APPENDIX A

TVA Vegetation Specifications

SECTION 580 - Seeding (Pay Item 580)

580.1 -- Description

This specification consists of furnishing and placing seed, commercial fertilizer, and agricultural limestone on roadway slopes, shoulders, borrow pits, channel banks, waste areas, lawns, meadows, beaches, open play areas, and other areas specified by the plans or the Engineer and in accordance with the methods outlined by these specifications.

580.2 -- Materials

1. Seeds

Seeds shall meet the requirements of applicable seed laws and shall be tested in accordance with the most current edition of the U.S. Department of Agriculture Handbook No. 30, Testing Agricultural and Vegetable Seed. Seeds shall be from the last preceding crop and comply with the requirements outlined below for purity and germination. Each variety of seed shall be furnished in separate, strong bags with each bag being fully tagged or labeled to show the variety, weight, purity, germination, and test data prescribed by law. All test results shall be fully certified by the vendor or by a recognized seed testing agency. TVA reserves the right to require that samples be furnished, and to inspect and test the seeds after delivery. Seeds found not to comply with specification requirements shall be subject to rejection.

When mixing or forming seed mixtures, the seeds shall be carefully and uniformly mixed. Seeds shall not be mixed until each variety of seed to be used in the mix has been inspected and/or tested separately and approved.

Seed Varieties	Purity, Minimum %	Germination, Minimum %
Korean Lespedeza (Lespedeza stipulacea), scarified . . .	90	85
White Clover (Trifolium repens)	95	85
Alsike Clover (Trifolium repens hybridum)	95	85

580.2 -- Materials (Continued)

Seed Varieties	Purity, Minimum %	Germination, Minimum %	
Red Clover (Trifolium pratense)	85	95	
Crownvetch (Coronilla varia), scarified	95	80	
Foxtail Millet (Setaria italica)	80	98	
Bermuda Grass (Cynodon dactylon), hulled	95	80	
Annual Rye (Lolium multiflorum)	90	90	
Perennial Rye (Lolium perenne)	90	90	
Kentucky 31 Fescue (Festuca arundinacea, variety Ky 31)	95	85	
Rebel Fescue (Festuca arundinacea, variety Rebel)	95	85	1
Hard Fescue (Festuca ovina, duriuscula)	95	85	1
Kentucky Bluegrass (Poa pratensis)	95	90	
Creeping Red Fescue (Festuca rubra)	95	90	
Centipede Grass (Eremochloa ophiuroides)	90	75	
Weeping Lovegrass (Eragrostis curvula)	95	90	
Switchgrass (Panicum virgatum)	80	75	1
Zoysia Grass (Zoysia japonica)	95	80	
Little Bluestem Grass (Andropogon scoporius)	40	60	
Bahia Grass (Paspalum notatum)	75	80	
Buffalo Grass (Buchloe dactyloides)	85	50	

580.2 -- Materials (Continued)

Seeding materials shall be free from seeds or bulbets of Wild Onion (Allium vineale), Canada Thistle (Cirsium arvense), and Johnson Grass (Sorghum halepense).

Seed species shall not contain more than six seeds per ounce of the seed of any of the following noxious weeds or the seeds of any other weed specifically listed as noxious:

Bindweed (Convolvulus arvensis)
Buckthorn (Plantago lanceolata)
Corncockle (Agrostemmo githago)
Dodder (Cuscuta species)
Oxeyedaisy (Chrysanthemum leucantheumum)
Quackgrass (Agropyron repens)
Sorrel (Rumex acetosella)

Seed species shall not contain an excess of 2 percent by weight of weed seeds, noxious or otherwise.

2. Seed or seed mixtures, rates, and seasons

Seeding mixtures, rates, and seasons shall be those specified herein. The types to be used for each area or project will be specified by the drawings or by memorandum. Mixtures or rates of application other than those specified shall be used only when specified by the plans or the Engineer. Seeding shall be planted during the season and between the dates specified. Temporary cover shall be planted when it is required during seasons not suitable for planting the seed specified by the plans.

a. Lawns

Type 1: Spring or fall seeding (Plant between March 15 and May 1, or between August 15 and October 15).

