

Productive Landscapes for a Sustainable Future

Dakota County Technical College, Rosemount, MN

Introduction

Long before the term “Green” was attached to anything and everything that was good for the environment the term “Green Industry” was coined by the landscape industry as a catchall phrase to describe all of those involved from the growing of plant materials to the design, installation and maintenance of our landscapes. Well as it turns out our “Green Industry” is often not so green after all. Deeply ingrained perceptions of what a well cared for and socially acceptable landscape should look like are based on historical precedent and are in direct conflict with a more sustainable and ecological approach to landscape design. Conventional landscape practices that place a priority on beauty and man’s control of nature above all else are in fact some of the most wasteful and consumptive practices around.

The “Green Industry” which I will expand to include all crop producing sectors of the agricultural industry as well is at a crossroads. Just as the American automotive industry did for years, many in the “Green Industry” will follow the path of least resistance and continue to provide landscape products and services that are unsustainable and detrimental to our health and that of the environment. Others in the “Green Industry” will awaken to the growing call for change and lead the way to a sustainable future that works in harmony with the environment rather than against it and provides greater abundance and beauty than ever before.

Education will play a vital role in the shift to really going “Green” as college and university horticulture programs are responsible for educating and training the future leaders in the “Green Industry”. Many of these programs need to change the focus away from ecologically sterile landscapes that function solely as eye-candy to landscapes that operate on multiple levels and include everything from producing home grown fruits and vegetables to harvesting rain water, and in order to be successful, are aesthetically pleasing and socially acceptable. Educating the general public to the benefits of sustainable and productive landscapes will be just as, if not more important, to the total buy-in to going “Green”.

My proposal is aimed at creating the appropriate environment in which active learning of sustainable and productive landscape practices will occur. I propose to redevelop the area south of the horticulture wing that is currently a haphazard collection of aging hedge plots, flower beds and wood construction projects. The transformation of this area into a more enriching teaching and learning environment will be facilitated through development of a master plan. The master plan will be organized around the premise that alternative ways of thinking and designing holistically will become increasingly important to our way of life and our approach to design. The lab area and demonstration gardens will be based on ten design principles that lead to a more sustainable and productive landscapes and overlap with the teachings of Permaculture which emphasize the creation of self – sustaining systems that: capture and store energy, obtain a yield, produce no waste, function on multiple levels, restore the health of our ecosystems and create a more equitable society.

Issues:

- The not so green “Green Industry” needs to change its ways in a rapidly changing world of heightened environmental awareness.
- Curriculum updates and outdoor lab spaces need to reflect the growing trend towards more sustainable and productive landscapes allowing students the hands-on experiences vital to a technical education.
- The existing outdoor lab space dedicated to hedge plots and landscape construction projects is outdated, underutilized and in need of major renovation.

Opportunities:

- To create a dynamic living laboratory that allows students opportunities to observe, research, plan and construct landscapes and landscape features that embody concepts of sustainability.
- Many opportunities exist for students in other programs (architecture, concrete masonry, electrical, interior design, graphics...) to play an active role in its final design and development.
- The **DCTC Sustainability Showcase** building could be built within the garden / lab area with each entity benefiting from the other.
- The garden and lab area could be used by the greater campus community such as food for the cafeteria or a place to take a lunch break outside.
- The garden further strengthens DCTC’s commitment to campus-wide greening initiatives as stated in the President’s signing of the American College and University Presidents Climate Commitment in June of 2007.

Constraints:

- Maintenance and upkeep of the lab and garden area will require considerable maintenance at a time of year when students are traditionally off campus on internship or working summer jobs.
- Tough economic times and budget shortfalls will potentially slow progress of garden / lab installation.
- Incorporating other uses for the space such as the “DCTC Sustainability Showcase” project will require the plan to be more flexible and adaptive as additional phases of project are implemented.

Ten Principles for More Productive and Sustainable Landscapes

The overriding principle of any sustainable project is to always be thinking:



Incorporating the following principles into every landscape setting will result in productive and sustainable landscapes that are beautiful and socially acceptable as well.

1. Reduce the amount of traditional lawn area
2. Use native plants
3. Reduce the amount of impervious surfaces
4. Capture and store storm water on site
5. Use vegetation to modify micro climate
6. Protect and restore existing soils
7. Reduce waste through composting
8. Plant a vegetable garden, fruit and nut bearing trees and shrubs
9. Fully consider environmental impacts of building materials
10. Spread the word and educate the public

Design Principle #1 – Reduce the amount of traditional lawn



Conventional turf grass lawns are the present day carry over of the English manor where large expansive lawns were a sign of prestige and wealth. Turf grasses were well adapted to the cool, rain drenched English landscape and before the advent of the power lawn mower, maintained by herds of sheep that grazed (and fertilized) the lawn. This pastoral image brought to North America with the Europeans didn't always fare well in our often drier and much hotter climate. Today, lawns from Maine to California are the predominant feature of our landscape replacing plant communities that were well acclimated to our harsher weather conditions. In order to maintain these lush carpets of well cropped turf grasses we now apply extraordinary amounts of fossil based fertilizers and pesticides in addition to wasteful amounts of precious water resources.

