

SECTION 02960  
WETLAND MITIGATION

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Emergent Wetland Habitat Structures.
- B. Lower Scrub-Shrub Wetland Plantings.
- C. Upper Scrub-Shrub Wetland Plantings.
- D. Lower Forested Wetland Plantings.
- E. Upper Forested Wetland Plantings.
- F. Buffer Tree Plantings.

1.2 RELATED SECTIONS

- A. Section 02222 - Excavation.
- B. Section 02223 - Backfilling.
- C. Section 02218 - Landscape Grading.
- D. Section 02936 - Seeding.

1.3 MEASUREMENT AND PAYMENT

- A. Emergent Wetland Habitat Structures:
  - 1. Basis of Measurement: At the unit price bid per acre of Emergent Wetland Habitat Structures as stated in the proposal.
  - 2. Basis of Payment: Includes labor and equipment to supply and install habitat structures within emergent wetlands as shown in the plans or described in the specifications.
- B. Lower Scrub-Shrub Wetland Plantings:
  - 1. Basis of Measurement: At the unit price bid per acre of Lower Scrub-Shrub Wetland Plantings as stated in the proposal.
  - 2. Basis of Payment: Includes labor, equipment, and material necessary to prepare and/or place soils, planting, seeding, seeding of all bare areas with an annual rye cover crop and mulching, watering and maintenance to provide for uniform growth at the completion of the Project and up to one-year period after completion. In summary includes all Work necessary to construct scrub-shrub wetlands as shown in the plans or described in the specifications.

- C. Upper Scrub-Shrub Wetland Plantings:
  - 1. Basis of Measurement: At the unit price bid per acre of Upper Scrub-Shrub Wetland Plantings as stated in the proposal.
  - 2. Basis of Payment: Includes labor, equipment, and material necessary to prepare and/or place soils, planting, seeding, seeding of all bare areas with an annual rye cover crop and mulching, watering and maintenance to provide for uniform growth at the completion of the Project and up to one-year period after completion. In summary includes all Work necessary to construct scrub-shrub wetlands as shown in the plans or described in the specifications.
  
- D. Lower Forested Wetland Plantings:
  - 1. Basis of Measurement: At the unit price bid per acre of Lower Forested Wetland Plantings as stated in the proposal.
  - 2. Basis of Payment: Includes labor, equipment, and material necessary to prepare and/or place soils, planting, seeding, seeding of all bare areas with an annual rye cover crop and mulching, watering, and maintenance to provide for uniform growth at the completion of the Project and up to one-year period after completion. In summary includes all Work necessary to construct forested wetlands as shown in the plans or described in the specifications.
  
- E. Upper Forested Wetland Plantings:
  - 1. Basis of Measurement: At the unit price bid per acre of Upper Forested Wetland Plantings as stated in the proposal.
  - 2. Basis of Payment: Includes labor, equipment, and material necessary to prepare and/or place soils, planting, seeding, seeding of all bare areas with an annual rye cover crop and mulching, watering, and maintenance to provide for uniform growth at the completion of the Project and up to one-year period after completion. In summary includes all Work necessary to construct forested wetlands as shown in the plans or described in the specifications.
  
- F. Buffer Tree Plantings:
  - 1. Basis of Measurement: At the unit price bid per each for buffer tree plantings as stated in the proposal.
  - 2. Basis of Payment: Include labor, equipment, and material necessary to prepare soil, planting, seeding of disturbed areas, watering and maintenance as indicated in the plans to provide for uniform growth at the completion of the Project and up to one-year period after completion. In summary includes all Work necessary to install the buffer trees as shown in the plans or described by in the specifications.

#### 1.4 REFERENCES

- A. ANSI Z60.1 – Nursery Stock.

#### 1.5 DEFINITIONS

- A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.
  
- B. Plants: Living trees, plants, and ground cover specified in this Section and as described in ANSI Z60.1.

1.6 PROTECTION

- A. Protect landscaping and other features remaining as final Work.
- B. Protect existing structures, fences, roads, sidewalks, paving, mailboxes, curbs, etc.

