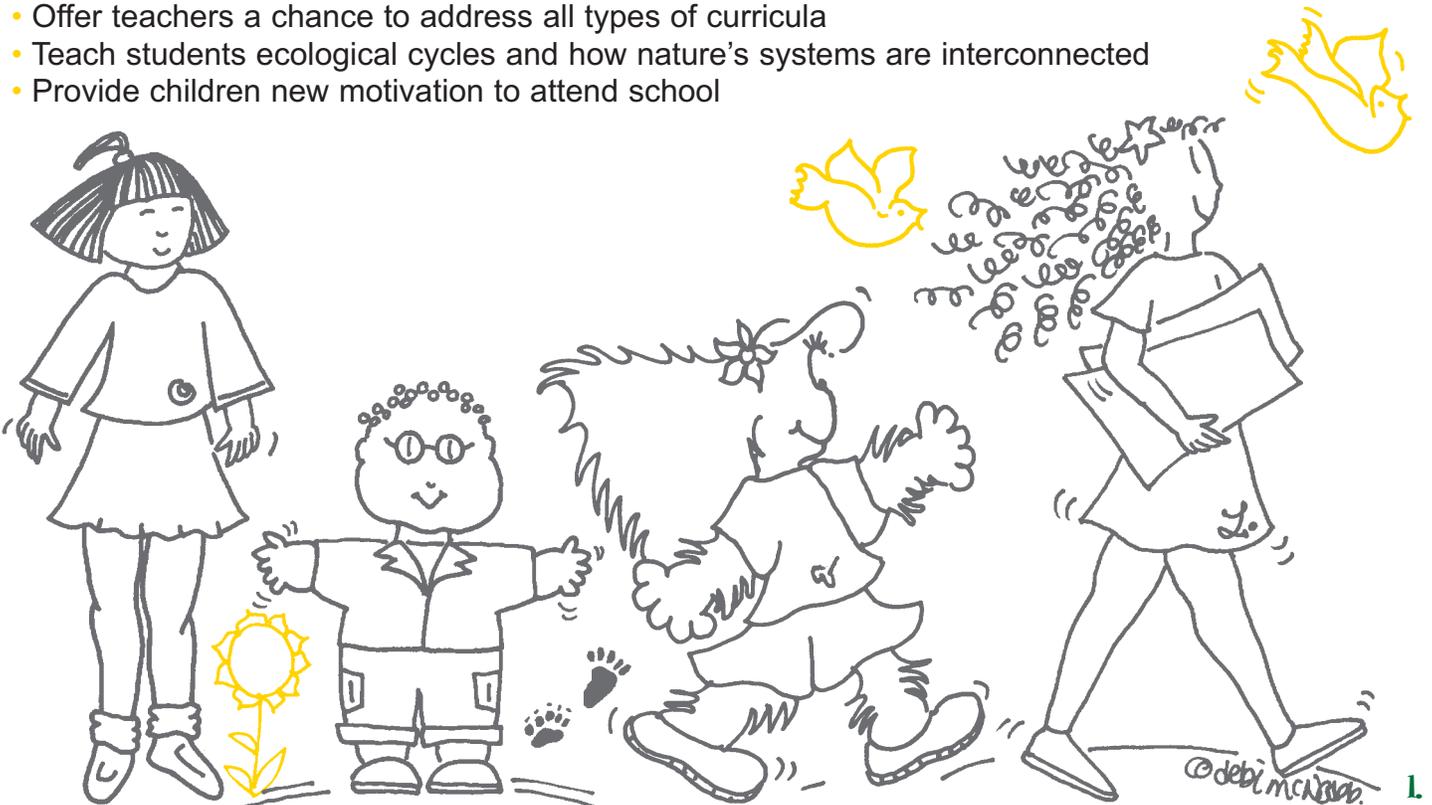
Build A Foundation of Respect for the Earth

Environmental Outdoor Learning Centers at schools provide students a dynamic opportunity to learn about their impact on the environment while working together with their teachers and the community.



An outdoor classroom can:

- Give students an increased sense of pride and identification with their school and the environment
- Offer teachers a chance to address all types of curricula
- Teach students ecological cycles and how nature's systems are interconnected
- Provide children new motivation to attend school



Step 1 A Garden Committee: "The Green Team"



A successful school garden requires long-term commitment by many members of the school community. A garden committee consists of teachers, parents, custodial or maintenance staff, principal or other administrator, and any other members of the community that are willing to help and committed to the school garden's continuous use. This committee is also responsible for finding funds and any professional help needed.

Step 2 Brain Storming Time!

Identify the purpose and objectives of the garden. Possibilities include:

- Teaching environment for biological studies or the performing arts
- Donation garden to grow fresh fruit and vegetables for the community or a food bank
- Educational opportunities tied to history, geography, or social studies lessons
- Marketing project to raise money by selling things grown
- Multi-sensory garden to teach about taste, smell, touch, hearing and sight



Step 3 Looking for a few good gardeners!

Volunteers are essential and can be found in a variety of ways:

- Send flyers to the neighborhood groups and local businesses
- List workday events with Volunteer Houston on their web page at www.volunteerhouston.org
- Notify area schools and ask that flyers be sent home with students

After organizing a group, assign garden tasks to volunteers and students. Try to set realistic goals by starting small and then growing. Each grade level can have a plot and use a curricular theme to decide what to plant. Try to connect the garden to the school's curriculum in as many ways as possible. It is important to have all grade levels participate in the project. Each class could be required to work in the garden one hour a week. Host one big function a month to invite parents and others from the school community to keep them involved.



Step 4 Make a year-round schedule



Give some consideration to the care of the garden during long holidays and the summer break. Send out letters to parents/students to sign up for maintenance days. Many plants are just beginning to bloom in the summer, so it can be exciting. If there is enough help during the summer, use plants that harvest in the summer such as okra and peas. If the garden cannot be taken care of for a period of time, cover the beds with 10 sheets of newspaper or cardboard and top with hay to keep the weeds out and the nutrients in place.

Step 5 Choose a garden design and get started!

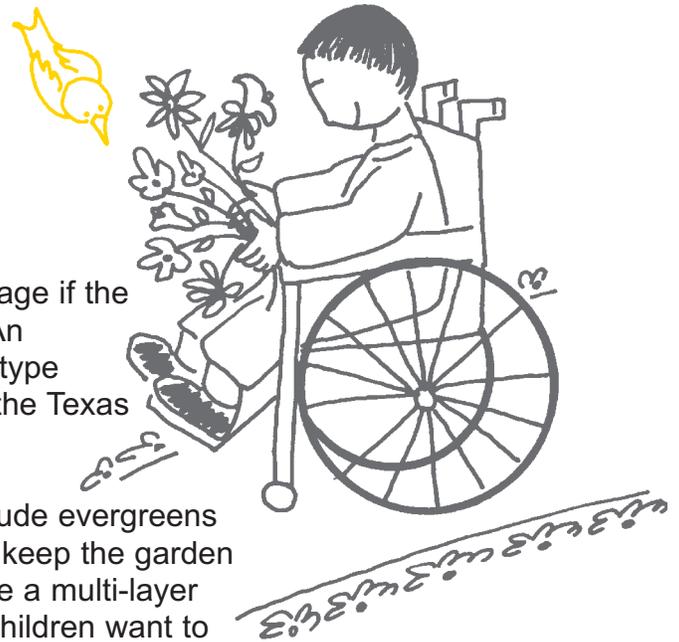
The best location for a garden has:

- Sunlight
- Good drainage
- A nearby source of water and electricity
- Accessibility to everyone

The garden should be raised slightly to improve drainage if the ground stays wet for too long after watering or rain. An inspection hole can be useful for determining the soil type and its ability to drain properly. Clay soil common to the Texas Gulf Coast can be improved by agricultural gypsum.

Know the full-grown height of all plants installed. Include evergreens and plants that bloom at different times of the year to keep the garden thriving and continually providing food for wildlife. Use a multi-layer effect by planting tall, medium, then shorter plants. Children want to see fast results so either buy plants that are close to bloom or use seeds that produce quickly.

The garden and site should be wheelchair accessible along with raised planters that are easily accessible to the disabled. While under construction, start seeds in the classroom. There should be a transformation from classroom to garden. You can start small and continually add things year after year.



Plant lists Consult a garden calendar before planting!

