

ADAMS
HOMESTEAD
&
NATURE PRESERVE

Native Landscape Arboretum

Department of Game, Fish and Parks
Wildlife Small Grants Program

Submitted By: Mark A. Ernste

Purpose

The purpose of the native landscape arboretum is to provide park visitors with visual representations of what native plantings are beneficial to wildlife at a scale of how they actually grow on the landscape. It also provides added natural shelter areas and food sources for wildlife. It provides spaces and opportunities for visitors to view wildlife in naturalized settings and identify different native plants and learn their aesthetic and functional attributes. It is meant to raise public awareness of succession and other ecological processes characteristic of native habitats in southeastern South Dakota.

This is the first stage of the envisioned native landscape. This project sets up the framework for a larger project encompassing companion plantings. Some of these companion plantings would include other shrubs, forbs and grasses that would naturally occur with these habitat types. The companion plantings cannot be put in place until the framework of dominant trees has been established.

Design Plan Narrative

The design plan gains its inspiration from the Missouri River and its fluvial processes. It mirrors the curves of Mud Lake and McCook Lake as illustrated on aerial photographs of the area. The curves of the pathways and design of the overall shape reflect the historical river movements indicated on the aerial photographs. Another area of inspiration for the design comes from the cottonwood forest located within the park. The design theme within the vegetative plantings illustrates the succession of these riparian forests from willow-cottonwood domination through the seral stages of eastern red cedar, dogwood, and boxelder into the new climax stage of hardwoods (American elm, Green Ash, Black walnut and Bur Oak).

The path represents the river and the cutting of the river into the landscape and the deposition of materials on the inside of the cut. Within the deposition area the design addresses vegetative succession and water availability and what happens with the plant type domination as the water eventually dries. It also addresses oxbow creation when a river changes its course leaving a smaller body of water. This is represented in the design by the footbridge.

The wetland area represented by the footbridge expresses the value of water in the successional processes found within the design. It provides an interpretation tool to teach about wetland values and ecology. The wetland area provides a habitat resource for wildlife in the area also.

Design Uses

The native landscape arboretum design can be used several ways. Along the main path interpretation about vegetative succession and prairie ecology can be developed. The movements and natural processes of a river with its cutting and depositing can be interpreted. The primitive path can also be used heavily in interpretation as a teaching tool. It provides an easy wander through the various vegetative succession patterns and provides private secluded areas for resting offering a different feel from the main path. The gathering spaces serve as overlooks and blinds,

and offer other wildlife viewing areas. The gathering spaces also provide learning places with a different look and feel, places to interpret the succession of the vegetation.

The design not only provides ample opportunity for interpretation of forest succession and native landscape ecology but also provides wildlife habitat. The wetland area is an attraction to animals as well as people. The vegetation provides cover, shelter and food for the variety of wildlife that live in the area.

Native Plant Listing with Source and Cost

The price and cost estimate for the recommended trees comes from the Big Sioux Nursery, in Watertown, SD and from the Union County Conservation district office. The Liberty elm is a genetic hybrid of six different elm trees. It is resistant to Dutch elm disease and is recommended in this planting for that reason and that American elm are unavailable for purchase. The Liberty elm still retains the majestic elm appearance as the traditional, native American elm. The Liberty elm price is quoted from the Elm Research Institute, Elm Street, Westmoreland, New Hampshire 03467 (1-800-367-3567).

Quantity	Species	Price/Each	Total Cost
35	Sandbar willow (<i>Salix exigua</i>)	\$0.35	\$12.25
60	Cottonwood (<i>Populus deltoides</i>)	\$0.35	\$21.00
80	Gray dogwood (<i>Cornus racemosa</i>)	\$0.35	\$28.00
30	Eastern Red Cedar (<i>Juniperus virginiana</i>)	\$0.45	\$13.50
5	Boxelder (<i>Acer negundo</i>)	\$0.40	\$2.00
7	Liberty Elm	\$25.00	\$175.00
10	Green Ash (<i>Fraxinus pennsylvanica</i>)	\$0.75	\$7.50
3	Black Walnut (<i>Juglans nigra</i>)	\$0.45	\$1.35
22	Bur Oak (<i>Quercus macrocarpa</i>)	\$0.38	\$8.36

Discussion of Site Soils

The four-acre plot of the proposed arboretum is made up of the Onawa soil type classified as a silty clay soil. Soil samples at 0 – 6 inches and 6 – 12 inches were taken from the four acres and tested at the soil-testing laboratory at South Dakota State University. The soil contained 2.7 % organic matter, medium texture with a pH of 7.7. Nitrogen levels rank in the medium category with results of 27 lbs/A for 0 – 6 inches and 41 lbs/A for the 6 – 12 inch depth for a total of 68 lbs./A. Phosphorus (Olsen) levels ranked in the medium to high levels with a test of 11 ppm. Potassium levels were high with a test reading of 467 ppm. Soluble salts were satisfactory at 0.4 mmho/cm.