1.7 QUALITY ASSURANCE

- A. Provide inspection by a qualified individual as determined by Engineer to verify acceptability of plants.
- B. Plants must be clearly labeled according to species.
- C. The Contractor shall make arrangements to obtain plant materials with nurseries within 30 days after he/she is awarded contract and provide a list of nursery Suppliers to the Engineer.
- D. The Contractor will provide a final list of all species and number purchased to the Engineer 90 days prior to planting.

1.8 SUBMITTALS

- A. Submit under provisions of Section 01300 - Submittals.
- B. Submit shop drawings and product data for all items to be installed and/or constructed within this Section.
- C. Provide seed mixtures in containers showing percentage of seed mix, year of production, net weight, date of packaging, location of packaging.

1.9 REGULATORY REQUIREMENTS

- A. Plant Materials: Certified by the State Department of Agriculture as described by ASTM Z60 to be free of disease or hazardous insects.
- B. Comply with regulatory agencies for fertilizer and herbicide composition.
- C. Comply with state agencies for plant material certification and inspection.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01600 – Material and Equipment.
- B. Deliver seed mixtures in sealed containers. Seed in damaged packaging is not acceptable.
- C. Deliver plant life materials immediately prior to placement.
- D. At all times the planting stock shall be kept moist and protected from the wind and sun.
- E. Engineer and Wetland Consultant shall grant approval of plants prior to installation.

- F. Injured or otherwise unsuitable plants may be rejected as determined by the Engineer and Wetland Consultant.

1.11 COORDINATION

- A. Coordinate work under provisions of Section 01039.

1.12 MAINTENANCE SERVICE

- A. Maintain planted areas immediately after placement until plantings are well established, exhibit vigorous growth, and are accepted by Owner. Guarantee replacement of dead material for up to one year following acceptance if survival rates is below 80 percent of original plantings.

2. PART 2 PRODUCTS

2.1 ACCEPTABLE NURSERIES

- A. Partial List of Native Plant Nurseries: The following is a partial listing of nurseries that specializes in native plants. Other acceptable nurseries may exist within the Michigan or Great Lakes region. The nurseries listed are not endorsed by either the Engineer or Owner and have been included only for convenience.

ESTABLISHMENT	ADDRESS	PHONE	EMAIL
WILDTYPE Native Plants	900 N. Every Road Mason, MI 48854	(517) 244-1140	<a href="mailto:wildtype@msu.edu">wildtype@msu.edu</a>
Michigan Wildflower Farm	11770 Cutler Road Portland, MI 48418	(517) 647-6010	<a href="mailto:wildflowers@voyager.net">wildflowers@voyager.net</a>
The Native Plant Nursery	P.O. Box 7841 Ann Arbor, MI 48107	(734) 994-9592	<a href="mailto:plants@nativeplant.com">plants@nativeplant.com</a>
Prairie Moon Nursery	Route 3, P.O. Box 1633 Winona, MN 55987-9515	(507) 452-1362	<a href="mailto:pmnrsy@luminet.net">pmnrsy@luminet.net</a>
Prairie Nursery	P.O. Box 306 Westfield, WI 53964	(800) 476-9453	
Wildlife Nurseries, Inc.	P.O. Box 2724 Oshkosh, WI 54903	(414) 231-355	

- B. Michigan Department of Natural Resources: Directory of Michigan Seedling Nurseries.

ESTABLISHMENT	ADDRESS	PHONE	FAX
Armintrout's	1156 Lincoln Road Allegan, MI 49010	616-673-6627	
Badger Evergreen Nursery	902 26 <sup>th</sup> Street Allegan, MI 49010	616-673-2662	616-673-2263
Bosch's Evergreen Nursery	10785 84 <sup>th</sup> Allendale, MI 49401	616-892-4090	616-892-4290
Chippewa Plantation		616-924-4214	
Cold Stream Farm	2030 Freesoil Road Freesoil, MI 49411	616-464-5809	
Conservation Resource Center Nursery	61591 30 <sup>th</sup> Street Lawton, MI 49065	616-624-5200	
Fairplains Nursery	6104 County Farm Road	616-754-3200	616-754-4580