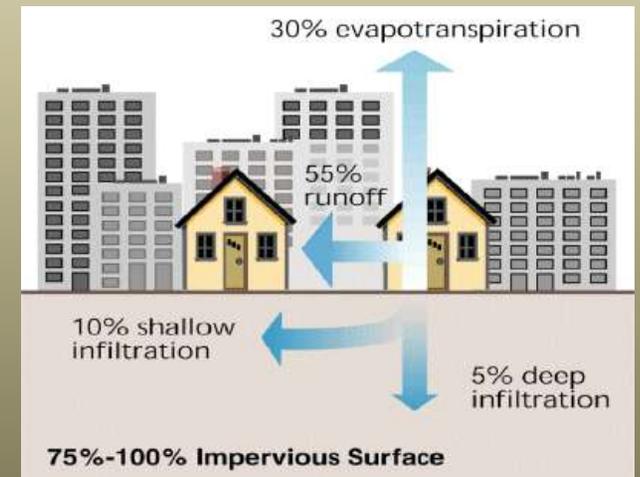
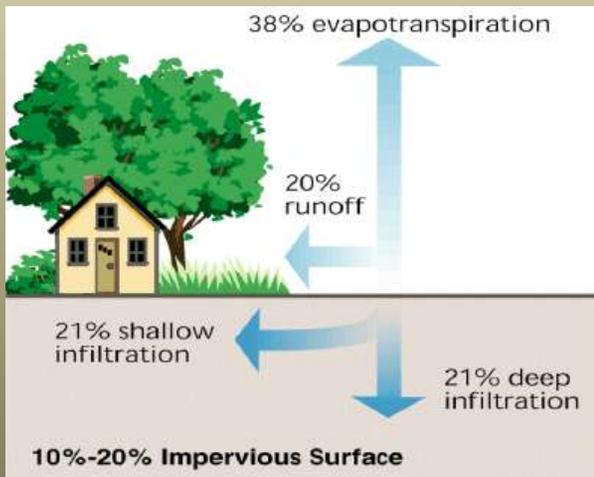
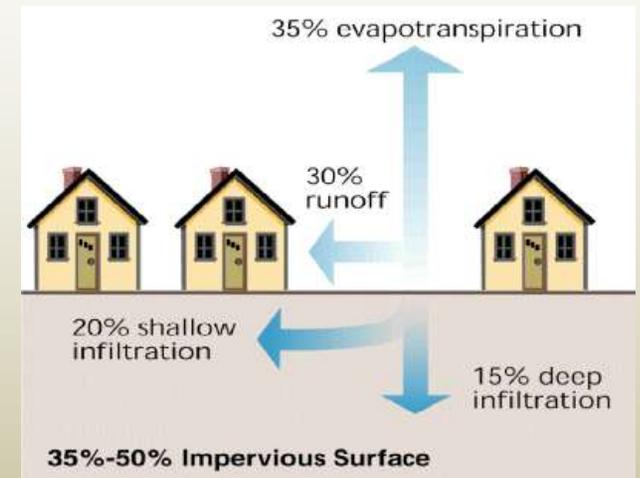
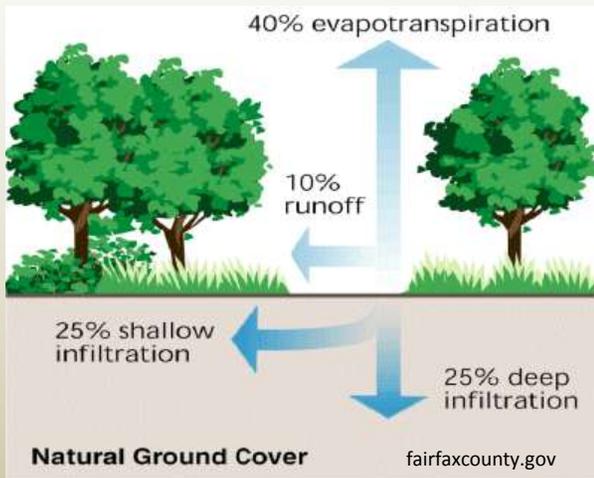
While reducing the amount of yard space dedicated to turf grass in favor of ecologically appropriate plantings is the single most effective way to reduce the negative impacts of lawns on our environment alternatives do exist. No-mow turf grass lawns that are allowed to grow higher and are better adapted to heat and drought reduce drastically the amount of chemical and water inputs required by the conventional lawn.

Design Principle #2 – Use native plants



Plant species native to a particular geographic region are best adapted to that region's climate and soil conditions and as a result fare much better than exotic species imported from abroad. When exotic species that are not well adapted to local growing conditions are introduced into our landscapes we become their caretaker applying fertilizers and pesticides harmful to other beneficial life forms. Additionally many exotic species require supplemental watering that puts unnecessary strain on local water supplies. As plants and animals have evolved together over time they have become dependant upon one another for their very survival. As exotics replace natives, insects adapted to native sources of food and nectar are in decline with adverse effects on they birds that prey upon them for their very survival. In many instances exotic plant species brought to this country have escaped from our gardens and infiltrated local ecosystems crowding out natives entirely.

Design Principle #3 – Reduce the amount of impervious services



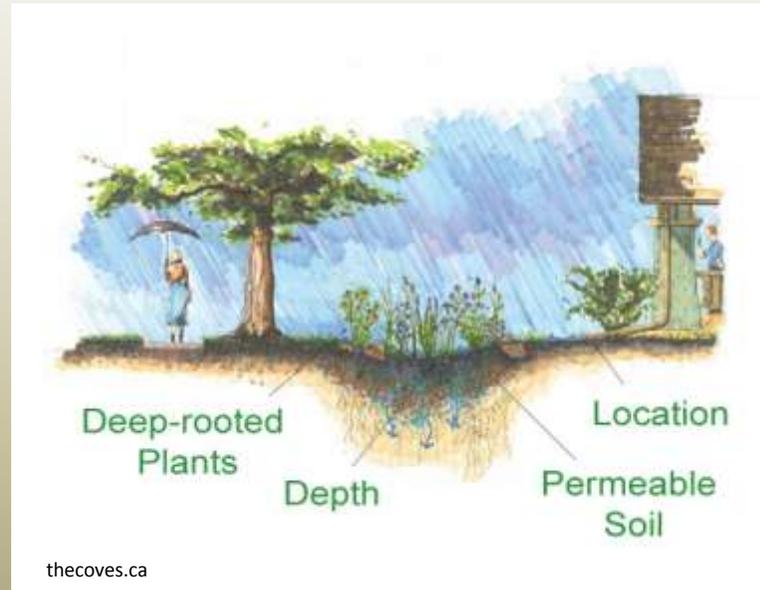
As the amount of impervious surfaces increase so to does the amount of stormwater runoff. This excess runoff affects water quality as accumulated surface pollutants are swept into rivers and lakes while storm surges intensify damage caused by erosion. Stormwater runoff that has been warmed by pavement has adverse effects on temperature sensitive fish species such as brook trout. Decreased infiltration results in streams that run dry prematurely adding further stress to already sensitive aquatic ecosystems.