All of the tree and shrub species selected are native to southeastern South Dakota and most can be found in the other areas of the Adams Homestead and Nature Preserve. Nutrient and soil condition requirements as well as any recommended additions follow for each species.

Sandbar Willow (Salix exigua)

Sandbar willow occurs in an early seral community adjacent to wetlands or waterways. Sandbar willow occurs on a wide range of soil textures. The main determining factors of survival

are adequate moisture and minimal shading. Sandbar willow is a pioneer species and often shares this community with cottonwood species.

Cottonwood (*Populus deltoides* with a subspecies *monilifera*)

Cottonwood will become the dominant species in the habitat type. For the plains cottonwood availability of moisture is more significant than soil texture or fertility. Cottonwoods can grow on a wide range of soil textures.

Gradually as cottonwoods age and cannot regenerate beneath their own shade they will be replaced by more shade tolerant species. One of these species is the eastern red cedar (*Juniperus virginiana*).

Eastern Red Cedar (*Juniperus virginiana*)

Eastern red cedar grows on a wide range of soils including silty, clayey loam, and heavy clay soils such as is on the Adams Homestead and Nature Preserve site. Soils are often high in calcium, with limited soil moisture and nutrients. Calcium can be added to the soil on the Adams Homestead and Nature Preserve site to make it more suitable for red cedar but it is not required for successful establishment and growth. Eastern red cedar will still grow in soils with low calcium levels. The soil pH range needs to be 4.7 to 7.8; red cedar most commonly occurs on neutral or slightly alkaline soils.

Gray Dogwood (*Cornus racemosa*)

Gray dogwood grows on a variety of sites. It grows best on rich, moist, well-drained soils.

Green Ash (*Fraxinus pennsylvanica*)

The forest gradually evolves into a new climax habitat type of hardwoods. One of the hardwoods that grows commonly with cottonwoods is green ash. Green ash occur on a wide variety of soils although it survives best on deep, permeable, well-drained loams. It will also grow fairly well when planted on medium to coarse-textured upland sands and loams with good moisture. It is tolerant of moderately strong acid (pH 4.0) to moderately basic reacting soils. The pH of the Adams site is within the conditions but the texture of the soil on the site may be too fine for maximum growth potential.

American Elm (*Ulmus americana*)

American elm will also begin replacing cottonwoods as the canopy opens. American elm grows best on rich, well-drained loams. Growth is good in loam or clay soils if the summer water table drops 8 - 10 feet below the surface. American elm is also common on clay and silty-clay loams on bottomlands. It is recommended that Liberty Elm be planted in place of American elm due to the Liberty elm's resistance to Dutch Elm disease.

Boxelder (*Acer negundo*)

Boxelder commonly grows in association with plains cottonwood and green ash and sometimes bur oak. This species is able to tolerate a wide variety of soils but shows a strong preference for more acidic pH, well-drained, aquatic soils. Boxelder will grow on soils from gravel to clay; it grows best on deep sandy loam, loam or clay loam soils with a medium to rocky texture. The pH needs to be 6.5 to 7.5.

Black Walnut (*Juglans nigra*)

Black walnut is found a variety of soils but grows best on a deep, well-drained neutral soil that is moist and fertile. The addition of organic matter would be beneficial to black walnut.

Black walnut is classified as a shade intolerant species. Availability of light is a greater limiting factor than soil and moisture conditions.

Bur Oak (*Quercus macrocarpa*)

Bur oak tolerates a wide range of soils. Commonly it grows on medium to somewhat coarsely textured soils, and more rarely on clays. It is well adapted to fairly acidic (> 4.0 pH) to moderately basic nonsaline soils. Optimum soil depth is greater than 20 inches.