ESTABLISHMENT	ADDRESS	PHONE	FAX
	Greenville, MI 48838	616-754-5738	
Harmor Nursery	515 9 <sup>th</sup> Street Manistee, MI 49660	616-723-4846	616-723-4846
J.W. Tourney Nursery	Watersmeet, MI	906-358-4523	
John Arnoldlink, Nursery	723 Old Orchard Road Holland, MI 49423	616-335-9823	
Kobe Nurseries	43624 County Road 653 Paw Paw, MI 49079	616-657-3094	
Lake Superior Nursery	RT#1 Box 360 Baraga, MI 49008	906-353-6906	
Needlefast Evergreens, Inc.	4075 Hansen Road Ludington, MI 49431	616-843-8524	
New Life Nursery	3720 64 <sup>th</sup> Holland, MI 49423	616-857-1209	616-857-1770
Newaygo SCD	940 W. Rex Street Fremont, MI 49412	616-652-7493	
Northern Pines Nursery	2300 S. Morey Road Lake City, MI 49651	616-839-3277 616-839-2865	
Northwoods Greenhouse	Cooks, MI	906-644-2065	
Oikos Tree Crops	Kalamazoo, MI	616-342-6504	
Peterson's Riverview Nursery	Allegan, MI	616-673-2440	
Stempky Nursery	5157 N. Straits Hwy. Cheboygan, MI 49721	616-627-4814 616-627-9061	
Van's Pine Nursery, Inc.	7550 144 <sup>th</sup> Avenue West Olive, MI 49460	616-399-1620 800-888-7337	616-399-1652
Woodlands Seedling Production Mead Corporation	Escanaba, MI	906-786-1660	
Zelenka Evergreen Nurseries, Inc.	16127 Winans Street Grand Haven, MI 49417-9652	616-842-1367	
Wahmhoff Farms	11121 M-40 Hwy. Gobles, MI 49055	888-648-7337	616-628-4308
Windy Hills Farm	1565 E. Wilson Road Scottville, MI 49454	616-757-2373	

## 2.2 MATERIALS

### A. Topsoil:

1. Topsoil removal and/or placement and preparation rough grading is under Divisions V, VI, VII, for Detention Areas E, F, and G, whichever applies.
2. Detention Areas E and F: To minimize the potential reestablishment of reed canary grass (*phalaris arundinacea*), the top 18 inches of existing topsoil within the wetland areas of Detention Areas E and F must be removed and disposed of offsite or in an upland area within the project as directed by the Engineer. Once the existing topsoil is removed, topsoil from an alternate source, as approved by the Engineer, shall be installed as described in these specifications.

B. Accessories:

1. Root Pruned and balled wrapping material: Shall be burlap.
2. Stakes: Shall be sound uniform softwood lumber with pointed ends 2" x 2" x 24" long or as shown on the plans.
3. Cable, wire, eyebolts and turnbuckles: Shall be non-corrosive and of sufficient strength to withstand wind pressure and resultant movement of plant life.
4. Staking cable: shall be 12 to 14 gauge annealed galvanized steel.
5. Plant protectors: Hose for covering wire cable to protect plant stems, trunks and branches shall be new or used, black or red, 2 ply fiber reinforced garden hose, not less than 1/2 inches inside diameter.
6. Tree wrap: Shall be first quality, heavy, waterproof crepe paper manufactured for this purpose.

C. Emergent Wetland Plantings:

1. Natural regeneration will be the primary method to establish emergent vegetation.

D. Scrub – Shrub Wetland Plantings:

1. Seedlings (Bare Root Stock – 18 inches minimum height).

Scientific Name	Common Name	Wetness
<i>Cephalanthus occidentalis</i>	Buttonbush	OBL
<i>Cornus amomum</i>	Silky dogwood	FACW+
<i>Cornus stolonifera</i>	Red Oiser Dogwood	FACW
<i>Ilex verticillata</i>	Michigan holly	FACW+
<i>Lindera benzoin</i>	Spicebush	FACW-
<i>Physocarpus opulifolius</i>	Ninebark	FACW-
<i>Sambucus canadensis</i>	Elderberry	FACW-
<i>Viburnum dentatum</i>	Smooth Arrow-wood	FACW-
<i>Viburnum lentago</i>	Nannyberry	FAC+
<i>Viburnum opulus var. americanum</i>	Highbush Cranberry	FACW

- E. Alternate plant types may be used as approved by the Engineer. Provide planting list 90 days prior to installation.