Design Principle #4 – Capture and store stormwater on site



simplegreengirl.com

Rain Barrels



Rain Gardens



simplegreengirl.com

Cisterns

The same stormwater runoff that in excess can be detrimental to the environment can also be harvested on site and turned into a precious resource. Rain barrels can trap small amounts of runoff that can be used to water thirsty garden plants while larger cisterns can be used provide water for larger landscapes. Rain gardens or bio-infiltration basins along with bio-swales can trap stormwater runoff allowing it time to percolate back into the soil and recharge the ground water supply.

Design Principle #5 – Use vegetation to modify the micro-climate



Trees are often planted to fulfill the desire for a burst of spring color, sweetly scented flowers or brilliant display of fall foliage. Few people, many landscape professionals included, acknowledge the potential environmental benefits of planting trees. Studies have shown that correctly positioned trees can cut the energy consumption of a conventional residence by as much as 25%. The combined effects of cast shade and evapotranspiration can lower ambient air temperatures by almost 10 degrees F. Various studies have also shown that well placed coniferous trees can potentially reduce home heating bills by 10-40%. Shade trees also help keep our cities cooler by shading the enormous amounts of asphalt and concrete that would otherwise absorb the sun's heat and reradiate it back into the already warmed atmosphere resulting in what is known as the heat island effect.

Other uses for vegetation in modifying local micro-climates include green roofs and green walls. Green roofs and walls have been utilized in building structures throughout history but have only recently seen a resurgence in popularity due to their recognized environmental benefits.

Design Principle #6 – Protect and restore existing soils



Healthy soils are what make our very sustenance possible. Without this thin layer of living matter our very survival is compromised. That said, it is incredible how modern day man treats this precious resource, often referring to it simply as “dirt”. A healthy landscape, one that can persist through periods of drought and remain productive is dependant on a healthy living soil. Modern day practices of development in which soils are stripped and compacted then later poisoned with herbicides and pesticides leaves most landscaped areas unfit for long term sustainability. The soil becomes nothing more than the medium in which we add water and chemicals in an futile attempt to sustain life.

In a sustainable and productive landscape the soil is protected from the ravages of development and maintained through proper stewardship. This includes unnecessary disruption and compaction in the first place. It also includes recycling of biomass, protection from erosion and restraint in the application of chemicals in the form of fertilizers, herbicides and pesticides. This type of stewardship requires a different mindset; one that appreciates the intricate process of decay and renewal (recycling plant wastes) one that maintains and builds soils as has been done long before modern Man started tinkering with it.

Design Principle #7 – Reduce waste through composting



The answer to many of principle #6's problems is solved in design principle #7. Rather than send yard wastes to the local landfill and wash food scraps down the kitchen disposal, we should be composting this material in our own backyards. When composted, this waste is transformed into **Black Gold**. Soils amended with compost are better equipped to retain moisture and produce healthier, more productive plants as opposed to degraded soils that are dependent upon a steady diet of irrigated water and chemical based fertilizers for continued productivity.

Design Principle #8 – Plant trees, shrubs and gardens that produce food



Landscapes can be more than just something to pretty up an ugly building or house. In addition to creating pleasant and comfortable surroundings, landscapes can be designed to produce food. In this day in age where the average tomato has traveled 1,500 miles to get to the dinner table and food poisoning scares are commonplace, it only makes sense to grow and harvest food in your own back yard. Homegrown fruits and vegetables are fresher and higher in nutrient content than those that are grown on far flung factory farms and free of harmful chemicals used in commercial production. In this time of economic uncertainty and skyrocketing health care costs, healthy, homegrown produce only makes sense.

Design Principle #9 – Consider the full environmental impact of building materials



