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EROSION CONTROL on EXTREMELY SANDY SOILS in NEW JERSEY

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●THIS report is concerned only with the sandy coastal plain area which comprises the southern half of New Jersey.

The methods used in stabilizing the surface of sand fills in this area depend on existing conditions and available materials. Topsoil is used when it can be stripped from the graded width of the new roadway or when it can be brought in economically from outside sources. Peat and muck deposits which must be excavated as undesirable subgrade material are also used. They are spread 2 or 3 inches thick and worked into the upper 4 to 6 inches of soil. In some instances, peat has been brought in from outside sources. To date, areas thus treated have produced good results. The turf established is not always of the best quality but it seems to do a good job of controlling erosion.

At this point, it should be mentioned that tests have shown that in soils containing some clay, silt, and colloids a less costly refertilization program obviates the need for expensive organic supplements. Therefore, some question arises to the practicality of using mucks and peats as supplements in sandy soils, and the need for further experimentation is indicated.

The use of fertilizer at the rate of about 1500 lb. of 5-10-5 per acre, high-magnesium limestone in the amount needed to obtain a pH of 5.8, and mulch at the rate of about 2 tons of native-grass hay per acre are standard procedure for the

treatment of all slopes $2\frac{1}{2}$:1 or steeper and for all out-of-season seeding.

Figure 1. Sand dunes in South Jersey, showing native dune grasses and goldenrod (top left).

New Jersey is fortunate in that it has little bank or stream erosion from swiftly flowing rivers along its highways. It does have occasional tidal-water problems along several of its highways. These are adequately cared for by bulkheading or by stone or cement-bag riprap.

Wind erosion is of small consequence along our highways; however, it is a problem along local streets in the immediate vicinity of the coastal beaches. In such areas wooden snow fences are often erected during the winter months to

Figure 2. Riprap slope protection is used where salt water and tidal currents prevent growth of vegetation.