Native Plants

Annuals: These plants attract bees and butterflies

- Coreopsis tinctoria (May-Aug)
- Eupatorium serotinum (Aug-Nov)
- Gaillardia pulchella (Feb-Dec)
- Monarda citriodora (Apr-Jun)
- Phlox drummondii

Native Plants

Perennials:

- Achillea millefolium/Common Yarrow
- Calyptocarpus vialis/Horseherb
- Coreopsis lanceolata/Lanceleaf Coreopsis
- Echinacea purpurea/Purple Cornflower
- Eupatorium coelestinum/Blue Mist flower
- Lantana camara/Lantana *
- Malpighia glabra/Barbados cherry
- Malvaviscus arboreus drummondii/Turk's Cap
- Nymphaea odorata/White lily
- Penstemon tenuis/
Gulf Coast penstemon
- Pontederia cordata/Pickelweed
- Rudbeckia hirta/Blackeyed Susan

Hardy Texas Plants

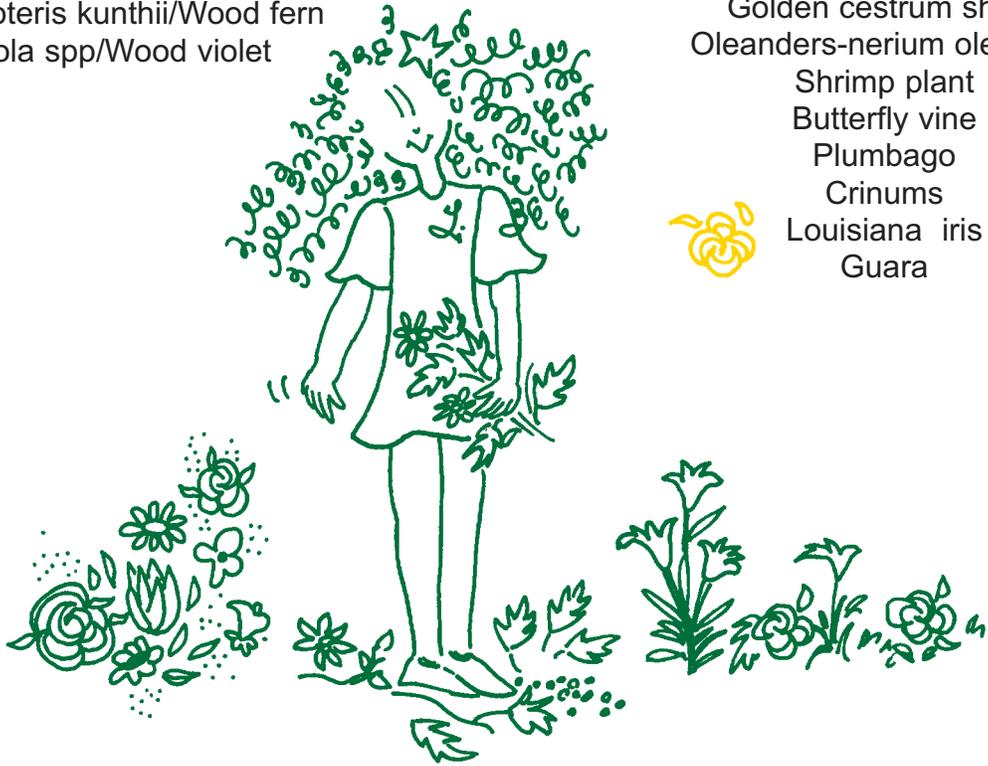
- Althaea- perennial herb
- Salmon-spiked porterweed
- Peacock ginger
- Summer phlox
- Coral vines
- Duranta
- Indigo plant
- Ruellias
- Crape myrtles, weeping (2 to 3 feet)
- Spreading (3 to 4 feet), and standards (tall shrubs and trees)
- Antique roses
- Yellow bush daisies
- 'Indigo Spires' hardy salvia

Perennials:

Hardy Texas Plants

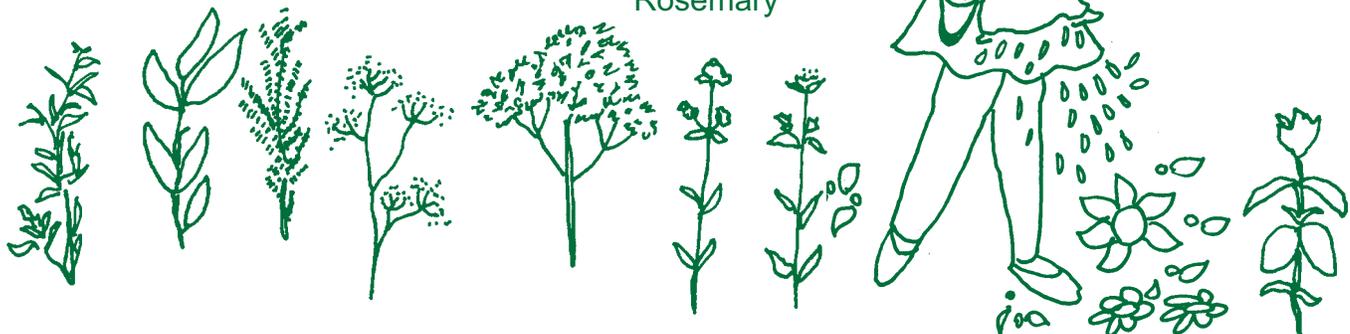
- Ruellia spp/wild petunia
- Salvia Farinacea/Mealy blue sage
- Salvia leucantha/Mexican Milky Sage
- Salvia Coccinea/Scarlet Sage
- Symphoricarpos orbiculatus/Coral Berry
- Thelypteris kunthii/Wood fern
- Viola spp/Wood violet

- Rudbeckia
- Lantana
- Cannas
- Native or mallow hibiscus
- Buddleias
- Golden cestrum shrub
- Oleanders-nerium oleander
- Shrimp plant
- Butterfly vine
- Plumbago
- Crinum
- Louisiana iris
- Guara



Herb garden

- Basil
- Sage
- Mint
- Thyme
- Chamomile
- Echinacea
- Rosemary



Fruit Trees

Apple; sp. Rev. Morgan Atlaspur, Anna, Dorsett Golden, Granny Smith, Irazu, Pink Lady, Fuji, Red Fuji,

Apricot; sp. Royal Rosa, Early Golden, Flora Gold, Gold Kist, Katy, Royal Rosa

Berry; sp. Arapahoe Blackberry, Brison Blackberry, Navaho Blackberry, Rosborough Blackberry, Boysenberry, Loganberry, Youngberry

Fig; sp. Banana, Celeste, Lsu Purple

Grapes, Muscadine- Black Beauty, Darlene, Fry, Granny, Ison, Supreme, Sweet Jenny

Nectarine; sp. Arctic Glo, Arctic Star, Desert Dawn, Double Delight, Panamint, Snow Queen, Sun Coast, Sun Mist, Sunraycer

Paw Paw; sp. Prolific, Rebecca's Gold, Sunflower, Well's

Peach; sp. Tropic Snow, Earlitreat, Eva's Pride, Gold dust, Maypride, Red Baron, Tex Royal, Atlas Super Snow, Tropic Sweet

Pear; sp. Garber, Atlas Super Orient, Ayers, Flordahome, Hood, Hosui Asian, Shinseiki Asian, Shinko, Spalding, 20th Century Asian, Warren

Pecan; sp. Choctaw, Moreland, Oconee, Pawnee

Persimmon; sp. Izu, Fuyu, Ichikikijiro, Matsomotowasefuyu

Plum; sp. Beauty, Gulf Beauty, Mariposa

Pomegranate; sp. Balgal, Dawey, Fleishman



Plants that attract Hummingbirds listed by common name



Scarlet trumpet honeysuckle

Weigela

Nicotiana

Beardtongue

Angelonia

Hinckley's Columbine

Fairy Duster

Sweet Autumn Clematis

David Verity Cigar Plant

Velvet Hummingbird Plant

Purple Coneflower

Ruby Star Purple Coneflower

Hummingbird Bush

Pink Habranthus

Lion's Tail

Turks Cap

Purple Passion Vine

Rudbeckia

Texas Mountain Laurel

Foxglove

Beebalm

Petunia

Red-hot-poker

Flame Acanthus

Yellow Queen Columbine

Yellow Senna

Blue Clerodenum

Pink Cuphea

Native Purple Coneflower

White Coneflower

Coralbean

Native Copper Rainlily

Louisiana Iris

Green Cloud Sage

Honeysuckle

Penta

White Katie Ruellia

Red Poterweed Summer phlox

Scarlet sage

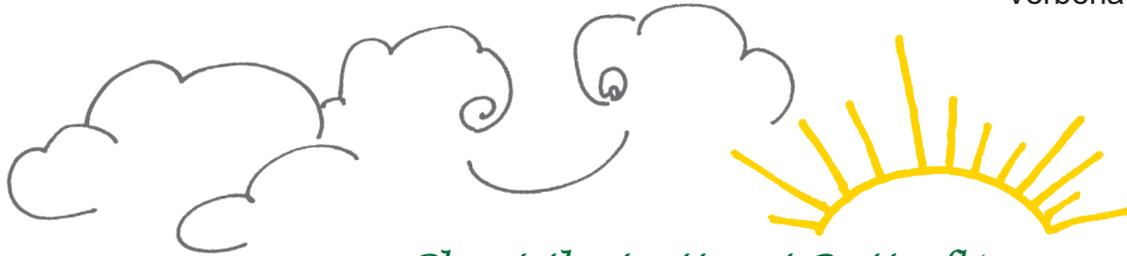
Butterfly bush



Red Buckeye
 Red Columbine
 Pride of Barbados
 Native Buttonbush
 Scarlet Clerodenum
 Golden-dewdrop
 Fireman's Cap



Red Yucca
 Texas Star Hibiscus
 Lantana spp.
 Red Firespike
 Purple Cat Whiskers
 Louisiana Phlox
 Sage spp.
 Verbena spp.



Plant that attract Butterflies

Ageratum
 Cosmos
 Globe
 Candytuff
 Columbine
 Asters
 Primrose
 Daisies
 Parsley Hawthorn
 Sweet Bay
 Loblolly Pine
 Viburnum spp.
 Heliotrope
 Lantana
 Marigold
 Mexican sunflower
 Torch flower
 Sweet alyssum



Zinnia
 Nasturtium
 Texas Persimmon
 Southern Wax Myrtle
 Blue Plumbago
 Wedelia
 White coral Vine
 Pawpaw
 Carolina Aster Vine
 Wine Cup
 Canna
 American Hornbeam
 Pecan
 Redbud
 Dahoon Holly
 Peruvian Pavonia
 Bur Oak
 Montrose Purple ChasteTree



Finding the Plants

“Treeseach Farms is a wholesale grower and excellent source of Texas native plants, perennials, shrubs, ornamental grasses, ornamental trees, shade trees, fruit trees, berries, citrus, and plants for butterfly, hummingbird, and habitat gardens. We provide container grown plants in pot sizes from four inch to 45 gallon.”