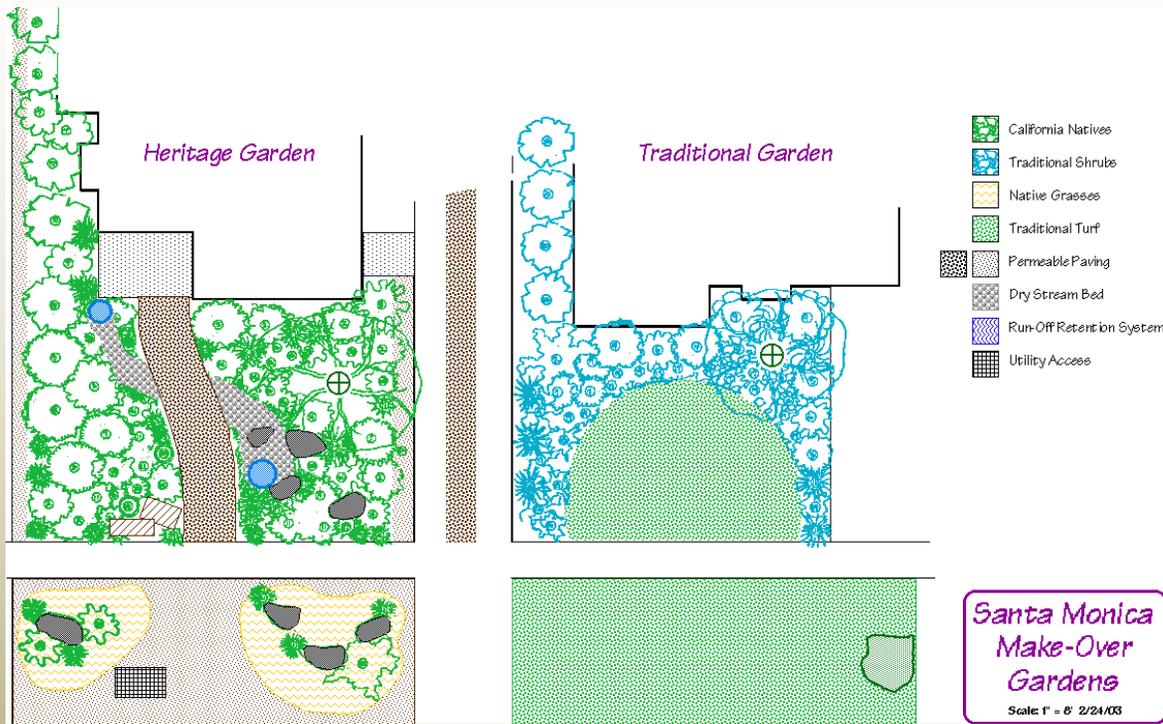
In addition to creating ideas, landscape designers are responsible for specifying materials to be used on the job. Just as plant choices can have long term impacts on the amounts of water, pesticides, energy and labor needed to maintain a landscape, hardscape elements can have environmental impacts of their own. The term **embodied energy** refers to the amount of energy expended in the process of mining materials, processing materials and the shipping materials to their final destination. The environmental impact of a locally quarried stone verses a slab of travertine shipped half way across the world is significant and should considered when selecting building materials for your next job. It is also important to reflect on the fate of a particular material after it has served its useful life; will it be buried in a landfill or can it be crushed and recycled into another patio?

Design Principle #10 – Spread the word



stepitup2007.org

The last and perhaps the most important principle in creating productive and sustainable landscapes is getting the buy-in of your clients and the general public. This is not always easy as long held perceptions about what makes a beautiful and socially acceptable landscape are in many ways in direct conflict with the more ecological and sustainable approach to design. As concerned landscape professionals we need to communicate with our clients and help them understand the complex relationships and consequences that result when we attempt to outsmart nature. While great strides in promoting everything “Green” have been made over the last few years, the long road to recovery lies ahead. Landscape professionals must promote smart, sustainable landscape designs that demonstrate the fact that sustainable and productive landscape are more beautiful than anything we have strived for in the past.



Native California Garden



Traditional California Garden

Garden/Garden is a “real life” demonstration garden composed of two adjacent front yards contrasting the benefits of native gardens and traditional gardens of southern California.

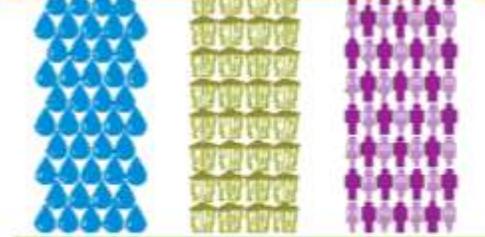
The native, California-friendly garden features only California native plants, which provide habitat and food for beneficial native birds and insects. A water-efficient drip irrigation system provides each plant the right amount of water based on plant type and weather information that the irrigation controller receives via satellite. Rainwater is captured from the roof and directed into an under-ground filtering system before it recharges the local groundwater supplies.

The traditional garden is the most common type of garden found in southern California. It features exotic plants, native to the Eastern United States, that require large amounts of water, fertilizers, pesticides and maintenance to keep them healthy in our Mediterranean climate.

www.smgov.net

The Numbers Speak for Themselves

Traditional Landscape



52,000 Gallons
670 Pounds
80 Hours

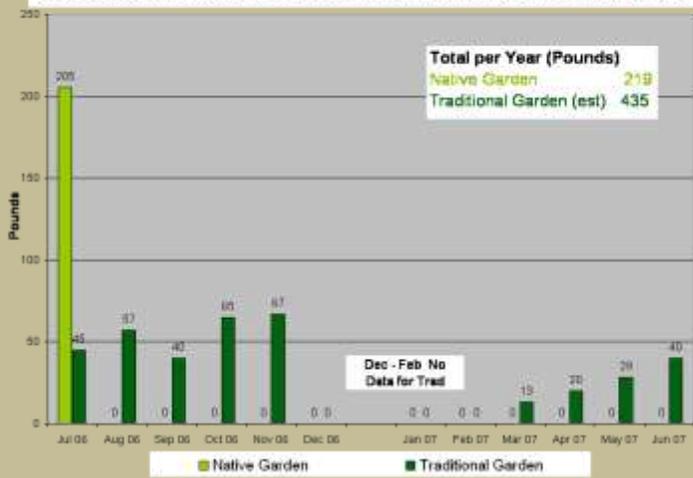
Sustainable Landscape



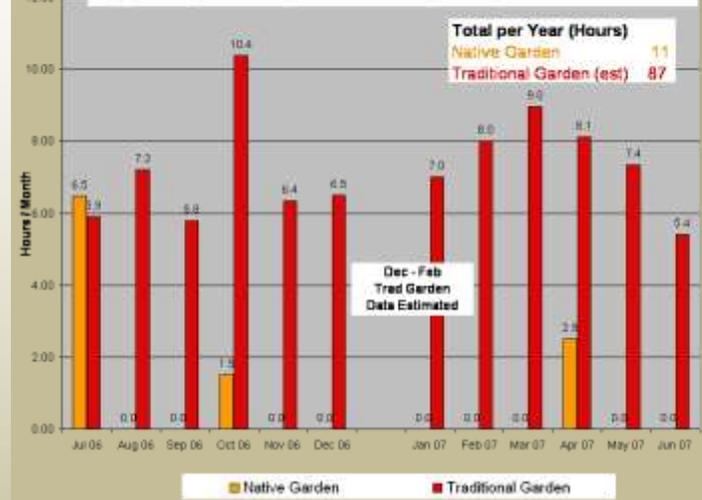
6,000 Gallons
258 Pounds
15 Hours

Consumption for one year based on 2003-2006 data.

