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Laboratory Tests on Gravelly Material for Use in the Pervious Zones of Newton Dam, Newton Project, Utah

W.G. Holtz

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Bureau of Reclamation
Denver Laboratories
Earth Materials Testing
Denver, Colorado
November 16, 1943

Subject: Laboratory tests on gravelly material for use in the pervious zones of Newton Dam, Newton Project, Utah.

INTRODUCTION

The material tested consisted of one sample, in two sacks, which was obtained from a deposit located adjacent to the project rock borrow pit. The sample was accompanied by a letter from the resident engineer to the chief engineer, dated October 15, 1943. It was desired to test the material to determine its suitability for use in the pervious gravel zones of the Newton Dam.

L laboratory Tests

A compaction test was performed on the soil (2") material and mechanical analysis, specific gravity, and percolation-consolidation tests were made on the entire sample including the rocks. The percolation-consolidation test was made in a large (19") diameter, percolation cylinder and the material was well compacted into the cylinder. A consolidating load equivalent to a 20-foot fill was applied. Because it was believed that some of the fine sand might be transported through the gravel and rock by the percolating water, a 1/4-mesh screen and a 2-inch layer of clean fine gravel (3/16" - 3/8") was placed over the gravelly material being tested. After the percolation-consolidation test was completed, the screen and fine gravel was removed and the fine gravel was screened on a No. 14 screen. This minus No. 14 material which had been transported out of the sample was then weighed and computed as the percent of the total percolation sample.

A summary of the test results is given below:

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>54-48</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent clay</td>
<td>2</td>
</tr>
<tr>
<td>Percent silt</td>
<td>2</td>
</tr>
<tr>
<td>Percent sand</td>
<td>19</td>
</tr>
<tr>
<td>Percent gravel and rock</td>
<td>77</td>
</tr>
<tr>
<td>Percent + 3&quot;</td>
<td>12</td>
</tr>
<tr>
<td>Soil classification</td>
<td>Sandy gravel</td>
</tr>
</tbody>
</table>
Soil (\(\text{-}\frac{1}{2}\)"):

- Maximum dry density: 94.0 lbs./cu.ft.
- Optimum moisture: 23.5 %
- Plasticity at opt. moist.: Sandy

Soil + Rock:

- Percolation rate: 224 ft./yr.
- Consolidation: 4.0 %
- Dry density as placed: 112.9 lbs./cu.ft.
- Consolidated dry density: 117.5 lbs./cu.ft.
- Fine material carried out of percolation sample during test: 0.4 % (8 days)

- Volume of rock (as placed): 60.0 %
- Volume of soil (at 94.0#/c.f.): 30.5 %
- Unfilled rock voids (as placed): 9.5 %

Specific gravity soil (\(\text{-}\frac{1}{2}\)"): 2.51
Specific gravity rock (\(\text{-}\frac{1}{2}\)"): 2.25

Figure No. 1, which is attached, is a gradation curve of the material tested.

CONCLUSIONS

The test results and observations made during the testing conclude that the material, as represented by the sample tested, would be satisfactory for a pervious zone in the dam. The soil density of 94.0 lbs./cu.ft. is low, but some binding action was apparent during the compaction test and during the placing of the soil and rock percolation sample. Although there is insufficient soil mortar to completely fill the rock voids (9.5% rock voids not filled at placement), it is believed that no harmful amount of fine material will be carried out of the pervious section by the percolating waters. The very small amount of material which washed out during the test probably was derived entirely from the uppermost layer lying on the top surface of the sample.
Gravelly material for use in pervious zone

Newton Project
NEWTON DAM

Figure No. 1