



Procedures for Lake Edge Enhancement System

Part 1 General

1.01 Section Includes

- A. Preparation
- B. Seeding
- C. Planting
- D. Seed Protection
- E. Waterfowl exclusion
- F. Maintenance

1.02 Bidder qualifications

- A. The submitting bidders shall be, and have been, actively and directly engaged in wetland plant installation for a period of two (2) or more years. Provide proof of five (5) or more successful wetland plant installations.
- B. Qualified bidders shall possess specialized equipment for working in and around water, including a small boat, hip waders, and floatation life preservers to be worn while working in water.

1.03 Environmental Requirements

- A Installation shall be performed in mid to late spring, specifically between April 1 and July 1st.

- B. Hydrology shall be established prior to installation. Detention pond must have an established pool level to utilize as a reference for planting.
- C. Surrounding uplands shall be stabilized with the specified grass seed mix. No pre-emergent herbicides shall be applied to surrounding turf during the six months prior to installation and for at least 1 year following installation.
- D. Emergent plants shall be installed prior to seeded communities.

1.04 Materials

- A. All native seed shall be refrigerated for at least 90 days prior to installation.
 - 1. All native seed must be of wild ecotype as provide by Spence Restoration Nursery or approved local source. No hybrids or cultivars may be included.
 - 2. Local genotype seed shall be used whenever possible due to its adaptation to central Indiana soil and climate. These specifications do not apply to the temporary matrix.
- B. Container grown plants shall be used for the emergent plant communities.
 - 1. Container grown plant must be nursery propagated of wild ecotype in 2 3/8" square by 3 3/4" deep open-bottomed pots as provided by Spence Restoration Nursery or approved local source.
 - 2. Container grown plants shall be inoculated with VAM (Vesicular Arbuscular Mycorrhizae) endomycorrhizal fungi as provided by Spence Restoration Nursery or approve local source.

Part 2 Products

2.01 Seed Mixture

- A. Mesic Community

Temporary Matrix

Species	Latin Name	Amount per 1000 sq ft
Seed Oats	Avena sativa	1 lb
Annual Rye	Lolium multiflorum	6 oz

Permanent Matrix - Grasses

Species	Latin Name	Amount per 1000 sq ft
Big Bluestem	Andropogon gerardii	1 oz

Little Bluestem	<i>Andropogon scoparius</i>	1 oz
Sideoats Grama	<i>Bouteloua curtipendula</i>	.25 oz
Canada Wild Rye	<i>Elymus canadensis</i>	.5 oz
Switchgrass	<i>Panicum virgatum</i>	.1 oz
Indian Grass	<i>Sorghastrum nutans</i>	1 oz

Permanent Matrix - Forbs and Wildflowers

Heath Aster	<i>Aster ericoides</i>	.05 oz
Smooth Aster	<i>Aster laevis</i>	.05 oz
New England Aster	<i>Aster novae-angliae</i>	.05 oz
White False Indigo	<i>Baptisia leucantha</i>	.1 oz
Wild Senna	<i>Cassia hebecarpa</i>	.1 oz
Tall Coreopsis	<i>Coreopsis tripteris</i>	.05 oz
Pale Purple Coneflower	<i>Echinacea pallida</i>	.2 oz
Purple Coneflower	<i>Echinacea purpurea</i>	.25 oz
Rattlesnake Master	<i>Eryngium yuccifolium</i>	.2 oz
False Sunflower	<i>Heliopsis helianthoides</i>	.1 oz
Western Sunflower	<i>Helianthus occidentalis</i>	.1 oz
Roundheaded Bushclover	<i>Lespedeza capitata</i>	.1 oz
Rough Blazing Star	<i>Liatris aspera</i>	.1 oz
Dense Blazing Star	<i>Liatris spicata</i>	.1 oz
Wild Bergamot	<i>Monarda fistulosa</i>	.05 oz
Pruple Prairie Clover	<i>Petalostemum purpureum</i>	.05 oz
Mountain Mint	<i>Pycnanthemum virginianum</i>	.05 oz
Prairie Coneflower	<i>Ratibida pinnata</i>	.25 oz
Black-Eyed Susan	<i>Rudbeckia hirta</i>	.20 oz
Sweet Black-Eyed Susan	<i>Rudbeckia subtomentosa</i>	.20 oz
Rosinweed	<i>Silphium integrifolium</i>	.20 oz
Prairie Dock	<i>Silphium terebinthinaceum</i>	.10 oz
Stiff Goldenrod	<i>Solidago rigida</i>	.10 oz

Tall Ironweed	Vernonia altissima	.10 oz
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A. Wet-Mesic Community

