

METODE PELAKSANAAN TRIAL MULTIPLE STAGE GROUTING DI BENDUNGAN KARANGNONGKO

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ABSTRAK

Bendungan Karangnongko merupakan upaya strategis pemerintah yang berfungsi untuk penyediaan air baku, irigasi, pengendalian banjir, dan pembangkit listrik di wilayah Kab. Blora, Kab. Bojonegoro, dan sekitarnya. Stabilitas pondasi pada bangunan pelimpah terutama mercu menjadi hal penting, dikarenakan kondisi geologi setempat didominasi tanah napal yang berpotensi mengakibatkan rembesan. Oleh sebab itu, dilakukan perbaikan tanah pondasi di area mercu dengan metode konsolidasi grouting. Pada Proyek Bendungan Karangnongko, dilakukan trial grouting dengan metode *multiple stage* teknik *downstage* untuk menentukan lokasi dan jarak titik bor yang optimal serta mengevaluasi efektivitas metode injeksi terhadap kondisi geologi setempat. Metode pelaksanaan meliputi pengeboran lubang primer dan lubang cek (*pilot hole* dan *check hole*), pengujian tekanan air (*Water Pressure Test*), serta injeksi semen dalam dua tahapan kedalaman, yaitu *stage 1* sedalam 2.00 meter dan *stage 2* sedalam 3.00 meter. Komposisi campuran grout disesuaikan dengan nilai Lugeon yang diperoleh di lapangan, dengan rasio campuran 1:10, 1:5, 1:3, dan 1:1:0.5 untuk plugging. Hasil trial grouting menunjukkan bahwa pada *stage 2* nilai Lugeon < 3, menunjukkan rekahan telah terinjeksi dengan baik. Oleh karena itu, untuk pelaksanaan grouting difokuskan pada *stage 1* dengan kedalaman 2.00 meter menggunakan metode *single stage contact grouting*. Efektivitas dari *trial grouting* terlihat pada nilai Lugeon yang didapat dari hasil water pressure test pada titik sekunder (T1 dan T2), yaitu menunjukkan kekedapan yang sangat baik. Berdasarkan RAB pelaksanaan grouting memerlukan anggaran sebesar Rp36.369.646.848,00, dengan item pekerjaan berupa drilling konsolidasi, water pressure test, drilling pilot hole dan check hole, pelaksanaan grouting, set-up rig, hook-up rig, serta casing grouting.

Kata Kunci: *trial grouting, multiple stage, drilling, water pressure test, nilai Lugeon*

TRIAL IMPLEMENTATION METHOD OF MULTIPLE STAGE GROUTING AT KARANGNONGKO DAM

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ABSTRACT

The Karangnongko Dam is a strategic government initiative that serves to provide raw water, irrigation, flood control, and power generation in the districts of Blora, Bojonegoro, and surrounding areas. The stability of the foundation of the spillway structure, especially the spillway, is crucial, as the local geological conditions are dominated by napal soil, which has the potential to cause seepage. Therefore, foundation soil improvement was carried out in the spillway area using the grouting consolidation method. In the Karangnongko Dam Project, trial grouting was conducted using the multiple-stage downstage technique to determine the optimal location and spacing of boreholes, as well as to evaluate the effectiveness of the injection method on the local geological conditions. The implementation method included drilling primary and check holes (pilot holes and check holes), conducting a water pressure test, and injecting cement in two depth stages: stage 1 at 2.00 meters and stage 2 at 3.00 meters. The grout mixture composition was adjusted based on the Lugeon values obtained in the field, with mixing ratios of 1:10, 1:5, 1:3, and 1:1:0.5 for plugging. The trial grouting results showed that in stage 2, the Lugeon value was < 3 , indicating that the fractures had been injected effectively. Therefore, the grouting implementation focused on stage 1 at a depth of 2.00 meters using the single-stage contact grouting method. The effectiveness of the trial grouting was evident in the Lugeon values obtained from the water pressure test results at the secondary points (T1 and T2), indicating excellent waterproofing. Based on the Bill of Quantities (BoQ), the grouting requires a budget of Rp36,369,646,848.00, with work items including consolidation drilling, water pressure testing, pilot hole and check hole drilling, grouting, rig setup, rig hook-up, and casing grouting.

Keywords: *trial grouting, multiple stages, drilling, water pressure test, Lugeon value*