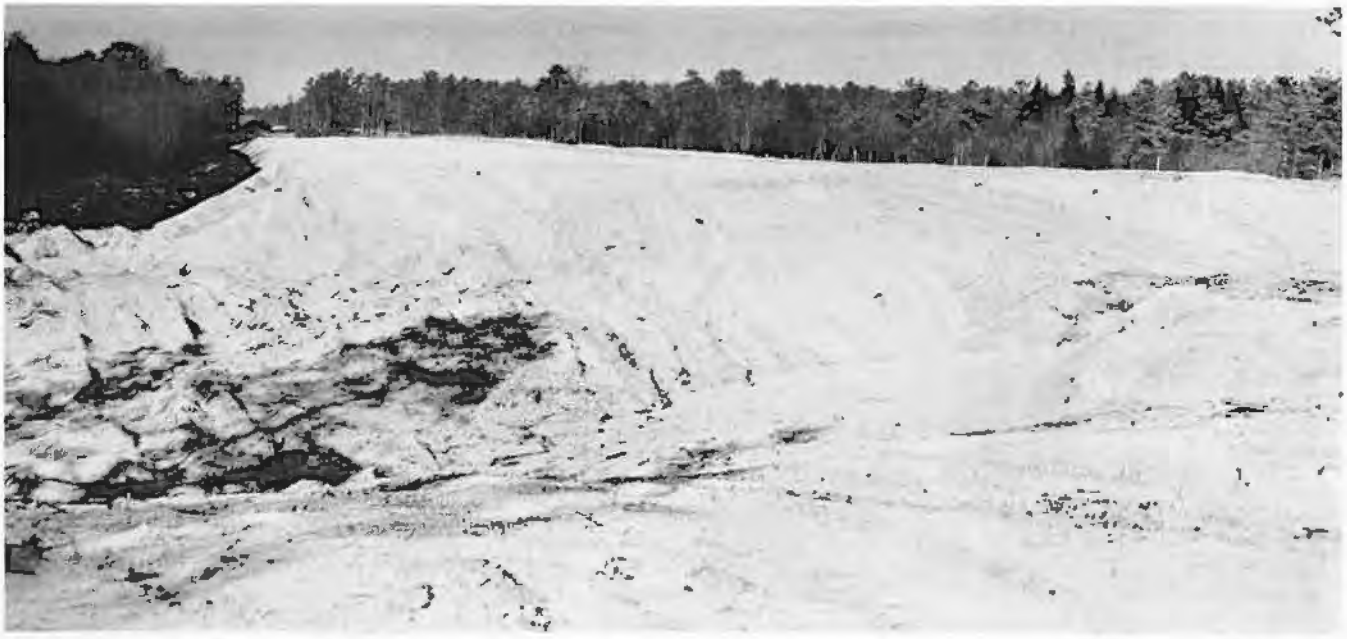

Figure 3. Early stage of construction showing the type of sand fill used in all areas shown in Figures 4, 5, 6, and 7. Note storage piles of native peat excavated as unsuitable fill material, at extreme left.

Figure 4. Peat from storage piles (see Figure 3) was disked into the surface of the sand fill which was then limed, fertilized, seeded, and mulched.

inhibit drifting of dune sands. Also, much drifting is prevented by an abundance of native shrubs of which northern bayberry and poison ivy predominate. Other very

important existing vegetation consists of beach grass, beach goldenrod, silverrod, and Hudsonia.

Figure 5. This slope was treated similarly to that described for Figure 4. Note the resulting stand of turf.

The following data are concerned with highway embankments at specific locations:

Location. Route 35 approaches to the Manasquan River Bridge at Brielle, N. J.

Height of fill. 35 feet (near high point).

Slope ratio. 2:1.

Exposure. Northeast and southwest. The river is salt tidewater and about $\frac{1}{2}$ mile wide at this point.

Drainage. Runoff from roadway confined to paved area and collected at inlets. However, water from 10-foot sidewalk area runs over slope.

Composition of embankment. Sand and gravel, 95 percent. Silt, clay, colloids, 5 percent.

Treatment of surface exposed to tide action. Wooden bulkhead at points of greatest stream action. Cement-bag riprap at other places.

Treatment of surface. 4 inches of topsoil, lime, fertilizer, grass seed, mulch, and shrubs.

Relatively little trouble from erosion except at bridge abutments where a concentration of water from the sidewalk area ran over the slope immediately next to the wall, causing a gully to form. This can be corrected easily by diverting the water to the gutter.

The early establishment of turf on slopes is important. Slopes should be as flat as practicable and runoff should not be allowed to concentrate where it can flow down the slope. Where the turf is desirable, topsoil should be used if available, since its use is the surest way to establish turf with the least amount of future maintenance. The use of shrubs and trees is a valuable aid in stabilizing a slope, but only species of proved ability to withstand conditions of poor soil, low fertility, drought, and exposure should be used. In the case described above, Northern bayberry, Aronia, sumac and black locust did very well. Where woody plants are used, it is very important that good maintenance practices be followed for the first two years to assist them in becoming well established.

Location. Route 4 Parkway - Toms River - Section 21.

Height of fill. 30 feet ± .

Slope ratio. 2:1.

Exposure. East and west.

Drainage. One-half the runoff from the pavement drains towards the median strip; the balance drains across the shoulder and sidewalk area and down the slope.

Composition of embankment. Sand and gravel, 97 percent. Silt, clay, colloids, 3 percent.

Treatment of surface. The wet excavation of this section of the Parkway was salvaged and stored for future use. This consisted of muck and silt from the river bottom and muck deposits from an old cranberry bog. Upon the completion of the grading, this stored material was spread in a 2 to 3-inch-thick layer over the areas called for on the plans to be topsoiled. The material was then thoroughly disked into the underlying soil and any unsuitable roots or stumps removed.