Treeseach Farms, Inc.
 Tel: 713-937-9811
 Fax: 937-9930

Wildseed Farms
 2001 Wildflower Reference Guide & Seed Catalog
www.wildseedfarms.com
 Tel: 1-800-848-0078
 Fax (830) 990-8090

*Materials and Quantities are site specific
Suggested Equipment*



Sharp shooter shovel
Hammers
Soil Rakes
Stakes
large shovel
Hoes

Skill Saw
Rototiller
Pencil
Carpenter Squares
String
Measuring tape

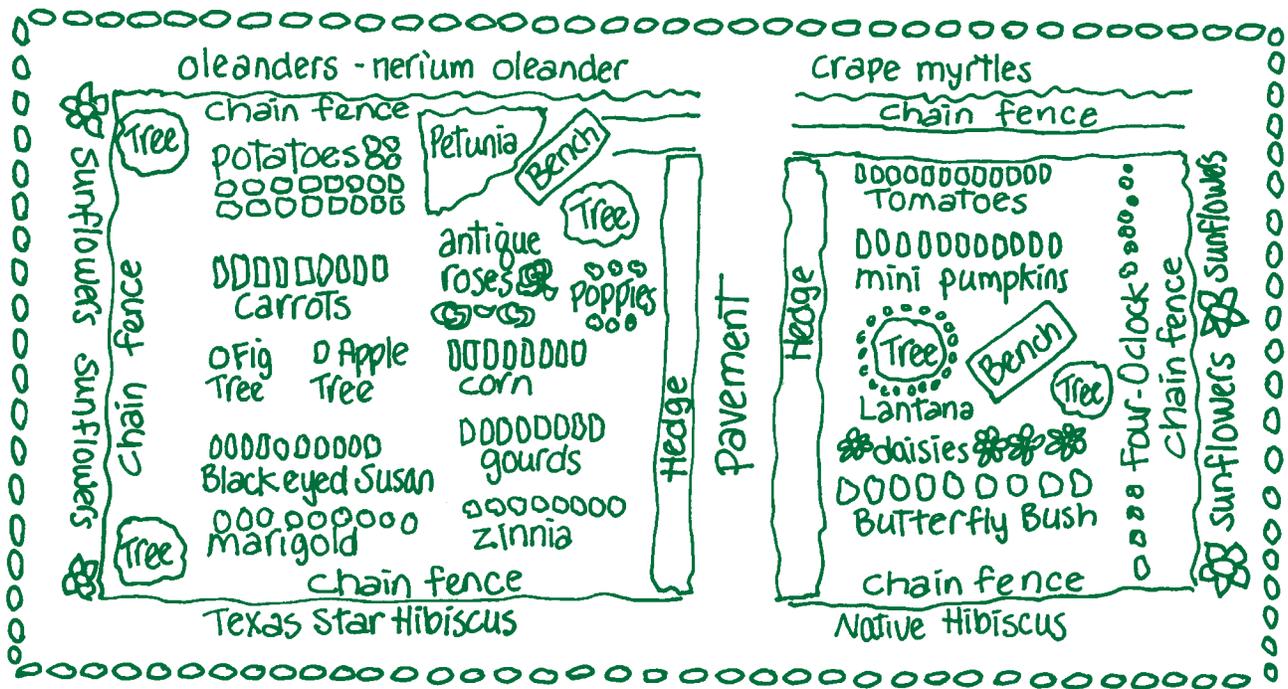
Water is not a never-ending resource and must be conserved.
To receive a Water Wise Landscaping Guide write to:



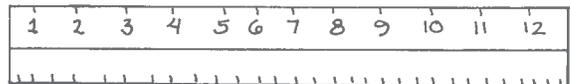
Water Conservation Branch
Department of Public Works & Engineering
City of Houston
P.O. Box 1562
Houston, TX 77251

Getting Started

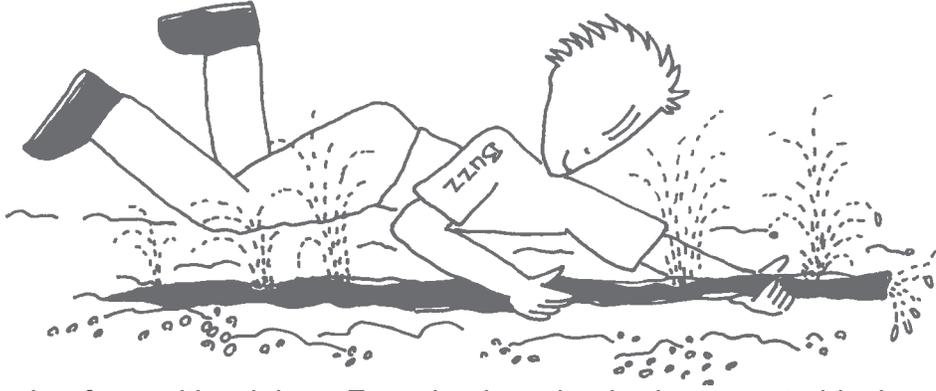
1. Survey the grounds; maybe even get a large plan scale of the grounds to find out if there are any major pipes or other obstructions. Think before you remove any existing feature, such as a tree, pavement, or hedge. It could be incorporated in the design.



2. Layout shape of garden with string and pegs. First measure and peg out the straight runs, then move on to circles with a piece of string attached to a central peg. Math classes can do all the measurements. A good size for a bed is 50 x 100 feet.



3. Spray existing vegetation with a non-residual, contact herbicide following the manufacturer's directions.
4. Remove existing vegetation and 1 inch of topsoil.
5. Till the soil to a depth of 4 to 6 inches and rake evenly.
6. Coordinate installation of the irrigation system, permanent soaker hose or watering system. A perforated hose laid across the area is usually sufficient.

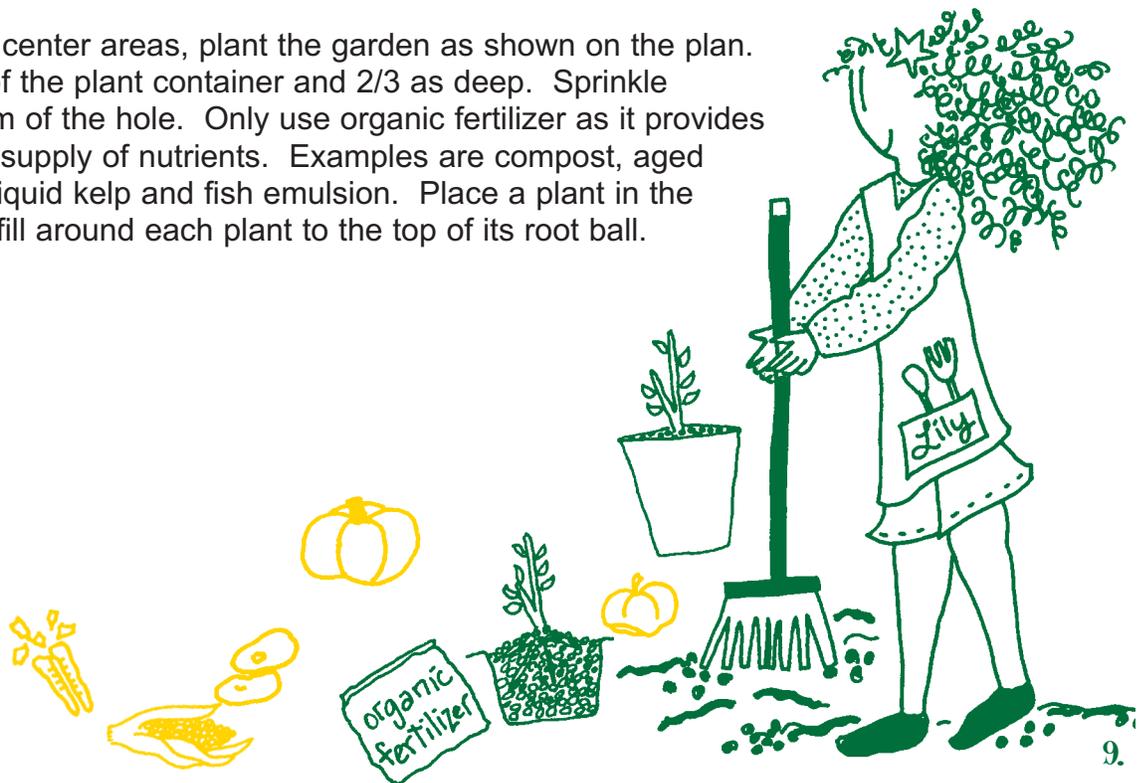


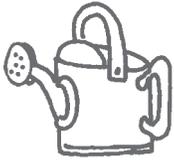
7. Build the garden form with edging. For raised garden beds concrete blocks work very well. Build the frame of the garden with blocks and then cover the beds with 10 layers of newspaper to prevent weeds from popping up. Some of the beds can be built up high enough to be wheelchair accessible.

8. Place the walkway material (decomposed granite or gravel) in sections as indicated by the garden plan. Fill in 2-inch layers and compact to approximately 1 inch from top of edging.

9. Place a soil mix in the garden bed areas, spread to fill the areas. A soil mix can be 1/3 sand, 1/3 topsoil, and 1/3 compost mix. Compact lightly as the soil is placed. Place additional soil until the garden is slightly mounded at the center of planting areas. Water the soil. Allow several days for settling. If settling occurs, place additional soil.

10. Starting with the center areas, plant the garden as shown on the plan. Dig a hole the size of the plant container and 2/3 as deep. Sprinkle fertilizer in the bottom of the hole. Only use organic fertilizer as it provides plants with a steady supply of nutrients. Examples are compost, aged bagged manure, or liquid kelp and fish emulsion. Place a plant in the hole. With soil mix, fill around each plant to the top of its root ball.