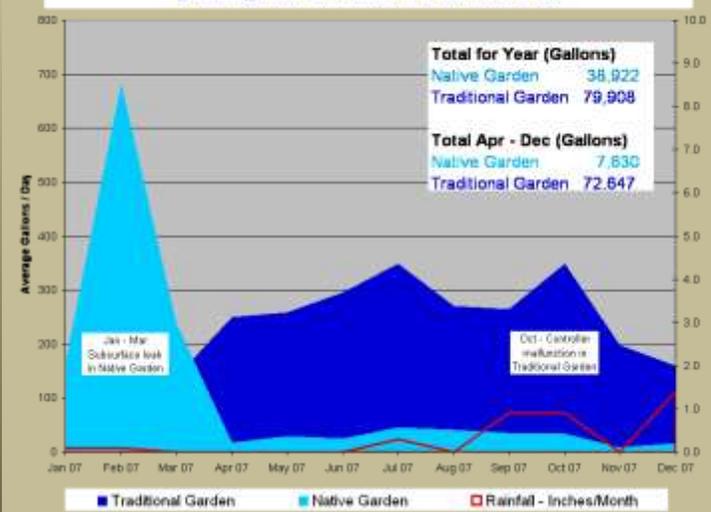
garden\garden Comparative Greenwaste Production July 2006 - June 2007

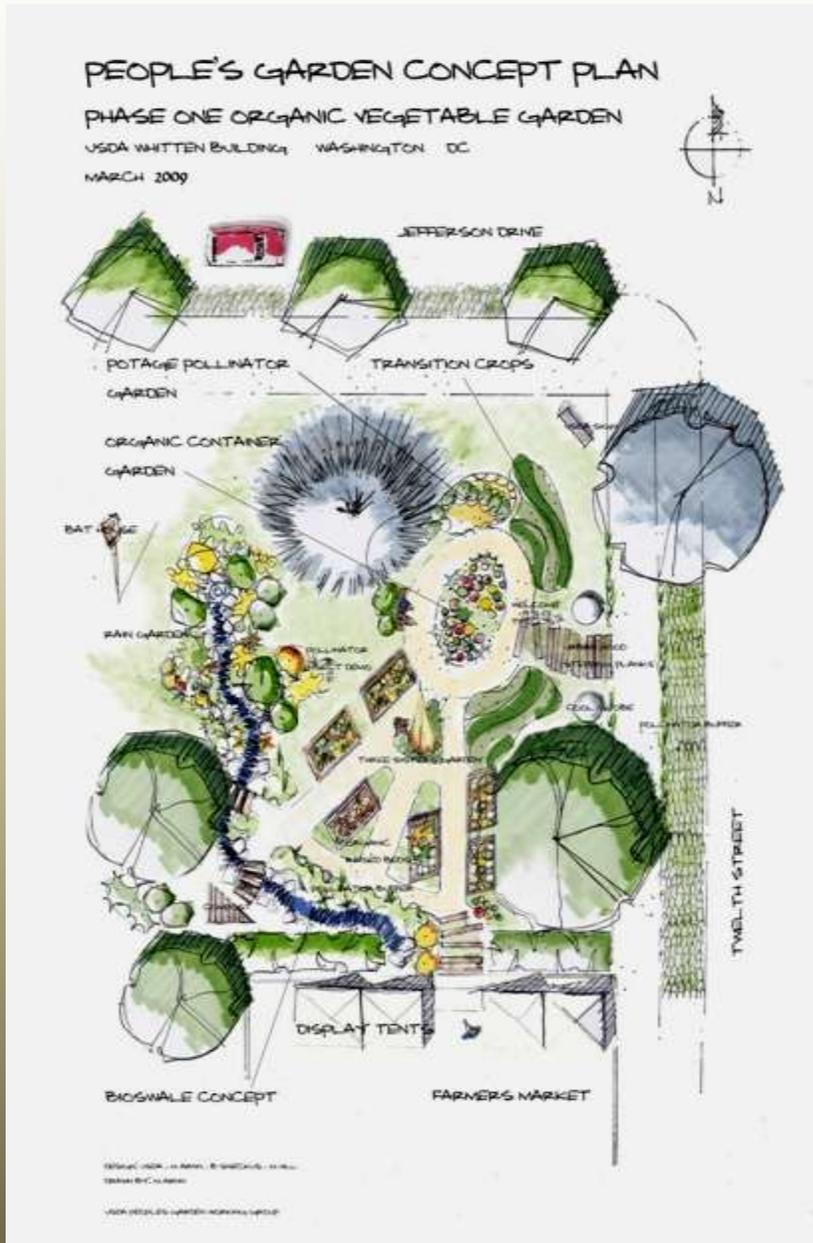


garden\garden Comparative Labor Input July 2006 - June 2007



garden\garden Comparative Water Use 2007





In honor of Earth Day, Agriculture Secretary Tom Vilsack declared the entire grounds at the USDA Jamie L. Whitten Building as 'The People's Garden' and unveiled plans to create a sustainable landscape on the grounds.

The People's Garden is designed to provide a sampling of USDA's efforts throughout the world as well as teach others how to nurture, maintain and protect a healthy landscape. If practiced, these garden concepts can be the general public's, government's, or business' contribution to providing healthy food, air, and water for people and communities.