F. Forested Wetland Plantings:

1. Root pruned, balled and burlap (RPBB, 23 inches diameter at breast height (d.b.h)).

Scientific Name	Common Name	Wetness
<i>Quercus bicolor</i>	Swamp white oak	FACW+
<i>Quercus palustris</i>	Pin Oak	FACW

2. Bare Root Stock (18 inches minimum height).

Scientific Name	Common Name	Wetness
<i>Acer rubrum</i>	Red Maple	FAC
<i>Acer saccharinum</i>	Silver Maple	FACW
<i>Platanus occidentalis</i>	Sycamore	FACW
<i>Quercus bicolor</i>	Swamp white oak	FACW+
<i>Quercus palustris</i>	Pin Oak	FACW

3. Alternate plant types may be used as approved by the Engineer. Provide planting list 90 days prior to installation.

G. Buffer Tree Plantings (root pruned, balled and burlap (RPBB), 10 feet minimum height).

Scientific Name	Common Name
<i>Pinus strobus</i>	Eastern White Pine
<i>Pinus resinosa</i>	Red Pine

2.3 PRODUCT REQUIREMENTS

A. Scrub-Shrub Wetland Plantings:

1. Shrubs must be from a Michigan source.
2. The Contractor may not use landscape stock; stock must be from a forestry Supplier.
3. Stock must be dug while dormant and in a manner to avoid injury to the roots.
4. Stock must keep stock moist and covered during transportation to site.
5. Seedlings that are damaged or injured may be rejected as determined by the Engineer.

B. Forested Wetland Plantings:

1. Root pruned, balled and burlap stock (RPBB)
  - a. Trees and shrubs must be from a Michigan source.
  - b. The Contractor may use either landscape or forestry stock.
  - c. To maximize survival, RPBB stock should only be dug up when in a dormant stage. Therefore, trees must be dug up before "budbreak" in spring or after the trees begin to "harden off" in fall.
  - d. Plants shall be dug and transported so as to provide and retain a firm ball of earth. Roots shall be kept moist at all times. The root balls should be protected from rain or sudden changes in weather. Stock with loosened or broken balls of earth will not be accepted as determined by the Engineer.
  - e. Trunks and branches shall be protected from injury at all times. Trees that are injured may be rejected as determined by the Engineer.
2. Seedlings (Bare root stock):
  - a. Trees must be from a Michigan source.
  - b. The Contractor may not use landscape stock; stock must be from a forestry Supplier.
  - c. Stock must be dug while dormant and in a manner to avoid injury to the roots.
  - d. Stock shall be kept moist and covered during transportation to Site.
  - e. Seedlings that are damaged or injured may be rejected as determined by the Engineer.

C. Buffer Tree Plantings:

1. As indicated on the drawings.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that prepared soil base is ready to receive the Work of this Section. See Section 02218 - Landscape Grading.

### 3.2 PREPARATION OF SUBSOIL

- A. Buffer Tree Plantings:
  - 1. Remove foreign materials, weeds and undesirable plants and their roots.
  - 2. Scarify soil to depth of 3 inches where plants are to be placed.