11. Water each plant at the base. Then place about three inches of mulch. Woodchips or sawdust is good for mulch. Mulch retains water and controls WEEDS.



12. Water consistently until plants are well established and a regular maintenance routine can be followed. Try to conserve water by watering thoroughly only when needed. Students can use a “poke test” to determine need for watering: push finger into soil and if it feels dry then water. Water early in the morning, so that the moisture soaks into the earth before midday. Remember, direct the stream of water into the base of plants, leaves and stems are fragile. To conserve water, place buckets around the school to catch runoff from the roof when it rains. Drip irrigation is another way to conserve water and promote quick and healthy growth of plants. A very good web site with information, instructions, and products is drip irrigation made easy at www.dripirr.com.

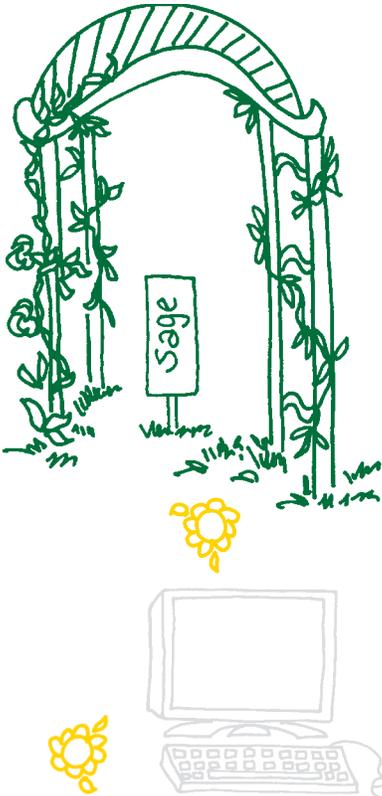


Additional Tips

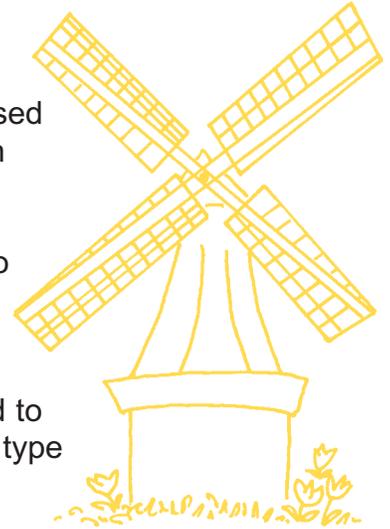
- Try spraying insects with forceful water to avoid using pesticides.
- Use a sign or an arch for an entrance marker to make the garden special and decorate to personalize it.
- A low fence can create clear boundaries to prevent trampling. An idea for protecting growing plants is to cut out the bottom of a cup and place over a small plant. This will protect from insects or other invaders.
- Be sure there is a large trash can in the area.
- Try to work in the garden in the morning when it is not too hot.
- Use sturdy tools that are meant for children.
- Have the students wear the correct clothing when planning to spend time in the garden.
- Buy ladybugs to place in the garden as they eat aphids. Plus, the kids love them.



Specialty Areas



- It is important to have a covered area for a place to relax and escape from the sun. A gazebo covered with vines, a greenhouse, or a bean teepee are some examples.
- A pond is used for observation of water, aquatic plants and animals. It helps students become familiar with water resource problems and solutions.
- A cistern is a tank that stores rainwater for use. It is a wonderful way to conserve and recycle water. Cisterns were used in houses that were built long time ago when people were not able to just turn on a faucet.
- A windmill is a machine that uses the wind to turn a wheel of adjustable vanes, slats, or sails. As the wind blows, it turns a shaft, wheels and gears that power machinery. For hundreds of years the windmill has been used to grind grain such as wheat and corn. Today a type of windmill called a wind turbine is used to generate electricity.

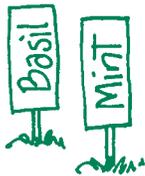


- Weather Station: Go to www.weather.com/education for information on The Weather Classroom, hurricane tracking, teacher and student resources.

Suggested Activities



Plant Markers



Use flat stones, Popsicle sticks, or tongue depressors, with waterproof acrylic paint. Label the names of plants in the garden and include a picture.

Expert Awards

A Mother Nature Award can be given to students who can walk through the garden and talk about the different plants.



Explorer Kit



Assemble a magnifying glass, notebook or journal, Plexiglas (to display things students find and allow them to look at the undersides), canning jar, measuring tape, and camera.

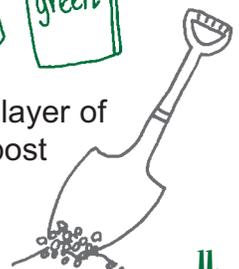
Compost "Cake"

Layer 1: 3 bags of dry brown things such as leaves, hay or straw.

Layer 2: 1 bag of wet green things such as old vegetables or grass clippings

Icing: 1 shovel full of dirt.

Students can build a structure out of wood to enclose the pile. After adding the first layer of ingredients soak with water, but not too much. Keep adding layers. Turn your compost once a month and soon there will be a deep, rich compost cake!



Worm Hotel

Earthworms produce great fertilizer by eating waste. Use exterior grade plywood to build a bottomless box at least 4 feet square and 1 foot high. Cut a piece of plywood for a lid. Separate the box into two sections with a solid center divider. Layer the bottom with a few inches of moist soil and some kitchen scraps of uncooked fruits and vegetables. Gently add worms, introducing them to their new home. Cover them with a topping of clippings or soil. Make a habit of topping the worms with soil, clippings, or wet newspaper when they feed. Sprinkle with water and close the lid. Fill one section of the box before filling the other section. To check progress, dig into the full section and look for loose dark soil. If you find any, then the worms are working their magic. A bucket can be used to fill with worm offerings and spread them around your plants. Watch how much the plants will love it.



Gather sturdy branches, scissors, heavy string, newspapers, 8 empty aluminum cans, and spray paint. Lay three branches in a triangle shape. Cut pieces of string to tie the ends of the branches together. Place the cans on the newspaper, spray paint them, and let them dry. Bend up the tabs of each can. Cut six pieces of string one foot long and tie an end of each string around a tab. Tie the other end of the strings to each corner of the triangle and one in the center of the branch. Tie each can at a different height, but they must be able to touch each other. Take two cans and stomp on them to make them flat. Tie these two cans so that they are at the bottom. These two will be able to catch the wind.



Butterfly House



There are kits that can be bought at Whole Earth or other nature stores where caterpillars can be ordered so that the children can watch them transform and grow into butterflies. When the process is complete, the new butterflies can be released out into the garden.



Garden Hats



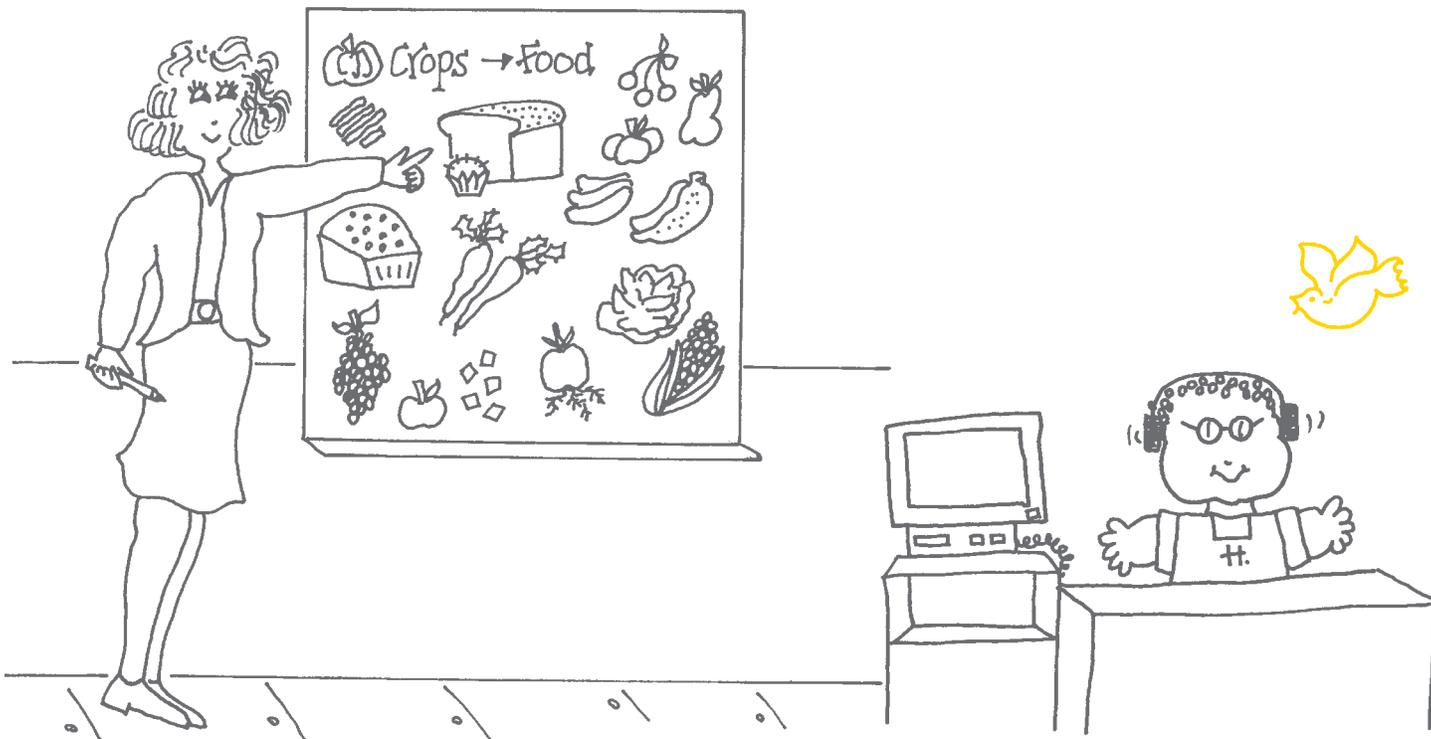
Make garden hats for protection from the sun. One way is to make them out of paper or buy visors and paints from a hobby store.