<http://www.usda.gov/peoplesgarden>



<http://www.usda.gov>







View to proposed garden / lab area from south building entrance



Existing raised flower beds and pergola



Hodgepodge of existing deck structures and hedges



Existing deck structures showing effects of deterioration over time



View to gravel service road and new pole barn in distance



View to deteriorating gazebo and pergola structures



View to south side of main building with gravel service road, deck, patio and grilling area in foreground



View to greenhouses and south building entrance with asphalt driveway in foreground



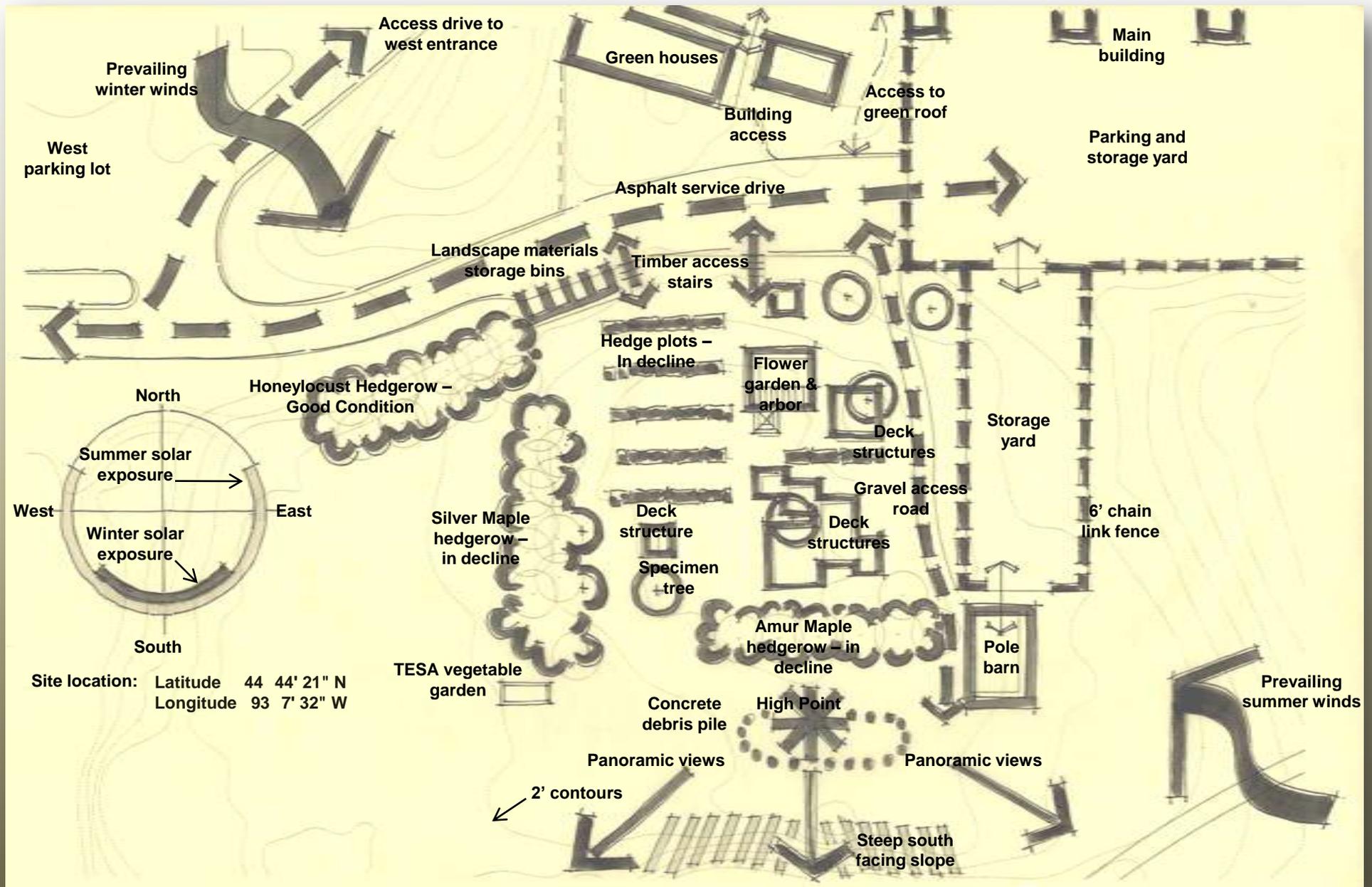
Assortment of existing deck structures and picnic tables adjacent to Amur Maple hedgerow

