01-19-03 Drainage and Erosion Control, Assignment D1-1-19

1.4.5 DRAINAGE AND EROSION CONTROL (2019)

1.4.5.1 Ditches and Drains

Drainage is a very important function in providing for a stable track roadbed. Drainage can be achieved by using properly designed and constructed open ditches, subdrains (refer to Section 1.2.4.3 Subsurface Drainage) and drilled-in, horizontal drains.

a. Along tracks with relatively flat adjacent grades, additional drainage measures, such as ~~the use of~~ subdrains, should be used in areas of observed or suspected seepage and where surface or subsurface water could impact roadbed stability or performance.

b. Ditches require periodic maintenance to ensure long-term performance and proper function. Excess vegetation, talus, debris, and erosional deposits should be removed to sustain positive ditch drainage. Excessive ditch scour/erosion must be corrected. Ditches not properly maintained could pond and reduce roadbed stability. Routine and timely ditch maintenance can sustain stable roadbed conditions.

c. Subdrain and drilled-in, horizontal drain systems also require periodic maintenance. Pipes, manholes and/or cleanouts should be periodically inspected and accumulations of sediment, plant roots, and other debris removed. Records of locations, date of inspections, types of maintenance used, and general conditions observed should be maintained.

1.4.5.2 Erosion Control

Erosion of right-of-way slopes and ditches is caused by a variety of conditions and should be monitored. The extent of erosion is affected by the vegetation, steepness and height of slopes, engineering properties of the soil, such as grain size and cohesion, and presence of protective cover. Erosion can block, reduce flow, or otherwise adversely impact the normal function of drainage features and deteriorate slopes. There are several methods of erosion control, including re-grading of slopes, flattening of slopes, interceptor/diversion ditches, using variations of seeding and sodding, using protective cover and filter layers, and using geosynthetics.

1.4.5.2.1 Interceptor/Diversion Ditches

Interceptor/diversion ditches should be constructed to prevent surface runoff water from running over and down the sides of slopes. Roadbed shoulders should be shaped to their original design configuration to the extent possible to ensure uniform runoff. Periodic let down drains and ditches may be required. Refer to Section 1.2. Design

1.4.5.2.2 Seeding and Sodding

a. Grasses or ground covers can be used to control erosion. Steps in seeding and mulching eroded slopes consist of filling gullies, placing topsoil where required, applying fertilizer, seeding, mulching, and, if required, reseeding until vegetative cover is established. Local state highway standards and specifications can be very helpful sources of information concerning recommended seeding, sodding and planting seasons. Some railroads have their own standards/requirements for seeding, fertilizer, seed mixtures and mulching. Suitable seed mixtures and fertilizers for particular locations can also be recommended

by agricultural bureaus and seeding companies. Refer to Section 1.3.8 Seeding and Mulching.

b. Standard methods include hydro-seeding, hand seeding and drill seeding.

c. Where active erosion of young growth may occur, erosion control matting can be used with seeding. Seed, matting and fertilizer should be applied according to the erosion control matting manufacturer's specified procedures.

d. Sod can be used on areas where immediate vegetation coverage is required and for aesthetic reasons. Where necessary to prevent slippage on slopes, sod should be pegged in place. Use of light wire netting over the sod can improve stability of the sod layer.

e. Typical railroad maintenance along right-of-way includes spraying of weed control products. This may adversely affect seeding and ground covers. Refer to Chapter 1, Part 9 Vegetation Control.

1.4.5.2.3 Protective Covers

a. Earth slopes can also be protected against erosion with a layer of coarser stone material. In such cases it is essential to distribute surface runoff water and avoid concentrated flows of water from the top to the bottom of the slope. Filling gullies with coarse stone material will not in itself prevent further erosion.

b. Paved surfaces such as asphaltic concrete, shotcrete, or Portland cement concrete can also be used to for a protective cover on slopes.

c. A graded filter layer can be used as a maintenance method when water seepage from pervious layers in the slope causes erosion. The filter layer is designed to keep the underlying soil in place while at the same time carrying flow from both seepage and rainfall without eroding itself. The thickness of the layer depends on the intensity of rainfall and on angle of repose of the filter material. A filter layer must be properly designed and installed. Properly installed filter layers can prevent erosion under conditions that would cause seeding or sodding to be an unsuccessful method of slope protection.

1.4.5.2.4 Filter Layers

a. Properly designed and installed filter layers can prevent erosion under conditions that would cause seeding or sodding to be an unsuccessful method of slope protection. A graded filter layer may consist of a rock layer with varying gradation and thickness depending on the site soil conditions. The filter layer is designed to keep the underlying soil in place while at the same time carrying flow from both seepage and rainfall without eroding itself.

1.4.5.2.5 Geosynthetics (see Chapter 1, Part 10)

a. A geosynthetic layer, filter fabric or prefabricated erosion control matting can be installed to prevent erosion on earth slopes. Geosynthetics must be designed to hold the slope material in place ~~They are designed to hold the slope soil material in place,~~ , but porous enough to allow passage of seepage water. The geotextile must~~should~~ be designed and installed in accordance with the detailed instructions from the manufacturer.