(1) Kentucky 31 Fescue . . . 120 pounds per acre
(2) Rebel Fescue . . . . . 120 pounds per acre
(3) Creeping Red Fescue . . 80 pounds per acre

Type 2: Fall seeding (Plant between August 15 and October 15).

(1) Perennial Ryegrass . . . 120 pounds per acre
(2) Kentucky Bluegrass . . . 80 pounds per acre

Type 3: Spring seeding (Plant between March 15 and May 1).

Bermuda Grass . . . . . 40 pounds per acre

580.2 -- Materials (Continued)

b. Meadows

Type 4: Spring seeding (Plant between March 15 and May 1).

Mixture:

(1) Kentucky 31 Fescue . . . 50 pounds per acre
Korean Lespedeza (scarified) . . . . . 10 pounds per acre
Alsike Clover . . . . . 10 pounds per acre
Total mixture . . . 70 pounds per acre

(2) Bermuda Grass (hulled) . . . . . 40 pounds per acre
Korean Lespedeza (scarified) . . . . . 10 pounds per acre
Total mixture . . . 50 pounds per acre

(5) Crownvetch (inoculated and scarified) . . . . 30 pounds per acre
Kentucky 31 Fescue . . . 30 pounds per acre
Total mixture . . . 60 pounds per acre

Type 5: Fall seeding (Plant between August 15 and October 15).

Mixture:

(1) Kentucky 31 Fescue . . . 50 pounds per acre
White Clover . . . . . 15 pounds per acre
Total mixture . . . 65 pounds per acre

(2) Bluegrass . . . . . 50 pounds per acre
White Clover . . . . . 15 pounds per acre
Total mixture . . . 65 pounds per acre

580.2 -- Materials (Continued)

c. Channel Banks, Cuts, Fill Slopes, Waste Areas, and Other Disturbed Areas

Type 6: Spring seeding only (Plant between March 15 and May 15).

Mixture:

(1) Kentucky 31 Fescue . . . 60 pounds per acre

(2) Bermuda Grass (hulled) . 40 pounds per acre

(3) Creeping Red Fescue . . 80 pounds per acre
(Shaded slopes only)

(4) Weeping Lovegrass . . . 15 pounds per acre
Korean Lespedeza
(scarified) . . . . . 10 pounds per acre
Total mixture . . . 25 pounds per acre

(7) Crownvetch (scarified
and inoculated) . . . . 30 pounds per acre
Kentucky 31 Fescue . . . 30 pounds per acre
Total mixture . . . 60 pounds per acre

(8) Bahia Grass . . . . . 40 pounds per acre
Bermuda Grass . . . . . 20 pounds per acre
Switch Grass . . . . . 10 pounds per acre
Total mixture . . . 70 pounds per acre

(9) Rebel Fescue . . . . . 40 pounds per acre
Hard Fescue . . . . . 10 pounds per acre
White Clover . . . . . 5 pounds per acre
Total mixture . . . 55 pounds per acre

1

580.2 -- Materials (Continued)

c. Channel Banks, Cuts, Fill Slopes, Waste Areas, and Other Disturbed Areas (Continued)

Type 7: Summer seeding (Plant between May 15 and July 15).

Mixture:

(1) Bermuda Grass (hulled) . 40 pounds per acre
Korean Lespedeza (scarified) . . . . . 10 pounds per acre
Total mixture . . . 50 pounds per acre

(2) Buffalo Grass . . . . . 40 pounds per acre
Korean Lespedeza (scarified) . . . . . 10 pounds per acre
Total mixture . . . 50 pounds per acre

Type 8: Fall seeding (Plant between August 15 and October 15).