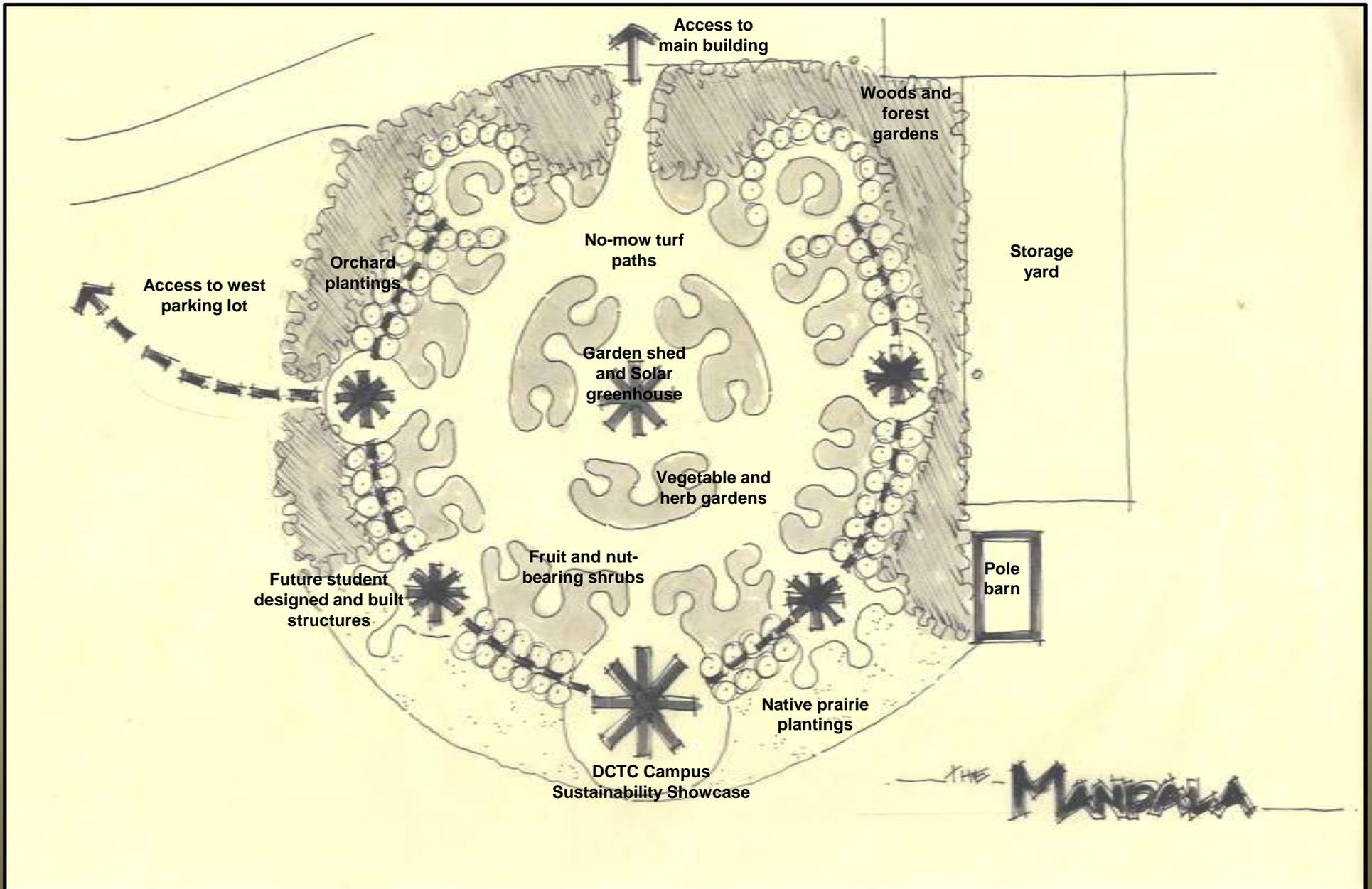


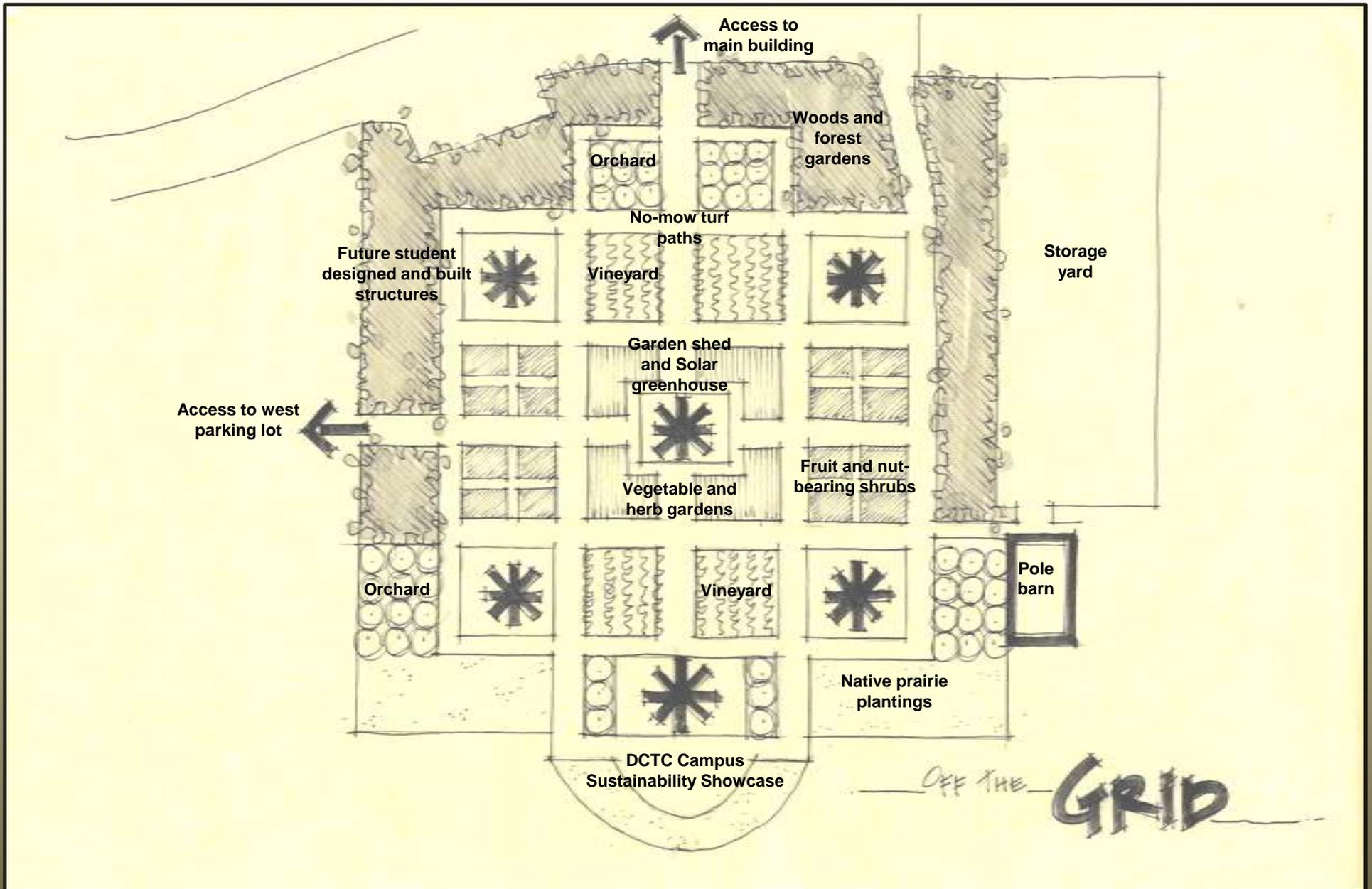
View to southwest through canopy of existing trees with railroad conductor training tracks in background