Garden Aprons

Pick up some plain aprons at a hobby store and decorate. Then put on an apron every time there is work to be done in the garden to help keep clothes clean.

Suggested Topics and lessons for Teachers



- Look at the garden as a living laboratory with endless options.
- Network for information with other schools that have gardens to find out new ideas.
- The garden provides subjects for oral presentations along with written reports or garden journals. By planting crops, all kinds of history and cultural lessons can be covered. Plant corn to learn about the Native Americans or cotton for slavery.
- Learn about proper nutrition and make smoothies from the fruit grown in the garden.
- A vegetable garden allows kids to understand where food comes from and issues dealing with uses of land.

Books

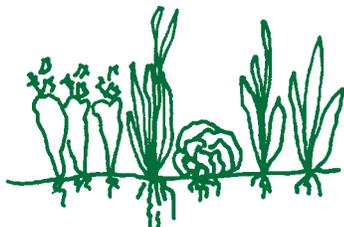
[Creating A School Habitat](#)- a planning guide for habitat enhancement on school grounds in Texas. Written by: Diana M. Foss of the Urban Program, Wildlife Division Texas Parks and Wildlife; and Ronald K. Jones, Ecological Services U.S. Fish and Wildlife Services.

[Year Round Vegetables, Fruit, and Flowers for Metro Houston](#); A natural organic approach using ecology. Written by Bob Randell, Ph.D.

[Houston Garden Book](#), by John Kriegel and the editors of Houston Home and Garden magazine

[Citrus of Gulf Coast](#), by Stewart Nagle

[Habitat Gardening for Houston](#), by Mark Bowen and Mary Bowen



@debmeharib.

[School and Youth Gardening](#) by Mark Cothem, Suzy Fischer, and Sue Way Available at Urban Harvest

[Herb Gardening in Texas](#), by Sol Meltzer

[Greening School Grounds](#), by Tim Grant and Gail Littlejohn

[The Growing Classroom](#), by Robert Jaffe and Gary Appel

[Landscapes for Learning](#), by Sharon Stine



More lists of books and grants are available at www.eih.uh.edu/education/habitats/index.htm and <http://hort.ifas.ufl.edu/ggk/resfin.htm>



The people listed below are available as resources and specialize in school habitats. They offer on-site technical assistance about site selection and evaluation, habitat design, native plant selection, site installation, linking the habitat to curriculum standards, and more. A “Creating a School Habitat in Texas” manual is available free of charge from either Texas Parks and Wildlife or the U. S. Fish and Wildlife Service offices. The manual provides step-by-step advice, local plant lists, and much more.

Two school habitat workshops are conducted annually, starting in September with an introductory “Creating a School Habitat” workshop and an advanced “Getting Your School Habitat ‘On the Ground’”. Reservations are required.

There is also the Habitat Share Fair which is a networking opportunity for teachers. The Share Fair group meets three times per year: August, January, and May. Schools with established habitat sites, or those planning to start such a site are invited to attend. Community experts share information on natural resources, conduct tours of established habitat sites, and discuss habitat problems/issues. Reservations are required.

The Environmental Institute of Houston also offers free curriculum workshops for schools that have established school habitats on their campuses. The four-hour workshop, entitled “Linking TEKS to Your School Habitat,” is given as in-service training for all faculty members at the school. Call EIH to schedule.

For more information, contact the following:

Urban Biologists (Diana Foss or David Veale)
Texas Parks and Wildlife Department
14320 Garrett Rd., Houston, TX 77044281-456-7029 phone
Foss email: urbanfwhou@aol.com
Veale email: urbanwildhou@aol.com



Ron Jones
Biologist
U. S. Fish and Wildlife Service
17629 El Camino Real, Suite 211
Houston, TX 77958-3051
281-286-8282 phone
Email: ron_jones@fws.gov



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Curriculum Specialist
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281-283-3045 phone
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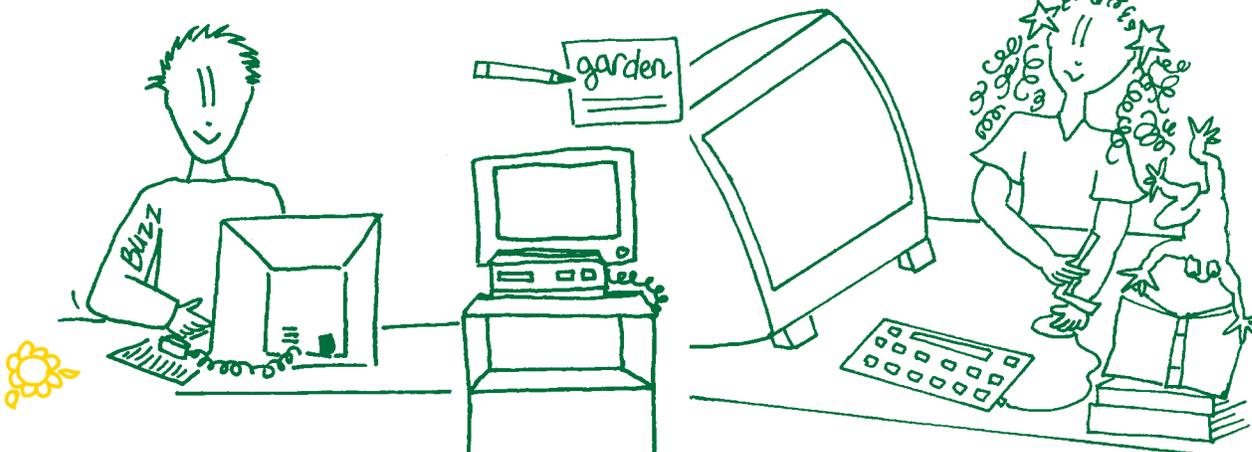


To subscribe to Green Teacher magazine:
Green Teacher
PO Box 1431
Lewiston, NY 14092

Texas Master Gardener
Texas A&M has extensive programs, gardening advice and resources.
www.aggie-horticulture.tamu/mastergd/mg.html



Texas Agricultural Extension Service
Urban Extension Program, Harris County
The School Enrichment Program offers materials that focus on science and agriculture and meet
criteria of T.E.K.S. for various grade levels.
www.harris-tx.tamu.edu/index.html



Schoolyard Habitat Roundup

A project of the Environmental Institute of Houston at the University of Houston-Clear Lake and the University of Houston that shows how schools in the Houston area have built and used their habitats. Also, this is an excellent site for activities and other resources.

www.eih.uh.edu/education/habitats/index.htm



University of Florida Researchers
<http://hort.ifas.ufl.edu/ggk>



National Wildlife Federation

A very good resource for guidelines, registry, kits and information about 1,450 Certified Schoolyard Habitats.

www.nwf.org/habitats/schoolyards/index.html



Urban Harvest

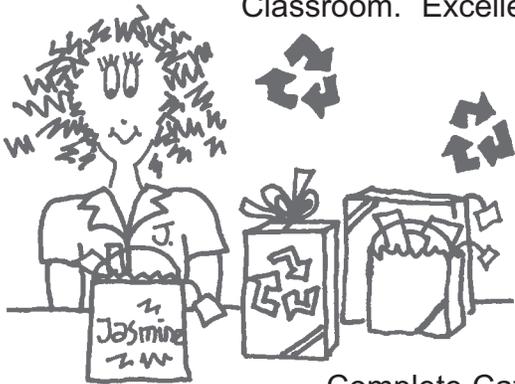
Working with Gardens & Orchards to Build Healthy Communities

Workshops are provided for teachers to learn how to create, teach, and maintain an Outdoor Classroom. Excellent resource for books, advice, seeds, and more.

Tel: 713/880-5540

Fax: 713/880-5545

Info@urbanharvest.org



Supplies

Let's Get Growing!

Complete Catalog of Environmental Education Supplies

www.letsgetgrowing.com

1-800-408-1868

Fax 831-476-1427



Educational Kits

www.educationalscience.com/about.htm



Naturally Curious, Inc.

512-321-2098

www.NaturallyCurious.com



Field trips



Black Wood Education Institute

A living classroom that teaches students of all ages to explore the natural webs of life.
Website: blackwoodland.com

Mercer Arboretum

Visit outdoor classroom, gardens, and visitors center.
website: cp4.hctxnet/mercero/general.htm



Houston Arboretum and Nature Center

Programs are available for Kindergarten to 5th grade classes that correlate with the T.E.K.S.
713/681-8433

Teachers are invited to join Texas Committee on Natural Resources' (TCO NR) Outdoor Partner Program (TOPP) and learn to use the outdoors as a classroom during the day or night. TOPP teachers receive training in taking their students on day long and overnight outdoor field trips, receive a field trip to Sheldon Lake Environmental Education Center, and participate in a mentored camping weekend. TOPP is open to Houston area 6th and 7th grade teachers and 25 of their students. For more information and/or an application, contact Sandra Skrei, TOPP Coordinator, sskrei@aol.com, 888-258-4697.

Financial Resources

Youth Garden Grant

www.garden.org

There is a registry for school gardens and a chance for email pals with other schools.