Planting and Maintenance Methods

Sandbar Willow (*Salix exigua*)

Unrooted willow stem cuttings (slips) should be planted on sites that provide sufficient moisture to start and maintain growth through the growing season. Since willows are sensitive to both competition and shading, dense tall grasses will reduce transplant survival and may need to be removed by cutting or by herbicide application. Rooted stock is recommended because it has higher survival rates. Slips should be obtained from local native stands, such as the large stand in the southwest corner of the park. Cuttings should be planted 12 inches (30 cm) deep, with 8 inches (20 cm) left above ground. Planting deep allows for more rooting surface to extract soil moisture and higher amounts of carbohydrates as stored food reserves. It is recommended that the willow be thinned every two years to allow for maximum growth of the remaining willow and so that the wetland does not become overgrown with willow.

Plains Cottonwood (*Populus deltoides*)

Rooted cuttings or nursery-grown seedlings can be used in plantings. Cuttings of 8 ft. (2.4 m) or more planted in 3-foot (1 m) deep holes have been shown to have advantages over standard 20-inch (50 cm) cuttings. These advantages include less intensive site preparation requirements, a reduced need for browsing protection, and less intensive weed control. Cuttings should be longer where upper soil moisture is limiting. If seedlings are used the plants must be kept free of competing vegetation to survive. Browsing and trampling by wildlife must also be controlled for successful growth. It is recommended that the cottonwood seedlings be thinned every two years to provide for rejuvenation and maximum growth of remaining trees.

Eastern Red Cedar (*Juniperus virginiana*)

Red Cedar transplants readily. Caution must be taken to control red cedar as it invades grazed areas easily and is considered a problem plant in several areas. It is highly resistant to chemical control by use of herbicides. It is recommended that the red cedar be thinned every three to five years to control the unwanted spread of these trees.

Gray Dogwood (*Cornus racemosa*)

Gray dogwood is easily established by direct seedling and grows rapidly.

Green Ash (*Fraxinus pennsylvanica*)

Green ash of sapling or pole size sprouts readily, resulting in clumps of several stems. Transplant of seedlings is recommended. An interesting note – green ash is commonly found now replacing cottonwood as a climax species where flooding is no longer common and cottonwood stands are dying out.

American Elm (*Ulmus americana*)

American elm seedling transplant is recommended. The largest concern for the maintenance of American elm trees is protecting it from Dutch elm disease. A hybrid elm is now commonly used to replace American elm in plantings because it is more resistant to Dutch elm disease than the American elm.

Black Walnut (*Juglans nigra*)

Weed control is essential for the establishment of black walnut. An antagonism between black walnut and many other plants growing within its root zone has been recognized and attributed to juglone, a toxic substance found in leaves, bark, nut husks, and roots of black walnut trees. Black walnut is classified as a shade intolerant tree. Black walnut maintains itself in most stands as scattered single trees occupying openings in the canopy.

Bur Oak (*Quercus macrocarpa*)

Seedlings of the largest size obtainable are recommended because of this tree's slow growth. Chemical control of the bur oak is difficult.

Conclusion of Planting and Maintenance Methods

Although several methods of planting have been discussed for the various species it is recommended to plant the largest seedlings available. Seedlings will be the easiest to maintain and have a higher success rate than any other method of planting. Most all of the recommended species are shade sensitive and sensitive to competition by other trees, shrubs and grasses. It is recommended that the tall grass currently established on the site be cut or burned before planting seedlings. This will give the seedlings a chance to establish with limited competition. Burning the grass area will also aid in the regeneration of several of the grasses present. It is recommended burning take place in the wet, rainy season of spring.

Maintenance of the paths would require regular mowing of the primitive pathways and repair of the main pathway in the event of heavy runoff or rain causing washouts.