(1) Kentucky 31 Fescue . . . 60 pounds per acre
White Clover . . . . . 15 pounds per acre
Total mixture . . . 75 pounds per acre

(2) Hard Fescue . . . . . 10 pounds per acre
Rebel Fescue . . . . . 40 pounds per acre
White Clover . . . . . 5 pounds per acre
Total mixture . . . 55 pounds per acre

(3) Rebel Fescue . . . . . 40 pounds per acre
Hard Fescue . . . . . 10 pounds per acre
White Clover . . . . . 5 pounds per acre
Total mixture . . . 55 pounds per acre

d. Highway Shoulders

The planting dates and seed mixtures for each type listed here are described above.

Type 6: Spring seeding [Mixture (1), (2), (3) or (9)]

Type 7: Summer seeding [Mixture (1) or (3)]

Type 8: Fall seeding [Mixture (2)]

580.2 -- Materials (Continued)

e. Temporary Cover

Type 9: Temporary winter seeding (Plant between October 15 and March 15).

Annual Ryegrass	80 pounds per acre
White Clover	10 pounds per acre
Total mixture	90 pounds per acre

Type 10: Temporary summer seeding (Plant between May 1 and August 15).

Mixture:

(1)

Korean Lespedeza (scarified)	20 pounds per acre
Foxtail Millet	20 pounds per acre
Total mixture	40 pounds per acre

(2)

Red Clover	20 pounds per acre
Weeping Lovegrass	10 pounds per acre
Total mixture	30 pounds per acre

3. Fertilizer

Fertilizers shall be those readily available commercially. The application of fertilizer shall be at a rate of 200 pounds Ureaform (38-0-0) per acre with either 400 pounds of 15-15-15 per acre or 600 pounds of 6-12-12, unless specified otherwise by the drawings or memorandum.

Ammonium nitrate (NH_4NO_3) may be used for supplemental fertilization when specified by the Engineer.

4. Agricultural Limestone

Limestone shall contain no less than 85 percent calcium carbonate by weight. It shall be crushed so that at least 85 percent will pass a No. 10 sieve. The application of limestone shall be at the rate of 2 tons per acre unless specified otherwise by the drawings or memorandum. Hydrated lime may be substituted at a rate of 1 ton per acre.

580.3 -- Topsoil

All lawn areas to be seeded shall have a 2-inch minimum depth of topsoil immediately below finish grade. Topsoil requirements for other areas, if any, will be determined by field inspection and shall comply with Section 581.3.

580.4 -- Soil Preparation

Areas to be seeded shall have approved cross sections and grades. Objects such as large roots, stones, stumps, coarse vegetation, debris, or any other items that might impede mechanical mowing shall be removed and disposed of satisfactorily.

Seedbeds shall be plowed, disked, harrowed, scarified, or cultivated to the approved depth. In areas where it is practical, this work shall be done with farm-type equipment. On steep slopes, preparation of seedbeds shall be done with the tools and methods specified by the Engineer. It is strongly recommended that scarifying and preparation of seedbeds on cut and fill slopes be accomplished with tools or equipment specially designed for this purpose. Small furrows or grooves formed in the slopes shall be horizontal or as nearly horizontal as practical. The work shall be performed only when the ground is in a workable and tillable condition as determined by good farming practices.

580.5 -- Special Hydroseeding Equipment

Equipment to be used for the hydraulic application of planting materials shall be a Finn Hydro-Seeder, Bowie Hydro Mulcher, Toro Environmental Control Unit, or an approved equal. The equipment shall have mixing tanks with built-in agitators having operating capacities sufficient to agitate, suspend, and homogeneously mix slurries of water and planting materials. Tanks shall have capacities of 1000 gallons or more, and shall be mounted on traveling units that can be either self-propelled or towed by a separate vehicle. The slurry distribution lines shall be large enough to prevent clogging or stoppage. Discharge lines shall be equipped with sets of different sized hydraulic spray nozzles capable of providing for even distribution of varying slurry mixtures on areas to be seeded. Slurry mixture rates are described in Section 580.6.

580.6 -- Seeding Methods

Seeds shall be sown with approved mechanical power-drawn drills or seeders, hand cyclone seeders, or with special hydroseeding equipment. Rates specified in Section 580.2 shall be maintained in a manner that will guarantee uniform coverage. Seeding operations shall not be performed when drought, high winds, and excessive moisture or other factors may defer satisfactory results.