### 3.3 PLANTING

- A. Emergent Wetland:
  - 1. Natural regeneration will be the primary method to establish the emergent vegetation.
  - 2. Contractor must place a range of 1 to 5 dead and downed logs per acre inside emergent wetland to increase habitat for amphibians and reptiles. This number will be determined by the Engineer.
  - 3. Contractor must establish snags to increase habitat for songbirds by:
    - a. Finding a dead tree at least 20 feet in length – diameter 8 inches.
    - b. Digging a hole 6 feet deep.
    - c. Placing the dead tree in the hole.
    - d. Backfilling the hole.
- B. Scrub-Shrub Wetlands:
  - 1. Seedlings must be planted by hand between April 1 and May 15. The Engineer may alter the planting dates due to weather and construction schedules.
  - 2. All disturbed and bare areas shall be seeded according to Section 02936 – Seeding, with an annual rye cover crop and mulched as approved by the Engineer.
  - 3. The Contractor will hand plant shrubs as shown in the plans as directed by the Engineer. Shrub seedlings will be a minimum of 18 inches tall.
  - 4. Shrubs denoted as lower scrub shrub species shall be planted in the area marked as lower scrub shrub in the plans.
  - 5. Shrubs denoted as upper scrub shrub species shall be planted in the area marked as upper scrub shrub in the plans.
  - 6. The Contractor will complete 1/4 acre of hand planting, of that part an inspection by the Engineer will occur to guarantee proper installation procedures. After the initial planting is approved, the Contractor will be authorized to complete the Project.
  - 7. Shrubs will be planted on top of mounds created from Site preparation.
  - 8. Spacing will be random at approximately 6 feet on center.
  - 9. Shrubs of the same species will be planted in small groups. That is, each small group will consist of 9 seedlings of the same species. Spacing remains the same as above. The only exception to this rule is buttonbush (*Cephalanthus occidentalis*), which must be planted adjacent to the emergent wetland.
  - 10. Individual holes shall be dug wide and deep enough to easily accommodate the seedling's roots.
  - 11. No root pruning shall be permitted, unless roots are damaged.
  - 12. Shrubs shall be set plumb and to a depth equal to that of their original location.
  - 13. When planting, the roots shall be held firmly in the proper position while prepared soil is puddled around the roots and firmed at intervals during backfilling.

14. **Area E:** Seedlings shall be planted according to the following table:

Scientific Name	Common Name	Wetness	Elevation	Number to Plant
<b>Lower Scrub Shrub</b>				
<i>Cephalanthus occidentalis</i>	Buttonbush	OBL	846-846.5	763
<i>Cornus amomum</i>	Silky dogwood	FACW+	846-846.5	763
<i>Ilex verticillata</i>	Michigan holly	FACW+	846-846.5	763
<i>Viburnum opulus var. americanum</i>	Highbush Cranberry	FACW	846-846.5	763
<b>Upper Scrub Shrub</b>				
<i>Cornus stolonifera</i>	Red Oiser Dogwood	FACW	846.5-847	763
<i>Physocarpus opulifolius</i>	Ninebark	FACW-	846.5-847	763
<i>Sambucus canadensis</i>	Elderberry	FACW-	846.5-847	763
<i>Viburnum dentatum</i>	Smooth Arrow-wood	FACW-	846.5-847	763
<i>Viburnum lentago</i>	Nannyberry	FAC+	846.5-847	763
<i>Lindera benzoin</i>	Spicebush	FACW-	846.5-847	763
<b>TOTAL</b>				<b>7, 630</b>

15. **Area F** Seedlings shall be planted according to the following table:

Scientific Name	Common Name	Wetness	Elevation	Number to Plant
<b>Lower Scrub Shrub</b>				
<i>Cephalanthus occidentalis</i>	Buttonbush	OBL	See Plans	1,125
<i>Cornus amomum</i>	Silky dogwood	FACW+	See Plans	1,125
<i>Ilex verticillata</i>	Michigan holly	FACW+	See Plans	1,125
<i>Viburnum opulus var. americanum</i>	Highbush Cranberry	FACW	See Plans	1,125
<b>Upper Scrub Shrub</b>				
<i>Cornus stolonifera</i>	Red Oiser Dogwood	FACW	See Plans	1,125
<i>Physocarpus opulifolius</i>	Ninebark	FACW-	See Plans	1,125
<i>Sambucus canadensis</i>	Elderberry	FACW-	See Plans	1,125
<i>Viburnum dentatum</i>	Smooth Arrow-wood	FACW-	See Plans	1,125
<i>Viburnum lentago</i>	Nannyberry	FAC+	See Plans	1,125
<i>Lindera benzoin</i>	Spicebush	FACW-	See Plans	1,125
<b>TOTAL</b>				<b>11,250</b>

16. **Area G** Seedlings shall be planted according to the following table:

Scientific Name	Common Name	Wetness	Elevation	Number to Plant
<b>Lower Scrub Shrub</b>				
<i>Cephalanthus occidentalis</i>	Buttonbush	OBL	839-839.5	98
<i>Cornus amomum</i>	Silky dogwood	FACW+	839-839.5	98
<i>Ilex verticillata</i>	Michigan holly	FACW+	839-839.5	98
<i>Viburnum opulus var. americanum</i>	Highbush Cranberry	FACW	839-839.5	98
<b>Upper Scrub Shrub</b>				
<i>Cornus stolonifera</i>	Red Oiser Dogwood	FACW	839.5-840	98
<i>Physocarpus opulifolius</i>	Ninebark	FACW-	839.5-840	98

