PROJECT COMMITTEE ON COOPERATIVE AGREEMENT PROJECT ANALYSES

F. G. Brant, Chairman.

Scope of Report. This report is not to be considered a complete analysis of the 109 highway erosion control demonstration projects handled cooperatively by the Soil Conservation Service, the Public Roads Administration, the various State highway organizations and the Highway Research Board. Observations of long-range results on these projects are still being made and progress and final reports are still being received.

At the present time, however, turf establishment and soil erosion control on airfields, cantonments, access roads and other military areas is important and this partial report has been prepared with particular thought to such areas. On these military areas speed and simplicity of operation coupled with rapidity of establishment of vegetation are most important, and therefore this report may not include some methods giving utmost economy but slow results.

This report has been compiled from final project reports submitted by the Soil Conservation Service and from progress inspection reports submitted through the Public Roads Administration. It does not cover the New England States or any area west of the Mississippi River except Minnesota, Missouri, Arkansas, Louisiana and eastern Texas.

Grading. Analyses of these project records shows that the flatter the slope, the easier the operations of establishing vegetation become and the more rapid the accomplishment of desired vegetative cover. Slopes of a ratio 4:1 or flatter have been found most effective for all except non-traffic border areas in heavy topography and even in such areas slopes not steeper than 2:1 are justified on the basis of rapidity of vegetative establishment.

On large military areas such as airfields and cantonments there is even more justification for flat slopes than on highways. The amount of excavation or embankment necessary to provide flat slopes on borders of large flat areas is much smaller in comparison to total grading quantities than is the case on the narrower "ribbon" of a highway.

Topsoiling. The question of whether or not to salvage topsoil during construction, or to "import" topsoil if it is not available for salvage, must be left to individual judgment on specific projects. The kind of subsoil, quality of topsoil, availability of topsoil, size of area and its effect on quantity of topsoil required, availability of organic and fertilizing materials--all these factors are so interrelated and yet so variable that separate consideration and separate decisions must be made for individual projects.

Since topsoil usually brings in roots and seeds of many weeds, it may prove to be objectionable in some areas being prepared for frequent-traffic use where a close heavy turf of a single species is needed; but in the majority of occasional-traffic or non-traffic areas where the exact composition of vegetative cover is unimportant, the use of topsoil is strongly recommended unless the areas are so extremely extensive as to make it unquestionably impossible from an economic standpoint.

Recommended Practices. For the sake of ease and clarity of presentation practices which have been observed as most successful on the cooperative projects have been divided into logical areas and items of work. These should serve as a basis for further improvement in roadside practices.

A - Treatment of the Flatter Areas
  1 - Frequent-traffic Areas
  2 - Occasional-traffic and Non-traffic Areas
B - Treatment of the Steeper Slopes
C - Drainage Channels
D - Cover Crops (Nurse Crops)
E - Mulching
F - Fertilizing

A - Treatment of the Flatter Areas (Ranging from level to a 4:1 slope)

1 - Frequent-traffic Areas. (Usually almost level)

a - Upper Mississippi Valley and North Central States
Seeding - Kentucky bluegrass, Canada bluegrass, Redtop, Red fescue, White Dutch Clover. 1/

b - Southeastern States
Topsoil Planting of Bermuda Grass. (Also known as mulch sodding and broadcast sodding) Bermuda grass and topsoil in which it is growing is disced up and mixed together, hauled and applied as a layer of topsoil. This practice has the dual purpose of furnishing both topsoil and sod in one relatively simple operation. 2/For detailed information see pp. 112a and 126a of the 1941 Committee Report for specifications and list of terms.

1/ Although Ryegrass was not reported experience in other work has proved its value.

2/ Seeding of Bermuda and Carpetgrass is a good practice although not reported on these projects.

Sprigging of Bermuda Grass (Row or broadcast sprigging)

Note: In both of the above methods, it is important to loosen soil thoroughly to a depth of not less than 4" before topsoil planting or sprigging operations.

2 - Occasional-traffic and Non-traffic Areas. (Either level or up to 4:1 slope)

a - Upper Mississippi Valley and North Central States
Seeding - Alfalfa, Brome grass, Bluegrass, Orchardgrass, Redtop, Red Clover. In the southern portions of this area annual Lespedeza is also effective. 3/

b - Southeastern States
Topsoil Planting - Bermuda Grass.

Sprigging of Bermuda grass, row or broadcast. (For level areas and fills)

Seeding - Carpetgrass (moist areas), annual Lespedeza, Orchardgrass. 4/

Strip Sodding and Spot Sodding - Recommended only for level, relatively fertile areas not disturbed by movement of water; and only if shortage of sod. Topsoil planting is much cheaper, simpler and quicker.