National Gardening

www.garden.org

School Garden Project Mini Grants

www.stopwaste.org/sc-garden.html

National Education Association

www.nea.org/grants/free.html

The Butterfly Website

butterfly.website.com/educate/index.cfm

The Center for Environmental Education

www.cee-ane.org



More resources for Financial Assistance for School Garden Programs

University of Florida Researcher

<http://hort.ifas.ufl.edu/ggk>





G a r d e n P l a n s

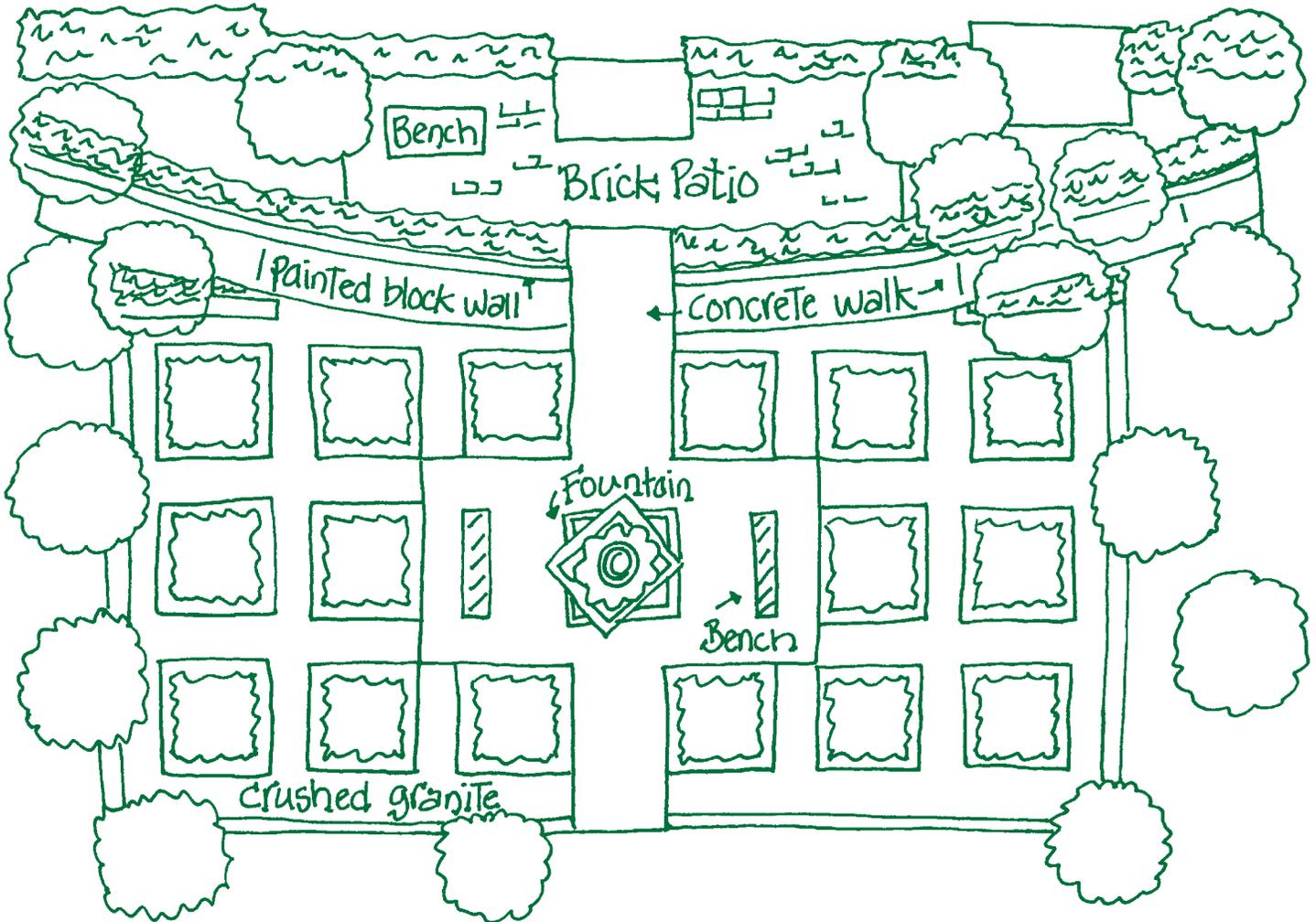


*Here are some examples of garden plans designed by landscape architects.
You should feel free to consult a professional for
conceptual ideas and help solving technical problems.*



Community Garden

Originally designed by Keiji Asakura, ASLA



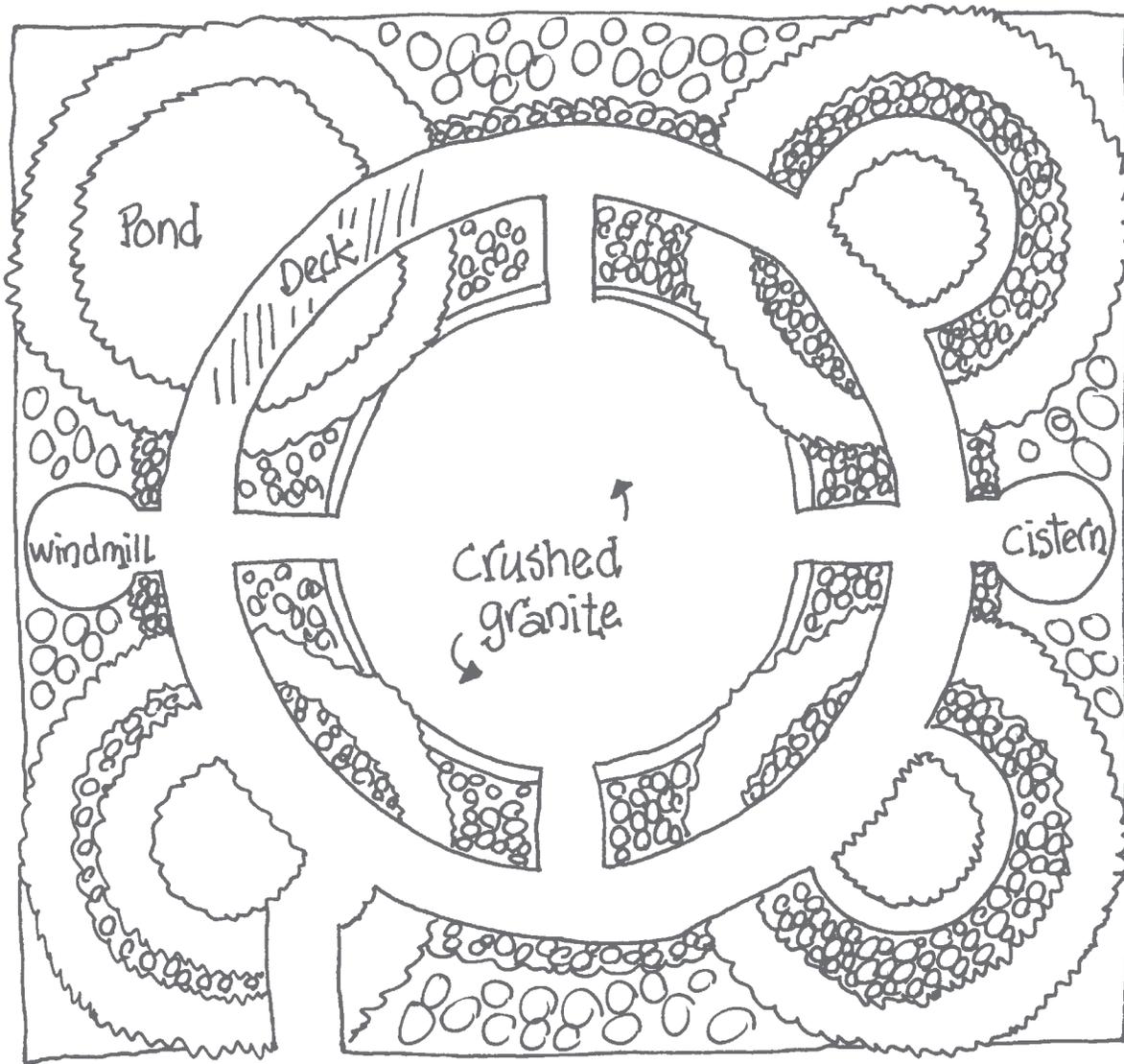
Edible Garden Elements

- Four-square garden design forms a quiltlike tapestry of 16 squares
- Plant vegetables, herbs, fruit trees and vines plant to feed the body, and flowers to feed the soul. Intermingle flowers freely in all of the squares.
- Key architectural elements, the center fountain and benches add drama and accent to the garden.