On slopes where the use of drills or seeders is not practical and in other areas specified by plans or by memorandum, seeding shall be accomplished using hydroseeding equipment.

Drill seeding shall be performed in rows with spacing suitable for the type of seed or mixture used. Fertilizer may be drilled simultaneously if drills are equipped for this type of operation. Where fertilizer is not drilled, it may be applied during the cultivation operation described in Section 580.4. When fertilizer and seed are applied separately, the fertilizer shall be spread uniformly over the prepared seedbeds prior to final filling. Rates of application shall be those specified by the plans or the Engineer or those specified in this section. It shall be thoroughly mixed with soil for a depth of 1/2-inch.

580.6 -- Seeding Methods (Continued)

Care shall be taken to ensure that seed and fertilizer remain uniformly and thoroughly mixed in the seeding equipment. Additional mixing shall be performed if necessary to avoid segregation of the seed or seed and fertilizer.

Hydroseeding is the method of applying lime, fertilizer, seed, and mulch combined with water in a single operation. Using the equipment described in Section 580.5, mixing tanks shall be filled with water to the level indicated inside of the tanks. With the engines turned on and the agitators running, the following materials shall be added: (1) limestone at the specified rate of 1/5 per acre (finely ground); (2) fertilizer; (3) seed (Section 580.2); and (4) wood fiber mulch (Section 582.2), for each 1000 gallons of water. The resulting slurries shall be applied to seedbeds at a rate of 5000 gallons per acre.

When hydroseeding slopes are 2:1 or steeper, a vinyl or plastic mulch (Section 582.2) shall be added to the slurries at the rate specified by the manufacturer.

Discharge lines are activated by opening bypass valves with hand levers that allow the slurries to spray through the nozzles. Slurries shall be sprayed on the seedbeds as the spraying vehicles move slowly across the area. Care shall be taken to ensure that all areas are evenly covered. If wind or rough terrain causes skips to occur, additional applications shall be made before moving to other areas. To provide for the even distribution of a slurry, hydroseeding should be performed with the wind or preferably with no wind at all.

For steep slopes, even coverage is best obtained when an application is begun at the top and worked down a slope with successive overlapping passes. When a hydroseeder is located on top of a slope, the reverse is true.

Seed not sown by drills or hydroseeders shall be covered to a depth of approximately 1/4-inch by lightly harrowing or raking. Raking or harrowing shall follow contours as closely as practical.

Where mulching is to be done, the mulch shall be applied immediately after the seeding is completed to avoid the loss of soil moisture or possible erosion. Mulching shall comply with Section 182.

When specified by the Engineer, one or more applications of fertilizer shall be made after a stand of grass has been obtained and allowed to grow for a period of from 3 to 6 weeks. The grade and rate of application of the fertilizer will be specified by the Engineer. When ammonium nitrate or a similar soluble fertilizer is used alone, areas shall be thoroughly soaked as soon as an application is completed.

580.7 -- Maintenance

Seeded areas shall be maintained until a satisfactory cover of plant material is secured, unless stipulated otherwise. All areas shall be preserved, repaired, and protected as specified for this purpose. Areas having poor stands of plant material shall be seeded again and fertilized at the proper rates.

Watering shall be accomplished during the maintenance period to the extent necessary.

580.8 -- Method of Measurement

Seeded areas will be measured in square yard units and include the seeded areas along slopes.

580.9 -- Costs

Costs for Pay Item 580 shall include all materials, labor, tools, equipment, and incidentals necessary to complete the work for this item.

SECTION 582 - Mulching (Pay Item 582)

582.1 -- Description

This item consists of mulching roadway slopes, shoulders, or other areas by covering them with straw, hay, hydro mulch, or similar materials in accordance with these specifications and at the locations specified by the plans or the Engineer.

582.2 -- Materials

The materials used for mulching shall conform to the following requirements and must be approved by the Engineer before being used. The stems or stalks of straw, hydro mulch, and hay should be as long as is feasible to obtain an overlapping or shingling effect when these materials are applied. Materials containing large amounts of chaff, leaves, short fragments of straw, or stems will not generally be approved.