B - Treatment of the Steeper Slopes

1 - All such Slopes Considered as Non-traffic areas.

a - North Central States
Seeding - Sweet clover, Orchardgrass, Bromegrass, Alfalfa. In southern portions, annual Lespedeza is also effective. 5/

3/ Although not reported Red Fescue, Alsike Clover, Meadow Fescue and Sweet Clover have proved effective.

4/ The seeding of Bermuda grass is successfully practiced, although not reported in these projects.

5/ Fescues and ryegrass have been successfully used but were not specifically reported.

b - Southeastern States

Seeding - Annual Lespedeza, Lespedeza sericea. Lespedeza sericea, though showing slow top growth the first year, is perennial and provides a good mulch on the ground. 6/

Naturalization - (See "The Naturalization of Roadbanks", by C. E. Hursh, Senior Forest Ecologist. Technical Note No. 51, February 1, 1942, Appalachian Forest Experiment Station, Forest Service, Asheville, N. C.)

Vine Planting - Honeysuckle and Kudzu. Both are slow, giving complete coverage. Kudzu should be planted at top of slopes, having generally failed when planted in middle of slopes. Use both of these vines with caution in wooded areas.

C - Drainage Channels

1 - Solid sodding is recommended for drainage channels and flumes where there is considerable water but where velocity is not too great for vegetative control. If solid sodding is not sufficient protection, rubble masonry, bituminous treated stone or other paved channel should be provided. Ditch checks, dams or other intermittent structures are not recommended except in non-traffic areas where the maintenance of a definite true cross-section is unnecessary.

a - Northern Areas - Kentuck bluegrass sod. Timothy sod has been used with some success. 7/

b - Southeastern States - Bermudagrass or Carpetgrass sod.

2 - In Southeastern States topsoil planting of Bermudagrass can be used successfully in wide flat bottom drainage channels on grades up to 3 percent. Sprigging of Bermudagrass is satisfactory in similar channels on grades up to 1 percent, or up to 2 percent under favorable soil conditions.

3 - Berms on top edges of steep fill slopes are recommended if there is any concentration of water over the edge. Water collected by these berms is carried to bottom of fills by means of sod, masonry or treated-timber flumes or spillways.

4 - Intercepting channels at top of cut slopes for the purpose of preventing flow down over slopes are very necessary on most fill slopes and desirable on many cut slopes, depending on steepness of slope and characteristics of soil and local rainfall.

6/ Although not reported in these particular projects, Lespedeza is often used in combination with grasses.

7/ Brome sod, although not reported, is also successfully used in the North Carolina region.

D - Cover Crops (Nurse Crops)

1 - Upper Mississippi Valley.

a - Oats or Rye, with any seeding, 18 to 32 pounds per acre. 8/

2 - Southeastern States.

a - Not recommended with Bermudagrass, except when sodding or sprigging is done in dormant seasons. Italian ryegrass, cereal rye or Cheat; at 60 lbs., 60 lbs., and 50 lbs. per acre, respectively. (Cheat, however, is a noxious weed in some areas).

E - Mulching

1 - Upper Mississippi Valley and North Central States

a - Straw mulch found of value on steep slopes when applied at rate of two tons per acre and worked into ground with disk-harrows before seeding. 9/

Note: It is thought that mulch applied after seeding would be of great value in this region on all areas where "off-season" seeding must be done.

b - Use of Cotton Mesh or Paper Mesh mats not warranted. Chicken wire protection is better, but not worth the expense.

c - Manure should be incorporated into soil, not used as mulch on top. 10/

2 - Southeastern States

a - Mulch necessary on "off-season" seeding or sprigging.

b - Mulch advisable on all seeding or sprigging on any areas to conserve moisture.

8/ The use of winter wheat was not emphasized in the reports, but is satisfactory in spring seeding.

9/ The Rotary hoe and Campbell packer have been used satisfactorily for this purpose.

10/ Strawy manure, however, may be applied as a surface mulch.

F - Fertilizing

1 - Frequent-traffic Areas.

In all sections the use of fertilizers, with emphases on nitrogen, is recommended to provide vigorous initial growth of grasses and rapid complete coverage of the ground.

2 - Occasional-traffic and Non-traffic Areas.

In the Upper Mississippi Valley and North Central States there will be some instances where little or no commercial fertilizer is needed due to large amount of humus in the soil. In general, however, the use of fertilizer is recommended on all areas. Where legumes are used it is not necessary to use as much nitrogen as where grasses are sown alone.

Note: Separate soil tests and fertilizer recommendations must be made for individual projects.