Ecological Garden

Originally designed by Keiji Asakura, ASLA



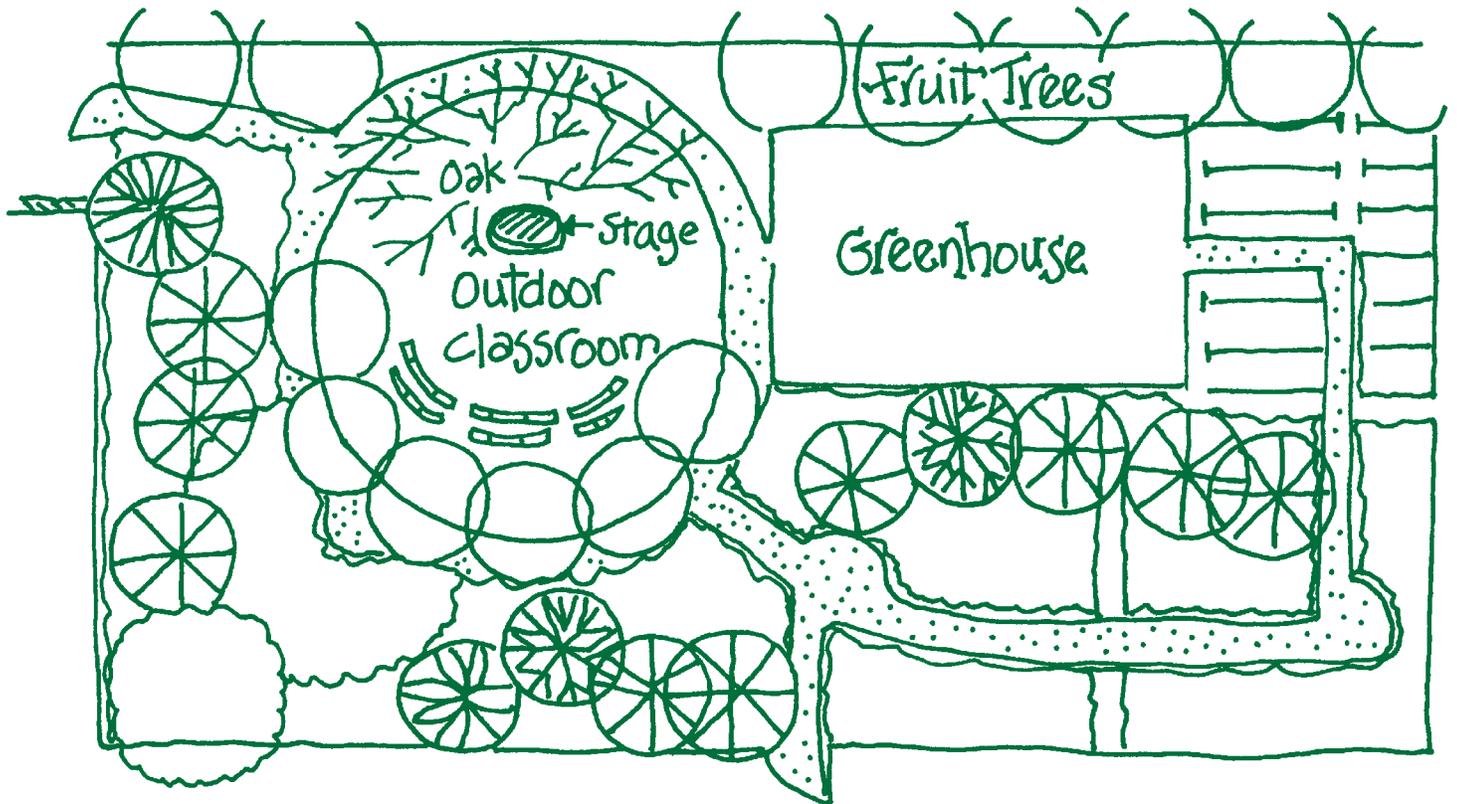
Conservation Principles

- Cistern, rainwater collection and drainage system
- Windmill for energy conservation and production
- Pond, wildlife habitat, restoration area



Working Garden and Outdoor Classroom

Originally designed by Margaret Chionis, ASLA

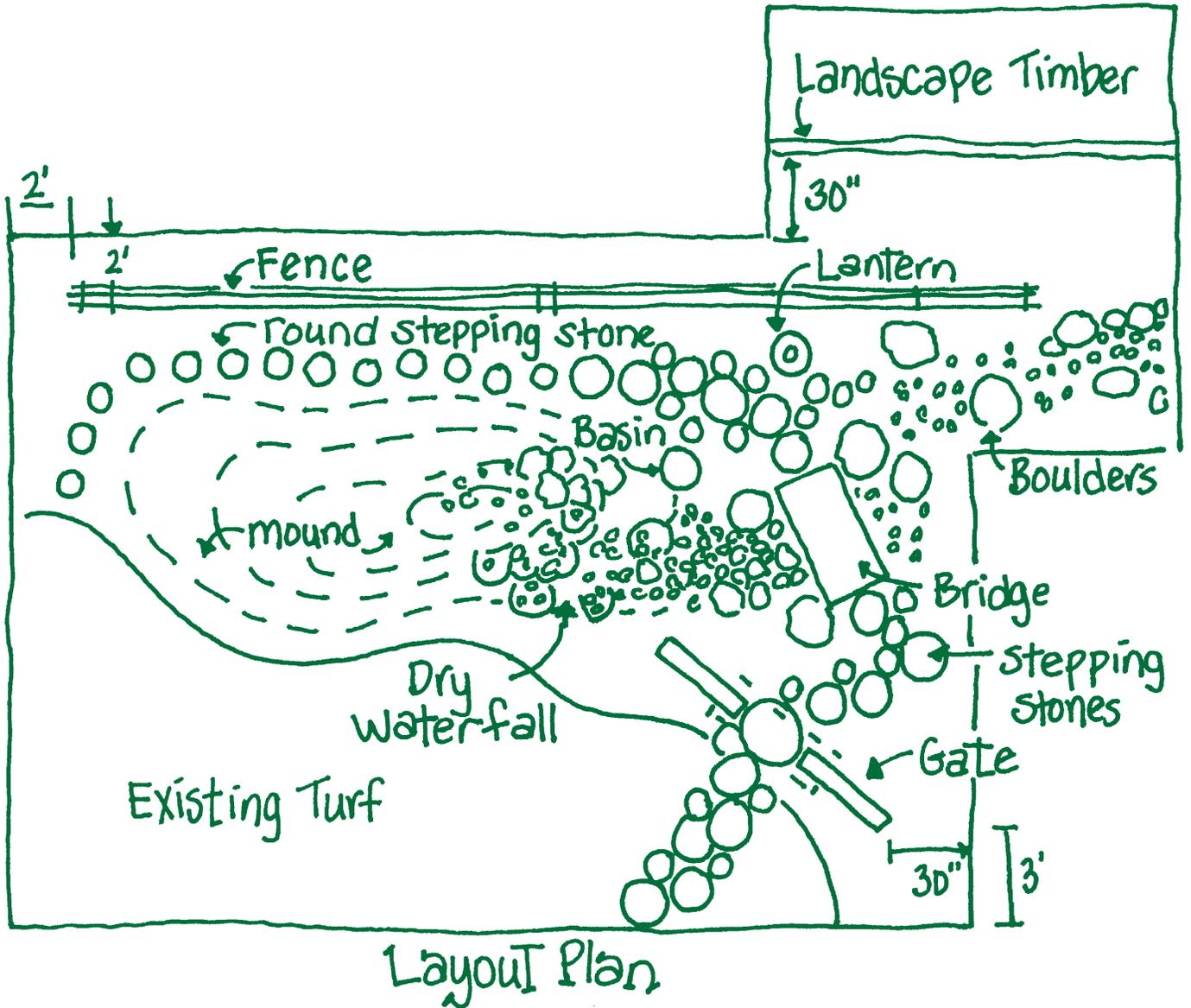


Garden Architecture

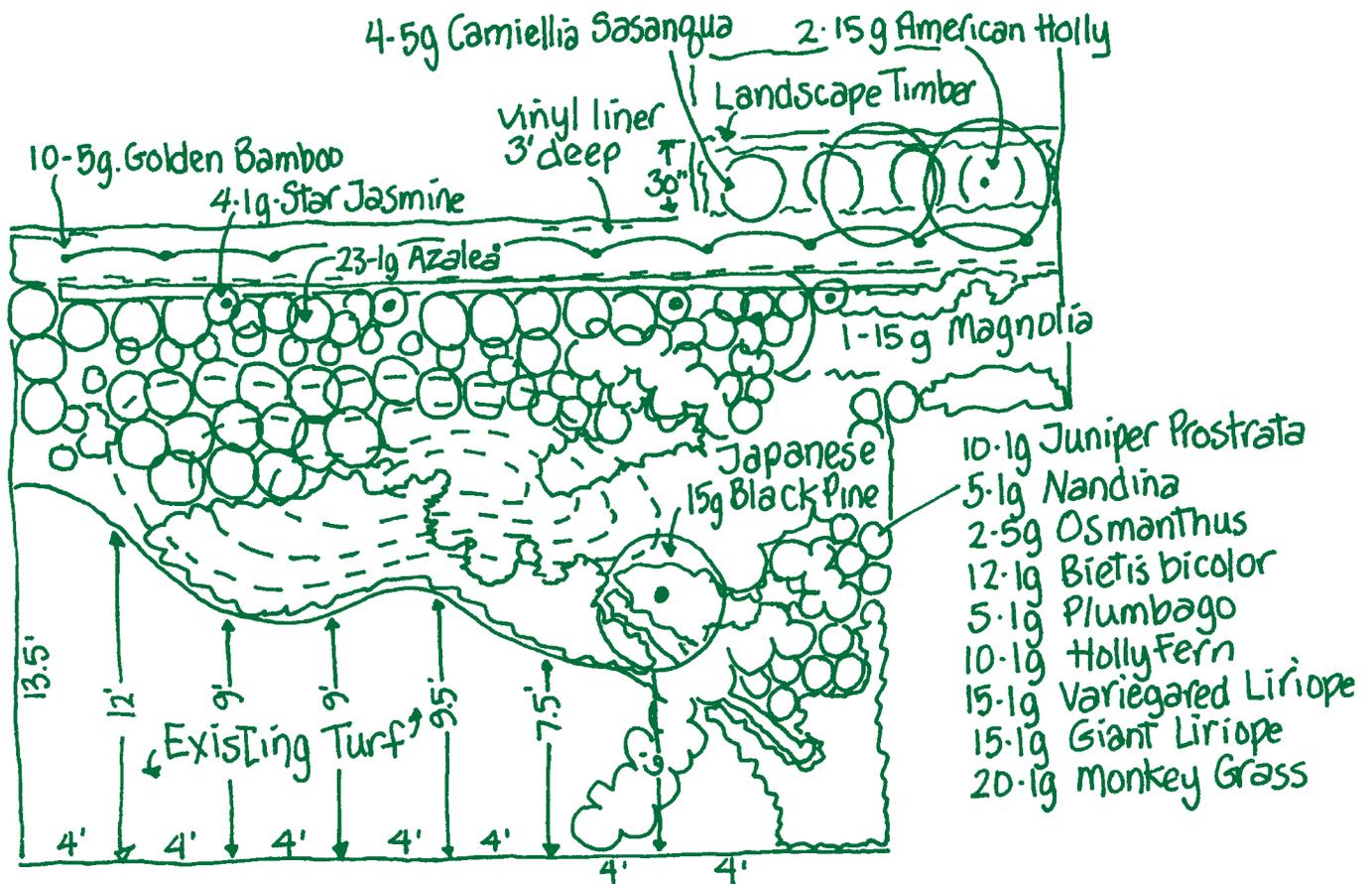
- Greenhouse, a simple seed-starting shed
- Outdoor classroom, includes a stage and seating area