Temporary Matrix

Species	Latin Name	Amount per 1000 sq ft
Seed Oats	Avena sativa	1 lb
Annual Rye	Lolium multiflorum	6 oz

Permanent Matrix - Grasses and Sedges

Species	Latin Name	Amount per 1000 sq ft
Big Bluestem	Andropogon gerardii	.75 oz
Fox Sedge	Carex vulpinoidea	.4 oz
Canada Wild Rye	Elymus canadensis	.5 oz
Virginia Wild Rye	Elymus virginicus	.5 oz
Switch Grass	Panicum virgatum	.1 oz
Indian Grass	Sorghastrum nutans	.2 oz

Permanent Matrix - Forbs and Wildflowers

Species	Latin Name	Amount per 1000 sq ft
New England Aster	Aster novae-angliae	.05 oz
White False Indigo	Baptisia leucantha	.10 oz
Tall Coreopsis	Coreopsis tripteris	.05 oz
Dense Blazing Star	Liatis spicata	.05 oz
Wild Bergamot	Monarda fistulosa	.10 oz
Foxglove Beardtongue	Penstemon digitalis	.05 oz
Mountain Mint	Pycnanthemum virginianum	.05 oz
Yellow Coneflower	Ratibida pinnata	.20 oz
Showy Black-Eyed Susan	Rudbeckia fulgida speciosa	.10 oz

Black-Eyed Susan	Rudbeckia hirta	.20 oz
Prairie Dock	Silphium terebinthinaceum	.10 oz
Riddell's Goldenrod	Solidago riddellii	.05 oz
Culver's Root	Veronicastrum virginicum	.02 oz
Golden Alexanders	Zizia aurea	.10 oz

B. Sedge Meadow

Temporary Matrix

Species	Latin Name	Amount per 1000 sq ft.
Seed Oats	Avena sativa	12 oz
Creeping Bentgrass	Agrostis alba palustris	.10 oz
Annual Rye	Lolium multiflorum	4 oz

Permanent Matrix - Grasses and Sedges

Species	Latin Name	Amount per 1000 sq ft.
Crested Sedge	Carex cristatella	.25 oz
Frank's Sedge	Carex frankii	.25 oz
Meadow Sedge	Carex granularis	.10 oz
Bottlebrush Sedge	Carex lurida	.10 oz
Tussock Sedge	Carex stricta	.05 oz
Fox Sedge	Carex vulpinoidea	.50 oz
Virginia Wild Rye	Elymus virginica	.50 oz
Fowl Manna Grass	Glyceria striata	.30 oz
Switchgrass	Panicum virgatum	.05 oz
Dark Green Bulrush	Scirpus atrovirens	.25 oz

Permanent Matrix - Forbs and Wildflowers

Common Name	Latin Name	Amount per 1000 sq ft.
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Swamp Milkweed	<i>Asclepias incarnate</i>	.50 oz
New England Aster	<i>Aster novae-angliae</i>	.25 oz
Swamp Aster	<i>Aster puniceus</i>	.10 oz
Bur Marigold	<i>Bidens cernua</i>	.25 oz
Spotted Joe-Pye Weed	<i>Eupatorium maculatum</i>	.10 oz
Boneset	<i>Eupatorium perfoliatum</i>	.25 oz
Autumn Sneezeweed	<i>Helenium autumnale</i>	.25 oz
Cardinal Flower	<i>Lobelia cardinalis</i>	.05 oz
Great Blue Lobelia	<i>Lobelia siphilitica</i>	.05 oz
Foxglove Beardtongue	<i>Penstemon digitalis</i>	.10 oz
Mountain Mint	<i>Pycnanthemum virginianum</i>	.10 oz
Black-Eyed Susan	<i>Rudbeckia fulgida speciosa</i>	.25 oz
Riddell's Goldenrod	<i>Solidago riddellii</i>	.25 oz
Blue Vervain	<i>Verbena hastate</i>	.50 oz

2.02 Plants

Shallow Water Emergent Community

Common Name	Latin Name	Size
Sweet Flag	<i>Acorus calamus</i>	2 3/8" X 3 3/4" deep pot
Riverbank Tussock Sedge *	<i>Carex emoryi</i>	2 3/8" X 3 3/4" deep pot
Lake Sedge*	<i>Carex lacustris</i>	2 3/8" X 3 3/4" deep pot
Creeping Spike Rush	<i>Eleocharis palustris</i>	2 3/8" X 3 3/4" deep pot
Blue Flag Iris	<i>Iris virginica shrevei</i>	2 3/8" X 3 3/4" deep pot
Soft Rush	<i>Juncus effusus</i>	2 3/8" X 3 3/4" deep pot
Water Willow	<i>Justicia americana</i>	2 3/8" X 3 3/4" deep pot
Common Arrowhead	<i>Sagittaria latifolia</i>	2 3/8" X 3 3/4" deep pot
Hardstem Bulrush	<i>Scirpus acutus</i>	2 3/8" X 3 3/4" deep pot
Three-Square Bulrush	<i>Scirpus pungens</i>	2 3/8" X 3 3/4" deep pot
Woolgrass	<i>Scirpus cyperinus</i>	2 3/8" X 3 3/4" deep pot