Straw shall consist of stalks of oats, rye, or wheat; straw is preferred.

Hay shall be obtained from any grasses or legumes that are reasonably free of noxious weeds.

Hydro mulch shall be a product manufactured from wood fiber, vinyl, or plastic materials designed specifically for use as a hydro mulch and for application by the hydro jet method.

Wood fiber mulch, such as Conwed "Hydro Mulch," Weyhauser "Silvafiber," or the equivalent, shall consist of a natural wood cellulose fiber which is readily dispersable in water, nontoxic to plant germination and growth, and does not react with other materials. The mulch shall be dyed, preferably green, to allow for visual metering during application. The moisture content shall be no greater than 12 percent, ash content no greater than 1 percent, and the pH no less than 4.5. The waterholding capacity measured in grams of water per 100 grams of fiber shall be a minimum of 1150 percent. The mulch shall be packaged in moisture-resistant bags.

Vinyl or plastic mulch, such as "Aerospray 70," "Terratack," or the equivalent, shall consist of a natural gelatinous material in a synthetic plastic, vinyl, or latex base that does not react with any other material. The mulch shall be readily dispersible in water, nontoxic to plant germination and growth, not hazardous to wildlife or the environment, and comply with Federal health standards. The material shall be acceptable in solid or liquid forms and packaged in measured containers.

Emulsified asphalt for adhesive shall conform to type SS-1 (Section 1115) except that the residue penetration at 25°C shall be 150 to 200. If type SS-1 is unavailable, emulsified asphalt type AE-3 may be used. Asphalt emulsions shall be prepared so that their specified characteristics will not change during transportation or normal storage. They shall be nontoxic to plants. Vinyl or plastic hydro mulch described previously may be used in place of asphalt where costs and availability permit.

582.3 -- Mulching

Hay or straw mulch shall be applied to a thickness of approximately 1 inch unless otherwise specified by the Engineer. This application corresponds to a rate of approximately 1 ton per acre. The exact thickness required will be determined by the Engineer for the material being used. It shall be loose enough to allow sunlight to penetrate small, closely spaced areas, air to slowly circulate, and thick enough to shade the ground and to reduce erosion and moisture loss.

Hay or straw mulch shall be applied by approved mechanical spreaders, such as the Finn Mulch Spreader. Throughout the mulching process, machines shall not appreciably cut or break the lengths of mulching materials. On slopes that are 4:1 or steeper, an adhesive consisting of an approved grade of emulsified asphalt shall be added at the rate of approximately 60 to 65 gallons per acre. Vinyl or plastic hydro mulch may be substituted for the asphalt and applied separately at the manufacturer's recommended rate.

Wood fiber hydro mulch shall be applied with special hdyro seeding equipment (Subsection 580.5). Mulch may be added to other planting materials and applied in one operation (Subsection 580.6) or it may be applied separately. When the mulch is applied separately, it shall be mixed at the rate of 400 pounds of mulch for each 1000 gallons of water and applied at the rate of 4000 gallons per acre.

Where mulching is applied to areas that are seeded or sprigged, the application of the mulching materials shall immediately follow the seeding or planting operations to avoid soil moisture loss or possible erosion.

The mulching materials shall be applied to produce a shingling or overlapping effect. On slopes the application shall begin at the lower edges of slopes and proceed upward.

Where mulch is not applied by a mechanical spreader, suitable methods shall be used to avoid the displacement of material such as by rolling with rollers, cultipackers, sheeps-foot rollers, or through the use of brush-mats, erosion nets, and other methods approved by the Engineer.

582.4 -- Maintenance

Mulching materials that become displaced or destroyed by wind, erosion, or other causes shall be replaced to maintain fully protected areas while the construction and maintenance of the project are in progress.

582.5 -- Method of Measurement

Areas specified to be mulched shall be measured in square yards along their slopes or other surfaces.

582.6 -- Costs

Costs for Pay Item 582 shall include all materials, labor, tools, equipment, and incidentals necessary to complete the work for this item.