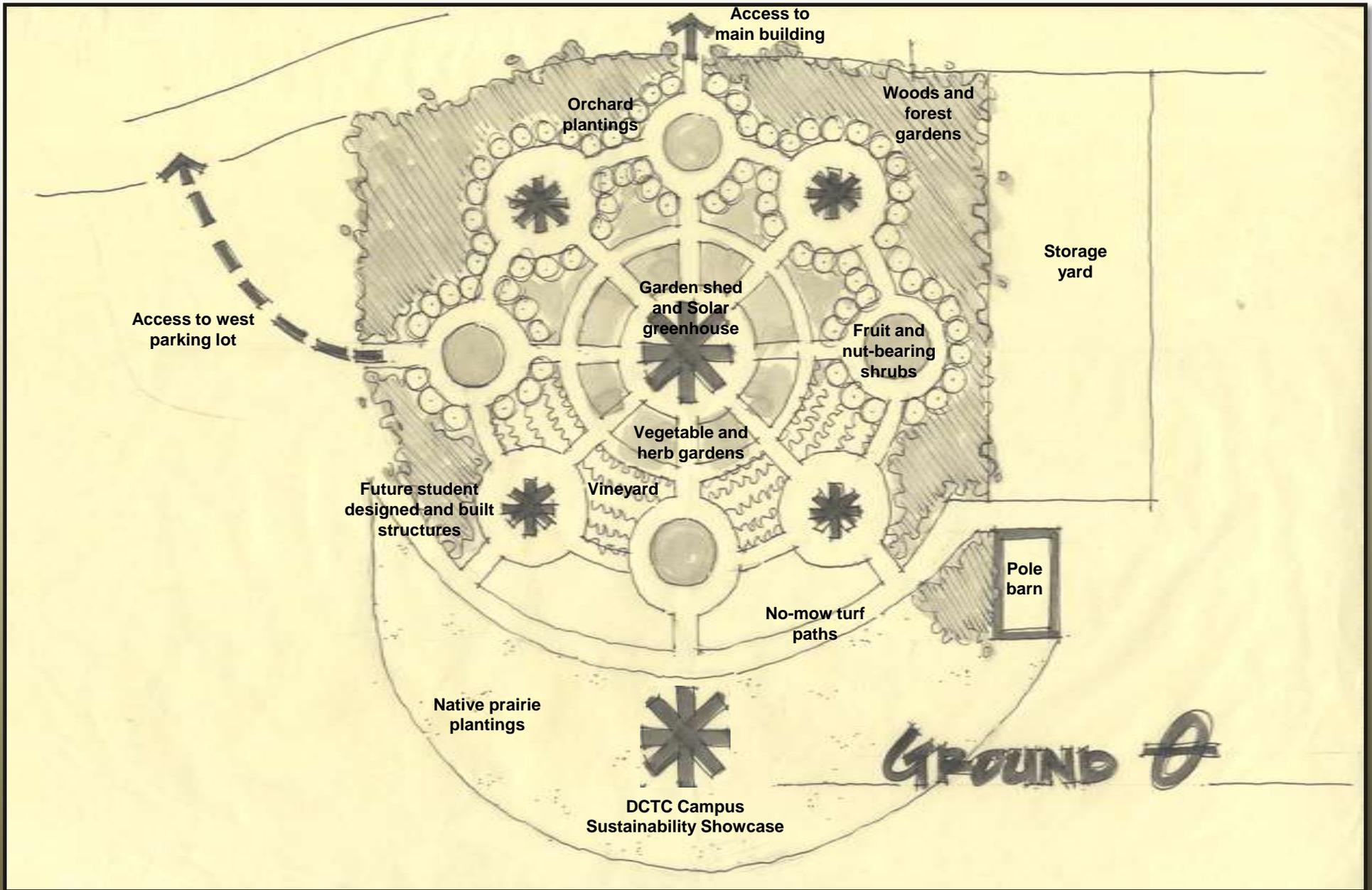


Panoramic view south to driving range and woods on Umore property and railroad conductor training tracks from high point south of Amur Maple hedgerow.













Side view showing, greenhouse, shed and porch



Rear view showing passive solar greenhouse

Resources

Books

Hemenway, Toby. Gaia's Garden White River Junction, Vermont: Chelsea Green Publishing Company
Jacke, Dave. Edible Forest Gardens White River Junction, Vermont: Chelsea Green Publishing Company
Coleman, Eliot. Four-Season Harvest White River Junction, Vermont: Chelsea Green Publishing Company
Mollison, Bill. Permaculture: A Designers Manual Tyalgum, Australia: Tagari Publications
Poisson, Leandre and Gretchen. Solar Gardening White River Junction, Vermont: Chelsea Green Publishing Company

Internet Resources

Permaculture Institute <http://www.permaculture.org/nm/index.php/site/classroom/>
Sustainable Sites Initiative <http://www.sustainablesites.org/human/>
Yestermorrow <http://www.yestermorrow.org/courses/mmbs/groof.htm>
Permaculturs Activist <http://www.permacultureactivist.net/articles/articles.htm>
City Farmer's Urban Agriculture <http://www.cityfarmer.org/>

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