The fill material used in this contract was local sand and gravelly sand obtained from nearby borrow pits. The existing topsoil was deemed unsuitable for salvage or reuse.

The above treatment was highly satisfactory in the areas where used. After treating with ground limestone to adjust the pH (about 3,000 lb. per acre) and fertilizing at the rate of 1,000 lb. per acre, the areas were seeded with New Jersey No. 4 at the rate of 175 lb. per acre with clover and rye grain added.

In normal procedures, all slopes $2\frac{1}{2}$:1 or over are mulched, but on this project all the seeded areas were mulched with hay. The mulch procedure produced an excellent cover both as grassseed protection and as a slope protection against erosion. One small slope was left unseeded and unmulched because of future construction plans. This slope became badly eroded during the winter rains.

The Toms River Parkway project is a good example of utilization of wet excavation that otherwise would have been wasted. An inspection four years after completion revealed an adequate stand of turf grasses.

Location. Route 47. Wildwood, N. J. East-west roadway across the salt marsh between Wildwood and the mainland.

Height of fill. 5 to 6 feet.

Slope ratio. 12:1.

Figure 6. Contrast between finished surfaces which have been seeded and mulched as compared with adjacent areas left exposed. Note how eroded material has clogged drainage, necessitating additional grading.

Drainage. One-half the runoff from the pavement drains across the shoulder and sidewalk area and down the slope.

Composition of embankment. Sand and gravel, 97 percent. Clay, silt, colloids, 3 percent.

Treatment of surface. Topsoil was placed 4 inches thick in a 10-foot wide strip next to the shoulder. This was fertilized, limed, seeded, and mulched. The remaining slope area 50 to 60 feet wide was left untreated. There has been very little erosion on the untreated portion even though the runoff from half the roadway flows across its surface. There is no tidal or wave action along this fill except during extremely high tides which might occur during a storm. To date, no damage has resulted from this condition.

There has been some blowing of sand as evidenced by a layer about $\frac{1}{4}$ inch thick deposited evenly over the topsoiled areas. Since this process will eventually destroy the grass areas and create shoulder maintenance problems, it is felt that native vegetation consisting of bayberry, beach goldenrod, Baccharis, and beach grass should be planted further to stabilize the sand.

The above illustrations represent three general types of slope treatments involving extremely sandy conditions.

At Brielle, topsoil was readily available. Its use along with fertilizer, seed, and hay mulch was most successful.

At Toms River, the use of a soil supplement in the form of peat and muck also resulted in success. In this case, however, the need for additional fertilizer is now evident in some spots.

At Wildwood, the sand slopes were flattened to a ratio of 12:1 and left untreated. Erosion from water runoff has been negligible; however, there is a small amount of wind erosion which indicates the need for vegetation on the slopes.

SEEDING and EMULSIFIED-ASPHALT MULCHING on ROAD in NORTH CAROLINA

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● THIS section of US 421 runs from US 17, west of Wilmington, N. C., northerly approximately 15 miles. It was completed in the latter part of May, 1953. With the exception of 2 miles on the north end, it runs through pure white sand ridges, with the height of some of the cuts exceeding 20 feet.

It was realized during construction of this road that erosion of this sand, both by wind and water, would have to be controlled quickly if any shape was to be maintained on the shoulders, fill and cut slopes, and ditch lines. Not only would a heavy rain wash the sand away, but both natural wind and wind from traffic would move it around.

At first it was planned to seed all areas and then mulch cut slopes over 4 feet in height with straw, which is the standard procedure in North Carolina. After further study it was apparent that to use straw would be extremely dangerous from a fire-hazard standpoint as this road runs through an undeveloped wooded area. Also, the amount of straw necessary to do this job was not available. In seeking other means of controlling erosion on this job, a report from a project in South Carolina was found which told of using emulsified asphalt for mulch. It recommended using this material as mulch only in cool weather, over topsoil which had