Softstem Bulrush	Scirpus validus	2 3/8" X 3 3/4" deep pot
Giant Burreed	Sparganium eurycarpum	2 3/8" X 3 3/4" deep pot

Those species denoted with an asterisk (*) shall be installed at the shoreline. All others shall be installed in 2" to 6" of water.

Deep Water Emergent or Floating Leaf Community

Common Name	Latin Name	Size
Yellow Pond Lily	Nuphar luteum	Bare root
White Water Lily	Nymphaea odorata	Bare root

2.03 Accessories

- A. Waterfowl Exclusion
 - 1. Posts - 6 foot lightweight fence posts or 6 foot length of #4 rebar.
 - 2. Fence - 5 foot width.
- B. Sand - Dry, Coarse Sand that is free from chemical contamination.
- C. Erosion Control Blanket - North American Green SC-150 or equivalent

Part 3 Execution

3.01 Examination

- A. Verify that a stable water level has been established in the detention pond.
- A.B. Verify that the surrounding uplands have been stabilized with the specified grass seed mix.

3.02 Preparation

- A. Two weeks (14 days) prior to installation, apply a glyphosate herbicide approved for use around water (Rodeo) to the area to kill existing lawn grasses and other vegetation.

- A. Following a complete kill of existing vegetation, begin installation by tilling area to be seeded to a depth of 3 inches. Till as close to the shoreline as soil moisture conditions permit.

3.03 Installation of waterfowl exclusion fence

- A. Place posts in 2' foot water depth at 15 foot intervals around the entire pond. Each post shall be driven approximately 1 foot into the pond bottom.
- B. Attach fence to posts with wire ties so that the fence extends to the pond bottom and at least 36 inches above the waters surface.

3.04 Installation of Plants

- A. All aquatic plants must be installed in the appropriate water depths between the waterfowl exclusion fence and the shore.
 - 1. Deep water emergent or floating leaf plants shall be installed in 1 to 6 foot water depths. Place 3 plants per 10 lineal feet of community.
 - 2. Shallow water emergent plants shall be installed in 2 to 6 inch water depths with the exception of shoreline species (noted with an asterisk in species list) which shall be installed at the water's edge. Place 1 plant per lineal feet of community. Evenly distribute each species around the pond, planting in groups of 3 to 5 plants of each species.
- B. All plants shall be installed by creating a hole with a spade or dibble, placing the plants in the hole and firmly packing the soil around them. Plants allowed to float to the surface following installation shall result in rejection of the installation.

3.05 Seeding

- A. Place a portion of the seed in a clean, dry 5 gallon bucket. Mix 2 parts coarse sand with 1 part seed. Thoroughly mix seed and sand.
- B. Hand broadcast seed/sand mixture across the specified tilled area. Apply half the seed/sand mixture over the entire area. Apply the second half over the same area utilizing the same procedure. This method prevents using all of the seed before the entire area is covered.
- C. Lightly firm seedbed with a roller where soil moisture permits. Do not roll areas where soil is moist enough to stick to the roller.

- D. Apply 1 width of erosion blanket starting just above the normal waterline. Secure with 2 staples per square yd

3.06 Protection

- A. Protect seeded areas with stakes and tape around area periphery.

3.07 Maintenance

- A. If weed growth exceeds ten inches in height in seeded communities, trim or mow to 4 inches. Do not cut plants in the emergent community.
- B. Maintain waterfowl exclusion fence for 1 year. At the end of that period, remove fence and posts.

3.08 Acceptance

- A. Planted Aquatic Communities - For acceptance at the end of the first growing season, the following condition shall be met.
 - 1. 75% of the species planted shall be alive and present.
 - 2. 50 % of the water surface in the shallow water community shall be covered with vegetation.
 - 3. 25 % of the water surface in the floating leaf community shall be covered with vegetation.
- B. Seeded Native Communities - For acceptance at the beginning of the second growing season, the following conditions shall be met.
 - 1. Coverage - 80 % of each plant community shall be covered with by vegetation.
 - 2. Presence - 50 % of the species planted should be alive and present.
 - 3. Abundance - 50 % of the vegetation should native species of the permanent matrix.