Budget

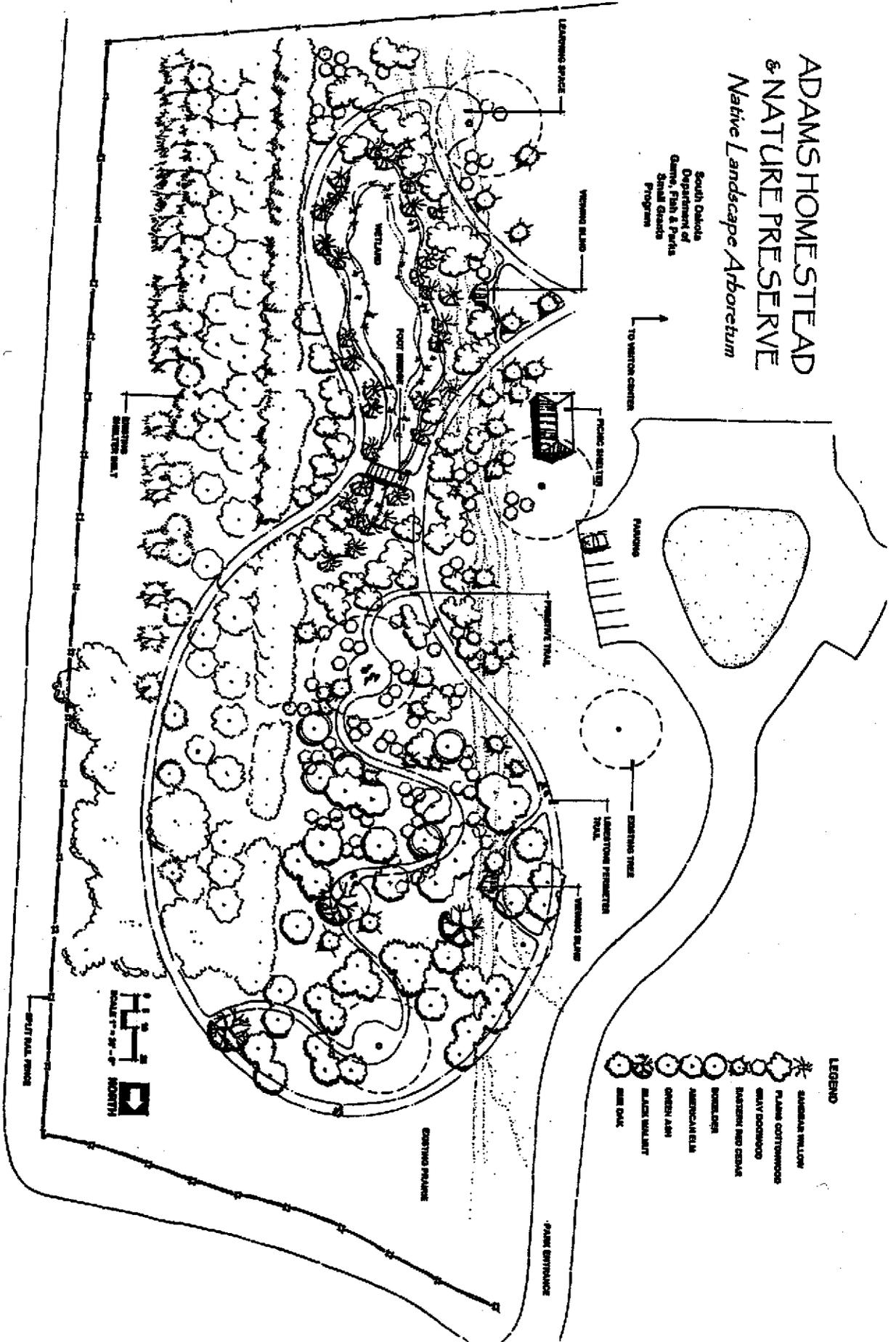
Material Items	Material Costs	Quantity	Labor	Total Cost
Viewing Blinds	\$2000.00/each	2	\$1500.00/each	\$7,000.00
Trails (1600 ft.) 6' wide x 4" deep			\$3360.00 total	\$3,360.00
Rock (with shipping)	\$20.00/ton	120 ton		\$2,400.00
Landscaping Fabric	\$0.10/sq.'	960 sq.'		\$960.00
Planting				
Plants (see listing sec.)				\$268.96
Planting Labor		252 plants	\$7.00/plant	\$1,764.00
Landscaping Fabric	\$0.10/sq.'	2268 sq.'		\$226.80
Total Establishing Cost:				\$15,979.76

- Wetland costs and establishment was not addressed in the scope of this project as it is easily a project upon itself.

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Native Landscape Arboretum

South Dakota
Department of
Game, Fish & Parks
Special Grants
Program



- LEGEND**
- SAGEBRUSH WILLOW
 - FLAME COTTONWOOD
 - SALIX BOCKHOOD
 - SASSAPARILLA AND CEDAR
 - BOXELDER
 - AMERICAN ELM
 - GREEN ASH
 - BLACK WALNUT
 - WHITE OAK

H&P
SCALE 1" = 40' - 0"
NORTH

MARCH 2000