Japanese Peace Garden
Originally designed by Keiji Asakura, ASLA



Japanese Peace Garden



Planting Plan

1. Trees:

- 2-15 gallon American Holly or Magnolia Grandiflora
- 1-15 gallon Saucer Magnolia or Japanese Maple
- 1-15 gallon Japanese Black Pine or Hollywood Juniper
- 10-15 gallon Golden Bamboo or Black Bamboo

2. Shrubs/Groundcover:

- 23-1 gallon Azalea So. Indica and/or Satsuki
- 4-5 gallon Camellia Sasanqua
- 10-1 gallon Prostrata Juniper - Juniperus Ch. Prostrata
- 5-1 gallon Nandian - Heavenly Bamboo
- 2-5 gallon Osmanthus Fragrans
- 5-1 gallon Plumbago
- 10-1 gallon Holly Fern
- 12-1 gallon Dietis Bicolor
- 15-1 gallon Variegated Liriope
- 15-1 gallon Giant Liriope
- 10-1 gallon Monkey Grass - Divide into 4 clumps for planting
- 4-1 gallon Star Jasmine or Carolina Gessamine

3. Landscape Timber

2-8 Ft

4. Stepping Stones

- 24" Dia. 1
- 18" Dia. 15
- 12" Dia. 33

5. Natural Stones

- Large t2'-20
- Medium t12"-20
- Pebbles 1/2"-3/4"-10 Cu. Ft.
- 2"-4"-2 Cu. Ft.

6. Landscape Soil - 5 Cu. Yd.

7. Compost/Mulch - 10 Cu. Yd.

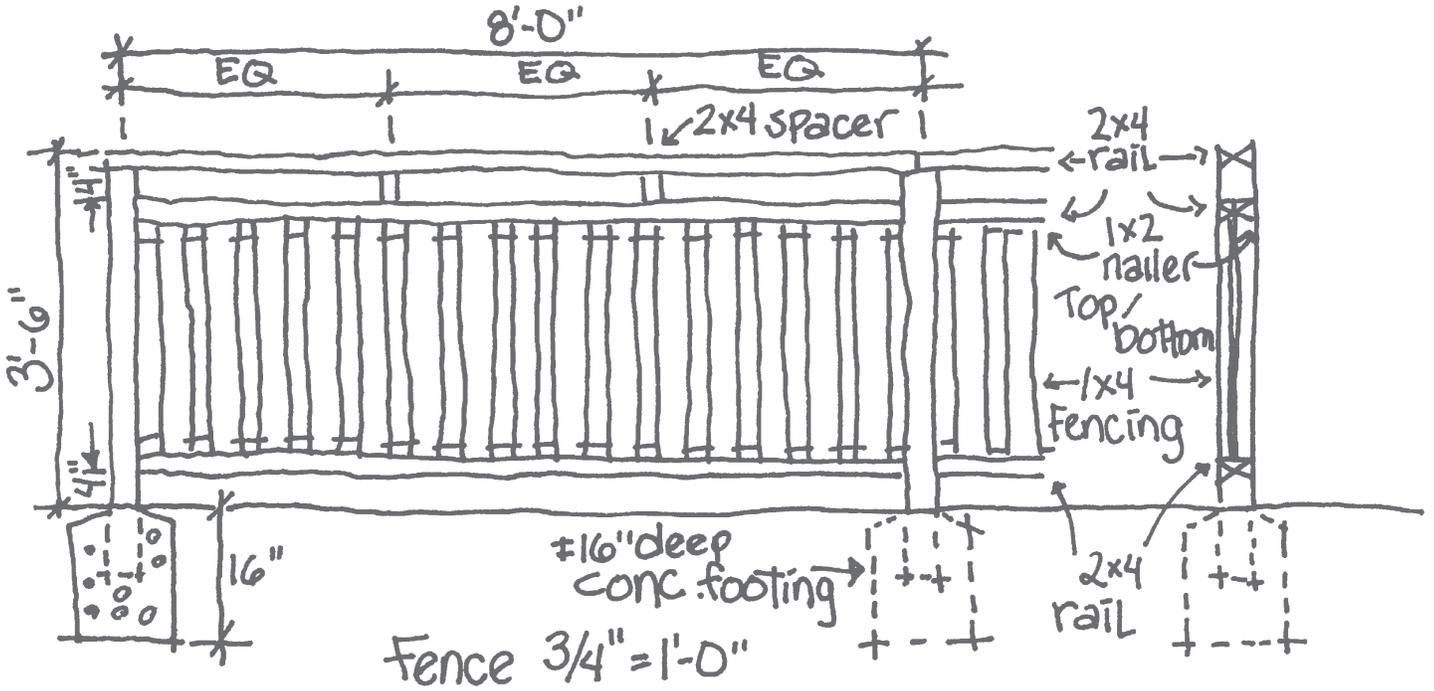
8. Vinyl Bamboo Barrier - t35 Yd.

9. PVC Pipe t200 Ft 3/4"

- 2-Water Spigots
- 2-t's/1-L
- 2-Galv. 12" Risers/Rebar Stakes

Japanese Peace Garden

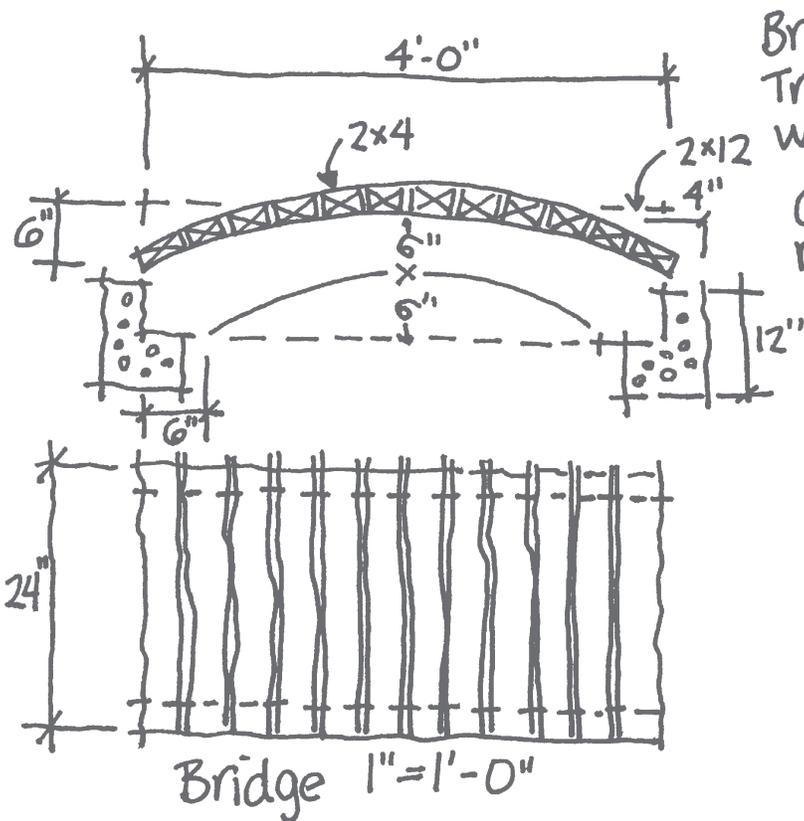
- material
- Treated wood
- 4x4x4' post 5
 - 2x4x8' rail 4
 - 2x4x7'-6" rail 8
 - 1x2x7'-6" nailer 8
 - 2x4x4" spacer 12
 - 1x4x2'-5" fencing 30
- concrete ready mix 5 1/3 cu.ft



Fence Detail



Japanese Peace Garden



Bridge material
 Treated wood 2x12x4' 2
 2x4x4' 12
 concrete ready mix 4-cu.ft.

Gate material
 Treated wood
 4x4x6'-6" 2
 4x4x4' 2
 2x4x2'-8" 2
 2x4x2'-6" 4
 1x2x2'-6" 4
 1x4x2'-5" 10
 2x2x3'-8" 2
 2x2x5' 1
 1x2x16" 8
 1x2x24" 8
 2x2x4" 1
 1/2x1x5" 8

Lath shingle 30 sq.ft
 conc. ready mix 5 1/3 cu.ft

Bridge Detail





Research information came from the following sources:

Roots Shoots Buckets and Boots by Sharon Lovejoy

Garden Planning by John Brookes

Better Homes and Gardens Junior Garden Book by Felder Rushing

Earth Quilts 101 by Keep Houston Beautiful

"Ecological Schoolyards", Landscape Architecture by Sharon Danks



A Guide for Creating Environmental Outdoor Learning Centers

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Keep Houston Beautiful can provide tools for workdays and assistance with designs.

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