Scientific Name	Common Name	Wetness	Elevation	Number to Plant
<i>Sambucus canadensis</i>	Elderberry	FACW-	839.5-840	98
<i>Viburnum dentatum</i>	Smooth Arrow-wood	FACW-	839.5-840	98
<i>Viburnum lentago</i>	Nannyberry	FAC+	839.5-840	98
<i>Lindera benzoin</i>	Spicebush	FACW-	839.5-840	98
<b>TOTAL</b>				<b>980</b>

C. Forested Wetland (**Area E**):

1. Planting shall be completed between April 1<sup>st</sup> and May 15<sup>th</sup>. The Engineer must approve any changes in these dates.
2. All disturbed and bare areas shall be seeded according to Section 02936 – Seeding, with an annual rye cover crop and mulched as approved by the Engineer.
3. Trees must be planted on top of the mounds created during site preparation as indicated in the plans and directed by the Engineer.
4. The Engineer will demarcate the boundaries of the different wetland types.
5. The Contractor will complete 1/4 acre of hand planting. At that time an inspection by the Engineer will occur to guarantee proper installation procedures. After the initial planting is approved, the Contractor will be authorized to complete the Project.
6. Upper Forested Planting Scheme:
  - a. Swamp White Oak and Pin Oak shall be planted in 10 randomly spaced groups across the upper-forested wetland as shown in the plans. Each group will consist of the following:
    - i 7 Red Maple seedlings.
    - ii 7 Pin Oak seedlings.
    - iii 1 Swamp White Oak RPBB.
    - iv 1 Pin Oak RPBB.
  - b. The remaining Red Maple, Sycamore, and Pin Oak seedlings shall be randomly planted across the upper-forested wetland.
7. Lower Forested Planting Scheme:
  - a. Swamp White Oak and Pin Oak shall be planted in 6 randomly spaced groups across the lower forested wetland as shown in the plans. Each group will consist of the following:
    - i 7 Silver Maple Seedlings.
    - ii 7 Pin Oak seedlings..
    - iii 1 Swamp White Oak RPBB.
    - iv 1 Pin Oak RPBB.
  - b. The remaining Silver Maple, Pin Oak, and Swamp White Oak seedlings shall be randomly planted across the lower forested wetland.
8. Root Pruned, Balled and Burlap stock (RPBB)
  - a. There will be 16 Swamp white oaks and: 16 Pin oaks planted as RPBB stock. These trees will have a single trunk of 2-3 inches diameter at breast height, be a minimum of 10 feet tall, and be in overall good condition.
  - b. Trees will be planted in designated locations as described above.
  - c. Individual holes shall be dug wide and deep enough to accommodate the RPBB stock. The planting holes shall be backfilled the same day they are dug.

- d. Trees must be planted plumb. All trees shall be “puddled” or watered-in at time of planting. Tree depth, after settling, must be the same as in their original location. All air pockets should be eliminated while backfilling. If root ball is damaged while backfilling, it shall be replaced with new stock. Upon completion of backfilling, the soil after compacting should be flush with the ground line.
- e. Remove any non-biodegradable root containers.
- f. Set plants in pits or beds, partly fill with prepared topsoil mixture as indicated on the drawings. Remove any burlap, ropes, wires or twine from the top 1/3 of the root ball.
- g. Brace plants vertically with plant protector wrapped guy wires and stakes as indicated on the plans.
- h. Staking shall be completed immediately after planting, stake all trees as indicated in the planting details.
- i. The trunks shall be wrapped spirally from bottom to top with material as specified and shall be adequately secured. The wrapping shall overlap and entirely cover the trunk from the ground to height of the second branch and shall be neat and snug. Overlap shall be approximately 2 inches.
- j. Root pruned, balled and Burlap (RPBB, 2-3 inches d.b.h.) plantings shall be according to the following table:

Scientific Name	Common Name	Wetness	Number to Plant
<i>Quercus bicolor</i>	Swamp white oak	FACW+	16
<i>Quercus palustris</i>	Pin Oak	FACW	16
<b>TOTAL</b>			<b>32</b>

- 9. Seedlings (Bare root stock)
  - a. The Contractor will hand plant 1,800 seedlings. Seedlings will be a minimum of 18 inches in height. To change tree species or size the Contractor must have approval from the Engineer.
  - b. Trees will be planted in designated locations as described in the planting schemes above.
  - c. Planting locations will be located on top of the mounds created during site preparation as indicated in the plans and directed by the Engineer.
  - d. Spacing will be random at approximately 10 feet on center.
  - e. Individual holes shall be dug wide and deep enough to easily accommodate the seedling roots.
  - f. Seedlings shall not be planted in standing water.
  - g. No root pruning shall be permitted, unless roots are damaged.
  - h. Trees shall be set plumb and to a depth equal to that of their original location.
  - i. When planting, the roots shall be held firmly in the proper position while prepared soil is puddled around the roots and firmed at intervals during backfilling.
  - j. Seedlings shall be according to the following table:

Scientific Name	Common Name	Wetness	Percent Composition	Number to Plant
<b>Lower Forested</b>				
<i>Acer saccharinum</i>	Silver Maple	FACW	35	630
<i>Quercus palustris</i>	Pin Oak	FACW	35	630

Scientific Name	Common Name	Wetness	Percent Composition	Number to Plant
<i>Quercus bicolor</i>	Swamp white oak	FACW+	7.5	135
<b>Upper Forested</b>				
<i>Acer rubrum</i>	Red Maple	FAC	10	180
<i>Platanus occidentalis</i>	Sycamore	FACW	5	90
<i>Quercus palustris</i>	Pin Oak	FACW	7.5	135
<b>TOTAL</b>				<b>1,800</b>

D. Buffer Trees:

1. Planting activities shall be conducted between April 1<sup>st</sup> and May 15<sup>th</sup>.
2. All disturbed and bare areas shall be seeded according to Section 02936 - Seeding and mulched as approved by the Engineer.
3. There will be 260 trees planted as RPBB stock. These trees will be a minimum of 10 feet tall and be in overall good condition.
4. Trees shall be planted randomly by species as directed by the Engineer.
5. Trees shall be planted in designated locations as indicated on the plans.
  - a. Individual holes shall be dug wide and deep enough to accommodate the RPBB stock. The planting holes shall be backfilled the same day they are dug.
  - b. Trees must be planted plumb. All trees shall be “puddled” or watered-in at time of planting. Tree depth, after settling, must be the same as in their original location. All air pockets should be eliminated while backfilling. If root ball is damaged while backfilling, it shall be replaced with new stock. Upon completion of backfilling, the soil after compacting should be flush with the ground line.
  - c. Remove any non-biodegradable root containers.
  - d. Set plants in pits or beds, partly fill with prepared topsoil mixture as indicated on the drawings. Remove any burlap, ropes, wires or twine from the top 1/3 of the root ball.
  - e. Root pruned, balled and burlap (RPBB) trees shall be planted according to the following table.

Scientific Name	Common Name	Number
<i>Pinus strobus</i>	Eastern White Pine	130
<i>Pinus resinosa</i>	Red Pine	130

3.4 MAINTENANCE

- A. Immediately replant any plant that does not survive as necessary for 80 percent survival rate.
- B. Immediately reseed areas that show bare spots.
- C. Repair any eroded areas and reseed immediately.
- D. Final payment will not be issued until uniform growth is established for period of one year on all areas as determined by the Engineer.
- E. The Contractor shall be responsible for watering during the one year guarantee period.

- F. Monitor all seeded areas during Site visits for water stress.
- G. The Contractor shall replace, at no cost to the Owner, all dead vegetation during the Guarantee period.
- H. Judgment of the plant's health will be the Engineers or the Owners.
- I. Limits: Plants replaced during the Establishment and Guarantee period are only under guarantee during that period.
- J. Protection from traffic and erosion in newly seeded areas is the responsibility of the Contractor. Safety fences and/or silt fences with appropriate signage may be used at the Contractor's expense until the grasses and flowers are fully established.

END OF SECTION